



the dtic

Department:
Trade, Industry and Competition
REPUBLIC OF SOUTH AFRICA



Aerospace Industry Support Initiative

an initiative of **the dtic**

Expression of Interest (Eoi)

Aerospace Industry Support Initiative (AISI)

Identifying Advanced Manufacturing Aerospace and Defence SMMEs and Non SMMEs (Integrators or Sub-Systems Suppliers) to participate in the AISI Technology Based Supplier Development Programme

Eoi No: 001/29/04/2024

Date of Issue:	29 April 2024	
Closing date and time:	28 March 2025, 16:30hrs <i>(Potential beneficiaries can submit applications anytime between 25 April 2024 and 28 March 2025). Received applications will be evaluated after the 15th of each month until the Eoi closes.</i>	
Submission Type:	Submissions to be emailed to Livison Mashoko - lmashoko@csir.co.za	
Enquiries and Submission	CSIR Manufacturing Cluster	E-mail: Livison Mashoko - lmashoko@csir.co.za

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1 INTRODUCTION

The Council for Scientific and Industrial Research (CSIR) is one of the leading scientific research and technology development organisations in Africa. In partnership with national and international research and technology institutions, the CSIR undertakes directed and multidisciplinary research and technology innovation that contributes to the improvement of the quality of lives of all South Africans. The CSIR's main site is in Pretoria while it is represented in other provinces of South Africa through regional offices.

The Aerospace Industry Support Initiative (AISI) is an initiative of the Department of Trade Industry and Competition (**the dtic**). The AISI is hosted and managed by the CSIR and has a specific aim of industrial development. The AISI is a fully government-funded mechanism to support the local South African aeronautics, defence, space, and other sector-wide industries including marine. The initiative takes its strategic direction from government's objectives with emphasis on:

- Industrialisation of Technology;
- Industry Transformation; and
- Job Creation.

The purpose of this document is to outline the framework for the Expression of Interest (Eoi) and submission procedures with regards to identifying applicants who are involved in **aerospace and defence manufacturing** and qualify to participate in the AISI's Technology Based Supplier Development Programme. It serves as a guideline to potential AISI beneficiaries interested in submitting Eoi applications for consideration by the AISI technical review committee.

2 AISI TECHNOLOGY BASED SUPPLIER DEVELOPMENT PROGRAMME

2.1 Background

The role of the AISI as an industry support mechanism is to:

- Raise the levels of direct investment overall, as well as in defined priority sectors;
- Increase market access opportunities for, and export of, South African goods and services;
- Contribute towards building skills and technology platforms;
- Improvement of the local industry competitiveness;
- Increase the contribution of small enterprises in the economy;
- Significantly enhance Broad Based Black Economic Empowerment (B-BBEE);

- Ensuring that new technologies are taken up by industry through an active process of industrialisation; and
- Enable new suppliers to enter the supply chain and develop new technologies, industries and SMMEs to enable market entry and global competitiveness through access to technology.

The AISI's Technology Based Supplier Development interventions provide enabling mechanisms to assist industry to improve its competitiveness, productivity and quality management systems. This will assist the industry to optimise its operations and procedures in order to ensure South African industry integration into global supply chains.

The AISI's Technology Based Supplier Development Programme has three distinct interventions for support. These interventions were identified as priority to assist and enable the South African aerospace industry to grow and compete globally. These interventions are:

- **Technology Enhancement;**
- **Standards and Accreditation; and**
- **Supply Chain Optimisation.**

This EoI focuses on identifying aerospace and defence companies (SMMEs or non-SMMEs) who will benefit from the aforementioned interventions.

3 TECHNOLOGY BASED SUPPLIER DEVELOPMENT INTERVENTIONS

The AISI selected three supplier development interventions to assist aerospace SMMEs as well as non-SMME companies (higher integrators or sub-systems suppliers) and contribute to the global aerospace manufacturing industry. The AISI will provide support for these interventions to be undertaken at approved companies.

NOTES:

1. All SMME or non-SMME companies applying for assistance must be involved in aerospace or defence, or advanced manufacturing within the aerospace and defence sectors.
2. Only SMMEs can apply for support in more than one area of intervention. Non-SMME companies can only apply for technology enhancement.

