Name	Yvan Petillot
Job title	Professor
Organisation	Heriot-Watt University
Can SFC contact?	
Summary of experience of research pooling initiative	I have been involved in research poolings since 2008, first with the Edinburgh Research Partnership (ERP) and more recently with SRPe in Robotics. In the case of ERP, the initiative brought critical mass around signal processing in Edinburgh and resulted in the creation of critical mass in Scotland in this area. Notable wins are large EU and EPSRC programs, especially in the defense sector (UK Defense Research Centre in Signal and Image Processing), ERC grants etc... The main advantage of such poolings is that they help to build the critical mass necessary to win large scale projects nationally.
Q1a. What has been the impact of the initial research pooling initiative?	Large scale grants in Signal and Image processing. Better links to Edinburgh University in general. It has also provided an example of what could be achieved, followed, for example by the Edinburgh Centre for Robotics Initiative.
Q1b. What lessons can be learnt from the research pooling initiative?	Early funding to facilitate collaborations is key. This can take the form of PhD studentships (very efficient) to staff support for networking and grant bidding (efficient).
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Built critical mass at Scotland level through the identification of a few key centres (National Manufacturing Centre, National Robotarium) and alignment of sector with these.
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes.
Further Comments	a- Prioritising areas with critical mass and real leadership: 1- Robotics & AI 2- Manufacturing 3- Quantum. b- Have one centre area only in Scotland. Focus resources and impact. c- Try to play to each region's strength.

Name	Mark Dunlop
Job title	Senior Lecturer
Organisation	University of Strathclyde
Can SFC contact?	
Summary of experience of research pooling initiative	As a computer science academic I have been involved in SICSA events.
Q1a. What has been the impact of the initial research pooling initiative?	Massively improved communication between Scottish Unis, in especially between PhD students that has supported their development and opened them to better mobility within Scotland as they know the other groups and people better.
Q1b. What lessons can be learnt from the research pooling initiative?	Although the budgets are very tight there have been many small benefits of SICSA leading to tighter collaborations.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes - ideally with more funds to support more cross-site collaborations.
Further Comments	

Name	Peter Edwards
Job title	Professor
Organisation	University of Aberdeen
Can SFC contact?	
Summary of experience of research pooling initiative	I was involved in early discussions around SICSA and SUPA, and experienced how certain HEIs in Scotland aggressively used the pooling agenda for their own benefit, often in a non-inclusive manner. The perceived benefit of pooling to Scotland has been to make the strong even stronger.
Q1a. What has been the impact of the initial research pooling initiative?	On small units, primarily negative.
Q1b. What lessons can be learnt from the research pooling initiative?	The importance of being inclusive, and not letting certain institutions adopt a dominant position.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Outside Scotland they are largely seen as irrelevant; I have worked for many years with RCUK and now UKRI and colleagues across those organisations barely knew of their existence - and certainly did not see them as strategically significant.
Q2b. Should research pools have a continuing role in the Scottish research base?	No - they have run there course and I would prefer to see the funding (and energy) applied elsewhere.
Further Comments	

Name	Ian Reid
Job title	CEO
Organisation	CENSIS
Can SFC contact?	
Summary of experience of research pooling initiative	Member of SICSA advisory board. Regular dealings as an Innovation Centre with SRPe, SUPA, MASTS and to a lesser extent with SINAPSE and ETP.
Q1a. What has been the impact of the initial research pooling initiative?	From an Innovation Centre perspective the pools simplify navigation of the Scottish NEI research landscape and improve the efficiency of communications with these communities. Interestingly the researching pooling idea is viewed with a degree of envy south of the border and this may be to do with the perception that such bodies carry extra lobbying power through their focus.
Q1b. What lessons can be learnt from the research pooling initiative?	As in most things of this type, some pools seem to work better and have a higher profile than others. Might a little more guidance on scope of their remit and governance help in this respect?
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Amongst the industrial base CENSIS deals with, there is limited recognition and understanding of the pools.
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes, but not necessarily the same pools in the same format. A review of effectiveness and mapping on to the evolving academic and industrial bases is timely.
Further Comments	If we believe they are relevant then we should also ensure they are resourced adequately and have a long term tuning horizon to aid planning.

Name	Alessandro Laudicella
Job title	PhD Student
Organisation	SAMS
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I believe it is a great opportunity to share idea and network with people. I have been to the last MASTS ASM and got a possibility to present some results of my PhD project to a wide audience. MASTS provides small funding opportunities for short research projects/travelling grants which allow mobility between UK and international Universities. Personally I am extremely satisfied with it.
Q1a. What has been the impact of the initial research pooling initiative?	
Q1b. What lessons can be learnt from the research pooling initiative?	Connection is fundamental in research. to connections follow ideas which can lead to research projectas and innovation.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Providing a platform to conntect researchers, in partnership with universities providing opportunities for training/doctorate. By injecting small grants in the research allow mobility and the establishing of connections between Scottish, UK and International research bodies
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes
Further Comments	

Name	Karl Burgess
Job title	Senior Research Fellow
Organisation	University of Glasgow
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I am manager of the SULSA-funded Scottish Metabolomics Facility, now part of Glasgow Polyomics. SULSA set up the facility, across both Glasgow and Strathclyde university, as a research pooling initiative.
Q1a. What has been the impact of the initial research pooling initiative?	
Q1b. What lessons can be learnt from the research pooling initiative?	
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The changing funding landscape has had considerable impact on the development of what, at its inception, was the Scottish Metabolomics Facility. Sustainability has always been a key requirement of the facility, as expert staff and cutting edge techniques and equipment are essential for the research environment across Scotland. High level commitment has been strong, but there is a significant push to recover full economics costs which leads to a challenging environment. The Scottish Metabolomics Facility relies heavily on interdisciplinarity to function. Each project requires the input of biomedical scientist, analytical chemists, data scientists and biochemists. As a core facility we are heavily engaged in challenge-led research, with collaborative research ventures being the norm. Metabolomics (and other omics research) is both hypothesis generating and hypothesis testing. While informal relationships have developed with the innovation centres, there is no formal connection between the innovation centres and research pooling centres. Flexible funding to cement relationships with pooling centres would be a useful addition to the innovation centres.
Q2b. Should research pools have a continuing role in the Scottish research base?	Absolutely. Interdisciplinarity is required for future science. The presence of core facilities such as Glasgow Polyomics allows access to expensive state of the art analytical technology and more importantly unique analytical, technical and biochemical expertise without the requirement to duplicate the platform in every university or department. Additionally, training is a critical aspect of a university's remit, and these facilities provide a unique intellectual resource for the next generation of scientists. As interdisciplinarity increases, the model for pooling should develop to strongly focus two areas: developing the capacity (both in instrumentation and staffing) for in-depth training of the next generation of scientists, who will be supported by current cutting-edge technologies; and wider availability of research pools – core supported facilities (containing both experts and equipment) who work with and support projects, which, due to the current and future funding landscape may be on shorter timescales than the typical 3-year PhD or postdoc. There are three key areas that the research funding pool supports: maintaining Scotland's reputation for scientific excellence, developing and producing the next generation of scientists and entrepreneurs and supporting Scottish innovation and enterprise. In the first two areas (scientific excellence and training), investment via government funding to support future developments is essential. While it is possible to fund training and research via typical research grants, platform technologies are more challenging to maintain at cutting edge. With improvements in analytical technology beating Moore's law (in the case of genomics for example) in recent years, equipment installations can rapidly become obsolete, so support for staff, equipment and maintenance should be considered in the long term. Flexible funding, such as the SULSA LEADERS grant, of which the author is a recipient, is instrumental in continuous professional development as well as building the facility's international reputation (Glasgow Polyomics is a member of the Reseau Francophone Metabolomique et Fluxomique (RFMF) and was instrumental in the development of the Metabolomics Association of South Africa (MASA)). Close relationships with instrument vendors (Polyomics was one of three academic beta-testers world-wide for Thermo Fisher's GC-Orbitrap and ICS-5000 instruments) have also allowed the developments of a close relationship with the African Centre for

	Genome Technologies (ACGT) in Pretoria, South Africa. Only in the third area (supporting Scottish Innovation) could the argument be made that core facilities should be revenue-positive. In the latter case, however accessibility to high end equipment and expert services for what is usually a high-risk project is beyond the capacity for most Scottish SMEs, and therefore mechanisms should be in place to support SME R&D, which are likely to lead to the next generation of industrial revenue growth. Working with academic/industrial partnership organisations, such as Scottish Enterprise, or the Catalyst programs is essential in the future. Omics technology for example, (and Glasgow Polyomics specifically) is written into the Scottish Industrial Biotechnology National Plan.
Further Comments	SFC's funding of the Scottish Metabolomics Facility kickstarted a wider revolution in small molecule analysis in Scotland. While the facility itself has grown to incorporate proteomics, genomics and data analysis to provide a 'one stop shop' for all omics projects, an informal grouping of small molecule researchers has culminated in the development of the Scottish Metabolomics Network, which is now an affiliate of the international Metabolomics Society and has recently completed its fourth annual conference with over 100 attendees and substantial industrial engagement. Our primary focus was on building relationships and directly pooling resources and expertise, so that best practises could be shared and projects could be directed to the resource with the greatest expertise. Polyomics, and especially the metabolomics unit, has an international reputation, particularly in the areas of industrial biotechnology and clinical research. Metabolomics alone supports nearly 100 projects per year. For this reason, research pooling should focus on expertise and capability overall in a given centre, rather than simply providing facility resources.

Name	Ian Phillips
Job title	Chief Executive
Organisation	OGIC - the Oil and Gas Innovation Centre
Can SFC contact?	
Summary of experience of research pooling initiative	Limited contact with Engineering Technology Partnership (ETP)and Scottish Research Partnership in Engineering (SRPe) ETP director sites on Board of OGIC I have presented specific industrial challenges to SRPe
Q1a. What has been the impact of the initial research pooling initiative?	
Q1b. What lessons can be learnt from the research pooling initiative?	
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Almost invisible to the oil and gas industry
Q2b. Should research pools have a continuing role in the Scottish research base?	
Further Comments	My experience of ETP is that it has done little in the oil and gas arena - even though this has been one of its stated "areas of focus". It appears to largely chase available funding in other forms of energy I presented a significant industrial challenge to a workshop attended by academics from multiple universities. The response is best summed up as "this is not my personal area of interest" .....little or no effort was made to consider more widely how this challenge could be articulated to other possibly interested academics or research groups. I left with the impression that this was a loose cooperative of individual researchers rather than a coherent and coordinated strategic organisation.

Name	Tim Stojanovic
Job title	Lecturer in Geography and Sustainable Development
Organisation	University of St Andrews
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I have been involved in the Marine Alliance for Science and Technology pooling since its inception, and I currently play a role as a co-chair of one of the fora. The MASTS pooling is excellently and efficiently coordinated and managed, has encouraged high quality research, and has been particularly effective at linking researchers and professional practitioners including government.
Q1a. What has been the impact of the initial research pooling initiative?	High quality research with applied science- (e.g. funded collaborative PhD on Adaptation to Climate Change in Scottish Island Communities.) Increased networking and collaboration between government and researchers (e.g. MASTS Forum Workshop on Science of/for Marine Planning bringing together delegates from Scottish government, local partnerships, natural and social scientists).
Q1b. What lessons can be learnt from the research pooling initiative?	Effective leadership and co-ordination of research across Scotland. Emphasis on high quality research with involvement of knowledge co-producers in government, industry and third sector.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	MASTS pooling has led to an increase in the critical mass and visibility of marine research and Scotland, which is illustrated by the Annual Science Meeting being one of the biggest gatherings of marine related researchers in the UK.
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes
Further Comments	

Name	David Sugden
Job title	Professor Emeritus
Organisation	University of Edinburgh
Can SFC contact?	Yes
Summary of experience of research pooling initiative	David Sugden (Edinburgh), Paul Bishop (Glasgow) and Tony Fallick (SUERC) were the main proposers of SAGES at the outset. We had learned how collaboration could help the community from our experience of bidding for ever increasing capability, including from NERC, at SUERC. I was first Director of SAGES.
Q1a. What has been the impact of the initial research pooling initiative?	When I look back, there are several significant benefits from pooling, some hoped for but some unexpected. I emphasize this is a personal view. 1. SAGES allowed Scotland to recruit top world figures to Scottish universities. We had a double page advert for some 39 (?) posts published in Nature. It had a huge impact both directly in attracting top talent from across the world, but also for the general world image that something interesting was going on in Geoscience in Scotland. 2. This pooling initiative brought together a cluster of small disciplines that found they could contribute more together as an cross-disciplinary whole. Previously we had departments studying geology, geography (physical and human), meteorology, environmental chemistry, ecology, geophysics, environmental science. Such small departments were finding it increasingly difficult to have the credibility to win UK research grants. 3. SAGES is probably unique in including such a wide range of disciplines from pure science such as Geophysics to Social Sciences such as Human Geography. The pooling initiative places SAGES and Scotland in a good position to contribute to the pressing need for research across the science/social science interface. 4. Collaboration within SAGES has achieved significant cross institutional benefits, for example efficient use of facilities (SUERC), joint NERC and other research grants, jointly supervised research students, an annual research meeting that helps that trigger new research initiatives, etc. 5. An unexpected benefit I encountered as initial Head of the School of GeoSciences in Edinburgh was the additional clout and support it brought to the field of Geoscience within the university. Scotland is renowned abroad as the birthplace of Geoscience and this recent support within universities has helped Scotland live up to its reputation. Before SAGES this status was rarely recognized internally.
Q1b. What lessons can be learnt from the research pooling initiative?	
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	
Q2b. Should research pools have a continuing role in the Scottish research base?	
Further Comments	

Name	Sian Henley
Job title	Lecturer
Organisation	University of Edinburgh
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I have benefitted from a Small Grant and a PECRE (postdoc and early career research exchange) Grant from SAGES, and I serve on the Research and Innovation Committee of SAGES as a co-leader for Theme 3: Atmosphere, Oceans and Climate. I have also been involved with various activities through MASTS, although to a lesser extent than with SAGES.
Q1a. What has been the impact of the initial research pooling initiative?	The research pooling initiative has been world-leading in bringing together research communities from across Scotland and from overseas e.g. SAGES and its developing partnership with Geoverbund in Germany. This has led, directly or indirectly by nurturing and developing research collaborations, to publications in high-impact journals and successful grant proposals. Perhaps the most tangible impacts have been on enhancing the development of Scotland's early career researchers through a series of relatively small funds that can be applied for to conduct fieldwork, laboratory analyses, community consultations, to attend conferences and training events, and to develop skills and research networks. These grants can be invaluable to early career researchers, who are often limited by financial resources, and can lead to outputs with value far in excess of the amount of money awarded by the research pools. This in turn feeds back into the collaborative culture that exists within and between the pools and makes the Scottish research pooling initiative an exemplar system for the international research communities.
Q1b. What lessons can be learnt from the research pooling initiative?	The initiative does a fantastic job of promoting research collaboration both within and beyond Scotland, making it an excellent example for maximising research outputs far beyond the value of individual contributing individuals and teams.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The pools are perceived to bring people together to develop research ideas and directions, and to provide important funding to facilitate these interactions. They have a strong role in training researchers at all career stages and providing a platform for communication that would not happen without the ethos and resources of the pooling initiative. The pools also have a strong role in promoting Scottish research at the international level and providing a unified voice for supplying evidence to governmental, financial and other organisations.
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes, definitely. Research pooling gives Scottish research and researchers substantial benefits in terms of research impact, links to policy, societal and industrial stakeholders, international reputation, and career development and progression. The cost of funding the pooling initiative is vastly outweighed by the value of its benefits to Scotland's research and researchers.
Further Comments	In addition to the clear advantages of the research pools for Scottish research and the many researchers who benefit from the opportunities created by the pooling initiative, the pools also give researchers the opportunity to become involved in the organisation of the pools and thereby the direction of research at the national scale. Further, serving on the committees of these pools provides a unique opportunity to develop important management, diplomacy and decision-making skills, which are very important in driving career progression. Whilst anecdotal evidence only, I recently obtained a permanent lectureship after a 5-year NERC Fellowship, and one of my attributes that the panel were particularly impressed with was my contribution to national and international research organisations and initiatives. This is another example of how the pooling initiative can contribute significantly to career development in Scotland.

Name	Alejandro Gallego
Job title	Oceanography Group Leader
Organisation	Marine Scotland Science
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I have been a member of two Steering Groups within MASTS's Research Themes (one in the old structure, one in the current one). I have co-organised and attended MASTS workshops, and attended science meetings organised by MASTS and its fora. I have been a participant in projects that have had a MASTS presence (e.g. providing management support). I currently co-supervise a MASTS PhD. Most members of my research group participate actively within MASTS.
Q1a. What has been the impact of the initial research pooling initiative?	I think MASTS has had a very important impact in marine science in Scotland, providing a considerable degree of co-ordination, communication and synergy.
Q1b. What lessons can be learnt from the research pooling initiative?	That in a relatively small country it is considerably more effective to collaborate than to compete.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	I think it is very positive in the field of marine science at least.
Q2b. Should research pools have a continuing role in the Scottish research base?	Definitely.
Further Comments	I can only speak about MASTS, where I have been very involved (both personally and through my research group, and also institutionally) and, to some extent, about SAGES, but MASTS has raised the profile of marine science in Scotland at national, UK and international level, and it has also resulted in numerous practical benefits (through collaboration) in the field of marine science and its relevance to policy and society. I strongly believe it should be maintained and supported as an established mechanism for the future.

Name	Michele Christian
Job title	Division Manager Natural Resources
Organisation	Government of Pitcairn Islands
Can SFC contact?	Yes
Summary of experience of research pooling initiative	The Government of Pitcairn Islands has an MoU with St. Andrews Universities Marine Alliance for Science and Technology Scotland (MASTS).
Q1a. What has been the impact of the initial research pooling initiative?	MASTS has created durable and productive collaborations and partnerships through projects and co-supervision of PhD students, and graduate internships. Themes and Forums have created a structure that encourages positive working relationships between researchers and other stakeholders including industry, regulators and Government. Marine Scotland Science were founding members of MASTS. Scottish Natural Heritage (SNH), the Scottish Environment Protection Agency (SEPA), the Joint Nature Conservation Committee (JNCC) and the British Geological Survey (BGS) have now joined MASTS.
Q1b. What lessons can be learnt from the research pooling initiative?	Time is required to develop trust based on transparency, fairness and impartial leadership of the Pools and is vital to underpinning effective collaborations. Once gained, more effective cooperation can be established with partners confident that their interests will be properly consider and protected. Involvement, communications and a mandate from the researchers is essential. The election of group (Forum) leaders has proved a success in MASTS.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Pitcairn Island is on UK Budgetary Aid funds available are very tight plus we don't have the expertise or facility for research therefore we rely heavily on partnerships. Partnerships provide Pitcairn with data, training and economic development. Reduced research funding and lack of training opportunities for potential doctoral students has made the pools more important as they have become adept at maximizing the use of limited funds and securing larger cooperative funding opportunities. The pools initially had, what seems in retrospect, generous funding. A much less generous second phase of “maintenance” funding has meant reduction of ambition and a focus on fewer key deliverables among the pools, often focusing on the graduate Schools at the expense of other equally important areas of development such as post-doctoral and early career researcher opportunities. It was clear that pools have to adopt an interdisciplinary, challenge-led research and innovation agenda. The policy agenda has become ever more prominent (especially under BREXT) and MASTS was formally referenced in the Scottish Marine Science Strategy, which is founded upon the principles of research to support: Clean, healthy, safe, biologically diverse and productive seas, managed for the benefit of people and nature. MASTS has, from the outset, worked closely with Government, regulators, industry and other relevant stakeholders.

	Our partnership with MASTS is extremely important to Pitcairn's marine reserve and to marine sciences as our waters is an "unknown".
Q2b. Should research pools have a continuing role in the Scottish research base?	Absolutely. It is small communities with limited budgets that benefit from research pools through their partnership with organisations, Universities etc.
Further Comments	The pooling model is variable and reflected differently in each pool. It would be difficult to judge all pools with the same metrics. MASTS as the last and the largest of the pools to be funded has demonstrated its value and potential and lack of further support would remove what has become an exemplar of national organization which is also recognised internationally.

