Driving tomorrow's technologies

Building a Compound Semiconductor Eco-system

Incize 10th Anniversary

Chris Meadows – CSconnected

Overview

- South Wales is home to the world's first, and largest Compound Semiconductor Cluster.
  - World class research (Cardiff & Swansea Universities, Institute for Compound Semiconductors, Centre for Integrative Semiconductor Manufacturing).
  - Fab infrastructure for prototyping – routes to commercialization.
  - Volume manufacturing from leading multinational companies.

Global semiconductor clusters – Mostly about silicon…

CSconnected represents the collective cluster:

Facilitate continued financial support from Publicly-funded benefactors

- Publicize funding opportunities
- Build research & development consortia
- Project management & dissemination

Lead activities where collective or collaborative action is more powerful

- Input to government strategy & policy
- Value-added initiatives to support members

Manage Shared Initiatives

CS connected

Measure Impact

Promote the benefits of the Cluster

- Seek out, introduce, facilitate and qualify new customers, investors and partners
- Maintain full-service marketing communications capabilities including collateral, website, events and PR

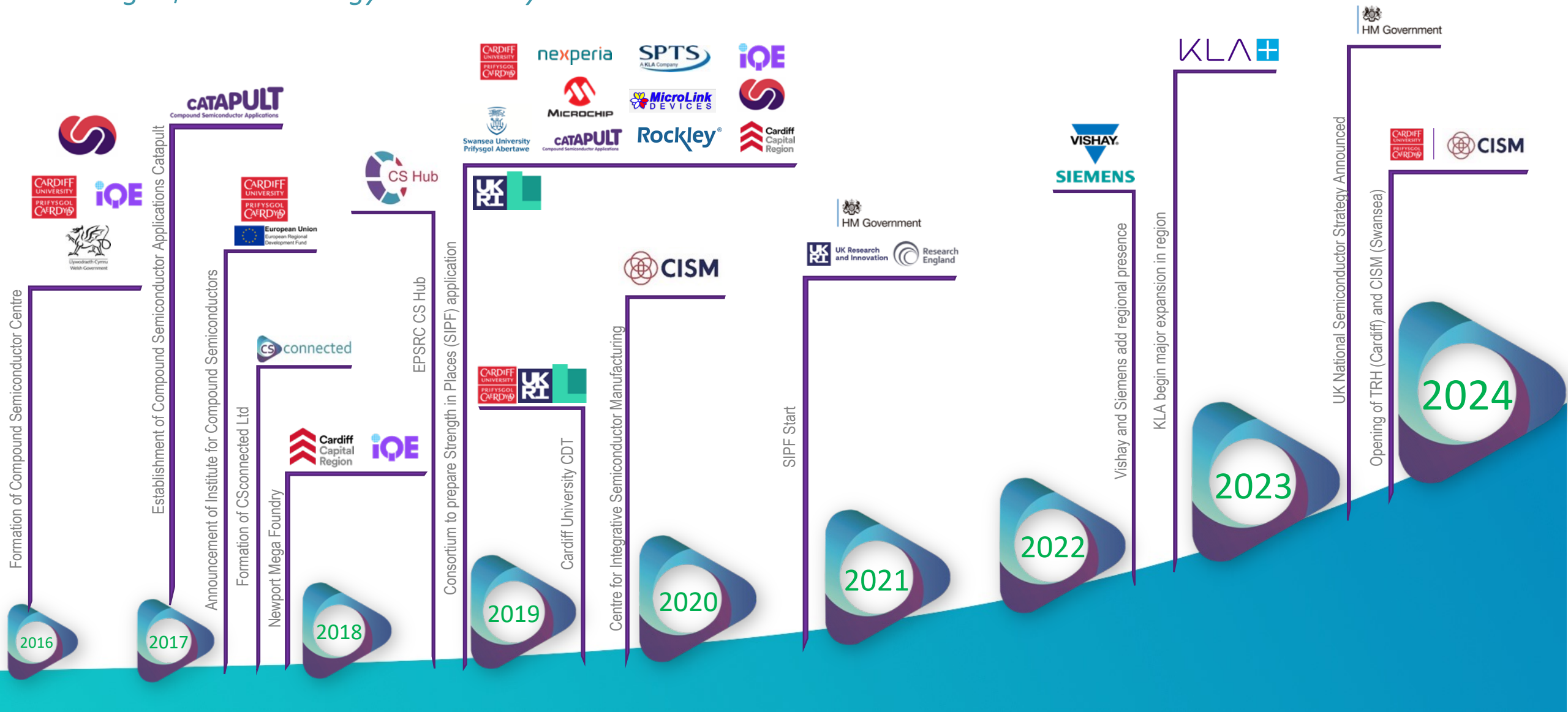
Implement non-core business development activities which benefit all stakeholders

