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BRAIN-be 2.0

BELGIAN RESEARCH ACTION THROUGH INTERDISCIPLINARY NETWORKS
PHASE 2 - 2018-2023

Call for proposals 2022-2023
Information File

Pillar 1: Challenges & knowledge of the living & non-living world
Pillar 2: Heritage science
Pillar 3: Federal societal challenges

Submission deadlines:

EoI: P2 (Thematic & Bottom-up): Tue. 19/10/2021 @ 14h00
P1 & P3 (Bottom-up & Co-Funded): Tue. 09/11 2021 @ 14h00
Pre-proposals: P1 & P3 (Thematic) Tue. 09/11/2021 @ 14h00
Full proposals (All Pillars, all project types): Tue. 01/02/2022 @ 14h00

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PART I: GENERAL INFORMATION

1. MULTI-YEAR FRAMEWORK PROGRAMME FOR RESEARCH - BRAIN-BE 2.0

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

1.1. GENERAL INFORMATION

On 7 September 2018, the Council of Ministers approved the implementation of the second phase of the BRAIN-be (Belgian Research Action through Interdisciplinary Networks) research programme, to be carried out under the responsibility of the Federal Science Policy (BELSPO).

Through the funding of research projects based on scientific excellence and European and international anchorage, this framework programme supports the scientific potential of the Federal Scientific Institutions[1] (FSIs - see **Annex 1**) and the scientific knowledge needs of the FSIs and Federal Departments' (list Federal Departments see **Annex 2**).

The general objectives of the programme are to:

- Support and strengthen scientific excellence in the FSIs
- Promote access to the scientific potential, infrastructures and collections available in the FSIs
- Align the research potential with societal needs
- Provide the scientific knowledge necessary for the preparation, implementation and evaluation of federal policies/federal strategies, in particular those on transversal themes in multiple departments
- Provide the scientific support needed to formulate a Belgian position in the various international policy development fora
- Develop and realise a critical research mass on themes considered to be a priority in order to strengthen the impact of federal research
- Encourage the participation of highly qualified Belgian scientists in relevant European or transnational and international research activities
- Promote systemic, multidisciplinary/interdisciplinary and integrative approaches
- Create added value by strengthening complementarity and synergies between activities of BELSPO (including contributions to international infrastructures and organisations)
- Contribute to strengthening the research identified as a priority for the implementation of the International commitments subscribed by Belgium
- Strengthen transdisciplinary research in order to enable potential users to make better use of the research achievements
- Promote equality between men and women in research.

BRAIN-be 2.0 is open to the whole Belgian scientific community: universities, colleges of higher education, public scientific institutions and non-profit research centres.

[1] The acronym FSI covers the institutions as defined in the Royal Decree of 30 October 1996 and their possible legal successors, such as Sciensano.

1.2. ORGANISATION

For its operationalisation BELSPO is assisted by three Advisory Committees and three Strategic Committees (one per Pillar).

The Advisory Committees are multidisciplinary and independent panels established for the duration of the programme.

The Strategic Committees are composed of representatives from the federal departments and/or FSIs for the duration of the programme.

The composition of these committees is available on the BRAIN-be 2.0 website:

- Pillar 1: https://www.belspo.be/belspo/brain2-be/project_p1_en.stm
- Pillar 2: https://www.belspo.be/belspo/brain2-be/project_p2_en.stm
- Pillar 3: https://www.belspo.be/belspo/brain2-be/project_p3_en.stm

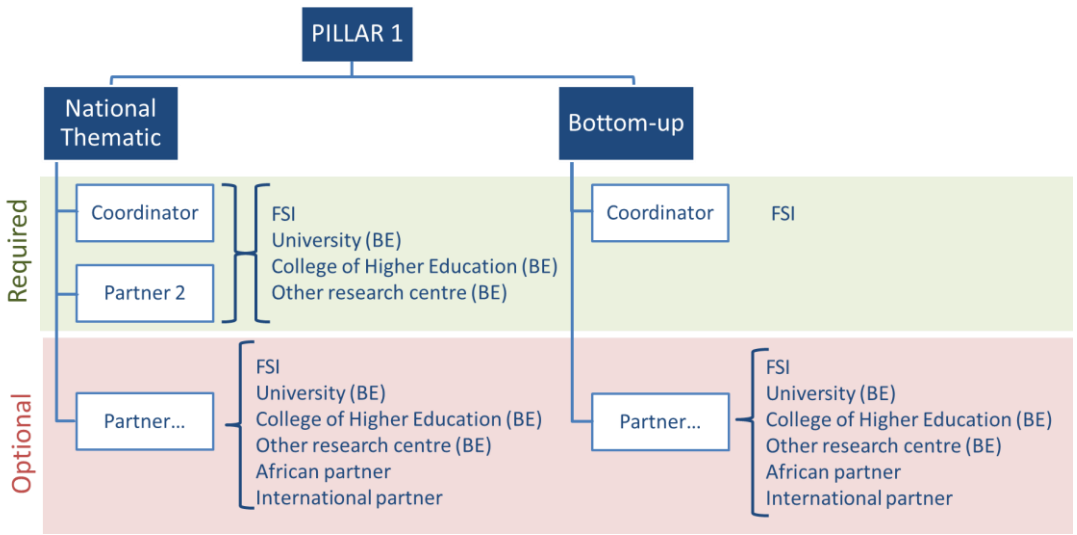
1.3. STRUCTURE

The framework programme is structured around **3 Pillars**:

- Pillar 1: Challenges and knowledge of the living and non-living world
- Pillar 2: Heritage science
- Pillar 3: Federal societal challenges

1.3.1. PILLAR 1: CHALLENGES AND KNOWLEDGE OF THE LIVING AND NON-LIVING WORLD

The implementation of this pillar is done both via **thematic** and **bottom-up projects**.



PILLAR 1A: THEMATIC PART

Pillar 1A contributes to the development of the necessary knowledge to support the decisions to be taken by the federal government in the short, medium and long term in order to cope with global change. The aim of pillar 1A is to respond to the research priorities identified at the European and international level such as H2020, Belmont Forum, IPCC, IPBES, EMB, SCAR, the strategic agendas of the JPIs in which BELSPO participates... These research challenges are guided by the international commitments that Belgium has endorsed (CBD, SDG-2030, the climate convention and the Paris agreement, the Antarctic Treaty, OSPAR).

They cover, inter alia, the research in support of mitigation and adaptation to climate change, the protection of biodiversity and ecosystem services, the protection of the natural environment, natural risks, and the sustainable exploitation of resources.

PILLAR 1B: BOTTOM-UP PART

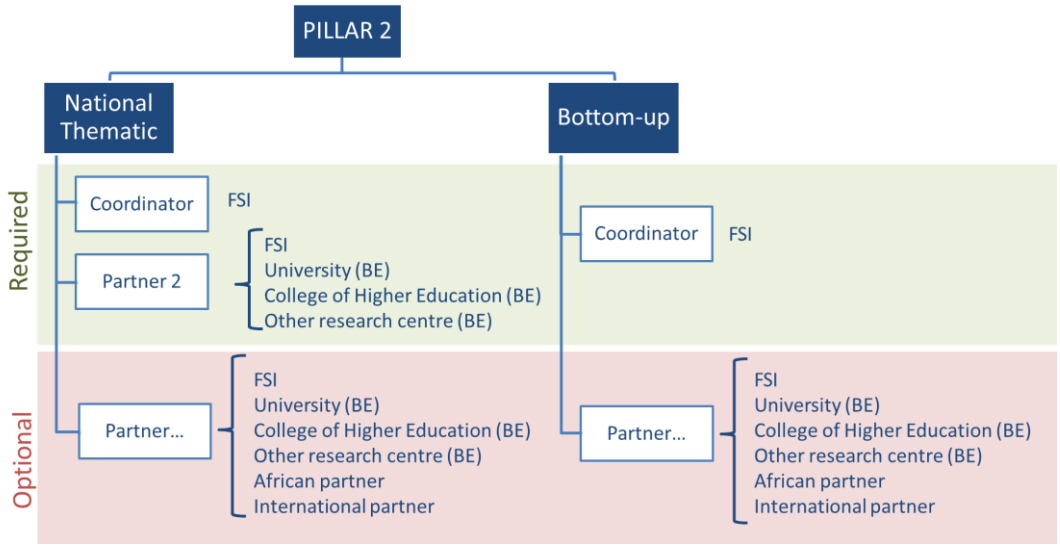
The contribution of the FSIs to the knowledge of the Earth and Universe system

Pillar 1B contributes to the strengthening of knowledge about the living (e.g. evolution) and non-living world (e.g. components of the Earth and Universe system). This part of pillar 1 is built around specific and innovative expertise that is specific to the FSIs and is in line with their strategic research challenges.

1.3.2. PILLAR 2: HERITAGE SCIENCE

The implementation of this pillar is done both via **thematic** and **bottom-up projects**.

All research projects - **thematic and bottom-up** - must be **coordinated by an FSI**, possibly in collaboration with universities and other research institutions. As such, the projects have as a challenge to fit into the global strategic priorities of the FSIs, in terms of their scientific expertise and / or their missions regarding public service.



PILLAR 2 "HERITAGE SCIENCE"

Pillar 2 "Heritage science" is dedicated to scientific research in support of the federal - cultural, scientific and historical - heritage and in particular the heritage in Belgian federal scientific institutions (FSIs : see annex 1) as well as the heritage on which the FSIs deploy their expertise. The potentially involved heritage is of a diverse nature: material / tangible and intangible / digital, of national or international origin.

The aim of the pillar 2 is to mobilise and develop the scientific expertise on "Heritage science", namely scientific research to support conservation, access (including new ICT tools), interpretation and management of heritage, especially with a view to scientific exploitation and social valorisation. This approach, often interdisciplinary, is at the crossroads of a wide range of knowledge and expertise, from fundamental sciences to human and art sciences.

The research aims to support:

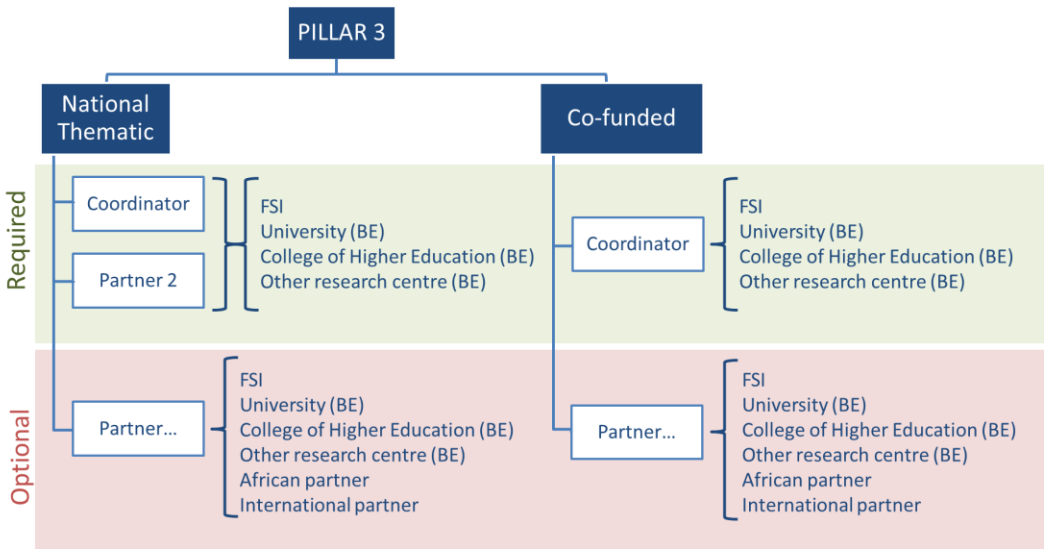
- The conservation, preservation and management of heritage and collections, with a view to exploitation, mainly scientifically, through the development and / or testing of best practices of techniques and methods, of sampling, of digitisation or other management and preservation methods, documentation, classification, identification and access to the information and / or access to material from the collections

and /or

- Its placement in social, artistic, historical, geographical, environmental, health, scientific, technical, political, archaeological, linguistic, literary, musical, economic or cultural context, in a synchronic or diachronic perspective.

1.3.3. PILLAR 3: FEDERAL SOCIETAL CHALLENGES

The implementation of this pillar is done **via thematic projects** and **co-funded projects**.