3.1 Intervention 1: Technology Enhancement

Technology Enhancement is a critical aspect for aerospace and defence companies, both SMME and Non-SMME, as it is a source of growth and new markets. The development and enhancement of new technologies, processes, and manufacturing methods is fundamental to remain competitive on a global scale. The Technology Enhancement intervention focusses on development or advancement of existing technologies in order to support an organisation's business objectives and enable access to market opportunities. This includes but is not limited to development and advancement of new products and processes. Some of the projects include technology transfer, validation and de-risking.

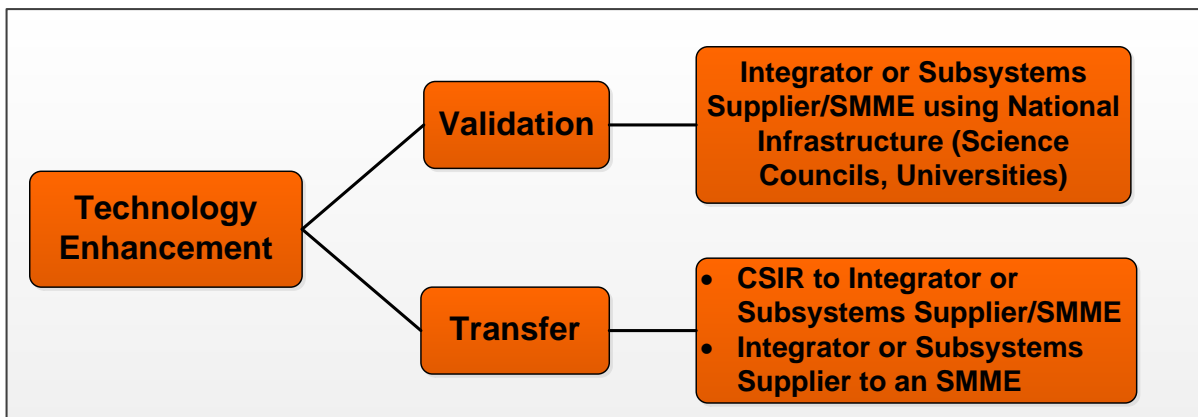


Figure 1: Technology Enhancement Interventions

Projects under Technology Enhancement are normally identified through Technology Roadmapping workshops in instances where such a roadmap is not already in place. The workshops are attended by the participating organisation (SMME/non-SMME), the AISI and any other technical expert(s) that may be agreed upon between AISI and the potential beneficiary.

3.1.1 Technology Roadmapping

Technology Roadmapping is a need driven technology planning approach that helps to identify, select and develop technology alternatives in order to satisfy a market need through enhanced products or capabilities. It ensures the alignment of technology investments and development of new capabilities in order to meet future market needs. The methodology takes into account the relationship between technologies, their products and services and the target markets.

3.1.2 Thematic Areas

The thematic areas are selected at the discretion of the AISI and are seen as those most relevant for technology advancement in the South African Aerospace sector. These are mainly

derived from the Aerospace technology streams shown in Figure 2. The relevant thematic areas are:

- Aerostructures including advanced manufacturing and processing (digital manufacturing, unmanned aerial vehicles (UAVs), post-processing technologies, additive manufacturing, etc.);
- Space;
- Avionics;
- Propulsion;
- Surveillance and Sensor Systems; and
- Land Systems.