- Support delivery of skill development, education and outreach initiatives
- Help develop the capacity & capabilities of a growing local supply chain

Not-for-profit, for the *growth* of the cluster

Evolution of the core CS connected eco-system

Building a $1B Technology Community



South Wales Semiconductor Cluster: Deal flow: RD & Innovation

THE COMPOUND SEMICONDUCTOR CENTRE

>£42M Investment in a JV between IQE and Cardiff University
Focus on materials and device innovation translation
Secured >£80M research funds since 2016

Cardiff University / Prifysgol Caerdydd — Institute for Compound Semiconductors — Sefydliad Lled-ddargludyddion Cyfansawdd — CS Hub

>£100M investment by Cardiff University in 8" fab
Focus on research to pilot production: RF and Photonics
New facility opened in May 2023

CATAPULT
Compound Semiconductor Applications

>£50M investment by UK Government: 2018-2023
RTO: Focus on CS chip design, packaging and test
100 staff co-located in IQE MegaFoundry, Newport

CISM
Centre for Integrative Semiconductor Materials

Swansea University
Prifysgol Abertawe

>£90M investment £40M capex/ £50M revenue
Focus on process development and integration
New facility is operational in Swansea 2023

South Wales Semiconductor Cluster: Deal flow: Manufacturing

>£39M Investment from public sector to establish Mega-Foundry
Space for up to 100 epitaxy materials manufacturing tools
Estimate >£100M executed since 2018: >£375M to full capacity

Primary manufacturer of fab capital equipment
SPTS acquired by KLA in 2019 for $3.4B
2-3x expansion with new HQ announced in 2021

Focus on chip packaging
Microsemi acquired by Microchip for $10B in 2018
<£5M capex expansion to create power package line

Focus on volume foundry for power components.
New investments planned following Vishay acquisition
from Nexperia after UK government intervention

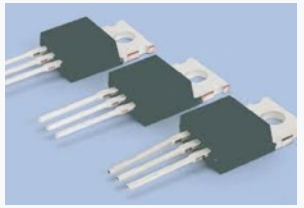
South Wales Semiconductor Cluster: Deal flow: Bridgeheads

MicroLink Devices UK Ltd

US manufacturer of flexible Photovoltaics
UK bridgehead to service UK and EU aerospace market
Integrated into the RD&I ecosystem

MaxPower Semiconductor

Specialist MOSFET design house HQ in San Jose
UK bridgehead to take advantage of infrastructure + talent
(Maxpower acquired by Vishay for $55M Oct 2022)



SIEMENS

Established Power Electronics Innovation Hub in July 2022
Co-located with CS Applications Catapult
Access to Infrastructure, Innovation and Talent

Overview of Strength in Places

"The Strength in Places Fund (SIPF) will bring together research organisations, business and local leadership to drive significant economic impact, job creation and regional growth"

