Early Experience from Running the UK's National AI Supercomputer Service

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The Bristol Centre for Supercomputing: BriCS

- Established in **2024** to deliver **national AI and HPC services**
- We've grown rapidly to ~30 staff, drawn from HPC centres of excellence all over the world
- Based at the **University of Bristol**
- Delivering **over £300M of AI and HPC services** over the next 5 years
- Continuing to hire across all levels

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December 2025

Bristol Centre for Supercomputing systems

We've built **two new modular datacentres** and installed **three new HPE supercomputers** in less than 2 years (Q4 '23 – Q3 '25):

1. **Isambard 3** – 384 nodes of Grace-Grace CPUs, air cooled
2. **Isambard-AI phase 1** – 168 GH200 GPUs in EX2500, DLC
3. **Isambard-AI phase 2** – 5,280 GH200 in EX4000, DLC

All use HPE's Slingshot 11 high-speed network. Mixture of air and direct liquid cooled.

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Isambard-AI phase 2

- **5,280 NVIDIA Grace-Hopper GPUs** in a new, 5MW HPE modular data centre (MDC) facility in Bristol, UK
  - **~21 ExaFLOP/s of 8-bit for AI**, **~216 PFLOP/s 64-bit for HPC**
  - **PUE typically 1.06-1.08, powered entirely by local renewable electricity**
  - **Ranked #11 in the world** on the Top500 November 2025

- **Extremely rapid deployment**
  - Site constructed from scratch and supercomputer installed in ~12 months
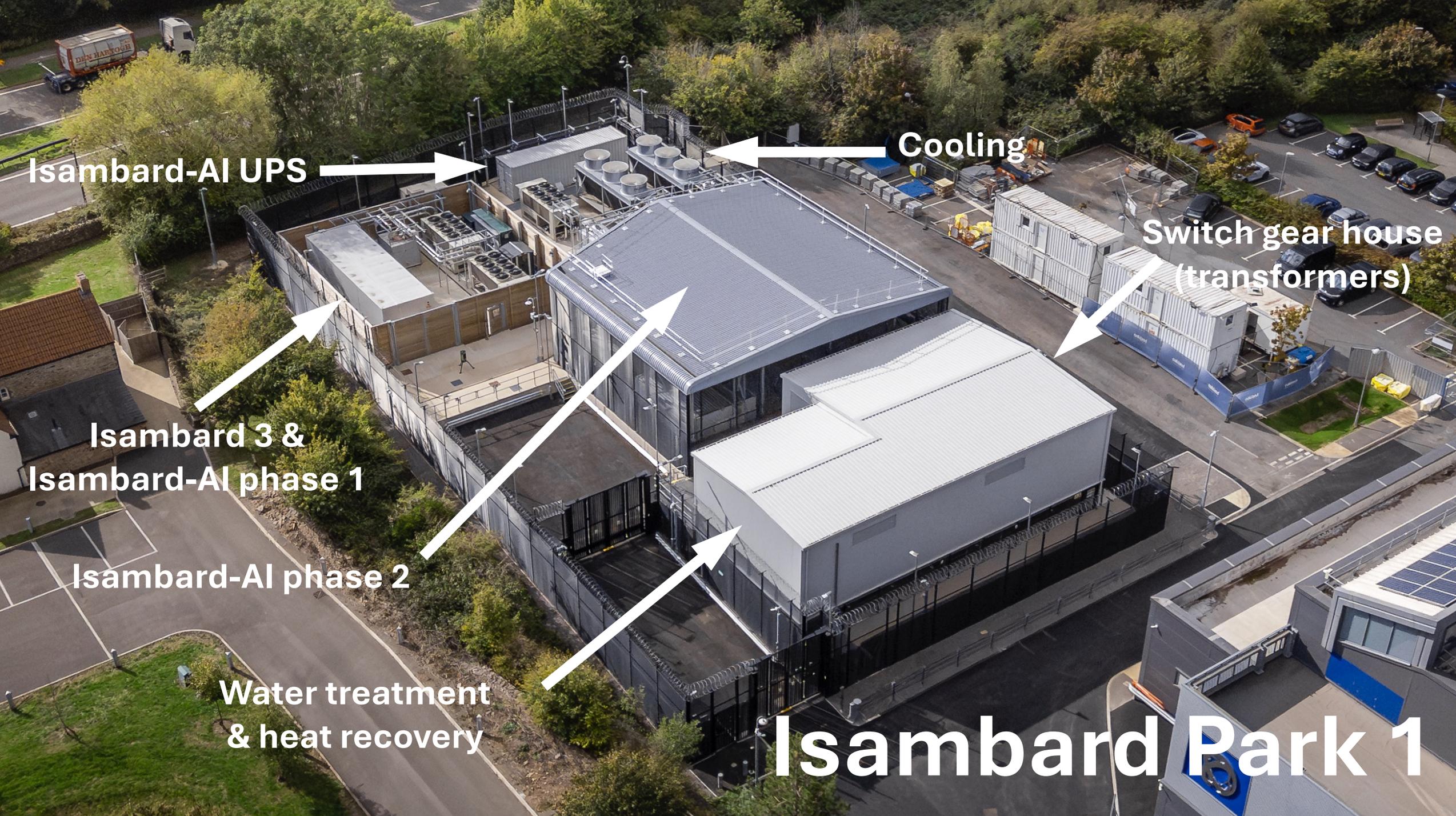 - ~2 months for bringup and acceptance

