

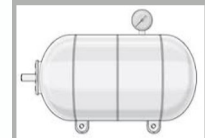
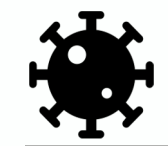


# Robotics and Artificial intelligence Impact Study

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# GOAL



## Purpose of today's session

- Participants to learn more about the Impact Study Innovate UK are running
- Answer any questions about the Study's questionnaire / survey; it's scope, objectives and purpose; what outcomes we hope to achieve
- Great opportunity for the RAI community to come together and network



InnovateUK  
KTN

# THE RULES

## Housekeeping rules

- If everyone can please ask all questions in the Q&A Box
- Feel free to use the Chat Box to introduce yourselves and network
- Can everyone remain on Mute throughout the presentation to limit background noises and/or distractions
- The Impact Study section of this event will be recorded for future use as informative material and be posted online on the Innovate UK KTN



InnovateUK  
KTN

# Innovate UK KTN

## About Us

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[www.ktn-uk.org](http://www.ktn-uk.org)



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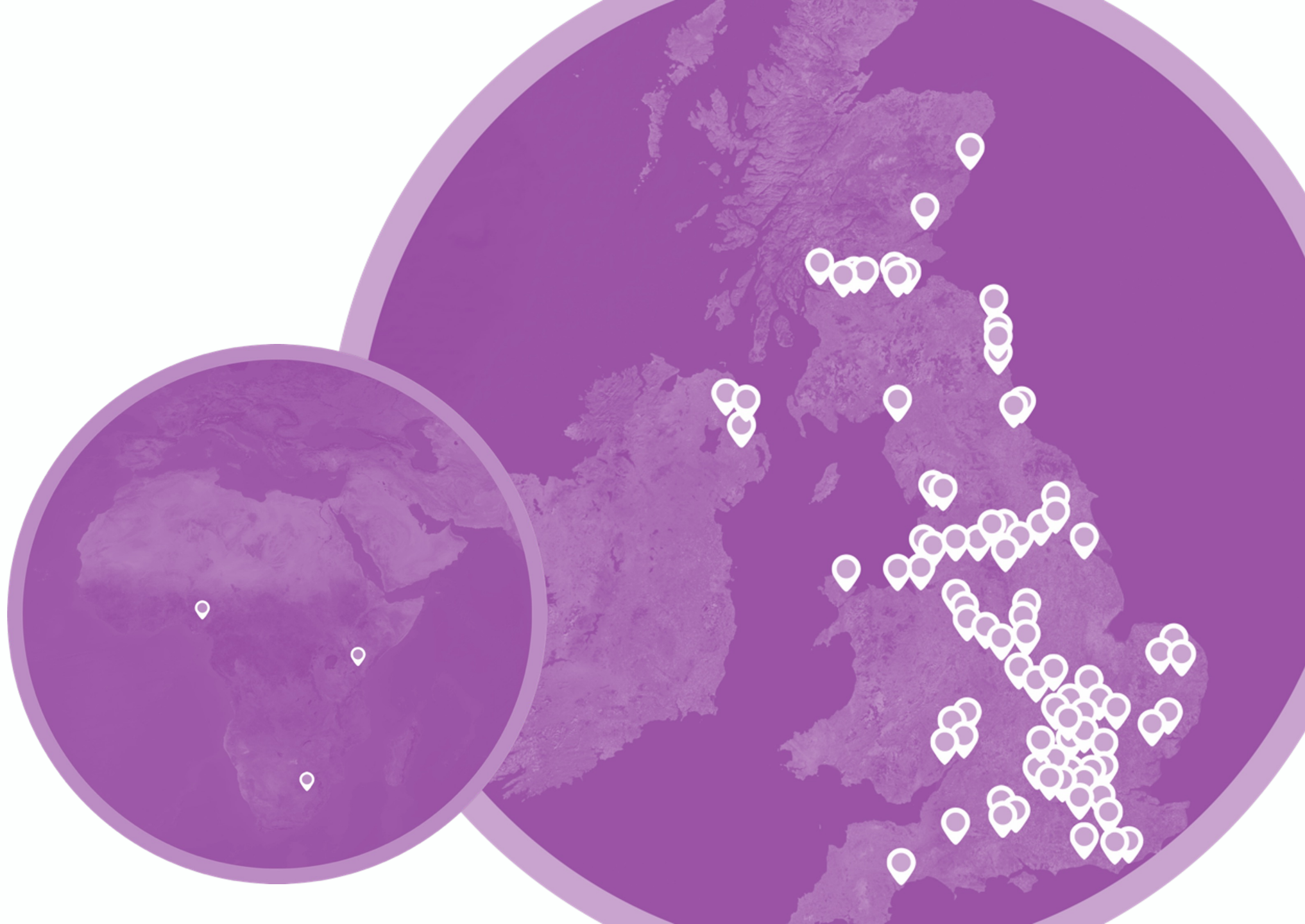


