

SENATE

Title of paper: Proposed NU Centre of Research Excellence in Industrial Biotechnology

Main purpose of the paper: For discussion and endorsement

Presenter(s): Professor Matthew Grenby, Pro-Vice-Chancellor Research and Innovation

Date of paper: 29 January 2025

Purpose of the paper

This paper presents a proposed NU Centre of Research Excellence in Industrial Biotechnology (SAGe-led). It is intended that this NUCoRE will join a portfolio of 18 NUCoREs, which will enable the University to offer a coherent narrative of our collective excellence in industrial biotechnology research.

Relation to strategy and values

NU Centres of Research Excellence (NUCoREs) are a transformative initiative of the 2018 Research Strategy.

Recommendations:

The documentation provides a snapshot of the current status of the NUCoRE, but approval is sought on grounds of future potential and trajectory.

Consultation to date (including any previous committee consideration and its outcome):

University Executive Board – endorsement of proposal

Appendix A- NUCoRE proforma

NUCoRE name	Industrial Biotechnology
Lead(s)	Prof. William Willats
Lead Faculty	SAGe

1. What?	Indicative 150 words
<p>What is the topic and mission of the NUCoRE</p> <p>The mission of the proposed Industrial Biotechnology (IB) NUCoRE is to create <i>a collaborative, nurturing and interactive environment that significantly enhances the funding, impact, visibility, and educational value associated with Industrial Biotechnology at Newcastle University (NU)</i>. The NUCoRE will encompass research across all three faculties, as well as NU Singapore and will take a holistic and synergistic approach of what constitutes IB now, and what it is likely to be become in the future. See Figures 1 and 2 for schematic overviews.</p>	
<p>What specific research advances will it aim to deliver in the next 5 years?</p> <p><i>The research undertaken by the IB NUCoRE will focus on solutions to ‘real-world’ problems and many of the specific research topics and themes will be identified in consultation with industrial partners.</i> Although individual goals, technical approaches and partners will vary across projects, they will all be underpinned by harnessing the potential of natural products, materials, and processes. <i>Increasingly, consumer demands reflect societal and environmental concerns, for example around reducing energy and water consumption, limiting carbon outputs and sustainably and ethically sourcing raw materials.</i> We are well-placed to develop projects that address these demands and challenges, but need to more effectively share ideas, knowledge, resources and techniques across disciplines and academic units - and communicate our activity to external entities.</p>	
<p>What workpackages or sub-themes/groupings might make up the NUCoRE?</p> <p>Cross-faculty research themes will include (but not be restricted) to: synthetic biology; bio-refining, bio-energy; crop protection and engineering; agrotechnology; biomaterials and architecture; consumer behaviour; skin and oral care; data science; computing; AI; machine learning and social science. This proposed NUCoRE will also include research into the commercial, ethical, and societal implications of IB. <i>For each theme, we will endeavour to identify specific individuals and/or research groups that will champion them and help us identify current thinking, opportunities, strengths weaknesses in that area.</i> The individuals and/or research groups involved will naturally change over time but an initial set would include: <i>synthetic biology</i> (ICOS, Jem Stach, Tom Howard - SAGe); <i>biomaterials and architecture</i> (Jane Scott, Ben Bridgens - HaSS); <i>skin and oral care</i> (Mark Birch-Machin, Nick Jakubovics – FMS); <i>bio-refining, bio-energy</i> (Anh Phan, Libby Gibson- SAGe); <i>crop protection and engineering</i> (Neil Boonham, James Kitson, Darren Evans - SAGe); <i>agrotechnology</i> (Neil Boonham, Ankush Prashar - SAGe); <i>consumer behaviours and supply chains</i> (Lynn Frewer, Diogo Monjardino De Souza Monteiro - SAGe); <i>data science</i> (National Innovation Centre for Data, Rachel Franklin); <i>AI and machine learning</i> (National Edge AI Hub); <i>social science, ethical, and societal implications</i> (Sally Shorthall, Lynn Frewer – SAgE).</p>	

2. Why?

Indicative 150 words

What are the external drivers and horizon scanning that tell us this is timely?

