

2022 – 2027
Strategic Plan consultation

Discussion Paper Three
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Evolving the UCL Grand Challenges

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Introduction

The UCL community has begun discussing the *Vision, Mission and Values* and *UCL Now* papers. This has led to important reflections on our current strengths, weaknesses, opportunities and threats, and on the kind of institution that we would like to be.

One of the concerns that has emerged strongly in the first phase of the consultation is the notion that there are some issues that are so profound – such as the climate crisis – that they will (and should) shape everything we do. Such issues represent challenges of pressing importance for our world that define our age. Our research can potentially have huge impact on these challenges, which at the same time have fundamental implications for our pedagogy and students, and deeply affect our internal operations and staff.

This paper proposes to draw together our response to such external crises in a single programme that works across research, education and operations for the benefit of our local community, the UK, and communities throughout the world. This approach will build on the cross-disciplinary success of the UCL Grand Challenges¹ and align with our values, particularly rigour and innovation, set out in *Vision, Mission & Values*. It will build on existing areas of research excellence, evolved and refreshed with an ambition and urgency that reflects the importance ascribed to the challenges in consultation feedback. And it will be complementary to the academic polycentricity highlighted in *UCL Now*.

This paper, and the next in the series, present proposals that will require investment. Some of the proposals will require new operational (ongoing) expenditure, and some will require capital investment (for example, in buildings) that must

be repaid over time. It is likely that many of the proposals will also generate income of various kinds to offset this investment. While financial decisions should not be the basis for establishing academic priorities, they will constrain our choices and we must acknowledge this. In each paper we will attempt to give a sense of the relative costs of each candidate area for investment. We acknowledge that our ability to undertake any investment in the UCL Strategic Plan 2022-2027 will depend on our overall financial performance and any external financial pressures (or benefits). We will also indicate (in the *Enablers* paper due to be released later in Phase 2) where there might be the potential for any cost savings, which would then increase the amount available for investment in any academic choices we make.

1 <https://www.ucl.ac.uk/grand-challenges/>

What are the urgent global challenges?

Humanity is facing major global challenges that are transnational in nature and cross-institutional in solution. These will require us to work across disciplines, institutions and sectors in ways that go beyond what we have achieved so far. There may be disagreement on the overall number and precise characterisation of such challenges, but there can be little dispute that people and planet face major challenges whose solution remains elusive.

Here we are particularly concerned with those challenges that have implications for the future, that will shape the lives of our staff and students, and that can be positively impacted by our fundamental and applied research and by the leadership of our staff and graduates. In these areas UCL can develop a distinctive approach to effect change.

We propose that we identify a small number of key thematic areas of pressing importance – challenges that matter for London, for the UK, for the wider world and for UCL itself. In those areas, we will draw together our activity across health, education, research and professional services operations, creating new structures and processes in a novel and extraordinary effort to create change. Candidate areas should:

- demonstrate consensus on the significance of the problem and the need to tackle it
- be of deep and lasting relevance to our students, their education and their future
- build on significant existing capability at UCL in fundamental and translational knowledge, expertise and practice

- require academic contributions from multiple disciplines at UCL
- have profound implications for our own operations as a university
- require working with communities and stakeholders beyond the university, and taking account of our location in one of the world's great global cities
- require additional interventions and actions to better harness and coordinate expertise across UCL which would not be possible otherwise.

Against these criteria we propose four candidate challenges for consideration – climate crisis, data-enabled societies, living well and mental wellbeing, and inequality. We will also propose a mechanism for starting to address these complex challenges. Integrating previous 'Grand Challenge' work, this will allow us to draw our own work together – across our research and innovation, education, and operations – and to engage productively with communities beyond the university. New operational structures will be required to enable such ambitious pan-UCL coordination. And it will require us to engage dynamically and coherently with the needs and capabilities of our external stakeholders and partners.

Success will not only ensure we are recognised as a 'go-to' place for expertise, collaboration, and solutions to each global challenge, but will also develop UCL graduates equipped to tackle the world's challenges; and a university community with its operations transformed by our own academic expertise.

Candidate challenge areas for discussion

Climate crisis

The climate crisis is the most significant challenge currently facing the world, with consequences including rises in temperatures (including increased heatwaves), intense wildfires, frequent and prolonged droughts, intensified air pollution, rising sea levels and flooding, intensified winter storms, and tropical cyclones and monsoons.

These are associated with global loss of biodiversity, food and water insecurity, displacement of populations and significant effects on human health. The crisis also raises concerns around social justice, with impacts disproportionately felt in the global south and adaptation strategies potentially placing a further heavy burden on people with low incomes.

In our academic work, UCL has a critical mass of expertise in relevant problem-focused groupings and programmes. In some areas we have pioneered distinctive new approaches to the challenge of the climate crisis. The Grand Challenge of Global Health, for example, initiated the work that led to the highly influential 2015 *Lancet* Commission, which mapped out the impacts of climate change and the policy responses necessary to ensure the highest attainable standards of health for populations worldwide.

The impact of climate change is now recognised as a major factor in many health challenges, and its mitigation would deliver many health co-benefits. Our comprehensive nature also allows us to harness the potential of cognate disciplines. For example, arts and humanities has a potentially crucial role to play in encouraging critical reflection on social, cultural and moral norms that may separate different communities and distance us from the effects of our actions; justice and ethics, human-centred design and the power of storytelling are all important in a collective response to the climate crisis.

Despite our individual strengths, our collective expertise is fragmented across UCL and not yet projected externally as a coherent and aligned whole. Our climate capability is thus significant, but it currently takes the form of many small or medium-sized activities which are not well aligned or integrated. Nodes of activity tend to reside within, rather than across, faculties. For example, to an external observer (or, increasingly, colleagues at UCL) it can be difficult to understand the different roles of the UCL Climate Hub, the UCL Environment Domain, the Climate Action Unit, the UCL Grand Challenge of Global Health, the UCL-Lancet Countdown on Health and Climate Change, UCL Sustainability and many others. All are doing excellent and necessary work, but polycentricity of presentation (see *UCL Now*) may be significantly impairing our overall impact and influence.

