

# ARCHITECTURE RESEARCH AND THE PROFESSION IN SCOTLAND

A RESEARCH STUDY FOR THE  
ROYAL INCORPORATION OF ARCHITECTS IN SCOTLAND

APPENDICES

July 2005

**ScotMARK**

Scottish Matrix for Architectural Research and Knowledge

# ARCHITECTURE RESEARCH AND THE PROFESSION IN SCOTLAND

## A RESEARCH STUDY FOR THE ROYAL INCORPORATION OF ARCHITECTS IN SCOTLAND

July 2005

This report has been prepared for the Royal Incorporation of Architects in Scotland by  
**Dr. Paul Jenkins, Dr. Harry Smith and Ms Soledad Garcia-Ferrari** for:

# ScotMARK

## Scottish Matrix for Architectural Research and Knowledge

Coordinator: Dr Paul Jenkins

ScotMARK is a Strategic Research Development Grant, funded by the Scottish Higher Education Funding Council from May 2005 to May 2006. The main objective of ScotMARK is to undertake a feasibility study for an institutional structure to promote excellence in, and facilitate wider access to, research in architecture across higher education institutions in Scotland, thus creating the basis for collaborative pooling of research capacity in key identified policy areas.

The main activities of ScotMARK, in summary, are as follows:

- **Knowledge transfer**, producing an overview of on-going research in architecture across higher education institutions in Scotland and benchmarking this nationally as well as developing a national conference on architectural research with a Scottish focus, to showcase actual research and research capacities;
- **Research development**, reviewing and preparing proposals for coordinated education and training in architectural research, including promoting the dissemination of Scottish architectural research across higher education institutions in a wide range of media; and providing, on a pilot basis, a "one stop shop" point of entry for those interested in architecture research across higher education institutions in Scotland;
- **Research implementation**, developing specific proposals for architecture research in conjunction with interested parties, with an initial focus on the key policy area of user engagement in the architectural process; and
- **Feasibility**, assessing the viability for the continued provision of the above services based on demand, with proposals for the on-going resourcing and options for an appropriate institutional structure.

The following Conference is being organised by ScotMARK. .



**Edinburgh University, Architecture  
Department  
20 Chambers Street, Edinburgh**

### KEY THEMES:

(with international and national renowned speakers leading discussion)

- CONCEPTUAL MODELS FOR ARCHITECTURE RESEARCH
- TRENDS AND PROBLEMS IN RESEARCH
- ARCHITECTURE RESEARCH TYPOLOGIES
- AGENDA SETTING
- THE WAY FORWARD

### AIMED AT:

- ARCHITECTURAL RESEARCHERS AND EDUCATORS
- PROFESSIONAL PRACTITIONERS AND ASSOCIATIONS

For further information on the conference programme, speakers, participation and registration contact RIAS on 0131 229 7545 or [kmcintosh@rias.org.uk](mailto:kmcintosh@rias.org.uk) or go to [www.archresearchconf.com](http://www.archresearchconf.com).

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## **APPENDIX 1 - RESEARCH BACKGROUND AND METHOD**

### **1.1 General background and research objectives**

In 2004, the Royal Incorporation of Architects in Scotland (RIAS) was asked to report on research across the profession by the Scottish Executive Architecture Policy Unit. RIAS, through its Research and Development Board, then undertook an initial “spot” survey of research and innovation across the profession, based on a short postal questionnaire. RIAS subsequently requested **ScotMARK** to undertake a study of architecture research and the profession in Scotland, following up this initiative in more depth. **ScotMARK** has been selected to undertake this due to its parallel remit from the Scottish Higher Education Funding Council to study collaboration across Scottish Higher Education Institutions involved in architectural research, including how such research relates to research users. This study also links with the study undertaken last year by Edinburgh College of Art School of Architecture into research in the Schools of Architecture across Scotland.<sup>1</sup>

The research objectives for the study are:

- a) To study the research interests and activities of a sample of private sector architecture practices registered with RIAS across Scotland; and
- b) To feed into broad networking and research promotion events for the wider architecture profession in Scotland and the UK.

The research objectives thus include data collection, analysis, reporting, and some promotional activity

### **1.2 Research methods and process**

The study uses a “rapid appraisal” approach, deriving its validity not from a large sample but from sequential testing of information collected. The three forms of information collection being used included an initial key informants’ focus group organised by RIAS to select relevant architecture practices as a relatively small sample to undertake in-depth interviews. This sample was approximately 5% of a core number of 457 private practices which receive Professional Services from the RIAS and thus on which the RIAS holds data in relation to the number of chartered architects employed. The sample takes into account practice size (number of chartered architects) and geographical spread (RIAS chapter).<sup>2</sup>

This focus group was followed up, as a second major information source, through a series of semi-structured interviews with the identified sample of architecture practices across Scotland (see Appendices for interview structure). The resulting research findings will then be validated through widespread distribution of these to all RIAS registered practices in this report, permitting feedback. A fourth source of feedback and information will eventually be through wide publication of the findings through newsletters, journals

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and discussion at the forthcoming UK National Architecture Research Conference, to be hosted in Edinburgh in mid December 2005, organized by ScotMARK with the RIAS.

The target sample includes practices in:

	Aberdeen	Dundee	Edinburgh	Glasgow	Inverness	Stirling	sample
small	1	2	3	3	1	1	11
medium	1	1	3	3	1	0	9
large		1	2	2			5
<b>total</b>	<b>2</b>	<b>4</b>	<b>8</b>	<b>8</b>	<b>2</b>	<b>1</b>	<b>25</b>

The research was initiated with the Focus Group meeting at RIAS on 11<sup>th</sup> May and interviews were carried out between 18<sup>th</sup> May and 20<sup>th</sup> June by Dr Paul Jenkins, Dr Harry Smith and Ms Soledad Garcia-Ferrari. While RIAS contacted some of the practices in advance, time constraints for practices and the research team meant the on-going logistics to arrange the interviews were quite complex in order to achieve the coverage in the time originally allotted. In general practices did their best to be available, but a few did not consider this possible and were thus substituted retaining the main sample characteristics (size and location). In addition, as the draft report was scheduled for 24<sup>th</sup> June, the 25<sup>th</sup> interview scheduled for 21<sup>st</sup> June had to be cancelled. This is not considered to have any significant effect as the sample is not meant to be narrowly representative. The main section of this report, analyzing and summarizing the **Key Findings from Interviews**, has been drafted by Dr Harry Smith and Ms Soledad Garcia-Ferrari, under the supervision of **ScotMARK** Coordinator, Dr. Paul Jenkins, who drafted the **Executive Summary, Conclusions and Recommendations**.

