



National Defence

Défense nationale

National Defence Headquarters  
Ottawa, Ontario  
K1A 0K2

Quartier général de la Défense nationale  
Ottawa (Ontario)  
K1A 0K2

## REQUEST FOR INFORMATION DEMANDE D'INFORMATION

### RETURN TO: RETOURNER À:

Myriam Zakaib  
DLP 7-3-3-2  
Myriam.Zakaib@forces.gc.ca

### Proposal To: National Defence Canada

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods and services listed herein and on any attached sheets at the price(s) set out therefore.

### Proposition à : Défense nationale Canada

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens et services énumérés ici et sur toute feuille ci-annexée, au(x) prix indiqué(s).

<b>RFI No – N° DI</b> W8486-206415	<b>Title/Titre</b> Digital Virtual Trainer
<b>Date of Solicitation – Date de l'invitation</b> 29 September 2020	
<b>Address Enquiries to – Adresser toutes questions à</b>  Myriam Zakaib DLP 7-3-3-2 Myriam.Zakaib@forces.gc.ca	
<b>Telephone No. – N° de telephone</b>  N/A	<b>FAX No – N° de fax</b>  N/A

### Instructions:

**Municipal taxes are not applicable. Unless otherwise specified herein all prices quoted must include all applicable Canadian customs duties, GST/HST, excise taxes and are to be delivered Delivery Duty Paid including all delivery charges to destination(s) as indicated. The amount of the Goods and Services Tax/Harmonized Sales Tax is to be shown as a separate item.**

**Instructions: Les taxes municipales ne s'appliquent pas. Sauf indication contraire, les prix indiqués doivent comprendre les droits de douane canadiens, la TPS/TVH et la taxe d'accise. Les biens doivent être livrés « rendu droits acquittés », tous frais de livraison compris, à la ou aux destinations indiquées. Le montant de la taxe sur les produits et services/taxe de vente harmonisée doit être indiqué séparément.**

<p><b>Solicitation Closes – L'invitation prend fin</b></p> <p>At – à : 14 :00 Eastern Standard Time</p> <p>On - le : 09 November 2020</p>
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Vendor Name and Address - Raison sociale et adresse du fournisseur	
Name and title of person authorized to sign on behalf of vendor (type or print) - Nom et titre de la personne autorisée à signer au nom du fournisseur (caractère d'imprimerie)	
Name/Nom _____	Title/Titre _____
Signature _____	Date _____

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## 1. Purpose and Nature of the Request for Information (RFI)

The Department of National Defence (DND) is requesting Industry feedback regarding a new requirement for a Digital Virtual Trainer for the Government of Canada.

This RFI is neither a call for tender nor a Request for Proposal (RFP). No agreement or contract will be entered into based on this RFI. The issuance of this RFI is not to be considered in any way a commitment by the Government of Canada (Canada), nor as authority to potential respondents to undertake any work that could be charged to Canada. This RFI is not to be considered as a commitment to issue a subsequent solicitation or award contract(s) for the work described herein.

Although the information collected may be provided as commercial-in-confidence (and, if identified as such, will be treated accordingly by Canada), Canada may use the information to assist in drafting performance specifications (which are subject to change) and for budgetary purposes.

Respondents are encouraged to identify, in the information they share with Canada, any information that they feel is proprietary, third party or personal information. Please note that Canada may be obligated by law (e.g. in response to a request under the Access of Information and Privacy Act) to disclose proprietary or commercially-sensitive information concerning a respondent (for more information: <http://laws-lois.justice.gc.ca/eng/acts/a-1/>).

Respondents are asked to identify if their response, or any part of their response, is subject to the Controlled Goods Regulations.

Participation in this RFI is encouraged, but is not mandatory. There will be no short-listing of potential suppliers for the purposes of undertaking any future work as a result of this RFI. Similarly, participation in this RFI is not a condition or prerequisite for the participation in any potential subsequent solicitation.

Respondents will not be reimbursed for any cost incurred by participating in this RFI.

The RFI closing date published herein is not the deadline for comments or input. Comments and input will be accepted any time up to the time when/if a follow-on solicitation is published.

## 2. Objectives of the RFI

The purpose of this RFI process is to inform Industry of the impending RFP for a Digital Virtual Trainer by Canada, to request that interested parties provide feedback on the breadth and depth of the project, as well as to inform Industry of the upcoming requirement.

The intent of the consultation process will be to request information regarding the feasibility of Industry providing the requirement as outlined in this RFI. DND will inform and consult with Industry regarding the following:

- Level of interest in providing a Digital Virtual Trainer.
- Ability to meet the technical requirements identified in Annex A.

A list of questions is provided in Annex B, for your response. Note that the information requested is for information purposes only and will allow DND to clearly define the requirement

for the required services and obtain additional information for the development of bid evaluation criteria.

### **3. Requirement Information**

DVT must provide the Department of National Defence (DND) and the Canadian Armed Forces (CAF) with enterprise licencing for a first person, squad, and, Naval, Aviation, and Land vehicle crew-level environment. It must integrate with the Canadian Army (CA) and Joint Constructive Simulation System (CONSIM) for visualization of aggregated and entity simulations, sensor feeds, and, after action reviews.

The DVT must operate as stand-alone, entity and formation, virtual trainer up to sub-unit level, corresponding to CA Collective Training (CT) Level Five (L5), and Joint equivalents (See Annex A).

Above L5, the DVT must federate, via standard protocols, (see Annex C), with CA and Joint Constructive Simulation systems. At this level, DVT must provide visualisation of CA and Joint level individual and aggregate level entities, plus sensor feeds from sea, land and air reconnaissance platforms.