## About Us

Innovate UK KTN exists to connect innovators with new partners and new opportunities beyond their existing thinking – accelerating ambitious ideas into real-world solutions.



**Innovate  
UK KTN  
Team**





## Our Purpose & Vision

We create diverse connections to drive positive change.

To establish a network of innovators so powerful its ideas will change the world.

# Explore the map

## The RAI Landscape Map

### Industry

#### Application Sectors

Robotics & Electronics	94 org(s)
AI Technologies	66 org(s)
Energy & Nuclear	57 org(s)
Aerospace, Space & Aviation	51 org(s)
Military, Defence & Security	49 org(s)
Industrial, Oil & Gas	46 org(s)

#### Capabilities

Autonomy for Mobility & Manipulation	115 org(s)
Planning & Simulation	101 org(s)
Robot Learning	99 org(s)
Visual Perception & Learning	92 org(s)
Vision & Sensor Based Control	92 org(s)
Robot Cognition	83 org(s)

#### Select an application sector

(All)

#### Select a capability

(All)

#### Search in orgs & descriptions

#### Select size

(All)

#### Select an organisation type

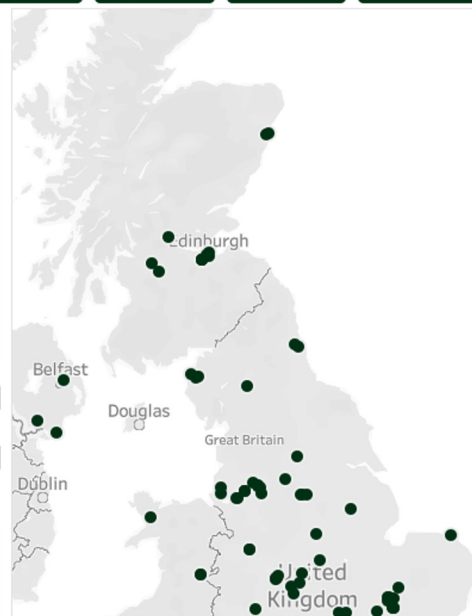
(All)

### Organisations

\*Centre for Doctoral Training in Robotics and Autonomous

Robots that can learn, adapt and take decisions will revolutionise our economy and society over the next 20 years. At the Edinburgh Centre of Robotics, we work on various research areas in the field of Robotics and Autonomous systems, with a focus on safety and safe interaction between robots, people and their environments.

USING THE MAP ⓘ RESET FILTERS ← GET IN TOUCH @ MENU ☰



Robotics & AI platform cross-sectored, including facilities and developers to showcase their organisation capabilities, specific technologies and USP's.

National representation across England, Scotland, Wales & Ireland.

Continuously growing with new entries.



Innovate UK  
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<https://ktn-uk.org/programme/rai-landscape/>

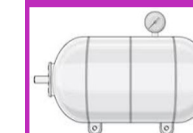




# UK Robotics: Landscape Map and Impact Analysis

Nikos Pronios, PhD  
Innovation Lead – Robotics & AI

[nikos.pronios@iuk.ukri.org](mailto:nikos.pronios@iuk.ukri.org)



# Agenda

- Introduction/Context
- Impact Analysis' Objectives
  - Robots for a Safer World Programme
- UK Landscape Mapping Objectives
  - Value Chain/Constellation view on Service Robotics
- Process overview
- Contributions & Interactions via Menti

