



Ministry
of Defence

Advantage through
Innovation

The Defence Innovation Initiative

Foreword



The UK is one of the world's most innovative nations. British brains gave the world the tank, the fighter aircraft, the Dreadnought battleship, radar and the jump jet. Over the past decade, the MOD and Armed Forces have innovated continuously to meet the challenges faced on operations in Iraq and Afghanistan, evolving a new generation of counter-IED capabilities and making significant advances in the provision and quality of battlefield medicine. Today our great minds are developing capabilities including sixth generation aircraft, complex new weapons such as Meteor and Brimstone and we are enhancing synthetic simulation using the latest games technology. We have also established innovative new organisations within the Armed Forces such as 77 Brigade and Joint Force 2025 will see the creation of a range of innovative new formations.

Yet we're also thinking about tomorrow. Our adversaries, whether state or non-state, are increasingly harnessing new technologies and unconventional methods against us. Last year's SDSR recognised that we needed a new approach to innovation to keep our nation safe. Advantage through Innovation aims to maintain the military edge of the UK's Armed Forces into the decade ahead and beyond.

It's a plan to harness the talents of academic and industry experts, especially Small and Medium Sized Enterprises, to create new disruptive

capabilities. It will utilise our strong science, technology and research base to develop new capabilities, more quickly. But it is much wider than that: it's a plan to change the culture of defence so our people become more attuned to imaginative concepts and ways of solving problems; and more open to taking risk. And it's a plan to collaborate more closely with allies and partners. We will grasp the opportunities to work with the US' 'Third Offset Strategy' knowing that our Defence Challenges are close to their aims.

Our initiative is backed up by an Innovation Fund of £800 million, a new Innovation and Research InSight Unit (IRIS), and a Defence and Security Accelerator to get new projects off the ground and contribute to our collective security.

This is more than just a blueprint for technological success. It's a call to academia, industry, wider government, other partners and my own department to fire up their innovative instincts and write a new chapter in Britain's proud history of innovation. The prize for doing so couldn't be greater - enhanced security, a stronger economy and a safer future.

A handwritten signature in black ink that reads "Michael Fallon". The signature is written in a cursive style with a horizontal line under the name.

Rt Hon Michael Fallon MP
Secretary of State for Defence

The Challenge

The global security landscape is changing...

The 2015 National Security Strategy describes a world of rapid and fundamental change. Long-term shifts in the balance of global economic and military power, increasing competition between states, and the emergence of more powerful non-state actors all pose risks for the United Kingdom.

...technology is creating far greater opportunities and threats to the United Kingdom...

Advances in technology hold enormous potential for the United Kingdom's security and prosperity whilst also posing risks, as they become available to adversaries who may seek to use them against us. This may erode our traditional advantage over time as access to knowledge and material becomes more widespread and competitive.

...and the global landscape has shifted.

In most areas, the private sector, not governments, drive today's rapid pace of technological, social and cultural change. Potential adversaries seek to leverage that change and use new ways of operating to challenge our traditional advantages.

So how will the Ministry of Defence respond?