DVT supports the Government of Canada, “Strong, Secure, Engaged”, (SSE) defence policy, by sustaining training and related force generation activities in a joint interoperability context.

User characteristics are linked to the simulation domains supported by CA Constructive Simulation, including DVT. Primary users include CADTC, CA Divisional Simulation Centres, and Joint Warfare Centres.

### **4. Legislation Trade Agreements, and Government Policies**

The following is indicative of some of the legislation, trade agreements and government policies that could impact any follow-on solicitation(s):

The requirement is subject to the provisions of all trade agreements: the Canadian Free Trade Agreement (CFTA), the Canada-Chile Free Trade Agreement (CCFTA), the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the Canada-Columbia Free Trade Agreement (CCoIFTA), Comprehensive Economic and Trade Agreement (European Union), the Canada-Honduras Free Trade Agreement (CHFTA), the Canada-Korea Free Trade Agreement (CKFTA), the North American Free Trade Agreement (NAFTA), the Canada-Panama Free Trade Agreement (CPanFTA), the Canada-Peru Free Trade Agreement (CPFTA), the Canada-Ukraine Free Trade Agreement, and the World Trade Organization Agreement on Government Procurement (WTO-AGP).

### **5. Schedule**

In providing responses, the following schedule should be utilized as a baseline:

- Request for Information (RFI)
- One-on-One sessions (if necessary)

- RFP issued
- Evaluation of Bids
- Contract Award

## 6. Important Notes to Respondents and Submission Requirements

### 6.1 Enquiries

Interested respondents must submit their responses and enquiries **electronically** to the DND Procurement Authority, identified below:

Name: **Myriam Zakaib**  
Title: **Materiel Acquisition and Support Officer**

Department of National Defence (DND)  
Assistant Deputy Minister (ADM) Materiel  
Director General Land Equipment Program Management (DGLPEM)  
Directorate Land Procurement (DLP)

E-mail: Myriam.Zakaib@forces.gc.ca

### 6.2 Response Format

- a) Cover Page:** If the response includes multiple volumes, respondents are requested to indicate on the front cover page of each volume the title of the response, the solicitation number, the volume number and the full legal name of the respondent. A point of contact for the Respondent should be included in the package.
- b) Title Page:** The first page of each volume of the response, after the cover page, should be the title page, which should contain:
  - i. the title of the respondent's response and the volume number;
  - ii. the name and address of the respondent;
  - iii. the name, address and telephone number of the respondent's contact;
  - iv. the date; and
  - v. the RFI number.
- c) Numbering System:** Respondents are requested to prepare their response using a numbering system corresponding to the one in this RFI. All references to descriptive material, technical manuals and brochures included as part of the response should be referenced accordingly.
- d) Language of Response:** Responses may be provided in English or French, at the preference of the respondent.
- e) Response Parameters:** Respondents are reminded that this is an RFI and not an RFP and, in that regard, respondents should feel free to provide their comments and/or concerns in addition to their responses, where applicable, alternative recommendations regarding how the requirements or objectives described in this RFI could be satisfied. Respondents are also invited to provide comments regarding the content, format and/or

organization of any draft documents included in this RFI. Respondents should explain any assumptions they make in their responses.

- f) DND reserves the right to seek clarifications from a respondent for any information provided in response to this RFI, either by telephone, in writing or in person.
- g) **Response Confidentiality:** Respondents are requested to clearly identify those portions of their response that are proprietary. The confidentiality of each respondent's response will be maintained. Items that are identified as proprietary will be treated as such except where DND determines that the enquiry is not of a proprietary nature. DND may edit the questions or may request that the respondent do so, so that the proprietary nature of the question is eliminated, and the enquiry can be answered with copies to all interested parties.

There is no page limit on the response to be provided. Respondents are requested to respond to all questions posted in Annex B.

### **6.3 Submission of Responses**

- a) **Time and Place for Submission of Responses:** Responses are to be submitted electronically to the Contracting Authority in Section 7.1.
- b) **Responsibility for Timely Delivery:** Each respondent is solely responsible for ensuring its response is delivered on time to the Contracting Authority in Section 7.1.

### **6.4 Nature of Responses Requested**

Respondents are requested to provide their comments, concerns and, where applicable, alternative recommendations regarding how the requirements or objectives described in this RFI could be satisfied. Respondents are also invited to provide comments regarding the content, format and/or organization of any draft documents included in this RFI. Respondents should explain any assumptions they make in their responses.

## **7. Treatment of Responses and upcoming One-on-One Meetings (if applicable)**

- a) **Use of Responses:** Responses will not be formally evaluated. However, the responses received may be used by Canada to develop or modify procurement strategies or any draft documents contained in this RFI. Canada will review all responses received by the RFI closing date. Canada may, in its discretion, review responses received after the RFI closing date.
- b) **Review Team:** A review team composed of representatives of the client (where applicable) and DND will review the responses. Canada reserves the right to hire any independent consultant, or use any Government resources that it considers necessary to review any response. Not all members of the review team will necessarily review all responses.
- c) **Follow-up Activity:** Canada may, in its discretion, contact any respondents to follow up with additional questions or for clarification of any aspect of a response. Also DND reserves the right to request a one-on-one meeting with any respondents. During this meeting respondents will be requested to provide an overall presentation, which will be followed by questions from DND. DND reserves the right to set the agenda, the number

of attendees and the date, time and length of these one-on-one meetings. Please note that these meetings are not to include marketing-type presentations. Respondent participation in any one-on-one meeting is **not mandatory** for this RFI, nor will non-participation preclude any supplier from participating in any potential final RFP resulting from this process. All meetings will be treated as confidential. Canada will not reimburse any respondent for expenses incurred for any follow-up activities

## **8. Closing date for the RFI**

Responses to this RFI are to be submitted to the Procurement Authority identified above, on or before **09 November 2020**.