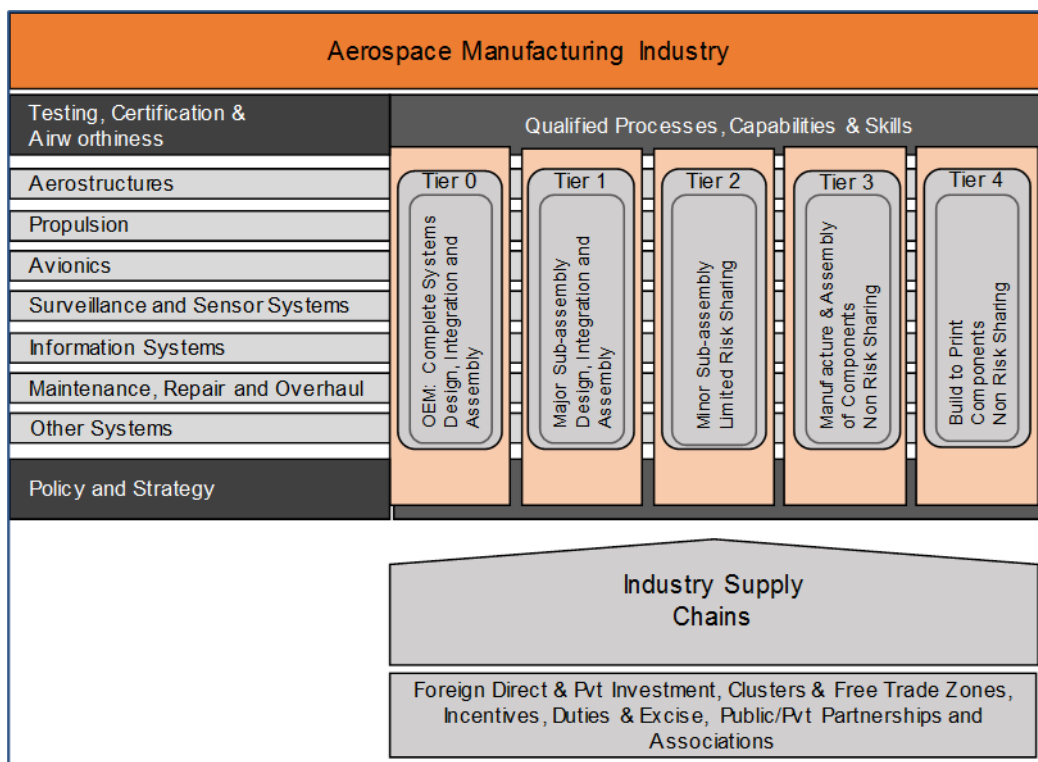


Figure 2: Aerospace Technology Streams and Industry Supply Chain Details

All technology validation and transfer projects must fall within one of the thematic areas in order to be approved for support.

3.1.3 Technology Readiness Levels (TRLs)

All projects supported through the Technology Enhancement intervention must be at a **TRL value of 4 or higher** at the start of the project. Preference will be given to higher TRL projects. Evidence of this will need to be provided with the application. Refer to [Annexure A](#) for the TRL definitions.

3.2 Intervention 2: Standards and Accreditation

Quality management in the aerospace industry is an important factor. It may provide the distinction between financial success and costly errors within an organisation. AS/EN9100 is the common quality management standard for the aerospace industry. It is used and supported by the world's leading aerospace companies and throughout their respective supply chains. AS/EN9100 can standardise the way the aerospace industry works thereby ensuring the industry gains an excellent reputation.

NOTE: The Standards and Accreditation intervention is only available to SMMEs.

This intervention will assist the SMMEs with implementing and attaining certification for the following standards:

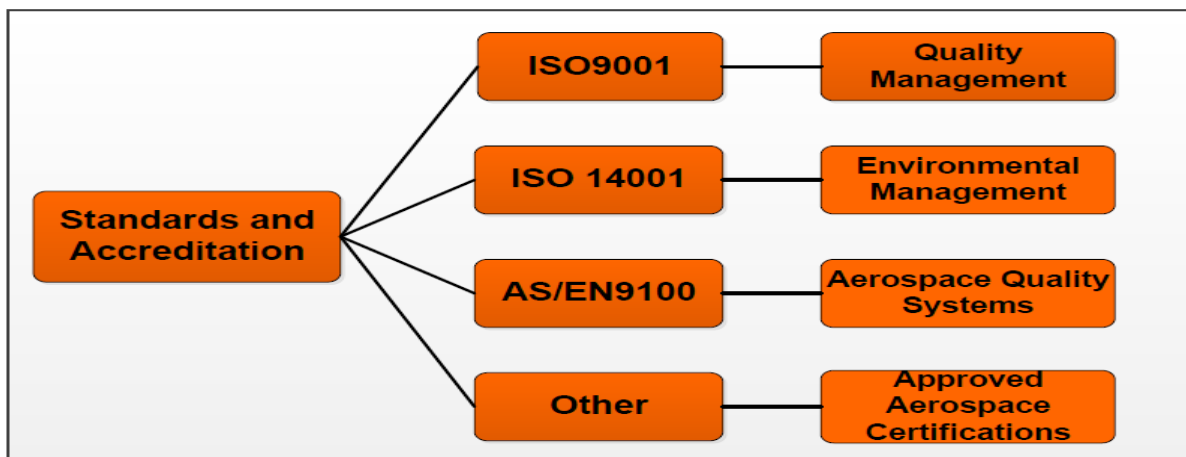


Figure 3: Standards and Accreditation Interventions

3.2.1 Procurement of Services

If the application for support is successful, suitable service provider(s) will be contracted. Procurement of these services will be according to the procurement framework of the CSIR (as host of AISI) in strict compliance with the Public Finance Management Act (PFMA).

