Market consultation

for: a Thermal Vacuum Chamber

Contracting authority:
The Netherlands Organisation for Applied Scientific Research TNO

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Contents

1. Introduction

This document describes the organisation TNO, and the content, objective, schedule, preconditions and procedural matters of the market consultation.

TNO, department Space Systems Engineering intends to purchase a Thermal Vacuum Chamber (TVC). TNO would like to gain more information from the market by conducting this market consultation. The information gained might be used as input for the formal tender process following the market consultation. Therefore, any party which is able to deliver such a system for the purposes described in section 3 is invited to contact TNO to present the answers on the questions posed in section 4 and other relevant information they would like to share with TNO.

After this market consultation TNO will decide which tender procedure is the most appropriate choice to buy a Thermal Vacuum Chamber.

1.1 TNO

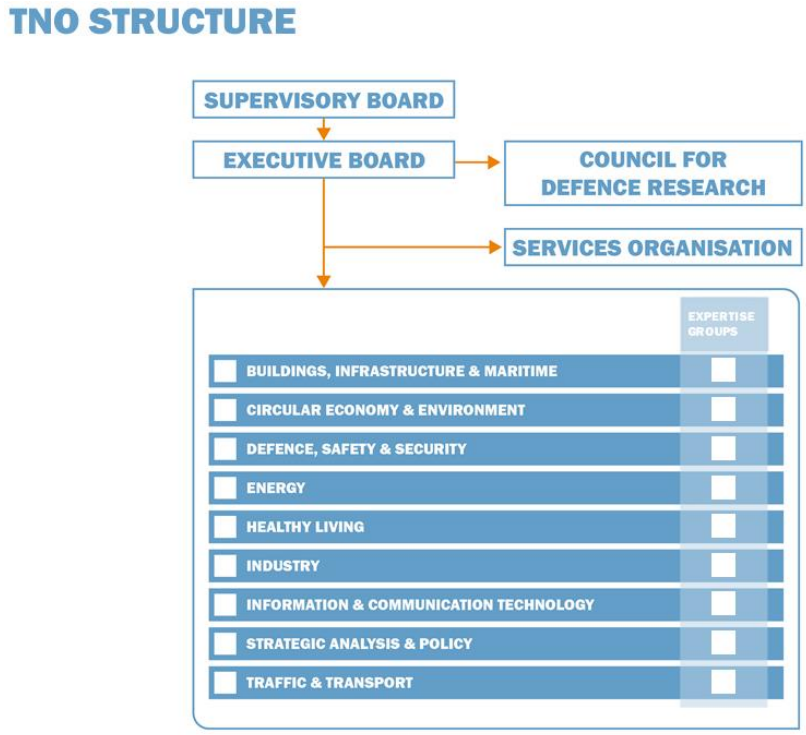
The Netherlands Organisation for Applied Scientific Research, hereafter 'TNO', is a modern, theme-led Research & Knowledge organisation. It was established in 1930 by Act of Parliament with the intention of maximizing the practical relevance of scientific research to the public sector, industry and society at large. The government of the day believed that this would enhance the innovative strength of the Netherlands and contribute to long-term economic growth. TNO is an independent research organisation. We believe in the joint creation of economic and social value.

TNO connects people and knowledge to create innovations that boost the competitive strength of industry and the wellbeing of society in a sustainable way. This is our mission and it is what drives us, the over 2,600 professionals at TNO, in our work every day.

Effective innovation is what TNO stands for. We do not do that alone but with companies, governments and a whole range of organisations. Through collaboration we create innovations that sustainably strengthen the competitiveness of companies and the wellbeing of society. We develop knowledge not for its own sake but for real applications. We work on issues that concern our environment, safety and security, the energy transition, innovations in industry and how to keep the ageing population actively engaged. These are the challenges that TNO researchers take up every day in their drive to produce impactful innovations.

