

<p><b>Institution:</b> Department of History and Philosophy of Science, University of Cambridge</p> <p><b>Unit of Assessment:</b> 32B</p> <p><b>a. Overview</b></p> <p>The Department of History and Philosophy of Science (HPS) in Cambridge is one of the world's largest institutions in the coordinated study of philosophy of science with history of science. All teaching and research takes place on a single site in the centre of Cambridge, with the Whipple Museum of the History of Science and the newly modernised Whipple Library at its core. The research community includes teaching officers, museum, administrative and library staff, affiliated lecturers, college research fellows, postdoctoral research fellows, visiting students and scholars, and Master's and Ph.D. students. The Department is located within the School of the Humanities and Social Sciences.</p> <p>For 25 years, Departmental research has been focussed around specialised seminars and reading groups with up to twenty running weekly and fortnightly; these are the core of the research groups. Research is conducted through groups closely aligned with the seminar, workshop and reading group programmes. Each seminar or reading group is sponsored by a core member of staff, as approved by the Department's Executive Committee (Research). All research students and Postdoctoral Fellows (PDFs) affiliate to these. Research work includes a commitment to collaborative workshop and conference planning with review and development of each research focus. Some of the seminars and workshops are closely associated with externally-funded research grants; others are free-standing and their activities may give rise to future research grant activity.</p> <p>The Department's research Groups/Specialisms: <b>A:</b> Early medicine; <b>B:</b> Early mathematics and natural philosophy; <b>C:</b> History and philosophy of physical sciences; <b>D:</b> Explanation, inference and realism; <b>E:</b> History of philosophy; <b>F:</b> Philosophy of mind, psychology and human sciences; <b>G:</b> Philosophy of biology; <b>H:</b> Ethics and political philosophy; <b>I:</b> Museology of the sciences and history of instrumentation; <b>J:</b> History of the life and environmental sciences; <b>K:</b> History of modern medicine and biomedical sciences; <b>L:</b> History of the human sciences; <b>M:</b> History of non-Western Science. Core members of staff usually belong to more than one Group.</p> <p><b>b. Research strategy</b></p> <p>The Department's research strategy consists principally in fostering the research initiatives of individual University Teaching Officers (UTOs) and the research groups to which they belong and lead. Through workshops, research seminars and reading groups, these UTO-led groups facilitate a multi-faceted series of feedback and synergistic relations with colleagues, associated postdoc researchers and graduate students that help shape and facilitate the development of further research projects. Research groupings also act as foci for collaborations and relationships with national and international colleagues that further invigorate the research environment of the Department. Research strategy is developed and overseen by the Executive Committee (all core staff, senior and junior) advising the Head of Department; every twice-termly meeting of the Committee includes a Strategy Agenda and Research Agenda. The Committee seeks to develop the Department's research expertise across all research groupings and new priority areas, in order to maintain the Department's world-leading research output, and plans to replace active grants with new projects on a 3-5 year cycle. Advice can be sought from the School's Research Facilitators. It is only rarely that anyone other than a UTO in the Department acts as PI for a major research grant, therefore the Executive Committee Meeting includes nearly all PIs. The largest research projects are the subject of long-term collaboration preceding the grant application. One specific project, 'From Generation to Reproduction' (GtR), funded 2009-15 by the Wellcome Trust (WT), built on the WT Enhancement Award (2004-9), with four senior HPS staff as joint-Pis alongside 4 from outside HPS across 3 of the University's six Schools.</p> <p><b>(1) Achievement of Strategic Aims outlined in RAE 2008</b></p> <p>Our 2008 aims were largely achieved, but, as with any active research culture, some shifts have taken place driven by staff changes and the strategic decisions of the Executive Committee. Research groups in Metaphysics, Epistemology and Sociology of Scientific Knowledge have been discontinued due to staff departures, although research in the areas mentioned in 2008 (including Sprevak on the metaphysics of computation) has been completed at other institutions. Lewens remains active in these areas and has published several peer-reviewed articles on metaphysical</p>
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themes in biology (especially essentialism, taxonomy and kind-hood) and risk and epistemology. The previous group 'History of Physical Sciences' is now expanded as 'History and Philosophy of the Physical Sciences' (which includes a vigorous group in 'History and Philosophy of Chemistry').

The Executive Committee formed a new research group focussed on the History of Non-Western Science (Group M), whose activities included conferences and workshops in connection with the project 'Exploring Traditions: Sources for a Global History of Science' (AHRC), studies of 'Scientific medicine in Bengal', studies of malaria and diet in nineteenth century British India and colonial astronomy in India and Australia. 'Field Notes', an initiative based at the Centre for Research in Arts, Social Sciences and Humanities (CRASSH) devoted to 'interdisciplinary discussion about the histories of archaeology and anthropology', has considerable HPS involvement and sponsorship.

