DEFENSIE
LA DÉFENSE

Royal Higher Institute for Defence

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DEFRA

Defence-related Research Action

Call for proposals 2022
Information document including submission and evaluation guidelines and budget rules

Important dates:

Information session: 10 March 2022 (14h00 - 16h00)
Deadline Pre-proposals: 26 April 2022 - 14h00
Deadline Full proposals: 28 June 2022 - 14h00

For more information on the programme, please visit https://www.belspo.be/defra

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1. SCIENTIFIC AND TECHNOLOGICAL RESEARCH OF THE MINISTRY OF DEFENCE

1.1. CONTEXT

Scientific and technological research in the domain of security and defence is key to maintaining the Belgian Defence military and technological edge, to face current and future security challenges.

For this purpose, the Ministry of Defence (2021)[1] seeks to further develop and strengthen the links between Defence, the national research institutions and the industry by gradually increasing its R&T contribution as from 2022, with a view to reaching 2% of the total defence effort in 2030.

The setup of the Defence-related Research Action - DEFRA - fits perfectly in and contributes to the implementation of this strategic vision and general policy for Defence.

1.2. ROLE OF THE ROYAL HIGHER INSTITUTE FOR DEFENCE - RHID

As a "smart hub" and "honest broker" for scientific and technological research, the Royal Higher Institute for Defence (RHID) is responsible for the development and implementation of the Ministry of Defence's policy on scientific and technological research. Within this policy, twelve focus areas have been identified, in which research is actively supported and stimulated.

As a "smart hub", RHID aims to promote the growth of Belgian scientific and technological research in the field of defence and security, as well as to restore and strengthen the links between administrations, universities and companies at this prospect. It wishes to achieve this, among others, by promoting and facilitating the participation of Belgium and the Belgian Ministry of Defence in international, national and regional research programmes. In addition, the results of research are published annually for a wide audience and colloquia are held regularly.

As an "honest broker", RHID manages and facilitates, through the department Scientific and Technological Research of Defence (STRD), the research programme of the Ministry of Defence. Although in the past this programme was primarily reserved for Defence research institutions, collaboration with other partners, including Belgian research institutes and industry, is increasingly becoming the norm.

The Ministry of Defence wants to further develop its capabilities through collaborative research with external partners by launching annual open calls for proposals within the frame of its research programme. The current call is the second open DEFRA call, based on four selected research themes.

More information on the institute and its activities can be found on the website: https://www.defence-institute.be/en/accueil-english/

[1] Policy Declaration Defence 29 October 2021. https://www.dekamer.be/doc/FLWB/pdf/55/2294/55K94008.pdf

1.3. COLLABORATION WITH THE FEDERAL SCIENCE POLICY - BELSPO

For organising and managing the DEFRA calls for proposals, a long-term collaboration agreement has been signed on 13 December 2021 between the Ministry of Defence and the Federal Science Policy (BELSPO). BELSPO will manage these calls for proposals on behalf of the Ministry of Defence. For the selected projects, funding is granted by, and contracts will be concluded with the Ministry of Defence.

2. DEFENCE-RELATED RESEARCH ACTION - DEFRA

2.1. OBJECTIVES OF THE PROGRAMME

Through the funding of research projects based on scientific excellence, the DEFRA programme allows meeting the scientific knowledge needs of the Belgian Defence.

The general objectives of the programme are the following:

- Support and strengthen scientific excellence.
- Develop and realise a critical research mass on themes considered to be a priority for Belgian Defence in order to:
    - contribute to short- and long-term capacity development, in line with the Integrated Capability Development Plan (ICDP) and the Strategic Vision for Defence.
    - contribute to the culture of innovation planned within Defence, both in terms of technology and process improvement.
    - foster employment for Defence.
    - contribute, in accordance with the Defence, Industry and Research Strategy (DIRS), to the development of a competitive and credible national industrial and technological base in the field of security and defence.
- Encourage the participation of highly qualified Belgian research institutes and industry in Defence and security related research activities.
- Promote systemic, multidisciplinary/interdisciplinary and integrative approaches.
- Strengthen transdisciplinary research in order to enable potential users to make better use of the research achievements.

This is the second call in the frame of the DEFRA programme.

2.2. ELIGIBILITY CRITERIA FOR PROJECT PARTNERS

This call is open to Belgian public and private non-profit research institutes and private companies (both as funded and non-funded partners in the project).

The project partnership must be in a triple helix composition where academia and industry work together to foster R&T for Defence (see section 3.5).

From the **public research sector**, all Belgian universities, colleges of higher education, federal scientific institutions, defence research institutes and other public research institutes are eligible partners.

Private non-profit research centres must have operational and/or research activities in Belgium. They must have legal personality and their registered office in Belgium.

From the **private sector**, companies (including SMEs) complying with the following criteria are eligible partners:

- The company must have operational and/or research activities on the Belgian territory.
- The company must have a legal personality and its registered office in Belgium. The legal personality is required at the latest when signing the research contract.
- At the moment of signing the contract, the company must have fulfilled its obligations to pay its taxes and social security contributions.

Specific partnership requirements per theme are set out in section 3.5.

Research institutes and/or companies external to the project (other than funded and non-funded project partners) can confirm their interest and commitment to provide input to the project via cash or in-kind contributions by completing the cash or in-kind commitment letter available on the platform.

2.3. INFORMATION SESSION

To inform potential applicants about the context, scope and modalities of this call, an online information session will be held on **10 March 2022 (14h00 - 16h00).**

Registration prior to the event is required.

More details will be announced through the **DEFRA-website** and the website of the RHID as well as through social media.

3. CALL INFORMATION

3.1. DOCUMENTATION RELATED TO THIS CALL

3.1.1. DEFRA WEBSITE

The following documents are available on the **DEFRA website** (https://www.belspo.be/defra):

- Information document, including submission and evaluation guidelines and budget rules: general information on the programme and the call, overview proposal content and corresponding evaluation criteria for the applicants and the evaluators (the present document)
- Evaluators eligibility: eligibility rules of proposed experts for the evaluation of the proposal
- Evaluation matrix for pre-proposals: overview of the evaluation ratings for the pre-proposals
- Evaluation matrix for full proposals: overview of the evaluation ratings for the full proposals
- Platform Submission guidelines: information for the applicants on the use of the submission platform
- FAQ
- Pre-proposal template (PDF file)
- Full Proposal template (PDF file)
- Annexe II - general conditions applicable to the 2022 contracts

