JOB DESCRIPTION

Job Title: Senior Research Software Engineer – HPC

Grade: SG8

Department: CMS

Responsible to: M³4Impact leads

Responsible for: n/a

Key Contacts: M³4Impact leads; Colleagues in M³4Impact and FES; Colleagues in IT and Library Services (ILS); Funding agencies; Research Partners

Standard Occupational Classification (SoC code):

Non-Contractual Nature of Role Profile: This role profile is non-contractual and provided for guidance. It will be updated and amended from time to time in accordance with the changing needs of the University and the requirements of the job.

PURPOSE OF ROLE

Our vision is to expand our world-leading Multi-Disciplinary and Multi-Scale Modelling expertise in both reach and ability, to tackle major societal challenges affecting the environment, quality of life, safety, security, and the economy. This will be achieved through the amalgamation and expansion of two existing award-winning teams: the Centre for Safety, Resilience and Protective Security (CSRPS) and the Computational Science and Engineering Group (CSEG), creating the Multi-scale, Multi-disciplinary Modelling for Impact (M³4Impact) platform.

Both CSRPS and CSEG excel at developing and applying mathematical models, computational simulations and bespoke software to create digital worlds that predict physically accurate outcomes addressing a wide range of societal challenges. M³4Impact links three cross-cutting research and enterprise themes: **Safety and Security**, covering disaster resilience, fire and evacuation, dynamically coupling urban-scale and building scale evacuation modelling, and protective security incorporating real-time interactivity through Virtual/Mixed Reality, from CSRPS; **Materials Science and Engineering**, focusing on the design and manufacture of lighter, stronger materials for transport and aerospace (targeting recyclability, low waste and energy efficiency), from CSEG; and **Digital Cities**, where interdisciplinary research will develop the evidence-base to protect UK cities/populations from pollution, pathogen dispersal,

natural/anthropogenic disasters and to support policy decisions using a multi-scale approach from cityscape to street level, jointly from CSRPS and CSEG.

This role is intended to cut across and support all the research, enterprise and knowledge exchange themes and activities of M³4Impact, delivering shared software engineering and scientific computing capabilities and following professional best practice. The role could also involve carrying out research and contributing to teaching and while currently classified as a professional services role, could, for the right candidate, be considered as an academic contract.

The role is intended to support the development and deployment of M³4Impact's world leading software tools on High Performance Computing (HPC) clusters. The role involves taking a lead in research and enterprise (RE) activities enabling the further development and enhancement of M³4Impact's tools including;

- Collaborate with researchers across the M³4Impact program to develop, enhance and maintain codes used for modelling of complex multi-physics phenomena and agent-based modelling. This includes the development of a general Lattice Boltzmann computational fluid dynamics (CFD) engine and the tailoring of the engine to specialist applications such as fire simulation, pollution dispersal, respiratory pathogen dispersal, solidification applications, etc.
- Advise on best software practices, techniques, design and architecture to help build robust and maintainable research software. This also includes considerations of hardware architecture as part of a significant HPC expansion.
- Contribute to teaching and training on best practices and utilisation of our HPC resources, delivered through classroom demonstrations / tutor, individual training sessions and authoring materials.
- Opportunity to grow research activity through contributing to proposals, co-authoring research outputs and co-supervision of MSc and/or PhD students.

Within this context, the role holder is expected to work across M³4Impact teams with responsibility for the delivery and support of specific software engineering projects, as well as assisting with other relevant projects, using requisite functional and technical expertise, in a timely and cost-effective manner.

The ideal candidate will have a PhD or equivalent professional expertise in research software engineering or other scientific area core to M³4Impact. Experience with the authorship, development, and maintenance of software for research & development in any field, preferably relevant to M³4Impact.

The successful candidate will support the leadership of the Centre in achieving a range of outcomes in RE and KE activities. The successful candidate will have experience of contributing to the generation of research income.

The focus of this position is on research and enterprise, but there would be a contribution to teaching, particularly in terms of the development of material for programmes and courses, and student supervision of up to 20%.

KEY ACCOUNTABILITIES
Team Specific:
- Collaborate with research colleagues from $M^34Impact$ to develop, deploy and maintain world leading software tools used for modelling, analysis, synthesis, simulation and more on High Performance Computing (HPC).
- Rapidly assimilate research context through publications and conversation with $M^34Impact$ colleagues, understand the computational algorithms, requirements and interfaces needed within the research effort, and construct high-quality software for research colleagues which will result in a sustained impact on their research programmes.
- Contribute to subject or professional research resulting in the publication and/or dissemination of original work of international excellence quality through authoring sections of formal research papers, technical white papers, blog posts, seminars and more.
- Support significant research/enterprise bids for funding in support of the five-year strategy for $M^34Impact$.
- Support research or innovation consortia with external partners including non-academic stakeholders.
- Support strategic alliances which build on existing collaborations and/or establish new partnerships to support new $M^34Impact$ research/enterprise activities in the UK, Europe and internationally.
- Raise the profile of $M^34Impact$ and establish strong relationships with targeted clients and partners resulting in increased business.
- Protect and enhance $M^34Impact$'s reputation, promoting its software tools, skills and expertise to position it as partner of choice.
- Support a portfolio of research and enterprise projects and/or contribute to teaching/knowledge exchange to achieve full personal commissioning at Full Economic Cost according to the five-year $M^34Impact$ strategy.
- Support the supervision of research students at doctoral level.