Changes to this RFI may occur and will be advertised on the Government Electronic Tendering System (GETS). Canada asks respondents to visit Buy and Sell at <https://buyandsell.gc.ca/for-government> regularly to check for changes, if any.

## **ANNEX A. Technical Evaluation Requirements**

### **1. Mandatory Requirements**

Canada defines Mandatory Technical Requirements in the criterion columns below. The criterion columns will determine if the Bidder has successfully achieved the minimum requirement. The Bidder must provide all information, documentation and follow any instructions specified in the evaluation criteria. Canada's evaluation team will evaluate the information, documents or other data provided by the Bidder to determine if the Bidder has successfully addressed all Mandatory Requirements.

Bidders must successfully meet all Mandatory Requirements in order for Canada to consider their response/proposal. If Canada's Evaluation Team deems that a Bidder fails to meet one of the Mandatory Requirements, Canada will deem the Bidder's response/proposal Non-Compliant, and their proposal will receive no further consideration.

### **2. Bid Compliance Matrix**

The Bidder must provide a completed copy of this Compliance Matrix with their bid in electronic (Microsoft Word Format) format as well as a printed hard copy. For each requirement the Bidder must indicate whether the **MANDATORY REQUIREMENT** is met in the **MET** column and identify in the **BID REFERENCE** column where in the proposal the requirement has been met.



## MODELLING

CATEGORY	REQUIREMENT
<p><b>Terrain Representation</b></p>	<p>4.1.1. DVT must represent the “Whole of Earth.” This is to include, at a minimum, the following biomes: tropical rainforest, temperate rainforest, desert, tundra, taiga (boreal forest), grassland, wetlands, and arctic. This must also include, at a minimum the following landforms: beaches, bluffs/cliffs, canyons, dunes, hills, mountains, lakes, oceans, rivers, and ponds, plains, and valleys. Terrain must reflect events such as the passage of vehicles and explosions.</p> <p>4.1.2. Users must be able to define the degree to which terrain impedes progress of entities in accordance with terrain classification.</p> <p>4.1.3. DVT must generate custom/geospecific terrain from source data provided by DND.</p> <p>4.1.4. Users must be able to generate 2D tactical and topographical maps that correlate to the virtual and real terrain at user selected map scales from 1:5,000 to 1:1,000,000. These maps must be georeferenced and exportable in standard (COTS) GIS formats</p> <p>4.1.5. Terrain modelling must enable tactical exploitation of terrain including but not limited to cover from enemy fire, cloaking, and fire positions.</p> <p>4.1.6. The DVT must enable cause-and-effect relationships resulting from within the synthetic environment. For example, during a simulation, vehicles will leave tracks on ground, artillery impacts will create craters, projectile impacts will damage buildings and impact terrain and rain will turn ground muddy and affect mobility. Effect of snow and/or ice on terrain/terrain features (ground will be slippery/traction reduced, bodies of water freeze, snow accumulation on objects/ground) and affect mobility.</p> <p>4.1.7. Terrain must portray a smooth transition between differences in terrain elevation and map edges in order to avoid sharp and unnatural edges. The DVT must permit import and display of standard elevation data formats at appropriate resolution to include but not limited to: DTED0; DTED1; DTED2; and, LiDAR.</p> <p>4.1.8. Terrain databases must include correlated day vision, night vision and thermal representations of the terrain. The user</p>

	<p>must be able to view and interact with the correlated day vision, night vision and thermal representations of the terrain.</p> <p>4.1.9. Features within the terrain databases must contain attribution according to their feature class (type) and extent, including but not limited to, soil surface region (sand, gravel, mud, soil, etc.), landcover (beach, forest, grassland, marsh, sand dune, swamp, thicket etc.), road types (paved, unpaved, gravel, dirt etc.), water depth (waterways, streams, lakes, oceans etc.), infrastructure, urban (built up areas).</p> <p>4.1.10. Placeholder.</p> <p>4.1.11. Terrain databases must incorporate solid obstacles to impede land vehicle movement. For example, houses, narrow urban terrain, and vegetation.</p> <p>4.1.12. DVT must not limit the size of the terrain databases. The area of the terrain database “playbox” depends on end users requirements. The rest of the world will be represented by fabricated/auto-generated terrain.</p> <p>4.1.13. DVT must be able to integrate custom terrains seamlessly with the fabricated/auto-generated world terrain. Terrain databases must have a visual extension at the border of the terrain with at least 5 km extent.</p>
<p><b>Environment Modelling</b></p>	<p>4.2.1. DVT Environmental conditions must be accurately depicted within the synthetic environment with their appropriate effects on sensors, movement, and vision. These conditions include but are not limited to light conditions, weather conditions, obscurants (smoke) and seasons. For example, a strong wind would blow smoke in the appropriate direction and speed.</p> <p>4.2.2. The DVT Software Developer Kit (SDK) must allow users to dynamically modify environmental conditions present in the synthetic environment.</p> <p>4.2.3. The synthetic environment must accurately represent light conditions according to the nature of the light source (sun, moon and artificial), simulated time, geographical location and weather conditions.</p> <p>4.2.4. The synthetic environment must accurately represent weather conditions including but not limited to rain, sleet, snow, fog, wind, and sand storms. This must include seasonal conditions, such as winter snow cover on the ground, water bodies frozen and effects on leaf cover.</p>