An important feature of this rapid appraisal approach is verification of the findings, and this report is a key mechanism for this, as it is meant to generate feedback, using the feedback mechanism attached to the covering communication from RIAS. In addition practices are encouraged to consider attending the UK National Architecture Research Conference in December – see initial information at:

<http://www.scottisharchitecture.com/crossover/index.htm?view=21>

## **APPENDIX 2 - DETAIL OF FINDINGS FROM INTERVIEWS**

### **1.3 The nature of research**

#### **1.3.1 Concepts and experience of architecture research among Scottish architecture practices**

Among architectural practices the concept of architecture research appears to be diverse, with no single notion of architecture research being prevalent. The two dominant views, which were each held by 7 out of the 24 interviewed practices, were that:

- a) architecture research in practice is project-driven;
- b) there are different types of architecture research.

The view of research in architecture practice as project-driven was supported by a further 3 respondents who defined research in architecture practice as “problem-solving”. This project-driven and/or problem-solving definition of research in architecture practices was more prevalent in small practices (6 out of 11) than in medium and large practices (2 out of 8, and 2 out of 5 respectively).

Respondents who classified architecture research into different types provided a wide range of typologies. The simplest classification was a fairly commonly perceived dichotomy between academic and practice-based research (5 out of 24 interviewees), but more complex categorisations according to different criteria included the following:

- (1) building technology; (2) academic; and (3) practice;
- (1) development of ideas in an academic environment; (2) design-driven research; (3) in-house specific research related to specialised institution activities, mainly technology-based; and (4) through individual learning;
- (1) minimum research in business-led initiatives; (2) specific project-led research in signature architecture; and (3) innovation per se, linked to practices’ keeping a cutting edge in a specific field;
- (1) searches for information; (2) specific research based on a clear premise; (3) pure architecture research (usually linked to academia); and (4) knowledge-based research (using a particular method for a particular problem).

There was also a view (held by 3 out of the 24 interviewees) that architecture research only took place in academia. This was seen either in a positive light, defining such research as “genuine” research, or negatively, seeing it as far removed from architecture and professional practice. Another perception of the nature of architecture research was that based on innovation, mainly seen as technical innovation and testing.

In terms of research activities in the interviewed practices, most of these stated that they undertook research in some way or another, with only 5 indicating that they either did not undertake research, did not do “formal” or real research, or were very limited in their research because of constraints. Interestingly, it was the larger practices who were more

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wary of defining some of their activities as research, with 3 out of the 5 large practices interviewed providing caveats such as their work not being “academic” research but rather problem-solving and innovation (only 2 medium-sized practices gave this kind of caveat, and no small practice did).

When asked about research activities carried out in their practices, the interviewees included a wide range of tasks. The most widely identified research activity was project-specific analysis and development (10 out of the 24 interviewees), particularly focused on the early stages of information gathering including meetings with clients, site studies, contacts with materials manufacturers, etc. Much of the research effort appeared to go into analysing materials and building technology (7 respondents), though this rarely took the form of actually testing new materials and thus innovating, due to the risks involved in potential poor performance and therefore liability. Part of the strategy to minimise risk seems to be building up knowledge, particularly through CPD, which was reported as a “research” activity by 7 respondents. Building up knowledge was also used to create areas of expertise that could be offered by the practice, an activity that 4 interviewees put forward as a form of research. Problem-solving on a project-led basis was reported by 3 interviewees as a research activity. Relatively few practices referred to specific and discrete research outputs such as feasibility studies (4 interviewees), post-occupancy or post-completion studies (3) and in-depth theme-specific studies (2) as part of their research activities. Other activities that were noted by respondents as “research” or involving research included:

- innovation
- building up knowledge through the design & build of prototypes
- redefinition of design stages
- teaching-related activities
- competitions
- individual learning
- investigating new approaches
- advising clients’ on others’ work
- generic research
- preparation of development strategies and briefs
- monitoring innovative buildings
- contract research.<sup>3</sup>

Few respondents referred specifically to research methods the practice used when addressing this question – methods that were mentioned included semi-structured interviews and questionnaires.

The area most commonly focused on by practices when undertaking research is related to technical and technological matters, including materials, construction details, construction systems, lighting and insulation (reported by 16 of the 24 interviewees). Much of this research is of the kind described above as “searching”, and is linked to the build-up of knowledge in terms of working details that are made available for ongoing and future projects. In this respect, as mentioned above, actual testing of materials and

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technology is not widespread because of the indemnity issues involved, but some practices do see this as necessary innovation, which is possible especially when clients are willing to share the risk. Another topic around which there is considerable interest is sustainability (10 respondents), including aspects such as eco-building, energy efficiency and carbon emissions. Equally strong is the interest in issues specific to building typologies, with 10 interviewees reporting research related to different types of buildings: new-build residential; tenement rehabilitation; theatre design; healthcare; education; and office space planning. Only 5 practices reported having undertaken research related to conservation and history. While 3 interviewees indicated that research in their practices was not issue-specific, but general and on a project-driven basis, there was a series of research topics that were each noted by only one interviewee respectively:

- landscape
- arts
- social and economic aspects of building
- CAD
- design methods
- working methods
- health and safety.

In relation to how the nature of research had changed in the interviewees' practices, there was no single discernible trend that was supported by a significant number of interviews. Rather, there seemed to be different preoccupations that had one thing in common: the changing environment in which architecture practices operate. Thus, while some practices simply alluded to the fact that over time they had built up knowledge which helped them tackle new projects,<sup>4</sup> others explained that different and more specialised knowledge was increasingly necessary because of: more complex regulation (3 interviewees); more complex design processes including project management (1); a more competitive environment (1); and new subjects and sets of problems such as sustainability (1). Changes reported by practices included: having adopted new research methods such as semi-structured interviewing; changing "visualisation" processes (including CAD); developing new forms of involvement in design with public/private partnerships; producing more feasibility & economic studies in response to increasing demand from developers; improving the efficiency of their staff in doing research; and using new sources of information that had become available. One practice reported a double-pronged change, with members of staff in the practice being more willing to try new ideas, and clients more pro-actively seeking ecologically and environmentally-sound solutions. On the other hand, while 2 interviewees reported no change in their practices, another 2 said that the problem they were faced with was having less time available for in-house research and thus not keeping as up to date as would be desirable. One practice reported that changes in the nature of research undertaken were simply in response to the changing nature of circumstances and opportunities rather than in a change of focus in a line of inquiry.

Evidence that architecture research had contributed to changes in the interviewed practices was not strong. It was noted that the purpose of research is to establish a

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knowledge base, and several interviewees reported that such knowledge base was under constant development within their practices, though it was noted that when this is based on design it is a slow process with a constant feedback loop based on experience. One respondent reported finding it difficult to find applied research that was relevant for any particular project. Some interviewees did provide examples of how research had contributed to the practice's work, including: developing good (or the best) solutions; providing the most accurate image of the final proposal to the client; developing the architects' awareness of materials; and innovation. Risk featured as an issue in a couple of responses, ranging from the need to strike a balance between being innovative and facing the real problems, to a lack of overbearing concern over risk and liability.

