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Implementing the OECD
Frascati Manual: Proposed
reference items for business
R&D surveys

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*Implementing the OECD Frascati Manual: Proposed
reference items for business R&D surveys*

This working paper contains guidance, of a voluntary and indicative nature, on the implementation of business R&D surveys, consistent with the standards and proposals contained in the OECD Frascati Manual. The document is oriented towards experts in charge of designing and implementing official R&D surveys, but may be also valuable to academics and researchers with a similar practical orientation. It aims to promote widespread testing and implementation in view of a potential future revision of the Frascati Manual or release of complementary annexes.

Keywords: Business, Research and development, Survey design, Reference questions

JEL classification: C83; O3

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Executive summary

This document contains indicative voluntary guidance on the implementation of business R&D surveys consistent with the standards and proposals contained in the OECD Frascati Manual. The document is oriented towards experts in charge of designing and implementing official R&D surveys, but may be also valuable to academics and researchers with a similar practical survey orientation.

This document is the result of a project undertaken by the OECD Working Party of National Experts on Science and Technology Indicators (NESTI). This project was initiated in 2019 in response to requests from countries for guidance to implement a number of Frascati Manual recommendations. Such recommendations had been incorporated in international data requests from OECD (as well as Eurostat) to national R&D contact points but elicited limited response owing to implementation challenges. Drawing on the rich experience of different national survey practices, this project has developed proposals for reference questions and companion material (reference survey items and explanations) that can be adapted for specific domestic purposes while maintaining a sufficient level of international comparability. The result of this work comprises a set of questions, presented in a logical constructive order that reflects the common topics and structure of national business R&D surveys and allows responses to build on previous ones.

This guidance document comprises the following sections, which follow the logical structure of a business R&D survey without necessarily representing a model questionnaire as such. Sections and their question items are identified with a reference code.

- Descriptive information on the respondent's business.
- Steps for estimating the main business R&D aggregate, namely intramural R&D expenditure, ensuring that the reported amount takes into account the necessary inclusions and exclusions, especially in light of different accounting measures used internally by firms or for regulatory reporting purposes.
- Proposals for deriving the main breakdowns for intramural R&D as well as identifying cross-cutting, statistical and policy relevant components of business R&D such as software R&D.
- Guidance for estimating the attributable sources of funds for the company's R&D performance, with special emphasis on government sources of funds and capturing intra business groups funding flows. This section also comprises suggestions for capturing indirect forms of government financial support for R&D.
- Examples for collecting data on payments by the firm for external performance of R&D (Extramurally-performed R&D).
- Guidance for collecting information of R&D personnel of the enterprise, taking into account reporting limitations concerning human resources that are external to the business (i.e. not persons employed by the firm). This section also proposes indicative language to adapt to the business world the functional categories of R&D personnel in the manual, in particular by translating the concept of "researcher" in businesses engaged in experimental development.
- Additional guidance on collecting information on R&D globalisation and multinationals, types of energy R&D and other special topics.

- Additional information on the R&D survey questionnaire.

A lot of the content, especially some sections, should be considered as work in progress. Some sections indicate potential future developments that respond to evolving user needs. Major areas requiring further development include items on artificial intelligence, as well as on R&D oriented towards mitigating greenhouse gas emissions, protecting the environment and sustainability in general.

This report offers an operational framework that aims to facilitate a common understanding of Frascati Manual guidelines and provide a starting point for countries seeking closer alignment with the latest OECD guidance. This reference document also intends to provide a common list of item codes that can be used to map topics/questions/variables in national surveys, for example for data tabulation, indicator construction and microdata analysis, thus extracting further value from collected business R&D data.

The material has been prepared so that it can be relevant to countries under different stages and modalities of economic and statistical development. This work was partly inspired by requests from OECD partner economies represented at NESTI to see the guidance initially developed by the UNESCO Institute for Statistics for R&D surveys in developing countries (based on the 6th edition of the Frascati Manual) to be updated and rendered compatible with the 2015 edition of the Frascati Manual.

This document is released as an STI working paper with the aim to promote widespread testing and implementation, with feedback being transmitted to NESTI in the course of its testing and implementation before the group can consider whether and how the guidance should be integrated into the Frascati Manual in the future.

