



## Independent review of the Scottish research pooling initiative

SINAPSE (Scottish Imaging Network: A Platform for Scientific Excellence) welcomes the [recently published report](#) from the independent review of research pooling commissioned by the Scottish Funding Council.

The report recommends the Scottish Government through SFC consider “*a major investment at scale*” that will build upon research pooling achievements to date, designed to “*lever ‘mission driven’ research income into Scotland*” and “*provide resilience on the international research stage*”. **SINAPSE** is ideally positioned to contribute to this vision for “*Scotland’s research powerhouse of the future*”, in continuing as the node for **medical imaging** research activity across Scotland, as summarised over the bullet points below.

- **SINAPSE is a cross-disciplinary research pool**

Research pooling has proven especially successful in the case of SINAPSE because medical imaging research is cross-disciplinary by nature. SINAPSE already meets the report’s call for research pools to be aligned to “*the modern research landscape, which is driving highly collaborative research that often requires multi-disciplinary approaches*”, as SINAPSE members have backgrounds ranging across medicine, physics, psychology, chemistry, and computer science – brought together by a common interest in imaging. Furthermore, SINAPSE is unique as the only research pool that directly involves the **NHS**.

- **SINAPSE collaborates with fellow research pools**

Not only is SINAPSE a cross-disciplinary research pool in its own right, but it collaborates effectively with several of Scotland’s disciplinary research pools.

SINAPSE is currently working together with **SUPA** (Physics) and **SULSA** (Life Sciences) on a cross-pool initiative to develop and expand academic-industrial partnership in Scotland around **optical imaging**, supported by £80k awarded by SFC in 2018.

Additionally, SINAPSE contributes to collaborations involving specialist sub-fields within the disciplines represented by fellow research pools. SINAPSE and

**SICSA** (Computing) partnered on a ‘Medical Imaging and Sensing in Computing’ theme that included a jointly organized workshop held in 2015; related activity continues in the SINAPSE **Image Analysis** topic group. SINAPSE and **ScotCHEM** (Chemistry) have collaborated on work to develop novel radiotracers for PET and SPECT imaging; related activity continues in the SINAPSE **Molecular Imaging** topic group.

- **SINAPSE attracts challenge-led funding**

The SINAPSE-supported bid for a Scottish centre of excellence in medical imaging and digital pathology with artificial intelligence (AI) obtained £10M from the **Industrial Strategy Challenge Fund** in 2018 and over £5M of additional funding from industry partners Canon Medical Research Europe Ltd. and Philips, plus 6 SMEs. [iCAIRD](#) (Industrial Centre for AI Research in Digital Diagnostics) addresses the 'data to early diagnosis and precision medicine' challenge in a pan-Scotland collaboration that spans academia [4 SINAPSE partner Universities], industry, and NHS Scotland.

The [BEIS Science and Innovation Audit report on Precision Medicine in Scotland](#) released in March 2019 recognised **Scotland’s imaging capabilities** as key assets for Precision Medicine, and directly acknowledged the value of SINAPSE in coordinating imaging research collaborations across Scottish universities and contributing to applications of AI and machine learning in medical image analysis.

Another example of investment that is international as well as challenge-led is the [INSPIRED](#) (INdia-Scotland Partnership for pReCision mEdicine in Diabetes) project, awarded £7M from the NIHR **Global Health Research** programme to combine retinal imaging and molecular information in order to achieve personalised diabetes treatment.

- **SINAPSE enjoys industrial engagement and international presence**

SINAPSE relationships with industrial partners are well established, ranging from sponsored collaborative research projects to joint funding of PhD studentships. For economic impact within Scotland, SFC-funded **Innovation Centres** for which SINAPSE research is highly relevant include [CENSIS](#) for imaging technologies in healthcare applications, [SMS-IC](#) for the use of imaging as a tool to stratify disease, and [The DataLab](#) for radiomics ‘big data’ advancements.

