csa.catapult.org.uk

CATAPULT
Compound Semiconductor Applications

CSA Catapult: Empowering a Sustainable Future

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We work with Innovate UK

UKRI Innovate UK

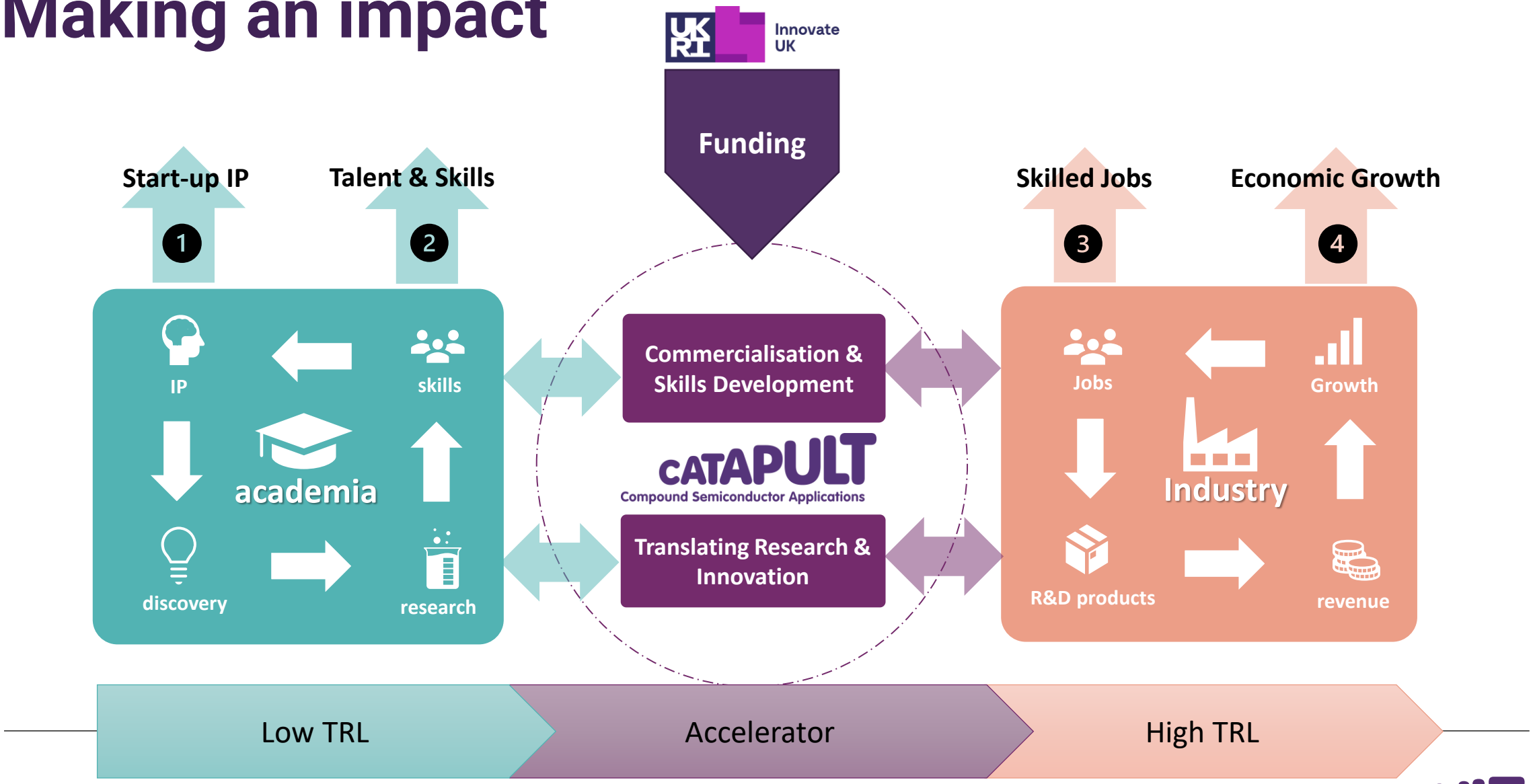
Who are we?

CSA Catapult helps deliver long-term benefit to the UK economy and accelerate UK economic growth in industries where applying compound semiconductors creates a competitive advantage and enables new products or end markets.

Our state-of-the-art equipment and leading expertise help businesses solve their problems when bringing compound semiconductor products to market, ultimately making those businesses – and the UK as a whole – more competitive.

We are one of nine Catapults that span over 50 locations across the UK.