In summary, on the concepts and experience of architecture research among Scottish architecture practices, it can be concluded that:

- there is no strong predominant conception of research in architecture practice among Scottish practices;
- although there is a variety of views on what constitutes research among architectural practices, there appear to be three main ways in which this is seen to happen: "search" activities for information, not normally considered to be "real research"; "research and development" activities, normally within practices as well as in other institutions; and what is seen as "real" or "genuine" research, which is considered to take place more in specialised research institutions;
- research in practices is seen as being predominantly project-driven;
- most practices consider that they undertake some form of research, engaging in a wide range of activities, particularly within the "research and development" category, including project-specific analysis and development, building up areas of knowledge and expertise (including through CPD), problem-solving, specific studies, etc;
- the research is focused mostly on material and technological aspects, sustainability and building typologies;
- the nature of research in practices changes in response to the changing environment in which architecture practice operate, with conflicting drivers resulting from increased competition being the need to become more knowledge-based (thus requiring more and better research) and time and funding constraints (thus making more and better research more difficult);
- evidence that architecture research has contributed to changes in practices is not strong due to a number of factors including the long time lag in learning through reflection on project experience, difficulties in finding relevant applied research, etc.

### 1.3.2 Research drivers in architecture practice

All the large practices that responded to the question on whether research is driven by practice or individual interests said that they encouraged individuals to develop their own interests, and supported and linked this to staff development. Pursuing individuals'

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interests was seen in the context of, and in balance with, the overall interests of the practice, and indeed was seen as under significant pressure from workloads.

In medium-sized practices it was the practice's needs and particular projects or types of work that were generally seen to be the drivers of research in the practice, with one interviewee reporting that such needs determined the practice's recruitment policy. Therefore, though there was still some support for individual interests, this was more explicitly subject to synergies with the practices' workload. In one instance the interviewee commented that undertaking research in the practice would require recruiting a particular type of "enquiring mind".

In small practices there appeared to be a divide between those that comprised one or two partners, often with particular interests, whose research focus was in effect that of the practice and therefore individually (and client)-driven, and those that, though being small, might have more non-registered staff. In the latter case the balance was more towards the practice driving any research.

In summary, in practices of all sizes the practice workload is a strong driver determining the nature and extent of research undertaken, with some scope for the pursuance of individual interests particularly in some smaller practices with particular interests among the partners and in some larger practices with sufficient leeway to support individual interests, linked to the practices' workload.

### 1.3.3 Architecture practices' experience of collaboration in research

The majority of interviewees (15) stated that their practices collaborated with other professionals, the main group being engineers (8), and particularly structural engineers. Other groups that were mentioned by at least one interviewee were urban economists, marketing specialists, sociologists and contractors. The issue of collaboration with other architects was controversial, with 3 respondents specifically stating that they did not collaborate with other architects, who were described as being quite "exclusive", "defensive" and "secretive" in their approach to work, and thus often engaged in "reinventing the wheel". On the other hand a couple of small practices described collaborating with other architects as being necessary because of their size, or informal in nature. Among large practices a couple of regular forms of collaboration were identified, including regular interaction with other branches of the firm in different geographic locations (through study trips and regular meetings/workshops), and working generally with the same professional team. One medium-sized firm also reported regular collaboration through a network of architecture firms.

A fairly large number of respondents (10) indicated that they collaborated with manufacturers, with an additional 7 interviewees stating that there was only some collaboration with manufacturers, and only 2 (both small practices) reporting no collaboration at all. This type of collaboration focused mainly on technical issues and

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situations, with a few respondents (3) indicating that such contacts between architecture practices and manufacturers were based on searching for information from the manufacturers rather than on actual collaboration on research. The nature of such “collaboration” was variously described as related to particular investigations, ad-hoc and problem-driven, and on a need-to-know basis, with time and funding being cited as limitations. Only one respondent specifically described collaboration with manufacturers as focused on innovation, and one indicated that collaboration was generally initiated by manufacturers.

Collaboration with academic institutions was reported to be very poor, with only 2 small practices answering that they did collaborate in research with academia, 10 practices stating that they had engaged in some collaboration, and 12 declaring they did not collaborate with such institutions. None of the large firms reported recent or ongoing collaboration in research with academic institutions, with only one stating there had been one instance of collaboration in the past. Many of the respondents (9) indicated that they had connections with academia only or mainly through teaching. A couple of those that had engaged in collaboration in research reported bad experiences with academia, due to issues such as the university reportedly not knowing “how to tackle” the research, rights over research products and reluctance to share information. Getting involved in collaboration in research appeared to happen mostly through existing contacts established through teaching, or other personal connections – a practice that had never engaged in this form of collaboration indicated it had never been offered the possibility, and another complained that geographic distance from the nearest school of architecture was a hindrance in this respect. Reported topics of collaborative research included design issues (hospitals), technological issues (timber construction), sustainability and housing. Academic institutions that interviewed practices had collaborated with in research included Dundee, Edinburgh, Napier, Robert Gordon, Stirling and Strathclyde Universities. Belfast was also mentioned, but only in connection to teaching.

Evidence of collaboration with specialised institutions was even scarcer. None of the large practices that were interviewed reported collaborating with specialised research institutions. Among medium-sized practices there were a couple of instances of collaboration, with BRE and other bodies with research interests such as the Scottish Special Housing Association and the Scottish Solar Energy Group. Among small practices, again only a couple reported some form of collaboration with bodies that have some specific research interests (rather than specialised research institutions *per se*), these being the Scottish Lime Centre and the Forestry Commission. BRE and RIAS were mentioned in this context by a couple of small practice interviewees as sources of information and CPD, rather than as partners in collaborative research.

Therefore, to sum up:

- there is considerable evidence of collaboration with other professionals, though not necessarily focused on research;
- collaboration with other architectural practices is less prevalent, this being often attributed to architects’ attitudes, with some evidence of networks benefiting small

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practices, as well as evidence of intra-firm collaboration in large practices with several branches;

- there is a fair amount of collaboration with manufacturers, particularly project-driven and focused on problem-solving rather than innovation per se;
- collaboration with academic institutions is very poor, often happening through personal connections and teaching links, and is seen as an area for improvement;
- collaboration with specialised research institutions is extremely low.