The achievement of research aims in RAE2008 and their further development included, in **Group A**, Kassell's major digital edition of Forman's and Napier's medical records (The Casebooks Project: Simon Forman and Richard Napier's Medical Records, 1596-1634 (2010-13; £515K)), live 2011-; Cunningham's and Kusukawa's major books were published; the sustained success in attracting WT-funded individual research fellows sponsored by Kassell (6 in the census period) and Jones has made the Department a major centre of early modern medicine. Robson's 2011 Pfizer Award-winning *Mathematics in Ancient Iraq: a Social History* (2008) and major studies co-authored by Jardine (2008) were published in **Group B**; *Geography of Knowledge in Assyria and Babylonia, 700-200 BCE* (2007-14) (£787k) continued; Taub's planned book on Greco-Roman writing about nature appeared. A *Special Issue* on 'Forms and functions of early modern celestial imagery' in *Journal for the History of Astronomy* (2010) brought together some of the work produced by the AHRC-funded *Diagrams, figures and the transformation of astronomy, 1450-1650* (2008-13; £491k) as did the study (2011) of picturing knowledge in the early Royal Society. Within **Group C**, Leverhulme funding (2008-10) for research on British astronomy and colonial projects resulted in Schaffer's co-edited collection (with an authored contribution) *The Brokered World: Go-Betweens and Global Intelligence, 1770-1820* (2009) and his Turner Lectures (2010) and in turn was the seed for the AHRC-funded joint project with the National Maritime Museum (NMM) of *The History of the Board of Longitude 1714-1828* (2010-15; £925k), which, through collaboration with JISC and the University Library (UL), generated the major website of the entire digitised archive of the Board: 'Navigating 18th century Science and Technology'. The AHRC award for work on Talbot resulted in a major joint publication (co-ed. M.Brusius, C.Ramalingam, and K.Dean, all members or former members of the Department), *Beyond Photography* (Yale, 2013), as well as a catalogue of Talbot's notebooks in the British Library. Ramalingam's BA postdoc (2011-14) has resulted in the completion of a forthcoming book *To see a spark* (Chicago) and several papers on Victorian physics and photography. Major studies by Rampling in early modern alchemy (awarded the 2008 Partington Prize) and Chang in chemistry furthered broader strategic aims.

**Group D's** projects mentioned in the 2008 submission were continued in other institutions after the departure of Dicken, McLeish, Sprevak, Tosh and Brosnan. Lewens completed several articles on biological explanation, and considerable amounts of work have been done by new staff (Chang, Birch, Alexandrova) in the areas of scientific realism, models, and explanation in scientific practice.

**Group E's** interdepartmental Kant Reading Group organised, in addition to its weekly term-time meetings, 5 annual workshops; the PhD students involved (Golob, Mudd, Choi, Kraus) all went on to PDFs and 2 to subsequent lectureships. The books on Kantian teleology and anthropology projected in the 2008 report have been published (Cohen (York) and Breitenbach (Philosophy, Cambridge)). The appointments of Alexandrova and John reinforced **Group F's** growing strength in the philosophy of the social sciences, with publications on values and well-being, models in economics and with two major ERC grants ('Economics and the public sphere' (see below)) and 'A science of human nature?'. Earlier work (2006) funded by the Philip Leverhulme Prize on 'Human nature: Assessing the Biological Foundations of Ethics' in **Group G** is to be published as a collection of articles with OUP, and has been further expanded into the major ERC-funded project "'A science of human nature?'" (2011-16), with two research fellows and two research students led by Lewens. Earlier work on philosophy of natural selection has been extended by the major studies published by precociously productive and already influential Birch (PhD 2013). The Department regularly hosts distinguished visitors in these areas, and has sponsored several workshops and conference sessions. Lewens' and John's work in bioethics, risk and applied ethics in **Group H**, particularly in relation to public philosophy, was continued and expanded with the arrival of

Alexandrova's work on values in the philosophy of economics; John also published articles on the precautionary principle and public health ethics. Books on the foundations of decision theory were published after Peterson moved to a different institution.

As anticipated in RAE 2008, within **Group I** ('Museology of the sciences and history of instrumentation' formerly 'Material culture and the scientific enterprise', renamed to reflect more accurately the central place of the Museum and instrumentation in the Department's research activities), the project on Auzoux's botanical models was completed (2009) and a special issue of *SHPS* (2009) featured new studies on scientific instruments (as did a special 'Focus' section of *Isis* (2011)); the new section on globes in the collection was incorporated into the research-based website (2009, continuing, as well as sections on other collection areas), and a permanent display featuring unusual globes has been installed, building on individual research projects (2010-13). An innovative exhibition related to the 'Board of Longitude' was installed in the Main Gallery (2011). The Scientific Heritage Project has completed work to map holdings in science departments and edited a special issue of *SHPS* (2014). Work continues on the catalogue of the large collection of hand-held electronic calculators. **Group J's** planned work on science in the era of Reform led to two workshops ('Great Chain of Being' and 'Seriality') which were published as a special double issue of *History of science* on 'Seriality and scientific objects in the 19th century' (2010). A series of publications coinciding with the bicentenary of Darwin's birth (2009) included Darwin, *Evolutionary Writings* and 'Global Darwin'. An HPS doctorate (2005) and research on the 'Past versus Present in Victorian Britain' project (Leverhulme, 2006-11) led to the publication of *Peoples on Parade: Exhibitions, Empire and Anthropology in 19th-Century Britain* (2011); the planned papers on Darwin and the science of emotion appeared (White). Several researchers continue work with the Charles Darwin Correspondence project at the UL, which, under the Directorship of Secord (2006-), has secured long-term funding and is providing a world-recognized website and resource. In **Group K**, the WT Strategic Award on GtR (2009-15; £810k) plus 3 WT PhD studentships and a WT project grant achieved the aim of increased core funding as aimed at in 2008. Studies of vertebrate embryology (IVF prehistory, approaches and species, portraiture) and the online exhibition 'Making Visible Embryos' were published. **Group L's** work on the reception of psychoanalysis in Cambridge led to publications on Bernal and Rivers as well as a major study of the intertwining of the founding British psychological and psychoanalytic institutions; special issues of *Psychoanalysis and History* were devoted to 'Psychoanalysis in mid-twentieth-century Britain' and 'Latin American Dossier' (2012). The project 'Economics in the public sphere' (2011-) gave substantial impetus and new resources to research in the mid- to late-C20 human sciences.