Name	Brice Rea
Job title	Professor
Organisation	University of Aberdeen
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I have been an active member of SAGES from the outset, having benefited from funding via co-supervision of PhD studentships, small grants and activities of various working groups and research fora. I became the University of Aberdeen representative on the SAGES Executive Committee at the end of Phase 1 and was active in the submission of the successful proposal for follow-on funding. In Phase 2, after the appointment of the new Director, Professor Mark Inall, I became Chair of the Executive Committee.
Q1a. What has been the impact of the initial research pooling initiative?	I am convinced that, with regards to SAGES (which I know best), the initiative has been successful in increasing our funding competitiveness and our ability to attract high quality national and international PhD candidates, via UKRI equivalent PhD stipends and also a well-established graduate school which has been innovative in the delivery of PhD training beyond direct academic training. Evidencing is non-trival but some successes are clear. For example of the 29 new academic posts 54% were international appointments. The SFC funding provided seedcorn allowing partners to lever additional funding for equipment (£1.1M funded by SFC +£9.9M from partner institutions). I think an excellent example of broader impact is success in NERC-DTPs where SAGES and MASTS are now involved in four partnerships, of which three are led by SAGES institutions. Evidence for the success of SAGES within the Scottish Research Landscape comes from the continually increasing membership, both institutionally and in individual members. This occurred as the SAGES budget decreased between Phase 1 and 2, and from the 2nd year of Phase 2 i.e. membership is not predicated in how much funding is on offer. The impact on Scotland's reputation nationally and internationally is demonstrated by SAGES engagement with a German equivalent - Geoverbund, where a collaborative framework for student training and research collaboration is developing, which will be increasingly important with our imminent departure from the EU. This is a clear example of something that could not have happened without the presence of SAGES. Anecdotally, SAGES have run sessions and breakouts at large international conferences raising the profile of research in Scotland and SAGES is planning an international science meeting for late 2019. In the UK, SAGES is an established name in a number of research fields, for example glaciology. Speaking from a SAGES perspective the focus in Phase 1 was more on the academic development of the Pool and the move into Phase 2 has seen our engagement with policy makers and industry ramp-up considerably. We have now: engaged with over 700 businesses; been developing links with innovation centres and policy partners (e.g. ClimateXChange); developed an intern scheme for SAGES PhD students to work with industry and policy makers; developed an online "Find an Expert" tool. These links continue to strengthen ensuring connection between the geosciences, business, industry, policy and environmental managers.
Q1b. What lessons can be learnt from the research pooling initiative?	I suspect the main lessons to be learned are that no one size fits all and that key to success of any individual pool is down to the director and those with oversight for the implementation of the pool e.g. the Executive Committee, Advisory board etc. It is through the efforts of this/these group/groupings that any Pool will be more, or less, successful. The academic success of a pool can to some degree be ensured via the appointment of academic staff and the provision of PhD studentships where a model of, at least, bi-institutional supervision is a requirement. While a rather blunt instrument, academic staff have many pressures on their time and the chance of a funded PhD studentship is always attractive, and it has been demonstrated to work in terms of fostering collaboration. Allied to this needs to be a vibrant graduate school within the pool as the PhD students will continue to foster cross institutional collaboration. A combination of bottom-up and top-down initiatives seems to have worked well within SAGES. Especially in Phase 2 we have been working more towards some directed activities to promote research and collaboration in areas where critical mass within the pool is recognised and funding opportunities exist. The range of pools funded initially was ultimately down to the vision and drive of the academic community to develop the areas which were, and in the future are, going to have the greatest impact. That said, I think that going forward the existence of the current pools and the innovation centres provides an opportunity to also generate ideas for directed pools i.e. SFC dictate that they would like a pool to address topic X and then accept bids/applications from the community to deliver these. However, this should not be the only model for pool development i.e. there should be an opportunity for bottom-up development of new pools. While currently the concept of inter/cross disciplinarity is in vogue, there should remain options for

	focused pools to be developed in the future, as critical mass in a specific area can have a major impact internationally. One final thing worthy of mention is the engagement of institutions in the pool. All of the Scottish Higher Education institutions have financial challenges, some more than others, and ensuring engagement from as many as possible is important to avoid Central Belt'ism. A self-sustaining model for a pool is not easy to implement, though some are trying, and will inevitably be limited to some areas where directed funding/consultancy is available. Therefore it is a requisite that SFC provide a level of match-funding to "encourage" buy-in from institutions if pools are to be supported going forward.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Unquestionably the pooling initiative has been seen very positively within Scotland and in the geosciences across the UK as a whole. I have partially addressed the institutional challenges at the end of question 1b. I think that the development of the innovation centres following the commissioning of the pools has provided further opportunities and I can see how common ground between them can be developed to deliver further impact and gains economically, academically and in policy. Perhaps going forward it should be a requirement of any new pool that they demonstrate in their bid/application that they can link to existing/new innovation centres and also city-region deals etc. As noted above inter/cross disciplinarity is very much flavour of the month. However, this is not simple to deliver and requires high quality fundamental academic research as a footing so it is important to allow any new pools to evolve in either a focused or a broader context.
Q2b. Should research pools have a continuing role in the Scottish research base?	Absolutely and as above; while inter/cross disciplinary and challenge led research is dominating the funding landscape at present, in order to ensure it is successful, rather than simply exploited as an easy funding stream, it is dependent on high quality, fundamental, academic research as a base from which to grow. Pooling unquestionably has a role going forward as it provides ready-made groupings, focused on fundamental academic research, well able to tackle the challenge led research coming to the fore. As noted above the evolution of the model should perhaps include some directed and some bottom-up pooling ideas, while existing pools can make the case for continued support. As earlier, it will likely only be a limited number, if any, of the pools which can be self-sustaining. This leaves two options: 1 - a process to apply for continued funding, probably at the current level, is opened to the existing pools,. This is assessed by SFC and each application is funded or not. 2 - the existing pools terminate at the end of the continuation funding and a call for new pools is initiated which may include some directed themes. This will inevitably lead to the re-envisioning of some existing pools and the development of new ones. A combination of the two is also possible i.e. if not all existing pools are funded in 1 this frees-up investment for some new pools (assuming no additional SFC investment). There are good reasons not to follow 2 – these pools inevitable were established due to strength in these areas in Scotland and one assumes the pool only enhanced this (certainly that sis the case for SAGES and MASTS). Therefore to abandon the successes/enhancements achieved by the pools to date seems like an opportunity lost – but a strong case for further funding will have to be made in any application. For example SFC could request in any application under 1 or 2 that pools demonstrate ongoing and future collaboration with innovation centres, city-region deals, business etc.
Further Comments	I feel that the pooling initiative has helped set Scotland apart from the rest of the UK in terms of progressive thinking. Coupled with the establishment of the innovation centres there is real opportunity, within Scotland, to deliver, enhanced academic performance, economic (business and industry) benefit, enlightened policy making and secure challenge-led research funding.

Name	Ian Ritchie
Job title	Chairman
Organisation	Tern plc
Can SFC contact?	
Summary of experience of research pooling initiative	I was a member of the Scottish Funding Council when we established the original Research Pools. Since then I have served on the International Advisory Committee of SUPA and and the Advisory Board for SICSA. (My career has been in informatics and entrepreneurship). My comments will be restricted to the two that I know: SUPA and SICSA.
Q1a. What has been the impact of the initial research pooling initiative?	There is no doubt that SUPA has substantially increased the status and effectiveness of Scottish Physics which has been transformed from several sub-optimal research departments to a grouping which form the largest physics research grouping in the UK. These conclusions do not apply to SICSA where the University of Edinburgh is already the largest informatics research group in the UK and has more than 50% of the research capability.
Q1b. What lessons can be learnt from the research pooling initiative?	The coordination between the various physics groups has led to a substantial increase in the scale of physics research and the ability to hire leading researchers. The impact of SICSA has not been as dramatic.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	I think SUPA gives Scottish physics an enhanced status and credibility.
Q2b. Should research pools have a continuing role in the Scottish research base?	SUPA should certainly continue and I would anticipate that the various University Vice-Chancellors would also support that given the benefits that are experienced compared with the old system of separate departments. I am not convinced that SICSA brings the same level of benefits.
Further Comments	I have been very disappointed with the level of industrial engagement and business formation arising from informatics research in Scotland. I have been involved in enterprise competitions in Scotland and with the Royal Academy of Engineering for the whole UK. There is no doubt that the 'golden triangle' (Imperial, UCL, Cambridge, Oxford) are regularly generating exciting new businesses - Scottish informatics is lagging badly.

Name	Ian Miguel
Job title	Professor, Director of Research
Organisation	University of St Andrews
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I was the Director of the SICSA (Computer Science pool) Graduate Academy, from 2014 to 2016. My responsibilities included developing SICSA strategy in collaboration with the other three members of the SICSA directorate, as well as the wider SICSA committee and and Advisory Board; managing the SGA funding programmes, such as student bursaries, visiting fellowships, and conference sponsorship; overseeing the organisation of the annual SICSA PhD conference; and sitting on the advisory board of the Data Lab innovation centre.
Q1a. What has been the impact of the initial research pooling initiative?	I will focus on Computer Science, where I have the most experience. The impact of the initiative has been strongly positive. In particular SICSA has engendered a much greater sense of community among the set of geographically disparate Computer Science departments in Scotland - all of its structures, events and programmes are explicitly designed to strengthen this community. The four members of the SICSA directorate are elected from across the full set of SICSA institutions on a regular cycle, and every institution has membership of the wider SICSA committee, which meets physically at least once a year. SICSA supports an active set of research themes designed to be inclusive of the broad set of interests across the SICSA institutions, which have been instrumental in fostering collaboration. The Distinguished Visiting Fellow programme has been highly successful in bringing prominent researchers to Scotland, and a requirement is that visiting fellows are required to visit and interact with multiple SICSA institutions. SICSA also runs the successful annual DemoFest event, where the community comes together to present to industry. Finally, one of the most notable successes of SICSA is the annual PhD Conference, which is organised predominantly by SICSA students themselves with the help of the SICSA Executive, and brings together students from across SICSA for a two-day programme of scientific and social events.
Q1b. What lessons can be learnt from the research pooling initiative?	The principal lesson is that pooling is an effective and cost-efficient way to build community and scientific collaboration across Scotland. One decision that might be revisited is concerning PhD funding. Initially SFC funded SICSA PhD students, which were extremely valuable as they were able to fund students from all over the world based on their excellence, and were significantly more flexible than EPSRC's current focus on the CDT programme, which tends to focus PhD funding on a single institution in Scotland. This is very poor for the health of the discipline.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	SICSA is very well established and is very effective in its role in building collaboration and community in Scottish Computer Science. SICSA's activity in connection with the innovation centres, such as the Data Lab and CENSIS has certainly raised the profile of Scottish Computer Science in industry. Its sponsorship for the Distinguished Visiting Fellowship and various travel programmes and events have similarly strengthened our international links and profile.
Q2b. Should research pools have a continuing role in the Scottish research base?	Based upon the answers I have given above, certainly.
Further Comments	

Name	Sandy Cochran
Job title	Professor / Deputy Head of School
Organisation	University of Glasgow, School of Engineering
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I was involved from the very beginning of the organisation of the Scottish Univeristies Physics Alliance (SUPA) in my then role as a senior academic at the University of Paisly / West of Scotland. In due course, I became the Chair of the SUPA KT Team and a member of its Executive Committee for some time. I have also been active from time to time in the Scottish Research Partnership in Engineering (SRPe), particularly as the Northern Research Partnership during time in Dundee. Subsequently, my work has taken me technically into greater contact with the Scottish Imaging Network: A Platform for Scientific Excellence (SINAPSE), at a time when the informal Scottish Ultrasound Group has been taken under its very effective leadership. My response here relates to my most recent experience.
Q1a. What has been the impact of the initial research pooling initiative?	EPSRC, as part of UKRI, will announce funding on 4th February for Centres of Doctoral Training. I will lead one of these at Glasgow University, in partnership with Strathclyde University, in Future Ultrasonic Engineering (FUSE). SINAPSE is a partner in the FUSE CDT. It's role was crucial in demonstrating that, whilst the CDT has a geographical focus in the City of Glasgow which will provide a strengthened local research experience, it also the links through SINAPSE to allow it to reach out across Scotland. This will provide a broader perspective for the trainee researchers and will link seamlessly with the many companies associated with the CDT and located in Scotland.
Q1b. What lessons can be learnt from the research pooling initiative?	Highly local links are very important. For example, more than one company is or will be located in Glasgow to gain proximity to the large centres in ultrasonics at Strathclyde and Glasgow Universities. However, it is important and valuable to have the broader perspective mentioned in the answer to Q1a and SINAPSE, as a research pooling initiative is perfectly positioned to provide this for the FUSE CDT.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Drafting the proposal for the FUSE CDT, there was clear tension between the impetus towards geographical localisation to allow a strong researcher experience and the need for a broader view than can be offered only locally. In this particular context, the perception of the research pools as mechanisms to allow both local and (Scottish) national breadth is positive.
Q2b. Should research pools have a continuing role in the Scottish research base?	For the reason outlined in the answer to Q2a, and in the context of winning UK funding for large initiatives such as a CDT, there is clearly a continuing role for research pools in the Scottish research base.
Further Comments	

Name	*Anon 1*
Job title	
Organisation	working in industry (I don't speak for my employer)
Can SFC contact?	
Summary of experience of research pooling initiative	
Q1a. What has been the impact of the initial research pooling initiative?	Rapidly allowing me to make connections across the Scottish PL community and get an accurate picture of the research landscape. Make use of funding to reinforce the links and put on events with international pull.
Q1b. What lessons can be learnt from the research pooling initiative?	From my point of view, it works. Don't change it just to be 'innovative'.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	It's great for Scotland and makes it very competitive. There was no equivalent structure in other areas of the UK I have worked, and hence a lack of a solid community.
Q2b. Should research pools have a continuing role in the Scottish research base?	Absolutely. Again, it works, I hope it is not just changed for the sake of change.
Further Comments	

Name	Moya Crawford
Job title	Managing Director
Organisation	Deep Tek Limited
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I am from Industry and gave input into the MASTS scope at its creation, having sat of the SAMS Council for a number of years, and being the first Chairman of its wholly-owned subsidiary SRSL. I have continued involvement through sitting on its Independent Advisory Board and interacted also through my chairmanship of the Society for Underwater Technology's International Salvage & Decommissioning Committee and also from the Chairmanship of the SOI Group Ltd (a wholly-owned subsidiary of the University of St Andrews, a position from which I resigned after twelve years in October 2018.
Q1a. What has been the impact of the initial research pooling initiative?	MASTS has been extremely successfully in bringing together the academic marine science community across Scotland. In the science part of its brief, it has met its original vision of the funded institutions speaking being seen and communicating as a whole. The measure of success can be seen by the attendance and liveliness of Annual Science Meeting, which is now attracting people from other parts of the UK, as well as abroad and equally importantly, industry.
Q1b. What lessons can be learnt from the research pooling initiative?	Time, patience and a sense of duty to put the entity first (as opposed to favouring any of its component institutions) are essential ingredients.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The role of pools should a) be strengthened b) be given funds to collaborate together, particularly as the views regarding what constitutes sustainability and wellbeing begin to mature c) they should be developed in order to offer a simpler, more unified face to business i.e. this space should not ne solely taken by the Innovation Centres, which can tend to parochialism
Q2b. Should research pools have a continuing role in the Scottish research base?	Absolutely
Further Comments	Scotland has a unique opportunity to bring its potential knowledge- economy to the fore, by reinforcing its long tradition of broad education and, in particular, enlightenment. I would like to see MASTS - which has worked well on many fronts - used as a working prototype to make the next necessary changes across Culture, Environment and Economy. To my mind this would require some experimentation with SAGES, in particular and increasing interaction with other crossovers into terrestrial science through investing in the CREW interaction with James Hutton, as a starting point. The links, too, to human health and wellbeing through mariculture and access to coastline/seascape/isles are also clear, but I do not know sufficient of any medicial pools to know where the best fit might be. That Norway has visited the MASTS executive in order to learn from what has been achieved is also a considerable achievement. I say this as a Managing Director of a Norwegian sister-company to Deep Limited. I trust that the above is of use.

Name	Clare El Azebbi
Job title	Head of Cyber Resilience Policy
Organisation	Scottish Government
Can SFC contact?	Yes
Summary of experience of research pooling initiative	The Scottish Government Safe, Secure and Prosperous: A cyber resilience strategy for Scotland 2015 recognised the importance of our universities role in ensuring Scotland's cyber resilience. This has been reinforced in the recent Programme for Government 2018-19 and the Scottish Government's 5 cyber resilience action plans to deliver these. The SICSA research pool was identified as being essential in contributing to the shaping of these strategies and action plans and to their delivery. SICSA is unique and the only organisation with the capability, mechanisms and direct access to work with all of Scotland's universities at an academic and research level over a broad range of cybersecurity 'digital areas'. Using SICSA as a 'portal' to their 14 universities across Scotland via a host university allows easy placement of contracts and funding. SICSA's ability to internally, seamlessly carry out activities and projects across their community through their SICSA established inter-university contracts and agreements gives access to the universities expertise. Consequently, this was recognised with the Government funding the £430k SICSA Cyber Nexus programme. - SICSA is a key stakeholder reporting to the Government at board level through the National Cyber Resilience Leaders Board. The SICSA Nexus programme is part of the Government strategy and designed to deliver into the 5 cyber resileince action plans - to provide the learning and skills required, grow the research capacity to drive innovation and translate this innovation with industry into economic growth.
Q1a. What has been the impact of the initial research pooling initiative?	The SICSA research pool plays a key role and an integral part in providing access to Scotland's universities' researchers/research dept, through - Providing graduates and experts - Growing learning and skills, - Providing research expertise and build a world class reputation - Building capacity - driving sustainable research and contribute to economic growth. - Provide solutions for industry - Create and support new companies - startups and spin-outs - e.g. Zonefox, Cyan Forensics A major advantage of SICSA is communications - SICSA is very well connected. Academic and industrial relationships are global. SICSA works closely with a broad range of stakeholders - SFC, EPSRC, UKRI, EU, Innovation Centres, Interface, Scottish Government, Scottish Enterprise and HIE, ScotlandIS, SBRC - a vast range of SMEs and corporates. SICSA works closely with the innovation Centres, particularly, Censis, The DataLab and DHI where there is a cyber digital overlap. A strength of the SICSA research pool is the direct access it has to internal university communications - mailing lists and an established communication process for distributing information across universiity CS departments. SICSA are also very effective in being able to reach across broader university communities and departments - business, engineering, medical There is wide following on their digital and social media (e.g. over 2,000 twitter followers) reaches a range of audiences At a cyber security level, the university of Edinburgh is National Cyber Security Centre accreditied as an Academic Centre of Excellence; The University of Abertay and Edinburgh Napier have courses which are NCSC accredited.

	Lab facilities at Glasgow for critical national infrastructure, Cyber academy at Napier, Blockchain Centre at Edinburgh and the recently announced Tayside city deal with the future development of the Abertay Cyber Quarter illustrate the rapid growth currently taking place in which SICSA is playing a role.
Q1b. What lessons can be learnt from the research pooling initiative?	A real opportunity of collaboration across universities, while recognising individual profiles and specialisms. Ideal as a single port of call - well-recognised as the go-to organisation for cyber security research.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	We would be in favour of SICSA's continuation
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes
Further Comments	

Name	Una McCarthy
Job title	
Organisation	Marine Scotland Science
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I have no knowledge or awareness of this initiative.
Q1a. What has been the impact of the initial research pooling initiative?	Unable to answer this question.
Q1b. What lessons can be learnt from the research pooling initiative?	Unable to answer this question.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	
Q2b. Should research pools have a continuing role in the Scottish research base?	
Further Comments	

Name	Lynsay Shepherd
Job title	Lecturer in Usable Security
Organisation	Abertay University
Can SFC contact?	Yes
Summary of experience of research pooling initiative	In 2012 I was a recipient of a SICSA PhD Prize Studentship, and I completed my PhD entitled "Enhancing security risk awareness in end-users via affective feedback" at Abertay University, Dundee. During my time as a student, I was provided with the opportunity to participate in a number of SICSA sponsored events, such as the Cyber Security Meet-ups (2012-2013), and the annual SICSA PhD Conference. I also presented at the SICSA Cyber Security Christmas Lectures from 2012-2014. Since 2016, I have been employed as a Lecturer in Usable Security at Abertay University- the Prize Studentship led to my employment. I have continued to engage with SICSA by attending Demofest annually, and by presenting at the SICSA Cyber Security Christmas Lectures. I was also one of the chairs of the IEEE Cyber Science 2018 conference which was sponsored by SICSA, and I was the recipient of a SICSA Cyber Nexus Research Exchange grant enabling me to travel to Germany later this year to develop research collaborations.
Q1a. What has been the impact of the initial research pooling initiative?	The research pool has had a significant impact on the Scottish research landscape. In particular the Prize Studentships have helped to develop the future generation of academics. The Prize Studentships attracted a great deal of interest from people outwith Scotland. Speaking from my experience of the 2012 PhD induction, many different nationalities were represented, covering a number of different research areas. Several of the projects represented also had links with industry. By investing in this area, and attracting researchers from across the world, this has helped Scotland become a top destination for cyber security research and development. Outside of research, SICSA also funded the likes of the Cyber Security Christmas lectures. The lectures aimed to encourage school pupils to consider a career in cyber security, subsequently enhancing Scotland's reputation in this area. The lectures appear to have had a positive impact. One such case study involves an Abertay University Ethical Hacking graduate, Jack Wilson. Jack attended one of the lectures, and it highlighted he could pursue a career in cyber security. After graduating from Abertay University in 2018, Jack went on to become an Associate Security Consultant. Jack's case study can be found here- https://www.christmascyberlectures.org/case-study/to-catch-a-criminal-youve-got-to-think-like-a-criminal/
Q1b. What lessons can be learnt from the research pooling initiative?	One of the key lessons is that it is important to support students, and academics at all stages of their career- SICSA has worked particularly well in this respect, encouraging collaboration.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Research pools such as SICSA are hugely beneficial. It is important for research pools to support students, and academics at all stages of their career. I believe SICSA has a positive impact in this respect, supporting everyone from school pupils engaging in outreach events, PhD students in developing their own research, through to academics who want to lead a research exchange and develop collaborations with industry.
Q2b. Should research pools have a continuing role in the Scottish research base?	The research pools should have a continuing role, enhancing Scotland's reputation for research excellence. Again, speaking from personal experience, I would not have been able to self-fund my PhD. The Prize Studentship provided me with the opportunity to complete a PhD and embark on a career in research. It would be fantastic if others could benefit from such an initiative.
Further Comments	