HM Government

UK Research and Innovation

Research England

CS connected

Cardiff University

Prifysgol Caerdydd

Swansea University Prifysgol Abertawe

Cardiff Capital Region

IQE

KLA

Llywodraeth Cymru Welsh Government

Rockley

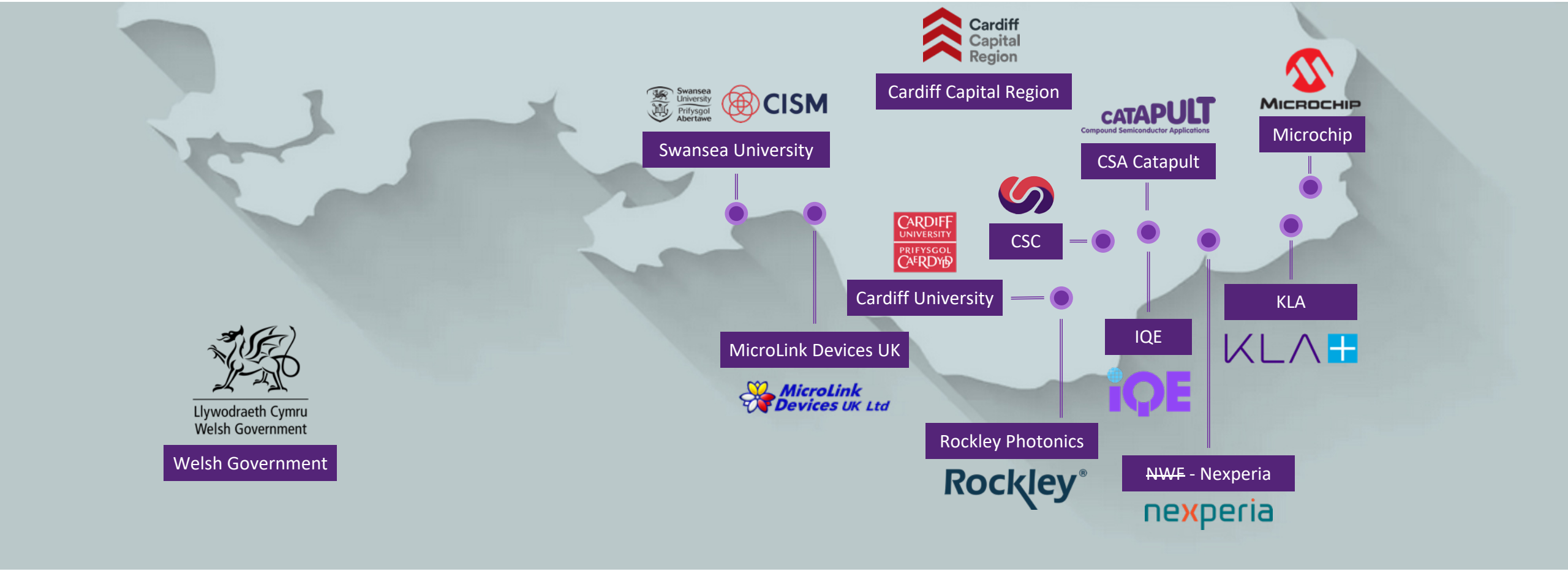
Microchip

CATAPULT Compound Semiconductor Applications

MicroLink Devices UK Ltd

Newport Wafer Fab

Core Strength in Places Partners



DER South West & Wales Industrialisation Centre

SIEMENS

VISHAY

Examples of other Collaborative Project Achievements (from 2018)

SMART Cymru award to develop low cost, high spec laser process

£5.5m Innovate UK quantum sensing project for battery technology

QFoundry: £5M to Establish Quantum Manufacturing Supply Chain

Innovate UK Quantum Technology project for magneto-imaging

£1.9m Innovate UK atomic magnetometer project for defect inspection

Creation of £37m Driving the Electric Revolution (DER) centre of excellence

MagV: £2.7M project to Commercialise Quantum Technology

£5M project to develop high-frequency device technologies

£1.3M OLEV (Office for Low Emission Vehicles) programme

£1.3M ASSET programme supported by Welsh Government and ERDF

£9.8M APC ESCAPE Project (for Automotive Power Electronics)