As future custodians of the planet, our students have a valuable role in informing both our academic inquiry and our practice as an organisation. However, current opportunities for them to either learn about solutions to this planetary crisis or contribute to its resolution during their time at UCL are limited. Although potentially any degree at UCL can contribute, there are in fact only 41 sustainability specific modules (out of 5,779) in the UCL Module Catalogue. These are taken by a tiny proportion of our students. Just 517 students (out of 48,168 in 19/20) completed the Sustainability Moodle Induction Course and 1,274 completed the Green UCL Introductory Module in the Introductory Programme. There is thus a significant opportunity to consider how UCL's curriculum could better embed learning about the crisis, as well as mitigation, adaptation, and resilience; and how a much larger number of students could be better involved in research-based or other activities to address aspects of climate change.

Our opportunity for education extends outside the university. For example, our Centre for Holocaust Education is the world leader for research-informed teacher and student education. We could employ

a similar philanthropically funded model to deliver Climate Change Education and provide research-informed teacher development for all teachers of *all* disciplines (including primary and secondary). Through the UCL Institute of Education, this could address all levels of experience in the UK, from Initial Teacher Education through to senior leadership, with some particularly targeted to support school sustainability leads.

Our UCL community is, and will continue to be, profoundly affected by the changing climate. We are at the forefront of our sector in our attempts to achieve long-term sustainability. Institutionally our goal is to have net zero carbon buildings by 2024, and to be a net zero carbon institution by 2030². We have consistently invested in new buildings that meet demanding energy-efficiency standards – for example, our Student Centre is UCL's first BREEAM Outstanding building, a level that represents performance equivalent to less than 1% of UK new non-domestic buildings.

However, we also have a significant repairs backlog, now conservatively estimated at £600 million, a figure which does not account for the adaptations that will be necessary to cope with a changing climate. Our net zero target applies to the carbon produced directly from UCL's energy use and the carbon indirectly related to organisational travel, waste, water and products and materials that UCL purchases. This is currently a carbon dioxide equivalent of 432,276 tonnes, and so is a major challenge.

To make progress with our Zero Carbon Plan will require coordinated action from across UCL; with key areas delivered by UCL departments across Procurement, Finance, Information Services, Estates Development and Estates Operations and Planning as well as UCL Faculties and Sustainable UCL. UCL has recently issued a Sustainability Bond which is guided by a Sustainability Finance Framework. The £300 million that has been raised will be invested within the parameters of the green and social bond which includes green buildings, energy efficiency and renewable energy projects and will support the implementation of the Zero Carbon Plan.

We currently miss the opportunity to accelerate this work because we do not make full use of our academic expertise to benefit our operations. Nor do we use our operational delivery to augment how we deliver research and innovation. Delivering the Zero Carbon Plan will be a complex undertaking, using data and insights to drive culture change, smarter operation and use of existing assets,

investing in zero carbon infrastructure and finally offsetting. There is a significant opportunity to embed and focus UCL's research capability in this plan, developing UCL's approach to working with stakeholders and integrating student education and student leadership through the Student Sustainability Council³.

We are, therefore, not as high-profile, influential, and impactful as we should be in responding to the crisis, and not as integrated across research, education and operations, as we could be. Perhaps no university is better placed to respond, and our ambition is to be the university most likely to be asked to do so. Harnessing our excellence and our comprehensive nature would enable us to develop a more holistic approach to the systemic societal and economic changes that will be needed, including consideration of resource consumption, waste, urban pollution, the built environment, biodiversity, health, and diet. By focusing UCL's excellence we will build not just planetary and societal resilience but also contribute to our own institution.

² UCL Sustainability Strategy <https://www.ucl.ac.uk/sustainable/sustainability-ucl/change-possible-strategy-sustainable-ucl-2019-2024>

³ The Student Sustainability Council aims to ensure that the projects and policies run by Sustainable UCL and the Student Union have a meaningful positive impact on people and planet from a student perspective.

Candidate challenge areas for discussion

Inequality

Inequality, between people and places, presents a major problem in London, the UK and globally. Inequality is a critical determinant of life chances and education, health, employment, and other outcomes. Socially excluded people (including those experiencing homelessness, addiction or imprisonment; migrants; and sex workers) are particularly vulnerable to the consequences of inequality.

Collectively, our academic expertise represents the potential for an unrivalled multifaceted and multidimensional approach to reducing inequalities: from educational and health outcomes and their social determinants to building inclusive prosperity, reducing spatial inequalities, understanding individual characteristics, driving institutional and structural change – and much more besides. For example, UCL is home to the UCL Institute of Health Equity, which has a global remit to ensure population health is improved and health inequities are reduced within and between countries through action on the social determinants of health. Our physical and mental health is shaped by a confluence of factors, including the food we eat, the air we breathe, the work we do, the places we live, the taxes we pay and the people we know. In the UK and globally, we face a growing and ageing population with multiple morbidities and more years spent in ill health, a rise in obesity and sedentary behaviour, and emerging and resistant infectious diseases. Major health inequalities, defined as “unfair and avoidable differences in both physical and mental health across the population”⁴, are well entrenched. Despite overall increases in life expectancy, there is still a 19 year-gap in healthy life expectancy between the most and least

deprived areas of England⁵, well recognised by the Government’s Levelling Up agenda.

The COVID-19 pandemic has exposed and exacerbated inequalities within the UK and globally. The existence of inequalities is well understood and UCL has developed a range of insights into how they might be addressed. The 2018 London Health Inequalities Strategy⁶ calls for an interdisciplinary approach to tackling the challenges we face, in partnership with academics, government and our public health partners. UCL also has powerful allies and a research presence in key London Local Authorities that have the most extreme health inequalities, including Camden, Tower Hamlets and Newham (particularly important for UCL East), and our approach should fully embrace the concept of ‘partnership for change’. Further afield, this approach is reflected in external collaborations with Bradford City Council, work in Brighton and Hove, and a developing strategic partnership with the University of Lincoln, with interventions developed that could be generalisable throughout the UK.

