

# Belgian Guidelines for the PRODEX Programme

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**Annex 1:** *PRODEX Poles of Expertise in Belgium*

**Annex 2:** *Project Proposal file*

**Annex 3:** *Evaluation of a "non-AO" Project Proposal file*

**Annex 4:** *Project Reporting file*

**Annex 5:** *Project Performance file*

**Annex 6:** *Evaluation of a Project Performance file*

**Annex 7:** *Acronyms and Abbreviations*

## 1. Introduction

These guidelines apply to scientists working in Belgian research institutes and universities. They explain the steps to be followed and present the documents to be filled in to introduce a PRODEX Project Proposal to the **European Space Agency (ESA)** via the **Belgian Federal Science Policy Office (BELSPO)**. This document and its annexes are available on the BELSPO website at [www.belspo.be/space](http://www.belspo.be/space).

More details about the overall rules and procedures of the PRODEX Programme of ESA can be obtained on the ESA website at <http://sci.esa.int/prodex>.

## 2. General objectives

The **PROgramme for the Development of scientific EXperiments (PRODEX)** is a programme of ESA to which Belgium, as member state of ESA, has been participating since 29 June 1988.

The purpose of PRODEX is to provide (co-)funding for the development and exploitation of scientific instruments and experiments in the framework of the space programmes of ESA, as well as, under certain conditions, of other space agencies. Four scientific areas are covered: **Space Sciences (SS)**, **Space Exploration (SE)**, **Earth Observation (EO)** and **Life and Physical Sciences in Space (LS&PS)**.

One of the major objectives of PRODEX is to foster collaboration between on the one hand scientific institutes and universities (hereafter called **Institutes**), and on the other hand industrial companies (hereafter called **Industry**). The overall responsibility of a project must be assumed by a leading Institute in order to ensure that the objectives remain driven by science.

Funding can be provided during the full life cycle of a scientific instrument or experiment for:

- (1) **scientific development** to be performed in Institutes: definition of the scientific requirements, preparatory ground experiments, development of processing software, preparatory calibration and characterization activities...;
- (2) **technical development and services** to be performed by Industry or/and Institutes: hardware development (including breadboard, engineering, qualification, flight and flight spare models), specific ground support equipment, software development, integration and testing...;
- (3) **operational activities** to be performed in Institutes with the possible support of B.USOC<sup>1</sup> and Industry, including related software development;
- (4) **data exploitation** to be performed in Institutes: calibration, validation, processing and research.

(1) and (4) are the mandatory elements to be performed under PRODEX (co-) funding to justify support for (2) and (3). Note that the term **development** will refer hereafter to (1) and (2) together, if not specified.

The funding includes (part of) the salaries of dedicated staff hired by the Institutes and Industry for the purpose of the execution of the project as well as associated costs for travel, equipment and services.

### **3. Administration of the Belgian PRODEX projects**

The administration of the Belgian PRODEX projects is jointly coordinated by the **Space Department of BELSPO** and by the **PRODEX Office of ESA**. BELSPO is responsible for funding, programmatic and policy aspects, while ESA is responsible for the contractual, administrative, financial, technical and scientific implementation and follow-up of the projects.

The Belgian team is composed of the delegates administrating the Belgian participation to the programmes of ESA that are concerned with the four scientific areas described in section 2.

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<sup>1</sup> B.USOC: Belgian User Support and Operations Centre (see [www.busoc.be](http://www.busoc.be))

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#### **4. Submission, evaluation and selection of a Belgian PRODEX Project Proposal**

##### 4.1 Announcements of Opportunity (AO's)

Periodically, ESA calls upon the European science community to respond with ideas or concrete proposals to participate in future space-related activities. The objective of the call can range from an entire space mission to any of its scientific components, including the data exploitation. During the pre-submission period, information sessions may be held by ESA to explain the objectives behind the opportunity and to provide clarifications. BELSPO also distributes information towards the Belgian scientific community concerning these AO's.

ESA evaluates and selects the proposals, submitted by scientists in response to such an AO, in accordance with the rules and procedures in force at the Agency. This assessment procedure is based on the scientific merit, the technical feasibility, the financial affordability and the programmatic compliance of the proposal, and involves consultation of the relevant bodies in ESA's advisory structure (including peer reviews).

Financial support to a selected project at different levels (science development, technical development, operational activities and data exploitation) may be foreseen by the ESA Programme to which the AO is linked. If a request for PRODEX (co-)funding of Belgian participating science teams and Industry is envisaged, a copy of the AO proposal must be sent to BELSPO at the time of submission. This intended request for (co-)funding may be mentioned in the AO proposal since it constitutes an element of the feasibility of the overall project. In general, the *Project Proposal* file (see annex 2) presenting the request for PRODEX funding must be sent to BELSPO after selection of the AO proposal by ESA.

