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Welcome, The Foundation for Science and Technology 24 Sept 2024

Fraunhofer Centre for Applied Photonics CAP

Fraunhofer Centre for Applied Photonics

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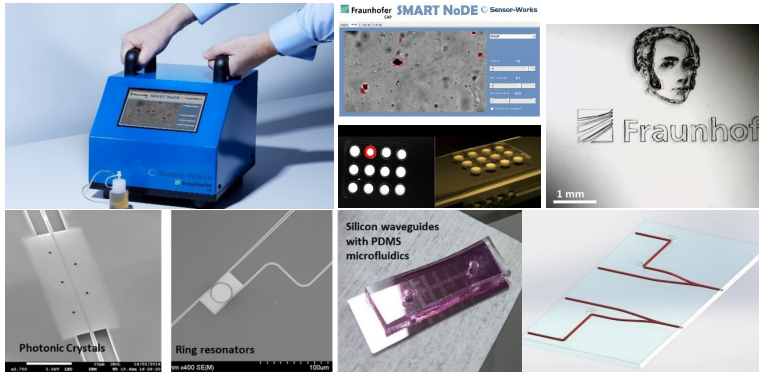
Space, aerospace & defence

- Satellite, drone and aircraft communications
- Airborne inertial navigation
- Earth observation
- Handheld explosives detection

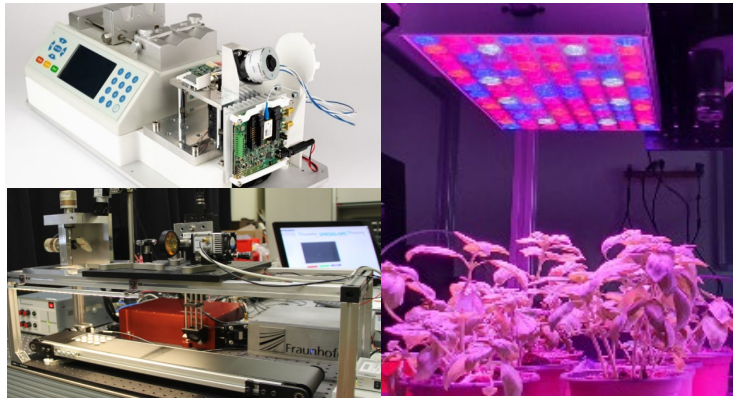
High-value manufacturing

- Particulate-in-oil monitoring
- Advanced lasers and sensors for manufacturing
- Manufacturing of advanced integrated photonics



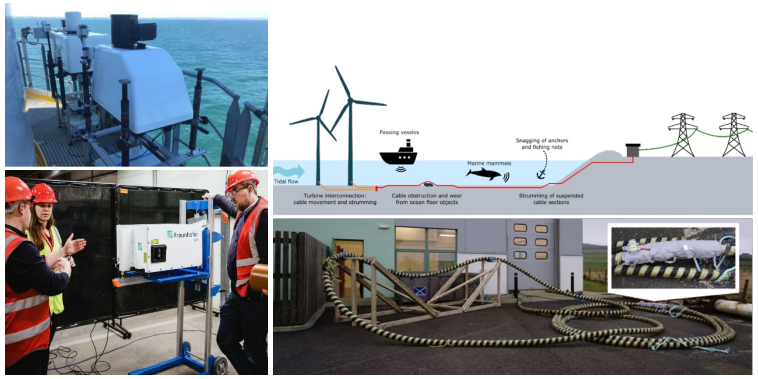
Health, pharma & agritech

- Optimised light for agritech
- Pharmaceutical content authentication
- Diagnosis, phototherapy, biochemical detection



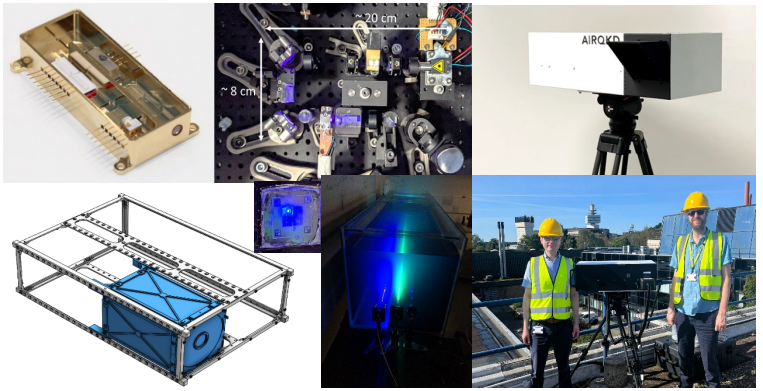
Net-zero

- Wind energy LIDAR
- Off-shore cable monitoring
- Hydrogen detection and imaging
- Satellite LIDAR vegetation monitoring



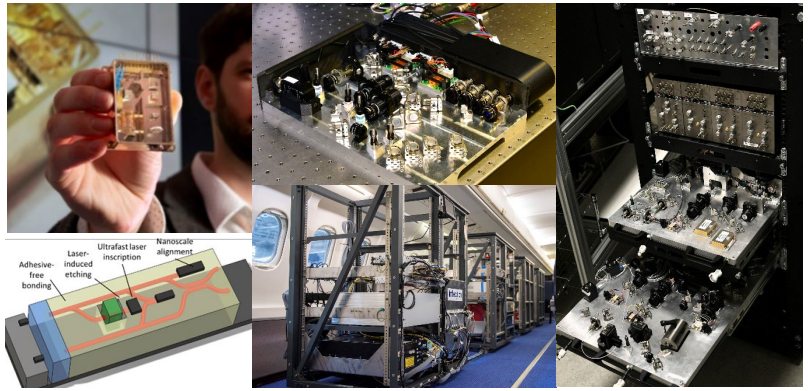
Communications

- Underwater communications and sensing
- Quantum secure comms
- Free-space optical
- Ground, air and space



