

# Joint Open Infrastructure for Networks Research

The world's best minds,  
working together on  
your next big opportunity.



For business leaders

# JOINER: Bridging the gap between industry and academia



*Simon Fletcher, CEO, Real Wireless*

*Real Wireless works with JOINER on the refinement of its capability, establishing value propositions, evidencing proof of concept and plotting a path to growth through sustainable business models.*

Large scale experimentation is sometimes dismissed as big dreams that never make it out of a laboratory. Within the JOINER ecosystem we're turning this myth on its head. We're bringing together academia and industry through a brand new offering. We call it experimentation-as-a-service.



To achieve this, we are leveraging the scientific discipline of the university sector collaborating within the EPSRC future telecoms hubs — where academics dedicate their time to identifying research questions, and understanding the fundamental challenges of future networks — to answer those research questions, leading to innovative new solutions for the future of the telecoms industry. I think of our job as creating value from the exposure of the sovereign

capability of the UK: the unique university approach to critical national infrastructure research challenges, integrated into UK-based companies — and then into the industry in its wider sense.

“There is a real, concerted effort for the UK to take a leadership position on the global telecoms stage”

What sets JOINER apart is the national and international scale that it operates on, and the network effect inherent to the platform. Businesses have the opportunity to engage with more than just one or two academic entities, instead tapping into experimentation expertise from 15+ labs to frame their experiments, all at once. The businesses we're engaging with — both big and small — face a range of challenges. From providing the proof points an

exec needs to justify reallocating budgets (something that's been compared to “turning a tanker”), to demonstrating, with evidence, that a start-up is successfully progressing with the proposition that piqued the interest of early investors and prospective customers. JOINER offers the space and expert support to hone these problem statements, and ultimately deliver an answer. Our AI, NTN, and spectrum facilities — offer a landing strip for businesses to enter into this sovereign capability network. And we offer a very flexible IP model. JOINER is simply a network, it doesn't imprint any IP. If you're using JOINER to run experiments, then you own all of the IP related to whatever it is you're experimenting on.

There is a real, concerted effort for the UK to take a leadership position on the global telecoms stage. Roadmaps developed by expert working groups at the UK Telecoms Innovation Network have helped to identify mid to long term opportunities and gaps, to direct where more work is needed, and to demonstrate where there are real strengths. JOINER provides an ideal platform upon which to actually start developing capabilities for those opportunities, building on strengths and filling gaps.

I invite you all to join in.



# Experiment

*We experiment.  
We collaborate.  
We innovate.*

**JOINER is a single, open platform operating on an international scale. It's where researchers and innovators come to experiment and innovate, with a deep commitment to collaboration.**

## A real-life experimentation platform for future connectivity

JOINER operates on a scale unmatched by any single laboratory. It is essentially a giant, open private network with an international footprint.

The JOINER platform has been designed to be heterogeneous, boasting multi-site architecture, and pulling in reams of data to provide a level of complexity to mirror real-world deployments. It offers robust capabilities in hybrid cloud, AI-ready edge computing, spectrum experimentation, non-terrestrial (NTN) emulators, and secure networking. And it is open to all. “It is,” says Ning Wang, Deputy Director for JOINER, “effectively, a scientific instrument in its own right: opening up new technological avenues and applications that haven't been considered before.”

Researchers are already using this infrastructure to develop and test decentralised, multi-party network AI, and apps and tools that can work, end-to-end, across

