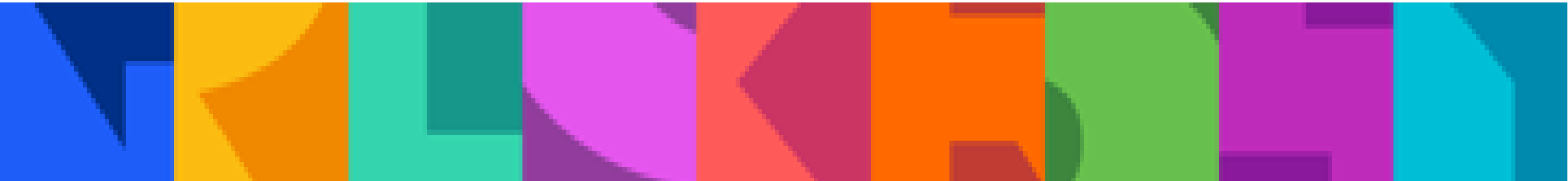
Network for Sustainable Digital Research Infrastructure - Vision and Expertise

London

18 February, 2025

Martin Juckes and Sarah Sparrow



Day 1, Tuesday, 18th February

- Session 1.1: 13:00 – 14:50
  - [20] Welcome (Alex) and Introduction (Martin/Sarah)
  - [30] Sustainable Computing (Jonathan Hays)
  - [60] Breakout 1 – Sharing ideas and concerns
- Session 1.2: 15:10 – 17:00
  - Feedback from Breakout Session 1
  - [30] GreenDigit (Catalin Condurache)
  - [60] Breakout 2 - Consolidating and balancing ideas

Part I : Introduction

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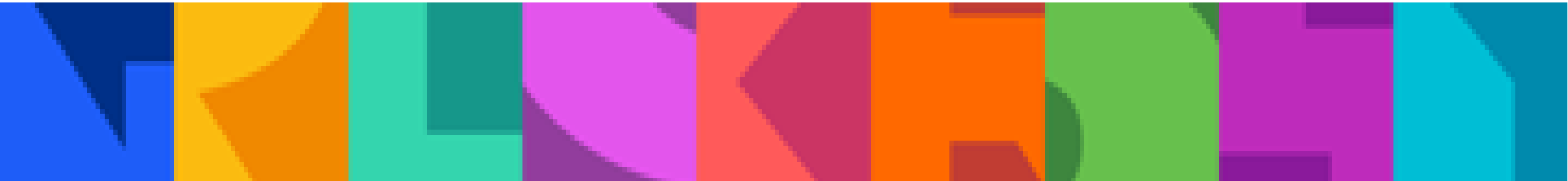