# High-level description of certain impact-related activities/analyses for Service Robotics in the UK

- Previous/Existing/Recent:
  - Economic impact & opportunities of Service Robotics and Autonomous Systems (RAS) in different UK sectors
    - “*ECONOMIC IMPACT OF ROBOTICS & AUTONOMOUS SYSTEMS (RAS) ACROSS UK SECTORS,*” by BEIS/London Economics
- Current:
  - Road mapping for (Service) Robotics (RAS/RAI) in UK
    - identify & articulate visions, trends and drivers, capabilities and enablers, as well as recommendations for a stronger and more globally competitive UK RAS/RAI sector for the next 10 years
    - provide decision-makers means to identify, evaluate and select among strategic alternatives for achieving the vision or objectives
    - Currently in editing
  - **Preliminary Impact Assessment of past Robotics Funding by UK Government**
    - Robotics for a Safer World (mainly)
    - Obtain information related to the impact that UKRI/Innovate UK robotics-related funding had on the funded industrial organisations
  - **Mapping of UK’s RAS/RAI Innovation Landscape**
    - Some preliminary work has already been done by the KTN
    - Update/expansion/enhancement by obtaining information the UK’s Service Robotics Landscape regarding the current or anticipated roles/positions of the stakeholders in the corresponding value chain

# Examples of Government strategies



# On terminology:

- “service robot”\*
  - a robot *“that performs useful tasks for humans or equipment excluding industrial automation applications”*
- Within the current context the following terms are used interchangeably:
  - RAS (Robotics and Autonomous System)
  - RAI (Robotics and Artificial Intelligence)
  - Service Robots/Robotics
  - Advanced robotics

\* See <https://ifr.org/service-robots> and ISO 8373

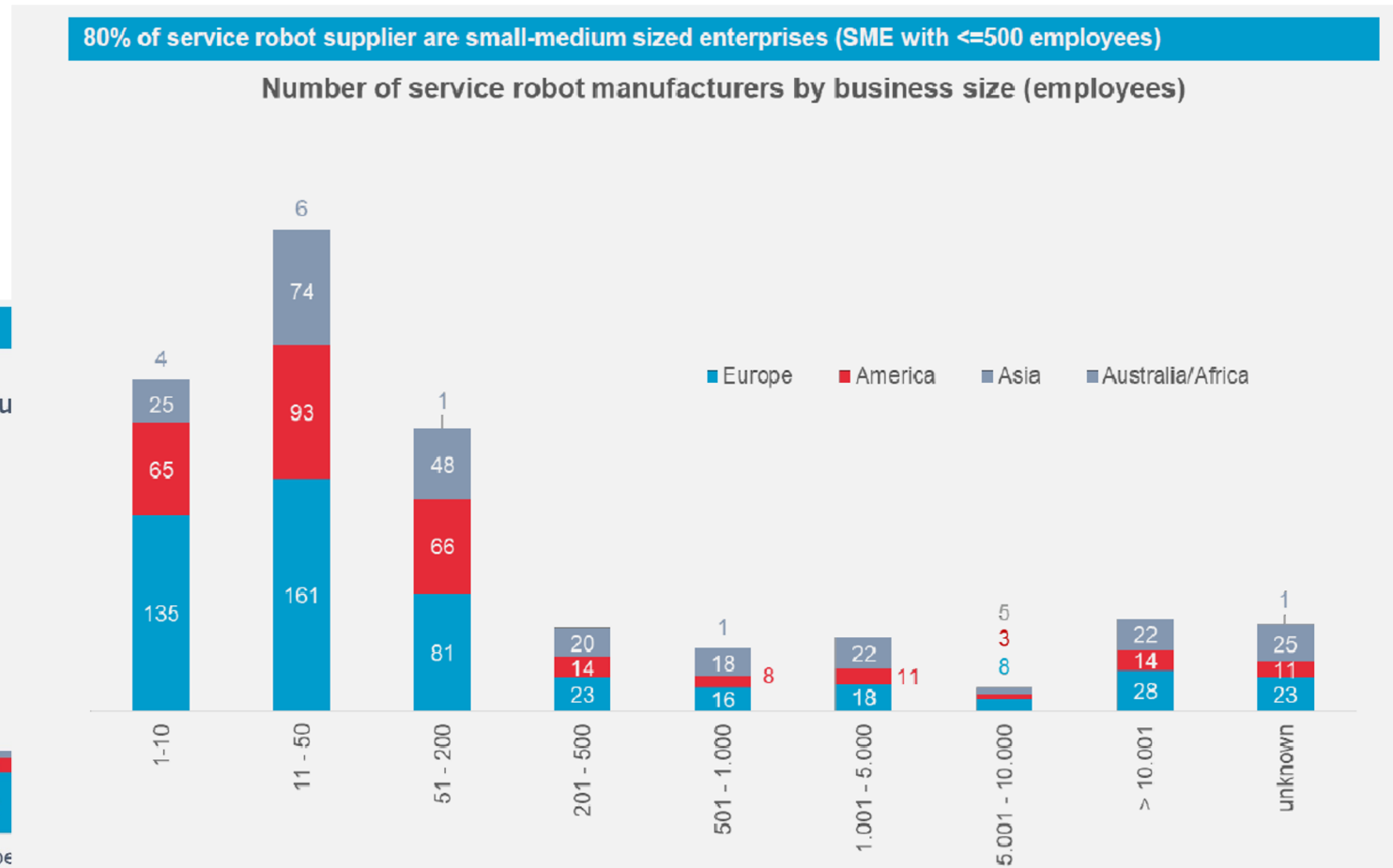
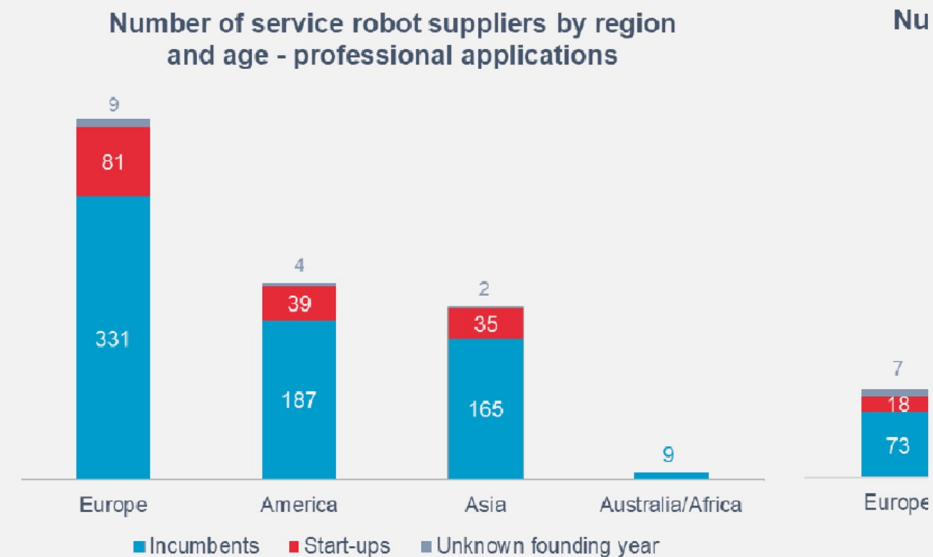
# Global Service Robotics in 2020

