Compound Semiconductor Applications Catapult

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Innovate UK

Delivery Plan 2016/17

www.innovateuk.gov.uk

Catapult highlights

https://www.catapult.org.uk/compound-semiconductor-applications-catapult

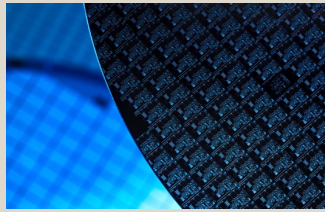
5-point plan

1. **Working with the research community and across Government** to turn scientific excellence into economic impact
2. **Accelerating UK economic growth,** nurturing small, high-growth companies with strong productivity and export success
3. **Building on innovation excellence throughout the UK**, investing locally in areas of strength
4. **Developing Catapults within a national innovation network**
5. **Evolving our funding models;** helping public funding go further

Sector focus to accelerate growth

Emerging and Enabling Technologies

Identifying and investing in technologies and capabilities that will lead to the new products, processes and services of tomorrow



Health and Life Sciences

Focused on agriculture and food and healthcare, underpinned by bioscience and medical research and enabled by engineering and physical sciences

Infrastructure Systems

Optimising transport and energy systems and integrating them with other systems such as health and digital

Manufacturing and Materials

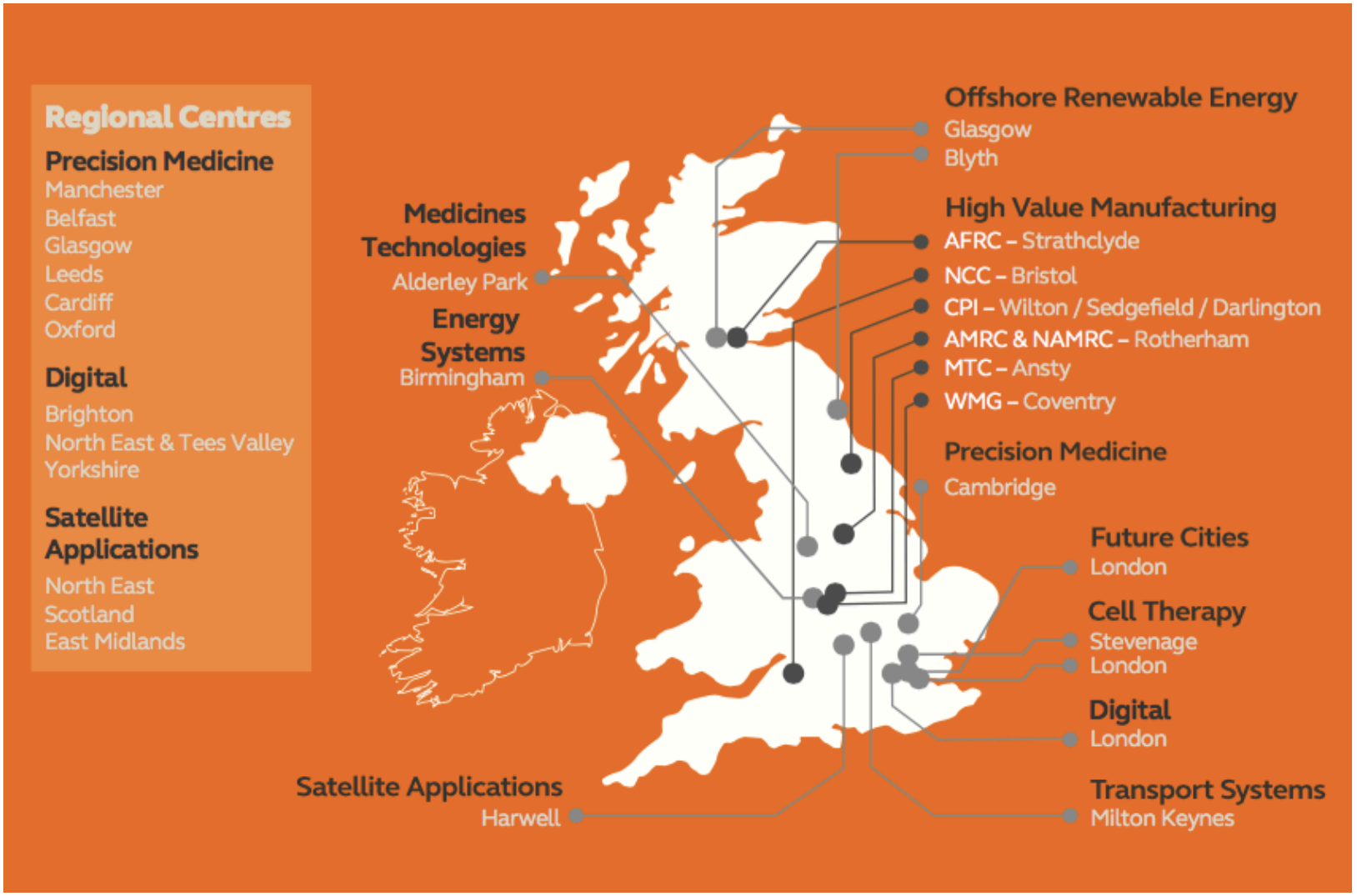
Advancing manufacturing readiness so R&D and technology developments increase productivity and capture value in the UK