3.3 Intervention 3: Supply Chain Optimisation

Supply chain optimisation has been identified as a key aspect to efficient manufacturing operations. Process optimisation will focus on supply chain and production optimisation.

NOTE: The Supply Chain Optimisation intervention is only available to SMMEs.

This will cover concepts such as:

- Lean manufacturing;
- Theory of constraints;
- Facility layout planning;
- Production planning and control; and
- Quality management systems.

4 INVITATION FOR EXPRESSION OF INTEREST

This call is aimed at Aerospace and Defence Companies (both SMME and non-SMMEs) that require Technology Based Supplier Development interventions that will contribute towards improved local and global competitiveness.

A manufacturing SMME is defined in accordance with the Revised Schedule 1 of the National Definition of Small Enterprise in South Africa published on 15 March 2019 by the Department of Small Business Development. According to this schedule a manufacturing SMME is defined as having less than:

- 250 full time employees; and
- R170 million annual turnover.

In most cases, SMMEs work with higher tier integrators (Tiers 0, 1 and 2) as part of their supply chains but in some cases, they are integrators for their own products and systems. An Integrator and Sub-Systems Supplier is a company whose products are used as components in the products of another company. The integrators and sub-systems suppliers generally work closely with the company that sells the finished product and customises designs based on that company's needs. Only integrators and sub-systems suppliers who are involved in aerospace and defence manufacturing, will be considered.

Companies that do not meet the definition for SMMEs are classified as non-SMMEs for the purposes of this EoI. **Error! Reference source not found.** shows the aerospace technology streams and tier levels.

Only companies involved in aerospace or defence or advanced manufacturing in the aerospace and defence sector will be considered for support. Both large organisations (integrators and sub-systems suppliers) as well as SMMEs are eligible, although preference will be given to SMMEs.

NOTES:

1. [Non-SMMEs only qualify for support under the Technology Enhancement intervention as indicated in Section 3.1.](#)

2. All applicants are required to include their BBBEE certificate and proof of Compliant Tax Status in their responses to the EoI.
3. Manufacturers or services industry that are currently receiving support for or similar interventions from other South African Government departments or international organisations will not be considered for support. Submissions from organisations that have received (or are receiving) AISI funding may however be considered.

The EoI process is shown in Figure 4.

- Any aerospace or defence company is invited to complete and submit the relevant template ([Section 21 - EoI Templates](#)) to the AISI based on the size and status of the company.
- All EoI submissions will initially be reviewed to ensure that they comply to the elimination criteria (see Section 9), qualification and critical evaluation factors (see Table 1 and Table 2) for identifying the correct size and status of the company. If the application fails this review, the EoI application will be disqualified, and the applicant will be informed thereof.
- If the applicant is successful, the AISI will prioritise and initiate interventions at its own discretion.
- All qualifying applicants with proposed interventions will be presented to **the dtic** for final approval.
- The AISI will monitor progress of all the interventions for the duration of the project.

The call for EoI and assessment process is shown in Figure 4.

