Institution: University College London (UCL)

Unit of Assessment: 20 (Social Work and Social Policy)

1. Unit context and structure, research and impact strategy

1.1 Context and structure

This submission is from the UCL Departments of Security and Crime Science (SCS) and Science, Technology, Engineering and Public Policy (STEaPP), collectively, the *Unit*. Both departments are in the Faculty of Engineering Sciences. While we occupy two separate premises, we have co-located researchers, research students and selected staff to enable strategic joint activities, including an EPSRC-funded CDT in Cybersecurity (also with Computer Science). We share the broad mission of producing cutting-edge research and translating it into practice and policy, through active engagement with research end-users, in order to address pressing global challenges, particularly issues of societal risk. SCS focuses on anticipating emerging crime threats and finding new ways to reduce crime and increase security. STEaPP coalesces around meta questions about the relationship between science and policy, and explores those issues through a range of lenses, such as energy access, climate change, cybersecurity and congested cities. There are also synergies between the two departments' respective areas of interest; cybersecurity is one, while topics such as climate change raise questions both about crime and security implications and ways in which science and policy interact. Integral to achieving their missions is a commitment to interdisciplinarity, with both departments comprising staff drawn from across the social, physical and engineering sciences. Both departments contribute to the Faculty's strategic aim to 'exploit (its) strengths in cross-disciplinary research to expedite societal impact', with SCS working with other departments to identify the crime (reduction) implications of their work, and STEaPP working with departments to bridge the research-policy nexus.

SCS was formally established in 2009 but its roots go back to 2001 and the founding of the Jill Dando Institute of Crime Science (JDI), named in honour of the murdered British television presenter. SCS is devoted to helping to reduce crime and other risks to personal and national security, and the term 'crime science' was coined to describe the empirically-based approach taken. Research examines patterns in crime in order to find practical ways to disrupt it. The location of the Department within the Faculty of Engineering Sciences was a strategic decision that has reinforced the problem-oriented underpinnings of crime science and facilitated the goal of integrating the social, physical and engineering sciences in the quest for community safety.

STEaPP was formed in 2013 as a strategic move by the Faculty of Engineering Sciences, following a growing recognition that Engineering's social impacts call for meaningful and sustained interactions with policymakers. Over its first six years, the Department has grown rapidly, attracting some of the best science, technology, engineering, social and public policy scholars and practitioners globally. It is the only science and policy department in the UK that is situated in an engineering faculty, which gives it a unique setting and intellectual framing. STEaPP's focus is unashamedly on policy, with scholarly attention to policy impact in theory and practice baked into the Department's ethos. STEaPP's scholars are experts in fields including energy, environment, cities, digital technologies, futures, and science diplomacy. Much of the work in STEaPP targets science, technology, innovation and engineering toward social, economic and environmental goals, and is underpinned by a growing and diverse body of academic literature that blurs the boundaries between science policy and social policy.

The departments have nine research priority areas (see Section 1.2.3), which shape their mission, and are home to six research Institutes and Centres. These coordinate research activities and help to deliver large scale projects, facilitating collaboration across UCL, with other universities, and with stakeholders and end-users.

1.2 Research & impact strategy

1.2.1 Overview

The Unit aims to produce research of the highest academic quality that, by influencing policy and practice, will change the world for the better. To achieve this mission, our key aims for the REF (as articulated for REF2014) period were to:

- Build a critical mass of interdisciplinary researchers with a problem-oriented focus to make our activities sustainable and enable us to tackle new problems. We had particular ambitions to develop expertise in the field of cybercrime.
- Improve research performance, as indicated by an increase in grant income and high-quality research outputs.
- Increase the number of PhD students who will become the next generation of interdisciplinary researchers dedicated to finding effective ways of reducing crime.
- Develop our supporting infrastructure, including the capacity to access and analyse sensitive datasets.
- Continue to work closely with stakeholders, and increase our reach across them, to realise real-world impact. The Mayor's Office for Policing and Crime (MOPAC) was identified as a particular stakeholder with which we would seek to develop a stronger strategic relationship.
- Further our impact-focused work in international contexts.

Fundamental to our strategy is a challenge-led approach to research; that is, beginning with the problem and asking what combination of skills are needed to address it. Key to this strategy is a commitment to interdisciplinarity. Accordingly, staff have been recruited from backgrounds spanning the social and physical sciences, including criminology, social policy, forensic science, computer science, mathematics, electronic engineering, and international relations.

Similarly, as part of our strategy we have created an environment that encourages staff to employ a diverse range of quantitative and qualitative methods that are appropriate to the problem(s) studied. Research methods include interviews, experiments, surveys, focus groups, computer simulations, statistical (Bayesian and Frequentist) analysis of primary, administrative, open source and data scraped from the Internet, machine learning, personas, scenarios, systems mapping, and systematic reviews.

The Unit's strategies are developed within the context of the Faculty strategy, which in turn is informed by the wider UCL Grand Challenges framework (*Global Health, Sustainable Cities, Cultural Understanding, Human Wellbeing, Justice & Equality*, and *Transformative Technology*). As well as providing strategic direction, UCL Grand Challenges and Engagement grants awarded to the Unit (36 awards this period totalling £375K) have provided seed funding for new projects and funds to support knowledge transfer activities. Strategies are also informed by UCL's commitment to being London's global university, and to produce research that has impact globally but also in London.

The Faculty strategy is set by the Dean and the faculty management board, and monthly meetings, attended by departmental research directors, ensure strategic coherence across departments, create pathways to support and implement research and impact strategies, and to coordinate responses to large funding calls. The location of both departments within the Faculty of Engineering Sciences has been pivotal to their success. It creates seamless opportunities for collaboration (including ongoing projects that examine the impact of emerging technologies on crime), as well as providing a critical mass to support larger research and infrastructure projects. For example, central to the activity of several research groups is the analysis of sensitive

datasets, to which access is restricted. This has been enabled by the creation of the JDI secure data lab with initial funding provided by the Faculty (see Section 3.2.3).

At the departmental level, research priorities are reviewed regularly with overall leadership provided by the HoDs of SCS JDI (**Wortley** then **Bowers**) and STEaPP (**Blackstock** then **Chataway**), supported by their respective leadership teams, and at the Centre/Institute level by their respective directors. Monthly leadership-team meetings ensure agility in responding to the changing research landscape, while annual departmental away days provide the opportunity for all staff to provide input into the departmental research strategy. Through these processes, new academic positions are strategically targeted to develop expertise in priority areas and to grow existing ones. To help acquire funding for strategic priorities, both departments have dedicated professional services staff whose roles are to co-ordinate major research proposals, identify funding opportunities and oversee the development, peer review, and submission of these in collaboration with external partners and academics.

1.2.2 Achievement of strategic objectives since 2014

STEaPP was established in 2013 and hence our REF2014 aims related only to the activities and aspirations of SCS. However, SCS's key aspirations (outlined in Section 1.2.1) broadly align with those of STEaPP, and through developments in SCS, and the addition of STEaPP, the aspirations of the Unit have been met and exceeded:

- In REF2014 the Unit comprised 11 FTE staff. With a total of 42 FTE submitted in this REF, we have met our first strategic priority; SCS alone has more than doubled in size to 24 FTE. New appointments have enabled us to not only build capacity in the strategic areas identified in our REF2014 vision (e.g., cybersecurity), but also develop exciting new areas, including future crime and science diplomacy.
- Growth has enabled a substantial increase in research performance and the development and delivery of a broader range of impact activities. Total grant expenditure during the REF period has increased by **a factor of over 14** from £1.1M for REF2014 to over £15.6M in the current REF period. There has been a corresponding increase in the volume, quality and reach of our research, with articles published in a wide range of top-tier journals specific to our disciplines (e.g., crime and security, science and policy journals), contributing disciplines (e.g., mathematics, chemistry, engineering) and in leading multi-disciplinary journals (e.g., Science, Nature, PNAS).

	REF2014	REF2021
Journal articles	150	620
Books	10	51
Book Chapters	62	149
Government reports	23	68

- There has been a surge in PhD enrolments and completions while candidate quality and alignment with the Unit's research mission has been maintained. Sixty-three PhD students (equivalent to 42.75FTE) have successfully completed during this REF period, compared to 3 in REF14, a **14-fold increase**. We have 68 PhD students currently registered (cf. 35 for REF2014).
- We have also grown the infrastructure required to support our research mission. In particular, our secure data lab has been accredited and launched, enabling fine-grained research on sensitive data sets.
- We continue to increase the breadth of our engagement with key stakeholders. We have strong links with both high-level policy makers, frontline practitioners, the voluntary sector and others. The establishment of the Institute of Global City Policing, jointly funded by SCS, MOPAC and the London Metropolitan Police, has strengthened our relationship with London policing.

- We have significantly increased the international reach of our research, with projects and collaborations across the globe, including in developing areas such as Africa and South America (see Section 4).