New Simplified Innovate UK competitions

	Expected open date
Manufacturing and Materials	9 May 2016
Open	6 Jun 2016
Infrastructure Systems	4 Jul 2016
Health and Life Sciences	12 Sep 2016
Emerging and Enabling Technologies	3 Oct 2016

We will also run competitions in partnership with other organisations.
For all competitions see the Delivery Plan or www.innovateuk.gov.uk

Catapult Locations



CATAPULT

High Value Manufacturing Locations

Strathclyde

Advanced Forming Research Centre

Coventry

Manufacturing Technology Centre

Warwick Manufacturing Group

Bristol

National Composites Centre

Wilton/Sedgfield

Centre for Process Innovation

Rotherham

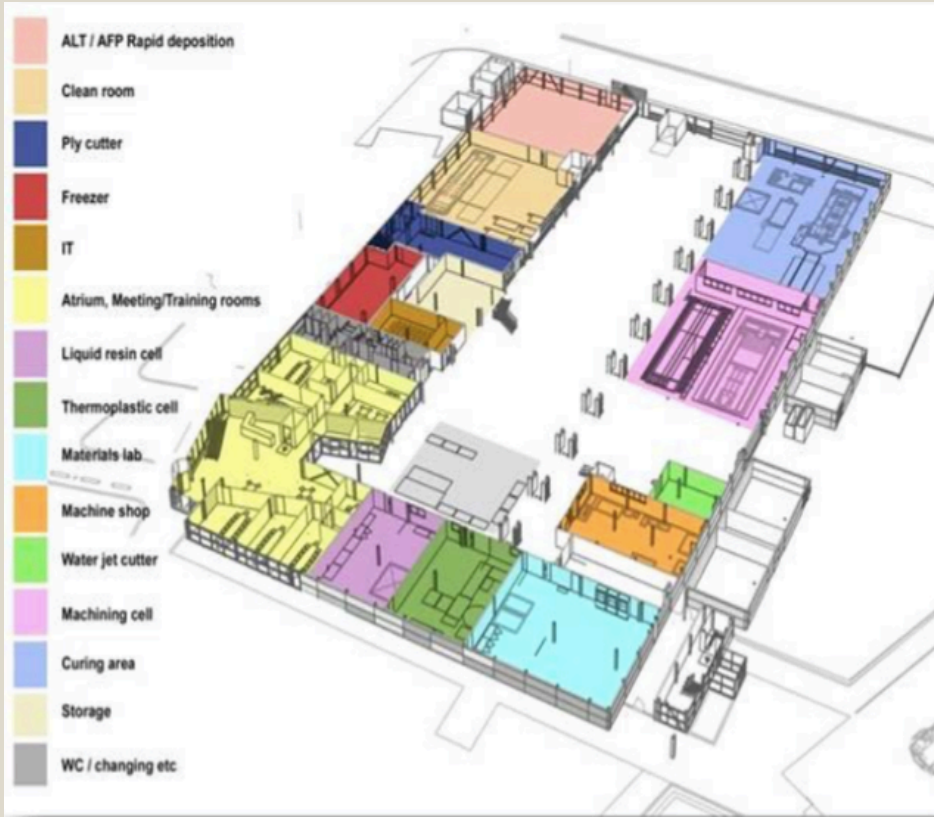
Advanced Manufacturing Research Centre

Nuclear Advanced Manufacturing Research Centre

CATAPULT
High Value Manufacturing

National Composites Centre

- Co-location of member equipment & staff
- 8,500m^2 State-of-the-art building
- 5,500m^2 workshop space
- Offices, meeting & teaching facilities
- 200 Expert Resources
- Optimised-design
- Analysis & Simulation
- Rapid manufacture
- Validation Offering
- Open & restricted access



