HMGCC Co-Creation

# Challenge: Data logging in extreme temperatures

## Summary of the challenge

Transport containers used to carry hazardous materials must be robust enough to withstand serious collision.

To test robustness of the containers, data logging devices need to be placed inside them – but can the containers survive the extreme temperatures of a test collision or explosion?

This is the question being posed in the latest HMGCC Co-Creation challenge, which seeks solutions to ensure data loggers can continue to operate, even at high temperatures.

Organisations are being asked to apply if, over a 12-week period, they can develop and demonstrate technology to meet this challenge. HMGCC Co-Creation will provide funding for time, materials, overheads and other indirect expenses.

## Key information

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| Budget up to | **£60,000** |
| Project duration | **12 weeks** |
| Competition opens | **Monday 23 June 2025** |
| Competition closes | **Thursday 24 July 2025 at 5pm** |

## Context of the challenge

UK regulations around transporting hazardous or explosive materials are rigorous, requiring a high degree of thorough, scenario-based testing. In a controlled test environment, sensors and data loggers are placed within a container, to validate its integrity and functionality, even in extreme conditions.

## The gap

A data logger with sensors that measure temperature, pressure and acceleration must be able to operate in a test scenario where it is exposed to significant physical shock and high temperatures for extended periods of time.

The container being tested, which holds the data logger, acts as a Faraday cage and cannot be altered as it would affect its physical performance.

Existing solutions are to use a commercial data logger (SLICE), surrounded by insulation to reduce the temperature. Active cooling cannot be used.

Due to the extreme external temperatures, there has been no insulation material found that is sufficient to maintain the safe operating temperature for electronics over a period of 14 hours. The highest internal temperature peaks at 90 °C, considerably higher than the operating temperature of the data logger, which is 60 °C.

We are interested in hearing about any ways which could be used to ensure these loggers can remain functioning, over a period of time, at extreme temperatures.

There may be parallel commercial markets in sensors used in extreme environments (e.g. oil and gas industry) and fire safety equipment such as building materials to prevent the spread of fire.

## Example use case

A military-grade articulated lorry is being used to transport hazardous material. The material is held within a container 5 metres by 2 metres by 2 metres. The transport container has been specified to ensure the material remains undamaged regardless of what happens to the articulated lorry.

When a major collision happens, there is severe shock to the articulated lorry and transport container. Briefly following this, a fuel tanker crashes into the back of the articulated lorry resulting in a fuel fire that lasts for the next several hours.

The container has been tested and validated to resist this physical shock and exposure to very high temperatures for many hours so, despite the serious collision, there is assurance that the container will continue to function and protect the hazardous material inside.

## Project scope

The focus of this 12-week project is to demonstrate a concept that could collect temperature, pressure and acceleration data.

HMGCC Co-Creation will consider different ways to approach this problem, whether it is a high temperature data logger, advanced insulation material or another technology solution.

HMGCC Co-Creation is also open to solutions at Technology Readiness Levels (TRL) from 5 – 9. It is recommended that applicants should label their existing TRL as well as the level expected by the end of the 12 weeks.

Essential requirements:

- Two triaxial shock accelerometers.
- Two triaxial angular rate sensors.
- Six temperature channels (PRTS) or thermocouples.
- Eighteen strain gauge/pressure channels.
- The data capture package inclusive of battery and any thermal protection must be accommodated within a limited overall size of 200 mm x 200 mm x 150 mm.
- If a thermal insulated package is developed, then a minimum of 150 mm x 150 mm x 80 mm internal volume is required to mount the current data logger system.
- The test item is exposed to a temperature of 90 °C for 14 hours, but the maximum operating temperature of the current system is 60 ºC.
- A data logger to record temperature, pressure, and acceleration for at least 36 hours, with the minimum number of channels (see project scope above).
- Alternatively, a demonstrable method of keeping standard loggers within their safe operating temperature would be acceptable.

Restrictions during operation:

- The container cannot be altered or opened once testing has started.
- The container acts as Faraday cage, blocking any wireless signals.
- There must be a breach opening or connection to the container to allow cables to protrude and allow data transfer.
- Active cooling cannot be used, nor can potentially dangerous materials such as liquid nitrogen or asbestos.
- The data logger must be able to be powered by a battery.

Not required:

- Only a horizon scan.

## Dates

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| **Competition opens** | Monday 23 June 2025 |
| **Online briefing link / Deadline to submit clarifying questions** | Tuesday 8 July 2025 at 10am |
| **Clarifying questions published** | Tuesday 15 July 2025 |
| **Competition closes** | Thursday 24 July 2025 at 5pm (UK time) |
| **Applicant notified** | Thursday 7 August 2025 |
| **Pitch day in Milton Keynes** | Thursday 14 August 2025 |
| **Pitch Day outcome** | Tuesday 19 August 2025 |
| **Commercial onboarding begins*** | Friday 22 August 2025 |
| **Target project kick-off** | September 2025 |

**Please note, the successful solution provider will be expected to have availability for a one hour onboarding call via MS Teams on the date specified to begin the onboarding/contractual process.*

## Eligibility

This challenge is open to sole innovators, industry, academic and research organisations of all types and sizes. There is no requirement for security clearances.

Solution providers or direct collaboration from countries listed by the UK government under trade sanctions and/or arms embargoes, are not eligible for HMGCC Co-Creation challenges.

