1. Key strategic goals for Computer Science over the next 5 years

The REF2014 results placed the UCL-Computer Science and Informatics submission in overall first place in the UK. Our plans for the coming 5 years are therefore pitched at enabling us to capitalize on this success and maintain this leading position. Achieving Silver Athena Swan recognition (2015) is a further key objective, and this also influences many aspects of the plan outlined below.

1.1 Teaching

- Continuing (controlled) growth of student numbers at both UG and PGT level, thus providing significantly increased fee income;
- Development of our Advanced Teaching Group, focussing on high quality core teaching, primarily comprised of teaching fellows, for managing and teaching core computer science, leading the development of teaching practice, and the evolution of UG and generalist MSc programmes;
- Review of Masters teaching (Faculty review) but also new initiatives such as MSc Business Analytics (2015); MSc Quantitative Regulation (2016?); MSc Logic, Semantics and Verification of Programs (2016), MSc in Data Science (with Statistics, 2016?) and MSc in Natural Language Processing (2016?). We should also consider splitting the MSc Computer Graphics, Vision and Imaging into strands to support real-time graphics & games, medical visualisation, virtual reality, etc. There is potential for a new Computational Design MSc, as another strand of MSc CGVI expansion, as part of a proposed Computational Design Centre (possibly at UCL East).
- We are looking into the feasibility of developing a new MSc in Data Science for the Civil Service, to be delivered online, with a notional target of 200 part-time students.
- We plan to develop a suite of MRes programmes, aiming to supply excellent students for PhD research. This could include an MRes for the (re-)qualification of practitioners employed in the banking and regulation sectors.
- We plan to continue/expand schools outreach and public engagement (including Engduino initiative);
- We envisage developments with the Institute of Education, including schools outreach collaboration. There is potential for more, including a joint Master’s programme in Internet of Learning.

1.2 Research

- Partner in Turing Institute
- (As discussed in our REF5 document:) ‘We have identified three strategic themes that link the research groups and centres in the UoA: Networked Systems, Intelligent Systems and Interactive Systems. During the next REF period we will develop these themes, from which we will launch CS grand challenges for strategic support. We will grow Digital Healthcare and Health Informatics, bringing together Computer Science, Medical Physics and the Department of Primary Care and Population Health. This will build on and complement the recently established hub of the national UK health informatics research institute, the MRC Farr Institute, exploiting our research activity in HCI, software engineering, bioinformatics, intelligent systems and networks applied to healthcare. We have established research in robotics for healthcare. These strands will be brought together, establishing a centre with new research activity in real-time automation and robotics. We will further develop the Life Sciences Interface, through the work of CMIC. We will create a new Institute of Image Directed Healthcare with Surgery, Radiology and Obstetrics. CMIC has had major input into The Wolfson Experimental Neurology Centre and received significant awards from the NIHR Biomedical Research Centres at UCLH, Great Ormond Street Hospital and Moorfields Eye Hospital to facilitate clinical translation of our imaging technologies. We will grow our capacity in Quantum information, launching a new research group and centre while also strengthening links with the London Centre for Nanotechnology. We will develop a new centre in computational design, linking recent activities in automatic and semi-automatic design, drawing in users across UCL including Bartlett School of Architecture and Mechanical Engineering, targeting advanced manufacturing. We will also continue to develop the big data infrastructure, expanding on leadership provided by the Media Futures, Financial Computing and Analytics, and Intelligent Systems groups, developing strategic partnerships with Security and Crime Science, MRC initiatives, financial institutions and retail collaborators.'
Other emerging opportunities we wish to explore include:

- Development of research activity in Sensor Systems, Robotics and associated teaching research;
- Expansion across Physical computing, IoT prototyping, and Making activities that underlie a number of the research groups’ activities;
- Further growth in Financial Computing by developing a new centre for Quantitative Regulation, in collaboration with Management Science & Innovation;
- Opportunities around making whole systems (hardware and software), and perhaps learning ways of doing this, extending recent work in graphics on exploring design spaces, or fitting form to function.

1.3 Enterprise
(As discussed in our REF5 document): ‘We will increase the number and size of our strategic industrial partnerships, building on the success of our BBC, Intel and Cisco initiatives.’

We also plan to develop our collaborations with financial and services sectors with partnerships with big-data companies, financial institutions, banks and regulators. The joint UCL-BUPA Global Institute for Digital Health Excellence (GLIDHE) will leverage CS investment in our secure data centre and our research activities in big data analytics.