1.2.3 Research priorities and their delivery

Research and impact activities across the Unit are organised around inter-related research priorities or themes (listed alphabetically below). These articulate the scope and mission of the departments and inform everything they do, including hiring strategies. Staff may work across themes. The delivery of these research priorities is supported by the institutes and research centres described in Section 3. Over the REF period, there were 9 research priorities:

Crime analysis

SCS staff pioneer methods of crime pattern analysis to advance understanding of crime, disorder and terrorism, and their prevention. Work includes the application and development of geographical and computational methods to study patterns of crime in physical space and, more recently, online environments. SCS's established expertise in this area has been strengthened by the appointment of **Davies** in 2018. Over the REF period, **Johnson** and **Gill** have directed research on offender and terrorist spatial decision-making (funders including EPSRC), while **Johnson** and **Davies** have led projects on the use of spatial and computational models to understand patterns of both illegal migration (funded by the Leverhulme Trust) and forced migration during conflict (funded by the US Minerva initiative). Funded by the ESRC and EPSRC, **Davies, Bowers** and **Johnson** have pioneered the use of mathematical graph theory in the analysis of crime at the micro level of place (i.e., street segments) and examined new ways that urban form impacts on crime risk at this level (see "Evidence Based Policing" Impact Case Study (ICS)). **Chainey** has developed a programme of research to examine such crime patterns in Latin America, a region that has received little attention to date.

Crime reduction policy and practice

SCS staff specialise in evaluation research (primary evaluations and systematic reviews), the development of evaluation methodology, and the use of evidence to shape crime policies. Work led by **Laycock** (see "Evidence Based Policing" ICS) has developed a new framework (EMMIE) for evaluating crime reduction strategies. Applied to systematic reviews, EMMIE combines the realist perspective (pioneered by **Tilley**) about *how* and *where* interventions might work, with experimental perspectives concerned with the reduction of bias. Funded by the ESRC (£3.2M), EMMIE and the systematic reviews produced, formed the basis of the College of Policing's *What Works Centre for Crime Reduction*. The Unit's portfolio of work on the evaluation of crime reduction at micro places has included an NIHR-funded national evaluation of the effects of street lighting on crime (**Johnson** and **Tompson**, with the London School of Hygiene and Tropical Medicine) and a large randomised controlled trial of an intervention to reduce repeat victimisation (**Belur, Bowers, Davies, Johnson**). **Wortley** and **Tilley's** work with colleagues at Griffith University (Australia), funded by the by the Australian Attorney General's Department, has focused on the prevention of child sexual abuse in two Aboriginal communities.

Emerging technology

Established as a new research priority during the REF period, this theme is supported by seven new academic positions (**Becker**, 2019; **Brass**, 2017; **Carr**, 2017; **Kleinberg**, 2018; **Mariconti**, 2019; **Tanczer**, 2018; **Watson**, 2014). Staff across the departments take a technical and socio-technical approach to understand how digital technologies impact on how we interact, work, and govern, and how crimes are committed or prevented. **Tanczer** and **Johnson's** work explores the implications of the Internet of Things (IoT) on crime, including gender-based domestic abuse. **Brass, Carr** and **Johnson's** EPSRC-funded research examines risks associated with emerging

technologies (e.g., synthetic biology and new targeted medicines) and how to secure them through the development of standards and regulation (see "Digital Technologies" ICS). **Stilgoe's** ESRC– and EU–funded work explores anticipatory governance in the context of self-driving cars. **Kleinberg** and **Johnson's** work has examined crime associated with cryptocurrencies and new payment methods, respectively. **Mariconti** uses machine learning to detect malware and online hate crime. **Carr's** EPSRC funded work evaluates cybersecurity evidence for policy advisors and industry board members who deal with crises or longer-term national security and capacity building. **Borrion** and **Becker's** EPSRC-funded work develops frameworks and tools to influence online behaviours to reduce risk.

Forensic science

Forensic science is a dynamic discipline that provides solutions to problems faced in the detection and countering of crime and terrorism. This research relates to all stages of the forensic science process from the crime scene, the analysis of evidence, the interpretation of those results and their presentation in court. The appointment of **Nakhaeizadeh (**2020) has strengthened our activity on this theme. **Morgan's** and French's research focuses on trace evidence dynamics, examining the way that traces (DNA, fibres, gunshot residue, electronic records) may be changed, become contaminated, transferred, and persist over time. **Morgan's** and **Nakhaeizadeh's** work examines the human element of forensic evidence interpretation, focussing on the impact of intrinsic and extrinsic factors on expert decision making at each step of the forensic science process. Underpinning both strands is a consideration of the philosophical nature of forensic science and how science can and should engage with policy and key actors in the justice ecosystem (**Morgan**), and the imperative for transparency to provide more robust interpretation of science to reduce the risks of miscarriages of justice.

Policing practice

Identified as research priority to develop significantly during the REF period, our research capacity in this area is strengthened by the appointment of **Ashby (**2019), **Bradford (**2017) and **Posch** (2020). Research examines operational aspects of the police role, with two broad research strands. The first, policing for crime prevention, covers topics such as evidence-based policing, hotspot policing, and Problem Oriented Policing. The second focuses on police-community relations, examining topics such as public trust, police legitimacy, cooperation and compliance in justice settings. **Bradford's** ESRC-funded collaboration with LSE and Keele University uses innovative virtual reality and ethnographic approaches to consider how police-public interactions can be managed to enhance consent-based relations. **Bradford, Belur** and **Waseem** worked with the Vera Institute of Justice (New York) to evaluate procedural justice related reforms inside police organisations in the UK and US. Funded by the Home Office, **Sidebottom**, **Tilley**, **Laycock**, and **Ashby** are evaluating the use and efficacy of police problem solving. **Johnson, Tilley and Bowers** are collaborating with Leeds University on UKRI funded research to understand how COVID19 is impacting on crime and policing.

Policy and decision making

Established as a research priority during the REF period, and supported by four new appointments (**Chataway**, 2018; **Mugwaga**, 2017; **Steenmans**, 2019; **Tyler**, 2019), this theme concerns evidence-based policy decision making. Significant projects include an ESRC investment that established a social science section in the Parliamentary Office of Science and Technology (**Tyler**), which has led to changes in the way that Parliament uses evidence. **Steenmans** led two projects for the UAE, one to develop a new national science policy strategy. **Chataway** (with **Mugwagwa**, **Steenmans**) leads a UKRI-funded project to steer research and innovation to address global sustainability goals in lower-middle income countries. **Tyler's** research brings together people from high-, middle-, and low-income countries to explore research questions about legislative science advice. **Chataway** leads an ESRC-funded International Public Policy Observatory, focusing on synthesising knowledge about the social

impacts of COVID19 on (for example) homelessness, housing and communities, care and mental health, to enable better decision making to benefit the British public. Here the blurred boundaries between science and research policy and social policy are particularly evident.

Sustainable development, energy and environment

Established during the REF period, with contributions from four new academics (**Cooper**, 2013; **Mugwaga**, 2017; **Peterson**, 2014; **Washbourne**, 2016) and spanning science, innovation and social policy, this research priority concerns responses to challenges and opportunities (including climate change and changes in governance) in the sustainable development domain. Research questions assumptions about development, why institutions behave as they do, and why policies fail. **Petersen's** work combines science and technology studies with the anthropology of development to interrogate how uncertainties are understood and dealt with in environmental planning. **Mulugetta's** research (funded by EPSRC, DfID and DECC) explores how agro-industries in sub-Saharan Africa can help reduce inequalities in rural energy access. **Chataway** and **Steenmans** are Co-I's on an East Africa-India-UK research collaboration that examines how to link industrial and social innovation for social and health policy related to cancer care**. Mugwagwa's** ESRC Future Research Leaders Fellowship explored health financing in South Africa and Zimbabwe. **Washbourne's** GCRF-funded Digital Innovation project examines flood early warning systems and water-related disease prevention for community capacity building and resilience in Africa.

Terrorism, serious and organised crime

Strengthened by the appointments of **Schumann** (2019) and **Zolghadriha** (2018), this research theme considers how methods of crime prevention, detection and disruption can inform counter-terrorism and organised crime research and practice. Research covers topics including lone-actor terrorists, radicalisation, terrorism risk prediction, organised crime networks, and trafficking. Projects by **Gill, Bouhana, Schumann** and **Zolghadriha**, funded by the ERC and others, have developed conceptual frameworks for the social ecology of radicalization, developed putative risk and protective factors for violent extremist engagement, examined the spatial risk of terrorist attacks, tested the reliability, validity and equity of terrorist risk assessment tools, and conducted process evaluations of risk assessment and management initiatives (see "Extremist Risk Assessment" ICS). **Cockbain**, **Bowers, Sidebottom** & **Tompson's** ESRC-funded work has filled a lacuna of empirical research regarding the scale and methods of human trafficking and pioneered approaches to its study that has impacted widely on policy and practice (See "Trafficking and Exploitation" ICS).