Isambard-AI site build: ground broken 3rd June 2024

03-Jun-24 12:50

Isambard-AI site build: ground broken 3rd June 2024

18-Feb-25 12:10

Isambard-AI UPS

Cooling

Switch gear house (transformers)

Isambard 3 & Isambard-AI phase 1

Isambard-AI phase 2

Water treatment & heat recovery

Isambard Park 1

January 22nd 2026: HRH Prince William visiting Isambard-AI

Early experiences running the AI service

Grown to **1,600 users** and **600 projects** since August last year.
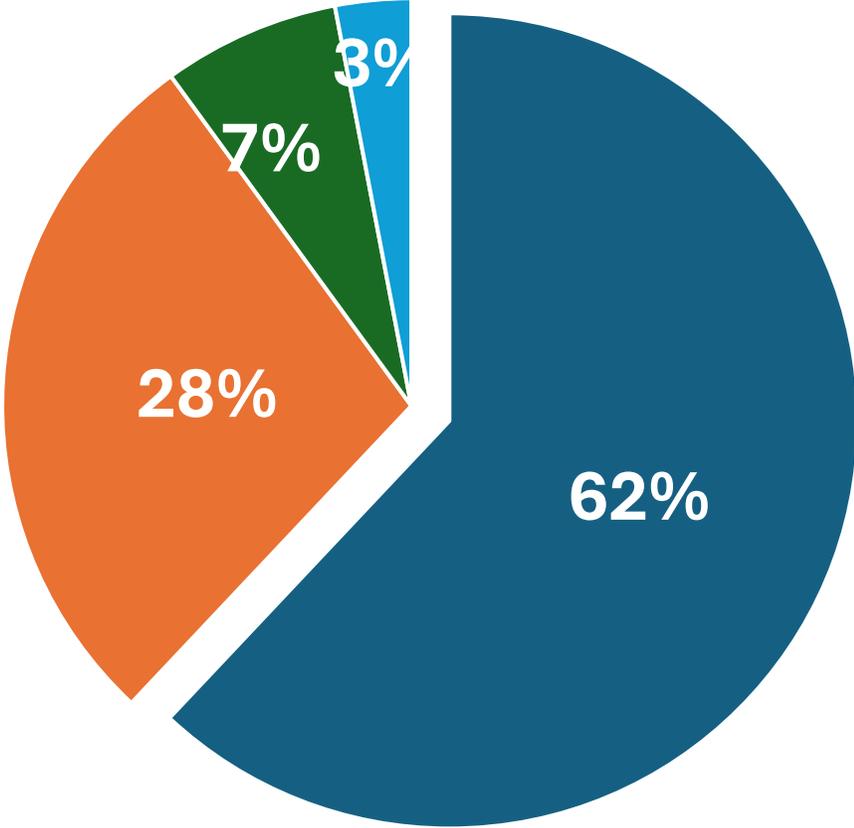
"AI first" users are <u>not</u> like HPC users.