1. Introduction

1.1. Rationale and key features

This document is the result of a NESTI project conducted in 2020-21 that was conceived in support of the implementation of the OECD Frascati Manual (FM) focusing on its implied guidance for national R&D surveys. Over 5 years after the publication of the manual's 7th edition (OECD, 2015), NESTI delegates agreed to facilitate the usage of the manual's concepts, definitions and classifications by undertaking new work indicating how these could be articulated as statistical survey items.

The initial phase of the work focused on Business Enterprise R&D (BERD) surveys. The exercise drew from a number of sources including a review of national BERD survey questionnaire forms as well as feedback from NESTI delegates and other R&D data collectors and users. The work carried out thus addressed concerns regarding the consistency of how such guidance is interpreted and applied at the national level.

The project developed proposals for reference questions and companion material (reference survey items and explanations) that can be adapted for national purposes while maintaining a sufficient level of international comparability. The output comprises a set of questions, presented in a logical constructive order that reflects the common topics and structure of national business R&D surveys and allows responses to build on previous ones.

This output offers an operational framework that aims to facilitate a common understanding of Frascati Manual guidelines and provide a starting point for countries seeking closer alignment with the latest OECD guidance. This reference document also intends to provide a common list of item codes that can be used to map topics/questions/variables in national surveys, for example for data tabulation, indicator construction and microdata analysis.

In line with the guidance provided in the Frascati Manual, this document proposals have been designed to ensure that its recommendations can also fulfil the needs of national accountants using business R&D data to produce SNA compatible measures of capital formation on R&D and other related macroeconomic aggregates (OECD, 2011; (Ker and Galindo-Rueda, 2017).

The material has been prepared so that it can be relevant to countries under different stages and modalities of economic development. It is worth underlining that this work was partly inspired by requests from OECD partner economies represented at NESTI to see the guidance developed by the UNESCO Institute for Statistics for R&D surveys in developing countries (based on the 6th edition of the Frascati Manual) to be updated and rendered compatible with the 2015 edition of the Frascati Manual.

1.1.1. Nature of guidance provided in this document

The guidance has been designed as:

- Voluntary in adoption. Rather than recommendations for literal adoption within countries, these represent indicative ways of phrasing questions, complemented by commentary aiming to assist survey designers and respondents by clarifying the definition, scope and intended concept behind each item;
- Flexible. Recognising different national approaches and priorities, the proposals allow for adaptation to meet the requirements and constraints of each, while

highlighting examples that have worked well in some contexts and focusing on common elements found across surveys;

- Practical, user oriented: a key goal is to use plain language as much as possible while referencing precise definitions found in the FM text and making a clear connection to them, having noted requests from practitioners for clearer illustrations of how one may go about collected data on the relevant concepts.

Therefore, the intent is not to change current FM guidance or definitions, but to provide a practical (and evolving) tool for implementing these by translating them into clearer terms that can be adapted. Practitioners in institutions and countries using or considering using this guidance should satisfy themselves that the proposals work in their own specific context, through cognitive testing, experimentation, and comparisons with other experiences.

1.2. Structure

This guidance document comprises the following sections, which follow the logical structure of a business R&D survey without necessarily representing a model questionnaire as such. Sections and their question items are identified with a reference code.

- BESRD_S1 – Descriptive information on the respondent business (DSCR)
- BESRD_S2 – Steps for estimating the main R&D aggregate: intramural R&D expenditure (INTRD).
- BESRD_S3 – Main breakdowns for intramural R&D (INTBRK)
- BESRD_S4 – Sources of funds for the company's R&D performance (SRCS).
- BESRD_S5 – Payments for external performance of R&D (Extramurally-performed R&D) (EXTR)
- BESRD_S6 – R&D personnel (PERS).
- BESRD_S7 – Globalisation / R&D and multinationals (MNE) and other special topics (SPEC)
- BESRD_S8 – Additional information on the R&D survey questionnaire (QUEST)

A lot of the content, especially some sections, should be considered as work in progress. In particular S7 on Globalisation and other special R&D topics, is more geared towards channelling potential future developments that respond to user needs that do not neatly fit into any of the other sections. Its placement towards the end of the questionnaire also aims to ensure that it does not interfere in the normal course of survey response.