Name	Linsey Dickson
Job title	Head of Research Development & Performance
Organisation	University of Stirling
Can SFC contact?	Yes
Summary of experience of research pooling initiative	Worked in Research Support for ~20 years covering the period of establishment of the pools and reviews. Worked in Organisations that had significant academic involvement in a number of the pools. Collated responses from research leaders within current institution to provide this response.
Q1a. What has been the impact of the initial research pooling initiative?	Pooling has enabled greater visibility of research, strengthened the relevant research communities and supported greater collaboration, personal development and postgraduate research and skills development. PGR is a strength and encourages supervision (and thus collaboration) across different universities (they could consider cross-pool scholarships to support interdisciplinarity). There seems to be a particular benefit for early career researchers and PhD students in accessing networks and funding for small scale/pump priming projects. Feedback notes that the pools have enabled greater collaboration across the Scottish Universities, have been useful in evidencing and demonstrating collaboration between institutions when applying for funding from Research Councils and others.
Q1b. What lessons can be learnt from the research pooling initiative?	Small amounts of money for e.g. networking is able to lever much larger amounts via the collaborations that it builds. Pooling can be an effective way to build critical mass and strength, uniting specialised expertise across institutions to develop a greater whole. However, administration of and running the pools can also take a lot of time and effort that risks taking away from individual staff and reducing their opportunities to engage in generating competitive grant applications and papers.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The perception is that they are mostly established to build – or rather strengthen - a research community. Greater awareness and collaboration of and with the pools beyond the STEM subjects and particularly with Social Sciences should be encouraged as they are not well known outwith the pool communities. Pools can appear somewhat arbitrary. There are many candidates for pools and it is not clear to many researchers why the current pools came into being since they do not all appear to conform to a particular national strategy - other than driving research excellence. However, the pools that exist do play a very useful role in research community and productivity for those involved.
Q2b. Should research pools have a continuing role in the Scottish research base?	Definitely! Yes, but subsequent developments should fulfil more roles. An example of this dual benefit to research and national strategy would be looking at pooling initiatives around climate change resilience driven by the recent IPCC identified priorities for ecological engineering - pulling together researchers across ecology and habitat restoration of forests and wetlands, economists, social scientists, hydrologists, engineers. Pooling in this way would drive interdisciplinary research excellence on a matter of fundamental importance for Scotland's response to global change, advising on adapting the landscape and economy to capitalise on the opportunities for change that the threat of climate change brings. Alternative examples would be transforming energy and transport - again focussing on matters of key national importance and opportunity. Pooling initiatives should be used to drive Scotland forward as a world leader in building alternative futures in response to the priorities identified as mankind's greatest challenges by the international community - we would benefit from research excellence, a more secure and resilient country, improved economy and recognition as a global leader.
Further Comments	There is a lack of flexibility in the pooling arena, this needs to be changed so that any pooling initiative is flexible enough to accommodate changing priorities. As an example for 30 years 'ageing' has been a priority for the Research Councils (there has been a continuous rolling programme of research

	funded in ageing since the 1970s) however this hasn't been reflected by any pooling initiative, if there were flexibility in the pooling arena then it could have done so. The Welsh Government were able to incorporate this in their research pooling exercise and use it to lever in funding. The review highlights the changing research environment and greater emphasis on interdisciplinary research would be welcome (cross-cutting sciences and humanities for instance). Furthermore, challenge based research - and research contributing to inclusive development, sustainability and resilience - could be more central to any subsequent initiative. Culture, heritage and creative economies are important areas for Scotland - and that these can play a key role in quality of life, resilient communities, ageing society, health and wellbeing - which are all important aspects of Scottish Government policy. So some research strands/pools that address these areas would be good to see in any future initiative. The lack of social science led pools also does not reflect the current thinking of social science being at the heart of initiatives (Industrial Strategy etc) and given its acknowledgement to be central to research on driving up productivity and economic growth. The review also needs to ask 'What is distinctive about the research pools in 2019?' Many other collaborations (joint Universities such as the N8, G4W, or thematic networks) have existed that make the Scottish pools seem out of date. The opportunity to maximise use of equipment across Scottish universities has not been achieved and is an area where pooling could excel.

Name	David Harrison
Job title	Professor of Pathology
Organisation	University of St Andrews
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I coordinated the bid to Innovate UK/ISCF to establish the Industrial Centre for Artificial Intelligence Research in Digital Diagnostics (iCAIRD).This Scotland-wide £15.8M programme which I direct from St Andrews, administered through the University of Glasgow, is approximately 50% each radiology and pathology. In constructing the consortium SINAPSE, and Professor Alison Murray, were absolutely crucial in building a credible and robust case.
Q1a. What has been the impact of the initial research pooling initiative?	Without SINAPSE, and in particular Professor Alison Murray, iCAIRD would not have come into being. The pathology side was single centre NHS (Glasgow) with one academic partner (St Andrews), with one major industrial partner (Philips). Logistically this was fairly straightforward. ON the radiology/imaging side there were three universities (Aberdeen, Glasgow, Edinburgh), two NHS areas (Glasgow, Grampian) and multiple SME partners under the industrial leadership of Canon Medical Europe. My initial approaches to site leads, national leads and industry were slow and tortuous. Once I had engaged with SINAPSE everything moved quickly: there was ready advice problem solving, expertise, discernment and filtering, and credibility with industry. SINAPSE/Professor Murray made this bid succeed.
Q1b. What lessons can be learnt from the research pooling initiative?	1. Credible overview of field 2. Focus SINAPSE was able to stand above single institution interests and provided me, but more importantly Canon and Innovate UK, a single credible voice that was focussed on problem solving rather than simply acquiring more research funds.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Research pools that are not dominated by a simple partner, that seek to address problems and provide solutions, are a very clear positive influence in raising competitiveness and credibility. Without SINAPSE no single Scottish centre would have been competitive enough in iCAIRD. SINAPSE will continue to exercise in a very important role in ensuring thatiCAIRD delivers on its agenda of democratising artificial intelligence research & development, and its implementation, in NHS.
Q2b. Should research pools have a continuing role in the Scottish research base?	I believe so, if they are genuinely set up to be responsive to problem solving and meeting needs, not simply as a means to an end to achieve more research funding. So leadership is key, and Professor Alison Murray headed a team of experts in SINAPSE across Scotland all of whom made positive contributions.
Further Comments	

Name	Tom Cowton
Job title	Lecturer
Organisation	University of St Andrews
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I have been a member of SAGES since I began my PhD in 2009. For the last two years I have sat on the committee for a forum (FIORD) within the framework of SAGES.
Q1a. What has been the impact of the initial research pooling initiative?	The greatest impact of SAGES on my work has been to create a new graduate school capable of attracting, and funding, excellent studies from within and beyond Scotland. Through this pathway I was able to appoint my first PhD student in 2018. This is a very valuable resource, particularly to a newly appointed academic, given the competition for sources of PhD funding. The value of this initiative goes beyond just the funds though - by creating a coordinated graduate school (rather than small, institutional funding schemes), this increases the visibility of the projects and improves the experience of the students, increasing the likelihood of attracting and keeping excellent PhD candidates.
Q1b. What lessons can be learnt from the research pooling initiative?	
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	
Q2b. Should research pools have a continuing role in the Scottish research base?	
Further Comments	

Name	Richard Heard
Job title	Programme Director
Organisation	INSITE Programme
Can SFC contact?	
Summary of experience of research pooling initiative	I am Programme Director for the INSITE Programme; INSITE is an independent research programme, funded by Industry and in its second Phase, NERC. Its objective is to increase the understanding of the influence of man-made structures on the North Sea ecosystem. MASTS has been significant in connecting Programme to the wider science community across Scotland, many in that community are working in similar areas to INSITE. For information, Phase 1 of the Programme had a value of £2.4M; Phase 2 has attracted funding of £7.6M, plus significant industry in-kind support.
Q1a. What has been the impact of the initial research pooling initiative?	From the perspective of facilitating a robust interface between industry and science, the role MASTS has been significant. Industry seeks an efficient way of reaching out to the science community and seeking to gain an understanding of what science can offer industry. MASTS provides that efficiency as a point of entry for industry as individuals or as groups such as the Society of Underwater Engineers or Oil & Gas UK and indeed my own Programme INSITE.
Q1b. What lessons can be learnt from the research pooling initiative?	
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	As noted, research pools are uniquely placed to enhance the interface between industry and science. In a world which is seeking to ensure science is relevant to society, the wider the the interfaces with the stakeholder community the better. Research pools can provide that 'width'.
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes, see comments above.
Further Comments	I am not sure if this is built into the current pooling model, but a further development of the industry/science interface would be to set objectives for the pools in this area. MASTS has excellent links and joint initiatives with industry which I am sure they are seeking to grow. Recognising this as a key objective of the pools would enhance their continued development in this area. Finally I would mention that the INSITE Programme has partnered with MASTS to organise a symposium on man-mades structures in the ecosystem in spring 2019. Without an organisation such as MASTS, this would be more difficult and have much less impact. Details of the INSITE programme are available on www.insitenorthsea.org. As summary has been attached.

Name	Conchúr Ó Giollagáin
Job title	Director of Soillse, University of the Highlands and Islands Gaelic Research Professor
Organisation	Soillse – The National Research Network for the Maintenance and Revitalisation of Gaelic Language and Culture
Can SFC contact?	Yes
Summary of experience of research pooling initiative	Professor Conchúr Ó Giollagáin, the Director of Soillse has been in post since 2014, now on a part-time basis since 2018 as he divides his time with the new Inverness-based University of the Highlands and Islands (UHI) Language Sciences Institute (LSI), the principal UHI legacy from the first phase of Soillse funding. Gordon Wells has been Soillse Project Manager since 2015, continuing this function on a full-time basis in the second phase of Soillse funding. Both posts are hosted by UHI, with the Project Manager post housed at Sabhal Mòr Ostaig UHI (SMO) on the Isle of Skye. Iain Campbell was previously the Senior Project Manager until 2015, later returning to the partnership as Knowledge Exchange and Public Engagement Manager, which role included a PEER-supported European brief, until 2018 when he joined the LSI as a Research Fellow.
Q1a. What has been the impact of the initial research pooling initiative?	The Soillse (Phase One) research pool commenced in 2010 with a £5.29M funding package consisting of an SFC investment of £1.86M, together with contributions from Bòrd na Gàidhlig of £541K and from Highlands and Islands Enterprise of £400K, together with new and match funding contributions for the four original HEI participants of Aberdeen, Edinburgh, Glasgow, and Highlands and Islands. Soillse's aims were and remain as follows: • An international-quality research capability that will support, inform and influence policy at national and local levels in the effort to maintain and revitalise the Gaelic language in Scotland and beyond; and • A powerful research network across the participating Scottish Higher Education Institutions, linking national researchers with expertise and interest in contemporary Gaelic language matters, with international minority language research institutions. The network has three main research themes: • Gaelic as a family and community language • Gaelic in education • Assessment of Policies directed towards the revitalisation of Gaelic Prior to the establishment of Soillse the fields of Scottish Gaelic-related sociolinguistics in general and language policy and planning research in particular had been in need of significant capacity-building as the issue of Gaelic language sustainability attained increasingly urgent salience, both in policy-making arenas and at local community levels. Soillse was launched in 2010 to address this need. Phase One placed post-doctoral research fellows in participating institutions and brought through a new cohort of doctoral students, who, in quantitative terms, have clearly added significantly to the sum of research capacity in the field. See the Table in the attached PDF. In addition to this the establishment of the network enabled joint projects for external bodies, an enhanced focus on baseline survey work in key geographical areas, and led to the establishment of the Language Sciences Institute (LSI) in a closely associated location. Three case studies are attached below. Further annual and cumulative metrics on publications, conferences, presentations etc were collected and recorded in the annual and final reports of the network, and are not reproduced here. While it has taken time to establish this relatively new field from sparse roots on a firmer footing, there are clear signs of increased national and international recognition. In Phase Two the Soillse membership has widened beyond Celtic Studies departments to include new Scottish universities who will bring wider interdisciplinarity to bear (through generic interests in Education, Economics, Media Studies, Sociolinguistics etc), and Soillse expertise is increasingly sought as an input to policy and planning processes for local and national government, and language development agencies. Network members are also able to point to this background when considering and proposing international collaborations, with the LSI, for example, now involved from 2018 in new related development work with both Ireland and India, with the projects "Stòras Beò nan Gàidheal" and "Mediating Multilingualism: a Sharing of

	Innovation and Expertise" (with further information in the Case Studies). Given the specific linguistic focus and priority of the pool it may be argued that, in the first phase, opportunities for a broader interdisciplinarity and interaction with other research pools were few. This is understandable, given the pressing need to first establish the field, virtually from scratch. This may be an area for deeper and wider exploration in the new funding phase. The very low level of penetration of functional Gaelic skills in Scottish academia will likely remain a serious inhibitory factor, however, in continuing and developing interdisciplinary spread at a rapid pace. Perhaps paradoxically, there may be scope for faster growth in international linkage to other minoritised language contexts.
Q1b. What lessons can be learnt from the research pooling initiative?	With the benefit of hindsight a case might be made from the Soillse perspective that a consciously interdisciplinary focus and membership from the start might have served to boost inter-university collaboration, perhaps mitigating a perceived tendency for similarly focussed departments in separate institutions to sometimes view each other in a competitive rather than a potentially collaborative light, and therefore tread cautiously with regard to sharing resources and ideas. From that point of view, the Small Research Fund element of the funding package (carried through to Phase Two) proved an important balancing factor as it opens the field up to new players outwith the immediate network, three of which (Heriot Watt, Strathclyde, and Glagow Caledonian) have now joined the pool in the new funding phase. Indeed Phase Two of the project has already taken on board important lessons from Phase One in that various weaknesses that became apparent have been mitigated. Improvements include: • The lead institution (UHI) has full responsibility for the management of funding • The funding mechanism has been simplified in terms of distribution and linkage to outputs • The academic membership has grown and diversified in terms of disciplinary strengths. However, a stronger focus on community linkage and capacity-building measures remains an on-going concern. Acting on the strategic implications of research outputs is also a related issue relevant to how language policy is evolving to address obvious societal challenges, as depicted in research findings. The question of location is also particularly salient in the case of the Soillse focus, in a situation in which the community linguistic resource is most concentrated in "remote" island locations but the topic nevertheless has a national policy relevance, with the traditional centres of academic gravity firmly located in long-established departments in mainland urban universities. It is important that the Soillse management and administrative function was deliberately placed in, and remains with, UHI (although originally in collaboration with Aberdeen). Video/audio-conferencing facilities can go some way to mitigating the effects of geographical dispersal. Face-to-face meeting through seminars/conferences is important, however, and remains a significant challenge.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	There is no inherent reason why interdisciplinary research cannot be carried out effectively within the bounds of one HEI – provided the institution concerned has the requisite breadth of specialisms and expertise – nor why separate institutions should not be able to co-operate on research in a single discipline. However, given the necessarily limited breadth and depth of the overall research capacity within Scotland it makes sense to encourage inter-institutional co-operation in order to ensure full use is made of all available expertise, and challenge researchers to imagine innovative and holistic pathways forward which incorporate fresh insights from beyond their own discipline or institution. From an institutional point of view, it would be disingenuous not to acknowledge that there are clear advantages to being the host of an ongoing research pool in receipt of second phase funding, in terms of support for staffing and the potential to directly leverage the wider network of contacts to develop new collaborative research projects. It may be less clear to other network members (particularly those who in Phase One may have received direct support for

	staffing and studentships, but no longer do in Phase Two) that the network continues to merit further participation with the same level of enthusiasm. Measures such as the Soillse Small Research Fund (although functioning on a very low budget), and ongoing seminar programme, should ensure an ongoing engagement, but it may be a recurrent challenge to keep all members equally committed without higher levels of support. It may be that smaller research pools will require a specific budget for outreach issues.
Q2b. Should research pools have a continuing role in the Scottish research base?	The Soillse research pool has produced added value in its first phase, and promises to further develop and broaden its interdisciplinarity and local, national and international linkages in the current second phase in a challenging funding and linguistically specific environment. In this context, the continued incentivisation of inter-university collaboration would appear justified. Soillse will continue to explore outward-looking and new inter-disciplinary opportunities wherever they may arise (perhaps including links with other pools, say for example in relation to links between bilingualism and healthy ageing) and are also consistent with its specific linguistic remit. At the same time, the nature of the present existential crisis faced by the language that is the focus of the network's founding remit will constantly demand a rigorous applied assessment of potential benefit in relation to that remit. It may conceivably be that the level of research income generated through pooled activity will of itself merit the continuation of a pool without further SFC support after the five years are up, particularly in the case of large networks whose work naturally aligns with relatively cash-rich business and industry sectors. Whether that will also hold true for smaller networks whose capacity for income-generation through, for example, business partnership is more heavily limited, remains to be seen. Research pools have a clear role for the future, but need to be configured to the specific research area and mode of operation of each pool. An undifferentiated universal approach would be unlikely to provide the most efficient means of maximising outputs/outcomes.
Further Comments	Case Study 1 – LEACAG Gaelic Corpus Development Project This project ran under the Soillse banner with a subset of Soillse members from 2016 to 2018 with £130K funding from Bòrd na Gàidhlig and MGAlba. Glasgow University was contracted as the lead institution with separate but complementary research modules divided between Glasgow, Edinburgh and Sabhal Mòr Ostaig UHI. The project had two main goals: to create an online system to coordinate, evaluate and disseminate new Gaelic terminology for use in Gaelic-medium education and broadcasting; and to draft the foundations for a comprehensive reference grammar of modern Gaelic, in consultation with both Gaelic language professionals and the community of traditional Gaelic speakers. The remit was to provide scientific linguistic and policy support to guide the work of a new Buidheann Stiùiridh Corpais (Corpus Steering Group). This group was set up by Bòrd na Gàidhlig, the statutory Gaelic development agency, with the aim of standardising, codifying and enriching the grammar and vocabulary of the traditional language for the 21st century. With reporting completed in 2018, discussions are now underway for continuation of the partnership to contact further research based on the same model, again under a Soillse banner. Case Study 2 – Islands Gaelic Research Project The Islands Gaelic Research Project was initiated half-way through Phase One of Soillse funding with the intention of refocussing research attention on the

	vernacular Gaelic-speaking communities, primarily situated in the Western Isles and other Hebridean islands, following the appointment of Professor Conchúr Ó Giollagáin as the new Director of Soillse. This new focus resulted in the design, development, and delivery, between 2015 and 2017, of the first comprehensive survey of patterns of actual Gaelic use in the communities that remain core to the ongoing sustainability of the language. The study was constructed in modular format, with three separate but interlocking community surveys included, among pre-school children and senior secondary school students, plus house-to-house community studies in selected indicative communities with the highest incidence of Gaelic speakers according to Census indications. This was resource-intensive work necessitating the employment of dedicated fieldworkers, and an exhaustive programme of community liaison, recruitment of local facilitators, and subsequent public consultation and feedback meetings in thirteen different island locations. As a baseline study, it provides a level of fine-grain detail that other studies in much more restricted localities or broad brush pictures from the National Census cannot match. It represents a highly significant step change in the quality of information available to language planning bodies and initiatives across the board, from national and local government bodies in relation to statutory responsibilities and innovation, through to voluntary sector and local community interests. The planned publication in 2019 of the comprehensive findings will mark a highly significant Soillse contribution to resetting approaches to Gaelic revitalisation. This project was led from Sabhal Mòr Ostaig UHI, following network-wide consultation and agreement on the allocation of funding, with Glasgow also contributing an element of its own Soillse grant. Case Study 3 – Language Sciences Institute On completion of Phase One of Soillse funding in 2017, UHI, with the support of SFC, created the new Language Sciences Institute (LSI) as a significant institutional legacy from the research pooling network. The Language Sciences Institute aims to connect innovation and expertise in research and learning and will use the collective power and multi-disciplinary strengths of the UHI academic network to reconfigure current approaches to the revitalisation of minority languages. With a particular focus on the traditional Gaelic speaking communities of Scotland, the LSI will build on the work of the Soillse project. The distinctive features of the LSI are: • A research and learning institute, embedded within a minority language community, with a focus on understanding the dynamic linkages between Gaelic communities. • An open and collaborative approach to minority language research that engages communities in a process of reflection and learning. • The co-design of new research methodologies and innovative knowledge exchange processes that will help develop the capacity of the university to address a sociolinguistic challenge. • Address the sociolinguistic challenge from both a both national and international perspective. • Use of a whole-systems approach to language research and practice, centred on addressing the challenges of social and economic sustainability within minority language communities. • A languages science approach to research, linking localised minority language situations to international perspectives on language revitalisation processes and which involve the community in the design of new interventions, policy and research. It is envisaged the research legacy of the Soillse partnership will enable the LSI to provide support in creating a sustainable future for the Gaelic language

	and culture in Scotland. Future policies and strategies that are articulated through National Language Plans, and the Language Plans of public bodies, need to be grounded in the reality of the Gaelic language condition. The LSI recognises this is particularly important in those locations where Gaelic is still, in relative terms, a community language. Knowledge exchange plan The LSI has been developed with the aim of strengthening the Gaelic language research, learning and developmental portfolios of the university in collaboration with the National Gaelic College, Sabhal Mòr Ostaig UHI, public bodies and the Gaelic speaking community. Institute staff will work across specific university disciplines to address increasingly complex social and global problems of sustaining minority languages and cultures in an integrated way. Developing policy and partnerships The LSI will provide a focus for informed debate and discussion on factors in relation to creating a sustainable future for Gaelic as a communal and social identity. Additionally, its establishment will provide a forum facilitating engagement in a meaningful and positive way with the traditional language community and with the new Gaelic communities emerging within the larger urban conurbations of Scotland. The Language Sciences Institute has a central role in researching and informing national policy in this area of language planning in Scotland. While firmly grounded in the lived social reality of twenty-first century Gaelic-speaking communities the LSI will also maintain an outward-looking perspective in relation to the sociolinguistics of multilingual societies, and in its first year of operation, while focussed on bringing the results of the IGRP to readiness for publication, has already initiated two pilot international research projects: • Stòras Beò nan Gàidheal is a Scottish-Irish ethnographic linguistic retrieval project, supported jointly by the lead Gaelic language development bodies in Scotland and Ireland, Bòrd na Gàidhlig and Foras na Gaeilge. As a pilot, the intention is to draw lessons from initial development work to inform the creation of a much larger follow-on project, probably involving UK and Irish research council support, which will draw on all available academic and other resources in both countries, including the wider Soillse network. • Mediating Multilingualism: the Sharing of Expertise and Innovation between Scotland, Ireland, and India is a pilot project funded by the Global Challenge Research Fund, which will see the LSI collaborating with Central Institute of Indian Languages, and Indian Centres for Endangered Languages contacts, again with a view to developing a joint agenda in relation to linguistic survey and language documentation work. While, as the fund requires, the primary focus will be on delivering meaningful impact in India, there is also evident potential for UHI and other Scottish HEIs to learn from this work, with provision, for example, for further academic networking opportunities, through Indian partners' reciprocal contribution to the ongoing Soillse seminar programme.