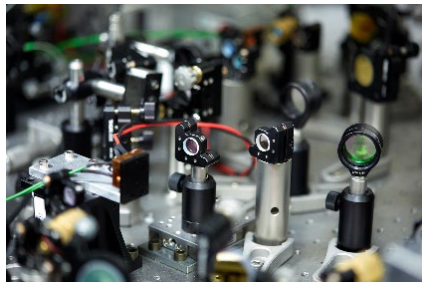
Precision measurement & computing

- Quantum magnetic and gravitational field measurement
- Quantum inertial navigation and clocks
- Quantum computing
- Single-photon imaging



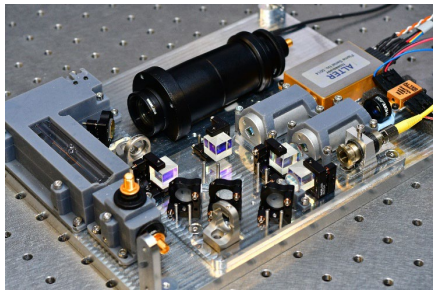
Lab to market, research to reality

From laboratory bench-top



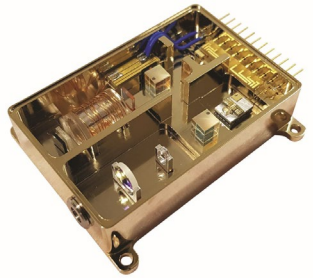
- 100cm

To engineered Proof of Concept



- 30cm

To Product



- 6cm

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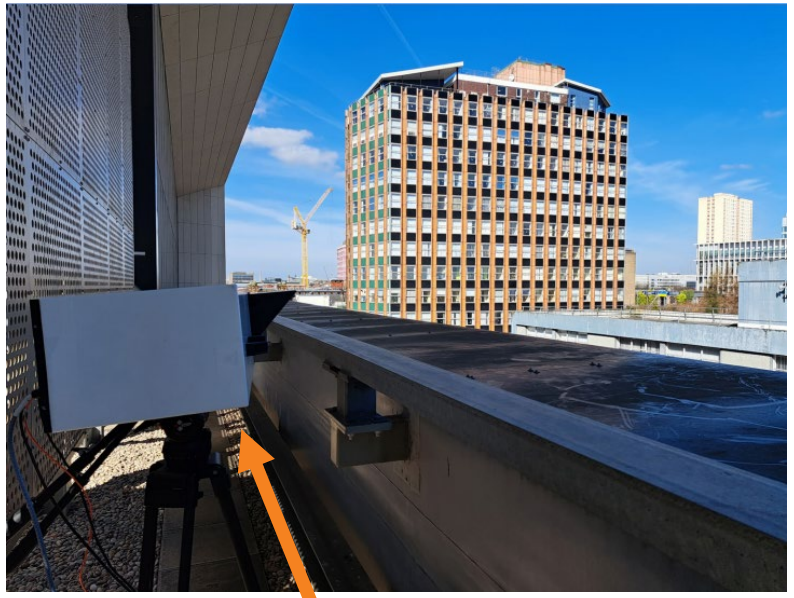
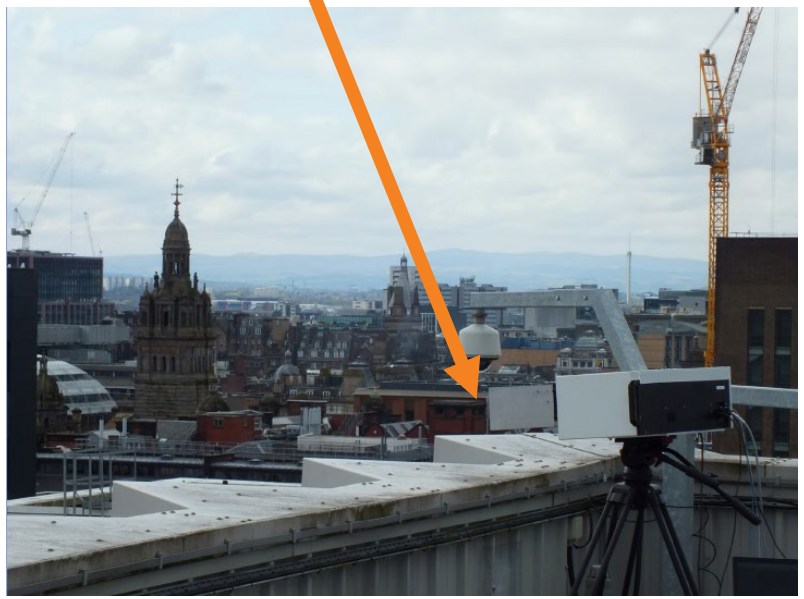
Quantum technologies: in the field