Team and Talk Overview

- Background and ambition
- Context
- Introducing the project

Coordinators

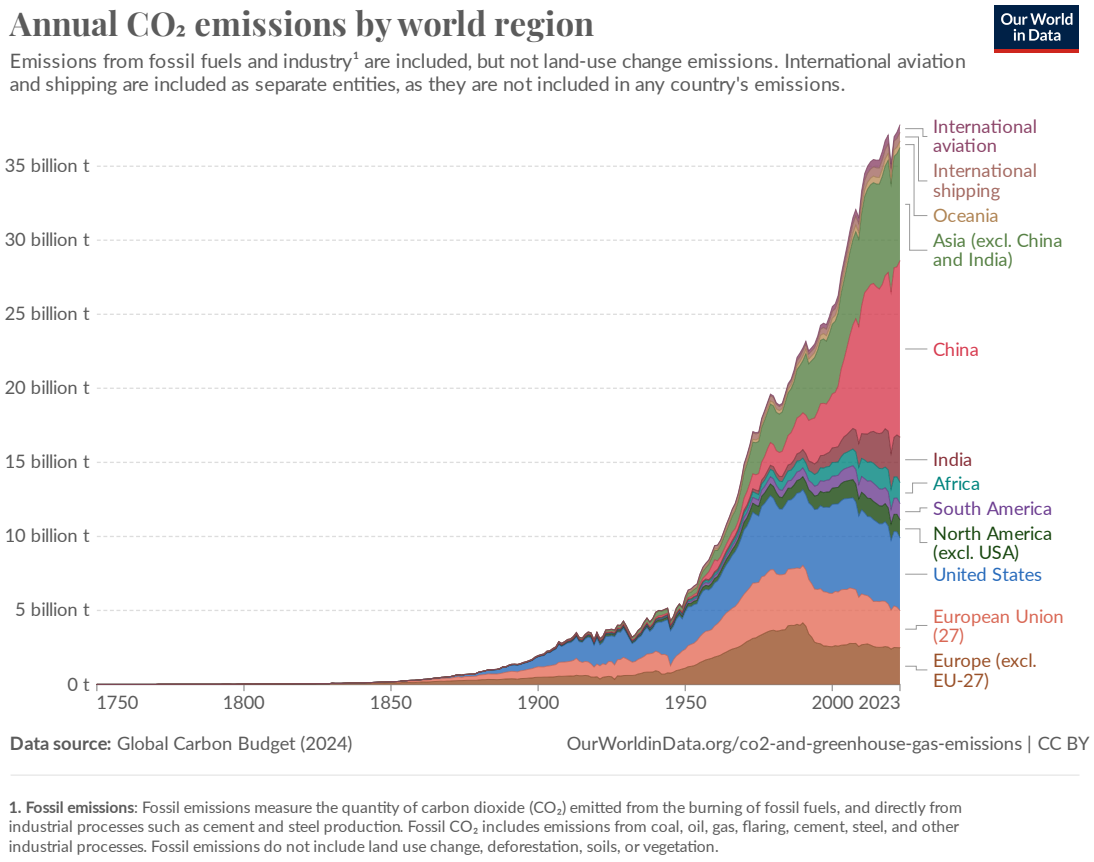
Martin Juckes

Sarah Sparrow

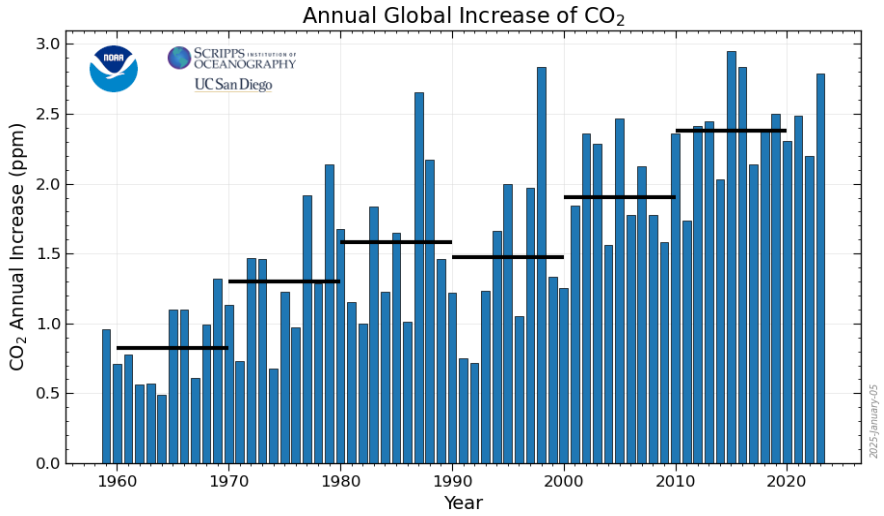
Oxford:
- Lucy (Huibo) Li: Grant Manager
- Graeme Smith: Support
- New recruit: Integration Lead

NCAS Leeds:
- James Armstrong: Contracts
- Alex Taylor: Finance
- Frances Dee: Events

