Job Description – JD186

Role Title	Head of Research Software Engineering
Department/section	Research IT Services/Research Software Engineering
Base location	UCL Bloomsbury Campus, London
Grade	9
JDO Reference	Technical Specialist NJ11-71
Reporting to	Director of Research IT Services
Direct reports	3 – 4 direct reports (plus 5-6 indirect reports)

Works closely with	• Team and Group colleagues
	• Other Research IT Services Group Heads and Team Leaders
	• Research IT Services Business and Communications Manager
	• Director of Research IT Services
	• Research teams from across UCL:
	  • Graduate students
	  • Research staff
	• UCL academic leaders in computational and data intensive research
	• Strategic Coordinator for UCL eResearch Domain
	• Managers from other organisational units within Information Services Division:
	  •
	  • Enterprise Architecture
	  • Application Development
	• Peers in partner universities and institutes, and associated national bodies.

Date updated	18th January 2018

Working Context

The Information Services Division supports and enhances learning, teaching, research and a range of administrative processes across UCL.

ISD has a recurrent budget of £30m pa and a capital budget of £13m-£20m pa and provides technology related services to over 38,000 students and 11,000 staff at UCL and associated institutions.

Facilities and services provided by ISD include all core data centres, email, desktop, printing, networking and software/hardware purchasing. The Division also supports research computing platforms, e-learning and IT security across UCL. The key administrative systems including HR, Finance and Student Information are provided by ISD, as are website development, support, and creative design.

With over 400 staff, the Division is structured into the **Director's Office, Service Delivery, IT Change and Project Delivery Services**, **Service Strategy and Improvement, Learning Technology and Media Services, Research IT Services, IT for SLMS, IT for IOE and Humanities**, **IT for Professional Services.**

Director's Office provides architecture services, strategic management, finance services, staffing support and communications. **Service Delivery** provides infrastructure and other technology services such as data centres, networks, server and virtualisation support plus the central IT service desk. In addition, **Service Delivery** also provides application support and enhancement services including database administration. **IT Change and Project Delivery Services (ITCPD)** owns the project delivery methodology and is responsible for delivering new and enhanced technology enabled change and services which support UCL's strategic goals.

The **Service Strategy & Improvement Department** is responsible for ensuring that ISD continuously improves and promotes is services and processes, including ITIL. The department coordinates the development of the ISD service strategy and ensures it is aligned across the service portfolio.

IT for SLMS provides local support for users in the School of Life and Medical Sciences (SLMS). **IT for IOE and Humanities** provides local support to users in the Institute of Education (IOE) and to departments in the Faculties of Arts & Humanities and Social & Historical Sciences. **IT for Professional Services** oversees the provision of technology enabled services to the central divisions such as Finance and HR.

Research IT Services and teams in **Learning and Technology and Media Services** focus on the two key missions of the university - research and teaching & learning. They aim to ensure services in these areas are world leading.

The **Research IT Services** (RITS) department is a growing team that includes a large proportion of specialist technical staff, many with research backgrounds. The department provides services across the following areas:

- **Research Computing services** – including High Performance Computing (HPC)
- **Research Data services** – including 2.7 PB data storage and management
- **Research IT Applications** – including grant costing tools, researcher profiles, and publication services
- **Research Software Development services**
- **Training and Support services**
- **Business and Communications support services**

The teams work in close collaboration with academics from across UCL, and with the Office of the Vice Provost (Research) and UCL Library Services. RITS also partner with a number of other Universities and research institutions across a variety of initiatives including the Alan Turing Institute, the MRC Medical Informatics platform *eMedlab*, as host of the national EPSRC HPC Hub for Materials and Molecular Modelling, and as founding members of the Science and Engineering South Consortium (SES).

The UCL Research Software Development group was established in 2013 and has grown from a headcount of three to ten full-time staff. Services and activities led by the group include:

- A scalable, collaborative programming service to design, build and maintain readable, reliable and efficient research software used for modelling, analysis and simulation in UCL research.
- A new Data Science consultancy service.
- Collaborative design and delivery of teaching and training programmes regarding best practise development of software for research.
- Consulting services on software development practices, techniques, design, and architecture to research groups.
- Design, provision and lead on maintenance and delivery of state-of-the-art infrastructure-based services to support best practice, including continuous integration, version control, and code review.
- Development of the broader community of research programmers across UCL.

As well as enjoying an excellent reputation across UCL for its collaborative and innovative approaches and the quality of work delivered, the team is recognised as being leading within the UK and internationally. The group has a strong track record in sourcing collaborative funding for scientific programming, winning over £1M in funding from EPSRC, BBSRC, NIHR, AHRC and other sources. High Performance Computing is a particular focus, with five awards under the ARCHER eCSE programme. The group collaborates with groups from across the full breadth of UCL's research disciplines, Arts and Humanities, Physical, Engineering and Life Sciences, and clinical care through collaborations with NHS partners.

Job Purpose

The Head of Research Software Development is responsible for providing strategic leadership in the development of research software development services at UCL. They work collaboratively across teams within and external to ISD to ensure that these services meet the current and future needs of the UCL community.

