



How architects
use research –
case studies from practice

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Foreword

What do architects understand research to be? How do architects use research? When and how do architects undertake research in their practices? What research knowledge do practising architects need? How does research bring value to architects' practices and their clients? How do architects connect with research from academic and other research organisations?

For practicing architects research can be a difficult concept to pin down and define. It is a term which can mean different things to different people, but what is clear is that research can be the intellectual fuel for the engine of innovation and growth for many businesses, including architects' practices.

This short investigative publication, commissioned by the RIBA, uses interviews and case studies to try to answer some of these key questions in relation to the nature of research in practice. We hope that it will inspire architects' practices to recognise the research they do in their day to day work, to actively support research activity and engagement as part of their business models, and to reap the benefits of the research knowledge available to them. It will also be invaluable in helping to shape the RIBA's own future research strategy, in particular as we assess progress against the ambitions set out in *Leading Architecture*¹ and start to develop our strategy from 2016 onwards.

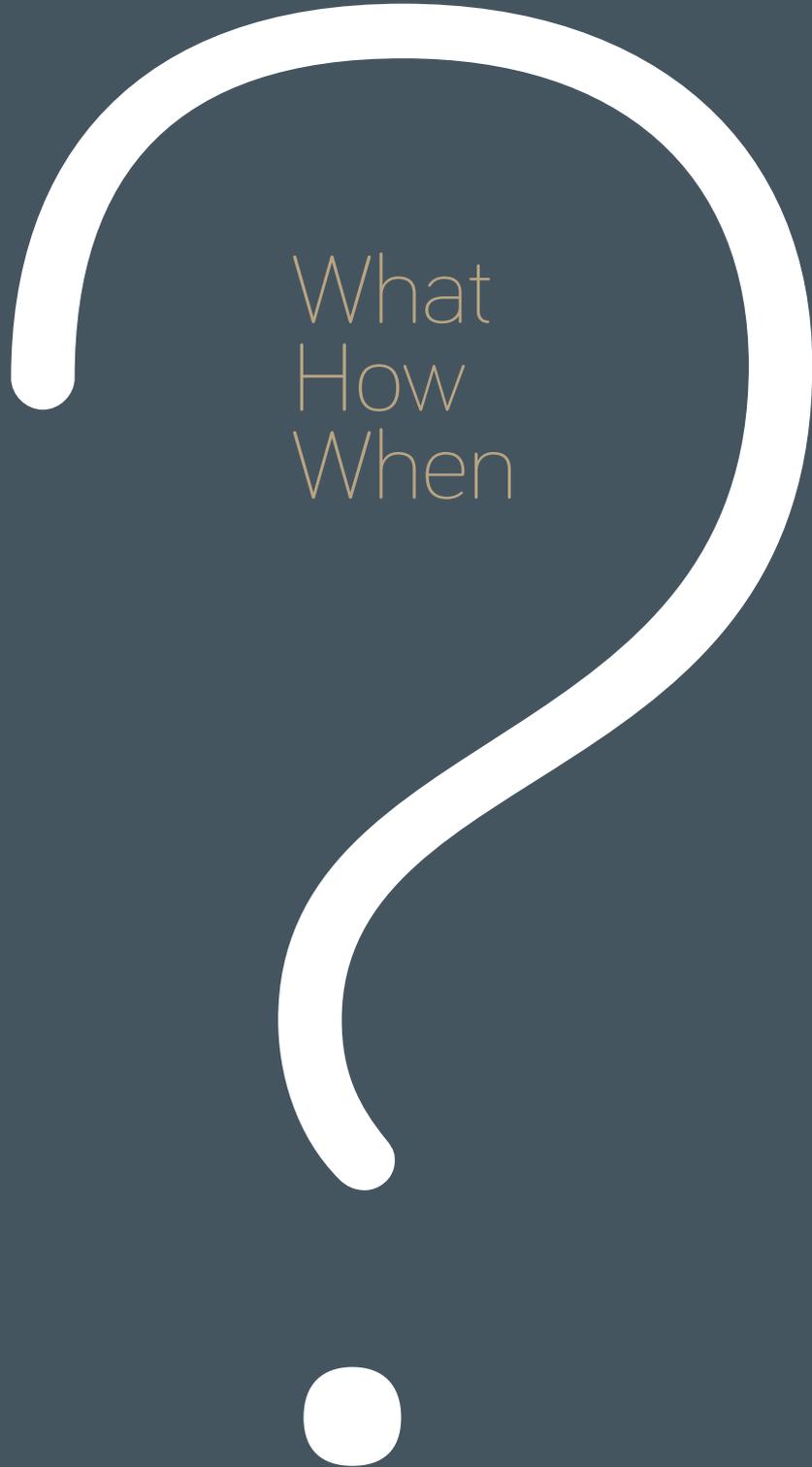


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¹RIBA (2012) *Leading Architecture: The RIBA's Strategy 2012-2016*, RIBA: London.
Available at: <<http://www.architecture.com/Files/RIBAProfessionalServices/RIBAStrategy2012-2016.pdf>> [Accessed 20 Aug. 2014]



Executive summary

This study uses interviews to develop a series of case studies and build up a picture of how architects in practice currently view research as a facet of their activities. By speaking to a range of different types and sizes of practice we have attempted to discover the various ways in which architects define, obtain, undertake and use research. We have also asked what benefits and advantages research knowledge brings to their business performance and quality of work, and to find out those areas of research in which they are most interested and engaged.

The study is a snapshot of research activity in practice, offering important insights into a sometimes under-appreciated and frequently misunderstood aspect of architectural practice. Our key findings are that:

- Architects' practices value research and consider it to be intrinsic to their work.
- Most practice based research is focused on the requirements of individual building projects.
- There is relatively little separately funded research activity in architects' practices and few practices access public research funds.
- Most research is technical/functional in nature; frequent areas of interest are environmental sustainability and energy efficiency, analysis of precedents, and research into materials, products and construction techniques.
- Post-occupancy evaluation is gradually emerging as an important research activity.
- Some practices use research in areas such as design theory, sociology and policy to develop their philosophical approach.
- Where broader research programmes are undertaken they tend to focus on developing sector expertise which enhances credibility and provides competitive advantage.

- Links to academic and other research organisations and knowledge bases are quite weak and where they do exist, are generally based on individual relationships.
- Practices recognise the potential for research as a separate practice activity forming part of a diversified service offer, but this has not yet been realised on a widespread basis.

All of these findings are discussed in more detail in the body of the report, but some further discussion is useful here.

We found that architects consider research to be an intrinsic part of the project work they undertake. This encompasses a range of aspects from understanding client needs, and evaluating project contexts, to assessing the performance characteristics of materials and building components. In fact most research in practices seems, perhaps not surprisingly, to be project focused. This project focused research includes investigation of environmental sustainability and energy efficiency, analysis of precedents, and research into materials, products and construction techniques. Post-occupancy evaluation (POE) is clearly emerging as an area of increasing interest and importance although, as we know from other studies, there remain a number of barriers to routine POE.

In practices whose portfolio of work is focused on a particular sector (or sectors) we found recognition of the value of specialist sector knowledge developed through broader research, not necessarily related to individual building projects, as a way of demonstrating expertise and differentiating themselves to competitive advantage in the market place. A specific research knowledge base both informs work in a specific sector and is a useful marketing tool.

We found that architects consider research to be an intrinsic part of the project work they undertake.

Whilst most of this broader practice- rather than project-orientated research was concentrated on technical and functional aspects, we did find examples of practice research which were more orientated towards design theory, sociological and policy matters. For some practices this was important in enabling them to develop a distinctive philosophy and demonstrate thought leadership.

Larger practices had more compelling examples of formal engagement with academic and research institutions, which went beyond teaching or individual research. In these larger practices there was an appreciation that research could be developed as a business service; part of a more diverse practice offer, which could broaden their market and generate new revenue streams. It is noteworthy that where practices were engaged with academic researchers this tended to be with individuals rather than at an institutional level.

There was only one practice which had received direct UK Government research funding.

Nonetheless the picture that emerges is one in which the role and value of research in a knowledge-based profession is recognised on a widespread basis, albeit with some practical barriers that stopped architects realising their aspirations. The project focused nature of architectural practice tends to mean that research is mainly undertaken in relation to individual building projects and is largely funded through marginal elements of project fees.

Overall, linkages to research organisations and research knowledge bases were often weak and ad hoc in nature. However, there is strong evidence of an increasing awareness of the potential role for research not just as part of project processes but as a distinct area of practice activity, potentially forming part of a diversified range of practice services.

Key themes

How architects understand research

Practicing architects can engage with research in a number of ways – with knowledge, process or resources – but the case study interviewees did not draw a clear distinction between these forms of research:

- Research knowledge – the subject of the research e.g. knowledge about sustainability principles and how they can be integrated, knowledge of which materials to use in a specific context.
- Research processes – ways of researching and finding knowledge e.g. a site review, a visit to an archive, an experiment in materials.
- Research resources – ways of accessing knowledge e.g. a journal article, the archive itself, blogs or websites.

Although this study was focused on the first two of these types, some overlap with the third – research resources – was unavoidable.