The PRODEX Programme also allows for funding of Belgian contributions in the framework of proposals which respond to AO's issued by other space agencies than ESA. A necessary condition, however, is that the concerned instruments or experiments selected by this space agency are endorsed by ESA as being consistent with the overall objectives of its own programmes. This formal endorsement must take place before the start of the phase B of the project. In practice, the PRODEX Office presents the proposed project to the relevant

programme board of ESA, on the basis of the *Project Proposal* file prepared by the scientists. The latter may also be requested to present the proposed project to the relevant advisory board of ESA. The programme board takes the final decision.

#### 4.2 Coordination of the project: PI, co-I's, BPI and Bco-I's

At this stage, a difference must be made between the **Principal Investigator (PI)** of the overall project (i.e. the coordinator of the AO proposal) and the **Principal Investigator at Belgian level (BPI)** which is the term used for the coordinator of the Belgian PRODEX project proposal. A BPI must be PI or co-I of the overall project, and requests PRODEX funding to support the role of his/her team in this overall project.

Similarly, the terms **co-Investigators (co-I's)** and **co-Investigators at Belgian level (Bco-I's)** will be used hereafter when referring to the overall project and to the Belgian PRODEX project, respectively. In particular, a Bco-I is defined as a Belgian co-I of the overall project who does not work in the same team as the BPI and who requests PRODEX funding to support the role of his/her team in the overall project. Only one Bco-I per scientific team can be taken into account.

#### 4.3 Other ("non-AO") PRODEX project proposals

BELSP0 offers the opportunity to Belgian scientists to introduce PRODEX project proposals to carry out projects which are not defined in the framework of an official AO. These initiatives are to be considered as Belgian national projects in the framework of the scientific space programmes and missions of ESA (or of other space agencies as far as the instrument or experiment is endorsed by ESA). These projects concern mainly the scientific exploitation of data coming from an already operating instrument.

In order to apply for PRODEX funding, the BPI must send a *Project Proposal* file to BELSP0. In the framework of a scientific collaboration between different research teams, Bco-I's can be included in this PRODEX project proposal.

#### 4.4 Evaluation and selection by ESA and BELSP0 of the PRODEX project proposal

ESA and BELSP0 evaluate the PRODEX project proposal taking into account several criteria listed hereafter.

- (1) **Selection of the overall project by ESA or another space agency:** priority is given to projects selected by ESA in the framework of one of its AO's. The level of competitiveness present in the selection process will be taken into account. For a given AO, priority will be given according to the ranking of the selected projects.
- (2) **Scope of the overall project:** priority is given to projects which support the participation of Belgium to the development phase of an instrument or an experiment. In the case of projects limited to data exploitation, priority is given to instruments or experiments to which Belgium participated during their development phase. For operational activities, the latter is a requirement.
- (3) **Role of the Belgian scientists in the overall project:** priority is given to projects for which the BPI is PI of an international instrument or experiment consortium.

- (4) **Role of the Belgian Industry in the overall project:** priority is given to projects for which the prime industrial company is Belgian. A strong collaboration between Institutes and Industry under scientific lead is a strong asset of any PRODEX Project proposal.
- (5) **Poles of expertise in Belgium:** priority is given to fields of research for which national poles of expertise exist. Several such fields of research are currently identified for PRODEX (see annex 1). This list can be revised after consultation of the scientific community.
- (6) **Scientific cooperation within Belgium** among research groups active in similar fields is a strong asset of any PRODEX project proposal. Moreover, cooperation within one proposal (involving a BPI and several Bco-I's) may be a requirement if different teams with similar scientific objectives each envisage submitting a proposal.
- (7) **Performance of previous PRODEX projects:** the scientific results as well as the management (see sections 6 and 7) of previous projects by the concerned scientific teams are taken into account.
- (8) The **endorsement** of, and medium term **commitment** to, the project by the management of the Institutes of the BPI and of the Bco-I's is a requirement.
- (9) **The affordability of the project** in the framework of the current and subsequent Belgian PRODEX financial envelopes.

The evaluation of a PRODEX project proposal by ESA is coordinated by the PRODEX Office, but may include technical and scientific advice from experts involved in the overall project that is executed in ESA, and from external experts. If the proposal is judged acceptable in principle, specific comments, if any, from BELSPO and ESA are sent to the BPI and Bco-I's, who are requested to prepare an updated proposal. Several of such iterations may take place. Formal approval of the final proposal takes place after a positive decision by ESA and a written endorsement of the latter by BELSPO.

In the specific case of a "non-AO" PRODEX project proposal (see section 4.3), ESA and BELSPO may request an evaluation by experts working at ESA or appointed by ESA, using the template document of annex 3 (*Evaluation of a "non-AO" Project Proposal*).

In specific cases, the BPI and Bco-I's might be requested by ESA and BELSPO to set up an international scientific user group to optimize the objectives of the project.