<b>Computer Generated Entity Representations</b>	<p>4.3.1. The DVT must render Blue, Red and Neutral entities in sufficient detail for visual detection, classification and identification. Entities must include, "Pattern of Life", instantiations in all terrain settings. Entity behaviours must reflect damaged, destroyed, wounded or killed states.</p> <p>4.3.2. Computer Generated Entities (CGE) must be modeled using open standard formats for 3D models. The SDK must modify vehicle attributes such as dimensions, weight, fuel and expendables capacity, transmission ration and maximum speed to reflect those of live sea, land and air vehicles.</p> <p>4.3.3. CGE articulations and animations must be configurable with DIS enumerations. Models must support damage states affecting mobility fighting ability and full loss of viability.</p> <p>4.3.4. DVT must provide tools to enable the creation, deletion and modification of CGE attributes at run time (such as EO/IR signature) and the import and export of GFI CGE.</p> <p>4.3.5. CGE must include but not be limited to enemy, friendly and neutral forces, civilians, animals, structures, obstacles and clutter. See Annex B. Enemy, friendly and neutral force CGE must include various military elements including but not be limited to naval and civilian water craft, infantry, armour, artillery, engineers, aviation, air defense, fast air, UAV, medical and logistical elements.</p> <p>4.3.6. CGE representing structures must include but not be limited to huts, barns, houses, apartment buildings, schools, religious buildings, hospitals, factories, shops, gas stations, rail stations, airports, compound structures, cave systems.</p> <p>4.3.7. CGE representing obstacles must include but not be limited to sand bags, fences, wire, ditches, road blocks, check points, tunnels, mine fields, trenches, concrete road barriers and gabions.</p> <p>4.3.8. CGE representing clutter must include but not be limited to barrels, car wrecks, garbage, containers, and crates.</p> <p>4.3.9. The CGEs must be affected by external influence including but not limited to being damaged, destroyed, wounded, killed or moved.</p> <p>4.3.10. CGE must be capable of being automated and displaying a realistic pattern of life. For example, neutral forces in a village will go about their daily business instead of remaining still or an attack on a village will cause civilians to flee or hide.</p>
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	<p>4.3.11. Autonomous and semi-autonomous CGE must be capable of detecting CGE, terrain and culture outside air and land vehicles, so that, when dismounting, they can execute appropriate TTPs.</p> <p>4.3.12. DVT CGE must have visualisations in different light condition and through sensors using light amplification or thermal energy: <u>Ground Models:</u> Day Visual Unaided (3 meter high target)<sup>1</sup> detectable@3000 meters; classify@1500 meters; identify@1000 meters Day Visual Magnified (3M high target) detect@6000M classify@4000M ID@2000M Night Aided (NVG or Thermal) detect@1000M classify@500M</p> <p><u>Air Vehicles:</u> Day Visual Unaided detect@6NM determine flight orientation@6NM ID air vehicle@4NM</p> <p>4.3.13. CGE must realistically display textures, damage states and articulated parts (for example a tank barrel). CGE with articulated weapon systems must have at least 4 damage states including: undamaged, mobility damage, turret damage and totally damaged.</p> <p>4.3.14. All other CGE must have at least 3 damage states: undamaged, partially damaged and totally damaged.</p> <p>4.3.15. CGE must be capable of aggregation at doctrinal Collective Training levels (See Annex A).</p> <p>4.3.16. Dismounted CGE, civilians and other life forms must be able of adopting postures including but not limited to standing, prone, crawling, walking, running, wounded and dead.</p> <p>4.3.17. Enemy, friendly and neutral force CGE must exhibit various modifiable attributes including but not limited to acquisition time, engagement time, effectiveness of fire and ability to evade fire.</p>
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<sup>1</sup> For example, Detect means, “there is a moving object at this location”; Classify means, “it is a commercial pattern vehicle”; Identify means, “It is a pickup truck”.

	<p>4.3.18. Enemy, friendly and neutral forces CGE and civilian CGE mobility must be affected by the terrain type including but not limited to its composition (road, sand, gravel, mud, etc.), slope, vegetation, water depth.</p> <p>4.3.19. DVT must realistically portray and animate the movement and behaviours of automatic and semi-automatic CGE sea, land and air vehicles.</p> <p>4.3.20. Battlespace CGE objects must have a unique reference ID that persists during run-time scenarios and re-starts.</p>
<b>Culture (Man-made features such as roads, bridges, buildings, towers)</b>	<p>4.4.1. DVT must render buildings, bridges, roads and other structures in sufficient detail for visual detection, classification and identification.</p> <p>4.4.2. Culture must reflect weapon effects, damage from environment effects such as floods and fire, and, the passage of vehicles.</p>
<b>Weapon Performance</b>	<p>4.5.1. Ballistics, damage and other weapon parameters represent effects of the class of system, but are UNCLASSIFIED (UNCLAS) on DVT delivery.</p> <p>4.5.2. The DVT SDK must allow users to modify weapon system parameters according to classification and objectives of the exercise or experiment.</p>
<b>Legacy and Tailored Models</b>	<p>4.6.1. DVT must import for re-use, Government Furnished (GFI) entity, culture and terrain models, (As listed in Annex B). DVT must support user or vendor generation of new models.</p>
<b>Vehicle Dynamics</b>	<p>4.7.1. DVT must animate sea, air and land vehicles with physics-based vehicle dynamic models. Dynamic models must be tuned to the specific vehicle class and type. The DVT SDK must enable modification of the dynamics models.</p>

