Environmental impacts of computing in health & life sciences research

November 7th, 2023 - Wellcome Trust, London

With support from:

Programme

10:00-11:20	**Session 1 - The Big Picture**
Opening remarks: Why the environmental impact of computing matters for health & life scientists Charlotte Rae, *University of Sussex*	
How the environmental impacts of research are currently being addressed (the role of funders and institutions) Gabrielle Samuel, *King's College London*	
Advancing environmentally sustainable research at Wellcome Talia Caplan, *Wellcome*	
Addressing environmental impacts in the lab Martin Farley, *GreenLab Associates; University College London*	
11:20-11:40	**Tea & coffee break**
11:40-13:00	**Session 2 - The Technical Side**
The carbon footprint of high-performance computing Loïc Lannelongue, *University of Cambridge*	
The UKRI Net Zero Digital Research Infrastructure (DRI) scoping project Miranda MacFarlane, *King's College London*	
Reducing the carbon footprint of digital pipelines: A case study from MRI Nick Souter, *University of Sussex*	
The benefits of efficient programming Lincoln Colling, *University of Sussex; Software Sustainability Institute*	
13:00-14:00	**Meat-free lunch**
14:00-15:00	**Session 3 - Breakout Discussion**
Separate moderated group discussions concerning steps you can take in your own work to reduce the carbon footprint of your computing, as well as barriers and potential solutions.	
15:00-15:30	**Tea & coffee break**
15:30-16:00	**Session 4 - Feedback**
Feedback from group discussions summarised by a member of each group, followed by closing remarks.	

Workshop Speakers

Charlotte Rae

Dr Charlotte Rae is a Senior Lecturer in Psychology at the University of Sussex, UK. Her research explores the biology of wellbeing, with a particular focus on how our working lives interact with our mental health, lifestyle, and brain function. In addition to her occupational neuroscience work, Charlotte works to tackle the environmental impacts of academic neuroscience, from flying to conferences, to the carbon emissions of research computing. She founded the Organization for Human Brain Mapping's Sustainability & Environment Action Special Interest Group and the British Neuroscience Association's Green Neuroscience Working Group to further these aims. Charlotte holds an MRC grant with Dr Nick Souter investigating how to reduce the carbon emissions of MRI brain scan analysis.

Gabrielle Samuel

Gabrielle (Gabby) is a Lecturer in Environmental Justice and Health at the Department of Global Health & Social Medicine, King's College London, UK. She's trained in sociology and ethics with a background in the life sciences and is particularly interested in research ethics and the environmental impacts of digital technologies. In her work, she draws on concepts of sustainability, justice, power, equity, and responsibility. She is principal investigator on a Wellcome project exploring the ethical and social issues associated with the environmental impacts of digital health research, as well as co-investigator on the EPSRC PARIS-DE project, which is co-designing a digital sustainability framework. She is funded by the MRC through various projects that explore environmental sustainability and digital technologies/health.

Talia Caplan

Talia is a Mitigation Research Manager in the Climate and Health team at Wellcome Trust. She led the commissioning of a report by RAND Europe which outlines the current state of initiatives aimed at reducing the environmental impact of health research. She continues to work to help make Wellcome a more environmentally sustainable research funder. Talia has experience managing funding proposals at the intersection of climate change, health and data science. She works to achieve her team's ambition of putting health at the heart of climate action.

Martin Farley

Martin started working in labs as a technician and researcher before moving into sustainable labs at the University of Edinburgh in 2013. He then moved to King's College London in 2014, where he initiated their Sustainable Lab programme. In 2015, Martin founded Green Lab Associates through which he supports the Royal College of Emergency Medicine through their GreenED programme. He created and manages the LEAF programme from UCL, where he currently works as their Sustainable Lab Manager. He speaks, writes, and engages widely on sustainable science.

Workshop Speakers

Loïc Lannelongue

Dr Loïc Lannelongue is a Research Associate in Biomedical Data Science in the Heart and Lung Research Institute at the University of Cambridge, UK, and the Cambridge-Baker Systems Genomics Initiative. He leads the Green Algorithms project, an initiative promoting more environmentally sustainable computational science. His research interests also include radiogenomics, i.e. combining medical imaging and genetic information with machine learning to better understand and treat cardiovascular diseases. He is a Software Sustainability Institute Fellow, a Post-doctoral Associate at Jesus College, Cambridge, and an Associate Fellow of Advance HE.

Miranda MacFarlane

Miranda holds an MSc in Bioethics and Society from King's College London (2020-22), and has previously worked in local government with a focus on the arts and culture sector, and public health. Her research interests are in reproductive technologies, digital health and environmental ethics. She joined the project team leading the UKRI Net Zero Digital Research Infrastructure scoping project in December 2022 during it's final 7 month phase. Miranda is currently a research assistant at King's College London in the department of Global Health and Social Medicine, working at the intersection of environmental sustainability, health/technology and ethics.

Nick Souter

Nick is a postdoctoral research fellow within the School of Psychology, at the University of Sussex. He has a background in Psychology and Cognitive Neuroscience, with previous work focusing on the retrieval of semantic concepts, in stroke patients with aphasia and in neurologically healthy adults. Nick's current work focuses on measuring and reducing the carbon footprint of computing required in human neuroimaging research, with a specific focus on functional magnetic resonance imaging (fMRI). This involves generating evidence-based recommendations for how neuroimagers can reduce carbon emissions resulting from specific digital pipelines - such as fMRIPrep.

Lincoln Colling

Dr Lincoln Colling is a machine learning engineer and has held academic posts at the Universities of Cambridge and Sussex. In his current work, he is investigating how to write efficient code for running analysis with minimal compute resources. He holds a Software Sustainability Institute fellowship, and with SSI colleagues, has developed the Climate Aware Task Scheduler package, which enables high performance computing users to automatically schedule jobs for times of low carbon intensity.

Breakout Discussion Guide

Please use this guide during '**Session 3 - Breakout Discussion**'.

The discussion will be led by a facilitator, selected beforehand. Within your group, start by allocating someone to take notes during the session, and another to provide feedback to the room during Session 4 (can be the same person).

Once this is done, focus on the following questions:

- What steps are you taking, or are going to take, to reduce the environmental impact of your computing?
- What are the barriers to this?
- What are some potential solutions to those barriers?

Resources

We are currently building a community focused on promoting environmentally sustainable computational research. To join, please fill out the this brief Google form: https://forms.gle/pftpt2YEFsQqayut6

LEAF (https://www.ucl.ac.uk/sustainable/what-ucl-does/leaf-laboratory-efficiency-assessment-framework) provides a framework under which labs are assessed on their efficiency and sustainability - with bronze, silver or gold accreditation given.

The UKRI Net Zero Digital Research Infrastructure Scoping Project (https://net-zero-dri.ceda.ac.uk/) demonstrates a commitment to net zero computing by 2040.

Nick Souter provides open source code relevant to green computing in human neuroimaging, on GitHub (https://github.com/NickESouter).

The Climate Aware Task Scheduler (CATS; https://github.com/GreenScheduler/cats) provides a tool to schedule high-performance computing based on the carbon intensity of local energy.

Green Algorithms 4 HPC

GA4HPC (https://www.green-algorithms.org/GA4HPC) is a server-side carbon tracking tool that can be integrated with high-performance computing clusters in order to provide estimates of carbon emissions resulting from computing.