

Belgian Guidelines for the ESA PRODEX Programme

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1. Introduction

These Guidelines apply to scientists working in Belgian research institutes and universities, possibly in collaboration with industry. They present the documents to be filled in and explain the steps to be followed to introduce a PRODEX Project Proposal to the **European Space Agency (ESA)** via the **Belgian Federal Science Policy Office (BELSPO)**. Information is also given on the evaluation process, the implementation steps and the projects follow-up. This document and its annexes are available on the BELSPO website <http://www.belspo.be/space/>

Submission of Project Proposals to ESA via BELSPO can only be done by legal entities registered in Belgium.

More details about the overall rules and procedures of the PRODEX Programme of ESA are available on the ESA website <https://sci.esa.int/web/prodex>.

2. General objectives

2.1 The PRODEX Programme

The **PRO**gramme for the **DE**velopment of **sci**entific **EX**periments (**PRODEX**) is an optional programme of ESA in which Belgium, as member state of ESA, participates since

1988. The purpose of PRODEX is to provide (co-)funding for the development, the operation and the 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.

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**). Since PRODEX Projects must always be science-driven, the overall responsibility and coordination of a project must be assumed by a scientist from an Institute.

Belgian PRODEX Projects are funded from the Belgian financial subscriptions to the ESA PRODEX Programme, generally made during ESA Ministerial Councils. These financial subscriptions are part of the Belgian public space budget which is administered by BELSPO under the authority of the federal Minister of Science Policy.

2.2 Fields of Research

Five Fields of Research are covered by Belgian PRODEX Projects:

- **Space Sciences (SS)**
- **Space Exploration (SE)**
- **Earth Observation (EO)**
- **Space Safety (SA)**
- **Life and Physical Sciences in Space (LP)**

2.3 Categories of Projects

Funding can be provided during the full life cycle of a scientific instrument or experiment; as such, there are four categories of Projects, listed below in decreasing order of priority in the Belgian PRODEX system:

- (1) **Hardware Development:** This includes engineering, breadboarding, manufacturing, qualification, ground support equipment, related software development, integration and testing, etc.
These activities are to be performed by Industry and/or Institutes.
- (2) **Science Development:** This refers to preparatory science activities that are essential for the success of the scientific instrument or experiment; they are as such defined by the development Consortium as a whole, thus excluding preparations for data exploitation; it includes definition of the scientific requirements, preparatory ground experiments, processing software, instrument simulators, preparatory calibration and characterization activities, observational planning, etc.
These activities are to be performed by Institutes with the possible support of Industry.
- (3) **Science Operations (post-launch):** This includes instrument commanding, pipeline processing, calibration and validation, updating of processing algorithms, maintenance of a data centre, etc.
These activities are to be performed by Institutes with the possible support of Industry.

- (4) **Data Exploitation (post-launch)**: Scientific research using space data; only research directly related to the interpretation of the data from a scientific instrument or experiment can be funded, excluding broader generic research. These activities are to be performed by Institutes.

Note that the term 'development' will refer hereafter to (1) and (2) together, if not specified. As the name of the Programme already suggests, development activities are the core business of PRODEX and have in general a higher priority than post-launch activities.

2.4 Categories of funding

Funding is provided to the Belgian Industry and Institutes for the work done within Belgium. The funding that can be provided includes:

- 1) (part of) the salaries of dedicated staff hired by the Institutes and Industry for the purpose of the execution of the project;
- 2) travel;
- 3) small equipment;
- 4) overheads;
- 5) large equipment;
- 6) industrial developments and services.

The limitations associated with each category are described in the *Project Proposal* template file (annex 2 to these Guidelines).

3. Administration of the Belgian PRODEX Projects

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

The BELSPO PRODEX team is composed of the delegates administrating the Belgian participation in the programmes of ESA that are related to the five Fields of Research described in section 2.2.

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The ESA PRODEX Office is located at the ESTEC site in the Netherlands. It is composed of a Head of Office, a Deputy Head, several Technical Officers (TO) who are each responsible for the implementation and follow-up of a subset of Projects, a Project Controller and administrative support.

