Scottish Universities Physics Alliance

SUPA Strategic Plan 2016-2021

1. Context

The Scottish Universities Physics Alliance (SUPA), launched in 2004 with the aim of placing Scotland at the forefront of research in Physics through co-ordinated promotion and pursuit of excellence, has been highly successful over the past decade in establishing Scotland as a recognised international leader in research and advance post-graduate training in Physics. The Scottish Physics community pioneered the concept of Research Pooling and, with the creation of SUPA, developed structures that have been copied by others within Scotland and beyond. Through a coherent approach to staffing strategy, research initiatives, graduate education and funding opportunities, Physics research in Scotland has flourished with SUPA partner institutions proving to be attractive to top class researchers and the best post-graduate students from around the world. Outstanding results in RAE2008 and REF2014 give ample evidence of the success of this national strategy for Physics in Scotland; research outputs are generating high impact both within the world of physics and wider society. All alliance partners are committed to SUPA as a permanent feature of the Scottish Physics landscape. Knowledge exchange, industry engagement and bridging to other disciplines are agendas of increasing importance to SUPA.

2. Background

SUPA is an alliance of eight Physics Schools in Scotland with a shared strategy for research and advanced graduate training; the Universities of Aberdeen, Dundee, Edinburgh, Glasgow, Heriot-Watt, St Andrews, Strathclyde and West of Scotland. A CEO supported by a Directorate staff is tasked with co-ordinating the overall operation of SUPA working with an Executive Committee (EC) formed from the senior physics representatives from each of the partner institutions and chaired by the SUPA CEO. Governance of SUPA is provided by a Board of Directors (BoD) at Vice-Principal level. SUPA receives strategic guidance from an International Advisory Committee (IAC) providing a broad combination of experience of top level Physics research globally.

Two investments (SUPA I: 2004-2009; SUPA II: 2010-2017) from the Scottish Funding Council (SFC) and all alliance partners delivered significant additional funding to expand the Scottish Physics research base. These allowed the recruitment of research leaders, construction of state-of-the-art facilities and laboratories, the SUPA Graduate School, prize studentships and a network of video classrooms. The Graduate School provides an extensive range of advanced courses exploiting the considerable knowledge base of experts from all areas of Physics across Scotland.

SFC has put in place a scheme for 'Further Funding' (beyond the original funding period) to allow successful research pools to sustain their progress. A SFC contribution of £150k per annum for a period of 5 years must be at least matched by the partner HEIs (combined) and is intended to cover primarily the cost of maintaining the pool's central administration and support positions to enable the continued collaborative benefit of clustering research in a pool and continued central support to graduate training, KE activity, international development and similar. It is anticipated that this fund will be available to SUPA (after an assessment and approval process) from August 2017. The BoD approved a 'Sustainability Plan' for SUPA in 2014 on this basis.

3. A Changing Landscape

Economic downturn has tightly constrained RCUK and SFC budgets for research which shows no sign of improving over the next five years. This has intensified competition for research funds and encourages strategies for alternative routes to funding such as the EU, charities and industry. Simultaneously there is an increased emphasis by funders to support larger research groupings formed to tackle major challenges and problems. This requires an openness to interdisciplinary working to be successful. Horizon 2020 offers new opportunities for funding with a focus on coupling research and innovation.

While continuing to foster closer relationships to build the critical mass necessary for Scotland to compete at the top level internationally in Physics, a more outward-looking approach must aim to bridge Physics researchers with other disciplines and organisations outside academia.

The creation of a distinctive collaborative ethos by Research Pooling in Scotland has encouraged SFC and the Scottish Government to incentivise collaboration in other domains. This policy is based on the acceptance that as a small country with limited resources, economic growth depends on closer and more efficient working. Academic collaboration with industry and the creation of new enterprise is encouraged through a number of initiatives.

The impact agenda introduced in REF2014 will only increase in importance in the next REF and beyond, and is already a major factor in assessment of RCUK competitions. Physics provides the starting point for innovation in many domains and technologies so it is important to recognise and stimulate new impact opportunities and then to nurture and track these effectively; a collective and cooperative approach to this agenda would be productive.