Tackling inequalities can also provide a powerful and purposeful framing to, for example, developing more participatory approaches in our research (particularly in our home and neighbouring London Boroughs); developing and integrating strategic partnerships; widening participation and improving attainment levels in our education; and addressing our institutional structures, policies and practices that exacerbate inequalities at UCL. Such partnerships need us to be responsive to the needs of local community and stakeholders, rather than solely reflecting the academic goals of our university.

However, although our academic expertise is unrivalled and our positive impact is profound, as with our climate crisis work, this should be better recognised both externally and internally. We do not integrate optimally across research, education and operations to create and deliver interventions that

4 NHS England. Definition of Health Inequalities, <https://www.england.nhs.uk/tphimenu/definitions-for-health-inequalities/>, accessed 12th July 2021

5 Office of National Statistics, 22 March 2021, [Health state life expectancies by national deprivation deciles, England: 2017 to 2019](https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/inequalitiesanddiversity/articles/healthstatelifeexpectanciesbynationaldeprivationdecilesengland2017to2019/2017to2019), accessed 12th July 2021

6 <https://www.london.gov.uk/what-we-do/health/health-inequalities/london-health-inequalities-strategy>

matter, and we have a fragmented and polycentric external profile that makes it hard for policymakers and others to recognise our contribution in this area and perhaps even to identify our experts (experts) with whom they should be talking.

While we deliver heavy-hitting interventions from individual research areas, the current lack of coordination means that we fail to adopt a truly systemic approach to addressing the complex factors that drive inequality and to understanding the risk of unintended consequences of interventions. There is therefore an opportunity to build on our strengths to amplify UCL's contribution to addressing the multiple causes and consequences of inequalities. We should also acknowledge where we, as an institution, create or contribute to inequality and take steps to address this.

One of the foundational approaches we take as an institution to address inequality is to ensure our intake better reflects the UK population in its diversity. Our current Office for Student Access and Participation Plan sets out stretch targets that have led us to invest strongly in an evidence-led approach. It is likely there will be new scrutiny of this approach by the Office for Students, which has indicated a renewed emphasis on access and social mobility. While our approach to date has been successful, we are now seeing signs of a plateau in diversity in some areas, pointing to the need for more radical action to meet our goals. Moreover, important inequality factors such as access to social capital persist while students are at UCL and this may contribute to a multiplicity of unacceptable outcomes, including the awarding gap for BAME students. We have world-leading academic expertise in many areas relevant to this challenge, including within the UCL Institute of Education, but this is arguably not as well integrated with our pedagogical approach or operational response as it could be. An institutional thematic focus on inequality could thus marshal our existing efforts in a way that we have not done previously, augmenting, and aligning them with research, health and innovation agendas as well as pedagogy.

Inequalities are also something we experience as an academic community. We should seek to be a radically more diverse and inclusive community, in which all staff and students are treated with respect. We recognise the importance to our increasingly ethnically diverse student body of being taught by academics with whom they can identify and who

can serve as role models. The value we place on equality, diversity and inclusion will underpin and inform all aspects of our work. We should strive always to appoint, promote and reward on merit, aptitude and track record, seeking to transform structural inequalities and resist systemic bias. Key goals for our operations should include eradication of the gender pay gap and employment of a significantly more ethnically diverse and gender equal workforce at all levels and in all roles across all Departments. We want staff from different backgrounds and with differing identities, with caring responsibilities, and with disabilities to be included and accepted as individuals, able to thrive at work as fully equal members of our community.

Candidate challenge areas for discussion

Data-empowered societies

Rapid technological change is delivering societal progress, but also causing social disruption. New technologies – particularly those around artificial intelligence, data and social media – are affecting every aspect of society, from the conduct of democratic systems and social interactions to the nature of employment, monetary and health systems. Integrating technology into existing social, political, economic and cultural frameworks to improve the human condition is a crucial challenge for global society. Digital transformations are also increasingly important determinants of human health.

Conventional policy, regulatory, ethical and other processes have not kept pace with the rapidity of technological change, and traditional institutions face fundamental challenges. The consequences of how individuals and societies interact with, shape, and are influenced by technological change are poorly understood.

This is particularly acute for the development of data and algorithms, which affect almost every aspect of daily life, business and government. Design and governance choices are crucial to the impact of a data-empowered (rather than data-driven) society. These have the potential to concentrate power in the hands of a small number of individuals and organisations, but also to significantly empower currently marginalised individuals and groups. A data-empowered society will require a more collaborative, democratic and inclusive approach to the way that choices are made, as well as a much more 'data-savvy' population.

UCL's extensive technological and social sciences expertise offers a powerful opportunity to build new socio-technical research and educational capacity, and to develop collaborations which can ask new questions that others may be unwilling or unable to ask. Our aim should be to develop a more holistic vision of the ongoing digital revolution, which ensures improvement of the human condition is embedded in decision-making.

Our students will live in such a world and need to be equipped with the tools to navigate and shape it. We are increasingly developing modules and programmes in data science, AI and machine learning. We have the opportunity to align core modules on data and AI, as well as relevant provision for continuing professional development. This might include the critical and ethical use of new technologies, incorporating ethnographic and qualitative methods as well as quantitative approaches, and linking across education, digital humanities, the social sciences, engineering, architecture and computing to the life and medical sciences. We also have opportunities through our NIHR Biomedical Research Centre partners and the Global Business School for Health to educate healthcare leaders of the future; and, through the Institute of Education, the teachers of the future.