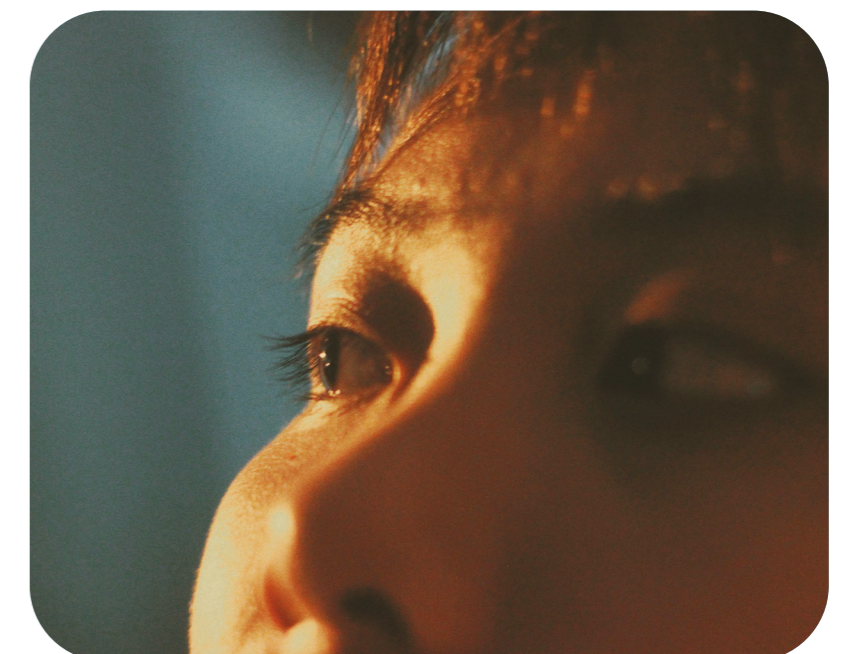
all components of a network. The platform is already — to give just one example — supporting efforts to utilise fibre networks as sensors, opening up potential use cases for everything from tsunami detection to critical international infrastructure defence.

“Opening up new technological avenues and applications that haven't been considered before”

It is an experimentation platform, but one with a firm focus on the possible. As such, the platform offers a space to put potential solutions through their paces,

gather proof-of-concept data to demonstrate to investors and prospects, generate new IP — with a view to standardisation — and gain a competitive advantage in what is a complex and competitive landscape.

This expansive but pragmatic philosophy extends to skills too. The telecoms sector faces a looming skills gap, with an ageing workforce in which 60% of workers are over 50 and there's an insufficient number of graduates and trainees coming through to replenish the pipeline. JOINER provides an environment in which to both learn new skills (within the field of AI, for instance) and upskill new talent in a safe environment, alongside seasoned experts.



# Collaborate

*Collaboration is in JOINER's DNA.*

Launched in 2025, JOINER exists to serve industry, academia, and government, supporting collaboration between start-ups, spin-outs, quangos, big corporations, and policymakers alike. The platform brings together the cutting-edge capabilities of 15+ world-leading universities and labs in one vibrant ecosystem, representing expertise from across the UK and beyond.

"It's about more than just connecting and comparing technical capabilities and research focuses," says Trinity College Dublin's Professor Dan Kilper. "The platform actively fosters a collaboration of perspectives. Social, cultural experiences alongside scientific, technical interactions."



The power of JOINER, then, lies in the connections made between its users, enabling them to push boundaries together and achieve more than they could alone. There is a twofold opportunity in this.

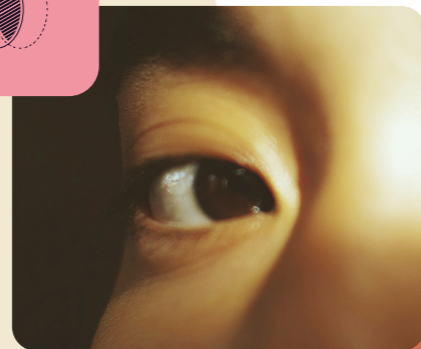
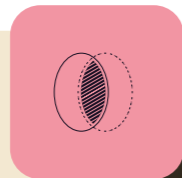
First, JOINER offers the chance to engage with academia at scale. Many companies may have a relationship with one or maybe two specific (and often local) universities. JOINER presents the opportunity to expand on and accelerate these connections, with immediate access to labs and facilities with a greater depth and breadth of expertise and specialism than any single university can provide. Tapping into the JOINER network means

accessing the combined brain power of these institutions, as well as a full stack of cutting-edge hardware and software.

*“JOINER offers the chance to engage with academia at scale”*

Second, is the opportunity to collaborate with other industry players in a neutral, non-competitive environment. Some challenges are too big for one company to tackle alone, and working with others can provide the creative spark that illuminates new ideas.

JOINER provides an unprecedented opportunity to work in collaboration on pressing, widely-felt issues like network energy consumption, data sharing, and storage across jurisdictions. As well as the obvious benefits to individual companies, this work delivers a net positive to the industry — and in some instances, the planet — as a whole.



# Innovate

*JOINER is where innovators come to realise their boldest ideas.*

Academia and industry have often existed in siloes, and in that scenario we all lose: R&D doesn't cross the chasm to the 'real world', and industry is unable to take the pioneering work being done at universities and turn it into practical, commercialised applications. JOINER closes the gap between the lab and the market, exploiting research, testing at scale in real-world conditions, working with end users and advancing commercialisation. Everybody wins.