## **5. Categories of PRODEX projects and related funding policy**

From a general point of view, the criteria applied in section 4.4 for the selection of the PRODEX project proposals are also applied to define the start, the level and the duration of the funding of the selected projects on a case by case basis.

PRODEX projects are classified in 3 categories characterizing the different management approaches of the corresponding overall projects by ESA. For each category, the funding policy of BELSPO is different.

### 5.1 Category "Instrument Development"

**Project led by a Belgian scientist as PI or co-I of an instrument selected in the framework of an AO issued by ESA or another space agency in the area of SS, SE or EO.**

The Belgian participation to the instrument development work in phases B2/C/D is supported by PRODEX. The level of support is negotiated on a case by case basis between the BPI/Bco-I's and Industry on the one hand and ESA and BELSPO on the other hand.

In case the BPI is PI of the instrument and the prime industrial company is Belgian, financial support by PRODEX to the scientific and technical preparatory work (phases A/B1) may be allocated in view of the final selection of the instrument which generally occurs at the end of phase B1.

In case the BPI is co-I of the instrument in the framework of an ESA AO, and if it is required by the standard procedures of the relevant ESA programme, a limited financial support to technical preparatory work in Belgium (phases A/B1) may be allocated in view of the final selection of the instrument. Considering that the focus in such cases is mostly on the development of critical technologies for the project, the financing may occur via other programmes than PRODEX, for instance via the GSTP Programme of ESA<sup>2</sup>. Outside the framework of an ESA AO, such support may be considered on a case by case basis.

Based on an adequate project proposal, additional financial support by PRODEX is generally foreseen from one year before the launch to guarantee first access to data exploitation (phase E) for the Belgian scientific consortium which was involved in the development phase. The duration and the level of this support depend on the project, but the duration does not exceed 3 years. Proposals for a project extension beyond this initial period are considered as belonging to the category "Data Exploitation" (see section 5.3). PRODEX support stops 12 months after the last raw data are available to the scientific community following the termination of the operations of the instrument.

### 5.2 Category "Experiment Development"

**Project led by a Belgian scientist as PI or co-I of an experiment selected in the framework of an AO issued by ESA or another space agency in the area of LS&PS.**

The technical development of the experiment is usually performed in the framework of a dedicated programme of the agency issuing the AO. In particular, for AO's supported by ESA, the technical development of the experiment is usually performed in a participating state of the ELIPS<sup>3</sup> Programme of ESA and since end 2016, of its successor the slice SciSpace of the E3P Programme of ESA<sup>4</sup>. In some cases, funding of (part of) the technical development of the experiment can be considered in PRODEX.

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<sup>2</sup> GSTP: General Support Technology Programme

<sup>3</sup> ELIPS: European Programme for Life and Physical Sciences and Applications in Space

<sup>4</sup> E3P: European Exploration Envelope Programme

The participation of Belgian Institutes to the scientific development of the experiment is supported by PRODEX. The start of the support mainly depends on:

- (1) the definitive selection of the experiment for implementation by ESA;
- (2) the status of the technical development;
- (3) the need for a possible preparatory programme (parabolic flights, ground experiments...);
- (4) the timing of the flight opportunities.

The level of the support will be modulated in time on a case by case basis to guarantee the execution of the Belgian tasks from one year before and during the in-flight experiment.

PRODEX support stops 12 months after the last raw data are available to the scientific community following the termination of the in-flight activities.

All projects which do not foresee a space experiment (e.g. parabolic flights, drop tower, Concordia, IBER...) are considered as belonging to the category "Data Exploitation" (see section 5.3).

### 5.3 Category "Data Exploitation"

#### **Project aiming at the scientific exploitation of available space data.**

Considered in this category are the requests for support concerning the scientific exploitation of space data by a Belgian scientific team or group of teams (BPI and Bco-Is) which are not (or not anymore) taken into consideration in the other two categories.

Funding can be provided from one year before the first data become available for the considered instrument(s)/experiment(s), till 12 months after the last raw data are available to the scientific community following the termination of the operations of the instrument(s)/experiment(s).

The level of support that can be provided by PRODEX depends on the relation of the BPI or Bco-I with respect to the instrument(s)/experiment(s) (PI, co-I, none) and is typically up to two FTE's (full time equivalent) for a given satellite mission.

## **6. Contractual aspects**

After approval of the PRODEX project proposal by ESA and agreement by BELSPO to allocate a defined budget to the project (in accordance with Art. 4.1 of the ESA PRODEX Implementing Rules), BELSPO requests the PRODEX Office to proceed with the contractual implementation of the project in accordance with Art. 2 of the ESA PRODEX Implementing Rules.