Making an impact



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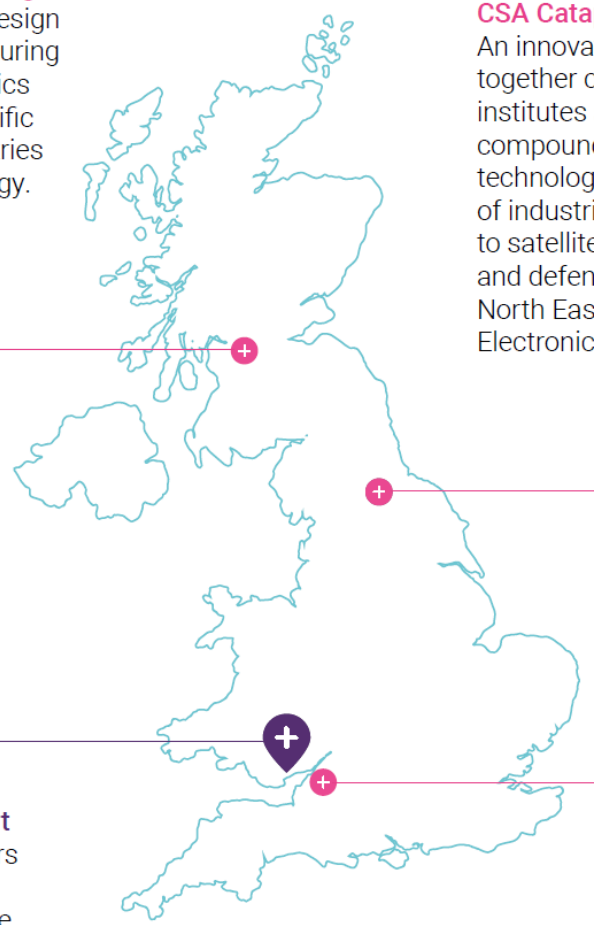
Supporting regional clusters across the UK

CSA Catapult is at the heart of clusters of compound semiconductor expertise across the UK, building networks, connections, investment and talent.

CSA Catapult Scotland, Glasgow
A centre focussed on the design optimisation and manufacturing process for power electronics and packaging, with a specific focus on high power industries such as transport and energy.

CSA Catapult North East, Durham
An innovation hub that brings together companies and research institutes actively involved in compound semiconductor technologies across a range of industries, from telecoms to satellite communications and defence. We support the North East Advanced Material Electronics (NEAME) cluster.



Innovation Centre, Newport
CSA Catapult's headquarters includes state-of-the-art equipment and cutting-edge lab facilities across four areas of expertise: power electronics, RF & microwave, photonics, and advanced packaging.
We are part of CSconnected – the world's first compound semiconductor cluster.

Future Telecoms Hub, Bristol
A translational research hub focussed on the speed, energy efficiency and security of future telecoms networks using expertise across RF, photonics and quantum technologies.
We have close links with the Western Gateway partnership.

What are Compound Semiconductors?

A few fast facts -

A semiconductor is a material that behaves a bit like a conductor and a bit like an insulator.

Silicon is the most common and popular semiconductor and is in most computers and electronic devices.

Compound semiconductors are semiconductors that are made using two or more materials.

Around 20% of the world's semiconductors are compound semiconductors.

Compound semiconductors can do things that aren't possible with traditional semiconductors like silicon.

Compound semiconductors can outperform silicon in three areas: speed, power and light.

This enables them to be smaller, lighter, faster & more energy efficient.

This contributes to a lower TCO (total cost of ownership).

Compound Semiconductor technology is unlocking new opportunities for innovation and efficiency across various industries, helping to accelerate the transition to a sustainable and carbon-neutral future.

Continued investment into research and development in this field is crucial for driving progress toward Net Zero goals.

Electric vehicles

Compound semiconductors are essential in the development of EVs.

They enable the efficient management of power in electric drivetrains, leading to longer driving ranges and faster charging times.

GaN and SiC-based power electronics also contribute to reducing the overall weight and size of EV components, enhancing their performance and efficiency.