PILLAR 3 "FEDERAL SOCIETAL CHALLENGES"

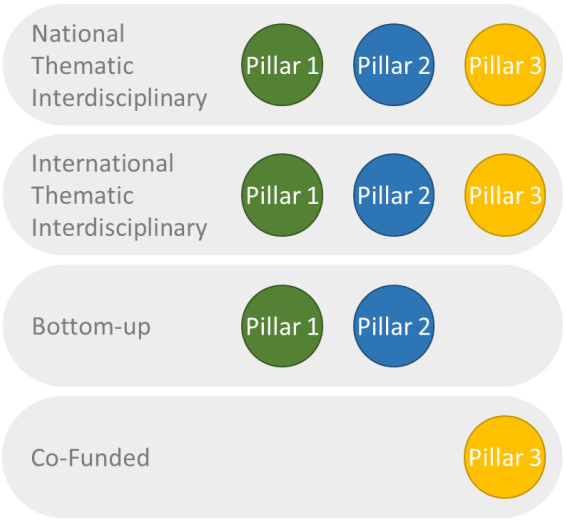
This pillar supports research that addresses current societal challenges (not covered by the other pillars). The topics funded in this pillar are selected in function of those challenges (e.g. health, security, ageing, economy...) that are considered a priority by the federal authority (as stated for example in Governmental Agreements, federal and interfederal plans...) and that align with international and European research agendas.

The ultimate goal is to develop a solid scientific expertise to support the competencies, strategic orientations and policies of the federal state. Such expertise will clearly enhance the knowledge base around these challenges, reveal opportunities and possible caveats and provide useful recommendations for the federal level.

The topics of this pillar will encourage research that mobilises a large spectrum of disciplines, that are embedded in the international and European context and that will strengthen the participation of a wide range of stakeholders.

1.4. PROJECT TYPES

This call finances **4 types of research projects**:



1.4.1. NATIONAL THEMATIC INTERDISCIPLINARY PROJECTS

For the **3 Pillars**

SCOPE / PHILOSPHY

National thematic interdisciplinary projects are of a strategic nature. They must meet one (or more) specific research priorities developed in the call text and be interdisciplinary in their content.

Partners are represented by their institution. National thematic interdisciplinary projects must be submitted by a network, composed of **at least two different eligible Belgian scientific institutions** paid by the project. Beyond this requirement, networks may also include (non-mandatory):

- additional funded partners: research groups from other eligible Belgian scientific institutions, or from the same institution provided they are from different departments.
- non-funded eligible partners.

Networks jointly share obligations and responsibilities during the implementation of the project. The project must be balanced (in terms of the way the budget is allocated between partners: see the **budget rules** in a separate document), even if different partners may have different tasks and subsequently different budgets.

In forming a network, BELSPO encourages the inclusion of **Federal Scientific Institutions** and the cooperation between research partners of **different Communities or Regions**. At equal scientific quality between the proposals submitted, priority will be given to networks in which one or more FSIs are involved. In addition, preference will be given to proposals composed of partners from different communities and/or that cover the Belgian territory.

The network must appoint a **coordinator** (belonging to a Belgian research institution) whose tasks, beyond his/her implication in the project, will consist in:

- Coordinating all activities to be carried out in the framework of the project.
- Coordinating the internal meetings between the network members.
- Coordinating the meetings with the Follow-up Committee and write the reports of these meetings.
- Coordinating the production of the interim and final project reports intended for BELSPO.
- Inform BELSPO of any problems that might hinder the implementation of the project.
- Coordinating the synthesis and translation of the research results, with a view to applications and support for decision-making.
- Coordinating the publication and dissemination of the research results.
- Organising meetings related to the project's progress between the network and BELSPO.

The project may require specific or punctual expertise, which can be delivered in the form of **subcontracting**. The subcontractor is not an official project partner. Their specific expertise may be of scientific nature or not.

The network can include foreign research partners, under the following conditions:

- **African research partners of Least Developed Countries**[2] (LDC) can benefit from financing of maximum 20% of the total project budget. Within this list there are partner countries of Belgian governmental cooperation selected on the basis of their degree of poverty, aspects of good governance and Belgium's potential for providing meaningful support[3].

  Note: in the project phase the budget allocated for the African partner will contractually be added to the budget of the project coordinator. The project coordinator will be responsible for the follow-up of the tasks carried out by the African partner(s) and will also be responsible for the flow of information to and from the African partner(s).

[2] https://unctad.org/en/Pages/ALDC/Least%20Developed%20Countries/UN-list-of-Least-Developed-Countries.aspx

[3] https://diplomatie.belgium.be/en/policy/development_cooperation/where_we_work/partner_countries

- **Other international/foreign research partners** can officially participate in the proposal, albeit without BELSPO funding.

It is the responsibility of the Belgian partner(s) to check the eligibility of the African research partner(s) and/or the International research partner(s). These must be strictly from the scientific community: universities, colleges of higher education, public scientific institutions and non-profit research centres and for the African partners being from a country on the LDC list.

The programme promotes **equality between men and women in research**. The research team(s) - promotors as well as researchers on the project - should therefore be balanced in their gender composition.

DURATION

National thematic interdisciplinary projects will have a duration of either 2, 3 or 4 years.

BUDGET

National thematic interdisciplinary projects are divided into 3 budget categories:

- small size projects: ≤ 500 000 €
- medium size projects: between 500 000 € and 750 000 €
- large scale projects: ≥ 750 000 €.

The maximum budget for large scale projects is set around 1M€, to allow generating a critical mass of research - meaning funding the largest possible number of projects - within the total budget envelope.

1.4.2. INTERNATIONAL THEMATIC INTERDISCIPLINARY PROJECTS

The programme enables eligible applicants to the BRAIN-be 2.0 programme to submit projects in transnational programmes and international thematic interdisciplinary projects to which BELSPO is committing funds. These calls are organised by relevant European, international or transnational research consortia such as ERA-NETs and Joint Programming Initiatives (JPI).

The introduction of this type of projects is subject to separate calls following the international call calendars and procedures.

1.4.3. BOTTOM-UP PROJECTS

Only for **Pillars 1 and 2**.
Only **FSIs** can submit a bottom-up project.

SCOPE / PHILOSPHY

Bottom-up projects must meet the scope of the respective Pillar and must comply with the following:

- Strengthen the scientific potential or expertise of FSIs
- Target and/or enable research on a specific circumscribed topic
- Fit the strategic priorities of the FSIs in support of their specific areas of expertise or public service missions.

Bottom-up projects differ from thematic projects in the sense that they do not have to fit within the research priorities of a given thematic call, do not require multidisciplinary research, and therefore must not necessarily be carried out in a network.

PARTNERSHIP

Given their scope and philosophy, Bottom-up projects can only be submitted by an **FSI** and are restricted in terms of number of partners. They can be carried out by a single FSI (acting as coordinator) who, whenever required, may seek to have other research partners - including other FSIs and/or other Belgian research institutions and/or African research Partners from Least Developed Countries, and/or other (non-BELSPO funded) international research partners - in order to answer the scientific questions posed.

Funded partners will jointly share the obligations and responsibilities during the implementation of the project. In the project phase, funded partners will be responsible for the follow-up of the tasks carried out by the non-funded partners.

The project may require specific or punctual expertise, which can be delivered in the form of **subcontracting**.

The programme promotes **equality between men and women in research**. The research team(s) - promotors as well as researchers on the project - should therefore be balanced in their gender composition.

DURATION

Bottom-up projects will have a duration of 2, 3 or 4 years.

BUDGET

Bottom-up projects are **small sized**. The **maximum project budget** amounts up to **500 000 €.**

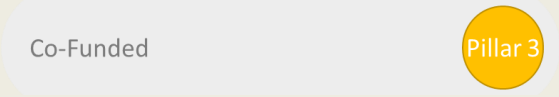
Each FSI may submit different bottom-up projects, for a total maximum budget (budget of the **coordinator)** up to:

- Pillar 1: 1 500 000 €
- Pillar 2: 900.000€

African research partners from Least Developed Countries[4] can benefit from financing that amounts to a maximum of 20% of the total project budget. Within this list are partner countries of Belgian governmental cooperation selected on the basis of their degree of poverty, aspects of good governance and Belgium's potential for providing meaningful support[5]. Other international research partners can officially participate to the proposal, albeit without BELSPO funding.

1.4.4. CO- FUNDED PROJECTS

Only for **Pillar 3.**



SCOPE / PHILOSPHY

Federal departments rely on evidence-based expertise to support some of their own specific missions. Policy driven research can take different forms: policy evaluations, evaluation guidelines, monitoring tools, contextual information in support of decision-making processes...

BELSPO is willing to work with the federal departments in addressing their specific needs regarding policy driven research via the introduction of a new type of research projects in this last call of the BRAIN-be 2.0 programme: the **co-funded projects**.

The call text of pillar 3 contains a list of priorities defined by the federal departments, that will lead to co-funded projects. These priorities comply with the following conditions:

- They require a scientific support that the department does not have at its disposal.
- They are implemented in close collaboration with the department(s) as direct stakeholder(s)
- They have a clear impact on the citizen, a scientific community, a sub-set of stakeholders etc)
- They result in an added value that goes beyond the concerned federal department. Project results that are strictly confined within the federal department are not eligible for a co-funding by BELSPO.

A share of the total Pillar 3 budget of this call is reserved for the co-funded projects, meaning that they will not compete with the thematic interdisciplinary projects.

PARTNERSHIP

Co-funded proposals can be introduced by a single eligible Belgian scientific institution or by a network composed of **at least two different eligible Belgian scientific institutions**. The network can include other

[4] https://unctad.org/en/Pages/ALDC/Least%20Developed%20Countries/UN-list-of-Least-Developed-Countries.aspx
[5] https://diplomatie.belgium.be/en/policy/development_cooperation/where_we_work/partner_countries

(non-BELSPO funded) eligible Belgian scientific institutions and/or African research Partners from Least Developed Countries and/or non-BELSPO funded international research partners.

The co-funding department(s) is/are not official partner(s) to the project.

In case of a network, funded partners will jointly share the obligations and responsibilities during the implementation of the project. In the project phase, funded partners will be responsible for the follow-up of the tasks carried out by the non-funded partners.

The project may require specific or punctual expertise, which can be delivered in the form of **subcontracting**.

The programme promotes **equality between men and women in research**. The research team(s) - promotors as well as researchers on the project - should therefore be balanced in their gender composition.

DURATION

Co-funded projects will have a duration of either 2, 3 or 4 years.

For each priority, the maximum project duration is provided in the call text.

BUDGET

For each project, the maximum project budget is provided. It shall not be exceeded by applicants in their proposal.

The scientific contribution to the project shall be co-funded by the concerned federal department(s) to the amount of min. 10% per participating federal department. The main and remaining funding will be provided by BELSPO (max. 90%).

Some specific operating costs (e.g. costs of a field survey) or large equipment (purchase of instruments) are not allowed. They must be financed by the department in addition to its contribution of min. 10% to staff and operating costs.

1.5. BUDGETS OF THE 2022-2023 CALL FOR PROPOSALS

The maximum BELSPO budgets for the 2022-2023 call for proposals are as follows:

Available budget in €	National thematic projects	Transnational thematic projects	Bottom-up projects	Co-funded projects	**TOTAL**
Pillar 1: Challenges and knowledge of the living and non-living world	7 307 000	1 250 000	2 850 000	NA	**11 407 000**
Pillar 2: Heritage science	5 407 000	250 000	3 046 000	NA	**8 703 000**
Pillar 3: Federal societal challenges	6 833 990	NA	NA	2 456 010*	**9 290 000**

* total budget co-funded amounts to 2 788 900€, of which co-financed by the concerned departments for an amount of 332 890€

1.6. PROJECT STARTING AND END DATE

The projects selected in this call will start 15 September 2022 or 15 January 2023, depending on the programme budget repartition over 2022 and 2023. The project contracts will have a duration of 2, 3 or 4 years plus 3 months to allow meeting all administrative requirements before the effective start-up of the project.

2. CONTRACTUAL OBLIGATIONS FOR SELECTED PROJECTS

2.1. CONTRACTS

For the selected proposals, a contract is concluded between BELSPO and the funded partner(s).

For this purpose, the applicants of the selected proposals will be asked at the end of the evaluation and selection procedure to concisely formulate the specifications on the basis of which the contract is to be drawn up. This **Technical Annex** to the contract will be drawn up in consultation with BELSPO and will take into account the recommendations formulated by the foreign evaluators and the Advisory Committees.

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

BELSPO grants the selected projects the funds required for their implementation. BELSPO 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.

For the Co-funded projects, the funded partners will receive a research contract from BELSPO and a bilateral contract from the participating federal department(s). This bilateral contract is subordinate to the BELSPO contract. The start and end date of this bilateral contract are preferable in line with the dates of the BELSPO contract.

2.2. REPORTS AND PROGRESS MEETINGS

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

- Initial report: to be submitted within three months after the start of the project
- Activity reports: to be submitted annually
- Final report: to be submitted at the end of the project
- If deemed useful by BELSPO, an activity report may be requested for an external evaluation of the project
- BELSPO can ask for a report or other input at any time during 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.

Meetings on the project's progress must be organised - minimum once a year - between the project partner(s), BELSPO and the user committee. The organisation of these meetings must be included in the project work plan and the project budget.