Industrial partnership is central to the [PICTURES](#) (Interdisciplinary Collaboration for efficient and effective Use of clinical images in big health care REsearch) project, which received £4.4M through an MRC **Industry Collaboration Agreement** earlier this year with additional support from EPSRC and as part of Health Data Research UK. Through a consortium involving academia [2 SINAPSE partner Universities], industry, and NHS Scotland, the project is leveraging big data from Scotland's national medical imaging archive to develop new clinical tools for disease diagnosis and risk prediction.

SINAPSE collaborative research is also international, as evident in **multicentre projects led from Scotland** including a \$6M Transatlantic Networks of Excellence Program on [perivascular spaces in small vessel disease](#) (UK, France, Denmark, Canada, and USA), a €27M Innovative Medicines Initiative project on [amyloid imaging to prevent Alzheimer's disease](#) (UK, Germany, France, Spain, Sweden, Switzerland, Netherlands, and Belgium), and a €4M doctoral training scheme on [PET imaging in drug design and development](#) (UK, Belgium, Norway, Spain, Germany, Netherlands, and Sweden).

- **SINAPSE is valued for multi-disciplinary training**

The SINAPSE Graduate School was established with financial support for 24 PhD studentships, a number eventually increased to 45 through match funding arrangements and subsequent funding bid success. Over 7 years, 23 female and 22 male students from 18 different countries of origin received a programme of cohesive **doctoral training** in Scotland with exposure to the multiple disciplines involved in imaging research.

The SINAPSE Annual Scientific Meeting continues as a highly popular event providing the Scottish imaging research community with opportunities for networking and **cross-disciplinary knowledge exchange**. Meeting attendance has recently expanded to welcome PhD students from two Scottish EPSRC Centres for Doctoral Training in which SINAPSE is a project partner: the newly funded [Centre for Doctoral Training in Future Ultrasonic Engineering](#) and the newly re-funded [Centre for Doctoral Training in Applied Photonics](#).

As a **public educational resource**, SINAPSE created a free [eLearning website](#) consisting of ten modules that explain in non-technical ways how medical imaging techniques work and what they can be used for.

**Written evidence** submitted to the review of research pooling included the following statements:

*The four iCAIRD universities are all SINAPSE members, as are NHS Scotland and Canon. The existence of SINAPSE was significant to the success of the funding bid, in which we pointed out "SINAPSE has a 10-year track record of developing and strengthening relationships among the iCAIRD participating organisations involved with medical imaging." Reviewer feedback referred to "well established existing partnerships", "clear evidence of nationally leading research and innovation in the targeted areas" and "an existing environment of collaborative working".*

– Dr Ken Sutherland, Canon Medical Research Europe Ltd.

*SINAPSE is a partner in the Future Ultrasonic Engineering (FUSE) CDT. Its 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 [has] the links through SINAPSE to allow it to reach out across Scotland. This will provide a broader perspective for the trainee researchers.*

– Prof Sandy Cochran, University of Glasgow

*The model of pooled resources is highly effective for medical imaging research; it would be grossly inefficient to set up advanced imaging facilities at multiple institutions in a country the size of Scotland. Through pooling, the investments at individual centres (e.g., 7T clinical MRI at Glasgow, PET-MR at Edinburgh, fast field-cycling MRI at Aberdeen, ultrasound at Dundee, mobile EEG at Stirling) have been made available to researchers across Scotland and are more effectively used as national resources.*

– Prof Alison Murray, University of Aberdeen

In SINAPSE, the Scottish research pooling initiative successfully produced a '**one stop shop**' – where none existed previously – for any individual or organisation, whether academic, clinical, industrial, UK-based or international, to engage with medical imaging research in Scotland. Universities work together more collaboratively now than before research pooling, and SINAPSE exemplifies the recommendation made in the report for Scotland to secure "*the cross-disciplinary capacity needed to compete effectively with emerging powerhouses in the modern research landscape.*"

**Further details** on SINAPSE achievements can be found in the [Final Report](#) from its first phase of research pooling funding [2007-2014], and in Annual Report summaries from its second (current) phase of funding: [2015](#), [2016](#), [2017](#), and [2018](#).

[www.sinapse.ac.uk](http://www.sinapse.ac.uk)