

An investigation into the process of making do in ad hoc self-builds in rural Wales

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Abstract

This study uses participant observation to investigate the process of making do in ad hoc self-builds in rural Wales. Making do involves the meeting of needs in situations where there is a scarcity of resources. In the context of self-build, these include skills, experience, materials, and finances. A review of the global and national context identifies a need for focus on resilience as a response to a future of resource scarcity. One Planet Development (OPD) is studied as a model for development that addresses the issue of resilience, and that has an established history in Wales. The OPD planning policy, which is unique to Wales, was introduced in 2010, and recognises Low Impact Development (LID) and permaculture principles, whilst also setting requirements for occupants to have considerably lower ecological footprints than is the national average. Direct observation of seven OPD/LID sites identifies them as locations where the processes of making do are common.

A review of the literature on making do established a need for research derived from active engagement in the processes involved. To address this, the researcher participated with others in self-build activities on four case study sites, all involving the need to make do with limited resources. Photography was used as the principal method for recording the processes, and arts-based methodologies were used in their interpretation. The study found that different attitudes to OPD are rooted in conflicting world views, and that the evidence of making do is often the focus for such conflicting viewpoints. By revealing the processes of making do and the reasons for them, this study helps to bridge the gap between these opposing perspectives and inform the ongoing debate on OPD.

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1. Introduction

1.1 Preamble

It is hoped that this study will help deepen understanding of the bottom-up processes that allow communities and individuals to flourish in conditions of limited resources. These processes, which are defined broadly as ‘making do’, often involve ad hoc responses to individual situations in order to meet immediate needs. By close study of this process, through use of photography and written discussion, the intention is to develop an understanding of the creative process of making do as it reveals itself in the built environment.

In a paper titled ‘The End of Sustainability’, Benson and Craig argue that the current age, the Anthropocene is subject to the ‘increasing likelihood of rapid, nonlinear, social and ecological regime changes’, and that policy discussions framed by the goal of sustainability have ‘failed to meaningfully change the human behaviour that created the Anthropocene’. In this context, they propose that ‘resilience holds promise as a new way of addressing the challenges ahead’ (Benson & Craig, 2014). Whilst the concept of sustainability remains valuable as an ethical basis for making decisions, it will be resilience that will allow individuals and communities to adjust to the conditions and resource shortages that will increasingly characterise the Anthropocene era.

Despite a succession of top-down measures in the UK aiming at sustainable development, many in society are finding that their basic needs, including that for a suitable home, are not being adequately met. However, there exists in Wales a planning policy that has responded to grass-roots pressure to recognise and allow an approach that already has a long history of addressing the issues of both sustainability and resilience. The requirements of this policy, which is referred to as One Planet Development (OPD), are set out in the planning document, TAN6 (Welsh Assembly Government, 2010), which was published in 2010. As the planning policy states, ‘One Planet Developments take forward Low Impact Development (LID) principles in the Welsh context’ (Ibid.).

Given the converging crises faced globally and in the UK, this study recognises that OPD represents a significant contribution to the search for new models for development and ways of living, suitable for the challenges of the Anthropocene age. As part of the study, I have visited many sites that the residents have identified as LID or OPD, and observed evidence of the process of making do at all of them. In a quest to gain insight into such processes, I have engaged in self-build projects with limited resources. The field research is therefore an investigation into the process of making do in ad hoc self-builds, all of which happened in rural Wales. Although this is not a study about OPD, the research is intended to inform the debate about OPD. In particular, it aims to address some misunderstandings of OPD by critics who often perceive certain aspects of LID to be at odds with the stated goals of low impact living. My observations of sites where one planet principles are being enacted, combined with my own experiences of trying to live by such principles, have provided me with an insight into the reasons for those aspects of LID and OPD that some find challenging. This study is an attempt to share this insight, and by doing so, provide a bridge between different cultures and worldviews, so that the benefits of OPD can find a wider audience.

1.2 Aim and Objectives

The primary aim of this research is to identify and investigate the drivers and processes surrounding 'making do' in the context of ad hoc self-build in rural Wales. My observation of OPDs has led me to identify them as places where making do in the context of self-build occurs, but I have also observed that it is this aspect of OPD that is most misunderstood by its critics. The intention is therefore to develop an understanding of the nature of making do as a process and relate this knowledge to the context of OPD.

The knowledge sought is not of a quantifiable nature, and nor can it easily be defined as qualitative. Rather, the objective is to develop an ontological understanding of the processes involved in making do. At the root of the misunderstandings between proponents of OPD and its critics is a conflict of world views. To some, evidence of making do demonstrates resourcefulness, creativity and an innate strength of the human spirit. To others it challenges their sense of propriety and their vision of what is aesthetically acceptable. Such profound differences in responses to the same phenomena reflect fundamentally different perspectives of the nature of the world and the human's place in it. This study examines how the process of making do influences one's understanding of one's environment, the things and other beings that inhabit it, and the relations between them. In particular, it asks questions about the human tendency to order and classify, the significance one places on such systems of classification, and the impact that making do has on such processes.

The ultimate objective of this study is to distil the aims set out above into transferable knowledge that may be of use to those that need to make do in the context of self-building, those who wish to be of assistance to others making do and those that wish to expand theoretical knowledge about issues of self-determination in situations of resource constraint.

1.3 Scope and Focus

The focus of the field research is on the processes of making do in the built environment, in particular where it comes about as part of a self-build project. Here, the term 'making do' is used in the same way as its commonly understood meaning, that is the process by which needs are met when there is a shortage or lack of certain resources. These can include finances, skills, time or materials, or a combination of these. Through observation of instances of making do by myself or by others, a wider discussion is opened up about how and why making do comes about, and about the characteristics of different types of making do.

The geographical scope for the field research has been limited to rural Wales. However, the different aspects of the findings are applicable to a range of settings where making do is a necessity. Rural Wales has been chosen as the setting for the field research for a number of reasons. The limited financial returns of many land-based activities have ensured that making do is a fundamental aspect of rural life and so makes for an environment rich in source material for such a study. Low impact development is also strong in rural Wales, and this provides opportunities for studying making do in the context of self-build. Finally, the principles of low impact development have been recognised in Welsh planning regulations through the introduction of One Planet Development policies. This means that rural Wales has the potential to provide precedents for others to follow.

The study focuses on ad hoc self-build. Here, 'self-build' is taken to mean construction projects whereby the people destined to be the end users of the buildings are actively engaged in the build process themselves. Whilst very rare in the UK as a whole, self-build of this type is the most common form of delivery of low impact homes. 'Ad hoc' means in order to meet a specific need, but the phrase also suggests a degree of provisionality in the process of delivery. Self-build processes are often ad hoc because of the self-builder's need to make do with limited skills or resources. It is accepted that ad hoc self-build has no clear boundaries with general making do, for reasons that are discussed in the study. Therefore, the scope of subject matter relating to making do is kept broad, so that making do in the context of self-build can be seen as part of a continuum.

Whilst limits to financial resources are not a prerequisite for making do, the focus of this study is on situations of limited financial means. The concept of living within one's means links personal economics to environmental principles. An awareness of one's responsibility to use only one's fair share of global resources is a founding principle of One Planet living, and such an ethical framework contributes to the processes of making do as evidenced in the case studies.

1.4 Methods

The fieldwork has been conceived as an art of enquiry, inspired by the creative processes that are inherent to making do. Tim Ingold, who advocates such an approach in anthropological research, recognises the importance of the researcher's active participation in the processes that are the subject of study (Ingold, 2013: 6). This methodology is based in an understanding that attempts to adopt objective and analytical frameworks in the study of creative processes cannot provide the type of insight that a participatory approach can generate.

The literature review and fieldwork have been carried out in parallel, with each informing the other. This approach is similar to the complex iterative processes of grounded theory first developed in the 1960s (Glaser & Strauss, 1967). The literature review has focused on three principal subject areas: the global and local conditions which affect people's need and ability to make do; the history and current situation regarding OPD and LID; and the literature about making do and related topics.

The fieldwork is composed of two distinct elements. The first, involving case studies of existing OPDs and LIDs, allows insight into the role of making do on these sites, that is not revealed in the literature. The use of case studies, using a methodology of direct observation, provide an overview of each site based on single visits. The second, more substantial element of the fieldwork involves the researcher's active participation in self-build and other activities that involve processes of making do. This element of the fieldwork follows the methodology of participant observation with the aim of gaining insight into the reasons behind the phenomena witnessed in the direct observation case studies of LIDs and OPDs. In particular the aims of participant observation in this context are mostly closely aligned with Tim Ingold's definition of 'a way of knowing from the inside' (Ingold, 2013: 5).

Photographs are used as the principal tool of analysis. In that they are initially used to record a process that I have observed in others, the methodology is a form of visual anthropology (Pink, 2006). However, they are then presented in ways that are informed by methodologies of fine artists who work with photography. Aside from being used simply to impart information, they are also used in groups to identify typologies, to show time sequences and also in to pairings make connections between the participant observation and the LID/OPD case studies and literature. Key precedents for the ways photographs are used in this study include Bernd and Hiller Becher, Richard Wentworth, Duane Michels and Hans-Peter Feldmann.

Those who are able to successfully make do embrace technical limitations and turn contingent conditions into opportunities for inspiration and creativity in a similar way to fine artists and photographers. In order to obtain genuine and valuable insight into the processes of making do, the author has recognised the need to design a research methodology that emulates such creative processes. The juxtaposition of photographs from different sources can set up new possible readings in a similar way that Marcel Duchamp's use of the readymade creates new contexts for familiar objects, or the unselfconscious appropriation of objects for ad hoc uses, as is common with the process of making do. Although it is accepted that there is no inherent reason why a study should emulate the processes of the subject, the use of creative processes that generate the opportunity of unexpected discoveries has allowed insights that would not have been possible with more pre-determined methodologies.

1.5 Structure

Aside from this, the Introduction, the thesis is composed of seven chapters, as follows:

2. *Research Design*: This chapter sets out the methods for the fieldwork based on practice-related research and participant observation. It sets out the principle of using arts-based methodologies for interpreting the knowledge and experiences of the fieldwork and discusses these and ecological worldviews as alternatives to empirical models of research. It discusses the precedents for such an approach and defines and justifies the methods used.

3. *Context*: This section opens with a chapter on global context, setting out the extent to which resource constraints already impact modern society and speculates about possible future scenarios in which societies or segments of society will need to make do with less. The chapter then looks at the situation in the UK, and more specifically rural Wales. It asks what needs are currently not being addressed so as to allow exploration of how these might be met.

4. *The One Planet Development planning policy for Wales*: One Planet Development (OPD) is studied as an alternative model of development and way of living, which uses iterative design processes based on permaculture. First, a review of the literature looks at the history of Low Impact Development (LID), and the processes that led to the adoption of a planning policy unique to Wales that takes forward the principles of LID in the form of One Planet Developments. Then, following a methodology of direct observation, seven case study sites are examined. There follows a short reflection on connections between these different sites, and a review of the typologies observed and their characteristics. The direct observation case studies reveal that making do plays a significant role in OPD and LID. This is seen as significant, and worthy of further investigation, especially as it is not discussed in the literature on OPD.

5. *The processes of Making do*: This chapter first reviews the key literature on making do. It then follows with a discussion of the subject that is structured around themes. A section about ad hoc homes allows a study of self-build in the context of a wider discussion about the wider range of needs that a home must meet. The photographic record is also reviewed for works that relate to the topic. The literature identifies making do as a creative process and a number of sources identify links with creative processes and methods used by artists.

6. *Participant Observation Case Studies*: Four case study sites are discussed, using the methodology of participant observation. I have engaged on making do in the context of ad hoc self-build at all these sites, and ongoing involvement with them has provided opportunities for detailed study of the processes involved. Observations are presented as vignettes, which are complemented by time studies that aim to draw out process without resorting to imposed narrative.

7. *Theme-based analysis*: This section makes comparisons and establishes common characteristics between the case studies and the literature. An inductive analysis process has been used to draw out a number of themes, and the findings of the research are structured on the basis of these themes. Photographic pairings have been used as a device to draw out insight.

8. *Conclusion*: The conclusion summarises the research carried out and the findings. Finally it identifies areas which would benefit from for further study.

1.6 Nature of the enquiry

This study has been set up as an experiment, not ‘in the natural scientific sense of testing a preconceived hypothesis’, but in the commonly used sense of ‘prising an opening and following where it leads’ (Ingold, 2013: 7). This methodology is common in the world of the visual arts, where the direction of travel is often more clearly defined than the destination. Artists often set up the starting conditions of their creative processes with the intention of encouraging chance discoveries, to which they need to be alert, so that they can capitalise on them. The artist works with the medium with which they are working, but the material responds to the artist. It is the ‘correspondence’ between artist and material that produces the final artwork (Ingold, 2013: 7). Similarly, in this study, the knowledge gained from the process is the result of correspondence between researcher and the material of study. This understanding of the nature of making do is gained through first-hand experience of self-build, following the methodology of participant observation.

There are clear precedents for structures for research that allow the process to inform the outcome. These include the methodology of grounded theory and the techniques developed by Ingold in his 4As post-graduate courses which ‘explore the connections between anthropology, archaeology, art and architecture’ (Ingold, 2013: 11). There are also precedents for using photography as a research tool in ethnography and anthropology (Pink, 2006). Participant observation is also an established methodology in these fields. However, the innovative way that the different methods have been combined in this study is original, and should provide a valuable precedent for others who recognise the importance of open ended research processes. modelled on “‘whole systems’ seeing and thinking to promote wider and deeper learning’ (Haley, 2011).

Aside from developing an original methodology that is widely applicable, this study also contributes significantly to the body of knowledge relating to ‘making do’. The literature on making do is composed of a limited number of key sources. Though insightful and well grounded in theory, none these sources relate observation of making do directly to first hand experiences. This study is able to provide the type of understanding that is based on researcher participation that is missing from other sources.

The link between OPD and making do that this study makes is unprecedented and it is anticipated that this exploration of processes that are common in the context of OPD will significantly contribute to an understanding of this model of development. The literature on OPD is largely advocative in nature, and often deals with it as a theoretical model rather than an actual lived experience. This study of the processes of making do in the context of self-builds will contribute to a richer insight into the relationship between the theory of low impact living and the practical reality of meeting needs with limited means.

2. Research Design

2.1 Methodology

Practice-related research

The methods used in the fieldwork, whereby the researcher is actively involved in self-build activities make this study a form of practice-related research. There has been much written over the last twenty years about this form of research. The labels used to describe it have been many and varied, with successive authors adding their own interpretations and terminology to the debate. In 1993, Christopher Frayling was one of the first to attempt to apply a coherent structure to the then emerging field of practitioner research in art and design. In his paper 'Research in Art and Design', he set out the argument that there needs to be clear distinction between three types of research: research *into* art and design; research *for* art and design; and research *through* art and design. He argued that research *into* art and design could be carried out using processes that were already established in the academic tradition, but that research *for* art and design could not be seen as having academic validity, since the research was secondary to the final artwork or artefact. However, he recognised the importance of research *through* art and design, whereby the activity of creating an artefact is capable of creating knowledge that is of interest and use to others. He identified three types of the latter category: materials research, development work and action research. The latter he described thus:

'where a research diary tells, in a step-by-step way, of a practical experiment in the studios, and the resulting report aims to contextualise it. Both the diary and the report are there to communicate the results, which is what separates research from the gathering of reference materials'

(Frayling, 1993)

In his 1995 article titled *The Nature of Research*, Bruce Archer expanded the discussion of research through practitioner action to all of the humanities. He argued that 'there are circumstances where the best or only way to shed light on a proposition, a principle, a material, a process or a function is to attempt to construct something, or to enact something, calculated to explore, embody or test it' (Archer, 1995). He pointed out that this approach is what defines action research, an established method in many of the sciences including agriculture, engineering and medicine. He set out his criteria for distinguishing research through practitioner action from the type of research carried out regularly to support practice as follows:

One has to ask, was the practitioner activity an enquiry whose goal was knowledge? Was it systematically conducted? Were the data explicit? Was the record of the conduct of the activity 'transparent', in the sense that a later investigator could uncover the same information, replicate the procedures adopted, rehearse the argument conducted, and come to the same conclusions? Were the data and the outcome validated in appropriate ways?

(Archer, 1995)

More recently, the term practice-led research has been commonly used. In 2007, Christopher Rust, Judith Mottram and Jeremy Till gave practice-led research the following broad definition: 'Research in which the professional and/or creative practices of art, design or architecture play an instrumental part in an inquiry' (Rust, Mottram & Till, 2007). They go on to suggest that the knowledge gained during production of an artefact is more significant than the artefact itself, stating that 'practice-led research should concentrate on how issues, concerns and interests can

be examined and brought out by production of an artefact' (Ibid). This emphasis on process over product is shared by Daniel Fallman in his description of design-oriented research:

In design-oriented research, the knowledge that comes from studying the designed artefact in use or from the process of bringing the product into being should be seen as the main contribution – the 'result' – while the artefact that has been developed becomes more of a means than an end.

(Fallman, 2007)

The methods and approach used in the interventions at the participant observation case study sites follow many of the various descriptions set out above. If we are to consider them in relation to Fallman's definition of design-oriented research, then the object of study is a particular aspect of the process of bringing the product into being, rather than the designed artefact in use. To be specific, the focus of study is making do, and the processes of ad hoc self-build are the opportunities to experience instances of making do that come about as genuine responses to pressures and constraints experienced during the process.

Much of the discussion of practice and design-related research assumes that the subject of research is in the field that the researcher has experience as a practitioner. For example, architects are expected to base their research on architectural design, of a type that they are likely to experience in their professional working life. Although some of the self-build I engaged in was initially approached through use of the typical medium of an architect, the measured drawing, many of the interventions were completed entirely without a drawing, and the focus of research was precisely in the areas where the project diverged from the process that the researcher, as an architect, is most familiar with. Therefore, whereas much discussion of research through action assumes that the action is expert, in the case of this study, it is partly my lack of expertise in self-build that has generated the research material.

Participant observation

According to Archer, research through practitioner action can never be entirely objective, as he argues that 'because action research is pursued through action in and on the real world, in all its complexity, its findings only reliably apply to the place, time, persons and circumstances in which that action took place' (Archer, 1995). However, Tim Ingold argues that it is the researcher's very immersion in the world that he is studying that provides the opportunity for profound insight. In his book, 'Making', he describes his understanding of the meaning of participant observation:

Only because we are already *of* the world, only because we are fellow travellers along with the beings and things that command our attention, can we observe them. There is no contradiction, then, between participation and observation; rather, the one depends on the other.

(Ingold, 2013: 5)

In the same way, the researcher's participation in self-build and other interventions should be considered an essential part of the research on making do in this study. Although observation of instances of making do by others can and does provide useful information, there is a limit to the depth of understanding of the process of making do that it can provide. If the goal of research through action for this study were to be to provide quantifiable data then a methodology preserving researcher objectivity would be necessary. However, the goal was rather to provide a more fundamental, ontological understanding of the process, and the only authentic way to achieve this was to gain first-hand experience of such activities.

Participant observation is an established research method in a number of fields, including anthropology, ethnography and sociology. James Spradley, the author a book on the subject of participant observation, illustrates an argument about the importance of this research technique using the example of a researcher who observed glider pilots:

take off, manoeuvre, and land. But only by ‘getting inside their heads’ could he find out what flying mean to these glider pilots. If we want to find out what people know, we must get inside their heads.’

(Spradley, 1980: 10)

Similarly, in order to understand what making do means to the ad hoc self-builder, I needed to experience it myself by putting myself into similar situations. By doing so I have gained an understanding of the processes involved through direct experience of them. Tim Ingold makes the following argument that this type of knowledge should not be construed as data:

participant observation is absolutely not a technique of data collection. Quite to the contrary, it is enshrined in an ontological commitment that makes data collection unthinkable... In a nutshell, participant observation is a way of knowing from the inside.

(Ingold, 2013: 5)

A reductionist approach based on collecting and sorting of data would fail to satisfy the objectives of this study for the gaining of ontological insight into the subject. This study therefore adopt’s the model of participant observation that Ingold proposes, which involves the researcher’s immersion on the process. However, this still leaves open the question of how the researcher should go on to evaluate and interpret their experience so that it can become communicable and useful to others. In answer to this, Ingold advocates the use of arts-based methodologies, or what he calls the ‘art of inquiry’ (Ingold, 2013: 6).

Arts-based methodologies and ecological worldviews

In the world of the visual arts, the direction of travel is often more clearly defined than the destination. As Joanne Lee has said of artists, ‘there is often a tension between what they think they are trying to do, and what in fact emerges from the attempt’ (Lee, 2010). Such an approach to the search for understanding about the world is fundamentally different to the positivisit worldview, which insists instead on on pre-mapped paths of enquiry. Tim Ingold advocates such an approach, which he calls ‘the art of enquiry’, in the field of anthropology. He states:

In the art of inquiry, the conduct of thought goes along with, and continually answers to, the fluxes and flows of the materials with which we work. These materials think in us, as we think through them. Here, every work is an experiment: not in the natural scientific sense of testing a preconceived hypothesis, or of engineering a confrontation between ideas ‘in the head’ and facts ‘on the ground’, but in the sense of prising an opening and following where it leads.

(Ingold, 2013: 7)

David Haley makes a similar case in an article that draws parallels between the artist’s method of enquiry and an ecological worldview. He calls for a new approach to learning, which he calls Question Based Learning (QBL). QBL is his response to the closed system thinking of Problem Based Learning (PBL), and he defines it as follows:

When it’s practiced intuitively by many artists and creative people, this approach opens up situations for exploration in non-linear ways. Problems may be found and resolved, and new questions may be formed in the process. QBL is based on ‘whole systems’ seeing and thinking to

promote wider and deeper learning, rather than solutions. This is potentially an ecological approach to learning; an 'eco-pedagogy,' or 'Eco Literacy' that is generated by the context, relationships and complex systems, not analytical, reductionist methods of understanding the world.

(Haley, 2011)

It is important to note that an arts-based approach to research is not necessarily less structured than an analytical approach. The difference between the two instead lies on the understanding of the role of that structure. For the natural scientist, the structure of a piece of research needs to be justified in order of the validity of the results to be accepted. Where quantifiable data is involved, the methodology is expected to demonstrate that the results have been arrived at through an objective process. For the artist, however, structure plays a very different role. It is seen as a tool for the generation of an art work but, since Duchamp, at least, there is always an awareness that it is to some degree arbitrary. To the natural scientist, any sense of arbitrariness is considered totally unacceptable, to be eliminated, or concealed, at all costs. To the artist, it is the arbitrary that allows the unforeseen discovery. So much of Duchamp's work was an attempt to demonstrate the limitations of the ambitions of enlightenment principles to define and measure the world. In *Three Standard Stoppages*, Duchamp used a rigorous overall structure to frame instances of what he called 'canned chance'. Three pieces of thread were dropped onto three sheets of glass, and glued in place in whichever position they lay. This shape was then defined by a piece of canvas cut to follow the line of the thread. As he said in interview with Cabanne at the end of his life, 'Pure chance interested me as a way of going against logical reality' (Cabanne, 1971: 46).

Many of the latest developments in science and mathematics are revealing that the world is far closer to Dada than we imagined, and many aspects of it are more effective at going against logical reality than Duchamp ever managed. According to Timothy Morton, 'the more we know about life forms, the more we know about the biosphere, the more uncanny they become' (Morton, 2011). Although empirical methods have provided advanced knowledge about the nature of the individual elements that make up the natural world, they have limited ability to predict the behaviour of ecosystems when even they are interfered with. For example, whilst it is possible for a scientist to gain a detailed understanding of a bee's biology and behaviour by studying it in isolation, the complexity of relations between such an insect and the conditions other organisms in an ecosystem make it difficult to predict how it might be affected by even the smallest of changes in the environment. The difficulty in establishing the causes of bee colony collapse disorder illustrate the limitations of reductionist empirical methods to protect the natural environment and by extension our own interests as a species. In the context of design education, Marc DeKay has argued for an ecological approach based on whole system thinking, stating that 'it has become self-evident that the biosphere and its processes can not be understood fully in terms of the fragmented atomism of contemporary knowledge disciplines' (DeKay, 1996).

Attempts to manipulate the environment for human gain are often made without adequately understanding the risks of unintended consequences. The worldview that imagines that humans can impose form on the world is called hylomorphism. Ingold is critical of this worldview when applied to the study of archaeological artefacts. He argues that hylomorphism misrepresents the creative process, and that instead the reality is that the artwork is generated by the coming together of both craftsman and material. This alternative understanding, which he calls morphogenetic, acknowledges that the material imposes its own terms on the craftsman, which

he then needs to respond to (Ingold, 2013: 22).

The morphogenetic worldview can also be applied to the realm of the research project, and is especially suited to a study that involves practice-related research and participant observation. In such cases, the research material that is generated will respond to the researcher and affect the nature of the research project. This has been the case in this study, as unexpected discoveries have elicited new lines of enquiry and a return to the literature to try to provide a theoretical context for first hand experience.

Whilst there is no reason why a study of a process should necessarily emulate the type of process it is studying, in this case, there are clear parallels between the creative processes of making do and the arts-based methodologies that have been used in this study. The reason for this is that a controlled empirical study does not allow the researcher to take advantage of opportunities and adjust their methods to suit circumstances. Making do is a complex and rich manifestation of the human's relationship with their environment. A fundamental characteristic of making do is the way it constantly transgresses codes and categories, so a reductionist research method would not be flexible enough to encapsulate the essence of such processes.

Although this study recognises making do as a creative process, simply emulating its ad hoc processes in the structure of the study would have interfered with the aim of clearly communicating the knowledge that has been gained. I have, however, gained a greater appreciation of the importance of being open to opportunity through studying the process of making do, and since I have seen acting on such awareness to be beneficial to the study, I have taken advantage of the contingent opportunity when it has presented itself. Instead of incorporating found objects and materials into a build, in this study, specific situations are recognised as significant and incorporated into the research. In a similar way, Jason Pine emulated the opportunism of his subjects in *The Art of Making Do in Naples*, an anthropological study of pop musicians operating in an underworld dominated by the camorra. He also had good reason for the methodology of his study to emulate the subject, since he was needing to operate in the same arena as his subjects and negotiate difficult and potentially dangerous situations (Pine, 2012).

The chapters presenting the fieldwork and the subsequent theme-based analysis are composed of collages of discrete observations. The only reliable way of classifying the case studies is by location, and within each of these I have presented a sequence of vignettes. I have not distinguished my role in each vignette, nor tried to extract the self-builds. The more I tried to distinguish between my role of participant and observer, or between build process and occupation, the more I found that the boundaries between such categories dissolved. There was no narrative to these processes, no beginning and end to the build projects, and in fact no 'projects' that could be defined in any meaningful way beyond the arbitrary structures I attempted to impose on them. The time studies, both drawn and photographed are another way of resisting the urge to artificially impose a narrative structure on the case studies.

The theme-based analysis distills the experiences from the case studies in to ten themes, but there could have been more, there could have been less. What is important is that the process of identifying themes and populating them provides structure and helps communicate the understanding gained. To refer again to the artist's method, the structure itself serves a pragmatic purpose. It is ad hoc because being ad hoc in this context works. Joanna Lee argues that an openness to ad hoc processes in the field of research has a valuable role to play in

addressing some of the disadvantages of a strict pedagogic structures and artificial divisions between disciplines:

Within the culture of practice-led research in fine art (at doctoral level and beyond) artists have become so worried over the propriety of their methods and methodologies that it has a paralyzing effect upon both their thinking and making. I wish artists (and their supervisors!) would instead remember the confidence to use what they find and to *fiddle* with it (with all the impropriety suggested with that word.) I think that there is much to learn from this approach, which might yet have positive effects upon disciplines beyond the creative realm. In this pluralist world with its overwhelming amounts of knowledge, a host of competing philosophies, and huge discontinuities between fields perhaps it is the adhocist approach of the artist rather than tight disciplinary systems that will allow us to navigate uncertainty and use imaginatively what we find.

(Lee, 2010)

I finish this section with an observation that Tim Ingold makes that the exponential increase of data available in the information age is failing to provide the kind of knowledge that our society actually requires. He argues that ‘never in the history of the world has so much information been married to so little wisdom’ (Ingold, 2013; 141). Referencing a comparison Le Corbusier makes in *The City of Tomorrow* between man, who travels in straight lines, and a meandering donkey, Ingold writes that ‘to me, wisdom travels not in straight lines but along the ways of the donkey’ (Ibid.). This study takes inspiration from Ingold’s proposition to seek knowledge by following a meandering line. After all, as Ingold observes: ‘the problem with the straight line is simply this: once it has reached its end, what then?’.

Background and role of researcher

The knowledge sought from the case studies derives from engaging in activities, sometimes alone and sometimes with others. If this were to be an ethnographic study of the people that I have worked with, then I would have needed to focus carefully on the way I was perceived by them to establish how this might affect the information they gave me. However, this is not the case. Instead, this study should be seen as anthropological, in that I am learning with others rather than about them (Ingold, 2013: 3). This relieves me of the requirement to try to describe how I appear to others. Instead, however, it is important to describe the nature of my relationship with the people that I worked with at the case study sites. To do this I need to provide some background about my own worldview and motivation as an individual.

I moved from London to rural Wales with my partner in 2011, soon before starting this research project. I had run my own architectural practice since 2006, at which I had the opportunity to work on a couple of rural house designs that re-examined the way human needs are met at a household level from first principles. Although not aware of the full implications at the time, the research I carried out for these house designs opened the door to an awareness of alternative models to the consumer capitalist paradigm that predominates in UK society. The crash of 2008 happened while work on these projects was ongoing, and the ongoing economic troubles had a profound effect on me, as it did on many others. These events also made me re-evaluate my work as an architect. My interest in the ways by which a household can meet its own needs effectively was strengthened, but my personal situation led me to become increasingly concerned with how this might be done on limited means. The aforementioned houses that I had worked on were large and with generous budgets, so no longer appeared relevant to me as models for a future of economic constraints that younger generations in particular would

experience. The outcome of both projects also had a significant effect on my preoccupations as an architect. One, which was to be in Hampshire, was refused planning approval at appeal, whilst the other, in Scotland was approved. The Scottish house is now complete and has received significant press interest. My experience with the application for the house in England, meanwhile, proved a motivating factor in an ongoing struggle with what I see as a planning system that is unfit for a modern age of resource constraints. My position, which has been consistent since 2008, is that there is a fundamental incompatibility between a planning system that seeks to prevent new residential development in rural areas, almost at all costs, and the benefits that be provided by low density development that combines highly efficient new-build houses with the resources a rural site can afford. My conviction of this was sufficient to provide the main incentive to make the dramatic change of lifestyle from urban to deeply rural, when I learned about the introduction of the One Planet Development planning policy that had been introduced in Wales in 2010.

Assimilation into the community that forms part of this study was remarkably easy. Since my partner and I had been active members of our local Transition group in London, we sought out the Transition group of the town we moved to, and within days found ourselves at our first Permaculture group's workday, working the vegetable beds of one of the members, and helping assemble a greenhouse with salvaged windows. Many of those we met on this first workday were also involved in workdays at three of the four case study sites, and many have become close friends. My role as researcher was therefore as a fully integrated participant. Everyone knew that I was engaged in a research project, but I am confident that this did not affect the nature of their relationship with me. We all share an ecological worldview that is based on a belief that the natural world is of critical importance to us as a species and also that it is facing an unprecedented level of threat. This shared worldview is what creates a sense of community amongst individuals who are otherwise from quite diverse backgrounds.

2.2 Photography as a research tool

Introduction

Five years of visiting and photographing case study sites and recording my own involvement in ad hoc self-builds have resulted in an extensive catalogue of photographs. Throughout this time, a parallel process of visual collating has been ongoing, whereby publicly available photographs that resonate with my interests and lines of enquiry have been assembled for future reference and possible use. Often these images have been located through structured reading, but often through chance encounter.

As the literature review and practical research have unfolded together, connections between images have become apparent. Sometimes the connections are visual and sometimes they are based more on a shared concept. The process of combining these images then reveals further information and opens new lines of enquiry. The links thus created between instances of my own making do, that which I have witnessed carried out by others and that which others have observed, whether contemporary or historical, leads to a deeper understanding of the subject.

One key difference between the precedents being used and the role of photographs in this study is in how the questions and information they elicit are developed or discussed. The visual artists that feature in this document produced the works, but, aside from occasionally explaining their intentions or process, did not see it as their primary function to discuss the work. In the art world, such a role falls on the critic. Also, in this context, the art work is of primary importance, and any critic's observations are secondary. However, for this study, the photographs and the ways that they have been presented are intended as facilitating tools to aid the primary role of a written discussion of OPD and the processes of making do. The use of photography as a tool to research such processes is similar to the approaches of visual anthropology first described in detail by John Collier (Collier, 1967) and more recently Sarah Pink (Pink, 2006). However, an arts based methodology is also being applied to generate an open ended research process and allow connections and insights that would otherwise not be made. Whilst always having in mind my overall intentions for the study, I have often relied largely on inductive processes to decide on how to group particular sets of photographs. These groupings have in turn led to discussions that are explorations of themes rather than attempts to definitively resolve subjects of enquiry.

Taking photographs

In order to gain a better understanding of the processes in which have been actively involved, I have needed to observe and reflect upon my own actions. The snapshot has been a key tool in this respect, as it does not take one's mind off the task at hand. I have needed only to rely on an instinctive recognition of which moments and subjects are salient to the subject of research. In 1978, Richard Wentworth wrote in his article for Artscribe Magazine about 'Making do and getting by', a photographic series that was to become one of his defining projects:

I began seven years ago to make casual notes with the camera, of situations which attracted me. Intended only as personal reminders, they were often technically poor photographs... The images have been collected casually, spontaneously, with little forethought as to overall theme and its possible syntax. As it turns out, this is no exact science - like language it is alive, unpredictable.

(Wentworth 1978)

Wentworth's photographs are snapshots of anonymous human interventions in the built environment. Snapshots tend to be spontaneous, and with little or no artistic forethought. In Wentworth's case, although the individual photograph is spontaneous, it is generally a response to an ongoing interest he has in particular types of phenomenon. As he goes on to say in the Artscribe article: 'they were for the most part photographs of how people place things, and later, consequences of the placings. I am less interested in 'how' and more interested in 'why'" (Ibid.). By this, it appears that he means not only the 'how' and 'why' of the acts of others that he photographs but also the way he himself takes the photographs. There is a similarity between the opportunism of the invisible actor and the opportunism of the spontaneous photographer.

The artist Hans-Peter Feldmann was also motivated by an interest in the apparently trivial moments that the amateur photograph captures. His argument was that 'works of art should not be expensive, nor unique, but cheap and fast to produce. A painting immediately acquires a sort of importance, whereas a photo is much more arbitrary, as it's a lot easier to throw away' (Feldmann, 2009).

The photographs that I present in this study are of varying quality. Like Wentworth, I make no claims to being an accomplished photographer, and am also aware that 'much information can drop off in a photograph, as if vital nuances of a context won't 'fit' into the photographic frame' (Wentworth, 1978). On the other hand, my lack of expertise prevents my transfiguring the subject by using advanced technique to impose my own agenda. Dezeuze describes transfiguration as 'making the photographed object look more beautiful than it is, or making it stand as a symbol for a wider message, and generally transforming the object into the expression of the individual photographer's style' (Dezeuze, 2013a: 105). The lack of agenda at the point of taking the photo also allows for others to be clicking the shutter if the situation requires it, and so at times I felt justified to ask others to take photographs on my behalf. This has allowed build processes in which I was engaged to be photographed.

Keeping photographs

Even the simple requirement of storing large numbers of photographs cannot be done without some way of structuring the collection. Geoff Dyer discusses the difficulty of finding sensible working classification systems in his book, 'The Ongoing Moment':

I am not the first researcher to draw inspiration from a 'certain chinese encyclopaedia' described by Borges. According to this arcane work 'animals are divided into: (a) those that belong to the Emperor; (b) embalmed ones; (c) those that are trained; (d) suckling pigs; (e) mermaids; (f) fabulous ones; (g) stray dogs; (h) those that are included in this classification; (i) those that tremble as if they were mad; (j) innumerable ones; (k) those drawn with a very fine camel's hair brush; (l) et cetera; (m) those that have just broken the flower vase; (n) those that at a distance resemble flies.

(Dyer, 2005: 1)

Although this Chinese encyclopaedia may be fictional, it served as a useful tool for Borges in his efforts to expose the risks inherent in attempts to develop definitive classification systems. In some domains, a definitive system is applicable, such as with the classification of living things according to their evolutionary relationships. However, for other domains, there is no one correct way to order information, and decisions about classification will have been arrived at through highly contingent means. When the classifier or user of the information understands that the system being used is contingent, then it can be a useful tool for handling large amounts

of information. Awareness of its contingency also allows one to adapt the rules and structures of the system to improve its use and benefits. However, the danger arises if a classification system based on subjective value judgements is viewed as being definitive (Bowker & Star, 1999).

Photographs are particularly difficult to classify, as each photograph frame can encompass a range of objects which relate to different themes of interest. The subject matter of a photograph, what it is 'of', is dependent on the interests of the viewer, and even the photographer may see different things in it on different viewings. The simple act of cropping a photograph can fundamentally change its qualities and change its subject. Despite all this, any collector of photographs is forced to order them in some way. The larger the collection, the greater the importance of imposing a memorable system of categorisation, if only to allow particular photographs to be located when required. In 'Faux Amis', Kate Bush discusses Eugene Atget's approach to classification of his collection of negatives:

Eugene Atget used five broad categories throughout his 40 year long career, to organise in the region of 10,000 pictures. These categories contained his work but did not define it: he constantly resorted, reclassified and recombined his pictures, mixing old work with new, revising his own taxonomies in order to present new collections to prospective clients.

(Bush, 2001: 22)

Another twentieth century photographer, Garry Winogrand, lost control of his classification system entirely. The prodigious rate at which he took photographs made it impossible for him to maintain order in the way they were kept. At the time of his death at 56, he left behind over 2,500 rolls of undeveloped film, with countless more that had been developed but not proofed. In the age of film, Winogrand was quite unique, but the advent of digital photography has removed the incentives to be frugal with shutter clicks that the cost of developing had on us previously.

The extended involvement I had with many of the case study sites and self-build projects did result in the archive of digital photographs to build up. However, the benefits of an ordered classification system was understood from the outset. In particular, easy access and simple identifiers were considered essential to facilitate the principal methodology based on the making of connections between photographs.

I chose to file all photographs in folders related to the location they were taken, and then in folders arranged by date but with words identifying the subject matter covered. This approach avoids the requirement at the time to make a judgement about the subject matter of a photograph at the time of archiving, as one folder will contain all the photographs taken on a particular day at a particular site. The descriptions are then supplementary and not seen as comprehensive.

By having a method for archiving photographs that is systematic but that avoids creating artificial categories, I have been able to refer to the archive over time and locate photographs to fit themes as and when I have needed. My photographic archive has acted as a reminder of the processes that I was involved in, but also occasionally revealed information that I was unaware of at the time it was taken.

Presentation of photographs

Photographs are used to perform a number of functions in the presentation of the field research. At the simplest level, individual photographs convey information, that supports descriptions in

the text. They have also been used in pairings and groups for specific purposes at different stages, whether to identify typologies, to show time sequences or to make connections between different phenomena, their role being instrumental in allowing insights that are expanded upon in the text. Often, their role is a combination of simple illustration and insight. Given the multiple roles each photograph can play, their presentation is kept simple and consistent throughout. Thus all photographs are presented with a simple black border to maintain the integrity of each.

All photographs have been reproduced in black and white in this document, irrespective of whether they were originally photographed in colour or black and white. The intention behind this decision is to allow commonalities between pairs and groupings of photographs from different sources to show themselves without the distractions that colour entail. If the colour photographs kept their colour, there would be an obvious difference between them and black and white photographs and also between different colour photographs with different colour ranges. One important benefit of this is that it gives historic photographs, such as those by Eugene Atget, parity with contemporary photographs or those by the author. Since a key aspiration of the study is to find characteristics of making do that are universal and timeless, this connection of photographs from across the ages is particularly important.

The use only of black and white images in a study of making do also feels appropriate in another way. Making do happens when one is viewing the immediate environment for its utility, not for its aesthetic qualities. Colour, or at least the aesthetics of colour, is therefore of less significance to the person making do than to a leisurely observer. Fittingly, one might say that making do occurs on the Heideggerian 'grey everyday' (Heidegger, 1953). Aron Vinegar observes this detachedness in the 'deadpan' photography of Ed Ruscha thus: 'Heidegger frequently positions our immersion in the mood of indifference revealed by the grey everyday (and other fundamental attunements such as anxiety and boredom) as opening us up to the 'nothingness', 'abyss' or 'void' of Being' (Vinegar, 2009).

It is understood that information and impact can be lost when eliminating colour in photographs that were taken in colour and can conceal the incongruity of some instances of making do. For example, sometimes manufactured products with garish colours are used for ad hoc purposes, and the resultant clashing colours are visually jarring. However, the need for consistency of presentation of the entire document overrides the benefits of using colour photographs. Instead, where colour is identified as an issue in the study, it is discussed in the text, and it is left to the reader to recreate the effects in their mind's eye.

Grids of photographs are used to present time sequences or typologies. When time sequences are presented in a grid, there can be a confusion about the order in which the sequence should be read. It is only the gap between rows, relative to the gap between columns that indicates whether it should be read in rows or in columns. Clarity in the sequences in this study is achieved by ensuring all frames have an outline. The grid has been an important tool for Peter Greenaway 'in devising the composition of a film-frame which is always rigorously bounded by the sides and right-angles of a rectangle (Greenaway, 1993). This quotation reveals the temptation to always fill a grid. However, it is often the case that achieving a complete grid is not possible. This is always the case where the number of images to be reproduced is a prime number. In this case, should the sequence be edited to reduce the number to suit a grid, such as $3 \times 3 = 9$ or $4 \times 2 = 8$? On the other hand, the presence of blank space could be welcomed. Ed Ruscha embraced the emptiness of the page in his photographic books. For example, Nine

Swimming Pools and a Broken Glass consists of only ten photographs ‘simply overwhelmed by the fifty-four blank pages that comprise the book’ (Vinegar, 2009). Vinegar posits that:

These ‘blank’ pages (I prefer the word ‘blank’ to ‘empty’ to describe them) have a relationship to Heideggerian ‘danger’ - the risk that we might be unwilling to acknowledge that blankness is a claim made on us... If there is any ‘danger’ here it is not one of ‘plunging’ down to the levelling-off of the ‘fallen’ everyday and mere indifference, but rather that we might want to rise above this ordinary condition, and thus fail to acknowledge that the everyday world - blanks and all - is our world.

(Vinegar, 2009)

I have therefore chosen to accept the blanks when composing incomplete grids, rather than artificially edit the number of photographs being presented. This is an example of a decision about how photographs are laid out that has been made on a pragmatic basis, where the particulars of individual cases have been allowed to influence the chosen approach.

Use of photographs to identify typologies

Photographic groupings have been used in the analysis of the direct observation case studies to identify key typologies. The methods used have been informed by a review of the work of some key photographers, who have produced series of photographs dealing with typologies. This section starts with the review of these artists and photographers, discussing shared methodologies and characteristics that make each distinct. This is followed by an introduction of the methods being used in this study to use photographs in pairs or groups, with reference to the precedents already discussed, explaining the reasons for choosing the approaches chosen.

Bernd and Hilla Becher are commonly seen as representing the apotheosis of the photographic typological study. The Bechers were a couple based in Dusseldorf who developed a technique of photographing different examples of typologies of construction from similar angles and displaying them on a grid. Their methods were highly influential to subsequent generations of photographers, and their influence extended beyond photography into the wider conceptual art movement.

(Image omitted: follow link below to view image)

Fig. 2.1 Bernd and Hilla Becher, Pitheads, 1974

Source: <http://www.tate.org.uk/art/artworks/becher-pitheads-t01922>

Some of the most famous names of art photography of the twenty first century, including Andreas Gursky, Thomas Struth and Thomas Ruff were taught by the Bechers at the Kunstakademie Dusseldorf. The Bechers’ influence is directly evident in all these artists’ early work. Gursky’s series of photographs of security guards at company headquarters, for example, produced while still a student of the Bechers, is closely faithful to their approach. Although it shares much of the Bechers’ methodology, the work is infused with humour and colour. The choice of a human subject also adds a richness and suggested narrative to these photographs, that is absent from the Bechers’ work. According to Peter Galassi, the series represents ‘a rare intrusion of humour into the earnest Becher aesthetic’ (Galassi, 2001: 19). The piece encourages the viewer to speculate about the relationship between the two security guards in each photo, and the reasons that they work in pairs.

Although the Bechers are famous for the lengths that they went to to achieve consistent viewpoints and lighting conditions, they were not the first to make photographic series of

building typologies. Although better known for his portraits of mid-western farmers suffering the hardship of the 1930s depression, Walker Evans was also photographing building types in small towns such as small shops and churches. The choice of full frontal perspective, which encourages comparison between different examples of each typology, shows a clear precedent for the approach of the Bechers.

(Image omitted: follow link below to view image)

Fig. 2.2 Walker Evans, South Carolina churches, 1935-1936 | Source: <http://www.artsconnected.org>

The artist Hans-Peter Feldmann also completed a number of photographic series, but had a very different attitude to the Bechers in the techniques he used to photograph and present his typologies. One series that illustrates well the difference in Feldmann's approach to the rigours of the Becher school is Beds. In this work, the beds are photographed from all angles. There are singles, doubles and twin beds. Feldmann accepts the constraints and unique conditions of each instance of an unmade bed and its setting. Given the fact that beds often occupy a significant proportion of a bedroom, then the viewpoint is likely to be governed by the particular layout of each room. The Bechers went to great efforts to take their photographs from similar views in relation to their subjects, but for the unmade beds, this would have been impossible to achieve. A photograph of an unmade bed is an intrusion on an intimate scene. The series begs the question of whether these were Feldmann's own unmade beds, and if not, whether he had obtained consent for these shots or if they had been secretly snapped. No matter which way, they were by necessity opportunistic. An unmade bed is something transitory. It is usually made in a hurry, whether by hotel room-service or its recent occupant. The moment, therefore needs to be grabbed.

Berndt and Hiller Becher photographed typologies. Their rigorous technique was to suppress and conceal all extraneous information and apply the same rules to each of their subjects, to reveal the characteristics of each instance of a typology that was shared by the separate examples and where each differed. An unmade bed, however, is so much more than a typology. Each is part of a scene, a story of which the whole room is a part. The Bechers worked hard to ensure the quality of light in all their shots was similar. Such efforts to achieve uniformity in the unmade bed series would have removed the individuality and therefore the humanity from these intimate scenes.

(Image omitted: follow link below to view image)

Fig. 2.3 Hans-Peter Feldmann, Beds

Source: <http://www.art-agenda.com/reviews/hans-peter-feldmann/>

Aside from unmade beds, Feldmann also collated series on a variety of subject matter including: women's knees, mountain peaks, shoes, soccer players and hedgerows. The seemingly arbitrary choice of subjects, which is humorously reminiscent of the classification list of the Chinese encyclopaedia mentioned earlier, speaks volumes about Feldmann's attitude to imposed structure and rigorous methodology. As an exercise, it is worth choosing one of Feldmann's series that would be best suited to the Becher treatment, and studying how Feldmann went about it. If we look, for example at his series of shoes, we can speculate how the Bechers might have chosen to photograph them and present the series.

(Image omitted: follow link below to view image)

Fig. 2.4 Hans-Peter Feldmann: Ursula and Hans-Peter

Source: <http://www.art-agenda.com/reviews/hans-peter-feldmann/>

By their very nature and function, shoes are mobile and not fixed to any given context. It would therefore be very straightforward to photograph them in the studio in identical conditions. Instead, though, Feldmann presents his series with different colour backgrounds and hangs the photographs with some shoes facing up and some facing down. Clearly there is no functional necessity to do this. The artist seems to be deliberately avoiding any predictable formal structure. The title of the piece suggests that these shoes do not belong to anonymous owners but to the artist and his wife. With this knowledge, the viewer is made aware of a relationship between the men's and women's shoes. The sequence, pairing and orientation of the shoes in the photographs suggest possible readings about the relationship between the artist and his wife.

In this study, photographs from the LID case studies are grouped so as to make connections and hence to identify typologies. Where photographs are acting as integral parts of groupings, they may have been cropped or their exposure adjusted if this helps create connections between different photographs. The shape of photographs may be as originally taken, or may be amended by cropping. In some cases, typologies have been photographed with the intention of presenting them as groups, so for each, all photographs are either portrait or landscape so they can be presented in a grid. However, sometimes typologies have been identified after the event, and so a rigorous approach to their framing is not always possible. Thus the methods for grouping photographs is more inspired by Feldmann than the obsessive rigour of the Bechers, whereby chance is allowed to play a role in throwing up unexpected associations and interpretations.

Photographic time sequences

Photographic time sequences have been used in the analysis of the participant observation case studies as a way of different types of process over different timescales. Time sequences are often used in a video format as stop-frame animation. However, although attractive to the viewer, this format does not allow close study of details in individual frames. The constraints imposed by the printed media also present opportunities to the viewer to examine each photograph at his own leisure.

Since the study is an examination of process, time sequences are particularly useful, but the medium of a static document imposes restrictions on how these can be presented. Therefore, examples of photographic time sequences by three different artists are discussed next, to explain the decisions made about presenting them in this document.

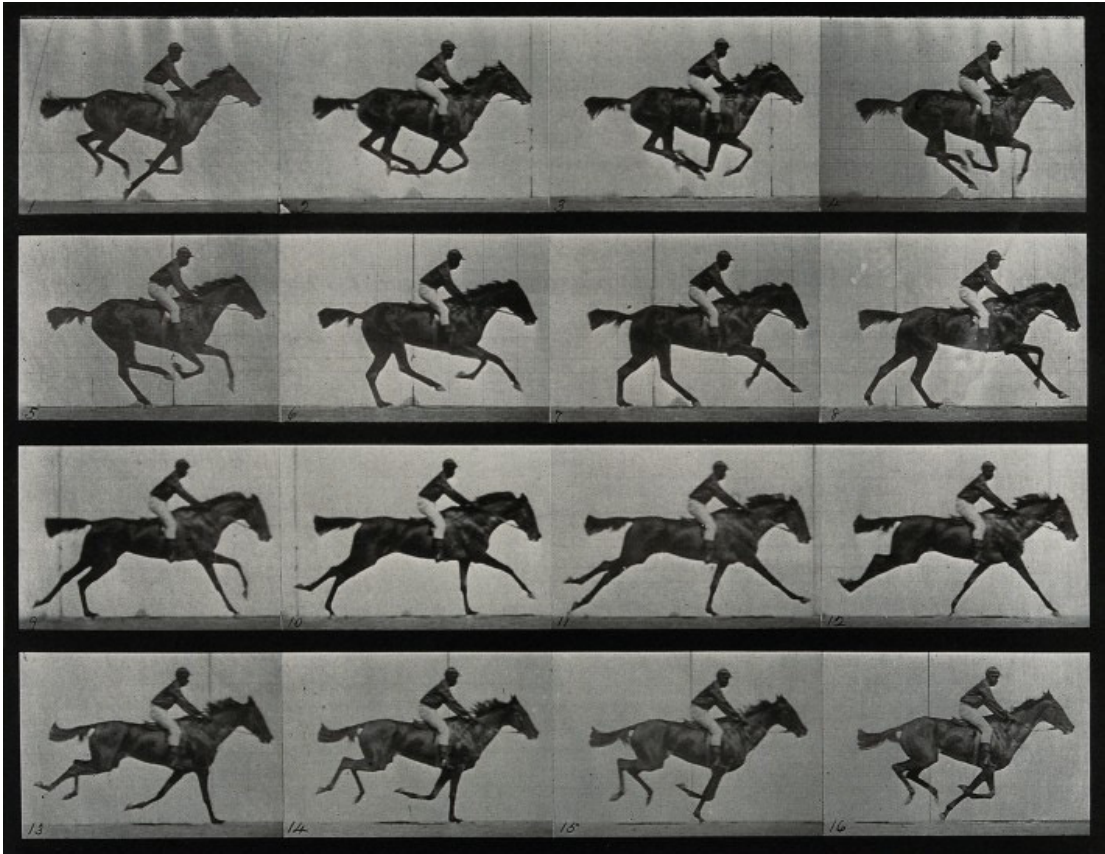


Fig. 2.5 Eadweard Muybridge, 'Galloping horse', first published in 1887
 Source: https://commons.wikimedia.org/wiki/File:Muybridge_race_horse_gallop.jpg

Eadweard Muybridge is known as the father of the photographic time sequence. The goal of many of his sequences was to make a forensic study of movement by humans and other animals. The above sequence is famous for establishing conclusively that a horse has all four hooves in the air at a certain point in the galloping cycle. Since his shots were taken at uniform intervals and close together in time, they were an obvious precursor to cinematography.

Duane Michals is also well known for his photographic sequences, but his methods are quite different to Muybridge's. Here, the viewer is often left to their own devices as to how they might interpret the sequence. For example with 'I build a Pyramid', the layout of the grid gives no indication of the sequence order. One assumes to read across rows instead of down columns because each stage shows a progressively increasing number of rocks as the pyramid is being assembled. However, build processes are not always so linear. Having helped build a dry stone wall, the author has experience of a process which involves assembling, followed by disassembling and reordering, as a combination of stones that feels 'right' is sought through a process of trial and error.

(Image omitted: follow link below to view image)

Fig. 2.6 Duane Michals, 'I build a pyramid', 1978 | Source: <http://www.pacemacgill.com/>

The last frame of the sequence is taken from a different vantage point to those that precede it. It is the only shot in which the artist is missing, and the camera has moved closer to the completed construction. In one way, the grid ties it to the other shots, in another, it is apart from the others, and acts as a coda to the sequence; a chance to reflect. The first five frames show the process, and the last shows the product.

The third example is 'Ladders', by Julian McKenny, a time sequence series showing a corner of his own self-build in rural Wales. He told me in an interview I conducted with him, that in this piece he was not looking to show a linear process of assembly and completion of the house. Rather, he was more interested in the changes between individual shots, due to general activities on site, or variations in light dependent on the time of day or weather conditions. These are a very different set of intentions to those of a cinematographer creating a stop frame animation. The cinematographer looks to minimise changes in light quality between individual frames and requires precise consistency in viewpoint, whereas McKenny's is actually choosing to draw attention to the dramatic changes in light quality between shots. The flow of objects and materials tells a similar story about the self-builder's day to day experience of a build. There is evidence of activities on site, as ladders shift back and forth and protection sheeting is wrapped and unwrapped, yet there is little evidence of a linear process. Indeed, if one compares the first and last photo from this sequence, it is hard to tell what progress has actually been made on the build. The lack of overview is far closer to the process as experienced by a self-builder than an idealised stop-frame animation showing apparently smooth steady progress.



Fig. 2.7 Julian McKenny, 'Ladders' series from *Self Build Self*, 2016 | Source: Julian McKenny

In correspondence with myself, McKenny makes it clear that he is not interested in taking individual photographs in his sequences at fixed time frames, saying that he saw such an approach as a method of documentation and that he is not documentary photographer. His principal interest is in catching variations in qualities of light, and so explains:

Even if I was intending just to document a build I would only take a sequence when the light was at its most revelatory - taking a pic at 9.00am every day is pointless.

(McKenny, 2016: email to author)

This approach is no less rigorous than the strict intervals of a sequence such as Muybridge's. It relies instead on an alertness to changing light conditions and a willingness to respond, to seize the moment when appropriate.

Photographic time sequences have been used in the participant observation case studies. The methodology for these takes inspiration from Michals and McKenny, in that strict intervals between shots has not been sought.