- Lots of *interactive* users e.g. Jupyter Notebooks etc
- Preference for ***Kubernetes*** rather than SLURM
- Lots of use of standard ~~packages~~ containers
  - Most users aren't writing their own code
  - "AI for science" users are the exception

Allocation routes

- In first few months ~3.6M GPU hours were allocated over ~550 projects
- **AI Security Institute** (1.14M GPU hours)
- **Sovereign AI** (1.08M GPU hours)
- **AI Research Resource Gateway** (564k GPU hours)
- **UKRI initial expression of interest** (540k GPU hours)
- Many small awards, more recently a growing number of much larger awards (new "**AI4S**" and "**Innovator**" routes making awards of 100k-1M GPU hours)

GPU hours (%)

- AISI
- Sovereign AI
- AIRR Gateway
- UKRI EoI

34.3%
32.5%
17.0%
16.2%

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Usage across sectors

- Most usage by university-based research groups
- Government users next major user group
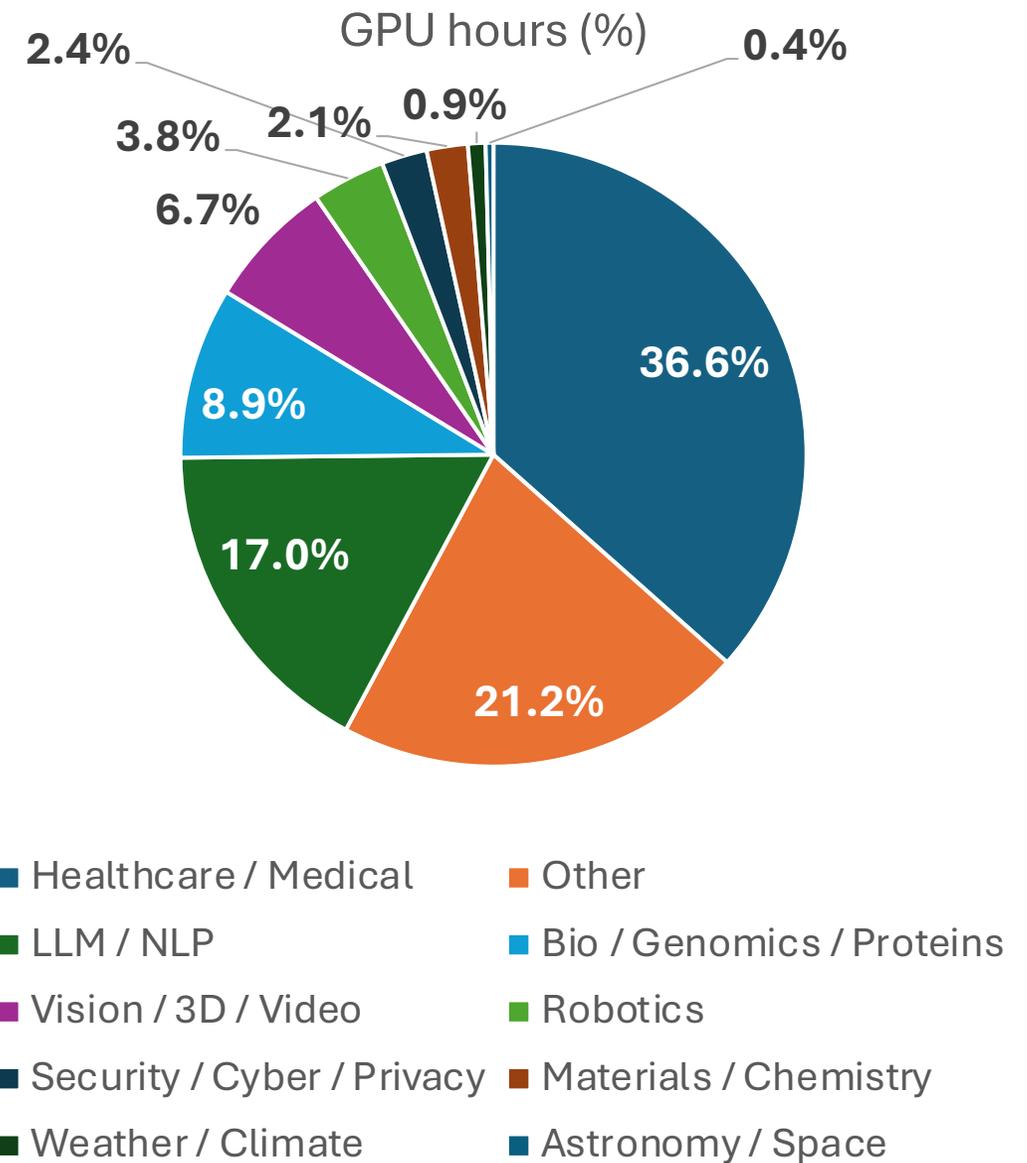- Industry usage larger than expected this early in the ramp-up

