

STATEMENT OF WORK FOR

“Colour vision assessment and operational requirements for military aircrew”

20 April 2015

OBJECTIVE

1. Defence Research and Development Canada (DRDC) is conducting a project on aircrew vision requirements and assessment. One focus area within this project is to investigate novel methods of colour vision assessment and the operational requirements for colour vision in military aircrew. The first objective is to evaluate several computer-based tests of colour vision that have recently become available. In order to validate these tests, a sufficiently large population of colour-deficient individuals must be tested. The second objective is to conduct an empirical study on operational vision requirements for colour vision in aircrew.

BACKGROUND

2. Canadian Forces Health Services (CFHS) has an ongoing requirement to evaluate CAF members' vision status, including colour vision status. This occurs during initial recruitment and over the course of a member's career. Several new colour vision testing methods have emerged (e.g. Colour Assessment and Diagnosis – CAD; Cone Contrast Test – CCT; Landolt C Contrast Test – LCST; ColourDx) that have the potential to eliminate shortcomings of the booklet-based in-service methods (e.g. Ishihara plate test, Standard Pseudoisochromatic Plate Tests 2). More specifically, computer-based testing of colour vision can randomize trial sequences and thereby reduce the potential for cheating. Computer-based tests are also administered automatically, which reduces or eliminates the potential for operator bias or mistakes. Accordingly, a computer-based colour vision assessment methodology could improve the effectiveness of screening and evaluation conducted by CFHS. Research is required to validate and compare these tests in their ability to detect, categorize and quantify the severity of, colour vision deficiency. In addition, the operational requirements for colour vision in aircrew require further specification. While some operational colour vision requirements are known (e.g. PAPI light discrimination), further research is required to rule out colour-vision dependent activities for aircrew.

SCOPE

3. The Contactor will be responsible for the conduct of all planning, coordination, training, execution, and implementation necessary to carry out the empirical components of the study, including preparation and submission of ethics protocol, participant recruitment and data collection.

4. The Sub Contractor must ensure they have adequate resources for designing, testing, and implementing the study and are staffed for the data collection, statistical analysis and publication of the resulting research findings. Some of the equipment required for the study will be provided on loan from DRDC (see paragraph 13); any remaining equipment must be provided by the Sub Contractor.

TASKS

5. The Sub Contractor must perform the following work:

a. Colour Vision Test Validation Study

DRDC Toronto has developed a protocol for evaluating the accuracy, reliability, and utility of colour vision tests (Detailed in DRDC Ethics Protocol 2014-044 Amendment 1). A pilot version of this study has already been run at DRDC Toronto and the Sub Contractor must run a full version of the study including a population of 50 colour vision deficient individuals.

1. The Sub Contractor must prepare an ethics protocol for the study. Once endorsed by the DRDC SA, the Sub Contractor must submit the protocol to their institution's research ethics board and to the DRDC Human Research Ethics Committee for approval.
2. The Sub Contractor must implement the experiment design and collect the data.
3. The Sub Contractor must complete the data analysis.
4. The Sub Contractor must provide the SA with a Study Report written-up as a scientific paper and submit the report for external publication once approved by the SA.

b. Operational Vision Requirements Study

The Sub Contractor must design and conduct an empirical study to identify operational vision requirements for aircrew.

1. The Sub Contractor must design an empirical study (Experiment Design) to be approved by the DRDC SA.
2. The Sub Contractor must prepare an ethics protocol for the study. Once endorsed by the DRDC SA, the Sub Contractor must submit the protocol to their institution's research ethics board and to the DRDC Human Research Ethics Committee for approval.
3. Once the Experiment Design and Ethics Protocols are approved, the Sub Contractor must implement the Experiment Design and collect the data.
4. The Sub Contractor must complete the data analysis.
5. The Sub Contractor must provide the SA with a Study Report written-up as a scientific paper and submit the report for publication (either as an internal DRDC

publication or an external publication to be determined by the SA) once approved by the SA.

c. The following general tasks must be completed by the Sub Contractor:

1. Coordinate research meetings between all essential subject matter experts, consultants, and study co-investigators.
2. Submit bi-annual progress reports summarizing all results/findings to date, and providing interim conclusions and recommendations with respect to the course of the study.
3. Develop a detailed multi-year budget plan.
4. Recruit and train all required staff – including clinicians and technicians in accordance with the approved study protocol.
5. Purchase all necessary equipment and laboratory supplies.

