RCloud Tasking Form - Part B: Statement of Requirement (SoR)

Title of Requirement	3D CT Airport Cabin Baggage Screening: Time on Task
Requisition No.	1000167927
SoR Version	0.1

Statement of Requirements

1.

1.1 Summary and Background Information

Research is required to identify the optimum session length for airport x-ray screeners using 3D Computed Tomography (3D CT) Computerised Image Processing technology to screen cabin baggage for threat items. This work is a continuation of work currently underway to explore optimum screening time for remote screeners of 2D cabin baggage X-ray.

The current EU legislation that the UK adheres to is continuous screening session lengths of no longer than 20 minutes. Specifically, section 4.1.2.11 from EU regulation 2015/1998 states "Persons screening cabin baggage by x-ray or EDS equipment shall normally not spend more than 20 minutes continuously reviewing images. After each of these periods, the screener shall not review images for at least 10 minutes. This requirement shall only apply when there is an uninterrupted flow of images to be reviewed."

Previous research has shown little conclusive evidence regarding the impact of this 20 minute session length on screening performance (referred to here as 'Time on task' or ToT). Moreover, the evidence that does exist is predominantly based on research that examined exclusively non-remote screening and/or screening that relies on 2D imagery. Evidence is therefore required in order to inform decisions on the optimum screening length for those using newer 3D technology, and to underpin any recommendations for changes to the regulations. Questions of particular interest include:

Compared to when using 2D screening equipment:

- Can staff using 3D equipment screen for longer than they currently do (20 minutes), without compromising performance?
- Is 3D image searching more or less cognitively fatiguing?
- Does the 3D equipment create cognitive (or other) challenges for screening staff, or does it facilitate their performance?

This Statement of Requirement invites proposals to conduct research to understand the optimum ToT for 3D screeners, and should include a comparison of 2D versus 3D equipment to understand the costs and benefits associated with each of these and how it relates to ToT. This will be

informed by a literature review already conducted by Dstl, and proposals should include methods to generate evidence that address this requirement. Currently, the number of 3D CT systems in use is limited, therefore a large scale field trial is not possible. As such, research may include laboratory-based studies and/ or other methodologies that are conducted remotely or otherwise. We also encourage bids that simulate a screening environment or include other proxy measures that remove the need for data collection of real time airport screening. For example, methods may include a comparison of 3D and 2D image searching conducted on a laptop/monitor screen instead of screening equipment.

A number of studies have been conducted to better understand the length of time airport screeners should screen for (i.e. ToT). However, the evidence produced from these studies has been somewhat inconsistent and almost always based on performance using 2D images. There is a question regarding the transferability of 2D ToT findings to 3D screening, as the cognitive demands between the two has yet to be fully explored. Research has measured a number of factors including the probability of detection, probability of false alarms, sensitivity, response bias, decision time, and various eye movement measures, but findings have been mixed.

Some relevant research into 3D imagery has already been conducted or is underway. The impact of image quality on ToT is currently being explored, as is the impact of screeners switching between 2D and 3D systems. However, 3D CT imagery presents some novel variables that have yet to be fully explored. For example, the manipulation of an image on a screen in 3D may lead to a higher or lower cognitive load on the screener, and could potentially affect vigilance as ToT increases. Conversely, the improved image manipulation and quality of 3D may allow the screener to make judgements faster and more accurately than 2D. Additionally, the screening process for 3D is different to 2D in that the cabin baggage is not emptied prior to scanning and, as such, a different set of visuals are viewed by the screener. As such, if 3D screening takes longer than 2D screening, the screening process itself may still be faster if 3D is more accurate as fewer bags will need to be opened and checked. Some, none or all of these differences may impact optimum screening time and as such should be explored in addition to other potential influences: any proposed method should consider a comparison of 2D image searching to 3D image searching.

In summary, it is not yet understood what factors effect ToT in 3D screening, and more research is needed to understand if a ToT effect occurs in 3D screening.

1.2 Requirement

A study is to be undertaken to provide evidence that will be used to inform decisions on the optimum screening length for screeners using 3D CT to screen cabin baggage for threat items. A comparative study in which a search task is performed both in 2D and 3D systems and compared for ToT effect is needed.

Initially, suppliers are required to provide a detailed proposal outlining their proposed approach to generate the evidence required. This may include experimental research methods and/or other approaches. The supplier must also demonstrate that they have the necessary skills, expertise

and experience regarding the methodological approach they propose. A detailed work plan that clearly demonstrates how the research will generate the required evidence is needed.