Urban innovation and infrastructure

This theme was identified as a research priority during the REF period, and developed with support from new hires (**Cosgrave**, 2017; **McArthur**, 2018). Projects are conducted in collaboration with public authorities, international organisations, the private sector and SMEs to create a unique environment for urban experimentation, research and policy advice. While the focus is on globally-relevant city challenges, projects are practically oriented and locally-focused. Examples include **Cosgrave's** work on choreography and design for sustainable urban environments and **Washbourne's** collaboration with the University of Melbourne and UN-Habitat. Both seek to understand how different types of knowledge about cities is created and used in decision-making. **McArthur** led research on the governance and politics of roadspace re-allocation in cities for an EU Horizon 2020-funded project.

1.3 Supporting structures, practices and culture

1.3.1 Pathways to impact

Impact has been fundamental to the missions of both departments since their inception. This is reflected in our research priorities which collectively aim to develop understanding of real-world problems, design policies or interventions to address them, evaluate those interventions, understand how stakeholders use evidence, and translate research findings into forms that they can use most effectively. We have developed a culture in which impact is explicitly valued. This is reinforced at staff meetings, during the staff appraisal process, and in promotion recommendations. Specific mechanisms through which impact is achieved include:

Engagement with stakeholders

Our research is routinely co-designed and carried out in collaboration with governmental, industrial and public sector partners. In addition to working with stakeholders on projects, engagement and co-production activities are facilitated through workshops with industry, government and voluntary sector stakeholders. For example, every 2-3 months, research Centre's run by **Johnson** and **Carr** (see Section 3.2.1) run 1-2 day "sandpits" with stakeholders (e.g., industry, voluntary sector, academia, policy, and police) to debate and understand how technologies (digital or otherwise) might be (mis)used to impact upon crime (or other societal outcomes), the associated ethical implications, and to develop programmes of research. Around 300 stakeholders have contributed to such events since 2017, and over 3500 people have attended other events since REF2014. The breadth of our external engagement is detailed in Section 4.

Policy Impact Unit (PIU)

STEaPP's PIU works with researchers in the Unit and across the Faculty to design bespoke policy engagement strategies. It facilitates engagement between the research and policy communities, designing and delivering engagement activities, and providing training. Recent examples include working with SCS to produce policy briefs on research concerning future AI-enabled crime, threats associated with cryptocurrencies and the challenges of preventing counterfeit goods; and assisting **Tanczer** to put gender issues relating to the internet of things on the policy agenda. The PIU conduct extensive background research on what is happening in the policy/practitioner community to ensure that researchers connect with those stakeholders who can make best use of their research.

Continuing professional development

Since 2004, we have had a programme of continuing professional development (CPD), and since 2018, a dedicated CPD director (**Chainey**). Training is research-led and delivered in the UK and internationally, and includes police training contracts in India (£1.3m) and Uruguay (£800k). As well as enabling knowledge transfer, CPD courses generate income to sustain our research capacity, create opportunities for collaboration with stakeholders, facilitate access to data, and ensure staff have an understanding of real-world problems which, in turn, informs departmental research priorities. For example, as a result of our police training programmes, **Tripathi** developed a research collaboration in Mumbai – part-funded with UCL Grand Challenges funding – to develop a Smartphone application for railway police to track missing children, which was supported by the chief of Government Railway Police (GRP).

Latin American and Caribbean Unit

Established in 2017, this unit, led by **Chainey,** supports the conduct and delivery of research and knowledge transfer activities in that region. Projects have included the implementation of a four-city hot spots policing programme in Argentina (see "Evidence Based Policing" ICS), and the founding of research collaborations in Brazil on analysing patterns of robbery and homicide. Furthermore, ten international PhD students have enrolled on our PhD programmes as a direct consequence of this activity.

1.3.2 Creating a stimulating research environment

Seminars

The Unit has several seminar series. Fortnightly lunch time seminars are organised for departmental staff, departmental and CDT Cybersecurity PhD students. A regular 'Meet the Policy Maker' series provides a forum for researchers to hear about policy makers' research interests and the practical considerations of making policy. Seminars and other events (including an annual horizon scanning poster session) organised jointly with the Home Office provide opportunities for staff and students to share their research with the policy community and voluntary sector. To support attendance at external seminars and conferences, for the REF period, a ring-fenced allowance of £2,000 per annum was available for all staff in the Unit.

Fostering interdisciplinarity

Undertaking interdisciplinary research has always been an explicit part of our mission and mechanisms to facilitate this are discussed throughout this submission. In the case of SCS, interdisciplinary ambitions were significantly accelerated with the establishment of the SECReT doctoral programme (see Section 2.2.2). This required academics from different UCL departments to supervise every PhD student, leading not only to interdisciplinary doctoral research but also stimulating regular inter-departmental interaction. The new CDT in Cybersecurity (SCS, STEaPP and Computer Science) has built on this ethos. The establishment of SCS-led and STEaPP-led research Centres (see Section 3.2) have further facilitated concrete research links across other UCL departments and external university partners.

1.3.3 Research Integrity

Research ethics

Both departments have their own ethics committee. All projects (staff or student) must be submitted to the respective Departmental Ethics Committee which, based on explicit UCL criteria, evaluates them and decides if they need to go to the full UCL Ethics Committee. Training in ethical issues in research are integrated into PhD programmes, and 'ethics boot camps' for research students (and staff) provide guidance on ethics, the process and timelines.

Responsible research and innovation (RRI)

The Unit is committed to research integrity and all staff and students are expected to follow UCL's Code of Conduct for Research. Research students are required to complete compulsory taught modules which explore RRI, and EPSRC CDT students are additionally required to undertake UCL training devoted to RRI led by **Stilgoe**. Research conducted by staff across the Unit explicitly considers RRI issues. **Stilgoe's** work examines the unintended consequences of innovation. **Bradford's** work explores the impact of policing practices on public trust and perceptions of legitimacy. Such research can involve the public, the voluntary sector, NGOs, the police and policy makers. As well as identifying issues associated with RRI, our work seeks to

identify solutions (e.g., **Brass** and **Johnson's** work to encourage industry to secure the Internet of Things).

Open science

In line with UCL policy, all staff and research students are required to make publications that meet the REF inclusion criteria Open Access either through Green or Gold access routes. Publishing fees are (where appropriate) covered by departmental funds, research grants, transformative publishing agreements, or the UCL Open Access fund. As of December 2020, 99% of the Unit's outputs (2016-) were compliant with this policy. UCL Press supports this policy by publishing 13 open access journals, with **Washbourne** being a member of the Editorial Board of the newly established UCL Press open access journal ***UCL Open: Environment***. In addition, the ***Crime Science*** journal, founded in 2012 with Laycock as editor, followed by **Bowers** (2017) and **Wortley** (2020), is a fully Open Access journal, published by Springer. It has attracted authors from over 40 countries and, with over 300,000 downloads in 2020, it has the most downloaded articles of Springer's Criminology and Criminal Justice journals. SCS runs a fortnightly 'Open Science' journal club and peer mentoring programme - **JDI Open** (http://jdiopen.github.io) - aimed at all PhD students and academic staff to promote open science practices and provide training in associated skills. Other specific activities that help to deliver our open science strategy include promoting reproducibility in research (http://bit.ly/2ZbUklr), collating open crime data for others to use (https://osf.io/zyaqn/), and making cutting-edge analytic tools openly available (e.g., http://bit.ly/3pd72kt).

1.4 Future research priorities

The Unit will build on the aims identified for this REF period. As resources permit, we will recruit additional talented staff who can take forward our ambitious interdisciplinary research and impact agenda. We will continue to develop our portfolio of research income to sustain and grow our existing centres and the training of research students, as well as funding new initiatives. To support our research and help our ECRs and research students gain experience managing grants, SCS will launch a small grants scheme. We will further develop a physical and social environment that not only supports our research ambitions, but enhances well-being, equality and diversity (including implementing Athena Swann action plans, see Section 2), and positive learning experiences for staff and students. We will strengthen links between research excellence and real-world impact, refining our approaches to the co-creation of research agendas with stakeholders, and championing the translation of research for policy partners.

These priorities are set within the broader context of the evolving social and environmental problems facing the word, captured in UCL2034's Grand Challenges. For SCS, there are particular challenges around advances in *Transformative Technology*. While such developments bring enormous benefits for society, they also have unintended consequences for crime and security. The growing threats of cyber-enabled crime and extremism are prime examples. At the same time, technologies offer new strategies for combatting these crime and security threats, for example, through advances in data science and machine learning. Reflecting this landscape, we will develop further our research capacity in areas such as digital forensics, data science and cybercrime. We recognise that these developments also have implications for *Equality and Justice*. We will explore how new and existing approaches might be applied to crime problems in ways that are socially responsible as well as effective, developing policy options that balance the need to reduce crime opportunities while maintaining public confidence in the legitimacy of policing and preventative strategies.