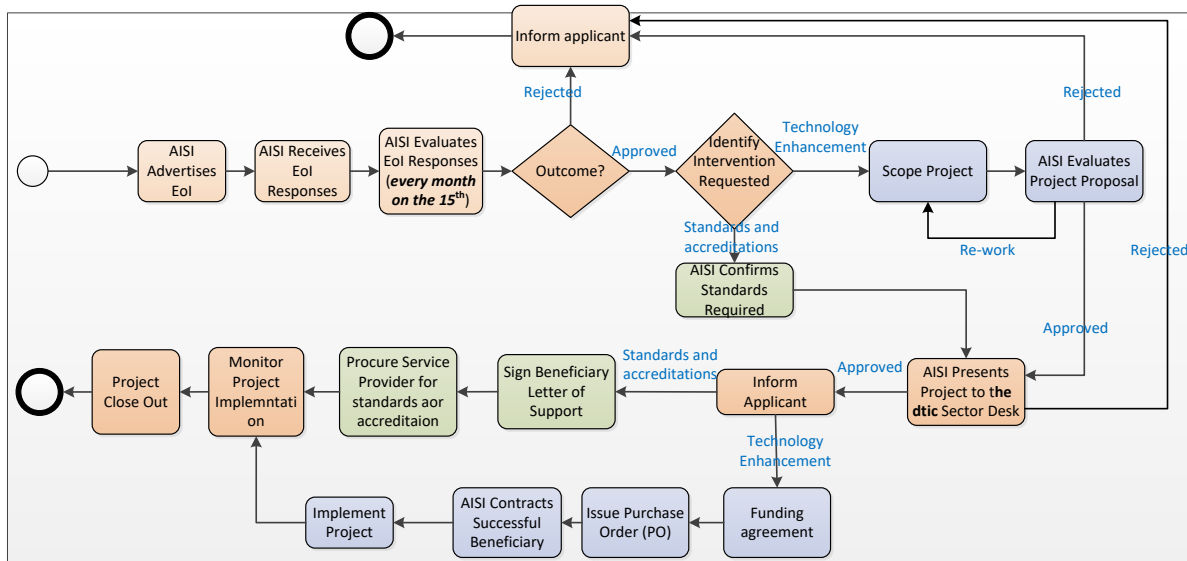


Figure 4: EoI Process

5 TIMELINE FOR INTERVENTIONS

The first set of priority interventions from this EoI are expected to start from 01 June 2024. All applications are valid for 2 years (24 months) from date of submission.

6 SUBMISSION OF EoI

ONLY electronic copies will be accepted and must be submitted via email to Livison Mashoko - lmashoko@csir.co.za. All EoI documents must be received no later than the stipulated closing date and time. Any EoI submitted after the stipulated time and date will only be considered in the next financial year provided there is enough funds in next year's budget to cater for that.

All queries pertaining to the EoI must be forwarded for attention: Livison Mashoko - lmashoko@csir.co.za with EoI 001/29/04/2024 **AISI Technology Based Supplier Development Programme** as the subject.

7 EoI PROGRAMME

The Programme, as currently envisaged, incorporates the following key dates:

- Issue of EoI documents: 29 April 2024
- Submission closing date and time: 28 March 2025, 16:30hrs
(Applicants are encouraged to submit their applications when they are ready and not wait for the closing date. The AISI will review applications **monthly** as they are received and will not wait until the closing date to review all of them at once.)
- Validity of Applications: 24 months after the date of submission.

8 DEADLINE FOR SUBMISSION

Received applications will be evaluated after the 15th of each month until the EoI closes. For the 2024/2025 financial year, applications shall be submitted via email no later than **28 March 2025 at 16:30hrs**. Applications received after the closing date will only be considered in the next financial year (2025/2026).

9 ELIMINATION CRITERIA

EoI applications will be eliminated under the following conditions:

- Incomplete submissions.
- Application templates (Section 21 - Eol Application Templates) not completed, signed and submitted.
- Eol compliance checklist not signed and submitted (page 18).
- Declaration of Conflict of Interest not signed and submitted (page 19).
- Declaration of Conflict of Financial Interest not signed and submitted (page 19).
- Final Declaration not signed and submitted (page 20).
- No B-BBEE certificate; and non-Compliant Tax Status.

10 EVALUATION PROCESS AND CRITERIA

10.1 Evaluation of Submissions

All Eol applications will be evaluated by a technical review committee for functionality **monthly**. The template ([Section 21 - Eol Templates](#)) which is also published with this Eol is required to be completed and submitted. The evaluations of the Eol will be based on the information provided in this template ([Section 21 - Eol Templates](#)) and any additional documentation requested. The qualification, critical and differentiation evaluation will be done for all applications.

10.1.1 Qualification and Critical Evaluation Factors

The assessment criteria for the evaluation of all applications are firstly divided into qualification evaluation factors (based on the beneficiary) and critical evaluation factors (based on the submission). These are shown in Table 1 for non-SMME companies and Table 2 for SMMEs. For the qualification and critical factors, any **NO** answer immediately disqualifies the application. This evaluation will be done by the review committee.