## SIMULATION

CATEGORY	REQUIREMENT
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<b>Placeholder</b>	5.1.1. This cell intentionally left blank.
<b>Time</b>	5.2.1. Simulations must execute in real time and user-selectable rates of slow or fast time. DVT must ensure that Simulation time is synchronized across user stations. At run-time, DVT scenarios must execute in the following user-selectable increments: .25, .5, 1, 2, 3, 5, and 10 times real time.
<b>Injects</b>	<p>5.3.1. DVT must permit users to modify parameters such as scenario, terrain and weather during run-time.</p> <p>5.3.2. DVT must display status information for CGE objects and changes via notification. Examples: position, waypoints, hostility level, materiel holdings, tactical posture, bearing, speed and damage state.</p>
<b>Environmental Conditions</b>	<p>5.4.1. DVT must represent environmental conditions such as 24 hour cycles, seasons, weather, position of sun, moon and stars, and, obscuring phenomena.</p> <p>5.4.2. DVT must reproduce natural and man-made environmental sounds, including Doppler shift. DVT must allow users to modify the language of human utterances.</p> <p>5.4.3. DVT must reproduce explosion sounds IAW weapon yields and flash to bang delay.</p> <p>5.4.4. DVT must reproduce machinery and other equipment sounds.</p>
<b>Synchronization</b>	5.5.1. DVT must support multi-display channel synchronization.
<b>Command and Control Interface</b>	<p>5.6.1. DVT must generate Command and Control messages in selected formats. (See Annex C.)</p> <p>5.6.2. DVT must represent CGE object navigation information such as position, altitude, heading, attitude and GPS information at a level appropriate to a virtual human or sea, land or air vehicle entity.</p>
<b>Instructor/Operator Station (IOS)</b>	<p>5.7.1. DVT must allow an IOS to load, initiate and control scenarios and environmental conditions.</p> <p>5.7.2. The IOS must allow instructors, operators or EXCON staff the ability to control training for a single trainee or multiple trainees from a single control station.</p> <p>5.7.3. The IOS must allow instructors, operators or EXCON staff to dynamically access, modify any element in the synthetic environment including terrain, environmental conditions and CGE. Specifically: Access to ORBAT Creation of new units and groups IAW Mil Std 2525 types</p>

	<p>Creation of new control features (markers) Create, read, update and delete CGE Access to fixed CGE object parameters such as ID DVT must allow apparitions such as rain and snow to appear suddenly or gradually</p> <p>5.7.4. The IOS must allow instructors, operators or EXCON staff to dynamically start, stop and restart specific exercises from any temporal or spatial location.</p> <p>5.7.5. The IOS must be designed to allow instructors, operators or EXCON staff to view multiple simultaneous windows including but not limited to: views in vehicle crew and dismount position and their instruments; trainee status such as health and ammunition count; a topographical map displaying position and orientation of combat CGE objects-including aim points of articulated weapons and sensors; and, statistical information.</p> <p>5.7.6. The IOS must allow instructors, operators or EXCON staff the ability to easily battlefield metrics and dynamically calculated statistical information including but not limited to hits, misses, and detection distances.</p> <p>5.7.7. The IOS must allow instructors, operators or EXCON staff the ability to dynamically control AI actions of CGE including but not limited to: movement; deploying weapon systems; mounting; dismounting; entering and leaving buildings; attacking; defending; withdrawing; retreating; delaying; clearing; patrolling; consolidating; breaching; and, taking up specific formations or positions.</p> <p>5.7.8. The IOS must allow instructors, operators or EXCON staff the ability to dynamically alter CGE attributes such as: health status; skill level hostility level; and, location. For example, a destroyed tank may be instantly revived and moved to another battlefield location, a group of civilians may suddenly become hostile.</p> <p>5.7.9. The IOS must allow instructors, operators or EXCON staff or operators the ability to introduce pre-programmed exercise injects using triggers.</p> <p>5.7.10. The IOS must allow players, instructors, operators or EXCON staff the ability to control CGE as individual entities or as aggregate groups, IAW CT Levels.</p> <p>5.7.11. The IOS must allow instructors, operators or EXCON staff the ability to communicate with any other personnel in the training system using C2 formatted messages, simulated radio, text or telephone as</p>
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	<p>appropriate. DVT must enable voice or formatted message communication between CGE.</p> <p>5.7.12. The IOS must allow instructors, operators or EXCON staff the ability to monitor and record trainee communications.</p> <p>5.7.13. The IOS must have an autonomous mode that allows a virtual instructor to operate the system using pre-defined scenarios and or course content.</p>
<p><b>After Action Review (AAR)</b></p>	<p>5.8.1. The DVT AAR capability must capture and replay the entirety of the synthetic environment (terrain, environmental conditions, CGE, instrument readings and site views) from any spatial or temporal point and from the viewpoint of any CGE.</p> <p>5.8.2. The AAR capability must be able to capture and replay all communications, sounds and recording of trainees.</p> <p>5.8.3. The AAR capability must include tools that allow for the automated creation of an AAR presentation based on relevant exercise events that instructors can then edit if necessary.</p> <p>5.8.4. The AAR capability must include tools that allow for the ability to tag and easily find specific temporal points and or actions that occurred within the synthetic environment. For example, during a 24 hour exercise a user must be able to find when a battle occurred without having to forward through the entire exercise.</p> <p>5.8.5. The AAR capability must allow for the selection, annotation and export of video sequences from an exercise replayed in 3D Stealth and 2D tactical map to a feasible media with related communication and sound (radio, intercom and combat sounds).</p> <p>5.8.6. The AAR capability must allow for the conduct of an AAR while another exercise is being conducted.</p>

