Innovation through Partnership
BAS Strategy for Innovation and Impact

SUMMARY

Innovation and impact are firmly embedded in British Antarctic Survey's (BAS's) Vision and Mission. Considerable potential exists for BAS to create impact through outward-facing innovation, and to innovate within through inventing and adopting novel technologies and processes, especially regarding the net zero carbon challenge. BAS will convert this potential through a strong innovation culture, sound self-awareness, understanding of the external landscape and targeted partnerships. Alignment of values, leveraging of assets, data and samples, and careful prioritisation will facilitate delivery of impact in a resource-constrained environment. The Aurora Innovation Centre at BAS is an enabler for impact.

Aim:

- To develop fully our potential to derive local, national and global impact from our expertise and assets
- To collaborate with others who complement our strengths to create external and internal benefit

SETTING THE SCENE

What do we mean by innovation, and how is it linked to impact?

Innovation comprises two key features: It introduces something *fresh* (new, original, or improved), which in turn creates *value* (benefit, impact).

In the context of BAS, innovation has a dual focus:

Outward facing:

Our aim is to generate new insights, processes, products and/or services and translate them into wider *benefit.*

Inward facing:

Jointly with colleagues across BAS, the innovation team endeavours to identify and develop new or improved ways of carrying out our research and operations to *increase effectiveness and sustainability*, which in turn augments resource- and carbon-efficiency, safety, wellbeing, inclusivity and job satisfaction.

Innovation is a process that naturally leads to impact as a result. It opens up BAS's expertise and assets for the benefit of stakeholders and finds novel ways to address issues of global importance.

Impact from research and operations: Innovation through partnerships

Outward facing:

The most fruitful path to impact is to co-design research with stakeholders. A mutual understanding between BAS researchers and potential end users, enabled by relevant knowledge exchange, will ensure that research is conducted in a way that will best enable its application in the public and private sector in the future.

Inward facing:

As a polar operator in the midst of major infrastructure overhaul and with a commitment for net zero carbon operation by 2040, BAS will communicate its innovation needs and co-design solutions with delivery partners, making best use of existing data and samples.

The Aurora Innovation Centre will nurture partnerships with complimentary expertise and ethics to enable both outward- and inward-facing innovation.

Government priorities

The UK government, through its strategies on Innovation, Net Zero, People and Culture, Industry, Clean Growth, Waste and Resource and Green Finance as well as its 25 Year Environment Plan, recognises innovation based on sound environmental awareness and inclusivity as a major driver for sustainable economic success in the UK. The commitment to act with urgency to end its contribution to global warming is reflected by the UK becoming the first major economy in the world to pass laws to achieve net-zero carbon emissions by 2050. The UK government also recognises its wider responsibilities under the Global Goals for Sustainable Development and through its presidency of COP26 has aimed to lead on actions towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change.

The Department of Science, Innovation and Technology (DSIT) prioritises excellent fundamental science that can be translated into applications for a sustainable future. The Aurora Innovation Centre, a £5M investment at BAS, comprises state-of-the-art conference and meeting facilities and a Collaboration Space for partners, as a hub to address issues of global importance.

Innovation and impact in the UKRI and NERC families

A foundational principle of UK Research and Innovation (UKRI), which the Natural Environment Research Council (NERC) and BAS are part of, is to enable an agile response to new challenges and opportunities across disciplines, pulling research through to application and co-creating solutions between business and academia.

UKRI's Strategy sets out priorities for how to deliver an outstanding research and innovation system in the UK that provides everyone with the opportunity to contribute and to benefit, enriching lives locally, nationally and globally. NERC's Strategic Delivery Plan highlights the relevance of NERC-funded research and operations to economy and society. BAS research is applicable beyond the polar regions, and is relevant to a spectrum of industries, from fisheries to satellite operators, from pharma to insurance companies. Like NERC as a whole, BAS aims at increasing its visibility to and interaction with business for mutual benefit, within the ethical boundaries of environmental stewardship.