## (2) Strategic Aims 2014-2019:

In 2008-13, five new appointments were made (4 at the Lecturer level), a relatively high proportion of the overall core staff of 12; of the 7 in post in 2008, 6 are now Reader or Professor. Our strategic aims will concentrate on developing the research areas of the new appointments, together with new fields which have been collectively identified as high priority by the Department's Research Committee, in particular the fields of Global Studies of Science, Technology and Medicine; Philosophy of Cognitive Science, Psychology and Artificial Intelligence; Medieval Science and Philosophy (including Latin, Greek and Arabic traditions). The Department's already strong and proven initiatives in the digital humanities will be strengthened and extended within the University's Digital Humanities Network. The planned expansion of the Museum with a new Gallery will be linked to the furtherance of projects already associated with 'Scientific Heritage'; a scoping project, jointly funded by the Department and the Isaac Newton Trust (INT) (2010-12), employing a Research Associate and a senior academic consultant, has laid the ground for this development. The history and philosophy of modern physical sciences has grown significantly in strength with new appointments (Chang (2010) and Staley (2013)) alongside Schaffer and new research initiatives in place (Mitchell's PDF): AD HOC ('Association for the Discussion of the History of Chemistry') is organized by Chang and Rampling and links groups in London and Cambridge.

The appointments of Alexandrova (2011), John (2012) and the award of two ERC major grants led by Lewens ('A Science of Human Nature? Philosophical Disputes at the Interface of Natural and Social Science' (2011-16); €1.4M.) and Mata ('Economics in the Public Sphere: USA, UK, France, Poland and Brazil since 1945' (2012-16); €1.6M.) give a strong core of experienced researchers, all still in their thirties, who will develop research in the area of history and philosophy of social sciences, ethics and public policy. Initial projects in detailed planning are: 'Philosophical foundations of quantification in ethics and social science' (3-year postdoc 2014-17), a WT New

Investigator Award ('Publics, Populations and Environments: an integrated philosophy of public health policy' 2014-18) and research on the philosophical foundations of 'well-being' in conjunction with the Cambridge Centre for Well-Being.

Future strategy in the history of medicine includes building on and extending the major digital edition of Forman's and Napier's medical records (*The Casebooks Project*) with further WT support, both specifically for this project and for the general area of early modern medicine. A large, field-defining edited volume on *Reproduction*, special issues on 'Transforming Pregnancy', 'Making Human Heredity' and 'Communicating Reproduction', and books on *Icons of Darwinism*, *Making Antenatal Life*, *Visualizing Human Embryos*, and *History of Pregnancy Testing* will result from the WT GtR.

The Department will also expand interdisciplinary and collaborative research. This will include participation in University initiatives including a new MPhil in Public Policy and the continued development of the Centre for Science and Policy. The new Lectureship in Philosophy of Public Health, continuing the Department's long-term collaboration with the PhG Foundation, will provide a key node for interaction with the University Strategic Network in Public Health. In addition, CamPoS (Cambridge Philosophy of Science), a joint initiative with the Faculty of Philosophy led by Chang and Huw Price, provides a new forum and research seminar.

### c. People, including:

#### i. Staffing strategy and staff development

As of October 2013 there are 12 established UTOs, including 6 Professors, one of whom is also the Director and Curator of the Whipple Museum, and one Reader in the Department; in addition, there are 30 Research Fellows and Teaching Associates, 5 Affiliated Lecturers and College Teaching Officers and 7 other College Fellows (excluding UTOs). The period 2008-13 saw major changes in the Department's philosophy of science activities due to the death of Lipton (2007), the resignation of Kusch (2009) and the retirement of Jardine (2010). The election of Chang to the Rausing Chair (2010) provided replenishment at the senior level; a new Lecturer (Alexandrova) was appointed (2011) with expertise in the philosophy of economics and the social sciences; John was appointed to a new post in Philosophy of Public Health (2012). On the history side, a new post in history of modern science and technology was created and filled (Curry, 2012), and a new Lecturer (Staley, 2013) was appointed with expertise in the history of classical and modern physics. Of the five new permanent appointments in the census period, four came from positions outside Cambridge (UCL; St Louis-Missouri; Yale; Wisconsin-Madison). Appointment to new posts proceeds through an identification of a very general field of need, rather than through strict replacement of expertise, although the Department was committed in this period to full restoration and expansion of its strength in philosophy of science. Posts are filled by international advertisement, short listing and two days spent by short-listed candidates with core Department staff, together with public seminars. The number of core staff has increased by two in the period 2008-13, through generous donations creating the Peter Lipton Lectureship in History and Philosophy of Science and through an interest-free loan assisting the establishment of a permanent Lectureship in Philosophy of Public Health.

