

# 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 Version copied from Dstl original. 00-02 Initial shaping and comments from the PMO. 00-03 Feedback from Dstl 00-04 Changes made by PMO after feedback from Dstl. 00-05 Comments from internal review. 00-06 Changes made after internal review. 00-07 Version 1 candidate.			
<b>REQUIREMENT</b>			
<b>Proposal Required by:</b>	02/12/2022	<b>Task ID Number:</b>	C70
<b>The Authority Project Manager:</b>	Redacted	<b>The Authority Technical Point of Contact:</b>	Redacted
<b>Task Title:</b>	Stone Soup Algorithms		
<b>Required Start Date:</b>	24/01/2023 or ASAP	<b>Required End Date:</b>	15/03/2024
<b>Requisition No:</b>	RQ0000016688	<b>Budget Range</b>	FY22-23: £100k FY23-24: £200k
<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		
<b>Abstract</b> The project aims to implement algorithms from published papers into Stone Soup.			
<b>Background</b> Stone Soup ( <a href="https://stonesoup.rtfid.io">https://stonesoup.rtfid.io</a> ; <a href="https://www.gov.uk/government/news/dstl-shares-new-open-source-framework-initiative">https://www.gov.uk/government/news/dstl-shares-new-open-source-framework-initiative</a> ) is an open source project for the assessment of tracking and state estimation algorithms. The framework is built in a modular way using an object-oriented approach, enabling construction of algorithms from			

sub-components. The modularity also enables the same components to be applied to many different domains, targets, sensor modalities, and fusion architectures. Assessments can be made against simulated, recorded, or live data.

The Stone Soup source code is available on GitHub (<https://github.com/dstl/Stone-Soup>) and is written in Python. Stone Soup is designed for the assessment of algorithms and as such is aimed at a research-level of code and performance, with tests and documentation for simple scenarios; it is not aimed at operational or real-time use.

Areas of interest for Stone Soup algorithm implementation include:

- Multi-hypothesis tracking (MHT);
- Track fusion and architectures;
- Track before detect;
- Out of sequence / latent measurements;
- Transition modelling, including route/path/road networks;
- Extended object tracking;
- Bearings only tracking;
- State estimation;
- Multi-Bernoulli.

Example papers for MHT include:

- R. L. Streit and T. E. Luginbuhl, "Probabilistic Multi-Hypothesis Tracking," Feb. 1995.
- S. S. Blackman, "Multiple hypothesis tracking for multiple target tracking," in *IEEE Aerospace and Electronic Systems Magazine*, vol. 19, no. 1, pp. 5-18, Jan. 2004, doi: 10.1109/MAES.2004.1263228.
- S. Coraluppi, "Fundamentals and Advances in Multiple-Hypothesis Tracking," 2015.

### Statement of Requirements (SOR)

Proposals are invited that **shall** provide a development team for the implementation of algorithms from published papers into Stone Soup. Papers **should** be chosen from the above areas of interest (and do not have to include the example papers, although those are of interest) and **shall** be agreed with the Authority prior to implementation. For any algorithm implemented, the Supplier **should** complete a check to ensure that there are no IP issues associated with the algorithms (patents, licence, or other IP issues should be considered).

The development team **should** use an Agile development methodology. A proposed approach to tasks would include a cycle of:

- For an agreed prioritised area of interest, identify popular algorithms in the literature.
- Ensure that there are no IP issues associated with the algorithms (patents, licence, or other IP issues should be considered and discussed with the Authority before proceeding).
- Estimate the effort required to implement one or more of the most popular algorithms.
- Once agreed with the Authority, implement, test and document one or more algorithms.
- Submit source code, documentation, and tests for review.
- Proceed to the next algorithm / area of interest whilst waiting for the review to be completed.

Additions into Stone Soup **should** consider the overall framework, breaking algorithms down into sub-components; this is to enable alternative forms of algorithms to be implemented via changing the sub-components.

The output **should** provide all the components required to run the given algorithm and the associated tests, and all new code **should** be covered by unit and integration tests. All components **should** be documented, describing the class/method/parameters and an overarching tutorial/example/demonstration notebook that provides an overview of the given algorithm in line with the current offering on tutorials and examples in Stone Soup's documentation. The existing Stone Soup code base is an example of what is expected of tests; unit tests are required for individual components, integration tests can either be formal tests or take the form of a tutorial or example notebook. Stone Soup test coverage is currently ~95%, and similar coverage is expected from contributions.