- Helped over 2,000 companies to develop new products and processes.
- Established national centres in printable electronics, industrial biotechnology, anaerobic digestion and now biopharmaceuticals.
- 75 % of our commercial turnover in 2012/13 was from SMEs.
- CPI has over £55m of open access development and prototyping facilities.
- Completed over 350 CR&D projects with a value in excess of £300m.
- CPI has grown at almost 50% per year and now employs 225 staff across four sites in North East England.

Warwick Manufacturing Group

- International Manufacturing Centre (IMC) is WMG's largest building (7,000m^2) on the University of Warwick campus.
- Contains a mixture of lecture and teaching facilities, research and demonstration areas and offices.
- Many of WMG's administrative teams are also based in the IMC.

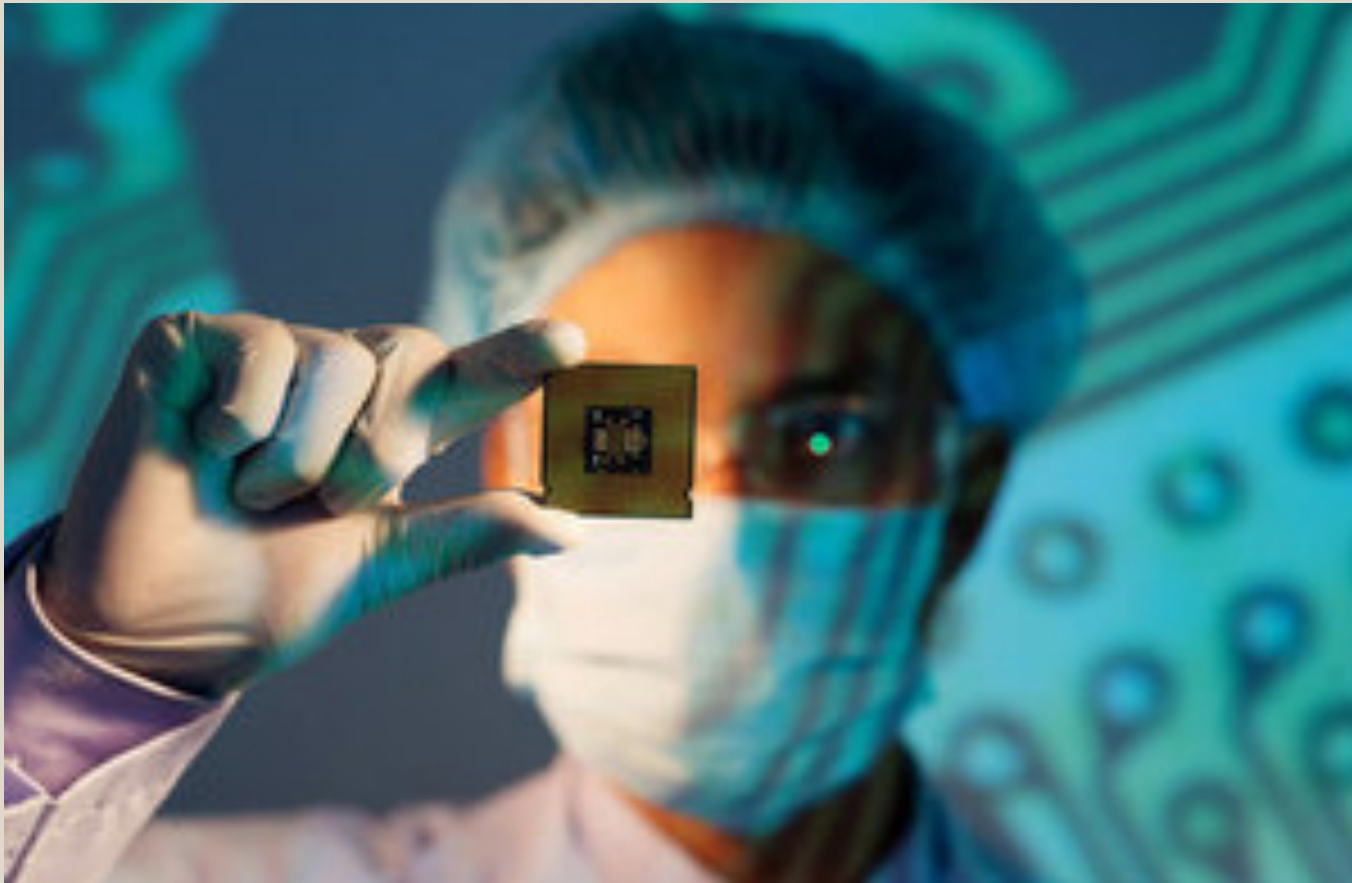
Hauser Review October 2014

Expand network based on investment criteria:

1. *A large global market? Estimate £125bn in 2025.*
2. *UK academic expertise? UK co-authored 4.9% of highly cited publications in compound semiconductors. From 2006 to 2014, EPSRC invested £198m in compound semiconductors, £110m in power electronics and £166m in RF/microwave.*
3. *Industrial 'absorptive' capacity to exploit? There's around 100 R&D intensive UK companies from micro to MNC that are active in compound semiconductors, and a further 5,000 'system integration' companies.*

Technology streams

- Power electronics
- RF/microwave (e.g. wireless)
- Photonics (e.g. opto-electronics)
- Sensors