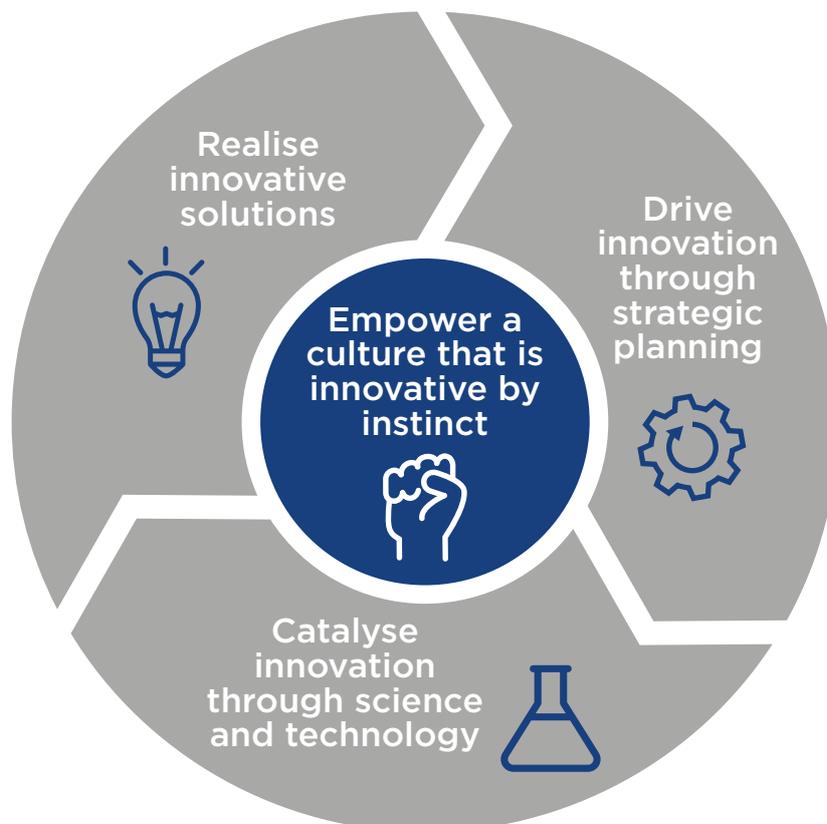
Innovation is key to maintaining our military advantage into the future. We must continue to adapt to stay ahead, finding ways to be more innovative in the ways we think, the ways we develop capabilities and the ways we operate ourselves, whilst developing the ability to harness private sector entrepreneurship and ingenuity quickly and affordably. Defence is therefore launching its innovation initiative in order to fundamentally change how it goes about its business. Our goal is to maintain military advantage into the future.

Delivering an Innovative Defence

The Defence Vision for Innovation

A Department that enables the Armed Forces to maintain military edge into the future.

The figure below outlines the key lines of effort Defence will pursue in order to deliver this vision.



Core Principles

The following core principles will guide decisions related to Defence's innovation initiative as it develops over time:

- **A broad and systematic approach** that seeks to embed innovation throughout the Department's organisation, workforce, process and culture, and includes better integration of military concepts, emerging technologies and capability development.
- **A culture that is 'innovative by instinct'** by incentivising and rewarding the innovative behaviours that we value. Such a culture emphasises the willingness—indeed expectation—to accept risk responsibly across the enterprise.
- **An open innovation 'ecosystem'** that capitalises on innovative expertise at the MOD and other national security departments, and builds effective, efficient and fertile partnerships with innovators in industry and academia, as well as with key allies and partners.
- **The ability to accelerate promising innovations from idea to solution,** quickly and affordably.
- **A strategy-driven approach** that provides clear strategic direction to the Department, the component parts of which will remain primarily responsible for delivering innovation.

Prosperity and International by Design

Establishing an innovative culture across the MOD will enable the Department to meet its most pressing challenges, and in doing so, contribute to the Government's vision of a secure and prosperous United Kingdom. Fostering an entrepreneurial spirit amongst our personnel and investing in their skills will help the Department to contribute directly to the country's prosperity by increasing opportunities. We will be able to support Defence exports by both our investment and the establishment of an innovation ecosystem through the Defence and Security Accelerator, which will expedite the process of turning innovative ideas into solutions.

The MOD will also look to contribute to the development of the next generation of innovators through initiatives such as Science, Technology, Engineering and Mathematics (STEM) apprenticeships and greater investment in Cadet organisations. We will look to work closely with industry and academia to identify how we create transformative improvements in organisational structure and processes within the Department which will deliver greater efficiency and value for money.

The United Kingdom's international allies and partners will play a key part in the progress of the innovation initiative. Many of our closest partners have recognised the danger of their operational edge being eroded and the importance of innovation to being able to successfully counter this risk. And while the ways our allies and partners will look to innovate may be different, the MOD will continue to seek every opportunity to learn in order to improve our plans as they mature.