Globally, both the natural world and human societies face unprecedented challenges - especially in the areas of food security, energy, materials, chemical building blocks and emerging threats to health. Many of the most promising solutions to these challenges are bio-based and harness the power of recent bio-technological advances in AI, genome sequencing, precision agriculture and protein engineering. **However, realising the full potential of biotechnology requires creative thinking and effective sharing of resources and knowledge. The proposed NUCoRE is designed to facilitate this.** The huge potential of IB is recognised by industry and funders but NU needs to present a coherent and compelling vision of what we have to offer. IB is currently not fully represented by a NUCoRE. This means that IB activity across NU risks being disjointed and does not fully capitalise on a critical mass of ideas, facilities, or staff. It also means that NU's IB activity is not sufficiently visible internally or externally. The proposed NUCoRE is also timely in the light of current financial challenges faced by the Universities including NU, and securing external funding has never been more important. **By more effectively marshalling our expertise, ideas, and resources in IB, the NUCoRE will drive a more coordinated and competitive approach to funding calls, especially larger hubs.** By adding value to our teaching programmes (for example, the Industrial and Commercial Biotechnology MSc and Biotechnology and Biodesign MRes) we anticipate the NUCoRE will boost recruitment of overseas students, especially to MSc courses.

What is our distinctive competitive advantage in this domain? How do we differ from other centres of excellence?

The 'industrial' component of the proposed NUCoRE is a vital and distinctive component of our vision that we believe provides a significant competitive advantage. NU benefits from strong links with biotechnology industry partners including P&G, Astra Zeneca, Croda, Fuji Film, Northumbrian Water, CPI and multiple SMEs. **Throughout the consultation and development process, we have engaged with industry partners to co-create the NUCoRE and ensure it provides as much value and impact as possible to all stakeholders.** We will use the NUCoRE to develop new ways of interacting with industry that go beyond our current offering and are distinct from other NUCoREs. We are excited by the potential of leveraging educational opportunities from the NUCoRE's research activities (also see **Section 5**). This would include extending the contribution made by industry partners to developing and developing UG and PG courses, expanding our Continued Professional Development offering, Industry Visiting Professors of Practice, Enterprise Academy programmes and potentially offering PhDs by publication for industry partners. In terms of competing initiatives, although we are not usually party to the internal structures of other institutions, we can nonetheless learn from how other Universities engage with industry. A good example is the relationship that Strathclyde University has forged with AstraZeneca and GSK. They have done an excellent job of making this relationship highly visible and developing aligned teaching programmes. One obvious role for the NUCoRE is to develop more coherent public narrative around the scale and breadth of IB at Newcastle and work with the marketing team to ensure that these messages are promoted more effectively.

What major contributions have we already made?

NU already has considerable traction and visibility in the IB space on which to build a successful NUCoRE. We have leveraged considerable direct and indirect funding, from our industrial partnerships and for example the P&G portfolio value is over 7m GBP. The BISCoP (Bioscience for Sustainable Consumer Products) CTP, Net Zero (PINZ) CDT and the recently awarded NEEDL (North East England PhD Studentships in Biosciences) DTP will train over 100 PhD students in biotechnology the Northeast over the next decade. With encouragement from the BBSRC, work is already underway to develop an IDLA which will in effect be a new iteration of the BISCoP CTP). A NUPaCT in enzyme technology development has recently been agreed between NU and P&G – ensuring the ongoing strength of our strategic partnership. ***This partnership has recently been recognised by the award of the prestigious P&G Euro 2024 C+D Partner Excellence Award to Prof Willats.*** Our teaching programmes have also contributed to our reputation and visibility in IB. In particular the successful ‘Industrial and Commercial Biotechnology’ MSc programme is popular with overseas students, and we believe can be grown significantly to >50 students per intake) and a similar model applied to develop programmes with other industrial partners.

3. Plans for consultation/development*Indicative 150 words*

Throughout the development of the proposed NUCoRE, we have been careful to consult and engage with stakeholders. Initial informal discussions were held with colleagues in SAgE and then later with HaSS and FMS. We also met with members and leads of other NUCoREs that have overlaps and synergies with the proposed IB NUCoRE (Centre for Cancer, Centre for Energy, Centre for Healthier Lives, Centre for Transformative Neuroscience And Centre for Biomedical Engineering). In addition, we launched a ‘Biotechnology Club’. This is run every two months in the Farrell Centre and is an opportunity for researchers engaged in IB and related fields to informally discuss current and potential project and ideas, including the proposed NUCoRE. We also consulted with the Deans of Research and Innovation in SAgE and FMS. Based on these discussions, we then developed an outline plan which was presented and discussed with stakeholders at a Community Engagement Workshop (13th June 2024 in the Stephenson Building). The Workshop was attended by > 50 colleagues from all three faculties as well as representative from large Industry (P&G) and an SME (Marrabio). The next step will involve a presentation to SIG in November 2024.