Pairings

Pairings of images have been used in the theme-based analysis, to make connections and comparisons between the participant observation case studies, direct observation of LID, and the literature. A pairing of two works from different contexts is a curatorial choice, intended to reveal new readings or possibilities that viewing the two works separately would not achieve. Often, by choosing subjects that are similar in some respects but separated by time or distance, the juxtaposition will break down these boundaries and reveal universal human experiences that transcend any specific age or culture.

(Image omitted: follow link below to view image)

Fig. 2.8 The Bather, c.1885, by Paul Cézanne (left); and Odessa, Ukraine, 1993, by Rineke Dijkstra (right) | Source: http://www.photokaboom.com/photography/learn/tips/033_curate_a_pairing.htm

The above pairing was created by the MoMA in New York in 1999. Despite being separated by over a century, the slightly awkward poses of both subjects speaks of the transitional nature of adolescence, which is universally experienced. As one contemporary critic observed at the time: 'To see this Cézanne fast-forwarded seems to deliver a shock to time itself. And afterward, both periods - his and ours - appear enlivened' (Stevens, 1999). This excitement at the recognition of human experience shared across the ages is shared by the author each time he finds a pairing that is separated by time. The pairing of photographs in this study aims to provide the opportunity for insight in a similar way. The choice of pairings is initially instigated by an awareness of similarities between the images being paired, but the act of pairing them and reflecting on the pairing then reveals further, unexpected insights, which are discussed in the texts.

2.3 Drawings as a research tool

Introduction

Site plans have been prepared for each of the four participant observation case studies. Since structures came, went and moved around the sites, a single plan of a site at a given point in time would not have served adequately either to locate the activities and subjects discussed in the text or to reveal characteristics of the processes involved in the various interventions on the sites. Therefore, multiple site plans were drawn showing the site layouts at fixed times during the time period that each site was the subject of study. These have then been presented in two different ways for each case study: they have been layered on top of each other so that a single drawing can accommodate activities and structures from different times, and they have also been presented as time sequences in a similar way to the photographic time sequences.

Compressed time site plans



Fig. 2.9 Chronophotography by Étienne-Jules Marey: 'Flying pelican', 1882 (left) and 'Blacksmith and striker', 1894 (right) | Source: https://en.wikipedia.org/wiki/Etienne-Jules_Marey (left) and <http://swansinsky.tumblr.com/post/132335040780/magictansistor-etienne-jules-marey> (right)

The methods used to produce the compressed time site plans for the participant observation case studies have been inspired by the chronophotography of Étienne-Jules Marey. Marey developed a technique to take photographs with multiple exposures over a period of time, to show movement. In order to explain the approach taken with the site plans, the above two photographs by Marey are being used to illustrate a discussion of the effects of time layered photographs.

In the photograph on the left the direction of the sequence is clear to the viewer. Since birds rarely fly backwards, one is inclined to read the sequence from left to right. Also, the fact that the images overlap in places indicate that this is a single bird shot in a time sequence. Hence there is a clear linearity to the image, which is further enhanced to those used to reading Latin script from left to right.

The photograph on the right, also by Marey, shows the process of smithing metal, with two men hammering a blade of steel. The effect of this activity on the item being smithed is linear, as an unshaped piece of metal is transformed to a specific form. However, there is no evidence if this linearity in the activity that is required to achieve this. The smiths instead carry out cyclical, rhythmical movements as they repeatedly bring their hammers down on the metal before raising them again to repeat the process. This photograph appears to show a full cycle in this process, or possibly two, though there are many aspects of it that would be unclear to someone who is

unfamiliar with this activity. For example, it is not obvious which of the images of the hammer heads are showing them coming down, and which are showing them being pulled up again ready for the cycle to be repeated. The merged site plans show temporary structures as fainter than more permanent ones, dependent on the amount of time they were there, but they do not show the sequence in which the features came and went. However, the examples above show that the apparent inadequacy of this method is in fact telling of the nature of the process. For although time inevitably passes, there is no narrative to life as experienced. A beginning and end of the period of study for each site has needed to be established, but these are imposed by the limitations of the research process, not intrinsic to the sites themselves.

Site plan time sequences

The methods used to present the photographic time sequences have inspired the approach used to show changes to the site layouts over time. For each case study they are presented after the compressed time site layouts. Unlike the photographic time sequences, the site plan time sequences follow equal time intervals, but this should not mean that they are intended to read as a method of data collection. Instead they are intended as a way of arriving at more profound insights into the processes of change. In particular, they demonstrate that on these sites, changes were not characterised by linear progress. Built form was moved and removed as much as it was added. The first and last frames of each sequence merely represents the beginning and end of the research period for each site, and the lack of evidence linear progress on the sites confounds any attempt to impose a narrative to the process.

2.4 Summary

It is important to note that the structure of this document does not follow the sequence that the research was carried out. A research project that is set up as an empirical study can be presented in the same order that the research was carried out. This would involve first the definition of the problem to be solved or the hypothesis to be tested, followed by a literature review, to establish the body of knowledge on the subject. Then, following a description and justification of the methodology that was employed, the process of research is described, and the results are presented. However, presenting a research project that involves separate threads being carried out in parallel in the order that it was carried out would not aid the reader in understanding the key issues or the findings of the research. Therefore, the structure of the following sections has been finalised only after completion of all the research and the relationship between the different elements of literature review and fieldwork fully appreciated. Henceforth, the sequence of chapters follows a structure designed to set out a coherent argument. The methodologies discussed in this chapter have been applied to support this argument as follows:

Context - This chapter uses a literature review to put forward an argument that a future of resource constraints will necessitate bottom-up processes, including the ability to make do. The only illustrations are graphs that have been carefully selected to communicate the increasingly non-linear patterns that characterise the anthropocene era.

The One Planet Development planning policy for Wales - This chapter uses a combination of literature review with direct observation of LIDs and OPDs. The direct observation is based on case studies, which are then compared by the grouping of photographs to identify typologies, following precedents by fine art photographers.

The processes of making do - This chapter is solely a review of the literature relating to the subject. Photographs are for illustrative purposes only.

Participant Observation Case Studies - This chapter presents the observations relating to four case study sites where I have actively participated in self-build and other processes that involved making do. Each case study is presented as a collage of discrete vignettes that are composed of photographs and accompanying text. Both photographs and time sequences are used to explore processes of making do, at different time scales. following precedents by fine art photographers.

Theme-based analysis - The observations from the participant observation case studies have been sorted into separate themes. Photographs from these case studies have been paired, in some cases with the direct observation case studies, and in other cases with works by other photographers or other images. Pairing have been set up to all chance discoveries that reveal further links and connections, the goal being to establish universal characteristics of the processes of making do.

3. Context

3.1 Global Context

Introduction

In 1972, the study ‘The Limits to Growth’, commissioned by the Club of Rome used computer simulations to test the interaction between different projections of population and exponential economic growth against the finite resource base of the planet. The report argued that:

If the present growth trends in world population, industrialisation, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years.

(Meadows, Meadows, Randers & Behrens, 1972)

Given the severity of the message, it is not surprising that the report was received with hostility by much of the world’s press and political establishment (Eastin, Grundmann & Prakash, 2011). However, recent studies comparing actual data to projections in the original report argue that the reality is disturbingly close to the projections made in 1972 (Turner, 2008 & 2014).

Whilst there are many who reject the arguments put forward by The Limits to Growth and its successors, there are now significant numbers of academic and social commentators who are deeply concerned about the risks to humanity of the last few decades’ exponential growth of activity and consumption, and of the continued trajectory suggested by current trends. The impact that human activity is having on the planet is so profound that a new geological age, the anthropocene, has been proposed to identify this new era. By studying the relationship between socio-economic and earth system trends since 1750, Steffen, Broadgate, Deutsch, Gaffney and Ludwig identify a sudden surge in human activity and corresponding impact on the planet from the mid twentieth century and therefore argue that this is the point when the anthropocene era began (Steffen, Broadgate, Deutsch, Gaffney and Ludwig, 2015).

Given the profound changes that will be forced on society in the short to medium term, due to the continuing and increasing disparity between the demands of the global economy and the ability of the biosphere to meet these demands, the possibility of collapse is now being increasingly discussed (Odum & Odum, 2006; Ehrlich & Ehrlich, 2013). Steffen et al. remark upon the incompatibility of an economic system dependent on continued growth with the fact that the Earth is a finite resource base. While they do point to ‘some glimmers of hope that the growth/collapse pattern may be avoided’, they use the example of the continued rise of greenhouse gas emissions to argue that responsibility is still not being taken globally for the impacts on the biosphere of an economic model based on the pursuit of growth (Steffen et al., 2015).

Current trends

In order to make an assessment of potential future conditions for people of ordinary means, it is necessary to examine the current trends in some of the key areas that are already showing signs of strain, and which will inevitably have an impact on conditions for those without access to significant wealth. The six key areas that have been identified for detailed study, that are all deeply connected, are: population, food, energy, economy, climate and ecology.

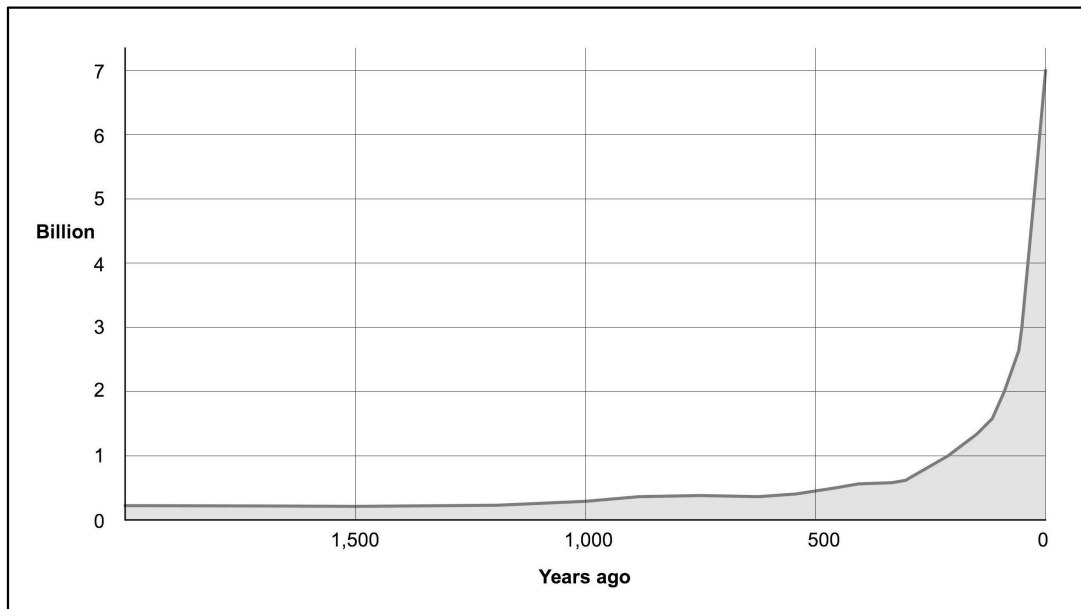


Fig. 3.1 World population from 2,000 years ago.
 Source: US Census Bureau and Steffen et al, 2015 (Year 0 = 2015)

In July, 2013, the global population stood at 7.2 billion. In 1940 it was 2.3 billion, so it has more than tripled within a lifetime. Human fertility rates are decreasing, and there is a commonly held assumption that the growth rate will steadily decrease, with global population stabilising at around ten billion by the end of this century. This is based on historic predictions by The United Nations Population Division. In fact, the UN's latest best estimate is for world population to reach 10.9 billion by 2100. This revision upwards is due to the fact that fertility levels have needed to be adjusted upwards for a number of countries, either due to increasing fertility levels in some countries, or because previous estimates were too low (United Nations Population Division, 2013).

The vast majority of population growth is expected in developing countries. In particular, many African countries are experiencing large increases in population, and these increases are expected to grow continuously until around 2050. Asia, which includes the world's two most populous countries, India and China, has experienced massive population growth over the last fifty years, but this growth is now slowing and from 2050 the UN forecasts its population to decline.

Population change for any given country or region is a function not only of fertility rates but also of life expectancy and migration. In Europe, fertility rates are low, but life expectancy continues to rise, while net immigration is contributing significantly to population growth. Immigration is becoming a politically charged issue in many European countries. With populations expected to grow at a phenomenal rate in countries where living standards continue to be well below those in Europe, the numbers of those wanting to migrate to European countries looks likely to increase.

As global population continues to grow, so too will pressures on food production systems. Although those in 'developed' countries are aware that food scarcity is a problem in the 'developing' world, it is generally considered a problem that the west, for itself, has solved. The widespread adoption of intensive farming methods in the 1950s, known as the green revolution, combined with an increasingly globalised food supply system has helped create an impression of abundance and value in the developed world in recent years. The ongoing trend towards

industrialised agriculture combined with large scale supply chains have driven down prices of many foods, but recent price shocks such as the 2008 global rice crisis have exposed the fragility of such globalised systems.

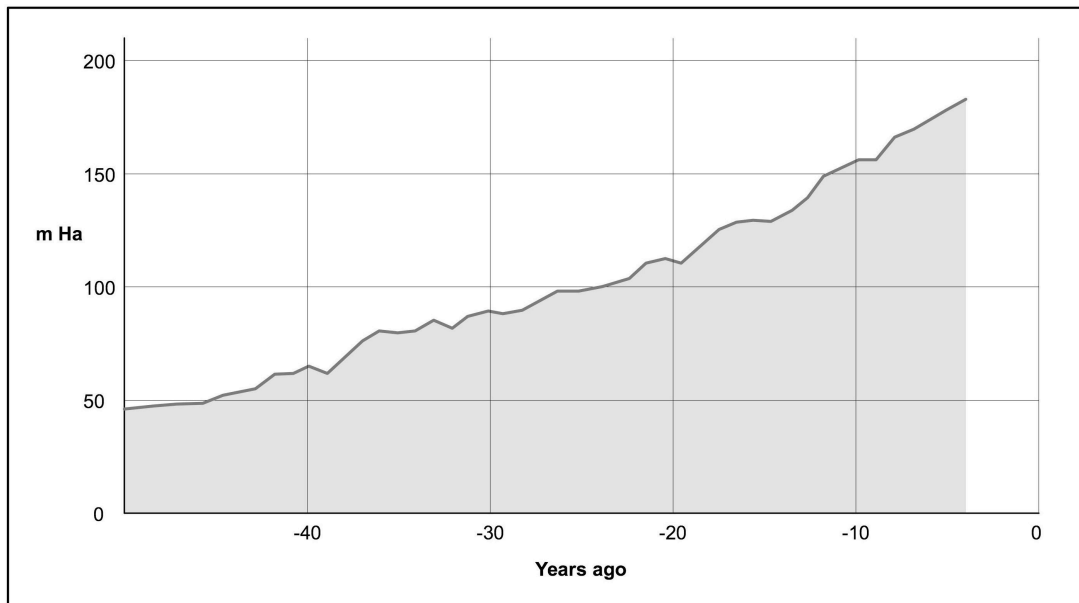


Fig. 3.2 The growth of industrial food crops: soybeans, rapeseed, sugar cane and oil palm (million hectares) | Source: Grain, 2014 (Year 0 = 2015)

The United Nations Commission on Trade and Development is so concerned at the continuing global trend towards large scale industrial food production that it issued a report in 2013, entitled 'Wake Up Before it is Too Late' warning that global food production was at grave risk unless urgent measures are taken to transform agriculture to 'ecological intensification'. To achieve this, it called for 'a rapid and significant shift from conventional, monoculture-based and high-external-input-dependent industrial production toward mosaics of sustainable, regenerative production systems that also considerably improve the productivity of small-scale farmers' (United Nations Commission on Trade and Development, 2013).

The health implications of an industrialised food production system are becoming increasingly apparent. Processed foods suited to lengthened supply chains lack essential nutrients and rely on unhealthy levels of fat, salt and sugar to be palatable. The expanding global obesity epidemic is demonstrating the risks to society of an increasing detachment between food consumers and the source of their food.

Global food and agribusiness corporations have considerable economic power, and are known to exert undue influence in the political arena. For example, patenting laws and international trade agreements are being used to criminalise the saving of seeds (Sirinathsinghji, 2015). Since the green revolution, the use of artificial fertilisers has been widespread. Although this has resulted in raised yields, it is causing the destruction of microbial life in the soil and damaging the land's ability to produce food in the future, while nitrogen-rich runoff is causing eutrophication in rivers and estuaries (Chislock, Doster, Zitomer & Wilson, 2013). Meanwhile, phosphorus, a valuable mined resource is being lost to the sea, from which it cannot be economically recovered (Fairlie, 2010).

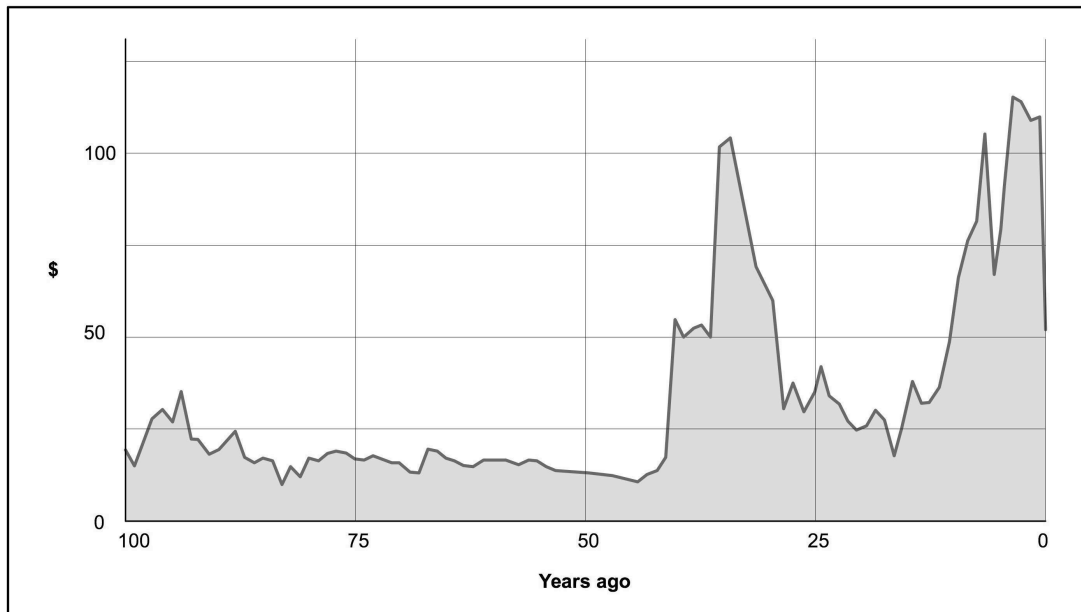


Fig. 3.3 Crude oil prices since 1915, adjusted for inflation (USD per barrel)
 Source: BP Workbook of historic data (Year 0 = 2015)

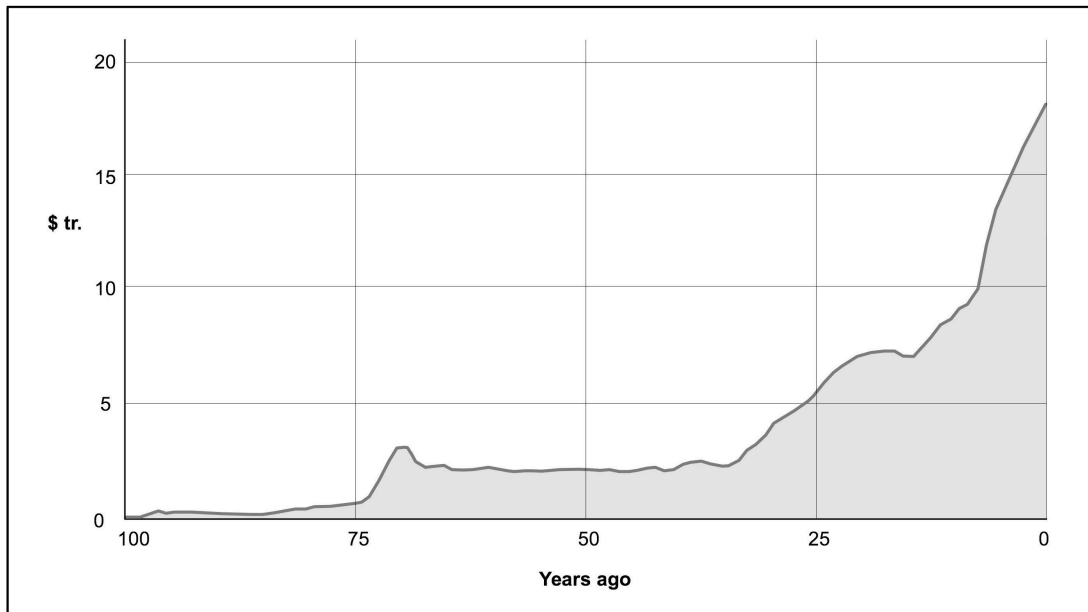
Industrial agriculture is highly energy-intensive and heavily dependent on fossil fuels. The above graph shows the volatility in oil price over the last decade, which has impacted food prices, while also resulting in increased transport costs for people of limited means. Heating and electrical costs have similarly contributed to high costs of living. Times of high energy price during recent volatility have disproportionately affected the lowest income groups (Tanaka, Macdiarmid, Horgan & Haggarty, 2015), while recent reductions in wholesale energy prices have been slow to translate to reduced household energy bills.

The implications of recent volatility in oil prices are as yet unclear. The debate about peak oil has developed in recent years, partly due to the claims of the fossil fuel industry of abundant supplies of oil and gas in shale rock, but ironically it is the recent drop in oil prices that has exposed the fragility of its economics, and fracking rigs in the US are already beginning to close as their operating costs make them unviable at current prices. Given the large amounts of capital invested in unconventional fuels, the current instability of energy prices presents a significant risk to such investments, with implications for the wider economy (Morgan, 2013a).

Some suggest that peak oil demand will precede peak oil supply (Brandt, Millard-Ball, Ganser & Gorelick, 2013). However, many commentators on energy issues use the concept of Energy Return On Energy Invested (EROEI) to argue that Peak Oil as a supply problem is as critical an issue as it ever was (Morgan, 2013; Heinberg, 2011; Kunstler, 2005; Greer, 2014). EROEI is a fraction calculated as the amount of energy required to extract energy, divided by the amount of energy being recovered. The lower the EROEI, the greater the energy investment required to extract energy. The earliest oil fields in the 1950s were providing many hundreds of joules of energy for each joule that was inputted. However, energy returns on modern extraction methods, such as deepwater drilling are now significantly lower at around 1/10 to 1/30.

The technical complexities of energy issues make it very difficult for those who are not expert to make an assessment of the veracity of competing arguments. However, recent price shocks have demonstrated the vulnerability of those of limited means to high energy prices, while recent energy price drops are too short term to provide any reassurance that they will not

experience similar difficulties in the near future.



*Fig. 3.4 US National debt, inflation adjusted (trillion USD)
Source: US Treasury Bureau of the Public Debt (Year 0 = 2015)*

The fragility of the globalised financial system was exposed in the crash of 2008, and in the years since, economies have not returned to the same patterns as they did following previous recessions. In order to maintain market confidence and stimulate economic activity, unusual measures such as zero interest rate policies (ZIRP) and the generation of new money through quantitative easing have become standard practice for central banks across Europe and America. However, since their application at this scale is unprecedented their long term effects cannot be known.

Tim Morgan, who for many years headed the research department of Tullett Prebon, a FTSE 250-listed financial company, holds that the UK and US are in levels of debt that are so large that there is no realistic prospect of them ever paying back without their economies being engulfed by runaway inflation. In his final report 'Perfect Storm' which was published in January 2013, one of the central arguments is that the published data for such economic indicators as inflation, national debt, GDP and employment have been so manipulated by 'adjustment factors' as to render them meaningless, and hence hide the true state of nations' economies (Morgan, 2013).

While the concepts behind economic models may appear abstract to the non-expert, when these models fail, the real-world effects are only too real. The fact that few economists foretold the 2008 crash has contributed to a growing distrust of experts amongst the public. Nassim Nicholas Taleb was one of the few to predict trouble when he argued in 2007 that the financial system was highly fragile and therefore susceptible to catastrophic collapse (Taleb, 2007). The reasons he identified, the globalised nature of the banking system and high levels of debt have not come close to being resolved (Buttiglione, Lane, Reichlin & Reinhart, 2014). Since nation states have largely taken on the debt that banks had previously built up, the potential for default by heavily indebted countries such as Greece threatens to have repercussions across the financial system.

The financial crash of 2008 and great global recession that followed it remind us of the inherent fragility of the system and the potential for rapid, almost instant collapse of markets and

financial institutions. Events in the apparently abstract world of financial markets can unfold at lightening speed yet have profound effects in the world of real lived economies for many years. Recent market responses to the Brexit crisis continue to act as reminders of the threat of financial instability to the global and UK economy.

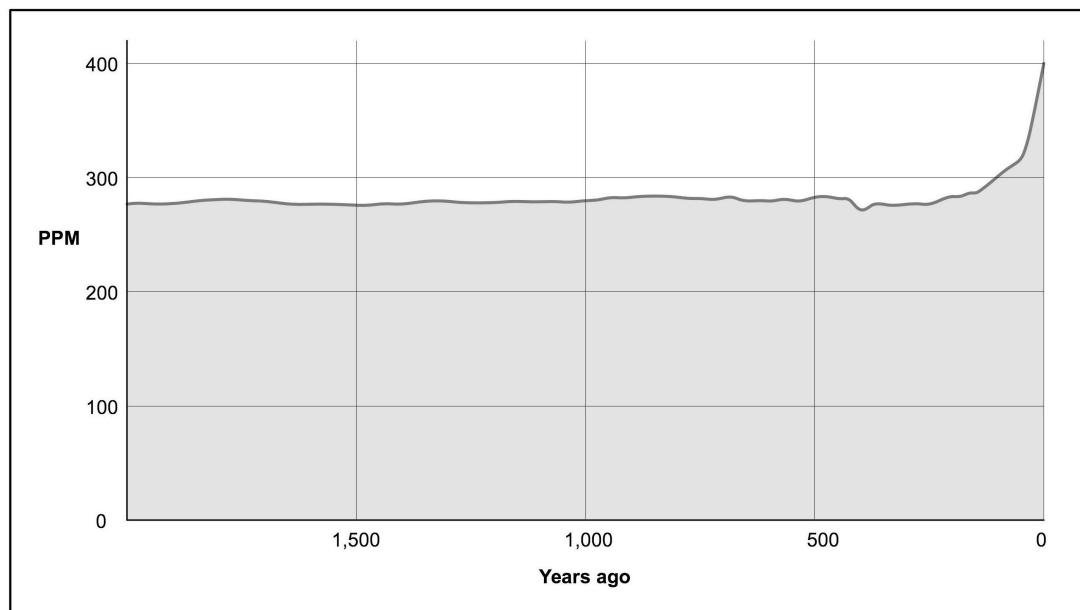


Fig. 3.5 Atmospheric CO₂ levels from 2,000 years ago to today (parts per million)

Sources: Pre-1959, ice core data from British Antarctic Survey, post-1959 data from Mana Lua Observatory (Year 0 = 2015)

In November of 2014, the Intergovernmental Panel on Climate Change (IPCC) released the Synthesis Report of its Fifth Assessment Report, in which it stated that ‘it is extremely likely that we are the dominant cause of warming since the mid-twentieth century’ (IPCC, 2014), while at the same time increases in greenhouse gas emissions are accelerating. Potential impacts of climate change that it identified included food and water shortages and increased poverty. It proposed a range of mitigation measures to keep temperature increases below 2°C.

The 2°C target has been commonly cited since the 1990s as the limit before climate change becomes dangerous for humanity. Some, however, such as Kevin Anderson of the Tyndall Centre consider 2°C as already dangerous, preferring instead to opt for 1°C as a safe limit. Unfortunately, though, he is not optimistic about the possibility of achieving this, stating in an interview in 2013 that we only have ‘an outside chance of avoiding what we might classify as dangerous climate change’, and this only because ‘the science is not sufficiently tight to say you have left it too late for 3, 4 or 5°C’ (Manchester Climate Monthly, 2013).

Scientists have been warning about the potential effects of climate change for over two decades, yet year-on-year, global CO₂ emissions continued to rise until 2015. A significant proportion of this rise can be attributed to economic activity in BRIC nations, but much of this activity goes to producing consumer goods for ‘developed’ nations. Meanwhile, even if some citizens of ‘developed’ nations appreciate the scale and urgency of the problem, there is barely any discernible evidence of this understanding being translated to behaviour, as the continuing exponential growth of air travel shows (Steffen et al., 2015).

It is becoming increasingly evident that the human species is not responding proportionately to the scale of threat that climate change presents. Despite the Paris Agreement’s commitment to

limit global temperature rises to well under 2°C (United Nations / Framework Convention on Climate Change, 2015), there appears to be still no collective appetite for voluntarily embarking on the scale of project that would be required to meet this commitment. Whatever the outcome, climate change will inevitably have a profound impact on national and local economies. Changed weather patterns are likely to challenge the ability of local communities to provide for their own food and housing needs at a time when national and regional governments find themselves increasingly stretched.

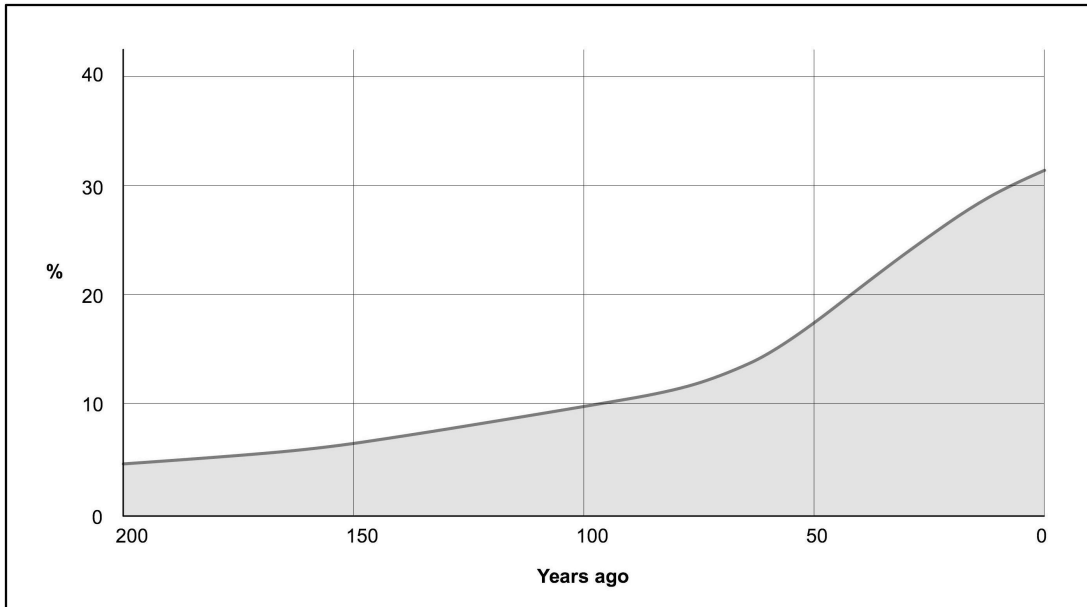


Fig. 3.6 Decrease in terrestrial mean species abundance as % of undisturbed ecosystems
Source: Steffen et al., 2015 (Year 0 = 2015)

The Secretariat of the Convention on Biological Diversity released a report in 2014 entitled ‘An updated synthesis of the impacts of ocean acidification on marine biodiversity’, in which it was stated that: ‘It is now nearly inevitable that within 50 to 100 years, continued anthropogenic carbon dioxide emissions will further increase ocean acidity to levels that will have widespread impacts, mostly deleterious, on marine organisms and ecosystems, and the goods and services they provide’ (Secretariat of the Convention on Biological Diversity, 2014).

Climate change is just one of an array of factors that are threatening the ecology of the planet. For example a recent study found rapid global decline of biodiversity in freshwater ecosystems to be attributable to ‘land use change, eutrophication, hydrological disturbance, climate change, overexploitation and invasive species’ (Janse, Kuiper, Weijters, Westerbeek, Jeuken, Bakkenes, Alkemade, Mooij & Verhoeven, 2015). Mass extinctions, overfishing of the world’s oceans, the impact of pesticides on global bee populations, the felling of tropical rain forests. The list of papers, journal articles, reports, and other information continues to grow, each revealing more about the wholesale destruction of ecosystems.

The converging resource and environmental crises are bound to have profound impact on the resilience of communities. Human activity relating to food production, development and industrial activity are damaging and depleting the world’s resource base, whilst population growth and increasing inequality are simultaneously reducing the share of this resource base available to those that do not have access to great wealth. This stage in the anthropocene era is increasingly being characterised by the ‘rapid, nonlinear, social and ecological regime changes’ (Benson & Craig, 2014), for which today’s economic and social structures are ill

suited, developed as they were in an age of abundant resources and cheap energy. We therefore need to turn next to the question of how societies are likely to adapt to these increasingly non-linear conditions.

3.2 Possible societal responses to environmental and economic crises

What future should today's societies be planning for?

All decisions that are made at any given time are based on a set of assumptions about future conditions. When involved in day-to-day planning, individuals and organisations will often make the assumption that underlying conditions will remain relatively unchanged for the timeframe in which decisions are acted out. However, for longer term planning, this approach will not work, as over time, even small changes will accrue to have a more significant impact on conditions.

Given the pace of change in recent history, it is inevitable that the world in fifty, twenty, or even ten years time will look profoundly different to today. Also, it is clear that decisions made today will have an impact on the way the world looks for these times in the future. Therefore, decisions that relate to the long term future must be based on assumptions about conditions in this future. For the individual, an example of such a decision would be saving for a pension. For a government, it may be deciding how to invest in energy or transport infrastructure. Forecasting the full range of conditions even one day into the future in its entirety is impossible, but as a society, we seem drawn to making assumptions about the continuation of stable conditions. However, those who understand the unpredictability of the systems that impinge on our ability to sustain ourselves have a more unsettled perspective of the future.

Taleb argues that there will always be events, which he calls Black Swan events, which are impossible to forecast and therefore make the future impossible to predict (Taleb, 2007). The impact of Black Swan events on conditions that may have previously displayed steady trends could be compared to the conceptual clash between chaos theory and newtonian physics. Accommodating the inevitability of Black Swan events into our world view breaks our perspective of the future into tiny shards. Like a shattered mirror, each shard now shows a radically different possibility, yet the boundary between each shard is but a hairline. The Black Swan events are the hairlines that transform one possible future to something profoundly different. The Dahlem Workshop Report, 'Sustainability or Collapse?' similarly presents a fractal vision of potential futures, setting out a range of potential scenarios for testing (Costanza, Graumlich & Steffen, 2007).

The high standard of living still enjoyed by many in the western world makes it difficult for us to emotionally engage with the possibility of unpredictability in the future, despite the fact that intellectually, many of us are all too aware of the resource pressures that are bearing down on us. We are so used to living in a world where our needs and wants are met on demand that we assume this to be the natural state, and are outraged at the slightest interruption to the status quo. As individuals, when we flick a switch, we expect a light to come on. We do not think about the scale of infrastructure required to maintain an electricity grid nor the range of factors that might lead to its failure. When things do go wrong, we also tend to look for scapegoats, instead of understanding the problem as a result of a change in the underlying conditions.

There is a common assumption in western culture that conditions will remain stable or steadily improve. This expectation is at odds with the findings of the scientific community in the fields of climatology, ecology and other fields that deal with the relationship between our species and the resource base of the planet. Even those who have intellectually engaged with the science of

climate change or resource depletion will still often base their decisions on an implicit assumption that tomorrow will be pretty much like today. To this extent our world view seems more driven by human psychology than intellectual rigour. Not only do we expect lights to keep coming on when we flick switches, but on a collective scale, we also expect entire cities to remain lit because they have in the recent past. A narrative has been created around the steady improvement in living standards over recent decades, with the expectation that this will continue indefinitely. Unfortunately, this narrative, which we call progress (Greer, 2014; Hueseman & Hueseman, 2011) is incompatible with the inevitability of Black Swan events.

Although there is no way of reliably forecasting the future, it is possible and necessary to challenge the assumption that the current status quo will continue indefinitely. We need to keep reminding ourselves that comfort is an extraordinary condition that is maintained by a small percentage of the world's population today, and a tiny percentage of the world's population in history. Comfort is maintained by complex systems that need to become ever-more complex as conditions on the ground become less benign. Increasing our efforts to insulate ourselves from external conditions will only incur more complexity, requiring more energy and resources. Given the increasing scarcity of energy and resources, it looks likely that this condition of comfort will be available to less and less people in the future.

If one is to embrace the fractal vision of possible futures, then one needs to accept the possibility of both greatly improved and far worse conditions and prospects for any given group or community, and that any attempt to quantify the likelihood of either is of little use. Of course, conditions can be divided into a myriad of different categories, so, it is likely that in some ways our lives will improve and in others they will worsen. One way they may worsen is through collapse of any of the large scale systems that our society currently takes for granted. Collapses can be partial or complete. They can be fleeting, temporary or permanent. When they do happen, then the only option is to adapt to the new set of conditions. For some this may never happen beyond experiencing a short power cut. For others their experiences of system collapse are likely to be more long-lasting and life-changing.

Collapse

Collapse is a word that twenty first century western society is deeply uncomfortable with, but to an ecologist, it is simply a natural and unavoidable process. Many economists believe in exponential growth ad infinitum, but an ecologist would see this as an illogical proposition. In order for there to be periods of growth on a finite planet, there must also be periods of collapse.

Depending on its scale and reach, collapse does not necessarily mean catastrophe. In ecosystems, collapse is rarely universal. It is far more common for populations of individual species to collapse due to scarcity of a particular resource that they rely on, but that others do not. Collapse of one species' population can then have knock-on effects on other species, either positive or negative, and so the cycle continues.

Tainter describes collapse as a rapid loss of complexity in a society. He argues that societies that have access to considerable resources tend to grow both in size and complexity (Tainter, 1988 & 2010). As problems arise, whether caused by the society's growth or for other reasons, the responses tend to also grow in complexity. Priority is often placed on maintaining stability in the conditions experienced by those in the society, as the natural reaction is to resist measures that require a change in behaviour or reduction of living standards. The threat that such societies

face is that when they come close to the point of collapse, they use up precious remaining resources to maintain the status quo instead of making preparations to adapt to a future of resource scarcity.

Odum and Odum argue that voluntary reduction of complexity in society is possible, writing in 2006:

Growth capitalism strategies were based on abundant available resources, while getting ready for descent requires the recognition that economic systems must downsize and adapt to resource oscillation. Growth is but a cycle in a resource cycle. Since the policy that works depends on the stage in the cycle and the next stage is economic descent, societies must be prepared and self-organize for the descent stage to be prosperous. Policies based on understanding could be the difference between a soft landing and a crash.

(Odum & Odum, 2006)

There are those that believe that technical solutions will be invented in time to resolve the various problems caused by the relentless expansion of human influence on the planet. However, Hueseman and Hueseman argue that science is intrinsically unable to determine the unintended side-effects of technologies that are invented and applied, and that these side-effects are unpredictable by the scientific method (Hueseman & Hueseman, 2011). Some argue that improved efficiency will help reduce consumption of resources. However, the Jevons paradox suggests that instead of reducing the consumption of a resource, improved efficiency often has the reverse effect and increases consumption, as the behaviour of the user adapts to take advantage of the increased capabilities of the improved efficiency (Jevons, 1865). Also, as technologies with improved efficiencies gain in popularity, the total number of users increases, thus cancelling out the benefits of improved unit efficiencies. An example would be motor cars that are becoming more fuel efficient but global numbers are increasing at a far greater rate, so total carbon emissions from motor cars are continuing to rise at an uncontrolled rate.

It would be unwise to base one's expectations of the future on assumptions that technological silver bullets will be developed, especially if they are not currently demonstrated to be achievable economically. For example, in an energy and resource-constrained future, the cost of research into nuclear fission may lose out to other pressing resources demands. Some argue that increased complexity of technologies has a negative impact on resilience (Greer, 2014). A simple mechanical product can be easily repaired or, if unreparable, taken apart and the parts recycled or repurposed. However, a product that combines complex mechanical and electrical parts will be beyond the abilities of the user to repair, and may also be beyond their financial means to commission a specialist to repair.

Many commentators dwell on the points of collapse, with some making forecasts as to when these are to occur and to what systems. The benefits of such predictions are questionable, and their accuracy impossible to verify. However, if we accept the inevitability of various types of collapse, without speculating as to their exact nature or severity, then we will inevitably become interested in understanding what happens after them. How do we as humans, and as a society adapt to changed conditions, in which there is now a lack of something that was previously taken for granted? In order to address this question we need first to make an assessment of what we as humans need as opposed to what is currently available to some members of society but that does not contribute to their wellbeing.

Human needs

In an age of plenty, few people take time out to consider what their basic needs are. A highly evolved physical infrastructure provides for everyone's basic physiological needs, while a state welfare system aims to support those who are unable to provide for themselves at any point in their lives. Aside from the basic physiological needs, human beings also need certain needs met in order to make them feel happy and fulfilled. It is people's relationship to these needs that consumer culture exploits in order to encourage economic activity. Therefore, in a consumer economy, genuine human needs and manufactured wants become confused and difficult to separate.

Abraham Maslow was one of the first to undertake a rigorous study of human needs. He came to see them as a hierarchy with distinct layers. At the bottom, he placed the basic physical needs for survival. Above these are four more tiers, which he labelled safety, belonging, esteem and self actualisation. His theory was that human beings will instinctively concentrate only on the level at which they are deficient in certain needs and will not be able to achieve higher level needs until those below them in the pyramid are met (Maslow, Frager, Cox, Fadiman & McReynolds, 1987). Maslow's approach to the subject of human needs seems to be informed by his background as a psychologist. It gave him a framework in which to analyse individuals' psychology and draw conclusions from people's life stories that may not otherwise have been apparent. However, there has always been debate about the validity of his approach, in particular the idea that higher level needs do not come into play until low level needs are met. One of the problems with his hierarchy is that it does not recognise that the way an apparently low level need is met affects some of the needs he has defined as high level. For example, the need for food can be met by any number of ways, from buying a prepackaged meal to cooking a meal using homegrown ingredients. Both will gratify the need for food but only the latter is likely to contribute to high level needs such as achievement or self-esteem. Also, most basic needs can be met in ways that vary greatly in the pleasure they can give. For example, thermal comfort helps provide homeostasis, an apparently low level need, but as Lisa Heschong argues in 'Thermal Delight in Architecture', this can be provided in any number of ways, many of which are rooted in our cultural backgrounds (Heschong, 1979).

Manfred Max-Neef provides an alternative model for understanding human needs to Maslow's. He identifies nine categories: subsistence; protection; affection; understanding; participation; idleness; creation; identity; and freedom. However, unlike Maslow, he did not see these as hierarchical (Max-Neef, Elizalde & Hopenhayn, 1991). He defined a number of different types of satisfier of needs, some being identified as genuine satisfiers, but others being false or having negative impacts on other needs.

Any society that measures its success on the level of activity in its economy relies on consumers to continue spending. This in turn requires the gratification consumers receive from their purchases to be temporary. Those who are satisfied with what they have do not need to keep buying products and services, and are therefore of no value to a consumer economy. Victor Papanek observed the way capitalism creates false goals in order to generate economic activity in 1971 (Papanek, 1971), whilst Max-Neef identifies advertising as a pseudo-satisfier that generates 'a false sense of satisfaction of a given need' ((Max-Neef, Elizalde & Hopenhayn, 1991). Despite the decades that have passed since Papanek's and Max-Neef's observations and the economic disturbances of the last decade, the model of consumer capitalism that they criticise continues to dominate today's globalised society, with profound implications for the

resource base of the planet. As a result, the question of whether we can find new models of meeting human needs without damaging future generations' prospects is becoming increasingly urgent.

Different societies will adapt to changing conditions in different ways dependent on the resources that are available to them, and also their political and social structures. Likewise, changes in conditions will vary dependent on geographical location. Since the focus of this study is in the UK, and specifically rural Wales, we need next to examine how current global conditions have affected the ability of local communities to meet their own needs, and how this is likely to change in the future.

3.3 The UK Context

The situation today

In the early hours of June 24, 2016, the UK experienced a profound shock when the result of the EU referendum was declared. Although the vote was expected to be close, most commentators were expecting that the country would elect narrowly to remain. The impact of the announcement that 52% of voters had chosen instead to leave the European Union was exacerbated by subsequent events in the political sphere. The Prime Minister immediately resigned and the Labour party descended into internecine conflict. Although a new Prime Minister was appointed within weeks, declaring that 'Brexit means Brexit', there was still no clarity about what Brexit actually meant.

The Brexit vote has already demonstrated itself as an event that was largely unexpected, certainly in that it was not planned for, and that will undoubtedly have profound implications for the country's future. As such it could be compared to the Black Swan events described by Taleb (Taleb, 2007). Many are fearful for the negative consequences the vote may have on the future of the UK, whether it be the potential for another recession, a constitutional crisis which may result in the breakup of the United Kingdom, or any number of other possible impacts. However, the result has also revealed the level to which the UK has already been suffering a crisis, no more so than in post-industrial parts of Wales. Adam Price, Shadow Cabinet Secretary of Business, Economy and Finance in the Welsh Assembly, has argued that many of those who voted to leave were voting against the status quo, and for a 'change project' (talk given at the White Hart, Llandeilo, July 14, 2016). The status quo in large areas of the UK is typified by economic decline and lack of investment that many would argue are a result of a globalised economy that increases dependency whilst simultaneously taking away self-reliance.

The irony for Wales is that the leave vote was particularly strong in areas where the EU has been investing heavily to try to regenerate social and economic infrastructure. This could be seen as evidence of the overwhelming influence of the global economic forces that are causing the economies of large swathes of the country to continue to decline, despite such investment, or otherwise it could be that the intended beneficiaries of EU investment have not themselves felt engaged with the process.

Because of the EU referendum, the UK has been confronted with realities that have been ignored or unseen, but have been developing at least until the financial crash of 2008. Although the housing crisis and cost of living crisis have been discussed for some years, for some these have remained as problems that others experience. Brexit has allowed a voice to those who have had first hand experience of these crises. As a political and constitutional crisis, this is now a situation that no citizen of the United Kingdom can ignore.

The failure of top-down measures to meet people's need for a home

Current models of best practice for the delivery of housing appear rooted in a culture that has not yet adequately confronted the imminent risks of resource scarcity or the profound impact that the converging environmental crises will have, or may already be having, on the world economy. The statutory frameworks as currently composed have limited opportunity for addressing the problems we face today and act to further disempower the economically disadvantaged. Increasing regulatory burdens are causing costs of newbuild to escalate at a time

when people's finances continue to be stretched. Strict planning rules limit development to tightly controlled zones, increasing the cost of development land which has to be transferred to house buyers. Equally, increasing requirements of building regulations also add substantial costs to end purchasers.

The Building Regulations Approved Documents undergo regular revisions, with the trend being towards increased complexity and more onerous requirements on house builders, whether developers or self-builders. For example, one of the consequences of the increasing complexity of Part L is the additional cost to the customer of commissioning the various consultants to prove compliance, costs which could otherwise have been spent on the built fabric. The combined costs can be substantial, and often make small scale projects economically unviable. While the intention is clear, the effect of the wide-scale application of these regulations on small projects is hard to measure, but inevitably some of the consequences will be at odds with the principles of sustainable development.

One new addition to the Building Regulations in Wales, that is likely to have a negative impact on small scale developers and self-builders, is the the new Part B, which introduces a requirement for fire suppressant systems to all new-build homes. This new requirement, which came into force from the beginning of 2016 means that sprinklers will have to be installed in all new homes. This is adding significant cost and complication to any self-builder, especially those in remote rural locations who are not connected to mains electricity or water.

In recent years Building Information Modelling (BIM) has gained in popularity, as evidenced by the UK Government's commitment to ensuring that all centrally procured projects achieve Level 2 BIM by 2016. BIM requires significant investment in IT infrastructure and expert knowledge in using the software. It has clear benefits for large high-budget projects, especially those involving repetition of design elements. All the information from consultants and suppliers needs to be rigorously coordinated to ensure that the model faithfully represents the building as it is to be constructed. In the context of the delivery of homes, BIM is best suited to urban apartment blocks and other types of development with a large number of units using the same materials and fittings. There are currently no regulatory requirements for BIM to be used on residential projects, but if these were to be introduced, small and medium size players would be further excluded from a house building industry that is already overly dominated by volume house builders.

Despite recent indications of a recovery in housebuilding, the number of new homes being completed in Wales remains very low. The last detailed report by the Welsh Government on the subject, which provides data up to March 2014, shows that the number of new homes being started annually in Wales slumped from over 10,000 in 2007-2008 to around 5,000 the following year, and failed to exceed 6,000 in any subsequent year (Welsh Government; Knowledge and Analytical Services, 2014). This compares to a need identified in the Holmans Report (Holmans, 2010) of 14,200 per annum. So, according to the figures in the Holmans report, for every five houses needed in Wales, only two are actually being delivered. Each year that this undersupply continues, the backlog of undelivered homes will continue to grow.

Although only a tiny percentage of the population in Wales is currently forced to sleep rough (Welsh Government; Knowledge and Analytical Services, 2016), the immediate effect of housing undersupply must be that existing dwellings and/or residential institutions are accommodating more people than those living in them would like. In the short term, this results

in more efficient use of existing housing stock, and lower carbon emissions than would be the case if all potential households were to be able to have their own home. However, the situation is causing generational inequalities and disproportionately disadvantaging younger generations by compromising their ability to meet their own needs at a critical point in their lives.

Local authorities no longer build homes but instead expect developers to build them as part of the 'affordable' homes provisions in their development plans or make financial contributions instead. In much of Wales, and especially in rural areas, most of those in need of homes simply do not have the financial resources to cover the additional costs that are being imposed on developers and prospective self-builders. For example, in Carmarthenshire, affordable housing commuted sum payments required on individual self-builds, often over £10,000 (Carmarthenshire County Council, 2014). When the economics of commercial building do not stack up then the inevitable outcome is that not enough houses get built. Meanwhile, development plans that allocate new housing land in a small number of large sites, combined with the burden of red tape acts as a barrier to those wishing to build their own homes.

Self-build: meeting one's need for a home

Previously accepted models for designing and procuring housing and the wider built environment are proving inadequate in dealing with the crisis in housing supply. As a procurement method, self-build currently represents a very small fraction of house completions, even in a market that is depressed across the board. However, given the inability of either social or private sectors to deliver the country's housing needs, one would expect an increasing number of resourceful individuals and communities to turn to self-build to house themselves. Indeed the National Self and Custom Build Association's (NaSCBA) research supports this. Survey data they provided to the Lyons Housing Review suggest six or seven million people are interested in building their own home. This compares to only ten thousand self or custom-built homes that are actually constructed annually (Lyons, 2014). Lyons identifies cost of land as the principal barrier to self-build (Ibid.), and this is a function of the supply of development land which is dictated by planning policy. Far higher proportions of self-build homes are achieved in nearly all other European countries which operate on similar economic models, so there is no fundamental reason why self-build numbers cannot be substantially increased in the UK.

The great majority of homes in the UK that are defined as self-built are actually only self-procured and built by professional contractors. Therefore the number of homes that the owners have a hand in constructing is smaller still. Self-delivery of this sort can be traced back at least to the plotlands of the early twentieth century, when individual pre-serviced plots were sold with permission to build on them. Initially conceived as holiday plots, many became permanent homes. The counterculture of the sixties and seventies was another period when self-build was popular. In the States, books like Ken Kern's 'The Owner-built Home' and 'The Owner-built Homestead' provided practical advice to those inexperienced in building on how to build their own home (Kern, 1972 & 1974). In the UK at a similar time, Walter Segal developed a timber self-build system that prioritises ease of construction and economy by making use of standard material sizes. In the 1980's, in circumstances similar to today, political writers argued for self-build to address the housing shortage of the time (Ward, 1985; Ospina, 1987). In a limited number of cases, some local authorities in London that were sympathetic to self-build created the conditions to allow the Segal method to be used as a social housing model. Some of those who were involved with the Segal method went on to become important advocates for self-build

in later years (Broome & Richardson, 1991; Borer, Willingham, Centre for Alternative Technology (Great Britain) & Walter Segal Self Build Trust, 1997).

In rural areas, self-build has continued throughout the last decades, often under the radar of an urban-centric planning regime. It has been used as a means to get by, its imperfections and hardships tolerated because alternatives are limited. Dominic Stevens observed this in Ireland in his book, 'Rural' (Stevens, 2007), which was published with apparently prescient timing in September of 2007. His criticisms at the time of the many and varied regulatory controls that interfere with people's ability to self-build as a way of making do look ever more relevant in this period of converging crises. Since then various glossy, beautifully presented reports have been published proposing self-build as the answer to the housing crisis (Parvin, Saxby, Cerulli & Schneider, 2011; National Self Build Association, 2011), and proposing ways that it can be encouraged. Meanwhile, in rural Wales, the far messier business of self-build continues despite the odds that are stacked against it.

Many of those engaged in the process of providing their own home with limited means in rural Wales would identify as members of the low impact community, and would describe their homes as low impact developments (LIDs). Low impact development has now been recognised by the Welsh planning system. By requiring that applicants demonstrate low ecological impact such developments are defined by the planning system as One Planet Developments (OPDs). Since the process of developing One Planet Development planning policy involved grass roots activists and practitioners, the concept and terminology of OPD has largely been embraced by the low impact community in Wales.

One Planet Development encompasses much more than simply the self-delivery of housing. A fundamental principle of OPD is that it allows the occupants to meet their needs for a home and for their basic human needs without damaging either the immediate or the wider environment. Taking steps to improve one's own self-reliance in this way helps one meet not only one's basic needs but those that Maslow identified as higher level. Former Environment Minister for Wales Jane Davidson, who introduced the OPD policy, observes this from her own experience in her introduction to 'The One Planet Life', writing that: 'basic needs are satisfied in a far more satisfying way in One Planet Lifestyles, because they are earned and actively contribute to an individual and mutual sense of self-esteem' (Davidson, 2015).

Economic, developmental and social models that have been accepted as standard during previous decades are showing themselves as no longer adequate for today's conditions. Although there is an urgent need for new models, political and regulatory systems seem ill-equipped to facilitate these. One Planet Development is one of the few models for development that addresses basic questions of how we can meet our basic human needs in an age of resource constraints. It has come about as a result of bottom-up processes, but has now been accepted and adopted in Wales as a positive model to pursue. It is therefore appropriate that we turn our focus on OPD and ask how such developments address the question of meeting needs with limited resources in both theory and practice.

4. The One Planet Development planning policy for Wales

4.1 Introduction

In 2010, the ‘One Planet Development’ planning policy was introduced in Wales, to ‘take forward Low Impact Development (LID) principles in the Welsh context’ (Welsh Assembly Government, 2010). Although through OPD, LID has been recognised as providing a valuable contribution to the search for more sustainable models of development, the limited amount of OPD applications approved to date demonstrates a continued cultural resistance to LID, whilst the ad hoc self-build approach and use of local and unprocessed materials has resulted in further tensions with other regulatory frameworks.

As the above quote suggests, OPD has its roots in the LID, so in order to gain an understanding of the current situation, we need first to study the background and history of LID. LID and permaculture, to which it is closely related, both rely on a close connection between people and resources, many of which are derived from the land. This requirement for land, combined with historic cultural differences between the LID community and mainstream consumer culture have resulted in the location of many Low Impact Developments in a deep rural setting. This has inevitably meant that LIDs have been at odds with the model of sustainable development sanctioned by planning orthodoxy. Therefore the review of the literature on OPD examines the planning situation, and the reasons and ways that the authorities responded to the demands of LID practitioners through introducing the OPD policy, and also the top-down measures that accompanied this to try to control development approved under this policy, most notably through the introduction of a requirement for OPD practitioners to measure their ecological footprints to ensure they meet their stated aspirations.