The MOD will look to innovate alongside allies and partners as we develop and train in combined formations such as the Combined Joint Expeditionary Force and across common platforms. We will also encourage MOD personnel to be innovative as they develop their relationships across the world. Promoting the United Kingdom's influence through Defence activity is a core task for the MOD and we will pursue a more innovative approach such as creating specialist career streams and exploiting niche and specialist skills amongst our Reservists.

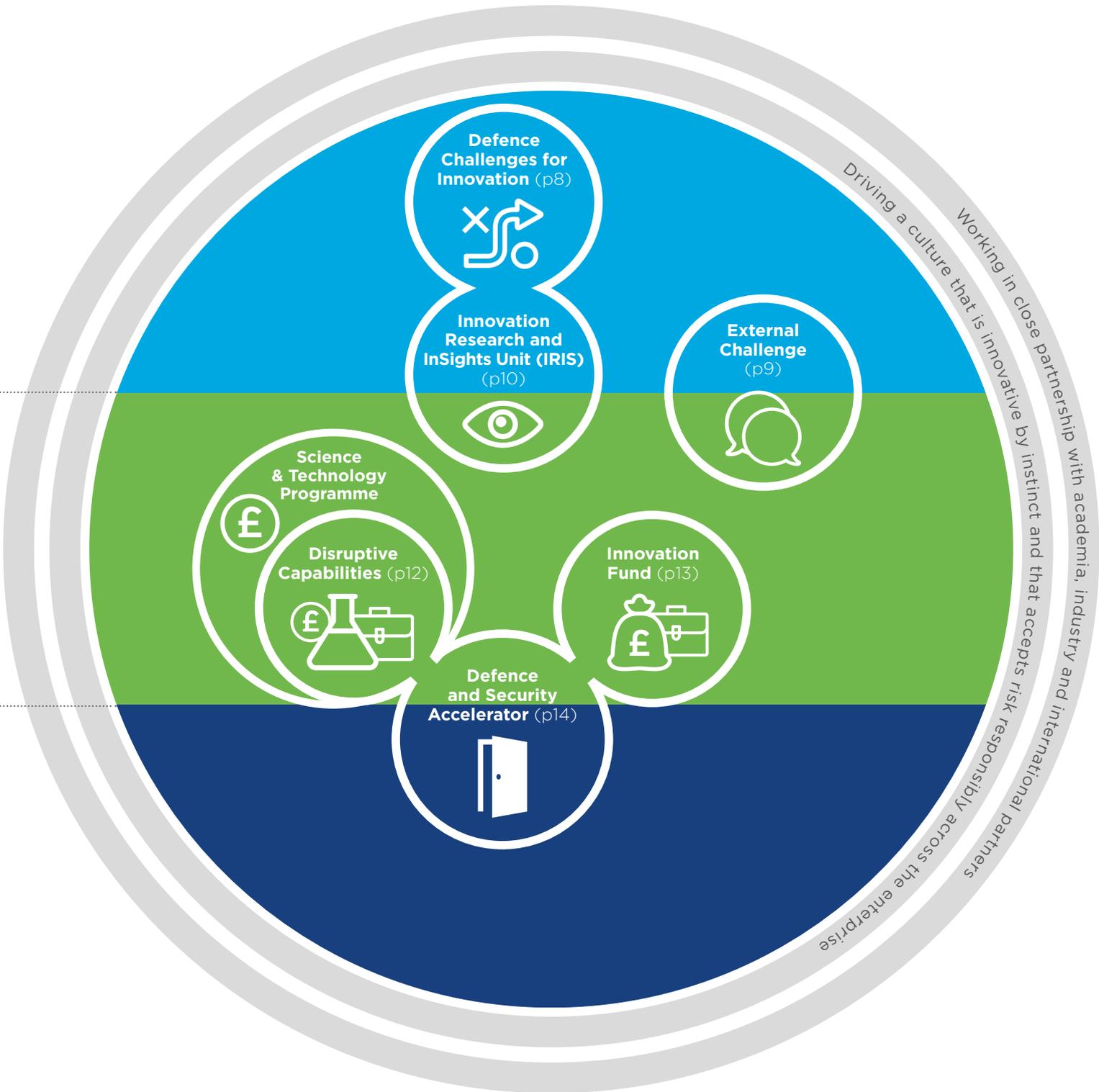
Key Initiatives and Opportunities

The MOD’s aim is to create an environment that better enables the Department to deliver innovative solutions to its most pressing challenges over the long-term. We will take a systematic and open approach to innovation which focuses on:

- building understanding of the innovation landscape
- defining and communicating our priorities
- soliciting innovative ideas from the widest possible sources
- connecting stakeholders, partners and suppliers to bring ideas to life and make innovative solutions a reality.

To accomplish this, the MOD will put in place several new initiatives in our drive towards greater innovation. Defence’s innovation initiative will be a continual learning process. We will persistently strive to improve and expand on this system as it takes root, working collaboratively with industry, academia and key allies as well as further integrating across Defence and alongside other Departments.





Defence Challenges for Innovation

 UNDERSTAND

 PRIORITISE

 DELIVER



Defence is not seeking to innovate simply for innovation's sake. To ensure we take a systematic, strategy driven approach, Defence is aligning its innovation efforts with broader goals and objectives. Consistent with Defence's vision for a Department that enables the Armed Forces to maintain military advantage into the future, and what the Defence sees as its greatest challenges going forward, the Department has developed a set of Defence Challenges to focus innovative energy, effort and resource.

Project military power against sophisticated adversaries, responding to the global proliferation of advanced capabilities aimed at reducing our reach, with innovative ways of developing, operating and sustaining our Armed Forces.

Influence potential adversary choices on terms favourable to the United Kingdom, developing competitive strategies and leveraging the UK's comparative advantages to dissuade adversaries from acting against UK interests.

Deliver non-traditional and novel ways to have effect beyond traditional weapons systems against sophisticated adversaries, allowing Defence to continue to offer a versatile range of options to decision makers into the future.

Understand and take effective decisions in the Information age, ensuring defence leaders have access to the best information possible to inform understanding of critical issues and enable decision making that outpaces our adversaries.

Adapt with agility to anticipated changes in the strategic environment, setting the organisation up to better recognise the need for strategic change and exploit opportunities to respond with greater speed.

Maintain robust strategic deterrence into the future.

Optimise the future workforce to meet anticipated needs, finding sustainable and effective approaches to deliver the resource and skills Defence needs in the coming decades.

External Challenge

 UNDERSTAND

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Defence has a rich tradition of game-changing innovation but this has often been in response to new threats. Innovation and technological development which results in paradigm shifts increasingly occur outside of government. To address this, a mechanism will be established to enable Defence leadership to partner with a small number of the United Kingdom's most influential and forward-looking innovators. These external advisors will ensure the Department is driving the right change at the necessary pace to meet its goals into the future.

The external advisors will provide a key source of expertise and advice as we progress the innovation initiative. They will offer insight into successful approaches and their potential

application within Defence and national security as well as providing critical appraisal and scrutiny of each element of the initiative.

The opportunity to learn from those with both technical and intellectual expertise and experience will allow Defence to adopt new approaches and thinking throughout the Department. Critically, the external advisors will play a key part in enabling an innovative culture to develop across all areas of Defence.