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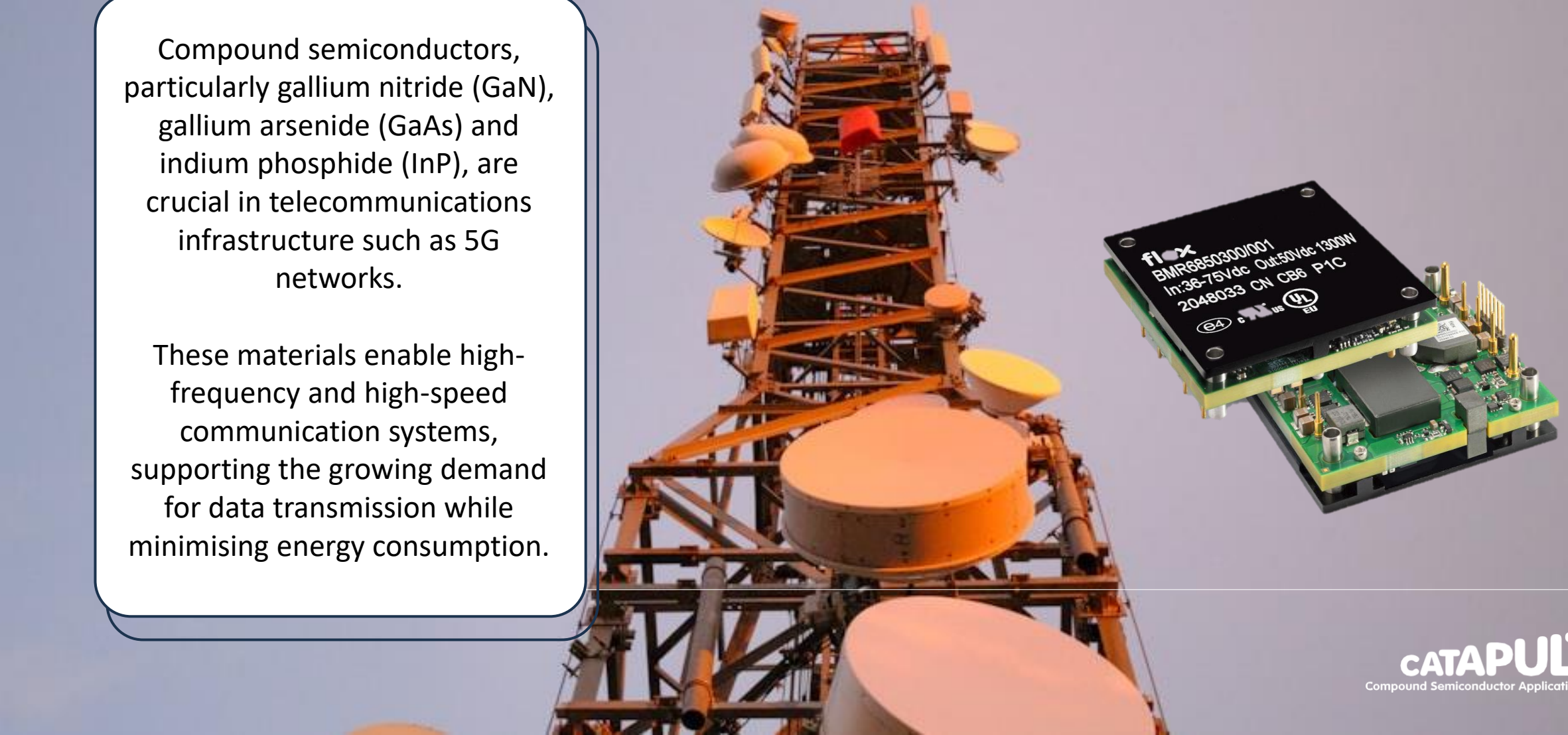
Telecoms

Compound semiconductors, particularly gallium nitride (GaN), gallium arsenide (GaAs) and indium phosphide (InP), are crucial in telecommunications infrastructure such as 5G networks.

These materials enable high-frequency and high-speed communication systems, supporting the growing demand for data transmission while minimising energy consumption.