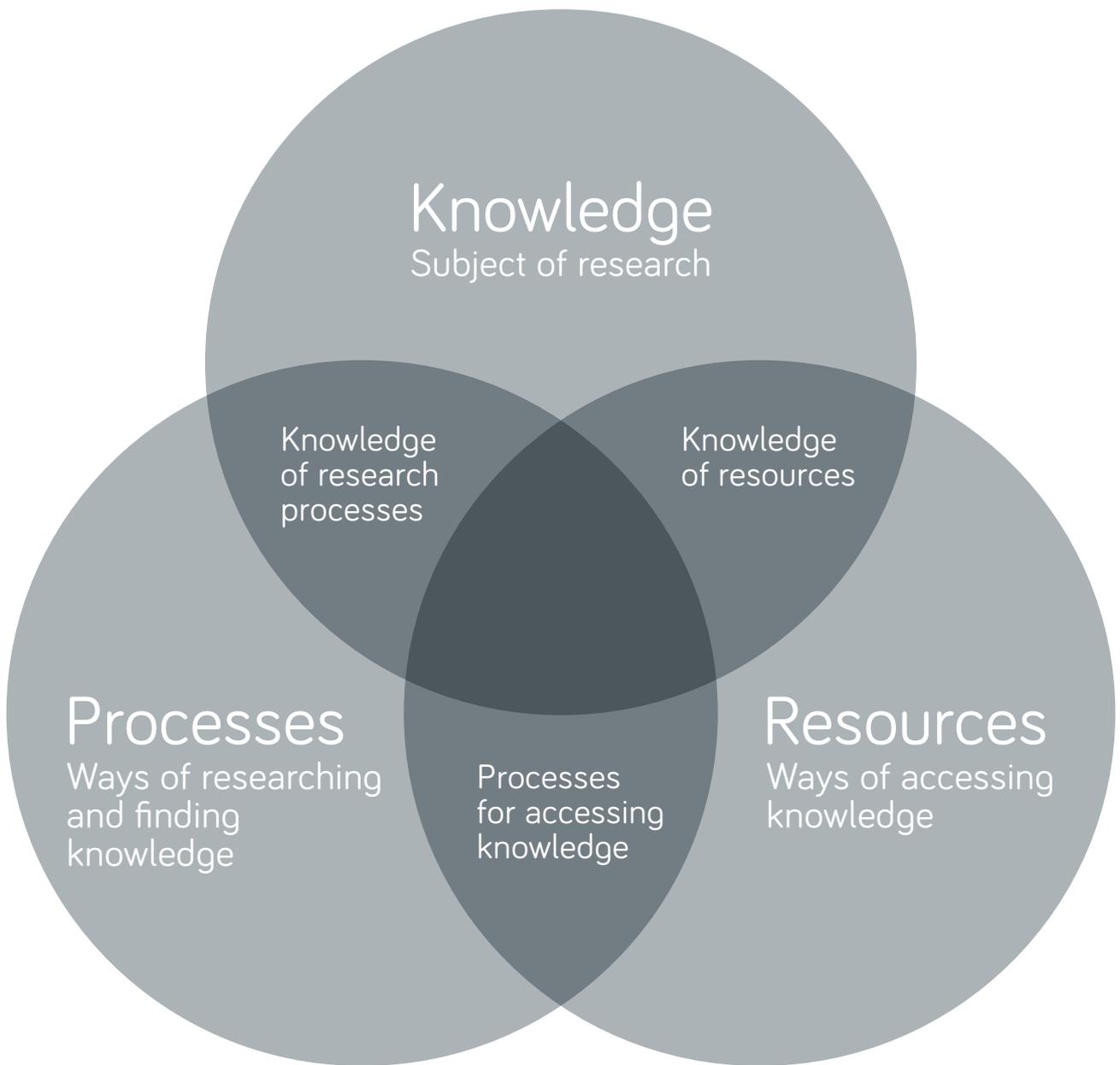


Figure 1
research and knowledge in architectural practice.
Source: BOP consulting

All the practices interviewed considered ‘research’ to be intrinsic to architectural practice. From the moment they receive a brief they initiate a series of research tasks in order to better understand the needs of the client and the context of the build. For some this is a highly structured approach, in others this is very loose and bespoke.

The move towards more structured research is part of a growing trend within the architectural community away from ‘core’ practice (designing buildings) towards using architects’ skills in other ways (such as generic design skills, communication, community engagement, project management, and some scientific skills). This can be seen as a move from “core” to “diverse” practice, mirroring changes in practice identified in the RIBA Building Futures publication *The Future for Architects*².

In very general terms (and recognising the limited sample of this work), this was viewed as a general trend or market movement away from “core” practice and “serendipitous research” towards a “diverse” practice and “structured” research. This is typified by PRP Architects, who have diversified their practice by entering new research and development areas; often these are highly technical and scientific. Interviewees attributed this to both market forces (the decline in traditional markets) and to the increasing technical requirements of current architectural practice, driven by the move towards sustainability – illustrated in **Figure 2**.

²RIBA Building Futures, (2010) *The Future for Architects?* [pdf]
Available at: <<http://www.buildingfutures.org.uk/projects/building-futures/the-future-for-architects/the-future-for-architects-report/>>
[Accessed 20 Aug. 2014]

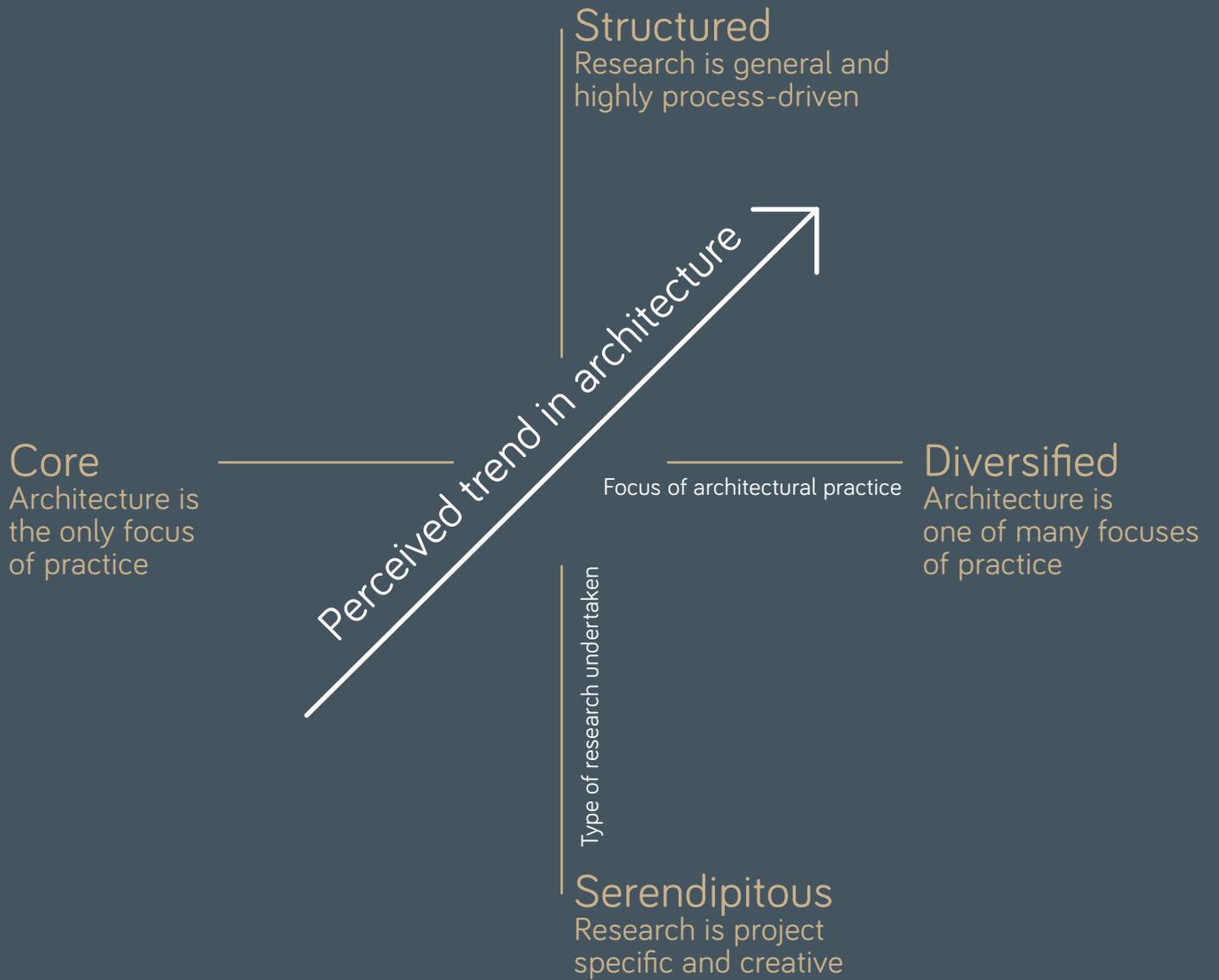


Figure 2
perceived trend in approach to research.
Source: BOP consulting

Drivers and constraints of research practice

Project-focused research

The client – and the brief they set – is the key driver and constraint for research activities. There was some suggestion that motivations for conducting research might also vary depending on size of practice; larger practices have capacity to conduct research outside of project time that is not necessarily client driven. For most, though, meeting client need was the main driver.

All the architects interviewed spent time researching the client, from understanding the motivations behind the project, to investigating the background of the client. This helps them to target their design concept at the right audience, helping them to be more successful at pitching ideas and winning work. For smaller practices, this is often the only type of research which they are able to dedicate research time to, whilst larger practices will allocate this activity to more junior architects. None of the practices reported that they had a structured approach to these client-related investigations.

The case studies show that architects frequently choose to become specialists in a particular sector. This is justified as being market driven or because the practice has particular experience in that field, and is often seen as a way to differentiate themselves in the market. The use of this tactic varies according to the size of the practice; sole practitioners generally do not have the capacity to conduct more than client-based research so it is often larger practices that are able to specialise in certain research fields. None of the architects interviewed identified themselves as having multiple research interests, citing the scope and magnitude of research exercises as being a factor limiting their research interests.

Of the architects interviewed, the majority focus their research activities on energy and sustainability.

All architects interviewed undertake research tasks, even if these sometimes were described rather as 'testing', 'experimentation' or 'innovation'; they viewed research as a separate activity that has dedicated time and resource allocation, going beyond the scope of usual architectural demands, both in social and environmental contexts. Research was also clearly seen as being different to 'development', which was viewed as the application of research-based knowledge.

Interviewees were also asked to review their research tasks against the RIBA Plan of Work.

Of the architects interviewed, none felt that their research activity sits easily within this framework; only client-based research tasks and post-occupancy evaluations were noted as fitting easily within it.

Figure 3 – research tasks by stage

In running a practice	In responding to a brief	In feasibility and design	Post-occupancy
<p>Comparisons of business data including salary rates and other business benchmarking data (supplied by the RIBA).</p> <p>Research to help differentiate a practice, and to give an ideological or theoretical standpoint.</p> <p>Market research (although this is unlikely to be formal or structured except for larger practices).</p>	<p>Research into the client and the context (mainly unstructured).</p> <p>Some theoretical or contextual research that may help to define a design response.</p>	<p>Context, planning and archival research.</p> <p>Research into materials, especially with a focus on sustainability.</p>	<p>Client survey and follow-up visit; informal and unstructured, or structured.</p>

Note that these tasks are not exhaustive, but rather are those identified by the interviewees.

Practice-focused research

Almost all the architects interviewed discussed specialist research interests of their own (potentially a result of sample selection – their willingness to be involved in the study being a reflection of their general interest in the subject). Alongside these, they also accommodate more traditional research activities, including maintaining a record of current building

regulations and standards, and conducting a site constraints survey. These activities are seen as what keeps the practice running and as an intrinsic aspect of an architect's knowledge and activity. Interviewees noted that newly-qualified architects had often failed to learn about this type of research at university, and that guidance from the RIBA on the subject would be welcome.

Knowledge exchange: internal and external

The case study practices recognised the value of sharing knowledge but found the process challenging. There were four ways in which they shared knowledge:

- 1 Internally, through formal briefings or sessions. Case study practices recognised that they needed to do more work in this area.
- 2 Within the sector, where the role of the RIBA was recognised as being highly important.
- 3 Within academia, where teaching roles were often about keeping people 'on their toes' rather than research. However there was limited evidence of practices learning from research academics directly, although Sofie Pelsmakers had done this very successfully by acting as the connection between architecture and academia herself.
- 4 Conversations across sectors were cited by almost all practices as playing a part in "serendipitous" knowledge sharing and searching for inspiration.

Regarding research skills, practices noted that those up to speed in current research practice might not yet be senior enough to use these skills in practice. There was therefore a gap in knowledge between senior architects who might not have up-to-date research skills, and junior architects who had the requisite training but were not given the opportunity to apply it.

Supporting research in practice

Interviewees identified numerous areas where they felt additional support would be beneficial with regards to access to research, or dissemination of research-based and other technical information.

These included:

- Helping architects to find, share or use research and research-based knowledge, such as best practice information.
- Information on the business benefits of research in practice, such as additional chargeable activities.
- Helping clients to realise the potential benefits that architectural research could bring to their project.
- Providing guidelines and a framework for post-occupancy evaluation.
- Clear technical guidance on emerging topics.
- Lists of contractors with experience in certain types of build processes.
- Verification/authentication of claims made by suppliers, especially regarding materials.