In addition to the provision of central services, the Head of Research Software Development also works across UCL, in conjunction with academic colleagues and research leaders, to promote, support, and facilitate the maturation of software development processes and practices, for research. As part of this role, they play a leadership role in building and coordinating a community of specialist research software developers across UCL.

The key aspects of the work of the Research Software Development Group include:

The Head of Research Software Development leads the team in all of the above activities, establishing and maintaining quality standards, ways of working, and internal best practices.

They lead the team in building and maintaining relationships within the research and e-Infrastructure communities in UCL and beyond, seeking opportunities to contribute to research,

and to generate and prepare opportunities for new research projects and funding. They will act as Co-Investigator to projects across UCL with a strong research programming component.

The Head of Research Software Development is responsible for providing strategic technical leadership in the development of Research Software Development services at UCL. They work collaboratively across teams within and external to ISD to ensure that these services meet the current and future needs of UCL's research community.

They also contribute to the wider ecosystem of support for computational research in UCL, working with departmental and group colleagues, departmental IT staff and other ISD colleagues to help build integrated systems and services which meet the needs of researchers.

Working with the Group and academic colleagues, the Head of Research Software Development is responsible for developing the wider research software development technical community across UCL, bringing together IT staff and practitioners from academic Departments to share knowledge and best practice, develop collaborative activities etc.

ISD makes extensive use of ITIL best practices and the Head of Research Software Development will hold responsibility for some ITIL Service Lifecycle processes as they apply to Research services – in particular, they have responsibility as Service Owner for ISD Research Software Development services.

UCL Research IT Services benefits from an academic-led governance framework, and the Head of Research Software Development will be required to play an active leadership role within this.

The Head of Research Software Development will frequently be required to represent RITS and UCL at University, national and international events, enhancing the recognition and reputation of the Group, Department and University, and creating opportunities for collaboration.

Main Accountabilities and Tasks

Accountability	Key Tasks	% Time Spent
Provide technical and strategic leadership for Research Software Development services and associated activities	• Lead Group and Departmental discussions relating to technical practice and technology roadmaps for Research Software Development services. • As Service Owner, lead the development and ongoing review of a strategic, multi-year roadmap for Research Software Development services and associated activity at UCL, proactively bringing forward ideas that may offer value to the full range of research activity at UCL over the medium/long term. • Attending, preparing reports and other materials for, and presenting at relevant governance meetings. • Develop and champion business cases for projects to develop news services or enhance existing services. • Maintain expertise through both independent study and training courses.	20
Engage with and contribute to wider research software community	• Build and maintain relationships within the research and e-Research communities in UCL and beyond, actively seeking opportunities for collaboration with researchers including grant preparation. • Work with colleagues to lead the development of community activities such as seminars and networking events. • Seek out and develop opportunities for new research projects and funding. • Engage and collaborate with neighbouring and regional institutions on projects and activities of mutual benefit. • Represent RITS and UCL at relevant University, national and international events, enhancing the recognition and reputation of the Department and the University, and creating opportunities for collaboration. • Contribute ideas, experience and thinking to technical working groups within and beyond UCL.	20

Leadership and Management of the Team	• Provide leadership and line management to staff in the Research Software Development team, including performance management and coaching, objective setting, identification and follow-up of training and development needs, and appraisal. • Coordinating and allocating team resources efficiently to ensure timely delivery of projects and other tasks. • Lead the development and adoption of appropriate monitoring processes, metrics, and dashboards, and documentation, ensuring that correct processes are followed. • Lead the team in the use of code review and issue tracking processes and tools. • Lead the design of the team's ways of working, ensuring continuous improvement and adoption of appropriate techniques, technologies and tools.	20
Research Programming Leadership	• Collaborate with research colleagues from across UCL to construct, improve, and maintain codes used for modelling, analysis and simulation in UCL research. • Rapidly assimilate research context and understand the computational algorithms, requirements and interfaces involved in a research programming project. • Oversee and direct the construction of high-quality software for research colleagues which will result in a sustained impact on their research programme(s). • Oversee and direct development work to improve reliability and performance for parallel codes on UCL-owned and other High Performance Computing platforms. • Assist colleagues in analysis and problem-solving tasks, sharing knowledge and expertise with team members. • Manage and mentor other team members ensuring the code they produce meets rigorous quality standards • Review and revise code and documentation produced by team members, amending as necessary to ensure consistency and quality.	10

As Service Owner, lead the operation and delivery of Research Software Development Services	• Ensure that all online service information and support documentation for all Research Software Development services is consistent with the latest best practice and service configuration. • Manage any user communications associated with any problems/incidents as appropriate and in accordance with local best practice. • Oversee the operation of 'Helpdesk' facilities for service users. • Act as the ultimate escalation point within the team for any operational issues arising. • Responsible for the maintenance and development appropriate of an internal 'knowledge base' for the team. • Monitoring of service performance according, periodic reporting, and taking action in respect of any adjustments needed.	10
Contribute to Departmental and Divisional activities	• Lead the Research Software Development Group's contribution to the wider ecosystem of support for computational research in UCL, working with departmental IT staff and ISD colleagues to help build and maintain integrated systems and services that meet the needs of researchers. • Contribute to wider Departmental and Divisional activities including discussions on a wide variety of strategic and operational matters.	10
Development and maintenance of online service information, and advisory and training materials to support users	• Lead the development of the technical programme of training courses in Research Software Development and programming, suitable for a range of audiences with a varying degrees of experience. • Deliver training courses/modules as the trainer/instructor as required, and as required, assist in the delivery of training courses by working with the instructor/trainer to support participants through giving clear advice and guidance based on technical and specialist expertise. • Advise researchers on software practices, techniques, design, and architecture.	5