2.3. DATA, RESULTS, INTELLECTUAL OWNERSHIP AND OPEN ACCESS

Foreground - the results (including information) produced by the project - shall be the property of the institution carrying out the work generating this foreground, as mentioned in article 11 of the General Conditions (Annex II of the contract). As regards existing information and data, ownership remains the same.

Each institution shall ensure that the foreground of which it has ownership, is disseminated as fast as possible and free of charge.

In accordance with the BELSPO Open Research Data Mandate, each Institution undertakes to make the foreground and background relating to research data, available as soon as possible and free of charge in an approved data repository (Open Research Data Repository). This relates to data that supports the research results, with its metadata and other contextualised (curated) and/or raw data mentioned in the Data Management Plan (DMP) submitted by the grant applicant. The data must comply with the FAIR principle (Findable, Accessible, Interoperable and Reusable) and must be accessible according to the principle "As open as possible, as closed as necessary".

For research areas concerning the marine environment, the Antarctic and biodiversity, researchers must transfer a copy of the analysis and measurement data and/or metadata to specific databases such as:

- BMDC (the Belgian Marine Data Centre). The Belgian Marine Data Centre, our federal NODC (National Oceanographic Data Centre), (bmdc@naturalsciences.be), can be contacted for assistance in the development of a DMP for marine applications and/or in choosing the right repository.

- AMD (Antarctic Master Directory). The Belgian representative of SCADM (the SCAR Standing Committee for Antarctic Data Management) (avandeputte@naturalsciences.be) can be contacted for assistance in the development of DMP for Antarctica related applications and/or in choosing the right repository.

- GBIF (Global Biodiversity Information Facility). The Belgian Biodiversity Platform can be contacted for assistance in the development of DMP for biodiversity related applications and/or in choosing the right repository. See also the guidance document.

- For social and Humanities data, a copy of the data and/or metadata must be transferred to SODA (Social Sciences Data Archive).

- The promoters of projects that include tasks in which biological materials are used, must ensure the preservation of this biological material by depositing it in a culture collection (Biological Resource Centre), and preferably one in Belgium. This does not apply to material that promoters can prove has already been deposited in a culture collection or for which existing agreements (Material Transfer Agreement) do not allow it to be deposited. Biological material includes cultivable organisms such as microorganisms, viruses, plant, animal and human cells as well as the replicable parts of these organisms, such as non-modified and recombinant plasmids (including those with DNAc inserts).

2.4. 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 necessary, the Ethical Board of the institutions concerned by a project must be consulted before submitting a proposal.

2.5. GENDER

BELSPO strongly encourages projects 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. All statistics produced, collected and commissioned are, where appropriate, disaggregated by sex and gender indicators are established where relevant.

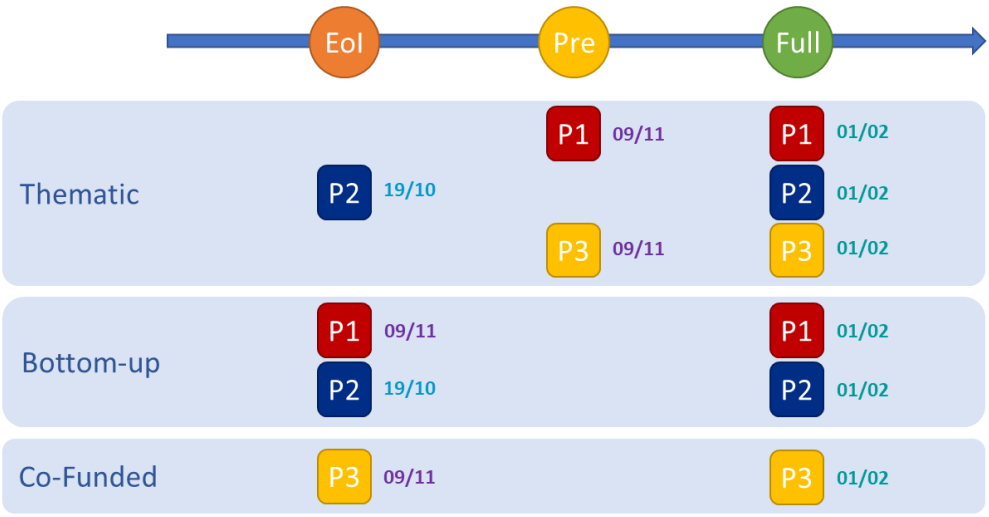
PART II: CALL INFORMATION

3. DOCUMENTATION RELATED TO THIS CALL

The following documents are available on the BRAIN-be website (https://www.belspo.be/belspo/brain2-be/call_open_en.stm):

- Information file: general information on the programme and the call (the present document).
- Evaluators eligibility: eligibility rules of proposed experts for the evaluation of the proposal.
- Submission and evaluation guidelines: three split documents, one for each pillar, with an overview of the proposal content and corresponding evaluation criteria for the promoters and foreign evaluators.
- Gender checklist.
- Evaluation matrix: overview of the evaluation ratings.
- Budget rules: overview of the budgetary rules to be applied.
- Platform Submission guidelines: information on the use of the submission platform.
- Institution Request Form.
- Strategic Committee members: Pillars 1, 2 and 3.
- FAQ.

4. SUBMISSION STEPS & DEADLINES



EoI = Expression of interest
Pre = Pre-proposals
Full = Full proposals

All proposals will be submitted in 2 steps: (1) either a EoI or a Pre-proposal, and (2) Full proposals.

5. RELANCE STRATEGY

The research priorities for the three pillars for this thematic call are part of the Relance Strategy. This Relance Strategy, which advocates for a greener, more digital and more inclusive society, is the guiding thread throughout this call.

The following main documents were used as references to draft the call:

- National Relance and Resilience Plan for Belgium - FR - NL (30/04/2021)
- European Relance Plan 'Next generation EU' (12/2020)
- European Green Deal and its set of policies (2021-2050)
- EU Climate Law (06/2021)
- The new European strategy for adaptation to climate change (02/2021)
- National Plan Energy-Climate (2021-2030)
- The last Assessment Report of the IPCC (AR6) (2021-2022)
- The Paris Agreement (22/04/2016)
- The European Commission's Communication 'Fit for 55': delivering the EU's 2030 Climate Target on the way to climate neutrality
- Various federal and inter-federal plans, recent or in preparation.

The guidelines used by BELSPO to focus the call for proposals are as follows:

- thematic priorities primarily support the federal level of authority and in a coherent way. A strategy will be provided by the applicants describing the position of their research within the Belgian "relance" context and with regards the state of the art. The strategy will explain how the proposal fills identified gaps in knowledge, ensures relevance, applicability and timeliness of the research. Applications will establish a path for the communication, valorisation and transfer of research outcomes to the policy (including but not limited to federal administrations) and societal domains.
- the priorities strengthen the knowledge needed for Belgium to meet its international commitments.

6. PILLAR 1 - SCOPE AND RESEARCH PRIORITIES OF THIS CALL

6.1. RESEARCH FRAMEWORK

The implementation of this pillar is done both via **thematic and bottom-up projects**. Bottom-up projects will be **coordinated by an FSI**, possibly in collaboration with universities and other research institutions. As such, the projects have as a challenge to fit into the global strategic priorities of the FSIs, in terms of their scientific expertise and / or their missions with regard to public service.

PILLAR 1 A: THEMATIC PART

Pillar 1A contributes to the development of the necessary knowledge to support the decisions to be taken by the federal government in the short, medium and long term in order to cope with global change. The aim of pillar 1A is to respond to the research priorities identified at the European and international level such as H2020, Belmont Forum, IPCC, IPBES, EMB, SCAR, the strategic agendas of the JPIs in which BELSPO participates... These research challenges are guided by the international

commitments that Belgium has endorsed (CBD, SDG-2030, the climate convention and the Paris agreement, the Antarctic Treaty, OSPAR).

They cover, inter alia, the research in support of mitigation and adaptation to climate change, the protection of biodiversity and ecosystem services, the protection of the natural environment, natural risks, and the sustainable exploitation of resources.

PILLAR 1B: BOTTOM-UP PART
The contribution of the FSIs to the knowledge of the earth and universe system.

Pillar 1B contributes to the strengthening of knowledge about the living (e.g. evolution) and non-living world (e.g. components of the Earth and Universe system). This part of pillar 1 is built around specific and innovative expertise that is specific to the FSIs and is in line with their strategic research challenges.

6.2. SCIENTIFIC APPROACH

Research priorities of the present Pillar 1 thematic call specifically focus on the **climate transition**. They intend to mobilise the rich expertise present in the Federal Scientific Institutions, universities and research centres in Belgium to produce knowledge, tools and products to inform federal decision making and to support the Belgian government to fulfil its national and international political climate related commitments.

Priority is given to strategic scientific research, close to federal decision support, over more fundamental research.

Applicants are encouraged to make best use of climate related (ESFRI) Research infrastructures to which Belgium contributes.

North Sea Research currently addressed in a specific RV BELGICA call as well as **polar/Antarctic research** which better fits in a specific call, **will not be funded in this call**.

6.3. CALL PRIORITIES

6.3.1. NATIONAL THEMATIC CALL RESEARCH PRIORITIES

[1.] DOCUMENTING CLIMATE CHANGE

There is a continuous need to strengthen the understanding of how climate system works and how it is changing in response to human activity. A wealth of expertise exists in Belgium, also within the Federal Scientific Institutes, to look at variability and changes happening at the global, regional, and even local (Belgian) scales. The recent IPCC's Sixth Assessment Report (AR6 - Climate Change 2021: The Physical Science Basis) points out that with further global warming, every region of the world is projected to increasingly experience multiple changes in the climate system such as increases in the frequency and intensity of hot extremes, terrestrial and marine heatwaves, heavy precipitation, agricultural and ecological droughts, ... AR6 also states that under scenarios with increasing CO_2 emissions, the ocean and land carbon sinks (such as tropical forests) are projected to be less effective at slowing the accumulation of CO_2 in the atmosphere.

More accurate information is needed to project possible climate futures, to assess risk and to support adaptation. The present call's section will focus on documenting climate relevant changes on temperate maritime climate regions and in the poorly documented Afrotropical regions[6].

Priority 1.A: Documenting climate change and verifying greenhouse gas emissions in Belgium

Improve regional models and develop climate scenarios for impact and vulnerability studies in Belgium: enhance spatial and temporal resolution; estimate uncertainties; identify precursors of rapid climate change (e.g. the gulf stream stop); incorporate climatic extremes. The models will combine both physical and biological aspects.

Compute low-emission high-resolution scenarios for Belgium which are consistent with the outcomes of the latest IPCC Assessment Report. (AR6) *(interlink with Priorities 4)*

Generate high-resolution climate information: improve and apply downscaling and/or decadal prediction of climatological data to produce climate data sets at the Belgian level. These datasets will contribute to a climate data hub providing a basis for developing climate services.

Based on models and on present, historic and paleo observations, develop national geospatial data platforms providing qualitative and quantitative information (spatial and temporal) on present and future climate extremes (e.g. storm events, extreme droughts and rainfall, heat waves) and their associated hazards and exposure to various threats (e.g. coastline erosion, flooding, landslides, soil settlement, heat stress, loss of biodiversity).

Develop an independent, top-down, spatially explicit greenhouse gas emission monitoring and verification system for Belgium in support of government policies and the global carbon stocktake and the EU strategy to reduce methane emissions.

Priority 1.B: Documenting climate relevant changes in the Afrotropical regions

Document climate evolution in Central Africa through field-based measurements, eddy-covariance monitoring, and satellite observations. Analyse satellite data of Essential Climate Variables and derived top-down emission inventories of climate pollutants above Central Africa for detecting long-term changes.

Improve multi-model research over the Afrotropical climate zone, including land surface model calibration and validation. Perform climate sensitivity studies with land-surface models and vegetation models (biogenic emissions)

Decipher the complex climate-natural hazards relationships in Central Africa by collecting and analysis data on rate, frequency, context of occurrence of extreme events, natural hazards and land degradation processes.

[2.] ASSESSING IMPACT OF CLIMATE CHANGE

Impact of climate change are increasingly being felt from regional to world-wide scales of ecosystems services and biodiversity, of natural resources, of human health, on infrastructures...

[6] Research carried out in tropical partner countries of governmental cooperation is encouraged (but not mandatory) https://diplomatie.belgium.be/en/policy/development_cooperation/where_we_work/partner_countries

There is a need to improve knowledge on the impact of climate change and on vulnerabilities of different sectors, their resilience capacities, and the limits of natural and human systems to adapt to climate change and thereby reduce climate-associated risks.

While the assessment of impact and resilience capacity to climate change of the Belgian society is subject to BRAIN-BE 2.0 Pillar3 (and partially addressed in the Pillar3 call), research priorities focused on the impact of climate change on natural environment and related issues will be dealt with in the present Pillar1 call.