*“JOINER closes the gap between the lab and the market”*

"The infrastructure for AI is being built and JOINER is the only available large-scale infrastructure where we can test agentic AI for telecoms," says Alex Mavromatis, founder of Madevo. "This gives us a unique competitive advantage as an AI start-up and is something we're very excited about."

Bringing bold ideas to market, of course, involves more than academics and businesses coming together. Our industry is one that is led by standards. Before a product reaches end users, you need to think about marshalling your IP to be accepted into an industry standard. JOINER is set up to facilitate the pathway from lab, to standards bodies, to the market. The platform offers services to test and validate at scale, paving a path to demonstrating evidence — a crucial stage in standards making.

While the JOINER platform convenes the top technologists in the UK, we also draw in experts in policy, regulation and ethics, to establish a broader ecosystem and framework from the start. The idea is to provide a unique environment where it's possible to explore elements such as inclusion and trust, and where policymakers can work with other platform users to undertake adoption testing and reach consensus on applications and services. This is particularly useful in edge cases, such as rural



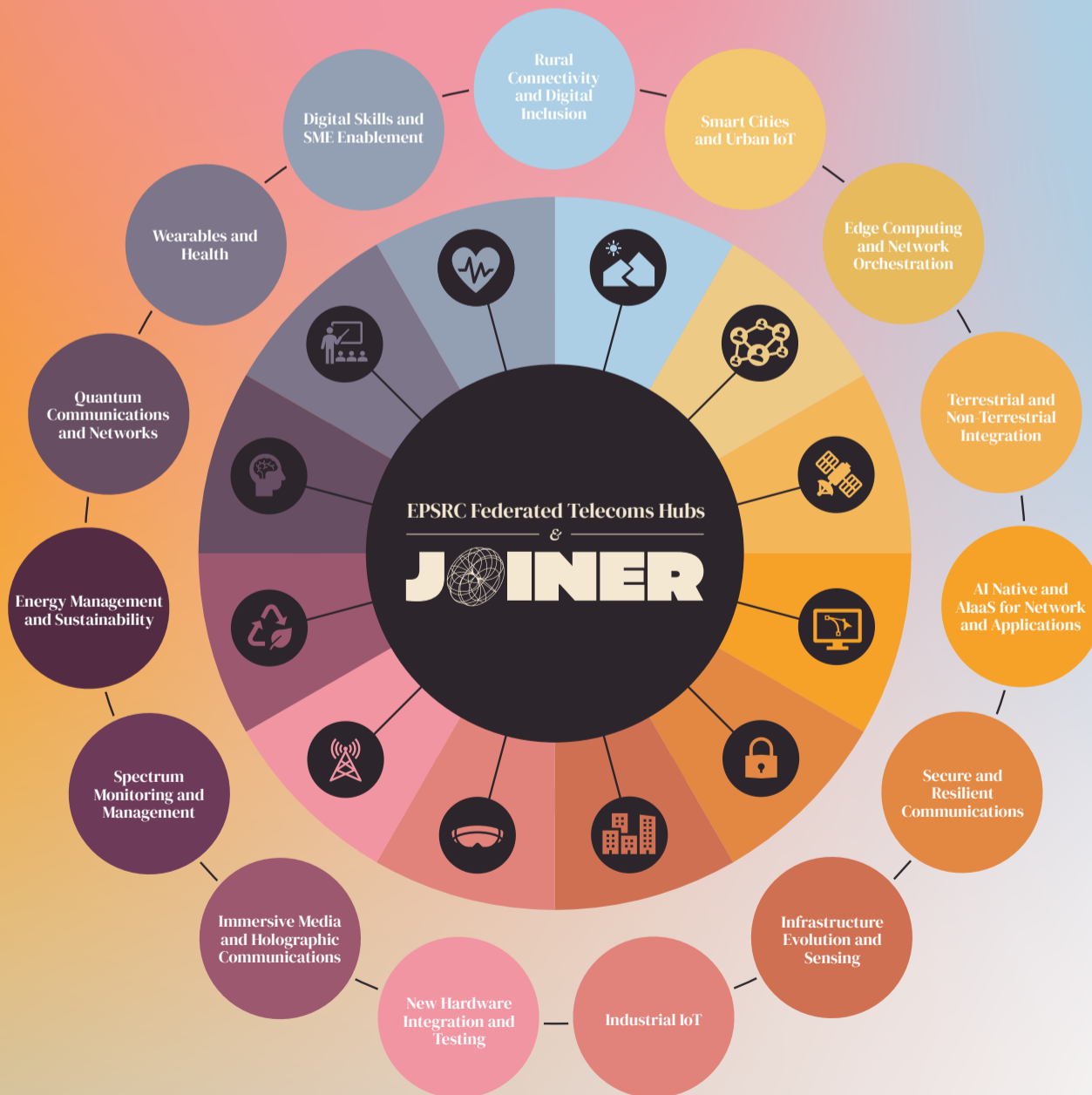
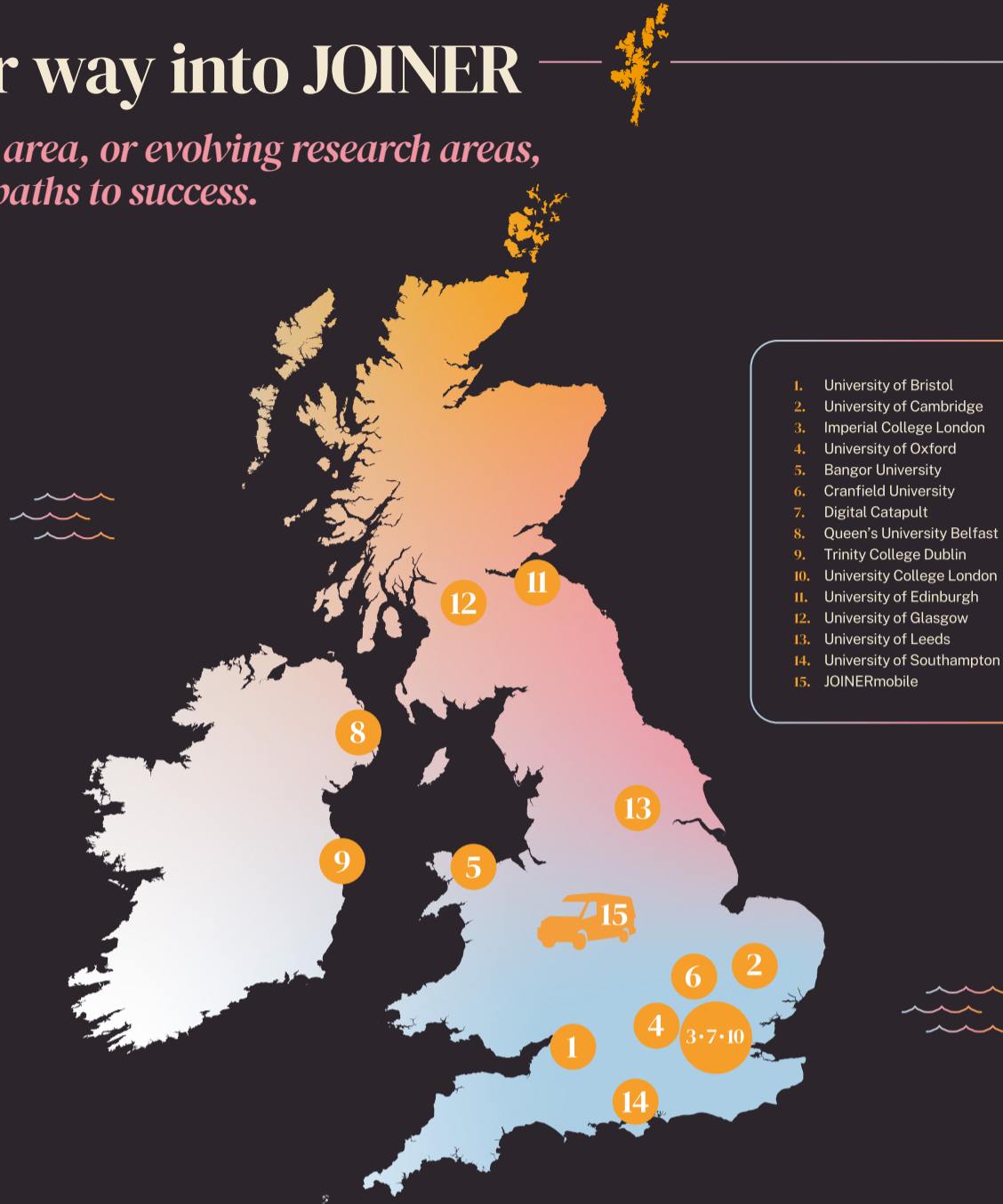
areas without connectivity, in which gathering a strong body of evidence can face more hurdles.