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4. Categories of PRODEX Projects and related funding policy

As pointed out in Section 2.3, PRODEX Projects are classified in 4 categories characterising the content of the work to be done. For each category, the funding policy of BELSPO is different, also depending on the Field of Research (SS, SE, EO, SA, LP) concerned.

4.1 Category 'Hardware Development'

Project led by a Belgian scientist who is PI or co-I of a scientific instrument selected in the framework of an *Announcement of Opportunity* (AO) issued by ESA or another space agency, and which aims at hardware development.

Fields of Research covered: SS, SE, EO, SA.

In the case of SS missions, the ESA Science Programme does not fund instrument hardware development work and the funding needs to be provided by national means, such as the PRODEX Programme for Belgium.

For SE, EO and SA missions, instrument hardware development is generally funded as part of the mission development by the dedicated ESA Space Exploration, Earth Observation and Space Safety Programmes. In some cases, however, specific additional instruments can be funded by national means, such as the PRODEX Programme for Belgium.

In case of an instrument developed for a mission of another space agency than ESA, the PRODEX Programme can be addressed for funding.

The scope of the work and the level of support is negotiated on a case by case basis between the Belgian Industry and Institutes on the one hand, and ESA and BELSPO on the other hand. This process needs to start from very early on during the preparation of the instrument proposal to ESA or to another space agency.

The exact start of the PRODEX funding during the development timeline of the instrument is determined on a case by case basis in concertation between ESA and BELSPO. While in general PRODEX support starts from phase B onwards (design), limited funding during phase A (feasibility) can be granted especially if the Belgian lead scientist is *Principal Investigator* (PI) of the instrument. If the focus in this early phase is mostly on the development of critical technologies for the project, the financing may occur via other programmes than PRODEX, for instance via the *ESA General Support Technology Programme* (GSTP) or the dedicated payload technology support funding line of the ESA Science Programme.

4.2 Category 'Science Development'

Project led by a Belgian scientist who is PI or co-I of a scientific instrument or experiment selected in the framework of an *Announcement of Opportunity* (AO) issued by ESA or another space agency, and which aims at science development.

Fields of Research covered: SS, SE, EO, SA, LP.

In general, science development activities taking place during the development of a scientific instrument or experiment have to be funded by national means, such as the PRODEX Programme for Belgium.

For SS, SE, EO and SA projects, the same guidelines as in section 4.1 regarding scope of the work, level of support and start of the funding apply.

For the development of scientific experiments in Life and Physical Sciences (LP), the following specific guidelines and boundary conditions apply to the different types of experiments:

- a) Experiments selected by ESA via peer review to fly on the ISS or on a sounding rocket.

The hardware development is funded through the dedicated ESA Space Exploration Programme.

Science development activities can be funded through PRODEX starting from the moment the *Experiment Scientific Requirements* document (ESR) has been established. The level of funding is determined in concertation between ESA and BELSPO.

Before the ESR is established, funding for maximum 1 FTE (and in addition for small equipment and travel) can be provided but only if the Belgian applicant is PI of the experiment; in the latter case, possible Belgian co-I's can also obtain funding but only for small equipment and travel.

In case the experiment hardware and science development are completed (to be confirmed by ESA) but the actual flight of the experiment is postponed by more than 1

year, PRODEX funding is temporarily stopped and will resume at the earliest 1 year before the confirmed flight; the time at which the funding resumes prior to the experiment flight depends on the complexity of the pre-flight preparations and will be defined by BELSPO in concertation with ESA.

- b) Experiments selected by ESA to fly on a parabolic flight or to be executed in a drop tower.

If the experiment is a preparatory part of a selected experiment on the ISS, it is covered under point a) above.

If the experiment is not part of a selected experiment on the ISS, PRODEX can only provide funding in the form of small equipment and travel (no FTE) and only if the applicant is PI of the experiment; in this case, possible Belgian co-I's can also be funded for small equipment and travel. Funding for the limited hardware that may need to be developed for these small experiments must be included in the small equipment budget.