The RIBA already provides some of these services, for example through Business Benchmarking and the CPD Providers Network, and it could take on a greater role in delivering others. Some however would be better provided by other organisations, for example verification of manufacturers' claims is better addressed by organisations such as the British Board of Agrément.

Case studies

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Pierre Maré Architects

Pierre Maré's use of research focuses on understanding client need. Serendipity plays an important role.



As a small practice, there is little time for anything but delivering work for clients and so there are few resources for research. The main drivers for research are client focused:

- Understanding client need
- Client requests for new products and services

Almost all of the practice's research is project-based with the practice allocating set hours for client-based research at the start of each contract. As a sole practitioner, a lack of capacity stops research from becoming a more distinct and packaged part of the service that the practice offers.

Any research that is conducted outside of project-time tends to be either serendipitous or informal. Mobile apps like Evernote are used to record new products, techniques and contractors, before being added to a hard copy product catalogue. Research in this form is embedded into practice and daily life.

Post-occupancy evaluations are not a priority for the practice; there is a lack of standardised guidelines which would make this type of research more applicable for a wider audience (and therefore hold more value). Informal return visits to buildings are conducted when possible, with domestic clients being easier to survey than commercial clients. In the past, the practice has spent a week staying in a private house that it designed to help understand and appreciate how the design works in detail.

The practice

Pierre Maré Architects (PMA) – founded in 2007 – is run by Pierre Maré. Pierre is a sole practitioner, but the team expands where projects require additional resources.

The practice works on projects in the UK and internationally, in particular in the US. Pierre has experience of working on residential, commercial and master planning projects. He studied at the University of Cape Town (South Africa) and the London Metropolitan University. Prior to setting up his own practice, Pierre worked for Jamie Fobert Architects and Denton Corker Marshall.

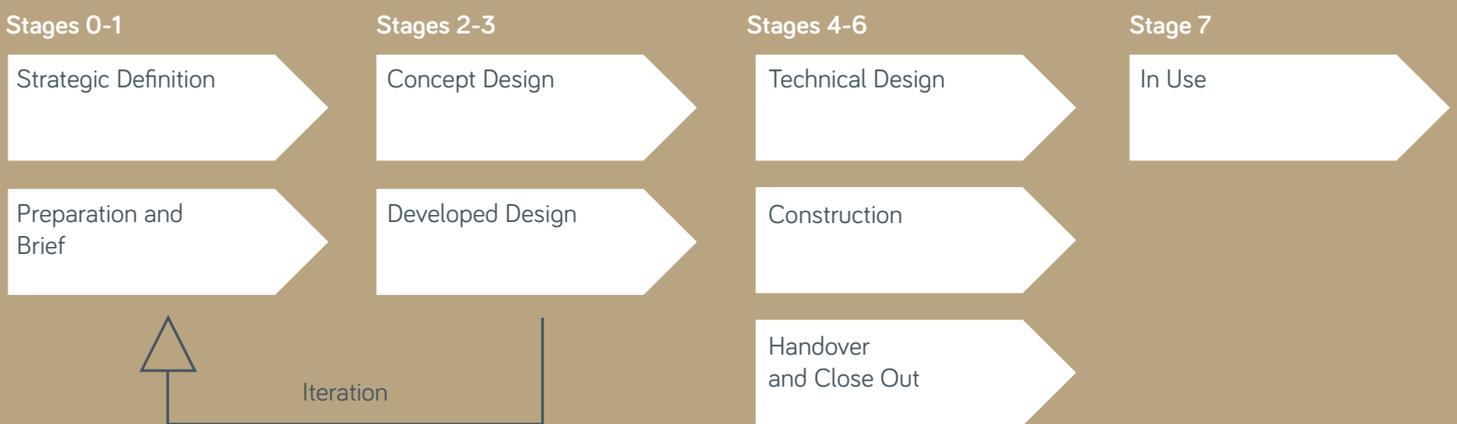
Recent work has included a master plan for the Methow Valley near Seattle, combining residential, commercial and recreational uses. The practice is currently involved in several residential alterations and refurbishments as well as a commercial kitchen and café in London.

Understanding research

The practice principal developed research skills and knowledge when working in larger practices, including an understanding in the need for rigour and diversity in research activity. Pierre's research activity is undertaken during project time; the working structure of the practice allocates set hours for research within a project budget. There is little capacity to conduct research outside these core activities and the practice would need to significantly increase in size if research were to become a separate service of the business.

As part of the response to a client, research is part of the everyday practice of PMA. The majority of research takes place in the initial stages of the project; from receiving the client brief to the point where the contractor becomes involved in the project. As seen in Figure 4, much of these early stages include iterative research, responding to the client comments and responses to initial ideas. Using the RIBA Plan of Work, for PMA the preparation and design stages are completely integrated; the client will normally start incurring costs after the initial research has been undertaken.

Figure 4
 Pierre Maré Architects' approach to research-based tasks within projects.
 Source: Pierre Maré and BOP Consulting



Research tasks

- | | | | |
|---|--|-------------------------------|---|
| <ol style="list-style-type: none"> 1. Understanding the client and brief 2. Planning and precedents | <ol style="list-style-type: none"> 1. Conceptualising the brief 2. Deciding on materials | <p>(No research activity)</p> | <ol style="list-style-type: none"> 1. Return to location 2. Follow-up survey to clients |
|---|--|-------------------------------|---|

Client driven research:

understanding a client's needs

The main research driver for Pierre Maré Architects is to understand the client need. A second and more nuanced driver comes from clients who will approach the practice regarding a particular product or technique that they are interested in applying to their own build, and which will require research-based knowledge in order to integrate them into the project. Both of these two drivers are client driven, sitting well within the traditional scope of an architect's role and activities.

Often the client isn't aware of the research involved in developing a concept and design. Once the technical drawings have been completed it is more difficult to stop and say to the client 'sorry the brief has changed' as it is not possible to go back and reconsider the design within the planned work budget.

An understanding of the client's needs is what underlines the majority of working practice. This type of research is intrinsic to the everyday functions of project-based work.

The style of each build is focused on what a client has requested – rather than a practice-based 'look' that is recognisable across the portfolio of commercial project-work.

The brief sets out the primary research drivers for activity to understand the client need, helping to outline the context and the objectives of the work. From here, PMA will build a picture of the client, including: who they are, what their motivations are, and an understanding of what they want.

Other research involves gathering information on the local area (planning applications, precedents etc.) and building a concept that fits within the brief. As a sole practitioner, Pierre works closely with all of the practice's clients over the period of the project, building a personal relationship.



Figure 5
North Bank Road, Methow Valley

Products and techniques

Sometimes, research requests come directly from clients, who want a particular product or techniques used in their building. The frequency of these requests is unpredictable, but they are welcome as it allows sole practitioners such as Pierre to allocate research time to a project: they would otherwise struggle to justify spending practice time on research. The research activities are informed by prior knowledge and experience; and benefit both future projects and future project-based research.

Detail –

a side extension to a residential property in Hackney

The challenge was not over-developing or over-designing the site. PMA noted that clients have a tendency to over-design which is not desirable when the intention is investment for re-sale.

Research activities undertaken:

- Research with the Planning Authority (Hackney) into previous precedents – what planning applications have been rejected and accepted.
- Design research: considering different layouts and determine what can be achieved, drawing on case studies.

Pierre spent approximately 10-15 hours designing the space, whilst two hours were carried out on preliminary research for the client.

The initial client brief outlined the inclusion of an en suite bathroom in the loft. After an initial design phase it was determined that the room was too small to accommodate this addition, and the brief had to change.

Informal and serendipitous research

Post-occupancy evaluation is treated with a degree of informality, with the approach varying between domestic and commercial clients. Domestic clients are more accessible, and so informal evaluations are easier to conduct once the build is complete.

When trying to undertake informal post-occupancy evaluation domestic clients can be more open to the process than commercial clients.

On occasion (depending on the project) follow-up surveys will be sent to corporate clients, but this depends on the project. Pierre Maré Architects learnt that visiting completed projects can generate new insights, one example being a residential project in the Methow Valley: in retrospect, the client and the architect agreed that the building should have been rotated on the site by a further 15°.

Sofie Pelsmakers

Sofie has a particular view on the research requirements of architects, in particular research into the performance gap – the gap between predicted performance of a building and that as-built.



Sofie Pelsmakers strongly believes that there need to be more systemised and robust processes to shape the research that is part of architects' everyday practice; there are few standardised guidelines to formalise data collection and encourage research practice. Sustainability – the focus of Sofie's research – is one of the most quantifiable and scientific fields of architecture, and she believes that many of the processes from this field could be applied to others.

She notes that environmental performance is just one area where there is a lack of detailed guidance on product specification, installation and commissioning. This may be responsible for a performance gap – that between the rated performance of construction products and their performance in use.

The architect

Sofie Pelsmakers is currently a doctoral research student at the UCL Energy Institute, she has worked as a senior lecturer in Environmental and Sustainable Design at the University of East London and is a cofounder of Architecture for Change, a not-for-profit environmental building and research organisation with an emphasis on practical advice to help clients and architects deliver environmentally friendly buildings.

In 2012 she published *The Environmental Design Pocketbook*, (RIBA Publishing, 2012) which was commended for its contribution to practice-based research. Sofie sits in an unusual position as both an academic and a practicing architect.

She believes that at present, the majority of architects see the sole purpose of research as informing project work and practice efficiency. If architects were able to see how their research could have cross-sector impact, architectural research would improve and strengthen.

Understanding research

Sofie's research background is strongly influenced by academic practice, and she has spent time reflecting on how architects use research in their everyday practice.

This perspective is slightly tangential to other architects interviewed, who often were unable to dedicate time and resources to research outside of project time.

Research “is just part of the job.”

Sofie recognises that practices undertake research intrinsically in their everyday activity, though they may not regard this as research, but she does not consider talking to clients to be research. She feels architects should be encouraged to see a distinction, and more importantly a value, in challenging the status quo of conducting project-based research. Sofie believes that changing the current approach of research in practice would enable specific project based research to become meaningful and useful to the rest of industry. For her, this process of change is centred on three main areas: transparency, standardisation (or systemisation) and access.

Transparency

Sofie notes there is a 'performance gap' between the capabilities of a product or building and its actual output or performance, and believes that architects are too trusting of product specifications as well as lacking the capacity to investigate and conduct their own tests; they never go to the primary source. Traditionally architects are recognised for their ability to be inquisitive and generate original, creative designs and so are well placed to undertake research, but these skills need to be applied more thoughtfully to how they can investigate, record, evaluate data and share their findings.

She proposes that the increasing uptake of BIM software may offer a solution as architects may feel their decision making is more exposed, and in turn will be encouraged to question their own sources of information more thoroughly.

Sofie believes that transparency also extends to the dissemination of the individual practice's research findings and lessons learned to the wider industry. This is to ensure the entire industry benefits and delivers better buildings together.

Standardisation

Sofie notes that standardising and systemising research processes would help architects to address the performance gap.

In an academic sense, research methods need to be systemised, repeatable and comparable; in architectural practice they are currently too ad hoc, informal and non-comparable. In the long term, standardisation and systemisation of data collection on product and building performance would benefit architects and clients, as there would be:

- improved efficiency in selecting materials and products for clients; and
- less time spent chasing 'dead ends' for products.
- a feedback loop, ensuring we learn and disseminate knowledge gained to understand – and reduce – the performance gap, leading to better performing buildings.