The Cambridge innovation ecosystem

The Cambridge ecosystem is renowned as one of the most vibrant innovation communities in the world. With the expansion of the West Cambridge site, BAS's headquarters have become an integral part of this energetic campus, linked to an increasing number of enterprises and Cambridge University departments. BAS's Aurora Innovation Centre, a joint project with the University of Cambridge, forms a valuable addition to the network of innovation and incubation facilities in the greater Cambridge area, and is an enabler for fruitful interaction and showcasing of emerging best practice.

PRESENTING A BLUEPRINT FOR ACTION

BAS Vision

Impact is firmly embedded in our vision:

To be a world-leading centre for polar science and polar operations, addressing issues of global importance and helping society adapt to a changing world.

BAS Mission

Innovation forms a crucial part of the BAS Mission:

A research-driven organisation recognised for:

- *Commitment to excellence in science*
- *Operational professionalism and innovation in everything we do*
- *A partner of choice for science, operations and business wherever polar expertise can be applied*
- *Safely delivering complex operations in extreme environments*
- *Commitment to environmental stewardship of the polar regions*
- *Developing our staff to reach their full potential*
- *Sustaining an active and influential presence in Antarctica on behalf of the UK and playing a leadership role in Antarctic affairs*
- *Engagement with policy-makers, government and the public*

Guiding Principles

The following principles guide our innovation activities:

- Addressing net zero carbon targets
- Fostering equity, diversity and inclusion, and high quality collaborations
- Realising impact potential
- Alignment with BAS core values, brand and rhythm of polar operations
- Drawing on united strengths of science and operation
- Making best use of BAS assets, including data and samples
- Financial sustainability

Strategic Priorities

Our Innovation and Impact priorities are synergistic with both the BAS Science and Operations Strategies, and comprise:

Outward- and inward-facing:

- Ensuring environmental stewardship
- Embedding innovation, responsiveness to net zero carbon targets and the principles of equity, diversity and inclusion in organisational culture and all activities
- Advancing environmental applications for sensing, artificial intelligence, and autonomy
- Deriving added value from data, samples and models
- Developing technologies, materials and approaches for cold, remote and challenging environments

Mainly outward-facing:

- Climate and space weather science for risk mitigation and public engagement
- Sustainable bioproducts with novel functionalities

Mainly inward-facing:

- Systems approach and professionalism in all operations
- Supply chain resilience and increased social value
- Investing in physical and psycho-social health, safety and well-being

What is our starting point?

Strategic innovative work is enabled by a cultural mind-set, arising from organisational self-awareness and a full understanding of the wider operational landscape and how it is evolving.

BAS's strengths include:

- its internationally recognised expertise as well as the outstanding dedication of its staff
- the quality of its assets (including a state-of-the-art Research Vessel, planes, research stations, laboratory facilities and the Aurora Innovation Centre)
- the diversity of its R&D outputs (including data, models, processes, technologies, pipeline for (bio-)chemical products, maps, images and educational resources)
- its strong, positive brand
- its location in the thriving innovation landscape of Greater Cambridge and the Cambridge-Oxford Arc.

Challenges we face:

BAS works within the constraints of government regulations, competition for resources, rigorous environmental stewardship and the rhythm of polar operations. The latter makes swift reaction to short-term commercial opportunities challenging. In addition, an increase in complexity and volume of core work restrain the ability to capitalise on wider innovation opportunities that draw on the expertise of BAS staff.

What are the drivers?

Impact

The primary driver is for BAS Innovation to benefit one or more of the following areas: the environment, public policy or services, economy, society, health, culture and quality of life. BAS values each of these areas and is working with a diverse range of partners to further strengthen our portfolio of innovation projects. Particular importance is ascribed to achieving net zero carbon emissions for BAS and UKRI by 2040, and to enhancing inclusivity throughout the UK polar community.

