

# Electech sector: A Roadmap for the UK

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<https://www.gov.uk/government/publications/electech-sector-a-roadmap-for-the-uk>

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Research and analysis

## Electech sector: a roadmap for the UK

This Electech report outlines the breadth, scope and future of the UK electronics and photonics industries.

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### Documents



#### [Electech sector: a roadmap for the UK](#)

PDF, 6.75MB, 78 pages

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### Details

This report reviews the technology of electech and then lays out a roadmap for the sector including: trends and drivers, application areas, system level capabilities, technologies and enablers.



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- What's Electech?
- Enabling technologies - a global view
- UK's landscape - the Electech opportunity
- Electech as a Sector - industry challenges
- Roadmap landscape
- Recommendations

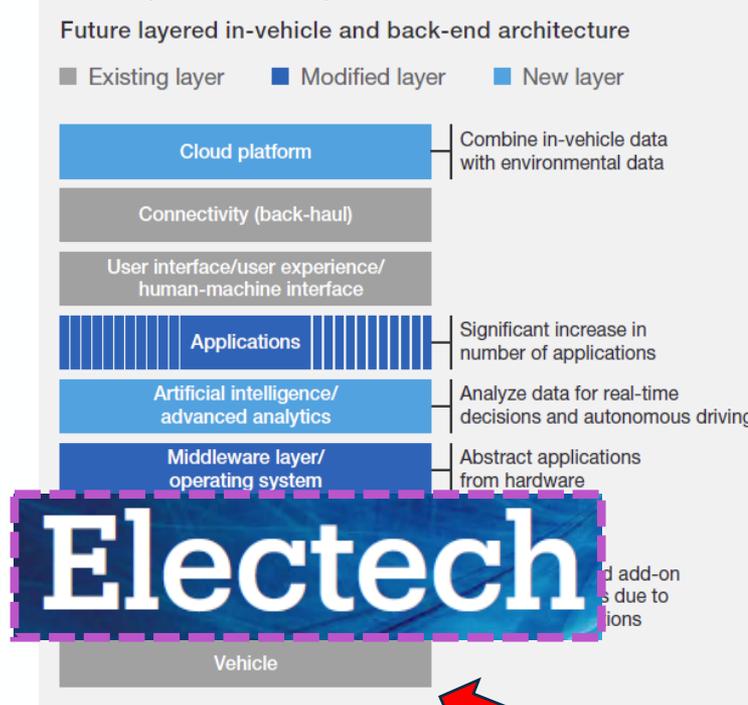
# Digital transformation across vertical sectors

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## Automotive - then and now...



Source: McKinsey Center for Future Mobility, 2018



**Electech**



# What's electech?

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- Electech is the enabling technologies anchored in **hardware** and **embedded software** developments
- that allows systems and products to have and support **advanced capabilities** amongst which to
  - communicate
  - have power
  - have intelligence
  - have situational awareness
  - be controlled
  - be automated
  - operate safely and even autonomously
- Electech is the **electronics, photonics, electrical, optical technology** and **embedded software**
- that enables a wide range of products, solutions, processes and business models across vertical industries and applications areas