1.3. Consultation and feedback on this document

Throughout 2021 and 2022, this draft guidance has been shared as a living document previously only accessible to NESTI delegates and members of the NESTI community on its internal community space. After incorporating a number of edits, the document has been publicly released as a working paper for broader consultation purposes. STI working papers are technical or analytical working papers that are prepared by staff or outside consultants to share early insights and elicit feedback.

The document's guidance can be used for testing purposes and aims to collect feedback on the proposals.

Feedback on these proposals may be submitted at any given time to: rdsurvey@oecd.org

2. Descriptive information on the respondent business (DSCR)

2.1. Introduction to the questionnaire

This section contains the most common items used to collect basic descriptive information on the respondent firm in BERD surveys. They also serve to categorise firms based on various criteria and facilitate linking the information to that collected in other business surveys in order to reduce response burden and allow for cross-validation. This information may not need collecting through a survey as, in some countries, official administrative registers will already include most of the relevant records whilst avoiding reporting error.

This model does not take a stance on the statistical unit used by a particular country. The questionnaire will need at the outset to clarify such point to the respondent and some degree of negotiation may be required. The questions are designed in order to allow as much as possible to identify separately flows that may not be additive across different parts of a global and domestic business group. This model also assumes an identity between the statistical and reporting unit. Where a respondent may do so on behalf of multiple statistical units, and may accordingly be asked to report separately for each one of those.

The term business is used throughout this document to refer generically to the target respondent entity. In practice this may correspond to the business / enterprise /company/firm. Countries will use in their surveys the term they find most appropriate based on language, reporting instructions, and consistency with other business surveys statistical and reporting unit.

Questionnaires may be used to help re-assess whether a statistical unit is actually within the scope of a business enterprise questionnaire. Particular attention should be paid to the language used with statistical units of a non-profit nature that, when set up to serve business enterprises, are according to FM (SNA) classified as part of the business (corporate) sector, for instance in the case of R&D organisations operating for business associations. The term business might be in such cases inappropriate.

Question items should be preceded by contact and invitation to respond that comprises the following key elements:

- Rationale for conducting the survey, including description of the subject matter and relevance;
- Exposition of legal authority under which data are being collected;
- Formulation of confidentiality and privacy assurances that are deemed appropriate in the survey design, including provisions to legally enable record linking and data sharing agreements;
- Formulation of value proposition for respondent, comprising positive motivation(s) as well as potential implication(s) of non collaboration;
- Guidance on survey completion steps for respondents;
- Contact details for helpline and other enquiries.

The exact formulation of these introductory points is very case dependent, hence no models are being provided at present. Examples can be consulted on the companion register of business R&D questionnaires. The overall opening should weight carefully trade offs between minimising non compliance with the introduction of potential biases.

2.2. Question items

Code	Stylised presentation of reference question(s) / item (s)	Comments for questionnaire developers
DSCR_NAME	Legal/registered name of your business[1]	Much of the information in this section is for verification /confirmation purposes. Field may be possibly pre-filled from business register data.
DSCR_LEG	Legal entity type of your business	This item should be in registers and is mainly for country specific analysis purposes, aiming to capture different types of business enterprise units (corporations, LLCs, PLCs, partnerships, sole partnerships, private foundations of industry, etc...). Named categories will be country specific .
DSCR_OPER	Is your business currently active [2]? [Y/N]	Used to filter out firms that are no longer active
DSCR_GRP	Is your business part of a group? [Y/N] [if No, can skip to DSCR_UNIT]	Used to identify firms that are part of groups[3] in order to clarify the statistical and reporting units [see FM 3.2 and 7.3]
DSCR_GRP_HEAD	If part of a group, is your business the head [4] of the group or an affiliate?	May be used to further clarify whether the firm is reporting as an enterprise or consolidated group. This should be consistent with national practices and guidelines for business statistics. Important to clarify whether head of domestic only or international group.
DSCR_GRP_HEAD_LOC	If an affiliate, is the head of the group located in your country or abroad? If abroad, please specify which country	Clarify that data reported should refer to domestic activities although worldwide/foreign can be mentioned as a reference (and to identify MNEs) [see FM 3.4 and 11.2] [see also Section on Globalisation] The country where the head is located may also be identified.
DSCR_GRP_CAA	Does the broader group that your business is part of have affiliated enterprises in other countries?	Part of MNEs with controlled affiliates abroad [see FM 11.2]
DSCR_UNIT	[Provide statement on the desired level of reporting by the respondent – i.e. the formulation of the notion of target statistical unit] Are you reporting data for your enterprise, group (consolidated) or any other statistical unit? (e.g. establishment). If reporting for a group, please list which subsidiaries are covered.	Companies may not necessarily align in their answers with the preferred statistical unit. There may be little that can be done about it other than understand the issues and work on the reporting relationship over time. May require guidance on boundary cases such as micro enterprises or self-employed. Consider recording list of subsidiaries within scope of response to avoid possible double-counting.
DSCR_ADDR	Main address	It may be useful to separate: <input type="checkbox"/> Postal address for correspondence purposes <input type="checkbox"/> Postal address for location of main centre of economic activities / to classify statistical unit by geographic location [see FM 7.4 and 7.6]. <input type="checkbox"/> Company email address for contact (may be a generic address) and could be included following the next item (DSCR_WEB)