Permanent posts now include 3 Professors still in post from the start of the assessment period and 3 new Professors appointed during that period, one by election (Chang) and two by promotion (Lewens 2013, Taub, 2010); Kassell was promoted to Reader (2013). Promotion to personal Readerships and Professorships is run through an annual highly-structured competitive exercise with final decisions made by a Committee chaired by the Vice-Chancellor. Promotion requires evidence to demonstrate a significant international research reputation, supported by objective criteria and strong external support.

By University Statute, Teaching Officers are granted one term's sabbatical leave for every six served or cumulatively *pro rata*; leave is co-ordinated with research projects and the general needs of the Department and requires approval by the HPS Board. All UTOs have made full use of their sabbatical research leave rights; the Department oversees arrangements for cover and encourages combining sabbatical leave with externally funded research leave, so that the Department may make longer-term fixed-term replacement appointments. The aspiration is usually to make 2-year appointments if possible, so that the fixed-term appointees may often combine periods of full-time research with teaching responsibilities; the Department regards this researcher-employment-template as facilitating the career development of junior scholars taking up these

positions; such posts may be regarded as stepping stones within a successful academic career rather than as temporary fixes. In the review period, 9 research-active staff were employed through such arrangements. The Department, in its recruitment and treatment of staff and students, is committed to the principles of the University's Equal Opportunities Policy, which was updated in 2010 in light of the Equality Act.

All research staffing appointments proceed through international advertisement. Individual researchers, usually external to the Department, approach core staff and develop individual research projects for funding with the core staff-member as sponsor; full oversight (and now ranking) is provided by the Executive Committee under its Research Agenda. The Department is very proud of its high rate of success in sponsoring individual candidates for free-standing international, national and Cambridge College research fellowships: the total awarded in the period 2008-13 was 25. Throughout the census period, a total of 36 research-active staff were employed on such free-standing research grant funds. As a result of the success of individual research project applications, major research grant applications and College Research Fellowships, the ratio of fixed-term researchers to University-funded permanent staff in the Department is very high (approx. 2.5:1 at present).

HPS is committed to encouraging and resourcing research expertise by all staff, especially entrance level and junior staff. Administrative duties are shared equally and teaching loads are uniform, with no distinction between more and less senior UTOs and no lightening of teaching load for administrative responsibility. Travel Grant schemes, along with HPS funds (including School-designated Head of Department funds), offer financial assistance with travel costs and living expenses incurred in research trips or conference participation; all core staff can apply to the Head of Department for up to £1,500 p.a. for research costs. For all staff, biennial appraisal interviews are conducted that include evaluation and advice on research output and direction. Officers prepare reports on their research work and set out plans for future initiatives. All teaching officers are supplied with computing and office facilities for their research work. HPS offers facilities for meetings and colloquia organised by staff in connexion with their projects. Seminar groups and provision of supportive resources for these projects play a decisive role in the publication of major joint collaborative works by HPS researchers.

The Department takes very seriously its 'duty of care' towards research staff. Staff development for core staff and PDFs follows University guidelines. Mentors are appointed with care. We assume that PDFs will wish to make available their expertise through teaching at undergraduate and postgraduate level and thus acquire experience valuable to the development of their careers; all non-UTO researchers or College staff are paid for contributing to the teaching programme. They are also invited to participate in the governance of the Department through election or co-option to the HPS Board, which is responsible for the overall governance of the Department. All research staff, including early career researchers, participate in the research groups and seminars, from the most general, with the largest audience (Department Seminar, audience often of 50+) to the smallest groups made up of core specialists. Three members of staff have taken advantage of the University's generous provision for paternity leave and five for maternity leave. Core members of staff have also made use of the University's Senior Academic Promotions CV Mentoring Scheme and the mentoring schemes designed especially for female researchers and teaching officers. The high ratio of fixed term research staff to permanent staff in the Department is in keeping with the general trend across the University; in recognition of the need for more housing for researchers, the University has embarked on a major property development in North West Cambridge. In the first £300M phase, due to open in 2015-16, high-quality and sustainable housing will be provided for over 600 postdocs and their families, together with retail and social facilities; this initiative will make it much easier for the Department's postdocs to find suitable housing.