Innovation and Research InSight Unit

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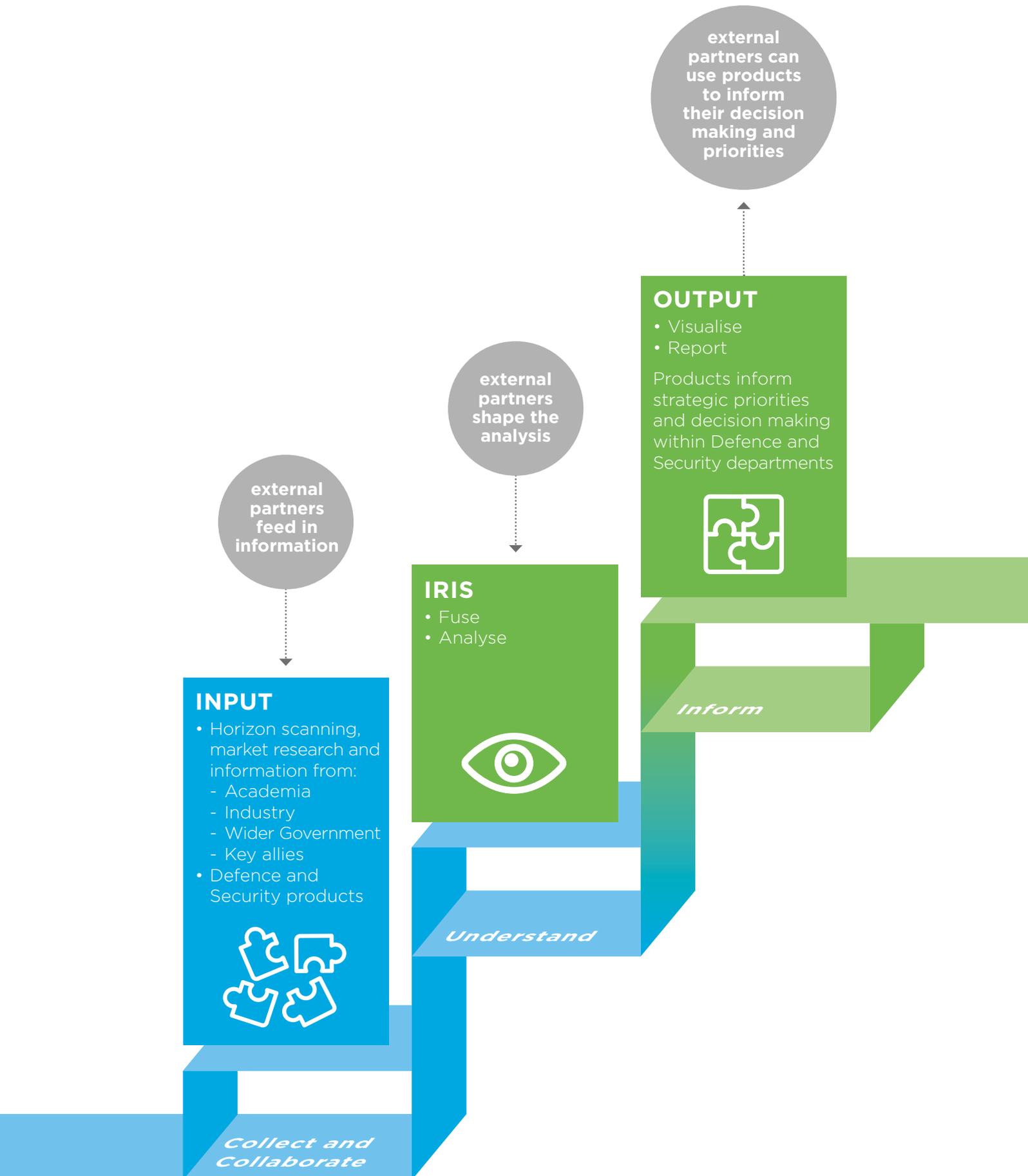
In order to be an effective customer for innovation, Defence must strengthen its understanding of the external technology and innovation landscape, critically consider the implications on strategy, priorities and investments and take decisive action on the findings. The new Innovation and Research InSight Unit, an emerging technology and innovation analysis capability, hosted by MOD, will work towards this aim.

IRIS will draw on horizon scanning and market intelligence from across government, academia, industry and international partners to develop a detailed understanding of the external technology and innovation landscape. By fusing this understanding with

knowledge of our most pressing Defence and national security challenges, IRIS will be well placed to identify the threats and opportunities presented by emerging technologies and innovation and to make recommendations to senior decision makers on strategy and investment priorities. These insights will seek to prevent strategic surprise, helping to maintain Defence and national security advantage into the future.

As well as informing internal decision makers, insights will also be provided to our external partners to support wider planning and decision making across all sectors.





