

Professional Experience

Health Data Research UK, DARE UK, Visiting Scholar EMBL-EBI

LONDON, UNITED KINGDOM

Director of Engineering - HDR UK & National Technical Lead - DARE UK Jan '19(PT) – Jan '20(FT) –

- Core contributor to the strategic direction of the institute and delivery alignment of its priorities
- Technology & engineering leadership of the cloud-native £10M Innovation Gateway & wider HDR UK technology projects with a risk appetite
- Strategic and joint technical lead for the National Cohort Discovery Service with £4M Co-Connect
- Technology leadership & collaboration without authority of a federated network of international Trusted Research Environments for health data research
- Core contributor to COVID-19 HDR UK Research and Analysis reports to SAGE
- Special advisor to WHO FAIR COVID-19 Data Infrastructures and The European Health Data Space
- Lead on the development of national and international metadata and computing services standards
- Created and reinforced human pathways between internal & external technology/engineering teams and the national & international health data research ecosystem
- Deputise for the CTO to manage the day-to-day engineering tasks and tackling governance issues
- Provided proactive technology leadership to cross-functional projects across HDR UK
- Provided strategic and technology advisory to strategic partners - International COVID-19 Data Alliance, ELIXIR, EMBL-EBI, GA4GH & THEDAS
- Technical strategy leadership and implementation of £4.3M COVID-19 National Core Studies
- Co-developed £78M+ multiple national grants aligned with HDR UK priority areas of work
- Stabilise and scale internal information technology governance using light-weight FitSM approach
- Represented HDR UK at various national and international forums to champion open science
- Oversight and matrix management of the HDR UK DDaT engineering team to build, integrate and operate end-to-end user and stakeholder services
- Curate and develop technology partnerships to meet current and future needs

EMBL - European Bioinformatics Institute

CAMBRIDGE, UNITED KINGDOM

Global Strategic Portfolio Manager - TSI, ELIXIR, EOSC-Life, EOSC-Hub & GA4GH Dec '17 – Jan '20

- Strategic technology portfolio planning, product management and service delivery of EMBL-EBI TSC services (ELIXIR Cloud & AAI Analytics Platform, EBI Cloud Portal, AuthN, AuthZ & Profiles & Reference Data Set Distribution Service as part of ELIXIR, EOSC-Hub, EOSC-Life GA4GH & HDR-UK.
- Work Package (WP7) co-lead of €26M EOSC-Life project to deliver internationally federated cloud resources to support the cloud-based FAIR RI data resources (WP1), workflows (WP2) and science demonstrators (WP3)
- Task Lead of €33M EOSC-Hub project to deliver a international GA4GH-compliant Reference Data Set Distribution Service service within ELIXIR and EOSC-Hub
- Project management and delivery of ELIXIR Compute Platform strategic implementation studies with alignment to GA4GH, EOSC-Life & EOSC-Hub.
- Co-authored EMBL-EBI's Hybrid Cloud Strategy report and developed a Strategic/Technology partnership RFP with cloud providers.
- Identify & develop TSI project portfolio with international partners as part of EC & RCUK grants.
- Co-wrote and contributed to 9 EC and UKRI funded grant proposals.

Technical Coordinator - Human Genomics and Translational Data - ELIXIR

Jun '17 – Nov '17

- Coordinated and created a consolidated strategic vision and technical road-map for Human Data Communities for ELIXIR's 2019-2023 work programme.
- Project managed and coordinated delivery of 2017 Human Data implementation studies' (3) and managed the selection process for 2018 Human data implementation studies (4).
- Coordinated two €19M+ ELIXIR EXCELERATE Rare Disease and Human Data work packages, including developing and driving alignment with ELIXIR Technical Platforms.
- Product and technical leadership within ELIXIR's Human Data portfolio of projects (e.g. Beacon Network, Local EGA, RD-Connect, TraIT, OcoTrack) in alignment with GA4GH and ELIXIR.
- Globally represent and promoted ELIXIR Human Data Communities (Rare Diseases, Beacon Network & Human Data) at multiple international conferences and workshops.
- Pioneered the central concept on applying FAIR principles to Pharma datasets and co-wrote two

work packages for a successful **IMI** grant proposal application - **FAIRPlus**.