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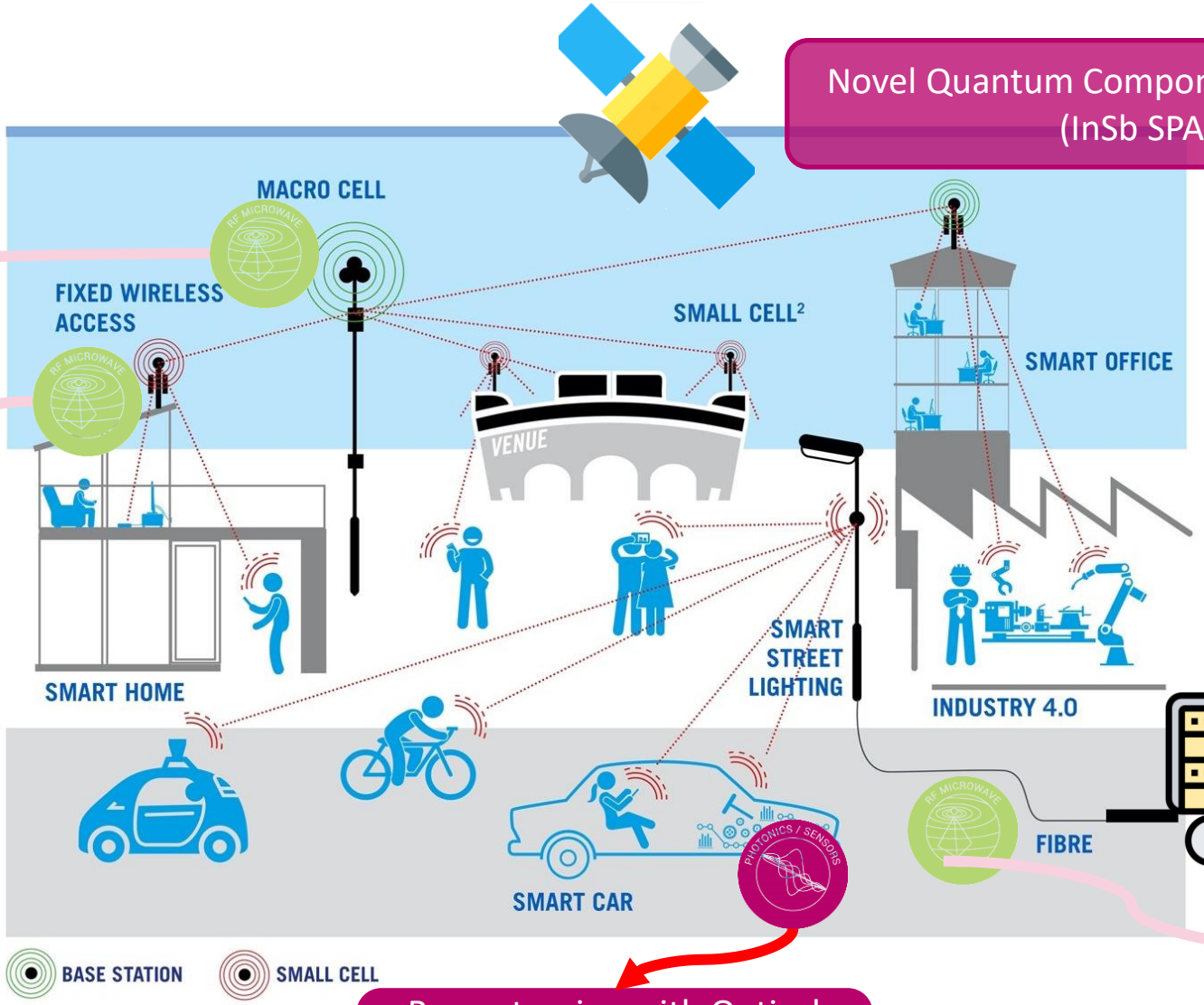
Novel Quantum Component Development (InSb SPADs)

Embedded Die Antenna in Package (GaN on SiC/Si)

PICs (Photonic Integrated Circuits) (SOI, SiN, LiNbO3)

Future Optical Interconnects (InP/GaAs/SiGe/InGaAs PIC-Tx/Rx)

RF Beamforming and Steering (RF GaN PAs)



Beamsteering with Optical Phased Arrays (PIC-LiDAR)