Much of the literature on OPD, LID and permaculture, including that written by academic experts on the subject, seeks to advocate this approach to development and living. I have therefore included in this chapter a number of case studies based on direct observation. The chapter then ends with a discussion that draws together the knowledge that has been gained from the literature with observations I have made by visiting the case study sites.

4.2 Literature

Low Impact Development: an introduction

Low Impact Development (LID) is the term commonly used to describe an approach to building and living that seeks to use natural and local resources wherever possible, and minimise the occupants' reliance on outside providers. As a movement, it has a clearly identifiable heritage that extends back to the counter-culture of the late sixties and early seventies. It has historically attracted people who see consumer capitalism as one of the main causes of the social and environmental problems faced by society. As a response to this, those in the Low Impact movement place great value on a combination of self-reliance and local cooperation as ways of reducing dependency and building resilience in communities. Low impact development can also be seen as part of the back-to-the-land movement, which has manifested itself in different ways across the developed world. Halfacree countenances against overstating the associations between counterculture and back-to-the-land movements, which, he argues is 'a very diffusive concept, whose borders blur into both more 'traditional' forms of agriculture and more 'bourgeois' forms of counter-urbanisation' (Halfacree, 2007). He also points out that gaining a livelihood from the land is challenging, and so ideological commitment to reruralisation has to be accompanied by hard work and skills. John Seymour was instrumental in both inspiring back-to-the-landers and providing them with practical knowledge (Seymour, 1976), and his legacy continues in west Wales, where he lived for many years. In recent years, the principles of permaculture have gained in popularity, often supplementing the traditional skills of smallholding.

One of the key figures of the Low Impact movement, Simon Fairlie, has campaigned for many years for changes to the planning system to allow those with genuine interests in contributing to the rural economy to live near to where they gain their livelihoods. In fact, he is credited by many for coining the term Low Impact Development when he published his book of the same name in 1996. In this book, he defined a Low Impact Development as 'one that, through its low negative environmental impact, either enhances or does not significantly diminish environmental quality' (Fairlie, 1996: xiii). Fairlie is an editor of *The Land Magazine* and a founding member of Chapter 7, which provides planning advice to those in rural areas struggling with unsympathetic planning regimes. Chapter 7 is named after the synonymous chapter from the Agenda 21 report from the UN Rio Conference of 1992, which argued for more equitable and sustainable methods of land-use and settlement planning and management (United Nations, 1992).

Although LID has often been viewed with suspicion by mainstream society, a number of factors are causing the movement to grow in popularity. LID is becoming relevant to more people due to changes both within the movement and in wider society. The recent changes in economic conditions, combined with an increasing awareness of the urgency of the environmental crisis, have caused many to question the value that they had previously placed on consumerism and to look for alternative ways of meeting their needs and aspirations. At the same time, many significant players in the LID movement have made efforts to engage local communities and others and to promote the benefits of low impact living.

Pickerill and Maxey identify LID as 'a radical approach to housing, livelihoods and everyday living' that offers valuable insights into how societies can adjust to more sustainable models in the future (Pickerill & Maxey, 2009). They argue that the flexibility inherent in LID and

permaculture ‘teaches us not only that we can survive changes in the environment, but that it is a process of constantly evolving and adopting to our changing needs and climatic uncertainty’ (Ibid.)

One proponent of LID, who has demonstrated its potential for mass public appeal is Ben Law. His self-built timber-framed house at Prickly Nut Wood (Law, 2005) was voted the most popular Grand Designs project of all time, and he now runs a successful business offering round-wood framed buildings near his home in rural Sussex. Meanwhile, in Wales, Paul Wimbush has been instrumental in raising the profile of LID by envisioning the Lammas project, and in particular the Tir y Gafel ecovillage near Glandwr in Pembrokeshire. His book, ‘The Birth of an Ecovillage’ recounts the effort and time it took to counteract a resistant planning culture before it was approved in 2009 (Wimbush, 2012).

Land use and planning policy

Since the introduction of formal development control in 1947, the planning system has needed to act as a buffer to uncontrolled and unsustainable development in the countryside. It has had some success in this goal, but has been far less successful in allowing development that would support the economy and resilience of rural areas. For some decades, the planning orthodoxy has been to rigorously control development in ‘the open countryside’, which is interpreted as outside a line called a ‘settlement boundary’ that the planning authority have drawn around everything they deem a settlement. This creates a split land market, with development land having a far greater value than land unlikely to receive planning approval. Historically those wishing or needing to live low impact lifestyles have found it easier to do so away from built-up areas. The low land values make the cost of owning or renting the land more affordable, and a degree of clutter that living within limited means entails is often away from public view and tends not to draw complaints from those living in working rural communities. When planning authorities have discovered LIDs, this has inevitably led to tensions and sometimes enforcement action. Given the numbers of people living in this way in rural west Wales, local authorities realised that prohibition could not continue to be their only response, and a process was commenced in 2002 to review policy to see whether LID could be accommodated in local development plans.

In 2002, the University of the West of England and Land Use Consultants carried out research into LID in Wales, and produced a report ‘Low Impact Development - Planning Policy and Practice’ (University of the West of England & Land Use Consultants, 2002). The research was funded by the Countryside Council for Wales, the Welsh Assembly Government, and Pembrokeshire Coast National Park Authority. This was followed in 2004 by a report by Baker Associates, which built on this research, but was focused specifically on ‘issues raised by the possibility of developing a LID policy’ (Baker Associates, 2004). The Baker report identifies the reason for a fundamental tension between the goals of LID and planning orthodoxy:

At the heart of the difficulty posed by the consideration of LID and planning is this. The planning system has a fundamental role in the promotion of sustainable development and LID is presented as a form of sustainable development, yet LID encompasses elements, notably housing, that are most fiercely resisted in the open countryside by use of the planning system, and with a concern for sustainable development cited amongst the justification for doing so. The task set for this project by the client and Brief is to find a practical way to resolve this paradox.

(Baker Associates, 2004)

The report concluded that a policy framework for allowing LIDs in the open countryside could be developed, as long as rigorous tests were met. In response to the recommendations in this report, Pembrokeshire County Council introduced Policy 52, which related specifically to LID, in their Unitary Development Plan (UDP). It was under this policy that Tir y Gafel, also known as Lammas, was approved on appeal in 2009.

Low Impact Development has now been recognised by Welsh planning law in the form of the One Planet Development policy in TAN6 Planning Policy document, which came into force in 2010. TAN 6 states:

One Planet Developments take forward Low Impact Development (LID) principles in the Welsh context. One Planet Development is development that through its low impact either enhances or does not significantly diminish environmental quality.

(Welsh Assembly Government, 2010)

The policy owes much to Fairlie's development of the LID model. In fact this definition of a One Planet Development (OPD) is almost identical to Fairlie's of a low impact development.

In planning terms, the OPD policy is highly significant, as it is the first national policy for LID, allowing development, including the building of new homes, in the open countryside. However, the policy sets stringent demands on those wishing to submit planning applications for One Planet Developments. Initially, very few applications were approved under this policy, partly because there was no technical help on how an applicant should go about compiling an application, or how a planning officer should assess one. In 2012, the release of the Practice Guidance addressed this weakness, and the number of applications and approvals has been increasing steadily. In 2014, the One Planet Council was formed, as an independent voluntary body with the aim of promoting and supporting One Planet Developments.

Simon Fairlie, who provided much of the inspiration for the OPD policy has also been one its critics. Although a model of living that relies on local resources inevitably requires a low density development pattern, Fairlie is aware of the dangers of dispersed development that much current planning policy tries to control (Fairlie, 2009). The OPD policy aims to address these concerns by requiring submissions that demonstrate that issues such as transport, ecological impact and financial viability have been carefully considered. However, Fairlie has argued that there is insufficient incentive to locate OPDs at the edges of settlements, given the restrictions of all other planning policy on any residential development outside of settlement boundaries (Fairlie, 2013). Fairlie has also criticised the OPD planning policy for the numerical targets and assessments that are imposed on applicants (Fairlie, 2013). The Practice Guidance (Welsh Government, 2012) runs to over seventy pages, and itself references other standards such as the now discontinued Code for Sustainable Homes. For those of modest means, this document may indeed appear daunting. However, it does appear designed to make some of the requirements of the OPD policy more achievable than one would have expected from reading of the policy document alone. Nonetheless, one would imagine that Tainter would see this piece of regulation as an example of his observation about complex societies adding additional further of complexity in order to solve a problem (Tainter, 2006 & 2010).

Although the current shortcomings of OPD planning policy are recognised by many of those looking to advance the principles of one planet living, a number of initiatives are underway that seek to work with the opportunities it presents whilst simultaneously lobbying for improvements to the regulatory framework. The One Planet Council was established in early

2014 with the stated aim of providing ‘a bridge between applicants and local planning authorities, with guidance and tools to support anyone making the transition to this more sustainable way of life’ (oneplanetcouncil.org.uk). It is also lobbying the Welsh Government for a new policy for settlement-connected OPDs that would recognise the benefits to existing towns and villages of having such developments in close proximity to them. Meanwhile, the Calon Cymru Network, which includes architects, planners and specialists in sustainable agriculture and forestry in its list of members, is advocating a bold vision for revitalising the rural areas along the Heart of Wales railway corridor following One Planet development principles (Calon Cymru Network, 2014). Since current local and national policies do not match the scale of ambition of this vision, they are proposing that whole railway corridor be designated a Strategic Development Area. This proposal has received cross-party interest, with Plaid Cymru including it as a commitment in its 2016 manifesto (Plaid Cymru, 2016: 79).

The design approach of permaculture

A permaculture approach is often adopted on land-based LIDs, as it provides useful design tools for food production and resource management on a small scale. Permaculture is a term that was invented by Bill Mollison and David Holmgren in the 1970s to describe an approach to sustainable design, land management and food production that aims to work with natural process to maximise the benefits to people without the need for continual inputs (Mollison & Holmgren, 1978; Mollison, 1979). Bill Mollison defined the term in his book, ‘Permaculture, a Designers Manual’:

Permaculture (permanent agriculture) is the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability and resilience of natural ecosystems.
(Mollison, 1988)

Holmgren has more recently stressed that the organising framework for implementing the aims of permaculture is based on ‘the use of systems thinking and design principles’ (Holmgren, 2007). From the outset, Mollison and Holmgren chose to maintain permaculture as a structured design methodology. Individual national associations regulate the teaching of permaculture and ensure that courses follow a prescribed structure. One of the main aims of these courses is to encourage an organic, iterative approach to designing and adapting one’s environment. In order to facilitate clear communication of the methodology, twelve key Permaculture Principles are taught on all the courses. Three of the twelve demonstrate the importance placed on an iterative approach to design. They are as follows: ‘Observe and interact’; ‘Self-regulate; accept feedback’; and ‘Creatively use and respond to change’. Therefore it is evident that adaptation to changing conditions is at the core of the permaculture approach. The reasoning is that by mimicking the cyclical processes in nature, the permaculture designer intends to benefit from the inherent efficiency of the organic world. Aside from the design courses, there are a wealth of books that give advice to those wishing to follow permaculture principles in different settings. Some focus on food production and land management (e.g. Whitefield, 1993; Law, 2001; Crawford, 2010), whilst others aim to encompass a wider context of sustainable living (e.g. Bell, 1992).

There has been criticism that many of the claims of permaculture are not backed up by empirical evidence. Peter Harper, Research Director at the Centre for Alternative Technology challenges the claims by some permaculture advocates of its ability to create abundant productivity, arguing that it has ‘entirely oversold the idea, claiming to have found the Holy

Grail of a low-input/high-output system' (Harper, 2013). He also questions the relevance of permaculture methods when applied outside of the field of food production: 'for some people 'permaculture' is a generic term for sustainable living, giving another whole set of shifting, fuzzy meanings' (Ibid.). Harper does however recognise the importance of permaculture when viewed as a set of pragmatic rules of thumb, and suggests that since the conception of permaculture, Holmgren has followed a rigorous, evidence based methodology (e.g. Holmgren, 2011), while Mollison has not provided adequate evidence to back up his claims.

Despite some of the criticisms levelled at permaculture, as a methodology it does itself advocate that the practitioner gather evidence and respond appropriately. Any system that is based on low inputs of energy or other resources needs a deep understanding of the processes involved, and given that food production and land management is so dependent on local climate and ecology, then there can be no one solution for all situations. The principles of observing, reflecting on what one sees and responding appropriately engender the type of long term thinking lacking in much of today's industrialised agricultural system (United Nations Commission on Trade and Development, 2013).

Living within one's means

Around ten years ago we became aware of the significant numbers of people in our country, who were opting to live very simple and sustainable lives. People who were living within their means, both financially and ecologically.

(Dale & Saville, 2011)

One Planet thinking, from which the OPD planning policy draws, is an attempt to apply a global perspective to the principle of living within one's means. The concept of living within one's means can be understood in both individual and collective terms. A wealthy person can live within their financial means but if their lifestyle is based on a high level of consumption and resource use it would be beyond the environment's means to support this way of living if it were replicated across society. Just as individuals need to behave in a way that recognises the constraints of their personal finances, society as a whole needs to work within the constraints imposed by the resource base of the planet in order to sustain itself.

On a day to day level, where a stable income is deemed likely for the foreseeable future, living within one's means is a simple balancing of income against outgoings. However, for those feeling the impact of turbulent economic conditions, the calculation is more difficult to make as it requires a degree of speculation about the future. Favourable conditions need to be recognised and capitalised on, to improve survival chances during harsher times. Investments in the future may be financially quantifiable or their value may be more difficult to measure, and dependent on a particular set of conditions arising at some point in the future.

It has been argued that a typical UK individual is consuming enough resources to require three and a half planet Earths (Thorpe, 2015: 5). Leaving aside the question of the reliability of the data underpinning such an assertion, it is a powerful image that helps one visualise a fact that few would question, that humanity is working its way through the planet's resources at an unsustainable rate. OPD planning applications require the submission of an Ecological Footprint Assessment (EFA). This way of quantifying one's environmental impact uses expenditure to estimate ecological footprint. Although this can only provide approximations based on certain assumptions, it does at least expand the scope beyond the carbon footprinting tools that have

previously been the standard metric. Given that climate change is only one of many environmental threats, then despite the practical difficulties in quantifying such a complex measure as ecological footprint, the effort to do so must be worthwhile. As Pooran Desai, the co-founder of Bioregional and One Planet Living argues: ‘Science tells us we need to reinvent our relationship with the planet - the metrics of ecological footprint and planetary boundaries must be fundamental to our way of life. Now is the time to create new options. We have no option’ (Desai, 2015).

For some, low impact lifestyles are more a question of necessity than choice. Those who are unable to access the funds or the credit needed to participate in the housing market need to provide shelter for themselves as best they can, by making do with the limited resources they have available to them. In such cases, necessity is the driver of creativity, instigating new ways of putting the world together. However, the necessity to improvise often places the person making do outside of the conventional parameters of mainstream society and challenges established notions of propriety and acceptable behaviour. When such norms are formalised into planning or building regulations then this inevitably results in conflict.

Tensions with regulatory frameworks

In a recent article on OPD, I identified ‘differences in world views between LIDers and the writers and administrators of regulations’ as the cause for significant barriers to this model (Waghorn, 2016). Permaculture principles are based on whole systems thinking, which recognises the interdependence and interconnectedness of the parts in complex systems. As Katherine Jones argues, this is at odds with the ‘tendencies towards dualism, reductionism and positivism’ (Jones, 2015) that typify the regulatory frameworks that impinge on OPD. The planning system in particular struggles to deal with permaculture’s organic approach to designing and adapting one’s environment, as is commonly practiced in LIDs. This is illustrated in Tolle’s account of issues experienced at Tir y Gafel, otherwise known as Lammas:

‘...all residents described how they were rethinking their design to feedback from the land, e.g. experiences of frost pockets. But although an evolving process is fundamental to permaculture, every deviation from the planning permission could be revised. Thus, the expected visit of a planning inspector caused much tension.’

(Tolle, 2011)

Despite the advent of OPD policy in Wales, there continues to be a disconnect between the world-view of the planning system and the reality of low impact and one planet living. Even in cases where there is an approved dwelling on site, the type of site occupation typical of LID is often incompatible with the premises of the planning system. One example is the notion of a dwelling curtilage which is marked around the ‘house’, and which is intended for ‘amenity’ use. This is commonly understood as a garden, with mown lawn, ornamental planting and so on, whilst beyond this would be the ‘agricultural land’, commonly understood to be fields with crops or livestock. However, few such notions would have much relevance to an LID practitioner, and the idea of clear delineation between these zones goes against such permaculture principles as ‘integrate rather than segregate’ and ‘use edges and value the marginal’.

The other major area of legislation that acts as a barrier to making do is the building regulations. The building regulations play an important role in ensuring buildings create healthy and safe

environments, and their role in ensuring the safety of amateur self-builds is critical. However, recent issues that low impact developers have had with the enforcement of building regulations suggest that there is a risk of these regulations jeopardising the viability of low cost self-build. In 2011, Simon and Jamine Dale of Tir y Gafel wrote about their personal experience:

It is apparent from our experience, as well as consideration of the wider matters involved, that there is at the very least a tension, if not an incompatibility, between the conventional application of the building regulations and LID.

(Dale & Saville, 2011)

The process of delivery of a low impact self-build should not mean that it is any less safe than a conventionally delivered building, and this necessitates oversight by a building inspector. However, if the regulations that the inspectors are required to enforce place considerable financial burdens on a self-builder, then at some point either they will not be able to carry out the project or they will try to operate outside of the regulatory system. Neither of these eventualities is desirable. There is therefore a need for a sustained effort to reconcile the differences in world view between legislators and OPDers. This work is already underway, with writers such as Karolina Rietzler arguing for the integration of institutional scientific knowledge with knowledge gained from grassroots initiatives (Rietzler, 2012). I have also previously argued for ‘a strengthening and deepening of the processes of engagement and communication’ between practitioners and theorists (Waghorn, 2016). It is to this end, then, that I turn to a number of case studies, to learn how the principles of permaculture, OPD and LID are applied in real life situations.

4.3 Direct Observation Case Studies

Introduction

Much of the literature regarding OPD, LID and permaculture is written with the intention of advocating these approaches to living and building. This includes much of the academic literature, which is written by those who self identify as ‘acadivists’ ie both activists and academics (Pickerill & Maxey, 2009). In order to better understand the current situation regarding One Planet Development in Wales, it is therefore appropriate to introduce a number of case studies at this stage to see how such an approach manifests itself in specific examples.

Over the course of the past five years, I have visited a large number of sites where the occupants have identified with the principles of permaculture or LID. The reasons for such visits are many and various, and include: organised site visits, pro-bono consultancy work, meeting a need for accommodation, attending meetings, visiting friends and much more. For all such visits, I had in mind their potential usefulness for this research project, but in only one case was this the only motivating factor for the visit.

The direct observation case study sites are as follows:

- CN - A group of roundhouses on the site of a well-known eco-community;
- UC - A former mill house in a remote location with outhouses and food growing areas;
- DI - A community of residents living in separate small structures, sharing a communal hub;
- BD - A woodland site with an A-frame house, previously occupied by a family of four;
- OD - A family’s self-built timber framed house, with food-growing areas and outhouses;
- HB - A former commercial nursery with large polytunnels converted to mixed permaculture;
- GC - A market garden, the owners of which are living in a static caravan, while they self-build a straw bale house.

These seven were chosen from a pool of twelve, all of which I visited during the period of the research project. Some of these were not considered suitable due to a lack of material generated by a site visit. For example, the occupants of one site did not allow the taking of photographs. The final choice of seven was made to ensure a good mix of different types. Care has been taken to ensure the inclusion of sites that are both famous and largely unknown in the LID community, and each site has a different set of building types.

The purpose of these case studies is to provide examples of a range of situations where One Planet and Low Impact principles are applied and provide some context for these situations. The process of observing evidence through photography has then informed subsequent stages of research and analysis.

Analysis of all of the direct observation case studies is based on a single visit to each. Without the variety of interests and connections outside of the defined scope of the project, it is unlikely that the opportunity for visiting such an extensive range of sites would have been possible. However, the fact that I was often engaged in activities unrelated to the research project whilst on site meant that the material for the research project needed to be obtained as and when the opportunity arose.

In all cases, I was given a site tour by someone resident on site and directly responsible for

many of the instances of self-build that were the subject of study. These site tours allowed snapshots to be taken both of the overall site and specific details that drew my attention. On all occasions, I was able to have an open, unstructured conversation with the resident about the history of the site and their involvement in it.

Since the information from each direct observation case study site is based on a single visit, the analysis and photographs represent only a moment in time. I am aware of developments on some, but not all of the sites. This information has not been included in the site descriptions. This is so that each of the seven is treated consistently, and also for simplicity of analysis.

Some of the structures that are the subjects of study have been built and occupied without statutory consents. This meant that I needed to be sensitive to the wishes of the occupants. In order to maintain their anonymity, the sites are identified by a two letter code that is related to their names, but are not exact acronyms. This also ensures that their identifiers do not imply a sequence, as a numbering system would.

The methodology used in these case studies is direct observation, with photography being the principal vehicle of observation. Direct observation is one of the most common forms of research method, in a wide range of fields. It is well suited to quantitative data collection but can also be used for qualitative research, as is the case here. The purpose of direct observation in this study is to test the findings from the literature about OPD and LID, and to help define the research design and questions to be explored in the fieldwork. The use of photographs as a research tool is well established in the fields of ethnography and anthropology (Collier, 1967; Pink, 2006).

Direct Observation Case Study: CN



*Fig. 4.1 One of several roundhouses on the site, with overhanging eaves used for storage
Source: the author*

The buildings at this long-established community in west Wales consist of an original stone farmhouse, outbuildings and polytunnels, and a number of recently built roundhouses located a short distance away from the main house, down a dirt track. Aside from the natural landscape that surrounds the roundhouses, there are a number of small structures including a log store and an external compost toilet, and food growing beds.

The roundhouses are built with timber from the site. Their structure is composed of posts dug

into the ground, a ring beam and a reciprocal frame roof with central skylight. The external walls are cordwood and the roof is turf over an EPDM membrane. Under the membrane, a web of willow branches spreads the load of the roof to the reciprocal frame members.

The roundhouse pictured above provides accommodation for visitors, many of whom are WWOOFers. WWOOFers are volunteer workers who provide their labour for free in exchange for board and lodging. They are motivated by a desire to contribute to projects that they see as for the common good and also to learn new skills. WWOOFing, which is common on low impact projects, helps make activities such as market gardening viable despite the low economic returns that are involved.

The roundhouse is surrounded by a broadleaf woodland, which has provided much of the timber for the build. The building is so integrated into its surroundings that it appears to be part of the landscape. The deep eaves provides storage space for firewood, food and other materials. Even on close inspection, the cordwood of the walls was hard to distinguish from the stacks of firewood. The pieces of wood in, on and around the roundhouse, are clearly only one step away from the branches of the trees that surround it.

Direct Observation Case Study: UC

This is a smallholding in a remote rural location. The original stone dwelling, which has been extensively refurbished using local and natural materials, is surrounded by outhouses, used mainly for storage. A caravan used for guest accommodation is covered in a sheet metal roof, supported by a structure independent of the caravan, which also creates a veranda over a deck on the entrance side.

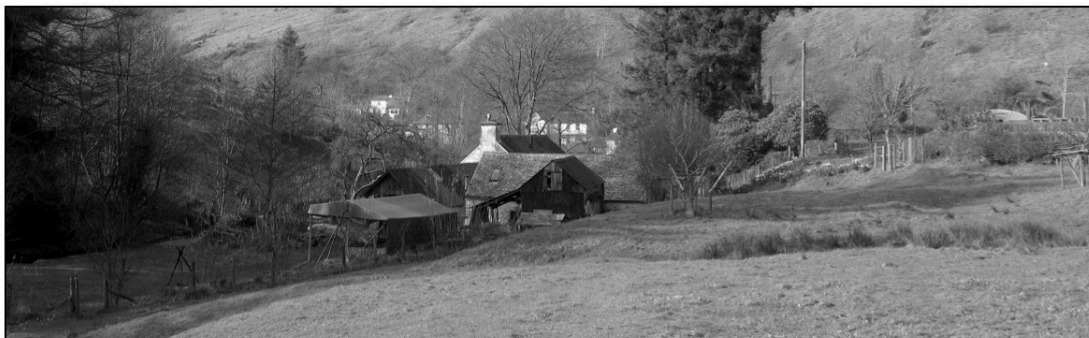


Fig. 4.2 Site photograph of UC: the house is in the centre of the photo, behind the barns and outbuildings, whilst the top of the polytunnel can just be made out on the right | Source: the author

On the day of the site visit, there were external vegetable beds and a polytunnel, around which ducks were roaming. A small field occupying a significant part of the site was given over to grazing and a pond had been introduced to increase biodiversity. Facing the field was a line of beehives.



Fig. 4.3 Outbuildings at UC: messy at a detailed scale, picturesque at a large scale | Source: the author

Viewed from a distance, the buildings appeared well integrated into the landscape, but at a detailed level there was a degree of clutter. For example, the gutter to the outhouse seemed to be quite ready to retire from its role of channeling rainwater, and join the other various objects on the ground below. Meanwhile, the tools propped up against the wall were in various states of disrepair. Spades, shovels and rakes are all used to work the ground, and as handles become separated from the working end, they seem destined to end up planted in the ground as stakes for one purpose or another. The apparently precarious state of the buildings and the general mess of objects served to break down the boundaries between buildings, objects and context.

Direct Observation Case Study: DI



*Fig. 4.4 Site photographs of DI showing various small structures used for accommodation
Source: the author*

This is a small community which was established as a place for artists to live and work, but has developed into a facility that is open to the public and that aims to combine the principles of low impact living with the creativity of an artistic community. The centre, which is open to visitors, offers courses and workshops for groups, schools and colleges and also hosts conferences and

weddings. Individuals, families and small groups can rent yurts for accommodation.

On the date of the site visit, residents were living in a variety of accommodation including yurts and repurposed railway carriages. There was a community hub with shared kitchen and dining space, and a separate art studio. A forest garden, polytunnels and external growing areas provided much of the food for the community, and there was also a large area of woodland, that provided building timber and logs for heating. A market garden produced vegetables for sale commercially.

The various types of individual accommodation at DI are all compact and only provide for the most basic of needs for each resident. They provide shelter and are places to sleep, work and rest only. Given that all the other various needs, including cooking, washing and going to the toilet, are accommodated elsewhere on the site, the occupants need to go outside on a regular basis, in all weathers. The shared hub building not only provides for functional needs but also acts as a focus for the residents. Meals are usually eaten communally and this provides the opportunity to socialise and also discuss issues of practical importance to the community.

Direct Observation Case Study: BD

This is a 15 hectare site composed of a mixture of deciduous woodland and plantation softwood, the majority being larch. An A-frame house, constructed from site-sourced timber and reclaimed materials, projects from a slope overlooking a clearing. It was self-built by the previous owners, a family of four, without planning permission or building control approval.

Due to the slope, the front end of the house is elevated above ground level. Each corner is supported on a roundwood larch pole which is dug into the ground. On the date of the site visit, the undercroft was used as covered storage for a variety of materials and equipment. Inside, the lower level had an open plan kitchen, with the living area having a window overlooking the clearing down the slope. A bathroom was accessed off the kitchen, as was a bedroom, which faced up the slope. A ladder from the living area led to a loft over the kitchen and bedroom, which was used as a sleeping and play area for the two children. On one side of the house, the roof was raised and a vertical wall was built to better accommodate the bathroom and children's loft area.



Fig. 4.5 The A-frame house at BD built on a wooded slope (left); and PV panels on the ground next to the house (right) | Source: the author

The location of the house, away from any vehicular access, ruled out the appropriation of an existing product such as a caravan. A mobile saw on site allowed the square cutting of timbers from the site for the purposes of building the house. Other materials and fittings were chosen for

with their portability in mind, for example lightweight metal panels were chosen as the roof finish.

The rudimentary method of construction and ad hoc adaptations such as the side extension give this house some of the characteristics of a shack, while the choice of site-sourced materials for practical reasons makes this house similar to a woodland cabin. Both ‘shack’ and ‘cabin’ suggest a sense of the handmade by the person who inhabits it. This description certainly applies to this woodland home, and sets it apart from the typical American A-frame house, which would often be built speculatively by a developer.

Direct Observation Case Study: OD



Fig. 4.6 The timber framed self-built house at OD | Source: the author

This family home was entirely self-built in timber, much of it sourced locally. It was designed to meet the definition of a caravan, so that building regulations would not apply. The site accommodates food growing areas and an assortment of ancillary buildings including workshops, polytunnel and repurposed containers used for additional accommodation.

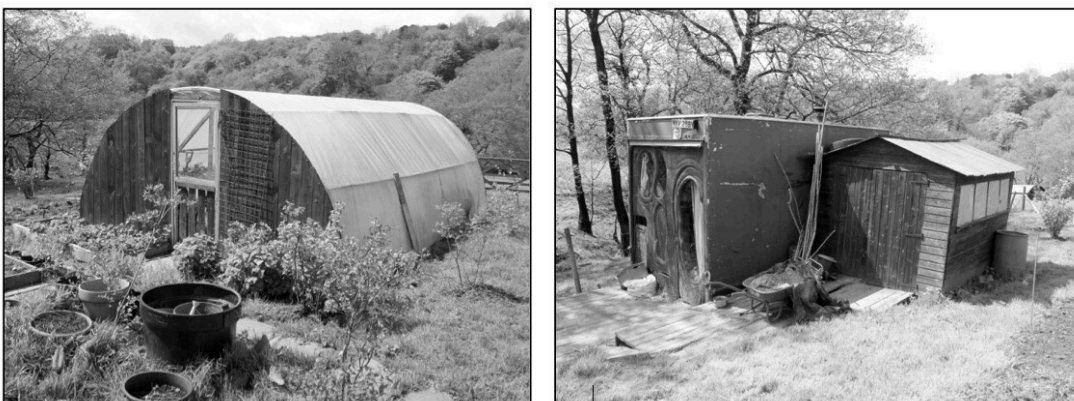


Fig. 4.7 The polytunnel (left) and the teenage son’s bedroom (right) at OD | Source: the author

The polytunnel was made from an old trampoline frame, which had been cut in half, with each half forming the semi-circular hoop frame at each end. Steel tubes were then inserted into the sockets for the trampoline legs at each end. In order to counteract the lateral tension force from the polythene, two sets of intermediate timber frames were built. The ends were covered in timber planks with gaps that allowed ventilation and the entrance was an old glazed PVC door.

Near to the polytunnel, nestled next to a timber shed, was the former enclosed box body from a van. The rear shutter was up, revealing a carved timber door and side panel, with organically shaped glazing panels in the door and side panel. I learned that this box had originally been part

of a van owned by the father of the family and had been used as a mobile ad hoc home, but had recently become the bedroom of one of the teenage sons.

Direct Observation Case Study: HB



Fig. 4.8 Bow top caravan, home to the site owner (left); and the double span polytunnel (right)
Source: the author

This site used to be a commercial nursery for flowers for municipal sites. Part of the site is occupied by a large twin-span polytunnel, with a second single span version adjacent to it. There are well established fruit trees and vines inside the larger polytunnel. Externally, there is an orchard of apple trees and a variety of other fruit trees. On the day of the site visit, the second polytunnel was used for storage, and drying of timber and clothes. The owner was living in a bow top caravan, and was building a low energy timber framed dwelling. There was a chicken enclosure and various areas given over to the growing of annual and perennial vegetables. There is a stall at the gate for sale of produce grown on site.

There is a small barn and adjacent to it a newly-built timber clad disabled-accessible composting toilet. Courses are offered to various groups including children from local schools and colleges. The interior of the large polytunnel is occasionally used for workshops. On the day of the site visit, which was a warm and sunny September's day, there was a conference on OPD, which started in the large polytunnel, before relocating to the grass outside for the afternoon. As is common also with permaculture work days, each attendee was asked to bring a homemade dish to share for lunch.

Direct Observation Case Study: GC

GC is a market garden on the edge of a small village in west Wales. The owners, a couple who are both trained as fine artists, are in the process of self-building a straw bale house. While this is ongoing, they live in a static caravan, and a second one adjacent to it is used as accommodation for volunteer helpers, known as WWOOFers. The interiors of the static caravans have been adapted, with internal walls being removed to allow more open-plan living. There is also a touring caravan on site, which is used to accommodate occasional visitors.

There are a number of ad hoc structures scattered around the static caravans. A compost toilet is clad in corrugated metal sheets that have been salvaged from site. There is a covered area,

described by the owners as a ‘camp kitchen’, with cob oven and seating area. At the other end of the caravans are a couple of small greenhouses.



Fig. 4.9 View looking down past the strawberries to the static and touring caravans | Source: the author

A south-facing slope rising above the caravans is used for growing, and on the day of the site visit was mostly given over to strawberry plants replete with strawberries. A second field at the top of the slope contains two large polytunnels used for food growing. There were various materials lying about, including a frame for a third polytunnel that I was informed was soon to be erected.



Fig. 4.10 Ad hoc measure to harvest rainwater from the roof of the WOOFERS' caravan (left) and an art piece called 'Opie & Dee' hiding in the undergrowth behind a pile of materials | Source: the author

On the day of the visit, there was an exhibition of contemporary art that the owners had curated. Most works were in the straw bale house, which at this stage was a single open plan space, with some pieces located elsewhere on the site. The exhibition was titled ‘Human Needs’, and artists had interpreted the theme in a rich variety of ways. A number of the works could be described as site-specific installations, and there was evidence of performance art from the opening event a couple of weeks previously.

There were various ad hoc measures to aid in the growing of food, including some very home-made looking arrangements to harvest rainwater from one of the static caravans and from the polytunnels. Also, buckets of diluted urine stood ready to add nutrients to the crops. The various crops, including the aforementioned strawberries, and tomatoes and beans inside the polytunnels, were neatly set out and obviously carefully tended, suggesting a high degree of expertise and experience, and providing a contrast to much of the clutter evident elsewhere on the site.

4.4 Typologies

Introduction

The photographic record of these seven case studies provides an opportunity visualise common characteristics between different sites. This has been achieved by the process of grouping photographs from different sites to identify shared typologies. These groupings are then used to make observations, with the aim of further elaborating on the nature of the connections between the case studies.

Identified typologies



Fig. 4.11 The house at BD (left); and one of the roundhouses at CN (right) | Source: the author;

Despite having very different forms, the A-frame house at BD and the roundhouse at CN have much in common. Both have been built using roundwood timber from their respective sites. Ease of construction was one of the motivating factors for the choice of an A-frame for the house at BD, though the self-builder admitted to me that he would not build an A-frame house again as it created an awkward space that was difficult to use. Constructing a roundhouse requires particular skill at carpentry, particularly as the roundwood timbers are not orthogonal. However, the builder of the roundhouse at CN was already experienced in this typology, having already built several both on this site and others.

The rudimentary appearance of these buildings, and the use of a combination of unprocessed site-source timber and recycled materials and elements, including windows, mean that they both seem to be somewhere between the typologies of shack and cabin.

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Fig. 4.12 Three roundhouse roofs showing the reciprocal frame and central skylight (the left one is from CN) | Source: the author

The left hand photograph above is of the reciprocal frame roof of another of the roundhouses at CN. The other two I have taken of examples of this typology on other sites I have visited. The two photographs on the left use softwood poles as the main members, while that on the right uses hardwood branches, resulting in a more organic appearance. In the case of the two examples on the right, thinner secondary members are arranged in a spiral running perpendicular to the reciprocal frame members. However, in this arrangement, the further from the centre they are, the greater the distance they need to span between the primary members. The addition of rafters parallel to each reciprocal frame member avoids this problem. The use of this approach at CN may have been required due to the fact that this is a larger roundhouse than the others, so the spans towards the perimeters would have been too large for the previous method.

Different approaches to design and construction of roundhouse roofs may be the result of a number of factors such as the materials available from the site, the previous experience of the roundhouse builder or the shape and size of the building. Graham Brown, who is credited with popularising this design in the UK over recent years, has said that the idea for a reciprocal frame roof came to him ‘out of nowhere’. However, the development over the subsequent decades of this typology appears to be following a similar pattern to vernacular architecture, as it evolves to meet particular conditions and requirements. Knowledge is passed from experienced roundhouse builders to others who then gain skills that they in turn are able to pass on in the construction of further roundhouses. As with the original vernacular, architects have had little involvement in the recent development of this typology.

If the roundhouse is emerging as a new example of twenty first century vernacular architecture, it is still extremely young in comparison to the time frames that pre-industrial vernacular building types were able to develop. Much of the evolution of vernacular architecture comes about through trial and error, but some types of error are not evident for many years. For example, one of the most significant issues for an untreated timber frame structure comes from the risk of rotting timbers, and the effects of this take time to reveal themselves. If and when they do, new examples of this type of building then need to be built to adjusted designs and tested again over this long time-frame. It is therefore likely to take many more decades before lessons learned from such slow processes can be incorporated, to allow the contemporary roundhouse to develop the maturity of approach typical of genuine vernacular architecture.

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Fig. 4.13 Beehives at UC | Source: the author

There were beehives at UC and at HB. The beehives at UC, all neatly lined up and evenly spaced, were like a readymade Becher series. If they had all been to the same design, there would have been little reason to study them as a series. However, the fact that each had been put together with an assortment of reclaimed parts meant that no two were the same.

Beehives need to follow a particular design. They are composed of stacked elements, each performing a different function. Sitting on the base is a bottom board, with an open front to act as entrance for the bees. Above this is the hive body, where the queen lives and lays her eggs, and the bees also keep honey and nectar. Above the hive body is a mesh called the queen excluder, that keeps the queen out of the supers, above. The supers are where the bees put the excess honey, which can then be harvested. Extra supers can be added during the summer when the bees are most active. Above the supers are the inner and outer covers which protect the bees from the elements while still allowing ventilation.



*Fig. 4.14 Three different improvised entrance restrictors on three different hives at UC
Source: the author*

In the winter, entrance reducers are needed to help the bees to limit the area that needs to be defended. This is important as at this time their population is reduced and there are less foraging visits. By zooming in on three different entrances, it can be seen that different methods have been used to achieve a reduction in the opening size. In two cases, fragments of perforated metal mesh, of two different types have been fixed over the entrance, held in place with rusting drawing pins. In the third case, a piece of timber with a reduced opening size has been inserted into the larger entrance opening.

Instead of relying on a complete designed kit, the ad hoc use of different materials to create the different elements of a bee hive required an intimate understanding of the needs of a bee colony. It may be that this requirement to engage with the role of individual parts ensures that the bee keeper is more attentive and responsive to the behaviour of the hive than he might otherwise be if using a standardised product.

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Fig. 4.15 Photovoltaic panels: at BD (top left); at CN (top right); at OD (bottom left); and at GC (bottom right) | Source: the author

Photovoltaic panels were photographed at BD, CN, GC and OD. The above grouping reveals that the choice of their location at all sites seems to some degree to be provisional. A more conventional approach would be to try to integrate them into the architecture, most typically fixing them to a pitched roof. Sometimes this is done even if the orientation of the roof is not ideal, or there is sufficient space to locate them on the ground. Could this be because in such cases, ideas of neatness are taking precedence over practical concerns? Although the four approaches photographed here are all different, they do all seem to indicate that practical requirements such as efficiency or maintenance access have been the primary factors in the decisions made in their installation. When all one's electricity comes from site, then it is hardly surprising that one would want to make certain that the solar panels are producing the most electricity they possibly can. The simplest approach, of propping them up on the ground, as used at BD, is also the one that allows the most flexibility if changes are needed.

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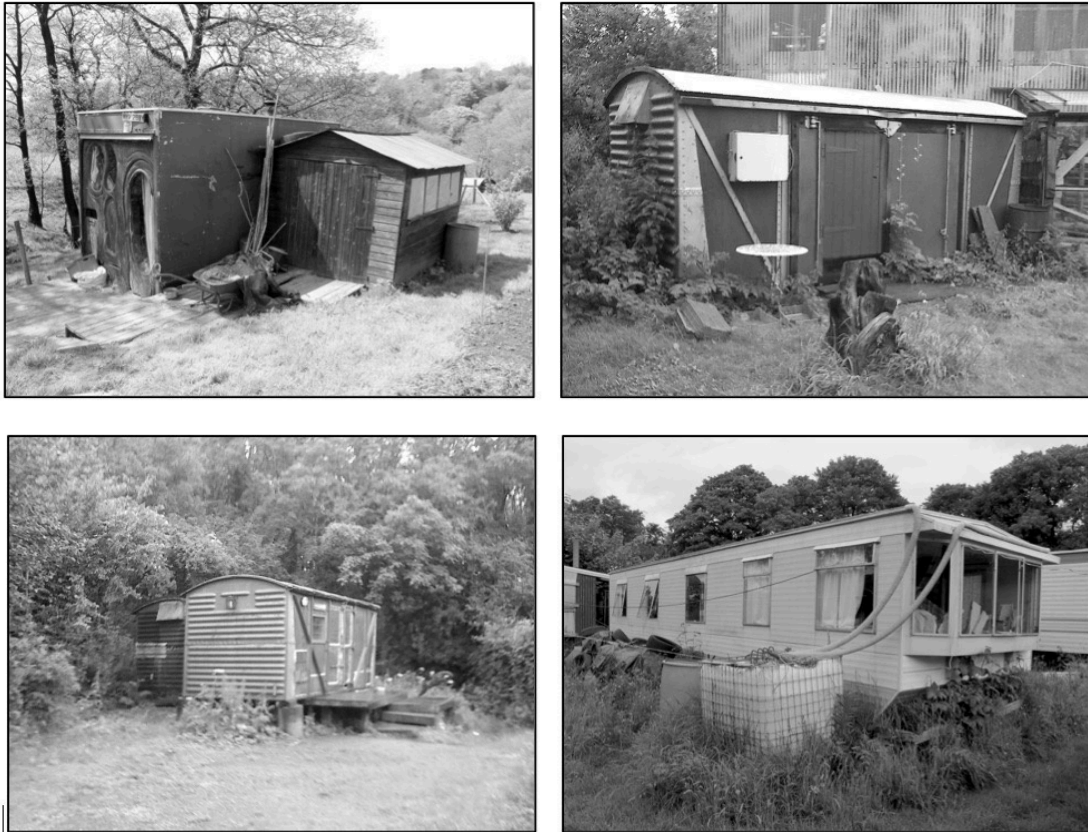


Fig. 4.16 A repurposed lorry box body at OD (top left); freight railway carriages at DI used as ad hoc homes (top right & bottom left); and an adapted caravan at GC | Source: the author

One of the most common typologies encountered in the direct observation case studies was the found or appropriated habitable box, used as a dwelling core. These included freight railway carriages, a van box body, pods and various types of caravan. The freight railway carriages at DI and the van container box at OD both provided sleeping quarters despite neither example being originally intended for this purpose. In other cases, products such as caravans had needed to be adapted to meet the demands of full-time use. An adapted static caravan at UC was rented out as holiday accommodation, and the resident of HB lived in a gypsy caravan, though he was in the process of building himself a new house. In some cases, not all the residents' core needs were provided in a single self-contained home. At DI and at OD, a variety of appropriated boxes provided shelter for individuals to sleep and live in, while other needs were met elsewhere on the site.

The uses of caravans are less obvious examples of appropriated boxes, due to the fact that they were designed to be inhabited. However, the fact that all the caravans have been modified by their occupants shows that the purposes they were being put to were quite different to those that were intended for them by their manufacturers. They were being used for far more intensive use than the kind of leisure uses that they are normally put to. The need to live in them in winter has required such adaptations as the installation of log burners and insulation, while the need to accommodate a variety of additional functions has entailed the addition of various types of structures and accommodation around them.

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Fig. 4.17 Interiors of three polytunnels from the case studies: HB (top left); OD (top right); and GX (bottom left) | Source: the author

There were polytunnels at five of the six initial case study sites (UC, CN, DI, OD & HB). At most sites, their principal use was food growing, but at HB, which had the largest area of polytunnels, they were put to a wide range of other uses also. These included food growing, food processing, clothes drying, timber drying, storage, conferences and group classes.

Although polytunnels are quite a common sight in rural Wales, there are few to be seen in many other rural parts of the UK, and they are particularly rare in areas of higher population density. Where they are seen, they are usually identified with commercial agriculture. Their utilitarian and often untidy appearance mean that they are not popular in affluent rural areas, where cultural preconceptions of the ‘countryside’ are driven by an aesthetic of the picturesque, while in urban and suburban areas, land prices often offset their practical advantages.

Polytunnels are composed of a frame of repeating tubular steel hoops and bracing elements covered in a single sheet of polythene (also known as polyethylene). The polythene sheet is typically only about a fifth of a millimetre thick, yet since the space is enclosed and solar energy is trapped in the interior, temperatures inside a polytunnel can be well above the exterior, and this provides opportunities for a wide range of uses. The interior environment of a polytunnel cannot be controlled in the same way as an insulated space. For example, on cold nights, when there is no solar energy, temperatures will drop quickly. Conversely on hot sunny days, solar gain can cause a closed polytunnel to quickly become very hot. Successful use of a polytunnel therefore requires constant attendance so that it can be opened up to ventilation or closed again dependent on the weather conditions. The uses that the polytunnels at HB were put to demonstrate that they can be remarkably convenient, as long as the initial basic requirements of attendance are met.

4.5 Discussion

These seven introductory case study sites show a wide range of approaches to low impact living. Some are family homes and some are small communities. Whilst the residents of all sites were committed to minimising their environmental impact, economic constraints have played a central role in the decisions they made about how to provide for their needs.

Homes were provided in a variety of ways. On some sites, historic stone houses were occupied (CN & UC), though in one of these cases, they were supplemented by more recently built roundhouses. Different types of caravan were also lived in. Adapted static caravans were used for different purposes at UC and GC, and the resident of HB lived in a bowtop caravan, though the residents of GC and HB were in the process of building themselves new houses. Meanwhile, the house at OD was self-built in timber but designed to meet the legal definition of a caravan, so that building regulations would not apply. In some cases, not all the residents' core needs were provided in a single self-contained home. At DI and at OD, a variety of appropriated boxes provided shelter for individuals to sleep and live in, while other needs were met elsewhere on the site. Meanwhile, at GC an open covered area served as a cooking and dining space. At CN, DI, OD, HB and GC, toilet facilities were separate from the main dwelling. There were polytunnels at six of the seven sites (all except BD). At most sites, their principal use was food growing, but at HB, which had the largest area of polytunnels, they were put to a wide range of other uses also.

At all sites the need to import outside resources was minimised, and some of the sites were entirely off grid. At all sites composting of organic waste was in evidence, and in the majority of cases, human waste was also composted and put to use on the site. Natural site sourced materials were evident in a number of the built structures, such as the roundwood poles providing the structural framing to the houses at BD and CN. Also common were repurposed materials and objects, such as the trampoline frame adapted to form the frame to the polytunnel at OD.

Some of the shared characteristics of these sites one would expect from the literature on permaculture, LID and OPD. The composting of organic waste, the use of natural materials for building, and the growing of food on site are all evidence of conscious efforts by the occupants to reduce their environmental footprint. However, there are other common characteristics to the sites that may come as a surprise to someone who was familiar with the literature without having first hand experience of low impact living.

As has been previously discussed, much of the literature on LID, OPD and permaculture is advocative in nature. The focus in the literature on emulating natural processes and using natural materials might lead the reader to imagine sites inhabited following such principles to be scenes of bucolic harmony. Although these seven case studies show evidence of a natural order that most would describe as beautiful, in all cases, there are aspects that appear to run counter to this expectation. Examples from these sites would include the use and condition of caravans and polytunnels, the ad hoc arrangement of infrastructure such as PV panels, or apparent clutter of materials lying around site. These instances are evidence of what happens when the theory of living within one's means meets the practical realities of daily life. They are examples of the need to make do with limited means. We therefore need to return to reviewing the literature, this time focusing on the subject of making do to gain better understanding of the observations of these case studies and to consider their wider implication.

5. The Processes of Making Do

5.1 Introduction

Making do is the process whereby someone lives within their means at any given time. It is the practical steps one takes to meet a need when the preferred resources are limited or unavailable. These can include time, finances, materials and skills. Financial constraints are the most significant factor in the need to make do, since the availability of financial resources usually allows the purchase of materials and other people's skills and time. Direct observation of low impact developments has shown evidence of making do, both in the process of self-build and also in other site activities such as the growing of food.

The main aim of this chapter is to explore the concept of 'making do' as a process, so that it can be identified and better understood in the analysis of the field research. Since the study is focusing on ad hoc self-builds, the term 'ad hoc' also needs defining. The chapter explores the meaning of both terms, with reference to closely related concepts, including those from other cultures.

The nature of the relationship between making do and craft, and also vernacular architecture is discussed. I then go on to look at how making do happens in the context of providing oneself with a home. I conclude the chapter by reviewing the understanding that has been gained from the review of the literature and visual record, and asking how this can inform a debate about the role of making do in OPD.

5.2 Making do and ad hoc processes

Making do: the key sources

The literature on the subject of making do is made up of a core of key sources that have provided the basis for ongoing debate and discussion up to the present day. Given that the subject has close connections to the practice and preoccupations of the art world, many of the sources on making do involve discussion about the visual arts, and photography plays an important role in this. The sources discussed in this section include both literature and, where appropriate the photographic archive.

Richard Wentworth's photographic series, 'Making do, getting by' and a number of important articles about this work, serve as a useful introduction to the topic. He first discussed this series in 1978 in an article he wrote for *Artscribe Magazine* (Wentworth, 1978), and has revisited the subject regularly in the years since, up to the present day. The art critic, Anna Dezeuze has recently written extensively about the subject of making do, using Wentworth's series as a starting point for a wide-ranging discussion, that makes connections with a number of key twentieth century theorists (Dezeuze, 2013a & 2013b). One such writer, Michel de Certeau, wrote a chapter entitled 'Making do' (translated from the French 'faire avec') in his book *The Practice of Everyday Life* (Certeau, 1984). Other contemporary writers who have discussed Wentworth's series include Kevin Henry (Henry, 2007) and Joanne Lee (Lee 2010). Henry has drawn parallels between Wentworth's photographs and the book by Jane Fulton Suri and IDEO called *Thoughtless Acts* (Fulton Suri, 2005). In this book, Fulton Suri discusses the concept of affordances. The term, as defined by J.J.Gibson, helps explain the process of how the person making do becomes aware of the possibilities of environment around them in the quest to meet a need (Gibson, 1979). Joanne Lee, meanwhile, discusses Wentworth in relation to the book 'Adhocism, the case for improvisation', by Charles Jencks and Nathan Silver (Jencks & Silver, 1972 & 2013).

'Adhocism' is undoubtedly an important book with great relevance for the subject of making do. However, the breadth of subject matter it covers makes it difficult to establish a simple and clear definition of their term, 'adhocism'. The fact that the word is an invention of the authors, and is not in common use, also makes its use as a key term in this study problematic. Where I have felt it appropriate, I have made reference to it during this chapter, but I have avoided using it in other parts of the study.

I have looked to other parts of the world for different approaches to meeting needs with limited resources. The term making do rarely has a direct translation, but writers in english have at times chosen this term for titles of studies, which has helped me locate them. 'The Art of Making Do in Naples', by Jason Pine is an anthropological study of pop musicians who need to operate in a shadow economy dominated by the camorra. The Italian term that he has translated to the art of making do is 'l'arte di arrangiarsi', but he clarifies that the term 'means more to them than simply "getting by"'. Many people in the scene want more than to merely live with chronic indeterminacy. They seek self-determination and a life that escapes precarity altogether' (Pine, 2012). In a similar way, Steve Daniels has given the title 'Making do' to his study of makers in Kenya's informal economy (Daniels, 2010).

In the following sections I shall explore different aspects of the subject of making do, picking up some of the key sources and other lines of enquiry, with the aim of establishing the

fundamental nature of making do as a process.

The Art of Making Do

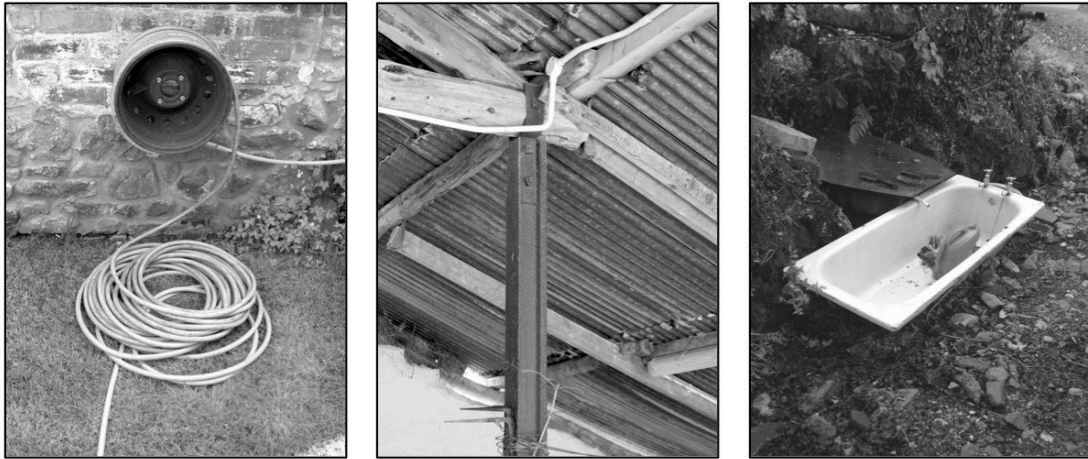


Fig. 5.1 Examples of repurposing of objects encountered by the author in rural Wales: a car tyre as a hose wheel (left), a railway track as a column in a barn (centre), and bath in a field being used to collect spring water (right) | Source: the author

Making do can enrich the environment by subverting expected hierarchies and relationships, whereby necessity is the driver of creativity, instigating new ways of putting the world together, and opening up further possibilities in the eye of the observer. Recycled and repurposed objects create new associations, often reminiscent of the Surrealist and Dada art movements of the early twentieth century. The most famous artwork from this period to create a new context for a familiar object is Marcel Duchamp's 'Fountain', a urinal that he simply set on its back and signed under the pseudonym, R. Mutt. Hoping for controversy, he submitted it for show at the Exhibition of Independent Painters in 1917. Despite Duchamp being on the jury, he kept the authorship secret, and was delighted at his fellow jury members' refusal to show it. The writer of the anonymous editorial (possibly Duchamp himself) in the Dada magazine *The Blind Man* wrote in an article on the subject:

Whether Mr. Mutt with his own hands made the fountain or not has no importance. HE CHOSE it. He took an ordinary article of life, placed it so that its useful significance disappeared under the new title and point of view - created a new thought for that object.

(Anon, 1917)

Duchamp had taken a manufactured object and placed it, almost unaltered, in a different context to the one for which it was intended. The fact that it did not make it to the exhibition for which it was intended was of no importance, as it was only the concept that needed communicating. The impact of this piece on the history of art has been discussed up to the present day, but in the world outside the gallery, such appropriation of one object for an unrelated purpose was in no way new.

The difference between pragmatic ad hoc appropriation of objects and the Duchampian 'readymade' is in the intentions of the actors. If an object is placed in a gallery, it is viewed as art, and its intended role is to throw up new associations in the mind of the viewer. However, a repurposed object will also achieve this subversion of expected associations, but only as a byproduct of the unselfconscious act of someone looking to meet a particular need. Therefore the new relationships that the purest form of making do create are random. Although

randomness was a quality that fascinated Duchamp he could never completely detach it from intent. Without any functional requirement beyond the impact it might have on its viewers, his choice of readymade was always going to be influenced by the associations he expected it to elicit in their minds. His choice of a urinal was anything but random. It was clearly calculated to maximise the controversy of the situation he had created.