Usage by sector

- Academia — 62%
- Public sector — 28%
- Industry — 7%
- Other — 3%

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Usage by theme

1. Healthcare / Medical ≈ 2,029,041
2. Other (uncategorised large awards, e.g., some AISI / Sovereign systems work) ≈ 1,176,828
3. LLM / NLP ≈ 944,313
4. Bio/Genomics/Proteins ≈ 493,125
5. Vision / 3D / Video ≈ 370,423
6. Robotics ≈ 210,569
7. Security/Cyber/Privacy ≈ 130,375
8. Materials / Chemistry ≈ 117,923
9. Weather / Climate ≈ 50,260
10. Astronomy / Space ≈ 22,250

GPU hours (%)

2.4% 3.8% 2.1% 0.9% 0.4%
6.7% 36.6% 21.2% 17.0% 8.9%

Legend:
- Healthcare / Medical
- Other
- LLM / NLP
- Bio / Genomics / Proteins
- Vision / 3D / Video
- Robotics
- Security / Cyber / Privacy
- Materials / Chemistry
- Weather / Climate
- Astronomy / Space

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What does AI (Copilot) make of all this?

- **Foundation models everywhere** (vision, language, multimodal, protein/genomics, climate, simulation).

- **Generative simulation/world models** across robotics, fluids, weather/ocean, and materials.

- **Healthcare & life sciences**: imaging FMs, radiology/pathology harmonisation, variant effect prediction, protein design, antibody/TCR design.

- **Climate & environment**: hybrid AI-physics climate models, retrieval-augmented VLMs for EO, geophysical & ocean health FMs.

- **AI safety, robustness, and evaluation**: jailbreaks, routing stability for MoE, bias/fairness, trustworthy reasoning, data poisoning, monitoring/oversight.

- **Robotics/vision**: 3D/4D reconstruction, egocentric HOI, gesture generation, VLA models, digital twins.