## ii. Research students

The Department trains significantly more doctoral candidates in the field than any other comparable institution in the UK; this has been true for several decades and continues to be the case. The number of research students registered at any given time has consistently remained high (above 40 PhDs) throughout the period 2008-13, with numbers increasing slowly but steadily. An important new avenue of access to postgraduate research in HPS was the establishment in 2009 of a Part III History and Philosophy of Science within the Natural Sciences Tripos – a fourth year undergraduate course which when successfully completed is rewarded with the award of

M.Sci. in addition to BA (Hons). This provides another route for students wishing to enter the doctoral programme in HPS. In its first four years, the number on this course has averaged at 11 (the provisional quota is 12). Taken together with those students taking the MPhil in History, Sociology and Philosophy of Science, Technology and Medicine (maintained at 20 p.a.), the numbers taking Masters courses (either Research Master's or M.Sci. with a 67% research component) in HPS have increased by 50% in the census period. A significant proportion (c. 30%) of students on both Masters courses go on to doctoral research in the Department (with an additional significant number continuing doctoral studies elsewhere); these two tracks now provide the principal source of HPS's entry-level doctoral candidates (c.70%). A further 39 visiting research students were hosted during the review period, taking part in seminars, reading groups and research supervision: most of these were registered at universities in North America, EU and East Asia (7 (2007-8); 5 (2008-9); 2 (2009-10); 9 (2010-11); 9 (2011-12); 7 (2012-13)).

HPS trains research students in methodology and historiography and instructs in the use of research resources. The Director of Graduate Studies oversees all students' work; the MPhil and Part III Managers direct Masters students and assigns them supervisors. Both the MPhil course and the Part III course combine taught and research components. Teaching takes place in weekly seminars led by the teaching officers and through individual supervision of essays and dissertations. Students are exposed to material from the field and present their own work in Seminar. All students attend two introductory meetings on research methods and resources. HPS publishes an online *Guide to Research Resources*. Staff organise Graduate Training workshops on topics such as grant and job applications and oral and written presentation skills, and maintains regular classes in Latin, Greek and German, with additional classes in Akkadian and Sumerian. All students have the opportunity and are encouraged to work intimately with Museum objects, and to gain specialist training in the history of the book. Further courses are offered centrally by the University through the Researcher Development Programme, which brings together training in research skills, communication, teaching, business, career development and presentation from across the University.

HPS encourages all prospective PhD students to take its MPhil or its Part III course. These promote the combination of historical with philosophical approaches to the sciences and offer a grounding in method and research strategy. Students who do not take the MPhil course submit a substantial piece of work at the end of their first PhD year which must reach the standard of an MPhil distinction in order for registration for the full PhD to be approved. Doctoral students have a supervisor and an advisor. The advisor is appointed by the Degree Committee at the end of the first term in consultation with both supervisor and student and regularly reads draft material. At the end of each year a substantial piece of work, thesis outline and timetable are read by the advisor and supervisor who provide the Degree Committee with a joint report. All PhD students maintain a progress log to record these joint reports, meetings with supervisor and advisor, action plans and attendance at seminars, conferences and courses. The Degree Committee closely oversees progress of all registered doctoral candidates regularly and adopts appropriate action to ensure that all students complete within 3 years. Submission rate is close to 100%.

HPS tries to integrate all younger scholars in its research activities through participation in research seminars and collaborative work with more senior members using the training opportunities offered by research groups. All graduate students attend the general HPS seminar and at least one of the other seminar series. Most PhD students present their work in the HPS seminar, the principal Departmental research forum. Graduate students organise fortnightly workshops in history of science and in philosophy of science for their research, play a leading role in organising seminar series and reading groups, and have organised Cambridge meetings of the postgraduate conferences (e.g. BSHS).

HPS forms part of the University's AHRC Block Grant Partnership. Research students have been successful in gaining Studentships from AHRC (27), Gates Trust (5), WT (9), Cambridge Domestic Research Studentships (2), Cambridge International Scholarship Scheme (2), Turner (1), Gerstenberg (2), BSPS (1). HPS attracts many overseas postgraduate students: in the review period, approx. one third of students were from overseas, one third from other EU countries and one third from the U.K. HPS maintains an active programme for research student funding through Williamson Studentships (University Trust Fund; income £15k p.a.) supporting research in history of biological sciences and Rausing Studentships (University Trust Fund; income £40k p.a.) supporting work in history and philosophy of science, excluding the history of medicine; on average

**Environment template (REF5)**

8 doctoral students receive partial funding each year. Students who have completed an undergraduate natural sciences degree and intend to pursue a course of philosophical study are eligible for a Gerstenberg Studentship (University Trust Fund; income £16k p.a.). Turner Studentships (Trinity College competitive fund) meet the full cost of a student undertaking a PhD in philosophy of science or history of scientific ideas. In recent years and going forward the School has established a new funding stream for Masters and doctoral students.

A very high proportion (c.80%) of successful doctoral candidates and PDFs take academic positions in history and philosophy of science (or history, or philosophy) or in related fields, such as museums – often the very best jobs: one PDF left in early 2013 to a 5-year University Fellowship at Birmingham preceding a Senior Lectureship there; another takes up a position as Assistant Professor, Princeton in early 2014. A doctorate in HPS is increasingly regarded as providing suitable and desirable expertise in other Departments in the humanities and social sciences: HPS doctoral graduates have recently been appointed in Cambridge to Lectureships in Geography, History (2) and Philosophy; the new Head of African and Asian Studies at the British Library holds a doctorate from HPS.