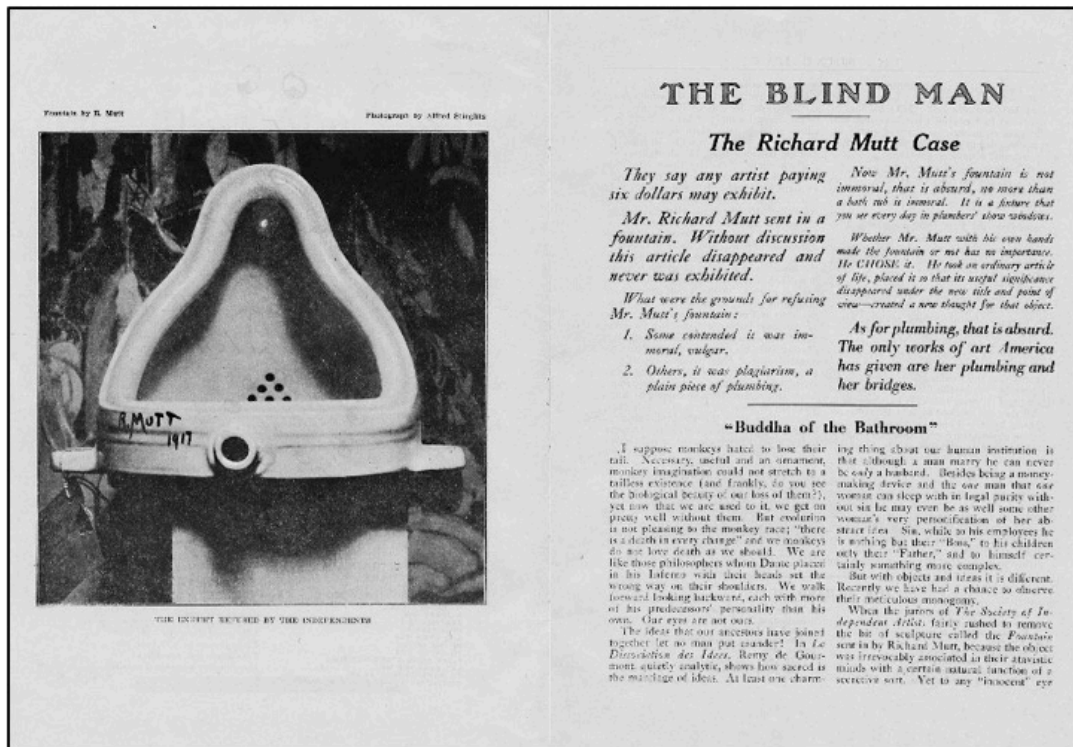


Fig. 5.2 Double page of *The Blind Man*, Issue 2, May 1917
 Source: <http://sdcrc.lib.uiowa.edu/dada/blindman/2/>

Another artist interested in the appropriation of objects approaches the subject in a very different way to the conceptualism of Duchamp. Richard Wentworth has for over forty years been photographing ad hoc adaptations to the city environment by anonymous actors. This continually expanding collection of photographs has been exhibited various times over the years under the title 'Making do, getting by'. Many of the interventions that are recorded in these photographs appear to be entirely unconscious, but the resulting photographs are laden with meaning and rich with possibilities. An unconscious decision by a single person can suggest how easy it really is to adapt our environment to suit our needs, and in the process enrich it. In her book, 'Thoughtless Acts', Jane Fulton Suri has assembled a selection of photographs that document people's intuitive interactions with their environment, and in which making do features strongly. She observes:

There is a kind of self-contained elegance and tidiness in these ad hoc solutions. Human beings have evolved with imagination and an ability to create and make do. This ability serves us well, not just in times of scarcity but also in times of abundance when our ingenuity enables us to make good from the resources around us.

(Fulton Suri, 2005: 177)

In his foreword to the expanded and updated edition of 'Adhocism', Jencks writes: 'If necessity is the mother of invention, then combining previous systems is the father, and adhocism is the creative offspring (Jencks & Silver, 2013: xix).' The similarity of this statement to Wentworth's

and Fulton Suri's observations about making do suggests that it would be worthwhile at this point to try to establish how the two are related. Although the original 1972 foreword to 'Adhocism' describes it as 'a method of creation relying particularly on resources that are already at hand' (Jencks & Silver, 1972), the examples cited in the book do not always suggest the sense of necessity that is implicit in the notion of making do. Making do often results in, but is never motivated by a desire for the juxtaposition of incongruous elements. Whereas, for Silver and Jencks, an artefact with incongruous elements can be enjoyed as an example of an adhocist sensibility, whether the result of an expedient act to meet a need or not. Hence, 'after taking delight in adhocism as an occasional method, attention naturally turns to appraising its value as an entire aesthetic principle (Jencks & Silver, 1972)'. Seen in this way, some of the more baroque examples of surrealist art, such as Meret Oppenheim's fur-covered cup and saucer find their way into 'Adhocism', but could not, by any stretch of the imagination be defined as making do.

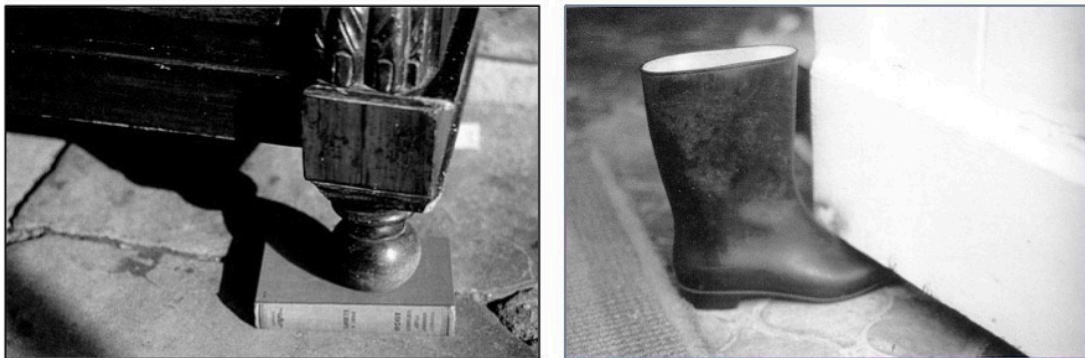


Fig. 5.3 Richard Wentworth: Old Kent Road, London, 1974 (left); and Hertfordshire, England, 1981 (right) | Source: 'Richard Wentworth / Eugène Atget: Faux Amis' pp. 107 & 106

Wentworth's photographs are often of one-off acts, but some are of interventions that may have been repeated many times, for example in the use of a seemingly random object to prop open a door that needs to be kept open on a regular basis. After the initial act of using, for example a boot, for this purpose, then the possibility arises of the act becoming at least partly self-conscious. The next day, the actor might have the opportunity to buy a door wedge, but decide not to. At that point their decision to continue to use the boot to hold open the door can potentially reveal something about their character and world-view. This example illustrates the difficulty of dividing instances of making do into the two categories of self-conscious or unselfconscious. The ad hoc artefact by its nature reveals more about its creation than a designed product. However, it also leaves much to the imagination of the viewer, inviting him to speculate about the motivations and levels of self-consciousness of its creator. Therefore the narrative that is told is a result both of the doing and of the seeing, and for each observer the story will be different.

Propriety

The necessity to improvise often places the person making do outside of the conventional parameters of a consumer society. Sometimes this creates opportunities for both the person making do and for the wider community, but sometimes it causes difficulty and misunderstanding. As social animals, humans are naturally inclined to conform to behaviours of those around them (Maslow, Frager, Cox, Fadiman, McReynolds, 1987). Embarrassment is an emotional state that humans feel particularly strongly, and it occurs when someone becomes

aware that others have witnessed them do something deemed inappropriate (Goffman, 1956). Fear of embarrassment is therefore a powerful driver of human behaviour towards conformity.

Context is of key importance to the notion of propriety. What might be deemed entirely normal in one situation could easily become out of place if only minor changes are made in the context. In day to day life, the citizen will constantly assess tiny clues in situations and both moderate their behaviour and also make judgements about others in response to these clues (Goffman, 1956). Acts of making do often transgress conventions of behaviour but in doing so they also expose these codes to public view. Therefore the viewer of an ad hoc act (or its evidence) is offered a different way of seeing the world and a perspective on the cultural framework that sets these unwritten rules. As Richard Wentworth wrote in his 1978 article, 'Making do and getting by':

Our own fear of the unpredictable, coupled with an inflated sense of our own dignity helps to maintain the view that such things in our own lives are trivial and beneath contempt. Our sense of how we conduct ourselves publicly is mocked by the idea of being caught in one of these gauche and untutored movements... Resistance to acknowledging informal behaviour extends also to its relation in the inanimate world, where mere objects are displaced - typical commonplaces such as the ruck-and-jam method of holding open a door, where the energies of a doormat are re-assessed and re-directed, or the folded cigarette packet to chock a wobbling table.

(Wentworth, 1978)

In an affluent, consumer society, the notion that objects have specific purposes is a particularly powerful driver of behaviour. For example, the intended purpose of a table knife is for cutting one's dinner. However, most people have used one to tighten a screw and found it adequate for the job. When doing so, though, one is often aware of the significance of the act. Even a simple example such as this involves a complex array of relationships: between the actor and the viewer, between the actor and the object, and between social conventions and the objective of the task.

In order to understand the reason that ad hoc appropriation of objects has such impact in today's society, we need to ask why particular objects are deemed to have particular purposes. It only takes a cursory look around us to realise that the vast majority of the objects that surround us are consumer products. That is to say, they are objects that have been conceived by product designers, mass produced, and sold to 'consumers'. The use of the word consumer to describe anyone who buys a product suggests a passive role for the purchaser. The product being bought is not just the object, but includes the narrative that the producer attaches to it. The 'what it is for' is being sold to the consumer as much as or more than the object itself. This includes both what it does on a practical level and how it helps define the identity of the purchaser. Advertising and packaging are used to sell the product, but the designer will also ensure that the product tells the same story, since the object itself acts as advertising to others in use. When a consumer product is used in a way that was not its intended purpose, the act of doing so challenges the narrative assigned to it by the producer, and subverts the rules of a consumer economy.

Affordance and tactics

One of the simplest instances of making do, as has been photographed many times by Wentworth, is the use of an immediately available object to perform a basic function, such as

keeping a door open. Different objects are suited to performing this task in different ways, so the actor needs to have an understanding of the qualities of the object they have chosen for the task. For example, a door mat needs to be wedged under the door, whereas the weight of a full tin of paint will allow it to act simply to block the door from closing. Since the object is being used in a way that is not its primary purpose, the actor needs to actively engage with both object and task to achieve the desired outcome. The possibilities presented by the interaction between environment and actor are an example of what J.J.Gibson called affordances. He describes the concept thus:

The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill... I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment.

(Gibson, 1979).

Therefore, the affordance of any given object is dependent not only on the characteristics of the object but also on the person engaged in the task. A range of factors is likely to come into play that will effect different outcomes with different actors. These may include previous experience of the success (or lack of) of any given method of holding a door open, or perhaps a cultural resistance to using any sort of ad hoc method for this task, which may result in measures being taken to secure the 'correct' tool for the job.

In his book, 'the Design of Everyday Things', Don Norman built on Gibson's concept by introducing the term 'perceived affordance', to describe the affordances an actor perceives to be available, whether or not they are actually available (Norman, 1988). In 'Thoughtless Acts', Fulton Suri discusses perceived affordances, stating that 'sometimes features mislead us. Everybody's had the frustrating experience of trying to pull a 'push' door or twist of a 'pull' cap! This happens when perceived affordances, cues, are misleading or unclear' (Fulton Suri, 2005). As a product designer, she approaches the question of perceived affordances from a problem-solver's perspective, and looks for inspiration in everyday situations for the design of new products. The successful maker do, on the other hand, will be looking for solutions to 'there-and-then' problems, and will already be aware that they need to look for affordances of objects beyond those that are made explicit in their design.

If past experience and cultural conditioning are the external factors influencing the actor, then there will also undoubtedly be innate qualities that are different for each person. Anna Dezeuze draws useful comparisons between what Wentworth calls 'a very high level of material intelligence' shown by the anonymous actors in his photographs and the ancient Greek notion of 'metis' (Dezeuze, 2013b) . Metis (Μήτις) was a figure in Greek mythology who was defined by her combined wisdom and cunning, and the combination of these qualities was considered to be highly admirable and was regarded as one of the notable attributes of the Athenian character. The concept of 'metis' was described by Marcel Detienne and Jean-Pierre Vernant in their 1974 book 'Les Ruses de l'intelligence: La Metis des Grecs' as 'a certain type of intelligence involved in practice, faced with obstacles that it needs to overcome through cunning in order to achieve success in a variety of fields of action' (Detienne & Vernant, 1974).

According to Dezeuze, 'Vernant and Detienne's study was very influential for Michel de Certeau, who recurrently compares the practices of everyday life to the operations of metis or practical intelligence' (Dezeuze, 2013b). Certeau saw this practical intelligence as a tool used by those without power to appropriate the cultural and consumer products that are imposed on or

sold to them by those with cultural or economic power. In the chapter, 'Making Do' in his book, 'The Practice of Everyday Life', Certeau described the use of language, architectural space or objects to one's own ends as 'tactics', and distinguished this from the 'strategies' used by the strong to assert conventions and assign roles (Certeau, 1984). One important difference between tactics and strategies is the way each relates to place and time. Strategies, as instruments of the strong, have the benefit of control over place, and are enacted in a sequential manner, through forward planning to execution. Tactics, as instruments of the weak, on the other hand, must be enacted in a space that its user does not control.

The space of the tactic is the space of the other. Thus it must play on and with a terrain imposed on it and organised by the law of a foreign power...It takes advantage of 'opportunities' and depends on them.

(Certeau, 1984)

Thus, the art of making do relies on the ability to capitalise on serendipitous moments. This is also discussed by Dezeuze, with reference to 'what the ancient Greeks called the *kairos* - the occasion, the contingent opportunity' (Dezeuze, 2013b). The significance of the *kairos* has been discussed by Vernant and Detienne in relation to the *metis*, and also by Certeau.

Tim Ingold has developed the concept of affordances in his 2010 working paper: 'Bringing things to life: Creative entanglements in a world of materials'. In it, he elaborates on Heidegger's notion of 'things' having complex relations to the world around them and 'objects' as being distinct and separate (Heidegger, 1971). To illustrate this point, he uses the example of a stone:

Surely, you will say, the stone is an object. Yet it is so only if we artificially excise it from the processes of erosion and deposition that brought it there and lent it the size and shape that it presently has.

(Ingold, 2010)

Therefore, Ingold accepts that a piece of matter can change its nature between thing and object, and that a person, as agent can cause this change to happen. In the context of ad hoc self-build, this can happen when a loose object, with a specific, widely understood function is taken and incorporated into a build and hence becomes a thing, and also changes the nature of the thing of which it is now part. However, the question then needs to be asked as to whether the act of using the object needs to be physically carried out, for it to change from object to thing. An ad hoc self-builder needs to have already made the calculation about whether an object meets a given need before he uses it. In this process of weighing up the particular characteristics of the object against its intended use, the maker-do is already turning the object into a thing. In that sense objectness and thingness are as much in the eye of the beholder as in the physical characteristics of objects or things. If that is the case, there are likely to be some people who see the world around them as composed mostly as objects, and others who see mostly things. Those who see the world as composed as objects would be those with a sense of propriety and tendency towards neat categories, not to be transgressed. Those who see the world as things, on the other hand, will have an open outlook on the environment that surrounds them, and the opportunities it presents. To them, classification systems are heuristics only, to be reordered as required to suit a given goal, and the world is full of things which are inseparable from the environment that envelopes them, their past and, crucially, their possible futures.

(Images omitted: follow links below to view images)

Fig. 5.4 LID roundhouse - world as things (left); and bungalow mentality - world as objects (right)

Source: <http://tinyhouseblog.com/dome/that-roundhouse> (left); and <http://www.rightmove.co.uk/property-for-sale/property-26838951.html> (right)

Differing attitudes to the space around people's homes is very telling about different world views. By merely defining a particular outside area as a garden, a cultural expectation is applied, as to how it should look and how it should be used. In a rural context, this becomes a matter of interest to the planning authority, with the potential for intense scrutiny of the uses that a dwelling's curtilage is being put to, as opposed to the land beyond, which may be in the same ownership, but is only to be put to 'agricultural' use. Someone who is living a life of low consumption, either due to economic necessity or principles, needs to see their environment as composed of things. Bureaucratic systems, however, require imposition of strict categories. The planning authorities want to see site plans that identify access, defined areas of hard surfaced parking, a garden, and a clear boundary to the agricultural land beyond. Although this attitude is common in today's society, it requires great effort to maintain this degree of control on the forces of nature. As Ingold says:

However much it has tried, through feats of engineering, to construct a material world that matches its expectations – that is, a world of discrete, well-ordered objects – its aspirations are thwarted by life's refusal to be contained. We might think that objects have outer surfaces, but wherever there are surfaces life depends on the continual exchange of materials across them. If, by 'surfacing' the earth or incarcerating bodies, we block that exchange, then nothing can live. In practice, however, such blockages can never be more than partial and provisional. The hard surfacing of the earth, for example, is perhaps the most salient characteristic of what we conventionally call the 'built environment'. On a paved road or concrete foundation, nothing can grow, unless provisioned from remote sources. Yet even the most resistant of materials cannot forever withstand the effects of erosion and wear and tear. Thus the paved surface, attacked by roots from below and by the action of wind, rain and frost from above, eventually cracks and crumbles, allowing plant growth through to mingle and bind once again with the light, air and moisture of the atmosphere. Wherever we choose to look, the active materials of life are winning out over the dead hand of materiality that would snuff it out.

(Ingold, 2010)

It is not only nature that is constantly chipping away at our insistence on prescribing what should go on where. Certeau tells us also that the average person is by necessity subverting systems imposed on them by those who create the environments in which they need to get by. As an example, in the *Craftsman*, Richard Sennett discusses the appropriation of the stoops up to the entrances of New York tenement blocks for a variety of uses never conceived by the buildings' designers. It was actually the city building regulations that inadvertently gave the stoops the particular characteristics that made them so attractive for these improvised uses. The requirement for lower ground floors to have a certain amount of access to light and air raised the upper ground where the main entrance is located, and created a long flight up to an elevated platform, ideally suited to a variety of improvised uses. As Sennett says:

The raised front stoops of the tenements, usually made of brownstone, were designed to be functional passages in and out of the buildings. Tenement dwellers early on began to use the stair treads as seats; the side walls to the stairs became armatures on which goods for sale were displayed. Rather than a passage, the stoop became an inhabited public space, people hanging around, gossiping and selling, a street life that relieved the crowding within the tenement interiors.

(Sennett, 2008: 235-236)

It is clear that the linear processes of the regulatory system and culture of the architectural profession are sometimes at odds with the art of making do. However, the example of the stoops reminds us regulations can have a powerful positive influence on the quality of life of the citizen. In this case, a city regulation resulted in better living conditions for those on the lowest floors of the tenements, whilst inadvertently creating a chance opportunity for social and practical uses which was seized upon by the residents. The difficulty arises when the designer, legislator or enforcer refuses to embrace the inevitability of unforeseen outcomes to their carefully conceived plans. Too often, strict adherence to development plans prevents organic processes of change based on individual responses to needs that would provide a more natural human environment than the prescriptive approach of the planners' ten-year plans. Sometimes those with an intimate knowledge of their locality can capitalise on opportunities unrecognised by central planners and in the process make real contributions to their local communities and economies.

Recycling, resilience and perceptions of poverty

Making do with one's fair share of the world's resources would require a radical reappraisal of how one might live within one's means. Those wishing to do this on an individual level can carry out their own ecological footprint assessments. However, the feasibility of accurately measuring environmental impact using this tool is questioned (van den Bergh & Jeroen, 2014), and it remains of interest to only a small minority of the population.

Could it be that the ambition for any society to voluntarily reduce its resource use for the common good is hopelessly optimistic? Perhaps humankind's tendency to keep using the resources that are currently still available will always prove a stronger drive than the intellectual awareness of the need to preserve these resources for future generations. If this is the case, then at some point relearning the art of making do will be more a matter of necessity than choice.

Whether undertaking it voluntarily, or forced into it, relearning how to make do will not be a comfortable process for societies that consider themselves affluent. It is inherently messy. It resists our instinct to order the world, to make it neat and tidy. When meeting a need comes first, then it is harder for us to control our image of ourselves and the world around us. One way that the so-called 'developed' world maintains its self-image is by ensuring that what it considers to be waste is removed from view at the earliest opportunity. While some progress has been made to increase recycling levels, to the householder the experience has changed little. Although there is now a requirement to sort one's waste, there is little real thought put into what happens to it once it has been passed to the municipal authorities to deal with.

Kate Bush, the curator of the 2001 exhibition that paired Richard Wentworth with Eugene Atget, draws parallels between the photographs of both men. Atget, who saw himself as a documentary photographer, assembled a vast collection of photographs of Paris over his forty year career that spanned the late nineteenth and early twentieth centuries. One of his albums focused on The Zone, a peripheral area between two historic walls on the edge of the city:

The Zone was inhabited by a miscellaneous colony of ragpickers and scrap merchants, Romanys and squatters: the poor and the disenfranchised who didn't quite fit into the bright clean city that Haussman had created. The Zoniers harvested the city's scraps, sifted and sorted them, and returned them to the metropolis in newly ordered form.

(Bush, 2001: 28)

Soon after it was documented by Atget, the Zone fell victim to Hausmannisation and the rubbish collections introduced by M. Poubelle, and was erased from the Parisian cityscape. However, the junk shops and second hand furniture stores that can be found throughout his photographs of Paris tell a similar story of recycling and reinvention, and are immediately familiar to today's viewer. As Bush observes about Wentworth's photographs, 'with its bustling parade of house clearers and secondhand furniture salesmen, its junk shops and discount stores, the Cally's low-level commerce represents a similar triumph of economics over entropy' (Ibid.).



Fig. 5.4 Eugene Atget: Rags collector, 1899 (left); and Ragpickers, 1913 (right)

Source: http://www.masters-of-photography.com/A/atget/atget_ragpicker_full.html (left); and <http://www.mheu.org/en/timeline/atget-valmy1.htm> (right)

Given the limited opportunity for generating an economic return on other people's waste, the ragpicker has always been on a bottom rung of society, but in 19th century Paris it was nonetheless considered an honest livelihood. Although it is still common in many countries around the world, in western society today, it is generally seen as beyond the pale.

In the United States, the association between making do and poverty is particularly strong. The Great Depression and the simultaneous ecological disaster in the American midwest known as the Dust Bowl was deeply traumatic for American society. Whilst John Steinbeck's *Grapes of Wrath* describes many examples of creative repair with limited means, this is in the context of extreme hardship (Steinbeck, 1939). The main characters in the book, a family migrating west from their ruined farm in Oklahoma in the search for work, are reliant on their vehicle. Without the funds to pay for repairs or spare parts, they resort to ingenious measures to ensure that they can stay on the road. However, such resourcefulness is ultimately unrewarded, as the privations of the ongoing economic crisis take their toll on the family.

Given the suffering experienced during the Great Depression, it is understandable that American culture embraced the unprecedented material prosperity of the subsequent decades, and even defined itself by it. The downside of this aspect of the American dream is that frugal living or modest use of resources is often viewed as a sign of failure. However, despite American society's unwillingness to acknowledge them, there continue to be people there, who do not follow the rules of a consumer economy, and even make creative use its detritus. 'Once upon a time in Knoxville' is an illuminating film that follows one such self-confessed outsider, Rollo Sullivan:

With great humour and clear-eyed foresight, recycling guru Rollo Sullivan uplifts us with a vision of not just how we can live, but how we will be living in the not too distant future. We all know that environmental crisis and resources collapse awaits us. Rollo's solution is adapting and making use of what we throw away. He's built a whole community out of junk, and he's turned scavenging into a way of life that will withstand economic collapse.

(Once upon a time in Knoxville, 2011)

While being interviewed, having recounted the story of a visit to a garbage dump in Mexico City and witnessed local inhabitants picking through the rubbish, Rollo reflects:

'I really think that what Knoxville needs or the United States needs is a scavenger class. I've always been a scavenger and I'm proud of it, you know. I think there's just as much dignity and you're just as much of the circle of life being a scavenger as being king or more so... so I thought it was natural; it hit me, like, this is the way it should be, how did we get so artificial or abnormal in the United States to think that we're so wealthy that we can just bury our garbage right away and not give anybody the chance to pick through it.'

(Ibid.)

The film suggests that the United States is facing a 'third world future', with one of the sections being given this title. Although many would reject outright the suggestion of this provocative title, it does at least invite one to reconsider one's preconceptions about the 'developed' and the 'third' world. Although the terminology used to describe developed and less developed countries appears in constant flux, the assumptions remain, of a privileged 'us' and an impoverished 'them'. However, the rapid development of the BRIC and many African economies, coupled with the recent financial woes of the 'developed' countries in Europe and North America make such duality appear outdated. As the rich across the world continue to get richer, it appears that globalisation is generating the conditions to allow extremes of wealth and poverty no matter which country's borders one resides in.

If certain segments of UK society are indeed facing a future of economic and resource constraints, then it makes sense to look to developing countries for examples of techniques that individuals and communities might be able to use to thrive with less. The culture of *Jugaad* in India is one such example of a resourceful approach to living. *Jugaad* is a Hindi word that translates roughly as 'overcoming harsh constraints by improvising an effective solution using limited resources' (Radjou, Prabhu & Aruja, 2012). *Jugaad* has recently generated significant interest with both business and academic communities in the west. In 2012, Nesta, the UK's innovation foundation, produced a report titled 'Our Frugal Future' (Bound & Thornton, 2012) that examined in detail the Indian approach to 'frugal innovation' that is informed by the culture of *Jugaad*. As a concept, *Jugaad* covers the widest possible range of scales, from the simple tactics India's poor use to get by (Singh, Vaibhav & Akash, 2012) to the country's space programme which, although ambitious, operates on a fraction of the budgets of European or North American space agencies. The success, in 2014, of the Indian Space Agency's Mars Orbiter Mission demonstrates the agency's ability to apply principles of frugal innovation in the most demanding of settings imaginable. At about \$70 million, it is the lowest cost of all missions to Mars to date (Bagla, 2014). By comparison, NASA's MAVEN mission, which arrived at the planet only days earlier, cost over \$670 million (Bagla, 2014).

Another example of innovating with limited resources can be found amongst the micro-enterprises of the Kenyan grey economy. 'Informal artisans who engage in the production of goods are known as *Jua Kali* (Swahili for "hot sun") and have established entire ecosystems of production, from scrap sourcing to repair' (Daniels, 2010). Sometimes working outdoors (hence

the name), or otherwise in the most basic of shacks, the Jua Kali craft new products or repair broken ones using tools and equipment that have themselves been put together from discarded materials. The fact that Jua Kali tend to operate in clusters in peripheral areas of Kenyan cities allows for efficient sharing of resources and exchange of skills.

The kind of creative repair involved in Jua Kali, whereby the object being repaired is transformed in some way by the process, is closely related to tinkering. Tinkering often comes about through necessity as only objects and materials that are to hand are available to carry out the repair, so inevitably the broken component will be substituted by something of different material or functional qualities. A tinkered object therefore may perform its original functions differently, have lost some functions, or even have gained new ones. The word tinkering itself implies an unstructured approach whereby either the process, intended outcome or both are not clearly defined, or that the person tinkering is unskilled.

The word, 'tinker' can have negative or positive connotations depending on the context. The original tinkers, who were repairers of tinware, such as kitchen pots, needed to travel from place to place to allow them to generate sufficient business to earn a living. The fact that 'tinker' has been used as a pejorative term reveals social attitudes to those with an itinerant lifestyle. Today, the name 'tinkerer' is now gaining in popularity in the burgeoning maker culture, and is used to describe amateurs whose experiments with increasingly affordable digital fabrication technologies are motivated more by enjoyment of process than a desire to achieve set goals.

Taleb compares tinkering to bricolage, which he describes as 'a form of trial and error close to tweaking, trying to make do with what you've got by recycling pieces that would otherwise be wasted' (Taleb, 2012: 181). He argues that tinkering has the potential to generate a large potential payoff with minimal risk, 'so long as one is capable of identifying a favourable result and exploiting it' (Taleb, 2012: 181). Dezeuze maintains that those making do in Wentworth's photographic series are bricoleurs using 'the odds and ends around them to respond to specific 'predicaments' (Dezeuze, 2013b). In *The Savage Mind*, Claude Levi-Strauss maintained that the bricoleur used devious means to achieve an end with available materials, contrasting this approach with that of the engineer, who instead carefully prepares everything in advance (Levi-Strauss, 1962). In 'Architectures of Chance', Yeoryia Manalopoulou instead uses the mason as the counterpoint to the bricoleur. Suggesting that architects combine attributes of both:

Masons combine pieces following a systematic logic, but bricoleurs work with what they have accumulated or accidentally have at hand. Combining precision and chance, architects take the roles of masons and bricoleurs in turn. Their buildings are unfinished assemblages which the users may extend to more complex assemblages, based on their habits and ad hoc design practices.

(Manalopoulou, 2013: 142,144)

Jeremy Till, however, makes the point that the culture of architects is to deny the role that accident and chance play in their work. In his paper, 'Architecture and Contingency', in which he uses William Rasch's definition of contingency as 'quite simply, the fact that things could be otherwise than they are' (Rasch, 2000: 52), he sets out the argument 'that architecture is through and through a contingent discipline, but that architects have to a large extent attempted to deny this contingency through a retreat to notions of order, beauty and cleanliness' (Till, 2007). Similarly, James Wines has been critical of contemporary architects for 'continuing to describe design values in such constipated terms as "rigorous," "disciplined" and "formally consistent," while the built manifestations of this orthodoxy have been glacial and

uncommunicative' (Wines, 2000: 216), arguing that there is an urgent need for an iconoclastic figure to challenge the conventions of the architectural world in a similar way that Duchamp's Fountain shook up the art world over a century ago.

When budget and resources are limited the platonic formalism of modernism is hard to achieve, but for those architects who eschew photoshopped purism for the rewards of helping others meet their needs, chance provides a powerful generator of design. Manolopoulou cites the example of Auburn University's Rural Studio:

Initially under the direction of Samuel Mockbee, Rural Studio designed and built economic houses and small community schemes in deprived areas in western Alabama. Built by students through a participatory process and extremely low budgets, the buildings incorporate salvaged and donated materials of all kinds, from old roof beams and railway timbers to used carpets, windshields and car number plates. Each building is an assemblage, further activated, personalised and modified by the inhabitants.

(Manolopoulou, 2013: 145-146)

When environmental principles demand that waste be minimised, then the validity and ethics of the idealised architectural object need to be questioned. For those with a firm faith in the ability of cities and societies to provide for its citizens while dealing with their waste and recycling resources in an efficient circular economy, then this vision will continue to hold firm. However, those with concerns about the potential for breakdowns in an increasingly resource-constrained world are likely to be more inclined to take an inventive approach to the reuse of resources that are immediately to hand.

Making do, craft and vernacular architecture

On initial consideration, making do might seem to have little in common with craft. Instances of making do are usually messy. Materials are used because they are available, not because they have been selected to work aesthetically, and they may be of inferior quality or unsuited to the use they are being put to. The workmanship is often evidently poor, because the act of making do is often the response to a one-off need, and hence the work will be a first attempt to achieve the required goal, and may be the first time of working with the chosen material or materials. Craft, on the other hand, involves a craftsman who has many years of experience of working with a particular material. Workmanship will be of the highest quality because of this experience, and also because of the craftsman's desire to do a good job for the sake of it (Sennett, 2008). This section makes the case, however, that making do and craft are intricately linked, and that in fact, craft derives from the development of making do over time.

Both making do and craft involve an intricate relationship between planning and making, which in the case of building construction are defined as designing and building. In the case of craft, the apprentice craftsman is helped in his learning by the generations of experience that have been acquired before him, and that are passed on by the master craftsman. Someone making do, however, needs to learn without a teacher. Instead, they have to learn by the process of trying. However, there is a limit to the master craftsman's role as teacher, as the apprentice needs to learn by doing. As Sennett says in *The Craftsman*, 'Learning by demonstration puts the burden on the apprentice; it further assumes that direct imitation can occur. To be sure, the process often works, but equally often it fails' (Sennett, 2008: 181). Therefore, for both the apprentice craftsman and the person making do, it is the behaviour of the material that is being worked that provides the primary influence on the learning process.

As David Pye argues, there is no such thing as a good material without a good craftsman working it: ‘Good workmanship will make something better out of pinchbeck than bad will out of gold’ (Pye, 1968: 18). The craftsman learns to work within the limitations and exploit the qualities of a particular material or set of materials. A good craftsman learns to use his knowledge of characteristics others would see as problematic to his advantage. For example the tendency of timber to shrink as it loses moisture can cause problems if not understood, but the green oak framer relies on this behaviour to ensure the pegged joints of his building frame tighten as the oak seasons.

In today’s society, we associate craft with luxury. This is because mass production has eliminated the cost of labour from manufactured goods, hence often making them cheaper than those that are made by craftsmen. However, before industrialisation, all objects had to be made individually. Some were finely made, and expensive, while others were roughly made, to make them affordable for those of average means. David Pye makes the point that the quality of workmanship is independent of whether an object is finely or roughly made. He uses the carved wooden spoons of a Welsh turner, James Davies, sold at fairs for tuppence, as an example of rough workmanship that was of good quality: ‘He said that at that price there was just enough time, when the spoon was finished, to look once at the inside, once at the outside, and throw it over your shoulder onto the heap at start another! But having seen his work I do not doubt that the spoons were a pleasure to look at’ (Pye, 1968: 36).

Rough workmanship requires objects to be made not only quickly but also out of economical materials. In a pre-globalised world, this often meant those that were available locally. In any given locality, the craftsmen would learn to work with the characteristics of the available materials to meet specific needs. In the case of building construction, a number of locally available materials would be combined such that their particular attributes would be matched to the specific nature of the local climate and building uses. This type of construction is commonly called vernacular architecture. Insofar as it involves the use of materials that are to hand to meet specific needs, one might say that vernacular is a type of making do. Part of the delight and shock of making do is to be found in the incongruous juxtaposition of elements, whereas the vernacular is defined by the harmonious combination of natural materials and forms. The elements of vernacular architecture look like they belong, while with the type of making do shown in Wentworth’s series, the elements often jar. The reason for this difference relates to vernacular architecture’s origins in a pre-industrial society.

Since the advent of the industrial revolution, the human environment has been characterised by the vast array of mass-produced products that are available to us. These products, which are generally made up of a combination of materials, are usually communicating their nature and purpose, for the reasons discussed above (‘Propriety’). Even when a product is broken or fragmented, it still often communicates its previous life. The person making do today is likely to use manufactured products, or their fragments, when meeting a need, because that is what is most likely to be lying around, waiting to be put to use. In the pre-industrial world, however, one would be far more likely to make use of local raw materials for improvisation, as most household objects would have been too valuable to be repurposed. Both approaches can be defined as making do, but their visual impact will be very different. The post-industrial version, with individual elements that communicate their former purposes, is well represented in the book ‘Adhocism’ (Jencks & Silver, 1972 & 2013) and in Wentworth’s photographs. The pre-industrial version would have used natural materials that were at hand, rather than man-made

objects. The fact that the materials would have been minimally processed, natural and locally derived, means that the incongruity of parts, typical of contemporary making do, would not have been a feature of pre-industrial vernacular. Given that the human environment would have changed little from generation to generation in pre-industrial times, the needs to be met and the materials available would have remained remarkably consistent from generation to generation, and so builders were able to learn from and improve on methods of their forebears through an ongoing process of trial and error. Vernacular architecture was therefore able to evolve to a type of craft finely tuned to the specific environment and lives of its locality. The craft qualities of the vernacular give it a picturesque quality that cannot be authentically recreated in a post-industrial context without appearing artificial. In 1964, Bernard Rudofsky wrote a brief text for the catalogue for an exhibition entitled 'Architecture without Architects' in which he warns against putting too much emphasis on the picturesque in photographs in the show:

No doubt the picturesque element abounds in our photographs, yet, again, the exhibition is not an exercise in quaintness nor a travel guide, except in the sense that it marks a point of departure from the exploration of our architectural prejudices. It is frankly polemic, comparing as it does, if only by implication, the serenity of the architecture in so-called underdeveloped countries with the architectural blight in industrial countries.'

(Rudofsky, 1964: 3)

It was the conditions of a pre-industrial world that allowed vernacular architecture to develop in such a way that it was finely tuned to the functional, social and environmental needs of any given society. Its picturesque qualities can easily mislead the modern viewer into thinking that aesthetic considerations were at the forefront of its creators' intentions. The truth is rather that it came about principally due to the requirement to meet basic needs with materials that were at hand.

Ad Hoc Processes

In the book 'Adhocism: the case for improvisation', Jencks provides the following definition of 'ad hoc':

'Ad hoc means "for this" specific need or purpose. A need is common to all living things; only men have higher purposes. But these needs and purposes are normally frustrated by the great time and energy expended in their realisation. A purpose immediately fulfilled is the ideal of adhocism; it cuts through the usual delays caused by specialization, bureaucracy and hierarchical organization.'

(Jencks & Silver, 2013: 15)

This passage, from the beginning of the opening chapter of the book, describes the concept, and sets it apart from other methods of making changes to the built environment that would be more familiar to those involved in the construction industry today. The ad hoc approach is evident in the Low Impact Development movement (Pickerill & Maxey, 2009), and also with the methodology espoused by Permaculture design principles (Holmgren, 2011). This iterative, organic approach to building is profoundly different to the approach of construction professionals and procedures formalised in various guides (e.g Great Britain, Dept. for Communities and Local Government, 2010), and this explains the cultural gulf between proponents of the different approaches.

Although practicing architects have always needed to be able adapt to circumstances, the RIBA Plan of Works, suggests that the model to aspire to is rigidly linear, and that any design

iterations should be confined within each of the key stages. Architects' training, and the regulatory framework in which they practice, leads them to believe in the paramount importance of detailed pre-design for successful delivery of a building project. The advent, and increasing popularity, of Building Information Modelling (BIM), relies on the assumption that all the project parameters can be ascertained and fixed, well before construction starts. For large buildings, where economies of scale allow for well structured project teams with the requisite skills and knowledge, then the benefits of such an approach are self-evident. However, both traditional models of building procurement and modern technology-dependent methods such as BIM suffer from lack of flexibility to changing conditions. The clear delineation of roles between designers and builders also prevents an organic adaptation of the design in response to the nature of the building material or other constraints that show themselves during the build.

With an ad hoc approach, the design and building processes are in a symbiotic relationship, sometimes fused into one act. Where all the qualities of the materials being used cannot be known in advance, then the ability to adapt to lessons learned during the process becomes essential. Ad hoc processes do not produce polished results, because the individual engaged in them will not have the range of skills possessed by a full construction team. However, the process of learning by doing still allows the desired goal to be achieved, and the ad hoc approach taken will often manifest itself in the built form of the completed construction. Such evidence of an individual's intervention in the build process can be enjoyable to experience when it remains as part of the built environment.

An ad hoc approach is most useful when used as a technique to meet a simple set of needs. Where these needs can be met with minimal investment, and changes can easily be made, then the act of doing becomes the way to test the design. The feedback gained from the first iteration then informs any changes that may be carried out to better achieve the purpose. However, in cases where the purpose requires significant investment, or where post-hoc changes might undermine quality of the construction, then a more linear approach to design would be more appropriate.

An ad hoc solution is one that has needed to be developed in response to a specific problem or situation. Ad hoc solutions can be required for a number of possible reasons, but all relate to the fact that a standard solution is unavailable or undesirable. This might be because the problem to be solved is new, and hence could apply to the most advanced technologies, for example in space exploration, but equally, it could also apply to a bodge job where the decisions have been motivated by expediency. Where the problems to be solved are complex, they will involve a whole sequence of stages to pass through to arrive at a solution. When one ad hoc solution has been applied at a certain stage of the process, this in itself changes the conditions of the process to which further solutions will need to respond to in an ad hoc way. Thus the more stages an ad hoc process has, the more complex the interaction between individual ad hoc steps.

5.3 The Ad Hoc Home

Introduction

This section looks at ways in which the need for a home is met when conventional means are unavailable or undesirable, often due to financial constraints. Such ad hoc homes tend to either make use of existing products or typologies, or to be self built from available materials.

Before exploring the different types of ad hoc home, it is worth first asking what makes a home. The principal definition of 'home' in the Oxford English Dictionary is 'the place where one lives; a fixed residence', and the second is 'a dwelling house'. However, if one lives in a mobile caravan, then the place where one lives is neither a fixed residence nor a dwelling house. If a home is not necessarily a house, then what characteristics can a home have that a house does not? The principle definition for a house is a 'building for human habitation'. The word 'building' suggests a permanent structure, and hence one that is built to building regulations, and generally communicating its permanence through its appearance. In the UK, this translates to a cultural expectation for a house to appear to have weight, and so to be made of 'bricks and mortar'. However, a house is not just defined as a building, it is a 'building for'. It is defined by the purpose it has been built for ('human habitation'). A home, on the other hand is principally defined by what is happening there ('one lives'). However, the concept of living when applied to a home is not easy to define. Mary Douglas observes that home is 'a pattern of regular doings'. Since she goes on to argue that the concept of home cannot be defined purely by the functions that it accommodates (Douglas, 1991), then the nature of living in a home must reside more in the 'patterns' than the 'doings'.

In the modern world, living is becoming harder to be defined in opposition to work, especially if one's work revolves around intellectual production or communication. Not only can one work anywhere, but increasingly one does work everywhere, as mobile devices continue to infiltrate all corners of our lives. Despite this, regulatory and cultural frameworks continue to insist on delineating between a place of work and a home. Planning authorities decide where we are allowed to live, local authorities want to know where we live so they can tax us, and insurers want to know if a place we live and/or work is a home or an office.

The ad hoc home is the home that does not neatly fit categories, whether by intent or by necessity. The kind of living that happens at or in an ad hoc home is often intensive, if the work involved in meeting one's needs is carried out in and around the home, but it might also be transitory. Douglas argues that 'home is located in space, but it is not necessarily a fixed space. It does not need bricks and mortar, it can be a wagon, a caravan, a boat, or a tent' (Douglas, 1991). Still, making one's home in a tent or a caravan can challenge some of the expectations of contemporary society and may even be incompatible with the regulatory frameworks that have been built on such expectations. Ad hoc homes may not conform to regulations or cultural expectations, but in an age of profound environmental crisis, they provide an opportunity to examine the assumptions that dictate how a home should be, and allow us to rethink how we might live in a world with less resources.

What makes an ad hoc home?

One way of approaching the question of what makes an ad hoc home is to start by asking what it is not. A conventional house that is owned by the occupant would be unlikely to qualify,

especially if the owner is financially secure, and occupies the house as their only home. Ownership of the property provides the security to invest to make the house suitable for their needs, and as a permanent dwelling, its use is long term, not for a specific purpose or occasion. Starting at this baseline, we can see any place where one spends the night as somewhere on the continuum, what one might call the ad hoc scale. Anyone who travels, whether for business or pleasure, needs to make a temporary home each time they change location. Christopher Tweed has identified even the most fleeting of forms of occupation as forming temporary homes:

Even temporary homes establish an orientation, and it can be argued that people continuously create 'homes' in a variety of different spatial and social settings beyond their residences as they 'dwell' in places such as offices, schools, cinemas and even when colonising space on the beach.

(Tweed, 2010)

Similarly, a hotel room, a bedroom in a friend's house, even a row of seats at an airport, all can become ad hoc homes if used as a place to sleep or otherwise rest. A second home could also be seen as ad hoc, especially if used for a specific purpose such as a bolt hole close to work or as a holiday home.

The above types of ad hoc home suggest that there is a permanent home to return to. However, there is another category of ad hoc home that has to act as the principal home because the permanent home is not available or desirable. For example, a rented home can be seen as ad hoc, especially if, as is common in the UK, the form of tenancy is not secure. The majority of private rental contracts in the UK are short hold tenancies with short contract or notice periods. Since a tenant has no way of knowing whether they might even be living in the same place a few months hence, they cannot see their home as anything more than a temporary measure. Lack of long-term security is often an issue when the occupant is also the owner. When a site is being occupied without planning consent, or a house is built without building regulations approval, then it is only a home until the authorities take notice, take action and if successful enforce the action. As with a tenanted home, this may never happen, but the possibility is always present, and any investment of time or money in the home is carried out at risk.

Travellers can either make a temporary home wherever they lay their head or they can take their home with them. Although the number of people living genuinely itinerant lifestyles in developed countries is today only a tiny fraction of the population, the idea of taking your home wherever you go has a widespread appeal. Perhaps it is because so many of the pressures of the modern world tie us to a particular place, that the freedom promised by the mobile home is so alluring.

Although a holiday home or a fully fitted motorhome could be seen as ad hoc homes, they fall outside the scope of this study, because they are luxuries, not necessities. When financial resources are limited, then the occupant of an ad hoc home needs to use their wits and personal ingenuity to make it their own home. They might take something they have found or salvaged, that is large enough to inhabit, and adapt it to their needs and tastes, or they might assemble a home from materials that are immediately at hand or easily and cheaply sourced. Ad hoc homes are often small, either because something bigger would be unaffordable or because they need to be mobile. This means that the occupant needs to be adept at living in small spaces, and also that a certain degree of living needs to be carried out outside or elsewhere. The sharing of spaces is another way of managing limited resources, and with this comes the need for developed social skills to manage the frictions that can arise from close quartered living.

The ad hoc home is sometimes chosen, but often it arises from a need to make do with limited resources. However, the creativity that arises from the processes of making do is evident in the richness and diversity of examples, which will be discussed next.

Types of ad hoc home

Ad hoc homes can be divided into two main categories: those that make use of a pre-existing box and those that are assembled. Those that are assembled are self-built using available low-cost materials, which might be site-sourced or salvaged or a combination of the two. Boxes give the benefit of already providing an enclosed space, but since they tend to be appropriated, they need to be adapted to their new uses as homes. Sometimes the boxes being used had an entirely different function, but others, such as caravans were originally designed to be occupied. However, the intensity of use required for low cost living involves a very different pattern of use to a caravan being used for leisure purposes.



Fig. 5.5 Mobile homes in the Paris Zone, Eugene Atget
Source: http://www.moma.org/collection/object.php?object_id=43807

Caravans, also known as mobile homes, range from the small touring caravans (travel trailers in US) to the 'double-wide' manufactured homes that are delivered in two sections and joined together on site. These are known as park homes in Wales and are popular with retirees wishing to free up capital from the sale of their homes. The single unit static caravan is a very familiar sight in the Welsh countryside. They are used for a variety of purposes, from providing temporary accommodation while homes are being built or refurbished, to providing holiday accommodation. However, in many uses that they are put to, mobile homes are not fit for purpose. Their poor insulation makes them uncomfortable and expensive to run in the winter, and often ad hoc measures are used to try to ameliorate these problems.

In the UK, caravans are subject to different regulations and planning controls to permanent dwellings, and this provides opportunities to circumvent some of the barriers that those with limited means would otherwise face. The legal definition of a caravan in the UK is dependent on it being transportable in no more than two sections. These can be self-designed and built as long as the legal requirements are met. Another advantage of a mobile home is that if enforcement action is taken, the investment in the home is not lost.

The caravan as legally defined covers a much wider range of construction types than the commercially manufactured static or touring caravan. For example, when the aesthetics of design play a prominent role, they are often described as pods. In practical terms, there is little difference between the mobile home and the architect-designed pod. Both are compact self-contained units, the shape and dimensions of which have been considered to allow transportation with a flat-bed truck. However, there are significant differences between the two in terms of cost, quality and popularity, and these are undoubtedly related. Colin Davies argues that, as with their designs of modular systems, architects' unwillingness to compromise on quality for cost purposes has meant that their pod designs do not achieve a unit cost that is economical enough to make them commercially viable (Davies, 2005). Richard Horden's design of the Micro-Compact Home is an example of a design that is innovative and designed and built to high standards, but that has a price tag that means that its market is limited (Horden, 2008). Perhaps architects would have more success if they tried to design a better caravan, rather than starting from scratch with their individual pod designs. By studying this typology and the key role that costs play in its development, architects would have a better understanding of the critical importance of achieving a unit cost that the market is prepared to pay (Davies, 2005).

The emerging typology of the tiny house is an interesting mix of the pre-made and the self-assembled. The tiny house movement started in the United States a few years ago, as a reaction against excessive house sizes and levels of borrowing required to fund their purchase. A typical tiny house is built on a standard trailer and uses a construction method similar to conventional timber frame construction, with conventional details. The tiny house movement has a cultural significance that extends beyond the limited numbers who are actually living in tiny houses. It reflects an attitude amongst a segment of the younger generation typified by a rejection of a culture of excessive consumption, and an interest in self-build and self-determination (Kahn, 2012).

Not all tiny houses are self built. The Tumbleweed Tiny House Company, which was instrumental in popularising this type, produces a range of standard models as completed products. If delivered in this way, then they are simply caravans that use a traditional architectural language and materials. This means that they are heavier than touring caravans, which have been designed with lightness in mind. However, for many, the fact that they are on wheels is largely to avoid having to meet minimum space standards that apply for dwellings in many US states. There have been several independently produced documentaries about the tiny house movement (We the Tiny House People, 2012; Tiny: A story about living small, 2013), and the subject is now gaining mainstream interest. The US television series, Tiny House Nation is already in its third series by August 2016 (Tiny House Nation, 2016).

Even when self-built, tiny houses usually conform to conventional construction methods and use materials and products sourced through the large scale supply chains that supply builders merchants and DIY stores. When instead the materials for a self-build are recycled or scavenged, then the resultant typologies are shacks and shanties. Where such structures are used

as homes, they tend to be associated with the most socially deprived. Berenice Abbott's photographs of huts made by the unemployed homeless in the Great Depression show a row of shacks made by those suffering economic hardship. Despite being made from an assortment of salvaged scraps materials, the desire to create a sense of domesticity is evident in such touches as the hanging of framed pictures, or a propped up broom.

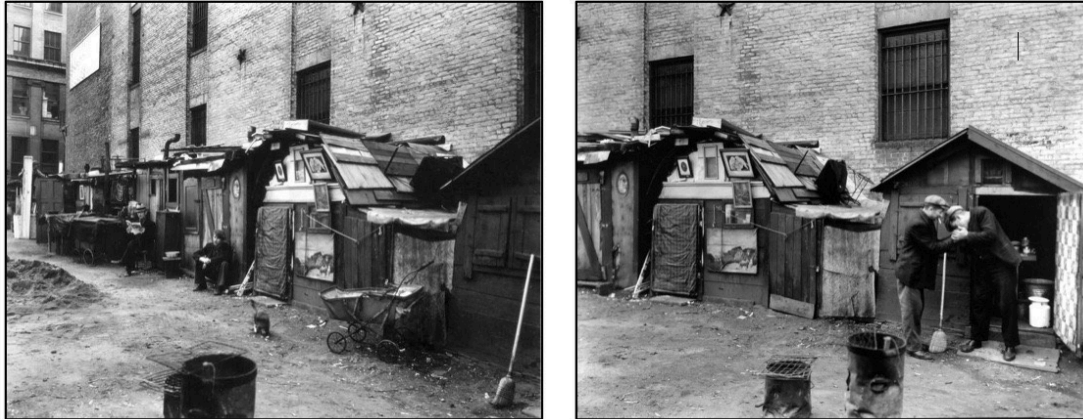


Fig. 5.6 Berenice Abbott, Unemployed huts, New York, 1935

Source: http://commons.wikimedia.org/wiki/File:Huts_and_unemployed_in_West_Houston_and_Mercer_St_by_Berenice_Abbott_in_Manhattan_in_1935.jpg (left) and <http://www.siws.fr/2012/10/02/19353/> (right)

It is estimated that about a billion people worldwide live in shacks (Davis, 2006). In 'developed' countries such ad hoc structures are more commonly found in other contexts, such as allotment sheds. Sometimes their construction is a result of a desire to reduce their environmental impact by making use of materials that others would consider waste. Occasionally this approach is used for dwellings such as can be found at Rollo's in Knoxville (Once Upon a Time in Knoxville, 2011).



Fig. 5.7 Zoniers shacks, Agence Rol, 1913 (left); and Fiddler's house at Knoxville, 2011 (right) |

Source: <http://peccadille.net/2014/02/04/avant-le-periph-la-zone-et-les-fortifs/agence-rol-zoniers-divry-1913-4/> (left); and http://www.fuguestatefilms.co.uk/knox/once_upon_a_time_in_knoxville_Directors_Statement.html (right)

This approach to cobbling a home together was popularised in the early seventies with such books as 'Handmade houses: a guide to the woodbutcher's art (Boericke & Shapiro, 1973) and 'Woodstock handmade houses' (Haney & Ballantine, 1974). Some of the examples in these books were located in remote areas and made use of locally available timber, and as such tread the line between shacks and cabins.

Both cabins and shacks provide simple shelter with available materials, but whereas shacks make use of materials cast off by an industrialised society, the rural locations of cabins provide opportunities to use natural materials sourced from the site. The cabin and the simple life it

represents have held a particular romantic attraction to those not entirely satisfied with their city lifestyles ever since Thoreau wrote of his life in the woods in the mid nineteenth century (Thoreau, 1854). Hut, shack, shanty or cabin: however it is called, the simple shelter has fed our desire for a less complicated life throughout the twentieth century (Beard, 1920; Cline, 1997). These days, websites such as cabinporn.com continue to feed such rustic fantasies without troubling the daydreamer with the harsh realities of rural living.

Another form of shelter that has captured the public's imagination in recent years has been nicknamed the hobbit house. These buildings, which are popular with the LID community are growing in numbers in rural Wales. The grass roofs with undulating curves combined with the use of natural, handworked materials on the external walls give the houses the appearance of being dug into the landscape, like the hobbit houses of Tolkien's novels, and Peter Jackson's popular films, *The Lord of the Rings* and *The Hobbit*. This nickname has been adopted by some Low Impact Developers, including Simon Dale, who describes his first self-built home as 'The Hobbit House' in his website, where he gives a detailed account of the process of construction of this dwelling (shelter:: the hobbit house, from beingsomewhere.net). The most popular form of construction of hobbit house is commonly described by Low Impact Developers as a roundhouse. LID roundhouses differ from their bronze age namesakes in that they have a central round roof light that is created through the use a particular form of reciprocal frame for the primary roof timbers. A reciprocal frame is one in which the individual members support each other due to the nature of the geometry.

The popularity of the roundhouse amongst the LID community is in large part attributable to Tony Wrench, who wrote 'Building a Low Impact Roundhouse' (Wrench, 2001). This book, which describes the process of building a roundhouse as a home for himself, has inspired others to follow his example and do the same for themselves. Wrench also builds or helps build roundhouses for others and also offers courses on the subject. In 'Building a Low Impact Roundhouse', Wrench credits Ken Kern's 'The Owner-built Home' (Kern, 1972) and Lloyd Kahn's 'Shelter' (Kahn, 1973) as key influence and inspiration.

As a building type, the roundhouse has been the subject of some criticism and concern by construction professionals and authorities. An inherent weakness of a reciprocal frame is the risk of progressive collapse. Since all members rely on a neighbour for support, the failure of one means the potential collapse of the entire roof. The use of ungraded timbers means that loading calculations are difficult, and the use of grass as a roof finish means that the roof is subject to significant loads from water-laden turf. In the absence of any publicised cases of structural failure, the roundhouse continues to be a popular building type for low impact developers.

Appropriation

Often, products or typologies originating from or intended for different contexts are appropriated for the purposes of creating an ad hoc home. This avoids the laborious process of building a home from scratch or the cost of buying a product or commissioning a bespoke design. The ad hoc adaption or repurposing of manufactured products and standardised building typologies is common in Low Impact movement, with examples of such construction types including yurts, tipis, polytunnels, and found and salvaged objects such as railway carriages.

Often vehicles not originally intended for habitation are adapted to become homes. A

decommissioned ambulance, bus or other public vehicle or other vehicle of a size and shape suitable for converting will cost only a fraction of the price of a new motor home. Essentially, all that is needed is a box on wheels with an engine. The cultural lineage of such ad hoc motor homes extends from hippies through new age travellers of the 1980's to today's travellers and off-gridders.

