Dstl R-Cloud
Commercial Services
Porton Down
Salisbury
Wiltshire
SP4 0JQ

E-mail: dstlrcloud@dstl.gov.uk

Statement of Requirement for the R-Cloud Strategic Systems Strategic Capability

Introduction:

The Defence Science and Technology Laboratory (Dstl), which is part of the UK Ministry of Defence (MOD), is refreshing its commercial agreement for Science and Technology (S&T) research contracts, known as R-Cloud (Research Cloud).
MOD places extensive fundamental, experimental and applied research with industry and academic suppliers and wants to broaden access for this supply base, reducing the cost of trading with MOD and enabling agile contracting. R-Cloud complements MOD's other contracting mechanisms and academic and industry suppliers of S&T research are now invited to apply to join MOD's research supplier community within the Strategic Systems Strategic Capability.

This statement of requirement relates to suppliers joining R-Cloud within the Strategic Systems capability area. R-Cloud provides a low barrier to entry for potential suppliers and offers direct access to MOD's current and future research requirements. Academic and industrial suppliers of Strategic Systems research are invited to apply to R-Cloud if you are a supplier of Science and Technology Research in this area.

Strategic Systems encompasses a broad range of technical areas, not limited to but including, Strategic Systems and Missile Defence. A summary of the work in this Strategic Capability is given in Table 1:

	Strategic Systems	Maintain and develop an impartial and credible national capability to assess system capability and effectiveness of a range of scenarios for strategic weapons and Ballistic Missile Defence (BMD).
Sub-capabilities	Deterrent & BMD Policy Advice and Impact	
	Ballistic Missile and BMD Systems Engineering	
	Ballistic Missile and BMD System Assessment	

Table 1: Overview of Strategic Capability

Strategic Systems

Statement of Requirement

The work undertaken under this capability aims to maximise the impact of Science and Technology in Strategic Systems[1] research to maintain and advance UK Sovereign Capability against emerging threats. The area also provides S&T advice to government on Strategic Systems related topics with the outputs ensures intelligent customer status within the MoD, and develops niche capabilities and technologies to ensure maintenance of sovereign capability. Through undertaking relevant S&T work MoD risks are de-risked, so that the UK is able to respond to future defence requirements.

A summary of overarching research requirements for the Strategic Systems area follows, listed by topic area and then relevant research areas.

1) The scope of coverage of topics related to Systems engineering includes , but is not limited to, the following:

a. Technical investigation of current and future Strategic Systems, including:
   i. All methods of detecting Ballistic Missiles.
   ii. Generation of algorithms for detection, tracking, and discrimination
   iii. Conventional and novel methods and mechanisms for neutralising the threat posed by threat offensive Ballistic Missiles (e.g. interception by single/multiple bodies, etc.).
   iv. Tracking and discrimination of Ballistic Missile offence, defence, and debris;
   v. Command and control of Ballistic Missile engagement and battle;
   vi. Prediction of the performance and effectiveness of offense Ballistic Missiles and defence interceptor vehicles to engage such threats.
   vii. Post intercept kill assessment.

2) The scope of coverage of topics related to Strategic Systems performance assessment includes, but is not limited to, the following:

a) Assessment of the performance of current and future Ballistic Missile systems and associated defence systems, including:
b) Trajectory modelling;
c) Performance trade off studies;
d) Assessment of vulnerability;
e) Prediction of the aerothermal operating environment;
f) Aerodynamic and aerothermal performance;
g) Hypervelocity flows;
h) Material response to high enthalpy flows.

[1] Strategic Systems includes Ballistic Missiles (BM) and Ballistic Missile Defence (BMD) throughout.

3) The scope of coverage of topics related to Ballistic Missile characterisation includes, but is not limited to, the following:

a) Understanding of re-entry vehicle behaviour from launch to impact, or interception;
b) Understanding of re-entry vehicle behaviour during post interception, including behaviour of debris;
c) CONOPs;
d) Assessment of strategic and theatre Ballistic Missile defence architectures, and doctrines;
e) Technical analysis of BM/BMD systems to inform the understanding of current and potential world integrated air and Missile defence architectures.
f) Generation of re-entry vehicle RCS;
g) Generation of debris RCS;
h) IR signatures of RV and launch plume;
i) Trajectory modelling of RVs and interceptors;
j) Ballistic and non-ballistic trajectories;
k) Guidance and control of interceptors.

4) The scope of coverage of topics related to Defence sensors includes, but is not limited to, the following:

a) Individual sensor and collective sensor performance for BMD defence system;
b) Modelling of current and emerging sensor suites;
c) Radar resource management;
d) Integration of sensor information into battle management command and control process.

5) The scope of coverage of topics related to Ballistic Missile battle modelling includes, but is not limited to, the following:

a) Provides MoD capability to represent and evaluate interactions between offensive and defensive strategic systems for performance and effectiveness studies.it includes:
b) Modelling and simulation;
c) Systems and software engineering;
d) Advanced statistical methods; and results analysis;
e) Many-on-many modelling – multiple RVs and multiple layered defence interceptors;
f) Assessment of defence performance;
g) Assessment of offence/defence effectiveness;
h) Offence/defence tactics;
i) Optimisation of tactics;
j) Software project management;
k) Through life cycle software development;
l) Command and control;
m) Uncertainty quantification;

n) Sensitivity analysis.

6) The scope of coverage of topics related to Ballistic Missile Performance includes, but is not limited to, the following:

a) Detailed understanding of Ballistic Missile trajectories, including boost, exo-atmospheric, re-entry and endo-atmospheric phases;
b) Aerodynamic properties of re-entry vehicle;
c) High temperature materials.

7) The scope of coverage of topics related to Scenario assessment and wargaming includes, but is not limited to, the following:

a) Capability to develop and explore current and future operational concepts of BMD from theatre to strategic applications;
b) Capability to develop UK understanding of the BMD problem space;
c) Understanding of the high-level issues associated with proposed Ballistic Missile defence system architectures;
d) Force protection;
e) Campaign analysis;
f) Workshop and table top exercise design and facilitation.

The research for these seven topics may include, but is not limited to:

- Basic research into processes, techniques and technologies;
- Applied research into component, sub-system and system level aspects;
- Software, and experimentation techniques and equipment that could be used to assess performance, at either a sub-system or system level;
- Operational concepts including Concepts of Employment.