With 48,168 students and 13,696 staff (19/20 figures), UCL is increasingly a data-enabled community, both in terms of the institutional management of information, but also in the complexity of our research data and our work with data-intensive partners such as our NHS hospitals. Technology is transforming both the data available and the methods of gathering and analysing data – for example in social scientific and historical research – posing significant challenges for education, research, and IT resourcing. The availability of social media, administrative, and other sources of non-traditional, unstructured data is opening new vistas for research. Data and text mining, modelling and simulation, possibilities of data linkage, natural language processing, and the

use of AI are extending the scope of computational social science and the digital humanities. Our academic excellence in areas such as the use of technology in learning and teaching⁷; technological engagement⁸ across the Arts, Humanities and cultural heritage; and a profound interest in the role of design connecting engineering, architecture and the humanities could all contribute to creating a highly distinctive role for UCL.

In 2021 we created Advanced Research Computing as a central initiative to highlight and concentrate our hardware and software provision across the university, linking to existing initiatives such as the Data Safe Haven and planned initiatives such as the Social Science Data and Methods Laboratory. We are also a founding partner of the Alan Turing Institute. These assets, together with our strong community of software engineers, provide an opportunity to help create data-enabled societies. This extends to our own operations. For example, to address the “lack of diversity of voice, coupled with a lack of transparency of information” identified in *UCL Now*, we could choose to significantly increase the transparency of our institutional data and to revolutionise UCL’s collective decision-making using new information technologies.

7 For example, the UCL Knowledge Lab in the Institute of Education explores how we live and learn with technology and media to solve societal challenges

8 The UCL Centre for Digital Humanities, founded in 2010, brings together a vibrant network of people who teach and work in a wide range of disciplines

Candidate challenge areas for discussion

Mental wellbeing

Good mental health is not just the absence of illness or disorder, but positive wellbeing that leads to flourishing and resilience to adversity. Stigma has arguably led to the reluctance of societies to treat mental health problems with appropriate urgency and seriousness, resulting in poor mental health as a leading and costly cause of disability worldwide.

The pandemic has exacerbated this challenge and the mental health and wellbeing of groups already facing inequalities – women, younger people and those facing financial hardship – has suffered the most. Two-thirds of mental illness starts before the age 24, with mental disorders appropriately termed “the chronic diseases of the young”, casting the impact of the pandemic in a particularly stark light. But mental ill-health and mental wellbeing are not exclusively the preserve of the young and affect all ages, including many of our staff and students.

The solutions to mental health problems – both of prevention and treatment – are social, environmental and political. Integrated cross-disciplinary initiatives from the creative arts, the humanities, the social sciences and engineering are therefore highly relevant to addressing mental health and well being. Work at UCL shows that engaging social activities normally designated ‘leisure’, like art, drumming, singing and reading, provide relief from common mental disorders comparable to evidence-based professional therapies. Insights into deficits and distortion of human social understanding (the ‘embedded brain’) may as likely come from the study of literature and history as from neuroimaging and social development.

The impact of engaging with mental ill health also provides an opportunity to understand many of the major social problems facing our society. Focusing on the millions with serious mental illness and

addressing the breadth of their concerns puts us on a path to a more equitable, compassionate and inclusive society. This would link both to the values proposed in Vision, Mission & Values of care and respect, openness and inclusion; and to the proposed thematic area of Inequality described elsewhere in this paper. We know what recovery of mental health requires: our biggest task is putting it into practice. This is not achievable from within disciplinary boundaries, but entails a systematic and joined-up study of the individual, social and societal barriers to the provision of adequate living environments, supportive social relationships and the personal empowerment that a sense of agency provides. We should move beyond the study of the causes of illness and embrace cross-disciplinary inquiry into salutogenesis, the physical and social processes that generate health and wellbeing, not only to prevent unnecessary distress but also to provide adequate care to those already suffering.

Compared to other universities without such a strong tradition of inter- and cross-disciplinary work, UCL is uniquely placed to undertake this challenge. Our innovative neuroscience research, together with our strong population health expertise and our skills in advanced technologies such as machine learning, could be at the crux of these efforts. But focusing on these areas of strength is not enough. Although robust genetic, neuroscience and environmental epidemiological knowledge is important to provide the biological and social biographic markers predictive of future disease and to develop effective interventions, this knowledge needs to be integrated with that from social sciences, cultural studies, built environment and arts to achieve a holistic view of why mental ill health emerges and what we can do to promote wellbeing and prevent mental disorder. At the centre of this work is the need to address known disproportionalities and vulnerable populations; to focus on the development of preventative efforts that promote wellbeing; and to prioritise principles of inclusivity, stigma reduction, and human rights.

UCL research in mental health and wellbeing is already cross- and interdisciplinary, incorporating insights from many disciplines including anthropology (study of resilience in young people), architecture (role of built environment in promoting wellbeing) and law (impact of access to legal advice on mental wellbeing) with neuroscience and population health approaches. By adopting wellbeing as an cross-disciplinary theme, we could accelerate holistic work across different disciplines and faculties to drive a truly novel wellbeing and mental *health* science.

This will require conscious efforts to incentivise research and education across disciplinary silos. It will also require us to better communicate our standing and unique offering as a comprehensive cross-disciplinary university to the outside world – including the public and policy makers. We could invest in developing a clearer vision of what innovation in supporting mental health looks like. UCL's Centre for Behaviour Change is one example of how we can scale our understanding of human behaviour to national and international level. Translating our collective insights on wellbeing and the prevention of mental ill health could therefore create particular opportunities for UCL to deliver direct public benefit.

One area where we are already developing considerable leadership is prioritising student and staff mental health and wellbeing. During the pandemic we used our understanding of emotions and behaviour to focus on our students and staff and delivered great value despite the challenges. Future institutional strategies could now incorporate new ways to promote mental wellbeing based on our unparalleled strengths in mechanistic understanding of psychological function. Mental health literacy, cognitive skills, self-perception and values, self-management strategies, social skills, significant relationships and modification of attitudes to mental disorders are all central for promoting good mental health in asymptomatic young people who are at risk of developing mental health problems.