For STEaPP, work on innovation and science related to *Global Health and Wellbeing* create the framework for new initiatives. STEaPP academics are developing integrative perspectives across concepts of health systems, innovation systems and transitions thinking to inform new academic and policy perspectives. One important element of the work is focused on

understanding the dynamic evolution of health, scientific innovation and industrial capabilities. Existing work led by **Mugwagwa**, **Chataway** and **Steenmans** looking at these issues at national and global levels are examples of early work reflecting this approach.

2. People

2.1 Staff

The Unit has undergone significant strategic growth since REF 2014 with 44FTE submitted this time (cf. 11 for REF2014). We have developed particular research capacities in policing, the nexus between technology and crime, cybersecurity, the science-policy interface, data science, science diplomacy and futures. The staff profile has also matured, with 13 professors (cf. 3 in 2014) and 8 associate professors (cf. 1 Reader in 2014). As with REF2014, all HESA3 and qualifying HESA2 staff have been entered.

2.1.2 Sustainability

With four exceptions (**Bradford**, **Chataway, Mulgan** and **Carr**), all REF2021 recruitments have been of early career researchers (ECRs) with an appetite for interdisciplinary, impactful research. Appointments have been associated with our Masters' programmes (circa 180 students pa) or our BSc in Security and Crime Science, which are in turn closely linked to our research priorities. This synergy helps to provide a sustainable research environment that aligns with our long-term agenda. Sustainability has been supported by year-on-year increases in student enrolments. Workload models ensure that academic lecturing staff can devote at least 50% of their time to research with staff teaching only two modules per annum. The increase in HEFCE-funded permanent staff (relative to REF2014) provides a more stable basis for our research capacity, but we are also keen to encourage the careers of our non-HEFCE-funded researchers. To do this, where possible, these staff have been given short bridging funds to enable continuation between research projects.

2.1.3 Recruitment

Staff are recruited from a variety of disciplines as appropriate to need. Like the wider university, our staffing policy is to recruit the best talent from the global pool. Vacancies are widely advertised and processes transparent. We particularly seek out suitable women and candidates from other under-represented groups, in accordance with our commitments to increase diversity at UCL.

2.1.4 Equality, diversity & inclusion (EDI)

UCL policies ensure Equality, Diversity and Inclusion at all levels. Both departments have equality, diversity and inclusion (EDI) committees that promote good EDI practice for all staff and students. These committees are inclusive and all staff and students are encouraged to apply to be part of them. Committee membership is voluntary, but account is taken of this in staff workloads. The Unit has a proud record relating to equal opportunities in the recruitment, training, appraisal, development and promotion of staff. Both Heads of Department, some 41% of our HESA3 staff (cf. 40% for REF2014), 76% of our HESA2 staff (cf. 60% for REF2014), and 38% of our professoriate are female (higher than the 2018/19 national average of 27%). Collectively, Category A staff have taken 11 periods of Maternity or Paternity leave in the REF period and subsequent requests for flexible part-time working have been accommodated, with workloads adjusted accordingly. In relation to ethnicity, per FTE, 10% of our HESA3 staff (cf. 10% for REF2014), and 20% of our HESA2 staff (cf. 6% for REF2014) are from BAME groups. Two staff completed Women in leadership courses during the REF period. Both departments have held compulsory workshops for staff on diversity, equality, bullying and harassment, and

four staff have completed senior management training regarding bullying and harassment prevention. UCL training on unconscious bias is also mandatory.

Our commitment to EDI is reflected in our approach to REF staff and output selection. Without exception, all staff who met the REF criteria were submitted. To ensure inclusivity, all submitted staff were involved in the selection of outputs, providing (anonymous) ratings for, and comments on, nominated papers. An average of 2.6 outputs were submitted per FTE female staff member (cf. 2.5 for males), and slightly more female staff submitted four or more outputs per FTE. For BAME staff, the average number of outputs was 1.5, and for ECRs it was 2.3 per FTE. For ECRs, this is expected as 100% of our ECRs started in 2018 or later. The figure for BAME staff warrants attention, but we note that the figures are distorted by the number of staff with an undeclared ethnicity (for whom the rate was 2.25).

Going forward, both departments submitted applications for Athena Swan Bronze awards in November 2020 that presented a comprehensive picture of their EDI profiles and set out clear action plans, with specified success criteria, to consolidate and strengthen our performance. The exhaustive self-appraisal process identified areas in which we were performing well and areas in which there is room for improvement. For example, our inclusive culture promotes a strong sense of belonging and collegiality from all staff groups, and flexible working practices are embedded. At the same time, we have work to do in improving gender and ethnic balance in selected staffing areas. The many specific commitments made include ensuring: that staff recruitment strategies promoted a gender- and ethnic-balanced workplace (e.g., further diversifying selection panels); that staff undertake regular diversity training; and that there is greater diversity with respect to honorary appointments, seminar presenters, committee chairs, and other areas that provide visible role models.

2.1.5 Career progression and promotion procedures

All staff are formally appraised annually – professors by the Head of Department, and more junior staff members typically by the professors. Plans for career progression are always discussed in appraisals. At the beginning of each year, departmental leadership teams invite staff members interested in promotion to submit their CVs for feedback and advice, and proactively prompt eligible staff members who have not self-nominated. The environment created has been very successful: since 2014, 11 staff members have been promoted to Associate Professor (all in SCS, three of whom have subsequently left the Department) and four to Professor (2 in SCS; 2 in STEaPP).

2.1.6 Early career researchers (ECRs)

Senior staff members routinely publish with **ECRs** and provide guidance on career plans and strategies of knowledge transfer. New academic staff are allocated lighter teaching loads than existing staff for the first year of their appointment, and are initially given minor administrative roles, such as library liaison or the membership of committees, to help them to establish themselves as independent researchers. We have appointed ten lecturers from our pool of postdoctoral researchers, including two staff who won competitive **ESRC/EPSRC early career fellowships**.

2.2 Research students

2.2.1 Ethos

Our aim is to deliver world-leading doctoral training programmes that produce future generations of scientists (physical and social), policy makers and intermediaries whose work impacts on social policy. All of our doctoral programmes are inherently interdisciplinary and we recruit students from a wide range of disciplines, including sociology, psychology, computer science,

political science, geography and mathematics. Students are required to have supervisors from different disciplinary backgrounds. All PhD programmes involve a taught component to ensure students receive a solid grounding in their discipline and the wider public policy (STEaPP) or crime and security context of their work (SCS). All doctoral candidates are encouraged to take on paid teaching assistant responsibilities (with capped hours) to build their teaching and administration skills. UCL training – completed by 64 students in the REF period – is provided to support this. PhD students are routinely employed to work on research projects (also with capped hours), which further enhances their experience including opportunities to work collaboratively and to publish. They are also encouraged to take UCL training in entrepreneurship (8 have), and public engagement (4 have).

2.2.2 Doctoral programmes

SCS launched the £7M UCL SECReT CDT in 2009. The initial EPSRC investment (2009-2018) provided the means to create a vibrant and competitive programme that continues to enrol around 15 students annually. There is a mix of self-funded students, international students who bring scholarships with them, and students who win a Dawes Centre (of which there are currently four annually, see Section 3.2.1) or other UCL scholarship. The first centre of its kind, SECReT offers a three-year and a comprehensive four-year integrated MRes/PhD (1+3) programme for students wishing to pursue multidisciplinary security or crime-related research. To date, 71 students have completed the Department's MRes in Security Science, and 79 (including students supervised by staff in other REF UoAs) have been awarded their PhDs. Annual industry evenings bring together end-users, academic and public sector partners to meet the current student cohort, stimulating exchange between students and external agencies, facilitating access to data, lab facilities, internships, practitioner expertise and research problems, and encouraging career pathways. An additional £2.7M of studentship funding has been provided by industry, grants and UCL, while in-kind contributions from partners including the Home Office, the Defence Science Technology Laboratories, L3G, Selex, Rapiscan, AWE, the National Crime Agency, and various police forces have exceeded £4M.

STEaPP's doctoral training programme started in 2015 and offers two routes. A traditional PhD and the less common (and unique to UCL) Doctor of Public Administration (DPA). All students undertake a taught component in their doctoral studies consisting of eight modules. This includes training on what policy is, how the policy process works and how research can be tailored to maximise policy impact. The DPA is a ‘doctorate on the job’ that can be undertaken full- or part-time, which enables those who cannot take a career break to take a research-driven approach to change policy. There have been 39 PhD students and five DPA students since 2015, of whom four have graduated.