Table 1: Qualification and Critical evaluation factors for non-SMME suppliers

Qualification Evaluation Factors	Yes	No
South African registered company		
Compliant Tax Status		
Valid BBBEE Certificate (Level 1-8)		
Critical Evaluation Factors	Yes	No
Tier 0-3 supplier		
Designing, manufacturing/integration of aeronautics, space and defence related systems		
Assistance to current SMME supplier base		

Table 2: Qualification and Critical evaluation factors for SMMEs

Qualification Evaluation Factors	Yes	No
South African registered company		
Compliant Tax Status		
Satisfies definition of a manufacturing SMME (as defined in Section 4)		
Valid BBBEE Certificate (Level 1-8)		
Critical Evaluation Factors	Yes	No
Aeronautics, space and defence sector SMME		
Provision of engineering services that support the aerospace and defence industry		
Designing, supplying and/or manufacturing of aeronautics, space and defence related components to higher tier integrators locally or internationally		

10.1.2 Differentiation Evaluation Factors

The differentiation factors for the evaluation of all project applications are shown in Table 3 for non-SMMEs and Table 4 for SMMEs. Each differentiation factor is assigned a score (maximum 10) which is then weighted according to the importance of the factor. Please note:

- A minimum total weighted score of **65** must be achieved. If this is not achieved the application will be disqualified.

Table 3: Differentiation Evaluation factors for assessing project applications from non-SMME suppliers.

Differentiation Factors	Score	Weight	Weighted Score
Factor Description	(/10)	(%)	
Experience in Aerospace Advanced manufacturing as an integrator or sub-system or component manufacturer (Number of years) More than 10 years (assigned score 10) 3 – 10 years (assigned score 8) Less than 3 years (assigned score 5)		25	
Percentage of black ownership in the business (Please provide proof e.g BBBEE certificate. If using an affidavit, ensure this information is included) ≥ 50% Black Ownership (assigned score 10) 1 – 49% Black Ownership (assigned score 7) No Black Ownership (assigned score 5)		20	
BBBEE Level 1-2 (assigned score 10) BBBEE Level 3-4 (assigned score 8)		15	

Differentiation Factors	Score	Weight	Weighted Score
Factor Description	(/10)	(%)	
BBBEE Level 5-8 (assigned score 5) BBBEE Level Non-Compliant- Disqualified			
Design, manufacture or integration of sub-systems or components for South African and International aerospace OEMs, integrators or sub-systems suppliers. Manufacturing for: More than 3 integrators/sub-system developers, or more than 3 own products manufactured (assigned score 10) 2-3 integrators/sub-systems developers, or 2-3 own products manufactured (assigned score 8) 1 integrators/sub-system developer or 1 own product manufactured (assigned score 5) <i>(List the Integrators/Subsystem developers supplied or own products produced)</i>		20	
Level of support for current SMME supplier base. Support for SMMEs: More than 3 SMMEs (assigned score 10) 2-3 SMMEs (assigned score 8) Less than 2 SMMEs (assigned score 5) <i>(List the SMMEs)</i>		20	
Total		100	/100

Table 4: Differentiation Evaluation Factors for Assessing Applications from SMMEs.

Differentiation Factors	Score	Weight	Weighted Score
Factor Description	(/10)	(%)	
Aerospace or defence related manufacturing SMME in the advanced manufacturing sector (Number of years) More than 10 years (assigned score 10) 3 – 10 years (assigned score 8) Less than 3 years (assigned score 5)		25	
Percentage of black ownership in the business (Please provide proof e.g BBBEE certificate. If using an affidavit, ensure this information is included) ≥ 50% Black Ownership (assigned score 10) 1 – 49% Black Ownership (assigned score 7)		20	

Differentiation Factors	Score	Weight	Weighted Score
Factor Description	(/10)	(%)	
No Black Ownership (assigned score 5)			
BBBEE Level 1-2 (assigned score 10) BBBEE Level 3-4 (assigned score 8) BBBEE Level 5-8 (assigned score 5) BBBEE Level Non-Compliant- Disqualified		25	
Design or manufacture of components for South African and International aerospace integrators/sub-systems suppliers and SMMEs. Supplying to: More than 3 higher tier entities or other SMMEs, or more than 3 own products manufactured (assigned score 10) 2-3 higher tier entities or other SMMEs, or 2- 3 own products manufactured (assigned score 8) 1 higher tier entity or SMME, or 1 own product manufactured (assigned score 5) <i>(List the Integrators/Subsystem developers or products produced)</i>		30	
Total		100	/100

10.2 Guidelines and Key Points

All South African aerospace and defence manufacturing companies (SMME/non-SMME) are invited to submit EoI applications in support of this call. Please note the following:

- Complete the EoI Application Template ([Section 21 - EoI Templates](#)) for either SMMEs or Non-SMMEs and submit it with relevant documentation. (This is dependent on whether the applying organisation is an SMME or not based on Section 4)
- All submissions relevant documentation, data and information will be treated as confidential.
- The process of evaluating all submissions will be conducted in a fair and confidential manner.
- All technical experts in the review committee are also bound by an obligation of confidentiality.
- Subject to the nature and scope of a project, a Project Manager from the AISI shall be the primary technical contact between the AISI and the recipient.