Standardisation and systemisation would also add rigour to architectural practice, increasing architects' drive and competition between practices.

Part of the struggle is to be able to translate academic research into something that is meaningful and useful for architects. Current systems are not well suited to help academics disseminate their work amongst practices, nor are practices generally in a position to receive academic insights. Sofie is concerned that the skills gained by students whilst studying architecture are not being effectively applied in the workplace.

Research “is just part of the job”

Access

Beyond lacking capacity to conduct research, Sofie believes that architects are faced with barriers to accessing data on product performance and effective practice. Few practices have access to the academic journals which publish peer-reviewed scientific data on product performance and the monitoring of buildings. Most frequently architects are likely to access secondary industry literature, such as building regulations and planning policy documents (for example from the Construction Information Service).

Knowledge about the relationship between energy performance and building design is constantly developing, though in many cases there are currently no precedents or research-based guidelines available to practices. In order to gain insights – and to be able to apply them – architects need to engage directly where those insights are being generated, in this case primarily within academic institutions.

Sofie's *Environmental Design Pocketbook* attempts to bridge the knowledge gap between academia and industry by translating useful academic research into an industry publication, as will a future publication for 2016. Sofie believes that if more architects and construction industry professionals see the value of residing in both worlds, the construction industry will have a better opportunity to understand and reduce the performance gap.

Axis Design Architects

Axis Design use research to develop their practice around Passivhaus methods, helping build a new business stream and distinguishing them from their competitors.



The two main subjects for Axis Design's specialist research:

- a Social housing
- b Sustainability and Passivhaus

The practice's clients are mainly social housing providers, and are often risk averse and unwilling to try new products and services. By building a network with suppliers they are able to test new products in-house before taking them to clients. By showing a commitment to Passivhaus, they were able to introduce its principles to their designs. This took three years of research into the field of Passivhaus, culminating in a seminar with potential and existing clients and suppliers.

Other areas of research tend to get wrapped up in project time including site constraints mapping, BIM and CPD. This research is generally carried out by junior architects who are also expected to provide up-to-date information on building regulations and standards.

The practice

Axis Design undertake two types of research projects: specialised research and everyday project- and practice-based research.

Understanding research

The practice's specialised research presents the practice to clients as leading specialists, and acts as a marketing tool. This has become a more important part of their practice since their involvement with sustainable design and Passivhaus movements (the last 3 years).

When it comes to everyday project- and practice-based research (which includes updating records of building regulations, standards and working best practice) research tasks are undertaken by project architects and other practice staff, while the specialised research primarily involves practice directors.

In the past, their close relationship with the social housing sector has meant that research needs to go beyond everyday project work as it may fit with the wider political agenda; specifically on the welfare state and housing.

Online you
quickly find
shared interests,
links and access
to latest papers
and thinking

Detail – Passivhaus – a research specialism

For over 3 years, Axis Design have been involved in the discussion around Passivhaus design and build, promoting the use of Passivhaus methods. The practice first came across the concept of Passivhaus through online connections and trade magazines which has led to the practice actively undertaking its largest research programme to date, including attending conferences and joining in the wider debate; particularly on social media platforms. Building up the research specialism on the subject has involved in-depth conversations with manufacturers, in order to offer clients a more thorough presentation of the services available.

A submission to a BRE competition meant that time spent compiling a report could be used as a standalone piece of research, presentable to clients. Without the competition they would have found it difficult to justify spending time on the subject.

The culmination of this research was a seminar on Passivhaus, given to their clients (local authorities and social housing organisations) with the invitation extended to the supply chain.

Axis Design Architects see the outputs of this research activity as a powerful marketing tool, placing them as leaders in Passivhaus and social housing and showing them to be dedicated and committed to the field.

Online and social media as a way to get an informed understanding

Axis Design are heavily involved in online social networks, in particular using Twitter to engage with other architects, suppliers and contractors. The benefits of involving themselves in this dynamic environment are:

- Engaging with the leading thinkers in a particular field.
- Allowing them to punch above their weight.
- Engaging in wider political debates.

“Online you quickly find shared interests, links and access to latest papers and thinking.”

By generating an online identity, Axis Design are able to access the leading thinkers in their particular research field. They do not have strong collaborative links to other academic institutions so social media platforms allow them to engage with this otherwise distant network of researchers.

Building relationships with suppliers to collaborate on research

Axis Design's relationship with suppliers gives a research mechanism to help test new products and services. In the sustainability sector it is seen as difficult at first to determine what products are likely to perform according to the manufacturer's specifications, which is why they have collaborated with suppliers to test performance.

“The sustainability sector in particular is becoming increasingly complicated, and full of green wash. As an architect I think it’s extremely difficult to have an informed opinion on product choice.”

Research for Axis Design is not just about time, but about having access to the physical resources and products to test. Building a relationship with the supply chain allows them to build sample panels to refine the design and related construction techniques. This is a service that smaller practices generally struggle to offer to clients, or to gain access to themselves. Engaging with supplier networks has improved learning and research throughout the practice, and also improved client relationships as they are provided with more detailed and specific information about the actual performance of a product.

“By demonstrating commitment and enthusiasm to the supply chain I get their support in return.”

Figure 6

Research subjects and methods at Axis Design

	Sustainability and energy performance	Social housing	Source
Passivhaus – products and methods	✓		Social media networks, trade magazines, suppliers
Recent standards and guidelines	✓	✓	Online
Attending conferences and seminars	✓	✓	Conferences, seminars
BIM	✓	✓	In-house training and CPD
Site constraints plan	✓	✓	In-house, online resources

The social housing sector

The social housing sector has specific design needs; Axis Design note that the sector need to offer affordable, functional accommodation with limited creative ‘design’ elements, built within a tight budget. These clients, often local housing associations, have an existing set of suppliers who they use for materials and there can be little room to bring in new products. This limits the scope for offering additional services and does not encourage ‘blue-sky’ thinking in relation to problem-solving and research.

“Because we do a lot of work for local authorities, they have set specifications of materials and products that they use. As we’ve worked with the same clients time and time again you just know the set list of suppliers you normally go to.”

Part of Axis Design’s research in this sector is keeping up to date with spatial standards and lifetime standards requirements, including adhering to housing quality indicators.

Building Information Modelling

Axis Design have undertaken BIM training over the last few years. This has helped them to streamline customer interaction and improve efficiency within their own practice. Currently they use BIM in client meetings as a demonstrative tool, to help them showcase designs or concepts. Each architect has a responsibility to research BIM and its applications. Research in this area includes:

- How BIM will help them to manage their drawing formats and protocols.
- Which British Standards are applicable to BIM.
- Comparative analysis – how other practices and organisations are using BIM.
- Which BIM procedures best suit their practice.

As a growing sector of industry, they anticipate a need to dedicate time to understanding BIM procedures over the coming years and more research time will need to go into this.

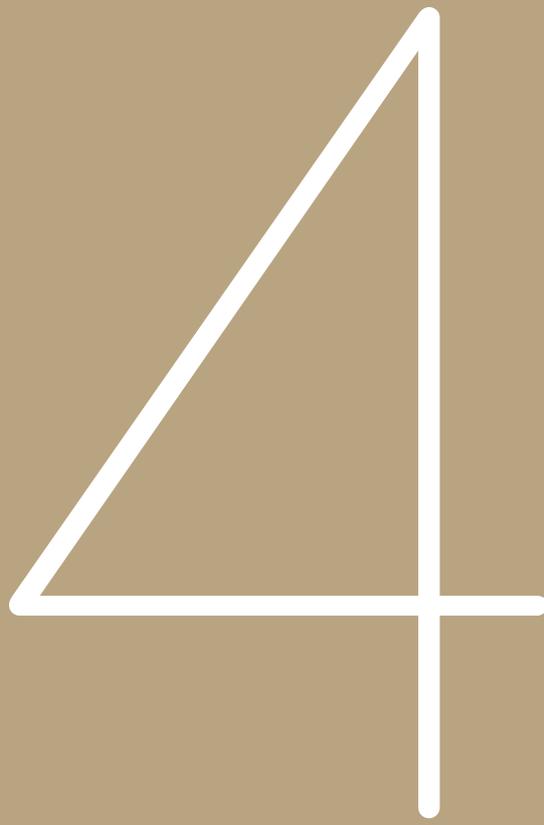
Project-based and practice management research

Junior architects carry out the majority of the practice's everyday research-based activity. Once a project has been commissioned, a series of research tasks will be undertaken to build up a picture of the brief, resulting in a 'site constraints plan'. The site constraints plan includes:

- Details of the demographics of the area.
- Aerial photography.
- Topographic maps.
- Details of utilities and existing services (usually this is commissioned as a separate piece of work).
- A note of relevant building regulations and standards.
- Details of previous planning applications and precedents.

Avery Associates Architects

Avery Associates Architects have a structured process for research that tries to look beyond immediate practical use.



This is based on the practice's experience and knowledge, but is also a result of the projects it has been commissioned to design.

As is the case with most practices, Avery Associates Architects' research work on a new project will be primarily driven by the client. The practice is motivated by a desire to gain an understanding of the client in order to define (and meet) a project's aims.

Once this initial work is completed, Avery Associates Architects' research is concerned with developing a thorough understanding of a building's holistic integration into its surroundings. In practical terms, research is also driven by contextual considerations about the site, the environment, the building's users, its materials and expression.

The practice

Avery Associates Architects was founded in 1978 by Bryan Avery, a London-based architect who studied architecture at Leicester College of Art (now De Montfort University) and at Essex University. The practice has been involved in a large range of projects ranging from acclaimed cultural buildings – such as the Museum of Moving Image in London and the BFI London IMAX – to offices and educational buildings. The practice was named the winner of the Open Award for Technical Excellence in Architectural Technology 2012 for its Repton School New Theatre in Derbyshire.

Under Dalibor Veseley and Joseph Rykwert, Bryan Avery was a student of phenomenology, the philosophical discipline that studies subjective experience, and this has had a strong impact on the practice and its approach to research.

Understanding research

Research is viewed as intrinsic to the practice with “contextual integration” forming the bulk of activity; including an understanding of the ground rules that can be established for a specific project, and will lead its design process.

The research integration process is highly structured. When starting a new project, the practice moves through a checklist of research tasks, which Bryan calls the seven Cs – Constraint, Contiguity, Content, Climate, Construction, Choreography and Concinnity (referring to a harmony of parts). This establishes the parameters of each project.

Their understanding of research does not only cover the technical aspects of projects but is also strongly linked to their aesthetic, moral and philosophical aspects. This is viewed as being particularly true for the non-commercial projects that the practice takes on.