The £5.4M EPSRC-funded **CDT in Cybersecurity** was launched in 2019 jointly by SCS, STEaPP and the Department of Computer Science. The integrated four-year programme trains students in the socio-technical skills necessary to understand and address the evolving cybercrime threat. There are currently 20 students enrolled. A unique aspect of the programme, that reflects our approach to research and impact, requires students to work in groups to conduct systematic reviews of the literature on topics nominated by stakeholders (e.g., Department for Digital Culture Media and the Home Office). Students are subsequently encouraged to publish these and provided with support to do so.

2.2.3 Selection, support and progression

Programmes are widely advertised and applicants are shortlisted by PhD programme panels. Places are highly competitive with over 200 applications in 2020. Short-listed applicants are interviewed in accordance with UCL policies either in-person or online. UCL provides mandatory training for PhD supervisors, as well as courses to help them further develop their skills. All supervisors must see at least one student through to the completion of an MRes project as a second supervisor before being a first supervisor. Monitoring ensures that staff have

manageable supervisory loads and that opportunities and support are given to ECRs. Students and supervisors meet regularly and complete the UCL Graduate School log. Completed every 3 months during their first year, and every 6 months thereafter, the log requires students to summarise their progress and plans, which are reviewed by their supervisors. All students are initially registered for an MPhil and to transfer to a PhD they are required to complete an upgrade assessment, usually in their second year. They submit a substantial report and complete an oral examination. Students receive substantial feedback as well as a pass/fail decision, and those who fail the upgrade can retake it within 6 months.

All students are encouraged to present at international conferences and publish in peer-reviewed journals or conferences. There is a dedicated poster session for all students at the annual Crime Science conference. For students whose funding does not provide conference support, a ring-fenced budget of at least £3K is available.

Dedicated teaching committees monitor the quality of the PhD and MRes programmes and consultative committees elicit student feedback to help continually evolve and improve the PhD experience. The SECReT society, run by and for PhD students, organises a mentor scheme for new students, pairing them with existing ones, and organises activities (seminars, breakout rooms, fund raisers) to enhance the PhD experience. The LACU provides additional social and academic support for the increasing number of PhD students from South and Central America.

2.2.4 Student outcomes

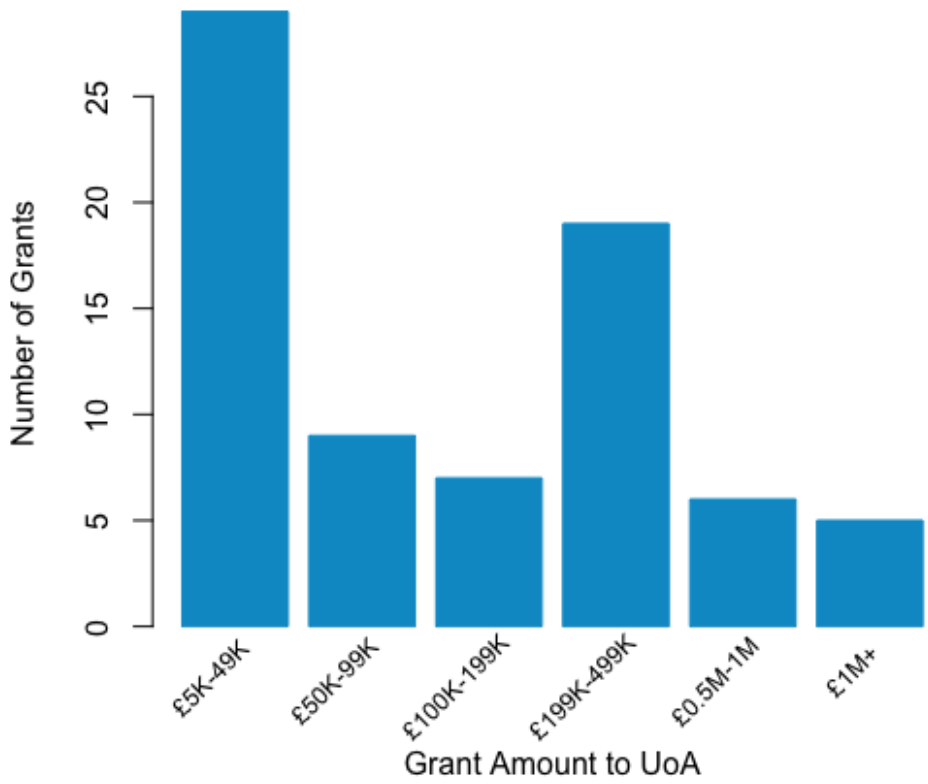
Since REF2014, our PhD graduates have gained employment in universities (including Australian National University, Cambridge, UCL, Lancaster and Manchester), companies (including PWC, Aecom, Dyson, and Bank of America Merrill Lynch, and Crest Advisory), and organisations (including NHS Trusts, the Defence Science and Technology Laboratory, the Digital Catapult, and the United Nations).

3. Income, infrastructure and facilities

To provide a sustainable research environment and to anticipate future needs, the Unit has grown its research infrastructure since 2014. SCS has its own dedicated building and facilities, and has led the development of the only police-assured secure data lab located in a UK university. In 2019 STEaPP moved into a larger building to accommodate for growth, allowing STEaPP, some SCS staff and all PhD students from both departments to be housed together. Both departments have also grown their Professional Services research teams to provide all important support to turn research ideas into funded projects. The Engineering Faculty supports the Unit by match funding large scale investments, which provides a competitive advantage.

3.1 Research funding

The Unit has three main sources of research income – competitive grants **(£23M awarded to UoA during the REF period**), money earned through CPD (£1.8M) and consultancies (£2.2M). Excluding CDT funding, staff have submitted 75 successful competitive grant applications, with prestigious awards from UK research councils (e.g., EPSRC, ESRC), charitable trusts (e.g., Leverhulme Trust, Lloyds Register Foundation), Government Departments (e.g., DFID, Home Office), industry and other funders (e.g., US Minerva). As shown, grants awarded varied in size – for 33, more than £200K came to the UoA (for 5 the amount exceeded £1M).



3.2 Infrastructure and facilities

3.2.1 Research centres

Facilities, administration and other infrastructure to support the nine research priorities outlined above are provided via six research centres (four established during this REF period) that play a key role in the delivery of the Unit's research agenda. The research priorities do not always sit neatly within one centre.

The Jill Dando Institute for Security and Crime Science (JDI)

Established in 2001 with £1.2M from a public appeal, the JDI remains the umbrella structure under which the other SCS centres sit. **Wortley** was director 2010-2020; **Bowers** is current director (2020-). With a broader remit than the specialist centres, it hosts projects that have a general crime and terrorism reduction focus, including the What Works Centre for Crime Reduction project.

The Centre for Forensic Sciences (CFS)

Established in 2010 with an initial £90K grant from the Provost's Strategic Fund, this centre is directed by **Morgan.** The Centre has been successful in securing over £1m in cash and equipment from industry partners and through a crowd-sourcing appeal. A new JDI Forensic Science Lab will be completed in 2021.

The Dawes Centre for Future Crime (DCFC)

Directed by **Johnson** and established in 2017 with a £3.7M grant from the Dawes Trust (matched by UCL), the Centre focuses on finding pre-emptive solutions to emerging crime problems associated with technological and social changes. It funds four full PhD scholarships annually and research projects across UCL and other universities.

The Institute for Global City Policing (IGCP)

Established in 2017, under the directorship of **Bradford**, the Institute is a collaboration with the MOPAC and the London Metropolitan Police Service (MPS) who together provided £500K funding, matched by UCL. In addition, a researcher from the MOPAC research unit is seconded to the Institute. Both the MOPAC and MPS have ongoing involvement in the activities of the Institute. Money from the grant is used to fund seed projects and support post-doctoral researchers.

PETRAS

Led by **Watson**, PETRAS is the National Centre of Excellence for the Cybersecurity of the Internet of Things and associated systems at the 'Edge' of the internet. It connects over 100 commercial (e.g., BT, Costain and Pinsent Masons) and government partners, 16 research institutions, and is linked to a £10M Innovate UK Demonstrator programme. Since 2019, the parent programme (SDTaP) has received £25M in funding from the UKRI Strategic Priorities Fund (£14M of the grant allocated to UCL). This provides academic funding and access to industrial partners and their facilities, with funding for other institutions administered through competitive calls.

Research Institute for Sociotechnical Cyber Security (RISCS)

RISCS, led by **Carr**, is the UK's first Research Institute focusing specifically on sociotechnical aspects of cyber security (i.e., how people, processes, and other related factors influence the security of organisations). Financed by the EPSRC and the National Cybersecurity Security Centre (NCSC), as well conducting research it co-funds a portfolio of (£500K annually) research projects with partners including the EPSRC, Home Office and NCSC.