## **1.4 Institutions and research**

### **1.4.1 Practices' awareness of, and access to, research in academic and other specialised institutions**

Most firms interviewed expressed not to be aware of research undertaken in academia (15 of the 24). Moreover many respondents (10) highlighted the existence of a “big gap” between practice and academia in relation to research. Among the reasons for this it was mentioned that academic research seems to be focused on “abstract subjects”, it seems “commercially unrealistic” and disconnected from the real problems that architects have to deal with in practice.

However, some research subjects addressed by academic research emerged in the remaining interviews as of some interest for the respondents. These focused on technical research including timber construction, conservation, energy efficiency and green issues. Napier, Strathclyde, Robert Gordon and Heriot-Watt Universities were the most regularly mentioned research institutions.

Regarding access to published research, a considerable number of interviewed practices reported having some form of access to it (10 of the 24). The sources indicated were:

- academic journals, which appear to be reviewed only rarely (see below);
- other forms of published research that in general could be found in newsletters, professional journals (RIBA & RIAS), technical journals (BRE), building standards publications and regulations; and
- additionally, informal access to research also takes place among the practices interviewed.

In general searches are focused on construction details, technical information and the particularities, performance and regulation of specific materials.

In this context approximately half of small firms (5 of 11) indicated having access to published research, while most large firms (3 of 5) reported not having the time or tradition in practice for searching specific sources. Overall approximately half the interviewees specifically indicated not having access to academic journals. The reasons

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given for this lay partially in that practitioners do not find enough information available about the contents of these sources. A couple of respondents highlighted that it would be useful to have more straightforward access to academic journals when they need to reach information about specific subjects. In addition, 3 of the 24 practices reported having consulted academic papers when a reference indicated the source, and generally when aiming to address a specific problem.

Concerning published research other than academic journals, most of practices interviewed have access to professional newsletters and journals, such as RIAS and RIBA publications or other forms of technical periodicals. Internet searches appear to be widely used by approximately half of the practices interviewed. Other types of sources are also consulted by some practitioners. Among these are libraries or manufacturers' information. However libraries are not commonly used since only one practice reported searching for specific information in university libraries or national institutions such as Historic Scotland.

In particular large firms tend to work on the development of some form of internal database or access to the firm's accumulated knowledge to prevent repeatedly dealing with a similar problem. However, in general keeping this information updated is not straightforward for practices that generally find it difficult to "keep on track with what is going on outside and inside the office". A particular case in sharing information within the office was given by a firm associated to a network of practices throughout the UK. This network encourages the dissemination of experiences and information among its members. CPD activities were occasionally mentioned as a form of updating information within the office in relation to details from manufacturers and the use of construction technologies.

In relation to forms of practice-academic links, half of practices interviewed have or had in the past some participation in teaching in different universities. In general these activities have been carried out by at least some members of staff in the form of part-time teaching.

Regarding other forms of practice-academic links, approximately one third of practices consulted experienced some contact with academia during the development of different projects. The need for this type of link had emerged for a variety of reasons and with diverse kinds of focus, such as:

- when the particularity of the project subject needed specialised information, e.g. the development of a dementia centre;
- when specialised literature is needed, leading to searches at universities libraries;
- relating to specific technical studies, e.g. lightweight structures;
- interactions between Schools of Architecture and Engineering (a particular project called "Interact" was mentioned);
- seminars and some form of CPD activities taking place at Universities

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The majority of interviewees that reported having some experience in teaching, indicated that working with students is a very positive activity having constructive outcomes for both practitioners and apprentices.

The reasons that respondents gave for not having any form of practice-academic links included:

- lack of available time and funding;
- “not having been invited” to participate in academic activities;
- occasionally the political structure of the university was mentioned as a difficulty for enabling these links;
- universities’ caution in sharing information, which was less frequently mentioned.

In summary, therefore:

- generally there is extremely low knowledge among architectural practices of research undertaken in academia, though there is interest in issues that may be addressed by academic and specialised research institutions, particularly in relation to technology and sustainability;
- most practices access some published research through professional newsletters and journals, as well as increasingly the Internet, rather than through academic journals;
- some large and medium firms try to build up their own “knowledge banks” internally or through sharing via limited networks;
- practice-academic links tend to take place through part-time teaching, which is generally seen as beneficial to both academia and practice;
- about a third of interviewed practices had engaged with academia during the development of a project, for different reasons, but in general there are a series of factors that inhibit such collaboration, including time pressures in practice, lack of available funding, a lack of openness towards such collaboration with practice in academia, and bureaucratic structures in academia.

### 1.4.2 Practices as an institutional context for research: needs and potential

Most practices have not published any research undertaken (17 practices). However 8 firms indicated to have some form of publication of work carried out such as building construction and occasionally research. The forms of dissemination mentioned were professional magazines, websites and participation in talks and conferences, with building materials, construction technologies and particular housing typologies being among the topics they had published on. The most frequent reason given for not publishing research was the lack of both time and funding available. Academic journals did not feature as a means for publishing research in practice.

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Internal publications and networking emerged among the interviewees as a useful procedure to maintain updated information of experience gained. Moreover one third of firms interviewed (8) expressed that publications could be very useful for their practice, for other practices and for academic institutions.

The majority of interviewees (15) were not greatly concerned about copyright issues. Moreover 3 of these practices indicated the need to “give back to society” the results of the experience gained from a particular job. In this context it was frequently mentioned that architects should work in greater collaboration. However some firms (5) believed that it is necessary to be careful about freely disseminating architecture work produced. Respondents within these firms expressed that protection of information should be applied in particular occasions, e.g. when developing an idea with individual commercial interest. Two of the latter practices highlighted not only the necessity of protecting clients’ confidentiality but also the difficulty in sharing information with other practices and in particular with small firms, which were seen as benefiting from the risks taken by larger firms.

In relation to how funding affects research agendas 14 interviewees were of the view that academic research is highly driven by funding available, though awareness of how research is funded in academia or of the RAE system for research assessment was not so widespread. It was also noted that the building industry supports research as and when needed. More than the half of the interviewees (14) stated that within their practice any research undertaken is funded with each project client’s overall fees, and occasionally large and medium firms indicated that they build up a special budget to carry out research activities (3 interviewees). In addition, there was evidence that research undertaken in practice may be more highly linked to academic agendas when practitioners’ involvement in academia goes beyond part-time teaching.

Therefore in the majority of the cases (16) other forms of external/academic funding do not generally influence research undertaken in practice. In this context a significant number of practitioners highlighted the need for greater information on academic funding available. Moreover 8 of the 24 firms, particularly medium and large ones, indicated they had a particular interest in receiving information on funding available for research. These respondents highlighted that more research would take place in practice if mechanisms to access funding involved a more straightforward process. However the need to identify research agendas within practice was emphasised.

Almost half the respondents (11) indicated that practice-academic links in architecture research seem to be affected by funding available and academic research assessment. These interviewees highlighted the need for more interactions between practice, academia and also “commerce”, in order to establish research agendas.