3.1.2. DEFRA SUBMISSION PLATFORM

The following templates will be made available on the **DEFRA online SUBMISSION platform** (https://defra.belspo.be) and must be used compulsorily unless otherwise stated. Applicants must Log In to the platform in order to access them:

In PHASE 1 of the call (submission of pre-proposals):

- Pre-proposal template (Word file)

In PHASE 2 of the call the following documents will be made accessible to the applicants that are invited to submit a full proposal:

- Full Proposal template (Word file) - only accessible to the selected pre-proposals
- Gantt chart (Excel file)
- Cash or in-kind commitment letter (from institutes/companies which are not partners of the project) – non mandatory, only if applicable (Word file)

3.2. INDICATIVE CALENDAR OF THE CALL

	Date	**At / via**
Information session	10 March 2022 (14h00 - 16h00)	Online
Deadline Pre-proposals	26 April 2022 - 14h00	Online submission platform
Communication of evaluation result pre-proposals	10 May 2022	Mail
Deadline Full proposals	28 June 2022 - 14h00	Online submission platform
Remote scientific peer review evaluation	05 July - 15 August 2022	Online evaluation platform
Feedback to applicants in preparation of panel meeting	end August 2022	Mail
Panel evaluation, incl. interviews with the applicants	beginning September 2022	RHID or online
Selection proposal formulated by the scientific committee of the RHID	mid-September 2022	NA
Final selection of proposals by the board of directors of the RHID and allocation of projects	mid October 2022	Mail
Signature contracts	01 December 2022	Online E-sign platform

3.3. RESEARCH THEMES AND INDICATIVE BUDGET OF THIS CALL

The present call covers the following research themes, with their indicative budget:

	Indicative budget (M€)
Theme 1: SPACE: Space Weather for security and defence applications	1,6
Theme 2: COMMUNICATION: 5/6G for military, security and crisis applications	1,6
Theme 3: **ENERGY**: Sustainable and “green” energy applications for military use	1,6
Theme 4: HEALTH: Preventive Medicine for improved soldier fitness	1,6
TOTAL	**6,4**

There is no set maximum budget per project. However, applicants should take into consideration the total available budget for each theme. The objective is to develop a project with the most efficient use of public resources.

The number of projects that will be funded per theme depends on the evaluation of the proposals and the requested budget per proposal. It is envisaged to have 1 or 2 projects funded for each of the themes. Budget transfers between the themes are possible.

3.3.1. THEME 1- SPACE: SPACE WEATHER FOR SECURITY AND DEFENCE APPLICATIONS

Context

The global space sector is undergoing rapid transformations. Due to the importance of its structures and services, new players are entering the space sector and it becomes more and more open to smaller, non-state actors. In order to remain one of the world's leading space actors, Europe and the European countries have to react and invest early into the most promising future technologies to generate the necessary breakthroughs. Belgium needs to find its place and its role in defining this bigger picture. Space weather is a new discipline, which has become a Belgian specialty for several years. Space weather describes changes in the environment that are driven by physical processes, largely of solar origin and associated with changes in magnetic complexity in the Sun. The effects range from the earth's surface, through the atmosphere (including the ionosphere), the earth's magnetosphere, the interplanetary medium to the sun and into interstellar space. Astrophisics explains today a lot of space weather events, how they are created, how they evolve over time and space and what could be the impacts. We know today the main drivers of space weather: electromagnetic radiations, solar winds and solar particles. And we know how an event can impact the Earth through a driver, notably: the ionosphere. With consequently impacts on ground wave communications, sky wave communications, SATCOM and GNSS. The Solar Terrestrial Center of Excellence in Uccle is an internationally recognized pole in the domain providing products worldwide. Belgian Defence developed a partnership with them in order to develop a military niche expertise in Space weather that few countries have. The military aspects of this national niche will need to be explored in order to develop exploitable space weather services to support allied military operations.

Research scope

The knowledge of space weather has grown over the years and is quite consequent today. The Belgian Defence will also be part of the development of dual niche capabilities in the area of "Space Domain Awareness" including Space weather. But there is still a gap in this knowledge: the impacts on systems. In order to fill this gap scientists, industry and users need to assess and get information about those impacts. Unfortunately, the sporadic character of space weather events slows down the process. A solution is to investigate into the development of a simulation and testing tool for space weather events on military systems and sub-systems (TRL 4-5). Hardware and software development, creation of procedures for standardization and harmonization or development of any other aspect needed for such a simulation tool could be considered. Particular attention will be given to:

- assessment on military equipment
- space weather forensics,
- classification and standardization,
- configuration benchmarking,
- dissemination and exploitation of forecast products, ground-based or space-based sensor design or development, ….

As additional information, we can state that there are already two standards regarding measurement and test procedures in the commercial world.
JEDECS: JESD89A – Measurement & reporting of Alpha particles & Terrestrial Cosmic ray induced soft errors in semiconductors devices.

JEDECS: JEP151 – Test procedure for the measurement of Terrestrial cosmic ray induced destructive effects in power semiconductor devices.
These standards could be used as start of a testing of a specific device or adapted to military world but other standards could be explored or created as well to fill other gaps in our knowledge. The most impacted systems are Global Navigation Satellite Systems (GPS, Galilleo, Glonass, etc.) and telecommunications but secondary effects on other systems such as high voltage lines, pipelines or even human body could be investigated as well.

Expected impact

The outcome of Space weather products, data and services will be strongly improved for Belgian Defence stakeholders but also for external partners. Forecasts will be leveraged for the operational community and more directly exploitable by a larger portfolio of customers inside and outside Belgian Defence.
The processing work for the Space weather Small and Medium Entreprises (SME) will be more structured and standardized in order to increase the outreach of their products. The Space weather products should be more descriptive on the expected operational impact on specific equipments.

