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

Title of Requirement	Mobile App Enhancements
Requisition No.	**RQ0000012950**
SoR Version	**0.1**

1.	**Statement of Requirements**
1.1	**Summary and Background Information**
	The aim of this project is to determine if physiological parameters (physical and molecular biomarker signatures) that are indicative of pre-symptomatic infection are available within data collected from individuals. Parameters and signatures generated from these studies will inform algorithm development to enable reliable, identification of the first signs of infection in healthy individuals/groups. This application is required to enable secure collection and transmission of physiological data from human participant studies. This requirement is dependent on previous development of a Garmin Software development kit (SDK) application built by Riskaware and requires access to a Garmin license agreement to enable exploitation of the application in human participant trials. The project will undertake human participant trials to ensure that Defence understands the potential utility of wearable technologies for early and reliable screening to detect communicable disease prior to the onset of symptoms Riskaware has developed an iOS mobile application, Heart Rate Variability – Upload Platform (HRV-UP), to interface with Polar and Garmin wearable devices, extract the data and upload it to a cloud storage platform (Amazon Web Services, AWS). The app has been used during recent human participant trial and an outcome from this is a list of issues and lessons that can be learned. This work looks to address these issues with a view to improving the operation and usability of the app in future trials.
1.2	**Requirement**
	The following requirements are to be met: 1.4.1 Enhance Existing App Continue investigation into Garmin SDK errors and implement improved workaround if not resolved. Create additional server endpoint to receive app usage logs. Carry out Beta testing of the upgrades. 1.4.2 Cross Platform Mobile App Develop a cross-platform version of the HRV-UP app to allow it to be used on iOS and Android phones. Where necessary, carry out platform specific development for Garmin and Polar wearable devices. Develop the user interface in the cross-platform technology • Wrap Polar and Garmin SDKs for integration into the new HRV-UP app framework • Carry out Beta testing of the updated app for each release

1.4.3 Research and Prototype Additional Wearable Devices

The current HRV-UP app supports Polar H10 heart-rate monitors and Garmin Fenix 6 watches, only, which may not provide the best performance when compared to more newly developed wearable sensors. We therefore require a review of other hardware options, which Dstl will identify, which could be integrated with this and future versions of HRV-UP. These could include options from Garmin and Polar, but may also include options from alternative suppliers.The review should include the following:

• Comparison of the performance and acceptability of these alternative wearable options. As a minimum, these alternative options must be capable of collecting the required physiological data (heart rate, heart rate variability (HRV), blood oxygen (SpO2), respiration rate and step count)

• Evaluation of any available SDKs to integrate with the app, including license, stability, support, ease of integration with existing app framework

Dstl will identify and supply hardware that will be compatible with type of trials to be carried out. Following the comparison review, two of the most promising options will be agreed to be prototyped for integration into the HRV-UP app.

1.4.4 Improve Participant Information and Experience

This task is to make updates to the HRV-UP app that improves the participant's experience and encourage them to wear the devices and want to engage with the app more frequently.

This requires enhancements to be made to the information the app makes available to the user, and includes but is not limited to:

• Line graphs of BBI/HR/HRV, respiration Rate, SpO2, steps count (average by date for historical data or more detailed for that day's data)

• Cumulative daily stats (rather than just average from the last batch of data uploaded)

• % of time that data has been collected (i.e. encourage users to raise this stat by wearing it more)

• Table of comparison with other (anonymous) trial users in terms of the quality of the data being provided

1.4.5 Study Administrator Dashboard and Management Application

Develop a new web-based administrator management and dashboard application that allows trial administrators to configure, monitor and interact with the trial participants and to visualise synchronisation status and data quality for participants in real time.

Develop the framework and User Interface for the application. It will utilise a technology such as React to develop a web-based application that administrators will be able to view in a browser. The application would be hosted on the same AWS servers as are currently used for upload and storage of data.

- Give the trial administrator application access to the participant database to the administrators so that participants can be added, removed and updated throughout the trial without needing to get a third party to make the changes.
- Add a study/cohort identifier for participants
- Enable ease of data extraction via the proposed administrator app
- Add dashboard to provide monitoring information including but not limited to the following:
  - The most recent date that data was synchronised from the wearable device to the app for each user
  - The most recent date of data upload for each user
  - The percentage of data within the valid range in the last 24 hours for each user
  - The number of failed logins, uploads and data processing executions
  - A list of any warnings or errors that have been reported by the app
- Enable the app to raise notifications for but not limited to:
  - Prepare the participant to expect to receive a phone call or contact somebody
  - Prompt the participant to take some action, for example synchronise the devices and upload data
  - Automatically trigger a task within the app to execute, for example uploading debug information on errors