1.4 International activities
(As reported in our REF5 document) ‘We plan to develop the EIT ICT Labs, a large EU-funded consortium that will translate research into products and services.’

2. Major challenges we face in achieving these goals.

2.1 Premises
- Working across 3 different sites in the short term (1 Euston Square, MPEB and 66-72 Gower Street);
- Challenges faced in ensuring business continuity during relocations;
- Uncertainties and potential staff and student retention/recruitment difficulties due to sub-optimal premises/facilities;
- Shortage of general (UCL) teaching accommodation;
- Shortage of specialist (CS) student and research lab space for current activities and students numbers, or to support further expansion;
- Lack of consolidated lab space. Inefficient small rooms are not ideal for some areas such as VECG. A larger more flexible multi-participant space would be effective.

2.2 Staff
- Under-strength research groups (see also 3.2 below);
- Recruiting leading academics, given the increasing cost of living in London;
- Teaching capacity, especially in core CS subjects such as UG programming, where student numbers are very large, coupled with the need to maintain a high quality student experience;
- Managing the balance between research and teaching commitments for academic staff;
- Succession-planning (HoD, REF2020 lead etc) and achieving Athena Swan priorities;
- Management of increasing numbers of part-time academic staff who also hold contracts in industry;
- Work/Life balance.

2.3 Research
- Funding landscape uncertainties, especially the flow of UKRC funding;
- Challenges of collaborating with industry while maintaining research creativity and flexibility.

2.4 Teaching
- Maintaining and improving the student experience;
- The student environment (labs, group working areas, teaching space) needs significant improvements. The changes in teaching practice require large open plan areas in addition to labs and lecture theatres.
• Developments around the IEP, including ensuring compatibility with CS teaching and appropriate coverage of core CS material;
• The challenge of effective forward planning (rather than quick fixes) in a fast-changing environment.

3. Priority actions in order to address these challenges and secure progress.

3.1 Premises
• Part-relocation to 66-72 Gower Street (Spring 2015)
• Bloomberg lab (underway – Spring 2015)
• Eventual relocation to new premises for whole department, including 1ES, target date 2016. HS2 blight is an important issue.

3.2 Staff
• Academic staff recruitments in under-strength Research Groups: 2014/15/16 proposals include Financial Computing and Analytics; Systems and Networks, VECG and PPLV.
• The department’s post-REF review (see 3.3 below) is expected to inform the focus for further hires beyond next year, including (for example) Natural Language Processing; Quantum Information and Robotics;
• Teaching Fellow recruitments (at least 4), including large group teaching of core UG module;
• Professional Services recruitments, including Teaching Lab Manager (Spring 2015); administrative support (including PA/research impact) and technical support.

3.3 Research
• Post-REF strategy review, leading to an away-day of Heads of Research Groups and other key colleagues on 10 March 2015;
• Support and encouragement for research-grant writing and research fellowship applications. This follows on from workshops held in Oct and Nov 2014, including a 2-day grant-writing retreat.
• Creation of Quantum Information Research Group to consolidate our emerging strengths in this area;
• Creation of new Research Group in Sensor Systems, Robotics and associated teaching research;
• Reorganisation of Intelligent Systems Research Theme, incorporating NLP, AI, Machine Learning.

3.4 Teaching
• Develop and enlarge the Advanced Teaching Group, to provide a good sized group of teaching focused staff;
• Further teaching innovation with concomitant evidence based analysis to manage large numbers of students effectively whilst improving the student experience
• Development of MSc targeted at professional mature students for re-qualification – e.g. MSc in Data Science (to be delivered online) in partnership with the Civil Service
• As part of the MSc review, overhaul the assessment processes to make them more efficient and effective for the students.

4. Resources necessary to accomplish our priority actions.

4.1 Staff
• Ability to make teaching fellow and academic staff appointments;
• Ability to make Professional Services staff appointments as appropriate.

4.2 Space
• At least one additional computer lab and two large open space teaching areas for use for project work, robotics and flipped teaching.
• Design/prototyping studio (planned for 66-72 GS);

4.3 Equipment
• Expansion of virtual machine service for teaching use;
• Further enlargement of the pool of teaching equipment for project use;
• Relocation of CS Machine Room facilities (electricity and air conditioning overload).