

# Serapis Tasking Form

## Tasking Form Part 1: *(to be completed by the Authority's Project Manager)*

<b>To:</b>	Lot 1 Roke Manor Research Ltd	<b>From:</b>	The Authority
Any Task placed as a result of your quotation will be subject to the Terms and Conditions of Framework Agreement Number: LOT 1 DSTL/AGR/SERAPIS/COL/01			
<b>VERSION CONTROL</b>			
00-01 Copied from Dstl original. 00-02 Task form revised to contain only ST1 with significant changes. 00-03 Task form revised after internal review. 00-04 Final version (approved by Stephen Ablett). 01-00 Version 1.			
<b>REQUIREMENT</b>			
<b>Proposal Required by:</b>	09/12/2022	<b>Task ID Number:</b>	C72-01
<b>The Authority Project Manager:</b>	[Redacted]	<b>The Authority Technical Point of Contact:</b>	[Redacted]
<b>Task Title:</b>	WAMI simulation		
<b>Required Start Date:</b>	06/03/2023 or ASAP	<b>Required End Date:</b>	15/03/2024
<b>Requisition No:</b>	RQ0000011301	<b>Budget Range:</b>	£250k
<b>TASK DESCRIPTION AND SPECIFICATION</b>			
<b>Serapis Framework Lot</b>	<input checked="" type="checkbox"/> Lot 1: Collect <input type="checkbox"/> Lot 2: Space systems <input type="checkbox"/> Lot 3: Decide <input type="checkbox"/> Lot 4: Assured information infrastructure <input type="checkbox"/> Lot 5: Synthetic environment and simulation <input type="checkbox"/> Lot 6: Understand		

**Abstract**

The project aims to develop a Wide Area Motion Imagery (WAMI) simulator including artefacts found in trials data, with sufficient realism for the development and testing of WAMI target/track extraction algorithms.

**Background**

In September and October 2021, Dstl conducted the Contested Urban Environment (CUE) 2021 trial in Portsmouth, UK. One of the sensors deployed was a WAMI camera mounted onto a Cessna 207 flying in a racetrack pattern over the city. The location and altitude of the aircraft varied for each sortie according to cloud height and the activity being monitored.

A number of cars were fitted with differential GPS and tasked to drive set routes around the city. These routes were designed to demonstrate activities indicative of events that may be of interest to an analyst. During the event the vehicles conducted a number of scenarios, including those in table 1 below.

[Redacted]

In addition, there were some non-planned incidences including trial cars being involved in road traffic collisions and occasional deviations from planned routes.

During CUE 2021, three types of WAMI data was produced:

- Imagery chips – Low resolution images of small areas (typically a few blocks);
- The full imagery cube – Raw images from each of the 12 cameras (PNG files), composite frames, and the aircraft position, yaw, pitch, and roll information for each frame (CSV files).
- Track files for designated vehicles, approximately 20 per flight (CSV files).

The WAMI sensor has an optimal altitude of 8,500ft, but due to low cloud coverage, some flights were conducted at lower altitudes, down to as low as 1,500ft. Different altitudes give a different target resolution and affect the coverage of the sensor.

### **Statement of Requirements (SOR)**

The supplier **shall** develop a WAMI simulator which **shall** include a behavioural model for objects being simulated and it **should** have “realistic” graphical output including artefacts found in real trials data. The output is to be used to drive the development and testing of WAMI target/track extraction algorithms (developed as part of a separate task, not this task), and it **should** have sufficient realism to be used for this purpose.

The development team **should** use an Agile development methodology. Proposals **should** provide information on the expected work rate (or velocity) of the development team (with the understanding by the Authority that this will vary depending on the features chosen for implementation), and how much could reasonably be achieved within the budget allowed. Details of how the Supplier will collaborate with the Authority as part of the Agile development methodology **should** also be given.

The task has been split into three phases: Scoping; Development; Simulation.

### ***Phase 1: Scoping (1-2 months)***

This phase consists of requirement gathering from the key Authority stakeholders, formation of a prioritised product backlog (with initial development time estimates) in collaboration with the Authority, and a workshop to gain agreement on the development priorities and progress reporting cadence.