From IFR:

- In 2020: Service Robotics still growing strongly
- New professional service robots\*
  - 131,800 units (+41%)
  - Turnover: USD 6.7 billion (+12%)
- New consumer service robots
  - 19 million units (+6%)
  - Turnover: USD 4.4 billion (+16%)

\*All numbers are based on a sample of 235 companies and 3 association reports

More than 1,000 service robot suppliers worldwide

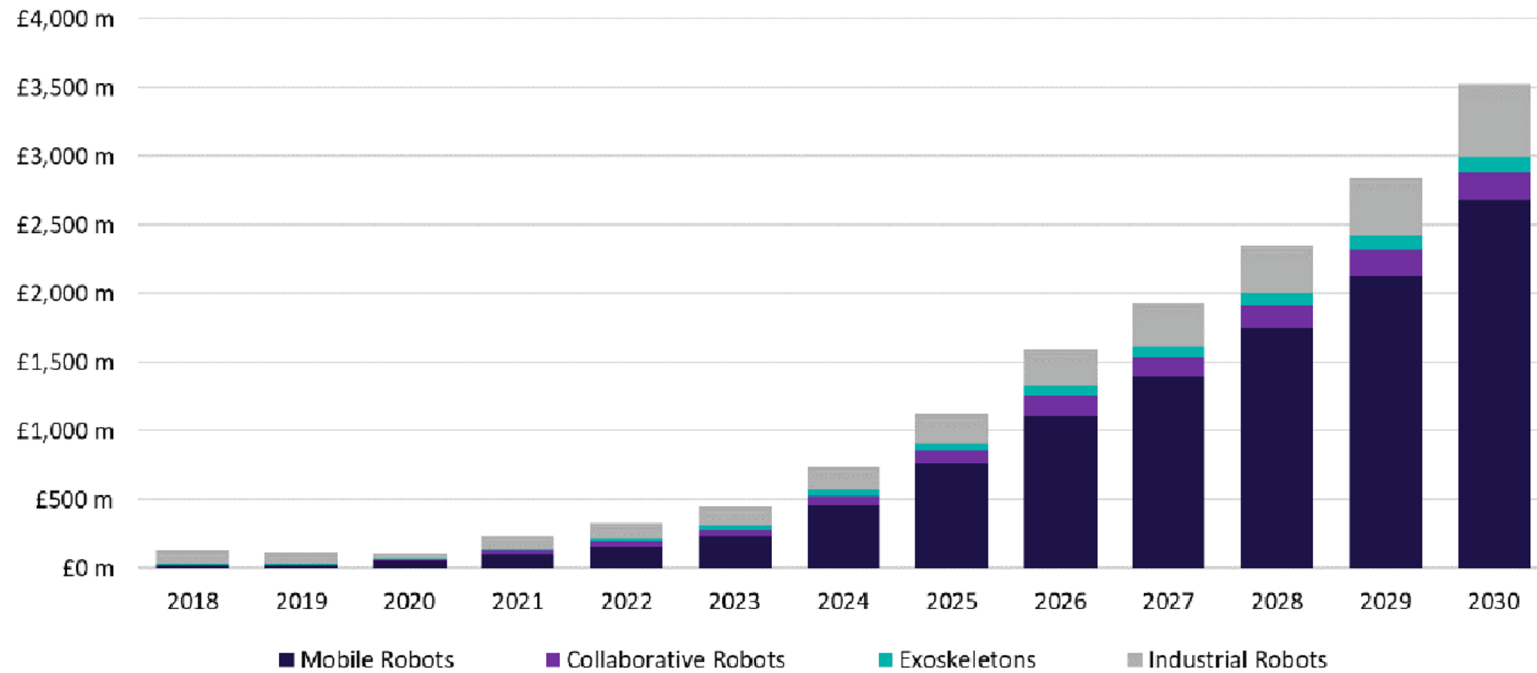


# On the Economic impact of RAS in UK

- What is the potential future economic opportunity of RAS adoption across UK sectors?
- Based on this analysis, the total economic impact of RAS uptake across all selected sectors is estimated to be in the region of £6.4 billion by 2035 (based on current adoption trends).



