Research funded by the Research Councils makes a vital contribution to the UK’s economic growth, prosperity and well-being.

We take a variety of approaches to support innovation and deliver impact from research, including the development of collaborative research programmes, investment in major research capabilities, such as national research facilities, and the support of impact-related capabilities.

Often the impact of research is realised through the combination of several investments over time. The Research Councils seek to ensure that the outputs and outcomes of their funded research have significant long-term benefits for the economy and society. This timeline, one of a series, highlights how investments made in research over the long term combine to create a significant impact in particular areas. In addition, research in one area can combine with that from another to drive innovation and make a key contribution to UK growth. For example, robotics and autonomous systems have been used across a range of sectors over recent decades, with Dr Kinnier Wilson designing an early prosthetic arm for use by children in 1963 and the first flapless aircraft, the Demon Unmanned Aerial Vehicle (UAV), developed jointly by RCUK-funded researchers and BAE systems, taking to the skies in 2011.

A key part of the Government’s Industrial Strategy is supporting technologies where the UK has the depth of research, expertise and the business capability to develop and exploit commercially. Robotics and autonomous systems is one of ‘Eight Great Technologies’ identified by the Chancellor of the Exchequer in autumn 2012 when he announced an additional £600 million to help support their development. These eight are: Big Data and energy-efficient computing; Satellites and commercial applications of space; Robotics and autonomous systems; Synthetic biology; Regenerative medicine; Agri-science; Advanced materials and nanotechnology; and Energy and its storage.

Robotics and autonomous systems

RCUK-funded research in the field of robotics and autonomous systems has progressed rapidly over the last few decades and has led to significant impacts across a variety of sectors including transport and healthcare.

From the invention of the first autopilot in the 1940s to the development of cars that can literally drive themselves, robotics and autonomous systems have changed the way we think about transport. What was previously only seen in the movies has now become reality. Similarly, within the healthcare sector the use of surgical robots is no longer just a future aspiration. The world’s first robotically assisted heart bypass was carried out in 1999 and the first robotic transvascular aneurysm repair was performed in 2008.

The use of robotics and autonomous systems has attracted public interest and led to public debate on the ethical implications of robotics research. RCUK has encouraged and in some cases initiated these discussions about the potential ethical and societal impacts in this field to help determine the future direction of research.
Robotics and autonomous systems

- **1995**: RCUK-funded research at the Royal Aircraft Establishment, Farnborough, continues the world's first fully autonomous landing on a ship.

- **1999**: QinetiQ's Autosub Long Range inspection vehicle was deployed for the first time to undertake automatic inspection missions to provide critical information on deep sea oilfield infrastructure.

- **2004**: In a world-first, Perpetuum, a University of Southampton developed a autonomous robot to undertake automatic battery charging.

- **2005**: **2013**: The National Plant Protection System (NPS) becomes operational in the UK, enabling aerial spraying of crops and trees.

- **2006**: The ExoMars robotic arm mission by ESA is successfully deployed to drill into the surface of Mars.

- **2007**: The first robotic surgery system based on the da Vinci surgical robot is successfully used at the University of Califorina, San Diego.

- **2008**: The first complex robotic system for high-level tasks, the 'Hendon' arm, is demonstrated.

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- **2010**: The first complex robotic system for high-level tasks, the 'Hendon' arm, is demonstrated.

- **2011**: The first complex robotic system for high-level tasks, the 'Hendon' arm, is demonstrated.

- **2012**: The first complex robotic system for high-level tasks, the 'Hendon' arm, is demonstrated.

- **2013**: The first complex robotic system for high-level tasks, the 'Hendon' arm, is demonstrated.
The seven Research Councils are:

- Arts & Humanities Research Council (AHRC)
- Biotechnology & Biological Sciences Research Council (BBSRC)
- Economic & Social Research Council (ESRC)
- Engineering & Physical Sciences Research Council (EPSRC)
- Medical Research Council (MRC)
- Natural Environment Research Council (NERC)
- Science & Technology Facilities Council (STFC)

Research Councils UK is the strategic partnership of the UK’s Research Councils.

We invest annually around £3 billion in research. Our focus is on excellence with impact. We nurture the highest quality research, as judged by international peer review providing the UK with a competitive advantage. Global research requires we sustain a diversity of funding approaches, fostering international collaborations, and providing access to the best facilities and infrastructure, and locating skilled researchers in stimulating environments.

Our research achieves impact – the demonstrable contribution to society and the economy made by knowledge and skilled people. To deliver impact, researchers and funders need to engage and collaborate with the public, business, government and charitable organisations.

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