RF over Fibre

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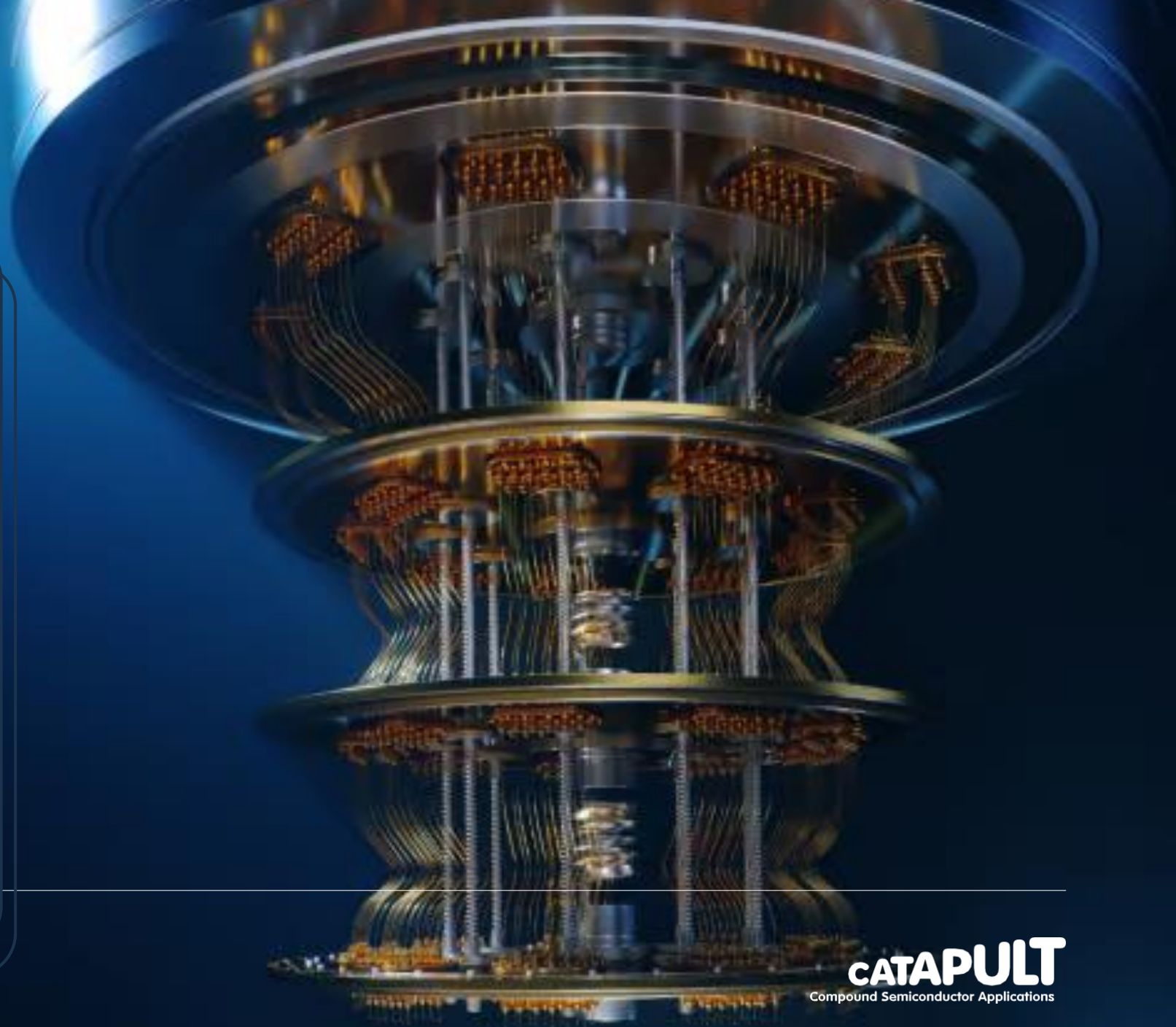
Quantum

Compound Semiconductors play a critical role in the development of quantum computing technologies.

Compound semiconductors, such as gallium arsenide (GaAs) and indium phosphide (InP), offer superior electrical and optical properties compared to traditional silicon-based semiconductors. These materials enable the creation of high-performance qubits and other quantum components, leading to more efficient quantum computing systems.



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Data centres

Materials like SiC and GaN enable the creation of power-efficient servers, switches, and power distribution systems, reducing energy consumption and heat generation in data centre infrastructure.

Additionally, compound semiconductor-based optical communication components, such as lasers and photodetectors, enable faster data transmission with lower energy consumption, optimizing data centre performance while minimising environmental impact.

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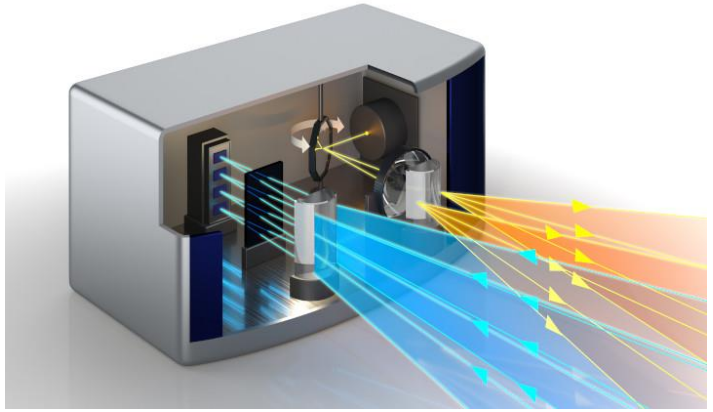
Sensing



