

Sayı: 58224147-TİM.OAİB.26.ARG4.2026/135-8545

Ankara, 26/08/2026

Konu: MS Paradigm Framework for Adaptive AI Simulation on Quantum konulu (RFP-ACT-SACT-26-81) İhale

Sayın Üyemiz,

T.C. Savunma Sanayii Başkanlığı'ndan alınan yazıda, Müttefik Dönüşüm Komutanlığı (ACT) tarafından “M&S Paradigm Framework for Adaptive AI Simulation on Quantum (FAASQ)” konulu RFP-ACT-SACT-26-81 referans numaralı ihale dokümanının Ek'te sunulduğu ve söz konusu tedarik kapsamında, NATO'nun gelecekteki Modelleme ve Simülasyon (M&S) kabiliyet geliştirme faaliyetlerini desteklemek üzere kuantum teknolojilerinin M&S ekosistemlerinde sağlayabileceği operasyonel, analitik ve hesaplama avantajlarının değerlendirilmesi amaçlandığı duyurulmaktadır.

Anılan İhaleye, ilgili alanda faaliyet gösteren, sözleşmenin icra edileceği yerde gerekli yasal yetkilere sahip ve benzer büyüklük, maliyet ve kapsamda iş deneyimi bulunan firmaların katılım sağlayabileceği ile beraber yükleniciden; 10 Ekim 2026 tarihine kadar kuantum ile ilişkili M&S entegrasyonu ve yeniden formülasyonuna yönelik tasarım metodolojisinin, 10 Aralık 2026 tarihine kadar Kavram Kanıtı (Proof of Concept-PoC) aday formülasyonları ve karşılaştırmalı değerlendirmenin, 31 Aralık 2026 tarihine kadar ise gelecekteki M&S kabiliyet gereksinimleri ve kuantum teknoloji yol haritası raporunun sunulması beklendiği belirtilmektedir. Tekliflerin En İyi Değer (Best Value) esasına göre, %70 teknik ve %30 fiyat ağırlığıyla değerlendirileceği bildirilmektedir.

Bu kapsamda, İhaleye katılmak isteyen firmalarımızın açıklama ve ilave bilgi taleplerinin **28 Ağustos 2026** tarihine kadar hqsact.contracting@nato.int adresine iletilmeleri; teknik ve **mali tekliflerin ise 9 Eylül 2026 saat 09.00'a** (EDT, Norfolk/Virginia) kadar sırasıyla hqsact.techproposal@nato.int ve hqsact.priceproposal@nato.int adreslerine ayrı olarak sunulması gerekmektedir. Ayrıca, dokümanda tekliflerin tamamen veya kısmen üretken yapay zekâ araçları kullanılarak hazırlanmasının kabul edilmeyeceği ve bu şekilde hazırlanan tekliflerin değerlendirme dışı bırakılabileceği belirtilmektedir.

Bilgileri ve gereği rica olunur.

Musa DEMİR
Genel Sekreter

Ekler:

- 1-Fiyatlandırma (2 Sayfa)
- 2-İhale Dokümanı (27 Sayfa)

Ayrıntılı bilgi için: Sumru İdil Horoz - Uzman

Ceyhan Atuf Kansu Cad.
No: 120 06520
BALGAT ANKARA
Tel : (312) 447 27 40
Faks : (312) 446 09 11
info@ssi.gov.tr

www.turksavunmasanayi.gov.tr
www.ssi.gov.tr

Musa Demir tarafından 5070 sayılı
kanun gereğince güvenli elektronik
imza ile imzalanmıştır.





HQ Supreme Allied Commander Transformation
Purchasing and Contracting Section
Office of Budget and Finance
Norfolk, Virginia | USA



Request for Proposal

RFP-ACT-SACT-26-81

Headquarters Supreme Allied Commander Transformation's M&S Paradigm Framework for Adaptive AI Simulation on Quantum (FAASQ)

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BIDDING INSTRUCTIONS

1. General

a. This is a **Firm Fixed Price Deliverables** contract in accordance with the HQ SACT General Terms and Conditions.

b. HQ SACT General Terms and Conditions Dated **15 January 2026** are applicable to this procurement and can be located on the ACT Website at <https://www.act.nato.int/wp-content/uploads/2026/01/HQ-SACT-General-Terms-and-Conditions-20260115.pdf> under Contractor Information.

c. Contract Award is contingent upon funding availability; Partial bidding is NOT allowed.

2. Classification

This Request for Proposal (RFP) is a NATO UNCLASSIFIED document.

3. Definitions

a. The “Prospective Bidder” shall refer to the entity that has indicated its intention without commitment, to participate in this RFP.

b. The term “Bidder” shall refer to the bidding entity that has completed a bid in response to this RFP.

c. The term “Contractor” shall refer to the bidding entity to which the contract(s) is awarded.

d. The term “Contracting Officer” designates the official who executes this RFP on behalf of HQ SACT.

e. “Contracting Officer’s Technical Representative” or “COTR” is the official who is appointed for the purpose of determining compliance of the successful bid(s), per the technical specifications.

f. The term “HQ SACT” shall refer to Headquarters Supreme Allied Commander Transformation.

g. The term “ACT” shall refer to Allied Command Transformation.

h. The term “NATO” shall refer to the North Atlantic Treaty Organization.

i. The term “days” as used in this RFP shall, unless otherwise stated, be interpreted as meaning calendar days.