Publish, document and support use of research software outputs	• Lead the development of processes to support the release and dissemination of UCL research software, through open source, scholarly, and commercial channels. • Explain and document software created with the team's involvement, contributing to research papers published in the academic literature, project reports and case studies, and code documentation and manuals.	5

Person Specification

Essential

1. PhD degree in a computationally based field and experience as a computational researcher.
2. Recognition as a leader or senior practitioner in research software development/engineering or programming, with involvement in appropriate community or professional bodies.
3. Line management experience, and/or significant experience leading project or other teams
4. Excellent written and verbal communication skills including the ability to effectively present complex or technical information to a range of audiences.
5. Proven ability to forge effective professional relationships at senior management level.
6. Ability to work collaboratively and as part of a team, as well as under own initiative.
7. Proven ability to manage multiple concurrent tasks and activities, working to deadlines and prioritising as appropriate.
8. Ability to rapidly acquire fluent knowledge of new programming languages, libraries and platforms. Advanced skills in C++ and/or Fortran 2003. Experience with the advanced use of high-level dynamic languages for numerically-intensive research, preferably Python.
9. Experience of analysing, researching and solving complex programming problems.
10. Advanced knowledge of applied mathematics.
11. Experience of working with a team using Agile processes, such as SCRUM or XP.
12. Desire to keep up-to-date and learn about new developments in computational research and a demonstrable understanding of the strategic landscape of research computing and research programming in the UK and internationally.
13. Deep knowledge of and commitment to software development best practice including issue tracking, testing, documentation, version control, continuous integration, software re-use and deployment. Knowledge of and experience with object-oriented design, design patterns and refactoring. Expertise in several specialist areas of technical computing from the list below. While no single specialism is essential, candidates must be able to demonstrate completion of significant work using several of these technologies:
    - OpenMP, MPI, CUDA and other high performance computing tools
    - CMake and other build and installation management tools
    - Spark and similar High Throughput computing tools

- Machine learning libraries such as Tensorflow or Pytorch
- Parallel debuggers and profilers
- Parallel numerical algorithms and libraries
- Inter-language binding technologies such as Pybind11
- Highly scalable databases, both relational and NoSQL
- Cloud computing and virtualization, containerization, Docker
- Map/Reduce, Hadoop, HDFS
- Semantic Web, RDF, OWL, SPARQL
- Management of scalable computational infrastructure: DevOps, Puppet, Chef…

14. Experience of open source software practices, with at least one accepted contribution to an open source project.

Desirable

1. Operational experience maintaining actively used systems and services, including change and problem management.
2. Advanced software process and project management expertise, with knowledge of multiple process frameworks and theories, from a variety of cultures (SCRUM, XP, Lean, PRINCE II, ITIL), with an understanding of commonalities and differences.
3. Knowledge of and interest in software leadership, demonstrable through awareness of appropriate books, websites or blogs
4. Experience as a leader/coordinator of agile software management processes, for example as a "scrum master".
5. Understanding of commercial aspects of the software industry.
6. Understanding of research and academic funding sources.
7. Demonstrable leadership in one or more software communities, such as through membership of standards bodies, organisation of community events, or a lead maintainer role for open source tools or packages.
8. Track record of designing and delivering high-quality computational teaching and training courses.

Special Working Conditions

None.

Conditions of Service

The normal hours of work are 36.5 hours per week. However flexibility will be expected in response to varying workload. Occasional evening and weekend working may be required. Reasonable notice will be given and where properly authorised such work will be recompensed as stated in the terms and conditions. The annual leave entitlement is 27 days per year, plus 6 College closure days, plus public holidays.

Note: This job description reflects the present requirements of the post. As duties and responsibilities change the job description may be subject to amendment, in consultation with the post holder.

Additional Information

The job description reflects the present requirements of the post, and as duties and responsibilities change/develop, the job description will be reviewed and be subject to amendment in consultation with the post holder. The post holder will carry out any other duties as are within the scope, spirit and purpose of the job as requested by the line manager or Head of Department/Division.

The post holder will actively follow UCL policies including Equal Opportunities policies and be expected to give consideration within their role as to how they can actively advance equality of opportunity and good relations between people who share a relevant protected characteristic and people who do not share it.

The post holder will maintain an awareness and observation of Fire and Health and Safety Regulations.

The post holder must ensure organisational compliance, and conformance with the Data Protection Principles. All data, whether stored electronically or by other means must be processed in accordance with the Data protection Act 1998.