- c) Ground campaigns.

For campaigns selected via ESA peer-reviewed calls related to ground facilities (e.g. Concordia, IBER, bed rest, pre- and post-flight), PRODEX can provide funding in the form of small equipment and travel (no FTE) and only if the applicant is PI of the campaign; in this case, possible Belgian co-I's can also be funded for small equipment and travel.

Only LP projects executed in ESA context are accepted for funding by PRODEX due to the difficulty to properly assess the pertinence and monitor the implementation of non-ESA projects in this field.

4.3 Category 'Science Operations' (post-launch)

Project aiming at performing scientific operational activities for a space instrument or experiment.

Fields of Research covered: SS, SE, EO, SA.

Funding for scientific operational activities is often shared between the dedicated ESA Programme within which the mission was developed, and national funding sources, being the PRODEX Programme for Belgium. Especially if the instrument has a Belgian PI, full science operations activities in PRODEX may be required. Belgian scientists in general, often within an international Consortium, may also become involved in limited specific activities such as calibration and validation (cal/val), improvement of processing algorithms, the maintenance of a data centre, etc.

The level of funding provided by PRODEX depends on the type of operational work proposed and is decided in concertation between BELSPO and ESA. A project aiming at the full science operations of a PI instrument can obtain the required funding needed for the agreed operational tasks that have been discussed beforehand between BELSPO and ESA. Support

for more limited specific activities is generally limited to a maximum of 2 FTE (plus small equipment and travel).

Since the PRODEX Programme has a project-oriented approach, continuously aiming at flying and exploiting new and more advanced instrumentation in space, its funding of operational activities needs to be limited in time. This implies that for long-lived missions of an operational or monitoring nature, and decided on a case by case basis in concertation between BELSPO and ESA, PRODEX funding for recurrent operational activities may be terminated before the end of the mission lifetime.

Note that for the LP Field of Research, limited support by Belgian scientists to ESA-led operations of their experiment may in some cases be required; funding for this can then be considered as part of their related Data Exploitation Project (section 4.4).

4.4 Category 'Data Exploitation' (post-launch)

Project aiming at the scientific exploitation of space data.

Fields of Research covered: SS, SE, EO, SA, LP.

Data exploitation refers to scientific research predominantly based on data collected from space-born instruments or experiments. This type of work is in general not funded from the ESA mission budgets and comes into consideration for national funding. PRODEX funding from BELSPO is only one of the possible financing sources, in addition to funding provided by other Belgian federal and regional sources, scientific institutes, universities, the European Union, international organisations and private initiatives.

PRODEX only funds research directly related to the interpretation of the data from the scientific flight instrument or experiment, excluding broader generic research.

Funding can be provided from about 1 year before the start of the instrument or experiment science operations until maximum 3 years after that start, irrespective of the mission lifetime. A maximum of 1 FTE and additional budget for small equipment and travel can be foreseen. In case the Belgian scientist is PI of the instrument or experiment, the PRODEX project duration can be extended by a second and last period of maximum 3 years and the funding level for personnel can be increased to a maximum of 2 FTE.

Notwithstanding the above, PRODEX funding for data exploitation terminates at the latest 1 year after the end of instrument or experiment science operations.

In the case of competitively peer-reviewed awarded observing time on long-lived international space observatories, the abovementioned restriction in project duration to maximum 3 years is counted from the time of the start of the awarded observations.

Data exploitation projects have the lowest priority in the PRODEX system and are subject to a number of specific selection criteria as explained in the next section. The most important weight is given to whether or not the applicant was involved in the development of the instrument or experiment for which data exploitation budget is requested.

5. Submission of a PRODEX Project Proposal

5.1 Context of a PRODEX Project: the 'Top-level Project'

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 these *Announcements of Opportunity* (AO) can be the development of an entire space mission or of any of its scientific components, including operational activities. 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 scientific merit, technical feasibility, financial affordability and programmatic compliance of the proposal, and involves consultation of the relevant bodies in ESA's science advisory structure (including peer reviews).