1.2 Organisational structure

TNO's high level of ambition demands an appropriate organisational structure and corporate culture. Staff must be given every support as they pursue innovation and productive cooperation. The current organisational structure is shown below:



We focus on transitions or changes in nine societal themes:

- Buildings, Infrastructure & Maritime: 'Robust constructions, sustainable use'
- Circular Economy and the Environment: 'Directing and accelerating sustainability'
- Defence, Safety and Security: 'We're putting our knowledge and technology to work for safety and security'
- Energy: 'Faster towards a sustainable energy supply'
- Healthy living: 'Focussing on participation, not on the disease'
- Industry: 'Innovating for employment, welfare and well-being'
- Information & Communication Technology: 'Interpreting and accelerating digital transformation'
- Strategic Analysis & Policy: 'Turning complex issues into concrete innovations'
- Traffic and Transport: 'Helping to create liveable, sustainable cities'

Innovation with purpose is what TNO stands for. We develop knowledge not for its own sake, but for practical application. *For further information, see: www.tno.nl.*

1.3 Procurement

The TNO Procurement Department is involved in the purchasing, procurement and tendering procedures on behalf of TNO. For the TVC that is done in close cooperation with the department Space Systems Engineering which is part of the unit Industry. As part of the Finance, Procurement & Legal division, the Procurement Department is responsible for organizing and implementing all procurement processes in keeping with the corporate objectives of the organisation.

1.4 Purpose

Before proceeding with the preparation of a tender, TNO would like to consult the market on how this tender (in broad lines) can be structured. Within the scope of the market consultation, advice is sought to gain insight into the potential market for the delivery of a TVC for TNO. The market consultation is open to all players in the market.

The market consultation generates benefits for all parties involved. TNO observes what is possible and what the perception is of the market. So as to provide a more effective and coordinated response in how, for example, preferences and requirements can be formulated in the tender.

For interested players in the market an added advantage is that they get an early view of TNO and the tender which might follow. In addition, the market can affect requirements which will come back in the tender. This allows participants to contribute to the success of the tender.

The purpose of the market consultation is covering the following aspects:

- To gain more insights in discriminating factors for different configurations of Thermal Vacuum Chambers.
- To gain more insight into the current possibilities and the choice on the market.
- To get a clear understanding of the visions, ideas and suggestions of market participants.
- To gauge market interest for this possible tender;
- To decide which procurement strategy is best suited to our functional requirements in the current market.

The results of the market consultation may be processed in the possible tender documents, without traceability of participants of this market consultation.

1.5 Schedule

There are no follow up sessions planned for this market consultation, although after the market consultation TNO may wish to contact subscribers for an explanatory interview on their reply.

The schedule of the market consultation is shown in the table below.

Date	Deliverable / activity	Who?
28th of March 2018	Market Consultation document published by TNO	TNO
11th of April 2018, 15:00h	Deadline for submitting your input	Subscriber
After 11th of April 2018	Explanatory interview	TNO and Subscriber
Date of tender publication	TNO summary of market consultation results on TenderNed	TNO

1.6 Explanatory interview

Based on the answers of the Questionnaire of section 4, TNO may wish to invite or visit parties for an explanatory interview. TNO will assess the received answers on content and relevance for an explanatory interview, as well as the need for (further) explanation. The location for the interview will be Stieltjesweg 1 Delft or the location of Subscriber.

2. Basic principles and preconditions

The basic principles and preconditions mentioned below apply to this market consultation:

- TNO observes the principles on non-discrimination and transparency when carrying out this market consultation;
- This document is solely intended for market consultation purposes;
- Market parties who do not join this market consultation are thus not excluded of participating the possible tender. Neither are market players who join this market consultation in any way excluded, or privileged in, the possible participation of the tender;
- If market parties are not joining this market consultation, although they are able to deliver such system, they are kindly requested to forward this information to the TNO contact person named in section 2.1.
- This market consultation is without any obligation, both for participants and for TNO;
- Parties who are participating or not in this market consultation cannot derive any mutual obligations or rights towards TNO;
- Participating to this market consultation does not confer an entitlement at obtaining a contract award;
- TNO shall not reimburse any eventual costs in participating to this market consultation;
- Participating market parties agree that the information provided by them can be processed anonymized in the further elaborating program of requirements;
- In the context of the market consultation, provided information may differ from the information that will be provided in the tender procedure;
- The contribution of participating Parties will be handled as much as possible with confidentiality and in any case TNO will take into account the legitimate interests of the parties;
- The official language during this market consultation is English;
- TNO is not bound in any way by the outcome of the market consultation or obliged in realisation and/or tendering of the project upon which the market consultation is linked;
- No claim will be honoured for the use of information, confidentiality, or request for compensation herewith;
- All documents submitted by the participating Parties are considered public documents and shall be copy-right free unless otherwise marked by participating Parties. If copyrights are applicable, TNO is protected by the participating Parties;
- TNO reserves the right:
    - To perform the proposed procurement process in a different way, in terms of content and style, than the process that may have been communicated;
    - To cease publication of the market consultation temporarily or permanently;
- Participating in this market consultation, constitutes the Parties unconditional approval of the procedure as stated in this document.