University of Sheffield - Electronic & Electrical Engineering SHEFFIELD, UNITED KINGDOM

CTO - Translational Technology Officer - CISTIB, Insigneo Institute Jun '15 – Mar '17

- Spearheaded the Scientific Software Development (SSD) team (6-7) to co-develop and operate 2 product suites in clinical research.
- Responsible for the overall technical vision, strategy and execution of software development & operations, including recruitment, budget management, resource/capacity planning and applying for international competitive grants.
- Conducted a detailed technical project portfolio to consolidate and formulated a technical road-map for CISTIB products and services.
- Responsible for the overall product strategy and execution of the **GIMIAS** biomedical image processing workbench and clinical domain-specific product suites.
- Architected a distributed hybrid cloud (AWS, GCP, Azure, & OpenStack) & HPC enabled **VPH-DARE@IT** Research-As-A-Service platform to deliver over 70 multi-modal clinical datasets, 230 scientific tools, 80 workflows and 3230 services for more than 75 daily active users.
- Managed and operated the **VPH-Share** and **VPH-DARE@IT** project platform for over 4 years, including managing planned technology modernisation, DC migrations, incident management and DR.
- Responsible for team recruitment, supervision and training/coaching of software developers/engineers and mentoring of junior developers.
- Invited keynote speaker and promoted the need for distributed research infrastructure to accelerate translation of clinical research to bedside.

University of Sheffield - Cardiovascular Science SHEFFIELD, UNITED KINGDOM

Scientific Workflows Coordinator - VPH-Share, Insigneo Institute Sep '11 – May '15

- Coordinated a disperse team of research scientists and developers to deliver over 25 projects.
- Co-architected, developed and operated the **VPH-Share** cloud platform and achieved good or excellent commendations in all EC project reviews.
- Proactively developed relationships with commercial cloud providers and external clinical research use cases as part of the **VPH-Share** project.
- Hand-built 2 clusters for internal staging/test cloud & HPC workloads for clinical workflows.
- Co-supervised postgraduate students to develop clinical research applications.

Multiscale Modelling Infrastructure Technical Officer - Insigneo Institute Jan '14 – May '15

- Designed, developed and deployed of scientific/technical solutions for Insigneo members and on-going projects (**VPH-DARE@IT**, **MySpine**, **CHIC-VPH** & **MultiSim**).
- Provided consultancy on application migration and integration of VPH-Share scientific tools and platform technologies for Insigneo and University of Sheffield.

Post-Doctoral Research Associate - VPH-NoE Jan '10 – Sep '11

- Evaluated and deployed of a range of distributed data storage and scientific workflow infrastructures for enabling cloud computing services for the pan European **Virtual Physiological Human(VPH)**.
- Developed a strategic initiative for scientific data and compute federation across the VPH.

University of Sheffield - Computer Science SHEFFIELD, UNITED KINGDOM

Research Associate - Epitheliome May '06 – Dec '09

- Involved in a multi-disciplinary research project modelling epithelial cells; providing advanced research and software design.
- Co-architected **FLAME**, a high-performance agent-based modelling framework.

Software Consultant - epiGenesys Ltd. Oct '05 – Dec '09

- Software consultancy for R&D software to **epiGenesys Ltd.**

Research & Development Officer - Genesys Solutions Sep '04 – Sep '05

- Developed and tested various eXtreme Programming plug-ins for the Eclipse IDE, funded by IBM.
- Conducted Quality Assurance audits for various internal teams.

Education

University of Milan-Bicocca MILAN, ITALY

Executive MBA - Management of Research Infrastructures 2018 – 2020

Management qualification to support successful leadership of Research Infrastructures requires a complex collection of scientific and managerial competencies, especially for those working across national borders

University of Sheffield

SHEFFIELD, UNITED KINGDOM

Doctor of Philosophy in Computational Systems Biology

2005 – 2010

Title: Hybrid, Hierarchical Models of Cardiac Cells and Tissues. ORS & Departmental scholarship, WUN Travel grant. SET Poster at House of Commons. Co-developed **FLAME** and **CHASTE** Frameworks.

Master of Science (Engineering) in Advanced Software Engineering

2004 – 2005

Distinction. Recipient of the Fretzwell-Downing Award for the Best Dissertation.