## How we evaluate

All proposals will be assessed by the HMGCC Co-Creation team. Proposals will be scored 1–5 on the following criteria:

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| **Scope** | Does the proposal fit within the challenge scope, taking into consideration cost and benefit? |
| **Innovation** | Is the technical solution credible, will it create new knowledge and IP, or use existing IP? |
| **Deliverables** | Will the proposal deliver a full or partial solution, if a partial solution, are there collaborations identified? |
| **Timescale** | Will the proposal deliver a minimum viable product within the project duration? |
| **Budget** | Are the project finances within the competition scope? |
| **Team** | Are the organisation / delivery team credible in this technical area? |

## Invitation to present

Successful applicants will be invited to a pitch day, giving them a chance to meet the HMGCC Co-Creation team and pitch the proposal during a 20 minute presentation, followed by questions.

After the pitch day, a final funding decision will be made. For unsuccessful applicants, feedback will be given in a timely manner.

## Clarifying questions

Clarifying questions or general requests for assistance can be submitted directly to cocreation@HMGCC.gov.uk, please also copy to co-creation@dstl.gov.uk, prior to the cut-off date. These clarifying questions may be technical, procedural, or commercial in subject, or anything else where assistance is required. Please note that answered questions will be published to facilitate a fair and open competition.

## Routes to apply

Please send applications directly to cocreation@HMGCC.gov.uk and also co-creation@dstl.gov.uk, including the challenge title with a note of the community collaborator where this challenge was first viewed.

**All information you provide to us as part of your proposal will be handled in confidence.**

## How to apply

Applications **must** be no more than six pages or six slides in length. HMGCC Co-Creation reserve the right to stop reading after 6 pages if this limit is breached. The page/slide limit excludes title pages, references, personnel CVs and organisational profiles.

There is no prescribed application format, however, please ensure your application includes the following:

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| **Applicant details** | Contact name, organisation details and registration number. |
| **Scope** | Describe how the project aligns to the challenge scope. |
| **Innovation** | Describe the innovation and technology intended to be delivered in the project, along with new IP that will be generated or existing IP that can be used. |
| **Deliverables** | Describe the project outcomes and their impacts. |
| **Timescale** | Detail how a minimum viable product will be achieved within the project duration. |
| **Budget** | Provide project finances against deliverables within the project duration. |
| **Team** | Key personnel CVs and expertise organisational profile if applicable. |

## Co-Creation terms and conditions

Proposals must be compliant with the HMGCC Co-Creation terms and conditions; by submitting your proposal you are confirming your organisation's unqualified acceptance of Co-Creation terms and conditions.

Commercial contracts and funding of successful applications will be engaged via our commercial collaborator, Cranfield University.

## HMGCC Co-Creation supporting information

HMGCC works with the national security community, UK government, academia, private sector partners and international allies to bring engineering ingenuity to the national security mission, creating tools and technologies that drive us ahead and help to protect the nation.

HMGCC Co-Creation is a partnership between HMGCC and Dstl (Defence Science and Technology Laboratory), created to deliver a new, bold and innovative way of working with the wider UK science and technology community. We bring together the best in class across industry, academia, and government, to work collaboratively on national security engineering challenges and accelerate innovation.

HMGCC Co-Creation aims to work collaboratively with the successful solution providers by utilising in-house delivery managers working Agile by default. This process will involve access to HMGCC Co-Creation's technical expertise and facilities to bring a product to market more effectively than traditional customer-supplier relationships.

## FAQs

1. **Who owns the intellectual property?**

   As per the HMGCC Co-Creation terms and conditions, project IP shall belong exclusively to the solution provider, granting the Authority a non-exclusive, royalty free licence.

2. **Who are the end customers?**

   National security users include a wide range of different UK government departments which varies from challenge to challenge. This is a modest market and so we would encourage solution providers to consider dual use and commercial exploitation.

3. **What funding is eligible?**

   This is not grant funding, so HMGCC Co-Creation funds all time, materials, overheads and indirect costs.

**4. How many projects are funded for each challenge?**

On average we fund two solution providers per challenge, but it does come down to the merit and strength of the received proposals.

**5. Do you expect to get a full product by the end of the funding?**

It changes from challenge to challenge, but it's unlikely. We typically see this initial funding as a feasibility or prototyping activity.

**6. Is there the possibility for follow-on funding beyond project timescale?**

Yes it is possible, if the solution delivered by the end of the project is judged by the HMGCC Co-Creation team as feasible, viable and desirable, then phase 2 funding may be made available.

**7. Can we collaborate with other organisations to form a consortium?**

Yes, in fact this is encouraged, and additional funding may be made available. Please see the maximum budget of the individual challenge.

**8. I can't attend the online briefing event, can I still access this?**

If a briefing event is held, which varies challenge to challenge, then yes. Either the recording or the transcript will be made available to view at your leisure after it has been broadcasted. This will be made available via the HMGCC Co-Creation community collaborators.

**9. Do we need security clearances to work with HMGCC Co-Creation?**

Our preference is work to be conducted at OFFICIAL, we may however, request the project team undertake BPSS checks or equivalent.

**10. We think we have already solved this challenge, can we still apply?**

That would be welcomed. If your product fits our needs, then we would like to hear about it.

**11. Can you explain the Technology Readiness Level (TRL)?**

Please see the UKRI definition for further detail.

**12. Can I source components from the list of restricted countries, e.g. electronic components?**

Yes, that is acceptable under phase 1 - feasibility, as long as it doesn't break UK government trade restrictions and/or arms embargoes.

## Further considerations

Solution providers should also consider their business development and supply chains are in-line with the National Security and Investment Act and the National Protective Security Authority's (NPSA) and National Cyber Security Centre's (NCSC) Trusted Research and Secure Innovation guidance. NPSA and NCSC's Secure Innovation Action Plan provides businesses with bespoke guidance on how to protect their business from security threats, and NPSA and NCSC's Core Security Measures for Early-Stage Technology Businesses provides a list of suggested protective security measures aimed at helping early-stage technology businesses protect their intellectual property, information, and data.