# Enabling technologies – A global view

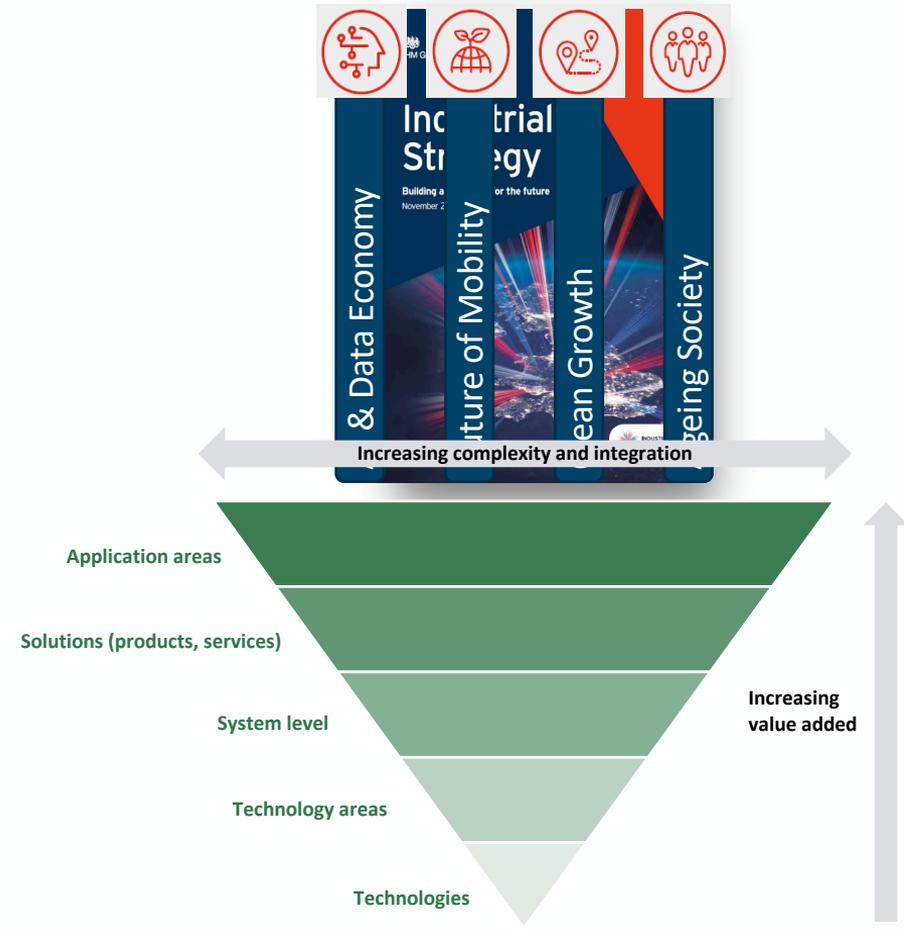
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-  - **Key Enabling Technologies (KETs) and ECSEL JU** in Horizon 2020
  - >€5.5 Bn between 2014-2020 for KETs (incl. micro/nano-electronics and photonics)
  - ~€4.8 Bn public-private investments over 2014-2020 for Electronic Components and Systems
-  - **“Microelectronics for Germany - Driver of innovation for the digital economy”**
  - €1 Bn public investment 2016-2020
-  - **“Research Fab Microelectronics Germany”**
  - €350 Mn 2016-2020
-  - **Dutch National Agenda Photonics** – “PhotonDelta” initiative to accelerate integrated photonics solutions
  - €236 Mn public-private investments over an 8-year program
-  - **Electronics Resurgence Initiative (ERI)**
  - >\$1.5 Bn over a 5 year timeframe
-  - **AIM Photonics** - American Institute for Manufacturing Integrated Photonics
  - \$610 Mn public-private funding commitments
-  - **“Next-Generation Intelligent Semiconductor Technology Development Project”**
  - \$1.34 Bn public investment over a 10-year timeframe
-  - **‘Made in China 2025’ Strategy (2015-2025)**
  - Electronics and semiconductor technology as one of the top 10 focus areas
  - Beijing Technology Innovation Fund - \$3.17 Bn public funding including for optoelectronics technologies
-  - **China National Integrated Circuit Industry Investment Fund**
  - ~\$29 Bn with fund-raising expansion

# Electech is an opportunity for the UK

- Electech technologies are the 'building blocks' that combine to create systems that in turn build solutions for vertical industries and end markets
- They allow industries to increase their value-added by developing and deploying novel processes, services and business models that keep them competitive and improve productivity
- The general purpose nature of electech technologies increases their development speed and enables their acceleration and uptake in news areas of application
- Electech plays a foundational role in the development of industries and value chains of the future

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# Electech as a sector

- A collection of sub-sectors, each with its own historical identity, self-identifying membership and industry representation
- **UK Electronic Systems:** employs ~1 Mn people across >53,000 companies accounting for >£52 Bn in turnover
  - Amongst UK's manufacturing major growth contributors in 2018
  - UK accounts for >40% of Europe's electronics design industry
- **UK Photonics:** employs 69,000 people across ~1,000 companies accounting for 13.5 Bn in turnover
  - Like-for-like grow of 8.4% between 2017-2019
  - UK photonics manufacturers export >75% of their output
- Electronics, Electrical and Photonics production accounted for >10% of the total UK manufacturing output in 2017

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CATAPULT  
Compound Semiconductor Applications



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# Electech as a sector

- A collection of sub-sectors, each with its own historical identity, self-identifying membership and industry representation
- UK Electronic Systems: employs ~1 Mn people across >53,000 organisations accounting for 6.5% of UK manufacturing output
- UK accounts for 40% of European electronic systems production
- UK has 2.5 Bn in turnover
- Like-for-like grow of 8.4% between 2017-2019
- UK photonics manufacturers export >75% of their output
- Electronics, Electrical and Photonics production accounted for >10% of the total UK manufacturing output in 2017

