Statement of Requirement (SOR)
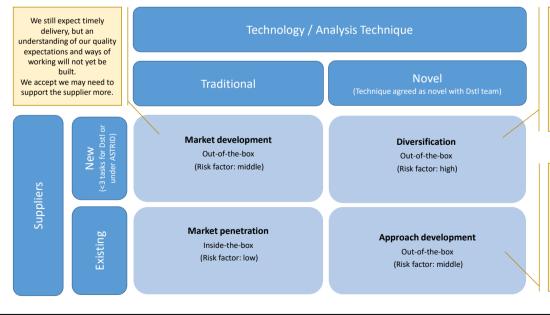
Contact & Project Information:

Project Manager	Name	Redacted under FOIA Section 40 – Personal information
	Email	Redacted under FOIA Section 40 – Personal information
	Telephone number	Redacted under FOIA Section 40 – Personal information
Technical Partner	Name	Redacted under FOIA Section 40 – Personal information
	Email	Redacted under FOIA Section 40 – Personal information
	Telephone number	Redacted under FOIA Section 40 – Personal information

iCas project number	709513		
Owning division	Exploration	**Delivering division**	Exploration
Programme	Policy and Capability Enterprise Support (PCES)		
Indicative task budget(s) £k	Core / initial work:	£150K	Options / ~~follow on work~~: FY22/23 £TBD

Innovation risk appetite:	Middle - Approach development
Narrative (if applicable):	Novel techniques, existing suppliers

Using the Ansoff matrix below, please indicate your risk appetite with regards to accepting innovative bids/solutions. The type of analysis/experimentation technique is included within 'Technology/Product'.

We still expect timely delivery, but an understanding of our quality expectations and ways of working will not yet be built.
We accept we may need to support the supplier more.

If the Dstl project team have chosen diversification, this positively rewards the selection of a high risk supplier who can deliver innovation.

We accept that risk of failure is highest here.

We may not know how well techniques work and cannot assure value for money until we do the work.

Existing suppliers will understand the quality Dstl requires and should be able to deliver risky work within these bounds to an agreed timeline.

Technology / Analysis Technique

Traditional

Novel (Technique agreed as novel with Dstl team)

Suppliers

New (<3 tasks for Dstl or under ASTRID)

Existing

Market development
Out-of-the-box
(Risk factor: middle)

Diversification
Out-of-the-box
(Risk factor: high)

Market penetration
Inside-the-box
(Risk factor: low)

Approach development
Out-of-the-box
(Risk factor: middle)

Use of Outputs:

This section is used to inform risks, liabilities, mitigations and exploitation. Questions 1-10 below should be a Yes/No/NA response. Please indicate if the questions do not make sense in the context of your task.

	Intended uses (including the approximate time before use and any key decisions that will use the output):

Specific. Deliver by NLT early March 22.

General. The products and knowledge generated have the potential to enhance the robustness of strategic planning and analysis processes, including:

- a. Defence policy development, led by DSP and including SONAC.
- b. FMC's strategic balance of investment process.
- c. Force Structures Analysis, generated by Dstl for FMC Cap Strat.
- d. Defence Force Development, led by DG JFD and supported by Dstl.
- e. DCDC's Global Strategic Trends programme and wider futures work.
- f. Military-strategic planning in MSO and PJHQ.
- g. Dstl X-Div and Futures work.

The products and knowledge generated through this task will build Dstl's 'in-house' capability to use uncertainty analysis tools and techniques.

Possible uses:

As above but to a wider audience i.e. other partners in government.

Excluded uses:

None identified.