Synergies and a continuum of research is sought between section A (scenario); section B (Impact) and section D (vulnerability and adaptation)

Priority 2.A: Impact of climate change on biodiversity and ecosystem services

This priority focuses on the following topics:

Invasive alien species (IAS): analyse how climate change facilitates the spread and establishment of alien species, and how it creates opportunities for species to become invasive. Focus on IAS (1) that are possible vectors of parasites and pathogens for humans, livestock and/or crops, (2) that are included in EU regulation 1143/2014 (and subsequent additions), or (3) that cause agricultural, horticultural, and other economic damage.

Functional biodiversity: analyse how the resilience of ecosystems, founded on (hidden) genetic and epigenetic diversity, can be affected by climatic factors.

Microbial communities: analyse the impact of climatic factors on microbial communities, including gut microbiota, playing a vital role in (1) the provision of ecosystem services (e.g. in recycling processes, water purification, soil functioning, ...) or in (2) human and animal welfare (e.g. climate driven dietary changes impacting human health via gut microbiota alterations, regulation of rodent pest outbreaks due to climate driven gut microbiota changes; skin microbiome and its interplay with climate factors...).

Biological conservation: develop rapid species identification methods enabling to preserve rare or threatened species susceptible to climate change and requiring appropriate conservation measures

Ecosystem resilience: identify tipping points (thresholds towards new states) when ecosystem architectures change slowly because of gradual climate change or rapidly because of extreme events.

Priority 2.B: Impact of Climate Change on food security and health in Belgium.

Analysis of scenarios that integrate (1) the impact of climate change on agricultural and livestock production in Belgium (including impact of climate change on water management and biodiversity in relation to food production in Belgium) (2) the impact of climate change on food imports in Belgium (including impact of climate change on water management and biodiversity in relation to the production of imported food). *(interlink with 3.A; Pillar3 #Be Sustainable)*

Study the aggravating impact of "heat islands" combined with a raise of ozone level, aeroallergens, and other pollutants on health issues in urban areas and assess whether policies and interventions aimed at reducing emissions (through better transport, food and energy-use choices or by greening the cities), can result in improved public health.

Develop a multidisciplinary approach of innovative concepts that integrate protein, genetic and epigenetic aspects to optimise the use of potential health biomarkers. These biomarkers will be used in a Belgian population- to monitoring exposure, effects, and susceptibility to climate change.

Priority 2.C: Impact of climate change on energy resources

Study the effect of climate change on resources for the production of sustainable energy: investigate whether the power generated by water, solar and wind farms would differ between current and future climates (incl. extreme events) and develop future scenarios to assess the optimal balance between the various types of energy production.

[3.] TOWARDS CLIMATE NEUTRALITY BY 2050

The European Union aims to be climate-neutral by 2050, i.e, to have an economy with net-zero greenhouse gas emissions. This objective recently written into the European Climate Law is at the heart of the European Green Deal in line with the EU's commitment to global climate action under the Paris Agreement.

EU Member States are required to develop national long-term strategies aiming to achieve the greenhouse gas emission reductions required to meet their commitments under the Paris Agreement and EU objectives.

Research priorities listed below are developed to support the further update of the National Energy and Climate Plan (2021-2030) and of the Belgian Long-term strategy, as well as the National Recovery and Resilience Plan to reduce greenhouse gas emissions.

Priority 3.A: Impact of climate neutral scenario in/for Belgium

On 1 June 2021, a new prospective report was published identifying different transition scenarios aiming at climate neutrality by 2050 in Belgium. Belgium needs to gradually evolve towards a climate-neutral, circular bio-economy. Knowledge is needed to steer this transition and ensure that it is environmentally sustainable.

The call focuses on:

- how the food-and biomass sectors can become climate neutral, emit less nitrogen, and maximise biodiversity conservation (interlink with 2.B; see also Pillar3 #BeSustainable)
- how the increased use of resources (land, water, but also various other resources such as cobalt) in the green economy will have environmental impact.

Priority 3.B: Carbon management and negative emissions in Belgium and Afrotropical Regions

Because greenhouse gas emissions can never be reduced to zero (e.g. agriculture will always emit methane and nitrous oxide, steel industry emits carbon dioxide), net zero greenhouse gas emissions imply that negative emissions will need to be realised wherever possible in both urban and rural areas.

The call priorities focus on the determination of land-based negative emission technologies including enhanced soil carbon storage, biochar amendments, enhanced silicate weathering, wetland restoration, and re- and afforestation. Their trade-offs, permanence, risks, and environmental and societal co-benefits remain to be properly accounted for and tools to monitor and verify carbon removals need to be developed.

The impact of biodiversity on ecosystem capacity to sequester carbon, but also the impact of negative emission technologies on terrestrial and aquatic biodiversity, need to be assessed to optimally reconcile carbon-oriented land management with biodiversity conservation.

[4.] PREPARING FOR ADAPTATION TO CLIMATE CHANGE

In support to the federal contribution to the National Adaptation Plan, and with a view to support a coherent set of adaptation measures, the following key priorities have been identified.

Priority 4.A: Vulnerability, exposure, and risk in Belgium

Based on currently available data and on the climate scenarios and associated hazards developed in Priority A1, assess exposure and vulnerability to relevant threats (e.g. coastline erosion, flooding, landslides, soil settlement, heat stress, loss of biodiversity) and combine these dimensions into risk analyses.

Identify key vulnerabilities and associated strategic, well defined measures that target improved resilience of sectors providing essential services such as those identified by the National Crisis Centre: transport, energy and telecommunication but also identify risks associated to food security and health.

Priority 4.B: Towards climate services

Based on Priority D1, start working at the science-to-service-to-practice interfaces to enable delivery of climate services aimed at informing action at needed scales.

Develop mitigation/adaptation stakeholder information for urban areas based on high-resolutions model and data (crowd-sourced data and citizen science): Study mitigation and adaptation technologies in urban areas such as blue/grey/green infrastructure in order to make cities resilient to future climate extremes such as heat waves, flooding, … (*interlink with Priority 2.B)*

Develop climate services for renewable energy applications: Development of forecast tools of renewable energy production coupled to high-resolution atmospheric weather prediction and regional climate models. Improve the predictability of variables that are essential for the prediction and management of renewable energy power production. (*interlink with Priority 2.C)*

Investigating to what extent changes in agricultural practices (for example in scale, or in traditional versus agroecology) can facilitate mitigation/adaptation to climate change and, in a wider context, water management in sensitive areas and biodiversity conservation and/or restoration. (*interlinks with Priorities 1.B and 3.B)*

6.3.2. TRANSNATIONAL THEMATIC CALL RESEARCH PRIORITIES

The programme enables participation in transnational programmes, such as the ERA-NETs, the Joint Programming Initiatives (JPI), the Horizon Europe Partnerships. Introduction of projects is subject to separate calls following the international call calendars and procedures.

Bearing in mind the priorities of Pillar 1, the programmes and actions in which BELSPO (will) participate(s) with expected new projects in 2022-2023 are:

- The European Biodiversity Partnership – first call for proposals
  "Supporting the protection of biodiversity and ecosystems across land and sea"

- The JPI Climate. A call is in preparation on operationalisation of climate services, as a follow-up of the ERA4CS initiative.

6.3.3. BOTTOM-UP PROJECTS

The aim of these projects is to support the Federal Scientific Institutes (FSIs) in their scientific potential in their specific areas of expertise or missions.

The projects do not have to be in line with the thematic research themes in the context of the calls but must be linked to the general frame of Pillar 1.

Only FSIs can submit a bottom-up project. Given their scope and philosophy, bottom-up projects are restricted in terms of number of partners. They can be carried out by a single FSI (acting as coordinator) who, whenever required, may seek to have (an)other partner(s) - including other FSIs and/or other Belgian research institutions, African research Partners from Least Developed Countries, and/or other (non-BELSPO funded) international research partners - in order to answer the scientific questions posed.

7. PILLAR 2 - SCOPE AND RESEARCH PRIORITIES OF THIS CALL

7.1. RESEARCH FRAMEWORK

The implementation of this pillar is done both via **thematic and bottom-up projects**.
Bottom-up projects will be **coordinated by an FSI**, possibly in collaboration with universities and other research institutions. As such, the projects have as a challenge to fit into the global strategic priorities of the FSIs, in terms of their scientific expertise and / or their missions with regard to public service.

PILLAR 2 "HERITAGE SCIENCE"

Pillar 2 "Heritage science" is dedicated to scientific research in support of the federal - cultural, scientific and historical - heritage and in particular the heritage in Belgian federal scientific institutions (FSIs : see annex 1) as well as the heritage on which the FSIs deploy their expertise. The potentially involved heritage is of a diverse nature: material / tangible and intangible / digital, of national or international origin.

The aim of the pillar 2 is to mobilise and develop the scientific expertise on "Heritage science", namely scientific research to support conservation, access (including new ICT tools), interpretation and management of heritage, especially with a view to scientific exploitation and social valorisation. This approach, often interdisciplinary, is at the crossroads of a wide range of knowledge and expertise, from fundamental sciences to human and art sciences.

The research aims to support:

- The conservation, preservation and management of heritage and collections, with a view to exploitation, mainly scientifically, through the development and / or testing of best practices of techniques and methods, of sampling, of digitisation or other management and preservation methods, documentation, classification, identification and access to the information and / or access to material from the collections,

and /or

- Its placement in social, artistic, historical, geographical, environmental, health, scientific, technical, political, archaeological, linguistic, literary, musical, economic or cultural context, in a synchronic or diachronic perspective.

7.2. SCIENTIFIC APPROACH

The research projects need to make a scientific contribution in the form of a cross- and interdisciplinary exploitation/valorisation of relevant federal heritage, if possible clustered to gain critical mass.

The objective is to federate the expertise of the scientific community – in the scientific institutions, universities and other research centres - around topics which present an issue of scientific knowledge that is important for the promotion of federal heritage.

In order to clearly demonstrate the concordance between the research projects and this joint approach, the proposals will provide the following in an explicit and well-argued manner:

- **Identification of the federal heritage (sub)-collections** – cultural, historical and/or scientific – tangible and/or intangible – of national and/or international origin – for which the project will provide a scientific contribution.
  Using collections in the project that aren't part of the federal heritage can be envisaged as far as:
  - Federal institutions contribute to their promotion, through their expertise,
  - They are used in the project as additional support for the federal (sub)-collections.

- The **nature of the interdisciplinarity implemented in the project**, especially at the level of:
  - The mobilised scientific disciplines,
  - And / or the integration of methodological approaches
  - And / or the various ways to apprehend the studied topics
  - And/or the merging and/or possible integration of (sub)-collections of a heterogeneous nature
  - ...

- **Demonstration of the balance between the project's methodology** on the one hand – including the tasks to valorise and disseminate the results – and, on the other hand, the **objectives** that the project is pursuing in terms of relative impact and benefits (scientific, strategic, policy supporting, societal) and in terms of sustainability (e.g. through possible further integration into distributed European infrastructures such as ESFRI).

This joint approach will be encouraged by the organisation of research in partnerships. This will allow a reinforcement of the collaboration between the different scientific actors, particularly with and between the institutions responsible for the heritage concerned, as these institutions are on the front lines of the exploitation and valorisation of their heritage.

The research projects will take advantage of international research activities in the fields concerned, as necessary. Some scientific communities, certainly in the field of social science and humanities, have developed in recent years impressive open digital research and collaboration tools. Project proposals are strongly encouraged to develop, re-use and open up these digital tools, methods, data repositories and collection data to scale up research outputs.

7.3. CALL PRIORITIES

7.3.1. NATIONAL THEMATIC CALL RESEARCH PRIORITIES

[1.] HERITAGE BIOBANKS AND COLLECTIONS OF BIOLOGICAL MATERIALS

Motivation and general challenge

Developments in molecular analyses have radically transformed research within museums and scientific institutions, among them IRSNB-KBIN, KMMA-MRAC, Sciensano and NICC-INCC. This new form of scientific collections concerns both the study of historical collections and the use of research collections created de novo in the context of research projects or structural programs. A biological collection (DNA, tissues, strains, sequences, ... from human or non-human origin - hereafter referred to as a "Biobank") and its metadata can therefore be associated with physical samples in collections, related to specimens destroyed for analysis or kept in other institutions, or even correspond to traces of genetic information found in the environment without being attached to a specific specimen.

Possible federative / pluri-disciplinary aspects

The development of "Biobank" as a new category of Heritage collection covers different expertises of Federal Scientific Institutions (FSIs).
Research to improve the conservation and the management of the collection is needed, including:

- Development of adequate quality management system
- Adequate "error" and "redundancy" detection
- Optimal conservation infrastructures ensuring e.g. genetic stability, and integration with FSIs disaster plans
- Appropriate Collection Management System(s) for data and physical specimens
- Respect for ethical, privacy and legal constraints

It allows the integration of these "Biobanks" in the international networks.