3.2.2 Buildings and facilities

SCS moved into its current premises on Tavistock Square in 2011. Until 2019, the building accommodated all staff, all PhD students whose primary supervision was undertaken within the Department, and any visiting academics. The building has a computer cluster room and a printer for student use, as well as a seminar room (capacity around 25) with AV facilities. The Department maintains a small, specialist library. Personal computers are typically replaced every three years.

Following significant growth, a strategic decision was made to move all PhD students (including those belonging to the CDT in Cybersecurity) and research staff to co-locate with STEaPP in their newly-acquired premises (see below). This has created a vibrant PhD and research environment intended to stimulate multidisciplinary perspectives and research, and to capitalise on our shared missions. Splitting SCS in this way requires efforts to maintain departmental cohesiveness. To this end, two senior staff members (Professors **Gill** and **Bradford**) have offices at Shropshire House to provide leadership, and staff are encouraged to conduct some PhD supervision on site. Apart from relieving pressures at Tavistock, the premises at Shropshire are more spacious and up-to-date, and students have been overwhelmingly positive about them.

STEaPP moved into Shropshire House in 2019. In addition to SCS staff and students, *The Conversation* (an online magazine which communicates science and research to the general public) shares this space and offers regular training to staff on writing for non-academic audiences. The office is fully equipped with meeting rooms, a board room and social space to enable casual interaction. Every member of staff and PhD students are supplied with appropriate ICT equipment.

The DCFC has invested in Web Scraping and GPU Servers which provide State of the Art resources to enable open-source data collection, computational modelling, and machine learning on non-sensitive datasets. The servers are located in Tavistock Square, with back-up storage situated in Shropshire house.

3.2.3 JDI Research Laboratory (JDIRL)

JDIRL, directed by **Bowers** and then **Sidebottom**, is a **secure data lab** located on the UCL campus. Built with £1M funding secured from the Faculty, and in collaboration with the Department of Computer Science, the lab meets UK government standards for data security, and is formally accredited as a Police Secure Facility. Only the second of its kind in the world, it facilitates access to rich crime and other data that would normally be unavailable to university researchers. It is located in a highly secure space with controlled access, secure wiring, and high levels of electronic screening to prevent eavesdropping, and is managed by vetted technical staff. The lab houses a high-performance computing cluster. It has a separate visualisation suite; areas for secure working and document storage; and access to state-of-the-art computing and computational software. A secure tutorial room can be used by staff to teach MSc and PhD students, and departmental students can undertake dissertations and research projects on restricted data. It is difficult to overstate the value of this facility to the research activities of the Department and the full academic community in the UK generally.

4. Collaboration and contribution to the research base, economy and society

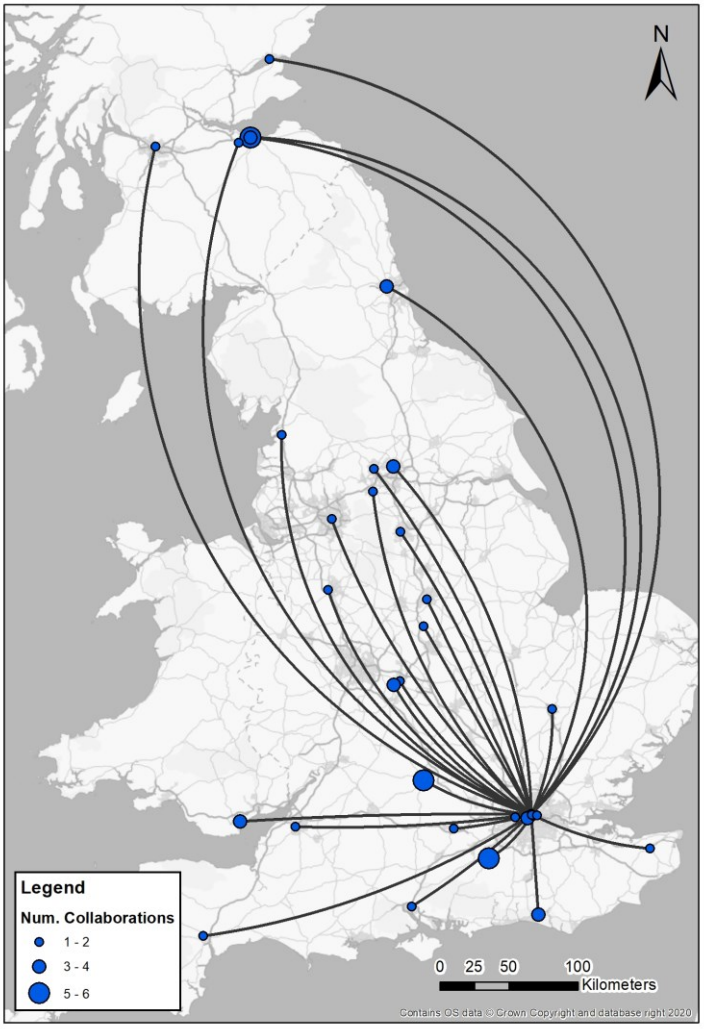
4.1 Collaboration

Collaboration occurs at all levels – within UCL, within the UK, and internationally – and involves both academic partners and external stakeholders in both funded and unfunded research.

4.1.1 Collaboration across UCL

With its commitment to interdisciplinarity the Unit has active collaborations across the Faculty and UCL more broadly. Much of this collaboration involves funded research projects. For example, the EPSRC-funded *Crime, Policing and Citizenship* project brought together researchers from the departments of SCS, Civil Engineering, Computer Science and Geography. At a structural level, the Unit's research centres foster ongoing cross-departmental collaboration. For example, the DCFC has supported projects by researchers from departments including Civil Engineering, Medical Physics, Institute for Materials Discovery, and Biochemical Engineering. Collaboration extends to research training, of course, with the EPSRC CDT in Cybersecurity.

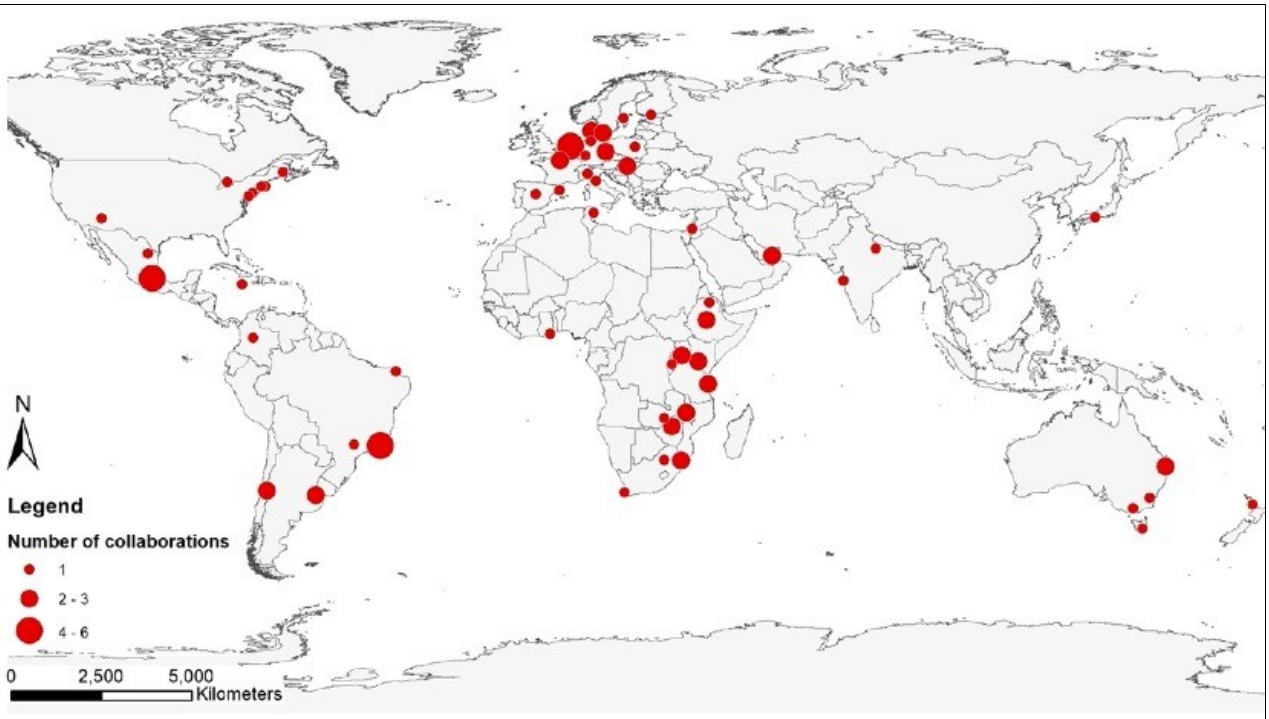
4.1.2 Collaboration with other UK universities



As shown on the map, staff have carried out more than 20 funded collaborative funded research projects with more than 30 UK university partners to deliver research aligned to our strategic priorities. Notably, PETRAS (led by **Watson)**, is made up of 16 institutions: UCL, Imperial College London, University of Oxford, Lancaster University, University of Warwick, University of Southampton, Newcastle University, University of Nottingham, University of Bristol, Cardiff University, University of Edinburgh and University of Surrey, Coventry University, Northumbria University, Tate, and University of Glasgow. In another example, **Laycock,** led the ESRC funded *What Works in Crime Reduction* project that involved eight institutions; UCL, Institute of Education, London School of Hygiene and Tropical Medicine, Birkbeck College, University of Cardiff, University of Dundee, University of Surrey and University of Southampton.