With an increasing number of developing countries making enormous investments in research facilities and infrastructure, it is imperative that Physics in Scotland combines strengths and builds critical mass to be able to maintain its competitive edge, and pursue new international alliances and collaborations with developing regions of the world.

In a changing funding landscape, SUPA has a role in identifying emerging areas of research, defending the use of public funds, public engagement and influencing the national strategy for research and education. SUPA offers a degree of institutional impartiality in public and policy engagement and can contribute positively to debates that influence Physics education via inspiring examples of ground breaking science and innovation of the highest international quality.

Ten Key External Drivers:

- REF2020/21 – Collaborative strategy, impact agenda, joint submissions…
- RCUK – Shaping capability, centres, facilities, themes, CDTs...
- Europe – Horizon 2020, ERC...
- Strategic initiatives - Grand challenges, interdisciplinary groupings…
- Developing research leaders – Skills pipeline, Fellowships, CPD...
- Business – Industry, Catapults, Innovation Centres…
- Innovation & Entrepreneurship – Company creation, SMEs…
- Promoting & Supporting Physics – Public & policy engagement, schools…
- Dissemination – Open access, social media…
- Equality & diversity – Athena Swan, Juno…

SUPA is now a widely respected 'brand' representing Physics research and advanced postgraduate training in Scotland; SUPA can help to build capability in Scotland as a whole, taking the lead in developing areas and collectively promoting the discipline.

4. Vision and priorities for 2016-2021

SUPA partners endorse and comply with the fundamental basis for conducting research expressed in the recent Nurse Review of UK Research Councils[1], *"Research in all disciplines, produces knowledge that enhances our culture and civilisation and can be used for the public good. It is aimed at generating knowledge of the natural world and of ourselves, and also at developing that knowledge into useful applications, including driving innovation for sustainable productive economic growth and better public services, improving health, prosperity and the quality of life, and protecting the environment".*

SUPA adheres to the traditional values of integrity and ethics in research and conforms collectively with the principles of social justice to ensure fair distribution of wealth, equal opportunity and equality of outcome.

Physics is a key discipline underpinning any knowledge-based economy. Advancing our understanding of the fundamental laws and building blocks of nature feeds the development of new and disruptive technologies for wealth creation, while the procedures, techniques and skills acquired by those trained in Physics research are widely applicable in many organisations including and beyond technology industries. It is essential that Scotland continues to foster its considerable collective strengths, reputation and global presence in Physics research and training to support Scotland's ambitions for economic, social and environmental development in an increasingly competitive international landscape.

In the third phase of SUPA, the value of an established network will be exploited to help maintain and expand the physics research base in Scotland. Cooperation across partner HEIs is now embedded in the Graduate School and Centres of Doctoral Training (CDTs), knowledge exchange, collaborative research, sharing of facilities, and cooperation on REF submissions. The Theme based approach, fundamental to the SUPA operation from inception, will continue, but the activities and mechanisms, together with all external engagements, will be continuously reviewed and refreshed to maximise the effectiveness of SUPA.

The SUPA Graduate School is a widely acknowledged success and its continuation will be placed at the highest priority during the next phase of SUPA. The range of advanced courses provided by world experts combined with the ability to share these across a grid of video classrooms is a valuable and unique resource; it is a powerful attractor to bring high quality students to Scotland. The network provision will be updated to provide a more flexible system at a quality that is competitive with global trends in education and professional development. Recognising that the major knowledge exchange output of SUPA is via its graduate students, a close working relationship between the SUPA Graduate School and the Knowledge Exchange agenda has recently been established; SUPA will build on this with new schemes for exchanges and industry placements. SUPA will continue to be active in helping partners exploit new initiatives via coordinated engagement with Innovation Centres, Catapults, Interface and other government funded agencies to establish a broader base for more substantive working with industry.

SUPA will intensify engagement and collaborative activities across discipline boundaries, establishing closer working relationships with other Scottish Research Pools. Many Physics academics in Scotland already work across disciplines, often as members of departments or institutes outside traditional

Physics Schools or Departments thus offering established interdisciplinary relationships with potential for extension.