**Level of Technical Assurance – ** Standard

1	Will any output be directly used as part of a safety critical system, or will it be one of the most important factors in decisions on Cat A/B investments (>£100M), or at Ministerial level policy making?	No
2	Is this task collating and presenting previous work without making further / new recommendations?	No
3	Is this task research - for example, an exploration of new methods, models or tools?	Yes
4	Will a re-run of the modelling or analysis be required before outputs are presented to a decision maker?	Yes
5	Will the outputs form a minor part of the work that will be combined by the Dstl Project Team before being used for decision-making?	Yes
6	Has the approach to the work (how to undertake the work) been fixed by Dstl/MOD?	No
7	Will 100% of the technical assurance of the outputs provided by the Dstl Project Team?	No
8	Is the Dstl Project Team capping the maximum levels of verification and validation to be carried out on outputs?	No

9	Is this task developing or maintaining a method, model or tool (MMT) which will be used for multiple use cases over a period of time by Dstl Project Teams?	Yes
10	Can you confirm that there are no known intended uses of the outputs over and above those described here that could result in new risks if the output was incorrect?	Yes

Statement of Requirement (SoR)

Project's document ref	20210929-AST070_Defence_Strategy_Under_Deep_Uncertainty_SoR_Final v1.0
Version number	1.0
Date	29/09/2020

1.	Requirement
1.1	**Title (including AST/ prefix)**
	AST/Defence Strategy Under Deep Uncertainty
1.2	**Summary**
	Robust analysis and decision techniques – often referred to as Decision Making Under Deep Uncertainty (DMDU) – have the potential to help mitigate the inevitable exposure of Defence and the Joint Force to uncertainty and surprise. This project will improve Dstl's ability to deliver DMDU approaches to support MOD Head Office strategic decision-making by demonstrating DMDU approaches applied to one or two Defence policy challenges. This project builds upon a recent scoping study delivered for Dstl by RAND.[1]
1.3	**Background**

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[1] RAND, *Robust Defence Strategy: Leveraging methods and tools for Decision Making under Deep Uncertainty (DMDU) in the UK Ministry of Defence (DRAFT)*, ASC 0230 Study 21 D3.1 V2.0, 30 June 2021 (DRAFT)

Defence policy and strategy documents are replete with references to ever-growing uncertainty.[2] As the Secretary of State for Defence has suggested: "We plan for the worst and hope for the best".[3] Yet in practice, MOD's decision-making is often inherently deterministic and risk-centric, potentially leaving defence policy exposed to surprise.[4] Given the increasingly complex and uncertain strategic environment, efforts should be renewed to explore the utility of methods and techniques that aim to enhance the *robustness* of policy, strategy and capability decision-making under uncertainty.

Robust approaches optimise decisions and strategies to cope with 'surprise' (a consequence of uncertainty) rather than seeking exquisite performance against a narrow 'most likely' future. A strategy or decision is robust to uncertainty if the specified outcome requirements are achieved even if the future evolves very differently than initially assumed. Previous work by Dstl concluded robust approaches could provide important benefits to Defence, but needed further demonstration to prove the techniques, benefits and limitations in practice, and to generate the capability within Dstl to deliver them 'in-house'. This work identified two key benefits of robust approaches: reducing the 'cost of surprise' and an improved understanding of the problem space.

Robust approaches have been extensively applied in climate science, water management and other areas.[5] However, many of the concepts and idea behind these methods were developed in the defence and security sphere.[6] A recent scoping study delivered for Dstl by RAND identified a range of techniques under the rubric of DMDU[7] that could deliver several benefits to MOD policy-making, including:[8]

- *Minimising future regret*: DMDU approaches are not used to select a most favourable optimum policy option (in traditional sense of optimization) or one based on a 'lowest common denominator'. Instead, they rather aim at selecting options that will be the most robust over the policy lifecycle – optimum in robust terms, the most robust over the policy lifecycle.
- *Creating 'digital campfires'*: The development of computational tools frequently used in DMDU methods acts as an enabler to foster dialogue between different stakeholders – both analysts and decision makers – and to capture a wide range of perspectives.
- *Overcoming short-termism*: Embedding uncertainty can seem to be disconnected from the imperative of short-termism that exist within all organisations, including Defence. Developing futures-oriented policies may be challenging and even perceived as a threat at the bureaucratic level, but it is the necessary condition for the development of policies and plans with "FARness"[9]. DMDU provides rigorous, defensible methods for doing so and an approach that proactively builds stakeholder buy-in.