3.3.2. THEME 2 - COMMUNICATION: 5/6G FOR MILITARY, SECURITY AND CRISIS APPLICATIONS

Context

Modern mobile communications is a complex topic that is moving very fast. It pushes the limits of technology in several areas in both access and core networks, for example for crisis management, with the ambition to develop specifications likely to encounter significant implementation challenges. Credible analyses in this topic area require significant effort. In addition, its standardization and development efforts are moving very fast, with intensive research and development (R&D) and testing being conducted.
The Belgian Defence currently relies on different technologies for tactical or crisis communications (TETRA, 3/4G, PMR, …). It is therefore eager to research what the impact of the emergence of 5/6G will be on its communications systems, and what are the challenges, risks and opportunities linked to this transition.
Military applications of 5/6G in the Belgian Defence are:

- Voice & Data Coverage in support of Coastal patrols (covering Exclusive Economic Zone (EEZ)).
- Homeland crisis management communication systems with different options for Belgian Defence
  - Use of partner/common private network (e.g., Evolution of ASTRID towards 5G)
  - Deployment of military private network
  - Use of public infrastructure (network slicing)
- Fixed or Mobile (mounted on vehicles) tactical networks
- Replacement of TETRA and PMR Systems for internal communications on Defence infrastructure
- …

Research scope

Many key features of 5G are still to be specified and implemented. Proper attention will also be given to 6G (next generation 5G), predicted to be a lot like 5G in its general infrastructure but with even more speed, accuracy and ubiquity.
For this call, the applicants have to focus on one or more of the following research topics that we consider particularly interesting to support the possible military applications:

- Mobile 5/6G capacity: mobile deployable networks (vehicle mounted base stations)
  - Impact on performances
  - Agility of the network
  - Security of personnel in the vicinity of the base station
- Resistance to jamming:

  - Performance of 5/6G in an Electromagnetic Spectrum (EMS) contested environment
  - Ability to detect and jam 5/6G when used as Improvised Explosive Device (IED) triggering signal
- Security risks and/or requirements for network slicing (Secure network slice on public network)
- Reliability of 5/6G in a crisis management situation (high concentration of users and traffic)
- Agile/dynamic authentication and network forming in a crisis management situation.
  Crisis management is characterised by the rapid ad-hoc formation of different communities of interest that need to exchange information in a secure and transparent way. Mission preparation is usually not an option.
- Spectrum management: developments of 5/6G solutions that can be deployed worldwide taking into account the spectrum management restrictions.
- Supply chain security/ Strategic autonomy for military/Crisis management application of 5/6G including user terminals, core network for national application, deployable solutions…

Expected impact

5/6G offers opportunities and challenges for military applications in different military application domains and utilization concepts such as implementation of 5/6G in different types of spectrum and in multiple bands, high-capacity tactical wireless systems, virtualization and slicing…
Proposed studies should provide clear insight and solutions to the Defence staff (and national crisis management actors) on the possibilities, advantages and risks linked to the possible adoption of 5/6G for specific future applications.

3.3.3. THEME 3 - ENERGY: SUSTAINABLE AND "GREEN" ENERGY APPLICATIONS FOR MILITARY USE

Context

As current military energy solutions are still largely based on fossil fuels, it is important and urgent to make further progress on the transition towards a more sustainable eco-friendly energy approach.
Despite a constant improvement of energy efficiency, the transition towards low or zero carbon can only be achieved by means of new or improved "green and sustainable" production and storage means, such as harvesting energy from renewable sources, improved batteries and other innovative means of energy storage. However, these new technologies often pose a challenge for their integration and compatibility in or with military systems, from a technological readiness point of view, as well as from a logistics and operational management point of view.
Military camps abroad need a lot of energy. Where possible, military camps are connected to the local energy network. However, this is not always possible. Due to limited capabilities and reliability of the local network, due to the remoteness of the camps or due to security threats, many military camps depend on their own (sometimes massive…) energy production. In most cases, a considerable number of fossil fuel based generators are required in order to provide the necessary energy, day and night, 24/7, year after year. In recent times, commercially available technologies permitting wind and solar energy harvesting, complement fossil fuel generators, but those cannot produce the total required energy, nor the peak requirements when needed.
The daily energy requirement of a standard military camp is very variable. It is a combination of peaks (morning, noon, evening), depending on the operational activities, depending on daily activities such as kitchen or service facilities and depending on the local climate (air conditioning, heating, lights,…). Additionally, the energy supply of military camps is vulnerable to attacks or sabotage, as the local network might be targeted and as resupply-convoys are an easy target for ambushes. Moreover, the poor quality of local fuel often causes technical problems for the generators.
For the time being, it is also very difficult to store overproduced energy at a large scale and to use that stored energy when required (peaks, reserves). That is why, without daily external energy supply, military troops have

to rely on huge quantities of reserve fuel in order to remain operational for multiple days and continue their missions. This reserve fuel storage is very vulnerable to fire and attacks.
Future military systems are expected to use increasing amounts of electrical energy. This is driven by a number of factors, including the use of increasingly powerful computers and sensors on military platforms, the use of alternative weapons that require significant electrical power (such as directed- energy weapons – DEWs), and the deployment of future military assets in increasingly harsh operating environments. These factors – and others – may further increase the need for higher capacity, higher power and more resilient energy storage systems.
In addition, as military environmental conditions can be very aggressive regarding energy storage performances, some specific protective elements might be necessary, such as heat shields, heat sinks, electromagnetic shields, protections, cushioning, cooling systems, fire barriers, and advanced battery management systems to name a few.
Finally, the development and integration of future energy storage systems may not only enhance military capability and operational resilience, but also reduce through-life financial and environmental costs.

Research scope

Part of the answer will come from further exploration and development of new or improved energy harvesting and conversion technologies (synthetic fuels, hybridization, hydrogen, ammonia, etc.), as well as the study of solutions allowing better management of resources and optimization of needs. New or improved energy storage solutions of any kind however, will be key to achieve optimum performance. As such, autonomous military camps will have to integrate a wide and diversified energy source and storage approach, combining different technological bricks for optimum results.
BEL Defence is particularly interested in the energy storage aspect and would like the study to focus on smart ("beyond state-of-the-art") energy storage systems with following characteristics:

- Absorb and store overproduced energy of all locally available green energy sources (wind, solar (thermal and PV), geothermal energy, ambient energy, hydropower, …)
- Considering an overall energy need of several thousands of kVA for larger camps
- Considering peak shaving, as well as one or more days of storage capability
- Allowing peak performance, as needed by the operational requirements (for example as Emergency Power Supply (EPS) for high-end military systems or the use as Directed-Energy Weapon (DEW))
- Be modular/scalable and semi-mobile (easy handling, transport (container ISO 20ft…))
- Be able to operate in a wide range of temperatures (-19°C up to +44°C (Ref STANAG 4370))
- Be ruggedized enough to withstand transportation in rough conditions (mechanical constraints, mechanical flexibility, shock resistance, …)
- Easy to set up (plug and play, interoperability, modular/stackable)
- Be less vulnerable to external military threats
- Be environmental-friendly and sustainable

Circular economy aspects

- The use of non-polluting production technologies
- Recyclability of components with a shorter life span

Expected impact

The proposed solutions will offer an optimized energetic autonomy with minimal impact on operational flexibility/effectiveness and with an expected (significant) impact at the level of:

- Reduced noise
- Smaller logistic footprint
- Facilitating more extensive use of renewables
- Lower maintenance
- Lower logistic risks

- Higher reliability
- Lower Life Cycle Cost

Overall, the envisioned energy transition should become an operational asset, making it possible to be more energy efficient, aiming at a better autonomy and strengthening the resilience of forces.
Proposed studies will offer improvements in one or multiple aspects presented in the Research Scope. The improvements resulting from the study, will have to be demonstrated in a validated environment (TRL max 5) by using a realistic operational scenario (to be defined in the project) representative for the supported activities.