The ESA PRODEX Office concludes a framework agreement with Institutes called **PRODEX Institute Agreement (PIA)** within which approved projects can be conducted. The **PRODEX Experiment Arrangement (PEA)** defines the specific modalities applicable to the execution of the agreed tasks of any specific project, as well as the respective roles and responsibilities of the two parties, i.e. ESA and the Institute. In particular, the PEA defines the

milestones of the project and the deliverables to be produced by the Institute, as well as the payment plan. In general, a separate PEA will be concluded with the Institute of each scientific partner of the project (the BPI and each Bco-I). In case of a change of the status of the BPI or Bco-I's (retirement, change of Institute or team...), the BPI or Bco-I must be replaced by another team member of the same Institute (unless the project is transferred to another team or Institute). The BPI and each Bco-I must declare in the project proposal the endorsement of the project by the Head of their Institute.

The BPI is responsible for the scientific integrity of the whole project. He or she must ensure that the total requested budget is coherent with the proposed activities and that those are in line with the content of the overall project as selected/endorsed by ESA.

For developments and services by Industry defined in the project, the selection of the Belgian industrial partner(s) proceeds via an ESA ITT (Invitation To Tender = open competition) or RFQ (Request For Quotation = direct negotiation), depending on the specific needs of the project on a case by case basis. A standard ESA contract(s) is concluded between ESA and the Belgian industrial partner(s), to which the **General Clauses and Conditions of ESA** apply. This contract usually takes into account a FFP (Firm Fixed Price) for all the tasks to be performed in the defined timeframe. The management of these contracts is delegated to the PRODEX Office. On a case by case basis, ESA and the Institute may decide that some tasks are directly subcontracted by the Institute to an industrial partner.

In specific cases where strict deliverables and timing are mandatory, a standard ESA contract (FFP) can be concluded with an Institute. However, as a rule, a PEA is never applicable to Industry.

## **7. Follow-up of selected projects**

ESA provides scientific, technical and programmatic advice concerning the missions, projects, instruments or experiments related to PRODEX projects. The PRODEX Office retains visibility on the expenditure planned and actually incurred by the Institute/Industry. Where appropriate, this may include a right of audit by or on behalf of ESA.

The BPI as well as each Bco-I in a given PRODEX project are responsible for their own part of the allocated budget and must assume its management in collaboration with the department of the Institute in charge of the financial administration of the PRODEX projects, in line with the specific modalities stipulated in the PEA.

One yearly report of the evolution of the PRODEX project prepared by the BPI in collaboration with the Bco-I's (see *Project Reporting* file in annex 4), has to be sent to ESA with copy to BELSPO during January of the year following the reporting period. For PRODEX projects where other reporting rules are implemented by the overall project (e.g. reports more than once per year) or stipulated in the PEA, only these reports have to be sent to ESA with copy to BELSPO.

The development of space instruments/experiments depends on many aspects that are difficult to predict, such as the delay of launches, the availability of flight opportunities and the activities of (international) partners. The financial plan approved in the PEA at the start of the project presents a distribution per year and per category (salary, travel, small equipment...) of



the budget which is defined based on the knowledge of the tasks to be performed and of their timing at that time. The amounts approved for all categories of the financial plan in a given year must be interpreted as an upper limit within which invoices can be introduced to ESA to cover the expenses incurred while performing the corresponding tasks defined in the Project Proposal for that year. During the course of the project, in any given year, tasks may be cancelled, postponed or added, which may have a direct impact on the financial needs of the project. The unspent budget in each category at the end of each year is therefore removed from the financial plan, while the earmarked budget may be increased if the addition of unforeseen tasks is clearly justified.

In particular, the BPI and Bco-I's are allowed to replace recruited personnel as long as the initially approved total number of FTE's over the whole project duration is not exceeded. Frequent changes of personnel are, however, not appreciated as they are usually not in the interest of the project.

At the request of any of the three parties, a negotiation can take place between the BPI/Bco-I's, the PRODEX Office and BELSPO, to implement an **Arrangement Change Notice (ACN)**. Approval of this ACN follows the same procedure as outlined in the first paragraph of section 6. As a rule, any change in the financial plan must be agreed with the PRODEX Office and endorsed by BELSPO.

At the end of the term specified in the PEA, a final report (see *Project Performance* file in annex 5) must be sent to ESA with copy to BELSPO. At the request of ESA or BELSPO, it may be submitted to experts working at ESA or appointed by ESA for evaluation, based on the criteria defined in the *Evaluation of a Project Performance* file (see annex 6).

## **8. Acknowledgement**

Each publication (scientific as well as in the field of outreach, in written form or using any other type of media) based on the results obtained in the framework of a project (partially) supported by PRODEX in Belgium, must contain the following acknowledgement:

*"The authors thank the European Space Agency (ESA) and the Belgian Federal Science Policy Office (BELSPO) for their support in the framework of the PRODEX Programme".*