4. Who?*Indicative 150 words***Which researchers, research groups, networks, existing University Research Centres or other Newcastle ‘assets’ will contribute to the NUCoRE?**

The NUCoRE will encompass all researchers, research groups, and networks involved in IB in the widest sense. This will include colleagues across all three faculties and Singapore. In addition to ‘wet’ lab-based research, the NUCoRE will also welcome contributions from those involved in researching the commercial, ethical, and societal implications of IB and HaSS is especially important in these aspects. Synergy with medical biotechnology is also important and as described in the following sections, we anticipate significant cooperation with FMS lead NUCoREs We also envisage that the NUCoRE will make a significant contribution research-led teaching (see Section 5).

Another important role for the NUCoRE will be as a ‘shop window’ to help commercialise our assets. Currently, it’s difficult for external partners to easily assess what we offer in terms of expertise, equipment, and facilities. The NUCoRE will facilitate more effective access (and

Which external partners will be involved?

Our Strategic Partners and especially P&G, Northumbrian Water and Arup will be involved in the NUCoRE and have already helped formulate this proposal. P&G are a global powerhouse of IB research with whom we enjoy particularly strong links. They will take a key role in identifying the challenges, problems and opportunities in the fast moving consumer goods sector. We will also use the NUCoRE to extend our existing partnerships with NWG, Arup, Astra Zenica, Croda, Johnson Matthey, NEPIC, CPI, Fuji Film, NEPIC, Prozomix and our successful spin-outs in the commercial biotech space which include Aelius Biotechnology, Alycomics, AMLo Biosciences, Marrabio and New Cells Biotech. We will also engage with IB external networks such as the Industrial Biotechnology Innovation Centre, BioNow and The Bioindustry Association.

How have you captured the diversity of potential contributors across the host Faculty, University, international campuses and external partners?

As noted in Section 3, we have been careful to consult and engage with stakeholders and we recognise that several existing NUCoREs encompass multiple successful collaborations with industry partners involved in medical biotechnology and pharma-related activities. These include the Centres for Cancer, Healthier Lives, Rare Disease, and Transformative Neuroscience. Nevertheless, there are extensive areas of IB not covered by these NUCoREs.

It is essential that the new IB NUCoRE is synergistic with NUCoREs engaged in medical biotechnology and this can happen in several ways. For example, there are multiple scientific disciplines that cut across medical and non-medical biotechnology, including enzymes, protein engineering, bioimaging, high-throughput screening, molecular probes, AI, bio-informatics and metagenomics. It is important that coordination of funding, training, facilities and expertise is shared between medical and non-medical NUCoREs. It will also be important to share best practice and training provision in developing and managing relationships with industrial partners and help coordinate the activities and support of business development PS teams across medical and non-medical IB.

Who will make up the senior leadership team?

We propose a management team representing the three faculties: William Willats and Paul Race (SaGE); Penny Lovat and Liz Lowe (FMS); Ben Bridgens and Jane Scott (HaSS); Ana Morales Garcia (P&G). An advisory board will also be established and will include representatives from industry and academia. The composition of the advisory board will be decided in discussion with stakeholders once the NUCoRE is established.

5. How?*Indicative 300 words***What workpackages or sub-themes/groupings might make up the NUCoRE?**

Sub-themes would include, but not be limited to: industrial enzymes; protein engineering; natural products, bio-refining, bio-energy; crop protection and engineering; agrotechnology; biomaterials and architecture; consumer behaviour; skin and oral care; data science; computing; AI; machine learning; social science. This proposed NUCoRE will also include research into the commercial, ethical, and societal implications of IB.

Specific workpackages tasks and projects that the NUCoRE will drive, and be involved in will be developed in discussion with internal, and external members but will include: developing applications for external funding especially larger hubs; streamlining the commercialisation of assets (facilities, expertise, outstations, fee for service work etc); reviewing how the NUCoRE can best contribute to research led teaching.

What external grants and contracts and/or philanthropic donations can be leveraged by the NUCoRE?

The proposed NUCoRE is closely aligned with the priorities of major UK funding bodies including UKRI and its constituent councils, especially the BBSRC and EPSRC. Some of the specific funding opportunities and themes the NUCoRE will target include: Building a green future; Innovation to Commercialisation of University Research (ICURE); Artificial intelligence in bioscience; Advanced Manufacturing and Clean Growth. We will also be active in developing funding around Innovate UK, KTPs, and Leverhulme, as well as engaging with our alumni for philanthropic donations.

What thematic doctoral training programmes will align with the NUCoRE mission and how will these be funded?