3.3.4. THEME 4 - HEALTH: PREVENTIVE MEDICINE FOR IMPROVED SOLDIER FITNESS

Context

Being a soldier is a physically demanding job. One of the challenges in a military environment is keeping the service member physically ready at a high level for an extended period of time, starting from the recruiting and initial training phase, preparing for deployment and during deployment. Physical readiness relies on four pillars: Physical fitness is the first pillar, mental fitness, nutrition & hydration and rest & recovery are the other three pillars. Monitoring the physical readiness of the soldier in order to prevent and mitigate injuries and other health conditions is key. A detailed assessment of cardiorespiratory, metabolic and musculoskeletal functions as well as mental health requires appropriate and sophisticated medical exams, limiting their applicability for large groups.

Research scope

For this call, the main scope is about the use of recent sensor-based technology, which could open the possibility of remote diagnosis and monitoring of large numbers of people, supported by central data capture, analysis and artificial intelligence-supported algorithms. Measures implemented to improve the condition can also be monitored for their efficacy in larger cohorts of people.

Qualitative and quantitative high-quality data management has to be taken into account, with respect for privacy, but with a very high usability and reliability of data used throughout the project.
Data capture will comply with all applicable laws and regulations, including ICH E6 Good Clinical Practice (GCP), 21 CFR Part 11, EU Annex 11, General Data Protection Regulation (GDPR), HIPAA (US), ISO 9001 and ISO 27001. The trial participants will be pseudonymised by their unique Subject ID. Data is placed on a dedicated storage server and regularly backed up. Access to data is determined by the Sponsor, preventing unauthorized access to data.

A proper IT infrastructure and good communications between the people monitored and the health care professionals who supervise the management in the different settings are also key.

The detailed assessment of the health functions must be done in an integrative fashion demonstrating clearly its innovative character (TRLs 4-5) and scientific benefit.
The specific focus is on :

- Identification of high end remote sensor suite
- Central data capture and data management
- Remote assessment of the physical and mental readiness based on comprehensive sensor data
- Remote reliable diagnostics based on comprehensive sensor data;
- Impact measurement of prescribed mitigation plan based on comprehensive data

Expected impact

All service members and leaders would benefit from such an early-warning health monitoring system, which could also improve military performance in operations and training and reduce the long-term effects due to injuries and other health conditions.
Example of a use-case: A platoon in training for cold weather operations could benefit from real time information on the (hypo)thermic condition, fatigue state, heart rate (variability), … of each member and sending out warnings to buddies, platoon leader, medic or even more remote stations if needed. This would lead to an improved focus on the operation/training as the health situation is kept monitored. This example can be expanded to long oversea or tactical operations where the baseline health and fitness can be assessed and the evolution could be monitored. This could be of particular interest for occupational medicine services, improvement of training programs, etc.
The impact is therefore that the health condition of the service members can be assessed on time to prevent a heavy burden of Diseases and Non-Battle Injuries (DNBI) on the unit.
This technology could be of interest for other tactical athletes such as firefighters or police forces and could potentially also be used in other domains such as sports, rescue or other activities where health monitoring is paramount.

3.4. PROJECT DURATION

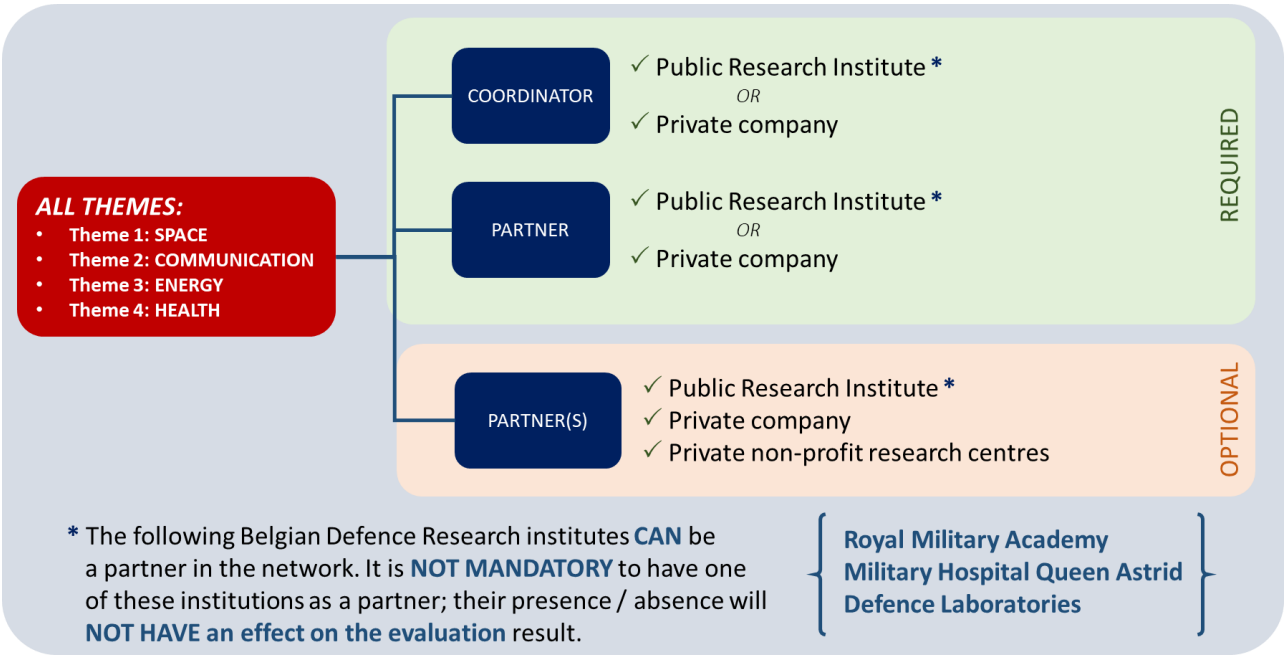
The projects will have a duration of **2 to maximum 4 years**.