**Scan to find out more about how you can use JOINER** →



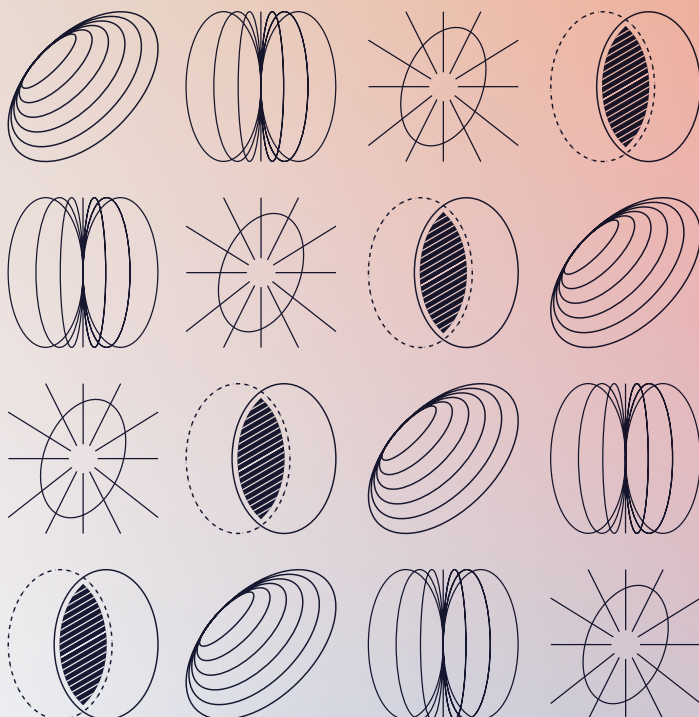
# Find your way into JOINER

By geographical area, or evolving research areas, there are many paths to success.



# Joint Open Infrastructure for Networks Research

Where next gen  
networks research  
becomes reality.



For technical leaders

# Welcome to JOINER

*Professor Dimitra Simeonidou,  
Director, JOINER*



## Most people who know me, know that I like to think big. New ideas are for investigating, not shooting down.

Grand ambition is something worth reaching for. But when we kicked off JOINER at the end of 2023, I can admit now that I sometimes wondered if I had set our sights a little too high. How were we going to bring together so many different people, working within a famously siloed sector, to pull in the same direction? At that point, with so many unknowns still ahead, we were driven by brains, yes, but we were also reliant on a healthy dose of sheer force of will. Happily, those tiny niggling doubts have long since evaporated.

In the two years since this venture, incubated through the EPSRC Federated Telecoms Hubs, we've stacked up a growing pile of milestones: the platform is up and running in locations spanning the UK; our JOINER Brain nerve centre is fully operational (*more on that on page 4*); 15 nodes have been connected, including a mobile node that can zip up and down the country; and we are breaking new ground in the field of AI for telecoms. What we've built is rivalling commercial scale offerings, and we are fostering an environment in which academics — and now commercial researchers — can collaborate on neutral ground. The ability to launch services and replicate production environments at unprecedented speed, cutting out months of procurement from project timelines, is accelerating innovation in our sector. All of this has put us at the forefront of some of the most exciting technological challenges within our sector.

JOINER's success in advancing from speculation about the role AI will play for telecoms to concrete solutions and new efficiencies is exactly the sort of thing the project exists to achieve. The link between AI and telecoms, at first merely theoretical, has now become concrete. Our win in the AI Award for High Tech & Telecom category at this year's National AI Awards is, for me, a happy and timely recognition of this progress.

“ Breaking new ground in the field of AI for telecoms ”

At first, scaling across the UK felt ambitious. We soon realised that our foundation was strong enough to extend JOINER's reach even further. With the addition of a new node in Ireland, based at Trinity College Dublin, our footprint has gone international. Later this year, we'll expand to new continents, with demonstrations planned through JOINER with Taiwan's Industrial Technology Research Institute. As Professor Dan Kilper, who heads up the Irish node, has noted, working with colleagues overseas, even in very similar research areas, immediately reveals “grey space” in which innovation thrives.