**d. Income, infrastructure and facilities****i. Income**

The Department has 27 active research grants with income amounting to over £6M for the period 2008-13 (31.7.13), rising strongly across the census period. These are a mixture of large scale 5-year programme grants, research leave awards, project grants, network grants and fellowships. The remaining large budget flow for 2013-17 provides a secure financial basis going forward. The substantial Department Trust Fund capital of £11,804,652 (31.7.13) provides income for clearly specified and restricted expenditure, supporting (in descending order of annual expenditure): i. Whipple Museum acquisitions; ii. Posts: Rausing Lecturer; Lipton Lecturer; Curator of Whipple Museum (part); Lecturer in Philosophy of Public Health (part); iii. Research studentships; iv. General support for History and Philosophy of Science.

Officers have been successful in winning external awards to pursue research, for which the HPS Board grants them additional research leave: Kusch (Professorial Award, Helsinki Collegium for Advanced Studies, 2008-9, £35K), Schaffer (Leverhulme Major Research Fellowship, 2008-10), Secord (American Council of Learned Societies, approx. £19K p.a. 2008-13), Robson (Friedrich Wilhelm Bessel Research Award, Alexander von Humboldt Foundation, €45K (2011-12)); Lewens (Crausaz Wordsworth Fellowship, CRASSH, 2011; ERC, 2011-16). The WT Strategic Award funded 8 specialist research assistant posts with doctoral qualifications and 3 years of replacement teaching during research leave granted to 4 Departmental PIs, for which the Department used matching funds (in part from the INT) to fund a series of 2-year positions. The University and INT has established the Cambridge Humanities Research Grants Scheme for individual University researchers (£1K-£20K).

**ii. Infrastructure**

The Department is located in one building in the centre of Cambridge; the building, part of the first generation of scientific laboratories in Cambridge, is Grade II listed; the Museum's Main Gallery is a seventeenth-century hall housed within the 19th-century structures. The physical proximity of all teaching, research, museum, library and administrative staff is vital to the Department's success by creating a vibrant and collegial research environment. Funding of £1.7m (SRIF3) supported the construction of a fully renovated library building opened in 2008. Full IT services are available to all researchers, Museum and Library; off-site back-up is hosted by a School IT service. A compact and well-organised Departmental administrative office comprising 11 members of support staff working in 5 teams – administration, library, museum, IT and H&S – coordinates relationships between students and staff, funding applications and contracts, data for investigators and funding bodies, seminars and lecture series as well as maintaining records, producing reports and managing resources.

**iii. Facilities**

*Whipple Museum:* The Department is unique in the UK in having major teaching and research programmes connected to a museum which houses a world-renowned collection of scientific instruments apparatus, models, pictures, prints, photographs, books and associated material relating to the history of science from the medieval period to the present day. The Museum is open to the public *gratis* for 4 hours each weekday. The Whipple Museum of the History of Science was

granted Designation status as a pre-eminent collection by the Department of Culture, Media and Sport in 1997 and has an outstanding international reputation, featuring prominently in scholarship in the field. The Whipple collection provides an important resource and service to the wider research community, is particularly well placed to engage in and stimulate innovative and interdisciplinary activity and is very actively used by research students, academic staff, PhDs and scholars from a range of UK and international universities and institutions.

The Museum is sensitive to the needs of scholars and students and strives to provide ready access to and information on its collection through a variety of means. The Director and Curator and other staff members offer Research Methods seminars for researchers, to encourage and support research topics based on Whipple holdings. Access to the collection, documentation, specialist staff, the Whipple Library and study facilities are readily available to support research. Museum officers and researchers collaborate in exhibitions and documentation of artefacts. Museum staff publish studies on the holdings of the museum and research its collections with a focus on issues of provenance and historical significance. Researchers also use the very important resources of other museums in Cambridge, including those of Zoology, Geology and of Archaeology and Anthropology. Research students have over an extended period regularly been able to work as interns in the Museum, in addition to the National Maritime Museum, Greenwich, under a scheme established in 2004.

A new Gallery for the Museum, together with expanded research and postgraduate facilities, is planned as part of the University's redevelopment of the New Museums Site (2014-22); the new Gallery will allow display of more of the Museum's objects and materials relating to the development of science in Cambridge; it is anticipated that the University will fund nearly all of the new Gallery and research facilities. A recently filled (2013) new permanent Assistant Curator will allow the Museum to make full use of the recently (2013) endowed Whipple Museum of the History of Science Conservation Fund (£0.5M) and help develop plans to open the new Gallery.

*Whipple Library:* As the UK's pre-eminent specialist HPS library the Whipple plays a central part in the Department's mission supporting the research, learning and teaching of staff and students. Staffed by a full-time Library Assistant and Librarian, who reports on a termly basis to the Library Committee chaired by the Head of Department and reporting to the HPS Board, the fully renovated library building (2008) provides improved research access to loan, reference and archival holdings; the Library is now one of the most attractive library spaces of its kind in the University, accommodating 45 readers, an area for holding seminars as well as the following facilities: 8 iMACS for searching catalogues/e-resources/internet, a microfilm reader/scanner, colour photocopier, wireless network, scanner and printer. The Library is heavily used not only by members of the Department but also by students and staff from other departments in the University, as well as visitors. In addition to its holdings (36,500 books) the Library provides new microfilm scanners and electronic access to research resources for all researchers. The policy to acquire and conserve valuable archival material from science departments remains a priority.