In the Belgian PRODEX system, we call the selected project that follows from such an AO the 'Top-level Project'. In the context of PRODEX, we are only concerned with AO's in the five Fields of Research mentioned in Section 2.2.

The PRODEX Programme offers to the Belgian scientists involved in the response to those AO's the possibility to obtain (co)-funding to realise their contribution to the Top-level Project if the latter is selected. Such a contribution may be self-standing or be part of an international Consortium. It can take the form of hardware development, science development or science operations (or a combination of them) for a scientific instrument or experiment.

If, during the preparation process of the response to the AO, a later request for PRODEX funding is envisaged by the Belgian scientists involved, it is mandatory to contact BELSPO already at that moment in order to be able to negotiate an acceptable Belgian participation in the response to the AO. BELSPO needs in particular to approve already at that stage (at an indicative level) the technical, scientific, financial and programmatic implications of the proposed Belgian contribution. This process is done in close concertation with ESA. The fact that this prior agreement by BELSPO is mandatory has two reasons: firstly to allow a proper long-term planning of the Belgian PRODEX budget by BELSPO, and secondly to avoid a later rejection of the envisaged PRODEX funding at the moment ESA has already selected the Top-level Project.

In addition to priorly contacting BELSPO, an electronic copy of the final AO proposal, in which the agreed Belgian participation should be mentioned, must be sent to BELSPO at the moment of submission.

In addition to the abovementioned AO's targeting development and operational work, ESA may (regularly) issue AO's specifically targeted at data exploitation of specific already flying space missions. The Top-level Project in this case is the said space mission. The procedure to be followed by Belgian scientists wishing to obtain PRODEX funding if selected in the AO, including prior contact with and agreement from BELSPO, is the same as outlined above.

The Belgian PRODEX system also offers the opportunity to Belgian scientists to request PRODEX funding for data exploitation from an already flying space mission outside the context of an AO. The Top-level Project in this case is again the said space mission. Since

this type of projects have a very low priority in the Belgian PRODEX system due to the lack of peer review selection, BELSPO strongly advises scientists in this case to contact BELSPO before writing and submitting their PRODEX Proposal in order to discuss funding possibilities.

The Belgian PRODEX system 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 mission, instruments or experiments selected by this space agency are endorsed by ESA as being consistent with the overall objectives of its own programmes (see section 7.2).

Lastly, space agencies may also implement Top-level Projects without an explicit AO process. An example is the Sentinel missions in the Copernicus programme of the European Commission in collaboration with ESA. The guidelines explained above apply also to a Belgian participation in these Top-level Projects. Informing BELSPO on the intention to participate should be done as soon as the opportunity is identified.

5.2 Preparation and Submission of a PRODEX Project Proposal

Once the Top-level Project has been selected and its implementation within the relevant ESA Directorate (or other Space Agency) has begun, the Belgian scientists involved may start the process of obtaining funding from PRODEX for their contribution.

In order to obtain funding, the *Project Proposal* template file (annex 2 to these Guidelines) must be filled in and send to the BELSPO PRODEX administrator responsible for the relevant Field of Research (see Section 3). After a quick check to identify possible major shortcomings of the Proposal (if so, BELSPO contacts the applicant), BELSPO sends the Proposal to the ESA PRODEX Office.

The following points are important to take into account while preparing the Project Proposal:

- Read and follow carefully the instructions in the header of each Section of the Project Proposal template.
- The Project work description and funding request must be strictly limited to the essential development, operational or data exploitation work related to the selected flight instrument or experiment.
- If a PRODEX Project Proposal contains a request for funding for several distinct developments or operational tasks, the latter must all be strictly related and complementary to the same scientific objective, and the funding request in terms of manpower, small equipment and travel must be clearly quantified and justified for each task individually.
- The context of the Top-level Project must be described.
- Development projects are in general implemented in phases following the classical project phases A, B1, B2, C and D. Operational projects are in general implemented in successive periods of 3 years. After a first phase has been completed, the next phase can be added to the PRODEX Project via an update of the Project Proposal. Data exploitation projects need to take into account the limitations explained in section 4.4.
- It is strongly advised to contact the responsible BELSPO administrator before starting to write a Project Proposal in order to discuss modalities and boundary conditions.