Some of the algorithms considered may identify changes required to the framework, and as such could require modifications to existing Stone Soup components in order to be compatible. This is acceptable, and breaking changes **should** be documented for inclusion in release notes (one or two sentence summary highlighting the breaking change and what else might be impacted by the change).

When available, attendance at the fortnightly Stone Soup user conference (an informal Microsoft Teams meeting) is requested to share developments and activities on the use of Stone soup by the community and a place to ask questions about current developments and issues with implementations.

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 papers/algorithms 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 **shall** also be given.

## 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 reports (*which are brief reports in the form of slides, not held as meetings*) in order to monitor progress (deliverable D2.n). The Authority shall require a quarterly technical and project management review meeting (deliverable D3.n) in order to monitor progress. 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 D4), 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 and TickITPlus are desirable quality standards but equivalent standards of quality assurance are 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 NIPPY 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 <input type="checkbox"/>	Vests ownership with the Authority
DEFCON 705 Full Rights <input type="checkbox"/>	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* <input type="checkbox"/> , 15* <input type="checkbox"/> , 16* <input type="checkbox"/> , 90* <input type="checkbox"/> , 91* <input type="checkbox"/> , 126* <input type="checkbox"/>	Generally only suitable for deliverables at TRL 6 and above.
BESPOKE IP Clause <input type="checkbox"/> *	Details to be added and agreed by IP Group
* Do not use without IPG advice and approval	
<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> <p>Redacted</p>	

## DELIVERABLES

Ref	Title	Due by	Format	Expected classification (subject to change)	Information required in deliverable	IPR DEFCON
D1	Start-up meeting	T0 + 1 weeks	PMO template (.pptx) and minutes (.docx)	Redacted	See <i>monitoring</i> section for details.	Redacted
D2.n	Progress report	Monthly	PMO template (.pptx)	Redacted	See <i>monitoring</i> section for details.	Redacted
D3.n	Technical and project management review meeting	Quarterly	PMO template (.pptx) and minutes (.docx)	Redacted	See <i>monitoring</i> section for details.	Redacted
D4	Close-down meeting	Contract end - 1 week	PMO template (.pptx) and minutes (.docx)	Redacted	See <i>monitoring</i> section for details.	Redacted
D5.n	Source code	As development is completed against each task	GitHub pull request	Redacted	See SoR for full details. <ul style="list-style-type: none"> <li>Implementation of algorithm in source code per agreed task.</li> <li>Unit tests for new code or changes to code.</li> <li>Documentation for the new code.</li> </ul>	Redacted

					<ul style="list-style-type: none"> <li>Where agreed, a tutorial, example, or demonstration of the new algorithm.</li> </ul>		
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#### 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:-

Work should be delivered in a form of pull request at the GitHub Stone Soup repository, aligned with contribution guidelines (including license requirements), where new algorithms should include tests, documentation, and when agreed, examples, tutorial, or demonstration material. Code will be reviewed by two or more Stone Soup reviewers, changes may be requested, and once approved, accepted by the Authority via merging into the *main* branch. All completed pull requests to the Stone Soup main branch between quarterly meetings will be compiled and presented by the Authority at the next quarterly meeting, and this will be used to assess progress for payment purposes.

#### 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)

#### SECURITY CLASSIFICATION OF THE WORK

##### The highest classification of this SOR

OFFICIAL ☐ OFFICIAL-SENSITIVE ☐ SECRET ☐ TOP SECRET ☐ STRAP ☐ SAP ☐

##### The highest expected classification of the work carried out by the contractor

OFFICIAL ☐ OFFICIAL-SENSITIVE ☐ SECRET ☐ TOP SECRET ☐ STRAP ☐ SAP ☐

##### The highest expected classification of Deliverables/Output

OFFICIAL ☐ OFFICIAL-SENSITIVE ☐ SECRET ☐ TOP SECRET ☐ STRAP ☐ SAP ☐

**Is a Security Aspects Letter (SAL) required?** (A Security Aspects Letter (SAL) will be required for each Task above Official-Sensitive and above)

Yes ☐ No ☐

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

Cyber Risk Level	Redacted
Risk Assessment Reference	Redacted

**ADDITIONAL TERMS AND CONDITIONS APPLICABLE TO THIS CONTRACT**

**Please ensure all completed forms are copied to DSTLSERAPIS@dstl.gov.uk when sending to the Lot Lead.**

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

To:	The Authority	From:	The Lot Lead
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<b>Proposal Reference</b> TECHNICAL PROPOSAL: University of Liverpool response to <u>"Stone Soup Algorithms (C70)"</u> <b>(attached)</b>
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**Delivery of the requirement:**