All researchers and students in HPS, aided by the Whipple Library, have access to the outstanding library holdings elsewhere in the University and colleges. This includes the UL, a national legal deposit library home to over 8 million books, journals and other items. The UL also provides an extensive digital library of e-resources and databases and has, since 2010, begun to digitise many of its manuscript collections to make them more accessible to researchers and students. This includes the extensive Foundations of Science Collection that incorporates the UL's Newton papers, as well as those of Charles Darwin, Lord Kelvin, James Clerk Maxwell (among others) and the archives of the Cavendish Library and Royal Greenwich Observatory. HPS maintains a website holding information and instructive materials for all students, including the Guide to Research Resources, annual reports, timetables and seminar schedules.

Whilst departmental teaching requirements are fully supported and fundamental to the Library's collecting remit, support for research is provided primarily in areas relating to the Library's specific collection strengths which stem principally from the Library's foundation collections, its historic connection to the Museum, and from acquisitions based on advice from the permanent teaching staff of the Department over the past 60 years. The Library also provides subject expertise in the collection of HPS-related printed and e-resources across the University as a whole. As part of the Department's induction and research training programmes, Library staff provide a range of user education sessions to inform users about the vast range of available HPS-relevant e-resources as

well as relevant special collections held by other Cambridge libraries. The Library's website, under constant revision and enhancement, acts both as a guide to the Whipple and, most importantly, as a gateway to HPS-relevant electronic, print and manuscript resources. The Librarian monitors developments in e-resource provision in order to ensure the best possible service is maintained.

#### **e. Collaboration or contribution to the discipline or research base**

##### **i. Collaboration**

The Department enters into collaboration through research grants and through long-standing institutional networks: the AHRC-funded joint project on the 'Board of Longitude' with the NMM consolidated a decade-long research collaboration. Long-standing multi-level links with Berlin (Max Planck Institut für Wissenschaftsgeschichte (MPI)), the largest concentration of historians of science in the world) have fostered senior staff collaboration (Forrester, Schaffer, Taub, Staley) and a high number of pre- and postdoctoral fellowships have been awarded by the MPI to members of the Department. Through long-standing links with Sonia Horn, Head of the Department of the Collections of the Medical University of Vienna and Mitchell Ash, Director of the PhD Programme, 'The Sciences in Historical, Philosophical and Cultural Contexts', at the Austrian Science Foundation, University of Vienna, regular exchanges include reciprocal welcoming of postgraduate students and PDFs. The Department values its high level of reciprocal exchanges, with 39 Visiting Students in 2008-13, since they instil the values and benefits of collaboration, particularly at the international level, as part of core training in the principles and best practice of academic research. HPS is active in encouraging close collaborations with cognate groups elsewhere: the status of Visiting Scholar is awarded to senior researchers from other Universities: during the review period 2008-13, 70 Visiting Scholars, many on externally-funded overseas research fellowships, were hosted, including scholars from Australia (4), Austria (6), Belgium (5), Canada (1), China (4), Czech Republic (1), France (1), Germany (4), Greece (1), India (1), Italy (3), Luxembourg (1), Malaysia (1), Mexico (1), Netherlands (3), New Zealand (2), Norway (2), Romania (2), Spain (10), Sweden (1), USA (8), and Britain (Aberdeen (2), Birmingham (2), Oxford (1)). All Visitors (both Scholars and Students) must have a sponsor (leader of Research Group) from amongst the core staff (who acts as Temporary Research Supervisor for the Students), and their visits must be approved beforehand by the Research Committee.

The Department approves the appointment of Affiliated Research Scholars, for 3 years in the first instance, subject to scrutiny by the Executive Committee; these scholars greatly facilitate the building and maintaining of networks and collaborations. Each Scholar has a sponsor from the core staff, through whom the connection to Department activities and any collaborative research activities are maintained. Such Scholars are not necessarily resident in Cambridge, but must have a significant past or present connection with the Department's research activities and should in principle be available to supervise or examine Master's research essays; they number 74 and include, from outside Cambridge, members of the Universities of Oxford, Galway, Royal Holloway, Cardiff, Queen's Belfast, Open University, Lancaster, KCL, LSE, MPI Berlin, Uppsala, Swansea, Leicester, Anglia Ruskin, and UCL; from Cambridge they include staff at the Needham Research Institute (a recognized international centre for the study of the history of East Asian science, technology and medicine) and a dozen University Faculties/Departments with which HPS has particularly close collaboration. CRASSH has played an increasingly prominent role in fostering interdisciplinary collaboration across the census period: HPS's core staff, postdocs and research students have been leading figures in this development, active in organizing its events and conferences (e.g. 'Things: Early Modern Material Cultures' 2011-13).

##### **ii. Contribution**

Members of the Department regularly edit front-rank scholarly journals out of the Department (e.g. SHPS, BJHS, *History of Science*, *History of Psychiatry*, *Psychoanalysis and History*), take on administrative roles in the major learned societies (BSHS, BPS) and host their conferences in Cambridge; Hasok Chang is President of the BSHS 2013-14. Core staff not only examine Cambridge doctorates in HPS (45 in the review period) but act at least as often as external examiners nationally and internationally.