11 GENERAL TERMS

- a. AISI reserves the right not to engage further with the participants should the Eol not meet or address the AISI's needs.
- b. Email enquiries must be sent to Livison Mashoko - lmashoko@csir.co.za.
- c. Failure to comply will render your submission non-responsive and disqualified.
- d. Any form of canvassing by an applicant to any member of staff or supplier, for purposes of influencing the process, will automatically disqualify the applicant from the evaluation process.
- e. Applicants shall not offer or give any consideration of any kind to any employee or representative of the CSIR/~~the dtic~~/AISI as an inducement or reward for doing, or refraining from doing, any act in relation to the obtaining or execution of this or any other contract with the AISI.
- f. The AISI will nominate the applicants' whose Eol are determined to be the most advantageous to the AISI, taking into consideration the technical suitability of the shortlisted participant.
- g. The AISI reserves the right to cancel this Eol, or not to appoint any participant should the business conditions warrant such a move.
- h. The term participant, applicant, beneficiary and SMME will be used interchangeably and must be read in context with the sentence in which they are used.

12 MEDIUM OF COMMUNICATION

All documentation submitted in response to this Eol must be in English.

13 COST of Eol

Applicants are expected to fully acquaint themselves with the conditions, requirements and specifications of this Eol before submitting their Eol. Each applicant assumes all risks for resource commitment and expenses, direct or indirect, of application preparation and participation throughout the Eol process. The AISI is not responsible – directly or indirectly for any costs incurred by applicants in the preparation and submission of the Eol.

14 VALIDITY AND CORRECTNESS OF RESPONSES

The participant confirms satisfaction regarding the correctness and validity of its application.

15 RESPONSIBILITY TO EXECUTE, AND FAILURE TO COMPLY

The successful applicant hereby accepts full responsibility for the proper execution and fulfilment of all obligations and conditions devolving on him/her under this Eol.

The respondent hereby offers to render all the services described in the attached document (if any) to the AISI on the terms and conditions and in accordance with the specifications stipulated in this Eol documents.

16 VERIFICATION OF DOCUMENTS

- a. Applicants should check the numbers of the pages to satisfy themselves that none are missing or duplicated. No liability will be accepted by the AISI in regard to anything arising from the fact that pages are missing or duplicated.

16.1 The AISI reserves the right to:

- a. Amend any Eol conditions, validity period, specifications, or extend the closing date and/or time of Eol before the closing date. All applicants, to whom the Eol documents have been issued, will be advised in writing of such amendments on time;
- b. Verify any information contained in an Eol;
- c. Request documentary proof regarding any Eol issue;
- d. Not appoint any applicant;
- e. Vary, alter, and/or amend the terms of this Eol, at any time prior to the finalisation of its adjudication hereof;
- f. Cancel or withdraw this Eol at any time, without attracting any liability;
- g. Cancel or withdraw from this Eol as a whole or in part without furnishing reasons and without attracting any liability; and
- h. Request an applicant to do a presentation to the technical review committee.

17 DISCLAIMERS

- The AISI has produced this Eol in good faith. However, the AISI, its agents and its servants do not warrant its accuracy or completeness. To the extent that the AISI is permitted by law, the AISI will not be liable for any claim whatsoever and howsoever arising (including, without limitation, any claim in contract, negligence or otherwise) for any incorrect or misleading information contained in this Eol due to any misinterpretation of this Eol.

- This EoI is a request for EoI only and not an offer document; answers to it must not be construed as acceptance of an offer or imply the existence of a contract between the parties.
- The AISI makes no representation, warranty, assurance, guarantee or endorsements to any applicant concerning the EoI, whether with regard to its accuracy, completeness or otherwise and the AISI shall have no liability towards the respondent or any other party in connection therewith.