The BISCOP (Bioscience for Sustainable Consumer Products) CTP is already established and is highly relevant to the proposed NUCoRE. BISCOP is led by P&G but NU is a founding partner and Prof. Willats is the NU BISCOP lead. The last cohort of BISCOP students are being recruited in October 2024, but given the success of BISCOP it is highly likely that the partners (including P&G) will apply for a renewal under the new IDLA scheme that will replace CTPs. Initial discussions have already begun with P&G and the BBSRC.

What research-led teaching will be developed from the NUCoRE? How will the sustainability of the NUCoRE be enhanced through research-led teaching?

The proposed NUCoRE has an important role to play in developing research led-teaching. We are able to 'hit the ground running' since the MSc programme 'industrial and Commercial Biotechnology' (ICB) is already well established and popular with overseas students. This programme includes a site visit to the P&G Newcastle Innovation Centre and lectures from P&G researchers. This direct contact with industry is highly appreciated by students and we have already begun to ways to extend it. For example, the ICB research projects will now be more industry-focused and be informed by P&G problems. We are convinced that this model can be applied to other UG and PG courses and the NUCoRE will be central to developing this. To ensure that the ICB MSc is as competitive as possible, we will work with marketing to conduct market research into student and employer needs and also carefully examine our competitors (Bristol and Strathclyde primarily) offerings in this space. Moreover, we will work with marketing and the international office to ensure that this MSc is effectively promoted and sufficiently visible, especially internationally. The 'Entrepreneurship, Innovation and Sustainability' MSc is also highly relevant to the NUCoRE and there are also exciting possibilities around our PhD offering, especially to employees of industry partners. Discussions will continue with Phil Lord (Dean for Postgraduate Studies, SAgE) about the delivery and value of PhDs by prior practice and part time PhDs.

Responding to partnering and funding opportunities

We envisage the NUCoRE will work closely with the Research Funding Development Team (RFDT) and Business Development Managers (BDMs). Currently, it is difficult for BDMs to connect with the most relevant researchers and groups once funding opportunities have been identified by the RFDMs. The main reason for this is that researchers and groups in biotechnology (and indeed in other fields) are physically and administratively dispersed across the University. The NUCoRE will act as a connecting hub between the RFDTs, BDMs, Industry and researchers – facilitating a more proactive response to partnering and funding opportunities.

Entrepreneurship

IB is field with high potential for entrepreneurship and of the 37 active Newcastle University spin outs, most are related to IB or the interface between IB and medical technology. The proposed NUCoRE can play an important role in developing entrepreneurship and will work closely with the Company Creation team. Workshops will be held giving an opportunity for NUCoRE members to meet the founders of successful spin outs and the Company Creation team - providing the inspiration and knowhow needed to commercialise ideas and potential products and services.