3.5. PROJECT PARTNERSHIP

3.5.1. PARTNERSHIP

Proposals must be submitted by a **network** composed of **at least one public research institute** - receiving at least 10% of the project budget - **and one private company**. Both types of organisations can act as the coordinator. Private non-profit research centres can participate as a partner but cannot coordinate a project.

For all themes, Belgian Defence research institutes (Royal Military Academy (RMA), Military Hospital Queen Astrid (MHQA) and the Defence Laboratories (DLD)) can be a partner in the network. It is not mandatory to have one of these institutes as a partner; it will neither have a beneficial effect on the evaluation result (no bonus).



3.5.2. ROLES AND RESPONSIBILITIES WITHIN THE PROJECT

Project partners jointly share obligations and responsibilities during the implementation of the project. The project should be fairly balanced, even if different partners may have different tasks and subsequently different budgets.

A **coordinator** must be appointed in each network proposal.

For each project, a **Steering Committee** shall be established at the start of the project to act as the governing body (see section 6.3.).

ROLE OF THE COORDINATOR

The coordinator is responsible for the overall project management and coordination. He/she shall:

- Coordinate all activities to be carried out in the framework of the project.
- Coordinate the internal meetings between the network members.
- Coordinate the production of the required project reports intended for Belgian Defence as described in section 6.4.
- Coordinate the synthesis and translation of the research results, with a view to applications and support for decision-making.
- Coordinate the publication and dissemination of the research results.
- Chair all meetings of the Steering Committee, unless decided otherwise in a meeting of the Steering Committee.
- Convene meetings of the Steering Committee and write the reports of these meetings. The Coordinator shall give notice in writing of a meeting with the agenda to each Member no later than fourteen (14) calendar days in advance.
- Inform the Steering Committee and the RHID of any problems that might hinder the implementation of the project.

SUBCONTRACTORS

The project may require specific or punctual expertise, which can be delivered in the form of **subcontracting**. It is the responsibility of the project team to ensure that the rules and practices of the subcontractor, and in particular the ownership and valorisation of research results, publications and communications, are compatible with the rules governing the call. The project team takes full responsibility for the final result of the subcontracted work.

3.6. RESEARCH ETHICS

The first code of ethics for scientific research in Belgium was drawn up in 2009 (see http://www.belspo.be/belspo/organisation/publ/pub_ostc/Eth_code/ethcode_en.pdf).

The "Code of Ethics for Scientific Research in Belgium" is a joint initiative of the Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique, the Académie Royale de Médecine de Belgique, the Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten and the Koninklijke Academie voor Geneeskunde van België, with the support of BELSPO.

All projects must take this code of ethics into account in their research. If applicable, **it is the responsibility of the applicants to consult the relevant Ethical Board for their organisation before submitting a proposal.**

3.7. BUDGET RULES

Financing by Defence: This call is subject to the European legislation on State Funding (Art 107 (1) TFEU and the General Block Exemption Regulation in particular:

- Financing a public research institute or a private non-profit research centre is set to a maximum of 100% of the eligible costs.
- Financing a private company is limited to a maximum of 65% of the eligible costs for LargeCap enterprises, maximum 75% for MidCap and 80% for SME. The remaining % is indicated in the proposal as the partner contribution.

	REQUIRED PARTNERS		OPTIONAL PARTNERS
ALL THEMES	Coordinator: Public Research Institute *OR* Private Company	Partner: Public Research Institute *OR* Private Company	Public Research Institute *OR* Private Company
TOTAL PARTNER BUDGET **financed by Defence**	**Public Research Institute:** 100% eligible costs **Private Company**: • LargeCap enterprises: 65% eligible costs • MidCap enterprises: 75% eligible costs • SME: 80% eligible costs		**Public Research Institute** *OR* **Private non-profit research centre:** 100% eligible costs. **Private Company:** • LargeCap enterprises: 65% eligible costs • MidCap enterprises: 75% eligible costs • SME: 80% eligible costs

In the full proposal (section 6.5 Budget assessment) the total project budget should be detailed in the tables (100% cost). Additional lines are foreseen to indicate the partner contribution to the total project cost (depending on the partner type) and the subsequent RHID funding contribution.

The project budget is reserved exclusively for the project activities. The different categories of expenditure financed by Defence are:

Staff: Pre-tax wages associated with increases in the cost of living, employers' social security and statutory insurance contributions, as well as any other compensation or allowance due by law and secondary to the salary itself. Defence does not allow cumulative wages for Staff. Staff members bound contractually to a public institution - full time or part time - cannot apply for him/herself for Defence staff budget for that part.

For persons not identified by name in the proposal, the staff costs are limited to a maximum amount of:

- 4 640 €/month FTE for a technician/bachelor (regardless of years of experience)
- 6 075 €/month FTE for a Master (regardless of years of experience)
- 7 180 €/month FTE for a Master in engineering (regardless of years of experience)
- 8 285 €/month FTE for a PhD (regardless of years of experience)

The RHID only accepts staff to be hired under a labour contract. Tax-free doctoral or post-doctoral scholarships are not accepted.

General operating costs: this includes daily/usual supplies and products for the laboratory, workshop and office, documentation, consignments, use of daily software and IT facilities, organisation of internal meetings, etc. The general operating budget may not exceed 15% of the overall project staff budget for the project coordinator and 10% for the other project partners. The amounts claimed must correspond to actual expenditures strictly related to the project, even if supporting documents are not requested. Although no detailed justification is required for these costs, the administration of the concerned partner must keep these invoices in its accounts in the event of an audit.

Specific operating costs: this includes a list of operating costs specific to the execution of the project tasks, such as costs for project analyses, testing, maintenance and repair of equipment purchased by the project, use of specific IT facilities and software, costs for surveys, open data publications, organisation of workshops and events, etc. These costs need to be clearly described in the proposal and each of them shall be justified by invoices during the project.

Overheads: Institutions' general overheads that cover, in one lump sum, administration, telephone, postal, maintenance, heating, lighting, electricity, rent, machine depreciation, and insurance costs. The total amount of this item is set as a fix amount of 10% of the total staff and operating costs.

Equipment: List of investment goods specific to the implementation of the project and to be purchased on the project budget. It concerns the purchase and installation of scientific and technical equipment and instruments, including computer equipment, to be entered in the inventory or assets of the institute/company. Equipment needs to be clearly described in the proposal and shall be justified by invoices.

Subcontracting: Expenses incurred by a third party to carry out project tasks or provide services that require special scientific or technical competences outside the partner's normal area of activity. The amount may not exceed 25% of the total budget allocated to the partner concerned. If the subcontractor is not yet known then only the nature, the planned duration and the estimated amount needs to be indicated in the proposal.