The initial bid will require a work plan. Once contract is awarded, and based on evidence from a literature review (previously conducted by Dstl, to be shared with the supplier at the start of the contract) and stakeholder engagement, the supplier is to propose a more detailed work plan that sets out their methodology in line with any MODREC requirements. The proposed methodology is to be presented to Dstl and the stakeholder within 3 months of contract award.

With the support of a Dstl Technical Partner (TP), the need for ethical approval will be considered. If this is necessary then a study protocol that documents the proposed activities will be developed and the process required to gain a favourable opinion from the MoD Research Ethics Committee (MODREC) will be followed. The supplier will need to allocate a proportion of the budget (around £4,000) to the MODREC process should it be needed.

Once the proposed methodology has been approved by Dstl, the supplier is to produce a full execution plan and ethical protocol. The supplier is to work with Dstl and relevant stakeholders to ensure evidence is provided for the European Commission to assure that the study will not compromise security.

If a favourable opinion from MODREC is required, the supplier will be required to first present the protocol for review by the Dstl Scientific Advisory Committee (SAC) (based at Dstl Porton Down, Salisbury) to ensure it is scientifically rigorous and will deliver the evidence required (i.e. that sufficient participants are intended to be recruited, that performance data will be sufficiently sensitive to detect changes in performance). The supplier will then also be required to present the protocol to the MoD Research Ethics Committee (MODREC) (based in Main Building, London) to ensure it is ethically sound. The supplier will be responsible for making any changes to the protocol in order for it to be approved by both the DSAC and MODRREC. These two activities shall be conducted within 6 months of contract award. Note: If COVID restrictions prevent face-to-face meetings then attendance at the SAC and MODREC meetings may be via an online platform.

The evidence gathered from the study shall be written up and a draft available to the Dstl Technical Partner (TP) no later than 13 months from contract award. The Dstl TP will review the draft and provide feedback within two weeks and the final draft shall be revised by the supplier accordingly and this updated version will be delivered within 2 weeks.

The supplier is to attend a closure meeting with Dstl (and other interested parties such as the customer, stakeholders etc.) and will be required to provide presentation of the findings, conclusions and recommendations.

The supplier is to provide written monthly progress reports to Dstl and conduct a teleconference with the Dstl TP every month starting 1 month from contract award. We particularly encourage a methodological approach and study design that do not require airport staff to participate in live trials (such as lab based experimentation or use of existing data). This reduces the burden on airport staff to participate in trials, and mitigates for any low passenger numbers resulting from government pandemic restrictions. The ideal candidate would have an understanding of screening in airports and the typical environment that screeners operate within. We ask bids to consider the cost of data in their application and include this in any application, whilst being mindful of the overall budget available. 1.3 **Options or follow on work** (if none, write 'Not applicable') Not Applicable Health & Safety, Environmental, Social, Ethical, Regulatory or Legislative aspects of the 1.4 requirement Dstl encourages all bidders to be mindful of legal and ethical considerations, particularly where experiments may impact on privacy under Investigatory Powers legislation (the Regulation of Investigatory Powers Act 2000 and Investigatory Powers Act 2016) and obligations under the Data

Protection Act.

1.5	Deliverables & Intell	ectual Property R	ights (IPR)			
Ref.	Title	Due by	Format	Expected classification (subject to change)	What information is required in the deliverable	IPR Condition
D-1	Monthly Progress Reports	T0+3 Months	Email	Redacted under FOIA Section 24 – Nationa	Monthly update to include but not limited to: • Update on technical progress • Progress report against project schedule. • Review of risk management plan. • Commercial aspects. • Review of deliverables. • Risks/issues.	DEFCON 705 shall apply
D-2	Start Up Meeting	T0+2 weeks	Presentation	Redacted under FOIA Section 24 – National S	The supplier shall deliver a start-up presentation (online, or at a Dstl site) within 2 weeks of contract award to present their proposal.	DEFCON 705 shall apply
D-3	Site Visit	T0+1 month	Written Visit Report	Redacted under FOIA Section 24 – National S	The supplier is to engage with relevant UK airport staff (to be facilitated and supported by Dstl), to develop an understanding of the environment and context and options for data collection. Key points regarding this	DEFCON 705 shall apply