Another example of an appropriated product is the ubiquitous shipping container. The ultimate symbol of the globalised age, these welded steel boxes are some of the most accessible and universal pre made shelters of the post-industrial era. There are many examples of high-budget shipping container homes, but the logic for investing in high quality finishes in such structures is dubious. Instead, Simon Norfolk's photograph of ad hoc shipping container homes in Afghanistan speaks of the immediacy of a need met.

The appropriation of traditional typologies from other cultures has been a popular feature of counterculture housing that has continued through to today's low impact movement. This is partly because the spiritual traditions of such cultures as the north american indians presented an alternative narrative to prevailing western culture, in that humans and their environment are seen as far more integrated than the judeochristian religions. Accompanying this cultural connection are the practical benefits of typologies such as the tipi and the yurt, as illustrated in books from the period such as Lloyd Kahn's Shelter (Kahn, 1973). Both typologies have been successfully used in Tipi Valley in Carmarthenshire since it was established in the 1970s. The mobility of such simple dwellings successfully confounded the local planning authorities, as each time an enforcement order was served, they would be relocated to the other end of the valley, hence meeting the terms of the enforcement order (Wimbush, 2012).

The process of ad hoc self-build

Scant attention is given to the processes involved in ad hoc self-build in the examples given in 'Adhocism' (Jencks & Silver, 1972). Dezeuze's discussions of Wentworth's photographs provides valuable insight into the processes of making do (Dezeuze, 2013a & 2013b) but the subjects of such photographs tends to be one-off interventions rather than the complex sequences that are involved in self-build. In the context of LID, Pickerill and Maxey have identified the influence of permaculture principles on self-build processes, stating 'the virtuous feedback loop advocated both within ecological architecture and permaculture, whereby design leads to use and this informs re-design, is firmly embedded within LID' (Pickerill & Maxey, 2009). However, there is no detailed discussion about how this process works or reference to examples.

Since secondary sources are short on discussion about the process of ad hoc self-build, then it is necessary to refer to the primary sources, namely those who have actually engaged in it themselves. Rollo of Knoxville, in expounding on his philosophy of building, is helpful in this regard:

'My philosophy of building is basically do it on the cheap without any bank loans because - it's insane - people are - I don't know the exact numbers - but if you take a loan out you end up paying two or three times the money you took out so you might as well just slow down. Of course it's not as pretty - I mean it takes years to finish a house, but you don't have this weight on you - to have to work for the banker - plus it gives you a lot more time to design and it evolves. It depends on what kind of salvage material you get as to what the ultimate design will be instead of being in a rush.'

(Once upon a time in Knoxville, 2010)

Another primary source, this time from the Welsh LID context, is Tony Wrench, whose book 'Building a Low Impact Roundhouse' described the process of his self-build in detail. In one section he describes how the completion of the roof caused him to reconsider some of the design decisions he had previously made:

When all the secondary rafters were on, we could see the pattern of the roof underneath for the first time. I'd only ever seen it before in Aluna. I'm very pleased with it - it's like a giant iris of an eye. It became clear at this point that the internal design should not impede the clean sweep of the lines of the rafters, so that meant new thoughts about partitions etc.

(Wrench, 2001: 35)

Aluna is Wrench's name for a model he created of the design in his mind, and which evolved ahead of the real build. He used it to plan the works and anticipate issues, but in this instance it did not provide a complete picture so the design needed to be changed in response to new realities on site.

The decision to carry out much or all of the building work oneself is often driven by financial constraints, and this decision in turn imposes on the amateur self-builder a requirement to make do with his or her own lack of design or building skills. In addition, the use of available, often salvaged or site sourced materials also requires the self-builder to improvise and invent solutions on the spot. Whether due to an inability to fully anticipate how a design will translate to reality, or the need to develop a design based on available material, both Wrench and Rollo were responding to the contingent conditions of ad hoc self-build.

Making do does not necessitate ad hoc processes, but much of the nature of making do makes it difficult to map a linear process and follow it through faithfully. If both the needs to be met and the resources available are well defined from the outset then it may be that a structured process of making do can be pursued. However, in reality, the amateur self-builder's own lack of skills will often confound his original intentions, requiring ad hoc responses to situations that arise unexpectedly. Lack of experience in the particular activity being engaged in also makes it difficult to anticipate and design out such problems. Therefore, even if they have a planned path, the person making do has to be prepared to improvise responses to situations that throw them off it. Making do also involves using imperfect materials and tools. Since their performance is inherently unpredictable, the self-builder using them needs to be prepared to adapt their design in response to their experience of working with them.

5.4 Conclusion

The review of literature on making do has established that it is an active creative process, which relies on cunning and practical intelligence, as the necessity to meet needs with the resources that happen to be available requires an ability to find opportunities in chance situations. It established that successful making do requires an openness to transgressing cultural norms. However, it found that this often has implications for the way in which those making do are perceived by those with fixed notions of propriety. A wide variety of types of ad hoc home was identified. The appropriation of existing products and typologies was found to be common, while the assemblage of ad hoc structures out of available materials was also studied.

Although the writing on making do was found to be insightful, there were no examples that tried to draw practical lessons from its study. Commentaries were posited from the role of observer, not participant, and usually it was the products of acts of making do, rather than the processes themselves that were being observed. In order to address the shortcomings of the existing literature on making do, I have therefore engaged in the process myself, through my involvement in self-builds with limited means. My role has been as observer of the whole process, of which I have been a participant.

The following chapter presents my observations on the processes I have been involved in at four sites, but avoids referring back to the literature or the LID case studies. It is in the subsequent chapter, 'Discussion', that I analyse the learning gained from participant observation in relation to the literature and the LID case studies.

The aim of the fieldwork is to throw more light on the subject of the process of making do in ad hoc self-builds, so that in the future the evidence of it which can be seen in OPDs can be better understood. As has been extensively discussed in Chapter 2, an arts-based methodology has been used, so as to throw up opportunities for chance insights. A hypothesis or set of specific research questions has been avoided, as this would close down lines of enquiry. Instead, the learning gained from the combined fieldwork and literature review has been distilled down into a number of themes so that the results can be presented in a structure that can be easily remembered and hence be of practical use to those needing to make do or who have an interest in the subject.

6. Participant Observation Case Studies

6.1 The sites

The sites at which I engaged in participant observation are as follows:

HM - A stone cottage with about half a hectare of land including a polytunnel;

DH - A cabin and caravan in the woods;

UI - A caravan and pod providing a temporary home during the refurbishment of a longhouse;

BQ - A large site occupied by a commercial shed, shipping containers and ad hoc structures.

Despite the fact that I have had more involvement with some of the locations than others, there is no implied sequence or hierarchy to the main case study sites. Instead it is more helpful to the research to understand the qualities that make them similar, namely:

- They all show evidence of making do by others
- I engaged in making do to some degree at all locations
- Some of the making do for each site involves the appropriation of objects and products
- Some of the making do for each site came about as part of self-build processes.

The participant observation case studies differ from the direct observation case studies in that they have all been studied over a period of time, with multiple dates of site visits and photographs. The introduction of time creates a complexity that is both challenging and important for the study. The constant ebb and flow of materials and objects that is evident on all four sites is one of the fundamental aspects of making do.

My involvement in various self-build projects on the four case study sites afforded a detailed experience of the processes involved in making do in the context of self-build. In addition to a large number of limited interventions that were carried out during the research there were two self-build projects that took up a substantial amount of time and resources, and afforded me particularly valuable experience of involved and layered processes of making do. The re-covering of an existing polytunnel frame with polythene at HM provided insight into the central role of this typology in LIDs that I had witnessed as a direct observer. The other key self-build involved the erection of a pod made of SIPs adjacent to and accessible from a static caravan at UI. Although not conceived as an ad hoc self-build, my lack of building experience combined with a fast-diminishing budget meant that it proved a valuable lesson in the art of making do. For both of these, I was nominally the principal designer, but significant contributions were made in both design and delivery by other parties. These contributions and their influence on the design and build process are an important aspect of these case studies. These self-builds are discussed in the context of other activities on the sites where they were constructed. My role as participant was as only one of many actors, past and present that have played a part in shaping these locations, and the making do that I engaged in only creating additional layers to the making do of others.

The sum of my building experience prior to commencement of the study extended to the building of a small area of garden decking. As an experienced architect, I had a range of skills and experience that could be applied during the process. However, it should be noted that all

self-builders have their own unique sets of skills and experience, often in areas relating to design or construction, so it is not possible to make an attempt to compare the author's skills to a non-existent 'typical' self-builder.

As was the case with the direct observation case studies, some of these sites have structures that have been built and occupied without statutory consents. Therefore, again, in order to maintain their anonymity, the sites are identified by a two letter code that is related to their names, but are not exact acronyms. Also, names of all people involved in the case study sites have been changed to ensure anonymity. When I am discussing my own involvement in activities at the sites, the first person singular is used. This is consistent with a methodology based on participant observation, whereby the researcher's role in the activities and subjective experience of them is an instrumental aspect of the research.

6.2 Structure of analysis

Introductions

The discussion of each case study opens with a brief introduction to the site, the activities on it and the structures and features that are the subject of study. Each site was studied over a fixed period, over which time they were subject to constant processes of change and evolution. The introductory texts briefly outline the main changes on each site.

Above each introductory text is a site plan. A drawing showing the site at a single point in time would not have been able to show all the activities and structures that are discussed in the subsequent text. In order to create drawings that would be useful to the reader to help them locate all the subjects of subsequent discussion, the site plans from different times over the period of study have been layered, following the methodology set out in Section 2.4, 'Compressed time site plans'.

Vignettes

The observations about each site and the activities on them are presented as vignettes. The following definition, by a literary journal devoted to publishing only vignettes provides a concise but rich definition of the term:

"Vignette" is a word that originally meant "something that may be written on a vine-leaf." It's a snapshot in words. It differs from flash fiction or a short story in that its aim doesn't lie within the traditional realms of structure or plot. Instead, the vignette focuses on one element, mood, character, setting or object. It's descriptive, excellent for character or theme exploration and wordplay. Through a vignette, you create an atmosphere.

(Vine Leaves Literary Journal website, 2016)

The important thing about vignettes in the case of this study is that the scenes are not narratives but fragments. One is aware of the existence of a wider reality, but that reality is left unclear. The edges are blurred.

Texts are all paired with a single, pair or group of images that directly show an aspect of the scene being described. It is the combination of images and text that generates the vignette. It is through the gradual accretion of vignettes that an insight into the wider context is achieved. Yet a full picture can never be obtained, as it is understood that the choice and presentation of the vignettes is subjective.

Time sequences

Complementing the vignettes, each case study has a number of time sequence studies that look at the processes at a detailed and overall level. When viewing the time sequences in these case studies, it is apparent that the self-builds or smaller scale episodes of making do that are the subjects of these sequences do not follow smooth linear paths of progress. Unintentional setbacks are common, for example when the weather makes sustained attacks to which the self-builder has to respond, often needing to change tactics in the hope of finding more effective and durable solutions. Sites can also show apparent reversals because their occupants have intended them, such as when mobile structures are moved around sites or from one site to another.

For each case study, there are a number of photographic time sequences and also a sequence of site plans that form time sequences in a similar way. The methodology for making and

presenting the time sequences is explained in Section 2.3, 'Photographic time sequences', and 2.4, 'Site plan time sequences'. Both approaches are intended to complement each other in a search for a more profound level of insight into the contingent nature of processes of making do. Many photographic time sequences of build projects are set up with the assumption that there is an end point, the completion of the building. These studies are rather based on an acceptance that there is never a beginning or an end, only an ongoing process whereby things and occupants come and go, plans change, and events disrupt plans, but all the while, lives are lived in the messy unidealised space that is the everyday.

6.3 Participant Observation Case Study: HM

Introduction

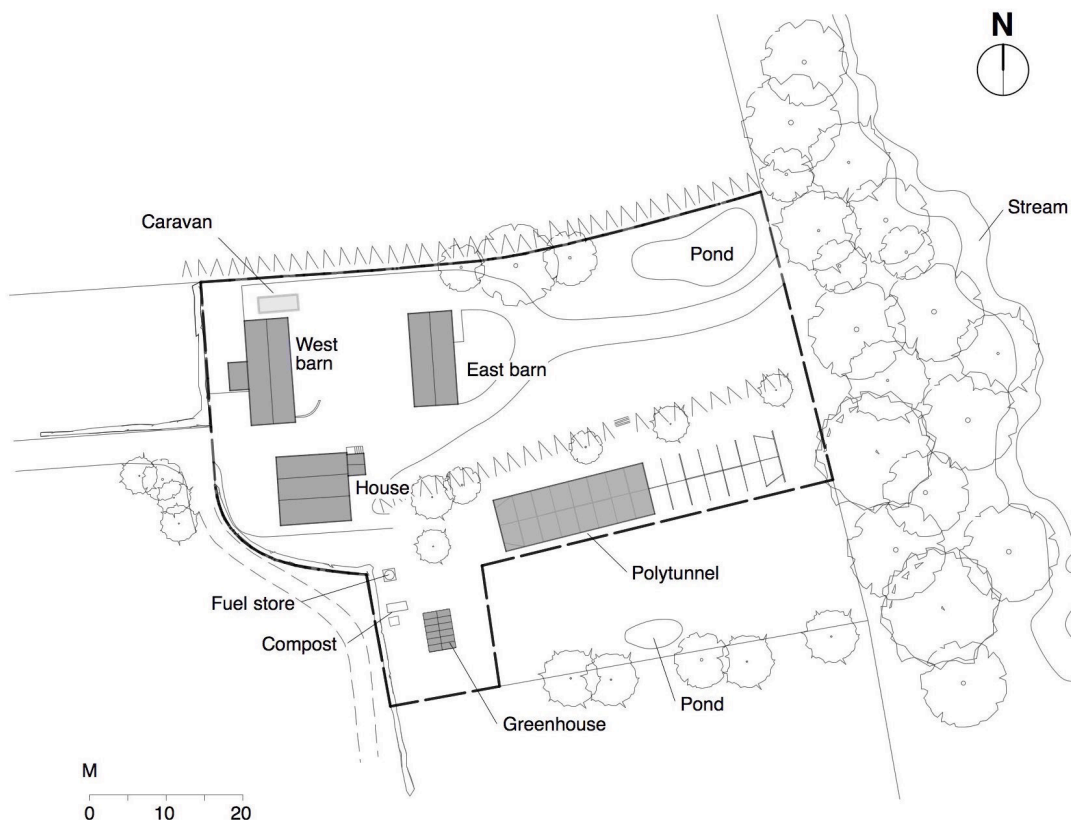


Fig. 6.1 Compressed time site plan of HM, covering the period of November 2012 to November 2013

This rural site is occupied by a stone house and two stone barns. The plot is surrounded by farmland, with a copse of trees to the east. Access is gained from the west via a long track that passes the farmhouse and buildings. The copse of trees, which has a stream running through it, is not part of the site, but is open access. The house is located in the west part of the site, near the access point. The two barns are situated to the north of the house, oriented north-south, and parallel to each other. To the south and uphill is a greenhouse with a composting area adjacent to it. The frame to a large polytunnel extends from here to the eastern perimeter of the site.

My partner and I lived in HM from November 2012 until December 2013. The west barn was kept by the landlord for his own storage purposes, but the east barn was made available for us to use. The compost area was expanded soon after we moved in, with the addition of a second compost bin. In spring of 2013, a touring caravan was lent by the landlord for us to use as a spare room when we had visitors. Although it was only used for one night, it stayed on site for over a month.

From December 2012, part of the polytunnel was re-covered and reinstated for food growing and other uses, though this process took some months to complete. The polytunnel was used throughout 2013 for food growing and a variety of other uses.

Vignettes



Fig. 6.2 The stone cottage at HM | Source: the author

The house is a stone-built two-storey cottage, thought to be from the early nineteenth century. It has a single storey kitchen extension on the south side being a later addition. Water is provided by a spring which feeds a tank uphill from the house, the house supply passing through a UV filter to purify it. Electricity is obtained from the national grid.

The windows are double-glazed and the roof void is insulated, but the stone walls are uninsulated. There is a solid fuel stove in the living room and also a kerosene-fuelled boiler providing domestic hot water and central heating via radiators. During the time I lived there, the price of kerosene was particularly high, making the use of central heating prohibitively expensive. Therefore the log burner was relied upon to provide much of the heating. Logs were bought in and stored in the east barn for this purpose. Temperatures in rooms away from the burner were often well below those considered acceptable in a modern home, and had to be compensated for by wearing multiple layers of clothing in winter months. The predominance of the log burner as heat source imposed a pattern of occupation that involved intensive occupation of the living room and closing of doors to separate parts of the house that were not being inhabited or heated.

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Fig. 6.3 Piecemeal adaptations to western barn | Source: the author

The west barn is a rectangular building oriented north-south on ground that slopes away to the north. There is a small stone lean-to on the west side, which according to the landlord had been a pig sty. The building is constructed from stone, with a timber trussed roof finished in corrugated metal and polycarbonate sheets. Both gable ends are stone up to eaves level, then timber framed with featheredge board cladding up to the ridge. Evidence of piecemeal adaptations and repairs to walls and doors demonstrates that making do has long been an intrinsic part of life on this site.

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Fig. 6.4 The eastern barn. Rudimentary door and window to storage | Source: the author

The east barn has an open section at the north end, and two enclosed stores at the south end, one being above the other, and accessed by external steps. The building is stone built with a corrugated metal roof. Close inspection suggests that the south part is a later addition.

The door to the enclosed store is part of a larger opening in the stone wall, the side panel being timber clad with a window above. This whole assembly has been put together in an ad hoc fashion. The window is particularly rudimentary, with two overlapping unframed single panes held loosely in place by timber planks. The door is also rudimentary, being made only from individual planks. Minimal effort has been taken to square the planks or remove the bark, suggesting either a desire to minimise waste or limit the amount of sawing needed, or a combination of both.

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Fig. 6.5 Detail showing fragment of machinery attached to steel section used to create ad hoc storage attic in eastern barn | Source: the author

The open section of the east barn has large openings on either side that would have originally had double doors, and traditional ventilation slits on all sides. The floor is earth and the space is open to the roof. There is a metal structure creating the high level storage, that makes use of various lengths of steel or iron that seem to be salvaged from agricultural machinery. The entire assembly is highly rusted and the legs do not provide much support. In fact, the bottom of one of the legs hovers an inch above the dirt floor. When we moved to the property, the lightweight frames for the greenhouse worktops and a few lengths of PVC guttering were stored on this frame. During the construction of the polytunnel, I used it to store lengths of square cut larch. The fact that it was already being used for storage suggested this function, but its poor state required an awareness of the risks involved in using it.

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Fig. 6.6 The second compost bin: being made using recycled pallets (left); and in use, with carpet cover (right) | Source: the author

When we moved to HM, the compost in the existing compost bin was already mature and ready for use. Therefore a second compost bin was needed. The landlord had offered free pallets and my partner asked for four of them, and devised a method to use these in conjunction with fence stakes to create the walls of the compost bin. The stakes were purchased from a nearby farm supplies shop. They were hammered into the ground using a heavy stone, then the pallets were slotted over the stakes to create the back and side walls. The final pallet was attached to the left-hand side with some thin polythene sheet, and the right-hand side was left unattached, to allow it to be opened. The inside of the bin was lined in chicken wire. Finally, a rectangle was cut from a roll of old carpet that was in the barn store room, and attached to the top of the back pallet. It was draped over the front pallet, so that it could be lifted when more composting material was to be added. The purpose of the carpet was to keep the worst of the rain off, and to maintain temperatures in the pile below.

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There was already a frame to a large polytunnel on site, measuring about 7m wide by 45m long. After some consideration, it was decided that eight bays, equalling 20m length would be recovered in polythene and brought back into use. The process started with the preparation of the existing frame, which was rusted and had degraded foam tape on it. This required first scraping the foam tape off, and then painting the tubes white. Initially, spray cans were used, but these ran out quickly and were not suited to the task, so a tin of paint was bought, and it was applied with a brush. Access to the top parts of the tubes was obtained by placing scaffolding planks on two rusty old trestles, on uneven ground that had recently been rotavated.

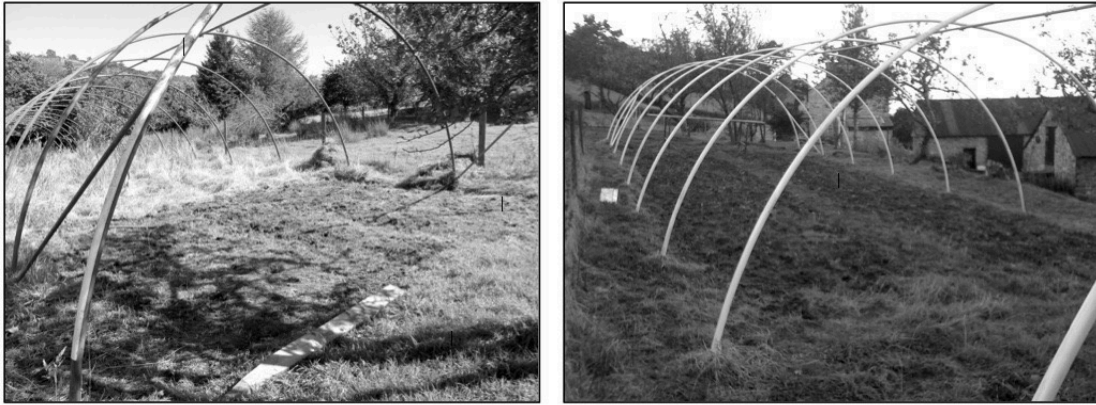


Fig. 6.7 The polytunnel frame at the early stages of preparation: 07/09/2012 (left); and 14/10/2012 (right) | Source: the author

I then prepared some drawings showing a design for the ends with the doors and frames. The polythene and clamps were purchased from a polytunnel supplier. The proprietor advised me that written instructions could be downloaded from the internet and also gave verbal advice on the design and installation methods. The tubes were not standard sizes so the clamps for the timber frames needed to be ordered and sent in the post. The following day, I revised the drawings based on the advice that had been given, and ordered the wood for the end frames from the local sawmill. A week or so later, at the weekend, some friends came to help dig the trench around the perimeter. This was physical work, but as was discovered later, the trenches were not dug deep enough.

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Fig. 6.8 The cross-braces, as transported in a compact car (left); the joint detail between two lengths of tubing (middle); and one of the two completed 3m long cross-braces after installation (right) | Source: the author

Because not all the bays of the existing frame were to be covered, there were two issues to deal with that I would not otherwise have been confronted with: the ridge beam would need to be cut or the polythene cut around it. Also, the end cross-braces would need to be moved, or new ones purchased. The landlord said he did not want the ridge beam cut or the end cross-braces moved, so I needed to obtain new cross-braces for the last bay that was to be covered. These would need to be 3m long, much more than the car would accommodate. In order to avoid the need to pay for their delivery, I asked the proprietor of the polytunnel shop if he could make them in two 1.5m sections that could be assembled on site, and he confirmed that he could, so I went to collect them. When I arrived, he carried out the process of turning standard steel tubing into lengths that could be joined on site while I watched. I was then supplied with bolts for fixing the two sections together and P-clamps for fixing them to the hoops. At 1.5m they fit easily in

the car. I also bought some polythene repair tape to close up the gap that would be created by cutting the polythene around the ridge beam. The next day the cross braces were installed.

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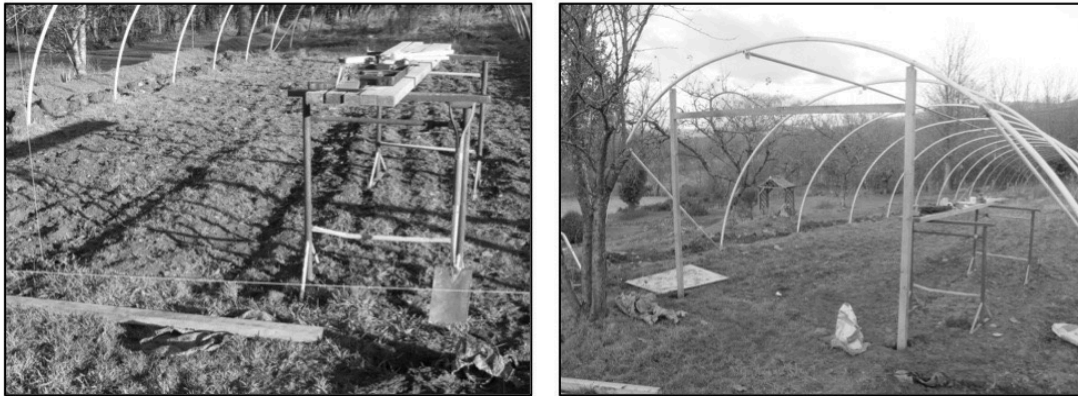


Fig. 6.9 Progress photographs showing first goal post being installed, 28/11/2012 | Source: the author

With the timber delivered, the frame for the doors at the end nearest the house was built. Following the supplier's advice, this was designed in a rugby post form, with P-clips fixing the verticals to the steel tubes at the top and the posts set in 'Postcrete' in the ground. The cross bar was held in place with 6" nails and angled brackets. This work was completed in a day. The following week, the frame for the doors at the other end was made. The frame was now ready for covering. This is a job that needs many hands, but it also requires still weather. The guides say that the best time to cover a polytunnel is on a sunny still summer's day. The daylight hours are long, giving plenty of time to finish the task, and the sun warms the polythene so that when fixed it is already expanded. As temperatures cool, it tightens and should feel like a drum when you tap it. Attempting the task in December is not recommended, but the polytunnel needed to be ready for the beginning of the growing season, so there was no choice but make do with the conditions and constraints that a winter date imposed. Prior arrangements had been made for friends to come and help the following Saturday, and these were confirmed the day before when the weather forecast suggested a still day.

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The first task on the day was to put the foam tape onto the tubes as I had been advised to do this only immediately before covering. Next, any projections that the polythene could snag on were taped up. The polythene was unrolled over the frame and pulled down on either side. The technique used to fix it to the end frames was to cut it into manageable sections and wrap these around timber battens which were then screwed to the timber frames. By this time, the light was fading, so the polythene was weighted down along the sides and at the ends with stones and wooden planks. In the evening, I carried out some research on the internet about how to secure the sides in the trench.



Fig. 6.10 The process of covering the polytunnel: smiles on the Saturday (left) make way for bitter determination to complete the job the next day (right) | Source: the author

In the morning, it became immediately clear that the wind had picked up, and that there was a risk that the sheet would come loose from its temporary weights. After some delay, during which several calls were made to recruit help, by late morning there were seven volunteers collaborating to complete the task. The first task was to complete the fixing to the end frames. Then, following the technique I had seen on the internet the previous night, the sides were buried in the trenches. However, some earth had slipped back into the trenches since they had been redug. It was apparent that they were too shallow in places and there was a concern that they would cause issues in the future.

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Fig 6.11 Carpets used as ad hoc doors at both ends of the polytunnel | Source: the author

The weekend following the covering of the polytunnel, the ends were cut back and dug into the end trenches. Two weeks after this, the polythene was retightened. The previous night the wind had picked up and I was concerned about it coming loose. When I checked in the morning, the polythene was all there, fixed and intact. The wind was still blowing, and I was aware that I urgently needed to close both ends somehow to reduce the forces on the polythene. Old carpets were chosen for this purpose, as they were readily available and easy to cut and fix.

During subsequent weeks, I noticed changes to the inside of the polytunnel that suggested the need to ventilate it on the still days, even in cold January temperatures. There would often be a pall of fog inside, and a mould was growing on the ground. I therefore used hooks and nails to

be able to secure the carpet doors closed or open to varying degrees depending on the amount of ventilation that was needed. However, the need to detach the carpets to gain access to the polytunnel and the battering the carpets took on very windy days caused the ends to fray and break, and the carpet to come loose at the edges. Therefore, more ad hoc efforts were required to deal with situations as they arose, with further measures used, including wedging the carpet between the frame and buckets filled with stones which were already at hand.

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Fig. 6.12 Ad hoc method for holding polytunnel window open | Source: the author

More wood was ordered from the local sawmill for the end doors, with the section size for the frames being 2x2" and the polythene being fixed with $\frac{3}{4}$ x 1½" battens. When it arrived, I realised that a section size of 2x2" was excessive for the doors and the weight may cause problems. Instead, I chose to use 1½ x 2" sections, and also to have a central cross-rail. At the same time, the decision was made to substitute one set of double doors at each end for an opening pane over a fixed pane.

The decision was made to have the opening pane swivelling on a horizontal axis below the centre of gravity of the window, with a chain controlling the degree of opening, and the weight of the window holding it in place. It was felt that a 2x2" section was well suited to this design, so I would be able to complete the windows, thus providing the more urgent need for controlled ventilation, and then obtain timber of a smaller section size for the doors at a later date. The installation of the windows at each end was completed, but the chain had not yet been obtained, so I initially tried using string instead fixed with nails. However, the string was not strong enough and broke repeatedly, so a spirit level was used to prop the window open at times, until the chain had been bought.

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Fig. 6.13 Ad hoc workbench | Source: the author

In order to cut the timbers down for the end frames, doors and windows, a stable surface needed to be found that was close enough to a power outlet to use the mitre saw. I initially used the ground outside the kitchen door, and connected the saw to an extension cable plugged into one of the kitchen socket outlets. This was the method I used for all the timbers for the fixed frames at both ends. It was only when I started work on the opening windows that I realised that the steps to the front door of the house provided a level surface at about workbench level, and hence would make a more convenient location for the mitre saw. The power could similarly be provided via an extension cable that ran through the boot room to a socket outlet in the living room.

The width of the top landing worked well for the timber lengths that were being used for the windows, as 2.1m lengths were being cut almost in two. However, when it came to cutting down lengths of batten that were about 4m long, a stand was needed to support this length while the mitre saw was used to cut the lengths. Having looked in the store, I found a wine rack that met this purpose well if placed on the bottom step.

I was unable to recall how the thought initially came about to use the steps as an ad hoc workbench. However, it may that be a growing awareness of other ad hoc actions on the project had meant an increased alertness to such possibilities. By the time I came to need a stand for longer pieces of wood, finding an ad hoc solution felt like second nature. The solution that I arrived at in this instance felt appropriate and safe. Having used a mitre saw with a roller stand in the past, I felt that the ad hoc method was an improvement. The wine rack felt more stable than when I had used roller stands in the past, especially as there was no completely flat floor to use as a base.

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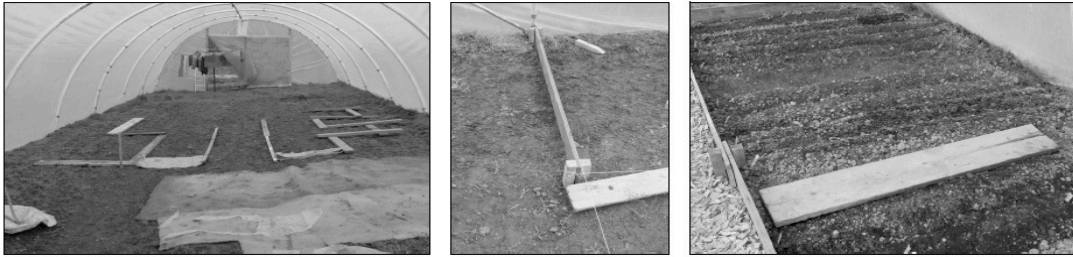


Fig. 6.14 Mock-ups used to develop the design of the planting beds | Source: the author

For the design of the planting beds, I prepared a drawing showing a complex arrangement using short planks and pointed 2x2” posts of larch. The arrangement was complicated because the intention was to allow all parts of the beds to be reachable from the paths. The quote for the timber was higher than expected, and it became clear that a simpler approach was needed. I drew an alternative proposal, and both versions were mocked up in the polytunnel with planks of wood that were lying around. The simplified version was chosen, but a couple of days later, after more thought, it was decided that this was still too complicated and was creating too much path area and not enough growing area. The final design therefore was simplified to a central bed and wide beds on either side. It was clear that some measure would be needed to access the further parts of these beds, but the details were left for later. As the planting started, a space was left at the edges unplanted for access, but it soon became apparent that this was not a satisfactory solution, as the barrel shape of the polytunnel limited one’s mobility here. The solution that was finally adopted was to plant in rows cross-ways and place planks at regular intervals running in the same direction. This was particularly successful for rows of small plants like salads, where regular access was needed for picking and reseeding.

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Fig. 6.15 Ad hoc bench at HM resting on concrete blocks and 2x2 timbers originally intended for polytunnel doors. | Source: the author

In March of 2013, a bench was created using a large piece of wood that was lying behind one of the barns. I had chosen a spot that was sheltered from the wind but caught the morning sun and prepared a support for the bench with concrete blocks and some spare lengths of 2x2” that were left over from the polytunnel build. Because of its weight, the slab of timber required six people to carry it to its new position, and so this was carried out as a task during a workday by the local permaculture group.

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Fig. 6.16 Different uses of the polytunnel, including food growing, working, drying clothes, processing food, showering, storage and entertaining | Source: the author

The re-covered portion of the polytunnel was 7m wide and eight bays long, with each bay being 2.5m in length. The first bay was used for general access and circulation by the entrance door, with space for storage and potted plants on either side. The following five bays were given over to planting beds. One central bed was flanked on either side by two paths, which were in turn flanked by wide perimeter beds. Because the area given over to beds was more than could be managed, the further end of the right hand bed was never planted. It was covered with old carpets to prevent weed growth and soon found a use for storing general food growing materials.

The decision to stop the beds two bays short of the end of the polytunnel gave an area of five by seven metres that could be put to different uses aside from food growing. Although the ground was disturbed after all the work to cover the polytunnel, the grass quickly returned to colonise, and was consequently kept short by strimming. The intention had been to erect an elaborate system of clothes lines. However, since there was already a rotary clothes drying tree outside with an integral ground spike, this was easily relocated to the interior of the polytunnel, and since it performed its task well here, no need was felt to develop the bespoke solution further. A camp shower, which was hooked over the central beam at the very end allowed for hand washing and the occasional shower. It was refilled by hose when needed at the same time as the beds were watered. The introduction of a camping table and chairs to the grassed area of the polytunnel allowed for a variety of sedentary activities. These included eating, drinking or general relaxing, with or without visitors, processing harvested food and working on a laptop computer.

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Fig. 6.17 A touring caravan lent by the landlord as overflow accommodation | Source: the author

When our landlord learned that we were to have visitors in the spring of 2013, they offered use of their touring caravan as an ad hoc spare room. We accepted this offer, and so they brought the caravan on site the weekend before our visitors were due, parking it on the north side of the western barn. Since our visitors were a family with two young children, we slept in the caravan, so as to give over the house for them. The caravan stayed in place for subsequent weeks, until it was eventually removed by the landlord.

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Fig. 6.18 A sink bowl from DH repurposed as a pond at HM | Source: the author

On the day that the log store at DH was being built, my partner accepted the offer of an old stainless steel sink from Tina, the owner of DH. He installed it in the corner of the polytunnel, behind the rotary clothes dryer, by digging it into the ground and filling it with water to act as a pond to encourage frogs. Frogs eat slugs, and given the fact that the previous year's growing was badly affected by slugs, it was hoped that having frogs resident in the polytunnel would

help keep their numbers down. A coconut shell, loose stones and cut grass were arranged around the sink, and the grass around it it was left to grow to provide cover for the new residents. It took only a matter of weeks for the frog, or frogs to move in. No slugs were found in the polytunnel the whole season.

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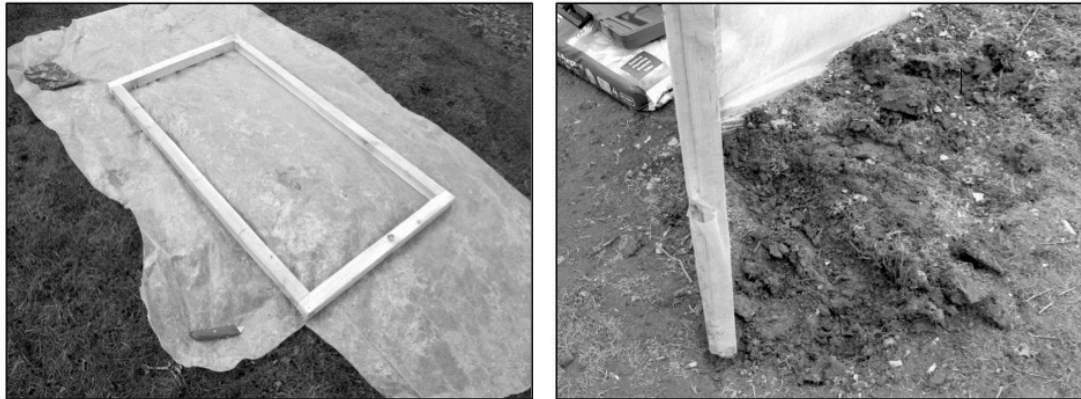


Fig. 6.19 Friendly ground: cutting polythene on the lawn outside - 16/02/2013; and removing earth to let the door open (right) | Source: the author

At times the ground was a challenging material to work with, as I learned in the final stages of covering the polytunnel. Polytunnel sides can either be dug into the ground or fixed using timbers that span from bay to bay. I chose the former, but regretted the decision when it was too late to change the strategy. The ground was often heavily water laden and the task of digging it was physically demanding. When problems arising from poor workmanship were identified, they could not be rectified easily or completely. Work to dig the sides in further to tighten the polythene was particularly demanding and unpleasant.

On other occasions, the ground proved accommodating, both as a tool to achieve goals as part of the process and as a medium with which to work. For example, an area of lawn served as a useful giant cutting-board to aid in the templating of the polythene for the doors and windows. It had no objections to being sliced through with a stanley-knife and did not damage the blade as a hard surface would have.

The material qualities of the earth also helped with an oversight in the installation of the polytunnel entrance doors. The right hand leaf, which was designed to swing outwards, could not do so initially because of the slope of the ground. However, after a few spadefuls of earth was removed, and the ground stamped back down again, the problem was solved. Such changes to a hard-landscaped finish would have required careful reinstatement of the surfacing material, but here, when such ad hoc adjustments to ground levels were made, the grass soon returned to recolonise.

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Fig 6.20 Cutting polythene on the lawn inside the polytunnel on 23/11/2013 to avoid problems caused by the wind. \ Source: the author

In November of 2013, I was preparing to move from HM to another rented house. There was a large amount of polythene left over from the covering of the polytunnel that I wanted to take with me. Most of it was derived from strips that had been cut off the sides and was crumpled and dirty, but still sound. I decided to cut it into manageable uniform lengths and fold it neatly, to allow the size of each sheet to be easily calculated. The technique used for cutting the polythene for the polytunnel doors and windows, using a lawn as a giant cutting mat had worked well, with one exception. The wind had kept lifting the corners of large sheets, and using stones as weights had been inconvenient and only partially successful. However, since the polytunnel was now available, and the last two bays had been given over to a lawn, this provided the perfect opportunity to use the same technique of cutting on grass, while avoiding the problems caused by wind.

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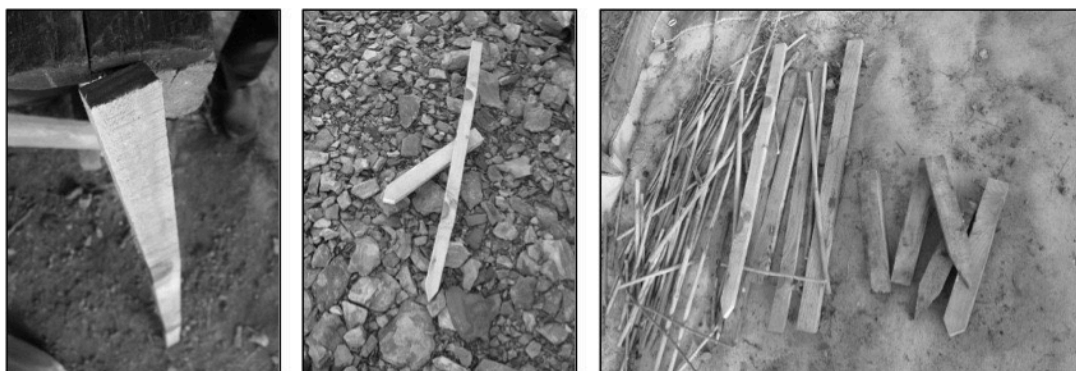


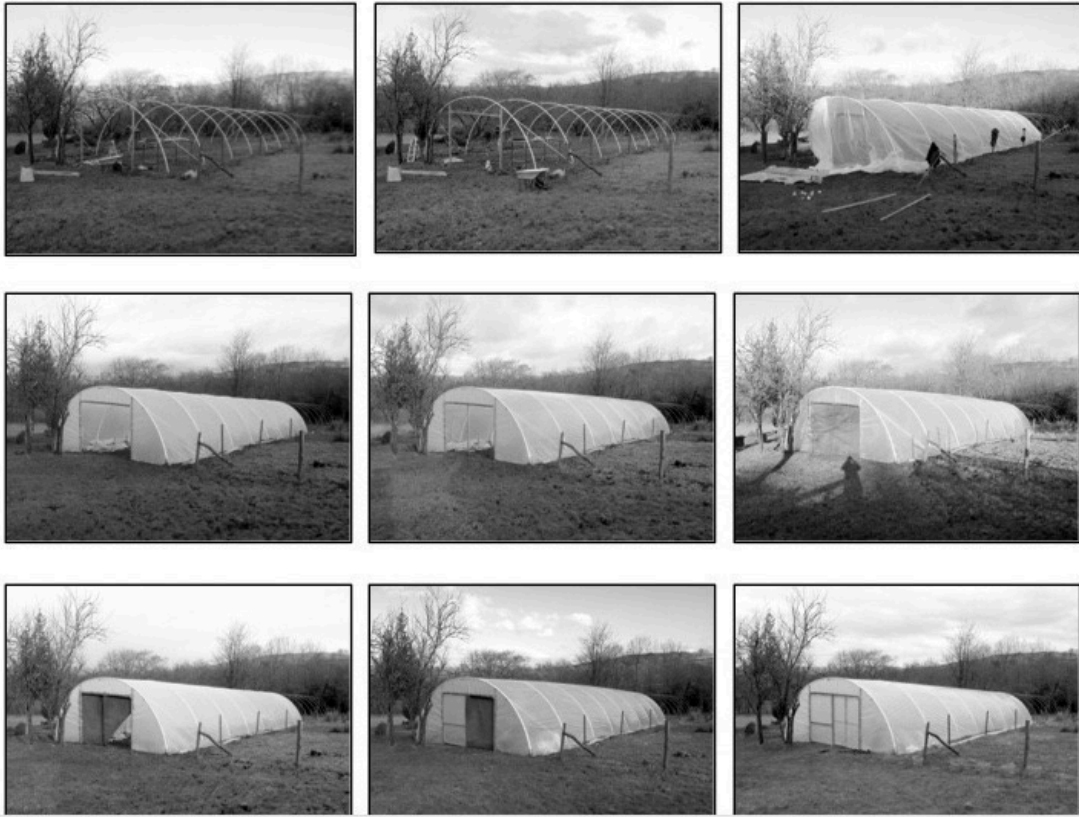
Fig. 6.21 Timbers originally intended for the pod that were badly deflected were repurposed as stakes for use in the polytunnel (24/11/2013) \ Source: the author

The following day, I tackled the lengths of square cut larch that were stored in the barn. The intention was to use them as battens for timber cladding on the pod, and for this use they could be cut into shorter lengths, as was required to fit them into the car. This also helped reduce the deflection in each length. Since the steps outside the house had previously worked well as a workbench, and the bottle rack as a support, this approach was used again to cut the timbers

down.

A couple of the timbers had significant deflections that I felt made them unsuitable for building purposes, so I made the decision to repurpose them as ground stakes for food growing. I had already used stakes made by the local sawmill that had two simple mitre cuts to create points, and since these had worked well, I did something similar, and then put them with the other stakes.

Photographic time sequences



*Fig. 6.22 Time sequence of polytunnel construction at HM from 28/11/12 to 30/03/2013
Source: the author*

Fig 6.22: This time sequence follows a recognisably linear route, as each frame shows some identifiable progress from the last. However, occasionally an incidental detail reveals something about the actual experience of the process of the build. For example, in the third frame, the ad hoc use of the fence posts to hang coats suggests the intensity of focus required at this critical stage of covering the frame with the polythene. The sixth to eighth frames show the carpet being used as an ad hoc door, the middle frame of which reveals the technique used to gain access by neatly folding the carpet diagonally back on itself.

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Fig 6.23: This time sequence shows the progression of the interior of the polytunnel after it had been covered. The processes of construction and use happen simultaneously from the outset. The second frame already shows the clothes dryer relocated from outside and put to use drying clothes, well before the end doors and windows have been completed. Similarly, the appearance of camping chairs show that the polytunnel is already being used for relaxation whilst the installation of the timber for the growing beds is underway and before food growing has been started. Objects and materials flow around the polytunnel interior, changing roles as they go. Some sections of carpet start off on the ground whilst others are requisitioned immediately to act as ad hoc doors, before being returned to the ground once the more permanent doors are in place. They then creep around the growing beds, suppressing weed growth in preparation for the phased planting of vegetables.

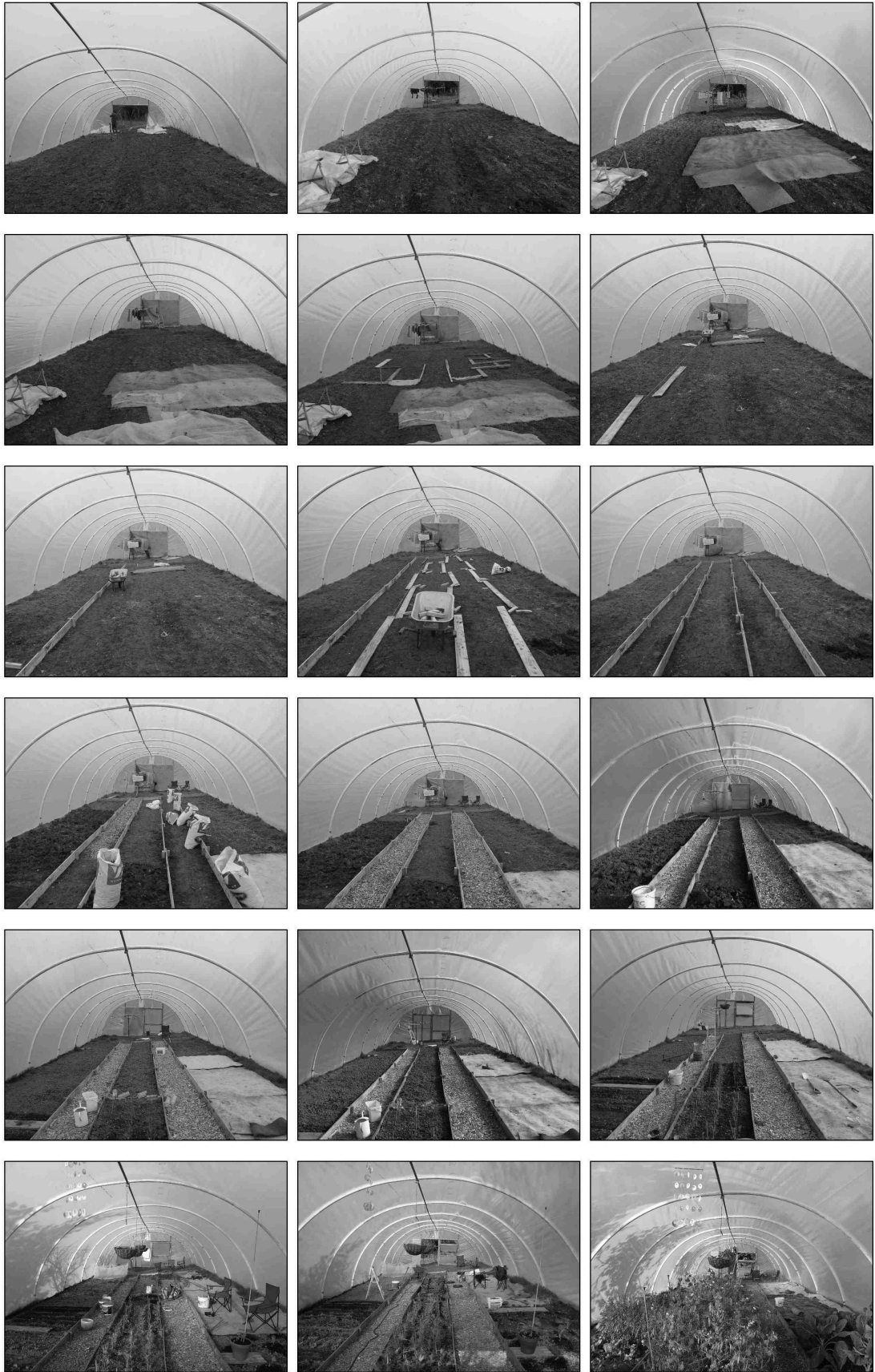


Fig. 6.23 Time sequence of development of polytunnel interior after covering from 09/12/2012 to 23/11/2013 | Source: the author

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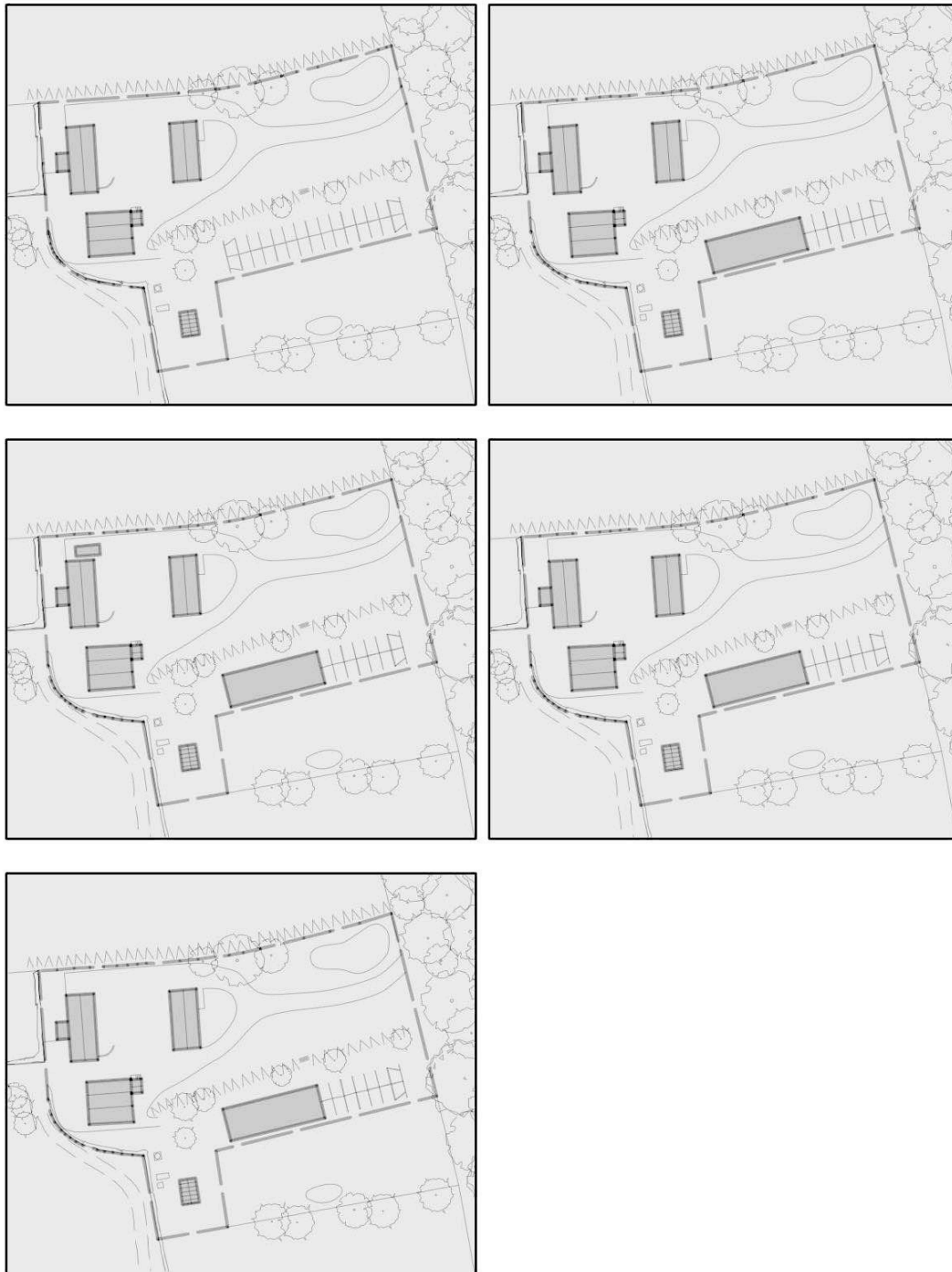


Fig. 6.24 Site plan time sequence of HM: November 2012 (top left), February 2013 (top right), May 2013 (middle left), August 2013 (middle right) and November 2013 (bottom)

This time sequence of site plans shows the site layout at three month intervals over the course of a year. The first frame (top left) shows the polytunnel frame, which is partly covered by the second frame (top right). The third frame (middle left) shows the touring caravan to the north of the west barn, but this is then removed from the site.

6.4 Participant Observation Case Study: DH

Introduction

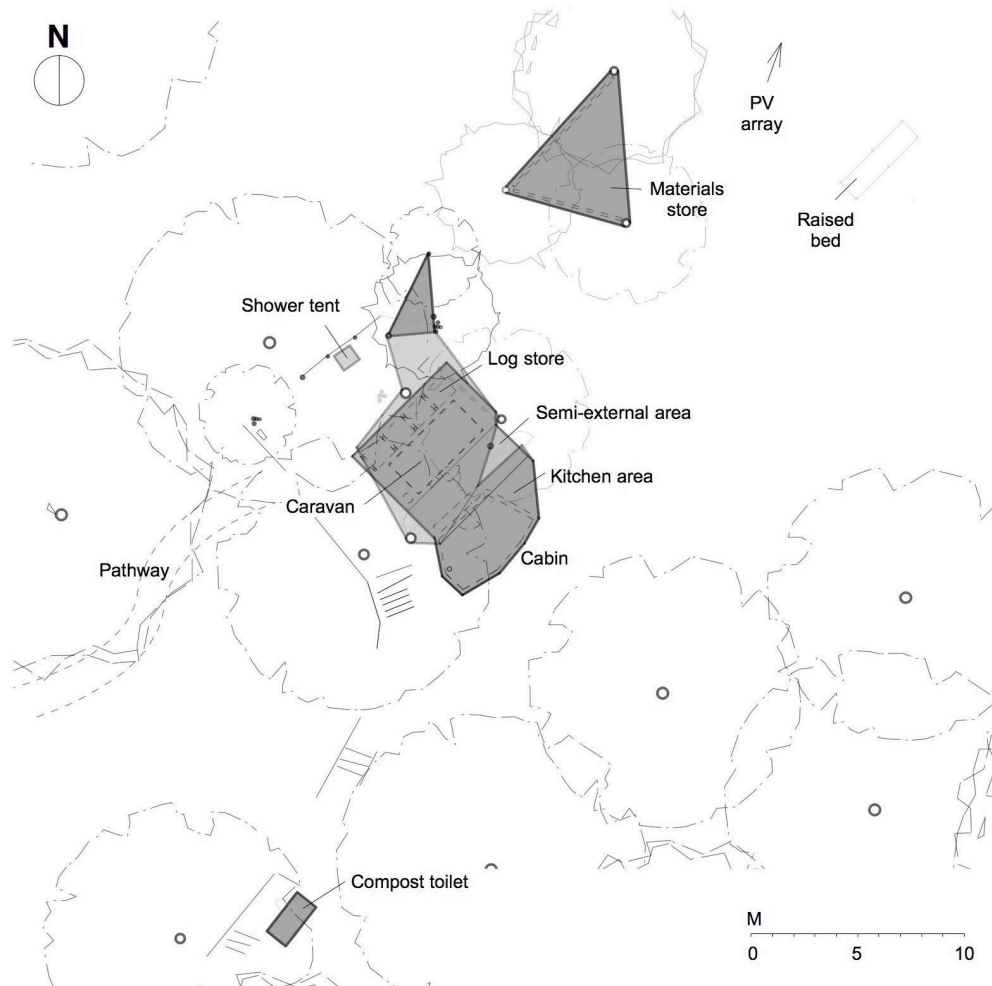


Fig. 6.25 Compressed time site plan of DH, covering the period of June 2012 to June 2016

DH is a camp in the woods consisting of a small touring caravan adjacent to a small cabin built largely of larch felled and milled on site. It is owned and occupied by Tina. The site is mostly planted with Japanese larch, with a small area of deciduous woodland. There is a materials store covered in a tarpaulin roof to the north of the cabin, and beyond that a PV array raised off the ground on a simple frame of roundwood poles. When I first visited the site in 2012, a tarpaulin roof covered the caravan and the space adjoining it. There was an external covered kitchen area, with a composting toilet a short distance away

In May 2013, a log store was built adjacent to the caravan by the local permaculture group of which I was a part. Later that year, the tarpaulin over the caravan was replaced with a timber framed structure with a corrugated metal roof and a polycarbonate roof over the area between the caravan and the cabin. The sides were clad, with doors providing access to this area, which remained open to the outside on the side of the caravan. At the same time a number of trees were cut down to create more of a clearing to the north-east of the camp. In late 2015, at another permaculture work day, ground was cleared in this area for food growing, and I was part of a small group responsible for building the structure for a raised bed.