**Our vision** is for an electech industry widely recognised for its impact and investments in innovation and supply chains and for its ability to solve the big 21st-century challenges in health, energy supply, productivity, security, mobility and sustainability

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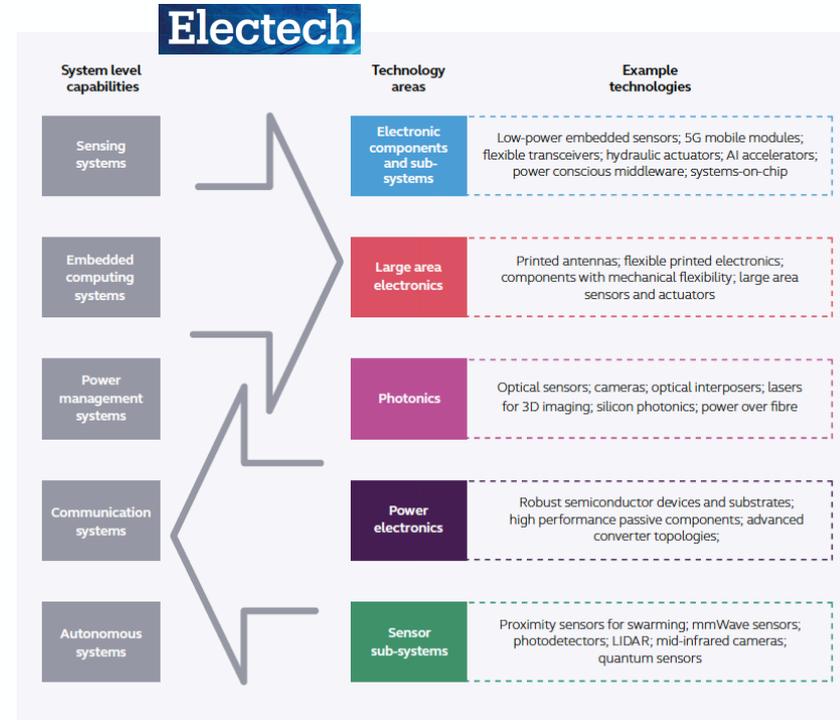
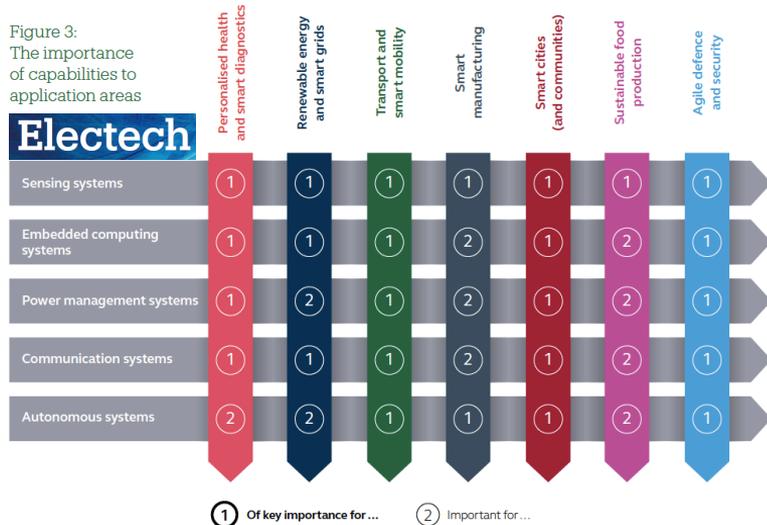
# Electech sector's main challenges

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- Sector recognition - in vertical industry strategies and government R&I policies
- Sector fragmented along sector-specific applications and technology lines
- SMEs struggle to persuade risk-averse systems integrators to adopt new technologies
- Conservative end-users for investing in and adopting new technologies
- Sector is largely capital-intensive and is challenged in establishing manufacturing capability
- Concern that the Industrial Strategy's focus on challenge-led investments reduces visibility on the underpinning role of enabling technologies
- Skills shortages, skills gaps and slow evolution of education and training to meet the industry's changing needs