	STAFF COSTS (monthly costs)	GENERAL OPERATION COSTS	SPECIFIC OPERATION COSTS	OVERHEADS	EQUIPMENT	SUBCONTRACTING
PROJECT COORDINATOR	**Technician**: 4 640€/month **Master:** 6 075€/month **Master (engineering):** 7 180€/month **PhD:** 8 285€/month	15% of Staff costs *(Automatically generated)*	-	10% of [Staff costs + Operation costs] *(Automatically generated)*	-	Max. 25% of the total budget of this partner
OTHER PROJECT PARTNERS	**Technician**: 4 640€/month **Master:** 6 075€/month **Master (engineering):** 7 180€/month **PhD:** 8 285€/month	10% of Staff costs *(Automatically generated)*	-	10% of [Staff costs + Operation costs] *(Automatically generated)*	-	Max. 25% of the total budget of this partner

3.8. GENDER

The RHID strongly encourages the applicants to take into account the equality between women and men and to ensure gender mainstreaming in the implementation of the project. The project should include this both in the choice of the researchers and, where relevant, by integrating the gender dimension into their research.

4. SUBMISSION PROCEDURE

The submission of projects will be done in two phases using the DEFRA on-line submission platform:

https://defra.belspo.be

4.1. PHASE 1 – PRE-PROPOSAL

A **pre-proposal** must be submitted at the latest on **26 April 2022 (14h00).**
If the pre-proposal has not been submitted in time, it will be impossible to submit a full proposal.

The following information needs to be filled in directly into the online platform:

- The choice of the theme
- The title and acronym of the project
- The coordinates of the foreseen partners
- Summary of the project (1/2 page)
- Keywords (min 2; max 6).

- The name and contact details of 4-6 scientific experts (minimum **2 Belgian** and **2 foreign** experts) capable of assessing the proposal. See also document 'Evaluators eligibility'.
- Optionally, the name and contact details of 2 non-grata scientific experts to be excluded from the evaluation of the proposal under the condition of sufficient motivation.

The pre-proposal form can be downloaded from the platform and will contain:

- The title and acronym of the project.
- The coordinates of the foreseen partners.
- A brief description of the intended project: the scope, objectives, the innovation with respect to the state of the art, the relevance and potential impact of the project for Defence.
- Relevant references of the partners in relation to the project, incl. a short profile of the foreseen partners.

The total length of the **pre-proposal** should not exceed **8 pages** format A4. Annexes may be added for clarification purposes, but not explicitly required information or documents will NOT be taken into account for the evaluation of the pre-proposal.

The pre-proposals will be evaluated by an internal evaluation committee of the Belgian Defence (see section 5.1.1.).

On **10 May 2022**, the internal evaluation committee will invite for each theme maximum five pre-proposals to submit a full proposal.

The pre-proposals will also be used by BELSPO / RHID to seek experts for the evaluation of the full proposals.

The project objectives of the full proposal may vary from that of the pre-proposal to some extent. However, it cannot diverge to the point that the expertise mobilised for the evaluation of the proposal will become irrelevant. Changes in the project partnership (changes in participating institute(s)/company(ies), including the coordination role) can only be accepted after the explicit approval of RHID. The keywords must remain the same since they are used for composing the evaluation panel.

4.2. PHASE 2 – FULL PROPOSAL

For each theme, maximum five pre-proposals will be invited to submit a full proposal. Applicants must submit the full proposal via the online DEFRA submission platform.

The **full proposal** must be submitted at the latest on **28 June 2022 (14h00).**
If the full proposal does not comply with the submission rules or has not been submitted in time, it will not be taken into account for evaluation.

Content of the full proposal:

Within the full proposal form:

- The title, acronym and summary of the project.

- The name and contact details of the project partner(s).
- The proposal description:
  - scope and objectives,
  - state of the art and innovative character,
  - relevance and potential impact for Defence, including the data management plan,
  - quality of the partners/partnership of the project,
  - methods and tools used,
  - the work plan: work packages, the project risk assessment, the budget assessment.

As a separate form:

- The GANTT chart (mandatory)
- Cash or in-kind commitment letter (not mandatory)

5. EVALUATION PROCEDURE AND CRITERIA

5.1. EVALUATION PROCEDURE

5.1.1. PHASE 1 – EVALUATION OF PRE-PROPOSALS

Only pre-proposals that are complete and submitted in time will be taken into account.

The pre-proposals will be evaluated by an internal evaluation committee of the Belgian Defence on the basis of the following criteria:

- The correspondence of the pre-proposal with the scope of the call themes
- The quality of the pre-proposal, based on the description of the project objectives and the innovation with respect to the state of the art)
- The relevance and potential impact for Defence.
- The quality of the partners and the adequacy of the partnership.

More information about the criteria used can be found in the evaluation matrix for pre-proposals.

The RHID will translate the outcome of each pre-proposal's evaluation into numeric scores. In practice, this will be done as follows:

1. Translating the appreciations given to each sub-criterion into scores.
2. Adding the scores of the sub-criteria to obtain a total for each criterion.
3. Performing a weighted sum of the criteria in the following way:

WEIGHT OF THE DIFFERENT CRITERIA	SPACE	COMMUNICATION	ENERGY	HEALTH
Quality of the pre-proposal	40%	40%	40%	40%
Impact	30%	30%	30%	30%
Quality of the partners & Adequacy of the partnership	30%	30%	30%	30%

According to the scores obtained, the proposals will be ranked in a list (Pre-proposal Ranking). This list will serve as the base for the selection of the applicants invited to introduce a full proposal.

This evaluation will take place within three weeks after the submission of the pre-proposals. On **10 May 2022**, BELSPO will communicate the conclusions of the internal evaluation committee to the applicants and will invite for each theme maximum five pre-proposals to submit a full proposal.

5.1.2. PHASE 2 – EVALUATION OF FULL PROPOSALS

Only full proposals that are complete and submitted in time will be taken into account.

The selection of proposals is based on a peer-review evaluation that guarantees scientific excellence and the alignment of the projects with the thematic objectives of the call. The evaluation of the full proposals runs in four steps:

Step 1 - Remote scientific peer review evaluation
Step 2 - Panel evaluation, including interviews with the applicants
Step 3 - Selection proposal formulated by the Scientific Committee of the RHID
Step 4 - Final selection of proposals by the Board of Directors of the RHID

STEP 1 - REMOTE SCIENTIFIC PEER REVIEW EVALUATION

BELSPO organises and coordinates a scientific peer review evaluation of each proposal. The principles of this evaluation are the same for the 4 themes.