					engagement will be captured in a Visit Report. This may be conducted remotely if Covid restrictions are in place. Dstl will facilitate engagement between the supplier and airport stakeholders, but the supplier is responsible for hosting this engagement.	
D-4	Methodology Confirmation	T0+3 months	Short written proposal or presentation.	Redacted under FOIA Section 24 – National :	The Supplier shall identify an appropriate methodology. This is to be undertaken and delivered no later than 2 months from contract start date.	DEFCON 705 shall apply
D-5	Ethical Application and Approval	T0+6 months	Application and Presentation	Redacted under FOIA Section 24 – Nations	The need for ethical approval will be considered. If this is necessary then a study protocol that documents the proposed activities will be required, and the process required to gain a favourable opinion from the MoD Research Ethics Committee will need to be followed.	DEFCON 705 shall apply
D-6	Final report	T0+13 months	Word Document	Redacted under FOIA Section 24 – National :	The work will be written up and a draft available to the Dstl Technical Partner no later than 13 months from contract award. The Dstl TP will review the draft and provide feedback	DEFCON 705 shall apply

					within two weeks and the final draft shall be provided within 2 weeks	
D-7	Presentation of Findings	T0+13 months	PowerPoint Presentation	Redacted under FOIA Section 24 – National S	A closure meeting shall be held with Dstl and other stakeholders (in person or virtually) no later than 14 months from contract award.	DEFCON 705 shall apply
					During this meeting the supplier shall present the research, in terms of approach, data analysis, key findings and recommendations.	
					This may be conducted remotely if Covid restrictions are in place. The supplier is responsible for hosting this engagement.	

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1.6 Deliverable Acceptance Criteria

Standard Deliverable Acceptance Criteria:

Deliverables will be accepted by the Technical Partner. Deliverables will be held for consideration by Dstl for up to 14 days and returned with any requested edits or changes. These changes should be made and returned to Dstl within 14 days. After acceptance of a given deliverable, the supplier may then invoice for payment.

Specific Deliverable Acceptance Criteria:

All reports/presentations 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.

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. The reports should be delivered in MS Word format and include: Approach/Methodology, Key findings (and supporting evidence), Additions or Amendments made to the Behavioural Matrix, Conclusions and Recommendations.

All Reports shall be free from spelling and grammatical errors and shall be set out in accordance with the Statement Of Requirement (1) above.

Failure to comply with the above may result in the Authority rejecting the deliverables and requesting re-work before final acceptance.

The supplier must request authorisation from Dstl 'Permission to publish' if they wish to consider publishing any results.

2.1 Method Explanation This requirement will be competed and awarded on the basis of the Value for Money Index (VFM Index) evaluating Technical and Price using a lowest price per technical point scored. This will be ascertained by dividing each bidder's quoted price by their own final moderated technical score.

All bids received by the closing date will be assessed against the tender evaluation process detailed below.

The Authority will use an evaluation model consisting of three criteria as follows:

Technical

• Commercial: PASS / FAIL

Pricing

2.2 Technical Evaluation Criteria

Technical evaluation will be carried out by a team of between 3 and 5 assessors who will review the technical proposals independently and then bring their scores to a moderation meeting. The moderation meeting will be chaired by the Dstl Project Manager.

The moderation meeting will discuss each Tenderers response in turn and attribute a moderated technical score to each of the technical criteria and a final score calculated. Technical criteria is provided overleaf.

Note 1: The Authority reserves the right to reject any Tender if a contractor scores below a 3 for any technical criteria. Please see beneath for further information on how each limb will be scored:

Ref	Criteria	Available Score	Weighting	Total Available Score
T1	The project team need to have the skills and expertise in the research area. They need to be named along with their qualifications.	0-5	15	
Т2	The project team has previous experience in the research and /or it is detailed how inexperienced members of the team will be adequately supervised by someone with relevant expertise.	0-5	15	
Т3	The project team have extensive experience in conducting relevant trials/experiments using	0-5	20	

	human participants and can provide examples to evidence this.			
T4	The project team have extensive experience in understanding human cognition, particularly in airport screening, and have their research published in various academic articles. Evidence and/or example to be provided.	0-5	20	
T5	The proposed approach is logical and will answer the research question. The theory is relevant to the research.	0-5		
			20	
Т6	Technical risks with mitigations, dependencies and assumptions are identified.	0-5	10	
				100

Technical Scoring Gu	ide - Definition of Terms:
Word or phase	Meaning
Comprehensive	Including or dealing with all or nearly all elements or aspects
Close to comprehensive	Including or dealing with slightly less elements or aspects than comprehensive
Satisfactory	Acceptable