A number of suggestions emerged among the interviewees regarding how practice-academic links could be more beneficial. These are described below according to the number of practitioners that advocated each proposal:

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- universities need to improve dissemination and information of research undertaken and facilitate this information to practices, in addition universities need to take a more proactive role in engaging academia with practice (5);
- practitioners need to interact with academic institutions and more communication should be established between practitioners and students (4);
- academia should provide some form of “accreditation or feedback” of research undertaken in practice, in order to support innovative work in practice (3);
- the need for more collaboration between academia and practice in order to identify research subjects that could be relevant for practitioners and to promote evaluation mechanisms for this research (2);
- the need to regulate interventions in the building process of architecture-related technicians if the aim is to improve the quality of design in architecture (2);
- more collaboration can help to provide practitioners with resources for research, this funding benefiting architecture projects and also clients who may be willing to be more innovative if support is made available (2);
- CPD activities are considered to be an interesting space for developing practice-academic links (1); and
- practice-based discussions were also highlighted to be needed similarly to those occurring in academia (1).

It is important to mention that while the majority of practitioners interviewed considered that practice-academic links need to be strengthened, it was also highlighted that academia should not create only “practical knowledge” since its principal objective should be to teach “to think the unthinkable”. In this context the need for academic-type spaces for discussion and experimentation was emphasised together with the need for more interactions with students.

The need for funding to support practice-academic links was highlighted by approximately one fourth of practices interviewed, but only two interviewees suggested that practices could pay for accessing information on academic research.

Most respondents (17) indicated that training in architecture research could be beneficial. A couple of practices suggested that this type of training might possibly encourage practices to “set up research arms” in a variety of topics. However, 4 respondents highlighted that this training should be relevant for the practice and contribute to its income generation. Moreover while research training could be very useful, spaces for developing research skills might not be easily found in the actual structure of the profession, which does not always allow time for carrying out research. Thus, according to these respondents, research training needs to be carefully incorporated only when necessary for a particular project or when the practice specifically identifies necessary research.

Any kind of training was encouraged by the majority of the interviewees, but in particular research training could help practices to develop more “systematic research” providing

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practitioners with skills on where to look for information. It could also encourage interactions between training and practice together with more participation and thus contributions from practitioners in academia. However, the need for research training to be focused on personal interests was highlighted by two respondents, with one indicating that you need a particular type of “enquiring mind” to undertake research.

Four interviewees felt that more emphasis needs to be given to practical knowledge rather than research training, as they find this lacking in most young professionals. In this context research training was seen as possibly being more relevant for architects with more than five years of experience.

Regarding how architecture research training could be provided, the need to study the availability of funding to undertake and supply this training was highlighted, as well as the need to consider the difficulties of actually establishing such training. In this context, there was a suggestion that clients could provide funds for research, Manufacturers were identified as possible facilitators of specific training when related to materials or building methods (2 respondents). Academic institutions were also considered as possible providers of research training, both within the institution and with a more proactive role in CPD activities (3). In addition practices could contribute to research training by making available their experiences on the use of innovative construction technology or building knowledge (1).

CPD activities were considered as having scope for providing research training by 8 interviewees, when structured and relevant for work in practice. A couple of respondents thought that RIAS could have a significant role in organising CPD activities with a focus on research training, and there was a suggestion that such CPD activities could possibly be organised regionally with ScotMARK having a delivering role.

To ensure the success of research training, some respondents stressed that it should be focused on specific problems and relevant to work in practice. Moreover the training needs appear to be mostly in learning how to access to information (4 respondents).

### In summary:

- most practices have not published research, mainly due to time and funding constraints, and if they have this has been in professional journals and through means such as the Internet, but not through academic journals;
- however, there is a perceived need for increased publication/dissemination, which is seen as potentially benefiting work in both practice and academia, and this drive is already leading to experimenting with forms such as internal publication in some instances;
- most practices are not concerned with copyright issues and indeed there is a perception of a need to disseminate, though particularly among larger firms there is some degree of concern about losing competitive edge through publishing expertise developed within the practice;

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- research in practice is funded through project fees, with only a few large and medium-sized practices establishing specific budget lines for research activities - which contrasts with the perception that academic and specialised research institutions have access to large funding streams which determine their research focus (though there is little understanding of how these funding mechanisms in fact operate);
- there is therefore considerable interest among practices in funding streams for research being made available, including to permit more interaction between practice, academia and industry;
- strengthened collaboration should allow for both the generation of more applied knowledge, but also continuation of more theoretical work;
- the majority of practices consider that training in architecture research would be beneficial, though it was noted that such training should support specific needs in practices, and that the current professional structure limits the potential to deploy the acquired research skills in practice;
- practices, clients, professional bodies, manufacturers and academia all have a role in the provision of architecture research training;
- there is scope for architecture research training through CPD activities, though these would need to be well structured and relevant for work in practice.

### 1.4.3 Support for research in architecture practice

Concerning forms of support for research, the need for advancing the agenda towards problem-solving research was highlighted. Existing academic institutions, governmental departments, RIAS or BRE could channel this, together with the provision of information on available funding. Funding is regarded to be a key issue for improving the involvement of practices in research and the generation of knowledge (7 respondents). Moreover 8 interviewees highlighted that funding for dissemination and categorisation of information available should also be provided.

Support also appears to be needed to improve the type of lifelong training available, which is considered by some respondents to require a more studio-based focus – as was the case during their university education – offering more workshops and participatory activities rather than just passive “talks”.

The majority of respondents (17) considered that government has a relevant role in supporting architecture research. It was highlighted in this context that building regulations are the result of a politically-driven approach to practice in architecture instead of an in-depth analysis of construction constraints. Thus the government was regarded as needing to take on board a more serious role in relation to policy design (3). Additionally it was suggested that government needs to lighten up the definition of what qualifies as research and that research should be a tax-free activity in order to create incentives for practitioners (1).

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A number of organisations within the government were considered to have potentially significant roles in supporting architecture research, channelling research activities, and categorizing and disseminating information. Among these Architecture and Design Scotland was seen as potentially supporting research fields and organising “impartial” access to information on specific subjects. It was suggested that this organisation could also provide research and funding for research in “quality design”. Communities Scotland was believed to need to fund more innovative research in housing and eco-housing. In addition it was proposed that The Lighthouse could make available a database of completed research. Moreover, government was seen as having a necessary role in bringing together the work undertaken by all the different organisations with a focus on architecture, and to develop communication among these. Key issues that government was seen as having a role in supporting and funding research on included: technical aspects of construction such as testing materials; and post-completion, monitoring and evaluation analysis.