Demonstartors

- H2 detection
- QKD
- Inertial navigation





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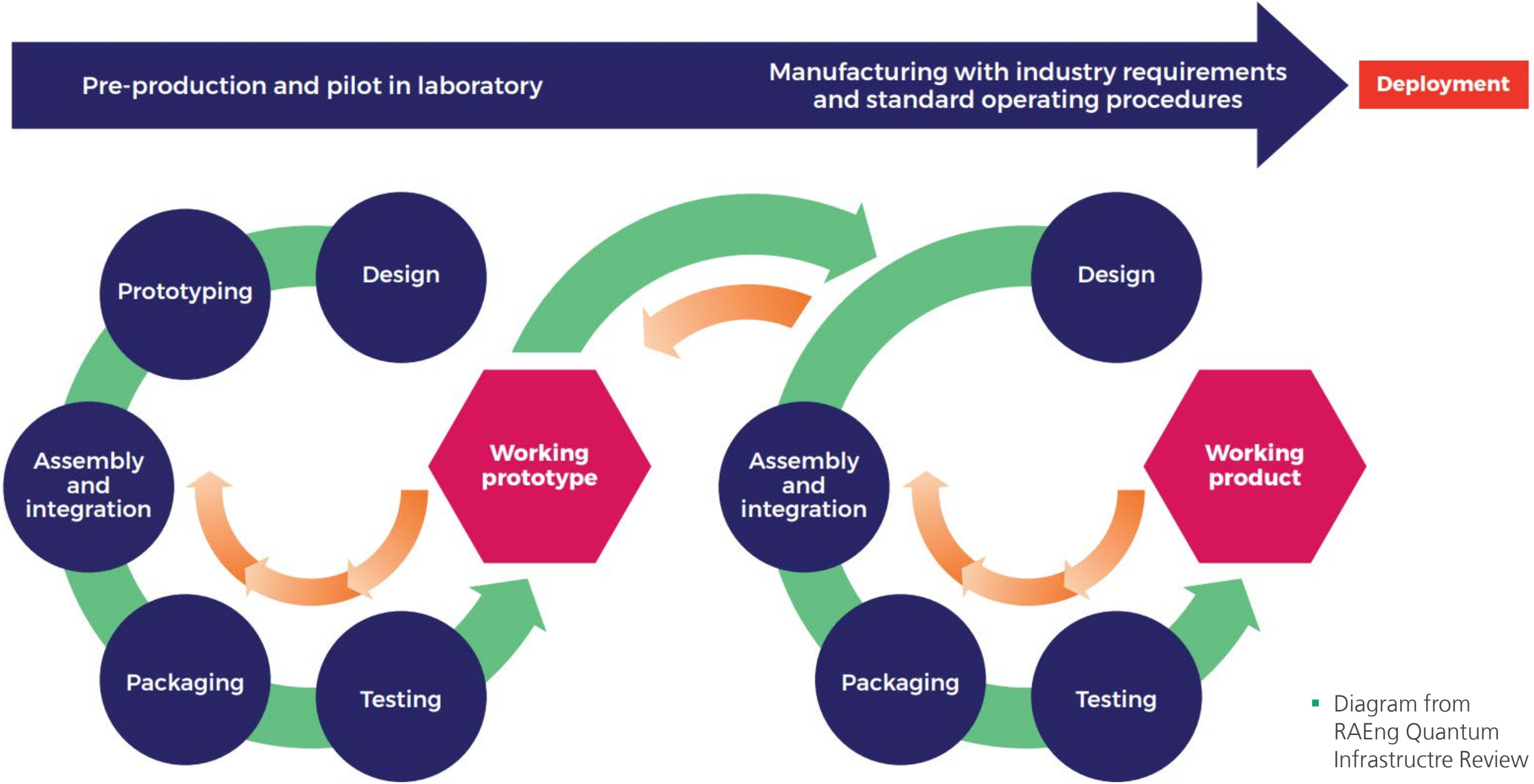
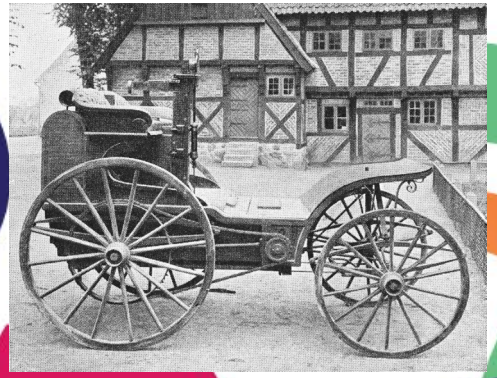


- Diagram from RAEng Quantum Infrastructre Review

Pre-production and pilot in laboratory

Manufacturing with industry requirements and standard operating procedures

Deployment



Prototyping

Design

Assembly and integration

Working prototype

Packaging

Testing

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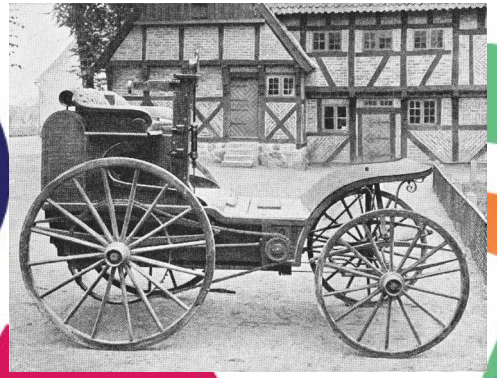