**SCENARIOS**

CATEGORY	REQUIREMENT
<p><b>Scaling</b></p>	<p>6.1.1. DVT must provide a first-person gaming interface to network individuals, squads, platoons, vehicles and Joint</p>



	<p>force team members. DVT must scale scenarios from CT Levels One to Five.</p> <p>6.1.2. DVT must demonstrate a scenario at CT Level Five (Combat Team) as described at: B-GL-321-006/FP-001: Combat Team in Operations. The demonstration must include the Combat Team, also known as the Sub-Unit, augmented by aviation and one battery of artillery.</p> <p>6.1.3. Demonstrated scenario must execute in an open format terrain data base, using source data provided by DND.</p> <p>6.1.4. The DVT application must provide a graphical interface, which does not require software coding, to create, modify or run scenarios.</p> <p>6.1.5. The DVT application must be configurable to coordinate multiple DVT application instances from a single master DVT application instance, to support a distributed scenario or vignette.</p>
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**INFORMATION MANAGEMENT/INFORMATION TECHNOLOGY**

CATEGORY	REQUIREMENT
<b>Hosting</b>	7.1.1. The vendor must provide hosting options to include desktop, client-server, virtual machine, thin client and cloud.
<b>Image Generator (IG)</b>	<p>7.2.1. DVT must include image generation in visual and sensor spectral bands. The integrated IG must provide resolution, field of view and brightness to enable detection, classification and identification of entities, culture and terrain.</p> <p>7.2.2. The IG must present imagery to desktop or other monitor, projection on flat screen or dome display, immersive virtual reality and augmented reality devices.</p> <p>7.2.3. The IG must ensure, “fair fight”, synchronization, between multi-user stations, of Level of Detail and weather.</p> <p>7.2.4. The IG must operate on the latest versions of MS Windows, starting with Windows 10 64 bit, at contract award.</p> <p>7.2.5. The IG must support CIGI version 3.3.</p> <p>7.2.6. Must support DIS 6 or higher (Entity packets as well as interactions).</p> <p>7.2.7. Must support multi-channel synchronization.</p> <p>7.2.8. Must support Virtual Reality headsets.</p> <p>7.2.9. Must support an accurate ephemeris model -based on the date, time and location.</p> <p>7.2.10. Must support weather effects such as clouds, fog, precipitation, and wind and sea states.</p> <p>7.2.11. Must support particle effects such as dust.</p> <p>7.2.12. Must support special effects such as tracer rounds, explosions, missile trails, muzzle flashes, smoke, fire and flares.</p> <p>7.2.13. Must support user created overlays (such as HUDs) in OpenGL or Direct X.</p> <p>7.2.14. Must support simulating infrared sensor and camera views and Night Vision Devices. Sensor displays must allow selection of position, orientation, and adjustment of optics on separate individual channels.</p> <p>7.2.15. Must support controlling the articulation and animations of standard 3D models.</p>

	<p>7.2.16. Must support whole world terrain with high resolution inserts.</p> <p>7.2.17. Must support modeling underwater terrain.</p> <p>7.2.18. Must support standard GIS vector and raster data for the construction of terrain data, including but not limited to: Vector polygon, line and point data, Raster image, elevation data and bathymetry data.</p> <p>7.2.19. DVT must allow users to create rule sets defining how and when CGE and terrain are rendered. For example: Specific CGE always appear regardless of view distance IG forces rendering of a specific CGE LOD regardless of view distance</p> <p>7.2.20. DVT must allow access to the framebuffer and rendering pipeline.</p>
<p><b>Integration with Legacy Constructive Sim</b></p>	<p>7.3.1 DVT must integrate with the legacy CONSIM systems to provide 2D and 3D visualization of the battlespace.</p>
<p><b>Placeholder. Left blank.</b></p>	<p>7.4.1 <i>Placeholder.</i> Left blank.</p>
<p><b>SDK</b></p>	<p>7.5.1. The DVT application must provide a graphical interface, which does not require software coding, to create, modify or run scenarios.</p> <p>7.5.2. The DVT application must provide a map-based user interface for scenario development by a non-specialist.</p> <p>7.5.3. The DVT application must provide a user interface for the editing of entities, weapons and sensors by a non-specialist. The SDK must allow access to object information such as type, size, shape, control features, and military characteristics.</p> <p>7.5.4. The SDK must allow enumeration of battlespace object instances, including units, materiel and control features.</p> <p>7.5.5. The DVT application must provide a user interface for the editing of terrain navigation mesh and CGE geometry by a non-specialist.</p> <p>7.5.6. The SDK must allow access to inter-visibility and sensor detection information, including: LOS visibility cylinder between two points Visibility between two points based on selected sensor Detection between two points based on sensor and AI</p>

	<p>7.57. The DVT API must allow access from C/C++, Java, JavaScript, HTML 5 or network protocol.</p> <p>7.5.8. Any C/C++ libraries must include current and one previous release of Visual Studio.</p> <p>7.5.9. Any Java implementations must support JRE 11.</p> <p>7.5.10. SDK documentation must include units and geometric frame, (for example, "get Speed", will return the current speed in metres/second).</p> <p>7.5.11. SDK and API must allow de-bugging during run-time: API calls return error codes in case of failure API sets breakpoints and watches Symbols are available for all user code Ability to attach to the process.</p> <p>7.5.12. The UI framework must use an open standard such as HTML 5.</p>
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## **ANNEX B – Questions to the Industry**