Nine interviewees considered that industry should provide support for architecture research. However, it was highlighted by 4 of these respondents that the building industry is more market-led and based on commercial needs, objectives and success. Thus support from industry is regarded to be beneficial for architecture research in financial terms, but clients’ needs should also be considered.

In summary, in relation to support for research in architecture practice the findings were as follows:

- there is a need to support practical practice-oriented research;
- funding is key for improving practices’ involvement in generating and disseminating knowledge;
- life-long interactive and practical training is also key to this;
- government has a responsibility in supporting architecture research, not only with regard to funding but also policy;
- several existing organisations can also contribute to architecture research in various ways, including Architecture + Design Scotland, Communities Scotland and The Lighthouse;
- the building industry can contribute financially to architecture research, but should not overly determine the research agendas.

Finally, with regard to general comments in the context of institutions and research as a whole, the respondents highlighted various additional points:

- the need for more straightforward access to sources of information on research and on practical experience;
- the need for a form of dissemination of completed and ongoing research, which could be provided in the form of a newsletter;

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- the issues emerging from architecture schools having become absorbed into the university system, leading to a greater separation between practice and academia;
- the emergence of disconnections between perceptions of civil society and quality design in architecture, together with the need for a more educated public in terms of design;
- collaboration within practices might also have positive contributions to architecture research as well as more interactions between experienced practitioners and young professionals;
- the relevance of education not only to practical knowledge but also to learning to think the unexpected when it comes to design.

## 1.5 Change and balance

### 1.5.1 Research and architecture in Scotland

There was an overwhelmingly positive view of the benefits that research could offer to reinforce architecture in Scotland. A wide range of benefits was suggested, including:

- delivery of better places and products;
- strengthening of design ideas;
- freer and safer innovation;
- improvements in the ways in which the profession works and increased efficiency;
- enhanced access to information, including on specifications, on availability of materials locally, etc;
- facilitation of learning how to use new construction methods and technologies;
- improved learning from experience through post-completion analysis;
- social validation of the profession;
- better knowledge of the particularities that define the Scottish environment and its identity in relation to architecture.

The latter benefit was noted in some way or other by several respondents, linking improved architecture research not only to (mainly) technical issues that might be specific to Scotland, but also to the strengthening of Scottish identity and to “supporting a project for Scotland”. On the other hand, several interviewees noted the global dimension of architecture research, e.g. citing the need “to help advance the well-being of humanity”. Thus there was a suggestion that research could further understanding of problems that are particular to Scotland and not dealt with elsewhere, as well as of problems that are relevant elsewhere and on which Scotland could take the lead.

Dissemination was a key issue highlighted by several respondents, at two levels. At the international level there is a need to disseminate research into sustainable buildings because the areas of major building activity are in the rapidly urbanising world, where

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further impacts of building activity on the environment may be greatest. Better dissemination at the local (Scottish) level was called for by several small practices, which tended to see themselves more as potential beneficiaries of enhanced architecture research rather than as undertaking increased research activities. Indeed, there was a suggestion from one small practice that enhanced research would benefit architecture as a whole across Scotland but not individual firms, while another indicated that large offices would be best placed to benefit, because small offices do not have time to undertake research and need to concentrate on ensuring commercial success.

Therefore, in summary, it is clear from the interviews that:

- architectural practices consider that research offers a wide range of potential benefits to architecture in Scotland;
- such benefits would go beyond the technological problem-solving and project-driven research to encompass cultural issues within Scotland, as well as broader issues relevant to humankind in general;
- dissemination is key to achieve the spread of benefits arising from this research throughout Scotland and internationally.

### 1.5.2 The scope for institutional strengthening of links around architecture research

Among interviewees there was unanimous agreement that some form of institution could strengthen links around architecture research, with one interviewee noting that no organisation has that specific role at the moment. Some stressed that there is a strong need for closer research (and design) links between academia, practice, professional bodies and industry. A key role that such an institution was seen to have was ensuring good communication and facilitating the flow and availability of information, with several interviewees visualising such an institution as providing some form of centralised access to research information – a database was suggested. Only one respondent cautioned that there may be a potential risk of increasing bureaucracy, and another expressed the view that such an institution would need strong leadership in order to avoid the old adage – “a camel is a horse designed by a committee”.

A range of ideas was offered by the interviewees regarding the type of activity such an institution might engage in. It was suggested that the aims of the institution ought to be to further better research, dissemination & training. In order to do so, possible activities that were identified included:

- generating a platform for lively discussion rather than being based on a formulaic specific committee, which can be dull;
- coordinating organisations related to architecture research by creating a network-based platform;
- establishing standards for practice-related architecture research including setting common formats for those who produce research, ensuring clarity in research

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- writing up, and defining research in relation to “realistic” practice-oriented benefits (including commercial ones);
- collating and disseminating potentially useful research, applying validation and gradation mechanisms;
  - taking on a third party role in publishing practice-based research;
  - making information available through conferences, seminars & publications;
  - creating a website where practices can access architecture research.

Notes of caution were raised by several interviewees concerning funding for the above activities, as there was suggestion that services provided ought to be free, and therefore appropriate sources of funding would need to be identified. At least one respondent also noted that such activities should not rely solely on altruistic collaboration, as architectural practice is a very competitive environment

In relation to which institution could take on the role and organise the activities described above, the vast majority of respondents indicated that this should be either based in an existing organisation or established as a partnership. Only 2 respondents suggested the creation of an independent institution, while 3 argued against such an independent institution because of the abundance of bodies in the area already (such argument being explicitly made by small practices only). The existing body most frequently suggested to take the lead was RIAS (by 12 interviewees, mostly from small and large practices), with only 2 respondents specifically stating that RIAS ought not to take on this role. Reasons for RIAS’s suggested lead included its existing role vis-à-vis practices providing these with information and legal advice as well as its role in protecting the profession and the public, and the existence of a RIAS-based dissemination vehicle – *Prospect*. Reasons cited against RIAS taking a lead included the problem of agenda setting and issues around its capacity.

A partnership was suggested by 7 respondents, reasons being given for this possibility including the opportunity it would open up for different participating institutions to have specific influences and for the overcoming of particular problems attached to a given sector taking the lead. Academia was suggested as a possible leading agency in institutional strengthening of architecture research also by 7 interviewees, with only 1 specifically arguing against this. Suggested advantages of academic leadership and input included research experience and access to funding, while issues against a strong academic role included possible vested interests among universities and their distance from practice. The Scottish Executive was suggested as a possible home institution or leader in a partnership by only 3 of the interviewees, with one specifically opposing this possibility. A particular reason for basing the institutional strengthening of practice-related architecture research in government was the possibility that this might increase available funding, while a disadvantage was the possibility of the institution being subject to political agendas. Other existing institutions that were cited (less frequently) as possibly taking a leading or strong role included the Lighthouse, Architecture & Design Scotland, and ScotMARK. In addition, a couple of respondents suggested the need for input (e.g. in defining research areas) and funding from industry. In relation to institutional models, a suggestion was made that past models be studied; in this regard

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possible examples to analyse include BRE, EDAS, GLC and SSHA. In summary, whatever institution took the lead in such an initiative, as one respondent put it, this would need to have funding, a good brief and clear intentions, and as others pointed out, it should be established in such a way that it allows research to be practice-led and relevant, while linking the profession more closely with academia.