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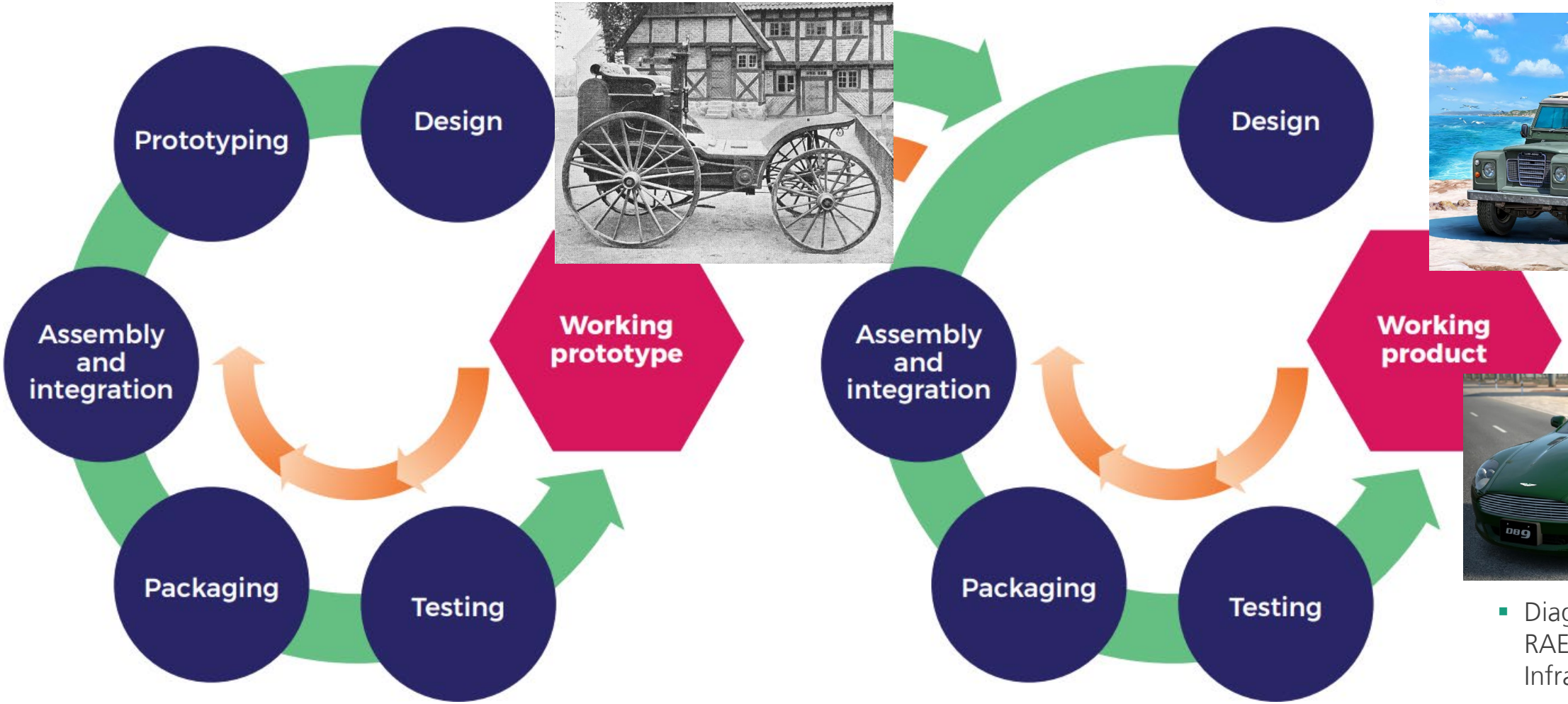

- Diagram from RAEng Quantum Infrastructre Review

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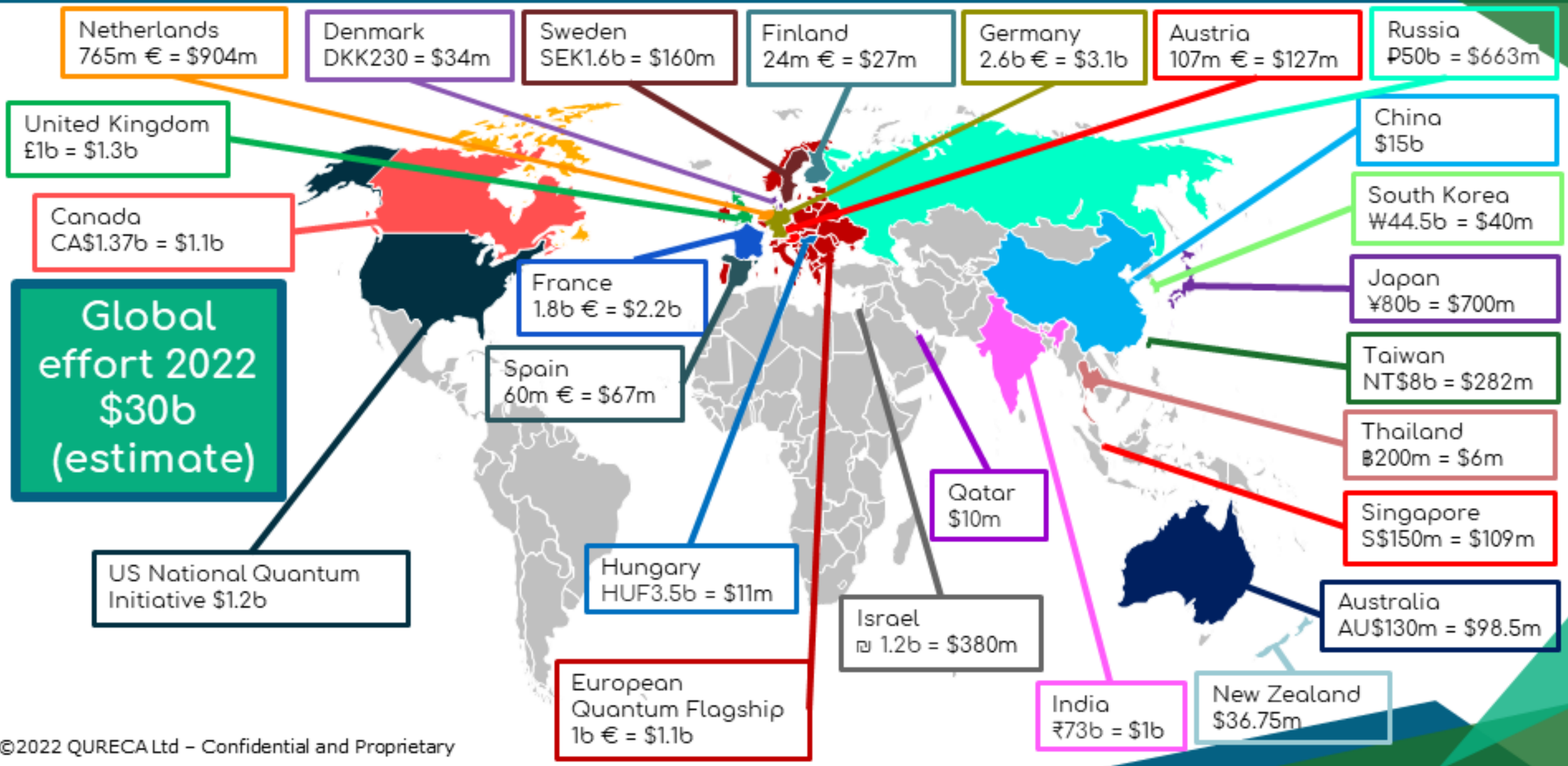
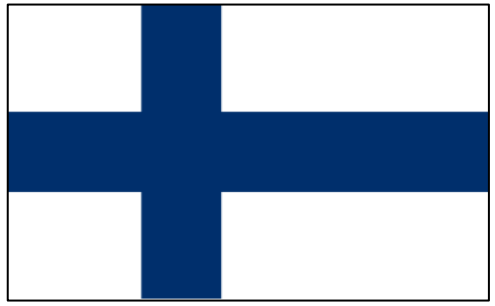
INTERNATIONAL YEAR OF