There are also examples of good practice in other institutions that we could consider adopting. For example, the Yale University course on the Science of Wellbeing provides an evidence-based model for integrating psychoeducation rooted in positive psychology with an effective course-credited academic programme addressing issues of expectations about happiness, overcoming fundamental biases, genuine generators of wellbeing etc. Introducing a programme like this

at UCL, but also incorporating our expertise in social determinants of poor mental health and contributions from colleagues engaged in research into pedagogy, social justice and built environment, would be one way to contribute substantially to mental health of students and staff at UCL.

UCL's current capabilities

UCL is particularly well equipped to deliver answers to such global challenges, both for the wider world and our community, because of our distinctive emphasis on cross-disciplinary research.

UCL was one of the first universities in the UK to recognise that solving complex global problems would require the synthesis of insights from across disciplines and began to explicitly address such 'grand challenges' in our 2008 Research Strategy. Investment in UCL Grand Challenges has primarily included awarding seed funding to projects, many of which have contributed to significant and enduring impacts such as the Global Disability Innovation Hub at UCL East, and stimulating the creation of novel cross-disciplinary institutes⁹. It has also seen success in commissioning impactful publications and reports¹⁰. The concept of 'grand challenges' has subsequently been taken up by research funders and agencies¹¹, charitable foundations¹² and national Governments¹³. Other universities have adopted 'grand challenges' as an organising principle, or to direct research or education programmes¹⁴.

Our existing UCL Grand Challenges – in Global Health, Sustainable Cities, Cultural Understanding, Human Wellbeing, Justice & Equality and Transformative Technology – will need to evolve with this new strategic initiative. Most of them align well with our proposed strategic areas, and so might be absorbed into the new initiatives. Similarly, the staff who support the current Grand

Challenges would naturally align with this new approach. A similar approach might in principle be taken with our research domain structures, which are heterogeneous in presentation and operation compared to the single delivery mechanism proposed here.

UCL has always believed in the value of practice and making to the advancement of critical thinking – for example, the Slade celebrates 150 years this academic year – as well as the intrinsic value of arts and humanities disciplines. As a comprehensive university committed to preserving and sustaining all its disciplines, UCL must continue to support subject areas and disciplines that are currently being undermined and/or reduced across the globe. To do otherwise would be to accept significant educational and intellectual inequalities, as well as an impoverishment of our comprehensiveness and a diminution of our ability to contribute to our Grand Challenges. The humanities are key to building skills in rhetoric, argument and investigation; contributing to cross-disciplinary and critical thinking; and thus helping to deliver a rounded UCL education. Disciplinary diversity also leads directly to social and cultural diversity. While focusing on our Grand Challenges, we must therefore be careful to also reaffirm the value of individual disciplines and the need to nurture their continuing excellence. We will also need to consider these issues when investing in disciplinary excellence (see the companion paper *Areas for Targeted Academic Investment*) and in our teaching and learning (to be addressed in the fourth companion paper *Education: Priorities and Programmes*, to be published later in Phase 2).

9 Examples include the Centre for Behaviour Change, Institute for Risk & Disaster Reduction, European Institute, and the Institute for Sustainable Resources.

10 [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(08\)60502-4/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(08)60502-4/fulltext)

11 See for example, Wellcome Leap, the Grand Challenges in Global Health launched by the Bill and Melinda Gates Foundation and other agencies; the DARPA grand challenge; and the first 'Grand Challenges' funding programmes launched by the then RCUK.

12 The Gates Foundation has now expanded its approach to the Global Grand Challenges initiatives

13 For example, Grand Challenges Canada, the UK Industrial Strategy Challenge Fund, and the UK Innovation Strategy's proposal of 'missions' to respond to national and global challenges

14 For example, Arizona State University has organised research units and academic centres around grand challenges; Popowitz and Dorgelo, Report on University Grand Challenges. (UCLA, 2018); Cambridge Grand Challenges; the University of Manchester's Ethical Grand Challenges or the University of Exeter's Grand Challenges week

The role of our (mega)city

Urbanisation and the mass movement of people to cities across the world are directly relevant to each of the candidate grand challenge areas. Over half of humanity now lives in cities, up from 30% in 1950, and this growth is accelerating. More than half of urban dwellers live in 1,022 cities with greater than 500,000 inhabitants.

There are currently 29 megacities – including London – with populations of over 10 million, up from two in 1950 and projected to grow to between 41 and 53 by 2030, mostly in the Global South. The need to build liveable cities that are just, sustainable, and healthy has never been greater.

UCL is one of only three global top ten universities located in a megacity. We have both a responsibility and an opportunity to mobilise our collective expertise across the institution to address the role of cities in the global Grand Challenges we are tackling. We have distinctive centres of academic excellence on cities and urban life embedded in all faculties across the university, and particularly concentrated in the Bartlett, Engineering, Maths and Physical Sciences, Social and Historical Studies, Arts and Humanities, Laws, and the Institute of Education. We also have initiatives such as our Cities Partnership Programme that have developed innovative, multidisciplinary research and teaching projects with partners in various global cities. We now have a dedicated team, the UCL London Office, driving our London-focused agenda and providing an accessible gateway to and from UCL, harnessing current London-wide collaborations and brokering new opportunities, while amplifying key partnerships with our local stakeholders. This reflects UCL's commitment at all levels to engage with our local

communities, policymakers, local government and other partners and supporters of UCL in London.

Connecting and strengthening this considerable and diverse urban expertise in a coordinated, cross-cutting fashion would boost our ability to develop solutions to the difficulties presented by each Grand Challenge, while simultaneously contributing more directly and impactfully to the many communities we serve here in London, across the UK, and around the world.

A common approach to delivery

Multidisciplinary work, based as it is around problems or themes, lacks the natural coherence of work within disciplines, which has the unifying language of shared methodologies or professional practice. It is almost inevitable that the impetus of so much work at UCL is towards the disciplinary or the professional; that the incentives built into our career structures and the logic of our organisational design favour the disciplinary or professional over the problem based or thematic.