“MAGIC” Consortium awarded funding to develop MAGnetic ICs

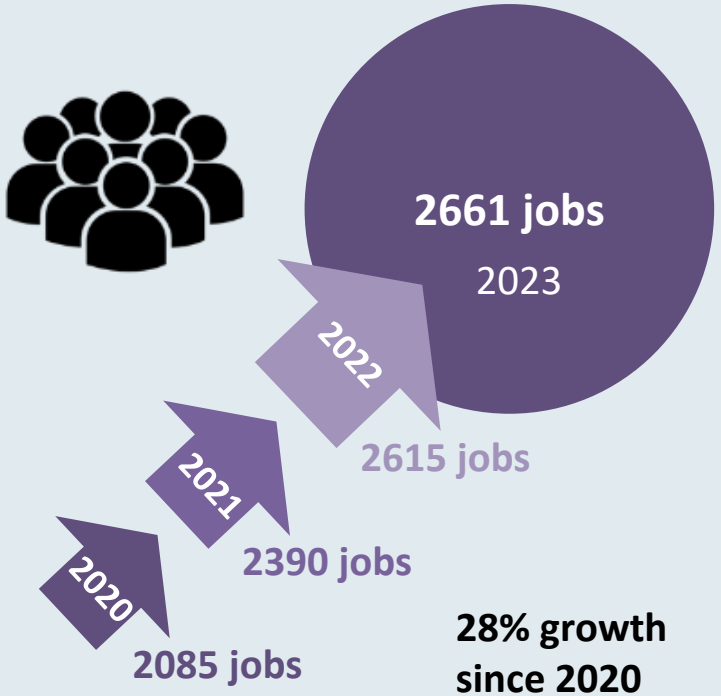
Developing talent is essential – Diverse skill sets are needed to grow

CSconnected has project resources which are focused on educational and skills outreach

ENGINEERS	INNOVATORS	MANUFACTURERS	SUPPORT STAFF	PARTNERS
▪ Process ▪ Equipment ▪ Mechanical ▪ Electrical/Electronic ▪ Facilities ▪ Environmental ▪ Health & Safety ▪ Quality ▪ Electronic & Assembly/Test Manufacturing ▪ Service	▪ Chemistry / Physics ▪ Compound Silicon ▪ Photonics ▪ Project Managers ▪ Research & Development ▪ Software / Engineering - Developers	▪ Operators ▪ Technicians ▪ *Process* ▪ *Equipment* ▪ *Facilities* ▪ *Fabrication* ▪ *Device/Test* ▪ Manufacturing ▪ IT Coders	▪ Supply Chain ▪ Logistics ▪ IT Technicians ▪ Administration ▪ Finance ▪ HR & LD ▪ Sales/Negotiation ▪ Customer Service	IQE, Microchip, KLA, SPTS, Rockley, MicroLink Devices UK Ltd, CATAPULT Compound Semiconductor Applications, CS Hub, Cardiff University, CISM

Delivering tangible results:
Economic Outputs of SIPF CSconnected Cluster: 2020 to 2023