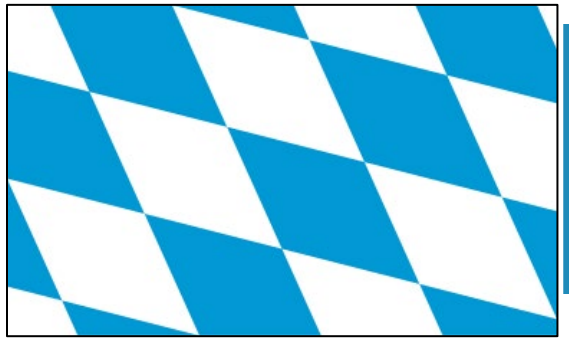
Quantum Science and Technology

Quantum effort worldwide

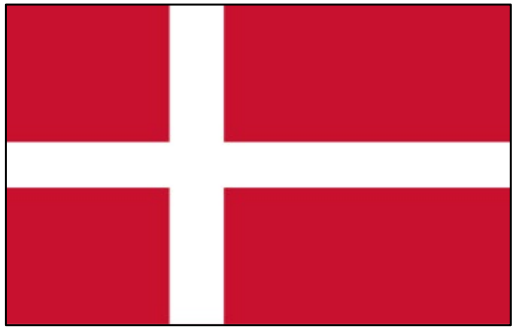




“In Finland we have this thing called Quantum Ecosystem – and it is globally unique”



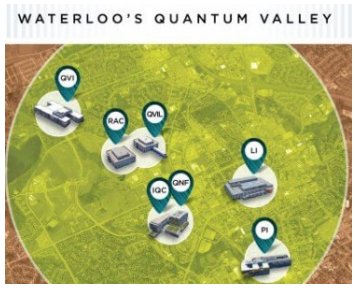
Munich Quantum Valley



Danish Quantum Community

Quantum Valley Lower Saxony

Quantum Delta the Netherlands



QUANTUM COMPUTING APPLICATION CLUSTER

QUANTUM FLAGSHIP

New roadmap to position Europe as the ‘Quantum Valley’ of the world

Photonics/quantum cluster?

Cluster:

Scotland has a photonics sector with a turnover greater than £1Bn

More than 60 companies with 5500 highly skilled jobs

Over 50% of Innovate UK funded Quantum Tech activities include a Scottish organisation

Fraunhofer CAP participates in ~30% of the UK's Quantum Technology Innovation projects

