

Professional Experience

Health Data Research UK, Visiting Scholar EMBL-EBI

LONDON, UNITED KINGDOM

Director of Engineering - HDR UK & National Tech. Lead - DARE UK Jan '19 (secondment) – Jan '20 –

- Core contributor to COVID-19 HDR UK Research and Analysis reports to SAGE
- Special advisor to WHO FAIR COVID-19 Data Inf. and EC on European Health Data Space
- Technology & engineering leadership of the Innovation Gateway with a team of 20+ engineers & wider HDR UK technology projects
- Strategic and technical lead for the National Cohort Discovery Service
- Technology leadership & coordination without authority of a federated network of international Trusted Research Environments for health data research
- Lead on the development of national and international metadata and computing services standards
- Thought leadership to align national health data custodians and trusted research environments around a streamlined health data access management framework
- 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 technology problems
- Provided proactive technology leadership to cross-functional projects across Uniting, Improving and Using remits of HDR UK
- Provided strategic and technology advisory to strategic partners - International COVID-19 Data Alliance, ELIXIR, EMBL-EBI, GA4GH
- Technical strategy leadership and implementation of Data and Connectivity National Core Studies - SAFE People (Researcher Accreditation), SAFE Projects (Data Access Request integration), SAFE Data (Metadata on-boarding with linkage opportunities), SAFE Settings (Federated Access) and SAFE Outputs (Airlock - Ingress & Egress)
- Co-developed multiple national grants aligned with HDR UK priority areas of work
- Provided advisory and digital transformation support for multiple internal HDR UK IT systems
- Represented HDR UK at various national and international forums to champion open science
- Line and matrix management of the HDR UK data engineering team (5)
- Continuous improvement and optimise policies and processes

EMBL - European Bioinformatics Institute

CAMBRIDGE, UNITED KINGDOM

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

- Strategic 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.
- Strategic planning, project management and delivery of technical ELIXIR services (RDSDS, ELIXIR AAI, Cloud Costing & Access Models, EOSC Code of Conduct) as part of EOSC-Hub.
- Product/ management, technical and team management (2) and delivery of Reference Data Set Distribution Service service within ELIXIR and EOSC-Hub.
- Product lead, technical and internal/external team management (16) and delivery of ELIXIR Cloud & AAI Analytics Platform within ELIXIR, EOSC-Life, GA4GH & HDR UK.
- Project management and delivery of the EBI Cloud Portal and AuthN, AuthZ & Profiles service for numerous internal EMBL-EBI teams (5) and external projects (BioExcel & PhenoMeNal).
- 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 RCUK 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).
- Administered and coordinated two ELIXIR EXCELERATE Rare Disease and Human Data work

packages, including developing and driving alignment with ELIXIR Technical Platforms.

- Product Leadership of the **Beacon Network** project in alignment with **GA4GH** and **ELIXIR**.
- Provided technical leadership within ELIXIR's Human Data portfolio of projects (e.g. **Beacon Network**, **Local EGA**, **RD-Connect**, **TraIT** & **OcoTrack**).
- Globally represent and promoted ELIXIR Human Data Communities (Rare Diseases, Beacon Network & Human Data) at multiple international conferences and workshops.
- Created 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

Fretzwell-Downing Award for Best MSc Dissertation, ORS 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**. **Excellent written and oral communication skills** in English. **Proven experience in defining and delivering impactful, 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** as a first level hands-on manager or senior-level technical team lead. 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 & RCUK 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**: TransSMART, 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 $\epsilon 4$ 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-: GA4GH TRS, WES, TES & DRS Standards | • 2018-2020: ECP & AAP |
| • 2018-2020: TESK & WES-ELIXIR | • 2018-2020: 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 |