2.1 Form and content

The consultation is set up as follows:

Written responses

Any interested market party who believes that they can contribute to the market consultation, should respond to TNO via the TenderNed procedure. Responses should be received by TNO no later than 11th of April 2018, 15:00h. Responses can be sent to:

Name : Raymond Peddemors
Position : Senior buyer
Department : Procurement
E-mail : raymond.peddemors@tno.nl

In the heading of your e-mail and in all future correspondence relating to this market consultation should be clearly mentioned ‘Market consultation 2018 FPL/INK 50’.

2.2 Intellectual property rights

Except where expressly permitted under Copyright Law or where necessary for the successful preparation of a Market Consultation document, no part of the market consultation documents may be reproduced in any form, by print, photocopy, DVD, CD-ROM, microfilm or other means, without the prior written permission of TNO. Market consultation documents and all accompanying documents submitted further to the Market Consultation Procedure become the property of TNO upon receipt.

2.3 Use of TNO logo

It is not permitted to copy, modify or otherwise use the TNO logo on any documents submitted by the Market Party further to the Market Consultation Procedure.

3. Background of the demand

TNO intends to replace its current TVC named the VCF (Vacuum Chamber Facility) by a new TVC called the CSI (Calibration Space Instruments). The CSI is also going to be located in the Van Leeuwenhoek Laboratory clean room facilities of TNO in Delft. The CSI will typically be used for calibration and characterisation of optical instruments or components of instruments of Earth Observation satellites. The calibration facility has to fulfil the typical requirements needed by Earth Observation instruments, covering:

- Thermal aspects
- Vacuum and cleanliness compatibility.
- Optical aspects
- Mechanical aspects

In the sections below these aspects are discussed in more detail, although it needs to be noted many of the figures mentioned are still under discussion and can also be influenced by the outcome of this market consultation.

3.1 Thermal aspects

Typical temperatures for Earth Observation thermal environment are within a range of about -60 °C to +60 °C. For specific type of tests low temperatures of -120 °C might be needed.

3.2 Vacuum and cleanliness compatibility

The empty and properly baked-out chamber should be able to reach a pressure better than 1 10^{-7} mbar throughout the range of temperatures. The TVC will be located in an ISO-6 cleanliness environment, although parts of the setup (like pumps and gasmixers if applicable) can be placed in an adjacent ISO-7 environment.

3.3 Optical aspects

To verify the optical performanceof instruments a specific Optical Unit will be developed. Note that this Optical Unit unit is **not** part of this market consulation and is not part of the related tender that will follow this market consultation. The Optical Unit will have a size (volume claim) of about 2 m (L) x 1 m (W) x 2 m (H) and needs to placed inside the vacuum environment. The Optical Unit will consist of Optical Ground Support Equipment (such as lenses, mirrors, polarisers, homogenisers) as well as mechanical manipulation equipment (such as rotation and translation tables). Note that there is no need that the Optical Unit (including the mechanical manipulation equipment) is exposed to the full temperature range as stated in section 3.1.

3.4 Mechanical aspects

The instruments to be calibrated will have an approximate maximum size of 1.2 m (L) x 1.2 m (W) 0.6 m (H). The required volume claim however will need to be much larger, since the instrument needs to be mechanically manipulated (translated and rotated) inside the vessel such that the optical pupil(s), that can be located at any position of the instrument, is in line of sight with the Optical Unit (see section 3.3) and close to the rotation point of the manipulators and rotations stages. A volume claim of about 2.5 m of height and 1.8 m diameter might possibly be necessary to host both the instrument and its mechanical manipulation equipment. Note that the mechanical equipment to manipulate the instrument is **not** part of this market consultation and is not part of the related tender that will follow this market consultation. Most probably interface specifications for the mechanical manipulators will need to be defined after contract award of the TVC, which must be acceptable for the supplier of the TVC.
To reduce the influence of vibrations of the instrument related to the Optical Unit specific low-vibration provisions needs to be available, such as an anti-vibration table on which both the Optical Unit and the instrument to be calibrated are placed, and/or dampers to decouple vibrations of the laboratory and the vessel (e.g. caused by pumps).