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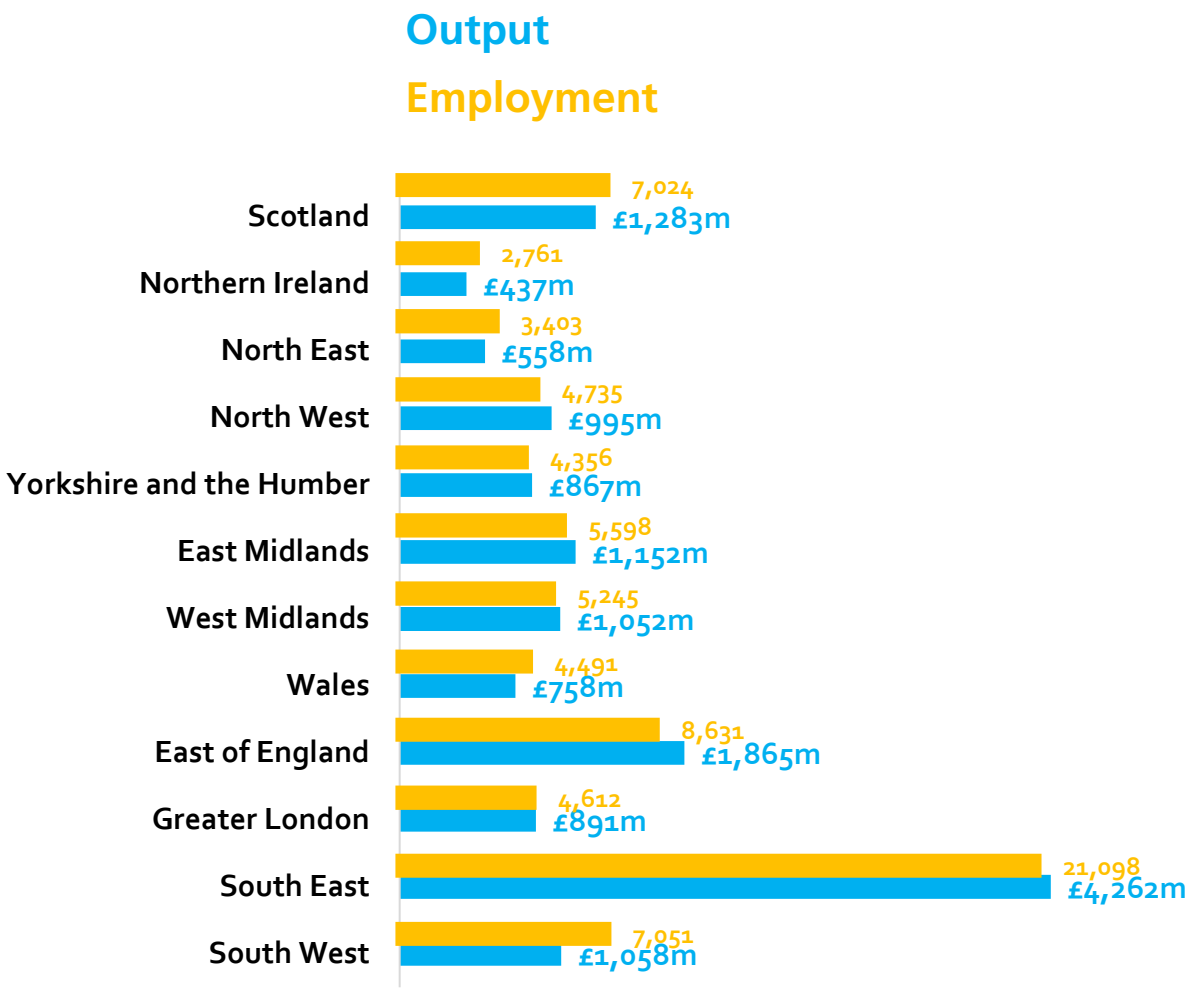
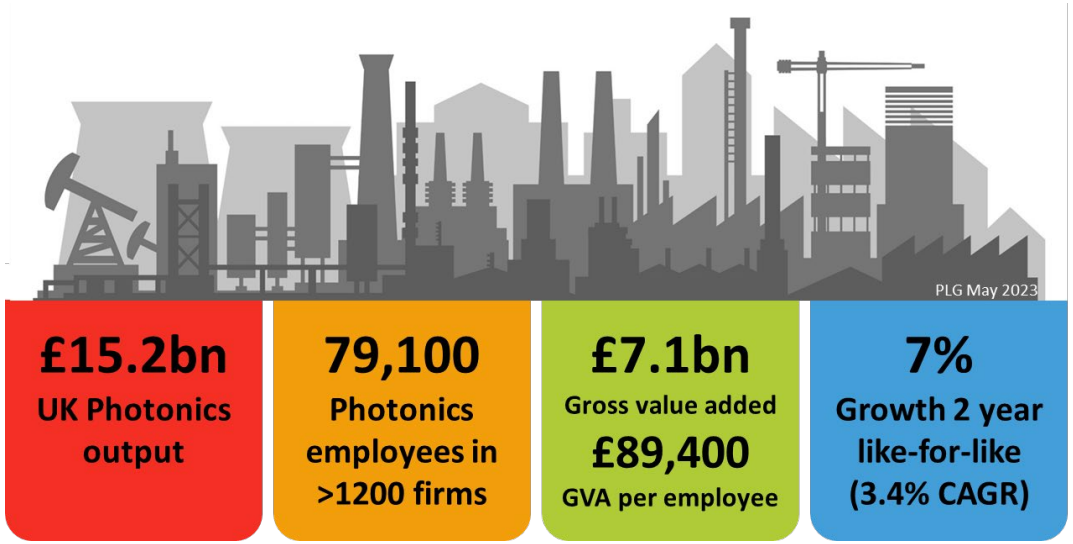
Photonics (not QT) Regional Output