1. Are the requirements as stated in the attached Annex A clear?
2. Are there missing elements/components to the work, tasks and/or deliverables?  
If yes, specify.
3. Are there any technical evaluation criterion that you think should be *added*? If yes, please explain what they are and why they should be added?
4. Are there any technical evaluation criterion that you think should be *removed*? If yes, please explain what they are and why they should be removed?
5. What management requirements would be necessary to support the requirements in Annex A?
6. Is enterprise access for licenses feasible?
7. Are training services available or would new training material need to be developed for this requirement?
8. Transition Period: How much time is needed in order to have the requirement listed in Annex A operational?
9. Please identify any issues that would limit your ability to provide the requirement outlined in Annex A.
10. Is there anything in Annex A that would preclude you from submitting an offer? If so, can you tell us what it is and explain why?
11. Would you submit an offer on this if it was tendered as described herein? If not, please explain why.
12. Can we request pricing to get a better cost estimate for potential contracts?
13. Do you have any other concerns that you would like to address?

## **ANNEX C – CONSTRAINTS**

DVT must enable the CA and Joint users to develop, deploy and support a Synthetic Environment (SE) capable of reliably and repeatedly generating virtual and constructive simulation events. Events must unfold in real, accelerated or delayed time. At a minimum, DVT, in stand-alone mode, must permit the creation of first person and sea, land and air vehicle crew simulation events at CT Levels Two and Three (see Table C-1). DVT must integrate with CONSIM applications to visualise and provides sensor feeds for Collective Training (CT) events above Level Three. For additional context, please see Table C-4 for the composition of CA Echelons.

User characteristics are linked to the simulation domains supported by CA Constructive Simulation, including DVT. Primary users include CADTC, CA Divisional Simulation Centres, and Joint Warfare Centres.

Training and Education. Navy, Army and Air Force Regular and Reserve Force personnel receive individual and formation training managed by staff at warfare centres, division training centres and training establishments. For additional context, see Table C-4 for the composition of CA Echelons. Users expect that the DVT will enable virtual first-person individual and crew/vehicle simulation at CT Levels 1-3 (see Table C-1). Above L3, DVT must integrate fully with Constructive Simulation applications for command and staff training, primarily for visualisation of 3D entities, sensor feeds and after action review.

Operations and Planning. HQ Staff use constructive simulation to develop Courses of Action and rehearse for missions (AKA war gaming). DVT provides image generation and entity level visualisation.

Concept Development and Experimentation. CA and Joint Warfare Centres use constructive simulation to explore courses of action and develop C4ISR doctrine. DVT provides image generation and entity level visualisation. For additional context, see Table C-3 for the mandatory visual entity models and Table C-4 DVT Interoperability Standards.

Research and Development. Defence Scientists and Defence Contractors use the Sim Baseline and DVT for reliable and repeatable experimentation and demonstration for training and human factors engineering.

Acquisition and Life-Cycle Management. Domains include requirements definition and in-service support modelling. Users may increase the fidelity of Sim Baseline components as required.

**Table C-1. Collective Training Levels**

<b>Collective Training Level</b>	<b>Comments</b>
<b>Level Seven:</b> Formation (Brigade Group)	<ul style="list-style-type: none"> <li>1. Training at this level may be multinational and may include a requirement to understand higher-level coalition operations.</li> <li>2. Increased emphasis will be placed on FSO within a JIMP context.</li> </ul>
<b>Level Six:</b> Unit and combined arms unit (battle group/battalion group)	<ul style="list-style-type: none"> <li>3. This includes unit training in non-manoevre units prior to incorporation into another unit or formation.</li> <li>4. Level 6 CAXs and CPXs should be used for command and staff training, in both FSO and domestic operations scenarios.</li> <li>5. Level 6 field training will generally be limited to training for high readiness and will be confirmed by force-on-force training.</li> <li>6. All Level 6 training will generally take place in a joint and combined context.</li> </ul>
<b>Level Five:</b> Combined arms sub-unit	<ul style="list-style-type: none"> <li>1. Level 5 training is the CA's vital ground in terms of CT. During training for high readiness, Level 5 training <b>must</b> include live fire training.</li> </ul> <p>Level 5 training is conducted by combat teams (cbt tms), company groups (coy gps) or other multi-disciplinary sub-unit organizations (ie, an All-Source Intelligence Centre (ASIC), a forward support group (FSG) or a field artillery battery).</p> <p><b>Enhanced Level 3</b></p> <p>may be used to describe combined arms operations at the sub-sub-unit level, in a Level 5 context.</p> <ul style="list-style-type: none"> <li>1. It is at this level that the synchronization of arms and services becomes critical.</li> </ul>
<b>Level Four:</b> Sub-Unit	<p>Similar to Level 3, focused on TTP training.</p> <p>Training a sub-unit to this level will generally be required by a FG unit prior to forming a combined arms unit or JTF.</p>
<b>Level Three:</b> Sub-sub-unit (troop (tp) / platoon (pl))	<p>Increased command and control challenges.</p> <p>Tactical situations should be less predictable than Level 2, and battle drills should be less detailed.</p>

<b>Level Two:</b> Section (sect)/ crew/det	Generally battle drills, aimed at executing battlefield tasks to a high standard.  Combat battle tasks training should generally culminate in a Level 2 live fire event (stand or FTX).
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**Table C-2. Composition of CA Echelons**