Employment



28% growth since 2020

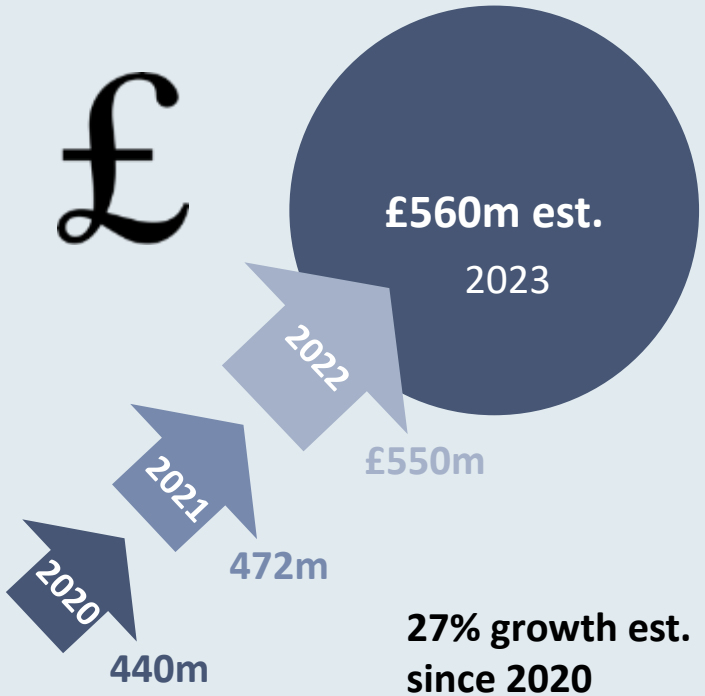
Figures show total number of direct and indirect jobs supported by the cluster

GVA contribution

122% growth since 2020

Figures show total value of direct and indirect Welsh GVA supported by the cluster