IRIS

- Fuse
- Analyse

Icon: An eye.

external partners shape the analysis (Callout)

OUTPUT

- Visualise
- Report

Products inform strategic priorities and decision making within Defence and Security departments

Icon: Three interlocking puzzle pieces.

external partners can use products to inform their decision making and priorities (Callout)

Understand

Inform

Collect and Collaborate

Disruptive Capabilities

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The MOD has committed up to 20% of its Science and Technology (S&T) Programme to Disruptive Capabilities (DisCap); these represent technologies with truly game changing applications. DisCap funds high risk research that challenges existing military and security strategy and tactics.

DisCap projects seek to provide operational advantage and freedom of action, as well as delivering political and economic benefit from the UK being able to contribute world leading niche military capabilities. This includes future weapon systems that can reduce the UK's dependence on high cost, complex munitions, new interventions to change the MOD's approach to recruitment, deployment and training as well as new autonomous systems to cope with complex environments. DisCap projects are funded across core themes, which evolve to maintain relevance with future operational needs.

DisCap will be opening up to external S&T ideas through the Defence and Security Accelerator. This will be trialled in January 2017 and focus on a specific problem area aligned to one of the Defence Challenges described on page 8.

CASE STUDY: SKEETER

Scale model representation

Project	Dragonfly Unmanned Aerial Vehicle
Requirement	Intelligence, Surveillance, Reconnaissance
Operation	Complex Urban Environments
Innovation	Bio-inspiration, Disruptive Capabilities
Development	Developed for the MOD under the STRATUS Project by Animal Dynamics, UK SME

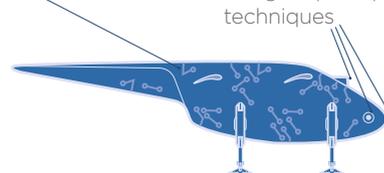
FRONT VIEW



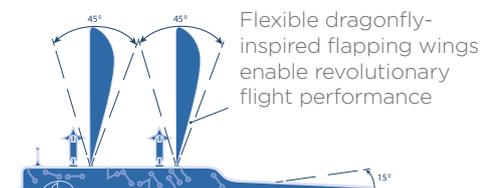
SIDE VIEW

Multifunctional composite structure with embedded smart electronics enabling advanced autonomous flight modes

Cutting edge sensing tech enables day/night intel gathering and high speed obstacle avoidance using bioprincipic design techniques



TOP VIEW



Flexible dragonfly-inspired flapping wings enable revolutionary flight performance

Defence Innovation Fund

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MOD has established an Innovation Fund of around £800m over 10 years, to provide the freedom to pursue and deliver innovative solutions. The Fund will take forward the best ideas, from inside and outside of Defence, in an open competitive process. Answers will be sought to address challenges based on Defence's most pressing problems but with an open mind to other, unexpected opportunities. Furthermore, the Fund will not seek to favour specific areas of innovation (technological, procedural etc.) but will seek to enable as broad a scope of innovative solutions as possible. The Fund will evolve rapidly over the next few years, with the understanding gained through its early operation being used to improve corporate approaches, innovation systems and mechanisms in order to realise the innovative potential of an even broader range of Defence activities.

The Innovation Fund will enable Defence to adopt an open and entrepreneurial approach to selection, funding and development. To fully exploit the potential of innovative ideas it will seek to embrace risk when appropriate. This should allow the Department to stay ahead of potential threats and better match the pace of agile and fast moving companies, increasing the chances of selecting and developing viable ideas.

The initial mechanism for the Innovation Fund will continue to develop through consultation in Autumn 2016. The agreed process, which is expected to employ a 'Pitch' Panel alongside more traditional methods, and the first defined challenge, will be published in December 2016 and the Innovation Fund will be open for bids early in 2017. This will allow the best ideas to be selected in time for the first funds to be disbursed in April 2017.