DELIVERABLES

6. The deliverables must include:

Number	Task reference	Description and Schedule for Deliverables
6.1	5.a.2	Data collection for the Colour Vision Test Validation Study to be completed and data to be delivered to DRDC SA no later than 27/05/2016.
6.2	5.a.4	Draft Study Report ¹ on the Colour Vision Test Validation Study to be delivered to CIMVHR no later than 27/07/2016.
6.3	5.a.4	Final Study Report on Colour Vision Test Validation Study addressing feedback from the SA on the Draft Study Report to be completed and submitted for publication no later than 26/08/16.
6.4	5.b.1	Experiment Design for the Operational Vision Requirements Study to be delivered to DRDC SA no later than 27/01/2016.
6.5	5.b.3	Data collection for the Operational Vision Requirements Study to be completed and data to be delivered to DRDC SA no later than 15/12/17.
6.6	5.b.5	Draft Study Report ¹ detailing all evidence-based data captured during the conduct of the Operational Vision Requirements Study – including executive summary, background, objectives, methods, results, conclusions & recommendations for future research in this domain to be submitted to DRDC SA no later than 26/01/2018.

¹ For a Study Report that will be a DRDC publication, the Report must be prepared as per DRDC contract publication guidelines (to be supplied by SA), and meet the approval of SA, failing which the documents will have to be revised and resubmitted.

6.7	5.b.5	Final Study Report on the Operational Vision Requirements Study addressing feedback from the SA on the Draft Study Report to be completed and submitted for publication no later than 23/02/18.
6.8	5.c.2	Bi-annual progress reports summarizing all results/findings to date, and providing interim conclusions and recommendations with respect to the course of the study, to be submitted no later than the end of month 3 and month 9 (i.e. months following start date) each year.
6.9		Invoices and supporting documents according to the format specified by CIMVHR no later than March 15 of each fiscal year (2016, 2017, 2018).
6.10		All deliverables and invoices are to be submitted to CIMVHR.

START AND COMPLETION DATES

7. Work is expected to start immediately upon receipt of this tasking and shall be completed by 15 March 2018.

LANGUAGE OF WORK

8. Language of work is English.

INTELLECTUAL PROPERTY (IP) OWNERSHIP

9. The Sub Contractor will own any Foreground IP created by virtue of this contract. The Sub Contractor will not be restricted from presenting accounts and results of the work pertaining to this Contract at symposia, national or regional professional meetings, or from publishing it in journals or other publications. Publications, conference presentations, symposia and all other dissemination of material pertaining to the work of this contract must acknowledge that the work was performed under the Contract with Canada.

10. The Sub Contractor may be invited to participate in the writing of peer-reviewed publications led by the SA and be listed as a co-author on the final manuscript(s). The Sub Contractor may also collaborate with the SA on Sub Contractor-led publications related to the Work.

LOCATION OF WORK

11. Tasks will be conducted exclusively on the premises of the Sub Contractor.

SECURITY

12. All work is unclassified and the Sub Contractor will not have access to any classified information.

GOVERNMENT FUNDED EQUIPMENT

13. The following equipment and software will be provided by DRDC on loan in service of the completion of the Colour Vision Test Validation Study:

- a. Landolt-C Contrast Sensitivity Test “LCST”;
- b. Colour Assessment and Diagnosis “CAD”;
- c. Cone Contrast Test “CCT”;
- d. Oculus Anomaloscope; and
- e. ColorDx.

Any additional equipment purchased by the Sub Contractor with Contract funds for the purposes of conducting the work will need to be returned to Canada at the end of the Contract.

TRAVEL

14. This contract may include the following domestic travel requirements: i) Sub Contractor travel to attend study planning meetings and progress review meetings, to provide training, to perform data collection and to present research findings at scientific meetings; ii) subject travel for data collection. All travel must be authorized in writing by the Scientific Authority and must be undertaken and will be reimbursed in accordance with the Treasury Board's Travel Directive and Special Travel.

BUDGET

15. Researchers who wish to bid on the contract will submit a proposed budget to CIMVHR along with the proposal documents. Budget must be submitted in a specific format using labour rates and allowable expenses determined by the Contract. Please contact CIMVHR for more information and the relevant budget documents.

Budget proposals should be structured to include approximately 6 months of work in 2015-16, plus the additional two years of work in 2017-18. A budget justification should be submitted with the proposal. Details of the final budget will be determined in consultation with CIMVHR.