It is vital that both HEI partner institutions and individual researchers value SUPA and its primary aim of working in partnership. In its next phase, SUPA will extend its reach to work more closely with those trained in Physics but located in other Schools, Departments, Centres and Institutes in Scottish HEIs. Increased flexibility in the method of providing SUPA advanced courses will introduce opportunities to offer advanced courses globally and hence further increase SUPA's reach and reputation by extending engagements to an increasing number of organisations.

SUPA provides a forum for cooperation in REF preparation and in this phase will work with all partners to improve performance, optimise submissions via sharing knowledge and expert advice, and will encourage and support joint submissions where appropriate.

Ten Key Objectives:

- Continue to build collaborative Physics research capacity in Scotland of the highest quality, benchmarked against global competitors.
- Continue to develop the SUPA Graduate School with the aim of offering the best training in the world, attracting top research students globally.
- Continue to expand international links, relationships, collaborations and alliances.
- Create a supportive environment for PDRAs to maximise expectations for career achievement.
- Encourage women and other under-represented groups in development and advancement in careers in physics.
- Facilitate interdisciplinary cooperation and collaborations via other Scottish research pools, whilst not diminishing the importance of physics as a discipline.
- Expand SUPA's industry engagement via the Graduate School and other mechanisms.
- Support impact creation, development and tracking.
- Grow coordinated school, public and policy engagement.
- Provide a basis for collaboration on preparation for REF2020/21.

SUPA, via these objectives, will exceed the criteria set by SFC in its Further Funding requirements. Additional funding sources need to be explored to support the collective ambitions of SUPA over the next 5 years in order to be fully engaged at an internationally competitive level. However the ultimate strength of SUPA, ambitions and longevity, is embedded in the highly cooperative network that has been established between the partners who are committed to work together strategically.

5. Indicators of Success

Volume of World Leading Research: Increased publications with high citations in top journals; significantly increased collaborative grant income; several major initiatives based on interdisciplinary collaborations; REF2020/21 performance.

Graduate School: Increased number of PGR students attracted from world's top 100 Universities; new CDT-style centres; SUPA courses adopted by other organisations.

Knowledge Exchange: Impact based on underpinning research enabled by SUPA; patents applied for/ granted, number of company spin outs, resulting employee numbers.

6. Operational Plan

SUPA will transition from being a component of a major SFC funded initiative directed at developing Research Pooling to an essentially self-sustaining strategic alliance in 2017. Nevertheless, all alliance partners are committed to SUPA as a permanent feature of the Scottish Physics landscape. The SUPA operational plan will support the above strategy based on the sustainability plan developed by the EC in 2014. Continuing to enhance the quality, critical mass and the international reputation of Scottish research and advanced training in Physics will remain the core objective with SUPA offering a 'single front door' for external engagement with Scottish Physics, while supporting key agendas in the present-day environment of increased interdisciplinarity and industry engagement. Most SUPA partner HEIs have their own strategies that include expansion of their Physics research base; SUPA will assist in achieving expansion without compromising research output quality, continuing the aim of enhancing the overall critical mass of Scottish Physics.

A. SUPA membership and categories of activity:

The SUPA operation is based on institutional (HEI) membership which establishes how SUPA is managed. A Consortium Agreement signed by all eight HEI partners has acted as a focus for procuring successful management and operation of SUPA and its related activities. It lays out the obligations of each of the partners to work together and comply within the conditions of the SFC contract. This will be updated ahead of the new funding arrangements post SUPA II (August 2017).

Effectively, there is also a personal membership of SUPA based on employment or student status and research activity within each partner HEI. The SUPA central administration maintains a list of Physics academic staff (T&R and R-only) in each institution (currently approximately 700) while the Graduate School registers all Physics postgraduate research students in Scotland (currently 608).

SUPA seeks to create a sense of belonging and community by creating and encouraging positive activities which are valued across the Physics research community in Scotland.