4.1.3 Collaboration with international partners

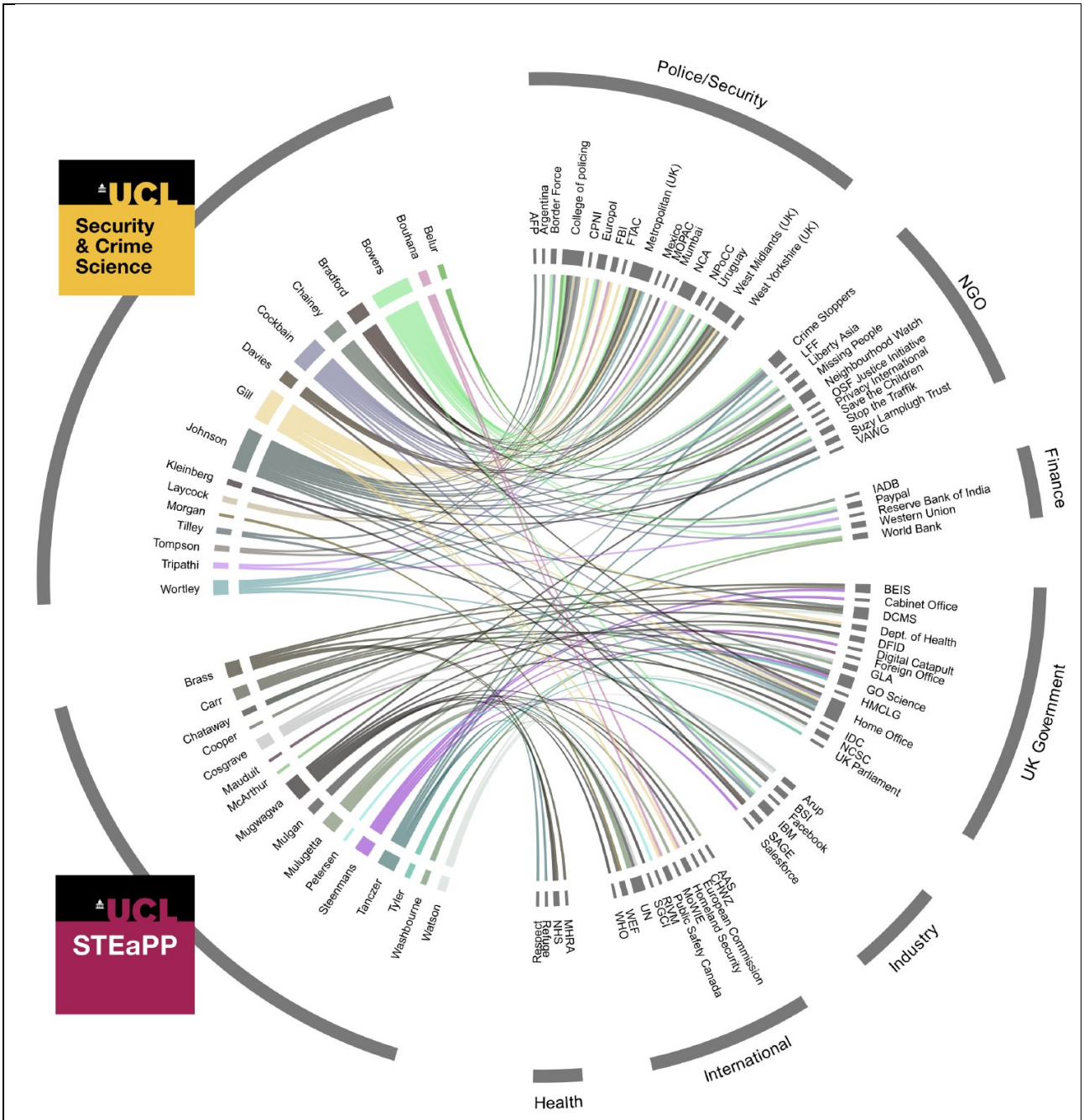
Our international reach is extensive, and staff have hundreds of international research collaborations. They have worked on funded projects with more than 50 international partners in more than 25 countries across all inhabited continents on research supported by the EU, the Australian, Dutch, French, Japanese and UK national research councils, the USA Minerva initiative, Public Safety Canada, US National Institute of Justice, CAPES-Brazil, FAPESP-Brazil, VERA Institute, British Foreign Commonwealth & Development Office, Inter-American Development Bank, Santander, and others. The map below shows locations where we have one or more research collaborations.



We are also regularly asked to accommodate visiting scholars and have done so for periods of up to two years. In the REF period we have hosted and collaborated with 15 scholars from countries including Australia, China, Japan, Korea, Netherlands, Poland, United States, Spain, Sweden, and New Zealand.

4.1.4 Collaboration with external stakeholders and research end users

Staff have active collaborations and long-term engagements with over 60 external stakeholders including police agencies (e.g., the National Crime Agency), government departments (e.g., the Home Office), industry (e.g., Facebook), the finance sector (e.g., PayPal), Non-Governmental Organisations and the charity sector (e.g., Lucy Faithfull Foundation). The extent and variety of some of these collaborations are illustrated in the Chord diagram below.



4.2 Contribution to research base

Staff make substantial contributions in terms knowledge creation and service to their disciplines.

4.2.1 Recognition

Staff are widely recognised for the significance of their research. Evidence of esteem includes:

Staff	Recognition
Bradford	Winner, 2018 British Journal of Criminology Radzinowicz Prize
Brass	BSI Standards Makers Award for Education about Standardisation by the British Standards Institution (BSI) (2019)
Carr	Appointed, World Economic Forum Global Commission on the IoT Appointed, Norwegian Research Council Panel of Experts

Chataway	BBSRC nominated member of the Academic.net network for Outstanding Female Academics
Cosgrave	Women's Engineering Society Top 50 Women in Engineering: Sustainability
Johnson	Appointed, Scientific Advisory Board of the Max Planck Institute for the Study of Crime, Security and Law
Morgan	World Economic Forum 21 Young Scientists 2019
Mulgan	Knighthood for services to the Creative Economy (2020) Chair, World Economic Forum Council on Innovation and Entrepreneurship
Mulugetta	Fellow, African Academy of Science
Petersen	Elected member, Academia Europaea, the European Academy of Humanities, Letters and Sciences Elected fellow, Institution of Engineering and Technology
Tilley	Co-recipient, ONS outstanding research award for the ESRC-funded project Home Office- sponsored awards for Problem Oriented Policing named in his honour.
Tyler	Appointed Council of the Royal Anthropological Institute Appointed Polaris Council of the STAA in the GAO in the US
Watson	Appointed Royal Academy of Engineering Trustee Board, 2019 Chair Royal Academy of Engineering Policy Centre President Institution of Engineering and Technology (2016-17)
UCL What Works team	Recipients, Chief Constables Commendation
Wortley	Member of the Order of Australia (AM)

4.2.2 Editorial roles

Staff have/had more than 40 active journal editorial roles during the REF period, including:

Editor

Collective Intelligence (**Mulgan**)
Crime Science **(Laycock**, **Bowers** and **Wortley,** in succession)
Journal of Forensic Science International: Synergy (Europe) (**Morgan**)
Zygon: Journal of Religion and Science (**Petersen**).