4. Eligibility

a. This RFP is open to governmental or commercial entities;

- b. Established in a North Atlantic Treaty Organization Alliance member nation;
- c. Working in the required field and legally authorised to operate in the country and state in which this contract is to be performed, at the time of bidding. Has performed the desired past performance including size, cost and scope, as described in this RFP; and
- d. All proposed key personnel identified to work on this requirement must be citizens of a NATO member nation.

5. Duration of Contract

- a. The contract awarded shall be effective upon signature (estimated mid-September 2026).
- b. Period of Performance: Award to 31 December 2026

Option periods may be exercised solely at the discretion of HQ SACT based on satisfactory contractor performance, availability of funding, budgetary & operational requirements and Contracting Officer approval.

6. Exemption of Taxes

In accordance with the agreements, (Article VIII of the Paris Protocol, dated 28 August 1952) goods and services under this contract are exempt from taxes, duties, and similar charges. The Contractor remains liable for all taxes levied on the Contractor and on Contractor's employees, to include responsibilities to report and withhold and/or disburse income tax on payments to Contractor's employees. See paragraph 14 of HQ SACT's General Terms and Conditions for provision in its entirety.

7. Amendment or Cancellation

a. HQ SACT reserves the right to amend or delete any one or more of the terms, conditions or provisions of the RFP prior to the date set for bid closing. A solicitation amendment or amendments shall announce such action.

b. HQ SACT reserves the right to cancel, at any time, this RFP either partially or in its entirety. No legal liability on the part of HQ SACT shall be considered for recovery of costs in connection to bid preparation. All efforts undertaken by any bidder shall be done considering and accepting, that no costs shall be recovered from HQ SACT. If this RFP is cancelled, any/all received bids shall be returned unopened, per the bidder's request.

8. Bidder Clarifications

a. Prospective Bidders should seek clarification at their earliest convenience. Any explanation regarding the meaning or interpretation of this RFP, terms, clause, provision or specifications, shall be requested in writing, to the contracting e-mail address hqsact.contracting@nato.int. Any clarification must be received via email no later than **28 August 2026**.

b. In lieu of a bidder's conference, HQ SACT invites bidders to submit technical and contractual questions not later than **28 August 2026**.

c. Information in response to all inquiries / requests for clarification to a prospective bidder shall be furnished to all prospective bidders at the following link: <http://www.act.nato.int/contracting> as a Question-and-Answer addendum. All such addendums and any necessary solicitation amendments shall be incorporated into this RFP. Verbal Interpretations shall not be binding.

9. Bid Closing Date

Bids shall be received at HQ SACT, Purchasing and Contracting Office, no later than **09 September 2026, 0900 hours, Eastern Daylight Time, Norfolk, Virginia, USA**. No bids shall be accepted after this date and time. **No hard copy proposals will be accepted**. Please see Proposal Submission (paragraph 12) for more details.

10. Bid Validity

a. Bids shall remain valid for a period of one hundred and twenty days (120) from the applicable closing date set forth within this RFP. HQ SACT reserves the right to request an extension of validity. Bidder shall be entitled to either grant or deny this extension of validity. HQ SACT shall automatically consider a denial to extend the validity as a withdrawal of the bid.

b. **HQ SACT will not accept supplier proposals prepared, in whole or in part, by means of generative artificial-intelligence (AI) tools, including and without limitation to chatbots, such as Chat Generative Pre-Trained Transformer (Chat GPT), or other language generating tools. HQ SACT reserves the right to screen applications to identify the use of such tools. All applications prepared, in whole or in part, by means of such generative or creative AI applications may be rejected without further consideration at HQ SACT's sole discretion, and HQ SACT reserves the right to take further steps in such cases as appropriate.**

11. Content of Proposal

The proposal shall consist of two (2) separate documents (Technical / Price) sent via e-mail as per the instructions. No hard copy proposals will be accepted. The E-mailed documents shall be received no later than **09 September 2026, 0900 hours, Eastern Daylight Time, Norfolk, Virginia, USA**.

a. **Technical Proposal shall be a Signed PDF document and contain:**

- 1) Company description (limited to 10 pages);
- 2) A table of contents for the entire proposal (as per Enclosure #1);
- 3) The bidder's full name, address, Points of Contact, Telephone, e-mail address, Internet site;

- 4) Compliance statement (as per Enclosure#2);
- 5) Past performance (as per Enclosure #3);
- 6) List of key personnel to provide services;
- 7) Supplementary relevant information, if applicable; and
- 8) Compliance and Best Value Criteria Matrices (as per Annex B).

b. Price Proposal shall be

- 1) **Submitted in U.S. Dollar Currency.** Contractor may request payment post award in alternate currency based on agreed conversion rate.
- 2) Prices shall be on a **Firm Fixed Price Basis**, include any relevant discount schedule.
- 3) Price proposal (as per Enclosure #4).