Defining project constraints

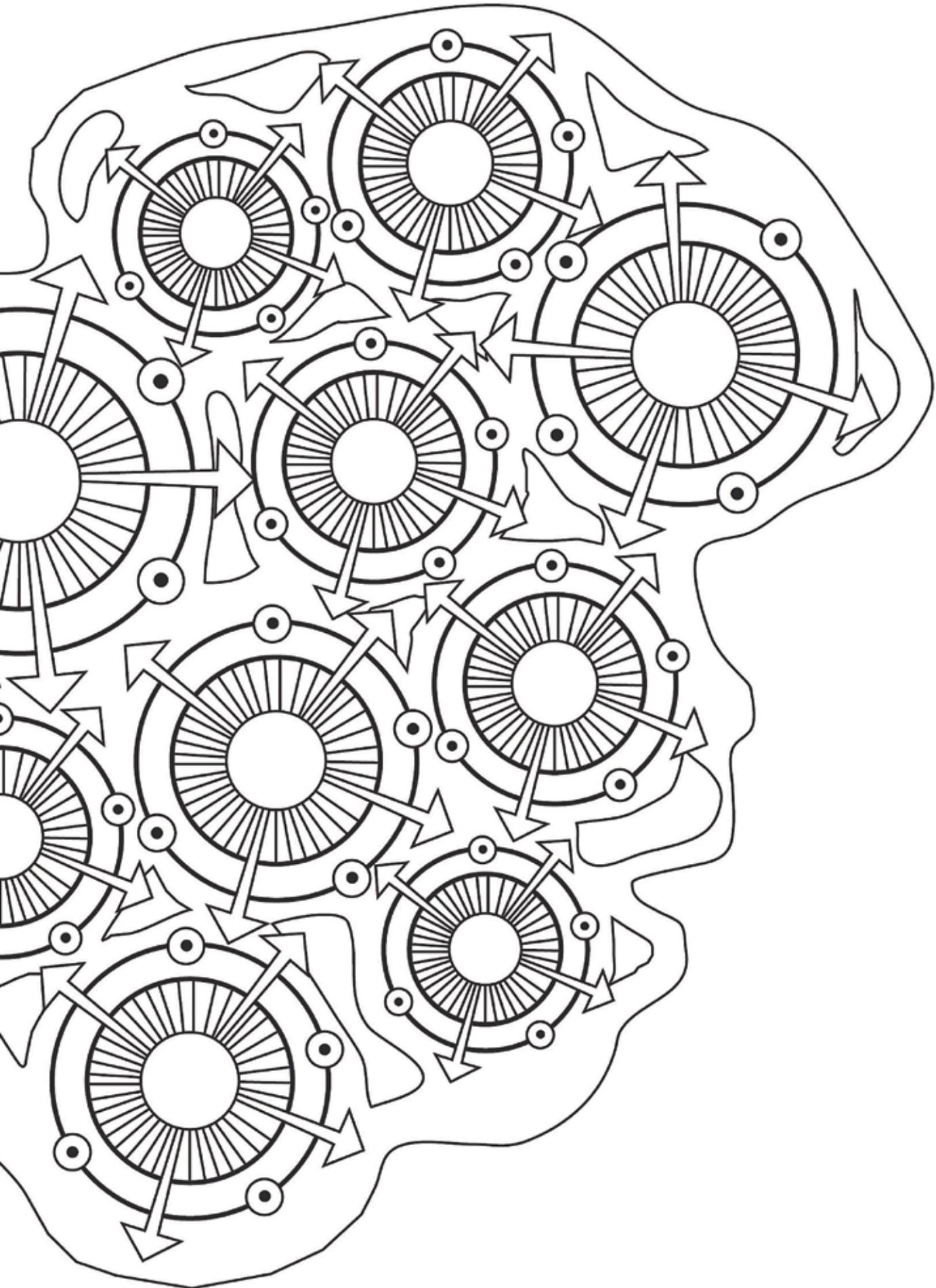
For any new project Avery Associates Architects look at the site and establishes its constraints; the ground rules that will define the project. This phase of the research will determine the building's character, most especially the project's ambition, and "whether your client wants the project to be the figure or the ground". Issues addressed include:

- Client need. Avery Associates Architects try, largely through interviews, to decipher the client and understand what constraints they may have in terms of their requirements, including level of ambition. In some rare cases, the client may be so ambitious that the architect has a totally free hand, but in most instances this is an important part in defining the project.
- History. The site is investigated through archival research and researching past precedents.
- Budgetary constraints. The available budget for the project and how it affects phasing or development.
- Context and planning. Topography, policy, and legal implications. There may be other proposed developments in the area, which will change the context.

This is the first phase of research on a project and is viewed as the most methodical and systematic one. It is a research process that involves communication with the clients about their ambitions and constraints, as well as communication with other professionals involved in the project – such as planners and highways engineers.



Figure 7
Fragments of
Wilderness City.



Research that
could lead to
a betterment,
a change, an
innovation

Sustainability

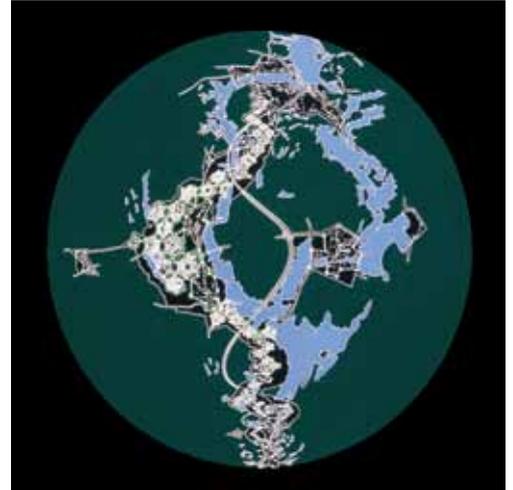
Mitigation for climate change is heavily integrated in Avery Associates Architects research process for each project; they aim to make the project responsive to ecological, and macro and micro environmental issues. The practice researches new 'green' materials and technology, along with environmental design that will be less disruptive to nature. The practice is also concerned with theoretical questions regarding the role of architecture in renewing people's relationship to nature.

"What really interests me is the research that could lead to a betterment, a change, an innovation."

As well as being integrated into projects, sustainability is part of the practice's independent research interests. Since the 1980s Bryan Avery has led his own ongoing research "project for a Wilderness City". This personal research contribution to the compact city concept is an approach to a sustainable way of living in cities in the future, where high density housing can occur alongside large restored wilds.

Understanding contiguity

Avery Associates Architects refer to the poetic background of a site or of a building as "contiguity". They seek to understand what the "poetry" of the site is and to define the integration of the building in its context in both place and time; it defines the building's relevance to its circumstance. If the intention is to fit in, this research phase seeks to understand which building may work in this context. If the intention is to be different, this phase seeks to understand which building may raise the quality of the area or/and change the circumstance, by being bolder for instance.



"The whole of your life is an observance of things, so is research in my practice."

Instinct is the main methodology for this research, informed by the experience and knowledge built up within the practice.

Understanding expressive potential

The practice defines the social and aesthetic connotations that a building carries as its "expressive potential". Research related to the expressive potential does not relate to practical research about technology or local constraints, but is rooted in aesthetic issues and critical thinking.

As part of this, Avery Associates Architects are interested in understanding the relationship between the main users and the building, in the contextual relationship between buildings and their tenants. The character of the building will become a statement of how it provides comfort for, and benefit to, the user. For example, in the design of the Old Bailey Courthouse the character of the building was a critical reflection of the needs of members of the legal profession.

The practice continues on-going research into materials that contribute to a building looking "well-built". The palette of materials is a reflection of both aesthetic preference and material properties.

Hyde and Hyde

Hyde and Hyde use research to help understand the local and philosophical context for their work.



As with other practices, research is an important part of meeting client needs. Of all our case studies, they were the most focused on the use of philosophical and sociological theory as a core part of their research practice.

Hyde and Hyde's practice focuses on private housing, with some larger social housing clients. The research is often about the local context for these houses – including materials and cultural history – or about the client's specific needs, to help them understand and develop briefs. This process is about being “open, engaged and liberal” rather than structured or systematic.

The practice

Hyde and Hyde was founded in 2006, and is based in Cardiff, Swansea and Amsterdam. The practice's directors, Kristian and Kay Hyde, both teach at the Welsh School of Architecture in Cardiff and at the University of Bath.

Understanding research

Hyde and Hyde view research as a constant, but informal process, within their work; they see their practice as analytical and self-reflective. Their research relies on personal phenomenological experience and empirical knowledge. This is expressed in the crafting of spaces and details fundamental to their creative output.

Both of the practice's directors view their teaching as beneficial to their research: students question their tutors, encouraging reflective practice.

Client-driven research

As with most practices, research at Hyde and Hyde starts with the client. Research in practice varies according to the client's response to the practice's architectural ideas; in their experience, clients hold a certain level of anxiety around contemporary design. Research into other models of practice or use of other examples, can help address these concerns. This is always a highly collaborative, engaged process which involves “deep conversations” and “constant questioning”, which allows the client to move towards a comfortable engagement with contemporary architecture.

“Research is about taking a client on a journey.”



Figure 8
House for a photographer
– camera obscura.

Theory underpinning practice

Hyde and Hyde were distinct amongst the case studies in bringing up wider theory as part of their research approach. They mentioned architectural, sociological and philosophical critics and theorists such as Kenneth Frampton, and the German philosopher Martin Heidegger. The practice's view is that this philosophical standpoint underpins their work, helping improve their understanding of local context and client needs. Continued engagement with these texts help to "teach them the timeless principles that will endure" and avoid "fads and buzzwords"; it also informs their teaching at the Welsh School of Architecture.

Engaging with other specialists

Hyde and Hyde explicitly recognise the limitations of their time and expertise when working on projects. Rather than conducting technical research, the practice uses external consultants, often having to persuade the client of the necessity of this approach and the value this brings.

The practice works collaboratively with others on technical research: *"Architects can't be experts in everything."*

Use of prototypes: materials and model making

Hyde and Hyde view testing and experimenting with early ideas, prototypes and models as part of their research tasks on each project. They bring back material from site visits to test and experiment with 'tactile research'. As a result of this approach, they spend more time than most at feasibility stage where these sorts of techniques can make a difference to the outcome of the project.

"We are trying to be more humanistic in approach. Reappraising the materials that have always been used... our work is often about traditional materials and using them in different ways."

Research and inspiration

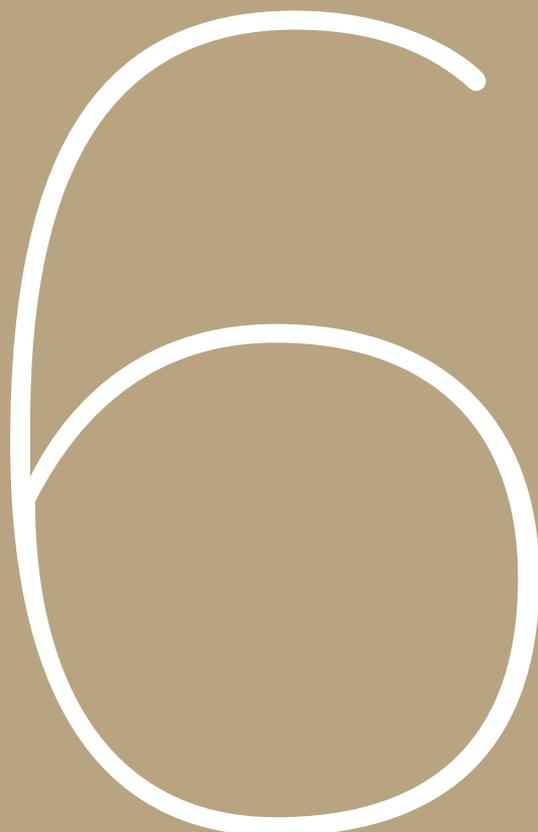
The creative functions of design are supported by research to give inspiration and to keep the practice up-to-date. This means the use of web resources (like Building Blog³) but also actively looking for other sources of inspiration, often from outside the sector.