Financial sustainability

A further driver is the financial reality of a research landscape where traditional sector-based public funding is under pressure. Delivery of benefits to stakeholders is dependent on BAS being able to maintain and develop its expertise base and first-rate assets. Through contributing to BAS's financial sustainability and competitiveness, innovation will ensure continued impact.

TAKING ACTION

How will we achieve success?

Outward- and inward-facing innovation are delivered through four fundamental steps:

i. Knowledge of internal strengths and needs

BAS seeks to build robust self-awareness of:

- *Strengths and gaps in capabilities and capacity:* This is being achieved through identifying and mapping strategic assets and needs, and building a BAS Expertise Map as a living document.
- *Embedded attitudes, enablers and barriers for inclusive innovation:* This requires extensive staff engagement and will be achieved through bespoke workshops and training, the work of Innovation Champions, as well as effective use of corporate communication channels.

ii. Knowledge of the external landscape

Full awareness of the external landscape BAS is embedded in, including competition and emerging trends, will be achieved through:

- Gathering intelligence through linking with strategic networks, such as the Knowledge Transfer Network, Catapult Centres, Local Enterprise Partnerships, Strategic Policy and R&D Initiatives, Industry Associations and Stakeholder Fora
- Working with university business schools to carry out market analysis
- Active participation in sector-specific external conferences

iii. Formation of partnerships where values, strengths and needs are aligned

Fruitful partnerships will arise from:

- *Clarity of boundaries and priorities*: BAS will only target partnerships that are compatible with the remit of environmental stewardship and the guiding principles defined above.

- *Engagement activities* between BAS and stakeholder networks, virtually or at the Aurora Innovation Centre, in strategic areas: this will expand on
    - where BAS strengths are aligned with stakeholder needs, and/or
    - where external expertise is capable of and interested in addressing operational, cultural or scientific challenges at BAS.

  For each prioritised area, a live engagement plan will identify potential partners, to guide development of impactful collaborative or commissioned work for the short, medium and long term.

iv. Joint translation of strengths into solutions

Conversion of BAS strengths into impact entails:

- *Targeted funding*: We will identify funding opportunities and provide pump-priming to build collaborative projects, with a particular focus on Net Zero Innovation and exploring best use of existing data and samples.
- *Delivery to highest standards*: BAS's mission is to be recognised for excellence in science and operational professionalism. Through delivering collaborative and commissioned work to the highest standards BAS aims to become and remain the partner of choice wherever polar expertise can be applied.
- *Building lasting relationships and capturing impact*: BAS aims to foster strong and lasting relationships with partners to build on past and current work, develop new avenues for mutually beneficial outputs, and stay connected with further developments. As impact in many areas will typically arise downstream of direct BAS involvement, enduring relationships with partners will enable BAS to celebrate and report on the full breadth of benefits its expertise has contributed to.

Future proofing

To remain at the forefront, BAS will engage in horizon scanning. This will include a continuous search for new technologies, materials and systems that could revolutionize the way BAS conducts science and operations, for increased resource efficiency and development of novel applications with wider benefit.

Empowering people

The ultimate source of innovation in every organisation is its staff. All those employed at BAS are encouraged to initiate and participate in innovation activities. This will be facilitated and accelerated by making appropriate training accessible, including on

- entre-/intrapreneurial skills
- awareness of enablers and boundaries (incl. policies and procedures)
- building and maintaining fruitful relationships.

BAS will make available a suite of training options to nurture and develop staff at all levels, enabling them to build on their strengths, tap into their passion for making a difference, and further their careers through innovative work. The leadership will actively seek feedback from staff on how to improve the development opportunities, and how to make BAS an even more innovative place of work.