# Estimated total UK robot market size



The Economic Impact of  
Robotics & Autonomous  
Systems across UK  
Sectors

Final Report

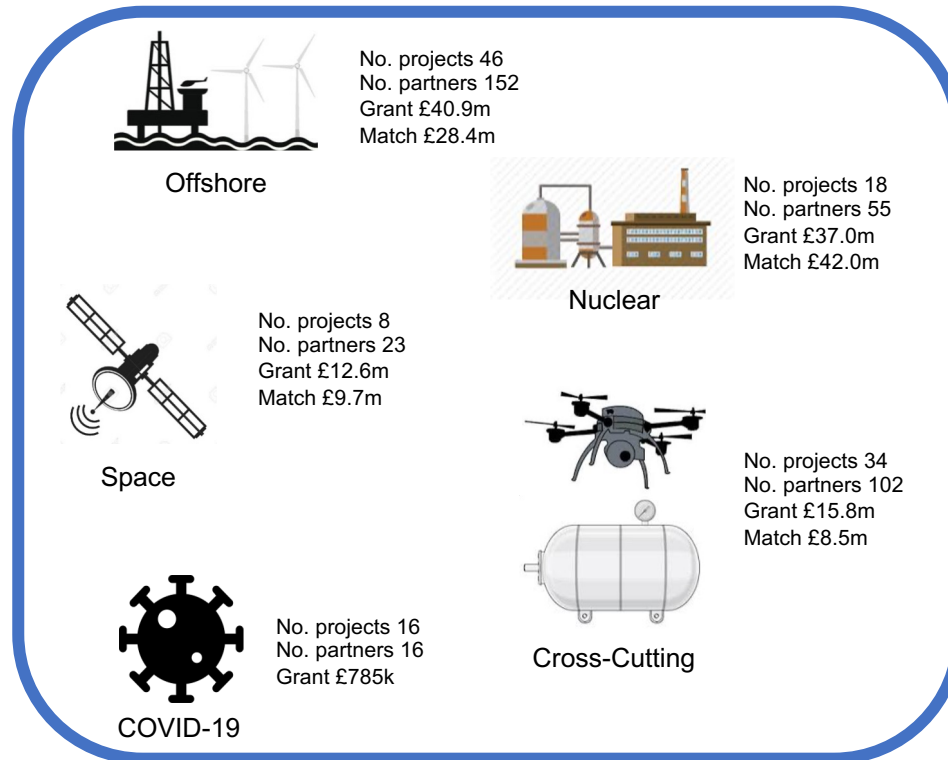
BEIS Research Paper Number: 2021/043

Estimated total UK robot market, by 2030, based on current trends

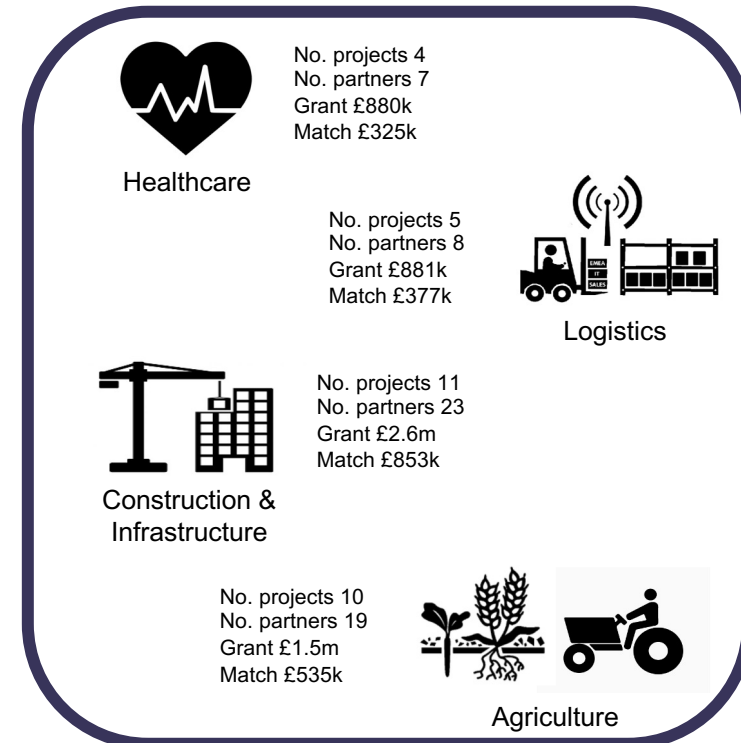


# Robots for a Safer World

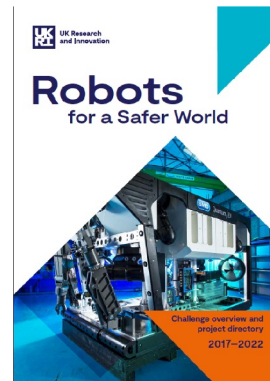
- A £112m, 5-year programme (2017-2022) developing robots to take people out of dangerous work environments, increasing productivity and going beyond human limits.
- In the final year the scope was extended to include other sectors focussing on Robots for a Resilient Future in a post COVID environment.



Robots for a Safer World (2017-2022)



Robots for a More Resilient Future (2021-2022)



# Preliminary Impact Assessment of past Robotics Funding by UK Government

- Obtain information related to the impact that UKRI/Innovate UK robotics-related funding had on the funded *industrial* organisations, based on:
  - Having received funding or not
  - The status of your organisation *before the funding and now*
    - ❖ Existence
    - ❖ Pre-revenue
    - ❖ Post-revenue and up to 5 persons
    - ❖ Post-revenue and more than 5 persons

# An Existing Map of RAS/RAI Innovation Landscape @ KTN

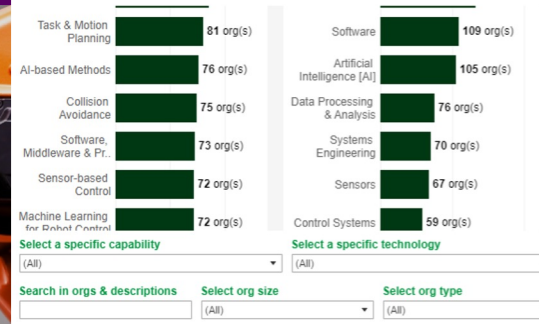
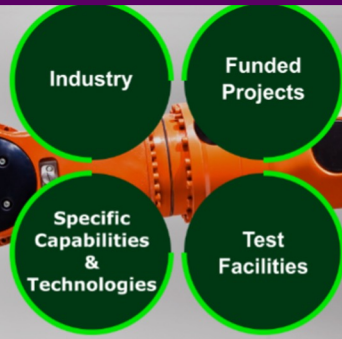
## Robotics and Artificial Intelligence Landscape

Robotics and Artificial Intelligence are significant globalised technologies that can be applied in many sectors. Our team have created a map of the UK research and technology landscape.