12. Proposal Submission

a. Proposals shall be separate e-mail submissions to:

Technical proposal: hqsact.techproposal@nato.int

Price proposal: hqsact.priceproposal@nato.int

b. E-mail subjects shall include the solicitation information along with company name (for example: RFP-ACT-SACT-81_Tech_ABC Inc. / RFP-ACT-SACT-26-81_Price_ABC Inc.). **Allow sufficient time in sending your submission should you encounter e-mail size challenges.**

c. No verbal bids or verbal modifications or telephonic bids shall be considered.

d. It is the ultimate responsibility of a prospective bidder prior to submission that all proposal submissions are reviewed to ensure they meet the technical, contractual and administrative specifications and that offers meet the limitations and expressed conditions.

13. Late Proposals

a. It is solely the bidder's responsibility that every effort is made to ensure that the proposal reaches HQ SACT prior to the established closing date and time. No late bids shall be considered.

b. A delay in an e-mail exchange due to server or size restrictions does not constitute a delay by NATO.

14. Bid Withdrawal

A bidder may withdraw their bid up to the date and time specified for bid closing. Such a withdrawal must be completed in writing with attention to the HQ SACT Contracting Officer.

15. Bid Evaluation

a. The evaluation of bids and determination as to the responsiveness and technical adequacy or technical compliance, of the products or services requested, shall be the responsibility of HQ SACT. Such determinations shall be consistent with the evaluation criteria specified in the RFP. HQ SACT is not responsible for any content that is not clearly identified in any proposal package.

b. Proposals shall be evaluated and awarded taking into consideration the following factors:

- 1) Successful administrative submission of bid packages as requested in paragraph 11 and as listed in this RFP.
- 2) Successful determination of compliance on mandatory criteria (Compliant/non-compliant).
- 3) **Technical factors / pricing factors rated as follows: Technical / Price = 70/30 (Best Value)**
- 4) Technical clarifications as determined may be conducted.
- 5) Acceptance of HQ SACT General Terms and Conditions.

16. Proposal Clarifications

During the entire evaluation process HQ SACT reserves the right to discuss any bid, clarify what is offered and interpret language within the bid to resolve any potential areas of concern.

17. Award

a. HQ SACT intends to award a firm fixed price deliverables contract to the successful bidder whose proposal represents the Best Value offer to NATO. Partial awards will not be considered.

b. HQ SACT will collect information from references provided by the successful bidder on its past performance. Contractors must provide authorization to contact references or that past performance shall not be considered.

c. HQ SACT reserves the right to negotiate minor deviations to the listed General Terms and Conditions to this RFP.

18. Surge Capability:

A surge capability requirement is included to have a contract vehicle in place should emerging circumstances require a quick and temporary increase in contractor services within the scope of the existing Statement of Work. The selected supplier shall be prepared to provide additional services if needed to support this SOW. The contractor shall be prepared to evaluate requirements and submit a price proposal for any new in scope requirement for consideration by HQ SACT. Surge proposals will be evaluated by the Contracting Officer for fair and reasonable pricing and should be developed based upon the same pricing structure as the original contract proposal. Surge requirements include, but are not limited to, required repairs identified during the annual maintenance checks, but not already accounted for and will be incorporated by formal contract modification. Requests for pricing are made on a non-committal basis and do not constitute a formal commitment by HQ SACT to contract for additional work; supplier will not be reimbursed costs for preparing price proposals or other related expenses in response to a surge request. HQ SACT surge efforts will not exceed 50% of the annual contract value or 50% of the cumulative contract value.

19. Lodging a complaint

Interested Parties should consult Appendix 1 of Procedure for NATO Competitive Procurement Policy

(https://www.nato.int/content/dam/nato/webready/documents/finance/procurement-procedure_en.pdf) to learn more about to learn more about applicable dispute resolution procedures. For this RFP, complaints shall be lodged by an interested party within 15 calendar days from the date when the interested party first knew, or ought to have known, about the circumstances giving rise to the grounds for the potential dispute, whichever is earlier. For complaints relating to the contract award decision, the deadline is 15 calendar days from the day following the date on which the contract award decision is communicated to the bidders. Contract award will not be held in abeyance until during this period.

20. Communications

All communication related to this RFP, between a prospective bidder and HQ SACT shall only be through the nominated HQ SACT Contracting Officer. Designated contracting staff shall assist the HQ SACT Contracting Officer in the administrative process. There shall be no contact with other HQ SACT personnel regarding this RFP. Such adherence shall ensure Fair and Open Competition with equal consideration and competitive footing to all interested parties.

21. Points of Contact

Hqsact.contracting@nato.int

Enclosure 1: Proposal Content / Checklist

PROPOSAL CONTENT / CHECKLIST

Table of Contents

- ☐ Bidder's name, address, POC, Contact numbers, email address.
- ☐ Compliance Statement (as per Enclosure 2).
- ☐ Past Performance (including References) (as per Enclosure 4).
- ☐ List of Key Personnel.
- ☐ Technical Proposal, including the Compliance matrix (as per Annex B).
- ☐ Price Proposal (Excel worksheet – as per Enclosure 5 - provides mandatory price proposal format).