Single Arm Echelon Name	Combined Arms Echelon Name	CAF Echelon Name	Typical Doctrinal Composition	Nominal Size	
				Pers	Vehicles
Brigade Group (Bde Gp)	Brigade Group (Bde Gp)	Formation	- 3 x Infantry Bn - 1 x ARmd Regt - 1 x Arty Regt - 1 x Cbt Engr Regt - 1 x Svc Bn (Logistics) - 1 x Field Ambulance - 1 x Signals Sqn	4800	400 Armoured 600 Support
Battalion/Regiment (Bn/Regt)	Battle Group (BG)	Unit	- 2 or More Coys/Sqns, typically 3-4 Coys Sqn - A BG will have Coys/Sqns from different Arms	600-900 pers	100-150 Vehs
Company/Squadron/Battery (Coy/Sqn/ Bty)	Combat Team (Cbt Tm)	Sub-Unit	2 or more Pls/Tps, typically 3-4 Pls/Tps - A Cbt Tm will have Pl/Tps form different Arms	60-180 pers	25-40 vehs
Platoon/ Troop (Pl/Tp)	Not Applicable	N/A	2 or more Sections, typically 3-4 sections	15-40 pers	4-8
Section/Patrol/Vehicle (Sect/Ptl)	Not Applicable	N/A	2 or more detachments	3-10 pers	1-2
Detachment /Team (Det/Tm)	Not Applicable	N/A	2 or more soldiers, potentially with a vehicle and special equipment	1-3 pers	1



**Table C-3 Mandatory Visual Entity Models**

DISMOUNTS	TRACKED	WHEELED	STATIC	AVIATION
AFV Crew – C7A2	Leopard 1C2	HLVW – Fuel Tank	C16 81mm Mortar	CC-130E Hercules
AT Soldier – Carl Gustav	Leopard 2A4	AHSVS – HET	C3 105mm	CC-177 Globemaster III
AT Soldier – M72 LAW	Leopard 2A4M	AHSVS – Wrecker	LG1 105mm	CC-177 Globemaster III – Cargo Seats
Automatic Rifleman – C9A2	Leopard 2A6m	Badger – AEV	My9 60mm Mortar	CF-188A – M61A1, GBU-12
FA/JTAC – C702	Badger – AEV, Up Armored	Buffalo	M2 Machinegun	CH146
Grenadier – C7A2/M203	Beaver – AVLB	Cougar	M2 Machinegun – API	CH-146 –C6
Machine Gunner – C6	Leopard 2A4	Coyote	M2 Machinegun – SLAP	CH – 146 – M134
Rifleman – C7A2	M113 – ADATS	HLVW – Cargo	M220 TOW	CH-147 C6
Rifleman – M870 Shotgun	Puma	HLVW – Cargo, Up Armored	Weapons: C6, C7, C8, C9, C14, M870, M19.	CH-147 – Ramp, C6
Section Leader – C7A2	Taurus – ARV	HLVW – Crane		
Sniper – C14	Taurus – ARV, Up Armored	HLVW – Crane, Up Armored		
Sniper – Tac50	Wiesel-1	Husky – T-MDV		
		Husky – T-MDV, All Trailers		
		LAV III – C2		
		LAV III – Engineer		
		LAV III – ISV, RWS		

		M777 – 155mm Howitzer  MPEV  MPEV – Up Armored  RG-31		
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#### ADDITIONAL VISUAL ENTITY MODELS

Note: DND requires the DVT to load, portray and animate Government Furnished entity models in Open Flight format. This entity model list is available on demand.

**Table C-4 DVT Interoperability Standards**

CATEGORY	STANDARD	RATIONALE
INTEROPERABILITY		
	C1. IEEE 1516-2010 High Level Architecture C2. STANAG 4603	Technical architecture developed to facilitate the reuse and interoperation of simulation systems and assets. Allows interoperability with Joint M&S systems.
	C3. IEEE 1278 Series	Protocol for linking simulations of various types. Allows interoperability with Army constructive M&S. Minimum requirement for Distributed Interactive Simulation (DIS) Version 6.0.
	C4. SISO-REF-010-2018	Data dictionary for Distributed Simulation. Must support DIS enumerations as specified by SISO

SYNTHETIC NATURAL ENVIRONMENT DATA SOURCES AND FORMATS		
Terrain Source Data - Imagery	C5. Geographic Tagged Image File Format (GeoTIFF)	Metadata standard which allows geo- referencing info to be imbedded within a TIFF file.
	C7. Compressed ARC Digitized Raster Graphics (CADRG)	
	C8. Scalable Maps	For interoperability, maps scaled between 1:25K and 1:250K should show the same terrain data. Entity model locations must correlate to WGS-84 mapping datum.
Terrain Source Data - Elevation	C9. Digital Terrain Elevation Data (DTED)	Digital datasets of terrain elevation values. Required at DTED Level 2.
	C10. USGS Digital Elevation Model (DEM)	3D representation of a terrain's surface
	C14. Open Flight	
	C17. SISO-STD- 013-2014 Common Image Generator Interface (CIGI)	Interface that promotes a standard for a host device to communicate with an image generator
COMMAND, CONTROL, COMMUNICATION		
NATO-STD-APP6A NATO Joint Military Symbology	C18. Allows 2D and 3D maps to represent units with standard military symbology to comply with CF training systems	All 2D map unit and overlay representations should comply to this standard
	C19. C2-SIM Gateway or equivalent	Allows entity data and messages to be integrated on a network into C2 systems. Specifically support for OTH-GOLD or MSDL (Military Scenario Development Language) or C-BML (Coalition Battle Management Language).