	This should implement the configuration required to allow notifications to be received by the mobile app and add a feature to the administrator app to allow administrators to send notification to individuals or groups of participants. • Add a mechanism for the participant to contact the study team if they have a problem or need to ask a question. Study team to be notified by email. App to allow the study team to see and respond to contact. 1.4.6 Symptom Survey Integration Replicate the existing participant surveys in the HRV-UP app and make responses available to the dstl study team. 1.4.7 Record Additional Measurements Enable additional measurements to be logged by the application. Additional measurements to be confirmed by Dstl. Generally, these measurements are already being recorded by the wearable devices, the app is just not currently collecting this information as it has not been deemed necessary within the scope of the previous trials conducted. A future measurement of interest could be, for example, skin temperature, which is already being recorded by the Garmin watch but has not been collected by the HRV-UP application. 1.4.8 Beta Testing Participate and support the Beta testing app releases after each major release of the mobile in order to ensure that the device integrations are working as expected. Support Dstl staff with beta testing of the mobile app after major updates to ensure app performance and device integrations are acceptable prior to it being formally used during research trials. Each testing phase will require the following high-level tasks as a minimum: • Allocation of unique participant IDs and the maintenance of a register of test participants and their allocated hardware • Analysis of data uploaded with comparison to the users' reported wear periods • Documentation and investigation of issues discovered during the testing process Dstl will be responsible for the recruitment and training of beta test participants. Dstl will also provide all hardware and will develop a beta test protocol which will be overseen by Dstl centrally, this will include frequent check ins with beta test participants and the collection of feedback, issues, errors which will be provided to the supplier to aid their data analysis (detailed above). 1.4.9 AWS Hosting Provide a cost-effective means to securely host sufficient data on the AWS cloud servers to support data from 5 trials (including associated beta test data) over a 12 month period. This is to include storage on the DynamoDB database.
1.3	**Options or follow on work** *(if none, write 'Not applicable')*
	This application will have application within multiple human participant studies. Suppliers are to provide a costed option for ongoing work to support maintenance and further development of the app for an expected period of not less than 3 years from delivery of this contract.
1.4	**Contract Management Activities**
	The Dstl Project Manager or delegate will liaise with supplier regarding progress and financial issues. The Dstl PM should be made aware as soon as is practical, in writing of any issues affecting delivery.

1.5	Health & Safety, Environmental, Social, Ethical, Regulatory or Legislative aspects of the requirement
	n/a

1.6	Deliverables & Intellectual Property Rights (IPR)					
Ref.	**Title**	**Due by**	**Format**	**Expected classification (subject to change)**	**What information is required in the deliverable**	**IPR Condition**
D – 1	*Weekly telecon meetings*	*T0+1week* End – Mar-23	*telecon*	Redacted – FOI Exemption	Weekly progress, planning and any issues to be resolved	*DEFCON 705 shall apply*
D - 2	Monthly Reporting	T0+1 month End – Mar-23	Written report/email	Redacted – FOI Exemption	Progress in last month Planned work for following Month Progress against plan Any issues Financial situation if applicable	
D - 3	Completion of Task 1.4.1	31/12/22	Demonstration of integrated app	Redacted – FOI Exemption	Provision of server end point to receive app usage logs	
D - 4	Completion of Task 1.4.2	31/12/22	Demonstration of app on android and iOS devices	Redacted – FOI Exemption	Provision of cross-platform app for use with Polar and Garmin devices	
D - 5	Completion of Task 1.4.3	31/03/03	Written report &	Redacted – FOI Exemption	Provide a review of alternative hardware	

			demonstration of app integration		Integration of 2 alternative hardware into HRV-Up app	
D - 6	Completion of Task 1.4.4	31/03/23	App	Redacted – FOI Exemption	Provide HRV-UP app update with improved participant information and experience	
D - 7	Completion of Task 1.4.5	31/12/22	Web-based platform	Redacted – FOI Exemption	Provide new web-based administrator management and dashboard application to improve trial management	
D - 8	Completion of Task 1.4.6	30/09/22	App	Redacted – FOI Exemption	Integration of Symptom survey into HRV-UP app	
D - 9	Completion of Task 1.4.7	31/12/22	App	Redacted – FOI Exemption	Demonstration that the app is able to log additional measurement from the wearable device	
D - 10	Completion of Task 1.4.8	31/03/23	App	Redacted – FOI Exemption	Completion of Beta testing of major new HRV-up app releases	
D - 11	Completion of Task 1.4.9	31/03/23	Data	Redacted – FOI Exemption	Provision of secure host data on AWS Cloud servers	

1.7	**Deliverable Acceptance Criteria**
	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. *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.* *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.* Verification by Dstl that the all requirements have been met per task for milestone payment.

2	**Evaluation Criteria**
2.1	Method Explanation
2.2	Technical Evaluation Criteria
	Proposal will be evaluated on the extent to answer the requirement
2.3	Commercial Evaluation Criteria
	Ensure rates for work provided are in line with current Framework agreement or better.