Also, do not hesitate to contact BELSPO again while writing the Project Proposal if any questions or doubts arise; this avoids frustration and multiple iterations afterwards. We are there to help you and realise your space projects!

A PRODEX Project Proposal must be submitted by a Belgian scientist who is PI or co-I of the Top-level Project. In the Belgian PRODEX system, this coordinator of the PRODEX Proposal is called the **Principal Investigator at Belgian level (BPI)**. The BPI is responsible for the overall scientific, technical and managerial coherence and progress of the project as a whole.

In addition, one or more Belgian scientists who are co-I of the Top-level Project may appear on the PRODEX Project Proposal as **co-Investigators at Belgian level (Bco-I's)**. They are responsible for the work to be executed in their Institutes.

The BPI and Bco-I's must each present a Financial Plan (last pages of the template), which is a key part of the Project Proposal.

A Bco-I cannot be from the same research group as the BPI or another Bco-I.

The template contains instructions on how to add industrial work to the Project Proposal; a PRODEX Project Proposal must not be coordinated or submitted by Industry.

6. Evaluation and selection of a PRODEX Project Proposal

6.1 Evaluation by ESA and BELSPO

As explained in section 5, BELSPO in concertation with ESA requests a prior contact with the applicants (BPI and Bco-I's) before submission of the Project Proposal. If the general content of the planned Proposal, and the envisaged financial scope, is accepted by BELSPO and ESA, the next steps after submission of the first version of the Project Proposal are meant to optimise its content and consist of one or more iterations of that document based on comments from BELSPO and ESA. During this process, there is an open discussion between applicants, BELSPO and ESA whereby it is expected that remaining comments from BELSPO and ESA are taken into account.

The evaluation of the Project Proposal by ESA is coordinated by the PRODEX Office, but may include technical and scientific advice from ESA experts involved in the Top-level Project, and from external experts. ESA in particular verifies that

- the project objectives and the work flow are well described and in line with the Top-level Project requirements and milestones;
- the technical and scientific challenges in case of a Development Project are well understood and the necessary technology development activities are foreseen; idem for the scientific and operational challenges in case of a Science Operations project and for the scientific challenges in case of a Data Exploitation project;
- the deliverables (with dates) are described, which will be reviewed by ESA during the project lifetime;
- the resources requested (personnel, equipment, travel, services, industrial work) are strictly in line with the project needs.

The evaluation by BELSPO takes place in first instance in the early stages when the applicants interact with BELSPO on the Project opportunity. BELSPO at that moment verifies whether the envisaged project fits into the Belgian PRODEX system in terms of context, content, planning timeline, budget etc. Several selection criteria are taken into account during this assessment (not in hierarchical order):

- (1) **Selection of the Top-level Project:**

Priority is given to Top-level Projects selected by ESA or another space agency 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 if any.
- (2) **Space Agency implementing the Top-level Project:**

ESA projects have a significantly higher priority than projects from other space agencies. ESA functions indeed as 'the Belgian space agency'. As mentioned in section 4.2, for Life and Physical Sciences (LP) only projects executed in ESA context are accepted.
- (3) **Category of the project:**

Priority is given to Hardware and Science Development projects as this is the core business of the PRODEX Programme in ESA.
Science Operations projects have a lower priority, unless they refer to instruments or experiments (partly) developed in PRODEX by a Belgian PI.
Data Exploitation projects have the lowest priority; within that category, a higher priority is given to projects aiming at data exploitation from instruments or experiments (partly) developed in PRODEX by a Belgian PI or co-I, and to projects related to a selection in the context of a competitive peer-reviewed data exploitation AO; in all other cases, an evaluation is asked by experts working at ESA or appointed by ESA, using the *Evaluation of a 'non-AO' Project Proposal* template file in annex 3 to these Guidelines.
- (4) **Role of the Belgian scientists:**