Enclosure 2: Compliance Statement

COMPLIANCE STATEMENT TO SEALED BID RFP-ACT-SACT-26-81

It is hereby stated that our company has read and understands all documentation issued as part of this RFP. Our company proposal submitted in response to the referenced solicitation is fully compliant with the provisions of this RFP and the intended contract with the following exception(s); such exceptions are considered non-substantial to the HQ SACT solicitation provisions issued.

Note: Any requested deviations/adjustments or considerations regarding HQ SACT General Terms and Conditions must be identified here - at the time of bidding - for consideration by the Contracting Officer.

<u>Clause</u>	<u>Description of Minor Deviation</u>
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(If applicable, add another page)

Company: _____

Signature: _____

Name & Title: _____ Date: _____

Company Bid Reference: _____

Bidder's proposal must be based on full compliance with the terms, conditions and requirements of the RFP and all future clarifications and/or amendments. The bidder may offer variations in specific implementation and operational details provided that the functional and performance requirements are fully satisfied. In case of conflict between the compliance statement and the detailed evidence or explanation furnished, the detailed evidence/comments shall take precedence/priority for the actual determination of compliance. Minor or non-substantial deviations may be accepted. Substantial changes shall be considered non-responsive.

Enclosure 3: Eligibility to Conduct Business in Virginia

**CERTIFICATION OF ELIGIBILITY TO CONDUCT BUSINESS IN THE
COMMONWEALTH OF VIRGINIA**

TO RFP-ACT-SACT-26-81

The undersigned hereby certifies that the company has reviewed and understands the requirements applicable to conducting business and performing work in the Commonwealth of Virginia.

The company further certifies that, if selected for award, it is legally eligible and properly authorized to perform the work contemplated under **RFP-ACT-SACT-26-81** within the Commonwealth of Virginia, including, as applicable, registration or qualification with the Virginia State Corporation Commission, possession of required business licenses, and compliance with any applicable state, local, or regulatory requirements.

For entities organized outside the Commonwealth of Virginia, the company certifies that it has either properly qualified to transact business in Virginia or will complete all required registrations prior to contract performance, to the extent such registration is required by law. Virginia identifies out-of-state and foreign formed entities as "foreign business entities," and such entities may be required to qualify with the Virginia State Corporation Commission before transacting business in Virginia.

The company's eligibility to perform work in Virginia is based on full compliance with all applicable registration, licensing, permitting, taxation, and legal authorization requirements, with the following exception(s), if any:

Requirement / Reference	Description of Exception, Pending Action, or Required Clarification

If applicable, additional pages may be attached.

Company: _____

Virginia SCC ID / Registration No., if applicable: _____

State / Country of Formation: _____

Signature: _____

Name and Title: _____

Date: _____

Company Bid Reference: _____

Enclosure 4: Past Performance Information Form

Company is required to submit a minimum of one (1) past performance within the last five (5) years. Company should be clear how the company met the requirements of past performance. Reference to a contract must include a detailed description of the work performed relevant to the requirements outlined in the SOW. Generic or Vague references to the contract awarded without clear connection to work performed will be disqualified

- (a) Contracting Entity:
- (b) Contract No:
- (c) Type of Contract (Firm Fixed Price, IDIQ, Requirements):
- (d) Title of Contract:
- (e) Description of Work Performance and Relevance to Current Acquisition (Type of facility, capacity, estimated patronage, summary of staff used):
- (f) Contract Dollar Amount:
- (g) Period of Performance:
- (h) Name, Address, Fax and Telephone No. of Reference:
- (i) Indicate Whether Reference Acted as Prime or Sub-contractor:
- (j) Comments regarding compliance with contract terms and conditions:
- (k) Complete Contact Information for client:
- (l) Permission to contact client for reference: Yes / No

Name/Signature of Authorized Company Official: _____

This Enclosure is designed to assist the respective company provide HQ SACT with all necessary documents/information required. For clarification, please refer to bidding instructions in part 1 of subject solicitation.

Enclosure 5 – Mandatory Price Proposal Excel Spreadsheet

Pricing shall be submitted using the excel workbook provided. Bidders may elect to submit a PDF proposal for pricing **in addition to the required excel workbook.**

Proposals not submitted in the proper format will not be considered.

Formulas have been added for convenience; however, it is the company's responsibility to ensure that the formulas are correctly reflecting your expected bid proposal value.