Each of the full proposals will be evaluated by a team of 3 independent experts having an adequate combined expertise to evaluate the research proposal. Each expert team will be composed of minimum one Belgian and minimum one foreign expert.

BELSPO is responsible for composing this remote 'written evaluation team' with experts from BELSPO's and RHID's own databases and experts suggested by the applicants.

For each proposal, an individual written evaluation is performed. The written evaluation takes place remotely, via the online DEFRA evaluation platform, based on an evaluation form. During this assessment, the experts will only have access to the proposals they will evaluate. They will not know who the other 2 reviewers are for that proposal, nor will they have access to each other's evaluations.

Each reviewer will assess the proposal and provide comments taking into account a variety of (sub)criteria, namely in the following categories:

- Scientific quality
- Quality and efficiency of the implementation
- Impact

More information about the criteria used can be found in the evaluation matrix for full proposals.

Once all written evaluations have been introduced for a given proposal, BELSPO will compile the evaluation reports into a Consensus Report for each proposal. The Consensus Report will consist of appreciations and

comments for the different (sub)criteria. The report will also include questions to the applicants to be presented and discussed at the panel presentation (step 2).

At this stage, the Consensus Reports are definitive. They will not be modified in the subsequent steps of the evaluation.

The individual evaluations are neither communicated to the Scientific Expert Committees, nor to the applicants.

Applicants will get access to an anonymised version of their definitive Consensus Report, in preparation of the panel presentation.

STEP 2 - PANEL EVALUATION, INCLUDING INTERVIEWS WITH THE APPLICANTS

Preparation of the panel evaluation

BELSPO will translate the outcome of each proposal's evaluation into numeric scores. In practice, this will be done as follows:

1. Translating the appreciations given to each sub-criterion into scores.
2. Adding the scores of the sub-criteria to obtain a total for each criterion.
3. Performing a weighted sum of the criteria in the following way:

WEIGHT OF THE DIFFERENT CRITERIA	SPACE	COMMUNICATION	ENERGY	HEALTH
Scientific quality	30%	30%	30%	30%
Quality and efficiency of the implementation	35%	35%	35%	35%
Impact	35%	35%	35%	35%

According to the scores obtained, the proposals will be ranked in a list (Proposal Ranking). This list will serve as a base for the panel discussion.

Panel evaluation

For each theme, the panel will be composed of relevant members of the Scientific Expert Committees of Defence.

Each panel will receive the corresponding Proposal Rankings, and will have access, via the online DEFRA evaluation platform, to the proposals as well as the anonymised Consensus Reports. The Consensus Reports shall not be modified by the panel.

Each panel will organise interviews[2] with the applicants of the full proposals according to the following schedule:

- Presentation of the proposal by the applicants, based on the questions in the Consensus Report (10 minutes).
- Questions and answers (Q&A) (20 minutes).

[2] Physical meeting if possible - online meeting if necessary. Detailed instructions to adequately prepare the panel presentation will be sent separately.

- Deliberation (10 minutes).

The applicants will assist in the meeting for the presentation and Q&A session of their proposal only.

Each panel will classify the full proposals into (a) Panel Funding Scenario(s) according to specific criteria:

- Budget availability.
- Complementarities and/or overlaps between proposals.
- The coverage of the themes of the call.
- The coherence of the proposals with the strategic objectives (scope) of the themes.
- The composition of the partnership.

The Panel Funding Scenario(s) will classify all proposals in:

- Recommended for funding.
- Not recommended for funding.

The panel may list the proposals within each category by order of preference for funding or put them in alphabetic order within each category.

STEP 3 - SELECTION PROPOSAL FORMULATED BY THE SCIENTIFIC COMMITTEE OF THE RHID

The Scientific Committee of the RHID is composed of senior scientists and research directors and guarantees the quality level of Defence research. It proposes evaluation methods and research objectives, participates in the drafting of the research programme (ranking and selection of research projects) and evaluates its implementation. The composition of the Scientific Committee is currently defined in the Ministerial Decree of 11 January 2022.

The Scientific Committee will receive the following documents:

- Panel Funding Scenarios(s) per theme, including its/their motivation
- Consensus Report of each proposal (on demand)

Based on these documents, the Scientific Committee will perform a strategic selection of the proposals based on the criteria and rules explained hereunder, delivering the Scientific Committee Funding Scenario.

The following aspects will be taken into account when formulating the Scientific Committee Funding Scenario to the governance board of the RHID:

- Alignment of the proposal in relation to Defence priorities.
- Added value of the proposal in relation to Defence priorities.

The Scientific Committee will formulate the Scientific Committee Funding Scenario taking into account the following rules:

- In NO case will proposals deemed ‘out of scope’ be considered.
- In NO case will proposals deemed ‘not recommended for funding’ be considered.

STEP 4 - FINAL SELECTION OF PROPOSALS BY THE BOARD OF DIRECTORS OF THE RHID

The final selection decision of proposals to be funded is made by the Board of Directors of the RHID on the basis of the Scientific Committee Funding Scenario.

5.2. EVALUATION CRITERIA

The evaluation criteria that are used in each step of the evaluation procedure are described in the evaluation matrices (pre- and full proposal).

6. CONTRACTUAL OBLIGATIONS FOR SELECTED PROJECTS

6.1. PROJECT STARTING AND END DATE

The projects selected within the context of the current call will start in December 2022.

The project contracts will have a duration of 2 to maximum 4 years (plus 3 months to allow meeting all administrative requirements before the effective start-up of the project).

6.2. CONTRACTS

For the selected proposals, a contract is concluded between Belgian Defence and the funded partners.

The Technical Annex to the contract will be drawn up in consultation between the funded partners of the selected proposals and the Belgian Defence/RHID. Recommendations formulated by the evaluators and the Scientific Committee will be taken into account when drafting the Technical Annex to the contract.

Adaptations to the original proposal may relate, among other things, to the content of the research, the composition of the project partnership, the budget, the proposals for valorising the research.

Belgian Defence/RHID grants the selected projects the funds required for their implementation. The RHID shall reimburse at most, and up to the amount specified in the granted budget, the actual costs proven by the partners providing these costs are directly related to the implementation of the project.

6.3. COMPOSITION AND ROLE OF THE STEERING COMMITTEE

Each project will be accompanied by a **Steering Committee**, to be set up at the start of the project. The Steering Committee is composed of the project managers of the partners, the programme manager and the domain manager of Defence. The intended end user of Belgian Defence can decide if they want to be represented in the Steering Committee.

The Steering Committee acts as a governance body, to ensure that the project remains in line with the research objectives and adapt the project plan accordingly whenever necessary. It ensures that the project reporting is done in accordance with section 6.4.