Research Scope

The scope of the proposed research is to evaluate all aspects related to the development and extension of such collections and associated data. The goal is to guarantee the heritage value/conservation, allow the availability of data, and facilitate the valorisation of the collection in the framework of a changing environment and One Health concept.

Expected Impact

Heritage "Biobanks" have a very important impact for the missions of the FSIs. They are an answer to the new research fields related to One Health concept or to the monitoring of biodiversity based on Heritage federal collections and federal competences. It will also organise the genetic resources of FSIs in respect to the international regulations (e.g. ABS Nagoya).

Link to the (post-)COVID strategy for recovery

The "Biobanks" are a key collection in the One Health concept. They allow research on the relationship between biodiversity and epidemic (pandemic) diseases.

They integrate data on species occurrence, presence of blood sucking ecto-parasites, environmental, animal and human pathogenic strains and human samples to improve our understanding of the emergence of pathogenic landscapes by assessing the risks of epidemic or epizootic outbreaks, whether or not influenced by climatic changes. In terms of health crisis management: reference "biobanks" and databanks are essential in long term contingency e.g. validating of diagnostic tests, updating vaccines, etc.

How will transdisciplinarity / stakeholder engagement / citizen science be incorporated?

The One Health concept enforce a global and trans-disciplinary overview which is reflected in the diversity of the FSIs biological sample collections and expertise.

Relevant EU/International research infrastructures

ESFRI projects or ERIC infrastructures: DiSSCo, BBMRI, ELIXIR, LIFEWATCH, MIRRI, EMBRC.

[2.] AGILE SEARCH! LINKED OPEN DATA, CONTROLLED VOCABULARIES, SPECIALISED THESAURI, WEB SERVICES AND MULTILINGUAL SEARCHES

Motivation and general challenge

The (meta)data relative to federal collections and federal expertises are massively produced through digitisation programs, research projects and mainstream activities of Federal Scientific Institutions (FSIs) in the context of the federal competences.

This information is produced in many formats, different standards and languages depending on the topic. The aggregation of this information in specialised or generic search portals represents one of the major challenges for FSIs in the framework of the digital transformation of the society and requires specific research.

Possible federative / pluri-disciplinary aspects

FSIs are specialised in different disciplines of science. Many of them are already involved in the setup of international infrastructures (Natural sciences, Heritage, One Health, Climate, Space ...). Through this priority cross-disciplines approaches will be stimulated, and common strategies and tools developed so as to allow each FSI to contribute significantly in the national, international and (inter)disciplinary landscapes.

Research Scope

The aims are:

- Establish common best practices based on the specificity of the collections and diversity of expertises
- Select the best (open source) technologies
- Share open access information with search portal(s)
- Use the FAIR principles
- Bridge federal heritage and expertise to international networks/infrastructures.

The use of controlled vocabularies, specialised thesauri, ontologies, linked open data and multilingual (including African languages) searches are key aspects of this research. It is one of the most time-consuming activities of data validation during the description and the encoding in database(s).

The recent developments in AI, speech recognition, automatic translation, semantic analyses and the new cloud-based computing architecture and web services offer new possibilities of developments which can dramatically change the game in data organisation, data access and valorisation.

Expected Impact

The proposed research will help the FSIs to make a landscape analysis of existing open-source technologies and to develop common strategy(ies):

- Valorise their collections and expertise
- Answer to the Open Data and Public Sector Information Directive
- Follow GDPR rules
- Optimise the access of this information by the different categories of stakeholders

Link to the (post-)COVID strategy for recovery

- #BeDigital, #BeInclusive, #BeProductive
- Serve to pool FSIs resources and create FSIs synergies
- Be designed to benefit from existing EU/Int. Infrastructures and networks relevant to FSIs
- Favour the creation of centres of expertise (Climate, Biodiversity…)
- Have an educational side / raise science awareness

How will transdisciplinarity / stakeholder engagement / citizen science be incorporated?

The "Agile Search" theme is the key stone to improve access to the diverse information sources hosted by FSIs. The goal is to develop common strategies and tools pooling the expertises and resources of the different FSIs in order to provide information with a more controlled, multilingual, accessible and smart search engine and promote the use of these data by international and thematic portals or by citizens. The multilingual aspect has not to be limited to NL, FR, EN, DE languages but potentially to other languages (African languages particularly) for which AI resources can be mobilised (inclusion). This will increase the impact of the search functionalities and facilitate the use of natural languages and questions (citizen science).

Relevant EU/International research infrastructures

DiSSCo, E-RIHS, DARIAH.

[3.] FEDERAL HERITAGE FACING SOCIETAL CONTESTATIONS AND SENSITIVE NARRATIVES

Motivation and general challenge

There is an increasing societal debate about the origins and legitimacy of the federal heritage, particularly from some problematic historical periods. One such debate is about the colonial past in Belgium of which the history is poorly documented, necessitating the inventory and access to the required archives. Another debate is on the impact of the 20th century wars and foreign colonial empires on the composition and acquisition of collections.

Citizens question the Federal Scientific Institutions (FSIs) directly : owners of contested artworks, métis affected by the segregation of the Belgian colonial regime, family members of convicted collaborators,

claimants of war booty, objects related to collaboration or symbolising dictatorial regimes, glorification of wars in collection formation acquisition and building/monument classification.

Possible federative / pluri-disciplinary aspects

Almost all FSIs have contested heritage in terms of objects, collections, and buildings and at the same time the sources for contextualising with more transparency this legacy.

Various disciplines are involved:

- History, Art History, Anthropology
- Provenance research, Museology, Archival Science

Research Scope

Within this thematic, projects will cover the following topics:

- History of the colonial past 1886 - 1962
- Access to and digital sharing (repatriation) of archives and collections related to the colonial past
- History of collaboration and conflict during WWII
- Provenance and/or authenticity of contested/ problematical collections
- Challenges for exhibition of contested collections/ collection items (in contested buildings)
- Research into institutional collection and acquisition history

Expected Impact

This strategic priority aims to support the federal government in responding to citizen questions on contested heritage and in societal debates on colonisation and collaboration and conflict history.

Link to the (post-) COVID strategy for recovery

This strategic priority frames with the federal coalition agreement (30 September 2020) in committing the federal government to support colonisation remembrance, reconciliation and study of the colonial history as well as conflict history.

The digital sharing is part of the digital transition.

How will transdisciplinarity / stakeholder engagement /citizen science be incorporated?

The issues addressed are closely related to the perspectives of our stakeholders and especially of politics and public. Citizen science will be incorporated via participative approach in case studies, either via crowdsourcing or via public debates.

Relevant EU/International research infrastructures

Debates on colonisation and on collaboration are international themes that are addressed in European and worldwide programs such as ICOM, UNESCO, and more Remembrance or "Mémoire"-oriented programs.

This strategic priority specifically addresses the Belgian context.

[4.] OBSERVATIONAL ARCHIVES, SCARCE DATA: LEARNING FROM THE PAST AND/OR REMOTE SPACES TO SHAPE VIEWS FOR TOMORROW'S ENDEAVOURS

Motivation and general challenge

The Federal Scientific Institutions (FSIs) produce and manage a broad range of remarkable digital/digitised data collections from past and/or remote observations. The outstanding character of these collections resides in the length of time series, in the abundance of data, or on the contrary in their exceptional character due to their scarcity and/or the difficulty to constitute or to measure them. These collections provide essential information to address a broad range of societal and scientific challenges (e.g. climate change, atmospheric and planetary changes, loss of biodiversity, sanitary crises and more generally population health, …), and to shape our view for tomorrow's endeavour (e.g. space/planetary exploration, future health challenges, …).

Possible federative / pluri-disciplinary aspects

Selected projects will provide a response to the challenges presented above and approach the considered societal/scientific challenge in a multi-facet, transdisciplinary way by involving partners from different FSIs and strengthening their mutual communication and/or scientific expertise, by fostering as much as possible meeting between exact sciences, humanities and/or arts, and by ensuring appropriate dissemination and outreach activities.

Research Scope

Seeking the exploitation of the full potential of these data collections will be realised, e.g. by:

- Rescuing and securing data if necessary
- Combining, harmonising data collections
- Assessing data reliability
- Improving their quality by appropriate processing (e.g. reprocessing, homogenisation, data quality control, …) to support end-user needs and/or requirements
- Increasing the visibility of data collections and supporting their valorisation
- Developing new or enhanced, high-level or integrated data collections providing new insights into a physical/environmental system

Expected Impact

These collections have a crucial role to feed future science in the service of the society, and to support economic deployment and the development of new governance. Also, they have to nurture social cohesion and contribute to the transition toward a knowledge-based economy and society in many ways, e.g. by :

- Challenging misinformation through the share of quality knowledge in appropriate ways
- Heightening public awareness about today's societal challenges
- Engaging the public about science, including specific vulnerable/less accessible/unprivileged target publics
- Increasing public's involvement/interest in sciences (e.g. citizen science)
- Promoting science and scientific studies, and encouraging scientific vocations to those publics, including girls and socially unprivileged publics

Link to the (post-) COVID strategy for recovery

Two conditions are indispensable to ensure that the full potential of these digital collections can be exploited. Collections must be processed and fully characterised following the most recent standards, and be archived in a secure way and made available to a broad range of stakeholders including professional users (scientists, economic actors, health sector, …), decision-makers, as well as a broad public (schools, associations, citizens, …).

Relevant EU/International research infrastructures

As a contribution to the digital transformation, their archiving in well-established national or international data stores for sharing and for long term preservation of data (e.g. Copernicus, PANGAEA, SeaDataNet, data stores relevant for data rescue such as the International Data Rescue Initiative I-DARE, the Population Health Information Research Infrastructure [PHIRI], the Healthy Cloud, etc.) will ensure that they can contribute to large European (EU, ESA, EPOS …) programmes and services such as Copernicus, or Virtual Observatories like VESPA, etc. Diffusion of knowledge shall follow FAIR principle (open science) including dedicated communication to the general public when relevant.

[5.] (MIXED MATERIALS) COLLECTIONS AND SUSTAINABLE SOLUTIONS FOR CONSERVATION

Motivation and general challenge

Preventive conservation of physical collections is central to the mission of the FSIs. The material study of collections is the basis of the development of new sustainable and ecological solutions for preventive conservation and models for decision making. This includes issues such as conservation treatments, storage, climate, handling, presentation, etc. of the objects themselves and relates to both the environment in which they are preserved and their materiality.

Possible federative / pluri-disciplinary aspects

Various FSIs are confronted with similar material conservation issues of their physical mixed material collections. However, each FSI has other needs and conditions challenging this preservation. A pluri-disciplinary holistic approach is urgently needed to investigate best practices and solutions regarding ecology, conservation practices, material conditions, presentation, storing, handling, packing, transport, etc.

Research Scope

One or more of these objectives:

- Sustainability of preservation methods and the complexity of combined materials
- Sustainability of presentation solutions regarding changing conditions
- Materiality and preventive conservation

Going local is also a mean of engaging particular local communities in the preservation and accessibility of such collections.

Expected Impact

By challenging current practices and solutions and departing from the collections, we built on sustainable preventive conservation for the future within the realm of ecological transition.

Link to the (post-) COVID strategy for recovery

Covid challenged current practices. Go local is the word of the moment and museums and institutions are concentrating on their own collections, highlighting also less visible parts of their collections. Within the recovery plan, sustainability as well as maintenance and modernisation of cultural heritage (including buildings) is on the forefront. Researching methods and solutions respecting sustainability (ecological, economic, social, etc.) for conservation-restoration practices and preventive conservation will allow to support these recovery projects.

How will transdisciplinarity / stakeholder engagement /citizen science be incorporated?

Research is at the cross-roads of technical art history, conservation sciences, natural sciences, engineering...

Stakeholder engagement: transversal collaboration between FSI, church fabrics, museums, ...

Relevant EU/International research infrastructures

ICCROM, IIC/International Institute for Conservation of Historic and Artistic Works (https://www.iiconservation.org)

7.3.2. TRANSNATIONAL THEMATIC CALL RESEARCH PRIORITIES

The programme enables participation in transnational programmes, such as the ERA-NETs and the Joint Programming Initiatives (JPI).

Bearing in mind the priorities of Pillar 2, the programme and action in which BELSPO participates with new projects in 2022-2023 is:

- JPI Cultural Heritage 'Heritage, Society and Ethics' (250 000€)

The introduction of this type of projects is subject to separate calls following the international call calendars and procedures.

7.3.3. BOTTOM-UP PROJECTS

The aim of these projects is to support the Federal Scientific Institutes (FSIs) in their scientific potential in their specific areas of expertise or missions.

Only FSIs can submit a bottom-up project. Given their scope and philosophy, bottom-up projects are restricted in terms of number of partners. They can be carried out by a single FSI (acting as coordinator) who, whenever required, may seek to have (an)other partner(s) - including other FSIs and/or other Belgian research institutions, African research Partners from Least Developed Countries, and/or other (non-BELSPO funded) international research partners - in order to answer the scientific questions posed.