ANNEX 1: Strategic delivery

The delivery of our strategy is nested in NERC's Strategic delivery plan in the following way:

Most relevant points for BAS innovation under NERC's Strategic Objectives				
People & careers	**Places**	**Ideas**	**Innovation**	**Impact**
Developing a deep understanding of our communities and using their insights to evolve our portfolio. Working with our community to promote greater diversity and inclusion across environmental science.	Creating and upgrading environmental infrastructures that unlock innovation and economic potential.	Working in partnership across UKRI. Pursuing strategic programmes that address the critical environmental challenges of climate change, biodiversity and habitat loss, and pollution.	Realising the potential of sensing and monitoring technologies, artificial intelligence and digital twinning, autonomous and remote sensing, and high-performance computing to create new information services.	Sustaining the UK's sovereign capability to advise and inform UK Government policy on the state of UK and global environment. Determining the effectiveness and accelerating the adoption of nature-based solutions.
Supported by a world-class organisation: Becoming environmentally sound across our head office and institute operations while enhancing scientific productivity				
BAS Innovation Strategic Priorities				
Embedding the principles of equity, diversity and inclusion in organisational culture and all activities. Systems approach and professionalism in all operations. Investing in both physical and psycho-social health, safety, and well-being.	Supply chain resilience and increased social value through novel procurement. Developing technologies, materials, and approaches for cold, remote, and challenging environments.	Ensuring environmental stewardship throughout our spheres of influence. Deriving added value of existing data, samples, and models.	Embedding innovation in organisational culture and all activities. Advancing environmental applications for sensing, artificial intelligence, and autonomy.	Climate and space weather science for risk mitigation and public engagement. Sustainable bioproducts with novel functionalities.
Ensuring environmental stewardship. Embedding responsiveness to net zero carbon targets in organisational culture and all activities.				
Delivered through				
Facilitating EDI knowledge exchange and collaboration internally and across the NERC ecosystem. Improving organisational processes to increase accessibility and effectiveness. Creating opportunities to support career development for people with different needs. Engaging the broader Polar Science community, our funders, and other key stakeholders through the Diversity in UK Polar Science Initiative to deliver activities for sustained change.	Innovation activities in collaboration with partners across the BAS Antarctic Infrastructure Modernisation Programme. Exploring the role and potential of digital infrastructure to enhance innovation and increase organisational efficiency and connectivity. Collaborating to enable testbeds for technology advances in polar environments.	Strategic partnership building and ensuring cross-disciplinary collaborations to maximise the impact for the environment, society, and industry. Delivering and developing cohesive user-based environmental data services and sample accessibility. Developing new technologies and approaches such as new uses of AI in environmental research and management.	Strengthening internal interdisciplinary collaboration for innovative applications. Creating opportunities for Innovation-focused stakeholder engagement across relevant industry partners, wider academia, other polar operators, and the public. Advancing capacity for environmental sensing and autonomous data collection, coupled with AI, machine learning and constraint modelling to enable data-centric decision-making. Horizon scanning and trend tracking in key areas of innovation delivery.	Involvement in COP[i], IPCC[ii], IPBES[iii], COBR[iv], CCAMLR[v], ATCM-CEP[vi] and other national and international environmental forums. Developing educational opportunities and creative methods to communicate our science to diverse audiences and inspire the next generation of environmental talent. Engagement with industry leaders to provide tangible environmental evidence for culture change and decision-making. Building collaborative partnerships to use our scientific assets for societal benefit.
Establishing best environmental practice at our Cambridge headquarters, our stations and infrastructure; exchanging learning with other polar operators. Activities of the Net Zero Working Groups to deliver the BAS Net Zero Strategy, including • adopting renewable technologies and low carbon ways of working • facilitating carbon literacy and carbon action plans across staff				

[i] Conference of the Parties
[ii] Intergovernmental Panel on Climate Change
[iii] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
[iv] Civil Contingencies Committee (Cabinet Office Briefing Room)
[v] Commission for the Conservation of Antarctic Marine Living Resources
[vi] Antarctic Treaty Consultative Meeting-Committee for Environmental Protection