Priority is given to projects for which the BPI is PI of an international instrument or experiment consortium.
- (5) **Role of the Belgian Industry:**

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.
- (6) **Poles of Expertise in Belgium:**

Priority is given to research topics considered as national Poles of Expertise; several such topics are currently identified for PRODEX (see annex 1 to these Guidelines).
- (7) **Scientific cooperation within Belgium**

Cooperation among research groups active in similar fields is a strong asset of any PRODEX Project Proposal since it increases the critical mass in our country; moreover, cooperation within one PRODEX Proposal (involving a BPI and several Bco-I's) may become a requirement if different teams with similar scientific objectives each envisage submitting a Project Proposal.
- (8) **Performance of previous PRODEX Projects:**

The scientific results as well as the management performance (responsiveness, reporting, invoicing, etc.) of previous PRODEX Projects by the concerned scientific teams are taken into account.

(9) **Anchorage of the Project within the Institute:**

The endorsement of, and medium-term commitment to, the envisaged Project by the management of the Institutes of the BPI and of the Bco-I's is a requirement; the BPI and each Bco-I must declare in the Project Proposal the endorsement of the project by the Head of their Institute or Department.

(10) **Affordability of the Project:**

The affordability of the Project in the framework of the current and subsequent Belgian PRODEX financial envelopes is obviously a *conditio sine qua non* when selecting new Projects.

After receiving the Project Proposal, BELSPO verifies that it is consistent with what was agreed during the preparation process, and that all the necessary information as explained in the template is present and in the right format.

In most cases, the comments of BELSPO and ESA require a (small or large) update of the Project Proposal. In some cases, a second update is needed.

6.2 **The LoE**

When the Project Proposal is judged satisfactory by both BELSPO and ESA, ESA notifies BELSPO by email of its approval to implement this Project Proposal as a PRODEX Project within the ESA system.

Subsequently, BELSPO sends its formal agreement to allocate the required budget to this Project for the specified period. This agreement takes the form of a signed ***Letter of Endorsement (LoE)*** which is sent by email to ESA with copy to the BPI and Bco-I's. The LoE mentions the name of the Project, the names of the BPI and Bco-I's, the budget and time period for the BPI and for each Bco-I, and contains a copy of the Financial Plan of the BPI and of each Bco-I (taken from the Project Proposal).

7. **Implementation of a PRODEX Project**

7.1 **The PEA**

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

The **PRODEX Experiment Arrangement (PEA)** is the specific contract that ESA concludes with an Institute for a given PRODEX Project. It defines the modalities applicable to the execution of the agreed tasks of the 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.

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).

PEA's are cost-reimbursement contracts for which the invoices presented by the Institutes are paid only if the Institutes duly justify that the corresponding costs have been accrued.

For developments and services to be executed by Industry as defined in the Project Proposal, the selection of the Belgian industrial partner(s) proceeds via an ESA ITT (*Invitation To Tender* = open competition restricted to Belgium) or RFQ (*Request For Quotation* = direct negotiation). The decision to go for open competition or direct negotiation is taken by ESA in application of the ESA Procurement Rules (see emits.esa.int).

A standard ESA contract is concluded between ESA and each Belgian industrial partner, to which the **General Clauses and Conditions of ESA** apply (see also emits.esa.int). This contract is standardly a *Firm-Fixed Price* (FFP) contract for all the tasks to be performed in the defined timeframe. The management of these ESA contracts is delegated to the PRODEX Office. On a case by case basis and in the interest of the Project, ESA and the Institute may agree that some tasks are directly subcontracted by the Institute to an industrial partner.

In very specific cases dictated by the content and timing of the Project, a standard ESA contract (FFP) can be concluded with an Institute. However, a PEA is never applicable to Industry.

7.2 A 'non-ESA' Project

In case the Top-level Project resides in another space agency than ESA, formal endorsement by the relevant thematic ESA Programme Board is first required before a PEA can be concluded. In practice, the PRODEX Office presents the proposed Project to the relevant Programme Board on the basis of the Project Proposal submitted by the BPI and after BELSPO's support has been duly expressed via the LoE. The BPI may also be requested to present the proposed Project to the relevant advisory board of ESA. The 'non-ESA' Project can only be implemented in PRODEX after confirmation by the Programme Board that it is consistent with the overall objectives of ESA's programmes.