With such firm footing, we are well set for many more years of cutting-edge experimentation and innovation, ensconced in a culture of collaboration.

Join us!



# The nuts and bolts: JOINER'S technical specifications

*JOINER is a comprehensive, feature-rich platform unifying advanced infrastructure, orchestration and automation software, and monitoring and analytics to enable full lifecycle innovation.*

## Node features

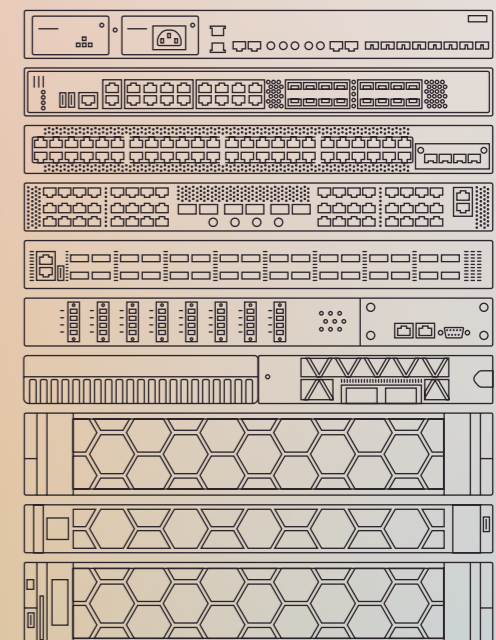
JOINER nodes are housed in 15+ leading research institutions from across the UK and beyond. Each node hosts a standardised equipment rack designed for performance and reliability.

- **Advance Networking:** Juniper ACX edge routers and EX switches in addition to Fortinet firewalls for SD-WAN deployment and security.
- **High-Performance Compute:** Dell R760 and R660 servers with up to 64 physical cores, 512GB+ RAM, and Nvidia L40S GPUs.
- **Scalable Storage:** Dell ME5024 SAN arrays offering tiered storage (SSD/HDD) for high-throughput data access.
- **Programmable Networking:** High-performance Edgecore P4 switches powered by the Intel Tofino chipset, complemented by AMD Alveo V80 accelerator cards for advanced data plane programmability and hardware offload.
- **Advanced Clock Synchronisation:** Oscilloquartz OSA 5412 for precision time distribution (PTP/SyncE).
- **Optional Components:** RFSoc FPGA evaluation kits, Open RAN radios, satellite links, and acoustic racks.

## Cloud and orchestration services

The JOINER platform boasts cloud-native capabilities that rival commercial hyperscale offerings. Users can launch services in minutes — including virtual network functions and cloud-native network functions within different nodes — and replicate production environments.

- **VMware Telco Cloud Automation Platform:** Centralised vCloud Director, NSX-T SDN, and distributed and centralised storage.
- **Public Cloud Integration:** 10Gbps Direct Connect to AWS with support for cloud native services including EC2, EKS, S3, and more.
- **Hypervisor-as-a-Service (HaaS):** Automated Bare-metal (single or multi node) OpenStack/OpenShift deployment with user-selected configurations on the fly.



## Questions about the technical nuts and bolts?



Scan here to contact the technical team

# JOINER Brain

*The JOINER Brain is the single point of managing and controlling the entire JOINER platform.*

At the core of JOINER's operational intelligence is the JOINER Brain: a centralised orchestrator that acts as the interface between users (particularly experimenters) and the underlying infrastructure subsystems, such as hybrid-cloud platforms, network fabric, spectrum systems, and other platforms.

Essentially, the Brain eliminates the need to configure every new test environment from scratch, meaning users can move more quickly from closed environments to commercial settings. This secure, simplified access helps meet the ambition of offering a real-world test environment, accelerates prototyping, and closes the gap between lab trials and successful deployments. While setup lead times on a typical 18-month project can often stretch beyond six months, with research only kicking off a year or more into the project's lifespan, the JOINER Brain truncates this process, effectively cutting out months of delays and ensuring more time is spent on actual research. Multi-tenant support is baked in as standard, allowing for secure user access controls (and privacy where IP might be concerned) and ensuring projects run in fully isolated environments from one another.