Total sales



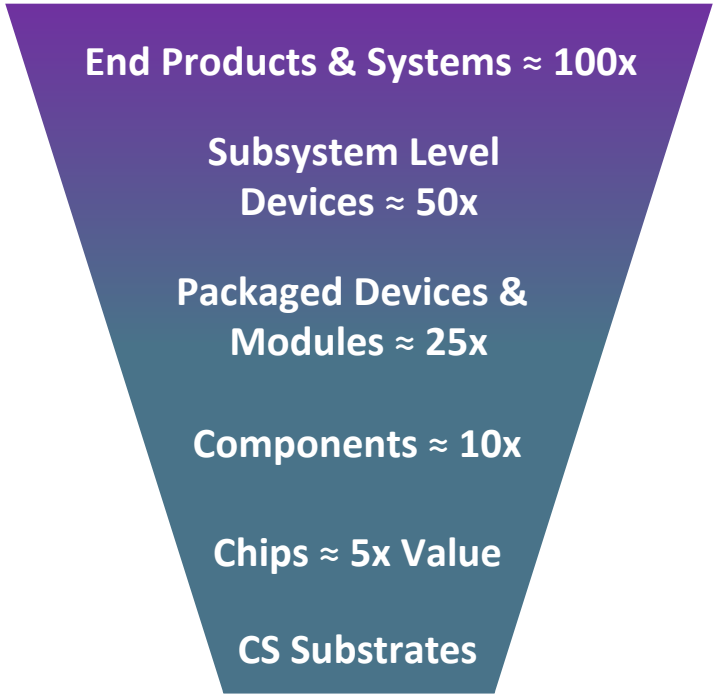
27% growth est. since 2020

Figures show total manufacturing sales by the cluster with est. 90-96% exports

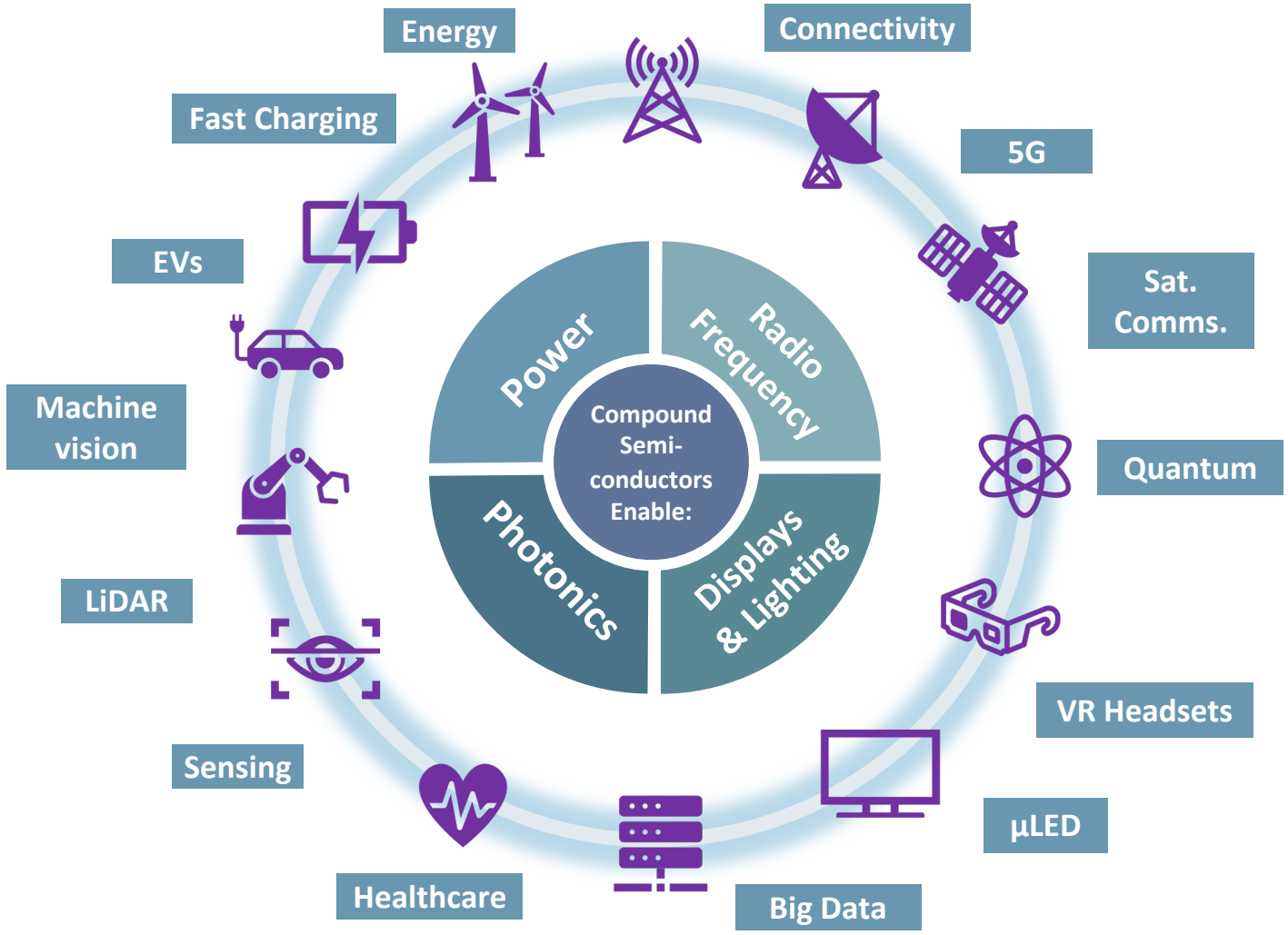
WERU CSconnected reports at: https://csconnected.com/resources/reports/

- US SIA estimates that there are 5.7 jobs created/supported by each semiconductor job