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Code	Stylised presentation of reference question(s) / item (s)	Comments for questionnaire developers
DSCR_WEB	Business website	Relevant for keeping up on public disclosures by the company. Small companies may use social media accounts etc...
DSCR_CONT	Contact person / survey coordinator	Can also ask for the person's title/position. Must consider privacy/personal data implications. Stability over time regarding: the contact person / survey coordinator within the firm and their authority to collect inputs is particularly important for a high quality response.
DSCR_YRCAL	Are you reporting data for calendar year YYYY?	Data should correspond to calendar or fiscal year according to normal national practice
DSCR_YREF	If not, please list the dates of the 12-month (or shorter[5]) period for which you are reporting data	To ensure data correspond to survey reference year
DSCR_ID	Business' unique ID number/code [if appropriate]	Most likely prefilled and assigned by NSO to enterprise. May elicit another type of administrative ID (e.g. CO registration number for incorporation, tax purposes, etc.). Allows for linking statistical unit to other information sources [see FM 7.4] and possibly help update registers. It should be noted that IDs may link to affiliated companies and heads.
DSCR_IND_MEI	Business' primary economic/business activity [using ISIC-type industrial classification codes or similar]	Can prompt respondents for codes (industry, business operations) or provide a list [see FM 7.4]. May need to provide some criteria for responding/ filling in to ensure consistency with the reporting unit. In some countries this information may be pre-filled. If Higher education is the chosen activity, need to consider whether the HE questionnaire may be more appropriate than the BE questionnaire.
DSCR_IND_OTHR	Other business activities if applicable [similar codes]	Can clarify these may differ from the industry orientation of the firm's R&D activities [see FM 7.6]
DSCR_CLASS_PUB	Does national, regional or local government have control over this business's own major decisions? (Is the business part of the (enterprise) public sector)	Indicative question for identifying whether business should be classified as a public business enterprise. This should be preferably assessed from established registers that define public sector membership.
DSCR_CREAT_DATE	Date of business creation[6]	Can be a given year, converted
DSCR_CREAT_NAT	Nature of business's creation (birth, break-up / split-off, merger, joint venture, etc.)	Not asked systematically at present, but can be useful for analytical purposes, if not obtainable from linked sources. It may be useful to refer to a standard typology such as [7]
DSCR_EMPL_DOM DSCR_EMPL_DOM_MNE_PAR and DSCR_EMPL_DOM_MNE_FCA	Total number of persons employed in your business (in headcount) [end of calendar/fiscal year, average over reporting period]	This refers to persons employed in the domestic territory [see section 6 on R&D Personnel]. Ensure this matches unit when reporting other data. Clarify that this includes full- and part-time employees, but excludes consultants or other in-house employees paid by third parties.

Code	Stylised presentation of reference question(s) / item (s)	Comments for questionnaire developers
		For MNEs, this can be further disaggregated between parents and foreign-controlled affiliates Used to classify statistical unit by size [see FM 7.4]
DSCR_EMPL_MNE_CAA	Employees based abroad	For MNEs, this allows to measure their global workforce
DSCR_TURN_DOM	Total value of your business' domestic sales/ revenues/ turnover ^[8] [as appropriate] during year YYYY [in local currency]	Can be used to cross-check business identity and to assess validity of reported R&D data. This may require different phrasing for firms in certain industries (e.g. noninterest income for financial firms).