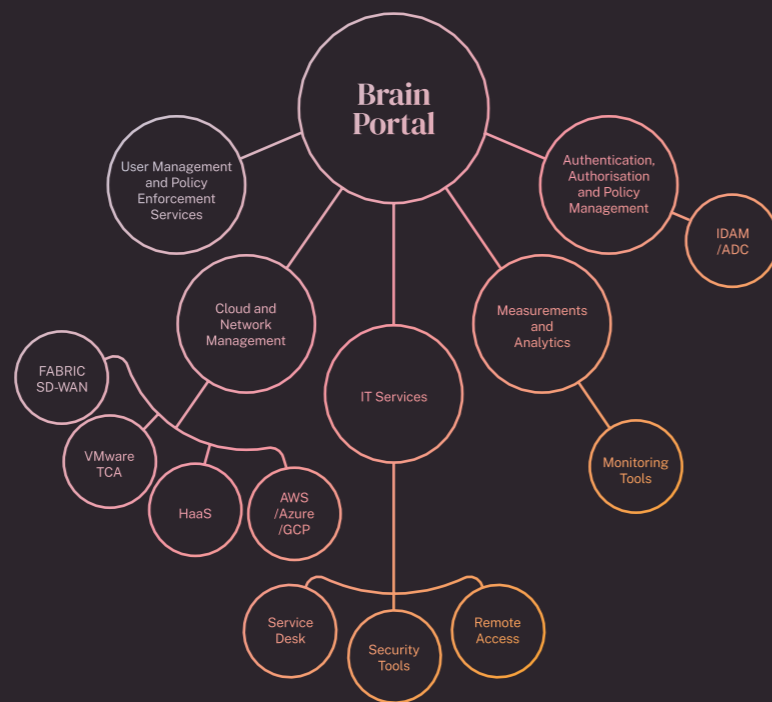
Users interact with the Brain through an intuitive self-service web portal, specifying high-level

resource or service requirements. The Brain then translates these into concrete infrastructure deployments by coordinating across compute, network, and storage components. The Brain aggregates real-time telemetry from physical infrastructure, virtual environments, and user activities to support experiment monitoring, infrastructure performance tracking, and policy enforcement.

**“ A portal that empowers users with transparency, operational assurance, and a streamlined experience ”**

Centralised monitoring dashboards integrated into the Brain include interfaces for exporting experiment metrics, enabling AI-driven optimisation, and running predictive analytics. This observes diverse performance metrics covering compute, network, storage and resource utilisation, along with spectrum activity, latency and throughput.

The result is a portal that empowers users with transparency, operational assurance, and a streamlined experience — reducing time-to-deploy and ensuring every experiment is observable, manageable, and repeatable.



# Centres of excellence

*JOINER is an open, international-scale, experimental platform for future networks research, development, and innovation born out of the UK. The platform boasts three core virtual facilities.*

## National Spectrum Facility: maximising spectrum potential

JOINER's National Spectrum Facility provides persistent, high-fidelity radio frequency monitoring and data capture across wide bandwidths and in diverse environments, enabling real-world, large-scale spectrum research, emulation and data gathering.

With these features, it's possible to predict future spectrum sharing scenarios, create testbeds to trial dynamic resource allocation strategies, and build AI-driven algorithms.

JOINER is committed to ensuring that spectrum access is not a limiting factor on the UK's economic and societal potential.

The National Spectrum Facility exists to deliver spectrum abundance.



## Non-Terrestrial Network Emulation Facility: leading the way in space-based networking

JOINER's Non-Terrestrial Network Emulation Facility is the UK's first open national platform to test and develop space-enabled 6G, and more.

The facility provides researchers, industry, and innovators with the tools they need to experiment at scale.

More specifically, it comprises two emulation platforms for NTN trials — from Keysight and Calnex — that can be integrated with the 5G core and the rest of the JOINER platform.

From satellite-terrestrial integration, to space-edge computing, spectrum sharing across land and space-based systems, and more, the Non-Terrestrial Network Emulation Facility supports those advancing into unexplored frontiers.



## AI Acceleration Facility: stripping back the barriers to AI adoption

AI is embedded into the JOINER platform's programmable infrastructure, enabling rapid experimentation, immediate deployment of AI capabilities, and faster time-to-value for powerful, real-world, telco-specific use cases for the technology — from new efficiencies to end-to-end applications working across networks.

By stripping back the traditional barriers to AI innovation in the telecoms sector, this facility introduces a fundamental shift in how telecommunications and advanced technologies work together.

More than just integrating AI into telecoms, JOINER is laying the foundation for a new generation of networks that are distributed, intelligent, and self-optimising. It's where intelligent, AI-driven next-generation networks begin.