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[2] SDSR 10 was called "Securing Britain in an Age of Uncertainty"; SDSR15 said "the world is more dangerous and uncertain today than five years ago"; the 2018 MDP suggested "the world has become more uncertain".

- *Conducting due diligence*: DMDU approaches form an important part of the policy due diligence process to ensure that various policy options as well as uncertainties are identified to ensure the long-term value of a strategy, policy or other major decision.

Ultimately, robust or DMDU approaches can *supplement* – not replace – deterministic or risk-based approaches, in order to address the increasing realisation that uncertainty needs to be taken seriously in public policy.[10] As two RAND analysts recently put it, "In the future, analysis that fails to address uncertainties…may come to be regarded as fatally flawed" [11] this work takes steps to address this.

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[3] Tim Shipman, *Ben Wallace interview: We can't rely on US, The Sunday Times*, 12 Jan 2020.

[4] See for example: Redacted under FOIA Section *Uncertainty in National Security Strategy*, New Strategist Journal, 2016; Redacted under FOI/, *Foresight in Uncertain Times*, Memo, Dstl/DSA/708307; DCDC, *Surprise doesn't have to be lethal: Robust defence strategy*, 21 Feb 2018.

[5] V Marchau et al (2019), *Decision Making Under Deep Uncertainty: From Theory to Practice*, Springer.

[6] See for example: S Bankes (1993), Exploratory Modelling for Policy Analysis, Operations Research, 41(3): 435-449; and S Popper et al (2003), *Shaping the Next One Hundred Years*, RAND US. More recent examples include: Ben Haim (2015), *Dealing with Uncertainty in Strategic Decision-making*, Parameters, Parameters 45(3), 63-73; RJ Lempert et al (2016), *Defense Resource Planning Under Uncertainty: An Application of Robust Decision Making to Munitions Mix Planning*, RAND Corporation; S Popper (2019) *Robust decision making and scenario discovery in the absence of formal models*, Futures Foresight Sci. 2019;1:e22; and

[7] Ref RAND scoping study

[8] RAND summary report (draft), pg 5.

[9] The "FARness principle" is that strategies should provide: flexibility, adaptiveness, and robustness. RAND_TR1249

[10] See for example: N N Taleb, *Black Swan*, Penguin, 2008; M King, *Radical Uncertainty*, Bridge St Press, 2020.

[11] P K Davis and S Popper, *Confronting Model Uncertainty in Policy Analysis for Complex Systems: What Policymakers should demand,* Journal on Policy and Complex Systems, Vol 5 No 2, Fall 2019, pg 181.

1.4	Requirement

Purpose and objectives. The purpose of this task is to improve MOD's ability to make strategic decisions that are robust to future uncertainty. To achieve this, the two specific objectives of the task are:

- Demonstrate the application of robust analysis and decision techniques to one or two relevant Defence policy, strategy or capability development problems.

- Increase the knowledge and skills of Dstl (and MOD) personnel in applying robust approaches in order to become an 'intelligent customer' and begin to develop the capability and capacity to deliver such novel analytical techniques 'in-house'.

Scope. In order to achieve both objectives apply a robust or DMDU approach to analysis and decision-making to one or two bounded policy problems representative of typical long-term Defence decisions on policy, strategy or capability development.

Indicative policy problems (to be determined in collaboration with the supplier).