3.5 First sketches

In Annex A a “market survey” presentation is enclosed, which shows the numbers as mentioned above as well as some additional numbers, which are mainly still to be discussed. Also two sketches are shown for a possible embodiment of the TVC: design option 1 showing a single vessel housing both the instrument and the Optical Unit mounted on the same anti-vibration table, and design option 2 showing a two-vessel solution with one vacuum vessel for the instrument and one vacuum vessel for the Optical Unit, both connected via a vacuum tube so eliminating the need for an optical window between the two vessels. It needs to be explicitly expressed that by no means possible solutions for the TVC are limited by these two design options. Subscribers to the market consultation (and later on the tender) are invited and encouraged to consider alternative solutions.

4. Questionnaire

Subscribers are not obliged to answer all questions of the market consultancy.
Subscribers can be asked for additional explanation in a second round.
Subscribers are requested to limit their response with a maximum of 8 pages of A4.

	Questions on interest
A1	Do you consider, based on the limited information of this document, to apply to the tender? If yes, why, if not, why not?
A2	If you consider to apply as a combination of parties, which parties would that be and why would you choose for these parties?
	Questions on the content
B1	Would it be possible to have the vessel build from two or more segments to facilitate placement in our clean room laboratory (which has limited entrance possibilities)?
B2	Is a vessel shape like the “current design idea option 1” possible (see page 12 of Annex A) without additional major cost drivers?
B3	Interfaces with specific manipulation equipment (like rotation table, hexapod, to be mounted inside the vessel) will not be clear at TVC contract signing. What kind of flexibility can be offered regarding late definition of interface definitions?
B4	Low vibration values might be of importance for the instruments to be calibrated in the TVC. What kind of vibration reduction options can be offered (e.g. anti-vibration table inside the vessel, decoupling of vessel with the floor, etc.)?
B5	What kind of thermal system can be offered (open loop, closed loop, gasmixers, cryogenic refrigerator, copper shroud, RVS, brazed tubes, embossed) in relation to the temperature ranges indicated in section 3.1?
B6	Do you have specific innovative solutions that can be used for the TVC?
	Question regarding the tender
C1	What is the track-record of your company in engineering/procurement/commissioning of thermal vacuum chambers with volumes of about 20 m^3 for space instrumentation?
C2	We consider the TVC to exist of 4 main parts: the vessel, the thermal system, the vacuum system, the control system. Which parts will be developed by yourself, which will be outsourced to third parties?
C3	We consider the development of the TVC to consist of several phases: design, engineering, manufacturing, system integration, testing, commissioning. Which phases will be performed by yourself, which will be outsourced to third parties?
C4	What are your strongest added values?
C5	How much time do you need to make a sufficient proposal during the tender?
C6	Is your organisation able to estimate the price-impact of still TBD requirementes, and can you provide estimation per each TBD item?
C7	Which ones are the price-driving parameters in the execution of the project?
C8	Which important costs can be reduced using a well-chosen approach during contract?
C9	What is the track record of your company in implementing vibration containment in mechanical applications?
C10	How your organization will ensure mastery of Engineering Procurement Construction for those subsystems of CSI where a track record of competence is not available?
C11	Is your componay ISO9001 certified?
C12	Does your company have a configuration control management system in place?
C13	Does your company have a Non Conformances Management system in place?
	Questions regarding planning
D1	What would be the lead time from contract award to Preliminary Design Review?
D2	When would it be possible to perform the Factory Acceptance Test at your premises?

D3	When would it be possible to perform the Site Acceptance Test at TNO?
D4	What do you consider as the greatest risk(s) of the development of the TVC?
	Finally
E1	Are you prepared to explain your answers to the questionnaire orally by invitation?
E2	Do you have other ideas, suggestions, or comments?

Annex A Presentation: Market Survey Thermal Vacuum Chamber