M&S Paradigm Framework for Adaptive AI Simulation on Quantum (FAASQ)

Objective

Modelling & Simulation and Learning Technology (MSLT) branch is responsible for the development, direction & coordination of M&S support for strategic studies, experimentation, wargames, operational planning, exercises, innovation and capability development and for NATO Command Structure M&S capability development. Future M&S demands will exceed what incremental improvements to current simulation architectures can address. New mathematical formulations, computational paradigms and hybrid workflows are needed to tackle bottlenecks such as combinatorial search, uncertainty propagation and repeated scenario evaluation. Quantum computing has been identified as one of the key enablers of future NATO M&S development. The objective of this project is to support future Modelling and Simulation (M&S) capability development by assessing the potential role of quantum technologies as disruptive, enabling, and/or transformational capabilities. The project will identify and test where quantum computing may provide operational, analytical, or computational advantages within future M&S ecosystems, and will derive implications for future NATO M&S capability requirements, technology investment priorities, experimentation activities, and long-term NATO M&S roadmaps with three lines of effort:

1. Quantum-Enhanced Modelling & Simulation

This line of effort shall assess whether selected computational bottlenecks arising across the M&S lifecycle can be isolated, mathematically reformulated, and addressed through Proofs of Concept (PoC). The lifecycle scope includes problem definition and requirements analysis, conceptual model development, model design, model implementation, Verification and Validation, experimentation and analysis, and maintenance and evolution (See ANNEX A).

In this pathway, the M&S capability remains primarily classical, while quantum-enabled components are examined as specialized solver kernels for selected high-complexity problems. The objective is not to define operational use cases, but to develop targeted PoC that test whether quantum-relevant computational approaches can provide measurable value within specific M&S lifecycle activities. The evaluation shall focus on whether each PoC behaves in accordance with the expected technical and decision-support assumptions. Assessment criteria shall include feasibility of mathematical reformulation, correctness of the quantum or hybrid implementation, solution quality, runtime behavior, scalability potential, robustness, formulation overhead, integration effort, interpretability of results, and added value compared with strong classical baselines.

2. Quantum-Reformulated Modelling & Simulation

This line of effort shall investigate whether complete Modelling and Simulation lifecycle can be mathematically reformulated as unified computational problems suitable for quantum-enabled execution. Rather than isolating selected

computational bottlenecks within an otherwise classical lifecycle, this pathway shall assess whether the entire M&S lifecycle activities can be expressed within a common mathematical formulation that can be addressed through quantum architectures. The reformulation shall not be limited to isolated activities of the M&S lifecycle. It shall start from the initial problem formulation and consider the entire M&S process as an integrated lifecycle, as described in Annex A. PoC shall be developed to test whether selected M&S lifecycle can be encoded into mathematically rigorous formulations compatible with quantum-enabled solution approaches.

The evaluation shall focus on whether end-to-end quantum-compatible reformulation is technically feasible, computationally meaningful, and operationally interpretable. Assessment criteria shall include formulation coherence, mathematical correctness, preservation of M&S semantics, scalability potential, solution quality, runtime behavior, robustness to uncertainty, reformulation overhead, integration effort, explainability of results, traceability across lifecycle phases, and added value compared with both conventional M&S lifecycle and component-level quantum enhancement approaches.

3. Quantum-Native Modelling & Simulation

This line of effort shall assess whether selected M&S problems can be formulated directly using quantum mathematical structures and, where technically feasible, implemented or tested through PoC on gate-based quantum hardware. In this pathway, quantum computing is not considered only as an accelerator for a classical M&S subproblem. It is examined as a potential modelling and computational substrate for representing, evolving, sampling, and measuring complex system states.

The evaluation shall focus on whether each PoC demonstrates the expected representational, analytical, or computational behavior across M&S lifecycle. Assessment criteria shall include feasibility of quantum-native formulation, consistency between the conceptual model and the quantum representation, implementability on simulators or available hardware, representational expressiveness, compactness, model fidelity, uncertainty representation, explanatory power, measurability of outputs, verification and validation feasibility, and added value compared with classical modelling approaches

Other Considerations

Across the three Lines of Effort, Artificial Intelligence shall be investigated as a cross-cutting support capability, not as an independent research line. AI-assisted methods may support problem decomposition, variable and constraint identification, mathematical reformulation, candidate formulation generation, semantic consistency checking, benchmarking design, baseline identification, and traceable documentation of assumptions, rationale, and modelling choices. AI-generated or AI-assisted outputs shall not be treated as authoritative results. They shall be subject to human-in-the-loop expert review, independent mathematical verification, comparison against classical baselines, reproducibility checks, and

VV&A-oriented assessment before being used in any PoC or capability recommendation.

For scope clarity, this project is limited to quantum computing approaches as they can contribute to Modelling & Simulation problem formulation, computational acceleration, optimization, sampling, inference, uncertainty representation, decision modelling, or lifecycle-level reformulation. Other areas of quantum technology are explicitly excluded from the scope of this document, except where referenced solely to provide contextual awareness. This exclusion includes, but is not limited to, quantum encryption, quantum cryptography, quantum key distribution (QKD), post-quantum cryptography (PQC), quantum communications, quantum networking, quantum sensing, quantum imaging, quantum radar, quantum navigation, quantum metrology, and quantum timing