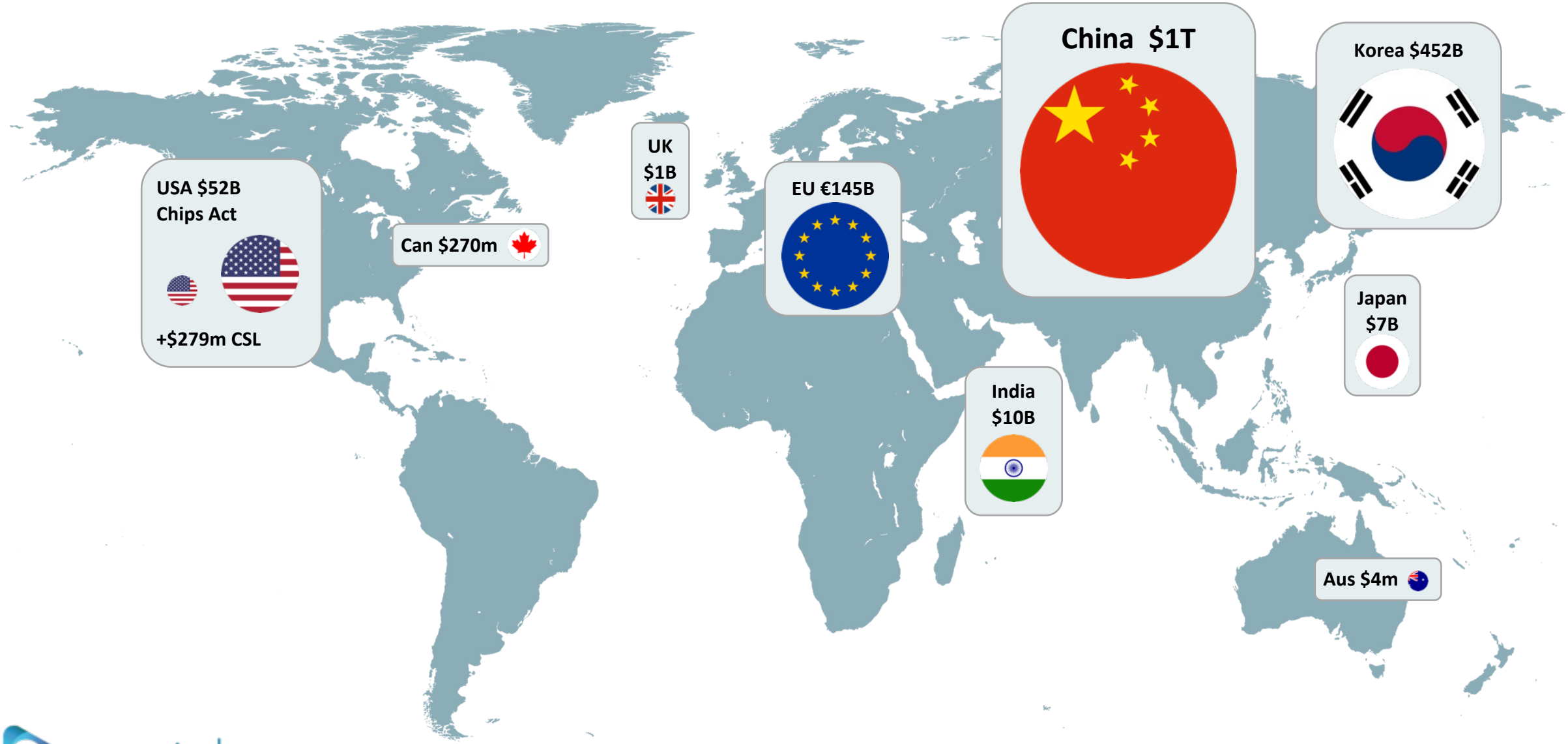
New functionality enabled by Compound Semiconductors



Increasing value creation within a global supply chain



Global Governmental Support for Semiconductor Manufacturing



- Links to news sources in notes section

Key Takeaways

- Deeply rooted expertise in compound semiconductor design and manufacturing:
  - Long history of academic research in the field
  - Established manufacturing companies
  - Unique IPR and proprietary know-how
- A rapidly expanding supply of local talent at all levels
  - Proactive outreach to develop new talent from within
  - Globally competitive salaries and employment costs
- Unrivalled RD&I infrastructure
  - With opportunities to fund CR&D projects with local and international partners
- A proactive business environment
  - Room for growth
  - Ideally located and globally connected

Thank you

www.csconnected.com