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1. PURPOSE

- 1.1 The Occupational Psychology Department of RAF Recruiting & Selection (R&S) seeks professional support and additional expert advice in cognitive & aviation psychology, aptitude test development techniques and psychometrics to assist with the development of an interactive computer-based aptitude test to assess Symbolic Reasoning.

2. BACKGROUND TO THE CONTRACTING AUTHORITY

- 2.1 The RAF R&S Occupational Psychology Department is a well-established research and development unit specialises in designing cognitive selection tests for the Officer and Aircrew Selection Centre (OASC) to assess candidates' aptitude for training in a range of complex and highly skilled specialisations such as pilot for manned aircraft, pilot for remotely piloted air system, aerospace battle manager and intelligence.

3. BACKGROUND TO REQUIREMENT/OVERVIEW OF REQUIREMENT

- 3.1 Aptitude testing at the OASC is the only gateway of the selection process that directly assesses the ability to acquire new knowledge and skills across different specialisations that involve complex operations, high risks of human errors and potential dire consequences for errors made. The OASC aptitude test system consists of a range of computer-based tests. Each test design reflects the various operational requirements and each test measures specifically the cognitive abilities that have been identified as important to training and operational success through detailed task analysis studies.
- 3.2 The tests broadly measure seven aptitude domains with Symbolic Reasoning (SR) being one of them. SR is mainly concerned with system diagnosis – the ability to evaluate verbal/numerical information and dynamic scenario (e.g. sequence of events/incidents) to solve problems, make assumptions, draw conclusions and decide on the correct course of action. There are currently two Symbolic Reasoning tests which are primarily concerned with verbal and numerical reasoning. They are well structured with all relevant task information being clear and concise.
- 3.3 However, it has been identified through a series of task analyses that a dynamic SR Test, which involves a complex changing system to specifically assess decisiveness, mental agility and practical problem solving, needs to be developed to cover logical reasoning elements currently not covered by the OASC suite of SR test to fully address training requirements across the different specialist branches.

4. SCOPE OF REQUIREMENT

There is a requirement for the contractor to work alongside the R&S Psychology Department and the in-house IT team to develop an interactive computer-based aptitude test to assess Symbolic Reasoning.

- 4.1.1 They are to provide specific professional expertise, support, assistance and advice in cognitive and aviation psychology, cutting edge computer-based aptitude test development techniques and psychometrics. Stages of the test development process include design conceptualisation, design/refine test specifications/scoring protocols, test trials and test trial data analysis.
- 4.1.2 They will not be responsible for the software and collation of test trial data.



5. THE REQUIREMENT

- 5.1 In order to fully assess the Symbolic Reasoning element which concerns system diagnosis in dynamic scenarios, as required in training, there is a need for the new SR test:
- a. To measure the candidates' aptitude to: search proactively for information in order to build up situational awareness; problem solve by means of adapting different rules and procedures; evaluate ambiguous/incomplete information; make successive decisions in terms of action planning and manipulate/control different systems that evolve over time.
 - b. That requires candidates to operate a complex system (e.g. aircraft, theatre air space) involving multiple sub-functions (e.g. different gauges, information inputs from different sources) that interact with each other. Candidates need to make a series of practical responses to a dynamic and unpredictable scenario (e.g. theatre).
 - c. Where responses must entail early decision-making and anticipation of future events, which are essential to enable individuals to carry out actions within safe parameters, reduce the likelihood of critical errors (e.g. oversights) and reduce the risk of later time stress.
 - d. Which is designed to incorporate alternative solutions to each of the problems to reflect real operational scenarios.
- 5.2 It is anticipated that both the contractor and the R&S Psychology Department will jointly conceptualise the test design. Based on the agreed concepts, the contractor will then write the test specification detailing the test content, draft test instruction, test responses and measures to be recorded. Working with the in-house IT team a prototype test is to be programmed for a series of test trials (using candidates attending the RAF Officers & Aircrew Selection Centre). It is expected that the test in its prototype form will pass through a number of design iterations. The test trials will cover trials on prototype design, calibration, production and establishment of test psychometric properties. Furthermore, for such a complex SR test, it is necessary to produce variant forms of the prototype that cover different aspects of the whole proposed test. After each trial, the contractor will be responsible for analysing the test results to show the psychometric characteristics of the test design. The statistical data will be scrutinised by both the contractor and the R&S Psychology Department to identify areas for refinement, calibrate the test (e.g. difficulty levels) and scoring protocol. The contractor is expected to document the design iterations and analysis results in a series of short technical notes.