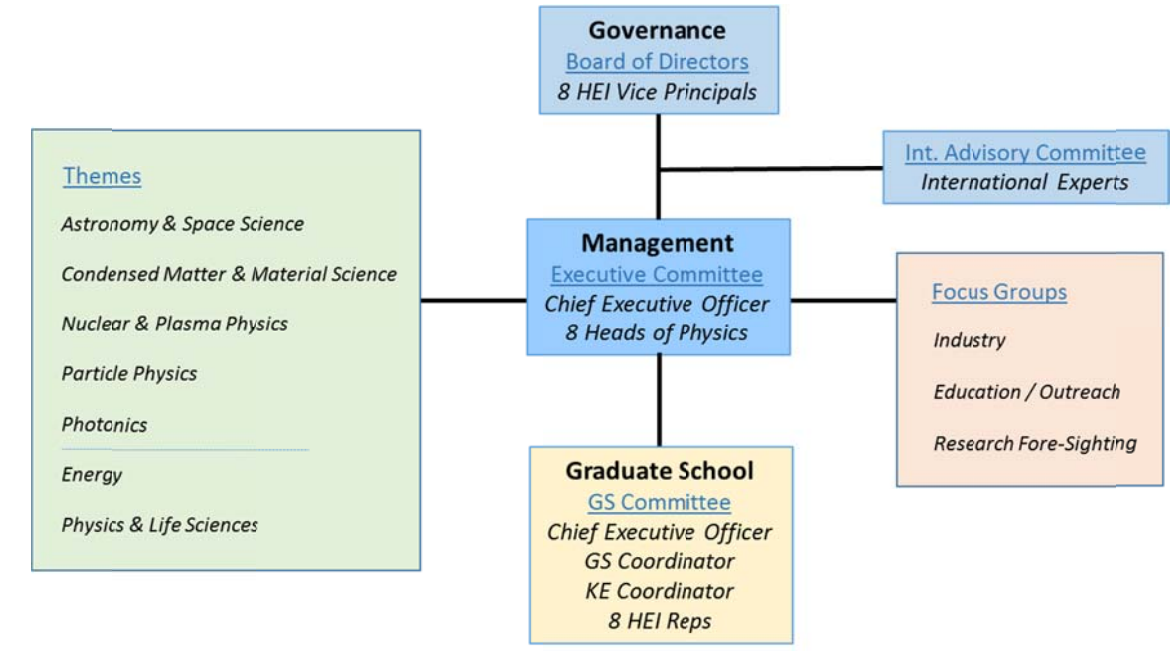
SUPA activities may be described under three categories

I. Research: Theme led approach
II. Individuals: Training, development & leadership:
III. External Engagement: Relationships, knowledge exchange & impact

While much emphasis has been placed on research performance, large research grants and the SUPA Graduate School, the EC has voiced concerns that there is a danger of early career academic staff, including PDRAs, being overlooked. It is intended to address this with appropriate career development meetings and inclusion of early career staff in discussions on future activities.

B. Organisational Structure:

The Executive Committee oversees all SUPA activities, developing general policy and strategy for cooperating on REF preparations, and deploying relevant funds. It also resolves problems and reports formally to member institutions. The Chief Executive is responsible for implementing the decisions of the Executive Committee. The Heads of Physics have responsibility for supporting and implementing the SUPA strategy within their institutions. .



Note that the SUPA CEO now also assumes the role of Director of the Graduate School while the KE agenda has been merged with the SUPA Graduate School. Appointed GS and KE Coordinators assist the CEO in fulfilling the aims and objectives of the strategy..

C. Themes

The Theme-based approach of SUPA is coordinated by appointed Theme Leaders. Five original themes represent the strongest Physics sub-disciplines in Scotland, (a) Astronomy & Space Science, (b) Condensed Matter & Material Science, (c) Nuclear & Plasma Physics, (d) Particle Physics, and (e) Photonics. A further two Themes represent two 'Impact' strengths of Physics in Scotland, (a) Energy and (b) Physics and Life Sciences (PaLS).