Name	Miguel Nacenta
Job title	Senior Lecturer
Organisation	University of St Andrews
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I have been one of SICSA's Theme leaders for almost four years. I have participated in many of the events organized by SICSA, both as an attendee and as an organiser. When I arrived in St Andrews in 2011, SICSA enormously facilitated academic contacts with eminent researchers in other institutions. These have served as mentors and collaborators. Having a Scottish research base has also been very helpful to demonstrate in EPSRC and FP7 applications that there is an infrastructure for students and collaborators to support their learning and their networking activities. All of my students have participated in large and small events organised by SICSA, giving them the benefit of making connections with industry and other institutions.
Q1a. What has been the impact of the initial research pooling initiative?	I believe that SICSA has been strongly beneficial for the Scottish research community. University research groups in my area (Human-Computer Interaction) are, due to SICSA, considered collaborators rather than competitors. It has allowed us to celebrate each other's success. One example of this is how we pulled together to get the biggest and most prestigious conference in HCI to Glasgow in 2019. Internationally, SICSA has now a very positive image and I have received many comments from international researchers that say that they envy having a national research community that is so strong and collaborative.
Q1b. What lessons can be learnt from the research pooling initiative?	Research pools improve the culture of research within Scotland. Research pools make Scotland's research more visible internationally and at UK level. Research pools help researchers be less isolated and benefit from each other's expertise. It is a great opportunity for young academics. Overall, research pools make the research stronger and helps across the board.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	I believe that research pools are considered extremely positively by an overwhelming majority of those who have participated in them. Without the pools there is often little incentive to engage in meaningful contacts with other Scottish institutions. The role of the pools should be to spread the excellence of some institutions to the rest of the institutions, and to strengthen the visibility and opportunities available to each of the institutions by offering membership to a prestigious meta-organisation.
Q2b. Should research pools have a continuing role in the Scottish research base?	Absolutely.
Further Comments	

Name	Stephen Taylor
Job title	CEO
Organisation	Technology Scotland
Can SFC contact?	Yes
Summary of experience of research pooling initiative	As CEO, I am making this submission on behalf of Technology Scotland. Technology Scotland is the representative body for the Enabling Technology and Smart Mobility sectors in Scotland. We provide an independent voice for those engaged in areas such as Photonics, Electronics, Mobility as a Service (MaaS), Product Design, Advanced Materials, Nanotechnology, Advanced Manufacturing, and more. Technology Scotland has over 110 members and runs three main networks: - the Scottish Optoelectronics Association (SOA), MaaS Scotland and Product Design Scotland. We have worked closely with SUPA on various initiatives including their Industry Skills Course, and the SFC Leverage Grant in a joint venture between SUPA, SULSA and SINAPSE on leveraging Scotland's world leading research in optical imaging for medical applications. SUPA is extremely active in supporting Scottish Optoelectronics Association initiatives and is currently supporting our creation of a photonics White Paper "Photonics in Scotland - A Vision for 2030". Finally we have worked closely to enhance the position of Scottish organisations seeking to win ISCF and EU funding competitions.
Q1a. What has been the impact of the initial research pooling initiative?	In regards to the Industry Skills course, this was very well supported with some 22 companies (in addition to the 8 SUPA Universities) supporting the initiative. Using a Technology Scotland (TS) Skills Survey by as a starting point, SUPA and TS arranged interviews and a consultation workshop to refine industry requirements. From some 24 suggested modules, 10 were ranked by industry representatives as those of most value to industry. These 10 modules were then delivered directly by industry experts, to students through SUPA's dedicated video conference (VC) facility. This has been a very successful initiative addressing the need for graduates to enter the job market with key transferrable skills.
Q1b. What lessons can be learnt from the research pooling initiative?	A key lesson is that given the right initiatives, industry will provide both physical and financial support, where they can see clear benefits. Industry needs a strong, collaborative, outward looking University ecosystem, and SUPA, through its cross university approach helps simplify industry's interface to the Physics community.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	From an industry perspective, anything which can support an increase in the number of suitably qualified graduates each year is very welcome. I am also strongly supportive of Pooling as a way and a means for Scottish Universities to join together, create a critical mass, and collectively punch above their weight in a highly competitive international market.
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes, absolutely, particularly if industrial partners can be found that can help shape and tailor requirements and perhaps sponsor specific and unique research topics. This will assist industry in creating new and innovative products and services, helping to drive exports and improving Scotland's competitiveness.

	Also by combining resources, the eight universities have found a cost effective way of delivering graduate education.
Further Comments	We can see the clear and positive impacts that research pooling will deliver in knowledge exchange across university faculties and from academia to industry and RTO's. In particular (i) expanding industry engagement and facilitating cooperation and collaboration with industry and other scientific and engineering disciplines, (ii) advancing the case for more diversity including women and other under-represented groups in developing and advancing careers in physics and engineering disciplines, (iii) continue with the Industry Skills initiative, imbuing students with the transferable skills that are critical for successful careers in industry. Finally I am keen that Scotland protects an excellent leadership position in the UK in Quantum Technology research. Technology Scotland has analysis showing that Scottish consortia including SUPA members in collaboration with at least 18 Scottish companies have captured some 39% of Innovate UK Quantum technology competition funding from 2014 through to March 2018. Research pooling, and the collaborative approach that this encourages will help maintain such a leadership role.

Name	Neil Simco
Job title	Vice-Principal Research and Impact
Organisation	University of the Highlands and Islands
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I have been closely involved with the research pools, since I took up my current role in January 2017, and to a more limited extent prior to that date in my previous capacity as Dean of Arts, Humanities and Business at the University of the Highlands and Islands. I currently Chair the project board for Soillse, and have been on the MASTS Board. It should be noted that the response in this return takes account of the responses from a number of the research pools, in which the University of the Highlands and Islands has profile.
Q1a. What has been the impact of the initial research pooling initiative?	The research pools have had clear and positive impact: 1. They have facilitated the creation of cohesive and purposeful research collaboration across Scotland, thereby enhancing Scotland's contribution to the UK research and innovation effort over many years. The University of the Highlands and Islands endorses the comment in the SAGES and MASTS submission that the "pools have engendered an ethos of co-operation within HEIs moving them from being destructively competitive to a collaborative and more interdisciplinary mode of operation." 2. This collaborative ethos which underpins the research pools has meant that the complimentary strengths across Scotland's HEIs have been utilised in order to maximise the impact of the pools, especially in regard to research which has demonstrable benefit to the economy and to society. 3. in the best examples - perhaps MASTS - the relationship between the pools and the innovation centres has been purposeful and has further enhanced impact. 4. Some of the pools have large scale annual meetings/conferences/events, with delegates from academia, policy and industry. Where these exist they are clear evidence of the impact of the pools. The MASTS science meeting is understood to be the largest UK marine science gathering. 5. The research pools have had a role in ensuring that the major research themes are embedded effectively in academia. An example of this is Cyber Nexus in SICSA. 6. The research pooling initiative has meant that the contribution of the specific sectors outwith Scotland has been enhanced, in ways that would not have been easily achievable without the pools. For example MASTS has a representative on the European Marine Board. This connectivity facilitates recognition of the contribution of Scottish academia to research and innovation across the UK and internationally. 7. In some cases the research pools have facilitated the development of strong DTPs, either formally in the case of MASTS, or more informally in the case of Soillse. 8. The inclusion of all institutions has meant that appropriate recognition is given across Scotland wherever there is relevant research activity occurring. This has given access for all institutions to the main research agendas, hence ensuring that research activity chimes with the priorities of the pools.
Q1b. What lessons can be learnt from the research pooling initiative?	There are a number of lessons which can be learned from the research pooling initiative. 1. As hinted at in our response to question 1, it is the case that at best there are good links between the research pools and the innovation centres. MASTS is a good example here. But it is also the case that there is more to be done if the impact of the pools is to be maximised as the links between the innovation centres and the research pools are often not sufficiently robust. Some form of merging of the innovation centres and pools may be desirable, especially given the rise of impact and innovation. Consideration should also be given to entities beyond the innovation centres and how these could feed into the research pools - for example in relation to SICSA the 'digital skills partnership' so that duplication of effort and resource is avoided. 2. Arts and Humanities, and to a much lesser extent social sciences, are generally underrepresented in terms of the research pools - with the notable exceptions of Soillse and SAGES. And yet there is some excellent inter-institutional collaboration, albeit collaboration focused on research students, occurring outwith the pools initiative. Examples of this include the Scottish Graduate School of Arts and Humanities and the Scottish Graduate School of Social Sciences. We would suggest that this strength could be built upon to progress a broader research pool concept, with a clear expectation around the notion of a graduate school being embedded in all research pools.

	3.The continuation funding for the research pools is at a significantly lower level than earlier tranches. Given the overall success of the initiative, there is some concern that the lower level of funding may compromise the overall value of the research pooling initiative, especially in terms of continuing to realise the quality of impacts identified in question 1b. 4. Interdisciplinarity is (rightly) more important now than it was at the point when the research pools were first established. We would contend that any outcome of the review of research pools should consider encouraging the enhancement of interdisciplinarity. Soillse for example could have had even more impact if interdisciplinarity was embedded from the beginning, as it would have broadened out from the core engagement of similarly focused departments.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Arguably the research pools become even more important in the current research landscape than before, especially as funding bodies progress to fewer larger grants, and larger consortia become the norm. It is also the case that there is an increasing expectation that consortia exist prior to competitions being announced and the research pools provide an excellent vehicle for this. There is a clear opportunity for the research pools to be aligned more closely with DBEIS/Scottish Government priorities, especially in regard to the Industrial Strategy. A reconfiguration of the pools, with revised CPIs, would seem to be important, particularly in regard to the relationship between the pools and the innovation centres, the Scottish Graduate Schools, and other relevant entities. There is an opportunity for a clearer alignment between the national priorities in research and development and the Scottish contribution to these. A further consideration is the desirability of future Scottish research pools being encouraged to make links with similar entities in the rest of the UK (for example the N8 in the north of England).
Q2b. Should research pools have a continuing role in the Scottish research base?	We believe that given the national (UK) context in regard to research and development that the research pools will be even more significant in the future than in the past, especially if a clear link is made to the key agendas around the industrial strategy, impact, applied research and innovation. There is no doubt that the facilitation of collaboration across Scottish HEIs, has brought clear benefits in terms of the building of capacity, enhancing the quality and volume of research output and innovation, and in terms of geographical inclusion where there is research excellence. All of this will need, in our view, ongoing funding support from the Scottish Funding Council, and in return for this the identification of clear performance and outcome measures linked to the national priorities. Institutional contribution is an appropriate consideration as is funding from industry or business, but the level of core funding from the Scottish Funding Council is critical if the research pools are to have maximum utilisation.
Further Comments	There is considerable volatility in the landscape for research and innovation across the UK at the current time, with some potentially very positive benefits for research and innovation, but also some risks and ambiguities, including related to BREXIT. Research pooling is deemed to be a notable success and has had and continues to have very positive impact, in terms of its contribution to the economy and society, in terms of developing Scotland's capacity to make an effective contribution to the research and innovation landscape, and in terms of forging clear links between academia and industry. Review is welcomed, and development necessary, but to destabilise the research pools at a time where there is considerable change in the research and development landscape would risk compromising the potential for ongoing impact.

Name	Stuart McElroy
Job title	Director of Biosciences
Organisation	BioAscent Discovery Ltd
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I worked at the European Lead Factory (ELF, a large collaborative EU project involving industry and academia. The Scottish component of the collaboration received ~£20 million of EU funding and the bid was supported SULSA. During the course of the ELF we also developed an initiative, called the SULSA assay development fund, fully funded by SULSA, to enable Scottish researchers to access the Drug development cababilities and compound libraries that were created at the ELF (see attached paper for a full description of the scheme and the impacts).
Q1a. What has been the impact of the initial research pooling initiative?	Creating high value scientific jobs - SULSA directly funded two scientific positions from 2015. The work of these two scientists was the main reason that, out of a totla portfolio of 71 projects accepted by the ELF in a competitive process open to all European academics and SMEs, 11 were from Scottish Universities. Each of these projects leveraged £0.5 million worth of compound screening and follow up work and access to up to 500,000 chemical compounds provided by the pharmaceutical industry. A number of these projects resulted in the securing of new IP and follow on funding to continue developing the compounds towards the clinic. We also created the assay development fund to be a training initiative and provided training in drug discovery to 5 PhD students and postdocs.
Q1b. What lessons can be learnt from the research pooling initiative?	Getting researchers to engage in translational research requires access to expertise and facilities that many researchers will not be able to access within their own institution. A pooling initiative is essential for this. It also takes a lot of work to make people aware such initiatives are available and encouraging them to engage. It works well targeting the funding as a pump-priming mechanism to plug gaps in existing funding frameworks, Drug discovery for example.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	My perception was from that of a service provider from within a research pooling initiative and not that of an applicant so I cannot best speak from an academic PI persepective. Everyone that we engage with was very pleased to have applied and were not previously aware of the quality of the facilities and expertise that was available
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes, it is a very useful tool for knowledge exchange and in making researchers aware of what fantastic facilities and expertise is available in the wider community.
Further Comments	

Name	Sir James Hough
Job title	Professor
Organisation	University of Glasgow
Can SFC contact?	
Summary of experience of research pooling initiative	Chief Executive Scottish Universities Physics Alliance 2011-2015 Currently Director of the International Max Planck Partnership.
Q1a. What has been the impact of the initial research pooling initiative?	Very considerable in terms of encouraging collaboration rather than competition between Universities, increasing research income, promoting recruitment of research stars, improving REF performance and enhancing international involvement as demonstrated in physics/engineering by the formation of the International Max Planck Partnership, the Fraunhofer Centre for Applied Photonica snd SU2P (the Scottish University Collaboration with Stanford University. Pan Scottish Graduate Schools developed by certain of the Pools led to similar pooling arrangements in England (SEPNet, for example) and also encouraged the expansion of Doctoral Training Centres in the UK funded by the Research Councils.
Q1b. What lessons can be learnt from the research pooling initiative?	Successful pooling greatly enhances the coherence of any research discipline and enables much more effective interaction with research funders and industry. Inclusivity os needed for success as is the need for all partners to feel they are being adequately rewarded for their input. There have to be incentives for all partners. Further, strong independent leadership, with professional administrative backup, is required to inspire the partners and avoid individual partner biases and interests dominating.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The pools have to become more cross=disciplinary as the research funding landscape is changing and this is already happening with SUPA, SULSA and SINAPSE winning collaborative funding for imaging research. They have to be able to bid successfully to the new funding streams launched by UKRI and (hopefully) to the forthcoming Horizon opportunities. In my opinion Pools should be encouraged to develop other Uk and international partners so that they can operate in the global environment, characteristic of modern research in almost all areas.
Q2b. Should research pools have a continuing role in the Scottish research base?	I strongly belive so, subject to evolution as suggested above.
Further Comments	I believe Research Pooling has been one of the most successful initiatives introduced by SHEFC/SFC.

Name	Gillian Docherty
Job title	CEO
Organisation	The Data Lab
Can SFC contact?	
Summary of experience of research pooling initiative	The Data Lab has had significant experience working with the research pools since our creation in 2014. Our engaged has spanned several pools including: - SICSA - MASTS - SAGES - SUPA - ETP We have had the significant and meaningful engagement with SICSA and work with the SICSA team and members on a weekly basis on activity and support. The other pools are engaged with The Data Lab across the last several years including events, board advice, specific call support and general connectivity into the Data Community in Scotland. We have also provided join doctorate programmes with MASTS and direct engagement in the Marine Industry with support from MASTS research pool.
Q1a. What has been the impact of the initial research pooling initiative?	SICSA have had an amazing impact for The Data Lab, they bring a complex landscape of researchers, academics and universities together which makes it significantly easier for The Data Lab to reach the broader computing science resources in addition to the specific data expertise in our Universities. Their annual events are very useful for The Data Lab community and we invite many commercial and public sector partners to participate in those including Demofest which provides an opportunity to researchers to demonstrate their work. Demofest specifically has enabled new collaborations for The Data Lab by providing that link to industry and academics. It also provides a platform for our previous projects to be showcased from a research perspective. Additionally SICSA have been very supportive to The Data Lab in finding the right resources across our Universities to support our initiatives and collaborative innovation projects. The computer science and informatics landscape is both deep and complex and navigating that to find the right academic resource that can then help and make a difference for Industry is crucial - SICSA help us do that. SICSA communication channel is important for The Data Lab and we leverage that network to get information out all about activity: Collaborative Innovation Projects, Skills and Talent and Community Building. SICSA also support our activity directly by attending and exhibiting at Data Talent Scotland, Data Summit both parts of DataFest. Indeed if you look at DataFest Fringe events for 2019 many are run from our University network that SICSA supports directly: www.datafest.global. The work they do to being the universities together is vitally important, I think without these the universities are likely to only act in their own interests and not consider the collaborative effort and might they can bring to either an industry problem, an opportunity such as strength in places fund or ISCF. Indeed SICSA was crucial in leading a strength in places bid on Cyber Strength with Industry partners, Scotland IS and others. This would not have happened without SICSA. The other pools help significantly where we have specific domains or industry sectors approach us for assistance and it is very easy to engage MASTS or SAGES to support us in navigating their research base. This would have been very difficult if not impossible for us to do without these research pools. We

	leverage both their networks for the data work we are doing in Marine or Geosciences both significant industries for Scotland. By working with MASTS and SAGES we are creating impact and opportunity for industry. projects
Q1b. What lessons can be learnt from the research pooling initiative?	The Data Lab was created after the research pools and I think would have found it much more difficult to achieve our maximum potential without the research pools. They are a critical part of the work to bring research together to both support research activity but also engagement with Industry.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The Data Lab is not directly involved in the research landscape but we engage with the research capacity to deliver on our Collaborative Innovation Projects and the research pools are a vital part of that. In our experience they are highly thought of and very valued contributors and vital to pull that distributed research capacity together under a single engagement mechanism.
Q2b. Should research pools have a continuing role in the Scottish research base?	Absolutely, The Data Lab would very much welcome continued and ongoing support for the Research Pools.
Further Comments	

Name	Denise Barrault
Job title	Executive Director
Organisation	NPSC
Can SFC contact?	
Summary of experience of research pooling initiative	I used to be SULSA's Exec Director, but transferred to being the Executive Director of NPSC in 2015, following successful fund-raising for the facility. Since 2015 I have received a £22K PEER award from SULSA for business development activities linked to the continuation of the European Lead Factory (ESCULAB)
Q1a. What has been the impact of the initial research pooling initiative?	I believe the impact was significant, and allowed a change in attitudes towards collaboration between universities in Scotland.
Q1b. What lessons can be learnt from the research pooling initiative?	I think it is fair to say that getting independent research organisations to collaborate effectively is difficult, and that is something that was really apparent during the pooling exercise. Involving the right kind of people is key to success. Also setting some rules early on helps with effective governence.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	I believe that the pools should focus on catalysing activities that require significant levels of cooperation, and facility sharing. They should deal with extraordinary projects, and also influence local and national funders to be ambitious and strategic with larger projects.
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes, but I think that they require more power and funds if they are to be effective. Research pooling was a real strength of the Scottish Research Landscape, it was ambitious and strategic. My feeling is that with reduced budgets, they may die out or become insignificant, as they require additional effort for all involved.
Further Comments	