## Robotics and AI

Explore the map



**Organisations**

Centre for Doctoral Training in Robotics and Autonomous Systems\* at the Edinburgh Centre of Robotics

Robots that can learn, adapt and take decisions will revolutionise our economy and society over the next 20 years. At the Edinburgh Centre of Robotics, we work on various research areas in the field of Robotics and Autonomous systems, with a focus on safety and safe interaction between robots, people and their environments.

The EPSRC Centre for Doctoral Training in Robotics and Autonomous Systems (CDT-RAS), hosted at the Edinburgh Centre of Robotics, is leading in the UK effort to realise its industrial potential in this revolution, by producing a new generation of highly skilled graduates.

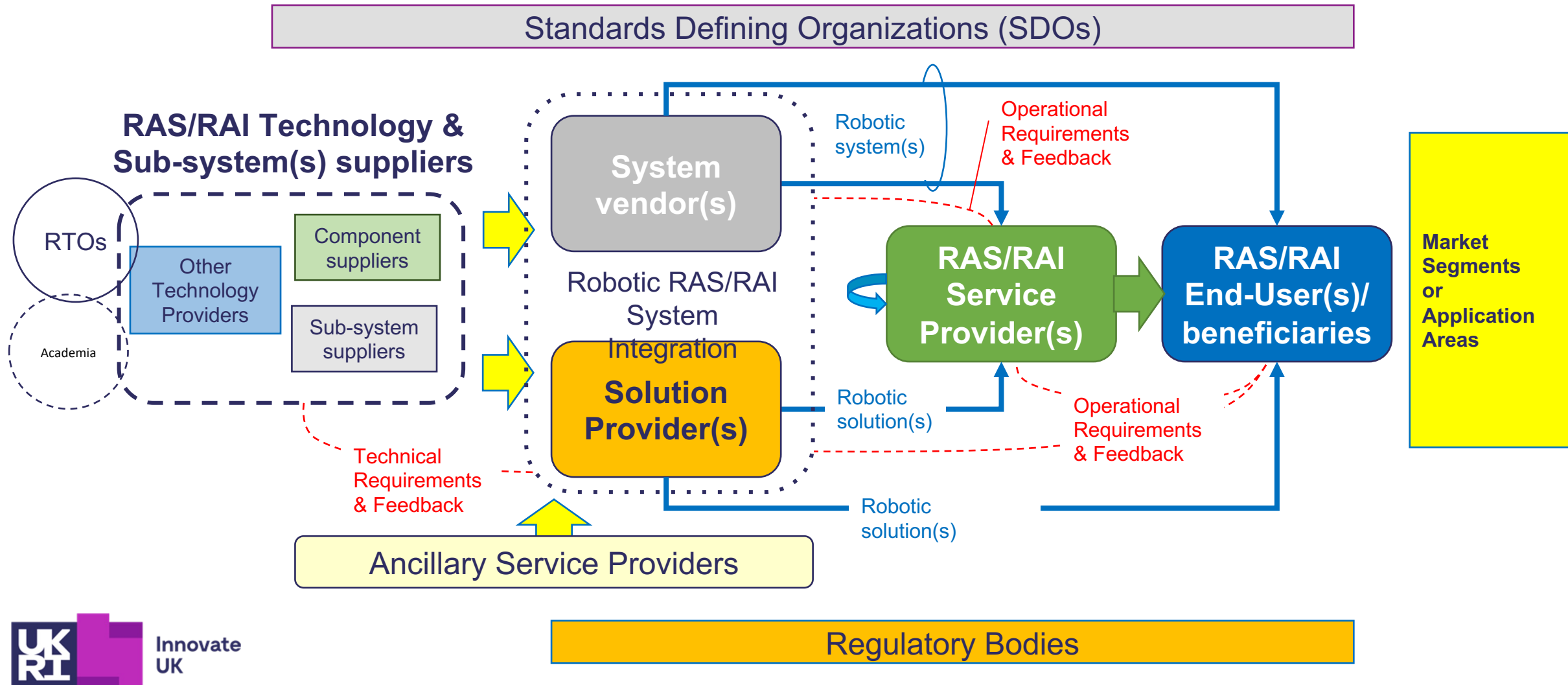
We are a technology company with an extraordinary technical team of engineers,...