Defence and Security Accelerator

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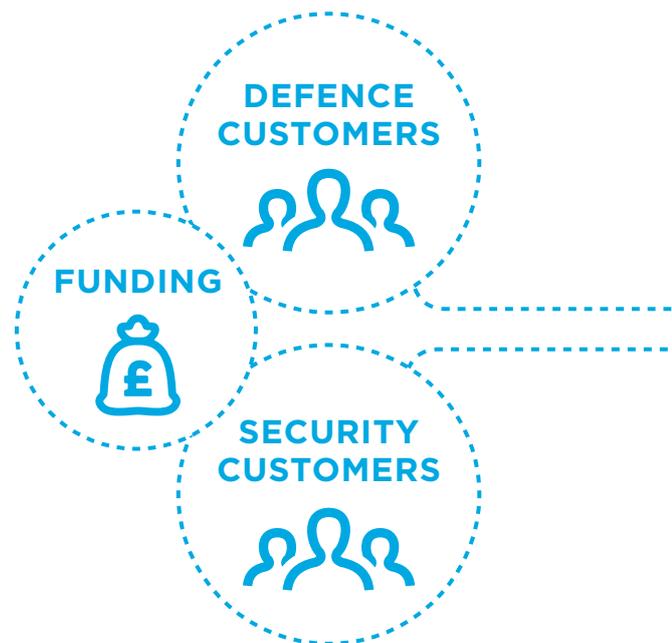


The Defence and Security Accelerator is an innovation hub that will accelerate ideas from conception through to application to help maintain military advantage and protect the UK over our adversaries.

The Accelerator will be a managed network which uses the knowledge, facilities and skills of its partner research institutes and innovation centres to support suppliers' journeys from concept to delivery and, crucially, works hand-in-hand with Government procurement bodies to pull novel solutions into service.

The innovation ecosystem it builds will provide opportunities for customers and suppliers to work together in physical and virtual collaboration spaces; these will act as safe environments where stakeholders can identify, experiment, incubate and demonstrate novel ideas and solutions. It will bring together a unique set of stakeholders for each of its programmes to identify and overcome barriers to exploitation - whether they are technological, procurement, legal, regulatory or financial - and work with its ecosystem to spin solutions into Government for national security and out for prosperity.