Theme activities include:

- Promotion of cross-institutional research projects, facility sharing, etc.
- Organisation of topical meetings to stimulate collaboration.
- Engagement with top global players (e.g. Max-Planck, distinguished visitors).
- Collaboration with other Research Pools (e.g. SRPe, ScotChem, SULSA, SICSA, etc).
- GS course and course content advice and recommendations.
- Coordinated preparation for REF.

The main duties of Theme Leaders are:

(a) Encouraging collaborative research and grant applications across the theme.
(b) Organising a yearly meeting of the theme.
(c) Promoting other associated events (IoP etc).
(d) Reporting to the Annual Gathering/IAC on theme achievements and priorities.
(e) Provision of theme data to SUPA administration.
(f) Join other theme leaders in advising the CEO on the overall operation.

D. Focus Groups

Selected topics will be addressed via Focus Groups to provide recommendations to the EC on what strategy should be adopted in developing areas and topics or where policy needs to change (e.g. recommendation of changes to Themes); these may be time limited. Initial examples of Focus Group topics are:

(a) Industry Engagement
(b) Education & Outreach
(c) Research Fore Sighting of Physics

This list will change over time. It is expected that topical issues of concern to SUPA will result in the formation of other Focus Groups. Membership of Focus Groups will be by invitation of EC members.

E. SUPA Graduate School

The Graduate School has been a major success of SUPA and is given the highest priority for continuation. Key components of the Graduate School are:

- Joint courses delivered via video-linked training rooms in each of the partner institutions
- GS advertising & application process for SUPA Prize studentships
- SUPA Induction
- Student retreats
- Careers events
- Relay of research seminars and colloquia via VCs
- Distinguished visitor programme
- Industry student placements
- Exchanges
- Cooperation with SUSSP in international summer schools
- Coordinate activities with CDT's; Quantum Hubs and similar collaborations.

A Graduate School Committee (GSC) oversees the operation of the SUPA Graduate School. This committee is chaired by the SUPA CEO and each HEI partner is represented on the committee. This committee has added the integrated KE agenda to its remit and both GS and KE coordinators are included as members of the committee.

Responsibility for maintenance of the VC rooms remains with the individual universities while the network and software licences are a central responsibility. The current Codex licence runs out in July 2017 and trials are currently under way to replace the current system with a software/internet based system which would be cheaper and provide more flexibility. The current questions centre on (a) quality of provision, and (b) bandwidth limitations. An advantage of the systems under trial is the flexibility to deliver courses to both classrooms and individual PCs anywhere in the world. Provision of courses beyond SUPA and possibly directed CPD courses for school teachers or industry could be envisioned in the future. A VC Project Team including representatives from a number of SUPA partner institutions and chaired by the GS Coordinator, has been formed to manage the assessment of options and to provide a recommendation to EC.

A closer relationship will be established with the Scottish Universities Summer Schools in Physics (SUSSP) which has delivered international Schools in physics for PhDs and PDRAs since the early 1960s. SUSSP has a high global reputation and has established valuable long term international relationships for physics in Scotland.

F. Knowledge Exchange & Impact:

This is an area of SUPA that is in transition, whereby the approach is being reassessed as to how collaborative working can best promote these agendas. SUPA KT has been assimilated into the Graduate School and is therefore currently overseen by the Graduate School Committee. The Industry Focus Group will discuss and make recommendations on the future policy on industry/enterprise engagement, while the Education and Outreach Focus Group will develop policies on Outreach. The key areas of activity are:

- Cooperation on developing impact across SUPA
- Industry engagement
- Establishing working relationships with Innovation Centres, Catapults, Interface, KTP Networks
- Outreach, public and policy engagement
- Cooperation and joint events with other Research Pools
- Joint working with IoP, IoP Scotland, SU2P, EPS.
- Joint working with ATC, Fraunhofer, NPL and similar organisations
- Promote entrepreneurship via Enterprise Campuses, Converge Challenge, etc.

G. Recruitment, Professional Development & Leadership

SUPA is in the end about individuals; a successful SUPA strategy depends on the performance of those individuals to perform at the highest achievable standard. SUPA brings an inter-institutional network of people to help and advice on career paths beyond what any individual HEI can provide. Priorities for SUPA are:

- Cooperation (i.e. SUPA panel representation) on all academic recruitment to ensure highest quality and strategic fit.
- Developing research leaders (e.g. mentoring and support for Fellowships).
- Collective supporting for developing our community of Research Staff.
- Equality & diversity within SUPA operation.