- Make contributions to the development of novel MSc programmes and CPD courses, integrating M^{3}4Impact research, enterprise and innovation, in support of teaching and KE programmes developed as part of M^{3}4Impact.

Generic:
- Maintain and develop their reputation as an authority and leading figure within the international academic or professional community in their specific subject.
- Maintain high professional standing in their discipline and develop their own professional profile.
- Implement approved policies, guidelines, and standard operating procedures efficiently in relation to their own academic/professional duties.
- Keep abreast of development within the disciplines in their work area and seek continuous improvement of their own professional practice.

Managing Self:
- Keep abreast of developments within the field and seek continuous improvement of own professional practice.
- Actively participate in established professional development framework activities.
- Behave in a manner that reflects the University values and creates a positive environment for work and study.

Core Requirements:
- Adhere to and promote the University's policies on Equality, Diversity and Inclusion and Information Security.
- Ensure compliance with Health & Safety and Data Protection Legislation.
- Support and promote the university's Sustainability policies, including the Carbon Management Plan, and carry out duties in a resource efficient way, recognising the shared responsibility of minimising the university's negative environmental impacts wherever possible.
- Adhere to current legal requirements and best practice relating to digital content and accessibility, including Web Content Accessibility Guidelines when creating digital content.

Additional Requirements:
Undertake any other duties as requested by the line manager or appropriate senior manager, commensurate with the grade.

This is a professional, demanding role within a complex organisation with an ambitious strategic plan and agenda for change. The role holder will be expected to show flexibility in working arrangements, including working hours, to ensure that M³4Impact delivers the required level of service.

KEY PERFORMANCE INDICATORS:
- Performance Indicators will be established in consultation with the line manager and M³4Impact leads, as part of the post holder's annual Appraisal and Professional Development Review and with due regard to the University's KPIs.

KEY RELATIONSHIPS (Internal & External):
- M³4Impact leads; Colleagues in M³4Impact and FES; Colleagues in IT and Library Services (ILS); Funding agencies; Research Partners

PERSON SPECIFICATION

EXPERIENCE:

Essential Criteria
- Experience with the authorship, development, and maintenance of software for research & development in any field involving mathematical software, but preferably in the areas of CFD modelling. This might include (but is not limited to) software supporting, user interface development, high-performance computing simulation software, cloud computing or VR/MR environments.
- Knowledge of and commitment to software engineering best practices (including issue tracking, testing, documentation, version control and continuous integration) that enable the delivery of reliable, sustainable and trustworthy outputs.
- Experience with at least one programming language used for research (such as C, C++, C#, Python, etc.,) at a level and breadth commensurate with seniority.
- Experience of analysing and solving complex problems.
- Experience authoring technical documents to a high standard, for example, research papers, technical white-papers, documentation describing a technology solution, or design, strategy or policy papers in a digital research space.

Desirable Criteria
- Knowledge and experience of fire safety engineering.
- Experience of algorithm and UXD/user interface development for CFD modelling software.
- Experience of MPI, CUDA, OpenMP and other HPC environments.
- Experience of algorithm development for Lattice Boltzmann CFD modelling software.
- Experience mentoring or leading other research technologists or students, either through formal line management or through guiding the work of more junior colleagues.
- Experience contributing to the development of research proposals, business cases, calls-for- proposals, or tenders for infrastructure submissions.
- Knowledge of agile methodologies, such as Scrum or XP.
- Experience designing and/or delivering training courses.

SKILLS:

Essential Criteria
- Well developed organisational and managerial skills.
- Outstanding interpersonal skills and ability to motivate others.
- Excellent written and oral communication skills.
- Commitment to the promotion of high standards and excellence.
- Ability to think strategically and conceptually.
- Capacity to listen and consult, good negotiation skills.
- Capacity to make informed decisions.
- Ability to work effectively and deliver under pressure.
- Ability and willingness to learn new skills quickly.

Desirable Criteria
- N/A

QUALIFICATIONS:

Essential Criteria
- PhD or equivalent professional expertise in software engineering for scientific computing OR CFD model development with experience of software development.

Desirable Criteria
- Postgraduate teaching qualification
- Membership of appropriate professional bodies such as, IEEE, IFE, SFPE, IMA.

PERSONAL ATTRIBUTES:

Essential Criteria
- We are looking for people who can help us deliver the values of the University of Greenwich: Inclusive, Collaborative and Impactful.

Desirable Criteria
- N/A