8 Regions ~£1bn+ output

- >4500 employees
- 1200 companies total

These figures courtesy of Photonics Leadership Group

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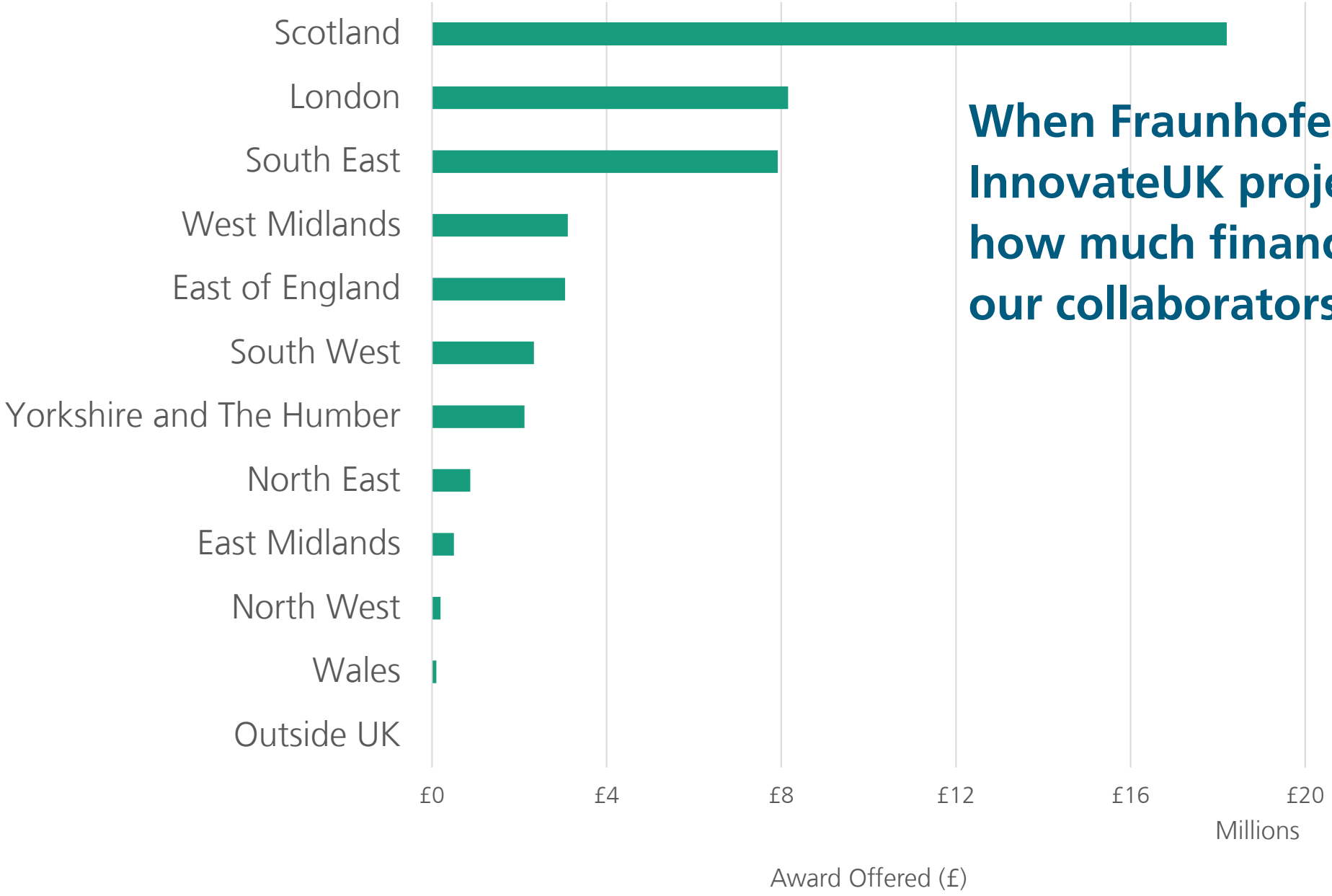
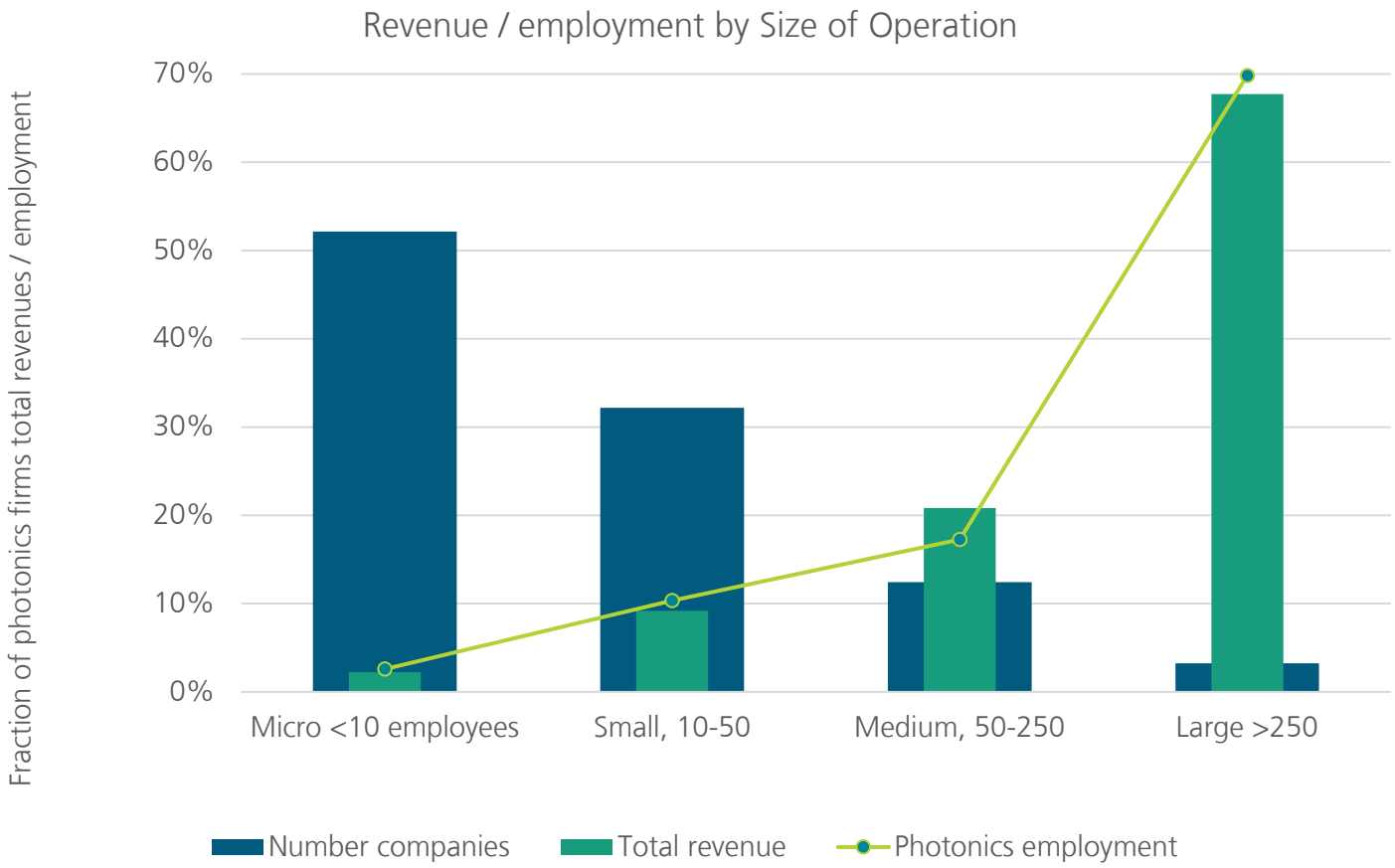
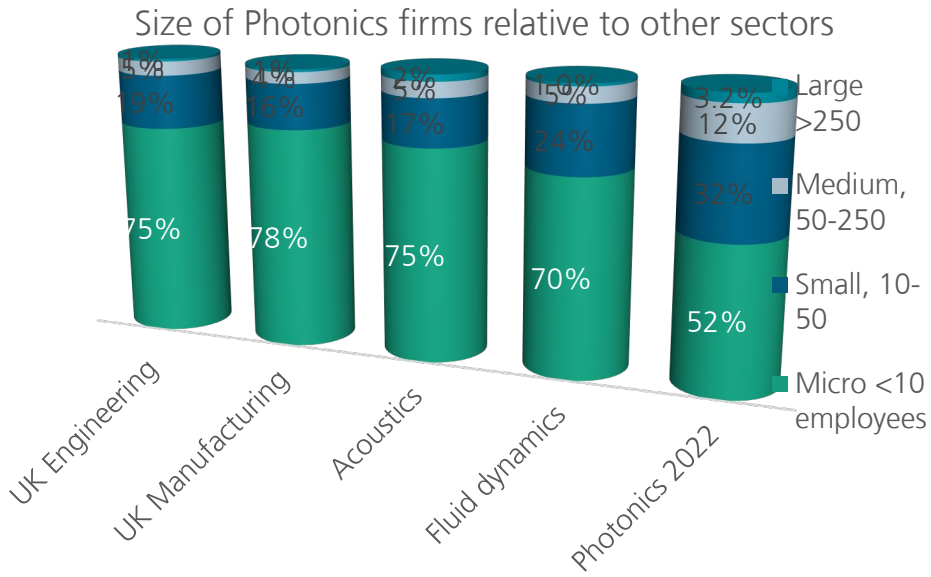
When Fraunhofer CAP wins InnovateUK projects: how much financial support goes to our collaborators, by region?