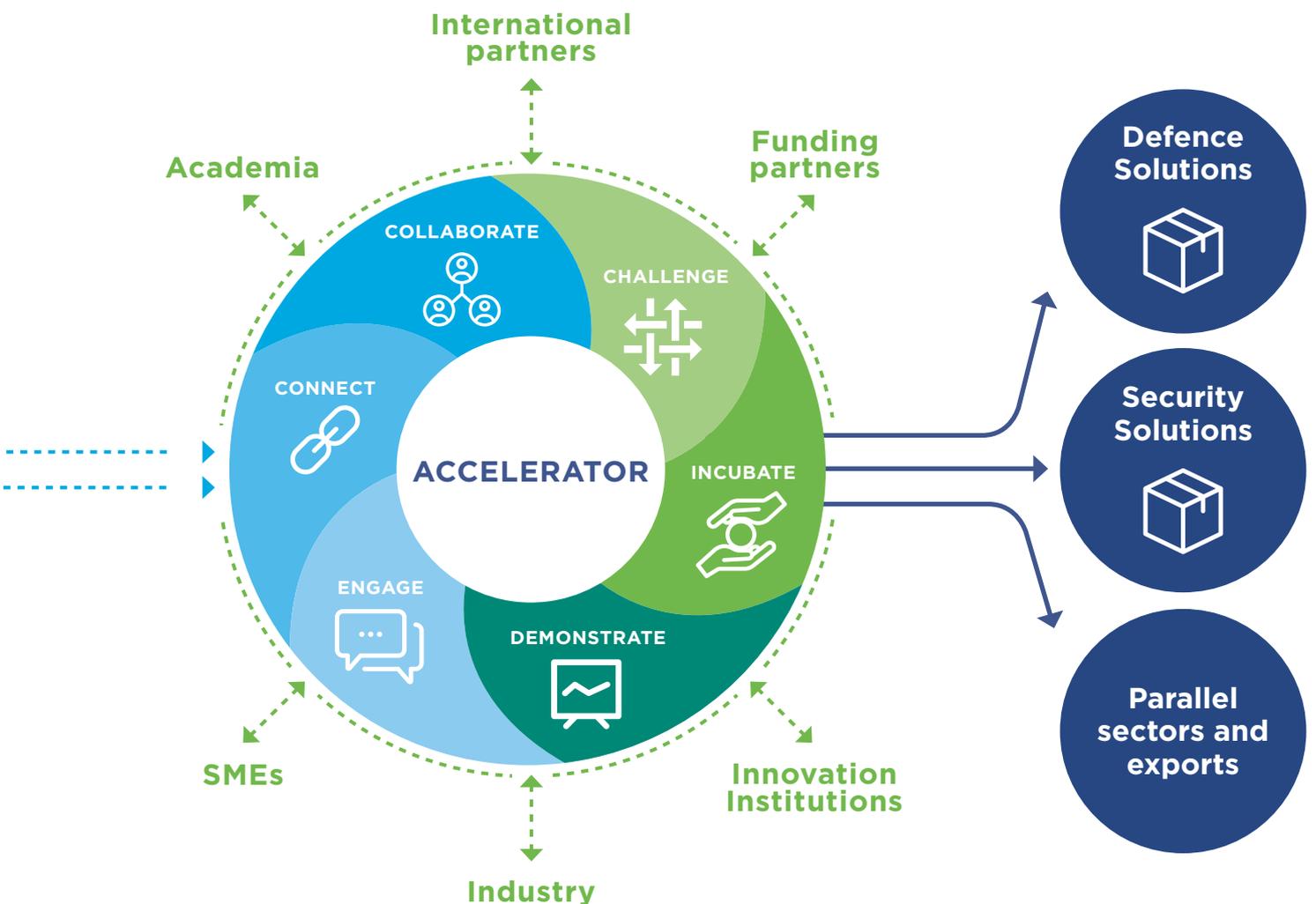
Key to the Accelerator's success will be an ability to draw on potential solutions from outside of the traditional Defence and Security supplier base and, through its partner centres, exploit solutions in parallel sectors to help boost national prosperity. To begin this journey, we will build on the Centre for Defence Enterprise (CDE) model, which already has successful experience identifying novel solutions from Small and Medium Sized Enterprises and Academia, and look to move beyond technological solutions into services.



Accelerator Pilot Innovation Calls

Defence will develop a series of challenges to stimulate research and development on the most promising innovation opportunities. The Department will seek solutions to important Defence and national security priorities through open engagement and partnerships with traditional and non-traditional suppliers, OGDs and key allies. The pilots are designed in a way

that will help us test the mechanisms we put in place for harnessing the cutting edge innovation that originates from outside of Government. The first set of pilots are in Autonomy; with a US/UK collaboration on Assured Resupply logistics and 'going the last mile' and a challenge call with the Home Office on *Hazardous Scene Assessment*.



Learning and Adapting

Better innovation in Defence and national security is in all our interests and will require government to engage closely with industry, our partners and allies to learn from successful approaches elsewhere. We will do so as we shape the new innovation units and processes and bring them into service over the next few months, and – because true culture change is a long-term goal – we intend to continually monitor the effectiveness of our approach and seek external views about what is working effectively and what could be improved.

Maintaining the United Kingdom's strategic edge in a world of enormous challenge is absolutely essential to our future security and prosperity. Delivering 'advantage through innovation' will enable us to use the ingenuity, skills and curiosity of the people contributing to Defence and national security. It will allow us to create productive partnerships with industry, academia and international partners and allies to establish a culture that is innovative by instinct. Adopting innovative solutions; across our organisation, processes and capabilities will ensure that we counter the risks to our security and prosperity whilst taking advantage of the opportunities the future offers.

Should you wish to comment or request further information on the Defence Innovation Initiative, please contact us at innovation-advantage@mod.uk.

“

If you always do
what you always did,
you will always get
what you always got.

A. Einstein

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