"We are never stuck in the tramlines of architecture."

³BLDG BLOG Available at: <<http://bldgblog.blogspot.co.uk/>> [Accessed 20 Aug. 2014]

Design Engine

Design Engine practices research by experimentation, using scientific methods and working closely with technical consultancies to add value to often complex projects.



Design Engine prefer not to limit their practice by declaring specialist expertise, and use the process, rather than expertise, as a selling point for their practice.

Starting out as a small practice, Design Engine worked on projects with a high degree of technical complexity, requiring considerable research. They have experienced periods of growth after intensive research projects; this has led to them being open to new ideas which challenge traditional briefs. All members of the practice are expected to contribute by exploring creative ideas and undertaking research.

Although they do not consider themselves as specialists in any one field (as this is seen as limiting), they feel that recently, the majority of their research has been in design and testing new façades.

The practice

Winchester-based Design Engine has been practicing for more than 12 years, and employs 30 architects. The practice started out working on small projects with a high technical content and demanding research needs. They now undertake a diverse range of projects from large scale master-planning to eco-town initiatives, as well as retaining a strand of work for domestic clients.

Understanding research

Design Engine understands research as a process of experimentation and testing, focused on the project, and driven by a need to make an original contribution. They see research and experimentation as “facilitating pivotal moments in the company’s growth”. Within the office itself they surround themselves with research materials and products that are the subject of this testing process; a particular research focus is on how materials can be used to temper, or to control, aspects of the environment. They do not see research as a bolt-on; they take it for granted that it is a natural part of the practice of architecture.

“Research tends to be more black and white, it has an answer. Experimentation as research: it’s whether it has an answer or not. There is an outcome but not necessarily an answer. Does research mean you’ll either find the answer, or you’ll find something as part of that process?”

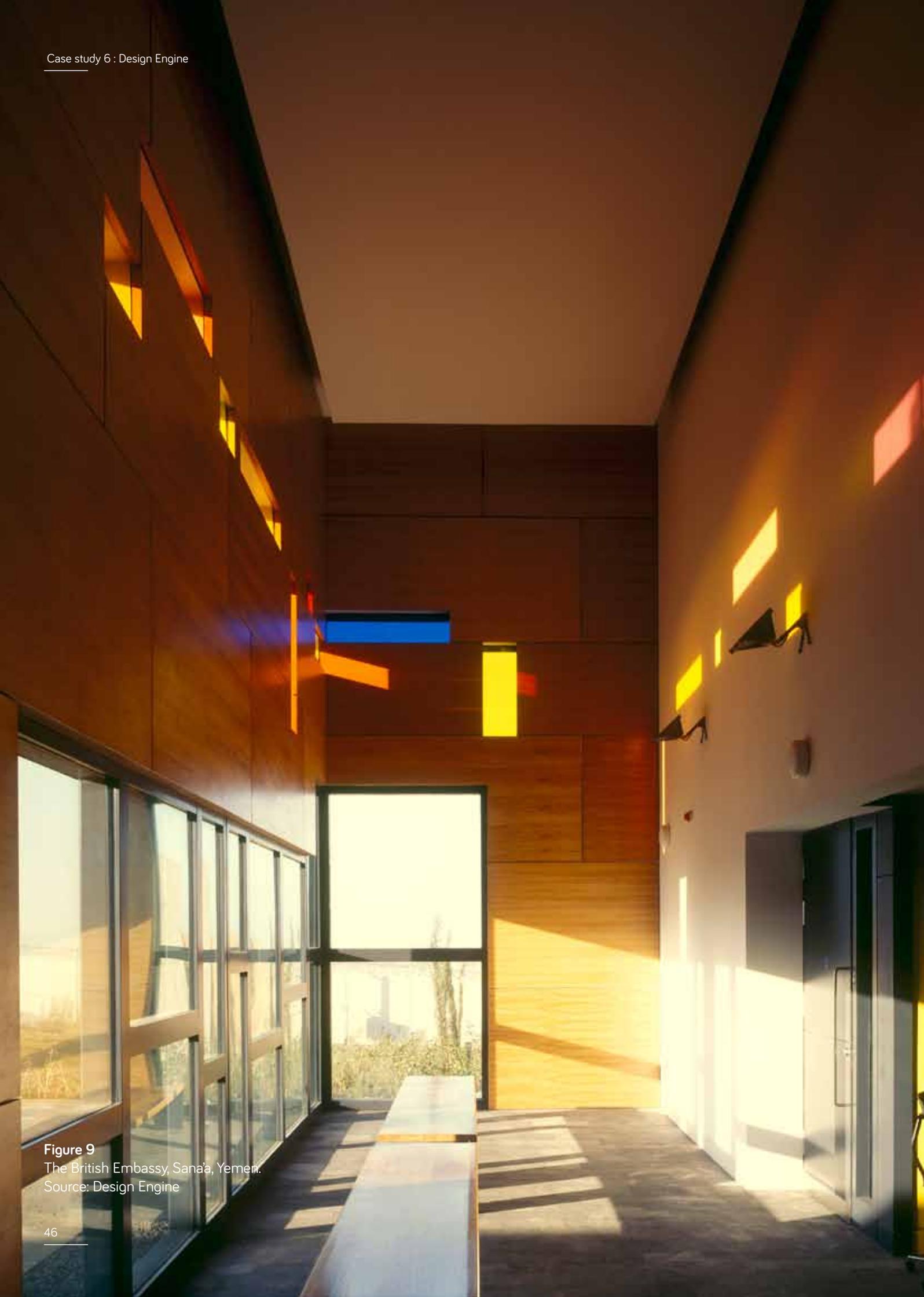


Figure 9
The British Embassy, Sana'a, Yemen.
Source: Design Engine

Detail –**Project focused research:
The British Embassy, Sana'a, Yemen**

Design Engine was commissioned to design the British Embassy in Sana'a, Yemen; one of their flagship projects as a practice. It was also a turning point in how the practice approaches research, and how research fulfils part of the client brief. The Embassy needed to be highly secure, as well as responding to the high temperatures in Sana'a.

The practice worked collaboratively with other expert professions, such as engineers and experts in ballistics in order to test products and to develop a design that addressed the client's needs.

Successfully tendering for this project meant that Design Engine had to change its research processes and approaches: they had to work more closely with other professional specialists, and this had led to their practice building close relationships with product manufacturers, and building a reputation for quality in design concept and the products used.

Experimentation

Design Engine considers itself open-minded about research; all staff are actively encouraged to innovative, and to test new ideas, with the practice likely to endorse requests for support for the research.

"I think our main understanding of research comes down to testing ideas, particularly when dealing with the environment and materiality."

Viewing research as a process of 'experimentation' means that they have no preconceptions about how something will turn out. This does not mean they are open to research without purpose; boundaries for research are related to the client's brief. This controls the ambition of the project, whilst leaving room for new ideas to be generated.

**Figure 10**

The exterior of the British Embassy, Sana'a, Yemen



**Detail –
Project focused experimentation – Charred larch**

Design Engine experimented with a new method of charring larch in order to reduce the risk of fire hazard in timber-clad buildings: charred larch is naturally fire retardant and prevents insect attacks. The method is popular in Japan where fire prevention is a priority and dwellings are in close proximity to each other.

This experimentation was supported by research for the Eco Town initiative in Cornwall. The practice found that larch is commonly found in Cornwall and they were able to resource and process the materials for the project near to the build site, complementing the client brief of using environmentally sustainable materials.

Informal experiments were undertaken in-house to investigate the impact of different charring times, with the results written up as a report and presented to the client. Although not a scientific output, it provides the justification for using this method.

Figure 11
samples of experimental charred larch.
Source: Design Engine

Much of Design Engine's recent research has been related to façades. The process begins with a specification, often written by the client. The practice then works closely with engineers and manufacturers to develop new products and prototypes. Prototypes are then tested to meet industry standards. Testing costs are built into the project budget; the client sub-contracts a manufacturer to create the product and the architects work with them to bring the product in line with the design.

“With [products like] welded glass, you would always get a prototype done... and test it. You go to industry. We worked with Italian glass manufacturers in Milan and we were testing glass to destruction. They mock up part of the façade and do pressure tests on them – Force 9 wind and rain, asking: can the façade keep the rain out?”

Detail -

Project focused product testing: Façade design for Oxford Brookes University

The development of solar control glass was part of an £85m redevelopment programme, which has a dedicated budget dedicated to new thinking. The new glass drew on research about the site: the site plan, historic survey data and desk-based research. The architects “liked the idea of reflecting on the fact that the oak plantation existed before we got there”.

Patterns for the glass drew on scientific investigation of the cell patterns of English oaks:

“We had slices of oak taken, blown those up; [a] ceramic print on the back of glass and we’ve adjusted the density. We use this glass to reduce the amount of solar gain on the building. Where we have south facing glass, it has that print on it.”

Knowledge culture

Design Engine has systems for structuring and sharing research from projects in-house. They use Friday afternoons to share and explain current projects and present information; a chance for staff to discuss recent projects in an informal setting. The practice wants to prevent its research work from being ‘wasted’: it is recorded (reports that were presented to clients or presentations from in-house meetings) and referred back to.



Figure 12
solar control façade at Oxford Brookes University
Source: Design Engine

HLM Architects

HLM Architects understand research can be a process where knowledge is developed cumulatively, based largely on visits and inspections of precedents, either their own, or others projects, as well as a significant use of post-occupancy evaluations.



HLM also undertake research projects, often into new solutions and technology not readily known in the profession and often resulting in the advancement of science and technology in the architectural profession and the built environment.

The scale of the practice allows for this aggregated knowledge and experience to be published, and they market the practice as leaders in the field.

The practice

Founded in 1964, 75 of HLM's 200 employees are architects, and they work from six UK offices, in London, Sheffield, Plymouth, Glasgow, Belfast and Cardiff. The practice also has an international profile, with one office in South Africa and one in Abu Dhabi. The practice provides services in most sectors of the built environment and has four business strands: HLM Architects, HLM Landscape and Urban Design, HLM Interiors and HLM Environment.

Understanding research

HLM Architects consider research to be an intrinsic part of their practice, and part of their daily processes. It is so integrated that, unless they are researching a specific subject, the architects interviewed argued that it was difficult for them to isolate any one of their regular activities as purely research. Further they do not have a dedicated research team, but often teams made up from different parts of the business bringing different skill sets, can be involved in specific research projects.

"Research happens sub-consciously within the organisation."

They understand research as a cumulative process where built knowledge, and the education and knowledge of their team, are a primary resource. They source this knowledge from their own experience as a practice, but also from information accessible online, from architectural journals and from conferences.

HLM believe that research within their practice gives them a competitive advantage, with their built knowledge allowing them to be ahead of competitors. The practice also uses research as a marketing tool. HLM Environment, for instance, allows the practice to respond to client concerns around environmental issues.