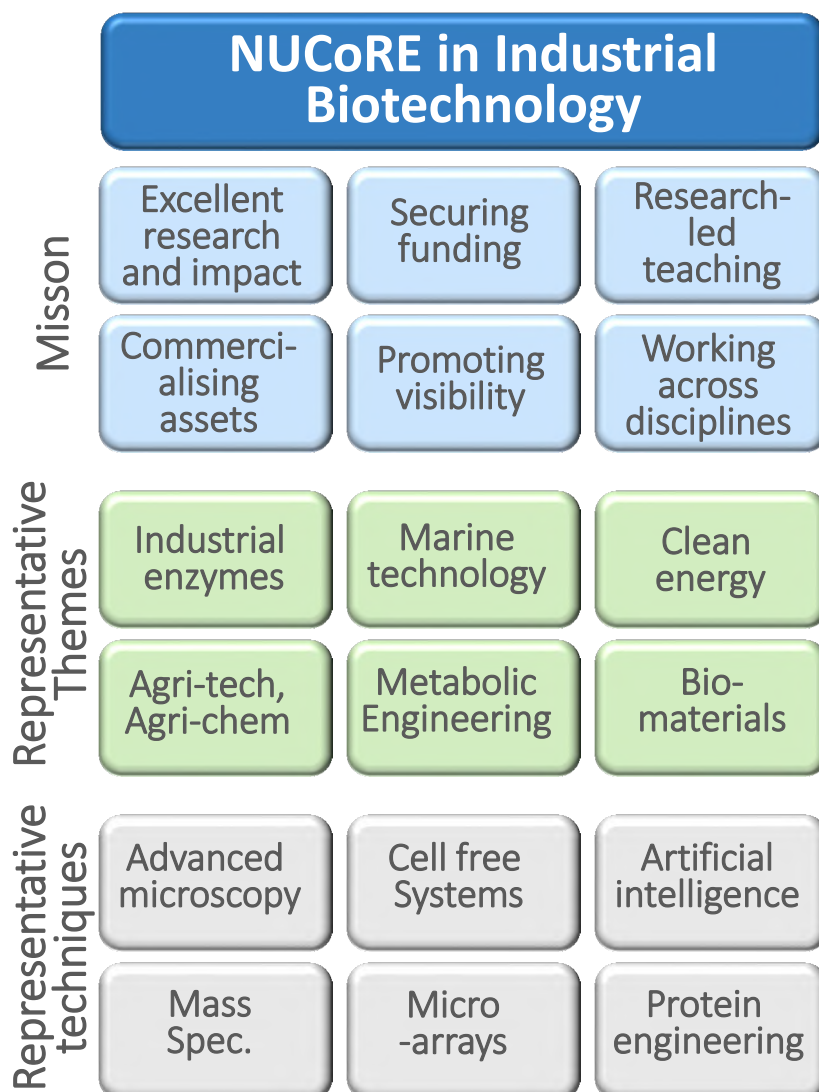


Figure 1. Schematic overview of the proposed NUCoRE in Industrial Biotechnology. Please note that the 'Themes' and Techniques' are intended as indicative examples, not an exhaustive list.

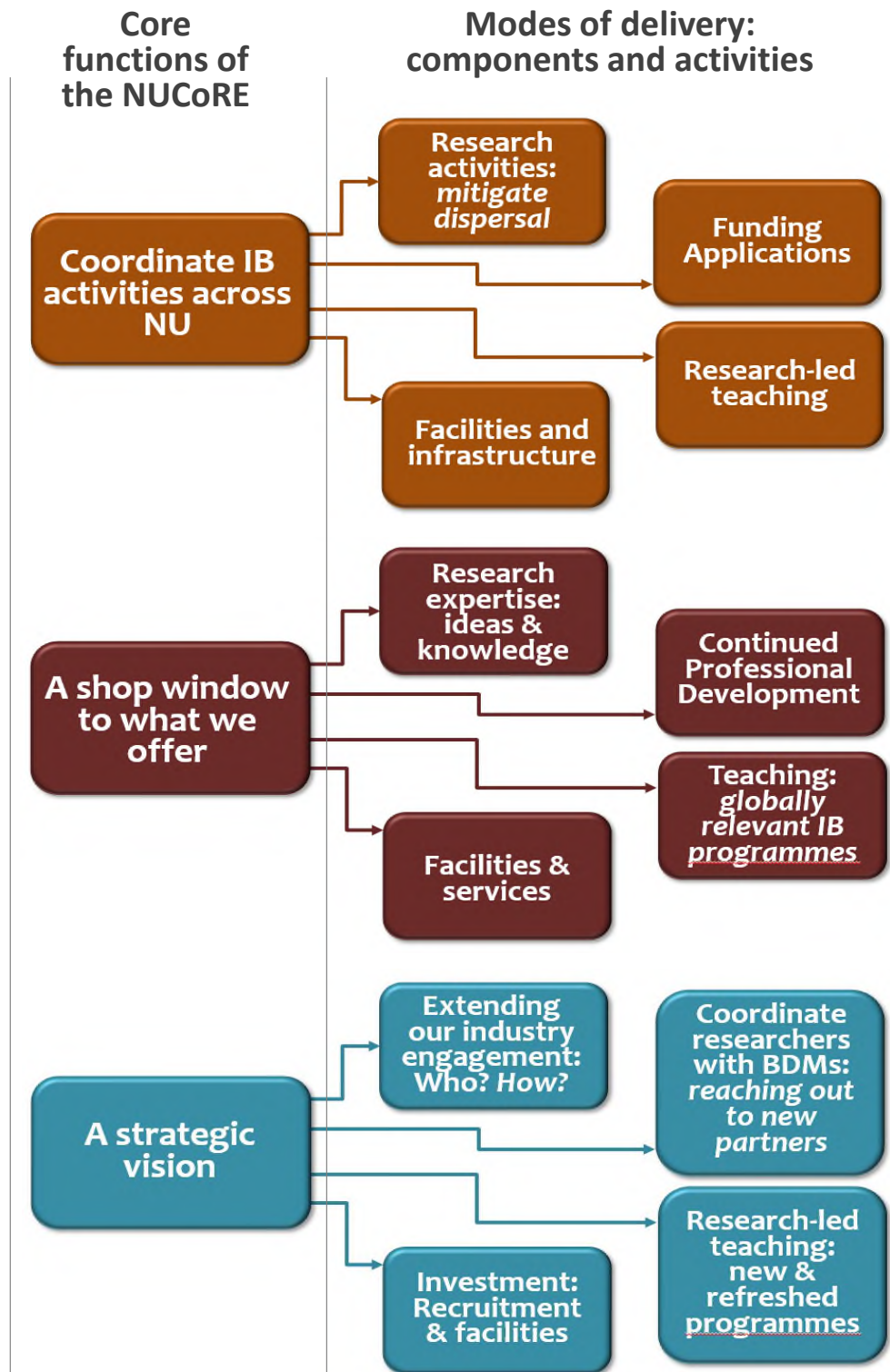


Figure 2. Schematic overview of the core functions of the proposed NUCoRE and how they link to components and activities