Vignettes



Fig. 6.26 Internal views of the covered area between the caravan and the cabin | Source: the author

The space between the caravan and the cabin used to be open to the elements and was only partially covered by the tarpaulin. The new roof and sides have ensured that there is no risk to occupants of this space of getting wet, though the fact that it is still open around the caravan means it cannot be heated and wind can get in. The space accommodates comfortable seating, work surfaces and a kitchen area. There is also room for storage of various equipment and boots. Attempts to define this as either an indoor or outdoor space are confounded by conflicting visual cues. For example, it is difficult to determine if one is standing on the ground or on the floor. In some places the bare ground is visible, in others a layer of gravel has been put down, but elsewhere, rugs and mats are neatly arranged, hiding the timber supports that keep them off the ground. Natural light floods through the corrugated clear PVC roof and acrylic windows.

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Fig. 6.27 The construction of the log store | Source: left photo: the author; right photo: anon

In May of 2013, I was part of a permaculture group work day at DH, during which we built a log store adjacent to the caravan. I was put in charge of the preparations for the day. I sourced pallets from my landlord at HM and arranged for one of the group members to take them to the site. I also discussed the options for construction method with other group members. The option of making use of larch timber from the site was considered, but this was discounted in favour of using fence posts purchased from the local farmer's merchants, as these are economical and have pre-formed points so they can be driven into the ground. I proposed that the individual bays of the log store be created in a similar way to the compost bin my partner had made at HM. The wall of each bay would be made by hammering two posts into the ground, spaced apart by a pallet width, so that pallets could then be slotted over the top of each pair of posts to form the

walls of each bay.

Firstly the fence stakes were hammered into the ground. This task was shared by everyone in the team. Then the square-cut timbers were fixed to the sides of the stakes using nails and screws. Subsequently, pallets were placed on the horizontal timbers, and nailed in place and tied with polypropylene rope. Following that, the dividing pallets were slotted over the fence stakes, and also nailed in place. Timber planks were then nailed onto the tops of the stakes and pallets.

The reclaimed profiled steel roofing sheets had very sharp corners. If they were to be used in a conventional way, these corners would have not posed a problem, as they would have been combined with standard gable end profiles and gutters. However, I realised that in this application, the corner would have been particularly dangerous, especially as it would have been at about eye level for some people. The chosen solution was to fold the corner over with the aid of a hammer and then to use the hammer to round the corner until there were no sharp edges or corners. The hand was run over the corner to establish where any areas needed further hammering. This solution was arrived at instinctively. That is to say that this approach presented itself as the obvious choice, and no alternatives were considered or discussed. The east barn at HM, where I was living at the time, has a roof corner at a similar height, and no edge profile, and the corner had been bent over in a similar way. I may have been aware of this, but not on a conscious level. The decision to use a similar approach on this occasion may therefore have been subconsciously influenced by familiarity with the place where I was living at the time.

The lower roofing sheet was put in place spanning the right hand bay. By chance, the angle perfectly followed the sloped bottom of the front side window of the caravan. In order to continue the slope of the roof with the second roofing panel over the second bay, an additional timber needed to be added to the top of the left hand divider of the second bay. The roofing sheets were fixed using special screws with self-sealing heads, that were drilled through the metal sheet and into the timbers below.

Before the installation of the roof had even been started, the team in charge of preparing firewood had already started loading the bays with logs. This did not help the construction team finish their work, but it did mean that by the end of the day the log store was not only complete but full of logs.

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Fig. 6.28 The raised bed that the author worked on, on 04/10/15 | Source: left photo: anon, others: the author

In October 2015, there was another permaculture work day at DH. Once the volunteers had assembled, tasks were assigned to different groups. These included clearing scrub in the clearing north of the camp, the building of a raised bed, enclosing the frame supporting the PV panels to create a store, and building a compost bin.

I joined a small team responsible for building the raised bed. We were given six fence posts and a stack of boards that had been left over from the building of the cabin. They had previously been cut from larch trees that had been felled and milled on site with a mobile saw. The first task for our group was to decide the exact location and dimensions for the bed. Tina only gave an approximate location for the bed and left it to us to decide exactly where and what dimensions to make it. I proposed that it should be 1.2m wide, since previous experience had taught me that if it was any wider, it would be difficult to reach to the centre when working the bed. It was decided that the length of the bed should be double the length of the shorter of the planks. The longer planks would then be cut down using a chainsaw and intermediate posts would support the ends of butt-jointed boards. Finding an exact location for the bed, however, was not straightforward as the members of the group had different opinions about what factors to base this decision on. Although I had no strong opinion on this, I was left feeling that the final decision on this was strangely arbitrary, accidental even. It seemed to derive more from the dynamics of the group than on practical considerations.

It was only after the posts had been driven into the ground, that we realised that the boards on the lower side of the slope would be better fixed to their inside faces, so that the posts would help resist the outward pressure of the soil inside the beds. However, the effort invested in this activity meant that there was no inclination to change their positions, so the bed became narrower than originally intended. Boards were fixed to all four sides, but at one end the screws were not fully driven in, so that the boards could be removed to allow soil to be wheeled into the bed with a wheelbarrow before this end was closed up finally.

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Fig. 6.29 Tree trunks left in situ, acting as columns to support the roofs to the enclosure over the caravan and to a materials store | Source: the author

When the camp was originally set up at DH, the trunks to the larch trees in the location were used to support tarpaulin roofs both over the caravan and for the creation of a materials store nearby. During the period that I was visiting the site and monitoring the changes, a number of

trees were removed to increase natural light levels around the camp and to enlarge the clearing to allow food to be grown. In the cases where the tree trunks were still needed for structural purposes, the trees were cut above the points where the roofs were fixed to them.

From the moment they were used to support the tarpaulin roofs, these trees were both living organisms and building elements. Once they were cut above roof level, I could see no evidence of new growth. Therefore, if they were dead, had they become solely building elements, and their roots foundations? This act made me question my assumptions about the boundaries between the natural and the built environments.

Time sequences



Fig. 6.30 Putting the roof onto the logstore: time sequence 1
Source: anon



Fig. 6.31 Putting the roof onto the log store: time sequence 2
Source: anon

Fig. 6.30, the first time sequence, which spans only a couple of minutes, shows the process of fixing the first roofing panel. Frank and I are collaborating on the shared goal of ensuring an even and solid support at both ends. The process involves a combination of activity, communication and shared reflection. While all this is happening, members of the firewood group are steadily filling the bays up with logs.

Fig 6.31, the second time sequence, which is taken at intervals of only seconds, shows the process of finding a way to maintain the roof slope over the second bay, by raising the top end of the roofing sheets by the required dimension. This was achieved by experimenting with lengths of sawn timber that were lying about. Through trying different combinations, it was found that by laying one piece on its longer edge, and another on its shorter edge, the right height for the roofing was achieved.

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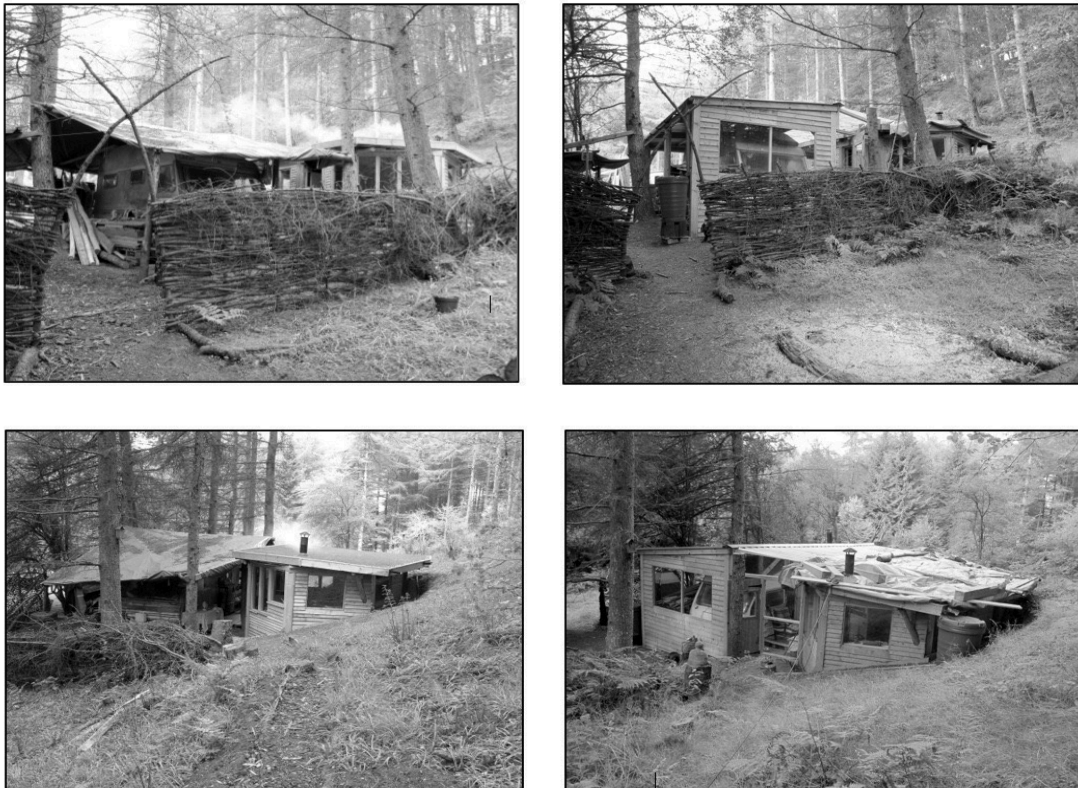


Fig. 6.32 Views of DH in May 2012 (left) and in September 2014 (right): looking up through entrance gate (above); and view from above (right) | Source: the author

This sequence shows the camp viewed from two different angles on two different dates, a year and four months apart. The later shots show the tarpaulin over the caravan replaced with a more substantial timber framed structure with metal timber framed roof, polycarbonate windows and a polycarbonate roof over the semi-external space between caravan and cabin. It can also be seen that the clearing to the north of the camp has been enlarged with the removal of a number of trees. These changes can be seen as progress, as they were the results of intentional choices. At the same time, though, there is evidence of change that had not been planned. The turf roof over the cabin had developed a leak, and in order to prevent water ingress, a tarpaulin had been laid over it, and weighed down in the corners by a number of heavy objects.

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Fig. 6.33 Site plan time sequence of DH: 2012 (top left), 2013 (top right), 2014 (middle left), 2015 (middle right) and 2016 (bottom)

This time series of site plans focuses on the camp structures and their immediate surroundings. On my first visit, a tarpaulin covered the caravan and also a storage area adjacent to it. The log store was built under this tarpaulin in 2013, but the subsequent year, the tarpaulin was largely replaced with a timber framed and clad structure with a metal profiled roof, with the exception of a small triangle over the remnant of the storage area. The shape of the tarpaulin roof was influenced in great part by the positions of the trees that were used to support it, whilst that of the metal sheet roof, was dictated by the orthogonal shape of the roofing panels. The tree trunk at the east end of the caravan was in the right place to act as a support for this new structure, but the tree above was cut above the roof level to allow more natural light into the area.

6.5 Participant Observation Case Study: UI

Introduction



Fig. 6.34 Compressed time site plan of UI, covering the period of February 2012 to February 2016

This site is owned and occupied by Jon and Lisa and their two young sons. A traditional stone ty hir (longhouse) runs diagonally away from the road, with a stream running parallel to the house and then forming the south-eastern boundary to the site. Adjacent to the house are a couple of barns clad and roofed in corrugated steel. The barn next to the road is enclosed, while a larger one, which is partly open, has a high barrel roof and lower sloped roofs on either side. Beyond the larger barn is an area of concrete hard standing, on which stands a static caravan, which was occupied by the family while they were restoring and extending the house. The space of the caravan was very cramped for a family of four, and the living and dining area was particularly limited. Additional facilities that had been installed in the adjacent barn included a shower room and WC, and a second kitchen and food preparation and storage area. In early 2013, a pod was constructed adjacent to and adjoining the caravan. It was designed and built by myself, with help from others. It was occupied until the summer of 2015, when the house was ready for the family to move into. Once it was vacated, I arranged for it to be relocated to BQ.

Beyond the hard standing are food growing areas, including vegetable beds and chicken coops. A yurt was located between the veg beds and the track for a period, but has now been removed. Beyond these areas is a field which is part of the ownership of the property and is occasionally grazed by sheep belonging to neighbours.

Vignettes

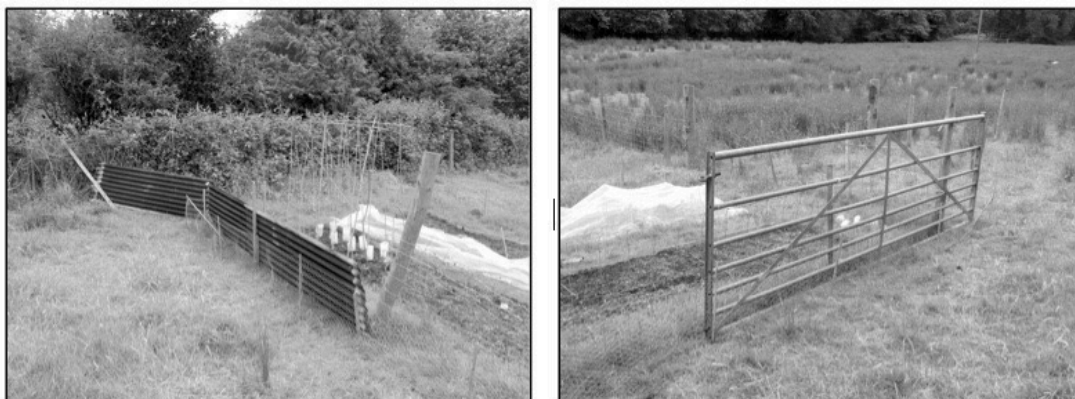


Fig. 6.35 Ad hoc measures to complete the enclosure of the veg beds: old roofing panels (left) and a metal gate (right); photographs taken on 01/07/2012 | Source: the author

In 2012, my partner and I were offered an area of the field to grow vegetables. The turfs that were removed were relocated to an area near the barn to serve as a lawn, then a carload of well rotted horse manure was applied to the freshly exposed ground to add nutrients to the soil. The season was particularly challenging for food growing, being the wettest summer in England and Wales for 100 years. Attempts to keep an array of animals away from the growing food set the agenda for interventions in the area around the beds during the period. Grazing sheep were kept out with fencing made of fencing mesh and fence posts hammered into the ground. Because there was initially not enough mesh to enclose the beds, a metal gate and loose corrugated metal roofing panels were used to fill the gap.

A chicken wire fence was then wrapped around the livestock fence and dug into the ground in an attempt to keep out rodents or rabbits, which were digging up root vegetables. The grass between and around the beds was strimmed regularly to discourage slugs. A range of further measures, including slug traps, pellets and fine mesh covering the beds eventually proved unsuccessful as the ongoing wet weather caused the entire field to be infested with slugs, which invariably found their way past the various measures.

The use of the gate and roofing sheeting as ad hoc fence was a quick solution to an urgent requirement, since there was no more fencing mesh on site at the time the sheep were brought to the field. They were used simply because they were available and they were able to exclude the sheep from the area containing the vegetable beds. Following their installation, I found that the corrugated steel panels provided the most convenient access, as sliding one past the other created an opening and hence avoided the need to climb over. In effect, the roofing panels had become sliding gate, while the gate, which was fixed in place, had become part of the fence.

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The entrance to the site from the road is bounded on the left side by a barn and on the right by the boundary fence to the neighbour. A wide metal gate is fixed to either side. At the time of writing, Google Street still showed the original arrangement, whereby both gates met a central post, from which a fence ran backwards, so that the left gate gave access to the yard and the right gate to the field, but this post and section of fence have been removed.



Fig. 6.36 Two different methods for holding gates closed at UI | Source: the author

When the site is occupied, the gates are swung inwards, allowing vehicles to access and park on the drive. When the site is unoccupied, the gates are swung towards each other and, because they do not quite meet, they are held in place with a length of rope. The rope is tied to one gate and there is a loop at the other end. In order to hold the gates securely, the rope needs first to be wrapped round the vertical bar, and then the loop slipped over the top which projects slightly above where the vertical and top horizontal bar meet. There is therefore some requirement for the person closing the gates to learn the most effective technique for securing them. This might happen simply by experimentation, but I also learned by observing and remembering the way it had been looped when I came to site and found it closed and needed to open it. Since the fixing of the string for closing the gates was an ad hoc measure in the first place, it cannot be said that there is a correct way of using it, but I learned that the way it was done when I came to it was most effective, and therefore followed this cue.

There is another gate nearby that can never be fully open but has to be closed in any of three positions, or ajar. In one closed condition, it spans between the two barns, preventing access from the site entrance to the house, but when it is swung either of the other ways, it blocks the opening into either of the other barns. Since both routes are needed in a regular basis, it is usually ajar when the site is occupied, but when unoccupied it is kept in its second closed state. Although it has no practical role in excluding intruders, its role is merely symbolic as a kind of ‘keep out’ message. It is held in this position by use of the inner tube of a bicycle, which is looped over a nail hammered into the timber post on the side of the opening. Attaching the inner tube to the top bar of the gate in the first place would only have required looping it over, pulling one end through the loop of the other end, and then pulling it tight. Using the inner tube to hold the gate closed simply requires the slipping of the loose end loop over the nail. The flexibility of the inner tube works well to make this an easy operation while also holding the gate securely in position.

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Fig. 6.37 Ad hoc measures to insulate the caravan at UI | Source: the author

When the owners, Jon and Lisa bought the property in 2010, the house was uninhabitable. They bought the static caravan and moved it onto site in order to live in it while they carried out the project to restore and extend the house. However, they soon discovered how poorly insulated it was. The first winter that they occupied it (2010/2011) was extremely cold, and internal temperatures in the mornings were often below zero. In late 2012, they bought aluminium foil bubble insulation and installed this on part of the ceiling and on the walls. They also used it as an insulated blind by rolling it down over the windows at night. They used a different type of foil-backed insulation under the carpet on the floor in the main living area.

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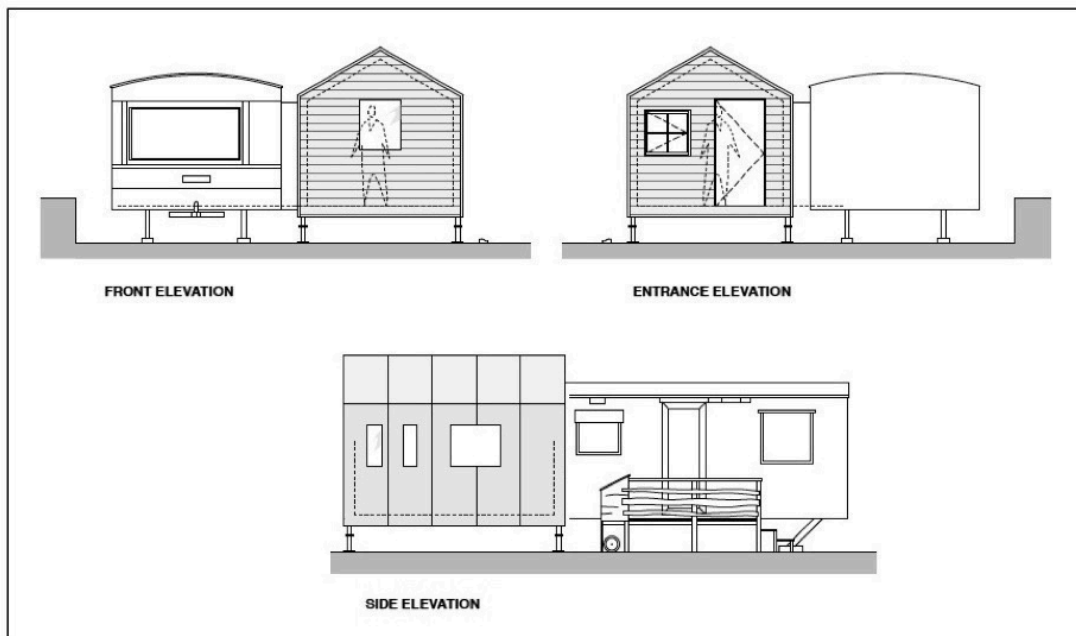


Fig 6.38 Initial drawings of the pod, prior to a change of design that omitted the external door so that access was only via the static caravan

Aside from being poorly insulated, the caravan was also cramped for a family of two adults and two children. In particular, the living area was very limited. In the autumn of 2012, I therefore made the proposal to them to build a micro-building adjacent to the caravan, to provide them with additional living space. Perhaps not surprisingly, Jon and Lisa agreed to this proposal, for what quickly came to be referred to as the 'pod'. The proposal was to make use of an unused

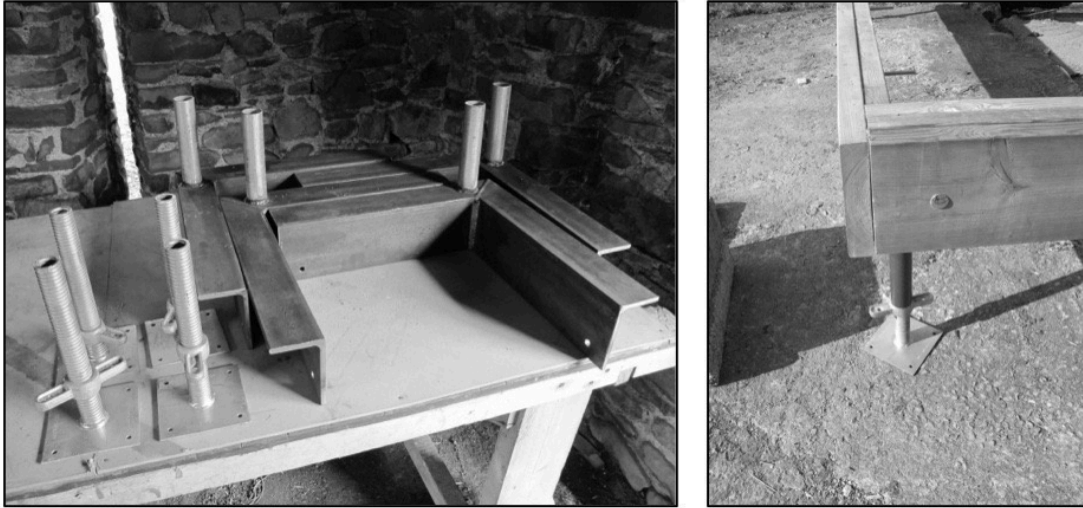
external door from the living area of the caravan to connect to the pod. Initially, there was a plan to build a simple uninsulated lobby in front of the main entrance to the caravan, which would also have allowed another access door to the pod. However, it soon became clear that this would create unnecessary complications, so the plan was abandoned.

The intention from the start was to design a structure that could at some point in the future be relocated. The practicalities of building the pod meant that it needed to be separated from the caravan, and hence a short link corridor was needed to link the two. It soon became clear that this part of the construction would need to follow a different process of conception and delivery to the main part of the pod. Given the road transport width restrictions, it would need to be removed prior to removal of the pod. In this sense its use is ad hoc, that is for this specific purpose. I realised at design stage that the design of the junction of the 'link' and the caravan would require decisions being made on site, so left this part of the design only vaguely defined.

The most important decision in the design of the pod was the choice of construction method. Because of a lack of experience in building, I prioritised ease of construction above any other consideration when choosing the system. Although I was prepared for partial failures along the way, I needed to feel confident of understanding the basic process of construction of the chosen system, and that if the correct procedures were followed, a structurally sound, insulated shell would be achieved. Structural Insulated Panels (SIPs) initially appeared to meet these requirements, so I visited the yard of a local supplier. When the principles of the system were demonstrated, using actual samples, I immediately decided to choose this system. I had been convinced not only as a designer but as the prospective builder.

The form chosen for the pod was a simple symmetrical duo pitch with central ridge and no eaves. From the start I had wanted to use timber cladding for the gable ends, but did not know what material to use for the roof and sides, beyond knowing that I wanted it wrap up across these faces. Applying the external waterproof layer directly to the outside of the SIPs minimises the wall thickness. Both this measure, and the elimination of the eaves would ensure the internal width of the space was maximised while keeping the overall width to three metres.

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*Fig 6.39 The pod legs to the engineer's design, using hollow steel tubes to standard dimensions to allow scaffolding feet to be used to accommodate differences in ground levels between corners
Source: the author*

For the pod legs, Jon first suggested using standard scaffolding tube and feet, as this would allow different ground heights for each of the four corners. I looked for something proprietary on the internet but was surprised not to find a standard product online that would meet the requirements. I played with ideas for using scaffolding feet and sent some initial design drawings to the engineer. The engineer produced a proposal that I felt confident would work. This was then refined with a few more iterations.

I went to a local steel merchant and ordered the steel sections. These were then taken to a car mechanic who welded them together. Next they were taken to HM where I painted them red oxide that J had supplied. The feet were ordered online separately. When these arrived, the legs were ready to be installed along with the timber base.

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Fig. 6.40 Timber blocks were used to support roof panels after full length profiled timber could not be sourced economically | Source: the author

While the walls were being erected, I needed to make plans to address a problem with the eaves and ridge timbers. They needed to be cut to a profile to accommodate the 30° angles involved, but no local mills could cut to this angle. Meanwhile, the quote that the joinery workshop had provided for them was more than the budget would allow. A solution to this problem was needed quickly as these profiled timbers were required to support the roof panels, which were to be installed immediately after the completion of the walls and installation of the ridge beam.

The mitre saw on site was able to make short cuts at angles, and it was used for this purpose to angle the ends of some of the timber fillets where they met the roof. It was while cutting one of these that I realised that short block supports for the roof panels could be made in the same way, hence eliminating the need for longer profiled timbers to run the full length of the eaves.

When all the roof panels were in place, another ad hoc solution was needed to deal with the lack of the intended timber fillets at the ridge. A combination of timber blocks and strips of plywood were used to extend the lines of the roof panels to create an apex, though the flexibility of the ply used did not make it very suitable for this task. Strips of OSB were used to close up the sections between blocks at eaves level, and the location of this work allowed for a neater job.

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Fig. 6.41 The same window, originally at the author's previous home, then installed at the pod
Source: the author

Jon and Lisa had a selection of reclaimed windows from a variety of sources stored in their barn. These included all the windows and external doors from a house previously occupied by myself and my partner, as when the landlord had replaced all the windows, I let them know the originals were available and they salvaged all the window casements and glazed external door leafs. To minimise costs, I decided to use some of these reclaimed windows. I chose to use fixed double-glazed units for the side, and a casement window for each gable end. Since no frames not been salvaged, these would need to be made up for the new openings. As I was aware that the design for the window frames was dependent on available materials and skills, I designed the window openings to be oversized, so the detail could be finalised during construction.

The installation of the windows was mostly carried out by Jon. As had been anticipated, the openings were reduced using timbers of varying thickness from around the site, to create a good fit for the window casements and fixed double-glazing units. The windows performed adequately, though the south-west facing window did allow some water ingress in conditions of driving rain. However, the fact that a cill was never incorporated would have complicated attempts to detail the window opening in the cladding.

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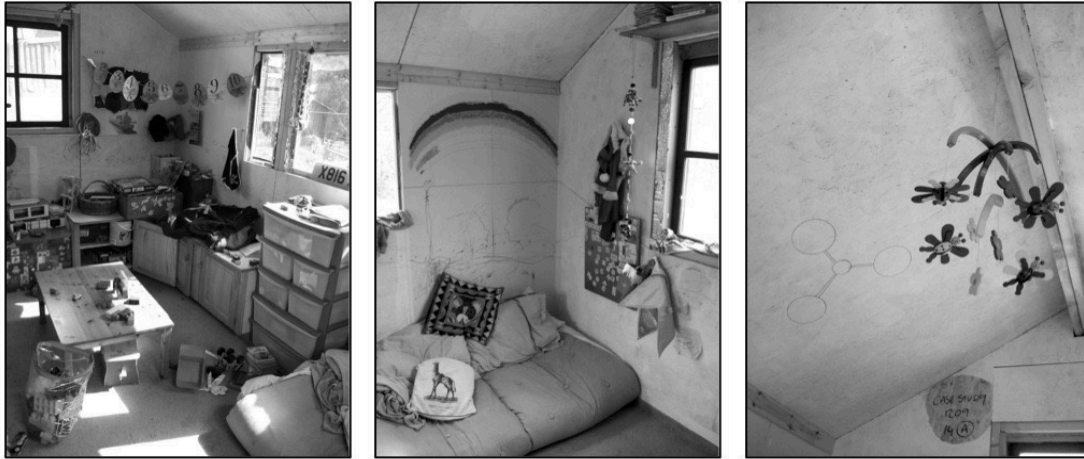


Fig. 6.42 The interior of the pod while being used as an extension to the caravan | Source: the author

The addition of the pod to the caravan created significantly more internal space for the family. It was first used, on the same day as installation of the last window, as overnight accommodation for guests. Subsequently, a second hand carpet was put down, and the bare OSB walls and ceiling were painted white. Decorations were added by the family together including the two young children, including paintings and drawings on the walls and mobiles hung from the ceiling. They left a section of one of the wall panels unpainted to reveal the text ‘Case Study 1209 14A’ as a reminder of the process of the build, like a contemporary truth window.

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Fig. 6.43 Black polythene being used as a roof finish | Source: the author

Once the shell was complete, it was wrapped in breather membrane. I then started planning the cladding for the sides and the roof. I chose to use polythene as it was the cheapest option, though it was only intended as a temporary measure. I therefore bought a roll of black DPM polythene from a DIY store. Intending to use the same technique that had been used for the polytunnel, I fixed the battens at the ends then started trying to attach the polythene as planned. However, DPM polythene is thicker than the clear polythene that had been used on the polytunnel and this added thickness made this technique difficult to use. Feeling that the installation was not going according to plan, I became disheartened and did not finish the task properly. I returned the next day to cover the ‘link’. The smaller scale of this was well suited to this technique.

Subsequently, there were recurring problems with the polythene. In storms the parts that had not been fixed according to the original plan came loose and I had to come back occasionally to patch it up.

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Fig. 6.44 Self-adhesive vinyl floor tile discovered on site used to test idea for cladding (left); and the pod after it had been clad in self-adhesive signage vinyl, but before it began to fail (right)

Source: the author

On one of the visits to attend to the polythene, I happened to discover a box of self-adhesive vinyl floor tiles. I took one and stuck it to the side of the pod, wrapping it round the end. It was a Eureka moment. I now knew that I wanted to use a self-adhesive sheet material, and started researching on the internet for something suitable that would be within a very limited budget. I did not find self-adhesive vinyl roofing, so I considered self-adhesive vinyl flooring, but this cost more than the budget would allow. I then found self-adhesive signage vinyl for a very reasonable price. Having bought a roll in green colour on eBay, I tried it out on a leftover off-cut of SIP, and it seemed to work well, but the shade of green was too bright.

There followed a delay of several months, caused by financial constraints and other commitments. When funds allowed again, I bought 50m of vinyl in a darker shade of green than the original roll, which was enough to cover the whole pod roof and sides. I then set aside a few days to apply the vinyl. Initially I was unsure of whether this experiment would be a partial success, a full success or a total failure. The technique needed to be developed immediately, and I needed to establish the risks and methods for mitigating them as the process was already underway.

It was during the initial installation that it became clear that the material was well suited to making patch repairs, as it sticks well to itself and is thin and lightweight so repairs are almost invisible. Therefore when I was told some days later that a part had torn off in high winds, I was confident that I could address this. I returned with the leftover vinyl and successfully carried out a patch repair.

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Fig. 6.45 Ad hoc head detail to window to create drip, 21/04/2014 | Source: the author

At this time I also bought several rolls of duct tape and started considering alternatives for reinforcing the vinyl. I sketched a couple of alternatives which would have had the duct tape exposed. However, when I came to do the work I decided instead to conceal the duct tape under a strip of vinyl. I ran the duct tape up from the bottom, over the top of the roof, and down to the bottom at the other side. I then hammered clout nails through the duct tape and vinyl into the OSB. Then I cut strips of vinyl and stuck these over the duct tape to conceal it. I also created an ad hoc window head detail in order to make a drip. I used a strip of wood that was lying about and a length of duct tape, and then covered it all with strips of vinyl.

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*Fig. 6.46 The veg beds in the summer of 2014, after they had been brought back into use
Source: the author*

With the opportunity to grow food at HM from the end of 2012, my partner and I abandoned the beds at UI. They remained unused until spring of 2014 when they were taken over by a friend of Jon and Lisa, who made some adaptations, such as connecting the two pairs of beds to create two long beds.

In 2013, after my partner and I had stopped using the beds, a further portion of the field was fenced off, allowing direct access from the entrance driveway without the need to pass through the field. On the day in 2014 when further photographs of the area were taken, the roofing panels had been replaced with mesh fencing as they no longer needed to act as a gate, and the fencing provided a more robust barrier to livestock. However, the metal gate remained in place. Despite initially being used on the spur of the moment to satisfy an immediate need, it had proved well suited to the task, and there had been no functional need to make the effort to replace it.

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Fig. 6.47 Lighter circular repair patches covering breaks in the vinyl - a decorative pattern created by chance | Source: the author

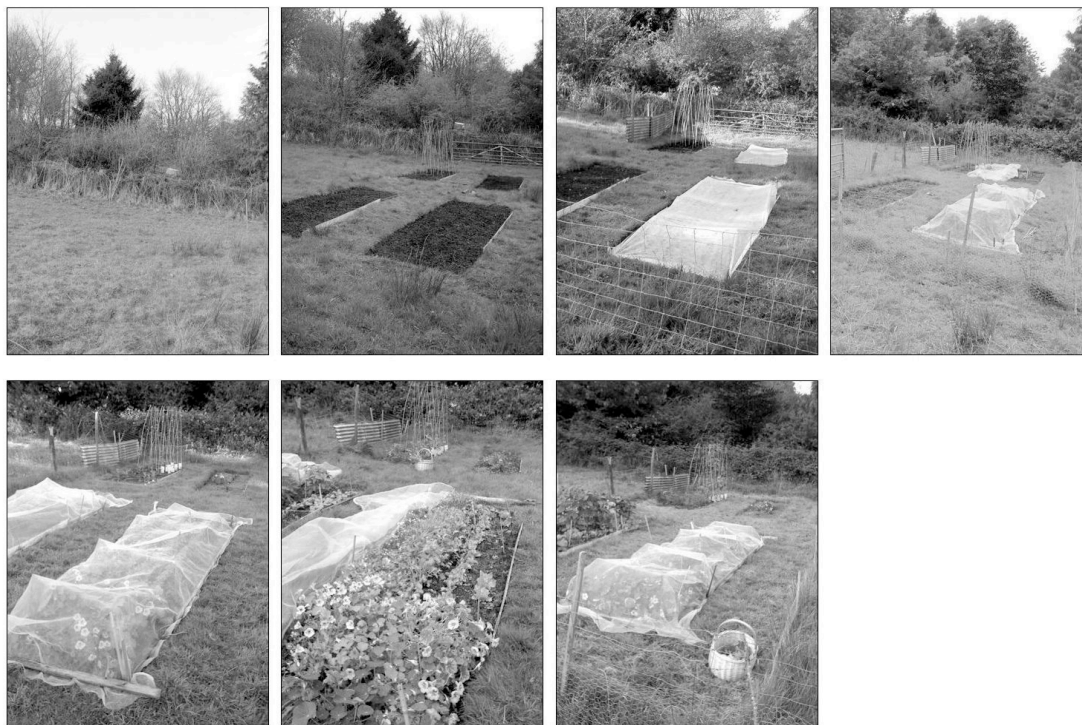
Over the summer of 2014 I learned that the vinyl was prone to shrinking. Having carried out some research on the internet, I established that I had bought monomeric vinyl, the cheapest available, and that it shrinks over time, especially when exposed to temperature fluctuations. The south facing roof was particularly vulnerable to this, and every few weeks, I had to return to carry out patch repairs, as the vinyl shrank and cracked or came loose at the ends.

When the leftover dark green vinyl ran out, I decided to try something creative with the lighter green original roll - to make a virtue of necessity. Various circular objects that were lying around were used as templates to cut circles of different sizes from the lighter green vinyl, and these were applied to the broken and cracked areas on the pod roof. Initially this created an interesting pattern, especially on the north facing roof but the south facing roof was deteriorating rapidly, and I started using duct tape in an increasingly desperate effort to patch it up.

Although the vinyl on the wall faces had remained in a good condition, the same could not be said for the roof. The vinyl on the south-facing roof, in particular was continuing to crack in ever-increasing degrees. Eventually, I accepted that it had failed completely and was not recoverable. At around this time, Lisa let me know that they would no longer need the pod after the spring of 2015. I intended to strip it back to its shell, removing windows and the link, and then to move it to BQ, ready for installation of new windows and doors, EPDM roof finish and larch cladding at each end. I therefore did not want to spend more money than was absolutely necessary until this time.

I decided to cover the roof with a tarpaulin to keep it watertight through the winter. I used a lightweight tarpaulin, and held down the corners with polypropylene rope and bungee cords. In January, Lisa told me that the corners of the tarp were tearing, and that the vinyl at the sides was coming off in areas. Therefore I bought a large heavy-duty tarpaulin to cover the existing one.

Photographic time sequences



*Fig. 6.48 Time sequence showing progression of the food growing beds during the 2012 growing season
Source: the author*

Fig 6.48 shows how grazed grassland was converted over the course of a growing season to vegetable beds. It shows a combination of linear progress with various cyclical changes that were part of the food growing process. For example, the mesh was needed to cover the plants to protect them from insects and slugs but then had to be partly removed to allow food to be harvested. Ad hoc measures were used to hold the mesh in place, with twigs forcing the mesh into the ground around the perimeters or objects including a timber plank weighing it down. These all needed to be carefully reinstated when the the mesh was put back in place.

The wide fencing mesh was adequate to keep sheep out, but when root vegetables started being dug up, we assumed by rabbits or rodents, another layer of defence was needed in the form of chicken mesh which was also dug into the ground. I was to find this layering of defences a common feature of making do on my other projects.

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Fig. 6.49 View of UI, looking back at caravan, barn and house: in 2012 (left); and in 2013 during construction of the pod (right) | Source: the author

The obvious change in this simple two-framed time sequence is the appearance of the pod. In terms of building development, it can also be seen that the house extension on the right of the

shots has also progressed, with the addition of external stone cladding. Also dominating both shots are a remarkable amount of objects, strewn about in apparent disorder. These include plastic chairs, car tyres, random sections of wood and children's toys and much more, and none of them seem to have a reason for ending up where they have. However, it does show a site that was being intensively occupied for a range of uses including living, working and building.

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Fig. 6.50 Ad hoc steps to provide access to veg beds at UI, made by my partner and Jon: in September, 2012, soon after their creation (left); and in February 2014 (right)

In September of 2012, my partner and Jon cleared an opening in a bank of earth between the track and the vegetable beds, and formed some steps using timber posts and planks, and gravel. I recall being impressed at the time at their initiative and ease with which they made this intervention on the ground, and the creation of what I saw as an architectural element, all in the space of an afternoon. By the time I photographed them again in 2014, the steps looked like they were well on the way to being absorbed by the ground. A well worn path to the right of them suggested that they were no longer fulfilling a worthwhile role and instead appeared more like an archeological remnant.

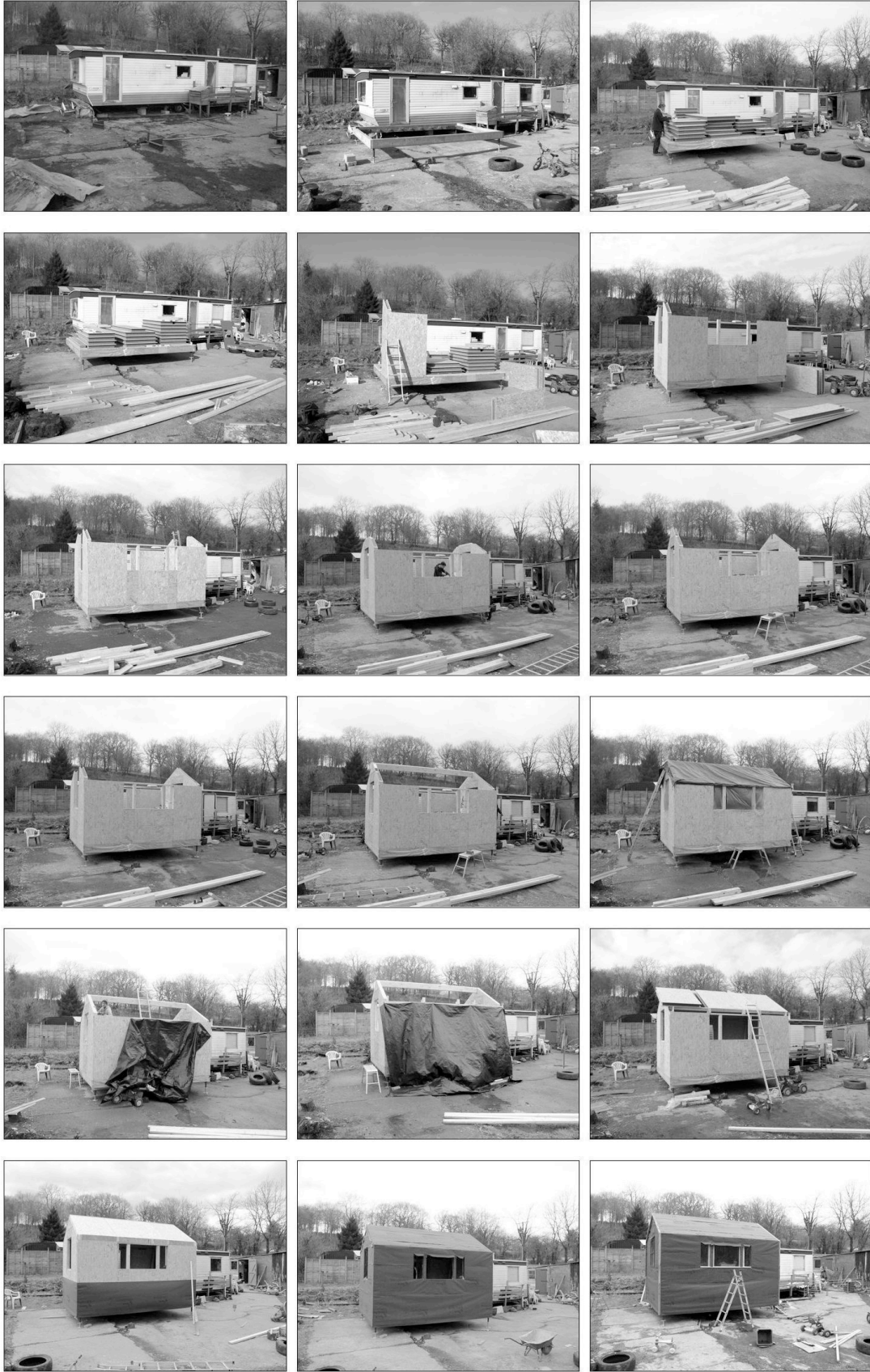


Fig. 6.51 Time sequence showing construction of SIPs shell and wrapping in breathable membrane
Source: the author



Fig. 6.52 Time sequence showing the process of cladding the pod in vinyl, 24/02/2014 to 27/02/2014
Source: the author

Fig 6.51 shows the sequence of construction of the pod up until it was covered in breathable membrane, prior to the use of black polythene as roof finish. Although there is a clear linearity to this sequence, the ongoing efforts to protect the panels from regular rain showers are evident in the form of a tarpaulin that is used as temporary roofing, then partly removed, but ready for recovering when the showers return. There are parallels here with the way the mesh needed to alternately put in place to protect the plants in the veg beds and removed to provide access to harvest.

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The first frame of Fig 6.52 shows the devastation left by the February storms of 2014. Whilst there is a significant time gap from the last frame of Fig 6.51, this could be read as a continuation of this sequence, and as such is a graphic illustration how amateur self-builds like this can take dramatic steps backward. Over the course of a couple of days, with help, I clad the sides and roof of the pod in signage vinyl.

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Fig. 6.53 Site plan time sequence of UI: 2012 (top left), 2013 (top right), 2014 (middle left), 2015 (middle right) and 2016 (bottom)

This site has undergone constant changes over the four years it has been studied. In 2012, the house extension was yet to be built, and the family were living in the static caravan. The following year, the shell of the extension was up but it would still be a while before it was habitable. The pod had been built next to the caravan to create extra living space. Meanwhile, the area beyond the caravan, and in a portion of the adjacent field that gets annexed, a variety of activities and structures are accommodated over the next couple of years. Come the final frame, the family have moved into the house and the pod removed to BQ.

6.6 Participant Observation Case Study: BQ

Introduction

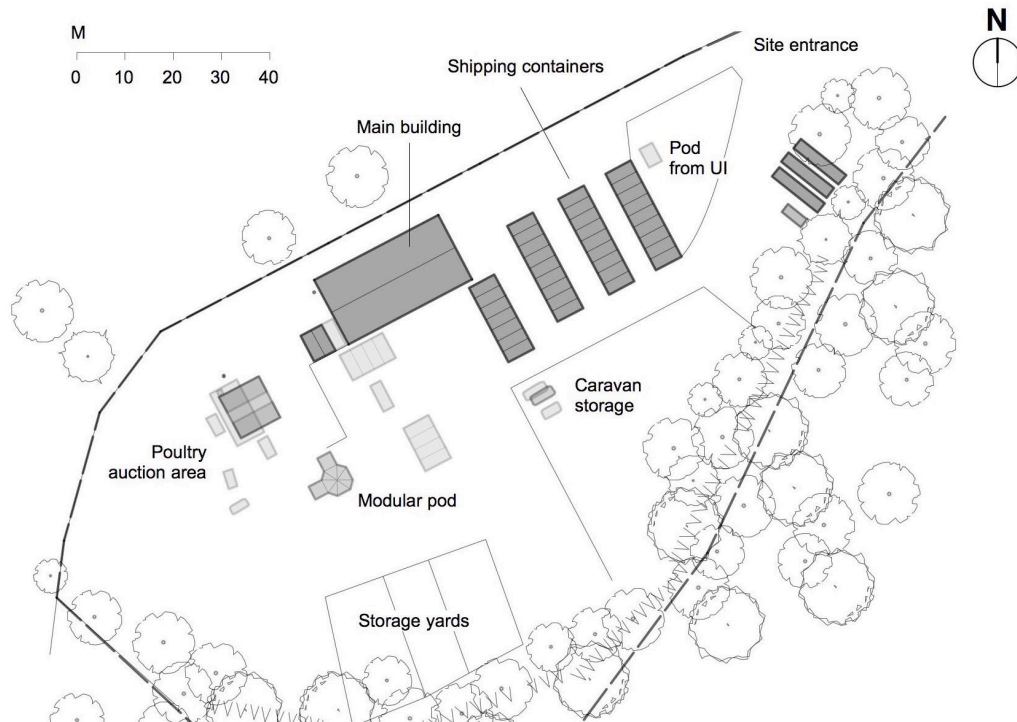


Fig. 6.54 Compressed time site plan of BQ, covering the period of July 2012 to July 2016

This site occupies the former location of a country house, since demolished. I have been told of an extraordinarily rich history of the site, including its use as a medieval deer park and a billet for American soldiers during the Second World War. The site is accessed via a long track off a major trunk road. There is a large area of hard standing, which is surrounded by wooded areas and fields. The large area of the site and the location allow uses that would be uneconomical in more built-up areas with higher land value. Much of the site is occupied by shipping containers, which are rented out individually as storage units. The containers are installed in rows and there is space between each row to allow vehicles to park and load or unload. Caravan storage is offered on the site, but rarely used. Other, fairly random uses spring up intermittently around the site.

Beyond the area of containers is a large commercial shed, which is composed of a suite of offices at the end nearest the site entrance and a large open storage area with high shelving units which accommodate cardboard boxes of archive storage. The offices are occupied by a social enterprise that manufactures and sells toiletries for retail and wholesale markets. I rented office space here from October 2012 until May 2014. I also rented a half of a 20' double-ended shipping container from November 2013 until May 2014 for storage purposes.

Beyond the shed building is the corner of a stone building, said to be all that remains of the country house that used to occupy the site. Located in this area is a rudimentary structure that was built to accommodate poultry auctions, which are combined with bric-a-brac sales. Adjacent to the poultry auction enclosure a prototype of a modular pod design system was located until 2014 when it was destroyed in storms and removed from the site.

Vignettes



Fig. 6.55 The warehouse building, with open storage and offices (left), and site shot showing shipping container, caravan storage and other ad hoc uses (right) | Source: the author

Having recently moved to Wales, and still in the depths of an economic downturn, I needed to establish my architectural practice with limited financial resources. The need to employ staff meant that home working was impractical, but there was very little commercial property available in the area that would have been suitable and affordable. The owner of the site also runs an estate agents, so when I enquired of him whether any commercial property was available in town, he told me about this site. Two small rooms were available to sub-let from the main tenants, the toiletries company. In retrospect, it is apparent to me that this would appear a curious choice for a profession that is dependent on presenting an image to prospective clients of aesthetic sensibility and quality. However, at the time this was very much a question of meeting a need with limited options. Having moved into the offices, I then became interested in the nature of the whole site and the activities that came and went on it. I saw it as a space that allows things to happen, and was interested to find out how and why.

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Fig. 6.56 Shipping container being used for storage by the author (right) | Source: the author

The house I and my partner were moving to from HM in late 2013 had almost no storage, so I needed to find somewhere to store items that would not fit in the new house. Since my office at the time was located at BQ, then renting a shipping container there was an obvious choice. The majority of containers on site are 20 feet long. Some had only one set of doors with one open space internally, but, some had a double door at each end, and had been divided in the middle so

that each rentable unit was 10 feet deep. We decided to rent one of the latter, which had a lower monthly rental cost than the full length units. The fact that the container was a stone's throw from the office made accessing items as they were needed convenient, though this convenience was compromised by the fact that the doors and padlock were difficult to open. While we were renting the unit I conjectured how such a unit could be converted into a useful work or meeting space with the addition of insulation and a glazed front behind the steel doors.

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Fig. 6.57 Poultry cages surrounded by various bric-a-brac in the poultry auction enclosure at BQ
Source: the author

The poultry auctions take place two Saturday mornings a month. Aside from the poultry auctions themselves, a wide range of items are bought and sold on the day, some of which are of apparently low value and little relationship to the keeping of poultry. Used door leaves, assorted lengths of cut timber, and various bric-a-brac are presented for sale next to the live birds. Poultry feed is sold from a trailer and a burger van dispenses hot food and drinks. The auctions are popular, attracting crowds despite minimal advertising. It is hard to speculate that they generate much revenue or that such a land use would be viable in areas of higher property values.

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Fig. 6.58 The pod being moved to the new location at BQ | *Source: the author*

When my pod was no longer needed at UI, I stripped it back to its shell, removing the ad hoc

elements including the link passage to the caravan and the windows. I contacted the person who had helped install the caravan at UI, and he agreed to transport the pod to BQ. Although I had designed it to be mobile, I was still anxious about how it would work in real life. In order to lift it straps were looped around the legs in each corner and then attached to the fork of a fork-life truck. The photograph on the right shows it being lifted off the lorry at BQ before the lorry was driven away and it was lowered onto the ground. Because I had not anticipated it being lifted in this way, I was concerned about the forces that the straps were exerting on the eaves where the roof meets the side walls. The pod survived undamaged, but I learned a valuable lesson to apply to future designs of mobile buildings.

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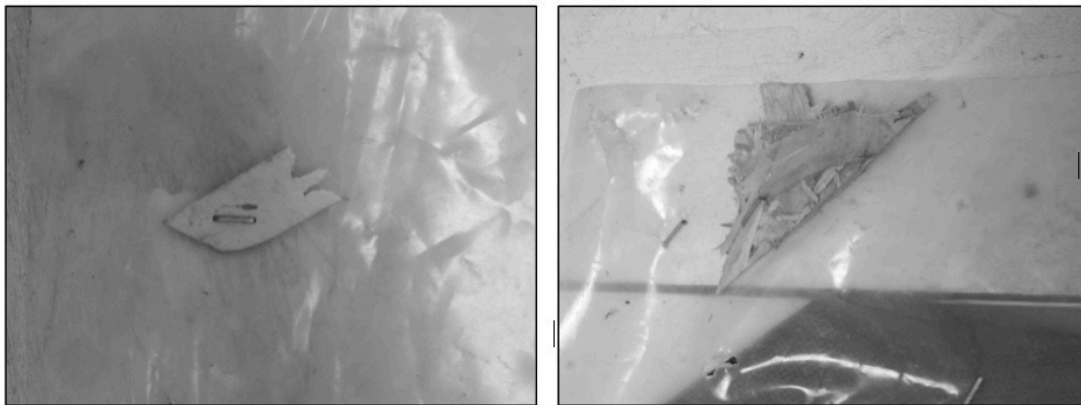


Fig. 6.59 Different materials used to sandwich between staples and polythene to prevent it tearing
Source: the author

My work on the pod at BQ involved changing openings including turning a window into a door, closing up the opening previously used for the link to the caravan at UI, and closing up the side windows. Whilst this work was ongoing, the various openings needed to be sealed from the weather. I used some of the leftover polythene from the polytunnel at HM for this purpose, initially fixing it using staples. However, on returning, I found that the wind had ripped the polythene away, leaving the interior exposed to driving rain. When refixing the polythene, I experimented with different techniques. I tried folding it over before stapling so that the staples would pass through several layers, and I also tried sandwiching the polythene behind fragments of other materials that were lying about such as OSB board. This proved the more successful of the methods, and when I found some vinyl flooring in the basement at my office, I had a sense that this would be suitable for this purpose, and when I tried it, my hunch proved correct.

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Fig. 6.60 Method used to keep the polythene 'door' in place to the pod at BQ (photograph to the right is a detail showing how a bungee rope was recruited into the task) | Source: the author

For the doorway that had been created out of one of the end windows, I needed a method of securing the polythene that could be undone to allow access and then reinstated later. I made use of a nail that had previously been hammered into the external face of the OSB board and a bungee rope that was helping to hold down the end of the roof tarpaulin. My experience suggested to me that if the polythene was pulled over the nail alone then the polythene would tear and come loose. However, the hook of the bungee rope provided enough friction to hold the polythene in place.