Deliverables

Deliverable	Title	Description
D1	Design Specification for Quantum-Relevant M&S Integration and Reformulation	Quantum-Relevant M&S Design Methodology. This deliverable shall define a design-oriented methodology for identifying, structuring, integrating, reformulating, and evaluating quantum-relevant approaches within future M&S ecosystems. It shall provide the methodological basis for the three Lines of Effort by defining how selected M&S problem classes can be analysed, decomposed, mapped to candidate mathematical structures, and translated into design patterns, architectural options, formalisation workflows, solver-integration approaches, and evaluation criteria. For the Quantum-Enhanced Modelling & Simulation Line of Effort, the deliverable shall define design patterns for embedding quantum, quantum-inspired, or hybrid quantum-classical computational components into otherwise classical M&S lifecycle activities. It shall describe how selected computational bottlenecks can be identified, isolated, decomposed, mathematically reformulated, encoded, solved through specialized solver kernels, and reintegrated into the classical M&S workflow. For the Quantum-Reformulated Modelling & Simulation Line of Effort, the deliverable shall define a methodology for investigating whether the complete M&S lifecycle can be mathematically reformulated as a unified computational problem suitable for quantum-enabled execution. The deliverable shall define design principles for capturing cross-phase dependencies, assumptions, uncertainties, semantic constraints, data transformations, model evolution, validation evidence, traceability mechanisms, and decision-support outputs within a coherent quantum-compatible mathematical formulation. For the Quantum-Native Modelling & Simulation Line of Effort, the deliverable shall define preliminary design models for selected M&S problems formulated directly through quantum or quantum-like mathematical structures. In this pathway, quantum computing shall not be treated merely as an accelerator for classical subproblems, but as a potential modelling and computational substrate for representing, evolving, sampling, and measuring complex system states.
D2	PoC Candidate Formulation and	POCs This deliverable shall apply the design methodology developed in D1 to define a set of candidate Proofs of Concept under the three Lines of

Deliverable	Title	Description
	Comparative Assessment	Effort, together with a structured comparative assessment methodology. Each PoC candidate shall include the rationale for selection, lifecycle traceability, problem description, modelling assumptions, data requirements, expected inputs and outputs, candidate mathematical or formal formulation, proposed quantum-enhanced, quantum-reformulated, or quantum-native approach, classical baseline, feasibility assessment, evidence requirements, and expected decision-support value. The deliverable shall include worked formulation PoC for each Line of Effort. For the Quantum-Enhanced Modelling & Simulation Line of Effort, the PoC shall show how a selected M&S bottleneck can be isolated from a classical lifecycle activity, reformulated mathematically, encoded for a candidate quantum, quantum-inspired, or hybrid solver, and reintegrated into the classical M&S workflow. For the Quantum-Reformulated Modelling & Simulation Line of Effort, the PoC shall show how selected M&S lifecycle activities, dependencies, assumptions, uncertainties, validation evidence, and decision-support outputs can be represented as an integrated quantum-compatible computational formulation. For the Quantum-Native Modelling & Simulation Line of Effort, the worked example shall assess whether selected M&S problems can be represented using quantum-native or quantum-like mathematical structures in a way that provides measurable representational, analytical, computational, or decision-support value compared with classical modelling approaches. The comparative assessment methodology shall define, justify, and apply suitable Key Performance Indicators (KPIs) for each Line of Effort, including solution quality, runtime behaviour, scalability, robustness, formulation overhead, integration effort, reproducibility, uncertainty propagation, interpretability, traceability, decision-support value, and maturity of the proposed approach. Classical baselines may include current M&S lifecycle practices, established numerical methods, optimization algorithms, simulation techniques, statistical methods, machine learning approaches, and domain-specific modelling practices. Where appropriate, AI-assisted methods may be used to support problem parsing, variable identification, constraint extraction, objective-function construction, state-space representation, formulation comparison, semantic checking, benchmarking design, and

Deliverable	Title	Description
		traceable documentation of assumptions. AI-generated outputs shall remain subject to human-in-the-loop review, mathematical verification, classical baseline comparison, and VV&A-oriented assessment.
D3	Future M&S Capability Requirements and Quantum Technology Roadmap Report	A Road Map. A final synthesis report translating the results of the Design and PoC definitions, and assessment planning into actionable insights for future M&S capability development and requirements definition. The report shall identify candidate future capability requirements, technology gaps, maturity limitations, integration implications, risk areas, recommended follow-on experimentation, and potential roadmap options for quantum-enhanced and quantum-native M&S. The report should also contain a quantum driven taxonomy of problem classes. The taxonomy shall classify candidate M&S problems according to their lifecycle relevance, mathematical structure, computational complexity, coupling across lifecycle phases, formulation feasibility, data and model dependencies, uncertainty characteristics, scalability constraints, maturity, expected benefit, and suitability for quantum-relevant treatment. The report shall identify national academic, industrial, cloud-computing, high-performance computing, and dual-use innovation ecosystems that may be relevant for future collaboration, experimentation, benchmarking, or capability development in quantum-enhanced and quantum-native M&S The report shall distinguish between areas where quantum technologies appear promising, premature, unsuitable, or requiring further evidence before being considered for future M&S capability investment.

