# HPC/ AI Roadmap concept as core pillar of Cambridge's* IT Strategy

Appendix 1

## The challenge

Cambridge is widely recognised as the UK Centre for Science, Technology & Innovation. And that was long before NVIDIA announced breath-taking plans to create an open Centre of Excellence for "the age of Artificial Intelligence (AI)" in the city, which includes a world-class AI laboratory at the Arm headquarters and Cambridge-1, the UK's most powerful supercomputer, which will be dedicated to AI research in healthcare and housed on the nearby Kao Data campus.

With a community of super-scale research organisations, University of Cambridge spin-outs and innovative startups, this heady combination of high performance computing (HPC) and AI heralds a golden age of significant scientific breakthroughs and opportunities for our region.

But, with burgeoning demand from the AI world and FinTech's too, we also need to consider how such technological advancement, supercomputing innovation and intensive machine learning workloads will impact the landscape around us, now and in the future.

## How did this conversation get started?

In December 2020, a bespoke roundtable event was held led by Kao Data (home of NVIDIA Cambridge-1), in conjunction with Business Weekly newspaper and the large data-hungry companies and organisations in Cambridge. This event created the idea for an HPC roadmap for Cambridge, which wouldn't just be relevant to large companies but would also support the city's unique AI/ deeptech startup ecosystem.

Cofinitive were the conveners of the roundtable and subsequently began a series of discussions on the potential of the roadmap x-tech and x-region.

## Why do we need a roadmap?

Post-pandemic, it has never been more important for Cambridge to be leading the way in AI, innovation, technological developments and drug discovery. However, supercomputing, the foundational building block for further growth, requires reliable and abundant sources of power.

There are currently an estimated 40 trillion gigabytes (40 zetabytes) of data in the world due, in part, to machines signing on to networks and the Internet – and this figure is set to continue doubling every two years.

With the imminent arrival of exascale computing (some 1,000 times faster and more powerful than the petascale), Cambridge's unique and highly skilled ecosystem urgently requires a specific HPC roadmap to:

- ensure there is suitable future provision of 100% sustainable power for its prolific research communities and power-hungry sectors
- ensure the provision of world-class data centre facilities and fibre within the Cambridge region
- support the convergence of technology for global advances
- strengthen and retain its global positioning as one of the premier hubs for both supercomputing and AI in the UK and Europe, and stay ahead of the game

*This project initiated for Cambridge but it relevant across the Combined Authority region, and beyond

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- The creation of a genuine supercomputing ecosystem to ensure accessibility to all, sharing of best practice and networked working between smaller startups and established research institutions.

In recent years, significant resources have been spent on progressing housing, transportation and community in the city– but now we need to move Cambridge forward technologically to support our existing businesses, and be a location of the future.

Many of the larger companies are currently served by their own means. As their compute grows, their needs will inevitably change.

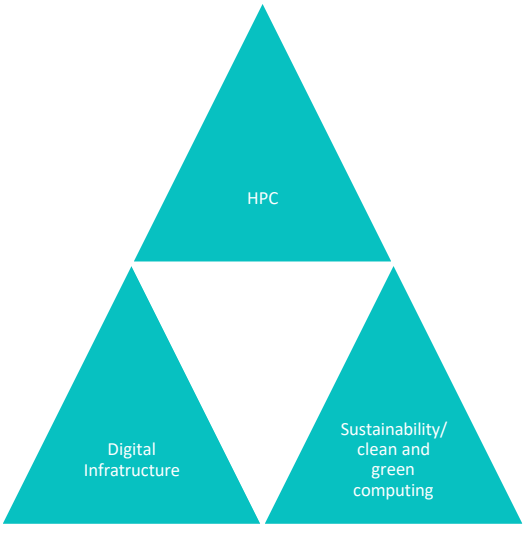
Meanwhile, smaller companies do not believe they have a voice at the table. Their needs are subsequently uncoordinated, unrepresented and under-served – which affects their ability to remain in the region. This needs to be addressed as part of this roadmap, to ensure they are part of the convened group.

## Where do we want to get to?

We intend the HPC roadmap to become a core pillar of the technological future of Cambridge and the extended region, as part of the Combined Authority's remit and ICT strategy. As we level-up and progress post COVID, we also need to be getting ahead of the need to retain our regions contribution to the rest of the country.

This is our opportunity to write the Cambridge Phenomenon looking forward, not backwards.

At its simplest level the roadmap will cover the digital infrastructure (led by Connecting Cambridgeshire), 5G requirements and infrastructure, and HPC needs – all led by clean and green computing.




This roadmap will need to consider:

- strategic growth
- sustainability/ net zero
- power

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- connectivity/ digital infrastructure
- compute access
- resilience
- shared data, expanding storage requirements and concerns around cloud adoption.

We believe this project will help to escalate the deployment of an infrastructure, which will make Cambridge, the Combined Authority region, and the neighbouring partners (UK Innovation Corridor, Cambridge Norwich Tech Corridor, OxCam Arc) one of the most technologically competitive regions in the world.

To achieve this, the first action is to engage with a relevant company to:

1. Provide a proposal to complete the initial feasibility study
2. Secure feasibility study funding (discussions underway with the Combined Authority officers)
3. Complete the initial study work leveraging a decentralized working group.

This feasibility study would then propose the next actions as appropriate which may then require further levels of investment to develop and deliver the roadmap – by collaborating with the public and private sector, locally and in Westminster.

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## Who is engaged?

Original group

- Kao Data
- Huawei
- EMBL-EBI
- Wellcome Sanger Institute
- University of Cambridge
- Arm

Other private sector organisations

- A broad range of startup, AI and ML growth companies
- Large compute companies
- Network providers

Stakeholders (approached and pending)

- Cambridge Network (supportive)
- Connecting Cambridgeshire (supportive)
- Cambridge Wireless (briefed ref ICT strategy)
- Cambridgeshire & Peterborough Combined Authority Business & Skills Team (funding potential agreed, link to Business Board)
- Sheryl French (energy and sustainability)
- Cambridge Ahead (discussions with Harriet Fear/ Dan Thorp)
- Cambridge&/ Growth Works (approach pending, inward investment draw)
- UK Innovation Corridor / Innovation Core / Cambridge Norwich Tech Corridor / OxCam ARC (approach pending)
- Cambridge Cleantech / OneNucleus (approach pending)

Conveners

- Kao Data
- cofinitive
- Business Weekly

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## Supporting Quotes

*"It's important for a centre like Cambridge to have the capacity to keep doing the research we are doing and to continue attracting the right talent."*

Henk Koopmans, CEO of Huawei Technologies R&D UK

*"The number of organisations in Cambridge utilising HPC and GPU-powered AI is unlike any other location in the UK. Power availability and, indeed, connectivity are two important issues for a city with desires to become a 'smart-city' of the future."*

Spencer Lamb, Vice President (Sales), Kao Data

*"A roadmap, showing the power infrastructure that's going to be built up around Cambridge, will allow people to do a lot more planning."*

Sarah Cunningham, Vice President,Technology Operations Services Group, Arm

*"Data growth is increasing at an alarming rate. Regardless of whether it's for NHS Test and Trace, epidemiological research or vaccine investigations, it is essential that we can scale up and manage this data in a coherent fashion across borders."*

Dr Peter Clapham, Team Leader for the Informatics Support Group, Wellcome Sanger Institute

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