A Global Perspective: Climate Metrics



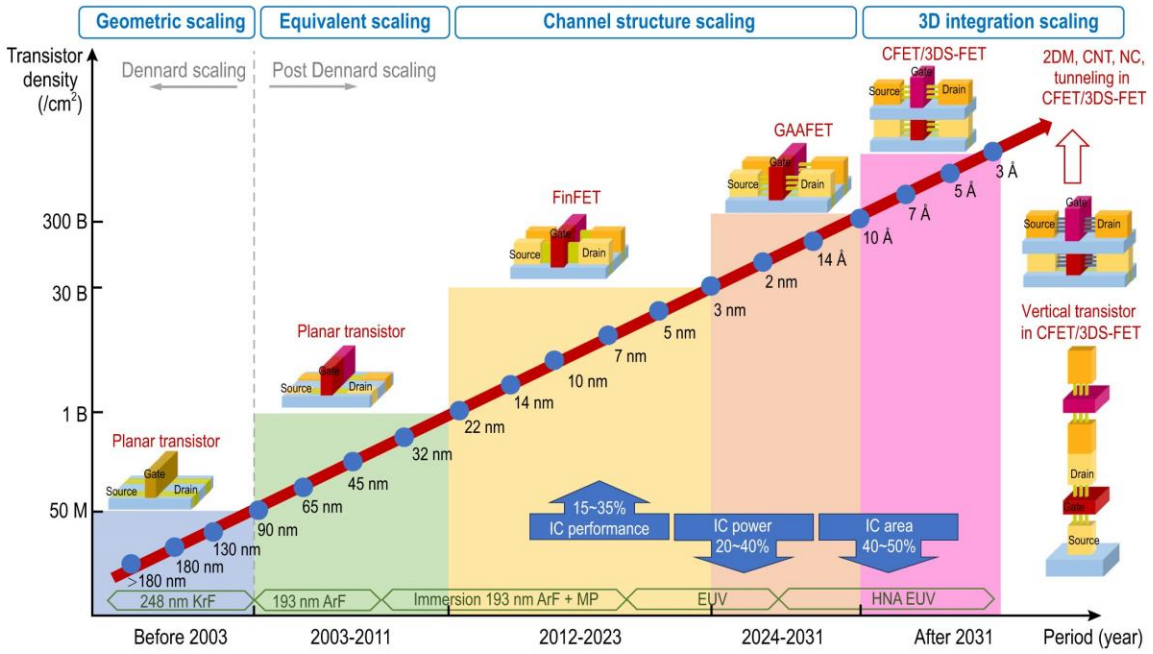
1. Fossil emissions: Fossil emissions measure the quantity of carbon dioxide (CO_2) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO_2 includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.



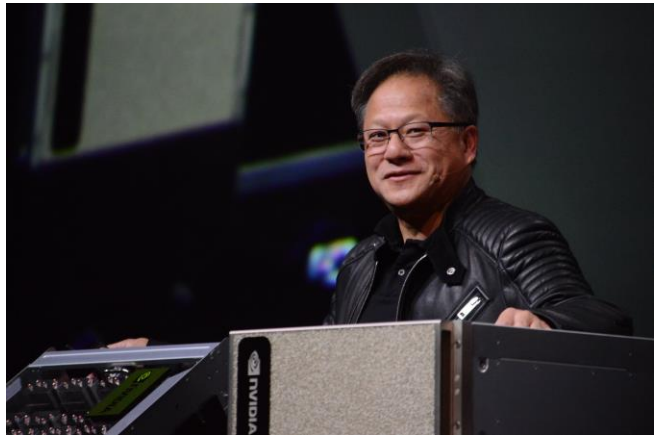
- Global emissions are rising
- Global warming is accelerating
- Nature's capacity to mitigate of emissions is at risk

Moore's law into the 7th decade

Many predicted the end of Moore's law when Intel fell behind the pace a technology reached the limits of what could be packed on the surface of a chip ….



Zhang et al, 2024, https://doi.org/10.1093/nsr/nwae008
Working with the 3rd dimension will keep Moore's law alive



"Our systems are progressing way faster than Moore's Law." Nvidia CEO, Jensen Huang, Jan 2025 (photo by: Sebastian Moss).

Projections for the first Zettaflop machine range from 2027 to 2032. Japan plans to build a zettaflop machine for research by 2030.

Some context

Our computers have a significant and growing carbon footprint.

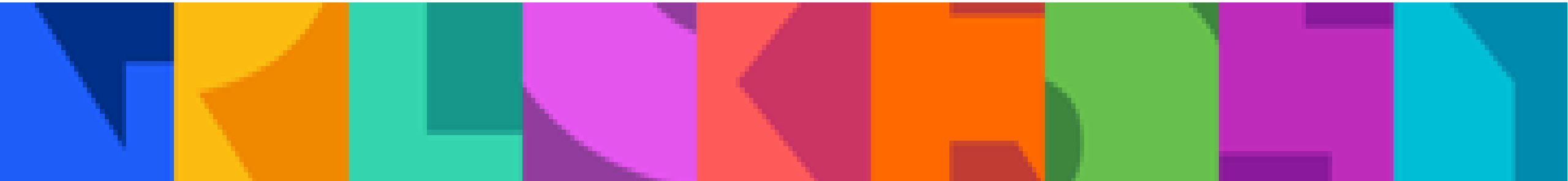
Efficiency gains lead to greater demand and greater resource usage.