Pondicherry University

PONDICHERRY, INDIA

Bachelor of Technology in Information Technology

2000 – 2004

First class (86%) Missed distinction due to loss of semester (ill health)

Fellowships, Grants, Awards, Certifications, Board Memberships & Honours

Fellow of the British Computer Society & Member of the Association of Computing Machinery	2021 –
Member of the Technology Advisory Board - Our Future Health	2021 –
FitSM Advanced Service Planning and Design and Advanced Service Operation and Control	2019 –
Amazon Web Services Cloud Solution Architect - Associate	2017 – 2019
Azure for Research Grant - \$40,000, AWS in Education - £16,000, WANDisco \$60,000	2013 - 2016
Software Sustainability Institute Fellowship (Lifetime)	2015
Worldwide Universities Network Travel Grant	2006
SET for Britain Poster at House of Commons	2005
Fretwell-Downing Award for Best MSc Dissertation, ORS & Departmental PhD Scholarship	2005

Strategic, Programme Management and Technical Skills

Excellent problem solving skills (Issue Identification Analysis and Solving), Proven consulting experience or relevant Technology Strategy background, with **experience of strategy formulation and delivery**. **Excellent written and oral communication skills** in English. **Proven experience in defining and delivering impact-ful, effective and pragmatic technology strategies**. **Intellectual skills** to think outside of the box and challenge clients and colleagues in their thinking. **Demonstrated engineering leadership experience** with a broad operating range. Well-developed communication and leadership skills.

Distributed Computing, Cloud Computing, Research Software Design, Architecture & Implementation. Substantial experience of **Agile (XP, SCRUM)**, Waterfall & **Cross-functional project management** methodologies. **Exceptional people skills** and a proven-track record for building high-performance software engineering teams. **Strong verbal and written skills**. with extensive project deliverable and grant writing experience (over 25 EC & UKRI grants).

Strong knowledge of Fortran, C, C++, Python, Go and working knowledge of Java (Scala), NodeJS, Ruby **Programming Languages, Version Control Systems** (Git, Subversion), **Web Technologies** HTML+CSS, Javascript, REST, SOAP and working knowledge of jQuery, XML+XSLT, RDF+SPARQL, & **Web Servers** Apache Webserver, NGINX. **Extensive SysAdmin & DevOps** experience with complex **Issue Tracking Systems**: Confluence, JIRA & Trac; **Continuous Integration/Deployment**: TravisCI, CircleCI & GitlabCI; Working knowledge of **Configuration Management**: Chef, Puppet, Salt, Ansible; **Infrastructure Automation**: Docker, Packer, Vagrant, Terraform, AWS CloudFormation; **Clinical Database Management**: TranSMART, OpenClinica, REDCap, MySQL, PostgreSQL, XNAT, MongoDB, Elastic & Neo4j; **Service Orchestration**: etcd & Consul.

In-depth Research and Healthcare Computing & Research Software Engineering experience and knowledge in developing and support for Matlab, Mathematica, R, Apache Spark, bioinformatics pipelines, **Workflow Management Systems**: Taverna, Galaxy, Arvados, NiPype, Nextflow, CWL; **High-Performance & High-Throughput Computing** technologies: MPICH2, OpenMP, CUDA, SGE & SLURM; **Container Orchestration**: Docker Swarm, Amazon ECS, Mesosphere Marathon, Kubernetes & Mesos; **Cloud Computing**: AWS (AWS Cloud Solution Architect), Google Cloud Platform, Microsoft Azure, **Openstack**, VMWare, bhyve/xhyve, KVM & Xen; & **Distributed Filesystems**: ZFS, Lustre, GlusterFS, iRODS & Hadoop.

Selected Publications, Book Chapters, Conferences, Invited Talks & Research Reports

- S Varma, T Hubbard, D Seymour, *Building Trusted Research Environments - Principles and Best Practices; Towards TRE ecosystems*, 2021