The projects do not have to be in line with the thematic research themes in the context of the calls but must be linked to the general frame of Pillar 2.

7.4. BUDGET RULES

In coordination with the Advisory Committee and the FSIs, the introduction of proposals in Pillar 2 has been limited in terms of a 2,7M€/FSI budget envelope, including both thematic AND bottom-up proposals. This limit has been set based on the average budget demanded by each FSI in the past calls and the available budget of the call, in order to achieve a success rate of approximately 30% for thematic proposals.

Within the 2,7M€ each FSI must count:

- For thematic proposals:
  - The budget of their FSI
  - If they are coordinators of the proposal: the budget of institutions that are not FSIs

- For Bottom-up proposals[7]:
  - If they are coordinators of the proposal: the budget of the coordinator

8. PILLAR 3 - SCOPE AND RESEARCH PRIORITIES OF THIS CALL

8.1. RESEARCH FRAMEWORK

The implementation of this pillar is done via **thematic** and **co-funded projects**.

PILLAR 3 "FEDERAL SOCIETAL CHALLENGES"

This pillar supports research that addresses current societal challenges (not covered by the other pillars). The topics funded in this pillar are selected in function of those challenges (e.g. health, security, ageing, economy...) that are considered a priority by the federal authority (as stated for example in Governmental Agreements, federal and interfederal plans...) and that align with international and European research agendas.

The ultimate goal is to develop a solid scientific expertise to support the competencies, strategic orientations and policies of the federal state. Such expertise will clearly enhance the knowledge base around these challenges, reveal opportunities and possible caveats and provide useful recommendations for the federal level.

The topics of this pillar will encourage research that mobilises a large spectrum of disciplines, that are embedded in the international and European context and that will strengthen the participation of a wide range of stakeholders.

[7] Bottom-up proposals must also adhere to the budget rules expressed in point 1.4.3.

8.2. CALL PRIORITIES

INTRODUCTION

In this call, the research priorities developed below are anchored in the **relance policy** of Belgium. This policy aims at a greener, more digital, and inclusive society. 5 main topics have been identified from the reflections of federal authorities in designing a relance plan: **#BeMobile**, **#BeSustainable**, **#BeDigital**, **#BeInclusive** et **#Beproductive**.

The scientific community is invited to develop interdisciplinary research projects that provide a response to one or more of these priorities. The projects should clearly support the federal administrations and federal policies.

Next to these *interdisciplinary thematic priorities*, applicants are also invited to submit proposals for the so-called *co-funded priorities*. These priorities are funded both by BELSPO (up to max. 90%) and by the concerned federal administration(s) (min. 10%/administration). These focused priorities call for a scientific support and require a strong implication of the concerned federal department to implement the scientific result in its own functioning. The expected added value of these projects should go beyond the concerned federal department but must also benefit the public at large or a specific segment of stakeholders (e.g. a scientific community etc.). Applicants must attach to their application a letter of support (in cash/in-kind letter of commitment) from the concerned federal department(s). Note that the maximum budget for each co-funded project is fixed in advance and shall not be exceeded in applications. A specific budget is reserved for these projects.

8.2.1. INTERDISCIPLINARY THEMATIC PRIORITIES

[1.] #BeMOBILE

A more sustainable mobility is at the heart of this topic. Scientific contributions could support the Federal state in the following domains:

- **Management of the work/home commute** and contributions of the Mobility Plans in the private and public sector: An analysis of good practices is expected (see also the results of a BELSPO project in 2011 called ADDICT that assess Employers Mobility Plans).
- **Mobility as a Service (MAAS)** and how can the federal state contribute to a modal shift that is fair for all segments of the population? What are the good and bad practices? How can one stimulate this modal shift? How can digitalisation help in this shift and how can one address the digital divide that might result from this shift for specific groups or specific (rural) areas?
- **Micro mobility for the future**: the covid-19 crisis has accelerated a trend towards electric bikes and light electric vehicles. What is the potential of these e-bikes and LEVs in the next decade in terms of their share in the total mobility? And what are the obstacles to their development and how to alleviate these obstacles (technical regulation, price, need to adapt infrastructures and the Road Code...) with a view to have a wide variety of transportation modes to coexist?
- **Potential and pathways for modal shift from road to rail** in passenger and freight markets.

[2.] #BeSUSTAINABLE

In the transition towards a carbon-neutral society by 2050, there is need for scientific contributions to improve existing evaluation tools, macroeconomic models and monitoring tools used to estimate

greenhouse gas emissions and the impact of the transition towards carbon neutrality. Specifically, improving such models by embedding the socioeconomic characteristics of households, their mobility patterns and ways of consuming is needed.

Secondly, there is a need to improve knowledge on the distributive impact on households of the burden and advantages of the transition towards a carbon neutral society. This impact need to be better documented and monitoring tools be put in place - at the exception of the link between energy and poverty, which was studied in an earlier BELSPO project - called 2Genders). In this respect, what is the role of social security and labour market policies? Also, how can one mobilise the wealth accumulated by households during the covid crisis towards sustainable investments (in conformity with the new European taxonomy)? More generally, Federal policies that would gear this transition by inducing a change of behaviour need, in their design, to account for social inequalities, possibilities offered by technology and a clear communication strategy. Research can provide tools to support the design of these policies.

A third stream of research focuses on the federal state - as owner of a large built patrimonial - in its transition to a Nearly Zero Energy Building management. We do not aim at technological research but rather on projects that could support the *management* towards NZEB, one of the pillars of the federal part of the National Plan Energy-Climate, taking into account the possibilities and the latest techniques and in the perspective of sustainably integrating this patrimonial into the urban settings. How to better coordinate strategic public procurement as a driver for (social) innovation in this domain?

Fourthly, research could support emerging energy technologies towards first industrial demonstration and scaled up production that are central in the energy transition (hydrogen, CO_2 capture etc).

Finally, we invite applicants to study how the transition of food production and consumption systems should be geared in the face of sanitary, health and environmental challenges, and in line with the EU context defined for the next decade by the European Green Deal and its strategies (Farm to Fork, Biodiversity, circular economy, zero pollution, …). What actions can be taken at federal level to support a transition to a more respectful account of humans, animals, and environment (in line with the One World One Health approach)? In terms of the transition of food demand towards more healthy ways of consumption, we invite researchers to study the impact of a protein shift on health and food security and safety, on biodiversity, on production and import of food products.

[3.] #BeDIGITAL

A first priority is related to the many aspects of the overall governance of digitalisation within federal public services. In this respect, research could support the federal strategy on the use of data and big (and smart) data for public purposes (use of data, combination of data from different sources...). Research could also support the efficiency of the public action via the use of Artificial Intelligence and Big Data.

Secondly, scientific contributions could support the fight against cybercrime and the efforts for cybersecurity in line with the objectives of the National Cybersecurity Strategy 2.0. Research could shed a light on how to strengthen the digital environment and increase users' trust in this domain; to arm users and administrators of computers and networks; to protect vital organisations from all cyber threats; to enhance public, private and academic collaborations or to improve our international commitments. In particular, research could focus on developing solutions towards a cybersecure Internet of Things, strengthening digital identity as a way to combat anonymous cybercrime, or on new technologies that could specifically assist in similar matters (AI, quantum computing, quantum-resistant cryptography). Research could also support a more efficient implementation of cybersecurity legislation (e.g. NIS-Directive on protecting essential services, or cybersecurity Act, on certification), advancement of secure communication tools between government administrations or strengthening of the tools of security services combatting cybercrime.

The digital relations between public services and citizens (mediated by communication operators) is another point of attention. What do citizens need in their digital relations with the state? How can the citizen be empowered and be an actor in the digital development of public services? How can privacy be articulated with the digital possibilities that federal services wish to grasp? How can the development of platforms and ecosystems of eAuthentification, eNotification, eConsent etc. be supported? The federal state, as one of the largest employer, could have a normative role to support/foster the strengthening of digital competences and capacities that employees can then use also citizens in private life (empowerment). This could boost the diffusion of digital innovations in many areas such as health, education, mobility….

The action of the state in its function of regulator of digitalisation of the economic and social life is another point of attention. In this respect, the regulation of e-commerce (including technical, health and other challenges) deserves further research. There is a need to provide metrological trust in commercial transactions based on measurements - metering and billing- for novel applications (smart electricity meters, charging electric vehicles). The state as a regulator of fake news and the role and action of the state in the Directive on Whistle-blowers are other areas where research is needed.

And finally, digital industries and digitalisation of society carries a negative impact that needs closer examination. One can think of the impact on health, on human relationships, on the environment, on the loss of direct contact (one example is teleconsultation between a patient and a GP), etc.

[4.] #BeINCLUSIVE

In the fight against social exclusion, a first point of concern relates to the most vulnerable groups of our society, strongly hit by the covid-19 crisis. Although the social security system has fully played its role as an essential stabiliser for a vast majority of people, it could not prevent specific groups against difficulties that the sanitary crisis has accentuated. This asks for scientific contributions that would enable the federal state to better monitor the socioeconomic situation of these groups (this aspect is specifically covered by a co-funded project - see further in the text). It also calls for shedding light on failures in the social protection system and evidence-based recommendations to make the system work better. Applicants interested in this topic are invited to grasp the full definition of social inclusion, as it is emphasised in the conclusions of the Peer review on social activation (February 2021) organised by the European Commission, and that is also embedded in the Federal Plan to combat Poverty and in the recommendations of the interfederal Working group on social impact of the corona crisis that counsels the government.

Inclusive societies need a comprehensive and holistic high-level vision, that goes beyond a piecemeal approach. As far as social inclusion and inclusive societies are concerned, a growing need surfaces to make our societies and democracies more resilient, as the impact of the financial great recession has not been devoured. Academic support is needed to develop a holistic and multi-level approach on social cohesion and anti-discrimination and the enforcement of the regulations.

More focused points of attention arising from the above mentioned interfederal Working Group could generate research projects:

- Loss of income - temporary unemployment - and slide into poverty: in the frame of the covid crisis, how can financial support be granted in the most efficient way to avoid people to slide into poverty?
- Official statistics show that certain specific groups (we think of people with a foreign background, people with a handicap, people with low or no qualifications, etc.) seem to accumulate the most difficulties in integrating the labour market. A relance policy need to be accompanied by structural

measures for such groups who, in their absence, might be left behind. Evidence-based policies constitute a crucial point for research.

- What are the potential levers and measures to help NEET youngsters integrate into the labour market?
- as a complement to the 2 points above, research should also scrutinise projected shortages on the labour market: where exactly? To what extent? How to anticipate and mitigate the potentially growing coexistence of unemployment and unfilled job vacancies?
- Students took a hard hit during this crisis: the supply of jobs has dramatically shrunk, leaving a portion of them financially deprived. The position of these student jobs within the overall supply of jobs on the labour market needs to be studied, accounting for the need to devote sufficient time for studying on the one hand, and the necessity for many students to finance their participation to higher education via these jobs.
- The situation of independent workers is also problematic and there is a lack of a clear view on their real situation.
- Beyond the labour market, the pandemic has exacerbated existing situations and reinforced structural problems: weakness and targeting of specific allocations, activity traps, inequalities in access to health care, to education... Here too a relance policy need to account for these structural situations to be fully inclusive.
- Another stream of research could focus on the psychological effects of the measures taken to fight the pandemic: social isolation, distress of young and old, intra-family violence, stress, school, and work drop out, burn-out... All these elements have affected large segments of the population and caused specialised mental health services to be quickly overwhelmed. Will these effects last in time? How have mental health services adapted to the situation and what are the lessons learned? And how can we mitigate this negative impact in the crisis management? Note that a priority co-funded by FPS BOSA on Burn-out and reintegration after long term sick leave deals with aspects developed in this paragraph. To avoid duplication, applicants interested in this specific topic should apply for the co-funded priority (see further in the text).
- The measures against the pandemic have translate in a more intense use of digital tools to stay in contacts with family, friends, work, public services, culture, to buy online... And this has widened an already existing digital divide. In the frame of a relance that will rest heavily on digital tools, an inclusive policy should address this divide and research can support this policy. Contributions from research groups can also look at two specific issues:
    - While most of the population uses digital tools in their daily lives, the access to - and use of - these tools remain difficult for specific groups. This needs to be better documented and solutions need to be brought forward for the federal level.
    - Fake news and disinformation on social media, forms of contestation and radicalisation of the policies against the pandemic have risen in the past months to an alarming level. A clearer vision of these phenomena and their underlying logic need to be studied and recommendations for the Federal level should be produced to inform policies and to enable credible counter-narratives.
- Official communication and the way it is perceived by the general public, accounting for selection biases induced by algorithms who have a tendency to reinforce one's opinion, deserves to be studied with a view to favour a communication from public authorities that can lead to more realistic beliefs from the public opinion.