To facilitate effective cross-disciplinary work, we need to pay attention to several factors. Any cross-disciplinary work needs charismatic and engaging leadership sufficiently comfortable in the language of several disciplines to be able to excite colleagues about the potential benefits of collaborating. Attention needs to be paid to the structure of cross-disciplinary projects so that the participants in a project have enough common language to be able to begin to work effectively together, and all participants have something to gain from such collaboration. Resources need to be allocated to cross-disciplinary work in a way that does not set up unhelpful competition or division between disciplinary and cross-disciplinary communities. This applies to labour, space and money. To keep their methodological or professional tools sharp, those participating in multidisciplinary work must have accountabilities to a disciplinary or professional community.

We will therefore need to develop appropriate mechanisms that go beyond facilitation of research collaborations. Moreover, ensuring a degree of consistency across our approach will help to build a

clear understanding of what we are doing and why, create overall coherence across the programme, and standardise evaluation and accountability. We should consider how each challenge relates to the other, as many of the ‘wicked’ problems facing the world in the 21st century will have solutions that require systemwide transformation.

We therefore propose six broad ‘underpinning’ elements of a common approach to delivery in each area of strategic challenge, that are aligned to the values (integrity & mutual accountability; openness and inclusion; care and respect; and rigour and innovation) expressed in our *Vision, Mission & Values* paper:

Academic leadership

The experience of UCL Grand Challenges to date shows that committed academic leadership is important to provide vision and credibility, build engagement and sustain momentum. For the development we propose, dedicated academic leadership will be even more necessary to link health, education, research and innovation. A model for this comes from our experience with UCL East, where a dedicated and independently appointed Academic Director of senior standing has worked effectively with colleagues in Faculties and Departments to define and shape a major cross-disciplinary development.

These Academic Director roles would – dependent on consultation – represent a substantial (0.5 – 1.0FTE) time commitment over a five-year term, and report to the Vice Provost for Faculties. They would provide credible collaborative academic leadership, drive coordination within and between areas, ensure effective monitoring and evaluation of progress achieved and be accountable for the outcomes.

Dedicated coordination and collaboration space

At one extreme, some universities have experimented with cross-disciplinary “hotels”, centres into which groups of researchers (though rarely teachers) move for fixed periods of time to work on particular problems, with the idea that they all move back to their home departments once the individual project on which they are working has finished. This model favours dynamism over the development of institutional expertise around a particular issue or set of issues. At the other extreme, some universities create, often with glamorous physical facilities, permanent homes for work in particular thematic areas, effectively creating new faculties or departments with a multi-disciplinary focus. Both models create not only opportunities but also challenges that are significant given our current size and shape.

While these may be potential future arrangements, we initially propose a more modest provision of a compact space in which the Academic Directors and secretariat could be based to facilitate communication, collaboration and alignment between each strategic area. It will also promote external visibility, openness and inclusion by establishing a single geographical point of contact for partners and stakeholders that nevertheless serves as a portal to a distributed whole-university activity. We propose that the space we create would not deliver specific academic activities or represent another polycentric centre or institute; rather, these would continue to be based in faculties and departments. This space will also facilitate the connections *between* each cross-disciplinary area that will be taken up in the next section, below.

A coherent and externally recognised UCL identity

While our research/innovation, education and operational activity will be at the core of each strategic challenge area, the effectiveness of each area in addressing major global challenges will in part depend on a coherent external perception that this is an area of focus for UCL. We have not satisfactorily achieved this to date in our cross-disciplinary work, where academic polycentricity has often resulted in a plethora of individually interesting but collectively incoherent external identities (for example, in our work on the climate crisis). Our engagement and facilitation of individual academics and their research groups in public

policy must continue; but there is a role for the leadership in each cross-disciplinary area of strategic challenge to also create a single coherent external identity for UCL’s work that underpins our relationships with key stakeholders.

An agile and cost-effective secretariat.

New structures for collaboration at UCL have historically often involved a multiplicative expansion of professional services staff whose duties involve supporting a domain, grand challenge or centre. Such support is vital but needs to be agile and cost-effective. We therefore propose that we establish a single secretariat shared across all thematic challenge activity and supporting the Academic Director(s), aligning, and integrating with existing Grand Challenge (and perhaps research domain) support. This should not result in any expansion of the overall cost envelope for Vice Provost and Vice President portfolios, ensuring that any new investment directed to this area benefits the academic activity that is at the core of each thematic challenge.

Affordable and time-limited investment in new academic activity.

These challenges will require significant investment over and above normal business-as-usual budgets, in initiatives that – with rigour and innovation – foster cross-disciplinary collaboration. This should not merely substitute for existing funding or activity, but demonstrably create additional activity; activity in education, health, research and innovation that would otherwise not have taken place. Investment will typically be embedded in faculty and departmental activity, which is the natural location for the majority of our research, education and innovation. It should therefore be channeled by academic leadership into faculties and departments in a coordinated and aligned fashion, rather than retained centrally.

The scale of such investment will depend on affordability as well as ambition. We will need to create sufficient surplus from our existing academic work to free up funding to invest in this new academic activity. This will also require us to work collectively to pool such investment across faculties, alongside existing reinvestment in continuing faculty academic work. We will need to be rigorous in establishing value for money from our investment, as with all our activities.

We suggest for consideration a figure of £1 million per candidate thematic area per year for an initial period of five years (i.e. £5 million commitment per candidate area). If affordability was constrained (to be discussed further in the forthcoming *UCL Size & Shape* paper) then we would need to consider whether to support fewer grand challenge areas at this level, or a greater number at a lesser level of investment. Alternatively, if we were able to identify a greater level of surplus for investment, we could invest more if that was affordable and felt to be needed.

knowledge'. Throughout their lives and careers, they will spread around the world the influence of our activities tackling 'grand challenges'.