For the requirement gathering, the supplier **shall** visit the Dstl Porton Down site to:

- Examine the CUE 2021 trial data to ascertain the requirements to replicate this WAMI data with sufficient fidelity for target/track extraction algorithm development. The WAMI collected during CUE 2021 will not be released under this contract, and access to the data will be by appointment on a Dstl site and using Dstl hardware.
- Agree with the Authority the initial requirements (behavioural and graphical) for the WAMI simulation.
  - The behavioural model **should** include (with additional requirements agreed with the Authority):
    - A realistic amount of background activity (vehicles, cyclists, and pedestrians).
    - Individual vehicles, cyclists, pedestrians, and watercraft should be modelled explicitly.
    - Realistic movement (sometimes stationary) over the map including object avoidance where necessary.
    - Vehicles driving on the correct side of the road and traversing roundabouts in a realistic manner.
    - Vehicles able to enter car parks and park.
    - Vehicles obeying the rules of the road.
  - The graphical output **should** (with additional requirements agreed with the Authority):
    - Mimic the data collected during CUE 2021 using the commercial WAMI sensor supplied by Persistent Surveillance Systems (PSS).
      - The sensor consists of 12 cameras, each with a 4872×3248 pixel resolution and a 1 Hz frame rate.
      - The specifics of the sensor model **should** be agreed in this phase.
      - At 8500ft altitude and 0° elevation, the minimum ground sample distance (GSD) should be 0.5m and the area covered 64km².
    - Include (but not be limited to) aspects of the physical environment such as:
      - Cloud.
      - Sun shadow.
      - Tree lined streets and dense vegetation where appropriate.
      - Reflections from windows.
    - Include (but not be limited to) and sensor effects such as:
      - Projection errors.
      - Auto-exposure effects.
  - A run of the WAMI simulator **shall** output the single images produced by each of the 12 virtual cameras, the stitched frames (the Supplier **shall** provide their own stitching algorithm which **should** operate as if the data were from a real camera), and the synthetic airframe position and orientation information.
    - The output of the WAMI simulator **should** also model geospatial inaccuracies.
- Agree with the Authority the scenarios of interest which **should** include (with additional requirements agreed with the Authority):
  - The scenarios conducted during the CUE 2021 exercise (see the background section for a broad description).
    - At least one from each of the activities in table 1.
    - Altitudes of 1500ft, 4500ft, 8500ft, 10000ft, and one more altitude (TBD) – providing each activity is modelled, an option to include multiple scenarios at each aircraft height may be considered.

- Additional scenarios which might be of interest for the development of target/track extraction algorithms as agreed with the Authority.
- Agree with the Authority the metrics which **should** be used to assess the performance of the WAMI simulator.

After requirement gathering has completed, the Supplier **shall** collaborate with the Authority to form a prioritised product backlog.

The Supplier **shall** hold a workshop (deliverable D4) at the Supplier's premises to gain agreement on the development priorities, development strategy, and progress reporting cadence. The workshop **shall** include a presentation which **should** cover:

- The prioritised product backlog with initial development time estimates.
- The Agile development methodology (e.g. Scrum).
- The progress reporting cadence (e.g. fortnightly or monthly).
- How progress will be demonstrated (e.g. small scale simulations to demonstrate features).
- How source code and documentation will be made available for review during the project.
- The third party licenses that will be required to run the WAMI simulator and their cost.

Following the workshop, the Supplier **shall** deliver the agreed WAMI simulator development plan (deliverable D5) which **should** cover all requirements (for simulator development and scenarios to run) agreed during phase 1 and all issues agreed at the workshop (including all points listed above).

### ***Phase 2: Development***

Development **shall** proceed as agreed in phase 1. Progress **shall** be demonstrated using the method and cadence agreed in phase 1. Source code **shall** be documented and include unit/integration tests as appropriate. Tests **should** be provided to test functionality and also to ensure exceptions are raised or managed appropriately.

As phase 2 proceeds and progress is reported, it **shall** be possible for the Authority to change priorities and add/remove requirements as necessary with the understanding that this will have an impact on the scope or delivery time/cost of the WAMI simulator.

At the end of phase 2, a summary of the work conducted during the phase **shall** be delivered to the Authority as a presentation in a meeting (deliverable D6). This **should** contain:

- Introduction.
- Details of the functionality developed (behavioural and graphical) including any limitations.
- Recommendations for future development.
- The scenarios that will be modelled in phase 3.

The Supplier **shall** also provide updated estimates of the expected time and ROM cost to complete phase 3 based on the current state of development of the WAMI simulator and the scenarios agreed with the Authority (deliverable D7) so that the Authority can adjust the number/scope of the simulations as necessary.

The Authority may choose to end the task at any point in the development phase (including the start and end) if it seems unlikely that the required output will be achievable. If the project is ended by the Authority, note that deliverables D9 and D11 will still be required (as far as whatever progress has been made), and the Authority may request deliverable D10 with sufficient time allowed for that to be completed.

### ***Phase 3: Simulation***

For this phase, development of the WAMI simulator does not need to continue unless generation of the scenarios of interest lead to the discovery of bugs which impact upon the usefulness of the output for target/track extraction algorithm development.