As mentioned before in section 4.2, only projects executed in ESA context are accepted for the Life and Physical Sciences (LP) Field of Research.

7.3 PRODEX slices

In the Belgian PRODEX system, each Project is part of a 'PRODEX slice', which is associated with the period after a given ESA Ministerial Council (and therefore with a new Belgian PRODEX financial envelope). For example, Projects implemented from the year 2020 onwards and until the next ESA Ministerial Council are part of the PRODEX-12 slice. ESA Ministerial Councils are usually held every 3 years.

8. Running and follow-up of a PRODEX Project

8.1 Technical, scientific, managerial and financial follow-up

The BPI and the Bco-I's are each responsible for the execution of their part of the Project as described in the Project Proposal and the PEA. The BPI is responsible for the overall scientific, technical and managerial coherence and progress of the Project as a whole.

The BPI and Bco-I's are each responsible for their own part of the allocated budget. They must assume rigorous financial management in collaboration with the department of the Institute in charge of the financial administration of the PRODEX projects and in line with the specific modalities stipulated in the PEA. Reimbursement of incurred Project costs is done by ESA following the digital introduction of invoices by the Institute into the ESA SAP system. The Institutes need to invoice all their costs of year n at the latest at the end of year n+1; failing to do so will prevent the implementation of the Project (or a follow up Project) in year n+2.

The PRODEX Office needs to retain visibility on the expenditure planned and actually incurred by the Institute and/or Industry. If deemed necessary, this may include a right of audit by or on behalf of ESA.

The PRODEX Office of ESA appoints a **Technical Officer (TO)** for each Project who is responsible for the contractual follow up of the Project from an ESA perspective, and for the reporting to BELSPO. The TO interfaces with other experts within ESA who provide a link with the higher-level mission and instrument development or operations teams within ESA. It is important to realise that the TO not only checks contractual compliance, but also provides technical and managerial guidance to the BPI and Bco-I's whenever needed in the interest of the Project.

The responsible **PRODEX administrator in BELSPO** (see section 3) is responsible for the follow-up of the Project from the BELSPO perspective. This person is the interface between the BPI and the Bco-I's on the one hand, and ESA on the other hand. All correspondence regarding a running Project should in general be addressed to both the ESA TO and the BELSPO administrator so that information is shared in an optimal way.

8.2 Everything changes, nothing remains the same: the CN process

The development and operations of space instruments and experiments depends on many aspects that are difficult to predict, such as technical difficulties, the availability of people, the delay of launches or flight opportunities, the activities of (international) partners, etc. The work description and the financial plan approved in the PEA at the start of the Project are defined based on the knowledge of the tasks to be performed and of their timing at that time.

If changes of any kind occur in the course of the Project, they need to be reflected in an update of the relevant documents. The PRODEX Programme and the Belgian PRODEX system allows this to be done efficiently and rapidly. In order to understand this process, it is important to realise that the budgets listed in the PEA Financial Plan are only 'not to exceed' amounts in the sense that they are not 'acquired' by the BPI or Bco-I's. During the course of the project, in any given year, tasks may be cancelled or added, which may have a direct impact on the financial needs of the Project in that year. Therefore, if changes occur that require a revision of the original planning, the work description and the Financial Plan must

be updated to reflect the new situation in each year of the Project whereby the budget may decrease or increase in any given year and in total. If the total budget is decreased, the unspent budget is removed from the Project (and available again for new projects as part of the total Belgian PRODEX envelope), while alternatively budget is added to the Project if justified and approved.

The particular case of a change of personnel without a change in the content of the Project is dealt with in a flexible manner in PRODEX. The BPI and Bco-I's are always allowed to replace recruited personnel or reshuffle them between years 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 desirable as they are usually not in the interest of the project.