Physical infrastructures supported by the DRI have significantly larger footrpints.

Digital technology is inherently transformational.

Stage 2 Project Overview

- Funded with ~ £4m (100% FEC) for 39 months from January 9th, 2025
- Partners: NCAS at Leeds, Oxford University, STFC.
- 50% of resources are in the flexible fund for redistribution to community activities.
- Remaining funds cover:
  - the core team (including full time Grant Manager and Integration Lead),
  - 8-10 Champions at 20% FTE, and
  - Network management cost (for 100-200 delegates, including annual in-person meeting).



Ambition

- Immediate and tangible progress towards net zero
- National and international thought leadership
- Confidence in our pathway to sustainability

Part II : Aims of the Meeting

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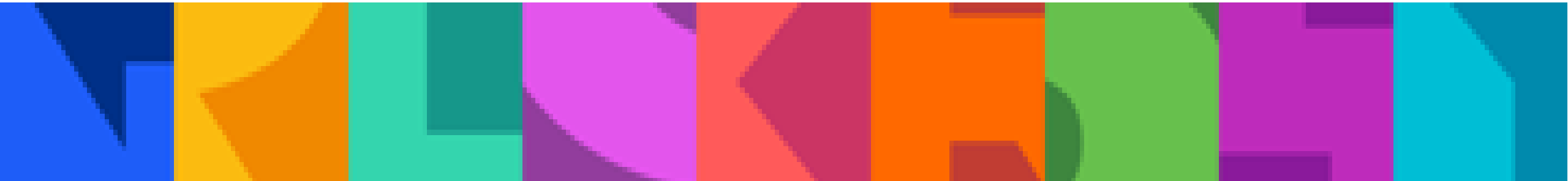

Themes

Machine room and hardware

Green software engineering

Galvanising individual action

Systemic change

Maxinusdn -- adobe.stock.com

Nadzeya -- adobe.stock.com

Questions we want answered/discussed

Q1: How can we maintain competitive computing capability when we have net zero challenges and a 10-fold increase per decade in the price of a top-end machine?

- What is a realistic ambition for the scale of our research computing resource? Should this be expressed in terms of international ranking or scale of budget?
- Can we learn from the Japanese approach (set an ambitious target for 2030 with a set budget -- $760m); US (set a really big target and ask the commercial sector to provide the funds -- $500bn); or Nvidia (send them all the data and they will handle the computing – cost tbd).?

Q2: How do we manage ethical issues around culture change and resource usage for our national compute resource and associated data?

- If behaviour change means, for instance, more preparation before gaining access to large compute resources, how should we ensure that this does not distort fairness of access?
- How do we maintain accessibility while enhancing awareness of negative impacts of resource use? Do we need to ration usage or educate users?

Q3: How do we develop the new skills needed both for rapidly advancing technology and evolving sustainability targets?

- Is there a substantial difference between the type of new skills needed now and the skills which were new 10 years ago? Do we need a different approach to skills or is it just a matter of expanding and updating existing courses?
- Do we need different approaches to management and different organisational structures?
- What is motivating early career software engineers and computational scientists today?

Three Breakouts

1 – Sharing ideas and concerns

- Present and listen to ideas; clarify points of understanding

2 - Consolidating and balancing ideas

- The second breakout should be used to look at the topics raised in the first session, consolidate views where there is agreement, and present a balanced view of differing perspectives where there is disagreement.

3 - Recommendations and Guidance

- This final breakout session will set out recommendations and guidance for UKRI and the community.
- Recommendations and guidance will be reviewed in the final plenary session and published in the meeting report.

Expected Outputs, Outcomes

Outputs

- Meeting report with recommendations and guidance related to the questions posed
- New connections in the community

Outcomes

- Inform aims of second funding call
- Clarify and publish community priorities on DRI investments

Day 2, Wednesday 19th February

- 8:30 Coffee
- Session 2.1: 09:00 – 11:00
  - [5] Welcome (Alex)
  - [25] Feedback from Breakout Session 2
  - [30] Flexible time
  - [60] Breakout 3 - Recommendations and Conclusions
- Session 2.2: 11:20 – 13:05
  - [50] Feedback from Breakout Session 3 and Plenary Discussion
  - [50] NetDRIVE Funding Opportunity
  - [5] Close

Part III : Funding Opportunity

London

19 February, 2025

Martin Juckes and Sarah Sparrow