The Supplier **shall** generate the simulations agreed during phase 1 with any additions/changes made during phase 2. Each run of the WAMI simulator **shall** output the single images produced by each of the 12 virtual cameras and the stitched frames. The following documentation **shall** also be provided (as a minimum):

- Aircraft position and orientation (CSV file, format to be agreed with the Authority in phases 1/2).
- Track files for designated vehicles (CSV file, exact format to be agreed with the Authority in phases 1/2).
- A description of the modelled scenario and all input parameters including:
  - Description of the vehicles of primary interest.
  - Description of other road traffic.
  - The camera model and all relevant parameters.
  - Included artefacts.
  - Any other relevant parameters required to duplicate the output.
- Any relevant metrics (to support use in testing WAMI processing techniques).

The simulation outputs **shall** be delivered to the Authority as they are generated (deliverable D8) to allow the Authority to check them for issues.

The generated videos **shall** be openly releasable (to anyone) to support planned open Stone Soup data challenges.

At the end of the project, the Supplier **shall** provide:

- The source code for the WAMI simulator and a compiled executable (deliverable D9).
- A user guide for the WAMI simulator (deliverable D10) which **should** include at a minimum:
  - Introduction to the WAMI simulator and the goals of the project.
  - Installation/Build instructions with any dependencies and system requirements.
  - A quick start guide to using the WAMI simulator.
  - A detailed description of each part of the functionality and how to use it.
  - Known limitations.
  - Examples of usage.
  - Advice to users.
  - Glossary.
  - Licensing information.
- A perpetual licence for the use of the simulation software and, as a costed option, any additional third party licences required to run the simulator to enable the Authority to generate simulated data sets in support of future trials (deliverable D11).

Where 705 FR applies, findings and software may be shared with [Redacted] partners for research purposes.

## Monitoring

Monitoring meetings can be assumed virtual unless explicitly stated otherwise.

A start-up meeting (deliverable D1) **shall** be held within the first week of the project. The Authority **shall** require regular progress meetings (deliverable D2.n) which **should** be aligned with an appropriate Agile event (e.g. sprint reviews). These meetings/reports **should** include:

- Update on technical progress.
- Progress report against project schedule.
- Review of deliverables.

- Review of risk management plan.
- Current risks/issues.
- Commercial aspects.
- GFA and supplier performance.

At the end of the project there **shall** be a close-down meeting (deliverable D3), taking place no later than 1 week prior to the end of the contract, which **should** include:

- Lessons identified.
- Future work.
- Benefits.
- Any administrative aspects associated with the end of the contract.

Additional meetings and technical workshops **should** be proposed by the Supplier as required.

Following any meeting, materials and minutes **shall** be delivered to the Authority within 5 working days of the event.

### Quality

The Supplier **shall** provide a description of their engineering and quality management systems and how these systems will be applied in the context of the task requirements. Please note that a proposal that does not provide a comprehensive response to this element of the requirement will not be taken forward. ISO9001 is a desirable quality standard but an equivalent standard of quality assurance is acceptable.

### Procurement Strategy

☒ Lot Lead to recommend ☐ Single Source / Direct Award

### Pricing:

☐ Firm Pricing ☒ Ascertained Costs\* ☐ Other\*

Firm Pricing shall be in accordance with DEFCON 127 and DEFCON 643

Ascertained Costs shall be in accordance with DEFCON 653 or DEFCON 802.

\*only at Authority's discretion

### Task IP Conditions

Task IP Conditions (Follow the <a href="#">NIPPY</a> guide to identify your information and IP requirements for each deliverable)	Summary of the Authority's rights in foreground IP (IP generated by the supplier in performance of the contract)
DEFCON 703	Vests ownership with the Authority
DEFCON 705 Full Rights	Enables MOD to share in confidence as GFI or IRC under certain types of agreements. Can be shared in confidence within UK Government.
OTHER IP DEFCONS: 14* , 15* , 16* , 90* , 91* , 126*	Generally only suitable for deliverables at TRL 6 and above.



BESPOKE IP Clause *	Where 705 FR applies, findings and software may be shared with [Redacted] partners for research purposes.
---------------------	---

<p>* Do not use without IPG advice and approval</p> <p>Please state in this text box if MOD or the customer has a requirement a) that one or more Other Government Departments is able to share confidentially with their own suppliers, b) to publish but you do not think there is a requirement to own or control the deliverable, or c) to share under a procurement* Memorandum of Understanding (MOU).</p> <p>If any of these three issues applies, please contact IPG for advice before completing this form. *Listing research MOUs is not required, but can be a helpful courtesy to the supplier.</p>	
---	--

## DELIVERABLES

### DELIVERABLE: ACCEPTANCE / REJECTION CRITERIA

Unless otherwise stated below, Standard Deliverable Acceptance / Rejection applies. This is 30 business days, in accordance with DEFCON 524 Rejection, and DEFCON 525 Acceptance.