Time sequences



Fig. 6.61 Collapsed poultry auction enclosure, 21/11/2013 (top left); and enclosure rebuilt to revised design, 03/04/2014 (top right); View of modular pod: 21/11/2013 (bottom left); and similar view, 03/04/2014 (bottom right) | Source: the author

During the autumn and winter of 2013-2014, the UK experienced several periods of extreme weather, some lasting weeks. The repeated storms that hit the British Isles brought high levels of rainfall and high winds, and tested two self-built structures at BQ to destruction at different times.

The poultry auction enclosure was the first construction to fail and had already collapsed before the now famous storms started in mid-December. However, it was rebuilt, to a different design in mid-January, ready to be tested by the second wave of storms that hit the UK at the end of the month and lasted for several weeks. The adaptations to the design proved successful, and it was still standing when photographed again in April.

The modular pod was still intact in November when photographed at the same time as the collapsed poultry auction enclosure, but lost its roof in early January, and so it stood roofless throughout the second bout of extreme storms that finished in mid-February and remained so when photographed again in April.

The auction enclosure had been built in an ad hoc manner, using fencing panels, square-cut timbers and corrugated metal roofing panels. After its collapse, each of these elements could be easily reincorporated into a revised design. Instead of having one open side that could collect the wind, the amended design had two separate structures so that the open sides of each faced each other and hence protected each other from the wind. This was clearly a case of learning by one's mistakes.

The modular pod had been designed by an architect with flexibility in mind. The plan of this

prototype was composed of a combination of a central octagon and two squares off two of its faces, but the intention was to allow adaptation as required, with possible additions of squares or octagons. A steel frame had been designed, with bespoke joints joining the members, and then composite panels composed of a sandwich of insulation, plywood and waterproof finish were used for the walls and the roof. Despite being designed for flexibility, after the collapse occurred, the prescriptive design and specific geometry made the pod difficult to adapt. As it sat roofless through the second bout of storms, the plywood in the composite panels absorbed the rainwater and buckled, rendering them useless.

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Fig. 6.62 The pod which was relocated from UI, photographed from the same position at three different stages of its progression whilst at BQ | Source: the author

After the pod that was built at UI had been moved to BQ, I started work on adapting it to a new layout. This involved closing up the opening that had previously connected it to the caravan and converting a window to a door. Because the time available to me to do this work was limited, I needed to try to protect the interior from the elements in between visits. Instead of showing the planned layout changes, the above series shows instead the progression of efforts to keep the rain out on the south and west sides, which were most exposed to prevailing weather. It became clear to me from this process that there would be no benefit to undoing or removing layers that I thought might be working to a extent. Instead, it made sense to keep adding layers until the rain was finally fully excluded.

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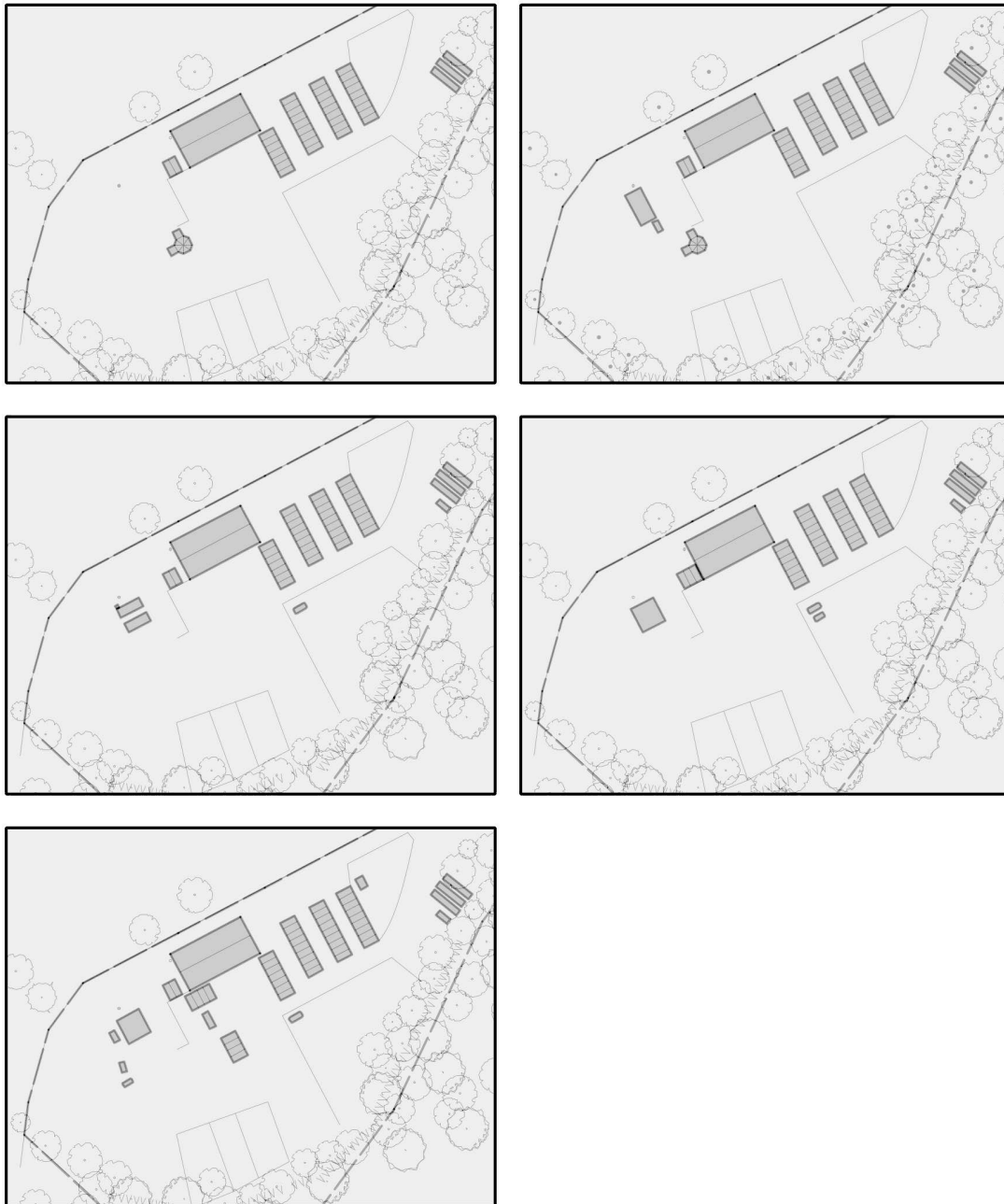


Fig. 6.63 Site plan time series of BQ: 2012 (top left), 2013 (top right), 2014 (middle left), 2015 (middle right) and 2016 (bottom)

There is only one fixed building on site, the commercial shed showing as the largest block on the plans. The other dominant feature is the ranks of shipping containers, whose numbers have recently increased. Set a year apart, the site plans show slow but constant change as old uses end and new ones are embarked upon.

7. Theme-based analysis

7.1 Introduction

Observation of examples of making do by others combined with my own engagement with ad hoc self-build have provided a rich mix of material. Following a standard methodology for qualitative research, this chapter distills the observations and experiences from the case studies into a number of themes. The method used is similar to inductive data analysis, as described by Creswell:

Qualitative researchers build their patterns, categories, and themes from the bottom up, by organizing the data into increasingly more abstract units of information. This inductive process illustrates working back and forth between the themes and the database until the researchers have established a comprehensive set of themes.

(Creswell, 2009: 175)

However, since the term data is problematic to a methodology that is based on the art of enquiry as defined by Ingold, this process would be better described as inductive participant observations analysis.

Within each theme, reflections are discrete. They should all make sense on their own, but they do not have headings, as the themes each embraces cannot be defined in a few words. Instead, they are separated by text dividers. Themes have slowly emerged during the process of digesting and interpreting the visual record and the written observations, and referring back to the literature. Titles have been chosen to best reflect the common thread between different observations. This methodology is consistent with that of grounded theory, as first developed by Glaser and Strauss (Glaser & Strauss, 1967), with photographs being the basic units that are analysed for the separate categories and themes that are relevant to them.

Photographs in this chapter have been presented as pairings. The left hand photograph of each pairing is of one of the participant observation case studies. I have then chosen an image either from the direct observation case studies of OPDs/LIDs or those by other photographers that deal with a similar subject matter. Some pairings are defined by characteristics that are predominately visual, but sometimes further explanation and written exploration is required. In this study, the combination of photographs and written reflection has provided the opportunity to create pairings that would not be intelligible on their own, having little or no visual similarities.

Although there is no suggestion that the number of themes is definitive, I have identified ten that are rich enough in material to present as separate categories. Each theme examines situations encountered in the participant observation fieldwork and makes connections with either the direct observation case studies the literature or photographic record, or both.

The ten themes that have been identified are as follows:

- *Making plans*: this theme looks at the processes of forward planning where the conventional linear processes of design to construction are either impossible or undesirable. Such processes might occur either before a self-build commences, or during the process but before a particular stage has been started.

- *Improvisation in making do* examines how the actor making do improvises during a process

that has not been fully mapped out in advance, and in particular questions the roles of brain, hand, tool and material and the relationship between each of these in the heat of the moment.

- *The influence of the natural world on self-build processes* looks at how natural forces such as the weather can interfere with the process of self-build, and hence require ad hoc responses, but also at ways that the natural world can be harnessed to facilitate the meeting of a need.

- *Appropriation*: This theme was already prominent both in the literature review on making do and in the direct observation case studies. The participant observation case studies have also thrown up multiple examples of appropriation, and this theme connects the learning gained from the fieldwork with the literature.

- *Adapted boxes*: Here, the theme of appropriation is continued, but focuses on the adaptation of different types of habitable box. The direct observation case studies identified different types of box as a recurrent typology in LID and OPD. This theme looks closer at how and why such processes occur using examples from the participant observation case studies.

- *Ways of learning*: Two distinct methods of learning are identified from the experiences gained on the case studies: learning by instruction and learning by experience. The processes of knowledge acquisition in each case are analysed and the benefits and disadvantages of each are examined.

- *Modest materials*: The experience of self-building with budgets that were either limited from the outset or that were spent during the process necessitated the use of economical materials. Three such materials are chosen for detailed study, with experiences from the participant observation being related to the literature.

- *Hoarding and sorting*: This theme looks at how experience of making do led to a tendency to start keeping materials 'in case they come in handy' in the future, and how this needed to be accompanied by a process of sorting to ensure they were available when needed.

- *Opportunity and risk*: The role of chance in ad hoc self-build is examined, using a number of examples from the case studies. This theme also looks at the importance of the actor's receptiveness and responses to both happy and unhappy accident.

- *Flow*: The final theme looks at processes of change that occurred on the sites, and compares them to linear models of progress that are common in the architectural profession and construction industry.

7.2 Themes

Making plans

Before starting on any substantial project, one needs to make plans for it. If it is to involve methods or goals that are new, then a degree of forward planning is especially important. At the start of the fieldwork for this study, I had no experience of self-build aside from the building of a small area of decking some years earlier. As an architect, I had, however, had extensive experience of designing build projects far larger than those that I would take on in this study, and also of project managing them in the role of Contract Administrator of traditional JCT contracts. Given my training, my first instinct is always to use drawing as a way of planning both the design and the work to be carried out. However, on these projects, my lack of experience in building combined with very limited budgets often resulted in my plans thrown off course. The purpose of this section is to examine the ways that plans were made on the self-builds that differed from the methods used in conventional design processes and also how things were thought through when unforeseen constraints or opportunities brought about a change in plan.

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Fig. 7.1 Marking out for growing beds at HM done by the author (left); marking out extent of pod by Jon at UI | Source: the author

At HM, the design of the planting bed layouts evolved through a complicated iterative process, which included sketches, CAD drawings, in situ mockups, and trial and error. A working solution was found that was inherently flexible, allowing the strategy to continue to evolve, depending on the activities being carried out. Wooden planks were used to mark out proposed footprints. In the case of the polytunnel, planks were used to try out two alternative layouts for the beds, based on sketches already prepared. This allowed the ergonomics of both to be tested. The wheelbarrow was run down the path and reaching distances were tested. Entirely independently, at UI, Jon used the same method to mark out the footprint of the pod, to help visualise how it would occupy the space of the yard adjacent to the caravan.

Marking out is easily done with materials that are lying about a site. It can be used either to test designs that have already been put to paper or to help develop a design in the first instance. It is particularly useful to designers and builders who do not have a training in design. For example, in Rebel Architecture (Al Jazeera, 2014) shows a lay designer-builder of Favela homes in Brazil

using bricks to mock up the layout of a house he is building for his family.

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Fig. 7.2 Use of a timber post for planning of dimensions (left), and 'Writeback' by Jane Fulton Suri: using someone's back as a support to write something (right) | Source: the author (left) and 'Thoughtless Acts' (Fulton Suri, 2005)

At certain times during the building of the polytunnel, I needed to either record measured dimensions or carry out simple drawing exercises in order to decide on measurements for preparing materials. The photograph on the left shows a sketch that I made on on the centre post for the doors, as I did not have paper to hand. Sketching on walls will be familiar to anyone who has spent time on building sites, but the first time I witnessed it I recall feeling that in some way it was an act of transgression. With a majority of experience being of residential refurbishment projects, one might speculate that I had some sense that it was inappropriate to write on the walls of someone's home. However, this act would have been minute compared to the major building works being carried out, and that should in time cover it up.

The right hand photo, by Fulton Suri, shows someone borrowing a friend's back to act as a writing surface. Richard Wentworth has similarly been interested in an image of 'the knee raised to convert the thigh into a writing table', though noted that the transience of such a situation has not given him the opportunity to photograph it (Wentworth, 1978). In these two cases, different parts of the body are being used merely for support. In the case of ad hoc self-build it is the paper itself that is often missing. Since a pencil is used for making marks directly onto materials, usually for cutting, it is therefore an essential tool for building, and will therefore usually be to hand. However, paper has no direct function in the building act, so when the need arises on site to plan, record or design, it may not be immediately available. Aside from the above example, the substitutes I used for paper during the self-builds were many and varied, including a stone and the palm of the hand.

When drawings have been prepared, often they are the only paper that is available on site. This

is a fortunate by-product of a lack of anticipation of the need for paper on site, as any further design sketches or dimensions are noted on the drawing, and so it acts as a record of the developments in design. However, as the next example attests, sometimes things are built without a pencil being lifted or a mouse clicked.

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The log store at DH was the only self-build for which no drawings or sketches were prepared. The idea of building anything without drawing it first runs counter to the training and culture of the architectural profession. However, the fact that the build was successfully completed in a day, and continues to provide valuable service, suggests that for simple projects, the ability of drawings to map the process of delivery can be overestimated.

Certainly there was a degree of pre-visualisation required, and the fact that the design was to be based on repeating the standard module of a pallet helped facilitate the pre-planning. The elements that needed forward planning were identified well in advance and appropriate steps were taken to ensure they were in place on the day. However, much of the detail was still left to the day of construction. The successful completion of the project then depended on a creative process of cooperation between the members of the group making the log store. I found that at times certain members of the group would carry out tasks without needing to communicate their technique to others. However, where tasks required collaboration, techniques developed independently needed to be communicated so that they could be shared. This was done through a combination of language, gesticulation and demonstration. Sennett has noted that language alone is incapable of adequately communicating detailed instructions on how to go about making something, given the level of detail and the specific spatial coordinates and sequences required for even the most basic of functions (Sennett, 2008: 179). Such visual communication between myself and Frank is evident in the photographic time sequences, except in this situation it is not simply a question of communicating method from one person to another, but developing a method together, and in this case, shared reflection was an important part of the process, as we collaborated to develop the design together.

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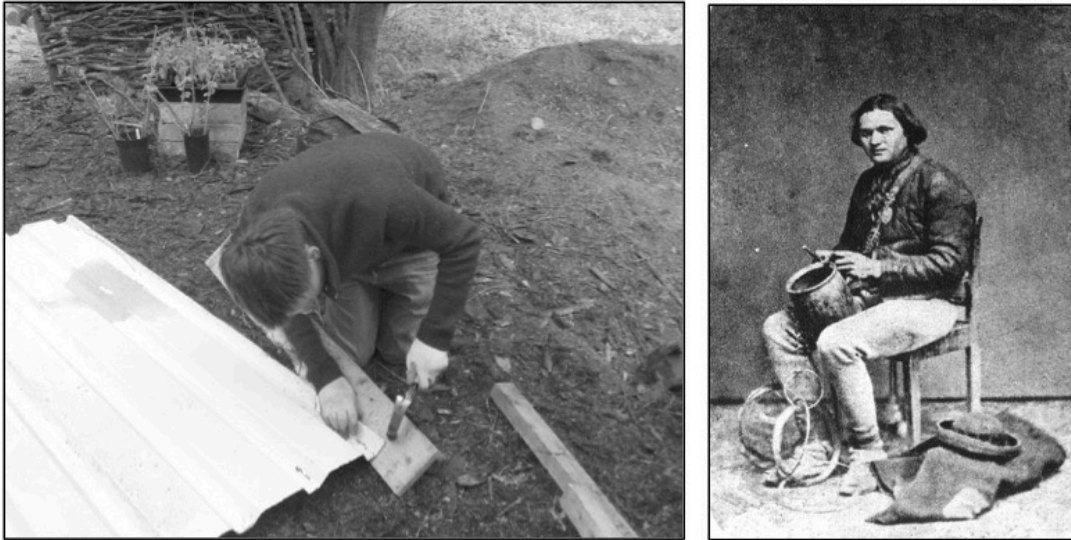
The above examples demonstrate that there are alternative models to the strict traditions of the architectural profession, which are rooted in an expectation of design linearity, whereby the architect develops the design and passes it on to a contractor to build. The self-build projects involved varying degrees of pre-planning that were largely consistent with the scale of project. Even where significant pre-planning was carried out, there was an ongoing process of revisiting and testing the design, but this was often achieved through ad hoc means.

Improvisation in making do

No matter how much I prepared for tasks during the various self-builds during the fieldwork, I found that I still needed to adapt my plans and make new decisions when work was underway. Situations invariably arose that I had not foreseen, and this was often a result of the need to make do without appropriate materials, tools, skills or time. At other times, plans had been intentionally left vague for certain aspects of a project because I did not have the information available to me at design stage to make decisions, so it was left to the build stage to finalise the design.

The intention of this section is to focus in on the processes of making do in the moments when they are being enacted. Choices that affected the appearance and performance of the builds in question were often made within seconds, sometimes even fractions of seconds. How was the mind working when deeply engaged in the process? Was the rational mind always in charge, or was the process directed more by the instinctive mind, in concert with the hand, the tools it was using and the materials it was grappling with? In order to investigate these questions, I will use three examples and relate these to examples from the LID case studies or literature.

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*Fig. 7.3 The author hammering (left); and 19th century tinker by Ignacy Krieger
Source: the author (left); and '<http://en.wikipedia.org/wiki/Tinker>' (right)*

When a problem arose during the log store build, a solution needed to be improvised on the spot. When I realised that the sharp corner of the metal roofing sheet would be hazardous as it would be at head height when installed, I was aware that a solution was required. However, the instinctive intelligence used to arrive at and enact this solution did not follow a linear route. There was no decision based on a rational thought sequence. Rather, the answer was arrived at through feeling. The initial feeling was in the mind, as an awareness of the material qualities of sheet steel suggested its foldability. Following this, the feeling extended to the hand and the eye. The focus of attention became the head of the hammer and the place where it hit the sheet. Michael Polanyi calls this 'focal awareness', and describes it in relation to the act of hammering a nail:

When we bring down the hammer we do not feel that its handle has struck our palm but that its head has struck the nail... I have a subsidiary awareness of the feeling in the palm of my hand which is merged into my focal awareness of my driving in the nail.

(Polanyi, 1962)

The technique for ensuring the corner was rounded and smooth was not established from the outset. Each strike of the hammer, and the material's reaction to it, informed the next move, the next location and strength of strike. This feedback loop from material, to mind to hand (or hammer-in-hand) did not involve a conscious process of reflection, it was entirely intuitive. As Sennett would have it, when we are involved in such an activity, 'we are now absorbed in something, no longer self-aware, even of our bodily self. We have become the thing on which

we are working' (Sennett, 2008: 174). Merleau Ponty also calls this 'being as a thing' (Merleau Ponty, 1962).

Much has been written about anticipation in the context of the process of making. Sennett describes it as 'always being one step ahead of the material' (Sennett, 2008: 175), while Ingold argues that it 'is not a matter of determining the final forms of things and all the steps needed to get there, but of opening up a path and improvising a passage' (Ingold, 2013). This description fits well with the process of building the log store. There was a clear aim, to end the day with a log store. Although preparations had been made for the day, and materials obtained, the steps to arrive at the end goal had not been determined. Instead a path was opened up and a passage improvised.

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Fig. 7.4 The compost bin at HM, with the stone used to drive the posts on the ground in front of it (left); and two stones used to crack open hazelnuts at DH (right) | Source: the author

When my partner and I were building the second compost bin at HM, we needed to drive posts into the ground, but did not have a post driver to hand. The ground was quite soft at the time and we found a stone that was lying around successfully completing the task. At other times I used a stone to hammer nails into the pod at BQ when I did not have a hammer with me. It could be argued that the stone in this situation was not acting as a substitute for a hammer, it was acting as a tool in its own right, and for the characteristics it holds. There is no doubt that the modern hammer makes tasks that require a degree of control more convenient. A lightweight handle combined with a heavy head with a flat front face allow an impact to be accurately delivered with minimal effort by the user. However, the simple task of hammering nails into a SIPs panel whilst working on the pod did not require this level of control. The stone was adequate for the job in hand.

The right hand photograph shows another example of found stones being used as tools, this time at DH. The fact that they were being used to crack open hazelnuts that had been collected from the forest floor take this activity even further away from the typical modern post-industrial

experience. Before using the stones, Tina had been using a sledgehammer but this was too unwieldy. So a modern tool designed for a different job had been replaced by an undesigned object that had more appropriate characteristics and hence made it a better tool for the task.

Another use for a stone is as a knife. Jon, the owner of UI, has passed on to me the following anecdote told to him by a colleague about a time he was visiting a farmer in Wales:

They reached a field gate tied with twine and the farmer reached into a crevice in the adjacent dry stone wall and pulled out a small stone with a sharp edge. He proceeded to use this to cut the twine. The farmer explained that he placed sharp stones or shards of glass next to all his gates in case he didn't have a knife with him. This can be interpreted in many ways according to whichever theory one is exploring. It is definitely a deliberate and planned approach to ad hoc tool and materials use.

(Anonymous (Jon), 2015: email to the author)

In the modern world, designed objects are far more available to most people than naturally occurring, hence undesigned materials and objects. When using a manufactured object (or fragment thereof) for a purpose it was not originally designed for, the very act is a statement of nonconformity, whether one wishes it to be or not. When using a stone to break open a hazelnut, there is no designer, manufacturer or brand behind the object whose intentions for it are challenged by the use one is putting it to. However, the very fact that a natural object is chosen over a man-made one provides an opportunity to evaluate some of the assumptions one makes about the naming and classification of tools and their relationship to tasks.

One benefit of using a stone as a tool is that it cannot be broken, or at least not in the way that a manufactured tool can. There is no handle to become detached from the head, no blade to be snapped off with too much pressure. If a stone breaks in two, it immediately becomes two stones, or if a sharp edge breaks there will be a newly formed sharp edge to take its place. In situations where stones are used as improvised tools, there tend to be more than one lying about, so if the original tool becomes changed in the process in such a way that it is no longer useful, then another one can be chosen to replace it. Greer has observed that the simpler a technology, the more resilient it is (Greer, 2014), and what simpler technology is there than the stone? It is simultaneously a tool and a material, and nothing the user does to it will turn it into waste. It can simply be tossed aside, and it returns to the earth from which it came. Tim Ingold proposes it is more accurate to imagine the stone tools of prehistory as undergoing this constantly evolving process, rather than the conventional image of a static artefact. He rejects the idea that there is a process of creation which culminates in the finished artefact, which is then put to use. Instead, he argues that 'flint tools are not so different from pencils. They wear in use and may have to be sharpened by further flaking until they too are reduced to a stub and discarded' (Ingold, 2013; 39).

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Many of the tasks on the various self-builds required the use of either electric or unpowered hand-held tools, but there were also times when I needed to work with a material directly with my hand. As the previous quote from Polanyi indicates, even when using a tool, the mind's awareness is focused on the interface between tool and material, but inevitably information is lost in the gap between material and hand. This is often compensated for by the other hand, that performs the combined role of supporting the task, and feeling the progress. For example, this hand will hold a nail against a piece of wood ready for the hammer's blow, and then test the stability of the nail after the blow to know when it can remove itself and allow more forceful

blows by the other hand without risk of injury.

The application of the signage vinyl to the SIPs on the side walls and roof of the pod is an example of a task that was mostly carried out without a tool. The process involved unwrapping 5m lengths of vinyl, peeling off the backing paper and then using the hand to push the adhesive back onto the OSB face, working steadily horizontally across from one end of the pod to the other. In this operation, the hand was simultaneously a tool and a sensor, as it needed to alert the brain to any creases that required redoing. There are those who will argue that the neurological connections between hand and brain make them impossible to separate (Ingold, 2013:112). The anatomist Frank Wilson goes so far as to argue that 'brain is hand and hand is brain' (Wilson, 1998: 307). If this is so, then the process of making something without use of tools could be seen as a direct interaction between brain and environment, an experience that is becoming increasingly rare in today's technological age.

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The brain, the eye, the hand and other parts of the body work in concert to interact with the world to achieve a goal, but as the world talks back, the brain needs to adapt its strategies. At some point the cues from the environment and the corresponding actions that they elicit from the hand are so minute that they happen below the awareness of the conscious mind. Yet there appears to be no defined cut-off between a conscious decision and an unconscious act.

Fulton Suri describes the 'Thoughtless Acts' in her book of the same name as 'all those intuitive ways we adapt, exploit, and react to things in our environment; things we do without really thinking' (Fulton Suri, 2005). But is there really a distinction that can be drawn between thinking and unthinking? In the context of ad hoc self-build, an awareness of the complexity of the mental processes at the minute level makes the notion that designing and building are two distinct processes seem illogical. Not only are design decisions being made throughout the build process, but if one is to accept the notion that conscious decisions and unconscious acts are two ends of a continuum, then it can be argued that the unconscious mind continues to make design decisions below the radar of one's conscious awareness.

The influence of the natural world on self-build processes

During the fieldwork, I found myself having to deal with the elements in ways that I had not experienced before. Sun, wind, earth and water in its various forms were essential elements in what I was trying to achieve but often acted in ways that I found profoundly challenging.

Modern science has established a new and detailed understanding of the elements that make up the universe that bears no relation to the categories of the ancients. However, I learned through trying to meet needs in the natural world that the classical categories have a more immediate relevance to someone trying to meet a need in difficult circumstances. I illustrate this below with a couple of examples of how I was forced to engage with the elements, and open up the discussion with references to LID case studies and literature.

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Fig. 7.5 Two different types of challenging weather: HM in the snow (left) and a photograph from the series 'Means of Escape' by Julian McKenny (right)
Source: the author (left); and courtesy of Julian McKenny (right)

Since I had previously rarely needed to achieve a goal in adverse conditions, the capricious nature of the weather and its affect on builder, build and building came as a rude awakening. The first experience of this came with the covering of the polytunnel. The intention was to cover the frame with polythene, fix it at both ends and dig it into the trench at the sides in one day. The conditions for that day were good, as it was sunny and still. However, the fact that the work was being done on one of the shortest days of the year, a shortage of hands, and lack of experience all conspired to ensure that the work needed to be left incomplete at the end of the day. The wind picked up in the early morning, and this set the pace and mood for the following day's work. Desperate calls for help were made and the work was carried out with an urgency dictated by concerns that the conditions might worsen.

The pod provided further invaluable experience of the repeated punishment the weather can deliver to the under-prepared self-builder. The site is located in a shallow valley, and the end elevation of the pod faces south-southwest, down the valley. This was therefore the end that would receive the full force of the winter gales and storms of the last couple of years. It seemed to me that the weather had a great deal of fun testing my various experiments in cladding and roofing to destruction, and that the wind never gave up looking for points of weakness and attacking them until they break. Once local failure has started, then it quickly spread as the integrity of the whole was compromised. Wind-driven rain would work its way under the window that faces the weather, but this was dealt with a tea-cloth that became a regular feature. Water also came through the main roof on various occasions when the roof failed, until it was repaired and recovered.

My experience of the weather as something apparently with a vindictive personality is mirrored in Alberti's discussion of it in 1450:

'For rain is always prepared to wreak mischief, and never fails to exploit even the least opening to do some harm: by its subtlety it infiltrates, by softening it corrupts, and by its persistence it undermines the whole strength of the building, until it eventually brings ruin and destruction to the entire work.'

(Alberti, 1988)

The righthand photograph, by Julian McKenny, is part of a series called 'Means of Escape', which he describes thus:

'Means of Escape is an on-going project responding to the life we are creating running a small market garden growing vegetables in Pembrokeshire, West Wales.'

Weather now plays a large part in our daily lives and is reflected in these images as do our living conditions as we live in a static caravan in a field whilst we build a straw bale house to live in permanently.'

(processional.co.uk)

For many in the modern world it is easy to avoid the weather. We pass from one sealed environment to another; modern houses, vehicles, places of work, leisure and of shopping are all designed to create controlled environments with regulated temperatures and acoustically separated from the outside world. Of course if one is well prepared and dressed, then outdoor leisure pursuits can be enjoyable in bad weather. However, if conditions get too severe, there is always the option to turn back and retreat to the controlled environments we have created for ourselves. In requiring food and an income to be derived from the land OPD policy demands of its practitioners a re-engagement with the weather.

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I found working with the ground challenging and rewarding in different contexts. At UI, the first task was to dig up the turf to create the vegetable beds. This was physically demanding but the results of the labour were immediately apparent. At HM, the qualities of the ground were helpful in a number of tasks. It provided a useful background for cutting large sheets of polythene, and allowed a miscalculation about the level of one of the polytunnel doors to be corrected by digging it out and letting the grass recolonise. However, the digging of the trenches for the polytunnel did not go so well. Due to the physical demands of the work, the temptation to dig a shallower trench than required proved too strong, and during the process of burying the polythene edges into the trenches, earth fell back into them. Having not done an adequate job in the first place, I found that rectifying it at a later date proved even more challenging, and made more unpleasant by the putrid smell of waterlogged earth inside the scoop of polythene when I tried to dig it out to redo it. All this needed to be done in bitterly cold winter temperatures.

Working with the ground requires an understanding of its qualities and the opportunities it provides. Some of its qualities are not welcomed by many. Mary Douglas defined dirt as 'matter out of place' (Douglas, 1966). In western culture, social status has always been inversely related to one's relationship with the earth, and so having dirt on one's clothes is often carefully avoided to prevent unwanted assumptions that might be drawn from it. However, for anyone prepared to overcome such cultural prejudices, then working with earth can reveal surprising opportunities. Once one understands them, earth and grass as surfacing materials are both convenient and attractive. Few things can be more satisfying to the ad hoc self-builder than starting a job and then letting nature take over and finish it for you.

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My experiences of dealing with the elements while engaging in self-build and food growing gave me an experience of the fundamental forces of nature in a fundamentally different way to the type of knowledge based on scientific understanding. The earth, wind, rain and sun all helped or hindered me in different ways at different times, meaning that my relationship with them could not be merely rational. They made me feel emotions, and when writing about the experience, I found myself assigning personalities to these natural forces that I had never felt inclined to in the past. At the same time, my rational mind was aware that there was no logical basis for such a response.

Bertrand Russell argued that there are two distinct types of knowledge, knowledge by

description and knowledge by acquaintance, and this position is supported by the fact that other languages including Latin-based languages have separate words for the different types of knowledge. Russell argues that knowledge by acquaintance is acquired directly by sense-data, but that knowledge by description does not necessitate knowledge by acquaintance (Russell, 1911).

The technologies and conditioned environments of the modern world are creating a detachment from the natural world that allows knowledge by description without knowledge by acquaintance of natural forces like the weather. I found during the processes of self-build in challenging weather conditions that abstract knowledge of weather patterns alone was inadequate preparation of the situations I found myself in. Direct knowledge by acquaintance of the processes of self-build during harsh weather conditions had implications that were felt in a visceral way, which informed behaviour as difficult lessons were learned.

The requirements of the OPD planning policy to make assessments of ecological footprint are based on quantifiable measurements that conform to the modern scientific paradigm. At the same time, the requirement for small scale food growing requires an engagement with the natural world. Therefore, for those engaged in activities that OPD requires, the scientific method that reliably provides knowledge by description must be complemented by a type of knowledge that is based on informed intuition which must derive from direct acquaintance with forces that are often challenging and unpredictable.

Appropriation

The direct observation case studies found examples of the incorporation of materials or objects into the building structure that would not normally be associated with such a use. An example of this is the old trampoline frame at OD that was repurposed as a polytunnel frame. The literature on making do identified this as a common feature of making do. Another category is the appropriation of spaces or elements of the built environment for uses other than their assigned one. By engaging in self-build myself in the fieldwork, I had the opportunity to witness how such appropriation happens as part of the wider process of making do. Below are a number of reflections on my own direct experience of appropriation on the participant observation case studies, and a discussion of how these relate to the direct observation case studies and the literature.

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Fig. 7.6 Steps as workbench at HM (left) and Eugene Atget, Saint-Sulpice, 1907 (right)
Source: The author (left) and 'Richard Wentwoth / Eugène Atget: Faux Amis' p.69 (right)

My use of the external steps at HM as an ad hoc workbench raises questions about the qualities that stairs have that make them well suited to ad hoc uses. Despite the fact that they need to provide for people of a wide variety of sizes, including young children, the range of tread length and riser height considered safe is relatively limited. This means that most stairs act as relatively comfortable ad hoc seats, with the choice of sitting one or two steps up from where one places one's feet. The fact that a whole flight of stairs provides a large choice and capacity of ad hoc seating means that they allow groups to gather. Thus, if they are located in places which are otherwise conducive to social interactions, such as the stoops to New York tenement blocks, people will instinctively take advantage of these inherent qualities to sit together and socialise (Sennett, 2008: 235).

The display of goods for sale requires the wares to be elevated to bring them closer to eye level. Steps achieve this, while also providing a combination of flat surfaces to rest objects on and support behind to prop them up if needed. The flower seller in the right-hand photograph by Atget has occupied the steps up to some doors to St Sulpice Church in Paris to such an extent as to almost make the space his own. It seems that the doors are not in use, so he has been able to use the whole space to his advantage.

In the case of both the above examples, the ad hoc use of stairs requires the actor to have consideration for the risks involved in their new application, as there is no guidebook for such unofficial uses.

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Fig 7.7 Different door holding methods: Ruck and jam method at BQ (left); and 'King's Cross, London, 1987' by Richard Wentworth (right)

Source: the author (left); and Richard Wentworth / Eugène Atget: Faux Amis (2001) p. 87 (right)

The photograph on the left shows a method I used to hold a door open at BQ when moving office. It is similar to one that Wentworth describes in his 1978 article for Artscribe, 'Making do, getting by':

Resistance to acknowledging informal behaviour extends also to its relation in the inanimate world, where mere objects are displaced - typical commonplaces such as the ruck-and-jam method of holding open a door, where the energies of a doormat are re-assessed and redirected.

(Wentworth, 1978)

The jammed rug has been chosen purely on the basis of its immediate availability, but performs its task adequately, as the friction between carpet and rug successfully held the door in place. Ad hoc door stops are possibly the most common instances of making do on a day to day basis. They are often necessary because the 'proper' measures are either unavailable or ineffective. For example, doors that do not open against a wall rarely have an inbuilt facility for holding them in the open position. If the occupant is a tenant, then there is limited incentive to invest in changes or additions to the building. The expedient use of a nearby object to do the job is therefore commonplace. One potential downside of this is that when it is performing its new role, the ad hoc door stop may no longer be available for its original purpose. In the right-hand photograph, by Wentworth, the stool used to prop the door open has not only temporarily surrendered its role as a perch, but has also robbed the door of its main role of providing passage, so one can infer that the requirement was for ventilation instead. By comparison, the crumpled rug in the left hand photograph could still be used for wiping shoes in its new position but doing this would risk dislodging it.

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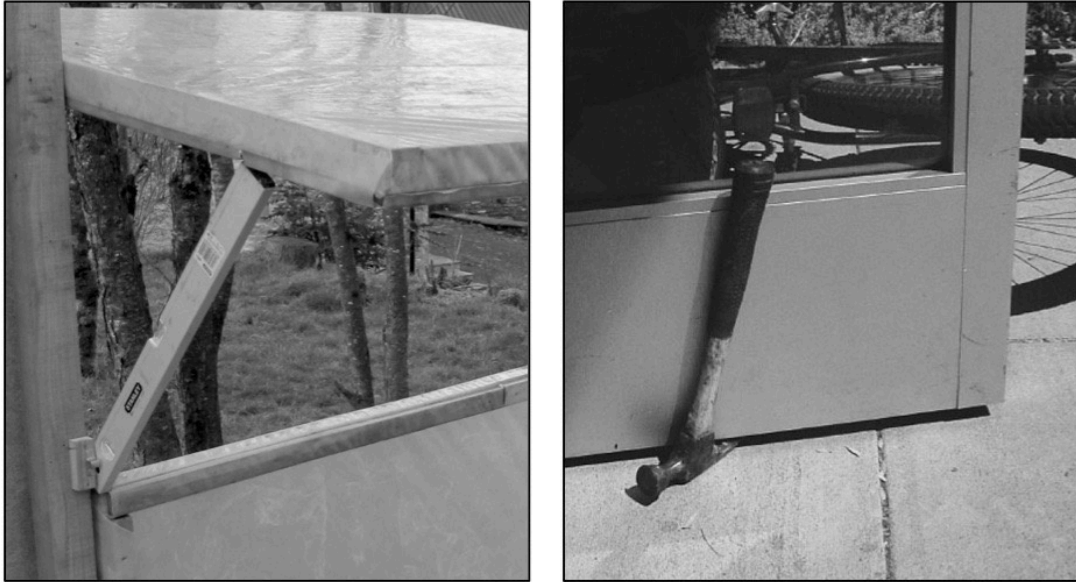


Fig. 7.8 Tools holding things open: spirit level to hold open window to polytunnel at HM (left); and hammer holding open a door, from 'Thoughtless Acts' by Jane Fulton Suri + IDEO (right)
Source: the author (left); and 'Thoughtless Acts' (Fulton Suri, 2005) (right)

The above pairing continues the theme of propping things open. The left hand photograph shows a spirit level I used to hold the window open on the polytunnel at HM before I had time to buy a chain for a more permanent arrangement. On the right, a photograph by Jane Fulton Suri shows a hammer used to hold a door open. About it, she wonders:

Is this permanent or just today's solution? It's interesting to speculate about how much thought went into this - was this just the nearest thing that would do the trick, or is the form or material especially suitable?

(Fulton Suri, 2005: 186)

In the case of the spirit level, then answer to the second question is that it was 'the nearest thing that would do the trick'. The fact that I had been building the window meant that I inevitably had building tools immediately to hand, so one of these would have been a likely contender if I was prioritising expediency in the moment. In a way, the form was suitable in that it was the right length to hold the window in a fully open position, but I never felt it was 'especially suitable', for reasons that Fulton Suri does not ask. There are a number of factors that need to be weighed up when using something for an ad hoc purpose. As previously discussed, putting an object to an ad hoc use takes away its original function, and although I could remove it and return it, this was not especially convenient. Another risk of such ad hoc uses is of damage, either to the object being used or the elements it is interacting with. The spirit level was precariously placed, and the glass tube that is fundamental to its core function is fragile. One needed to remember that the act of closing the window would make the spirit level fall if it was not held.

The fact that the spirit level was not an ideal solution answers Fulton Suri's first question. Clearly it was a temporary solution, though as is often the case, it took longer than originally expected to find the time to obtain the chain to replace it. Since the need was long term, then a more permanent solution was needed. However, the spirit level provided a valuable ad hoc role for the time that it was called on to do so.

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Fig. 7.9 Old carpets being used as ad hoc doors on the polytunnel at HM, 2012 (left); and Richard Wentworth, Islington, London, 1976 (right)

Source: the author (left); and 'Richard Wentworth / Eugène Atget: Faux Amis' p.104 (right)

The use of carpets as ad hoc doors for the polytunnel at HM was an example of short-term making do that became problematic the longer the permanent end doors and windows were delayed. As an initial response to the need to close up the structure with the onset of high winds, the measure worked well. However, I had not fully considered the range of functions that these carpets would be required to perform over time, or the demands these functions would place on the material being used. By contrast, it is hard to see the ad hoc use of a piece of carpet in Richard Wentworth's photograph from 1976 ever fulfilling a valuable function, but it does seem to be a similarly urgent response to a predicament. As Anna Dezeuze writes:

The immediate fix of repairing a car bonnet with a piece of carpet, like the urgency involved in sticking a foot out to keep a door open, imply a simple (more or less urgent) necessity to find a practical solution to a pressing problem.

(Dezeuze, 2013b)

Following the initial requirement to keep the wind out, the carpets were also required to allow access and to provide different levels of ventilation. Although further layers of ad hoc measures afforded these functions, the carpets soon became damaged with repeated hooking and unhooking and wind forces. In particular, at one point, high winds almost brought the measure to the point of complete failure, with the situation only being recovered by hammering nails through the carpet at close spacing all around the openings. Of course, this measure then negated their role of providing access so had to be undone when the winds had died down.

Despite their technical failings, the carpets played a couple of other important roles while acting as ad hoc doors. They helped define what the final doors and windows needed to do by making their users acutely aware of where and how they failed. In addition, their less than perfect performance provided a useful incentive to carry on and finish the job. Following the installation of the final doors and windows, the carpets returned to a horizontal plane. Their role in suppressing weeds in parts of the beds that were waiting to be planted was more successful as less technical demands were being made of them.

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Fig. 7.10 A gate being used as part of a fence at UI, 2012 (left); and Richard Wentworth, Gloucestershire, England, 1997 (right)

Source: the author (left); and 'Richard Wentworth / Eugène Atget: Faux Amis' p.117 (right)

While my partner and I were digging the beds at UI, and starting to plant seedlings, Jon and Lisa were fencing this corner of the field off, ready for it to be grazed by a friend's sheep. However, the sheep arrived before the job was complete, so in an urgent response to their predicament, and without enough fencing mesh, they took a gate that was not currently in use and closed the final gap. Subsequently, the entire fence, including the gate was covered in a layer of chicken wire, in an effort to keep out small rodents. In one way this embedded in the gate in its new role, making it more difficult to extract, but visually it still stood out as the object it was before. Wentworth's photograph on the right shows that a similar process has happened to a car door. One might imagine that it was a similar response to an urgent need, and the layers of barbed wire have trapped it into this new role in which it looks distinctly uncomfortable. It looks pretty clear that the car door could no longer fulfil its former role.

In 'Adhocism: the case for improvisation', Jencks makes reference to Reyner Banham's argument that chairs should be designed to accommodate a multitude of uses other than sitting on (Jencks and Silver, 2013: 119). Curiously, he illustrates this argument with a photograph of a broken chair propping open a door. Perhaps the example in the photograph was not designed following Banham's suggestion and was not designed to be stood on. The broken chair and the car door are at least finding roles, but their sorry-looking states create an air of dereliction that infect their whole context. On the other hand, the gate is still looking pretty confident in itself. Its current use as part of a fence does not preclude a potential future reuse as a gate. In a sense, then, it is in a state of useful storage.

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The sink from DH that was repurposed as a pond in the polytunnel at HM is an example of an object that travelled from one case study site to another, and in the process found a new role. It was a sink bowl, and became a pond. In fact it became an integral part of a habitat. Since its reuse did not require any irreversible changes to it, maybe it was still a sink, or maybe it was a pond that had been a sink and had the potential to be one again. A tin of paint used to prop open a door is still a tin of paint, so following this logic, the sink bowl remained a sink, while also being a pond. Its affordance as a sink is communicated through the fact that it was designed as such. So even in its new context as a pond, the possibility of it being used as a sink again can easily be perceived. However, it took imagination to perceive that it afforded use as a pond when he found it at DH.

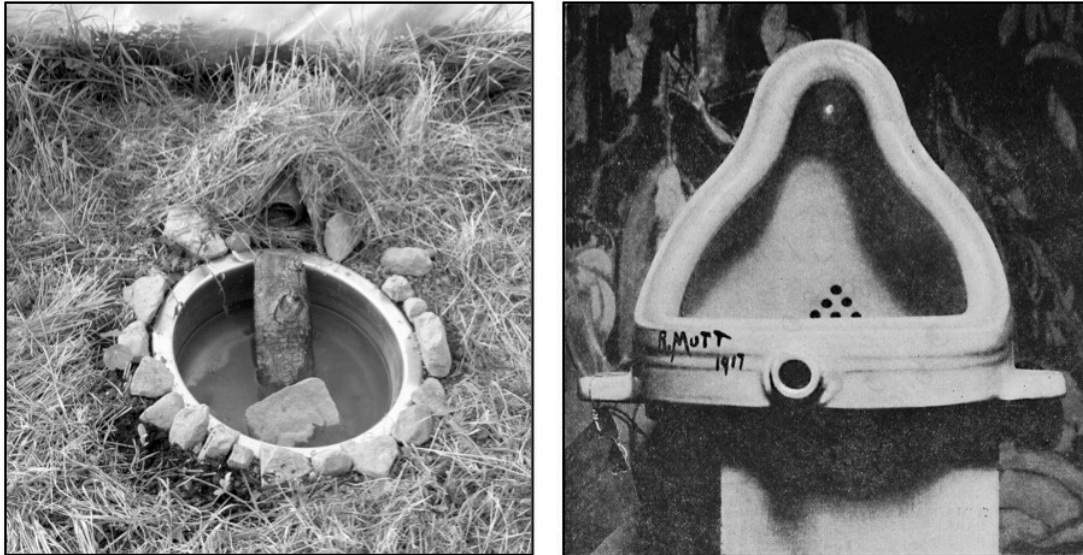


Fig. 7.11 A sink turned into a pond at HM (left) and a urinal renamed 'Fountain' by Marcel Duchamp, photographed by Alfred Stieglitz (right) | Source: the author (right) and <http://sdrc.lib.uiowa.edu/dada/blindman/2/> (right)

Marcel Duchamp turned a urinal on its end, signed it with a false name and called it 'Fountain'. It was a urinal, and became an artwork. To quote the anonymous article in the *Blind Man* (possibly by Duchamp), he 'created a new thought for that object' (Anonymous, 1917). The fact that it clearly never lost its affordance as a urinal is part of the game that Duchamp was playing. However, the peculiarities of the art world economics mean that to do so now would be unthinkable.

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Fig. 7.12 Plastic milk bottles adapted to keep slugs away from runner bean plants (left) and a photograph of CDs repurposed as bird scarer, by Jane Fulton Suri & IDEO (right) | Source: the author (left); and 'Thoughtless Acts' (Fulton Suri, 2005) (right)

I was involved in growing food at two of the case study sites. At UI we were offered a small plot that at the time was part of a field used for sheep grazing. The conditions were very challenging, with pests and the weather being the most significant factors preventing a successful season of food growing. The photograph on the left shows the use of plastic milk bottles to try to keep slugs away from the runner bean seedlings. Their bottoms were cut off and then they were pressed into the ground upside down to enclose the young plants. Clear soft drinks bottles are also often adapted for uses associated with food growing. At GC I saw them being used as part of some particularly Heath Robinson contraptions for distilling a liquid

fertiliser from comfrey. The economy and material qualities of plastic bottles make them well suited to such uses. The right hand photo, by Fulton Suri, is another example of the repurposing of a short-lived object. CDs, which are often unwanted when given away with newspapers, glint in the sun and scare away birds from crops.

Joanne Lee has observed that ‘contemporary allotment gardeners are renowned for their use of available resources and cunningly salvaged materials’ (Lee, 2010). Similarly, Tim Ingold has also identified allotments as a great place to find examples of making do (conversation with author, January 16, 2015). Small-scale food growing is a complicated and unpredictable process, in which the grower often needs to respond immediately to unexpected situations. These are the conditions that lend themselves to the creative processes of making do. My observations in rural Wales have shown me that commercial farms are also a good place to find examples of inventive repurposing. For examples, baths in fields are ubiquitous, and delight me with this new context for an object associated with personal ablution. Wentworth has also made the link between making do and agrarian culture (Henry, 2007). At the other end of the scale, agribusiness seeks to eliminate all the unknowns in the process, relying on science and standardisation of conditions and methods.

Food growing is a fundamental aspect of one planet living, and it is a requirement of OPD planning policy that at least 30% of the occupants’ food needs are grown or reared on site (Welsh Government, 2012). My own experience of growing at this scale suggest that there will always be an element of improvisation. This is particularly going to be true on OPDs, where economic and ethical concerns motivate the occupants to reuse and recycle wherever they can.

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Fig. 7.13 Polytunnel interiors showing a wide range of simultaneous uses: Clothes drying, food growing and processing, sitting and washing at HM; drying of clothes and timber, and storing materials at HB (right) | Source: the author

My personal experience at HM demonstrated that, aside from significantly improving food output compared to outdoor growing, polytunnels also help with other household activities that the local climate would otherwise interfere with. In this way, the polytunnel as a type could be

seen as helping people make do with the Welsh weather. The left hand photograph shows some of the uses it was being put to one summer day in 2013. In the foreground is a solar shower, which was also useful for handwashing. Behind that shirts are hung to dry on the polytunnel ridge pole. The rotary clothes drier is being used for both its expected purpose and for drying of garlic that has recently been harvested. To the left are a table and camp chairs, which were being used in that period for working on a laptop, relaxing and socialising. Beyond are the beds where a variety of vegetables are growing.

The right hand photograph shows the uses one of the polytunnels at HB was being put to when I visited it, including general storage, drying of timber and drying clothes. Polytunnels tend to be thought of as agricultural structures, meant for growing of food. Visitors to the polytunnel at HM expressed surprise at the type and number of uses it was being put to aside from food growing. From such a perspective, both examples above could be seen as examples of appropriation of a typology. However if one views the polytunnel for the opportunities it presents rather than the uses it is expected to fulfil, then it reveals itself as a remarkably useful and economical typology. For example, in even the most generous of houses, clothes drying often happens in an ad hoc manner, whereas polytunnels could not be better suited to this function. They provide ample space to hang clothes, they keep the rain off and they make optimal use of solar energy even in winter months.

Aside from a passing reference to drying clothes in a polytunnel in *The One Planet Life* (Thorpe, 2015: 127), the literature is surprisingly silent on the subject. I am unable to quote a single source that has made a serious study of the possibilities this typology presents in a resource-constrained world. Yet, my personal experience and my observations of LIDs and OPDs demonstrate that the benefits of polytunnels are recognised by those needing to live with limited means. This is a topic that clearly merits further study.

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The reflections above are about the repurposing of objects, building elements or spaces. Such ad hoc uses question some basic assumptions we make about the world around us. Our environment has affordances that we may or may not perceive, but putting things to unexpected uses requires us to make evaluations of the potential risks of such uses as well as their opportunities. Finding things out of context can be one of the most enjoyable aspects of making do. Kevin Henry has noted that the viewer may experience a 'grin of recognition', when realising that what appeared to belong there actually had a previous life (Henry, 2007). The finding of new thoughts for objects has a rich history in contemporary art, inspired by the iconoclastic genius of Marcel Duchamp, and many Dada and surrealist artists of the early twentieth century. The crises the world is facing today require of us that we are open to new ways of envisioning how the world might be put together.

Adapted Boxes

The chapters on OPD and on making do already established the use of boxes as a common feature of both. Given the fact that the types of box that feature in the case studies is largely a product of chance based on the choice of case studies, this section is not an attempt to further define the typologies. Rather, the fieldwork has provided the opportunity to observe how boxes are used and occupied and how they are adapted in the process of day to day making do.

Several types of box featured in the case studies. The static caravan at UI was used intensively

as an interim home during the reconstruction of the main house. Touring caravans featured at HM, DH and BQ in different ways with different intensities of use. One was integrated into a camp at DH, whereas they were merely stored at BQ. A homemade box, which became known as the pod was built to provide extra living space to the caravan at UI, before being moved to BQ. The other type of box featuring significantly at BQ was the shipping container, rows of which provided storage to paying customers. Below are a number of observations of how these different types of box featured as part of their respective sites' activities.

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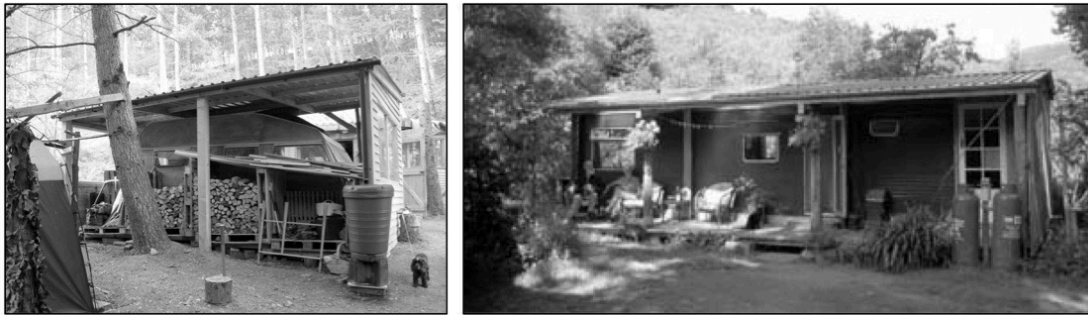


Fig. 7.14 Touring caravan at HM (left); and static caravan at UC (right): both covered with corrugated steel roofing | Source: the author

The touring caravan at DH had been painted green in an attempt to reduce its visual impact and covered in a tarpaulin roof that also covered external space over the entrance door and on the other side to provide a covered storage area. The tarpaulin was later replaced with a corrugated metal roof on a timber frame with side cladding and windows (left photo). I observed a similar treatment of a caravan at UC, one of LID case studies, (right photo).

The creation of a larger covered area outside of a caravan is an economical way of allowing certain activities to spill over beyond the limited confines of a caravan interior. Enclosing the caravan under the roof also has the benefit of reducing the sound of rain. Without it, the noise of rain on the roof of a caravan is one of a number of factors that remind their occupants that they are in a lightweight, insubstantial shell. There is also an aesthetic factor in such adaptations. Caravans are made of artificial materials that have little in common with the natural settings in which they are often found. The addition of structures around them, however lightweight, allows them to be read as built structure more than alien object, and natural materials such as timber help integrate them into their settings.

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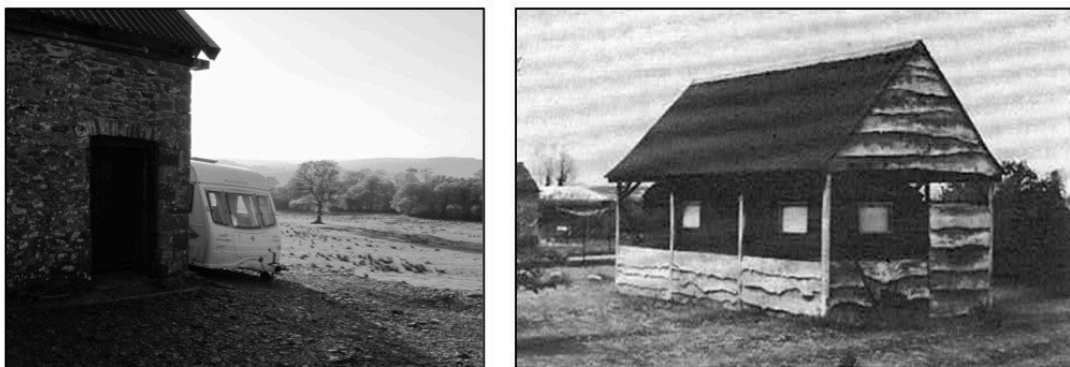


Fig. 7.15 Caravan lent by landlord at HM (left); and 'Spare Room' by Richard Wentworth (right) Source: the author (left); and Artscribe Magazine No.14, October 1978, p.21 (right)

The time I slept overnight in a caravan lent by the landlord at HM struck me as a simple and effective solution to a problem. A dedicated guest bedroom is a luxury. Sometimes a room such as a study can double up as a bedroom, and a sofa bed in the living room can also provide useful overflow accommodation. However, sometimes accommodating everyone in the house is difficult or inconvenient. On these occasions, a borrowed caravan gives everyone space and privacy, with only the mild inconvenience of having to leave the house to bed down. In this case it made sense for the occupants of the house to move out to the caravan and give our bedroom over to the visitors. There was a touring caravan at GC that was also used as a spare room, but in that case it was given over to visitors while the occupants stayed put in their static caravan.