Limited	Missing some minor / important elements
Inadequate	Missing some major / important elements
	need to have the skills and expertise in the research area. ed along with their qualifications.
Score	Key Indicators
5 = Exceeds	 Demonstrates a comprehensive understanding of the Authority's requirements and objectives, – illustrating knowledge that goes significantly beyond that presented in this Statement of Requirement;
	 Provides excellent insights into how the context and associated requirements may evolve - going well beyond the material presented in the statement of requirement.
	 Demonstrates comprehensive skills and expertise of relevance to the requirement and provides the relevant qualifications of the project team.
4 = Fully meets	 Demonstrates a close to comprehensive understanding of the Authority's requirements – illustrating knowledge that goes beyond that presented in this Statement of Requirement;
	 Provide good insights into how the context and associated requirements may evolve - going beyond the material presented in the statement of requirement.
	 Demonstrates close to comprehensive skills and expertise of relevance to the requirement and provides the relevant qualifications of the project team.
3 = Adequately meets	Demonstrates an understanding of the Authority's requirements;

	· Provide some insights into how the context and associated
	requirements may evolve - going beyond the material presented in this statement of requirement.
	Demonstrates satisfactory skills and expertise of relevance to the requirement and provides the relevant qualifications of the project team.
·	 Has shortfalls in demonstrating an understanding of the question area / requirement – for example, simply mirroring the information presented in this Statement of Requirement; The suggested method is unlikely to meet the requirements of the research question, or is not achievable in within the budget or timeframe; Does not directly apply to airport screening- for example, simply gives an experiment examining the problems
	discussed in the Statement of Requirement but does not apply it to real work screening. Offers little insight into how the context and associated requirements may evolve. Demonstrates limited skills and expertise of relevance to the requirement and provides the qualifications of the project team.
1 = Fails to meet in a major respect	· Fails to demonstrate understanding of the question area / requirement;
	Fails to provide a potentially valid and reliable method that answers the problem in the Statement of Requirement Offers no insights into how the context and associated requirements may evolve.
	Demonstrates inadequate expertise of relevance to the requirement.
1	s previous experience in the research and /or it is detailed nbers of the team will be adequately supervised by someone
Score	Key Indicators

5 = Exceeds	Demonstrates that the project team has comprehensive
5 = Exceeds	Demonstrates that the project team has comprehensive
	expertise and relevant experience to successfully deliver this
	requirement. Any inexperienced members of the team will be
	supervised by someone with the relevant expertise.
4 = Fully meets	Demonstrates that the project team has close to
	comprehensive expertise and relevant experience to
	successfully deliver this requirement. Any inexperienced
	members of the team will be supervised by someone with the
	relevant expertise.
3 = Adequately meets	Demonstrates that the project team has satisfactory
	expertise and relevant experience to successfully deliver this
	requirement.
2 = Fails to meet in a	Demonstrates that the project team has limited expertise
minor respect	and relevant experience to successfully deliver this
	requirement.
1 = Fails to meet in a	Demonstrates that the project team has inadequate
major respect	expertise and relevant experience to successfully deliver this
	requirement.

T3. The project team have extensive experience in conducting relevant trials/experiments using human participants and can provide examples to evidence this.

Score	Key Indicators
5 = Exceeds	Demonstrates comprehensive expertise of conducting trials/experiments using human participants in order to successfully deliver the requirement.
4 = Fully meets	 Demonstrates close to comprehensive expertise of conducting trials/experiments using human participants in order to successfully deliver the requirement.

T5. The proposed approther to the	oach is logical and will answer the research question. The e research.
1 = Fails to meet in a major respect	Demonstrates inadequate experience in understanding human cognition, particularly in airport screening
2 = Fails to meet in a minor respect	Demonstrates limited experience in understanding human cognition, particularly in airport screening
3 = Adequately meets	Demonstrates satisfactory experience in understanding human cognition, particularly in airport screening
4 = Fully meets	Demonstrates close to comprehensive experience in understanding human cognition, particularly in airport screening and has research published in various academic journals.
5 = Exceeds	Demonstrates comprehensive extensive experience in understanding human cognition, particularly in airport screening, and has research published in various academic journals.
particularly in airport so	ave extensive experience in understanding human cognition, creening, and have their research published in various lence and/or example to be provided.
1 = Fails to meet in a major respect	Demonstrates inadequate expertise conducting trials/experiments using human participants.
2 = Fails to meet in a minor respect	Demonstrates limited expertise of conducting trials/experiments using human participants.
	successfully deliver the requirement.
3 = Adequately meets	Demonstrates satisfactory expertise of conducting trials/experiments using human participants in order to