# Roadmapping process (1 of 2)

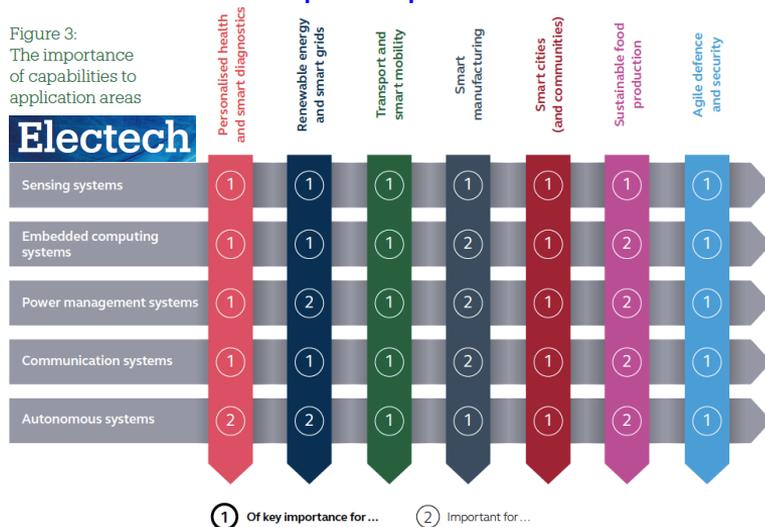
- Surveyed and consolidated international studies and roadmaps
  - **Baseline landscape**
- Pre-work contribution from across the Electech sector
  - **Updated baseline landscape**
- Consultation workshop#1
  - **Priority Application Opportunities and Priority Technologies**
- Consolidated findings, reviewed sector and technology coverage, extended literature review, identified gaps and additional expertise needed
  - **Baseline System-level Capabilities (SLCs) and Technology Areas (TAs) matrix**
  - **Baseline SLCs vs. Application Areas mapping**



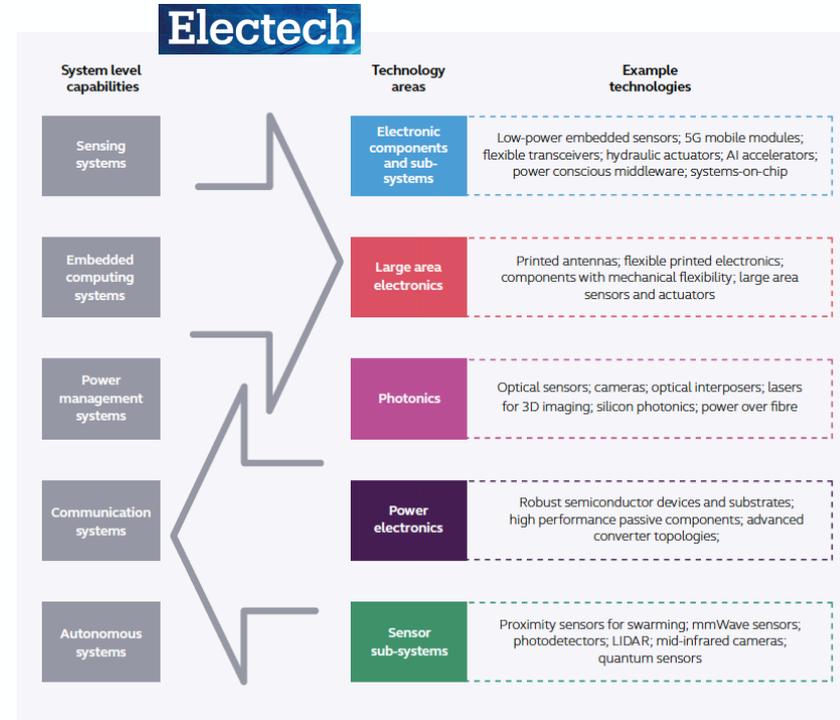
# Roadmapping process (2 of 2)

- Consulted stakeholders from across the Electech sector
  - **Validated and refined the matrix and the mapping**
- Consultation workshop#2
  - **Discussed, populated and prioritised the TAs vs. SLCs 5x5 matrix**
- Reviewed post-workshop findings and surveyed participants for further prioritisation and timelines to technology maturity
  - **TAs vs. SLCs 5x5 prioritised technologies**
- Series of direct consultation interviews with key industrials
  - **Validated analysis, provided insights on sector-specific aspects**
- Reviewed final roadmap and analysis with group of key Electech stakeholders
  - **Validated final Roadmap landscape**

Figure 3:  
The importance of capabilities to application areas



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# Roadmap landscape

- **Trends & Drivers** - define the 'why'
  - Social, technological, environmental, economic, political, legal, regulatory
- **Application Areas** - define the 'what'
  - what form electech enabled solutions make take and what needs they serve
- **System-level capabilities** - define the 'how'
  - how electech technologies are delivered as and within systems
- **Enablers** - non-electech technologies and a range of other factors (capabilities, standards, etc.) that are critically important to delivering electech solutions



Figure 2: An electech roadmap for the UK.