HPS sponsors two open annual lectures: since 1996, the *Hans Rausing Lecture in History of Technology and Industry* and, since 2005, the *Wellcome Lecture in History of Medicine*. Researchers organise important conferences in Cambridge with other Faculties/Departments and projects with CRASSH; conferences, workshops, public lectures and education through

international summer schools, the Whipple Museum, National Science Week and University Festival of Ideas; at the Needham Research Institute, the BAAS, the Royal Society, the Aristotelian Society, the Royal Society of Arts, the Royal Institution, the British Academy, and national and international venues and congresses. Department research programmes on GtR and on 'Past versus Present in Victorian Britain' (Leverhulme, 2006-11) sponsor conferences and workshops. HPS also played a key role in liaising with the Hughes Hall Centre for Genomics, Science and Society, leading to many publications. Amongst the conferences hosted in the Department in the census period were: Antikythera Conference (2008); 'Case Studies III from the Whipple Museum of the History of Science' (2008); Peter Lipton Memorial Conference (2008); 'Temporalizing the Great Chain of Being' and "Seriality and Scientific Objects in the Age of Capital and Empire, 1848-1919' (2008-9); 'Causation and Explanation in Epidemiology' (Two workshops, 2009-10); Annual Workshop on Greco-Roman Scientific, Medical and Technical Writing (2008 and 2009); BSHS Postgraduate Conference (2010); 'The Material Culture of Chemistry'. SHAC Workshop on the History of Alchemy and Chemistry (2011). The WT GtR sponsored 17 conferences/workshops in the period 2009-13 including 'Transforming Pregnancy Since 1900', 'Generation and Reproduction in Medieval Europe' and 'Populations and public health in the postwar era'.

The Department has been prominent in developing novel web-based technologies and platforms for the presentation of data and scholarship e.g. Robson's 'The Geography of Knowledge in Assyria and Babylonia' (U. of Cambridge and Pennsylvania, 2007-12, AHRC); Kassell's *The Casebooks Project* (WT); an online exhibition 'Making visible embryos' (Buklijas, U. of Auckland, NZ and Hopwood).

HPS staff contribute fully to leading the discipline and its research communities and have also often been recognized for their academic excellence: a small sample of contributions includes: Schaffer: FBA (Modern History); Tarner Lectures, Cambridge, 2010; Keynote Lecture, Sydney Sawyer Conference, University of Sydney, 2010. Forrester: Robert J. Stoller Memorial Lecture, Los Angeles (2011). Secord: Sandars Lectures, 2013: 'Visions of science: books and readers at the dawn of the Victorian age'. Taub: Einstein Foundation (Berlin), 2010-2014, Visiting Fellowship, TOPOI Excellence Cluster, Berlin. Hopwood: Co-director, Ischia Summer School on the History of the Life Sciences, 2008-; Curry: History of Science Society's 2010 Nathan Reingold Prize for the best graduate student essay on the history of science and its cultural influences; Fara: BSHS Herbert Dingle Prize for Science (2011) (best book for non-specialists); Marr: Philip Leverhulme Prize (2008); Mitchell, *Notes and Records of the Royal Society Essay Prize* (2010) and *Annals of Science Young Writer's Prize* (2011).

Senior staff have given great service to the field's international and national bodies: Taub has served on the Volkswagen Stiftung, Evaluation Panel on Research in Museums (2013); Freud Museum, London, Trustee (2007-2013); Zwinger Museum, Dresden, Mathematisch-Physikalische Salon, Beirat (2007-); Deutsches Museum, Munich, Wissenschaftliche Beirat (2002-). Schaffer has served on Advisory Board, Science Museum, London (Trustee of National Museum of Science and Industry, 2007-11); Advisory Committee, Centre for Arts and Humanities Research, Natural History Museum, London; Comité Scientifique, Centre Koyré, Paris; External review panel, STS Department, University College London (2009). Forrester sat on the Overseers' Committee, Department of History of Science, Harvard (April 2011) and the Advisory Board, MPI, Berlin (July 2013). Secord was a member of the Organizing Committee for the Darwin 2009 Bicentennial meeting, Cambridge, and its Science Programme Chair, 2004-9; he also was Principal Academic Advisor to the enthusiastically received (and well attended) 'Endless Forms: Darwin and the Visual Arts' exhibition for 2009, Fitzwilliam Museum, Cambridge, 2005-9. Chang is Co-Founder and member of the Organizing Committee, Society for Philosophy of Science in Practice, 2006-; founding member, Committee for Integrated History and Philosophy of Science, 2006-present; President 2012-14, BSHS: in that capacity, he played a key role in the organisation of the ICHSTM (Manchester) in July 2013. Lewens is Council member, Nuffield Council on Bioethics (2009-) and Science and Trust Expert Group member, Department of BIS. Members of the Department have given significant service to the WT: Lewens sits on the 'Ethics in Society' and 'Biomedical Ethics' Panels (2009-); Hopwood on the Medical Humanities Investigator Awards Selection Panel (2011-14), the Digital Library Advisory Committee (2010-11) and the Research Resources in Medical History Funding Committee (2010-11) and Kassell on the History of Medicine Funding Committee (2008-2011).