6. KEY MILESTONES

- 6.1 The consultancy period is to be 9 Months (Wednesday 27th July 2016 - Tuesday 19th July 2016 – Monday 27th March 2017)
- 6.2 The Potential Provider should note the following project milestones that the Authority will measure the quality of delivery against:

Milestone	Description	Timeframe
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1	Technical report on test concepts & specifications.	Within month 1 of Contract Award
2	Technical note on SPSS syntax files for data analysis	Within month 3 of Contract Award
3	Technical report on prototype test's psychometrics & recommended refinements	Within month 5 of Contract Award
4	Technical note on SPSS syntax files for analysing refined prototype test, statistical results and areas for further refinement.	Within month 7 of Contract Award
5	Test manual on final test design, technical details & test psychometrics.	Within month 9 of Contract Award

7. AUTHORITY'S RESPONSIBILITIES

- 7.1 The R&S Psychology Department will organise the test trials and be responsible for collating the test trial data. R&S will also provide the necessary software programming support and hardware for the test development programme.

8. REPORTING

- 8.1 The consultancy firm is to hold monthly review meetings with the Head of the R&S Psychology Department regarding progress and concerns.

9. CONTINUOUS IMPROVEMENT

- 9.1 The Supplier will be expected to continually improve the way in which the required Services are to be delivered throughout the Contract duration.
- 9.2 The Supplier should present new ways of working to the Authority during monthly Contract review meetings.
- 9.3 Changes to the way in which the Services are to be delivered must be brought to the Authority's attention and agreed prior to any changes being implemented.

10. QUALITY

- 10.1 The SR test developed must be content relevant to the RAF training requirements as identified in the task analysis studies and statistically shown to be psychometrically sound, a reliable measure of the construct and have incremental value to the current OASC suite of tests.

11. PRICE

- 11.1 Bids should be inclusive of all on-site and off-site consultancy work completed, as well as T+S.
- 11.2 Prices are to be submitted via the e-Sourcing Suite/Appendix E excluding VAT.

12. STAFF AND CUSTOMER SERVICE

- 12.1 Potential Provider's staff assigned to the Development of a Dynamic Symbolic Reasoning Test Contract shall have the relevant qualifications and experience to deliver the Contract. The potential provider's staff shall have specialist knowledge in



cognitive psychology, aviation psychology and human factors, as well as, specialist knowledge and skills in psychometrics and cutting-edge experience in computer-based aptitude test development, especially for aircrew selection. It is preferable that they are also knowledgeable of the aircrew and military training/operational requirements.

- 12.2 The Potential Provider shall ensure that staff understand the Authority's vision and objectives and will provide excellent customer service to the Authority throughout the duration of the Contract.

13. SERVICE LEVELS AND PERFORMANCE

- 13.1 The Authority will measure the quality of the Supplier's delivery by:

13.1.1 The expected SLAs/KPIs are set out in the below table:

KPI/SLA	Service Area	KPI/SLA description	Target
#1	Professional expertise, knowledge & skills in test development	Test conceptualisation and specifications. Expertise covers test design principles and methods.	A SR test at appropriate difficulty level, psychometrically sound with proven reliability & construct validity.
#2	Expertise and knowledge in cognitive psychology and assessment for aviation & related roles	Test conceptualisation and specifications. Expertise addresses the theoretical basis and assessment model for the test.	A SR test that is content valid and based on appropriate cognitive & aviation assessment models.
#3	Professional expertise in data preparation & handling	Data preparation, cleaning and management.	Supply of prepared test data files ready for analysis. Supply of SPSS syntax files used for data preparation.
#4	Professional expertise in psychometrics & statistics	Data analysis using psychometric & statistical procedures	Evidence of test psychometrics, reliability, content & construct validity presented in numerical format as appropriate.



#5	Technical reporting	Formal technical notes produced throughout the test development	Supply of formal technical notes describing the outcome of the analysis of each test trial and to include documented evidence of test psychometrics.
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13.2 Continuous poor monthly performance shall lead to early termination of the Contract.

14. SECURITY REQUIREMENTS

14.1 The potential provider will need site/premises access.

15. INTELLECTUAL PROPERTY RIGHTS (IPR)

15.1 The IPR, test prototypes, final SR test and associated documents produced shall be under Crown Copyright.

16. PAYMENT

16.1 Payment can only be made following satisfactory delivery of pre-agreed certified products and deliverables.

16.2 Before payment can be considered, each invoice must include a detailed elemental breakdown of work completed and the associated costs.

17. LOCATION

17.1 The location of the Services will be carried out at Adastral Hall, RAF Recruiting and Selection, RAF College Cranwell, Sleaford, Lincolnshire, NG34 8GZ.