Name	Amjad Ullah
Job title	Research Associate
Organisation	University of westminster, London
Can SFC contact?	
Summary of experience of research pooling initiative	I was one of the SICSA Prize Students and received my PhD funding from SICSA. During my entire PhD program, I was a regular attendees/participant of various SICSA organized research programs including, SICSA Demofest, Workshops, seminars and especially the SICSA PhD conferences. I had also utilized the Summer School Funding initiative. My experience with SICSA is very valuable, which enabled me to obtain my PhD Degree followed by a research career and therefore I am indebted to SICSA for all the various funding initiatives, especially the PhD sponsorship.
Q1a. What has been the impact of the initial research pooling initiative?	I think the impact of SICSA led research initiatives are quite visible and huge. Some examples in my capacity as PhD prize student include the following: 1: The chance to obtain the PhD degree to all PhD students, which wouldn't be possible for all the awarded students, if there were no funding. E.g. I wouldn't pursue, if didn't get awarded the PhD scholarship. 2: I believe that all the awarded PhD students could have produce various research outputs/publications during their PhD studies, e.g. I produced six papers. The proof can be found here at my google scholar page (https://scholar.google.co.uk/citations?user=kh35EDcAAAAJ&hl=en&oi=ao). 3: The various organized seminars and workshops promoted a pleasant environment for collaboration among the students and academic staff from all Scotland universities can collaborate. This will have an impact on future funding and research outputs. 4: The SICSA led PhD conferences provided a chance to the students of PhD to organize the conferences. This is a kind of unique experience, where students learn research based organizational skills to organize big event. Furthermore, the conferences itself were largely collaborative, where all students from Scottish universities take part, interact, discuss and exchange ideas about their research projects. 5: Demofest: The Demofest events promote the culture of industry and academia collaboration. I personally attended two of the events and was very happy to see the presence and interest of many companies and obviously the participation of all Scottish universities.
Q1b. What lessons can be learnt from the research pooling initiative?	I believe that the SICSA Prize studentship was a great initiative as it result in generating PhD Scholars, i.e. future researchers. Furthermore, it also provide the chance to the academic staff to supervise and collaborate with these new scholars to generate research outputs and possibly research funding. However, If I know correctly, the studentship program was stopped. It will be great to resume such programs to recruit new researchers into Scottish universities.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	
Q2b. Should research pools have a continuing role in the Scottish research base?	
Further Comments	

Name	Mark Brewer
Job title	Director
Organisation	Biomathematics and Statistics Scotland
Can SFC contact?	Yes
Summary of experience of research pooling initiative	Unfortunately we have almost no interaction with the Scottish Research Pools, despite having valuable skills which we could have brought to several of them - for example, MASTS, SAGES and SULSA. The intitiatives have largely excluded the SEFARI from participating. This is especially disappointing for BioSS, since our mathematical, statistical, modelling and bioinformatics skills could, I feel, have made useful contributions - indeed, one of our number participated in a life science think tank at Battleby when the Pools were being set up, but there was no mechanism for our further involvement. To further illustrate - although marine science is not part of the core SEFARI science areas, BioSS has worked with marine scientists in national organisations (e.g. JNCC), English bodes (e.g. Natural England) and abroad (e.g. AZTI in Spain), but being excluded from MASTS has meant, perhaps ironically, we have had almost no such opportunities in Scotland.
Q1a. What has been the impact of the initial research pooling initiative?	BioSS staff have attended a smal number of open seminar events, but beyond that the work of the Scottish Research Pools seems remote to us - it is difficult therefore for us to make a qualified assessment on the effect of the Pools. That said, we are aware that MASTS in particular is a well-known brand in marine science in Scotland. CREW has some links with MASTS, for example.
Q1b. What lessons can be learnt from the research pooling initiative?	One issue we might raise is that of eligibility - we entered into some of the preparations for the Pools not knowing the extent to which we would be able to get involved. Perhaps this could be made clearer from the start - if we are going to be excluded, it would have been better for this to have been made explicit from the outset.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The Pools are an excellent idea in principle, but perhaps in future should be more inclusive. The stated aim has been to create a critical mass for research - a laudable intention - but there is a gap in relation to how the Pools can feed into some aspects of government policy, for example (note this is a claim made by MASTS, for example). Including more partners beyond universities would help close this gap, and move towards a genuinely holistic body for Scottish science.
Q2b. Should research pools have a continuing role in the Scottish research base?	The research areas of the Pools still seem relevant today. While there is no specific Pool for mathematics/statistics/modelling etc, it is better perhaps that there is no such entity, as these specialities would be better embedded within existing Pools. That said, there would be great benefit if the quantitative community were involved better in initiatives - so there might be merit in a "cross-cutting" Pool of sorts. The end of the five-year renewal would be a good opportunity to extend the membership of the Pools initiative.
Further Comments	I can only reiterate that we would welcome any move to allow BioSS full involvement in the Pools. I cannot imagine any argument which could be made to the effect that excluding SEFARI from the Pools improves the work of the Pools, but many to the contrary.

Name	John Colin Adams
Job title	Consultant
Organisation	University of Edinburgh
Can SFC contact?	
Summary of experience of research pooling initiative	I am now "retired" but still connected with some of the innovation programs at Edinburgh University. In my former role as Director of Commercialisation in the School of Informatics at Edinburgh, I was involved in the original meetings to set up SICSA and served on the SICSA Board in the early years. My team set up the original DEMOfest activity and instigated a number of pool wide programs to bring industry, students and academics closer together.
Q1a. What has been the impact of the initial research pooling initiative?	Views here are from my personal viewpoint, nit that of any organisation and refer only to SICS as I do not have any depth with the other pools. 1) The pool has foster considerably more academic interaction between the participants of the pool to foster joint bids for funding, awareness of how to be successful in obtaining funding and awareness of what else was happening locally to facilitate more cross institution collaboration - open lectures etc. 2) Was ver successful in raising the bar across most of the pool, I believe the REF results in the main reflect this 3) Helped retain good academic talent in Scotland where earlier stage researchers may formerly have left the country if a post was not available for them in one of the more established, larger players, now move within the pool when posts are available as they understand and are know by the other institutions and also they understand they may retain collaborations with their current colleagues. 4) Developed a much stronger PhD cohort across Scotland via the cross institution supervision and the annual PhD conference and other activities 5) Developed much better links and awareness of the importance of industrial collaboration thru activities like the annual DEMOfest conference to showcase research that might be of use to industry, connections with trade bodies like ScotlandIS, awareness of start-up opportunities and skills thru events like Engage Invest Exploit, the annual technology investor conference. Specific sector initiatives like Digital Tourism and Cyber Security could not have been as easily developed without the pool structure. 6) gave a much better and cohesive picture of the Scottish strengths in this discipline as whole which attracts attention from both industrial and academic potential collaborators. It also provides the Scottish Innovation centres with a more cohesive academic landscape to collaborate with
Q1b. What lessons can be learnt from the research pooling initiative?	1) It does not come for free and requires a properly funded administrative function 2) It requires all participants to contribute, not just take. Though some form of incentive may be needed to keep the lager institutions in particular seriously involved
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	I believe the perception is positive and the pools facilitate the collaboration needed to make joint bids for UK wide structures such as Doctoral Training Centres (the Edinburgh Centre for Robotics being a good example).
Q2b. Should research pools have a continuing role in the Scottish research base?	Emphatically yes. There may be a number improvements that could be made, but i would strongly support the continuation of this pool.
Further Comments	It has to be recognised that we have a very diverse set of institutions involved from two REF leading Schools with international scale and a number of less research heavy, younger institutions, but all can and should benefit and the sum of parts will be better (and for SFC, better value for money)

Name	Mark Inall
Job title	Director SAGES, Professor in Marine Physics
Organisation	SAMS-UHI
Can SFC contact?	Yes
Summary of experience of research pooling initiative	Director of SAGES since 2015 Co-developer of MASTS (lead author of Physical Oceanography programme)
Q1a. What has been the impact of the initial research pooling initiative?	☐ Enhance interdisciplinary and multi-institutional collaboration between previously dispersed geosciences grouping in Scotland [and Germany]. ☐ Raise the quality and scope of geosciences research in Scotland through funded collaborations and networking between larger groupings and smaller, less well-established groups. ☐ Enhanced international visibility and networking, raising the profile of Scotland abroad. ☐ Broker improved connections between academics and policy units, regulatory bodies and SMEs. Achieved through directed funding and workshops for academics, placement of interns within government policy units, directorate level dialogue between Scottish Government and its regulatory instruments. ☐ Enhanced career development of early career researchers. 1.1. Has the pooling initiative met its objectives: to enable Scotland to compete effectively for funding, research staff and doctoral students both nationally and internationally; and provide a more attractive research environment? How can that be evidenced? ☐ Since 2006 SAGES has recruited 37 new university staff members; 54% recruited from outside UK; 77% recruited from outside Scotland. ☐ From 2007-2014 [analysis period], SAGES appointees produced over 450 papers and all members more than 3300 including over 50 in Nature/Science. Appointees, 48% of whom are international, generated £28M over this seven-year period. ☐ SAGES-related total research income to member institutions has now [2007 to 2018] exceeded £95.1M of new funding. ☐ SAGES Infrastructure investment: New laboratory equipment, £1.1M of investment funded by SFC + £9.9M from partner institutions. ☐ SAGES graduate school has recruited 27 SAGES-funded students, and membership is at an all-time high of 125. In the last two rounds all first offer candidates accepted SAGES offers – even those holding other offers [including from DTPs] demonstrating the strong appeal of the SAGES grad school environment. ☐ For self-funded international grad students, SAGES Grad School offers a collegiate inter-institutional environment which we understand through our Grad School events is a significant attraction factor to chose Scotland for their studies. ☐ Using Pools Engagement in European Research funds (PEER) SAGES has made 23 awards totalling £43,188 to the development of EU proposals resulting in more than £10M return from successful EU projects. ☐ Post Doctoral and Early Career Researcher Exchange (PECRE) funds of £144,198 have been committed to support 52 visiting early career researchers from all listed countries. ☐ SAGES funding schemes have made 167 awards totaling £154,377. 1.2. Examples of the ways that pooling has impacted on the relations between pooling partners and on how individual partners work with other external

	bodies. ☐ With a national trend towards larger quantization of research funding on shorter fuses (e.g. GCRF, ISFC) and well-established large EU funding initiatives, pooling provides ready-made research networks able to capitalise on these opportunities. SAGES provides specific funding and administrative support for large multi-partner initiatives. ☐ SAGES and MASTS have worked together in supporting large Scotland-coordinated EU proposal preparation, with notable successes [e.g. Atlas, iAtlantic, Thwaites]. ☐ SAGES research Themes are the 'shop window', supporting cross-institutional co-leadership, which breaks down inter-institutional rivalries and barriers, and at the same time provides mentorship and career development through thoughtful pairing. ☐ SAGES research Fora are the engines of new activity and innovation. Fora strongly encourage stakeholder engagement in their steering groups. For example, Scottish Water and SEPA help steer the Sustainable Water Management forum, SHN and NHS-Highland contribute to the Environmental Health and Human Wellbeing forum, SEPA participate in the Carbon Source to Sink forum. ☐ SAGES Advisory Board is an active body with diverse membership from external bodies: SNH (Chair), Scottish Water, DataLab IC, NERC Swindon, Our Dynamic Earth, NERC Arctic Office, SFC, MASTS Pool, SEPA. 1.3. Evidence that the partnerships associated with pooling have had broader impacts on Scottish HEIs. ☐ SAGES offers Scotland a powerful pan-institutional voice in the geosciences. SAGES research metrics [REF2014] in Earth and Environmental Sciences exceed that of Oxbridge plus London combined, by a factor of 1.6. Whilst it is impossible to make quantitative attributions, all partners agree that SAGES has had a positive influence on this type of metric, through all three assessment areas of Impact, Research Environment and Research Excellence. ☐ SAGES is expanding. Edinburgh Centre for Carbon Innovation (ECCi) joined SAGES in 2016. BGS Scotland joined in 2017. Discussions with two other HEIs are on-going. Membership is at an all-time high of 367. ☐ Shared facilities model avoids duplication of expensive analytical equipment. For example, smooth facilitation of SUERC facilities to SAGES members. ☐ SAGES [and MASTS] networks and dispersed pan-institutional Graduate Schools allow for positive contributions to many DTPs [E3, E4, IAPETUS1&2, SUPER]. Again, direct attribution towards success is impossible, but it is worth noting that in a pooling-mature Scotland, four out of the seventeen UK-wide NERC DTPs are either uniquely or strongly grounded in Scotland. The importance of this to the Scotland's HEI landscape in terms of future professional scientists should not be underestimated. ☐ SAGES works closely as appropriate with other pools [in particular MASTS and ETP]: for example, with the production of five environmental-based 'Energy Case Studies' for ETP, and joint funding awards for EU grant preparation and joint Grad School training events with MASTS. 1.4. Examples of other outcomes of research pooling, and how they have impacted on the Scottish research landscape. ☐ SAGES Annual Science Meeting brings together 100+ [and growing] geoscientists and stakeholders to an annual two-day event of presentations, networking and development. This is not a standard science meeting, it focusses on stakeholder engagement and future collaborative opportunities. ☐ Currently organizing a two-day summit [Nov 2019] on Regional Solutions to Global Environmental Challenges. Expectation is for high-level Scottish Government engagement and workshops on policy, governance and regulation lead by experts in each field. ☐ SAGES provides effective, proactive single contact point to NERC-science events in Scotland, e.g. NERC Unearthed public event in 2017, and NERC Scottish Parliament showcase in 2017

	☐ SAGES has been proactive in forging greater engagement between pooling and SSAC, and from Jan 2019 SAGES Director will represent geosciences and pools more widely on SSAC. ☐ SAGES engages with SPICe and RESAS on policy briefing, e.g. First Minister and Cabinet Secretaries vision for Scotland and the 'New North' Scottish Arctic Strategy since 2015. ☐ SAGES has placed interns with SPICe to co-write policy briefs, expanding this scheme to RESAS from 2019 ☐ We endorsed the statement in the MASTS submission: "The pools have engendered an ethos of cooperation within HEI's moving them from being destructively competitive to a collaborative and more interdisciplinary mode of operation" 1.5. Have pools made an impact on Scotland's reputation? What are the national (Scotland/UK) and international perceptions of pools? ☐ SAGES has forged a strong relationship with the German geoscience pool 'Geoverbund'. We are working together towards a wider international Geoscience network [http://www.geoverbund-abcj.de/SharedDocs/Meldungen/GEOVERBUND/EN/20181122_SAGES-ASM-2018.html] ☐ SAGES is known within NERC and UK-SIN [Science and Innovation Network]. SAGES Directorate is often used as a contact point for these organisations. ☐ Particularly through PEER funding, SAGES and all pools have raised the European and International reputation of Scottish-based geoscience. ☐ SAGES has had a particular impact on Scotland's reputation as a leader in Arctic research: through policy engagement with Scottish Government (for example, First Minister and Cabinet Secretary visits to Iceland and Norway, and active role in ongoing development of Artic strategy statement). Scottish-led research consortia in NERCs Changing Arctic Ocean program valued at >£4m (PRIZE and DIAPOD). 1.6. What aspects of pooling have attracted most interest from outwith Scotland/ academia and have they impacted on developments elsewhere? Can you give examples of this? ☐ Pre-existing national alliance networks [e.g. Geoverbund in Germany, as discussed above] are keen to share practices and join exchange schemes. Possibilities for bi-lateral research and funding are high on the agenda, particularly with EU networks post-Brexit. Opportunities to combine staff exchanges and funding scheme access are under consideration. ☐ SAGES has been used as an example of successful pan-institutional networking and exemplar for the potential creation of a similar network in Ireland. The same goes for MASTS and Norway. 1.7. What has happened that would not have happened without research pooling? Please give examples. ☐ Establishment of cross-institutional post graduate [PhD] training cohorts, and a pan-Scotland Graduate School in geo/environmental sciences. ☐ International reputational enhancement and early career development of Scottish-based ECRs through PECRE and SAGES Small Grants scheme. ☐ Full capture of Scotland's geosciences expertise for present and future advisory activity to Scottish Government, via membership of SSAC and established dialogue routes with SPICe and RESAS. ☐ Capture of significant EU funding through collaborative support of proposal preparation [partner matching, administrative support, direct funding]. ☐ Arguably the overall high Scotland-wide REF2014 success under UoA7 [Earth and Environmental Sciences]. ☐ Arguably the Scotland-wide success in NERC's DTP2 call can at least in part be attributed to the pooling initiative model.

	1.8. What has been the impact of pooling outside of the academic sector, on policy and industry? Can you provide examples of this? ☐ ECCi became a SAGES partner in 2016 to enhance our'third sector' activities. Since then SAGES has: o Made 700+ businesses aware of relevant geosciecnce expertise that could help their businesses [in collaboration with Interface]. o Placed interns with SMEs [e.g. Space Intelligence, WHRL, East Africa Sissal Company, Carbomap]. o Established internship programmes with Scottish Government [SPICe, RESAS]. o Internship programme with Scottish Centres of Expertise [ClimateXChange]. o Run a series of workshops for SAGES members on research into policy: 'Making Your Research Matter' ☐ SAGES has engaged with Nature Scotland to create the first ever Nature Scotland Science Award [2019] to celebrate the work of groups or individuals who's research has made a demonstrable impact on nature conservation in Scotland. ☐ Provided briefing materials for Scottish Government ministers [e.g. First Minster keynote speech to Arctic Assembly in 2016, Cabinet Secretary for Culture, Tourism and External Affairs in 2018, Minister for Rural Affairs and the Natural Environment, January 2019] ☐ Provided written and oral parliamentary evidence [e.g. oral evidence to House of Commons Select Committee enquiry on Changing Arctic] and to the Scottish Affairs Committee "Scotland and the High North Enquiry" Feb 2017 ☐ Positive interactions with some Innovation Centres [e.g. joint PhD studentships with DataLab] 1.9. Have there been missed opportunities, where pooling could have had an impact but didn't? ☐ Less interaction has taken place with SMEs than was anticipated at the beginning of Phase 2, though this is now increasing with renewed co-working with Interface and placement of interns. More financial resource would help. ☐ Generally speaking, the interaction between SAGES Innovation Centres has been disappointing. Overtures towards OGIC and SAIC were very positively received, but lack of resource from pools combined with the SME-led model of [some] ICs have made meaningful engagement difficult. More positive steps are now being taken with DataLab, with their understanding of the limited resource model currently experienced by the pools. ☐ SAGES has great strength within both our Transformations in Society Theme, and Environmental Quality and Human Wellbeing Forum. To encourage and enact the behavioral changes required by regional manifestations of environmental change requires academic evidence and innovation: there is still much to be done to bring [i.e. fund] academics to fuse evidence and innovation. ☐ SAGES has not [yet] sought a relationship with the north of England's "N8" partnership, which has some similarities to the pooing initiative. Limited resource has put this as a back-burner issue for now.
Q1b. What lessons can be learnt from the research pooling initiative?	1.10. What lessons can be learnt about making collaborations work effectively? ☐ Trust in a pan-institutional network is essential, especially when group size and prestige vary across the network. Trust takes time to develop. Efficient and unpartisan leadership is essential, and should be a primary, essential skill for Pool leaders. ☐ Administrative costs need to be transparent and [significantly] less than, for example, that of research councils. ☐ Open calls for pool-related posts are essential to maintain trust and ensure involvement of genuine enthusiasts. ☐ Opportunities for ECRs to win fund, travel, collaborate, network. This supports and drives early career, bottom-up innovative ideas and captures their energy. 1.11. Have particular pooling models been shown to work well/badly, in all cases/in specific contexts?

	☐ SAGES has deliberately followed a model which does not create a [real or perceived] competitor agent. The primary model is to support/promote combinations of SAGES academics and HEIs in their competition with others. SAGES deliberately has not sought to set up a PLC for this reason, though notes that some pools have adopted such a model. ☐ SAGES and MASTS are not discipline-based, unlike the other pools. This has perhaps provided greater opportunity to enhance multi-disciplinary activity. ☐ Pools have all struggled in one way or another to work meaningfully with the Innovation Centres. 1.12 Were particular elements of pooling more effective than others? ☐ Engagement with Scottish Government policy units and Centres of Expertise has been effective. Engagement with Innovation Centres has been less effective. ☐ Graduate school is highly effective. 1.13 From your perspective what evidence can you give regarding what worked well, or didn't? Why? ☐ Much of our response is directed toward answering this question. 1.14 You may wish to consider: academic posts; improved facilities and equipment; graduate schools and studentships. 1.15 Are there lessons to learn from the range of pools supported? ☐ See response to 1.16 1.16 Were the disciplines covered by pools the right ones? Some pools were focused on discrete discipline areas while others were broader / interdisciplinary – are there lessons to be learned from the different models? ☐ The 'new money' for UK to achieve 2.4% GDP on R&D will not be aimed at traditional disciplines and will not be disbursed via the remnant research councils. ☐ Naturally multi and inter-disciplinary networks are/will be best-placed to take advantage of the real growth in R&D spending. Innovation [however defined, but probably with a growth and/or 'carbon' tag] will hold the key. ☐ Pools might be best configured in a naturally multi-disciplinary manner to take advantage of this direction of travel. Some already are [SAGES, MASTS], others are not. 1.17 Were there missed opportunities in other areas? What happened in those areas? ☐ There was a missed opportunity not to engage with Pools when Innovation Centres where conceived and set up. Scotland was ahead of the game in setting up Pools and then ICs [ahead of UKRI], but has now been overtaken with the vision of fusing R and I within the single body of UKRI.