In relation to geographic coverage, the most frequent view (16 respondents across all sizes of practice) was that any institutional strengthening of research links ought to take place at the national Scottish level, with one respondent even advocating this to happen at a level beyond Scotland. Of those interviewees supporting a national level, 5 expressed the need for some form of acknowledgement and support of local needs, including through: representation of local organisations; providing access to information on local materials and construction methods; recognising differences in issues in rural and urban areas (rather than on a strictly geographic basis); using place identity to raise the research profile (at both national and regional levels); and using local chapters to foster participation. For the few (3 respondents) who considered that institutional strengthening should have a regional or local dimension, the reasons were: local variations in climate-related issues; influence of place and identity on the potential organisation; and the local variations evident in RIAS chapters structure. In addition, it was noted that at whatever level such institutional strengthening is pitched, it is likely that research will be centred in larger towns, and that avoiding centralisation in the Central Belt would require good provision of electronic means for communication and dissemination (local CPD having a role to play in the latter).

### In summary:

- there is a unanimous view that some form of specific institutional support to strengthen links around architecture research is required;
- a wide variety of activities that such institutional support could undertake were suggested, its aims being to further better research, dissemination and training;
- there is strong support for specific institutional support to be based either in an existing organisation or in a partnership involving the various bodies involved, with RIAS being most often cited as possible leading organisation from the point of view of practice;
- such institutional strengthening should take place preferably at the national Scottish level, though there is a perception that some form of acknowledgement and support of local or regional needs should be present.

### 1.5.3 Key recommendations from interviewees

When asked for key recommendations for promoting relevant research, respondents again, as in other parts of the interviews, provided a wide range of suggestions. A considerable number made recommendations that related to **research topics**, with it being suggested that there is a need to promote certain research themes, and that

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professionals need to have significant input in defining applicable research. Thus a need was identified to map issues of interest to practice and to link these to a research agenda. Specific topics suggested as being of particular interest included, among others: (1) issues around sustainability; (2) post-occupancy studies, which would look at building performance, possibly following up on any research undertaken during the design stage, and which could possibly follow a standard format – the particular interest of analysing failures being noted; (3) issues in Scottish architecture and building – such as the performance of modern materials in the Scottish environment; (4) pre-fabrication; (5) research focused on the countryside; and (6) in-depth analysis of housing and planning issues.

The next most frequent group of recommendations (from 7 interviewees) addressed **access to research** (which they felt needs to be made easier) and **dissemination**, which is fundamental to increased accessibility and thus needs to be improved. It was suggested that enhanced dissemination required research to be written up in an easily legible way, covering technical and practical experiences and testing, and including feedback from other practitioners. These research dissemination products could be made available through an edited architecture research website with filtered and structured contents.

Six interviewees included among their key recommendations the suggestion that a **leading body** take on a strong role in promoting architecture research (though possibly leading a wider network of organisations), with RIAS being identified by half of these as an appropriate body for such role, mainly due to the mechanisms already in place in this institution (see also previous section). Particular activities that this leading body could undertake included: promoting research through e.g. competitions, dissemination and liaising with industry; engaging “key people” to ensure feasible achievements; generating a research agenda; undertaking analysis of key examples of architecture describing experiences in design and construction (i.e. building up a database of case studies); and using a regular means of dissemination such as RIAS’s monthly practice email. It was suggested that the leading organisation would have to take a proactive role.

An issue that was identified in the key recommendations of 6 interviewees was that of the need for closer **collaboration between academia and practice**. Enhanced academic-practice links were seen as being extremely necessary in order to foster research that is relevant to architecture practice (though it was also noted that non-applied research is important as well). It was suggested that closing the gap between academia and practice would involve encouraging practitioners to engage in academic/work links.

**Communication and information** was an area flagged up as important by 5 interviewees (thus reinforcing the significance attached to dissemination – see above). Good communication was seen as essential for architecture research and for good links between research-related agents and practices. It could make relevant information on research and funding more accessible. Suggested means to achieve this included the

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leading body (see above) providing information on research funding, the provision of good CPD information covering research issues, and the publication of a newsletter containing research-related information.

A set of key recommendations was concerned with the **relevance** of architecture research (4 respondents). It was suggested that there needs to be architecture research that is relevant and helpful for practices, i.e. that has practical application. Setting a relevant research agenda would therefore require analysing who the research is being promoted for.

Raising **client and public awareness** was a key recommendation also made by 4 interviewees. The view was that the public needs to be educated in architecture and the built environment from an early age to encourage more openness to, and support for, architects' ideas. It was suggested this be done from an early age, i.e. with schoolchildren, as well as addressing the general public. Raising clients' awareness of key issues, such as energy efficiency, was also considered a potentially positive step, as clients could become strong drivers for research.

Other key recommendations included: (1) the need for training in how to undertake research, as well as in locating and evaluating available research that might be of interest to the practice; (2) establishing funding streams for practice-relevant architecture research such as providing universities with funding for practice-oriented research and encouraging manufacturers to fund research; (3) fostering changes in architects' attitude and approach to research, building this in to their approach to design; (4) identifying what would motivate "the right people" to get involved in research and/or use research more, as funding alone is unlikely to work; (5) ensuring "good governance" in whatever institutional structure takes a leading role in promoting architecture research; and (6) avoiding words but no action, i.e. "start doing it".

Interviewees were also asked for other (non-key) recommendations for developing architecture research. These replicated most of the key recommendations made above, though with a different emphasis. The highest emphasis was on the need for more **collaboration** (6 respondents), particularly between practices and academia. In this context suggestions were made regarding different roles that could be adopted by different institutions: e.g. a coordinating organisation could present research proposals to architecture practices; architecture research could be divided into types with academia and/or RIAS undertaking more general or theme-specific research with practices focusing on project-led research; alternatively practitioners could teach building issues while universities focused on research and design issues; and, finally, medium and large firms could carry out research in academia. It was noted that to achieve closer collaboration it was necessary for RIAS and academia to take the first step in promoting involvement with practices.