Coordination of research and innovation, education and professional services

Perhaps most importantly, what we are proposing in this paper requires us as an institution to effect coordination not only between research, innovation, and education; but also with professional services. For example, if we choose a focus on the climate crisis, we would need the Academic Director of this area to assist in coordinating and aligning institutional progress to Net Zero with our Director of Sustainability, a professional services function; with research, working with our Vice Provost Research, Innovation and Global Engagement; and with education, working with our Vice Provost Education & Student Experience. Such an approach may require particular focus on how we coordinate professional services and academic leadership, emphasising the parity of esteem and values of care and respect set out in the *Vision, Mission & Values* paper, and drawing on existing leadership models in this area. For example, the partnership between the Sustainability Steering Committee and the Sustainability team has been aided by close partnership between the (academic) chair of the former and the (professional services) Director of the latter. Models for such leadership therefore exist and we should draw on them.

We propose that these six underpinning elements will create an institutional delivery programme for each area of thematic challenge. For example, this would embed 'thematic challenges' across the curriculum and ensure that every UCL student is given the opportunity to undertake research activity aimed at addressing aspects of them. This would reflect UCL's commitment to integrating education and research and to enabling students at all stages to participate in the creation of knowledge, so that they will understand working at the 'edge of

Connecting each grand challenge area

Existing economic structures, extractive systems and patterns of consumption are eroding ecological resilience and exceeding planetary limits. Yet the imperative for new economies and societies that value biodiversity and ecosystem health as foundational for human wellbeing leaves us with a host of challenges and opportunities centred on how we may best build alternative social and economic infrastructures in inclusive and sustainable ways.

Some of these challenges are addressed in our proposed candidate thematic areas; but the system-wide changes in our social and economic systems necessary to realise the solutions to these challenges will be interconnected. Moreover, impacts from the challenges will themselves relate to and interact with impacts from other candidate areas. And the mechanism we propose also highlights interactions and relations between education, research, innovation, health and professional services within UCL.

These connections therefore provide an academic imperative; for the academic leaders of these thematic area to work together, supported by the offices of the Vice Provosts and Vice Presidents, to coordinate their activity. Such a connection will start to make the sum of our cross-disciplinary work more than its individual parts, further enhancing our ability to deliver meaningful change in our society.

The duration and number of areas to focus on

If UCL is to operate effectively in these cross-disciplinary spaces, attention needs to be paid to the duration and number of multidisciplinary areas of focus.

The cross-disciplinary space should be inherently dynamic and enable UCL to respond to new problems as they emerge and as others become less pressing. But in tension with this necessary dynamism is the fact that it takes time for cross-disciplinary communities to develop and to build the kind of relational capital that makes effective cross-disciplinary working possible.

How time-limited these different structures become also affects the issue of how many areas of thematic work UCL can support at once, assuming that there is not an endless number of challenges, grand or otherwise, that an institution can tackle well at any given point.

We should also consider the long-term priorities of our governments in considering the selection of our thematic areas, how to progress each grand challenge and perhaps how to subsequently evaluate progress. For example, the 2021 Integrated Review¹⁵ describes the government's vision for the UK's role in the world over the next decade and the actions that will be taken to 2025. While such policy papers do not (and should not) constrain our scholarship and actions, they are relevant for understanding how and where our impact might align (or not) with national priorities.

We propose that we should evaluate chosen areas for investment every five years or so. The expectation would be that we either renew investment at that point, or transition into a 'sunset' period where new investment in the candidate area from the grand challenge programme is gradually wound down and replaced by normal faculty and departmental mechanisms. This will ensure that our investment in new activity is integrated into existing faculty and departmental portfolios, to ensure it continues even if the overarching thematic activity is discontinued. It will also ensure that our approach is agile and responsive not only to the success we have aligning research, educational and operational activity, but also to external events and circumstances.

¹⁵ <https://www.gov.uk/government/publications/global-britain-in-a-competitive-age-the-integrated-review-of-security-defence-development-and-for-foreign-policy>

Informing societal debates, disagreeing well, and the limits of ‘grand challenges’

Each of these cross-disciplinary areas represents a global challenge of major significance, and we can expect that the content of our cross-disciplinary approach will not only excite debate and provide new knowledge, but also provoke challenge and disagreement. For example, in the societal debates around the climate crisis and potential responses we can see a wide range of responses, ranging from constructive debate to destructive polarisation.

This situation creates a complex and sometimes contested space for a university to occupy. Our role in serving society requires active engagement in such debates but is also shaped and justified by our intellectual integrity and leadership.

As a university, UCL can explore this complexity by advancing thoughtful and rigorous debate and by developing and disseminating knowledge through research, external engagement and education. Such an approach not only advances academic freedom but also promotes the values of openness and inclusion. We can model how to value diversity of thought and engage different views on topics that are subject to polemics elsewhere – through generous, rigorous, and methodologically diverse intellectual exchanges, and by working with our diverse student community and leveraging our position in London as a multicultural, global city. We can create and cultivate epistemic space for knowledge and difference of all kinds to be seen and heard on their own terms; for scholarship that cuts across political and disciplinary divides; and for partnerships that can help to navigate national, cultural, or political barriers.

UCL can also contribute to the ethical issues that are intimately associated with many of the thematic areas identified here. For example, UCL held a Digital Ethics Forum in May 2019 funded by a Transformative Technology small grant award. The project team has since received EPSRC IAA funding to develop a series of workshops and produce a UCL Digital Ethics Strategy Report. Through the delivery mechanism proposed here, we could amplify such efforts and connect them to our pedagogy.

Addressing such complexity also means engaging with and informing the institutional actors and structures that affect UCL as a university. We should draw on our in-house academic, cultural, political, and regional expertise as we respond to and seek to influence external developments. This also includes seeking to inform research, education, or innovation policies, and retaining a leadership position in higher education as an institution.