18 EoI COMPLIANCE CHECK LIST

To be completed by the applicant:

- I/We hereby undertake to render services described in the attached EoI documents as and when requested to the AISI in accordance with the requirements stipulated in EoI Number: **001/29/04/2024**.
- The following documents will be deemed to form and be read and construed as part of this EoI. The documents are:
 - EoI Terms of Reference.
 - The response to the EoI.
 - Declaration of Conflict of Interest.
 - EoI Templates (Section 21 - EoI Application Templates).
- I/We confirm that I/we have satisfied myself/ourselves as to the correctness and validity of my/our EoI application and that the submission covers all the services specified in the documents.
- I/We declare that I/we have no participation in any collusive practices with any other applicant or third party regarding this or any other EoI.
- I/we confirm that I/we am duly authorised to sign this document.

NAME (PRINT)

CAPACITY

SIGNATURE

NAME OF FIRM

DATE

WITNESSES	
1
2

19 DECLARATION OF CONFLICT-OF-INTEREST FORM (APPLICANT)

This declaration of interest must be completed and submitted with the EoI. Failure to do so may result in the elimination of the Applicant's EoI.

Declaration of Interest - AISI EoI Number: 001/29/04/2024

I/We declare and undertake that:

1. Neither the company or its staff member/s are connected to or have any relationship with anyone employed by the AISI/CSIR/**the dtic** involved in the evaluation of this EOI.
2. If I discover during the application that such conflict exists or might exist, I shall declare it immediately.
3. Any breach by me as the applicant will entitle the AISI at its discretion to disqualify this application.

Yes		No	
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If there is any relationship to declare, please state below:

Declaration of Conflict of Financial Interest - AISI EoI Number: 001/29/04/2024

Is the applicant receiving support for similar interventions from any other South African government department or international organisation?

Yes		No	
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If yes, please state particulars:

20 DECLARATION

I, _____ (THE UNDERSIGNED), DULY AUTHORISED, CERTIFY THAT THE INFORMATION FURNISHED IN THIS EoI IS CORRECT. I ACCEPT THAT THE CSIR MAY TAKE APPROPRIATE ACTIONS, DEEMED NECESSARY, SHOULD THIS DECLARATION PROVE TO BE FALSE.

Signature

Date

Position

Name of applicant

END OF EoI

21 EoI APPLICATION TEMPLATES

- [Non-SMME Application Template](#)
- [SMME Application Template](#)

ANNEXURE A: TECHNOLOGY READINESS LEVELS

TRL 1 Basic principles observed and reported: Transition from scientific research to applied research. Essential characteristics and behaviours of systems and architectures. Descriptive tools are mathematical formulations or algorithms.

TRL 2 Technology concept and/or application formulated: Applied research. Theory and scientific principles are focused on specific application area to define the concept. Characteristics of the application are described. Analytical tools are developed for simulation or analysis of the application.

TRL 3 Analytical and experimental critical function and/or characteristic proof-of concept: Proof of concept validation. Active Research and Development (R&D) is initiated with analytical and laboratory studies. Demonstration of technical feasibility using breadboard or brass board implementations that are exercised with representative data.

TRL 4 Component/subsystem validation in laboratory environment: Standalone prototyping implementation and test. Integration of technology elements. Experiments with full-scale problems or data sets.

TRL 5 System/subsystem/component validation in relevant environment: Thorough testing of prototyping in representative environment. Basic technology elements integrated with reasonably realistic supporting elements. Prototyping implementations conform to target environment and interfaces.

TRL 6 System/subsystem model or prototyping demonstration in a relevant end-to-end environment (ground or space): Prototyping implementations on full-scale realistic problems. Partial integrated with existing systems. Limited documentation available. Engineering feasibility fully demonstrated in actual system application.

TRL 7 System prototyping demonstration in an operational environment (ground or space): System prototyping demonstration in operational environment. System is at or near scale of the operational system, with most functions available for demonstration and test. Well integrated with collateral and ancillary systems. Limited documentation available.

TRL 8 Actual system completed and "mission qualified" through test and demonstration in an operational environment (ground or space): End of system development. Fully integrated with operational hardware and software systems. Most user documentation, training documentation, and maintenance documentation completed. All functionality tested in simulated and operational scenarios. Verification and Validation (V&V) completed.

TRL 9 Actual system "mission proven" through successful mission operations (ground or space): Fully integrated with operational hardware/software systems. Actual system has been thoroughly demonstrated and tested in its operational environment. All documentation completed. Successful operational experience. Sustaining engineering support in place.