A**ssociate editor**

Climate & Development (**Mulugetta)**
Climate Policy (**Mulugetta)**
Frontiers in Political Science (**Brass**)
Journal of Energy in Southern Africa (**Mulugetta)**
Journal of Threat Assessment and Management (**Gill**)
Legal and Criminological Psychology (**Johnson**)
One Ecosystem (**Washbourne**)

Wires Energy and Environment (**Mulugetta)**

Guest editor

Applied Network Science (**Davies**)
Energy Access and Sustainable Development (**Mulugetta)**
European Journal of Applied Mathematics (**Johnson**)
Frontiers in Psychology (**Wortley**)
International Journal of Geo-Information (**Chainey**)
Journal of Quantitative Criminology (**Johnson**)

Editorial boards

Brazilian Journal of Police Science (**Chainey**)
British Journal of Criminology (**Bradford**)
Crime Prevention and Community Safety (**Tilley, Bowers**)
Crime Science (**Ashby, Johnson, Laycock, Sidebottom, Tilley, Wortley**)
Criminal Justice Law and Society (**Bowers**)
Dignity: A Journal of Sexual Exploitation and Violence (**Cockbain**)
Earthscan Science in Society (**Petersen**)
Earth System Governance (**Petersen**)
Energy Efficiency (**Cooper**)
Energy Research and Social Science (**Cooper**)
International Centre for Counter-Terrorism publication series (**Gill**)
International Criminal Justice review (**Bowers**)
International Journal for Technology Management & Sustainable Development (**Mugwagwa**)
International Journal of Forensic Science & Pathology (**Gill**)
*Journal of Quantitative Criminology (***Bowers*, ***Johnson)***
Journal of Research in Crime and Delinquency (**Johnson**)
Journal of Trafficking, Organized Crime and Security (**Cockbain**)
Legal and Criminological Psychology (**Bowers**)
Perspectives on Terrorism (**Gill**)
Policing (**Tilley**)
Science Policy and Governance and Frontiers (**Mauduit**)
Security Journal (**Wortley)**
Socio-Environmental Systems Modelling (**Petersen**)
Terrorism and Political Violence (**Gill**)
UCL Open Environment (**Washbourne**)

4.2.3 Conferences

Conference hosting

Since 2007, SCS has organised the International Crime Science conference in London. The event showcases leading international research and responses to critical threats and brings together ~175 security and law enforcement practitioners, policy-makers, researchers and security industry professionals from around the world to promote interaction, and disseminate research. In 2019, the event was hosted at the Royal Society in collaboration with the police-run UK Society for Evidence-Based Policing.

Conference committees

Staff have served on organising committees for conferences including American Society of Criminology (**Johnson**); IEEE European Symposium on Security and Privacy (**Mariconti**); IEEE Radar Conference (**Chetty**); INGSA bi-annual global conference (**Tyler**).

Invited conference talks

Staff have delivered more than 600 invited keynote and plenary talks, including 300 at international meetings in countries such as Abu Dhabi, Argentina, Australia, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, Ecuador, Egypt, Estonia, France, Germany, Hong Kong, Ireland, Italy, Japan, Latvia, Mexico, Netherlands, Norway, Russia, South Africa, Spain, Sweden, Switzerland, Taiwan, USA, Zimbabwe.

4.2.4 Service Activities

Reviews

Since REF2014, SCS staff have reviewed over 1,000 articles for over 80 journals, spanning the fields of criminology, psychology, computer science, geography, political science, public policy, management, and sustainable development. Since REF2014, STEaPP staff have reviewed hundreds of papers for dozens of journals, across fields of health, futures, energy, climate change, Science and Technology Studies, meteorology, citizen science, law, physics, engineering, religion, philosophy, development, public administration, political science, cybersecurity, internet of things, international relations.

External PhD examining

Staff have examined over 120 PhDs, 43 of which were from international institutions, including: University of Twente; Ghent University; University of Melbourne; Queensland University of Technology; National University of Ireland; Delft University of Technology; University of West Indies; University of Delaware; University of Pretoria; University of Technology, Estonia; University of Oslo; and United Nations University. UK PhDs examined were from institutions to include the University of Cambridge, Kings College London, University of Leeds, University of Manchester and the University of Oxford.

4.3 Economic and societal impact

As real-world impact is central to both departments' mission, staff actively engage with research end users through expert advice and other knowledge transfer activities.

4.3.1 Membership of expert boards and committees

Staff members are routinely invited to contribute expertise to high level committees in the role of chair, member, or expert consultant/advisor, both in the UK and abroad. Examples include:

Staff	Role
Ashby	Member, EU-funded PoI-PRIMETT II expert panel on metal theft
Bouhana	Expert consultant, UK Independent Commission for Countering Extremism Expert advisor, International Consensus Guidelines Committee for the Prevention of Violent Radicalization and Extremist Violence (UNESCO)
Bradford	Research lead, London Policing Ethics Panel
Brass	Chair, IoT-1 Technical Committee at BSI Member, BSI Standards, Policy and Strategy Committee
Chainey	Member, Chile Millennium Science Initiative Member, Metropolitan Police Violent Crime Panel

Chataway	Member, GO Science's Areas of Research Interest Oversight Board
Cockbain	Member, Government's Modern Slavery Strategy and Implementation Prevent Sub-Group Member, Commonwealth Parliamentary Association's Modern Slavery Expert Panel Global Initiative Against Transnational Organized Crime
Gill	Member, *Europol's European Counter Terrorism Centre,* Advisory Group on Online Terrorist Propaganda
Johnson	Member, Home Office's Scientific Advisory Council Member, GO Science's Areas of Research Interest Crime Prevention Working group Consultative Member, Government Office for Science Pandemic Influenza Group on Behavioural Science Sub-group (Policing and Security)
Laycock	Member, Home Secretary's Advisory Board on the *Modern Crime Prevention Strategy* Member, Home Affairs Select Committee; the UK Anti-Doping Innovation Commission Member, Board of the Women's Security Society
Morgan	Specialist Advisor, House of Lords Science and Technology Committee inquiry into Forensic Science Member, Home Office Search Technologies Academic Research Team Member, Inns of Court College of Advocacy working group on expert evidence
Mulgan	Member, Science Technology Options Assessment international advisory board for the European Parliament
Mulugetta	Member, Scientific Advisory Group for the UN Secretary General's Climate envoy Member, Scientific Advisory Committee of the Climate and Clean Air consortium Chair, World Economic Forum Council on Innovation and Entrepreneurship
Tanczer	Advisor, Open Rights Group
Wortley	Member, NPCC's Child Abuse & Protection Academic Reference Group

4.3.2 Consultancies and other engagement

Commercialisation of research and expertise is yet another way of achieving research impact, and UCL Consultants help facilitate this. Staff have been paid consultants to organisations including Facebook, various UK police forces, PSHE, CPNI, and the Home Office. Staff also provide, on an ad hoc basis, pro bono advice and research expertise to government, civil servants, industry, NGOs, and policy makers, both in the UK and internationally. Advice may be

delivered via personal meetings, formal presentations, and written submissions. The list of recipients in the UK includes the Cabinet Office, the Parliamentary Office of Science and Technology, the Home Office, the College of Policing, MOPAC; and internationally, government agencies in Argentina, Colombia, Mexico, the UAE, and Uruguay.

4.3.3 Media and public engagement

The Unit shares UCL's commitment to 'open education and knowledge to the world' and to that end we have undertaken a variety of public engagement activities.

Public seminars

Prior to the pandemic, the Institute for Global Cities Policing, Centre for Forensic Sciences and STEaPP ran evening seminar series and other events (e.g. the launch of the London Ethics Panel report on live facial recognition, the role of policy in reducing gender inequality in the workplace), with 3-4 events per term attracting 50-150 attendees each time on topics such as undercover policing, the investigation of rape, (mis)interpretation of forensic science evidence, and public responses to armed police. A series of webinars has been launched in 2021, and a "policing the pandemic" webinar held in November 2020 attracted 130 attendees.

Science Lates

In collaboration with the Home Office, SCS was invited to stage an exhibition entitled *A Night of Crime* in the Sciences Lates series at the Science Museum 2016, an event attracting 3,800 visitors (http://bit.ly/3kJvSb2). In 2018, STEaPP contributed to the Science Museum Lates: Year of Engineering, organising and running an interactive workshop on Guerrilla Urbanism to engage the public on the work of the City Leadership Laboratory.

TED talk

Morgan delivered a TED talk on *The Dangers of Misinterpreted Forensic Evidence*, 2018 (https://bit.ly/3rjdFno).

Media engagement

Cosgrave is the co-presenter of the radio programme *My Perfect City* which explores urban policy across the world and broadcast on the BBC world service which attracts a weekly audience of 300million listeners. She is also co-presenter on BBC's Tomorrow's World podcast. Most staff have been interviewed by/quoted in/written pieces for the media, some on a regular basis. Media outlets have included: Asian Affairs; Associated Press: Australian: BBC (TV & radio); CBS Radio; CNN; Daily Mail; De Volkskrant; Economist; Financial Times; France 24; Globe; Guardian; Huffington Post; Irish Examiner; Irish Independent; Irish Times; Japan Today; Mail; Nation; National Post; Newstalk; New Republic; New Scientist; New Statesman; New York Daily News; New York Times; New Zealand Herald; PBS; Physics; Reuters; Scientific American; Sri Lanka Guardian; Smithsonian Channel; Sunday Times; Telegraph; TV3; Vancouver Sun; Vice Magazine; Virginia Quarterly Review; Washington Post; and Wired.

4.4 Concluding remarks

Building deep and productive relationships across a diverse range of partners, stakeholders and end users goes to the very heart of the mission of both departments. Collectively, these engagements ensure that our research, and our approach to it, contributes to the wider research base, policy making and practice both nationally and globally.