5 = Exceeds	 Provides a comprehensively detailed technical approach, illustrating how it may evolve during the life of the contract;
	Comprehensively addresses all of the key research questions / mandatory requirements;
	Provides significant additional relevant information and clear insights;
	Provides strong examples and reasoning to back up any arguments presented, including reference sources;
	Demonstrates excellent awareness of key challenges and provides significant detail on how they may be addressed.
4 = Fully meets	Provides a comprehensively detailed technical approach;
	Comprehensively addresses all of the key research questions / mandatory requirements;
	Provides some additional relevant information or insights;
	 Provides some examples and reasoning to back up any arguments presented, including reference sources;
	Demonstrates good awareness of key challenges and how they may be addressed.
3 = Adequately meets	Provides a satisfactorily detailed technical approach;
	Satisfactorily addresses all of the key research questions / mandatory requirements;
	Provides little additional relevant information or insights;
	Provides few examples and reasoning to back up any arguments presented, including reference sources;
	 Demonstrates awareness of some of the key challenges and how they may be addressed.

2 = Fails to meet in a minor respect	· Provides limited detail in the technical approach;
	 Limited consideration of the key research questions / mandatory requirements;
	· Provides no additional relevant information or insights;
	· Provides insufficient examples, and/ or little reasoning, to back up any arguments presented;
	Demonstrates only limited awareness of key challenges and how these may be addressed.
1 = Fails to meet in a major respect	· Provides an inadequately detailed technical approach;
	 Inadequate consideration of the key research questions / mandatory requirements;
	· Provides no additional relevant information or insights;
	· Provides no examples or reasoning, to back up any arguments presented;
	Demonstrate no awareness of key challenges and how these may be addressed.

T6. The Technical risks with mitigations, dependencies and assumptions are identified.

Score	Key Indicators
5 = Exceeds	Demonstrates that the project team has comprehensively considered any technical risks and identified relevant
	dependencies and assumptions. They have also provided comprehensive mitigations for these to successfully deliver this
	requirement.

4 = Fully meets	Demonstrates that the project team has given good consideration to any technical risks, dependencies and assumptions and have provided mitigations for these to successfully deliver this requirement.
	Demonstrates that the project team has considered some technical risks, dependencies and assumptions and have given some mitigations in order to successfully deliver this requirement.
2 = Fails to meet in a minor respect	Demonstrates that the project team has identified technical risks, assumptions and dependencies but has not provided appropriate mitigations for these.
1 = Fails to meet in a major respect	Demonstrates that the project team has not considered possible technical risks, assumptions and dependencies and has not provided mitigations for these.

The weighted scores on each limb will be added together to give a final technical score. Each technical assessor will perform an individual evaluation and then a final moderated technical score will be arrived at in the moderation meeting.

A minimum score of **3** is required on each technical limb, give an overall minimum score of **33** to be compliant. Dstl reserve the right to reject any bid deemed to be non-compliant.

Pricing

The price of each proposal will subsequently be divided by the final moderated technical score to arrive at the lowest price per technical point scored. The bidder with the lowest price per technical point scored will be adjudged as the winner.

Example:

Supplier A submits a proposal costing £150,000. Their proposal receives a final moderated score of 50.

£150,000/50 = £3000 per technical point scored.

Supplier B submits a proposal costing £125,000. Their proposal receives a final moderated score of 40.

£125,000/40 = £3125 per technical point scored.

In this scenario, Supplier A would be the winner as their price is lower per technical point scored.

2.3 Commercial Evaluation Criteria

Evaluation of Commercial bids will be undertaken against responses to the sub-criteria detailed below and scored in accordance with the 'Commercial Scoring Definitions' underneath.

The Authority reserves the right to reject any Tender if a supplier scores a 'Fail' in any of the criteria below.

Ref	Sub-Criteria Description	Scoring Range	Sub- Criteria Weighting	Maximum Weighted Score
C1	Please submit your full firm price breakdown for all costs to be incurred, including: What rates are being used for what Grade Quantity of manpower hours per Grade Travel & Subsistence costs Journal publication fees Any Materials costs Any Facility costs Any sub-contractor costs Any other costs	Pass/Fail	n/a	Pass/Fail
C2	Compliance with the Task specific terms and conditions as stated within the Statement of Requirement and Tasking Form.	Pass/Fail	n/a	Pass/Fail
	Subtotal Available Weighted Mark			Pass/Fail

The score (Pass/Fail) awarded to each of the Commercial Sub-criteria will be in accordance with the following definitions:

Score	Definition	
Pass	Fully meets the Authority's requirement. Provision and acceptance of the sub-criteria information in the format requested, which is clear, unambiguous and transparent.	
Fail Unacceptable/Nil Return. Tenderer did not respond to the question or the response wholly failed demonstrate an ability to meet the sub-criteria requirement.		