#### Standard Deliverable Acceptance / Rejection:-

Yes ☒ (DEFCON 524 Rejection, and DEFCON 525 Acceptance)

No ☐ (if no, please state details of applicable criteria below)

#### Deliverable Acceptance / Rejection Criteria:-

*If there are any other specific acceptance/rejection criteria you would like to apply to any of the deliverables, please state them here.*

### Government Furnished Assets (GFA)

**ISSUE OF EQUIPMENT/RESOURCES/INFORMATION/FACILITIES** (if not applicable, delete table and insert "None" in this text box)

None

**QUALITY STANDARDS**

- ☐ **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 in free text below)

[Redacted]

[Redacted]

**TASK CYBER RISK ASSESSMENT.** *(In accordance with [DEF STAN 05-138](#) and the [Risk Assessment Workflow](#))*  
[Redacted]

[Redacted]

Please ensure all completed forms are copied to [\[Redacted\]](#) when sending to the Lot Lead.

**Tasking Form Part 2:** *(To be completed by the Lot Lead)*

To: The Authority

From: The Lot Lead

<b>Proposal Reference</b>	<b>C72-01 Technical Response – [Redacted] (attached)</b>		
<b>Delivery of the requirement:</b>			
<b>The proposal <u>shall</u> include, but not be limited to:</b>			
<ul style="list-style-type: none"> <li>• A full technical proposal that meets the individual activities that are detailed in Statement of Requirements (Part 1 to Tasking Form).</li> <li>• Breakdown of individual Deliverables, with corresponding Intellectual Property rights applied.</li> <li>• Breakdown of Interim Milestone Payments, with corresponding due dates.</li> <li>• A work breakdown structure/project plan with key dates and deliverables identified.</li> <li>• A list of required Government Furnished Assets from the Authority, including required delivery dates.</li> <li>• A clear identification of Dependencies, Assumptions, Risks and Exclusions which underpin your Technical Proposal.</li> <li>• Sub-Contractors Personnel Particulars Research Worker Form and security clearances (if applicable)</li> </ul>			
<b>PRICE BREAKDOWN</b>			
<p><i>You are to use the costs detailed in Item 2 Table I in the Schedule of Requirement and at Annex E Table 2 of the Serapis Framework Agreement. Please also provide a price breakdown which should include, but is not limited to: Lot Lead Rates, Sub-contractors costs and rates, travel and subsistence. In support of your Proposal you are requested to provide clear details of all Dependencies, Assumptions, Risks and Exclusions that underpin your price.</i></p>			
<b>Offer of Contract:</b> <i>(to be completed and signed by the Contractor's Commercial or Contract Manager)</i>			
<b>Total Proposal Price in £</b>	£255,081.84		(ex VAT)
<b>Start Date:</b>	12/04/2023	<b>End Date:</b>	15/03/2024
<b>Lot Leads Representative</b>	Name	[Redacted]	
	Tel	[Redacted]	
	Email	[Redacted]	
	Date	12/04/2023	
<b>Position in Company</b>	[Redacted]		
<b>Signature</b>	[Redacted]		

**Core Work – Breakdown**  
[Redacted]

[Redacted]

[Redacted]

### **Core Work – Milestone breakdown costs**

#### **Proposed Milestones Payments**

*Your TMS bid costs shall be included in milestone 1.*

*The final Milestone must reflect the actual cost of the deliverable, and be greater than 20% of the Task value, unless otherwise agreed with your Commercial POC*

*Please duplicate the template per milestone table format below as necessary, and rename milestone number accordingly.*

[Redacted]
------------

## **Tasking Form Part 3:**

*To be completed by the Authority's Commercial Officer and copied to the Authority's Project Manager.*

<b>1. Acceptance of Contract:</b>		
<b>Authority's Commercial Officer</b>	Name	[Redacted]
	Tel	[Redacted]
	Email	<a href="#">[Redacted]</a>
	Date	27/04/2023
<b>Requisition Number</b>		RQ0000011301
<b>Contractor's Proposal Number</b>		WAMI Simulation (C72-01)
<b>Purchase Order Number</b>		DSTL0000016354
<b>Signature</b>		[Redacted]
<i>Please Note: Task authorisation to be issued by the Authority's Commercial Officer or Contract Manager. Any work carried out prior to authorisation is at the Contractor's own risk.</i>		