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Early AI science outputs from Isambard

A sovereign LLM for the UK – **UK-LLM**
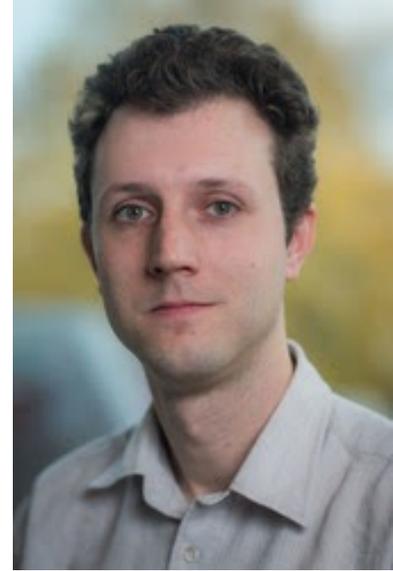
- Creating an LLM based on open source, open data
- Trained across multiple languages used in the British Isles:
  - English, Scots, Welsh, Scottish Gaelic, Irish, etc
- Also trained on UK legal case law etc
- Led by Prof. Pontus Stenetorp at UCL, London
- Scaling up to thousands of GPUs on Isambard-AI is enabling the BritLLM team to scale their models to compete with large **open** LLMs seen today, e.g. LLM-jp at 172B and OLMO at 32B

https://blogs.nvidia.com/blog/uk-llm-nemotron/

# Using OpenFold to improve healthcare

- Dr Jon Lees and Dr Danielle Paul at the University of Bristol are using OpenFold on Isambard-AI to understand how proteins interact within cells to cause disease

- The power of Isambard-AI allows them to start to reconstruct the cellular networks of proteins at unprecedented scales