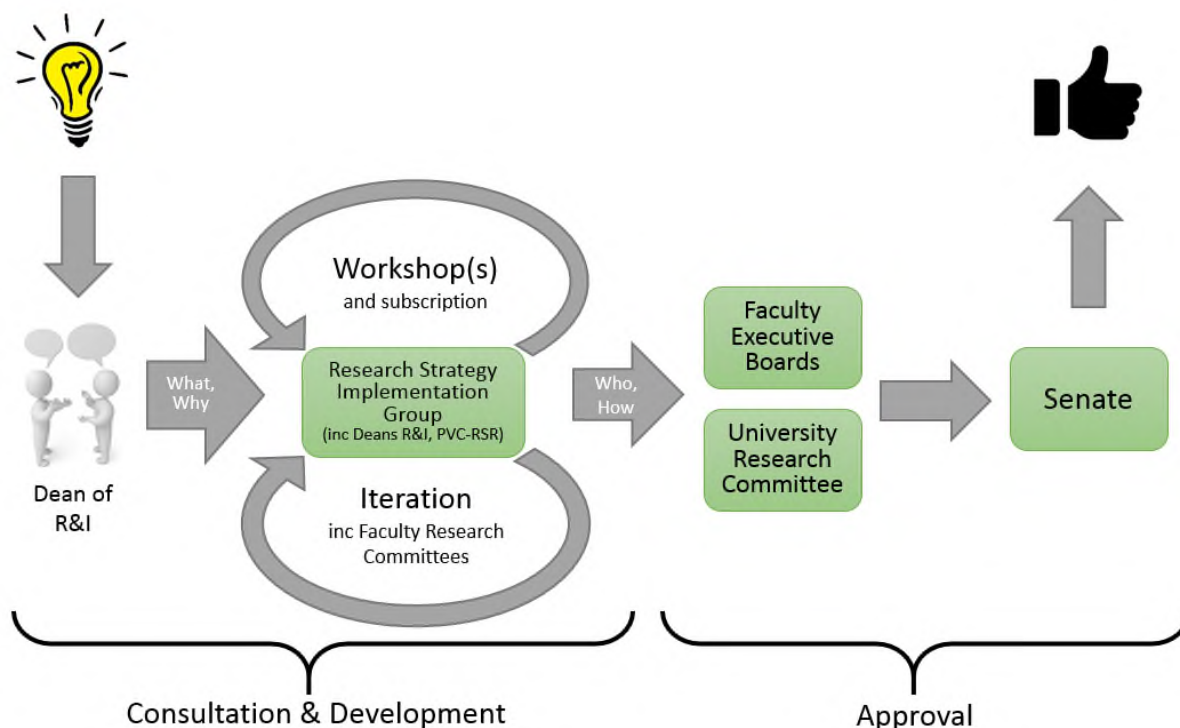
Appendix Bi - NUCoRE Guidance

NUCoREs will typically:

- be a collective of research investigators (~15-30 academic leads) with a clarity of vision (a research mission) to be delivered through identified work packages or themes across a 5-year period.
- be built on a foundation of collective research excellence and support a diverse team membership (including external partners) representing the spectrum of career stages and capturing a strong element of interdisciplinarity.
- aspire to become a visibly world-leading research centre and to leverage strategic partnerships with one or more key external stakeholders (e.g. external funding bodies, industrial partners, regional businesses, the NHS, local government etc) so as to achieve sustainability.
- promote an ethos of excellent research-led teaching at UG and PG level.
- create nurturing environments and mentorship processes that promote career advancement and reward contributions to research excellence for all NUCoRE staff and students.

See Appendix A for more details.