- H L Rhem, [...], S Varma, E Birney, *GA4GH: International policies and standards for data sharing across genomic research and healthcare*, Cell Genomics, 2021
- J Lawson, [...], S Varma, M Courtot, *The Data Use Ontology to streamline responsible access to human biomedical datasets*, Cell Genomics, 2021
- Keynote Speaker at joint European Commission & WHO session on FAIR Data for future pandemic preparedness, 2021
- HDR UK, *COVID-19 HDR UK Research and Analysis reports to SAGE 2020-2021*
- N Karrar, [...], S Varma, *Analysis of Data Use Registers published by health data custodians in the UK*, (Preprint)
- A Wood, [...], CVD-COVID-UK Consortium, *Linked electronic health records for research on a nationwide cohort of more than 54 million people in England: data resource*, BMJ 2021
- G Saunders, [...], S Varma, S Scollen, N Blomberg, *Leveraging European infrastructures to access one million human genomes by 2022*, Nature Reviews Genetics
- M Fiume, [...], S Varma, S Scollen, *Federated discovery and sharing of genomic data using Beacons*, Nature BioTech, 2019
- B Gruening, [...], S Varma, D Blankenberg, R C Jimenez, BioContainers Community, Y Perez-Riverol *Recommendations for the packaging and containerizing of bioinformatics software*, F1000Research, 2018
- M Cabili, [...], S Varma, Pandya R, *Library Cards: Simplifying research access to genomics and health data*, Scientific Data, 2018
- P Morris, [...], S Varma, P Lawford, R Hose, J Gunn, *Fast Virtual Fractional Flow Reserve Based Upon Steady-State Computational Fluid Dynamics (CFD) Analysis: Results from the VIRTU-fast study*, JACC: Cardiovascular Interventions, 2017
- M Kasztelnika, E Coto, M Bubaka, M Malawski, P Nowakowski, J Arenas, A Saglimbeni, D Testi, A Frangi (Acknowledgement) *Support for Taverna workflows in the VPH-Share cloud platform*, Computer Methods and Programs in Biomedicine, 2017
- L Guo, [...], S Varma, A Venneri, A Frangi, Y Ventikos, *Subject-specific multiporoelastic model for exploring the risk factors associated with the early stages of Alzheimer's Disease*, Interface Focus, Royal Society Special Issue, 2017
- M De Marco, [...], S Varma, A Frangi, A Venneri, *ApoE ε4 allele related alterations in hippocampal connectivity in early Alzheimer's disease support memory performance*, Curr. Alzheimer Research, 2017
- S Varma, VPH-DARE@IT Development Team, *The VPH-DARE@IT Platform for Translating Research to Clinical Decision Support of early and differential diagnosis of dementia*, VPH 2016
- D Warriner, A G Brown, S Varma, et al., *Closing the Loop: modelling of heart failure progression from health to end-stage using a meta-analysis of left ventricular pressure-volume loops*, PLOS-One, 2014.
- D Silva-Soto, S Varma, S Wood, R Hose *Workflows: Principles, Tools and Clinical Applications*, Book Chapter 8, Computational Biomedicine, Oxford University Press, 2014
- S Varma, [...], R Hose, *VPH-Share: Patient-Centred Multi-scale Cloud-Enabled Computational Workflows*, VPH-2014
- M Bubak, [...], S Varma, *Evaluation of Cloud Providers for VPH Applications* CCGRID 2013: 200-2013
- I M M van Leeuwen, [...], S Varma, [...], H M Byrne. *An integrative computational model for intestinal tissue renewal* Cell Prolif. 42:617-636, 2009.
- R H Clayton, [...], S Varma, [...], P Taggart, *Epicardial mapping of ventricular fibrillation in the human heart during ischaemia and reperfusion*. Computers in Cardiology 2008
- S Varma, M Holcombe *Extreme Programming: The Genesys Experience* eXtreme Programming 2005
- S Varma, M Holcombe, *Shared Code Repository: A Narrative* eXtreme Programming 2005

Open Source Software, International Standards & Policies Contributions

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| • 2021-: GA4GH Computational Cohort Representation | • 2020-: HDR UK Innovation Gateway API, Web |
| • 2020-: HDR UK Schemata | • 2020-: HDR UK Datasets, Papers/Preprints |
| • 2020-: HDR UK Phenotype Library | • 2020-: HDR UK Clinical Trials |
| • 2018-2020 GA4GH TRS, WES, TES & DRS Standards | • 2018-2020: EMBL-EBI ECP & AAP |
| • 2018-2020: ELIXIR TESK & WES-ELIXIR | • 2018-2020: EMBL-EBI RDSDS |
| • 2017-2020: GA4GH Beacon Network | • 2017-2020: Bioschemas Specification |
| • 2015-2017: VPH-DARE@IT Platform | • 2015-2017: GIMIAS Biomedical Workbench |
| • 2014-2015: VPH-HF Hypermodelling Framework | • 2011-2017: VPH-Share Cloud Platform |
| • 2006-2009: CHASTE | • 2004-2010: FLAME |