Milestone	Due Date
D1	10-Oct-2026
D2	10-Dec-2026
D3	31-Dec-2026

5. Type of Contract and Period of Performance

Type of Contract: This is a firm-fixed price deliverables contract in accordance with the General Terms and Conditions; as such, all employer responsibilities for the contractor(s) performing under this contract shall lie with the contractor company.

Period of Performance: Award – 31 December 2026

6. **Place of Performance:** Contractor facilities
7. **Security:** NATO unclassified
8. **Intellectual Property Rights.** Specific information to IPR is articulated in the General Terms and Conditions that support this contract. All furnished materials, associated assets and documents, etc. will be the property of ACT unless otherwise agreed in writing with the parties.
9. **Releasability and Export Control.** The products or services under this SOW will need to be releasable to NATO. The provider will make all required efforts to obtain necessary authorization from Government, Industry or any other owner of the information to disclose. Nothing herein requires the bidder to provide information to ACT that is subject to Export Control Laws, IPRs or any other constraints prior to receiving the applicable authorization.

Annex A

Detailed Modelling and Simulation Life cycle for analytical purposes

- 1 Problem Definition & Requirements Analysis
 - 1.1 Identify the objectives of the simulation.
 - 1.2 Define key requirements, constraints, and stakeholders.
 - 1.3 Establish performance measures (Key Performance Indicators-KPI, Measure of Effectiveness- MoE, Measure of Performance - MoP) relevant to the problem statement.
- 2 Conceptual Model Development
 - 2.1 Develop an abstract representation of the system or problem.
 - 2.2 Identify key entities, processes, and interactions.
 - 2.3 Define assumptions, simplifications, and scope.
- 3 Model Design
 - 3.1 Translate the conceptual model into a structured design.
 - 3.2 Choose appropriate modelling techniques (e.g., discrete events, agent-based, system dynamics or different).
 - 3.3 Define input parameters, algorithms, and data structures.
- 4 Model Implementation
 - 4.1 Develop the model/s using programming languages (If more models developed, implement their integration).
 - 4.2 Integrate necessary data sources and computational methods.
 - 4.3 Optimize performance and scalability.
- 5 Verification & Validation (V&V)
 - 5.1 Verification: Ensure the model/s is/are built correctly (debugging, code reviews, unit testing).
 - 5.2 Validation: Ensure the model/s accurately represents the real-world system (comparing outputs with empirical data).
- 6 Experimentation & Analysis
 - 6.1 Develop the scenario (in accordance with doctrine: Blue, Red and Green/White) that reflects the current or future operating environment
 - 6.2 Design of experiment to cover the problem statement and KPI
 - 6.3 Conduct simulation runs and sensitivity analysis based on a design of the experiment.
 - 6.4 Interpret results and assess the model's/models' effectiveness.
 - 6.5 Identify areas for improvement.
- 7 Maintenance & Evolution
 - 7.1 Update the model/s based on new data, technologies, or requirements

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7.2 COMPLIANCE MATRIX

SER	ITEM	COMPLIANT	NOT COMPLIANT
1	Bidder is headquartered in a NATO nation and all personnel supporting this contract (including subcontractor's personnel) must be a citizen of a NATO member nation. If individuals have dual citizenship that includes a non-NATO nation, their citizenship must be provided. Contractor shall be legally authorized to operate in NATO member nations at the time of the bidding.		
2	Contractor is to provide a minimum of two past performance citations (for work within the past five years) to show that it has successfully completed work that is similar to or directly traceable to the requirements outlined in this SOW.		
3	Key personnel are citizens of NATO member nations with valid passports with no travel restrictions. (Nationality must be indicated to include other citizenships)		
4	Contractor's key personnel possess demonstrated proficiency in English as defined in STANAG 6001 (Standardized Linguistic Profile (SLP) 3333 - Listening, Speaking, Reading and Writing) or equivalent.		

SER	CRITERIA	RANGE	SCORE (Out of 100 pts)
1	Experience with Quantum Computing, Quantum-Inspired Methods, and Hybrid Quantum-Classical Approaches	0 points: No demonstrated experience or familiarity with quantum computing, quantum-inspired methods, quantum annealing, or hybrid quantum-classical approaches. 1–4 points: The proposal demonstrates only generic theoretical familiarity with quantum computing concepts. Experience is limited, fragmented, or restricted to only some of the relevant concepts, with little or no evidence of practical implementation. 5–8 points: The proposal demonstrates familiarity with the main quantum-relevant concepts and some practical experience, but the experience is limited in scope, maturity, or duration. 9–12 points: The proposal demonstrates partially theoretical and practical experience with quantum computing, quantum-inspired methods, and/or hybrid quantum-classical approaches. 13–15 points: The proposal demonstrates strong and well-evidenced expertise across quantum computing, quantum-inspired methods, and hybrid quantum-classical approaches	
2	Approach to the Three Lines of Effort	0 points: The proposal does not address the three Lines of Effort or provides only a generic discussion of quantum technologies without relevance to M&S. 1–7 points: The proposal addresses only one Line of Effort or treats the three Lines of Effort as interchangeable. It does not adequately distinguish between component-level quantum enhancement, lifecycle-level quantum reformulation, and quantum-native modelling formalisms. 8–13 points: The proposal mentions all three Lines of Effort, but their distinction, purpose, methodological logic, or execution approach is only partially developed. The relationship among Quantum-Enhanced M&S, Quantum-Reformulated M&S, and Quantum-Native M&S remains	