	1.18 Are you aware of examples of location impacting on or limiting institutions' involvement in research pooling and/or of examples that overcame any limitation? ☐ Not aware of any geographical issues. Fiscal issues have been the main point of discussion with new partners. ☐ Pools have reduced the perceived "isolation" of intuitions sited away from the main academic centres. As part of a Pool you are never regarded as geographically peripheral. 1.19 What lessons can SFC learn from the initiative on how we design/ implement/ manage projects? ☐ In designing the Innovation Centre initiative, more consideration could have been given to creating a specific integrative activity stream with the pre-existing Pooling initiative.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	2.1. Has the changing landscape and funding environment affected evolution of the research pools? ☐ Pools have the freedom to adapt. SAGES has created new seed-corn funding streams in advance of ISCF and GCRF calls to help members create networks and proposals for these types of call. ☐ A challenging funding landscape has been a factor in the decision of some HEIs to delay joining a pool. ☐ Reduced funding to Phase 2 of the pools has focused decision making. Some avenues with unclear lines to sight to KPIs have not been pursued due to resource limits. More time/effort would likely have been made with Innovation Centres had resource permitted. 2.2. Do institutions remain committed to individual pools and the concept of pooling more widely? ☐ Yes. There was considerable debate over the subscription model going into Phase 2. Once that had been debated, negotiated, and agreed there has been full and unequivocal support. ☐ Between partners there are different internal approaches to funding the subscription. Some are more centralized than others. ☐ SAGES continues to expand, discussions are ongoing with two additional HEIs. 2.3. How does pooling fit with the current focus on interdisciplinarity and challenge led research? ☐ SAGES is naturally interdisciplinary. One challenge is time demand on social and economic scientists, but they are well supported through SAGES Themes and Fora and engage enthusiastically and bring great strength to the network. 2.4. What is the current role of pools and how has that changed since the initial phase? Is the current model right? ☐ The current role focusses on: o Stakeholder interaction/engagement; o Translational work at the science/policy interface; o Inter-institutional mentoring/support for ECRs (including PGR students); o Pan-Scotland Geoscience Postgrad School, with cross-institutional supervision and sharing of best practice;

	o Support for large, multi-institutional proposal preparation and international conference organization. ☐ Pool management has become more efficient. <25% of total spend is on SAGES 'officers' (1.8 FTE total). Committees and management practices have been streamlined in comparison with Phase 1. ☐ Phase 2 adheres to a new Equality and Diversity statement, endorsed by all partners with an independent arbitration mechanism. ☐ Phase 1 funding additionally managed staff recruitment and capital purchases, though much of that was organized at little cost to the pool via institutional arrangements. 2.5. How do pools interact with other SFC investments such as Innovation Centres (ICs)? ☐ Interactions are very good with Centres of Excellence (in particular ClimateXChange). ☐ Interactions with Interface are good and effective – with expertise database sharing in place. ☐ Interactions with ICs are slowly improving (in particular DataLab), but could be better with targeted resource.
Q2b. Should research pools have a continuing role in the Scottish research base?	2.6. Will the concept of research pooling remain relevant in the developing research landscape? How can/should the model evolve to fit that landscape? ☐ If anything, pools are more relevant now than when first developed. The direction of travel is towards large, multi-institutional, interdisciplinary research "quanta". Pools (particularly interdisciplinary ones) provide a natural network to improve Scotland's competiveness. Though the gain is often hard to quantify [how would we fare without pools? Do we want to find out?], the very presence of pools creates exactly the mindset needed for success in the current funding environment. 2.7. What happens when the five years continuation funding comes to an end? ☐ This question is a standing agenda item for SAGES Executive and Research and Innovation Committees. The consensus is that without the leverage offered by SFC's financial support, the pools would cease to function. Perhaps not immediately, but a subscription-only model would fail eventually [after two years or so]. ☐ The Scottish research environment would be a poorer place without pools, but the question is whether the current investment represents "value for money". SAGES is run efficiently; but effectively? Answering that question more widely is presumably the purpose of this review.
Further Comments	SFC investment in pools is quite modest and many of the gains are hard to quantify in a monetary sense – but it seems that the ethos of pooling has greater currency now than a decade ago. To see the pools disappear would be a destructive act that would take as long to repair as they did to build.

Name	Brian Quinn
Job title	Professor of Ecotoxicology
Organisation	University of the West of Scotland
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I initiated UWS to join MASTS when I arrived here in 2014 as having attended the Annual Science meeting in 2013 i was extremely impressed by MASTS. Not only was i impressed by the extremely high level of research being presented by the MASTS partners at the meeting, but also by the strong inclusive and collaborative nature of the group. I have subsequently been involved in chairing a community project (Scottish Microplastics Research Group) and am on both the MASTS and SUPER DTP boards.
Q1a. What has been the impact of the initial research pooling initiative?	One of the major impacts and successes of MASTS has been its ability to foster collaboration and networking. This is most evident from the annual science meeting, which is always an excellent event. This ethos of collaboration has resulted in internationally recognised research that has in turn lead to successful national and international research funding applications. Personally I have gained enormously from my interaction with MATS since UWS joined the group in 2014. I established the community project 'Scottish Microplastics Research Group' with a colleague from Marine Scotland (Dr Marie Russell) which has led to a co-funded PhD studentship with Marine Scotland and the co-supervision of a PhD student in SAMS. This project is also a member of the EU JPI BASEMAN project allowing us to directly interact with colleagues in Europe. As members of MASTS, UWS is now also a partner in the SUPER NERC Doctoral Training Partnership. This is something that we could not have achieved without membership of MASTS is is of huge benefit to the University. Not only will this increase the number of PhDs (allowing access to a valuable training network), but it will facilitate partnerships with both our MASTS partners and an extensive list of industry, academic and regulatory collaborators. Myself and other academics in UWS have also benefited from smaller grants available through MASTS, such as the PEER and travel grants.
Q1b. What lessons can be learnt from the research pooling initiative?	As mentioned above, the strength of MASTS lies in its inclusive nature. This ethos has to come from the top and it does, through Prof David Paterson, who has been extremely inclusive and encouraging of UWS involvement in MASTS. This ethos has created a vibrant and interactive collaborative community in the marine research area throughout Scotland. I do not have experience of any other pooling initiatives, but strongly feel that the key to MATST success has been the fostering of this collaborative, inclusive ethos. Another key aspect of MASTS is that it is constantly reviewing what it does, with changes in themes, forums and community projects to reflect the most current and relevant research. It is a dynamic platform, that is adapting and growing with the needs of both is members and of the scientific community. It therefore keeps itself and its research relevant.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The pooling approach adopted by SFC has been hugely successful and is the envy of several colleagues in neighbouring countries (e.g. Ireland and Wales). This approach is particularly important for less research intensive universities (such as UWS) as it gives us an opportunity to interact with our peers on a level playing field. Access to PhD studentships is of particular importance given the reduced research funding available. A key role for pools and in particular for MASTS has been to provide access to government agencies, who are fellow members of MASTS and have funds potentially available for research. UWS has recently become a full member of MASTS (associate member from 2014-2017) and sees this pooling initiative as a key driver for marine research in the university. One of the main advantages of MASTS is its interdisciplinary nature that allows researchers from different schools within the university (e.g. Health and Life Science and Computing, Engineering & Physical Sciences) to gain from our membership. There is a good level of interaction between MASTS and the innovation centres, particularly the Scottish Aquaculture Innovation Centre (SAIC), with whom I primarily interact. MASTS membership has facilitated my interactions and successful grant applications with SAIC.
Q2b. Should research pools	Given the continuing saga of BREXIT, the pooling initiatives have become more relevant and important than ever. Not only does is provide a unified voice

have a continuing role in the Scottish research base?	that is recognised and respected internationally, but it actively facilitates interactions with national and international (particularly EC and EU) organisation/partners. The pooling approach has also greatly facilitated collaboration, which has in many cases (and through my own experience) facilitated multidisciplinary research. This is aided by the diverse range of research themes within MASTS.
Further Comments	Through our membership of MASTS, UWS has established and developed productive collaborations that have led to the submission of 2 large NERC grants applications in the last 12 months. Not only is there an extremely important networking aspect of MASTS, but it also allows us access to larger research funding that we may not otherwise have access to. As partners, we also have access to facilities that are located with our MASTS partners, which would otherwise be inaccessible.

Name	Mary Daly
Job title	Acting Deputy Director, Strategy and Planning
Organisation	Glasgow Caledonian University
Can SFC contact?	
Summary of experience of research pooling initiative	GCU is a member of a number of research pooling initiatives including the Energy Technology Partnership (ETA), Scottish Informatics and Computer Science Alliance (SICSA), Scottish Universities Physics Alliance (SUPA), Soillse.
Q1a. What has been the impact of the initial research pooling initiative?	Research pooling initiatives have been useful in applications for EU funding and for encouraging collaboration across universities. As a University, we had moderate engagement with the Scottish Pools, which included collaborative elements and also aspects leading to nationally and Internationally recognised work (e.g. in our Built Environment & Asset Management (BEAM) Research Centre) which would not have happened without the initial support.
Q1b. What lessons can be learnt from the research pooling initiative?	Industry engagement is increasingly important. We also see a need for parallel engagement with Innovation Centres. It can be quite challenging for less research intensive universities to gain the same level of benefit from research pooling as more research intensive universities.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	
Q2b. Should research pools have a continuing role in the Scottish research base?	A modified version of research pools have a continuing role. As the research environment is facing more complex challenges, we feel that junior partners in the pools would benefit from an increased drive towards active inclusion by the more established players, so that pockets of excellence could be nurtured to the benefit of the national research landscape. This could include an element of mentoring, maybe via ECR secondments or training initiatives similar to EU Horizon 2020 ITNs, with a view to enhance capacity across the sector.
Further Comments	

Name	Stuart Reid
Job title	Professor
Organisation	University of Strathclyde
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I was a PhD student in the University of Glasgow during the establishment of SUPA in 2004, and was consulted at the initial stages of establishing the SUPA Graduate School. I was appointed my first faculty position through SUPA II at UWS, in relation to expanding capabilities in interface of Physics and the Life Sciences. I moved to the department of Biomedical Engineering in 2017 due to requiring additional support in clinical investigations being funded. Thanks for SUPA, I remain part of the physics community, and my research group receive the required support through SUPA (Grad School, networking, etc). An entirely new research field in regenerative medicine has arisen due to the support my research has received from research pooling in Scotland.
Q1a. What has been the impact of the initial research pooling initiative?	Driven research excellent ALONGSIDE multidisciplinary/KE relevant activities. International reputation. Recruitment at all levels - beneficial in recruiting international PhD students, increases applications for postdocs, and has helped recruit top professors from around the world. Enabling larger scale facilities to be created. Drives a collaborative structure.
Q1b. What lessons can be learnt from the research pooling initiative?	Drives collaborative structure - this should be maintained. Needs good leadership to ensure vision is inclusive - ensures that vision is bigger than a single institution.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	People around the world are trying to replicate (even in part) the successes in Scotland with pools. The role of research pools continues to be seen as important. I note that interdisciplinary and KE initiatives are increasing, and UK funding increasing, and therefore important that Scottish research pools are directed/encouraged/supported to leverage these opportunities.
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes. There are amazing examples of how research pools have been successful, such as driving research excellence and industrial engagement. However! The key question is, are there arising societal needs/challenges that we can use research pools to help address? Where are the opportunities to make Scotland the innovation leader in the world? (arguably Scotland has already been this in the past!). What are the breakthroughs we could achieve through collaborative approaches to research? For example (and I am a Physicist working in astronomy and biomedical research, so this is outside my direct area) the Scottish Government has strong ambitions for reducing our carbon footprint, but recent reports show that agriculture and transport cannot be significantly tackled (particularly the meat and diary industry). This is because the challenges are complex, e.g. reducing meat industry would likely kill Scottish farming, and then all meat consumption will rely on imports, which may negate the SG goals. This is an example of a problem where (a) all studies are now predicting the CO2 burden, dominated by the global food industry, to start decimating much of human life on earth within a few decades, and (b) the solutions are complex, require multidisciplinary expertise, and need to be handled with ethical responsibility (in terms paradigm changes in established industries - so affecting jobs and

	culture...). I would suggest that the SG should use research pools as one of the key tools for address such challenges.
Further Comments	Pooling can drive potential outcomes that are not achievable by a single institution. Research pooling can help the Scottish research base to be more responsive to societal needs and industry/business demands. Pools support both fundamental and applied research. Pools can support multidisciplinary research that would others be difficult within the "traditional" discipline areas.

Name	Victoria Gradin
Job title	Profesora Adjunta (Grado 3)
Organisation	Universidad de la Republica - Montevideo - Uruguay
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I did my PhD at the University of Aberdeen (2008-2011) investigating the neural mechanisms that underlie psychiatric disorders such as depression and schizophrenia. With this aim I used techniques such as functional magnetic resonance imaging (fMRI) and computational models of brain functioning. My PhD was funded by the SINAPSE (Scottish Imaging Network: A Platform) initiative for medical imaging which comprises a network of Scottish universities, having also the NHS as a partner. Being part of SINAPSE was a truly amazing and enriching experience. SINAPSE provided me with the opportunity to interact with other researchers and PhD students across Scotland, which was crucial for my work given the highly interdisciplinary quality of my PhD project. Thorugh SINAPSE it was possible to interact with a variety of researchers such as medical physicists, neuroscientists and clinitians. SINAPSE also gave me access to specialized training such as image analyses courses, and encouraged me to present my work in conferences, which highly contributed to my learning. I have now a position at the Universidad de la Republica in my home country Uruguay. I am working on establishing a research group focused on investigating the neural and behavioural mechanisms that underlie psychiatric disorders, continuinig with the research topic of my PhD. As part of this, I am contributing to develop imaging techniques in Uruguay. At the moment I am part of a group that is trying to set up the first 3T scanner of our country so that it is possible to develop fMRI research over here. Keeping in touch with the SINAPSE community has been very helpful in this process. In summary, I am very grateful to the SINAPSE team for the opportunity they gave me, and I hope that other students can also benefit from this program.
Q1a. What has been the impact of the initial research pooling initiative?	
Q1b. What lessons can be learnt from the research pooling initiative?	
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	
Q2b. Should research pools have a continuing role in the Scottish research base?	
Further Comments	

Name	Tanita Casci
Job title	Head of Research Policy
Organisation	University of Glasgow
Can SFC contact?	Yes
Summary of experience of research pooling initiative	We are involved in all of the pooling initiatives, either as a lead or as a participating institution.
Q1a. What has been the impact of the initial research pooling initiative?	When conceived and launched in 2003, the research pooling initiative created by SFC succeeded in inspiring researchers across Scottish to pool their resources and respond to increasing international competition. The impact of this initiative is exemplified by the increased citation impact of publications authored by Scottish-based researchers. Quoting from the Bibliometric Assessment of the Scientific Landscape of Scotland, â€œScotland has a high Field Weighted Citation Index (FWCI), which increased from 1.57 in 2007 to 1.75 in 2016, an increase of 11.5%, staying well ahead of the global average of 1 and also ahead of other UK nationsâ€. Beyond citation impact, the advent of research pooling raised the reputation and performance of Scottish HEIs within the RAE 2008/REF 2014 research assessment exercises. Quoting from the THE: â€œUniversities Scotland highlighted that 77 per cent of Scottish research submitted to the REF 2014 had been judged to be world-leading (4*) or internationally excellent (3*), slightly ahead of the overall UK figure of 76.1 per cent. This was an improvement on Scotlandâ€™s performance in the 2008 research assessment exercise, when 52 per cent of submissions were rated 4* or 3*, which was below the UK figure of 54 per centâ€. Examples of the most successful research pools include SULSA, SICSA and SUPA.
Q1b. What lessons can be learnt from the research pooling initiative?	
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Assuming that we credit the pooling initiative, at least in part, for the success of the Scottish research base, the key question is whether the research pools continue to be the key mechanism for driving Scotlandâ€™s future success. In planning such future mechanisms, we need to consider the landscape within which UK research is operating. Following the Nurse Review in 2015, the creation of UKRI and its incorporation of InnovateUK has changed the UK research landscape. UK research funding that was previously typified by subject-level support is progressively being replaced by large-scale challenge-led funding calls that are often linked to our emerging UK industrial strategy. In making this transition, UKRI is in line with other major UK funders, and the UK is in line with similar changes in scale and focus world-wide. In this new landscape we believe that the subject-based research pools will continue to support collaboration and information exchange. Consequently, we recommend that they continue to be funded at an administrative level, i.e. through the continued funding of a CEO with executive support and a modest operational budget for networking activities. This core funding is at a level similar to that which most of the existing pools are successfully operating.

	However, the change in the UK landscape means that we recommend that the large-scale investments that the subject-based research pools have received in their initial phases are no longer the optimum approach for SFCâ€™s future strategic investments in Scotlandâ€™s research base. Instead, the funding available through SFC should be used as a source to gear the investment of funding from outside Scotland. In particular, future strategic investments should be focussed on challenge-led initiatives â€" to support a consortium-based effort formed from across Scotlandâ€™s HEIs and across different disciplines that would be used to attract UK-wide or international research investment to Scotland. This geared model might be extended to funding, wholly or partially, Scottish bids (or Scottish parts of bids) that have met the highest standards of UK quality and peer review, but that due to restricted funds at UK level, were not fully funded. This geared approach obviously maximises the financial benefit and, perhaps more importantly, drives reputation on both a UK-wide and an international scale. England is already funding equivalent programmes â€" the Expanding Excellence in England (E3) and the International Investment Initiative (I3) â€" thanks to new investments. Research Englandâ€™s budget has risen by 20% in real terms since 2015/16. Within the context of the UK, the research funding opportunities that SFC could support include those identified within the Industrial Strategy Challenge Fund (ISCF), Strategic Priorities Fund (SPF), Strength in Places Fund (SIPF), UKRI Centres for Doctoral Training, and other similar UKRI/UK Government initiatives such as the Global Challenges Research Fund (GCRF). Of course, Scotland has research priorities and initiatives that might lie outside of those initially identified by initiatives such as ISCF, SPF and SIPF. However, even in these cases, rather than SFC providing a solely local funding mechanism, Scotland should use its critical, and cohesive, mass to lobby for the UK agenda to reflect the needs of Scotland and indeed other national or regional economies with similar needs.
Q2b. Should research pools have a continuing role in the Scottish research base?	
Further Comments	

Name	George Corner
Job title	Hon Professor (ret Consultant Medical Physicist)
Organisation	University of Dundee (Past NHS Tayside)
Can SFC contact?	Yes
Summary of experience of research pooling initiative	While I cannot speak as representative of industry on SINAPSE, (having been employed by the NHS and with honorary University positions), I hope I might be able to comment usefully from an industrial viewpoint. This I base on my modus operandi being to involve my NHS colleagues in my own Department of Medical Physics, but particularly research orientated clinicians and medical staff, and link up with the research resource in the Universities through to industrial partners both to develop equipment and systems and to implement fully developed but novel techniques. Some of the companies I have worked with in this way are Optomize Solutions, Active Needle both University spin=outs but also Philips, BBraun, Hitachi and Teleflex. SINAPSE has been one of several networks that I have used with success. SHIL, Scottish Ultrasound Group and SUPA have been among others. It is sometimes difficult to say which was the major facilitator as they work together with useful overlap and a recurrent question of my work was "Is this a University or an NHS project?" It was often both. Sometimes SINAPSE was the core of the initiative, sometimes the glue, other times the lubricant. What I found extremely useful was SINAPSE support of PhDs, travel grants and industrial placements particularly in early stages before a project was well enough established to obtain industrial funding. This enabled projects to gain a foothold and opened a door to further major funding including KTPs. Even now in semi-retirement SINAPSE helps keep me networked with those making a difference and those who can facilitate in the field throughout Scotland and beyond.
Q1a. What has been the impact of the initial research pooling initiative?	Funding of early stage projects Fruitful contacts and initiatives Excellent stimulating meetings
Q1b. What lessons can be learnt from the research pooling initiative?	The benefit of working accross professional specialties and in multiple centers - trully the benefit of pooling
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Essential maintain the momentum - do not let the contacts and collaborations slip. Continuing the funding of student placement degrees even in small numbers gives great benefits . Many grants cover hard ware and other resources but leave us short of the quality early researchers
Q2b. Should research pools have a continuing role in the Scottish research base?	Yes, the are addition to excellent individual institutions but give a nurturing umbrella. SINAPSE can provide a vehicle to explore and establish partnerships and can give a supportive substance to such intiatives
Further Comments	The core SINAPSE office holders provide a friendly and informed networking function with intros, direction and encouragement

Name	Jasmina Lazic
Job title	Chief Data Technologist - Bayes Centre
Organisation	University of Edinburgh
Can SFC contact?	
Summary of experience of research pooling initiative	I work closely with a number of researchers at the University of Edinburgh School of Informatics, which is a member of SICSA.
Q1a. What has been the impact of the initial research pooling initiative?	Research pooling initiative has had a very positive impact in fostering collaborative research in forms of research workshops, training and other events, research and industrial visiting fellowships, providing initial sources of research funding and entrepreneurship. A list of selective examples is enclosed separately in the Supported Evidence Document.
Q1b. What lessons can be learnt from the research pooling initiative?	Providing opportunities for connecting researchers, particularly across multidisciplinary areas, is immensely valuable.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	Network connecting researchers through various events and providing opportunities for funding and commercialising research.
Q2b. Should research pools have a continuing role in the Scottish research base?	That would be very helpful.
Further Comments	