The practice also publishes documents providing the profession and the general public with specific design principles that they have established through work in a specialised field; publications that are built on the existing practice-based knowledge. They have made public, for instance, a baseline primary school design and established a standard model of safe prison cell design. In 2012 they also published guidance on the design of single living accommodation for defence workers alongside the Defence Infrastructure Organisation and Lend Lease. These publications are intended to place the practice ahead of the competition. While publications are not formally planned, HLM use them to take advantage of their existing knowledge.

The practice feels that research time within projects is being reduced though newer procurement programmes, Whilst HLM do invest their own time and costs, the practice would like to be able to dedicate more time to research that is not solely driven by commissioned projects.

"The pace of new processes does not leave time for research, you have to just go at it, and you can't take any risks."

Precedent

The architects interviewed were most concerned with precedent as the type of knowledge that formed the primary research area for HLM architects, both from their own practice and from other architects. The two aims of their research are to get new ideas, and to learn lessons in order to avoid repetition of mistakes. Design precedents inform new design solutions.

The practice also consults existing building forms and massing as well as historical research on the site's existing buildings; they consider the city fabric and how buildings work within it. They seek to understand how their project will relate to the existing building environment.

As a result of the age of the practice, HLM often works with clients that they have worked with for more than 15 years. The catalogue of the practice's previous buildings and projects is used as an index to which HLM architects refer when working on a new project; they do an historical analysis of their previous schemes, as well as tracking their development over time.

"You do research into what works, what kind of spaces and what kind of colours you have to use in those sort of places."

Building on existing knowledge, HLM's architects look for case studies. This process can sometimes start with a simple online image search, that will be followed by further and more thorough online research if they are interested in a specific project they stumble upon. While they can find precedents in architectural journals as well, they usually favour searching online as they believe that schemes that make the journals are the schemes that have generous budgets, which distracts from the cost constraints of their projects. This research can also be done by peer-to-peer communication with the practice's contacts.

Conferences also provide a useful platform for knowledge exchange about previous projects and new design examples that may inform the practice's work. Building visits are another way of gaining insight into the approaches that they favour, and the architects interviewed regretted having neither the opportunity nor the time to visit existing projects more often.

Post-occupancy evaluation

Post-occupancy evaluation overlaps with HLM's assessment of precedents, especially with regards to certain types of projects. School, hospital and prison projects are projects that should be human oriented and committed to the needs of users; these are the ones where the practice tries to carry post-occupancy evaluations, through reference groups⁴, as often as they can.

“Going back into the buildings that we’ve designed is always the best way of finding out how buildings perform, because buildings are used by people.”

For example, the architects visit the prisons that they have designed as they consider that the best people to inform you about how prisons perform are the inmates. The practice's 'prisoner reference group' is a forum of offenders and inmates; inmates relate their daily experience, informing future custodial design processes undertaken by the practice. The visits are vital in helping the architects to understand how their designs are performing, and what they could do better.

New materials

Investigation of new materials is a balance between experimentation and avoidance of risk. HLM Architects do investigate new and different building materials, and research the impact that they would have on their buildings. Based on information from the manufacturer they can make an assessment about the potential to use a material.

However, they note that the desire to experiment and innovate has to be balanced against client wishes; clients may be averse to experimentation as they wish to avoid insurance risk. HLM notes that client requirements limit the research, and in particular the testing of new materials that the practice can undertake. This is especially true for projects in custodial or education sectors where clients seek 'a safe pair of hands'.

In interior design regular research on trends and new materials is even more important to the practice. This may investigate office design principles and concepts, specifications and furniture as well as new materials, products, and internal finish specifications. New information from manufacturers can prompt the practice to assess/reassess materials available to them.

⁴HLM Architects, *Reference Groups*. Available at: <<http://www.hlmarchitects.com/foresight-and-innovation/reference-groups>> [accessed 20 Aug. 2014]



Figure 13
Proposed atrium space at Sheffield Hallam.

Detail –**Project focused experimentation –
Sheffield Hallam University,
Heart of the Campus**

HLM architects are to create a new ‘heart’ to the Sheffield Hallam Collegiate Crescent Campus, providing academic, teaching and social spaces in a new hub building. Spaces will surround a three storey atrium, which will provide a focus for hub activities and primary circulation routes. The ground floor will house a café and social learning areas, while upper floors will contain teaching areas and offices.

The architects wanted a fairly strong graphic to create an identity for the building, and conducted research into materials that could be etched. They found a material that is a compressed timber; a base timber material with a lumber surface that can be etched – a material that has rarely been used in England. The architects researched collaboratively with a public artist to determine the technical constraints of the material (depth of etch etc.) as well as to develop designs for the façade system.

Sustainability

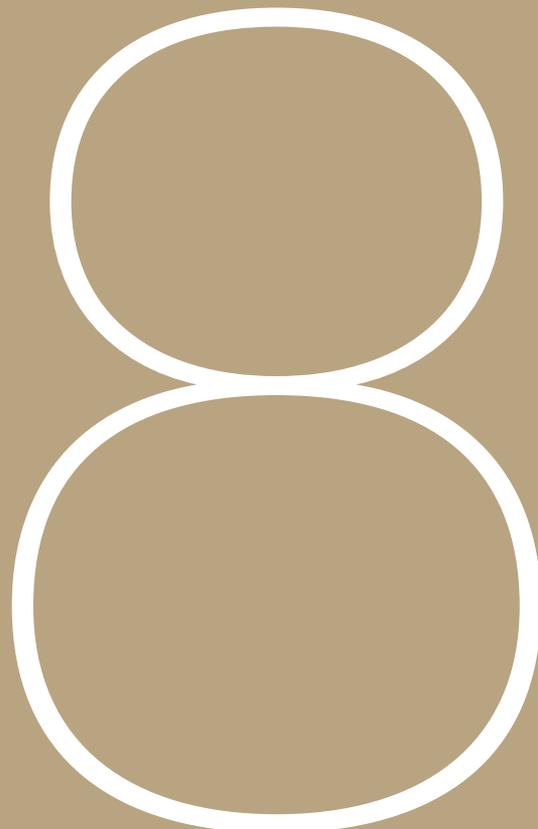
HLM aims that all of their architecture responds to the climate, local environment and setting, so sustainability is a strategic research area for the practice; sustainable design is part of the practice’s ethical position. Passive design – in order to reduce energy consumption of a building – is one of the approaches they have dedicated research time to. The practice’s Passivhaus terrace for the Scottish Housing Expo⁵ is an example of their work in the field. The practice works collaboratively with its clients to maximise its projects’ sustainability.

The practice’s research into sustainable design is to ensure the practice’s knowledge is up-to-date – to ensure its architects have a comprehensive understanding of legislation, materials, new techniques and technology and environmental design principles – to support integration of sustainability into the design process. For example, many of the practice’s architects are trained BREEAM assessors, not in order to carry out BREEAM assessments, but rather to inform sustainable design.

⁵The Scottish Government (2010) *Passive House Terrace*.
<<http://www.scotland.gov.uk/Topics/Built-Environment/AandP/InspirationalDesigns/ProjectType/smallscalerural/PassiveTerrace>>
[Accessed 20 Aug. 2014]

PRP Architects

PRP Architects has a strong commitment to research, experienced researchers, and it was the only practice in this study who directly access research funding, as well as claiming R&D tax credits.



Research helps position PRP as thought leaders, informs the practice, and helps it win new work. The practice has demonstrated the value of research by launching a sister company, PRP Innovate, as a vehicle to enable it to progress its research ambitions.

The practice assembles research teams, from across its wide range of disciplines and partners which include universities, technology partners, suppliers, contractors as well as other consultants. This activity adds value to the practice and gives it insight into developing design and technical solutions as well as working methods.

PRP's main research areas are: the residential sector, energy use and sustainability, and more recently, wellbeing and post-occupancy evaluation. It believes that research and expertise in these sectors means that the practice transcends the generally accepted role of architects, and are currently looking to promote this more widely.

The practice

PRP celebrated its 50th anniversary in 2013. It is a multi-disciplinary practice providing architecture and a range of complimentary services including environmental, project management, planning, transport, and landscape services. It specialises in all aspects of residential and mixed use development.

PRP is recognised for its in-depth knowledge of the residential sector and from the early days of the practice has contributed new thinking to policy and design related matters through research. In recent years this has developed into a full research function with an environmental and technical focus involving other in-house disciplines and external agencies.

Understanding research

The practice has a clear understanding of the research they wish to pursue, and how it will benefit their work. In particular they see research as fundamental to maintaining a position as leaders in the residential sector; with the aim to drive sector-wide improvements in quality and technical performance, for example in the understanding of energy use by occupants.

Specific reasons that PRP undertake research are:

- Generating new revenue streams.
- Expanding its knowledge and expertise.
- Broadening its market.
- Improving practice efficiency.
- Maintaining its position as expert in the residential sector.

Other more personal reasons for undertaking research include deriving personal satisfaction from seeing research inform government policy eventually leading to market delivery. However, the practice recognises that while research is vital for business and skills development it is not always followed through to its conclusion.

"I think you have to do research to do development, but sometimes we just do research and we stop at that. We don't do the development side of things."

PRP were the only practice interviewed who were taking advantage of major government R&D funding mechanisms, including the European Union's Framework Programme 7 funds, Technology Strategy Board (now Innovate UK) funding, and R&D tax credits. To make it easier to access research funding the practice launched PRP Innovate in 2013, which focuses on research into the development of construction products, low-carbon buildings, building sustainable communities and smart cities, smart systems and building occupancy. The group specialises in systematic research, which is largely scientific or technological.

The practice view major government research and development funds as more important as it is more difficult to access funding from bodies such as CABE or the HCA – who have had significant budget cuts – or the BRE. The major practices still need insights from large studies and technical guidance, so they are now looking to undertake studies themselves.

