

# MBDA Innovation Challenges 2017

## Introduction

MBDA is a defence company specialising in complex weapon systems. To ensure that our products stay at the cutting edge of technology, we are now looking for collaboration partners to help address the following challenges.

## The Challenges

- Flash Memory**  
We have a need for unpowered flash memory storage that remains viable for 20 years without being powered up (Will consider low frequency read/write cycles)
- Power and data cables**  
Current power and data cables are proving to be bulky and therefore we are looking for new materials that can replace copper. This should provide thin, lightweight cables and connectors leading to a reduction in mass and volume. We anticipate that this will also simplify subsystem interfaces
- Secure Short Range Communications**  
In support of logistics and HUMS, MBDA need secure communications that is undetectable beyond 10m. This must be without encryption, wifi or Bluetooth and be able to communicate through metal containers.
- Low cost, high temp materials**  
Advanced ceramics and Ceramic Matrix Composites (CMC) for various applications that must operate robustly in a high temperature environment.
  - 1000°C-3000°C
  - 500°C-800°C

Furthermore, what viable techniques are available for joining of dissimilar materials (i.e. ceramic/CMC to metals, and to ensure that joints survive the demanding requirements of military hardware).
- Thermal battery replacement**  
Given the huge investment in battery technologies, can any of them replace existing thermal batteries? (Batteries with rapid charge rates are also acceptable)
- Next generation of flight control**  
To improve the maintainability of our products we are looking to reduce the number of moving parts. Hence how can an aircraft be controlled without any moving parts?
- Secure user operation**  
To enable remote assistance MBDA need secure low bandwidth real time voice and video communications from anywhere in the world, that obey national and international encryption laws. This will unlock next generation support philosophy and improve MBDA's response to Front Line Commands, and have applicability to training, maintenance and supply systems.
- Secure, low observable mesh network**  
How to avoid detection of RF transmissions in a flying mesh network
- EMC Seal**  
Current elastomer based EMC seals tend to have a maximum operating temperature in the order of 200°C however, with changes in vehicle performance, future requirements are now extending out towards 400°C. Typical shielding effectiveness requirements are in the order of >90dB attenuation over the frequency range 1-10GHz. Any EMC seal solution would ideally also have a method for providing an environmental seal. The sealing methods must be capable of performing without reduced performance during the in-flight condition having been stored on the ground for a minimum of 10 years undertaking thermal cycling in accordance with climatic conditions described within military standards.
- Cluttered image refinement**  
What techniques can be proposed to address the challenges of Automatic Target Recognition for low contrast man-made object(s) in highly complex cluttered environments (both man-made and natural)?
- Distributed detectors**  
There is a need to combine IR and RF sensors in a limited volume. What is the most economical way of doing this? For instance, combining optical and RF waveguide paths, multiple small optical apertures, data fusion, computational imaging etc
- High power amplifier technology**  
How do we achieve improved, power-added

- efficiency through GaN or similar high power-output technology?
13. **Enhanced Control/simpler actuation**  
Can AI or other non-linear control techniques create a step change in autopilot robustness and performance for aerospace applications or allow simplification of actuation?
  14. **Multi-spectral materials / coatings**  
Are there materials (possibly with coatings) that enable high quality transmission of radio returns across the EO spectrum (LW to MW...further potentially) or across the RF and IR spectrum which are thermally stable and hardwearing?
  15. **Transducers**  
What approaches exist that achieve high precision and very high rate pick-off for RF sensor technology?
  16. **Miniature Datalinks**  
MBDA has an interest in small, compact data link terminals that are high performance, power efficient and bi directional supporting data rates from low kbps to low mbps. The RF bands of interest include UHF through to Ka-band hosting waveforms that are interference resistant and cyber secure. Interest includes software radio designs able to support different third party waveforms that can be loaded via a programmable interface
  17. **Distributed computing operating in uncertain and resource constrained environments**  
Knowledge fusion and feedback between sensing, decision making and action. The challenge is:
    - a. How to have a robust, distributed, and decentralised system design/architecture that is tolerant of QoS, failures and drop outs;
    - b. When this has to be done when time and resources are constrained and when there is a high degree of uncertainty and ambiguity in the environment.
    - c. How to prove the dependability of a distributed computing platform.

## The Process

MBDA is working with the Knowledge Transfer Network (KTN) to promote these challenges.

The intention is to apply for defence and civil institutional funding to develop solutions, with the aim of sustaining the resulting technology in the civil sector. The challenges are open to all organisations however; institutional funding may be limited by geography.

In the first instance proposers need to register on the MBDA Innovation Gateway  
<https://www.mbdainnovationgateway.com/default.aspx> and submit a short outline of the proposal.

## Timescales

- Outline responses to be received by 6<sup>th</sup> October 2017
- Feedback and one to one sessions to be arranged throughout October/November 2017

There should be sufficient detail to attract the interest of our technical experts without the need to put a non-disclosure agreement in place.

If selected you will be invited for a brief one to one discussion with our technical experts in order to determine the viability of any project and a way ahead.