Connecting for Positive Change



# A Value Chain/Constellation view on Service Robotics



# Seeking information for the UK's Service Robotics Landscape regarding the stakeholders' roles/positions

## Identified Roles in the Service Robotics Value Chain/Constellation

1. Academia
2. RTO
3. Technology provider
4. Component provider
5. Sub-system provider
6. Solution Provider
7. Robotics System Vendor
8. Robotics Service Provider
9. Ancillary Service Provider
10. End-user/beneficiary
11. Other

# On the Robotics Landscape roles/positions

Role	Definition/Description	Notes/Examples
Technology provider	Provides technologies that are/can be used for the development of Robotic System-of-Systems (SoS)	Algorithms enabling various functionalities/capabilities like, SLAM, collision avoidance, etc. ...
Component provider	Provides components that are/can be used for the development of Robotic Systems, but are not necessarily made only for them	CPUs, sensors, SW environments/platforms, etc. ....
Sub-system provider	Provides sub-system(s) that comprise Robotic Systems	Sensing, manipulation, power, HMI, comms, mobility/ locomotion/propulsion sub-system etc ...
Solution Provider	Combines/integrates technologies/components/sub-systems to develop bespoke robotic systems (which are termed as solutions)	Robotic systems especially designed/developed for specific end-users or service providers.
Robotics System Vendor	Combines/integrates technologies/components/sub-systems to develop robotic systems that are sold (more-or-less) as <i>"off-the-shelf"</i> products	Not specially designed or custom-made robotic systems
Robotics Service Provider	Offers services via the use of Robotic Systems, offering services to the end-beneficiaries	Offering Robotics-as-a-Service (RaaS)
Ancillary Service Provider	Offers services for the development/production/deployment of Robotic Systems	Different than Robotics Service Provider: design, simulation, manufacturing, etc. ...
End-user/beneficiary	End-user: uses Robotics/Robotic Systems End-beneficiary: Benefits from the use of Robotics/Robotic Systems, without directly using them	Business model dependent

# Service Robotics

## Market Segments/Application Areas Examples

- By Type
  - Professional
  - Personal & Domestic
- By Application
  1. Agriculture
  2. Construction/Demolition
  3. Food & drink
    - Services
    - manufacturing
  4. Health & social care
  5. Hospitality/Professional Cleaning
  6. Infrastructure
    - Energy
  7. Logistics
    - Warehouse
    - Field/Transportation
  8. Defence, Rescue, & Security
  9. Other
  10. Cross-cutting

# Process overview

To provide feedback/information on:

1. Person/Organisation
2. Type of Organisation
2. Having received recently funding
3. The status of the organisation in 2017
4. The current status of the organisation
5. The organisation's current MAIN role in the Robotics Value Chain
6. The organisation's future MAIN role in the Robotics Value Chain
7. Other roles that the organisation has currently
8. The organisation's main application area and/or market segment



# Robotics and Artificial Intelligence Landscape Impact Study

<https://info.ktn-uk.org/p/2VFU-CVE/robotics-and-artificial-intelligence-landscape-impact-study>

# Questions?

# Upcoming Opportunities



# MADE SMARTER INNOVATION ALLEY

FREE || In-Person Event || Wednesday 10<sup>th</sup> and Thursday 11<sup>th</sup> November 2021 || Liverpool ACC Arena Liverpool L3 4FP

- Be less than 5 years old OR have less than 10 staff
- Be based in the UK
- Have an innovative robotics and AI product/service targeted at manufacturers of any type
- Not have previously exhibited on Innovation Alley

Quick & Easy to apply: <https://www.digital-manufacturing-week.com/innovation-alley-funded-stand>

Can get exposure in from of ~ 5000 manufacturers, get a FREE stand to exhibit, present and network.



<https://ktn-uk.org/news/made-smarter-innovation-alley-is-back-for-2021-and-this-year-its-even-bigger-and-better/>

# Thank you