Richard Wentworth observed the use of a caravan as a spare room with a photograph he titled 'Catcott, Somerset 1977 (spare room)' which was printed as part of his article for Artscribe magazine (Wentworth, 1978). It appears to show a mobile home of some description inside a timber framed barn with timber cladding but large open areas. As such it also has parallels with the examples at HM and DH discussed previously. Although the photograph is enigmatic in that it leaves many questions unanswered, the title Wentworth gave it makes suggests that he was aware of its intended use.

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The family bought and moved into their second hand static caravan in late 2010, soon after they had acquired UI. It was not long before they experienced some exceptionally cold weather in the early months of 2011. They survived the winter, but resolved to address the issue of the poorly insulated caravan before the following autumn. The solution they chose was foil-faced bubble wrap. This was not only easily fixed to the inside faces of walls and ceiling, but was also well suited to performing the function of a roller-blind to the windows.

Ad hoc addition of insulation to caravans is a common response to their inadequacies. In the case of the caravan at UI, it was a response to the difficulties and discomfort caused by the product's inadequacies, the severity of which were not anticipated at the outset. Perhaps this is because the product presents itself as a box to be inhabited. On the other hand, if one is appropriating a box not intended for habitation, such as a shipping container, one will not make any such assumptions.

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Fig. 7.16 Part of the interior of the pod at UI, decorated by the family (left); and the unique piece of joinery forming the entrance and windows to the lorry box body at OD (right)

Source: the author

Neither time nor finances allowed the interior of the pod to be finished as one would finish a home. It started to be inhabited intensively from the moment the windows were installed. The family decorated, furnished and personalised the space together. The bare OSB faces of the SIPs were painted white, a second hand carpet was put down and the space filled with furniture and toys. There was no attempt to hide the structure. The texture of the OSB was clearly visible through the paint, and the ridge beam, with its fixings and pencil guide lines drawn during construction were left exposed. This was not accidental. Keen to reveal the process of construction, the family even deliberately left exposed the writing on one of the SIPs, which had been marked on each panel at production stage.

The interior walls and ceiling were used as one big canvas for paintings, writing, and collages of pictures cut out of magazines. It became a space play, where the usual rules, such as 'don't draw on the walls' did not apply. The juxtaposition of the writing from production stage with the children's writing illustrates the lack of boundary between the processes of building and use.

The lorry box body at OD is an example of a similarly personalised box. The former back of the lorry, has been replaced with a piece of timber joinery incorporating entrance door and window, all carved as one seamless organic composition. The conversion of vehicles into highly individualised motorised homes continues to be popular in a traveller scene that has its cultural roots in the hippy movement of the late 1960's. This mobile counter-culture was particularly active in the late 1980's and early 1990's, and the formation of large convoys of an extraordinary array of adapted vehicles in varying states drew much attention, and often opprobrium from media, public and authorities alike. Today, such ad hoc adaptation of vehicles is no longer seen as culturally threatening, with a popular UK television series (George Clarke's *Amazing Spaces*, 2012) regularly featuring such conversions. The vehicles are chosen for their economy and suitability for converting to living spaces. Second hand vans, lorries and horse boxes meet these requirements, as do buses, coaches and ambulances that have come to the end

of their service life. The application of individually designed and handmade functional and decorative elements in, on and around a vehicle body with a very different set of cultural associations create curious hybrids which can be shocking or enjoyable depending on the viewer's preconceptions.

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The reuse and adaptation of a variety of different types of box demonstrates the resourcefulness or the maker-do. Often, a caravan or container becomes the sleeping accommodation, which is the core of the home. As the place where one is most vulnerable, the place where one sleeps has to serve an important psychological function (Bollnow, 2011). It has to feel safe and secure. It needs to be relied upon to contain warmth, and exclude the weather. All the examples of appropriated products in this study have been inadequate in some respect, and ad hoc improvements have only provided partial solutions. There is an opportunity here for designers to develop products that are better suited to the types of use that feature in this study. They would, however, need to be designed following the principles of 'long life, loose fit, low energy' (Gordon, 1972), so their interiors can be adapted as and when needed, and they need to be relied upon to keep performing reliably.

Ways of learning

The different processes of learning can be illustrated by a reflection on some tasks I needed to carry out during a number of episodes during the self-build projects. At times I learned without any instruction from a third party. In these situations it was usually the behaviour of the material I was working with that I learned from, and dealing with failure was often a key part of the process. At other times, I learned from others, either by being told or shown, or a combination of the two. Other sources that I made use of included written and drawn instructions and videos available from the internet. However, I found that transmitted knowledge was rarely complete or completely suited to the task at hand, so I would often need to revert to looking to obtain knowledge from the specific situation or material that I was working with.

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The steps taken and methods used to cover the polytunnel at HM were initially influenced by a combination of verbal advice from friends and acquaintances and written guides. However, as the process evolved, and I became more familiar with the materials I was working with, I was able to adapt the techniques to better suit the requirements. Often, a situation would arise for which no relevant guidance could be found, and so an ad hoc response would be needed.

Instructions on the polythene supplier's website combined words with unclear photographs, so a competitor's instructions were chosen for the clarity provided by line drawings of the process. Efforts to dig the sides into the ground did not match the apparent simplicity of the instructions. This was partly due to inadequate preparation, as the trenches were not dug deep enough, but also because actions that looked straightforward in the diagrams threw up unexpected problems in reality. For example, it was difficult to keep a grip on the polythene whilst simultaneously pushing down with the foot. Other tasks went more smoothly, aided by the step-by-step diagrams in the instructions.

Sennett has written of the difficulty of conveying instructions with written language. As he says, 'language struggles with depicting physical action, and nowhere is this struggle more evident

than in language that tells us what to do' (Sennett, 2008: 179). I found the language and the photographs in the polythene supplier's instructions inarticulate and unhelpful. There was something about the line drawings of their competitor that, when combined with step by step instructions allowed the process to be communicated more effectively. Perhaps it is because the person drawing the sketches is able to show only the important information and omit extraneous detail in a way that a photograph cannot. For a number of tasks I found online videos particularly helpful. The popularity of such videos providing instructions on every building activity imaginable attests to video's ability to communicate process. Whilst not being interactive in the way one-to-one instruction is, the ability to replay sequences, combined with the sheer scale of the online archive and the power of search engines means that the internet learner is able to choose the direction of their enquiry and revisit stages in the process until it becomes familiar to them.

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The process of preparing materials for relocation from HM benefitted from the experience gained from the self-build projects. I had already learned of the suitability of grass as a cutting surface for polythene, but knew that any amount of wind made the task difficult to complete outdoors. I had therefore learned from both the successful and problematic aspects of the previous method. It was not inevitable that I would realise that using the grass area inside the polytunnel would solve this problem. The idea had to come to me. Although there is no way of guaranteeing that an available solution will be noticed, an openness to the affordances in one's environment can be learned, which will improve the chances of finding a solution that works.

At the same time, I needed to cut down timbers so they would fit in the car so I could move them. Since use of the combination of circular saw, house steps and wine rack to cut timbers had worked successfully previously, I therefore used the same method and felt no need for improvements. If I was expecting to continue with self-build at this site, then it may have been advantageous to look for a longer term solution to the requirement to cut down lengths of timber, as it is a common activity in self-build. Therefore, to learn good making do, one also needs to recognise when a more structured approach is more appropriate.

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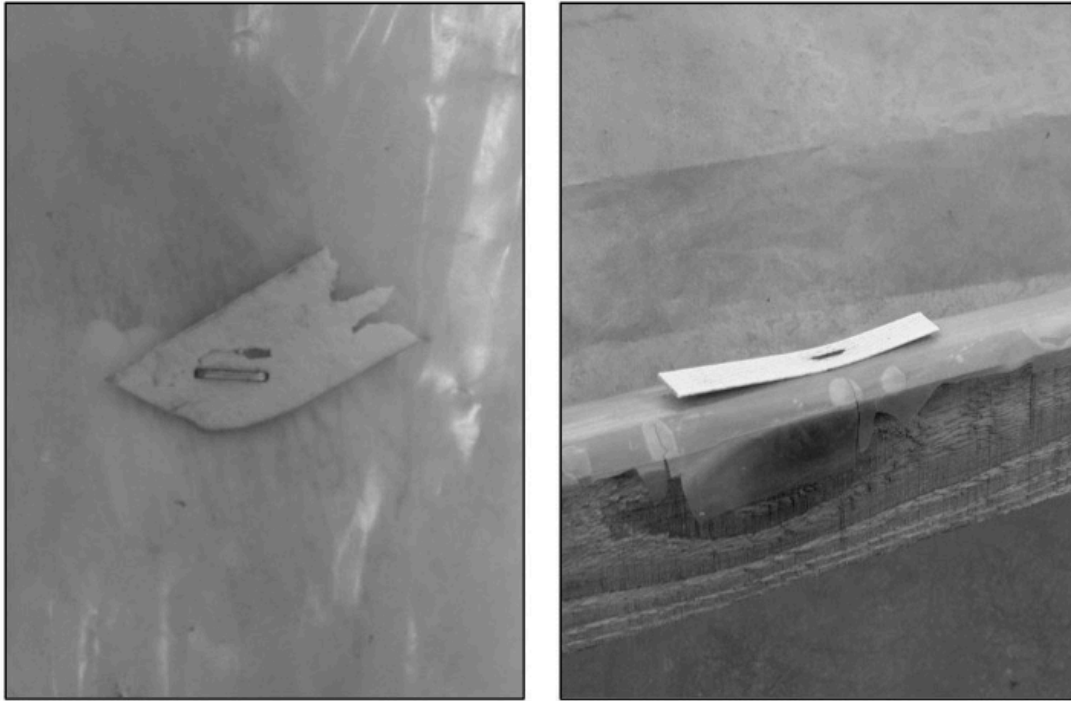


Fig. 7.17 The same solution, to prevent polythene tearing when stapled, arrived at independently: on the pod at BQ (left); and on one of the polytunnels at GC (right) | Source: the author

When making do, one often learns about materials through the need to address previous failed attempts to work with a material. The technique that I developed to fix the polythene covering the window opening on the pod at BQ is an example of this. In this case, the failure was caused by the fact that when stapled, polythene easily tears from the staples when being pulled at by the wind. Since stapling is the easiest way to fix a sheet material, I persisted with this method, but experimented with alternative ways of stapling it. When I found the fragments of vinyl flooring, it had an instinctive feeling that it would hold the polythene in place when sandwiched between staple and polythene. Even in retrospect I find it difficult to verbalise the qualities of this material that I thought to be appropriate. I recall that I was visualising the material's behaviour, imagining the compression of the polythene between wall and the vinyl fragment.

My decision to look for alternative methods when the original approach failed was a conscious one, but the process of finding the most appropriate method involved a feeling for material qualities more based on intuitive awareness. When I visited GC at a later date, I found that they had used an identical method when fixing an ad hoc gutter to the side of one of their polytunnels to allow them to harvest rainwater. They confirmed to me that they had arrived at the same solution as me through a similar process of learning from the material, and that they had not learned it from others.

The process of learning from experience is conveniently illustrated in the case of the gutters on the polytunnel at GC because the first method they tried has been retained on the other side, where they stapled directly through the polythene. Although the process taught them about the weaknesses of this method, the fact that this was the more sheltered side meant that it could be retained in parts. Knowing, however, that the other side faced the prevailing winds, they chose to use the method that they had developed of stapling through lengths of semi-rigid plastic.

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The last two examples, above, were of learning by experience, either through interaction with

the environment in which I was making do or the materials I was working with. On the face of it, the first example involved learning by telling, but given that the situation I was dealing did not match assumed conditions in the instructions, I needed to respond directly to the situation. The fact that my difficulty following the instructions was partly do to inadequate preparation on my part suggests that the role of learning by telling is limited in ad hoc self-build. The inherently unpredictable nature of situations that ad hoc processes throw up suggests instead that it is learning by doing that is at the core of making do. To put it another way, learning by telling can be an important supplement to learning by doing but cannot be a substitute for it.

Having engaged in making do for this research, I have learned from experience some principles that I could tell others, which I believe to be useful. They include: do not take on more than is absolutely necessary; keep your initial design simple; ask for help from others and offer help to others; or respond swiftly to urgent situations but don't panic. These are all principles that are helpful individually. They are not prescriptive of a path to be followed, nor of an outcome to be achieved. The 'Make Do and Mend' instructions from central government during World War II were a type of learning by telling, but they tended towards the prescriptive (Great Britain. Ministry of Information, 1943). They may have provided useful information to some but the following of instructions does not help one develop skills to prepare them for the unexpected. Since making do relies on initiative, the telling should be focused on preparing you for the journey into the unknown, not telling you what your goal is and how to get there.

Aside from the knowledge I have gained through experience, that is communicable through telling, there are also skills and aptitudes that I have learned that others would need to learn through a similar process. For example, an openness to using available materials and objects for uses that are not immediately obvious requires a fundamental change in attitude to one's immediate environment. It requires an ability to see the world as composed of things with affordances and potential connections with other things, not objects with fixed uses (Heidegger, 1971; Ingold, 2010). Successful making do requires an enjoyment of the process of making, and the ongoing process of discovery that making entails. Risks of failure need to be considered, but if fear of failure prevents measured risk taking, it will interfere with the process of making do. Therefore, new attitudes to risk need to be learned, and this can only happen when risks are taken and outcomes are witnessed. It is through such experience that metis, the combined wisdom and cunning that Certeau identifies as an essential characteristic of successful making do, is developed (Certeau, 1984).

Modest materials

Although the pod build started with materials and methods typical of conventional construction projects, as the remaining budget steadily depleted, more provisional methods and modest materials started to be used. The low cost of such materials allowed a level of experimentation that would not have been possible with more costly ones, but they had their disadvantages. In particular, their lack of longevity imposed a requirement for ongoing layers of patch repairs. The benefits and disadvantages of such materials are discussed below, using the example of three materials: duct tape, tarpaulin and rope, and how they were used on the later stages of the pod build.

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Fig. 7.18 Duct tape used on the pod to form an ad hoc drip detail (left); and duct tape used on the moon during an Apollo landing (right)

Source: the author (left); http://en.wikipedia.org/wiki/Duct_tape#/media/File:AS17-137-20979.jpg (right)

As the vinyl that I had used to clad the pod shrank and tore, several return visits needed to be made to make repairs. Initially these were carried out using vinyl, but soon the additional strength of duct tape was called upon, to try to counteract the vinyl's tendency to shrink. The low cost of both vinyl and duct tape allowed for a creative process of repair based on ongoing experimentation. Sometimes the repairs were combined with new measures intended to resolve certain issues, and so improve the performance of the design. For example, while making patch repairs around the window, an ad hoc drip detail was added over the window head. Such adaptations could be seen as part of a process of tinkering, which the literature review identified as a kind of creative repair, whereby the object being repaired is transformed in some way by the process. It was the economic nature of the materials being used for these repairs that allowed this experimentation.

Duct tape was used for a wide range of ad hoc purposes during the lunar missions. For example, The right hand photograph above shows it being used to attach a makeshift mudguard for the lunar rover to replace the damaged one, and prevent moon dust from kicking up and damaging the engine. Duct tape was also instrumental in saving astronauts' lives during the crisis that unfolded on the Apollo 13 mission, when one of the oxygen tanks exploded. In the absence of adequate levels of oxygen, the engineers at Johnson Space Center needed to work out a way to prevent the carbon dioxide the astronauts were breathing out from building up to fatal levels. The solution they arrived at was an ad hoc design that used cardboard, duct tape and plastic bags to allow lithium hydroxide canisters to absorb the excess carbon dioxide in the lunar module, which the astronauts had moved into, to conserve energy for the re-entry. When Ed Smylie, who oversaw NASA's crew systems division, heard that there were rolls of duct tape on board, he was confident that the issue could be resolved. As he later recalled: "I felt like we were home free. One thing a Southern boy will never say is 'I don't think duct tape will fix it'" (Henry, 2016: 128).

Joanne Lee has used the example of Sellotape as a material that is used in contemporary art practice. She notes that the spontaneity and improvisation that such cheap, everyday materials offer has been attractive to artists since the beginning of the twentieth century, but that 'such work does not easily convince those for whom some clear demonstration of technical, 'artistic'

skill is still a requirement' (Lee, 2010). In the end, the experiment of using the duct tape on the outside of the pod would have been equally unconvincing to an outside observer, but more importantly failed to delay the deterioration of the cladding by more than a few weeks.

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Fig. 7.19 Tarpaulin on the pod beginning to fail (left); and a photograph from the series 'Means of Escape' by Julian McKenny (right)

Source: the author (left); and courtesy of Julian McKenny (right)

Following the failure of the vinyl roof to the pod, I bought a light duty tarpaulin and secured it to the roof, holding it down with bungee ropes. It lasted several months, but then started wearing through at the corners. The tarpaulin was being used for its purpose, its failure could only be put down to its inadequacy as a product. I therefore invested in a medium duty tarpaulin and laid it over the original. After the pod was moved to BQ, this tarpaulin also started to fail, by losing its water resistance, so my final purchase was a heavy duty tarpaulin that fully covered the sides and roof, after the side opening had been closed up.

The theoretical benefit of a tarpaulin is that it maintains its integrity when fixed and can be adjusted as required, and removed and used elsewhere. However, the right-hand photograph by Julian McKenny suggests that my experience was not unique.

In *The Grapes of Wrath*, a tarpaulin is the only protection the family has from the elements at night. Steinbeck choose to make this tarp a constant in the book, and did not think to add the failure of the family's tarp, their only roof, to the other privations they had to endure (Steinbeck, 1939). Perhaps he did not think of it, or perhaps tarps were made better those days. Nor does he write of how they obtained it. Those that I bought I ordered online, and had it delivered to my door. But such benefits of the modern internet age were offset by the disadvantage of not being able to check the quality before proceeding with the purchase.

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When I was fixing the tarpaulin at UI, I used a combination of bungee cords and blue polypropylene twine. The rope was very smooth and I was concerned that the knots would come apart. I made the knots as secure as I could without having any particular knowledge about specialist knots. I found an example of the same type of rope being used to hold the ad hoc caravan steps together. This is obviously a ubiquitous material. I wondered at the time whether learning different types of knot be a worthwhile exercise. I did not know whether the knots that I made were secure, but since I did not know when would be the next time I needed to make a knot, I did not pursue it.

Kevin Henry explored the ad hoc way that gates can be secured with string in an interview with

Richard Wentworth and Jane Fulton Suri in 2007. The following quote demonstrates the pleasure both gain from witnessing such instances of making do:

Wentworth: I think the relative closeness to agrarian culture is quite important. So that if you go to put the sheep away for the night and you are not in agribusiness then any old piece of string will do. You don't have to go down to the big farm shop to get the special galvanised hook which has probably come through some sort of industrial design process. You just hold it together with an old shoelace and half the world still runs like that. Maybe in the foreseeable future the world won't run like that and it will all run with specialised galvanised clasps, who knows.

Fulton Suri: Well here's the wonderful tension for me in the sense that that's my business - doing away with those pieces of string and creating galvanised clasps. Now you're making me depressed because the thing that I get so excited about is the human capacity to find that piece of string and know that it is long enough and I can get the right kind of knot out of this material and it's that (capacity) which I think is exciting and interesting and amazing and I don't want it to go away.

(Henry, 2007)

When Jon, of UI, read an earlier draft of this thesis, he objected to Wentworth's assertion that 'any old piece of string will do' when farmers need to secure gates closed, and suggested that in fact they had a developed technique for this. He wrote in an email to me:

On a cold day the farmer will not undo it but simply cut the twine and knot together the residue when re-securing the gate. They will keep doing it until there is more knot than plain twine. They then replace the twine with a fresh length. I have met farmers who carry with them a bunch of strands of baler twine two feet in length precisely for this purpose. It has occurred to me that by counting the knots in a piece of gate twine one can work out how many times it has been used. A type of chronology of baler twine use can thus be obtained... I am working through an argument for us (conservation archaeologists) to consider baler twine as a traditional building material. I'm inclined to see it as the farmer's version of duct tape.

(Jon, 2015: email to the author)

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Tim Ingold has suggested that we don't need string any more, because the world is already put together for us (Ingold, 2013: 121), and Deuze has made similar observations in relation to Wentworth's photographs (Deuze, 2013b: 299). However, the above example clearly indicates that this is not yet true for everyone. Wentworth's reference to agribusiness reflects an awareness that the culture of making do is currently being eroded by the tendency towards large scale supply chains in agriculture as it is elsewhere in society. This makes the increasing interest in OPD and the processes of making do that are an intrinsic part of it significant. If the rest of society still appears to be travelling in the other direction, then OPD reminds us that we do not have to live in a world that has already been conceived for us. And if OPD continues to gain in popularity, this will indicate that more people have the need, the desire or both to put their own environments together themselves.

Hoarding and sorting

The keeping over time of materials 'in case they come in handy' is a common characteristic of making do. In order for this habit to be useful, the hoarding instinct needs to be accompanied by an ongoing sorting process, so that as a need for a material arises, it can be easily located. Whilst the keeping of leftover materials is easy, the sorting needs to be learned through experience.

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While I was at HM, I made a number of orders from the local saw mill. Although it was all ordered for specific purposes, either for the polytunnel or the pod at UI, as time passed, the original intentions for different pieces were lost as timbers of different section sizes accrued and ad hoc design changes were made on both projects. On leaving HM, most remaining timbers were cut down to fit in the car and taken to UI, where they were stored under the pod, for potential future use as battens for timber cladding to the end elevations. Some of the timbers that were badly deflected were repurposed as ground stakes and left at HM for use by future occupants. The preparation of some timbers for reuse in this way required a degree of effort that would be hard to justify in purely economic terms. However, the accrual of small amounts of different materials meant that when unexpected new needs arose, the necessary material was often available.

The repurposing of some of the stakes for gardening uses required an understanding of the nature of the material and also the functional requirements of different uses. The experience of using larch for the polytunnel beds had shown that some boards had deflected significantly whilst still remaining strong. Use as building timber required minimal deflection, but for use as ground stakes this was not an issue. Finding an alternative function for the most deflected timbers prevented them from being wasted. Developing and applying an understanding of a material in this way required care and patience, but by being engaged with and responsive to the material, I found myself acquiring skills and understanding of the material's qualities.

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Fig. 7.20 Two boxes used for storage with minimal sorting: the container at BQ rented by the author (left); and Prince's special shed, that also served as a place to relax (right) | Sources: the author (left) and www.huwdaviesphotography.com (right)

The photograph on the left shows the shipping container at BQ (actually half of a 20' container) that the author rented when moving into a house from HM that had far less storage space. Since it was almost adjacent to my office at the time, this was convenient to access for me. This is a type of box for putting things in. There was very little sorting applied, only enough to ensure that the contents fitted and were accessible, and only then when absolutely necessary.

The photograph on the right is part of a series by the photographer Huw Alden Davies on his

father, nicknamed Prince, and the elaborate world of sheds he has created in his back garden in Tumble, west Wales. As Davies writes:

Unlike America who have garages and basements, we have sheds. Even if we have garages, we still have sheds... this is one of my favourites, shrouded in mystery. With no special markings, or anything particularly interesting to look at, my father once described this shed as “better than any caravan”. With nothing but a deck chair, an ashtray and a radio surrounded by crap, it was the only room in the garden to have a padlock. I imagined him sitting there, thinking all kinds of things, and I figured this is where it happens. This is where all his ideas come to him.

(Prince St. website)

Although I did not use the shipping container as a living or working space, I was aware of its potential in this regard. Our rented offices were composed of two small rooms, with only room for workstations, so I had speculated about converting one into a flexible space that could be used for meetings, making models or other activities that could not be accommodated in the office.

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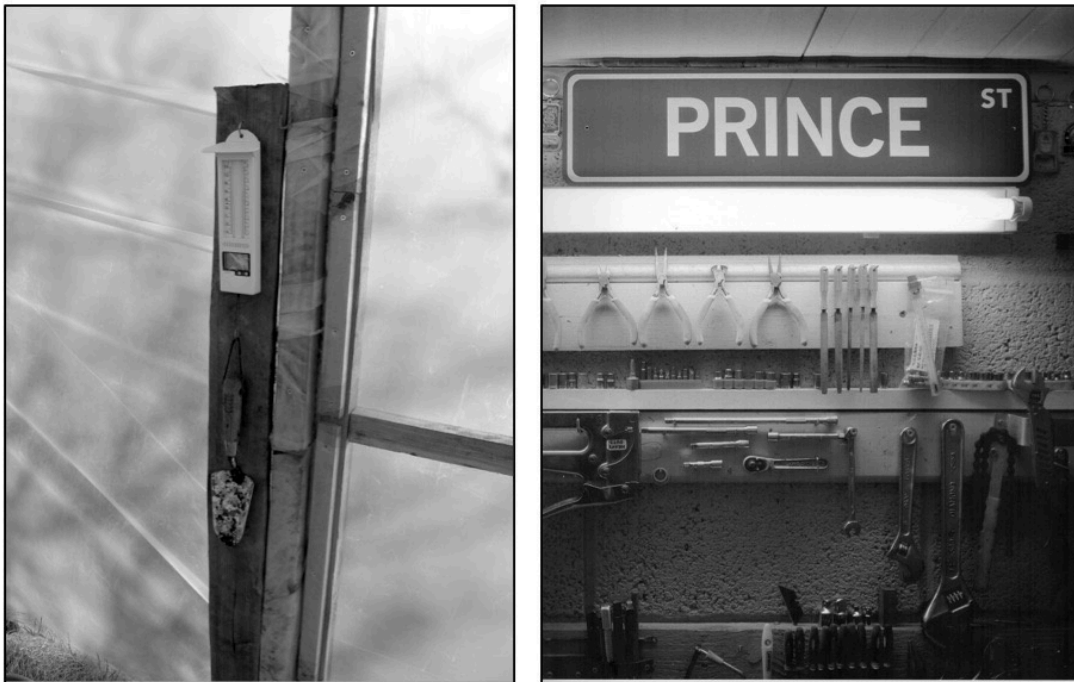


Fig. 7.21 A special place for the thermometer and the hand trowel in the polytunnel at HM (left); and Huw Alden Davies' photograph of his father's shed in Tumble (right) | Sources: the author (left) and www.huwdaviesphotography.com (right)

Adjacent to Prince's 'ideas' shed is his workshop shed, the interior of which is a world away from the apparent disorder of the former. The right-hand photograph above shows the careful sorting and ordering of tools in this shed. As is often the case in workshops, the tools have been arranged on the wall through apparently ad hoc means. Individual tools have been hung on nails or screws fixed to pieces of timber that are easily identified as old pieces of skirting. As the place for ad hoc invention, it is only to be expected that the home DIYer will eschew standardised solutions to fit his shed out, and instead put his workplace together with the materials he has to hand. The left hand photograph shows one of the first evidence that the polytunnel at HM was transitioning from a building site to a place for horticulture. An old half-round fence post had been found, and was fixed to the side of the door post, so that a

thermometer and hand trowel could be always at hand.

The methodical process of ordering, sifting and arranging is fundamental to 'shed life'. There is clearly a practical need to have tools and materials easily accessible when at one's workbench, but some take the task of sorting and cataloguing to extreme lengths. The artist Lee Phillips was so fascinated by the amount and variety of objects in his late grandfather's shed in Aberbargoed, that he set himself the colossal task of sketching every single item in it. His project, in its obsessive need to keep, store, and document an array of objects that appear of little or no worth, seems to parallel the subject he is studying:

There were rusty scissors, empty jars and tattered lengths of rope. Discarded chess pieces were in there, too, along with handmade tools – items that had been built to solve some long forgotten problem and retained in the unlikely case that they'd be used again.

(Craddock, 2015)

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Experience on the case studies demonstrated to me that the more one engages in making do, the more it makes sense to keep hold of materials. However, this needs to be accompanied by a process of sorting, or otherwise the hoarded materials become clutter, and interfere with rather than help the process. At the same time, tools needed to be kept organised and in good order so they could be easily located and used. However, having organised working spaces did not mean that they were regimented or standardised. The joy of sheds is that each is unique, and much of that is down to the fact that each individual will be using contingent means to achieve an end, usually with the materials immediately at hand.

Opportunity and risk

During the various self-builds, there were a number of cases where opportune moments were critical in the progress of the projects. The moments in which an impasse was suddenly cleared by a chance discovery or insight have been described as Eureka moments. The first such moment on the pod design, which occurred before construction had started, demonstrates that such realisations can happen as part of a traditional linear design process. However, other Eureka moments, which occurred during construction of the pod, were reliant on my ability to interact directly with materials on the site. Often I found that Eureka moments do not always provide a complete solution. They cleared a blockage in the creative process, but for complex problems, there were often further significant hurdles to cross. I also found that the ability to deal with the inopportune moment was often as important. Ad hoc responses to unexpected problems needed to be adequate for the task or else risked causing new challenges requiring further ad hoc solutions.

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The pod legs were an example of an ad hoc use of a system that was already well established in a different application. Jon's suggestion of using scaffolding feet was informed by his experience of using them for their original purpose as part of the scaffolding for the house extension. Adjustable scaffolding feet allow scaffold poles to be supported on uneven ground through the simple mechanism of a winged jack nut on a threaded scaffold foot. Some internet research established that the feet and nuts could be economically sourced online, but the strategy for transferring the load of the pod safely to the feet still needed to be established. The process of exchanging ideas with the structural engineer relied on him having a flash of

inspiration for how this would be achieved. After several false starts on both sides, he sent through a sketch that I immediately recognised as having the seeds of the solution. Although it still needed a couple more iterations, it was when I saw this initial sketch that I recognised intuitively that the problem had been solved. This was the first of several Eureka moments that happened on the project, and the only one to happen before the build had started, since the nature of the building element being designed required the detail to be resolved at the outset.

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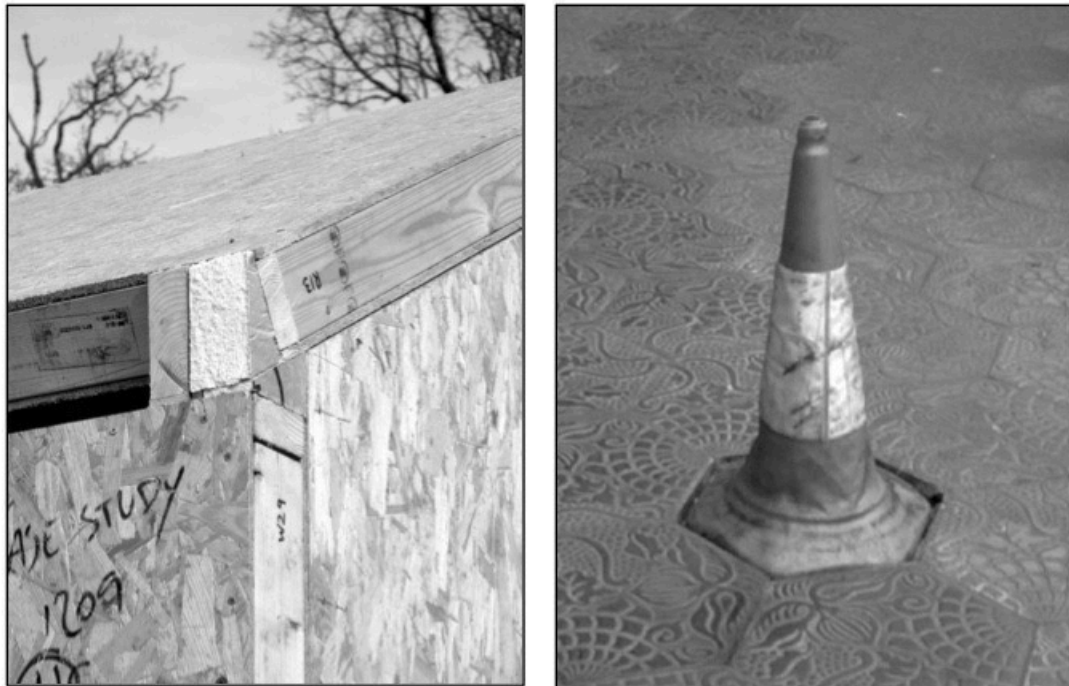


Fig. 7.22 Detail of pod construction 2013 (left); and Barcelona, 1998, by Richard Wentworth (right)
Source: the author (left); and <https://www.pinterest.com/pin/510525307729986953/> (right)

A common type of Eureka moment involves the discovery that something physically fits. The photograph on the left shows a solution to a requirement to complete the corners of the pod. The rigid foam insulation that was lying around on site, as off-cuts for the build of the main house, was exactly the right thickness to fill a gap in the corner junction of the walls and roof. The delight at ‘finding that something that fits’ has been observed and commented on by Richard Wentworth (Wentworth & Dezeuze, 2005).

The right-hand photograph shows the insertion of a battered traffic cone in the space left by a missing hexagonal tile (to a design by Antoni Gaudi), thus alerting passersby and simultaneously militating against what would otherwise be a trip hazard on a busy Barcelona street. Dezeuze discusses Wentworth’s response to just such a situation thus:

‘Discovering that things fit’, he muses, can lead to a ‘rather sexual’ kind of pleasure – is this the fiddler’s kairos of desire? This pleasure is most evident in the Making Do, Getting By photographs that visualise the perfect conjunction of cumulative memory and occasion: a used pencil casually slipped into a ring to replace the lost metal bar required to close a box, a found traffic cone that fits perfectly – if incongruously – into the hexagonal space of a missing tile... Through a conjunction of chance and practical intelligence, the bright orange cone suddenly presents itself like the missing piece of a puzzle – a sudden moment of discovery, a victory of the metis.

(Dezeuze, 2013b)

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The review of literature about making do identified the combined wisdom and cunning of metis, and an ability to capitalise on the kairos, the opportune moment, as key aspects of making do. The two are closely related since, as Joanne Lee writes, 'chance favours the prepared mind rather than the passive one' (Lee, 2010). Wentworth makes a similar point in when talking about his experience at art school as seeing 'how much luck we could make' (Wentworth & Dezeuze, 2005).

An example of my alertness to an opportune moment from the case studies is when I found the self-adhesive vinyl floor tiles in the barn at UI. Prior to this, I already had a clear idea of the material properties I was looking for in the side cladding and roof of the pod. These included the requirements that it be completely waterproof and easily handled and worked, and that it adhere easily to the OSB face of the SIPs. I had imagined that it would be some kind of plastic or rubber membrane. The DPM polythene, which had been used for expediency, was a difficult material to work with and did not fit the material qualities I had in mind. When I saw the box of self-adhesive vinyl tiles in the barn I had the sense that the problem had come one step closer to being resolved. When I took a tile, peeled off the backing and wrapped it around the corner detail I had created on the pod, its foldable and stickable qualities confirmed to me what I was looking for. However, I knew that this was only a partial answer. The discovery of the tiles did not provide a complete solution. For example using such tiles would not have been within the extremely limited budget, and I had no idea how the material would perform in extremes of weather and temperature. However, the discovery did get me past a specific impasse in the process of developing a design strategy for the folded cladding for the pod, and for similar future designs.

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When I decided to use self-adhesive signage vinyl to clad the sides and roof of the pod, I knew that this was not one of the applications that it is designed for, so I was aware that I was taking a risk. When Lisa asked me about the expected performance of the vinyl, I had to reply that I did not know, because it was an experiment. Prior to the first day of fixing the vinyl, I had imagined in my mind how the process would work in detail; how I would progressively adhere the vinyl to the OSB, by peeling off the backing paper section by section. During very first moments of applying the first roll, I recall experiencing a degree of anxiety about whether the experiment would be a total failure. However, although some of the technique needed to be adapted slightly in response to unexpected behaviours of the material, the installation happened largely as I had envisaged it.

Eventually, of course, the vinyl did fail. Monomeric vinyl, which I had used, is made using rollers to flatten the molten material to the thickness required. The monomers are mechanically spread out, but they remain attracted to each other. If the material is repeatedly heated and cooled, the sheets try to return to their original form and so contract and crack. The south facing roof was subject to direct sunlight, so subjecting the vinyl to extreme temperatures, and it eventually fractured to a degree that patch repairs could not deal with. The process of dealing with the failure of the material was therefore one of learning and discovery. It was informed by observation of the behaviour of the material over time, and this first hand experience provided a context in which to place ongoing online research about the material and the manufacturing processes that influence its performance.

I did not see the failure of the material as a failure of the experiment. The result of the experiment was a failure of the material, but this was instructive in itself, and the slow rate of failure allowed the short term goal, the creation of a watertight space for habitation, to be achieved for as long as it was required. Meanwhile the understanding of the nature and geometries involved in sheet roofing that was acquired while fixing and then repairing the vinyl contributed to my long term goal, which was to develop a design strategy for using a waterproof layer to wrap across different planes that form the walls and roof. The vinyl acted as an economical opportunity for testing design ideas, and so allowing a better understanding of the issues likely to affect the future use of the material that was finally chosen.

If one looks at the process of looking for a roofing and cladding material solely in terms of meeting the specific need of keeping the rain off the pod it seems unnecessarily protracted. However, viewed as an ongoing experiment that is intended to inform my future design choices, it then takes on a different value. The division of roles in the construction industry means that architects are expected to make materials choices without having first hand experience of working them. The experience of experimenting with unusual materials in situations of low risk helped me develop understanding of the different qualities of different materials, which in turn will inform my design decisions in the future.

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Once the pod had been moved to BQ, I found myself settling into a pattern of short but regular return visits to set about adapting it to the new layout. Without the pressure of needing to keep a habited space dry, I could enjoy the process more. Joanna Lee has written that she wishes artists would ‘remember the confidence to use what they find and to fiddle with it’ (Lee, 2010), and Ingold advocates the kind of experiment where ‘you try things out and see what happens’ (Ingold, 2013: 7). However, this is not generally the type of approach that would work for the practicing architect with paying clients. The small scale ad hoc self-builds that I engaged in during this research project were therefore a welcome opportunity to experiment, and provided a different perspective to the process of building to the linear models of conventional construction.

Flow

It became clear early on in the fieldwork that in settings where making do is common, materials and objects have a habit of changing roles and locations as they lose their original function or new uses are found for them simply to meet a need. The ebb and flow of objects around a site meant that it was often not possible to make a clear distinction between processes of construction and use.

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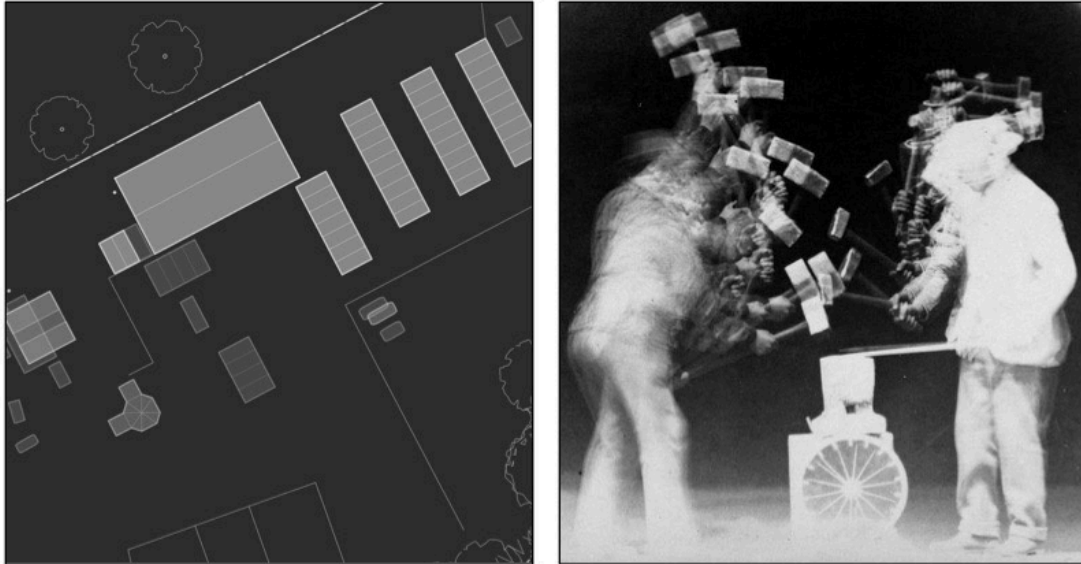


Fig. 7.23 Detail of compressed time site plan of BQ (left) and 'Blacksmith and striker', 1894, by Étienne-Jules Marey (right) | Source: <http://swansinsky.tumblr.com/post/132335040780/magictransistor-etienne-jules-marey> (right)

The left hand image, a detail of the compressed site time plan of BQ, has been paired with Marey's 'Blacksmith and striker'. The constant changes that BQ underwent demonstrated the flexibility of boxes and ad hoc structures to adapt to changing uses. This was also facilitated by the nature of the site itself, which is open and flat. The more temporary structures are shown as fainter than more permanent ones, dependent on the amount of time they were there, but they do not show the sequence in which the features came and went. Similarly, Marey's image does not reveal sequence.

Whilst withholding information about sequence, both images reveal something more profound about the nature of dynamic processes. Objects, structures and occupants come and go and always will. Buildings are built, but they also fall apart, or are intentionally taken apart or removed. Sometimes such activities follow cycles such as the seasons, but sometimes changes are erratic and unpredictable. The merged time site plans say something about change in a similar way that Marey's photograph of the smiths show movement. The lack of appreciable change in some parts of the site plans is an important part of the picture, just as the steady unmoving feet in Marey's photograph is suggestive of the focus of the smiths on the task in hand.

William Rasch defines of contingency as 'quite simply, the fact that things could be otherwise than they are' (Rasch, 2000: 52). Where substantial effort has been made to follow through on a decision, then in this context, this definition would need to be read as 'things might have been otherwise than they are'. However, the use of boxes that can be moved and ad hoc structures

that can be taken down and rebuilt differently means that things can be otherwise than they are. Much residential development in rural Wales is conceived as static, finished designs, and sit very uncomfortably in their contexts. The development patterns of LID, on the other hand, often look contingent and unresolved, especially during their early stages. However, the principles of permaculture that encourage interaction with context, combined with initially provisional site setups, allow a process of adaptation over time that is not possible with conventional approaches to development.

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The processes involved in food growing provide a useful analogy for the processes of ad hoc self-build that I experienced and observed during the case studies. When we started working the vegetable beds at UI, initially the progress was obvious. A corner of a grass field was transformed with the digging of four rectangular beds, and these then became populated with stakes, mesh and seedlings. However, the weather and pests soon stopped progress in its tracks. In the polytunnel at HM, the food growing was far more successful, but there were still plenty of factors that would set progress back on individual crops. Similarly, the self-builds that I was involved in did not often develop smoothly. The analogy is also useful when considering when things went to plan. With food growing, crops are harvested, and beds resown with new crops. Daily and seasonal cycles impose regular rhythm on the process. The weather, meanwhile, needs to provide a mix of conditions, including rain and sun but these change unpredictably. I recognised similar patterns to these with the build processes. For example the plan for the pod was always that it change role after it was no longer needed at UI. For this to happen, it had to be stripped back before being put back together differently. Sometimes plans changed and structures were adapted to suit. All the while, objects and materials flowed around sites and from site to site, performing different roles as they went.

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The nature of the architect's role in building projects leads them to experience the design and build process in a linear way with a defined beginning and an end to the project. At the beginning, the client provides the architect with a brief, the vision of where they want to end up. Then the architect develops the design through concept to detailed design, and then the contractor takes on the architect's design and delivers the completed project to the client. Various television programmes about domestic building projects reinforce this idea of a building project as a story. Despite being artificial constructs, the structuring of a project with a clear sequence can be helpful, especially in defining the roles of the different parties involved and expected outcomes. However, it can also be limiting. Needs and personal situations can change, and too much focus on the project goals can prevent the motivations for these goals from being questioned and tested. The ad hoc self-builds I was involved were far from perfect, but lack of imposed boundaries between processes of build and use meant that immediate needs could be met. The rotary clothes dryer was relocated into the polytunnel at HM the moment the cover was on. The pod at UI was occupied the moment the windows were in. The fact that things were never seemingly finished would be unacceptable to many, but I found that by accepting this ongoing state of flux, such instability and lack of permanence became an opportunity, not a threat.

8. Conclusion

8.1 Introduction

This study set out to gain understanding of the processes of making do in the context of ad hoc self-builds. The motivation for this is based on a concern that current models of best practice do not sufficiently take into account the effect that resource constraints have on building processes. With the introduction of One Planet Development planning policy, Wales now has the opportunity to develop this radical alternative vision for a more resilient future. The policy represents a rare opportunity for those wishing to follow a land-based model of living, while also requiring an ecological footprint analysis to quantify the environmental impact of such projects. The land management of LID differs significantly from conventional farming, as intelligent substitutes for the energy and resource inputs needed for conventional farming need to be used. Following a slow start, the number of OPD applications being made and approved is increasing steadily, and there is a growing pool of literature recording and analysing these pioneer projects (Thorpe, 2015).

A fundamental principle of One Planet living is the need to make do with one's fair share of the world's resources. While the efficacy of the Ecological Footprint Analysis as a tool to achieve this is debatable, the need for individuals and communities to live within their means is not. However, for those who have spent the majority of their lives immersed in a consumer society, a successful transition to a One Planet life requires the acquisition of a new set of skills, including that of making do. This study has therefore been carried out to try to gain an ontological understanding of the nature of making do, so that transferable knowledge can be shared with others wishing to reduce their resource consumption for the sake of their own security and resilience, and those of future generations.

8.2 Summary of research carried out

Three different methods of knowledge gathering were carried out in parallel over the period of the study. These were: review of literature, direct observation case studies and participant observation case studies. The literature that was reviewed covered three main areas: the global and local conditions and trends that are affecting or are likely to affect the need and ability of communities and individuals to meet their basic human needs; the One Planet Development policy in Wales, its history and its relationship to low impact development and permaculture; and the processes of making do, its relationship to ad hoc building processes and the ways that homes are made in limited resources. The direct observation case studies, which were of seven LIDs/OPDs, were required to provide an understanding of the realities of OPD that the literature did not adequately provide. Finally, I engaged in self-build and related activities that involved ad hoc processes of making do at four participant observation case studies. The initial knowledge that was gained was a combination of knowledge by description and knowledge by acquaintance (Russell, 1911). The literature review providing the former and the case studies providing the latter. Both types of case study were recorded using photography.

Using a methodology that combines grounded theory with an art of enquiry, inspired by the creative processes that are inherent to making do, the experiences of observer participation were ordered, processed and evaluated. Tim Ingold, provided particular inspiration for such an approach, which recognises the importance of the researcher's active participation in the processes that are the subject of study (Ingold, 2013), and recognises the value of processes that allow the research material to influence the structure of research. The photographic record of the case studies was referred to and a range of different methods was used to draw out understanding from them. They were combined into time sequences and grouped into typologies, following precedents from the history of fine art and documentary photography. Site plans were prepared of the participant observation case study sites. Since this study focuses on processes, methods needed to be found that allowed drawings to communicate changes over time, and the methods used for this were inspired by photographic precedents.

The final stage of the research involved sifting through the experiences gained during the participant observation and grouping them into themes. Individual photographs of these case studies were paired with either those of the direct observation case studies of OPD and LID sites or with images from other sources. This was done in order to reveal connections and characteristics of the processes of making do. The way such pairings then opened up new lines of enquiry, in the same way that artists often set up processes with the intention of generating happy accidents that can lead to unexpected discoveries.

8.3 Summary of findings

The analysis has provided a broad ranging understanding of the processes of making do, based on first-hand experiences of self-build and related activities. Sorting these into separate themes, and relating them to the literature and to observations made of LID and OPD sites allowed my experiences as participant observer to be set in a wider context. Ten broad themes were identified, though these are to be accepted as contingent and are used solely for the pragmatic purposes of providing a communicable structure to the understanding gained. These categories and the knowledge gained in relation to them are presented below:

- *Making plans*: Although ad hoc self-builds were found to differ from the linear models of conventional architectural design, they still involved a significant degree of forward planning, both at the outset and then at certain points during the process. A number of substitutes for traditional architectural drawings were used, and these were effective at addressing design questions quickly and efficiently when either an unforeseen constraint forced a change in plan or an unexpected opportunity presented itself.

- *Improvisation in making do*: the processes of improvisation during self-build were found to involve highly complex thought processes that combined rational and instinctive awareness. Consideration of the way the mind and body interact with tools and materials, often making split-second decisions revealed the difficulty in defining design processes as linear and based on rational thinking. In reality, making do is closer to the creative processes of the artist or craftsman than to the linear models common in the architectural profession.

- *The influence of the natural world on self-build processes*: The natural world was found to impose itself on the self-builder in a way that theoretical knowledge did not provide adequate preparation for. Knowledge by acquaintance needed to be acquired, to complement knowledge by description. Although the process of learning first-hand of the force of nature was often an uncomfortable one, it was necessary to improve the self-builder's subsequent techniques of making do.

- *Appropriation*: The research established the appropriation of objects, spaces and building elements as a fundamental characteristic of making do. Different attitudes to evidence of such processes are telling of conflicting world views. Such appropriation can be seen as enjoyable examples of creativity and innovation or as threatening challenges to established notions of propriety. These opposing expectations of the role of categories and systems of classification are deeply cultural, and therefore they cannot be easily reconciled.

- *Adapted boxes*: The use of adapted caravans or containers of various types is another example of appropriation which is prevalent in LIDs and OPDs. The experience of participation observation has demonstrated why this typology is common, as they are economical and the fact that they are mobile allows site setups to adapt to changing pattern of use. The fact that they are often inadequate for intensive habitation explains why they are so often adapted in various ways. Such occupied boxes are challenging to the expectations of outside observers for the same reasons as other form of appropriation, as discussed above.

- *Ways of learning*: Researcher participation in ad hoc build processes established that learning by telling can be an important supplement to learning by doing but cannot be a substitute for it. Since the self-builder inevitably starts from a position of inexperience, initial outcomes are often going to be inadequate or involve outright failure. Attitudes to failure are key in deciding

whether the amateur will persist, and learn by their mistakes, or be disheartened and abandon the process. However, if the need to be met is pressing then persistence will be the only option.

- *Modest materials*: It was found that economical materials are ubiquitous in situations where making do occurs. Their low cost allows experimentation that would not be feasible with more expensive materials, but their poor quality often means that they provide only short-term solutions. When circumstances do not allow their replacement with more permanent materials, the person making do needs to develop techniques that deal with the materials' progressive failure and allow needs to continue to be met.

- *Hoarding and sorting*: It was found during the case studies that as the aptitude for making do was developed over time, a tendency emerged for hoarding materials. Experience showed that this needed to be accompanied by a process of sorting both of materials and tools to facilitate the process of making do.

- *Opportunity and risk*: Chance played a pivotal role in the self-build case studies. The literature on making do discusses the role of happy accidents and the need for the person making do to be able to capitalise on them, but the case studies also revealed the importance of the ability to deal with cases of bad luck, or of making a virtue of a necessity.

- *Flow*: The processes of making do during the case studies were often found to be at odds with the linear models of progress of conventional construction. Sometimes builds regressed because of factors outside of the actors' control, but sometimes such processes were intentional. The constant reuse and recycling of materials and change of uses of different spaces allowed the occupants the flexibility to adapt to changing conditions.

8.4 Areas that would benefit from future research

Whilst there have been a number of studies of some of the high profile LID projects such as Lammas, such research often focuses on the aspects of these projects that make them exceptional. Although it is accepted that Lammas's role as an exemplar is important, this study started from the premise that modern conventional approaches to design and build are the exceptions, and that the iterative approach of LID and permaculture are far more typical of the way simple rural communities have built and operated throughout history. Despite the advent of global supply chains and the economies of scale that they entail, the art of making do is still alive in rural Wales and is not the preserve of any one social group. Given the resource scarcities that are expected in the coming decades, those who retain the skills and resilience to make do may be in a position to provide valuable wisdom to those who are currently dependent on a consumer economy. There are therefore opportunities for studies that look for historical precedents for LID and OPD in rural Wales, so that this growing model of rural development and land use can be understood as part of a much longer history than the context of post-sixties counterculture in which it has often been viewed.

Today's planning and building regulations are products of specific world views and expectations about society's future trajectories. For different reasons, both regulatory frameworks are acting as barriers to those trying to meet their own housing needs on limited means. Despite the fact that rural settings provide many of the means necessary for those with limited resources to provide for themselves, the prevailing planning orthodoxy is to strictly control development in the countryside. OPD policy is an exception to this, but itself makes the process of applying for an OPD very demanding. Meanwhile, the building regulations approved documents continue to expand in complexity, pushing up the designs costs of even the simplest custom-built home. There is therefore a need for further research into the impact of planning restrictions in rural areas and increasingly demanding building regulations and the viability of self-delivered housing.

This research has established that certain construction types are particularly popular with those involved in OPD, but the scope of the study has not extended to asking whether there are opportunities for designers to provide products that are more suited to people's needs. A study that seeks answers to this question would be beneficial both to potential suppliers and potential users of such products. The two typologies that merit particular attention are pods and polytunnels. The word pod is being used here to describe any micro-building that is deliverable as a volumetric unit, much like a caravan, but unhampered by some of the cultural associations, and designed to be a better fit for the specific needs of intensive all-season occupation, in particular with high levels of airtightness and insulation. This study has identified the need for an economically designed product based on the principles of 'long life, loose fit' that allows the purchaser to fit it out as they wish in a way that is appropriate to their budget. The other structure type that this study has identified as forming an important part of low cost and low impact living is the polytunnel. Poly tunnels are highly economical, and can be erected by those with limited building experience. They can also be put to a wide variety of uses other than the growing of food. There needs to be further research on their potential as mixed use spaces and their importance in low impact developments. Cultural attitudes to poly tunnels would need to be studied, as would their aesthetics, in order to establish why such a versatile building type is not more widely used. The possibility of combining poly tunnels with other types of space could also be explored.

The OPD planning policy in Wales is one of the few statutory instruments in the UK that enables a shift away from industrial scale monoculture-based agriculture to small-scale regenerative farming. The UN report, 'Wake up before it is too late' argues for such changes to the nature of land use on a global scale (United Nations Commission on Trade and Development, 2013). Meanwhile, cities are currently reliant on globalised supply chains and industrialised agriculture for their food. Understanding the changing relationships between urban and rural areas and their impact on the resilience of communities in both will be one of the great challenges of the coming years and the subject lies beyond the scope of any one study. However, there is an opportunity for a more focused study that looks at the potential role of OPDs in helping redefine relationships between cities and countryside. If, as the UN argues, societies have no choice but to adapt to small-scale regenerative farming, then OPD will need to grow from being a marginal planning policy to the preferred model of rural development and land use. For this to happen, new legislation will be required to facilitate accelerated adoption of OPD, and the creation of new models of land use that recognise the need for resilience to the 'nonlinear, social and ecological regime changes' of the Anthropocene age (Benson & Craig, 2014). In order for such legislation to be effective, it will need to draw on knowledge gained from research into the relationship between OPD as a planning policy and the actual lived experience.

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