With reference to the Integrated Review:

- <u>Persistent Engagement</u>. "In the current threat landscape, and in an era of constant competition, we must have an increased forward presence to compete with and campaign against our adversaries below the threshold of armed conflict, and to understand, shape and influence the global landscape to the UK's advantage. To pursue our foreign policy objectives and shape conditions for stability, we will rebalance our force to provide a more proactive, forward deployed, persistent presence. This will ensure our armed forces are more in use whilst maintaining the deterrent effect that comes from being ready for managing crises at scale".[12]

- <u>Grey zone (or sub-threshold) competition</u>.
  - o "The armed forces, working with the rest of government, must think and act differently. They will no longer be held as a force of last resort, but become more present and active around the world, operating below the threshold of open conflict to uphold our values and secure our interests, partner our friends and enable our allies, whether they are in the Euro-Atlantic, the Indo-Pacific, or beyond".[13]
  - o "The future operating environment will not be limited by lines on maps or by geography. We will be confronted by complex and integrated challenges below, and potentially above, the threshold of armed conflict. These challenges will be complex, test our approach and target our most vulnerable areas. We will likely be confronted by state and non-state actors who will employ brinkmanship, malign activity below the threshold of armed conflict, terrorism, proxies, coercion and the deliberate use of economic tools to undermine our economic and security interests".[14]

Approach (indicative)

1. Explore and characterise policy problem space (including model development, understanding uncertainties, generate policy options).

2. Conduct iterative DMDU 'deliberation with analysis' in conjunction with Dstl/Head Office policy-makers.

3. Review results and make recommendations about policy design options and further work.

4. Within 1 to 3 (when is most appropriate) provide training and guidance for Dstl analysts in using DMDU tools especially in how to use them in the 'Absence of Formal Models' [15]

Outputs.

The main output of this task will be a technical report laying out the approach, method(s) used results/insights from applying DMDU approaches to one or two Defence policy problems (TBD), and practical training for Dstl analyst (MoD) in applying the DMDU tools to problems where there is an 'Absence of Formal Models'. Any software platform used (e.g. for exploratory modelling) will be open-source to allow subsequent exploitation.[16] The task will be carried out at Redacted under FOIA Section 23 - National Security in order to maximise information-sharing, awareness and exploitability.

1.5	**Options or follow on work**
	FY22/23 Explore further indicative policy problem(s) (TBD). **(Outputs from the Core requirement and future Programme laydown will determine whether this option is taken).**

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[12] UK HMG, *Defence in a Competitive Age*, 2021, pg 15.
[13] UK HMG, *Defence in a Competitive Age*, 2021, pg 2.
[14] UK HMG, *Defence in a Competitive Age*, 2021, pg 9.
[15] As is described in Popper, S. W. (2019). Robust decision making and scenario discovery in the absence of formal models. *Futures & Foresight Science, 1*(3-4), e22.
[16] Existing open-source applications such as 'EMA workbench' or 'Rhodium' can be used (both Python-based).

1.6	Deliverables & Intellectual Property Rights (IPR)						
Ref.	**Title**	**Due by**	**Format**	**TRL***	**Expected classification (subject to change)**	**What information is required in the deliverable**	**IPR DEFCON/ Condition** *(Commercial to enter later)*
D – 1	Technical Report	Early March 22	Word doc.	n/a	Redacted under FOIA Section 23 - National Se	The approach, method(s) used and results/insights from applying DMDU approaches.	*DEFCON 705 shall apply*
D - 2	Customer Presentation	Mid March 22	Presentation ppx.	n/a	Redacted under FOIA Section 23 - National S	Covering all of the above.	
D - 3	DMDU Training	Mid March 22	TBD	n/a	Redacted under FOIA Section 23 - National S	Applying the DMDU tools to problems where there is an 'Absence of Formal Models'. (Supplier to propose).	