Name	Sheila Heymans
Job title	Executive Director
Organisation	European Marine Board
Can SFC contact?	Yes
Summary of experience of research pooling initiative	European Marine Board (EMB) is a marine science-policy think-tank whose members represent major nationally or regionally significant marine science research performing and/or funding organizations, as well as national-level consortia of Universities with a marine focus. Scotland is represented within our membership by the MASTS (Marine Alliance for Science and Technology for Scotland) research pool, who joined as a national-level University consortium in 2012. On an individual level our Executive Director, who is still a Professor at the University of the Highlands (UHI) and seconded from the Scottish Association for Marine Science (a member of UHI) to the EMB, is a member of MASTS. Through MASTS she has been able to obtain the networking possibilities within Scotland that is difficult to get for a scientist coming from outside the country. MASTS provided support for workshops, part studentships etc. which enabled the scientists in Scotland to work closer together.
Q1a. What has been the impact of the initial research pooling initiative?	The impact of the research pooling initiative for us has been significant, in that had there not been a research pool in our particular field, then Scotland would not have representation at European Marine Board. This would mean that Scottish research and innovation, and their outputs, would not have the same level of impact and recognition at a European and International scale in our field as it does currently. The presence and activity of this research pool within our membership has also led to the creation of a dedicated panel for University consortia at the European level within our EMB membership, as a platform for members to discuss common topics and exchange best practice; leading to the greater research and training excellence. This panel has also supported the creation of similar research pooling organizations in other European countries, including Norway, Ireland and Sweden. The Delegate from MASTS also currently serves on our Board of Directors, and as Chair of the University Consortium Panel. Through these roles, the voice of Universities and of Scotland has been represented at high-level influential meetings such as with Commissioner Karmenu Vella (Commissioner for Environment, Maritime Affairs and Fisheries, of the European Commission) and at events in the European Parliament; something that would be virtually impossible to achieve for a single University, and totally impossible at the EMB level as our membership rules precludes members from single universities.
Q1b. What lessons can be learnt from the research pooling initiative?	At the European level the pooling initiative has created the gravitas needed for MASTS to become a member of EMB, and we are aware that Universities in England and Wales would want to create the pools of marine science needed to become a member. Thus, the most important lesson that we can see is that pooling has created a large enough consortium for marine science to be heard at the European level, and through the Galway Statement, Belem Statement and All Atlantic initiatives, and also at an international level.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	In the view of the European Marine Board, research pools are very well perceived and actively encouraged; membership of our organization as a single University is not possible, meaning that researchers would not benefit from being represented by a significant voice at European level, and would not have the same ability to influence the future of research in Europe. The role of research pools, from our perspective, is to enable multi-University collaboration on common themes to further the scope of research that can be conducted, enable more impactful research through shared expertise and resources, enable greater visibility for research, support development and implementation of best practice to enable excellent research and training, and to serve as a common strong voice for national interests at an international level. Access to a wider pool of researchers and resources could also serve as an additional benefit and attraction for both researchers and funders.
Q2b. Should research pools have a continuing role in the Scottish research base?	We feel that research pools should certainly have a continuing role in Scotland, and we feel that Scotland could play a leading role in sharing their experiences and encouraging similar strategic investments elsewhere in Europe.
Further Comments	

Name	Helen Kennedy
Job title	Senior Manager Research
Organisation	University of the West of Scotland
Can SFC contact?	Yes
Summary of experience of research pooling initiative	This response is submitted on behalf of the University of the West of Scotland. UWS are currently members of six research pools and this is the institutional response to the call for evidence.
Q1a. What has been the impact of the initial research pooling initiative?	UWS staff are active members of 6 of the 11 research pools (SUPA, SAGES, SRPE, ETP, MASTS and SICSA). The university has benefited from each pool's efforts to raise the profile of their respective research disciplines. SFC research pools have made a valuable and positive contribution to the research environment at UWS in a variety of ways including: • Enhancement of opportunities for multi-disciplinary and inter-disciplinary research across institutions in areas which were previously fragmented and disconnected. • Increasing impact by facilitating international exposure of UWS research. They have been in a unique position to represent Scotland and sign MOUs with international organisations to help facilitate international collaborations for Scotland. • Improving leadership capabilities through participation of UWS staff in the management of the research pools. Currently Prof John F Smith represents UWS on the SUPA executive, Prof Naeem Ramzam represents UWS on the SICSA board, Prof Des Gibson is the Entrepreneur in Residence at SUPA supporting their commercialisation/company formation activities and Prof Milan Radosavljevic sits on the board of ETP. • Research Pools have been instrumental in enhancing competitiveness of Scottish HEIs. They have provided UWS with funded lectureship posts, funded industry placements, access to discipline specific graduate schools and related training, access to equipment and facilities plus seed corn funding streams to advance HORIZON 2020, ISCF and GCRF calls to help members create networks and proposals . • Research Pool fora provide a showcase for the benefits of working closely with industry, government and other stakeholders. Through a range of conferences run by the research pools UWS staff and doctoral students have benefited from improved connections with policy units, regulatory bodies and SMEs. This has been achieved through direct match funding for a range of projects, sponsored PhDs, work placements and workshops. • There is increasing evidence for pooling of resources in regional groupings, as pioneered during the period of RAE2008 by the Scottish Universities Physics Alliance (SUPA). UWS membership of this pool significantly assisted with impact in REF 2014 (submitted in UoA Engineering). Our strong engagement in SUPA will help with the UWS REF 2021 submission where we may submit to the UoA Physics. The five SUPA partners that submitted to UoA9 (Physics) all improved on their overall Grade Point Averages (GPA) between RAE2008 and REF2014, and all demonstrated significant performance in the new category of 'impact'. • Using the pools engagement in a European research funds (PEERS) has helped develop networks to participate in EU project applications. • With the increased focus of research funding to address global challenges (e.g. ISCF and GCRF, HORIZON 2020, Doctoral Training Centres), pooling is indispensable in the development and long-term nurturing of critical mass research networks to capitalise on these opportunities. MASTS has provided the critical mass to allow members to apply for and win funding for projects like NERC SUPER DTP. This doctoral training grant gives a £5m boost for Scottish Environmental research and would not have been possible for HEIs with internationally excellent yet small and emerging environmental research

	groups to increase the capacity and therefore position Scotland at the forefront of global environmental research.
Q1b. What lessons can be learnt from the research pooling initiative?	Scotland's research pools did not all start at the same time. Their sequential launch over a number of years has resulted in some evolution of remit and operation to the point where today they are predicated on support for early career researchers and on interdisciplinary and multi–institutional approaches. At the outset, there was a strong focus on research metrics and later pools including MASTS will attest to have been created to address wider social political and environmental agendas. From the UWS perspective some pools were closed to our membership at first. Tiered memberships as offered by SULSA represent a positive development, allowing smaller institutions to join additional pools, making them more inclusive, more representative of Scotland and affordable for smaller institutions. As expertise evolves this approach ensures that where a HEI has a nascent research group they are welcome to actively participate in the research pool. Mobility of staff is thus not restricted because a particular HEI was not part of the original consortium bidding to SFC. Since the advent of the Research Pools, SFC has also launched the eight Scottish innovation centres. Together they are providing a powerful research and innovation environment, enabling synergistic and seamless interaction between HEIs, industry, government and other stakeholders.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The research landscape has changed dramatically since the inception of the first research pools. Brexit, changes to funder structures and a focus on challenges and missions with an increasing emphasis on interdisciplinary research are creating significant challenges. The funding for the research pools has decreased for second phase funding rounds and the pools have had to reduce ambition and focus on fewer key deliverables. This adaption has led to reduced activity with a key focus on graduate schools and investment in doctoral training. While this has proven to be the appropriate approach, it leaves almost no room and funding for cross-institutional post-doctoral funding. Research pools have a role to provide leadership and direction in addressing significant global challenges through its pan-Scotland research themes. They are promoting collaboration across the universities of Scotland. They must work with other pooling initiatives to provide complementary skills and expertise and to encourage innovation in cross-disciplinary areas e.g. SULSA, SUPA and SINAPES working on imaging projects. They have a role to create globally impactful critical mass and a vehicle for Scotland's activities to increase engagement with partners outside academia, such as government agencies, industry partners and funding bodies. This promotes collaboration and stimulates an increase in research and helps to generate a larger UK global footprint in key research areas. UWS is an enthusiastic supporter of research pooling. Our continued commitment to research pooling is demonstrated very recently (January 2019) through increased investment to join SULSA. Annual monitoring clearly demonstrates that the pools are providing tangible benefits to UWS academics and research pools are considered an essential investment to help enrich the research environment and create opportunities for collaboration and impact. However, due to aforementioned challenges, if the research pools are not sufficiently funded, the institutional support at current levels might not be possible. Pooling has brought institutions together in many ways and while all pools operate in different ways they are all adapting to changing research agendas and their role in graduate training has been transformational in Scotland.
Q2b. Should research pools have a continuing role in the Scottish research base?	Failing to capitalise on the success of the research pools by not continuing their funding would represent a significant loss to Scotland and the UK. The triple helix of university, government (including SFC) and industry need to agree how an increasing emphasis on outputs and outcomes from investment in research and innovation is managed in an environment where public funding is constrained for the benefit of all their stakeholders. A primary tenet for each pool is to provide stronger and wider leadership and strategy to promote collaboration and the creation of critical mass to promote Scotland's future strength within the UK and globalised world economy. Research pools enhance the image of Scottish research to help attract leading researchers and collaborations in research and to attract the investment, industrial engagement and entrepreneurship needed to actualise innovation. An important aspect of their continuing role will be to ensure closer collaboration between the various research pools. An example is SUPA, SULSA and SINAPSE who are progressing a multi-disciplinary project in medical/life sciences imaging. SAGES and MASTS have worked together in supporting successful

	large-scale Scotland coordinated EU proposals (e.g. Atlas). There is a significant potential for the further development of the research pools as a vehicle for inter-disciplinary activities to tackle intractable challenges, develop joint Graduate School training events, form interdisciplinary research consortia and promotion of Scotland strength in research.
Further Comments	A member's subscription model for research pooling without core funding is unlikely to provide sufficient funds to sustain core operations required for success and creates a substantial burden for smaller institutions. Currently it would be difficult to judge all pools with the same metrics given the variation of models of operation. The research pools are exemplars of cross-institutional research collaborations, recognised internationally and they require long-term strategic nurturing to further strengthen the Scottish research environment.

Name	Pauline Jones
Job title	Head of Strategic Performance and Research Policy
Organisation	University of Edinburgh
Can SFC contact?	Yes
Summary of experience of research pooling initiative	Responding on behalf of University of Edinburgh, partners in majority of the funded research pools.
Q1a. What has been the impact of the initial research pooling initiative?	Against the original goal of pooling of increasing the critical mass of research in Scotland, to enable increased competitiveness for resource and reputation, some areas have shown modest growth; others have seen time-limited improvements; and in others, it is not clear whether the aspirations were reached. Academic staff numbers, PhD numbers and income have increased in absolute terms in most pools for which data is available, but the share of UK academics and PhD students has been largely static or in some cases decreased. Figures for income suggest growth in share of UK income in most pools, suggesting a reputational boost from the pools. In UK research assessment terms, improvements in top positioning of pooled UoAs were seen between RAE2001 and RAE2008 but in some cases these gains were reversed for REF2014. More gains were seen in relative proportion of 3* research than in the increase in 4* research (with some exceptions, notably Physics and Biological Sciences). The overall Scottish percentage of 4* in REF2014 is slightly higher than the UK average, but if this is not seen in the pooled UoAs it is difficult to attribute this to pooling. Overall, this suggests that the macro goals of the research pooling initiative in increasing income have been met, which may suggest that the caliber of academics employed through the initiatives is high and that Scotland is attractive. On the other hand, it has not been followed through with increases in PhD students (at least as measured by completions) and this should be investigated further. The REF2014 results may suggest that research pooling's influence was strongest in the UK context around the time of RAE2008 and was less visible in REF2014. Pools have been particularly successful where they have allowed shared access to facilities and equipment. SINAPSE, ScotCHEM and SULSA in particular allows Scottish researchers access to equipment, which is not affordable for single HEIs. These facilities are often available to non-university researchers, with broader benefits to Scottish industrial research. The pooled structures have also acted as springboards for partnerships for bids for doctoral training centres (for example from ERPEM, SULSA and EastCHEM), and increases in PhD students associated with these will be seen in later years of data. Pools have also acted as routes in for government or industry to work more closely with university researchers. Examples include the contribution of SIRE to Scottish Government energy modelling, and SINAPSE's role in attracting investment from the Wyeth Translational Medicine Research Initiative and investment from Pfizer in Aberdeen. Pools themselves cite examples of where the reputational benefit of pooling has been seen in a UK and international context, which may suggest that the influence has been more strongly seen at a disciplinary level rather than a sector wide level. Examples include: • the listing of SINAPSE as an exemplar of how to run medical imaging by the Wellcome Trust • SULSA's role in establishing Scotland as a leader in Synthetic Biology This in itself is positive, as competitive research grants and contracts are awarded within disciplines rather than at national level, but could work against larger initiatives such as Strength in Places. Pooling partnerships have in some cases catalyzed stronger relationships between their partner HEIs. For example, the Heriot-Watt – Edinburgh relationship has been strengthened by the ERPEM pool, as evidenced by REF2014 joint submissions not only in Engineering and Mathematics but also in

	Architecture.
Q1b. What lessons can be learnt from the research pooling initiative?	Different research pooling models have shown successes so a single approach does not appear to be necessary or desirable. The success of SINAPSE and other multi-disciplinary pools shows that the model need not be limited to single disciplines. Similarly, there are benefits of both a broad-based overall model, and not narrowing down to a single area of focus (eg drug discovery in SULSA); and of focus on specific projects (MASTS). Initial conditions identified as helpful in setting up the right partnerships include: • Partnerships where the institutions are of roughly equal scale and performance – EastCHEM • Building on existing collaborations – such as the Scottish Graduate Programme in Economics (SIRE) • Starting with a core strong partnership but planning ahead to expansion early (SULSA) Key to ensuring the initiatives are successful are mechanisms to enable strong collaboration from the outset. These vary, but approaches cited by pools in which Edinburgh is a member include: • Pooled members involvement in recruitment of staff to other member institutions (ScotCHEM, SINAPSE) • A central coordinating office (SULSA) or central coordinating role (ScotCHEM) • Means of creating shared ownership: regular rotating the site of meetings and using videoconferencing (SINAPSE); travelling between partners where geography allows (ScotCHEM) Joint supervision of PhD students was also identified as critical to building the partnership. SINAPSE and SIRE in particular stress the important role that joint PhD supervision has in building a cohesive group, cementing collaboration, and representing the shared interests of institutions. Sharing expensive, cutting edge equipment is a powerful reason for the set up and continuing existence of pools, catalyzing collaboration where it would be impossible for single institutions to invest singly in these facilities. (SINAPSE, ScotCHEM, SULSA) Some challenges were identified which make pools potentially less effective: • SINAPSE identified that as it was not a legal entity, any agreement such as commercialization had to be led through one of the host institutions. This reduced the sense that the pool was truly collaborative. • Support for new academics and their careers also is critical – identified as a success where it was present, and a weakness where it was absent.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The redistributive effects of pooling on the REG grant, particularly where pools were reflected in joint submissions, is acting to reduce the level of investment available for institutions to put into these partnerships. In the absence of external funding the central coordinating functions of the pools are therefore likely to struggle to remain sustainable. To continue the benefits of the pools, continued investment in pools coordinating functions would be required.
Q2b. Should research pools have a continuing role in the Scottish research base?	The greatest successes of pools relate to investment in cutting edge equipment which is otherwise not available on a pan-Scotland basis; and in catalyzing structures around which PhD training can be supported. SFC should consider retaining coordinating funding to which pools are able to bid to support pan-Scotland activities of this nature. However, to enable Scottish HEIs to leverage funding from outwith Scotland it will be necessary to think beyond the disciplinary structures of pools. With UK funding streams typically crossing disciplinary boundaries – for example the Global Challenges Research Fund and Industrial Strategy Challenge Fund – more flexible funding is needed to allow Scottish bids to be supported. Pools and structures which have evolved from them would be able to bid for these, and in some cases may be in a competitive position to benefit given their existing close collaboration - there is some evidence that a pool at the centre of a

	competitive funding application gives reviewers confidence that the partnership is strong and likely to be successful. However, artificially restricting these only to pools would be likely to mean Scotland misses out on leveraging these funding calls. Additionally it will be important to allow for non-Scottish partners to be part of these bids, though recognizing that SFC funding could only flow to Scottish HEIs. Pools roles thus evolves to being structures around which HEIs can base funding bids – but are not restricted to doing so where this is inappropriate to do so.
Further Comments	

Name	Marlis Barraclough
Job title	Senior Policy Advisor
Organisation	University of Aberdeen
Can SFC contact?	Yes
Summary of experience of research pooling initiative	Providing advice and administrative support to the Vice Principal Research at the University of Aberdeen who has institutional oversight for research strategy and performance. Clerk to the institutional Research Policy Committee, and institutional contact for research pooling initiatives. This represents the institutional response for the University of Aberdeen,
Q1a. What has been the impact of the initial research pooling initiative?	Attribution of research outcomes to a single measure or to enabling funds is very difficult, particularly in cases where those funds enable general collaboration rather than the delivery of specific outputs. For the University of Aberdeen, pooling has delivered: • Appointment of academic staff supported by pooling funds and other capacity building measures • Collaboration with and participation in pan-Scottish doctoral training centres • Improved research facilities; increased/improved access to research facilities elsewhere; sharing of research facilities with Scottish colleagues The overall impact of the pooling initiative for the University of Aberdeen has been a positive one. Scottish institutions remain among our most important partners for research collaborations, and during the first decade of this millennium the number of research publications co-authored with researchers from Scottish institutions grew by 98% (compared to overall growth of Aberdeen's output by 29% and that of the Scottish sector overall by 33%) . The quality of papers has improved as well. Between 2005 and 2017 the percentage of highly cited papers among those co-authored by Aberdeen and Scottish institutions rose from 0 to 6%, and the percentage of papers co-authored with industry increased from 3.4% to 5.45%. These trends can be attributed to a number of measures employed over the years by the University of Aberdeen to improve research quality, including investment in recruitment and retention of excellent researchers, investment in research facilities and infrastructure, quality assurance/peer review processes and early intervention in and support of research projects; pump priming for pilot/exploratory studies etc. The sector generally has seen a trend towards increased collaboration within and across disciplines, and towards internationalisation. In 2000, 24% of our research publications listed at least one international co-author (25% for the total Scottish sector); in 2018 that percentage had grown to 59% for Aberdeen and 56% for Scotland. The pooling initiatives were an important factor in facilitating this kind of progress. They enabled and supported collaboration across the Scottish sector, sharing of good practice and building critical mass, particularly in infrastructure intensive research disciplines.
Q1b. What lessons can be learnt from the research pooling initiative?	The disciplinary and interdisciplinary pools have achieved the objectives set out by the SFC. Of particular benefit to us have been the pan-Scottish Graduate Schools which have improved postgraduate provision, improved mobility of students, encouraged and supported internships.. In addition, these doctoral training programmes have enabled participation in national PhD training networks and has added to cohort/community building in disciplines. These networks also provide postgraduate research students with a broader view of research in the wider economy and its place in an innovative society. They have therefore helped improve provision across Scotland and to make our postgraduate offering more competitive within and outwith Scotland. This kind of capacity building could be a model for a similar approach to support and community building across the postdoctoral and early career researchers. Given the uncertainty around access to EU funds, this kind of capacity building may become even more important in the future. Similarly, co-ordinated infrastructure support and equipment/facility sharing has had a positive impact on the research landscape within Scotland. In conducting an overarching review of the pooling initiatives, the panel has to recognise that there is considerable difference in the aims and operational practice across the various pooling initiatives, and also their maturity. Some pools exist to strengthen particular disciplines across the Scottish research landscape while others have a much broader, interdisciplinary outlook. In developing recommendations around the continuation of the pools, each initiative should be evaluated against previous performance and against clearly articulated visions and deliverables. This would assist institutions in their

	own decision making around matched funding. In view of the diversity of types of institutions across the Scottish sector, and the differences in aspirations around research portfolios and performance, the kind of managed collaboration that the pooling initiatives facilitated is difficult to achieve. Institutions across the UK compete for research funding, media attention, staff and students in an increasingly challenging environment. Collaboration and engagement cannot be enforced and the benefits of any partnership need to outweigh the cost of it, whether that is a financial contribution or in-kind. Managed partnerships like the pooling initiatives will only work if they are closely aligned with the strategic objectives of all parties within that partnership. Strong academic leadership, excellent communications and clear objectives are crucial for successful pools. In practice, leadership and communications have varied across the pools, and it has sometimes been unclear whether the pooling initiatives enabled new activity or merely supported collaborations that were ongoing in any case. Awareness of the pools within Scotland has been relatively high across the research community and, to a lesser extent, across some of the research users. However, despite a number of joint submissions to REF2014, awareness and recognition of the pools south of the borders or beyond the UK has been poor. If the aim was to establish a marketable Scottish research brand to support our own research strategy for Scotland, then it has not been fully achieved.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The call for evidence makes reference to the changing research environment since the inception of the pooling initiatives. The government's research priorities are currently delivered through very large interdisciplinary research programmes -GCRF and ISCF, which are to be delivered in partnership with non-academic partners. SFC have made available funding that recognises the higher cost of delivery of GCRF projects and is supporting Innovation Centres and University Innovation Fund initiatives that support competing for ISCF funds.
Q2b. Should research pools have a continuing role in the Scottish research base?	A successor to the pooling initiative would have to complement the government's research priorities whilst avoiding duplication of support for particular measures or programmes. If they are to follow the current model, which requires matched institutional funding, then deliverables would need to be articulated clearly and linked back to the pools conclusively. A pooling initiative that supports capacity and strength in specific disciplines to assure a sound disciplinary base for interdisciplinary research may be a logical successor to some of the existing pools, complementing other measures that support partnership working. The SFC may wish to consider ways in which membership could be extended to non-Scottish partners to enable strategic partnerships that would benefit Scottish institutions, including affiliations with EU institutions post-Brexit and other international partners
Further Comments	.A further consideration is whether the knowledge exchange activities of the research pools contributed towards cluttering the landscape for industry engagement, by offering competing routes for access to university expertise, technology and facilities. A further consideration is whether this affected the development of interdisciplinary solutions to industry challenges. For example potential for overlap and competing interests with the Innovation centres.