- For example, they are studying a huge filamentous protein - the cardiac thin filament - a major component of heart muscle, to understand diseases such as hypertrophic cardiomyopathy, the most common inherited heart condition and leading cause of sudden adult death in the young

https://www.bristol.ac.uk/research/centres/bristol-supercomputing/articles/2025/isambard-ai-understanding-diseases.html

PolluGen: AI-based pollution forecasting

- A new high-resolution pollution dispersion model developed by the University of Manchester, using NVIDIA CorrDiff and Earth-2 Studio

- The model can use regional health and other data to help inform citizens and policymakers of air-quality impacts

- A pre-trained generative model is conditioned with low-resolution simulation data to infer a high-resolution output

- Led by Dr David Topping, University of Manchester
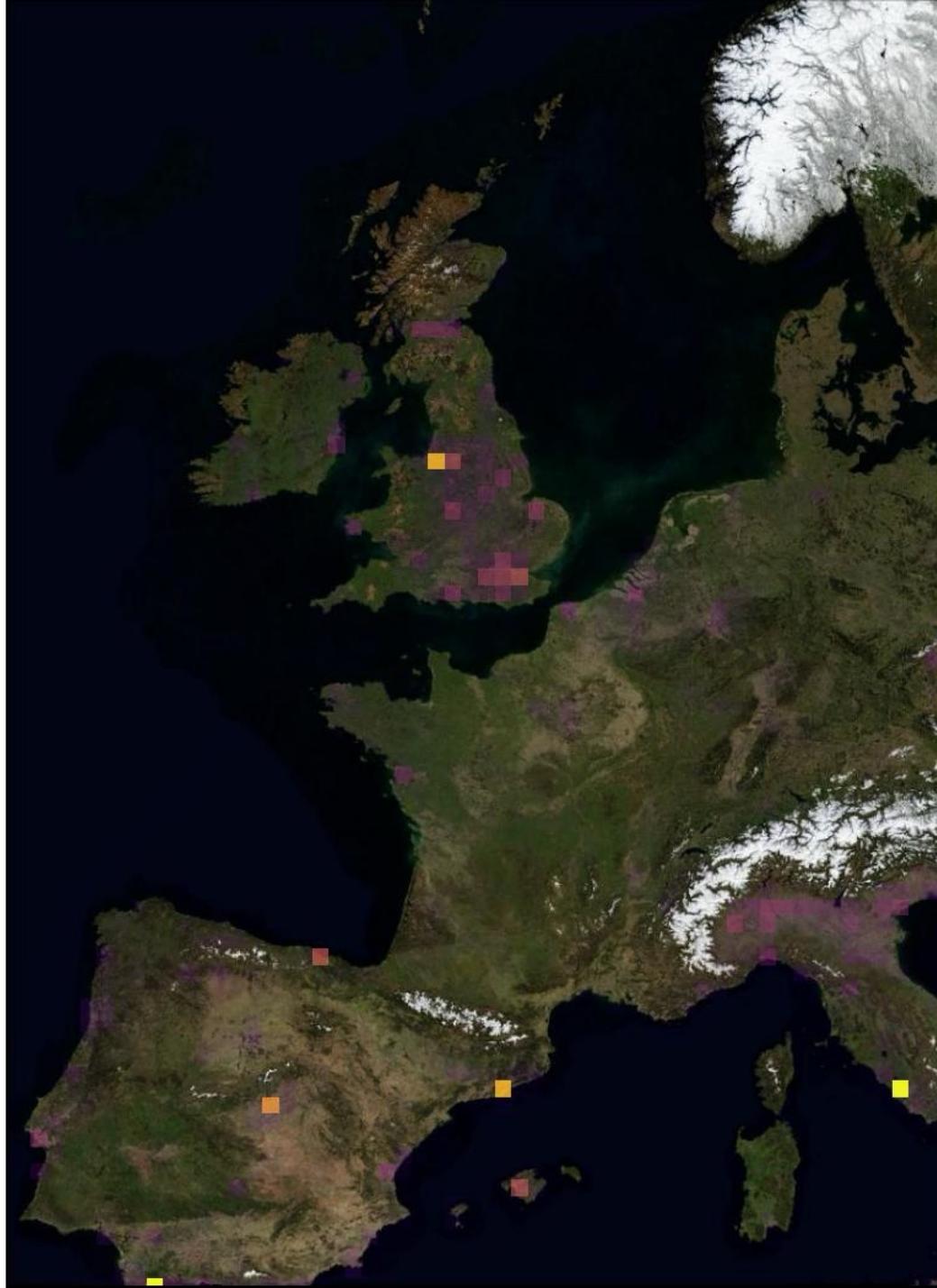
What's coming next in Bristol?