The Steering Committee should meet at least once a year to discuss the project's progress. The organisation of such meeting must be included in the project work plan and the project budget. Ideally, this meeting should take place in the same period as the delivery of the progress report.

The following actions and decisions will be taken by the Steering Committee:

- Examine information collected by the Coordinator on the progress of the Project, to assess the compliance of the Project with the Proposal and, if necessary, propose modification of the Proposal.
- Determine the policy for press releases, joint publications and other public disclosures regarding the Project.
- Keep a register of Foreground generated within the Project and patents filed thereon, which is concluded at the end of the Project.
- Examine and approve proposed changes to the work programme. In case of actions with a budgetary impact, the Steering Committee will make proposals to the funding authority but cannot decide without the approval of this funding authority.
- If necessary, propose the termination of all or part of the Project.

6.4. REPORTS

The contract foresees the following reports to be submitted to the RHID:

- Initial report: to be submitted within three months after the start of the project.
- Progress report: to be submitted in the middle of the project term.
- Final report: to be submitted at the end of the project.
- If deemed useful by the RHID, an additional report may be requested for an external evaluation of the project.
- The RHID can ask for a report or other input at any time during the course of the project in order to provide scientific support to valorisation and service actions related to the programme.

These reports are to be included in the project work plan and the cost of preparing them (including possible translations) must be covered by the project budget.

They should contain all necessary information to assess the progress of the project in relation to the work packages, deliverables and budget. Problems must be identified, including possible solutions.

7. DATA, RESULTS, INTELLECTUAL OWNERSHIP AND SECURITY REQUIREMENTS

7.1. GENERAL CONDITIONS

The Data Management Plan (DMP), to be submitted as part of the proposal, describes how the project partners deal with the collected data before, during and after the project. It is a key element of good data management.

For all aspects regarding the use of data, intellectual ownership and valorisation of the project results and the confidentiality or security requirements, the conditions of the General Conditions (Annex II of the contract and the articles 12, 13 and 14 in particular) apply.

Ownership of existing information and data (the individual background) remains with the original owner.

As a principle, the Foreground - the results (including information) produced by the project - shall be the property of the partner carrying out the work generating this foreground.

The principles for the use of joint foreground will have to be determined by the project partners, with respect for these General Conditions.

7.2. SPECIFIC CONDITIONS

For social and humanities data, a copy of the data and/or metadata can be transferred to SODA (Social Sciences Data Archive) (https://sodabelgianproject.wixsite.com/sodaproject) after explicit approval of RHID.

7.3. CLASSIFIED INFORMATION/SECURITY RELATED ACTIVITIES

For the themes 3-ENERGY and 4-HEALTH there are no specific security requirements.

For the themes 1-SPACE and 2-COMMUNICATION certain activities may use or generate classified information. This paragraph solely concerns protective measures to be taken to preserve the confidentiality of security-sensitive information regarding research projects under this theme.

A classification is given to documents to prevent their improper use which could damage, among other things, the fulfilment of the tasks of Defence, the external security and international relations of the State and the scientific and economic potential of the country (for the complete list see “Wet van 11 Dec 1998 Art 3/Loi du 11 Déc 199 Art 3”).

According to the same law this identification should be based on the following classification levels:

- The "**TRES SECRET/ZEER GEHEIM**" level is assigned to a piece if its improper use could cause EXTREMELY SERIOUS damage to the main Belgian interests listed in the law. Topics that qualify under this category cannot be part of the project.
- The "**SECRET/GEHEIM**" level is assigned to a document if its improper use could cause SERIOUSLY damage to the interests listed in the law.
- The "**CONFIDENTIEL/VERTROUWELIJK**" level is assigned to a document if its improper use could harm any of the interests listed in the law.

Documents of which the originator wants to limit the distribution to persons who are authorized to use them on a need-to-know basis, without however attaching legal consequences to this limitation, are marked with the indication "**DIFFUSION RESTREINTE/BEPERKTE VERSPREIDING**".

These classification levels should be applied taking into account both the need to protect information and the need to avoid unnecessary obstruction to the use of research information and results.

Applicants for this theme should identify in the Full-Proposal the classification needs for the work packages of the project that involve threat and /or vulnerability assessments and the information on specifications or capabilities of the tool(s) used.

- threat assessments (i.e. estimation of the likelihood of a malicious act against an asset, with particular reference to factors such as intention, capacity and potential impact)
- vulnerability assessments (i.e. description of gaps or weaknesses which can be exploited during malicious acts, and often contain suggestions to eliminate or diminish these weaknesses)

- specifications (i.e. exact guidelines on the design, composition, manufacture, maintenance or operation of threat substances or countermeasure substances, technologies and procedures)
- capability assessments (i.e. description of the ability of an asset, system, network, service or authority to fulfil its intended role — and in particular the capacity of units, installations, systems, technologies, substances and personnel that have security-related functions to carry these out successfully)

Based on the assessment of the provided input a security screening by Belgian Defence might be imposed in the contract on ALL partners of the selected project(s). In that case, these beneficiaries should obtain a security clearance before starting work on classified parts of the project.

The applicable security framework for the action must be in place at the latest before the signature of the contract and will be considered as an annexe to the contract.

More information can be found on the NVO website: https://www.nvoans.be/nl/private-ondernemingen/industriele-veiligheid

This security analysis will not be part of the evaluation process but is essential to be able to start the project.

8. COMPLAINTS

Both BELSPO and RHID place great importance on the quality of their service and on improving the way they operate. A complaint about the administrative handling of this call for proposals will be handled by BELSPO, RHID will handle complaints about the content of the call and the contracts that are concluded as a result of the call.

A special form to handle complaints has been created.

The complaint form is available at the following address:
http://www.belspo.be/belspo/organisation/complaints_en.stm

Complaints submitted anonymously or which are offensive or not related to our organisation will not be processed.

A complaint is handled as follows:

- Once your complaint has been filed, a notification of receipt will be sent.
- The complaint will be forwarded to the relevant departments and individuals and will be processed within one month.
- An answer will be sent by e-mail or letter.
- The complaint will be treated with strict confidentiality.

If you are dissatisfied by the initial response to a complaint, you can always contact the Médiateur Fédéral / Federal Ombudsman, rue de Louvain 48 bte 6 / Leuvenseweg 48 bus 6, 1000 Brussels (email: contact@mediateurfederal.be / contact@federaalombudsman.be).

9. CONTACTS

Further information can be obtained by contacting the **secretariat**: defra@belspo.be