NUCoRE Process



The process for forming a NUCoRE is split into two parts:

1. Consultation and Development
2. Approval

Appendix A - Newcastle University Centres of Research Excellence (NUCoREs)

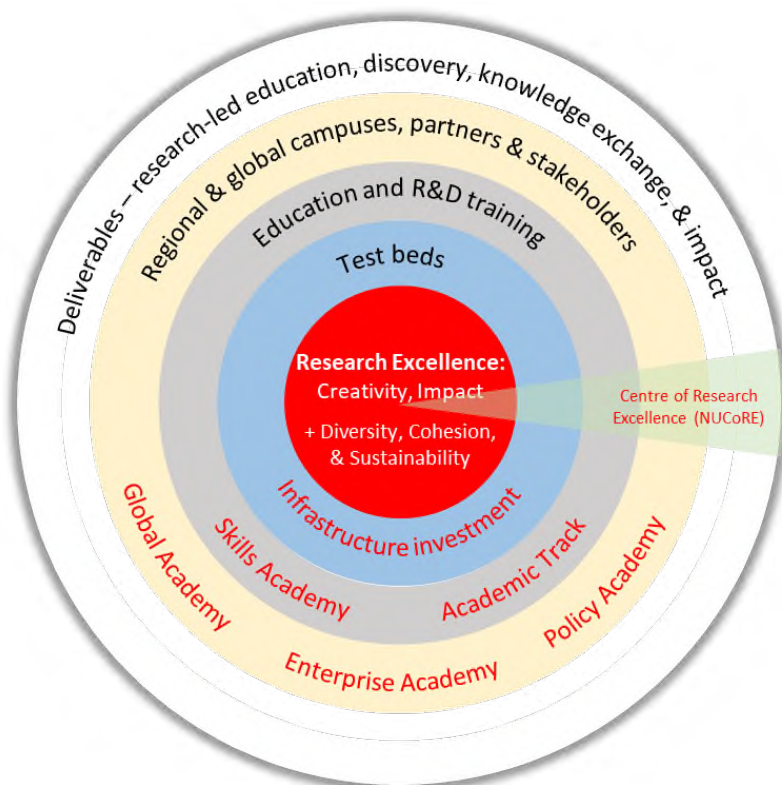


Figure 1: NUCoREs in the context of the University Research Strategy

Purpose To meet our strategic aims by enhancing the outcomes from Newcastle University research, providing an optimal environment to engage and train people in research, create added value by bringing together a critical mass and diversity of disciplines and external partners, and provide a framework for prioritising our strategic research investments

Aims In 2017, Newcastle University had 37 University Research Centres, 13 Research Institutes and numerous research groups, clusters, networks and initiatives.

Launching NUCoREs will consolidate our research assets around coherent research domains to avoid duplication, enhance critical mass, prioritise investments in research, and provide a narrative for our research activity that is understood inside and outside the University. There is no target number for NUCoREs but it is unlikely that there will be more than 20 across the University in the first phase.

As indicated in Figure 1, NUCoREs will have research excellence at their core, will encompass the diversity in their membership that is needed to deliver their strategic goals, and will explicitly align with the distinctive characteristics of the University's research. NUCoREs will usually include in their strategy the use of real-world test beds, support for life-long education, and engagement as an anchor institution in the region and with external partners. They will also contribute, together with

Schools and Institutes, to the fostering of new areas of research within their core mission.

Alignment with guiding principles

Visibly leading: NUCoREs will not only describe current research excellence, but will co-produce a vision for a coherent research mission over the next 5 years. They will achieve a national and international brand.

Working together: NUCoREs will corral resources from all necessary disciplines across the institution to address major challenges. They will provide a venue for sustained collaboration with external partners, and a contact point for affiliated researchers based in London, Singapore and Malaysia.

Freedom & opportunity: NUCoREs will provide a venue for all staff and research-active students to join in an important collective research programme.

Responding to challenges: NUCoREs will be tasked with setting an agenda for external partnerships and for research-led teaching and training.

Implementation

NUCoREs will be developed by iterative engagement between researchers and with support from University Research Committee (URC) and approval by Senate. They will be reviewed formally every 3 years by URC in an iterative process, to include face-to-face discussion, and informally at least annually. By default, NUCoREs will close after 5 years unless actively renewed.

Existing research centres, institutes and other groupings may be identified as NUCoREs and/or consolidate to form NUCoREs. It is anticipated that NUCoREs will draw in staff and research-active students who are not currently affiliated with a University Research Centre.

Within 3 years, a portfolio of NUCoREs will have replaced the existing University Research Centres. NUCoREs may host sub-Centres in the interests of maintaining brand identity, progressing a distinct programme within the over-arching domain of the NUCoRE, or managing a substantial strategic funding award. Creation or incorporation of sub-Centres will be subject to agreement with University Research Committee.

Governance

NUCoREs will be hosted within Faculties rather than Schools to facilitate cross-institutional reach while retaining unambiguous access to Faculty-based support services.