The need for enhanced **communication and information** was also emphasised among the further recommendations, through providing more access to information on research,

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as well as on related issues of interest to practices such as local availability of materials, and through sharing information between different organisations and practices – activities for which RIAS was suggested as being well placed. Linked to this was the recommendation of improved **access to research and dissemination**, through the creation of means for research dissemination in Scotland and internationally, which could have an important role in demonstrating the applied potential of research ( e.g. through government-supported dissemination of examples). **Funding** issues could be addressed through making research meaningful to decision-makers who provide funding (eg. politicians), as well as through fostering a funding role for the building industry. Respondents also added to the **research topics** that were put forward as key recommendations, again highlighting sustainability, energy efficiency and use of local materials as important topics. Other issues already raised as key recommendations included: the co-ordinating action that could be taken by a leading body (with government support); the need for practice-relevant research; and the need to support a “visually literate public”. Additional issues raised included: the need to address the issue of liability in any support mechanisms that were established for architecture research; the need to get manufacturers involved in research; and the need for better educated architects in order to produce better architecture.

In summary, therefore, besides a number of recommendations related to specific research topics, the main key recommendations made by interviewees for promoting relevant research were:

- to improve access to research and dissemination;
- that a leading body should take a strong role in promoting architecture research, with RIAS being the main candidate for such role from the practice point of view;
- to work towards closer collaboration between academia and practice;
- to improve communication and information, not only on research per se but also on research funding, related CPD activities, etc;
- to set a research agenda that is relevant and helpful for practices;
- to raise client and public awareness, with education from an early age having a strong role to play in this.

## APPENDIX 3 - SEMI-STRUCTURED INTERVIEW GUIDE

### Key question areas

#### Nature of research

- What is your view of the nature of research in architecture practice?
- What is the nature of any architecture research undertaken in your practice – currently and/or previously? Has this changed over time, and if so, why?
- Has architecture research contributed to any changes in your practice over time, and/or can this in future? If so, how?
- Is research driven by the practice or individual interests?
- Does architecture research involve collaboration/interchange with other professions and/or manufacturers, and if so which and how?
- Does architecture research involve collaboration/interchange with academia or other specialised research institutions, and if so which and how?

#### Institutions and research

- What is your perception of architecture research currently undertaken in academic or other specialised research institutions?
- Do you access any published research, and if so how?
- Do you have access to research in other ways (formal & informal), and if so how?
- Have you published or otherwise disseminated your own architecture research? Are there issues of privacy/copyright associated with practice-based research?
- To what extent does available funding drive research agendas and how does this affect architecture research? Does this also affect practice-academic links for research?
- What other forms of practice-academic links do you have and have these an influence on your attitude to research in practice?
- How can practice-academic links be more beneficial, especially for future architecture research?
- Is there a need for practices to access training in architecture research, and if so how would this be best provided?
- What other forms of research, or support for research, can be provided for architecture from government or industry??

#### Change and balance

- How can research benefit and/or reinforce architecture in Scotland?
- Can some form of institution strengthen such links, and if so which (e.g. within the profession, within academia, within government, through partnerships etc.)?
- Is there a regional dimension to this, or should this be a national effort across Scotland?
- What would be the key recommendations for promoting relevant research (for professional and/or academic institutions and/or government)?
- Do you have any other recommendations on developing architecture research?

**APPENDIX 4 - SAMPLE CONSTRUCTION**

The RIAS membership database has the following information on practices: registration number, name/address, chapter affiliation, number of RIAS registered architects, other architects, other staff. This has been used to create a “universe” database of private architecture practices across Scotland with RIAS registered members, broken down by size and location.

The size factor has included all architects in the practice, not just RIAS members and this has been split into three categories<sup>5</sup>:

- large practices (11+ architects) = 21 practices (5%)
- medium practices (3-10 architects) = 108 practices (24%)
- small practices (1-2 architects) = 329 practices (72%)

The location factor breaks down into five chapters:

- Aberdeen = 31 practices (7%)
- Dundee = 49 practices (11%)
- Edinburgh = 147 practices (32%)
- Glasgow = 162 practices (35%)
- Inverness = 52 practices (11%)
- Stirling = 16 practices (3%)

The target sample takes these aspects into account and applies 5% coverage, rounding up to full figures weighting this to ensure the role of larger architectural practices in research is adequately represented, as follows:

	Aberdeen	Dundee	Edinburgh	Glasgow	Inverness	Stirling	<b>sample</b>
small	1	2	3	3	1	1	<b>11</b>
medium	1	1	3	3	1	0	<b>9</b>
large		1	2	2			<b>5</b>
<b>total</b>	<b>2</b>	<b>4</b>	<b>8</b>	<b>8</b>	<b>2</b>	<b>1</b>	<b>25</b>

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**APPENDIX 5 - NOTES AND REFERENCES**

<sup>1</sup> Jenkins, P., Forsyth, L. & Smith, H. (2004a). **Balancing three dimensions in architectural research: depth, breadth and length. An institutional analysis of research in architecture in the UK higher education sector: The Scottish Dimension**, Edinburgh College of Art, available at: [www.eca.ac.uk/pdf/scottish\\_dimension/report.pdf](http://www.eca.ac.uk/pdf/scottish_dimension/report.pdf)

<sup>2</sup> It should be noted that there are a comparative number of chartered architects employed in practices whose data has not been advised to RIAS as well as those employed in other areas such as local authorities, academia etc. RIAS estimates that there are approximately 1000 practices within Scotland employing some 2700 chartered architects in total.

<sup>3</sup> Each of these activities was mentioned by only one interviewee.

<sup>4</sup> Two practices explained that they had been in operation for a short time and had thus not experienced major changes.

<sup>5</sup> In fact the breakdown is as shown in the following table.

	number of architects in firm	number of firms on RIAS database	% of firms in database	number of architects	accumulated number of architects	% of number of accumulated architects across database
	1	258	56.3%	258	258	18%
	2	71	15.5%	142	400	29%
	3	43	9.4%	129	529	38%
	4	22	4.8%	88	617	44%
	5	20	4.4%	100	717	51%
	6	5	1.1%	30	747	53%
	7	8	1.7%	56	803	57%
	8	3	0.7%	24	827	59%
	9	6	1.3%	54	881	63%
	10	1	0.2%	10	891	64%
	11	2	0.4%	22	913	65%
	12	2	0.4%	24	937	67%
	13	1	0.2%	13	950	68%
	14	2	0.4%	28	978	70%
	15	1	0.2%	15	993	71%
	16	2	0.4%	32	1025	73%
	17	4	0.9%	68	1093	78%
	18	1	0.2%	18	1111	79%
	21	1	0.2%	21	1132	81%
	26	1	0.2%	26	1158	83%
	28	1	0.2%	28	1186	85%
	48	1	0.2%	48	1234	88%
	61	1	0.2%	61	1295	93%
	103	1	0.2%	103	1398	100%
total	458	458		1398		