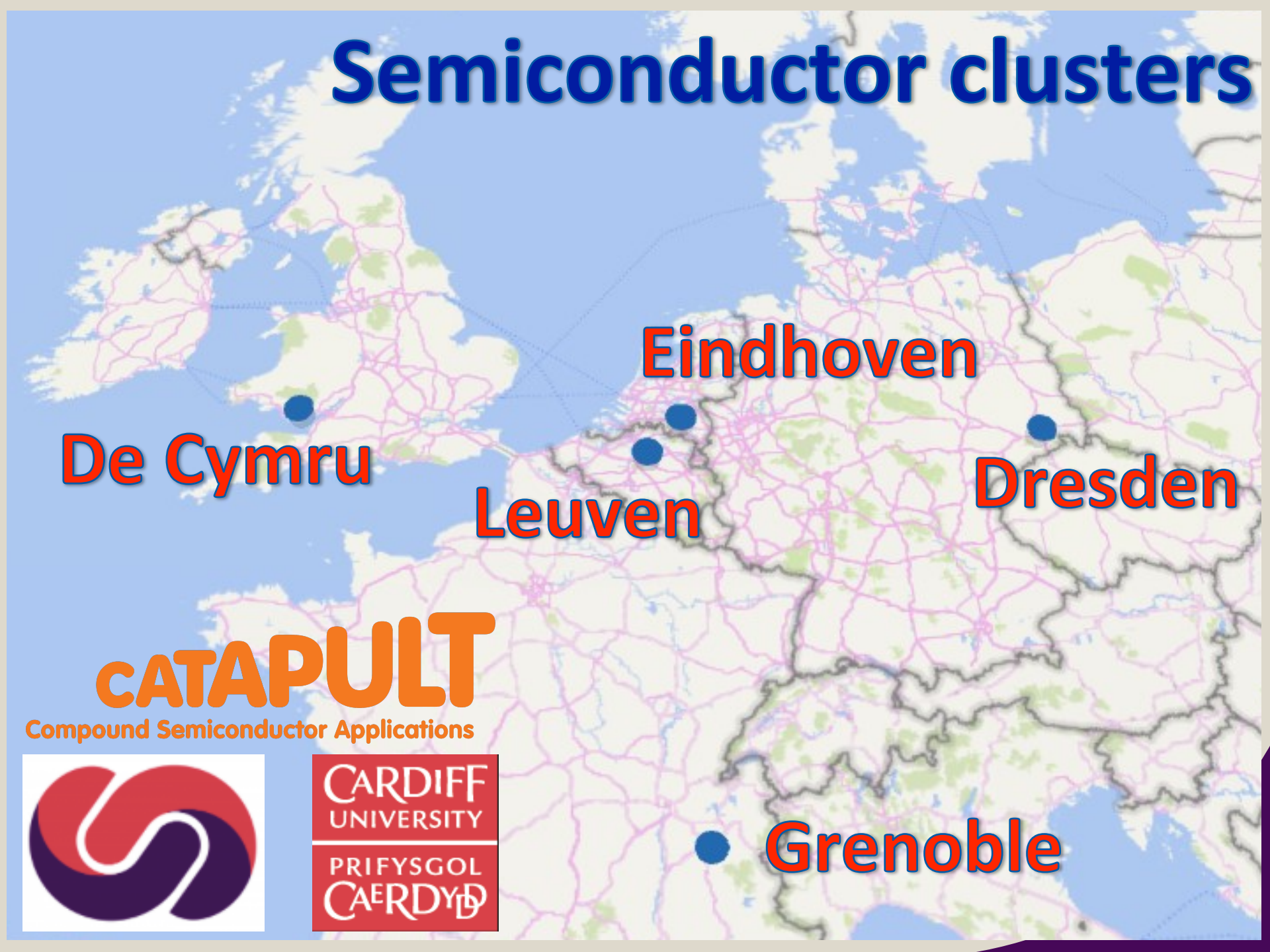


Application mapping

	Healthcare	Digital economy	Energy	Transport	Defence/security	Space
POWER ELECTRONICS	X-ray systems Magnet controllers Proton accelerators	Server farms Energy efficient computing	HV DC Smart grid Transmission and distribution High temperature electronics	Electric cars, trains, metro, trams Regenerative breaking Train retro-fit Electrical turbines	Directed energy weapons Marine drives Armoured vehicle drives Autonomous vehicles	Converters Power management Thermal management
RF/ MICROWAVE	Wearable technology data comms	5G Smart cities	Smart grid comms	Inter-vehicle comms Intra-vehicle comms Automotive RADAR In car networks	Phase array RADAR (maritime, air defence, Electronic warfare (offensive and defensive) Directed energy Antennae Missile guidance	Data comms Water purification
PHOTONICS	Curative photonics Laser surgery Photo-dynamic therapy	Optical comms Head-up displays	Energy efficient lighting	IR automotive imaging	Hyper-spectral imaging Thermal imaging	Photo-voltaics Lasers LIDAR
SENSORS	Imaging Bio-sensors Radiotherapy	IoT Sensors	System monitoring Oil and gas sensing Nuclear sensors	Aero-engine monitoring Autonomous vehicle sensing	Scanning Remote sensing Nuclear sensors	Geographic imaging Environmental sensing

Typical Industry challenges

- Advanced materials to operate with high energy densities at elevated temperatures
- High energy coupling (in and out): RF, microwave, electrical, photonic
- Hybrid integration: Si + CS; photonic + RF; photonic + power
- Nano-scale integration to operate at elevated frequencies
- Die bonding, flip-chip and alignment: Si + CS
- Proving – in system test, validation, reliability, temperature performance
- Simulation and modelling (device physics to systems)


Semiconductor clusters
Eindhoven
De Cymru
Leuven
Dresden
Grenoble
CATAPULT
Compound Semiconductor Applications
CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

Catapult positioning

- The Compound Semiconductor Applications Catapult will operate ‘post foundry’
- Focussing on challenges around power electronics, RF/microwave (e.g. wireless), photonics and sensors
- Complementing investments in the Institute of Compound Semiconductors at Cardiff University and the Compound Semiconductor Centre (joint venture between Cardiff University and IQE)
- An open-access facility, welcoming enquiries from start-up companies to SMEs and larger companies

Anticipated growth profile

YEAR	Announced	Spend profile	Industry income
2016/17	£10m	£1m	-
2017/18	£10m	£5m	£2m
2018/19	£10m	£10m	£5m
2019/20	£10m	£15m	£10m
2020/21	£10m	£20m	£15m

indicative

We can’t stop thinking about the future

Innovate UK

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