		insufficiently explained. 14–17 points: The proposal clearly distinguishes the three Lines of Effort and explains how each will be approached. It describes Quantum-Enhanced M&S as the use of quantum-relevant solver components within classical M&S lifecycle 18–20 points: The proposal provides a rigorous, coherent, and well-structured approach to all three Lines of Effort. It explains their complementarity, avoids conceptual overlap, defines distinct methodological pathways for each, and demonstrates how the three Lines of Effort collectively support future M&S capability requirements, experimentation priorities, and quantum technology roadmap development.	
3	PoC Identification and Selection Methodology	0 points: No methodology is provided for identifying or selecting PoCs. 1–7 points: PoCs are proposed without clear rationale, selection criteria, or traceability to the M&S lifecycle. 8–13 points: A basic selection logic is provided, but criteria are incomplete or insufficiently justified. 14–17 points: The proposal provides a clear methodology for identifying, screening, prioritizing, and selecting PoCs based on technical feasibility, lifecycle relevance, and capability-development value. 18–20 points: The proposal provides a robust and transparent PoC selection methodology, including technical suitability, feasibility, expected evidence, risk, maturity, classical baseline availability, and relevance to future requirements definition.	
4	Classical Baselines and Comparative Assessment Logic	0 points: The proposal does not include any meaningful comparison with classical approaches and does not define how the value of the proposed quantum-relevant approaches will be assessed. 1–5 points: The proposal mentions comparison with classical approaches only superficially, relies on inappropriate or non-equivalent baselines, or does not explain which performance indicators will be used. The	

		proposed comparison does not provide a credible basis for assessing whether quantum-enhanced, quantum-reformulated, or quantum-native approaches add value. 6–9 points: The proposal includes some comparative logic and identifies possible classical baselines, but the baseline selection rationale, KPI definition, measurement methods, or interpretation criteria are incomplete. The proposal does not fully explain how KPIs will be constructed, tailored to each Line of Effort, or used to compare classical and quantum-relevant approaches. 10–12 points: The proposal defines credible classical baselines or reference approaches and explains how the proposed quantum-relevant alternatives will be compared. It identifies relevant KPIs for the assessment, explains their purpose, and distinguishes between solver-level KPIs for Quantum-Enhanced M&S, lifecycle-level KPIs for Quantum-Reformulated M&S, and representational or modelling KPIs for Quantum-Native M&S. 13–15 points: The proposal provides a rigorous comparative assessment framework, including baseline selection rationale, KPI construction methodology, measurement procedures, interpretation thresholds, expected limitations, and criteria for determining whether quantum-relevant approaches add value or not. The proposal explains how KPIs will be derived, justified, measured, and interpreted across the three Lines of Effort, ensuring that the comparison is evidence-based, reproducible, and resistant to unsupported claims of quantum advantage.	
5	Project Execution, Risk Management, and Deliverables	0 points: The proposal does not provide a credible execution plan. 1–5 points: The work plan is vague, incomplete, or not aligned with the SoW. 6–9 points: The proposal includes a work plan and deliverables, but	

		milestones, dependencies, risks, or quality controls are only partially defined. 10–12 points: The proposal provides a clear execution plan, realistic milestones, defined deliverables, risk management logic, and quality-control measures. 13–15 points: The proposal provides a robust and realistic execution approach, including governance, milestones, technical reviews, risk mitigation, reproducibility controls, reporting structure, and clear linkage between tasks, deliverables, and decision points.	
6	Value for Future Capability Requirements and Roadmapping	0 points: The proposal does not explain how results will inform future requirements or capability development. 1–5 points: The proposal makes generic statements about future value, without a clear method for deriving requirements or roadmap. 6–9 points: The proposal identifies some potential capability implications, but the process for translating findings into requirements or roadmap inputs is incomplete 10–12 points: The proposal clearly explains how findings from the Lines of Effort and PoCs will be translated into future M&S capability insights, requirements candidates, and follow-on experimentation recommendations. 13–15 points: The proposal provides a strong methodology for converting technical evidence into actionable capability-development outputs, including requirements implications, maturity assessment, technology roadmapping, investment considerations, and recommendations for future experimentation. The implications and interconnections with future M&S capabilities are clear and detailed	

RFP-ACT-SACT-26-81
M&S Paradigm Framework for Adaptive AI Simulation on
Quantum (FAASQ)

#	Item
1	D1 - Design Specification for Quantum-Relevant M&S Integration and Reformulation
2	D2 - PoC Candidate Formulation and Comparative Assessment
3	D3 - Future M&S Capability Requirements and Quantum Technology Roadmap Report
TOTAL AMOUNT	

END OF TAB 1

Cost in USD
\$0,00