**The proposal shall include, but not be limited to:**

- A full technical proposal that meets the individual activities that are detailed in Statement of Requirements (Part 1 to Tasking Form).
- Breakdown of individual Deliverables, with corresponding Intellectual Property rights applied.
- Breakdown of Interim Milestone Payments, with corresponding due dates.
- A work breakdown structure/project plan with key dates and deliverables identified.
- A list of required Government Furnished Assets from the Authority, including required delivery dates.
- A clear identification of Dependencies, Assumptions, Risks and Exclusions which underpin your Technical Proposal.
- Sub-Contractors Personnel Particulars Research Worker Form and security clearances (if applicable)

  

**PRICE BREAKDOWN**

*You are to use the costs detailed in Item 2 Table 1 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.*

  

**Offer of Contract:** *(to be completed and signed by the Contractor's Commercial or Contract Manager)*

<b>Total Proposal Price in £</b>	£282,364.83	(ex VAT)
<b>Start Date:</b>	07/02/2023	<b>End Date:</b> 15/03/2024
<b>Lot Leads Representative</b>	Name	Redacted
	Tel	Redacted
	Email	Redacted
	Date	20/12/2022
<b>Position in Company</b>	Commercial Manager	
<b>Signature</b>	Redacted	

## Core Work – Breakdown - Redacted

### Lot Lead Rates for Task Management Services (TMS)

Please insert/delete rows as necessary

Team Member Name	Role	Activity Type	Rate (£)	Total Hours	LMS recovery per role per hour (‘d’ element)	Total LMS recovery due (£) (‘d’ x total hours)	Total TMS Cost (£) (Rate x total hours)
Total				Redacted		Redacted	Redacted

### Work Delivered by Sub-Contractor(s)

We recognise that suppliers may fit into multiple categories, please choose the drop down that categorises the supplier by the definition that is lowest on the list (i.e. a Defence Supplier Academic would be treated as an Academic.

Please insert/delete rows as necessary

Name of Sub-Contractor	Supplier Type	Activity Description	Rate (£)	Total Hours	Total Cost (£)
University of Liverpool	Academia	Redacted	Redacted	Redacted	Redacted
University of Liverpool	Academia	Redacted	Redacted	Redacted	Redacted
University of Liverpool	Academia	Redacted	Redacted	Redacted	Redacted
University of Liverpool	Academia	Redacted	Redacted	Redacted	Redacted
University of Liverpool	Academia	Redacted	Redacted	Redacted	Redacted
University of Liverpool	Academia	Redacted	Redacted	Redacted	Redacted
Total				Redacted	Redacted

### Travel, Subsistence, Materials & Equipment

Please insert/delete rows as necessary

Supplier Name	Spend Type	Description / Rationale	Unit Cost (£)	Qty	Total Cost (£)
	Choose an item.				
Total					

## 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

Milestone 01						
Description	TMS cost (£)	Self-Delivery cost (£)	Sub-contractor cost (£)	Total milestone cost (£)	Milestone due date	DEFCON
Redacted	Redacted	Redacted	Redacted	Redacted	Redacted	Redacted
Travel/Subsistence						
Materials/Equipment						
Milestone LMS recovery (£)	Redacted					

Milestone 02						
Description	TMS cost (£)	Self-Delivery cost (£)	Sub-contractor cost (£)	Total milestone cost (£)	Milestone due date	DEFCON
Redacted	Redacted	Redacted	Redacted	Redacted	Redacted	Redacted
Travel/Subsistence						
Materials/Equipment						
Milestone LMS recovery (£)	Redacted					

## Tasking Form Part 3:

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

1. Acceptance of Contract:	
Authority's Commercial Officer	Name Redacted
	Tel Redacted
	Email Redacted
	Date 17 Feb 2023
Requisition Number	RQ0000016688
Contractor's Proposal Number	TECHNICAL PROPOSAL: University of Liverpool response to "Stone Soup Algorithms (C70)"
Purchase Order Number	DSTL0000013619
Signature	Redacted
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.	

Note - As agreed at a Serapis Framework Level, please see Annex A to this Task.

Annex A to C70 - Redacted