UK Photonics(not QT) sector





These figures courtesy of Photonics Leadership Group

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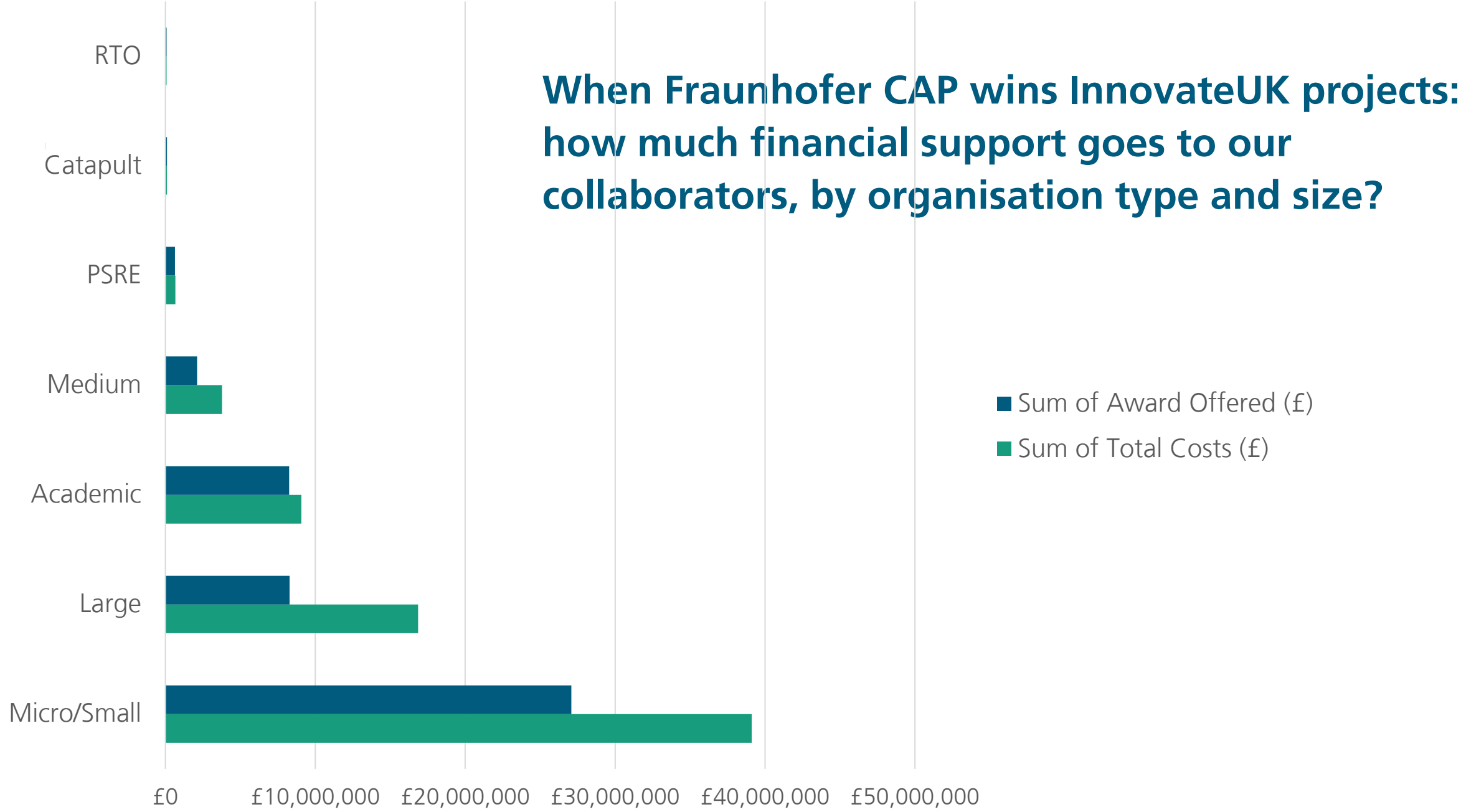
When Fraunhofer CAP wins InnovateUK projects: how much financial support goes to our collaborators, by organisation type and size?



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QT: global race from research to reality

Conclusions

There is intense global competition for investment, market share, and talent.

Clusters (with Universities and RTO) help accelerate technology development,
but do not do so in isolation
are attractive destination for investment and for young people.

The combination of Academic Hubs and ISCF has been a powerful, rapid and agile strategy for the UK

QT is complex, with some early products on the market,
but there are many 'heroic demonstrators' made out of 'heroic components',
there is still much to do to mature the market
still plenty of time and opportunity for growth

So in the upcoming Missions-
don't forget the development of components, processes, integration…