*Technology Readiness Level required, if applicable

1.7	**Standard Deliverable Acceptance Criteria**
	Deliverable Acceptance Criteria (As per ASTRID Framework T&Cs) 1. Acceptance of Contract Deliverables produced under the Framework Agreement shall be by the owning Dstl or wider Government Project Manager, who shall have up to 30 calendar days to review and provide comments to the supplier. 2. Task report Deliverables shall be accepted according to the following criteria except where alternative acceptance criteria are agreed and articulated in specific Task Statements of Work: • All Reports included as Deliverables under the Contract e.g. Progress and/or Final Reports etc. must comply with the Defence Research Reports Specification (DRRS) which defines the requirements for the presentation, format and production of scientific and technical reports prepared for MoD. Reports shall be free from spelling and grammatical errors and shall be set out in accordance with the accepted Statement of Work for the Task. • Interim or Progress Reports: The report should detail, document, and summarise the results of work done during the period covered and shall be in sufficient detail to comprehensively explain the results achieved; substantive performance; a description of current substantive performance and any problems encountered and/or which may exist along with proposed corrective action. An explanation of any difference between planned progress and actual progress, why the differences have occurred, and if behind planned progress what corrective steps are planned. • Final Reports: shall describe the entire work performed under the Contract in sufficient detail to explain comprehensively the work undertaken and results achieved including all relevant technical details of any hardware, software, process or system developed there under. The technical detail shall be sufficient to permit independent reproduction of any such process or system. 3. Failure to comply with the above may result in the Authority rejecting the Deliverables and requesting re-work before final acceptance. 4. Acceptance criteria for non-report Deliverables shall be agreed for each Task and articulated in the Statement of Work provided by the Contractor
1.8	**Specific Deliverable Acceptance Criteria**
	NA

2.	Quality Control and Assurance
2.1	**Quality Control and Quality Assurance processes and standards that must be met by the contractor**
	☒ **ISO9001** (Quality Management Systems) ☐ **ISO14001** (Environment Management Systems) ☐ **ISO12207** (Systems and software engineering — software life cycle) ☐ **TickITPlus** (Integrated approach to software and IT development) ☐ **Other:** (Please specify)
2.2	**Safety, Environmental, Social, Ethical, Regulatory or Legislative aspects of the requirement**
	NA

3.	Security	
3.1	**Highest security classification**	
	Of the work	Redacted under FOIA Section 23 - National Security
	Of the Deliverables/Output	Redacted under FOIA Section 23 - National Security
	Where the work requires more than occasional access to Dstl premises (e.g. for meetings), SC Clearance will be required.	
3.2	**Security Aspects Letter (SAL) – Note the ASTRID framework has an overarching SAL for quotation stage (up to OS)**	
	Redacted under FOIA Section 23 - National Security	
3.3	**Cyber Risk Level**	
	Redacted under FOIA Section 26 - Defence	
3.4	**Cyber Risk Assessment (RA) Reference**	
	Redacted under FOIA Section 26 - Defence If stated, this must be completed by the contractor before a contract can be awarded. In accordance with the Supplier Cyber Protection Risk Assessment (RA) Workflow please complete the Cyber Risk Assessment available at https://suppliercyberprotection.service.xgov.uk/	

4.	Government Furnished Assets (GFA)

GFA to be Issued -   Choose an item.

If 'yes' – add details below. If 'supplier to specify' or 'no,' delete all cells below.

GFA No.	Unique Identifier/ Serial No	**Description:** *Classification, type of GFA (GFE for equipment for example), previous MOD Contracts and link to deliverables*	Available Date	Issued by	Return or Disposal *Please specify which*
GFA-1					

If GFA is to be returned: It must be removed from supplier systems and returned to the Dstl Project Manager within 2 weeks of the final Task deliverable being accepted. (Any required encryption or measures can be found in the Security Aspects Letter associated with the Task).

If GFA is to be destroyed: It must be removed from supplier systems and destroyed. An email confirming destruction should be sent to the Dstl Project manager within 2 weeks of the final Task deliverable being accepted

5.	Proposal Evaluation
5.1	**Technical Evaluation Criteria**
	- Expertise in applying decision making under deep uncertainty (DMDU), exploratory modelling and robust analysis techniques to complex problems, ideally including in the realm of defence policy and strategy. - Breadth of knowledge of the use of robust analysis and DMDU techniques across government, private sector and in other nations. - Expertise guiding, facilitating and training clients (large companies or government departments) to implement robust analysis techniques. - PM, QA, delivery track record, etc.
5.2	**Commercial Evaluation Criteria**
	As per ASTRID Framework T&Cs.