Isambard Park 2: 4-acres, 50+MW

AI Data Facility BRAID

Isambard Park 1: 0.5-acres, 8.6 MW
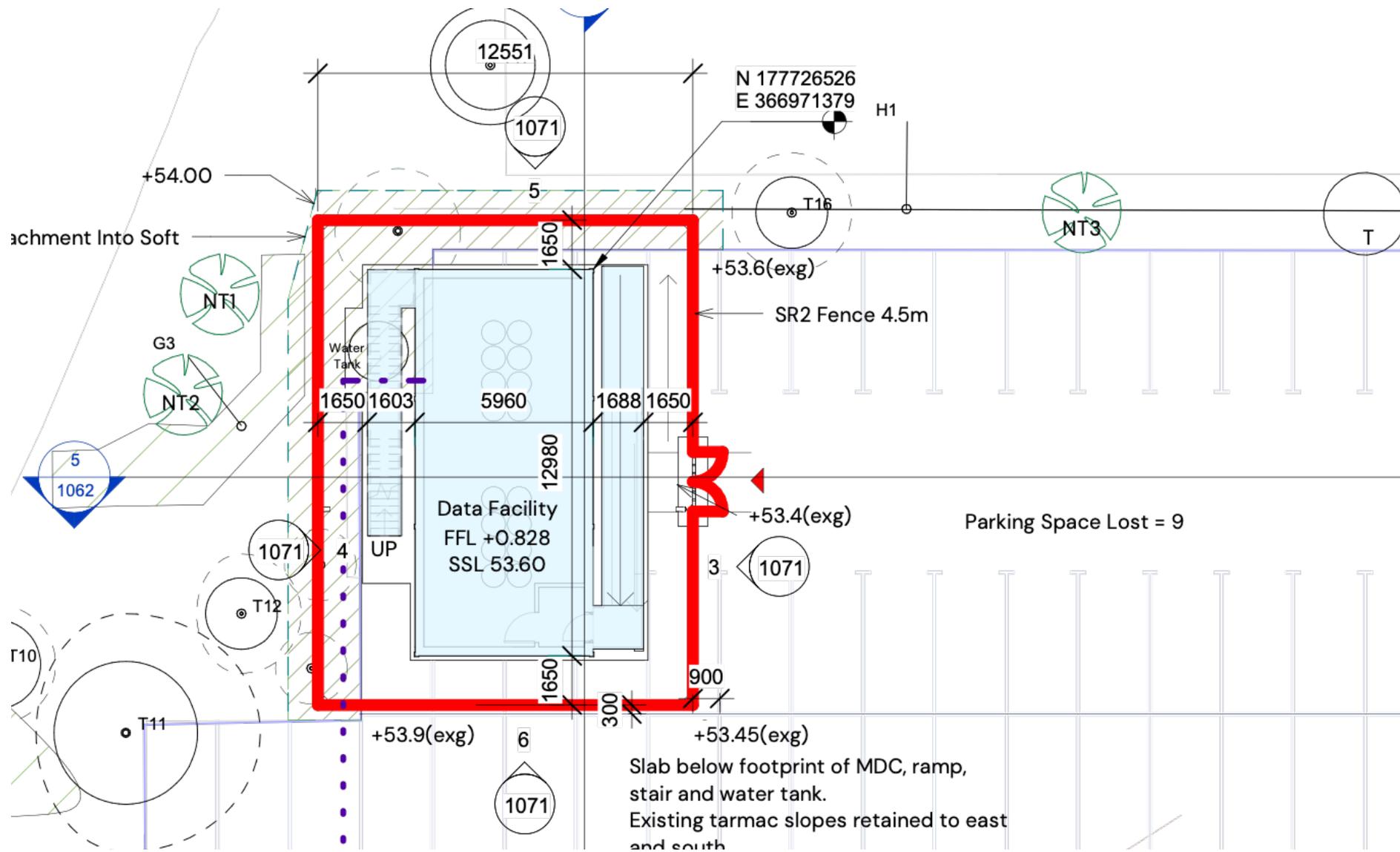
Bristol AI Data Facility (BRAID)