H. Facilities and Infrastructure

SUPA has funded the creation and upgrade of research infrastructure in Scotland. SUPA II funding enabled the following:

- SUPAscopes 3 Robotic 1m telescopes located in Chile, South Africa and Australia (St Andrews)
- HARPS-N Spectrograph located in the Canary Islands(Edinburgh/ATC /St Andrews)
- Low Vibration Laboratory (St Andrews)
- SCAPA (Strathclyde)
- MagTEM (Glasgow)
- Nanofabrication Facility (Heriot-Watt)
- Biophotonics Laboratory (Dundee) and clean room facilities (St Andrews, Heriot-Watt) in support of the PaLS Theme.

SUPA will continue to monitor and encourage maximum benefit of the use of these facilities for collaborative research with the prime objective of maintaining Scotland's position at the forefront in these areas.

SUPA will also remain alert to opportunities and will prioritise and coordinate joint bids for major facilities involving multiple SUPA partners, particularly in relationship to SFC calls and requests for information.

I. Communication

SUPA is a large community of well over 1200 physicists (staff and students) spread across Scotland. Regular communication lies at the heart of making this community feel part of the network. Priorities are to:

- Improve communication across SUPA by revamping SUPA web pages, introducing a SUPA newsletter/bulletin & use of social media.
- Improve communication within Themes via bulletins on latest activities.
- Improve external presence of SUPA via the same routes.

J. UK & International Collaborations & Agreements

SUPA's reputation on the international stage is set primarily by individuals who collaborate with foreign laboratories, publish in top rate international journals, and give talks (particularly plenary and invited talks) at international conferences. SUPA expects all publications to include SUPA in the address.

SUPA can assist collectively in this agenda in a number of ways, including:

- Cooperation through advisory body membership of South East Physics Network (SEPnet), White Rose Industrial Physics Academy (WRIPA) and similar.
- CEO and EC cooperation on international promotion, initiatives and agreements with SFC, US, RCUK, RSE, and HEIs.
- Engage closely with Max-Planck, and similar institutes and partnerships
- Promote Scottish Physics via Scottish Development International
- Promote Scottish Physics in Europe via Scotland Europa and similar organisations

SUPA is not a legal entity so cannot sign MoUs on behalf of its partner HEIs, however other institutions, for instance RSE or IoP, may agree to represent the Scottish physics community on behalf of SUPA.

K. SUPA Annual Gathering & IAC Meeting

SUPA will continue to share and celebrate success annually via a (renamed) SUPA Annual Gathering. The event, open to all staff and student members of SUPA and invited guests (including IAC members) will highlight recent research and KE successes from across SUPA via talks and exhibits and will include a distinguished invited plenary speaker. The Gathering will be followed by an annual dinner for IAC, BoD, EC members, Theme Leaders, SUPA Administration staff and invited distinguished guests.

The IAC meeting will take place the day following the Annual Gathering.

L. Staffing

The plan developed by the Sustainability Group on behalf of the EC and approved by BoD in 2014 presented a staffing model as the irreducible minimum level of SUPA Central staffing post SUPA II based on expected SFC income:

(a) Remainder of SUPA II (until end-Jul 2017):
- Part-time Chief Executive (0.5 FTE)
- SUPA Administrator (Grade 7)
- CEO Admin Support (Grade 4)
- GS Coordinator (Grade 8)
- GS Secretary (Grade 5)
- IT Officer (Grade 7)
- KT Manager (Grade 8)

(b) Post-SUPA II: the irreducible minimum staffing agreed by EC is:
- Part-time Chief Executive (0.5 FTE)
- A KT/GS Officer
- CEO/GS secretary
- IT Support

Additional posts will be considered subject to funding.

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[1] Nurse Review of UK Research Councils: https://www.gov.uk/government/collections/nurse-review-of-research-councils