[5.] #BePRODUCTIVE

Economic and social relance will require innovation, research, and employment in which new knowledge will play a crucial role in businesses. It is within this context that research could generate knowledge on the following points:

- Hybrid work and the evolution of work: what is the ideal mix between work and telework for the individual and society at large (e.g. when accounting for commuting from work to office, when

looking at residential choices...). How should work be organised so that the place of work can be adapted to the type of activity? Do we need a right to disconnect, such as it is the case in some countries? How should working time be measured when work can be independent of the place, moment or performed for different employers? How can health and wellbeing at work be ensured in these new ways of working and how can we fight burn-out and other health issues efficiently? What are the digital skills that are requested and what is the level of digital literacy that is needed from workers? And how should one pay specific attention to vulnerable groups in the working population that might have difficulties in switching smoothly in this digital trend on the workplace?

- Circular economy: what is the impact of it and what are the opportunities it offers on the labour market? In support of the Federal Plan on Circular Economy that is in preparation, research could also shed light on aspects on the demand side (share and functionality economy) and the supply side such as industrial ecosystems, new business models integrating a design for circularity (reparability, remanufacturing, recycling, upcylcing...), product/material passport, recycled content, substitution of dangerous chemicals to ensure a safe recycling... Next to the European indicators, what additional indicators should be developed to measure with more granularity the width and breadth of this new economy? Note that a co-funded priority deals with aspects of consumption of goods from the circular economy (see further in the text). To avoid duplication, these specific aspects will be dealt via the submission of a co-funded priority.
- Research can also contribute to the movement towards a bio-sourced or bioeconomy. In this respect, support to a follow up of imports - and their impact on GES and on the degradation of biodiversity - and flows of materials - in the form of an input/output matrix with clearer figures on biosourced materials transiting from one sector to another - will be a point of attention. We invite you to read the co-funded priority which deals with such aspects in order to avoid duplicating a thematic and co-funded proposal.
- Research should also focus on the lessons to be learned from the covid response learn for future economic shocks in light of the stabilisers and the resilience of our economy.
- Finally, our economy needs flexibility in the future and one focus should be put by research on existing barriers to innovation and competition in access to the profession and product norming.
- What are promising 'strategic economic sectors' for Belgium. What industrial policies have proven to be impactful to support the development of these sectors.

8.2.2. TRANSNATIONAL THEMATIC CALL RESEARCH PRIORITIES

For this 2022-2023 call, there is no participation foreseen in transnational programmes, such as the ERA-NETs and/or the Joint Programming Initiatives (JPI).

8.2.3. CO-FUNDED PRIORITIES

[1.] MONITORING OF VULNERABLE GROUPS IN SOCIETY

Co-funded by the FPS Social Security and the FPP Social Integration.

Scope

COVID-19 has clearly shown that good and reliable data are crucial to monitor the developments in society and to be able to inform the government of existing and submerging problems. The Working Group Social Impact COVID-19 and the Taskforce Vulnerable Groups have counselled the government in a manner that was unprecedented. Via ad hoc procedures data could be collected to inform policy makers in a timelier manner on socio-economic evolutions during the pandemic. But through the proceedings it became

obviously that, notwithstanding the excellent role our social protection system has played, certain gaps remain, especially concerning specific vulnerable groups. Data are needed to address the difficulties that became clear throughout the pandemic. Academic support is needed to further develop a comprehensive monitoring system. Alongside this, during the Peer Review on Social Activation organised by the Commission, it became clear that academic support is of the utmost importance to support the administration. The Working Group Social Impact COVID-19 has even been mentioned by the Court of Audit and in the press as an example of good practice during the pandemic. However, it is necessary to not only continue, but also to consolidate and deepen it's work and reinforce its capacities on monitoring, especially because of the clear need to design and implement a holistic and comprehensive strategy targeting vulnerable groups. Continuation of the monitoring and further development with academic support will be of the utmost importance. At the same time, the monitoring capacity will support the preparation and elaboration of the action plan on poverty as well. It will also play a crucial role in the monitoring of the results of the action plan on access to social protection.

Requested scientific support

As described above academic support is needed for the further development of a monitoring system that has proven its worth, but that has also revealed that no data or only little reliable data are available on certain vulnerable and specific groups, both on the social protection system as on the labour market (see landmark objectives of the European Pillar of Social Rights). We want to further develop, with academic support, the monitoring capacity to inform policy makers and make data accessible to the scientific community, for the benefit of all. Key features that need to be developed are data flows that allow on a permanent basis (1) a timelier assessment of social and labour market developments and (2) a better coverage of vulnerable groups. To guarantee the inclusiveness of the proceedings, a diversity counsellor will be involved. – Examples of the desired outcomes are a better linking of data (quarterly data and not annual data which are too slow), the development of even better indicators, simulations of incomes. Obviously, the outcomes are not limited to these.

We are not starting from a white page. When the monitoring system is fully operational, it will be able to generate results more quickly and reliably, thus reinforcing the quality of reporting and advise the government. It will facilitate the design of adequate measures for vulnerable and specific groups as well as a holistic and comprehensive strategy on social inclusion. Such a monitoring system – that can deliver fast and adequate inclusive information and answers to key questions of policy makers, will also inform and enable the support of the work of academia and will benefit the population through the better design of strategies and policy measures that will shape the post covid world. It can have the ambition of becoming a best practice in the EU. The monitoring system will be embedded in the federal administrations that coordinate the Working Group Social Impact COVID-19 and it will support the further cooperation between the range of federal institutions involved in this Working Group.

Timing and budget

We believe that a scientific support of three full time equivalent researchers over 24 months would enable this project to be implemented. This corresponds to a budget of 540 000€, of which 108 000€ will be funded by the FPS Social Security and the FPP Social Integration, and 432 000€ by BELSPO.

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[2.] CONSUMER BEHAVIOUR IN A CIRCULAR ECONOMY

Co-funded by the FPS economy.

Scope

In addition to efforts to promote circular, sustainable practices within industry and businesses, it is also necessary for consumers to be part of the story. However, there is no such thing as 'the average consumer' as we are dealing with a very diverse population with different preferences, budgets and lifestyles. To gain some insight into the way consumers make decisions (which do not always fit the theory of the rational consumer), one can look at behavioural economics. Within this field of study, much research has already been done into consumer behaviour and what obstacles they recognise in order to switch to more sustainable, circular consumption behaviour. The disadvantage of these studies is that they are always strongly dependent on the specific context in which experiments and studies are conducted. To get a better understanding of Belgian consumers, their preferences and their barriers to sustainable consumption, it is therefore necessary to test the various existing international studies in the Belgian context.

Requested scientific support

Research should be conducted into the potential impact of interventions within certain circular, sustainable utility products that may lead to more sustainable consumption patterns. Self-reporting is often misleading because consumers are influenced by the 'social desirability' of the questioned behaviour. Therefore, alternative research should be conducted to investigate the actual behaviour of consumers and the possible influencing factors. In general, four main categories of consumption are deemed to have the largest sustainability impact: housing, mobility, food and fast moving consumption goods (FMCG). In each of these categories, a analysis in line with recent theories of behavioural economics could be conducted to assess the impact of certain interventions.

With the resulting information about possible interventions in the context that can influence consumption behaviour, future campaigns by the government will be more targeted and efficient. This information can also be shared further with NGOs and interest groups that want to promote circular consumption behaviour among specific target groups. In addition, any obstacles at the legislative level that stand in the way of interventions to promote circular, sustainable consumption behaviour can be uncovered, and adequate solutions can be sought within the administrations.

Timing and Budget

We believe that a scientific support of 0,5FTE researcher over 24 months would enable this project to be implemented. This corresponds to a budget of 100 000€, of which 10 000€ will be funded by the FPS Health, Environment and Safety of the food chain, and 90 000€ will be funded by BELSPO.

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[3.] MONITORING THE TRADE IN WILD MEAT AND EXOTIC ANIMALS

Co-funded by the FPS Health, environment and Security of the food chain.

Scope

The current pandemic has shed light on the vital role of maintaining healthy ecosystems to protect human and animal health. The destruction and over-exploitation of natural habitats lead to a disturbance of the ecosystems and as a result, highly contributes to the emergence of zoonotic infectious diseases. Wildlife supports healthy ecosystems, and it has been demonstrated that the increased interaction between humans and wild animals (dead or alive) gives rise to spill over events and outbreaks of such diseases. While recognising its crucial role for the economy and food security, particularly in tropical countries, the trade in and consumption of wildlife is considered as a globally important risk for future pandemics (IPBES, 2020, Workshop report on Biodiversity and pandemics). Initiatives to reduce the risks of zoonotic spill over as a result of the trade in a) wild meat and b) live exotic animals as pets imply actions in the countries of origin but also in the final destination countries that act as end consumers in the trade chain.

Transition towards a more sustainable trade in wildlife (which plays an important role in the exploitation of natural resources) is needed considering that 'one million of the 8 million of the species of the planet are at the risk of being lost' (Green Deal, page 2). Through its Biodiversity strategy 2030 the EU has committed to actively supporting the ecological transition of the EU trade, including with respect to wildlife trade.

Current proposal covering both wild meat and exotic animals as pets aims to scientifically support the development of a One Health system strengthening the federal capacity for early detection, and the preparedness for and response to One Health risks posed by the trade in and the consumption of wildlife. A comprehensive characterisation of the trade in Belgium is first needed. Such information is however hindered by scarce and scattered data collected in different federal databases (customs, AFSCA, FPS Health, Sciensano, etc…). To collect data on wild meat, on live exotic animals being imported and traded into Belgium and the associated pathogens is the prerequisite for acquiring scientific knowledge and trends in trade.

Requested scientific support

The overall support requested is to collect and compile scientific data, improve the resource capture (capitalisation of current available data resources in a coherent way by using mainstreamed procedures) and provide data management to strengthen the federal capacity for early detection, and the preparedness for and response to One Health risks posed by the trade in live exotic animals and wild meat in Belgium. There are two aims that a network of complementary researchers would fulfil:

I. Set a baseline data for the trade of a) a selection of live exotic animals traded as pets in Belgium (import) and b) imported wild meat in order to compile a better knowledge in terms of e.g. origin, taxonomy, volume, pathway of introduction, their legal status and the presence of pathogens linked with the species involved.
II. Set up a data management system and protocols for the trade of a) live exotic animals as pets in Belgium and b) wild meat in a view of setting up an operational system including e.g. the creation of specific database(s) to manage data on origin, taxonomy, volume, pathway of introduction, legal status and presence of pathogens; the development of in the field (e.g. border inspection) pre-tested protocols to sample exotic animals and wild meat for further analyses; both supported by the training of the enforcement entities.

This study will allow 1) to compile, curate and clean existing data from different federal databases; 2) to assess possibilities to set up a single One health data source linked to the import of wild meat and live exotic animals to be used by concerned federal authorities (FPS Health, customs and the Federal Food Chain Agency); It would 3) help to better structure the data and information linked to the trade in wild meat and in live exotic animals, and hence to streamline the data access for policy and enforcement policies at federal level (federal administrations dealing with biodiversity (FPS Health), animal Health (FPS Health, FAVV), public Health (FPS Health), scientific research (Sciensano) and border controls (FPS Finance); 4)

develop tools to allow above-mentioned authorities to assess the Biodiversity and Health risks (One Health risks) posed by this trade and determine the appropriate policy (legislation, risk analysis and mitigation) to be pursued, and possibly to bring this issue at European level or at international level; 5) provide data that will allow to engage discussions with stakeholders and citizens participating in the trade, in order to promote a sustainable and clean trade for live exotic animals and to ensure enforcement of the prohibition linked to the importation of personal consignments of wild meat; 6) allow to complete current databases with ongoing data collected through a specific monitoring system, which will be designed and tested by the funded scientists to be implemented easily by the administrations on the ground; 7) this database will contribute to facilitate the scientific work of different federal scientific institutes active in the field of nature conservation, risk assessment and prevention of zoonotic disease emergence, epidemiological surveillance and early detection strategies for public and animal health.

Timing and Budget

We believe that a scientific support of a network of 2FTE researchers over 24 months would enable this project to be implemented. This corresponds to a budget of 360 000€, of which 36 000€ will be funded by the FPS Health, Environment and Safety of the food chain, and 324 000€ will be funded by BELSPO.

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[4.] KNOWLEDGE GAPS IN PFAS

Co-funded by the FPS Health, environment and Security of the food chain.