Environmental monitoring

Agri-Tech

Med-Tech

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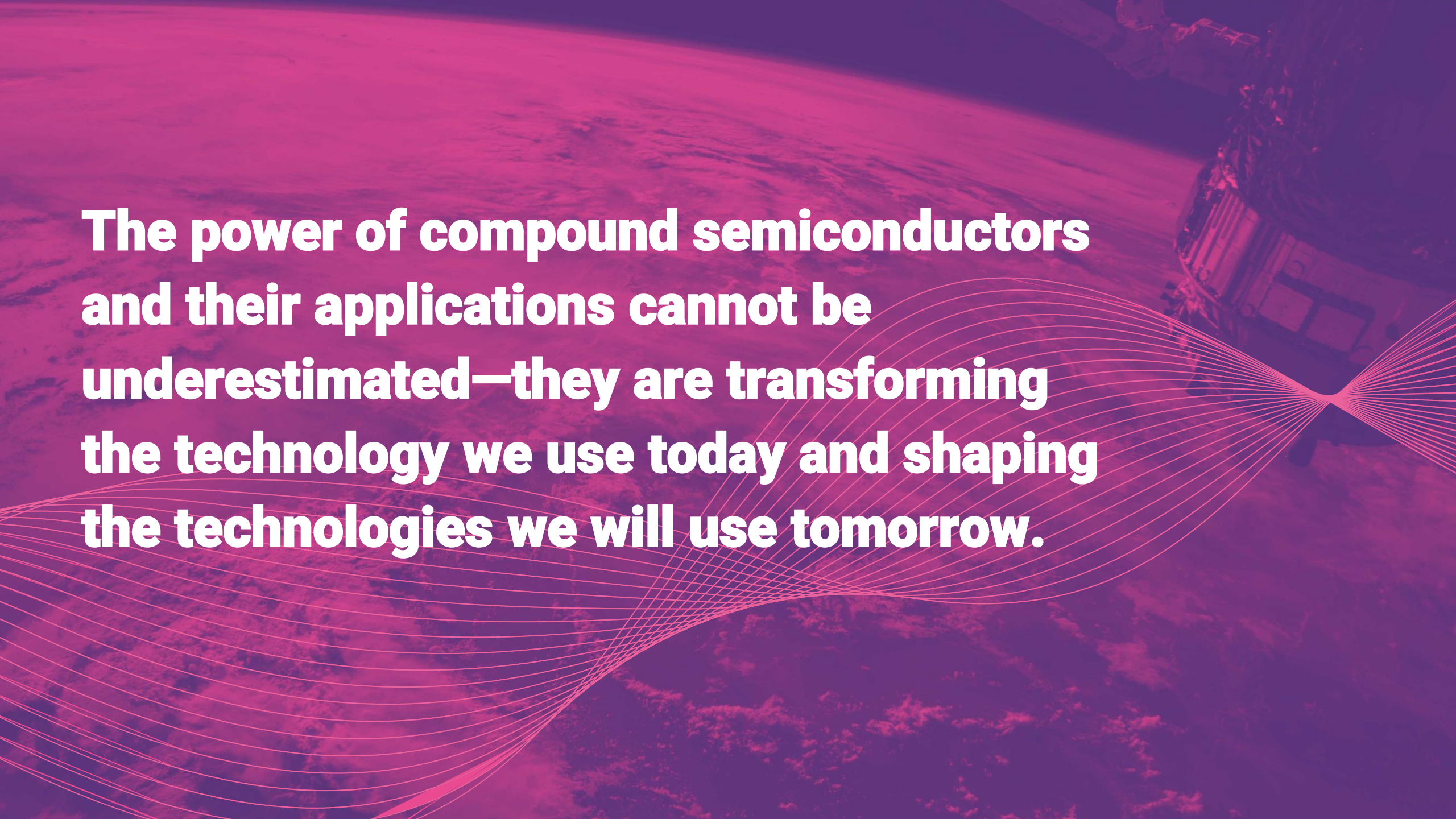
The power of compound semiconductors and their applications cannot be underestimated—they are transforming the technology we use today and shaping the technologies we will use tomorrow.

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