A Director or Co-Directors will be appointed with responsibility for academic leadership, to be supported by their Faculty and/or School professional service team. The internal governance of a NUCoRE will usually include a strategic management group and external advisory board.

Principal Investigators will subscribe time (reflected in their work allocation model if appropriate) to participate in NUCoREs. Line management, provision of facilities and monitoring of PGRs will remain within the host Academic Unit. An individual investigator may be a member of multiple NUCoREs but one of these should be primary and the others as an affiliate member.

Resource implications

The strategy set by NUCoREs and its endorsement by URC and Senate will provide a powerful indicator of priorities for strategic investment in research facilities, staff (eg through NUAct) and educational programmes.




Strategic investments in research activity will be recommended by URC in negotiation with the Faculties; these will be focused on appropriate infrastructural, HEIF allocation and set-up funds to enable NUCoREs to fulfil their role in bringing researchers and partners together and to leverage external funding; University funding will not be intended to enable NUCoREs to hold internal sub-funding competitions.

NUCoREs will be required to demonstrate financial sustainability through research income and provision of services internally and externally if appropriate. Trickle down of FEC and overhead income to NUCoREs will be consistent with policy in the host Faculty.

**Strategic
outcomes**

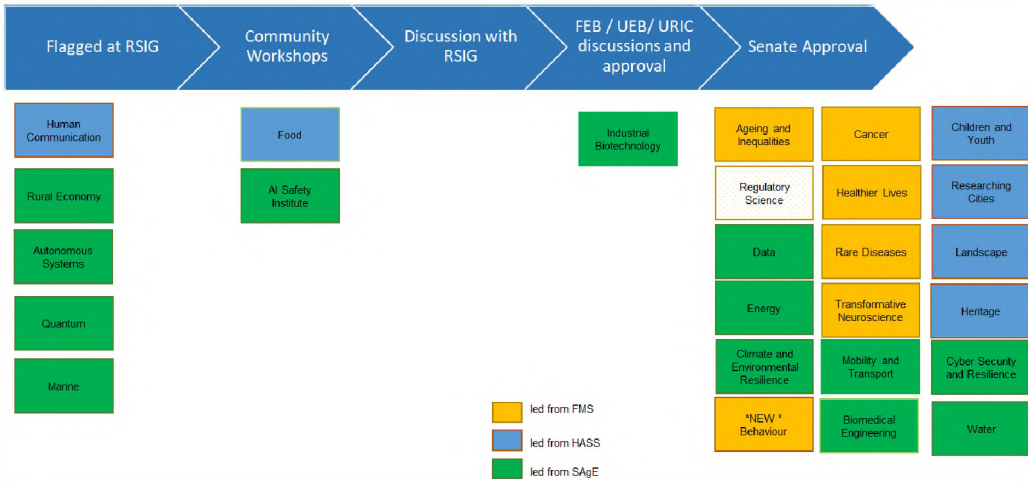
By hothousing research excellence and constructing teams capable of addressing major challenges, NUCoREs will leverage additional grants and contracts to contribute to increased research intensity, increase the proportion of high quality outputs and the talent pipeline of independent researchers to increase research power, and improve external collaboration and impact.

FOR COMPLETION BY MEMBERS OF THE RESEARCH STRATEGY IMPLEMENTATION GROUP

<p>The URC Research Strategy Implementation Group will assess the strengths of the proposed NUCoRE by indicating whether the proposal satisfies criteria via a traffic-light scoring system where: Green = Demonstrated Amber = Partially demonstrated, but requires further development Red = Not likely to be demonstrated</p>			
Criteria			
[1] The NUCoRE has articulated a clear and forward-looking research mission.			
<i>Explain score here</i>			
[2] This NUCoRE will consolidate and build on existing research strengths and assets at Newcastle.			
<i>Explain score here</i>			
[3] This NUCoRE reaches across disciplines and Faculties.			
<i>Explain score here</i>			
[4] This NUCoRE has a distinctive competitive advantage in this domain both nationally and internationally, and has potential to leverage strategic partnerships with one or more key external stakeholders (e.g. external funding bodies, industrial partners, regional businesses, the NHS, local government etc), so as to achieve sustainability.			
<i>Explain score here</i>			
[5] This NUCoRE will create and sustain a nurturing and collaborative research environment.			
<i>Explain score here</i>			
[6] The NUCoRE will promote an ethos of excellent research-led teaching at UG and PG level.			
<i>Explain score here</i>			

Appendix Bii – Guidance: NUCoRE Governance (January 2025)

NUCoRE Governance



New ideas? Internal guidance on developing NUCoREs: [Research and Innovation - Newcastle University Centres of Research Excellence \(NUCoREs\)](#)

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