Technology areas colour coding

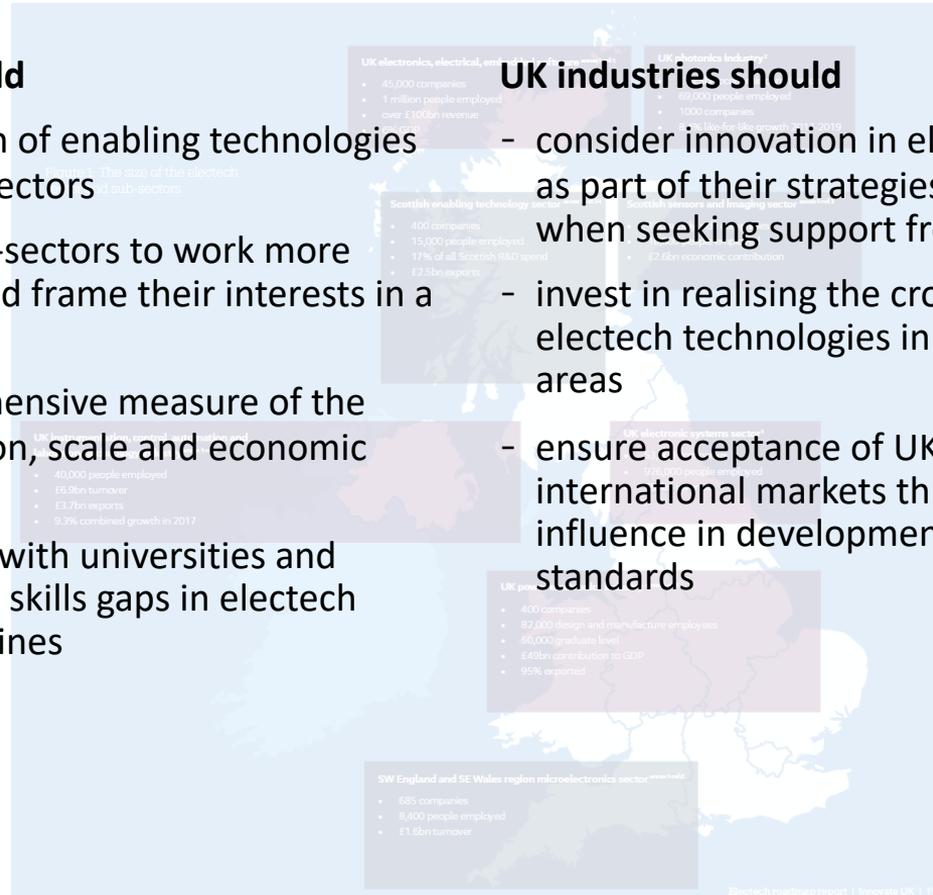
- Electronic components and sub-systems
- Large area electronics
- Photonics
- Power electronics
- Sensor sub-systems

## Electech sector should

- improve promotion of enabling technologies to all UK industry sectors
- orchestrate its sub-sectors to work more closely together and frame their interests in a common vision
- develop a comprehensive measure of the sector's composition, scale and economic impact
- work more closely with universities and colleges to address skills gaps in electech engineering disciplines

## UK industries should

- consider innovation in electech technologies as part of their strategies and roadmaps and when seeking support from government
- invest in realising the cross-cutting benefit of electech technologies in new application areas
- ensure acceptance of UK electech in international markets through continued UK influence in development of international standards



## Government should

- recognise the cross-cutting importance of electech technologies in delivering the Industrial Strategy's grand challenges and the associated Industrial Strategy Challenge Fund programmes
- support R&D in electech to develop and sustain strategic electech capabilities with wide applicability across UK industry sectors
- promote UK's excellence in electech abroad to support exports and international collaboration in research and innovation
- develop ambitious public-private partnerships to invest in capital-intensive capabilities for electech developments
- work with the Electech sector to address skills shortages in electech science and engineering disciplines



Thank you

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