We must also acknowledge the limits of our grand challenge activity. The thematic areas we have considered represent unprecedented areas of global challenge, where we all share an institutional interest but each of us also has a personal stake. Some of the solutions to areas we have considered – such as inequality – will rest in the political domain. Scholars might propose such solutions based on research and disciplinary expertise and excellence, but seeking to pursue political ends directly by university intervention risks stepping outside our role as a crucible of debate and a foundry of ideas and knowledge. We should therefore respect the conception of academic freedom we have affirmed in our *Vision, Mission & Values* paper, while also being mindful of the necessary limits on our role as a scholarly institution catalysing change.

Evaluating the UCL Grand Challenges: candidate measures of success

The proposed level of investment and effort across the institution in delivering chosen thematic challenge areas means that particular attention needs to be given to a set of measures for evaluating the candidates' effectiveness and success.

The proposed mechanism for delivery is common to all candidate areas so we should employ a common mechanism for assessment, while acknowledging that the academic leadership in each thematic area needs to have input into setting and sharpening any such objectives.

It is not a coincidence that the areas we proposed as potential candidates map well onto some of the United Nations Sustainable Development Goals. For example, climate change represents UN SDG 13, living well to SDG 3, and social inequalities to SDGs 5 & 10. We might therefore take as one approach to evaluation an assessment of our contribution towards these SDGs, aligned with the recent efforts by our Vice Provost (Research, Innovation & Global

Engagement) to address these goals. The UCL SDGs Initiative (SDGI) was established in 2020–21 to stimulate and facilitate more SDG-related activities across UCL, including: across our world-class research and teaching; the ways we engage with local, national and global communities; the extra- and co-curricular activities of our students; and the way we operate as an institution.

2020–21 is the first year that UCL has published a report¹⁶ on the extent of SDG-related activity across the university. Like many other institutions around the world, we are still exploring how we can best measure the different types of activity that are supporting the Goals, but we wanted to report initially on what we could measure. Some examples of the pilot work, classifying the descriptions of the 6,000 taught modules in UCL's online catalogue by SDG keyword mentioned in the module title; and analysing the number of UCL-affiliated research publications matched to two sets of SDG-related keywords; are shown below. While there are some assumptions underlying these methodologies and limitations, they nonetheless suggest that there may be particular promise in further examining the use of SDGs as a way of assessing our work in the cross-disciplinary thematic areas proposed here.

Figure 1:
UCL SDG-related teaching modules, 2021–2022

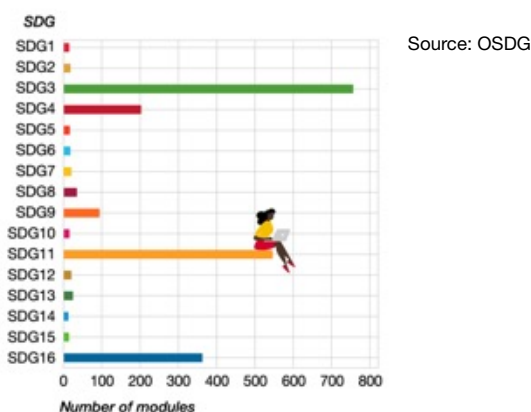
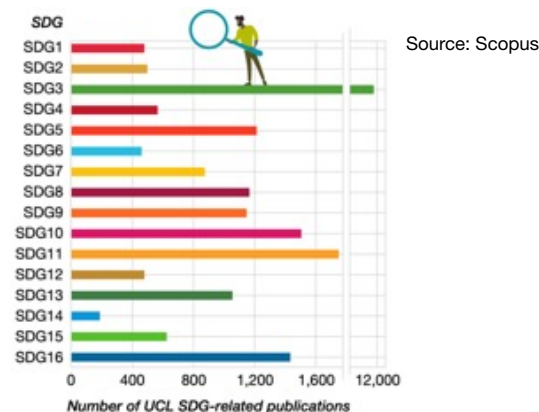


Figure 2:
UCL SDG-related research publications, 2016–2020



We further suggest two overarching criteria that our evaluation should address:

1. **Additionality.** Our approach should not merely substitute for existing funding or activity but demonstrably create **additionality**; activity in education, health, research and innovation that would otherwise not have taken place. Such activity should demonstrably add value through making the ‘whole’ more than the sum of its parts in each area.
2. **External recognition.** Our analysis, backed up by our market research, suggests that UCL is not recognized for its efforts in these thematic areas, despite our considerable excellence in research and innovation aligned to these challenges. One measure of success therefore should be that over time this approach is **externally recognised** as transformational in UCL’s approach to the challenge area. A good example of this - though not in the ‘grand challenge’ area - is in neuroscience, where academic leadership and investment has helped create a recognisable set of coherent activities and fostered the positive external perception of UCL’s leadership in this area. However, measures of external recognition in some forms (for example, media perception) can be subject to biases, are difficult to benchmark, and are not always consistently accurate.

For each of these areas we will need to provide both narrative and analysis to demonstrate success (or otherwise). We may also want to consider experimental measures of proxies for impact on a pilot basis. For example, in some areas it may be possible to anticipate or predict future impact on the basis of new research initiatives (e.g. prediction of future impact from bibliometric or patient citation analysis).

A common mechanism for evaluation should assess each candidate area for progress against the common considerations set out earlier. Specifically, has our investment delivered:

- Academic leadership in the candidate thematic area
- Investment in faculties and departments (and leveraged investment)
- Additional research and innovation activity that would not otherwise have taken place
- New educational activities that would not otherwise have been delivered
- New partnerships and evidenced influence on policymakers
- External recognition of UCL’s success in this area
- Alignment with our shared values.

Summary

This paper has argued that there is now an urgency to make rapid progress on the major challenges facing people and planet, and that UCL has both the ability and the opportunity to do this through our particular focus on cross-disciplinary research. Our UCL Grand Challenges now present an established and successful platform on which to evolve our approach, to bring together academic leadership with our research, education and operations in order to transform the world.