In exceptional cases, the planned continuation of a PRODEX Project does not make sense because of a sudden disruptive change in the Project's environment, such as the cancellation of a mission or the deselection of an instrument or experiment. In such cases, the PRODEX Project will be stopped earlier than the already approved end date, taking into account possible (limited) close down activities.

In practice, if any change is necessary, the BPI and/or Bco-I's must first contact the relevant administrator at BELSPO, putting the ESA TO of the Project in copy. After an informal 'in principal' agreement of BELSPO, the ESA TO will discuss with the BPI and Bco-I's the detailed scope and impact of the change. Note that a request for change can also originate from ESA or from BELSPO. Following convergence on the necessary changes, a formal update of the Project Proposal must be submitted reflecting the new work description and the new budget per year in the different categories (personnel, travel, small and large equipment, services). If the change does not significantly affect the work description, an update of the Financial Plan is sufficient. After acceptance of these updated documents by BELSPO and ESA, the next step towards implementation of the changes then depends on two possibilities:

- i. If the total budget is not increased, approval of the new Project Proposal (or only the Financial Plan) is done by BELSPO via email to the BPI and Bco-I's and the ESA TO.
- ii. If the total budget is increased, approval is done by BELSPO via a new Letter of Endorsement (LoE).

ESA then implements the changes via an ***Arrangement Change Notice (ACN, or simply CN)*** which becomes an annex to the PEA. In case the budget difference is less than 1000 EUR, ESA does not issue a CN but will settle the balance at the end of the Project term.

Industrial contracts are generally Firm-Fixed Price contracts. Changes related to industrial contracts within a PRODEX Project are implemented via the standard ESA *Contract Change Notice (CCN)* process (see *General Clauses and Conditions* of ESA contracts and related documents on emits.esa.int).

8.3 Project extensions

As explained in section 5.2, development and operational projects are generally implemented in successive phases related to Project milestones or of typically 3 years each. A Project extension can be implemented in two ways:

- i. If the extension represents a short continuation of the work of the original Project by one or two years, the BPI and Bco-I's should submit an update of the Project

Proposal, extending the work description and adding years to the Financial Plan. Requests for new budgets shall be clearly identified, separately from the already approved budgets, and justified. The results already obtained during the first phase should be described. The Project Proposal should as such continue to cover the whole duration of the Project.

- ii. If the extension represents a longer continuation of the work, a new self-standing Project Proposal should be submitted, formally leading to a new PRODEX Project.

The approval process of the updated or new Project Proposal is identical to the first one. The PRODEX slice (see section 7.3) under which the extension in the first case is implemented always remains the same as the one of the original Project.

Data Exploitation Projects must follow the specific limitations explained in section 4.4.

8.4 Reporting

One yearly report of the evolution of the PRODEX Project, prepared by the BPI in collaboration with the Bco-I's (see the *Project Reporting* template file in annex 4 to these Guidelines), has to be sent to ESA with copy to BELSPO by the end of January of the year following the reporting period. For PRODEX Projects where other reporting rules are implemented by the Top-level Project (e.g. more frequent reports) or stipulated in the PEA, only these reports have to be provided.

No longer than 2 months after the end of the term specified in the PEA, and before the final invoice is submitted, the final report (see the *Project Performance* template file in annex 5 to these Guidelines) 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* template file in annex 6 to these Guidelines.

The abovementioned Reports are formal deliverables of the PEA contract. Failing to submit a Report in time leads to the blocking of payments and will prevent the implementation of the Project (or a follow up Project) in the next year.

Each publication (scientific, technical 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 Belgian Federal Science Policy Office (BELSPO) for the provision of financial support in the framework of the PRODEX Programme of the European Space Agency (ESA) under contract number [PEA and/or Industry contract number]."

All publications arising from work performed under an ESA contract shall comply with the contractual provisions and the ESA publications policy.

It is recommended that important 'breakthrough' publications and press releases, based on the results obtained in the framework of a PRODEX Project, are immediately shared with the communication and outreach department of BELSPO (via the PRODEX administrator) in order to increase its dissemination towards the Belgian public, the latter being the ultimate funding source of any Project.