Energy use and sustainability

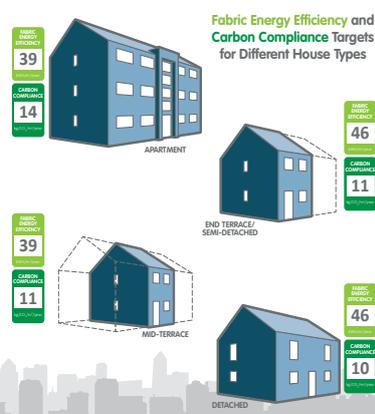
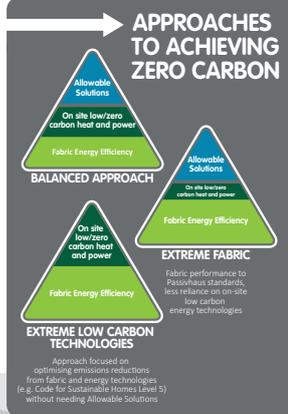
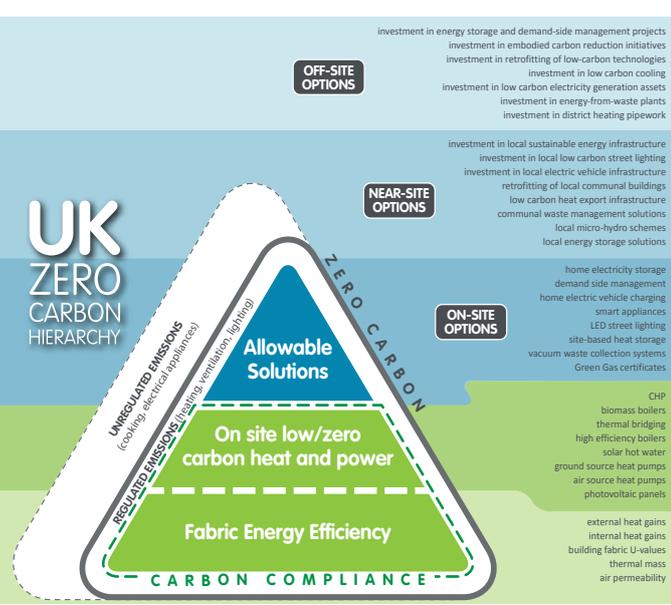
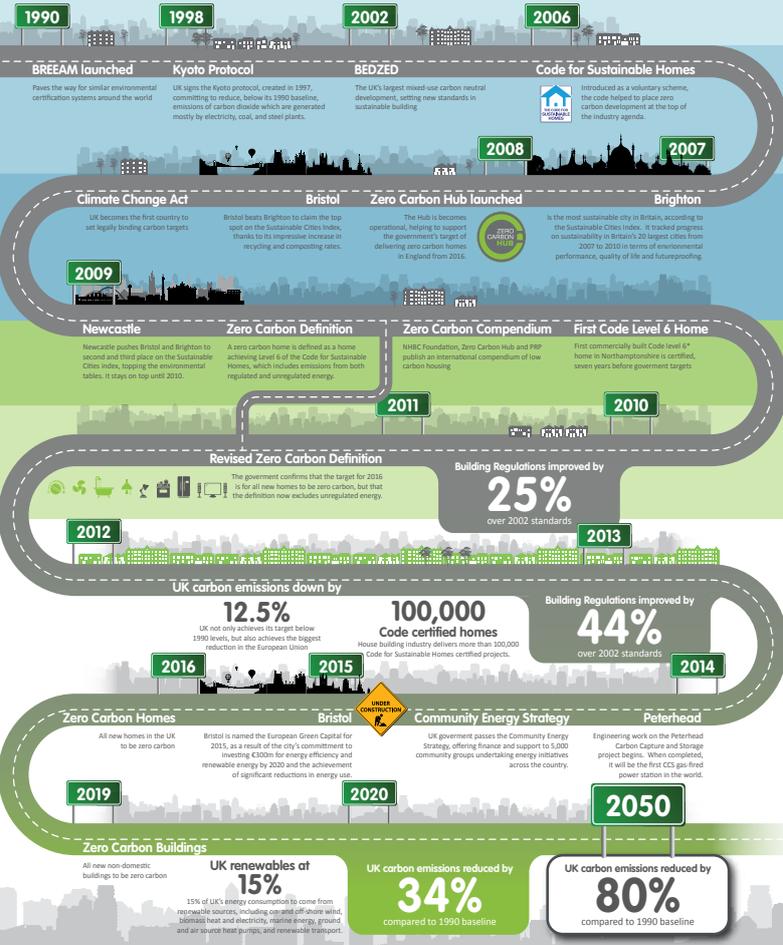
Research in energy use and sustainability forms a large part of PRP's research. For example, they are involved with research led by the Energy Technologies Institute (ETI), which is separate from their regular, practice-based research.

PRP have also started to build internal capacity to conduct research into energy use in homes. The analysis and development research team will lead on simulation work on building efficiency. This encompasses thermal modelling and energy modelling to look at energy performance of the building. This will include inputting future climatic figures and modelling environmental conditions. In one brief they were asked to design a building that was resilient to climate change up to 2030 and had the capability to adapt up to 2050.

PRP have worked closely with the World Green Building Council and the Zero Carbon Hub to deliver a roadmap to progress towards achieving zero carbon homes and buildings by 2019 and achieving our 80% emissions reduction target by 2050.

THE ROAD TO ZERO CARBON

Charting the UK's journey from Kyoto to Zero Carbon and beyond



© PRP and Zero Carbon Hub.

Figure 14 The road to zero carbon.

Detail –

**Research collaboration:
the Energy Technologies Institute (ETI)**

Background: The ETI was established in 2007 with £100m of investment of which 50 per cent was committed by the Department for Energy and Climate Change (DECC), with the remainder coming from six private companies: Shell, BP, E.ON, EDF, Rolls-Royce and Caterpillar.

It is funded until 2017, with an option to continue after that date.

Objective: To decarbonise the UK's energy and transport sectors.

PRP's role: PRP are involved in a number of programmes being funded by the ETI, including Smart Systems and Heat. They are the leading partner in the Consumer Response and Behaviour Unit (CRAB), which looks at why people use energy in their homes and other buildings, rather than how much they use.

Research: In partnership with social researchers the practice is researching monitoring systems and how to undertake technical evaluation in occupied homes.

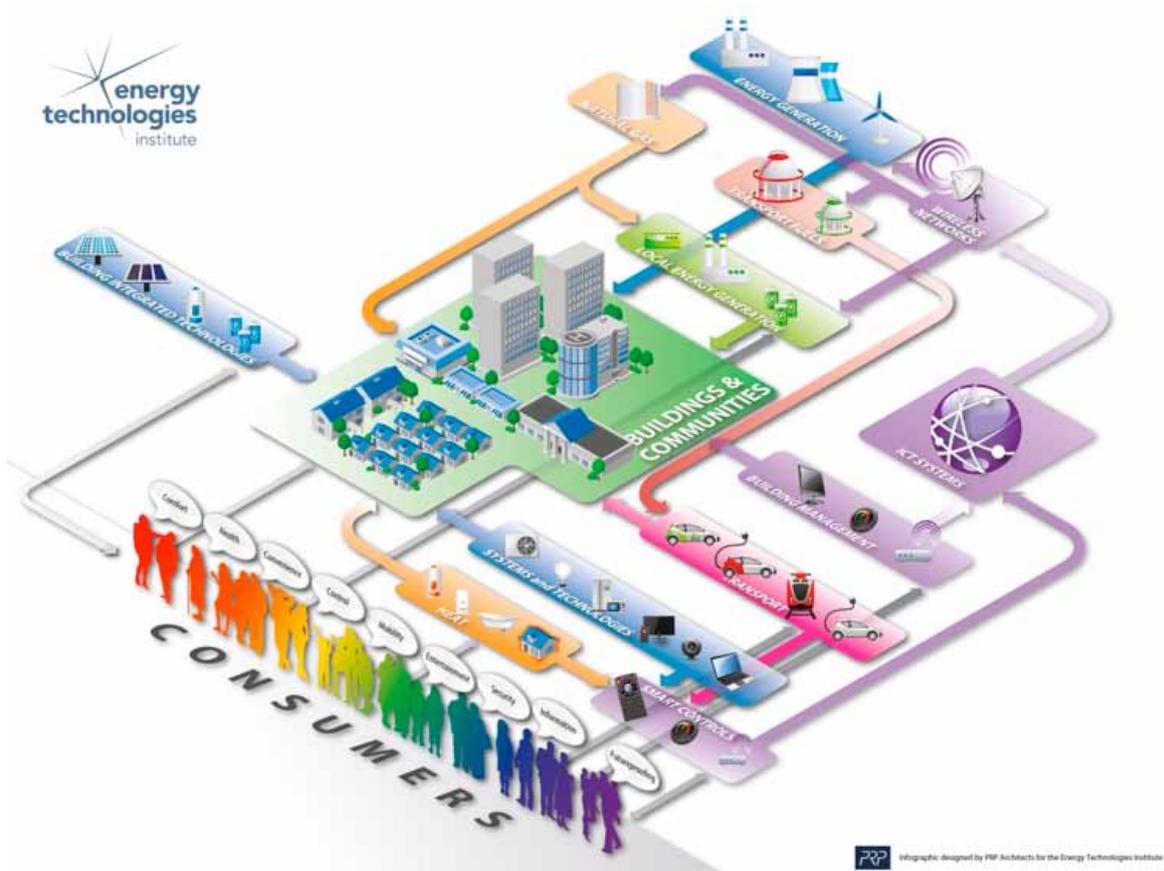


Figure 15
Systems diagram of the Energy.

PRP Infographic designed by PRP Architects for the Energy Technologies Institute

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Post-occupancy evaluation

Post-occupancy evaluation is an emerging area of research for PRP and they have recruited in order to build capacity and expertise. While the practice already undertakes post-completion site visits, over time these have become more technical and require a greater level of standardisation to produce detailed and valuable reports.

As the practice adopts a more technical evaluation process they will begin to monitor space utilisation, efficiency of the building and performance; by doing so they will be able to advise the client in how to use their building efficiently. At present they are unsure how much the new strategy will benefit the practice; for example they note that, at present, few clients are willing to pay for post-occupancy evaluation, in particular evaluation using social science methods. Will clients be more inclined to pay for a service which directly reduces their energy bills?

Skills and knowledge

PRP's approach to research – bringing together architects, engineers, economists and social scientists – is emblematic of their view of the practice more generally. Having a multi-skilled research team means “they can do lots of different things with lots of different people”. PRP also sees real value in bringing in external partners to enlarge their skillset; the ETI project involved working with academics from UCL as a technology partner; this teaches them to think in a different way.

Likewise much of the work the practice does sits outside traditional architectural activity. At present the majority of the practice's work is won on account of the practice's profile and through referrals from existing clients. PRP is seeking to change its profile and brand to reflect the multi-disciplinary nature of their work.

“We bring in different people, different organisations, that we know have skills that are different to ours.”

The practice believes that the most skilled researchers come from academic backgrounds (and have worked in research for longer) while research skills are not necessarily something that comes easily to all architects, some of whom may be more focused on defining the detail. They also believe that the benefits of working with universities are mainly felt by working with individuals, rather than institutions as a whole.

Research Methods

Methods

BOP Consulting carried out this research on behalf of the RIBA, looking into the need for research and research-based knowledge in architectural practices. The broad aims were:

- To consider how architects understand, use and undertake research in their practices.
- To assess RIBA members' research needs and interests.
- To support the RIBA's own research, including its future research strategy.

The findings are also pertinent to other parts of the RIBA, potentially impacting on CPD, support of members and its international work. The study complements the literature review *Architects and Research-based Knowledge* undertaken by the Research Information Network for the RIBA, a collaborative research project *Home Improvements Housing Research in Practice* led by the University of Sheffield, *The RIBA Research in Practice Guide* and the *RIBA SCHOSA Review of University Research 2013*. These documents make up the RIBA series *Architects and Research* and can be found at: www.architecture.com/research.

Research questions

The primary research question was:

- What research and research-based knowledge do architects require to support their practice?

Secondary research questions included:

- How do architects define research?
- What research do architects undertake themselves?
- How do architects use other's research?
- What value does research bring to architectural practice?

Approach and case studies

Semi-structured interviews were conducted with practices, ranging in size from sole practitioners to large practices with an international presence. Practices were chosen to give a range of practice focus, size and location. The researchers attempted to interview a range of architects of different seniorities, but access to younger architects was often difficult to achieve.

Figure 16
Case study interviews

	size	location	number of interviews
Pierre Maré Architects	sole	London	1
Sofie Pelsmakers	sole	London	1
Avery Associates Architects	small/micro	London	1
Axis Design Architects	small/micro	Birmingham	2
Hyde and Hyde	small/micro	Swansea	2
Design Engine	medium	Winchester	1
HLM Architects	large	Sheffield	3
PRP	large/international	London	2

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