Name	Robin Shields
Job title	Senior Innovation Manager
Organisation	Scottish Aquaculture Innovation Centre (SAIC)
Can SFC contact?	Yes
Summary of experience of research pooling initiative	My personal experience with the research pooling initiative mirrors that of SAIC as an organisation, in that connections are overwhelmingly with the Marine Alliance for Science and Technology for Scotland (MASTS). As an innovation organisation, SAIC's interactions with the research pool are primarily driven by the desire for effective academia-business engagement. The range of interactions include: - participation in MASTS Aquaculture Forum - Participation in MASTS Annual Science Meeting (including workshops) - Involvement of MASTS academic staff as PIs in SAIC aquaculture innovation projects - Involvement of MASTS PhD students in SAIC aquaculture innovation projects - Participation by SAIC PhD students in MASTS Graduate School - Co-funding by SAIC of MASTS Super DTP funding applications Beyond MASTS, is have also had preliminary engagement with the SRPe research pool.
Q1a. What has been the impact of the initial research pooling initiative?	- Recruitment of aquaculture-facing academic staff has increased critical mass in Scotland, contributing towards governmental goals for sustainable industry growth. - MASTS Annual Science Meeting has become a valued gathering for academic networking and
Q1b. What lessons can be learnt from the research pooling initiative?	- The success of Forums in encouraging positive working between researchers and other stakeholders varies considerably. In the case of aquaculture, the establishment of sectoral innovation centres has likely reduced the impact of associated research pool
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	With the proviso that my personal (and SAIC's organisational) experience relates to MASTS, the growing UK and international emphasis on challenge-led research provides clear justification for research pooling. This may involve some shift in emphasis by individual pools, towards meeting societal needs.
Q2b. Should research pools have a continuing role in the Scottish research base?	#NAME?
Further Comments	

Name	Derek Woollins
Job title	Vice Principal (Research & Innovation)
Organisation	University of St Andrews
Can SFC contact?	Yes
Summary of experience of research pooling initiative	As the Vice Principal (Research and Innovation) at the University of St Andrews, I have institutional oversight over the pools that the University is engaged with. This includes the Marine Alliance for Science & Technology for Scotland (MASTS), Energy Technology Partnership (ETP), ScotCHEM, Scottish Alliance for Geoscience, Environment and Society (SAGES), Scottish Imaging Network: A Platform for Scientific Excellence (SINAPSE), Scottish Informatics and Computer Science Alliance (SICSA), Scottish Institute for Research in Economics (SIRE), Scottish Universities Life Sciences Alliance (SULSA) and Scottish Universities Physics Alliance (SUPA). I have also been highly involved with EaSTCHEM for which I was the Director of Research for 3 years and Director for 4 years.
Q1a. What has been the impact of the initial research pooling initiative?	The University of St Andrews has fully engaged with research pooling initiatives from the development of the concept of pooling through to inception and operation. St Andrews is a partner in the following pools: • Marine Alliance for Science & Technology for Scotland (MASTS) • Energy Technology Partnership (ETP) • ScotCHEM • Scottish Alliance for Geoscience, Environment and Society (SAGES) • Scottish Imaging Network: A Platform for Scientific Excellence (SINAPSE) • Scottish Informatics and Computer Science Alliance (SICSA) • Scottish Institute for Research in Economics (SIRE) • Scottish Universities Life Sciences Alliance (SULSA) • Scottish Universities Physics Alliance (SUPA) The initial research initiative was highly influential in developing individual disciplines and strengthening the Scottish research base. Some joint REF submissions and Graduate schools have been especially successful. For example, the SUPA Graduate School trains 500 PhD students by sharing 50 graduate courses annually between the 8 partner institutions includes an industrial skills course with lectures provided by a number of Scottish companies. Even where joint REF submissions in pools have not ensued, reputation enhancing effects have flowed from the calibre of the appointees attracted to Scotland and have helped establish partnerships. The concept of pooling has been recognised by other parts of the UK and by research funders as valuable and likely to offer benefits both in terms of critical mass and quality. Pooling has facilitated some research disciplines in Scotland to achieve critical mass in their own right, leading to enhanced research reputations. Pooling has also created an enhanced collaborative research environment which has led to competitive bids for funding awards from the EPSRC, EU, and government. It has enabled the Innovation Centres and other bodies to engage effectively with HEI research. SICSA has successfully bid for joint funding to establish a base for cybersecurity research and innovation across its 14 member institutions, and to provide high-level input to Scottish government on cybersecurity and cyber-resilience issues, an area of significant concern to politicians. This would not have happened without pooling. St Andrews is a world-leading, research intensive institution, but is relatively small and so it can be difficult and costly to develop the infrastructure required for broad areas of research on its own. Resources provided through pools enable access to facilities that underpin world-class research. Scotland's history has resulted in its many universities being spread across diverse settings. Without these pooling mechanisms world-class research would concentrate even more heavily towards a few institutions, decreasing the world-class competitiveness of many Universities in Scotland and weakening the higher education sector as a whole across Scotland.
Q1b. What lessons can be learnt from the research pooling	There is no fixed pattern for success, flexible approaches to research pooling which are subject specific have proven successful. For example SICSA has adopted a model where leadership positions are shared among the partners on a rolling basis. This creates high levels of engagement and ownership.

initiative?	Leadership positions are highly valued within institutions, providing clear evidence of engagement in pooling. In SUPA, the Graduate School has been a particular success that has involved all eight partners in a collaborative activity that has benefited researchers at all levels from PhD students to professors. There is a delicate balance between competition (through REF) and collaboration that needs to be managed well to generate success. Rapid investment is not without its hazards and care is required to avoid any single partner in a pool dominating the relationship.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	It is clear that collaborative working can be beneficial but the initial success of pooling is now waning; continued low level funding is inadequate to sustain relationships at a suitable intensity to maintain the initial gains. Even with strong continuing commitment from all partner institutions, the limited level of funding restricts the scope for what the pool can achieve. It is unlikely that institutions will remain committed to pools if the level of support, and benefits received, are consistently less than the subscription. Pooling is not the best way of promoting interdisciplinarity, to achieve this probably needs much more targeted research centres and a more challenge-led approach.
Q2b. Should research pools have a continuing role in the Scottish research base?	Pooling is important to maintain Scotland's competitive edge in research and innovation. The pools provide key resources across Scotland that underpin and improve the research environment across Scotland as a whole, they generate significant co-operative activity between Scottish universities in ways that would likely not happen if they did not exist. Without improved funding, some activities could continue, but communities are likely to drift apart, to the significant detriment of Scottish research, and to the effectiveness of the Innovation Centres, Skills Partnerships and other bodies. A new generation of interdisciplinary research pools, with an international outlook, aligned to grand challenges and developing synergies with an expanded range of innovation centres may be the most cost effective and beneficial way forward.
Further Comments	

Name	Peter Liss
Job title	Emeritus Professor
Organisation	University of East Anglia
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I was a member of the Review/Evaluation Panel for the SAGES pool at its initiation. My main activity in the pools has been with MASTS. I had discussions with Ian Boyd when he was developing the MASTS concept and was much involved (as Chair) with its development and evaluation. Since it was established I have chaired the MASTS International Advisory Board and now the Advisory Committee.
Q1a. What has been the impact of the initial research pooling initiative?	Pre-MASTS the Scottish landscape in marine research was very varied and widely dispersed across the country. This led to much good but somewhat small-scale research but rather little integration. The whole could be described as less than the sum of the parts but MASTS has changed all that. Now the diversity and quality is still there and arguably has been enhanced by the existence of MASTS but the whole is much more integrated and visible at national and international level. In addition, the linkage with Scottish industry has been developed profoundly. It is not perfect but much improved by the hard work of individuals (both in HEIs and industry) and importantly by the opportunities created by the MASTS structure led by its small but effective secretariat.
Q1b. What lessons can be learnt from the research pooling initiative?	The MASTS pooling initiative has managed to garner the enthusiastic support of Scottish HEIs and research staff. This came about initially by the part-funding provided by the SFC but has continued to be developed by individuals and their institutions realising the benefits of cooperative working. The establishment of the MASTS Annual Science Conference has been an enormous success with participation now running at several hundred and rising. It is accurately claimed to be the largest gathering of marine scientists in the UK, which is a remarkable achievement given the relatively small size of Scotland compared to the rest of the country. Much of the obvious success of MASTS is due to the excellent secretariat based at UoStA. It is quite small but effective due to the quality of the leadership provided by David Paterson and Mark James, ably supported by Emma Defew. As is often the case, things work well when people make them happen.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	There is an important continuing job to be done by the MASTS pool. All the current excellent work needs to be supported and the organisation needs to be sufficiently fleet of foot to change as necessary and initiate and be responsive to new challenges. Although good progress has been made, the linkage with industry needs to be further developed with both political and financial support. For example, funding for a designated individual to develop links between Scottish marine industries and academics should be considered.
Q2b. Should research pools have a continuing role in the Scottish research base?	With respect to MASTS, the answer is clearly 'yes'; see answer to Q. 2a.
Further Comments	A huge amount has been achieved by MASTS. It would be a huge mistake for it not to continue and to develop and support academic integration of marine science in Scotland and to foster meaningful interaction of it with Scottish industry.

Name	Lynne Baillie
Job title	Director of Research School of Mathematical and Computer Science
Organisation	Heriot-Watt University
Can SFC contact?	Yes
Summary of experience of research pooling initiative	I am the Director of Research School of Mathematical and Computer Science. SICSA has been a wonderful success in terms of supporting academics, especially early career, and also PhD students. We believe SICSA helped Heriot-Watt achieved the ranking of equal 1st in the UK for its world-leading and internationally excellent research environment and also for the impact of its research. The proportion of Computer Science research that has been classified as Internationally leading during the time of SICSA has risen by 18%.
Q1a. What has been the impact of the initial research pooling initiative?	It helped us to increase the number of staff who were research active, increase the excellence in our research outputs. It provided early career staff with the ability to work with internationally leading partners such as Intel, Microsoft, Vodafone and Yahoo. It also enabled them to invite for visits to Scotland world leading academics. SICSA ensured that during these visits at least 2 Scottish Institutions and usually 3 were visited by the visiting academic. The PhD summer school, which all Scottish CS students are invited to has enabled you researchers to build a career network that is world beating. This has helped SICSA institutions attract the best and finest young researchers from around the world.
Q1b. What lessons can be learnt from the research pooling initiative?	That a pan Scottish pool is one of the core ways in which to enable all Scottish academics to work in cooperation rather than in competition. The result has been the creation of world leading collaborations, such as the Edinburgh Centre of Robotics (Edinburgh Uni and Heriot-Watt Uni). One thing that was removed from the funding during the second phase which we believe should be returned is the funding of PhD students. The students had to have 2 supervisors from 2 institutions. This again helped co-operation and research building.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	The the pools are there to nurture, support and grow research excellence in a key area across Scotland. They are essential to provide support to enable growth in key areas of success, especially as we approach the next REF in 2021.
Q2b. Should research pools have a continuing role in the Scottish research base?	Absolutely they are a key selling tool for recruitment of world leading staff and students. This is especially important at this time for departure from the EU and the loss of many staff and a reluctance of students to consider studying here. Having such welcoming pan Scotland networks is a way of demonstrating Scotlands commitment to being open and welcoming and a support place to study and work.
Further Comments	The final comment is on the support that SICSA provides in terms of nurturing and persuading academics and research students to engage with Industry, this is yet another way in which SICSA provides support to CS researchers. Demofest, which is a great success, is a fantastic showcase of our work that industry likes to see and engage with each year.

Name	David Donaldson
Job title	Professor and Head of Psychology
Organisation	University of Stirling
Can SFC contact?	Yes
Summary of experience of research pooling initiative	The SINAPSE pool has had a transformational impact on my research environment. When pools started I was the only neuroimager in Stirling - working in an EEG laboratory by myself. Ten years later Stirling is a thriving hub for neuroimaging of all kinds - Psychology now has a 5 academic staff who use EEG as their primary research method, new mobile EEG methods have been pioneered here at Stirling, we have also hired researchers using brain stimulation techniques, optical imaging and most recently thremal imaging. Whilst my own research focusses on memory, colleagues are now using imaging to study a wide range of issues including perception and action, child development, sporting behaviour, face recognition, attention and spatial navigation. There is no doubt that involvement in the SFC pool has played an important role in establishing all of this - through the initial funding of posts, through the network of collaborators and events that it created, through the support for postgraduate studentships and training across the network, and via the opportunites for engaging in imaging techniques that aren't available locally. Perhaps the most important element of SINAPSE was the clear signal that the pools sent to senior management at Stirling that imaging was an area to invest in and support - a message that was heard and responded to. I can only thank the SFC for supporting SINAPSE - and to encourage them to continue to support pooling networks in the future. I would be happy to provide more details to the review panel if it would be of use, but the essence of my experience is that pools really worked: they have produced massive added value, led to the development of a new generation of imagers, and have changed the research landscape in Scotland.
Q1a. What has been the impact of the initial research pooling initiative?	
Q1b. What lessons can be learnt from the research pooling initiative?	
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	
Q2b. Should research pools have a continuing role in the Scottish research base?	
Further Comments	

Name	Greg Michaelson
Job title	Emeritus Professor of Computer SCience
Organisation	Heriot Watt University
Summary of experience of research pooling initiative	As Heriot Watt University Head of Computer Science from 2003-8, I represented HWU in the negotiations that led to the Scottish Informatics and Computer Science Alliance (SICSA) pool. Subsequently, I was Research Theme Leader for Complex Systems Engineering, and then the first SICSA Director of Education and a member of the SICSA Board. I represented HWU on the SICSA Committee throughout SICSA 1 and partially during SICSA 2.
Q1a. What has been the impact of the initial research pooling initiative?	I will upload a single file.
Q1b. What lessons can be learnt from the research pooling initiative?	I will upload a single file.
Q2a. In the current research landscape, what is the perception of, and role for, the pools?	I will upload a single file.
Q2b. Should research pools have a continuing role in the Scottish research base?	I will upload a single file.
Further Comments	I will upload a single file.

Independent Review of SFC's Research Pooling Initiative - submission

Greg Michaelson

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18/1/19

As Heriot Watt University Head of Computer Science from 2003-8, I represented HWU in the negotiations that led to the Scottish Informatics and Computer Science Alliance (SICSA) pool. Subsequently, I was Research Theme Leader for Complex Systems Engineering, and then the first SICSA Director of Education and a member of the SICSA Board. I represented HWU on the SICSA Committee throughout SICSA 1 and partially during SICSA 2.

I will comment primarily on SICSA from the perspective of community building, as SFC has received annual returns detailing expenditure and activities against income. I will comment almost entirely on the period 2008-13, that is SICSA 1.

Pooling was intended to boost cooperative/synergistic research activity so it's worth briefly reviewing the Scottish Higher Education Computing community before SICSA, say around 2008. In research terms, there was a clear hierarchy of departments based on objective measures like RAE rankings, research income and number of PhD students and subjective perceptions of status and prestige based on perceived research/teaching balance, pure/applied/industrial research balance, size, undergraduate entry requirements, "would one want to work there", and so on.

This hierarchy would divide Computing into the three traditional tiers corresponding roughly to pre 1600 (old: Aberdeen, Edinburgh, Glasgow, St Andrews) , pre 1966 (Robbins: Dundee, Heriot-Watt, Stirling, Strathclyde) and post 1992 (former Polytechnics: Abertay Dundee, Edinburgh Napier, Glasgow Caledonian, Highlands and Islands, Robert Gordons, West of Scotland) institutions. Of the pre 1600s, Edinburgh was indisputably world class: a status Glasgow aspired to. Aberdeen and St Andrews were both highly regarded but markedly smaller. Of the pre 1966, Heriot Watt and Strathclyde were stronger

than Dundee and Stirling, but perceived as more industrially focused. The post-92s were seen as teaching heavy with small pockets of research. Is this just my opinion/stereotyping? Well, ask other aged academics...

A further complication was the increasing separation of Computer Science from substantial users of computing in Science and Engineering. In particular, the latter had often established their own domain-oriented teaching programmes and made most of the running in securing funding for high performance computing.

While there was certainly longstanding cooperation between departments, for example in examining each others' students and programmes, hiring each others' staff, and co-publishing by well established collaborators, there was little sustained cross-institution research momentum, beyond specialist alliances formed during the 1980s "5th Generation" Alvey programme and subsequent EU programmes.

Before the subject based SFC research pools, there were regional alliances between Universities such as the Northern Research Partnership between Dundee and Aberdeen, and agreements between Glasgow and Strathclyde, and Edinburgh and Heriot-Watt, with varying degrees of domain focus. I observe that the Mathematics and Engineering components of alliances between Edinburgh and Heriot-Watt have been particularly successful in growing and sustaining synergies.

In the first tranche of discipline based trans-Scottish pools, Computing was not included. However, there were at least three unsuccessful attempts to gain SFC support for variously: ScotGrid, led by physicists and chemists, principally at Glasgow and St Andrews; a Software Engineering initiative, from Dundee, Heriot-Watt, St Andrews and Strathclyde; and a proto –SICSA from Edinburgh, Glasgow and St Andrews.

As initially constituted, SICSA was to have been hierarchical, based roughly on RAE rankings, with membership by individual, not institution, and members from lesser institutions vetted by the top table. Thankfully, this was quickly scotched, enabling whole institution membership.

However, initially, SFC seemed to have a preference for leadership being drawn from Edinburgh, Glasgow and St Andrews. This was not unreasonable as these institutions were generous in provision of administrative support, and this also saved a certain amount of face. Note that a number of new Universities did not join SICSA from the start.

SICSA provided matched funding for staff and PhD students, and so the wealthier institutions tended to gain more. All such funding was pre-allocated so, when additional universities subsequently joined, there were no further funds available, which caused some resentment.

Looking back, SICSA has utterly transformed the Scottish academic Computing landscape for the better, principally by overcoming the long standing divisions alluded to above. The primary effect, as SFC intended, has been a marked expansion in research collaboration. Of course a sense of rivalry

remains, as in inevitable when institutions compete for resources. Still, I get the feeling that institutions are far more relaxed about working with each other more widely.

Key to SICSA's success has been an emphasis on all support being driven by evidence of multi-institution participation, and on scrupulous transparency and fairness in allocating support, based on peer review. I think this has been central in building trust and breaking down inter-institutional barriers. It has further been aided by the even-handed professionalism of the SICSA support staff, regardless of institutional affiliation.

It is striking that, while the overall Director has always been from Edinburgh, Glasgow or St Andrews, the other executive Directorships have been increasing taken by people from the wider group.

Furthermore, while SICSA Phase 1 allocated staff and PhD funds to specific institutions, to justify the SICSA imprimatur all applications and appointments were scrutinised by people from out with each institution, again widening insights into each other's constitutions and processes.

The Research Theme leaderships were drawn from the wider group from the offset. I think these have been particularly helpful for career development, especially for academics seeking a first promotion to Senior Lecture/Associate Professor, as evidence of external esteem and leadership.

The SICSA Committee, with representation from all pool members, has proved a convivial, supportive environment for pursuing common aims. In my experience, while debate is robust, it is consistently good natured, and decisions are made by consensus, leading to maximal institutional

buy in. Furthermore, it is accepted that an institution may be represented by whoever it nominates, often a Head of Department/School or Director of Research, but not uncommonly some other academic, again widening the range of contacts and participants. Meetings are hosted by different institutions, affording experience of each others' working environments.

The Graduate Academy has been highly successful in promoting cross institution interaction. In particular, the well attended PhD Conferences offer opportunities for graduate students to acquire skills in organising events as well as to present their work. The Graduate Academy has also been very strong in supporting Early Career Researchers.

However, I think that cross institutional PhD supervision in SICSA 1 proved unsuccessful. Students tended to be located at one site and to have more contact with the supervisor there. Furthermore, joint supervisory sessions proved impractical across distant sites, and digital communication didn't seem to compensate for unbalanced contact. In future, were there a new tranche of PhD funding, I would suggest cross institution progress review rather than supervision/affiliation.

I also have mixed feelings about the DemoFest. While I think that industrial interaction is a vital component of a research pool, latterly, in SICSA 1, industrial attendance at DemoFest tended to be modest, perhaps reflecting the lack of a large indigenous primary, as opposed to the substantial SME applications or user, computing economy. SMEs have tight finances and need research to be focused and close to market. This often does not sit well with academic priorities. Of course, this is not a SICSA specific problem.

I understand that industrial DemoFest participation has markedly increased in SICSA 2, but maybe there are more effective ways to engage rather than by academics setting out their stalls.

Finally, I have mixed feelings about how SICSA 1 knowledge exchange was organised. This was primarily run by Edinburgh, and, while they were scrupulously even handed, there was a feeling that this led to unbalanced KE activity.

I understand that SICSA 2 has forged new cross pool programmes of industrial fellowships, internships and proof of concept funding which have proved extremely successful. Nonetheless, I think it would be better in future to have a small network of regional KE centres (say West, East, North East), which do not have any perceived institutional loyalty.