- A new, ~50 PByte AI data lake alongside Isambard-AI
- All solid-state for speed and flexibility
- Embedded Kubernetes cluster for processing
- Room to expand rapidly to ~150 PBytes
- New Dell MDC
- High bandwidth to local compute – hundreds of Gbps
- 100 → 400 Gbps into national network (JANET)
- Going live summer 2026
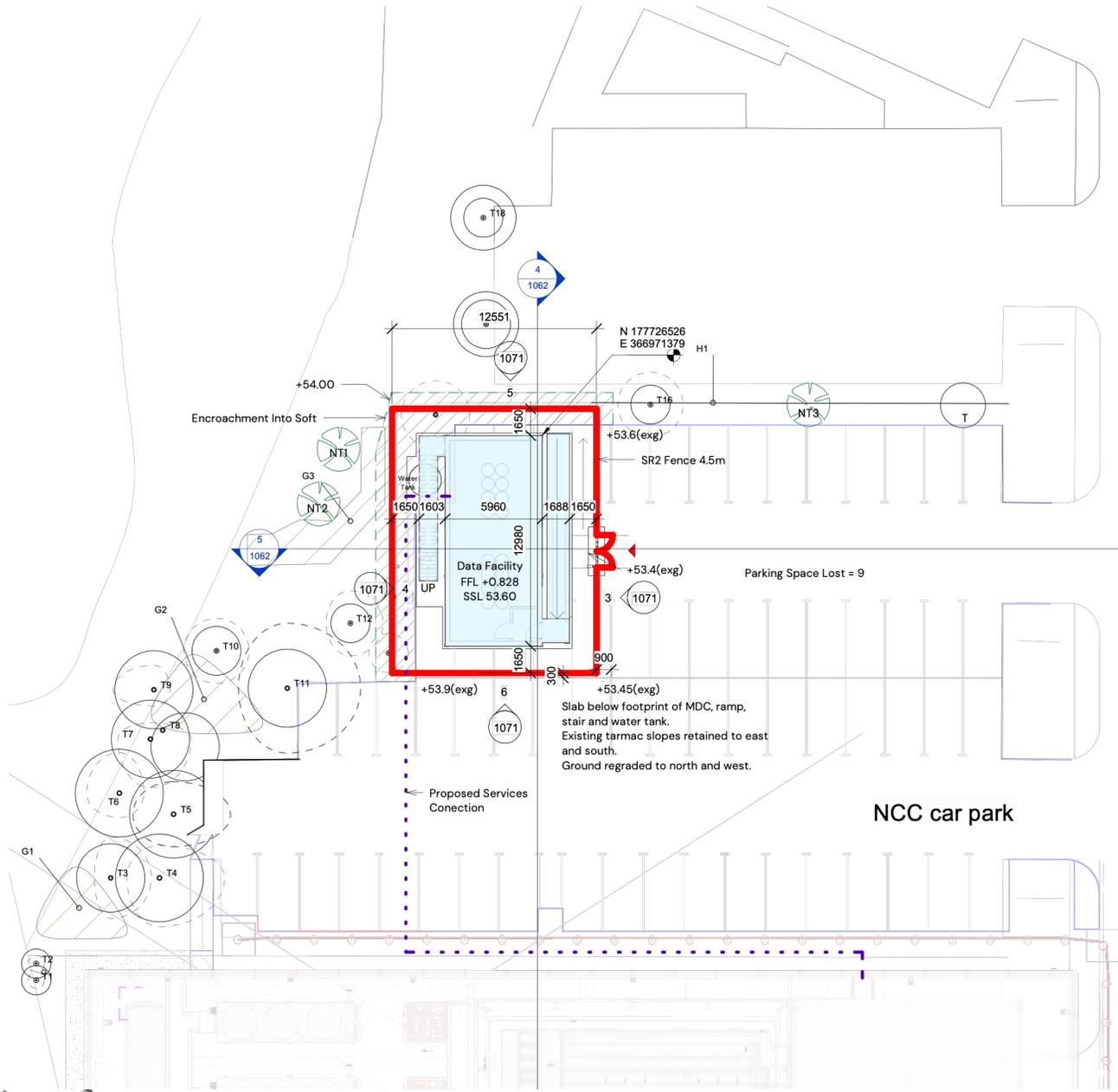
Proposed Plan Key

Loss of parking	9
Proposed Slab Level	53.60
Cut a fill requirements to be confirmed	
▬▬▬	Site boundary to be formed by 4.5m SR2 rated fence
Proposed Site Area	174m2
▪▪▪▪▪▪	Proposed Services Conection
G1/H1/T1	Tree cluster, Hedgerows and Trees, refer to Arb' Survey
NT1	Proposed New tree locations (contained within 1m3 tree pit).

N 177726526
E 366971379

+54.00

Encroachment Into Soft

+53.6(exg)

SR2 Fence 4.5m

Water Tank

Data Facility
FFL +0.828
SSL 53.60

+53.4(exg)

Parking Space Lost = 9

+53.9(exg)

+53.45(exg)

Slab below footprint of MDC, ramp,
stair and water tank.
Existing tarmac slopes retained to east
and south.
Ground regraded to north and west.

Proposed Services
Conection

NCC car park

National
Composite
Centre

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8 weeks to build the site (April-May), MDC installation June, storage July

Summary

- AI-focused services are **not** just rebadged HPC services
  - Interactive use and small jobs are important
  - Many users will happily scale to thousands of GPUs too
- AI4S users are a hybrid of AI and HPC
- AI users are coming from a broad range of research areas
- **Usage is changing rapidly** and **will continue to do so**
- **Sovereign AI** capability increasingly important around the world during periods of increasing geopolitical uncertainty

Acknowledgements

https://www.linkedin.com/company/brics-uob/

https://www.bristol.ac.uk/supercomputing/