Scope

Per- and polyfluoroalkyl substances (PFAS) are a large group of substances, characterised by their multiple fluorine atoms attached to an alkyl chain. Exposure to PFAS is an important public health and environmental issue. Indeed, PFAS are widely used in consumer products and industrial processes, whereas they can be highly mobile, water-soluble and extremely persistent. Moreover, the majority of PFAS are either non-degradable or transform into stable degradation products. Scientific studies have shown strong evidence of air and water contamination and environmental bioaccumulation, leading to plants, animals and human population increased exposure. Finally, several PFAS are considered as endocrine disruptors, whose exposure can cause many diseases (brain-associated disorders, cancers, obesity, diabetes, reproductive system disorders, thyroid disorders…).

These last years, the European legislation has considerably evolved on PFAS, but there is still a lot to do to ban their non-essential uses. The coming Chemical Strategy for Sustainability should help, as well as the restriction proposal for the entire group of PFAS. However, European actions take several years to enter into force, and the exposure is expected to last for decades. It has thus become essential for Belgium to also plan national actions, but it needs a solid knowledge basis.

Requested scientific support

There are still important gaps into the scientific knowledge on PFAS and their effects on Health and Environment, especially scientific knowledge of so called short-chain alternatives to the C8 PFOS and PFOA is still lacking. Neurological and immunological effects, as well as epigenetic modifications, are for instance not well considered for their evaluation and management. Interestingly, a recent study has shown a positive correlation between exposure to several PFAS substances and an increased risk or the severity of the symptoms of COVID-19 infection, indicating a possible perturbation of the immune system by these substances. We invite thus to develop a research project to investigate:

a. The effect of lesser studied short-chain PFAS on neurological and immunological systems.
b. The possible link between these neurological and immunological disorders and other diseases (e.g. COVID-19).
c. The possible link between PFAS exposure and epigenetic modifications in sub-populations, and assess the severity thereof.
d. The elaboration of Adverse Outcome Pathways for neurological and immunological systems.
e. The identification and performance of new *in vitro* assays.

This research project will be integrated within the National Action Plan on Endocrine Disruptors (starting in 2022) and/or into the future national strategy on PFAS. It will take into account planned European research projects in order to be complementary (e.g. the effect biomarkers will possibly be investigated within the PARC project). The acquired knowledge will help to develop specific actions on PFAS (e.g. preventive or regulatory actions), leading to a decreased PFAS exposure of both Belgian population and Environment. Moreover, the elaboration of Adverse Outcome Pathways for neurological and immunological systems or new *in vitro* assays will support PFAS assessment, and their possible identification as endocrine disruptors, by European competent authorities (FPS Health, Food chain safety and Environment in Belgium). And a better identification will allow a better regulatory management of these substances afterwards.

Timing and Budget

We believe that a scientific support budgeted at the level of 1FTE researcher over 36 months would enable this project to be implemented. This corresponds to a budget of 273 900€, of which 27 390€ will be funded by the FPS Health, Environment and Safety of the food chain, and 246 510€ will be funded by BELSPO.

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[5.] MATERIAL FOOTPRINT INDICATORS

Co-funded by the FPS Health, environment and Security of the food chain.

Scope

The extensive use of resources leads to environmental, but also social and economic, worries. The extraction and transformation of resources can generate an important environmental impact. The awaited scarcity of certain resources can lead to social and economic disorders. If today the domestic material consumption seems to be stabilised, we don't have a good picture on the global resources needed for the imported goods, and of the dependence of our economies on these (partially hidden) imported resources. The development of a more circular economy contributes to a better management of resources, which can prevent, to a certain point, an adverse impact. However, the circular economy as such does not automatically lead to a reduction in the consumption of consumer goods. Yet, such a reduction is necessary to be able to really reduce the environmental impact related to the extraction of resources, their transformation into products and the disposal of products at the end of their life.

Before proposing actions, policy makers must better know which are the critical materials and resources for the Belgian economy. While material and resources used directly (national production) by our economy is relatively well known, it's not the case for the imported goods, resources and materials.

The objective of this project is to develop material footprint indicators which allow the identification of priority area of actions and the evolution of the Belgian material footprint (including the imports). Ideally, this should allow for the setting, at the Belgian level, of quantified strategic objectives in terms of material footprint.

Requested scientific support

We would invite a scientific team to:

a. analyse the material footprint (domestic and imported) of consumption in Belgium per type of products and materials.
b. elaborate a method for building and monitoring indicators of the material footprint (domestic and imported).
c. Analyse the circularity of flows, at the level of materials and products: (selective) collection efficiency, recycling system efficiency, use of recyclates.
d. For the main (in terms of volume and/or hazardousness) flows, identify and characterise the routes/channels and technologies used.
e. Identify: the critical flows for BE, the products (and activities) related to those flows.
f. Summarise the known/identified environmental and social impact of the different material flows.

This scientific input will enable the identification of critical materials and resources for the Belgian economy, which will enable to define Belgian policy objective.

Timing and Budget

We believe that a scientific support budgeted at the level of 1FTE researcher over 36 months would enable this project to be implemented. This corresponds to a budget of 275 000€, of which 27 500€ will be funded by the FPS Health, Environment and Safety of the food chain, and 247 500€ will be funded by BELSPO.

Contact person

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[6.] BURN-OUT AND RE-INTEGRATION AFTER LONG TERM SICK LEAVE

Co-funded by FPS BOSA.

Scope

Within the federal government, a plan was recently rolled out to reduce the number of burnouts and improve re-integration after long-term absence. The intention is to examine, through research, which elements in that plan have worked well and which initiatives can still be improved. It will also be possible to examine in which areas the current policy in relation to burnout and re-integration still falls short, making use of theoretical models concerning stress and burnout and benchmarks with other governments and the private sector.
The research should result in a series of recommendations on various aspects of work (content, circumstances, conditions, relationships) and possibly focus on a number of target groups.

Requested scientific support

The scientific input could consist in:

a. A study of the literature on burnout and re-integration after sick leave. The focus should be on research that evaluates existing tools and practices.

b. An analysis and evaluation of the existing measures that were taken to reduce burnout and improve re-integration. This analysis should give a clear picture of what worked and what did not work in different target groups.
c. A study to discover new innovative methods, tools and practices to reduce burnout and improve re-integration. This might include literature research as well as benchmarks with the private sector and other governments in Belgium and abroad.
d. A series of recommendations to improve the policy of reducing burnout and improve re-integration after sick leave. These recommendations have to be concrete and easy to implement.

The results and recommendations from the research team will be used for the evaluation of existing initiatives and for the development of strategies, tools and practices to reduce burnout and improve re-integration. The methodology for the evaluation of existing practices can also be used to have a better monitoring of future initiatives.

Timing and Budget

We believe that a scientific support budgeted at the level of 2FTE researcher over 24 months would enable this project to be implemented. This corresponds to a budget of 350 000€, of which 35 000€ will be funded by the FPS Health, Environment and Safety of the food chain, and 315 000€ will be funded by BELSPO.

Contact person

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[7.] DIVERSITY IN FEDERAL PUBLIC SERVICES

Co-funded by FPS BOSA.

Scope

The federal government is the largest employer in the country and sets an example as an employer. Yet, recent data show that the staff of the federal government is not yet a good reflection of the ethnically diverse society. Steps still need to be taken to improve both the inflow (recruitment and selection) and the through-flow (career and promotion) of employees with an immigrant background. In this study, we would like a research team to examine how inhibiting factors for the inflow and through-flow of this group can be counteracted and how motivating factors can be set up or highlighted. The study should result in a number of recommendations to improve strategies, procedures, legislations, tools and practices for recruiting, selecting and promoting ethnic minority groups.

Requested scientific support

The scientific input could take the form of:

f. A study of the literature on the factors that stimulate and hamper the inflow and promotion of ethnic minorities in the workplace, with special attention for the public sector
g. A benchmark of the problem with the private sector and other public sectors both in Belgium and abroad. This also requires a unified method to define and identify ethnic minority groups.
h. A detailed analysis of the tools and procedures that are currently in use for the recruitment and promotion of staff in order to discover possible biases towards ethnic minority groups
i. A number of concrete recommendations that should allow us to improve our strategies, procedures, legislations, tools and practices for recruiting, selecting and promoting ethnic minority groups.

The results and recommendations will be used to improve our selection and recruitment process and for reviewing the promotion process. This might result in the development of new tools, adaptation of existing practices, or changes in procedures.

Timing and Budget

We believe that a scientific support budgeted at the level of 2FTE researcher over 24 months would enable this project to be implemented. This corresponds to a budget of 350 000€, of which 35 000€ will be funded by the FPS Health, Environment and Safety of the food chain, and 315 000€ will be funded by BELSPO.

Contact person

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[8.] FORENSIC INTELLIGENCE

Co-funded by FPS Justice.

Scope

To help solve criminal investigations, judges require a large number of expert reports. Each year, more than 60.000 expert reports are paid for by the courts. These reports inform the magistrates and their investigators, but also the judge and the parties about the evidence available in the case. Apart from these expert reports, numerous digital traces are also kept by specialised services of the federal police.

Many people, services and organisations are involved in these processes, from the collection of the traces at the crime scene to the use of the results of forensic analyses during police and judicial investigations (magistrates, police investigators, crime scene investigators, crime analysts, forensic experts). Once the analyses are carried out, the results and the links obtained are treated separately, except for very limited information exchanges between entities when a link is clearly identified between various cases. Until today no centralisation of these multiple traces has been organised. Each entity feeds, operates and maintains its own databases. Therefore, the exploitation of each type of data is mostly limited to the contribution they make to the case in which they were produced and to the kind of first grade analyse it allows (DNA allows to identify people, toxicology, to know more about the substances found in a body, etc.). This system results in a compartmentalisation of the information and in the limitation of the added value of each type of data production/collection.

A centralised vision, starting from information sharing and exchange, could contribute to proactive information management, creating intelligence from information inferred from traces. Indeed, "Forensic Intelligence" is based on the integration and structuring of trace information from judicial cases for data analysis to link cases, or more specifically the result of the analysis of the latter (see Figure 1). This approach is useful for crime resolution, better case management (joint management) and contributes to a better understanding of the criminal phenomenon in general. The aim of the project is to explore the possibilities of forensic intelligence and its usefulness for investigators, mostly public prosecutors and investigating judges.

Requested scientific support

A scientific team could provide support in:

- an inventory of available forensic data in Belgium.

- a relevance study demonstrating the operational usefulness of a forensic intelligence approach (The model exists on a theoretical level and has been tested in the field in other countries but had never been evaluated on the basis of data available in Belgium).
- a legal and practical feasibility study of the creation of a forensic intelligence system.
- conceive and determine how to implement a forensic intelligence tool.

The scientific results will support the federal strategy on the use of data within the judicial investigation. They will support the justice administration in its mission of fighting crime (the federal prosecutor's office, instructing judges, public prosecutors, NICC, specialised services of the federal police, investigation services of various administrations, etc.). The results will also support the definition of criminal policy priorities, for the policy statement of the Minister of Justice, the national security plan, the priorities of the College of Public Prosecutors and the Public Prosecutor's offices in general, etc.

Timing and Budget

We believe that a scientific support budgeted at the level of 2FTE researcher over 36 months would enable this project to be implemented. This corresponds to a budget of 540 000€, of which 54 000€ will be funded by the FPS Health, Environment and Safety of the food chain, and 486 000€ will be funded by BELSPO.

Contact person

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9. CONTACTS

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

10.COMPLAINTS

BELSPO places great importance on the quality of its service and on improving the way it operates. 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/Federale Ombudsman, rue de Louvain/Leuvenseweg 48 bus 6, 1000 Brussels (email: contact@mediateurfederal.be/contact@federaalombudsman.be).

ANNEX 1: LIST OF FEDERAL SCIENTIFIC INSTITUTIONS (FSIs)

- National Archives and State Archives in the Provinces (ARA-AGR)
- National Institute of Criminalistics and Criminology (NICC-INCC)
- Royal Belgian Institute for Space Aeronomy (BIRA-IASB)
- Royal Belgian Institute of Natural Sciences (KBIN-IRSNB)
- Royal Institute for Cultural Heritage (KIK-IRPA)
- Royal Library of Belgium (KBR)
- Royal Meteorological Institute of Belgium (KMI-IRM)
- Royal Museum for Central Africa (KMMA-MRAC)
- Royal Museums of Art and History (KMKG-MRAH)
- Royal Museums of Fine Arts of Belgium (KMSKB-MRBAB)
- Royal Observatory of Belgium (KSB-ORB)
- Sciensano
- War Heritage Institute (WHI)

ANNEX 2: LIST OF FEDERAL DEPARTMENTS

- FPS Economy, SMEs, Self-Employed and Energy
- FPS Employment, Labour and Social Dialogue
- FPS Finances
- FPS Foreign Affairs, Foreign Trade and Development Cooperation
- FPS Public Health, Food chain safety and Environment
- FPS Internal Affairs
- FPS Justice
- FPS Mobility and Transport
- FPS Policy and Support
- FPS Social Security
- Ministry of Defence
- PPS Social Integration, anti-Poverty Policy, Social Economy and Federal Urban Policy