2.3. Notes

[1] A functional definition may be provided. E.g. for the purposes of this survey, your “business/company/firm” is National implementations may vary.

[2] Countries may have a standard definition of “active”.

[3] Should include definition. See for example Eurostat (2010) Business Registers Recommendations Manual: <https://ec.europa.eu/eurostat/ramon/statmanuals/files/KS-32-10-216-EN-C-EN.pdf>

[4] A definition or succinct description of the term “head” may be needed to accompany this term (see for example previous reference to Eurostat (2010)). This may refer to the location of the ultimate ownership holder. This may however differ from where the part of the company making ultimate high-level strategic decisions on R&D and other key investments is based. In the FM (11.2), “control or majority ownership refers to ownership of more than 50% of the ordinary shares or voting power of an incorporated enterprise or the equivalent of an unincorporated enterprise.”

[5] For firms that were not active during the full 12-month period, for example those newly founded, or having ceased activities part way through the year.

[6] Needs an operational definition. Legal constitution may pre- or post-date commencement of operations. Adopt business demography preferred standard.

[7] See for example the one used in the Eurostat – OECD Manual on Business Demography Statistics: <https://ec.europa.eu/eurostat/ramon/statmanuals/files/KS-RA-07-010-EN.pdf>

[8] Reference definitions and terminology used in other Business statistics.

3. Steps for estimating the main aggregate: intramural R&D expenditure (INTRD)

This section outlines the basic steps that respondents can follow to arrive at an FM-compliant estimate for intramural R&D expenditure. It includes basic definitions, references to various FM concepts (e.g. funding/performance, intra/extramural) and -when relevant- to related R&D data from other sources (e.g. business accounts). Step-by-step adjustments for constructing the intramural R&D total based on an existing business accounting measure are described. Practitioners indicate that the derivation from the accounting measure is more relevant from larger, more complex enterprises.

3.1. Question items

3.1.1. R&D definition statement

Code	Stylised presentation of reference question(s) / item(s)	Comments for questionnaire developers
INTRD_DEF	<p>For the purposes of this survey, R&D is defined as “creative and systematic work undertaken in order to increase the stock of knowledge –including knowledge of humankind, culture and society – and to devise new applications of available knowledge.”</p> <p>For an activity to be considered as R&D, it must satisfy five core criteria:</p> <p>The activity must be:</p> <ul style="list-style-type: none"> • Novel: aimed at new findings; • Creative: based on original, non-obvious concepts and hypotheses; • Uncertain about the final outcome; • Systematic: planned and budgeted; • Transferable (freely or in a marketplace) and/or reproducible. <p>The term R&D covers three types of activity:</p> <ul style="list-style-type: none"> • basic research: experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view. • applied research: original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, practical aim or objective. • experimental development: systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes. 	<p>This should cover the main definitions from FM including both research and development and allude to the five key criteria [see FM 2.1, 2.2, 2.4, 2.5].</p> <p>The FM text can be used directly or adjusted and simplified for clarification purposes. Definitions can be included in full or short version at the beginning of this section (possibly with comments), or in more detail in an annex.</p> <p>It is also recommended to include examples, as well as mentioning closely related concepts for which there may be boundary issues (e.g. in relation to some innovation, design and software activities), and those that should be excluded (e.g. routine test and data collection) [see FM 2.7, 2.8].</p> <p>The term ‘experimental’ may be adjusted/adapted in the text to ensure that not all <i>development</i> work is included and to avoid implying that it needs to be carried in experimental lab conditions, as noted in the FM.</p>

Code	Stylised presentation of reference question(s) / item(s)	Comments for questionnaire developers
	[Recall that] R&D can be found in the social sciences, humanities, and the arts (SSHA) as well as in the natural sciences and engineering (NSE). [R&D includes...] [R&D excludes...]	The definition can also reference other R&D figures which the respondent may report elsewhere and be familiar with, and clarify the distinction between these [which may be used later in this Section to calculate the FM-compliant intramural R&D figure]

3.1.2. Identification of BERD

Code	Stylised presentation of reference question(s) / item(s)	Comments for questionnaire developers
INTRD_INTR	Did your business carry out R&D (on its own behalf or on behalf of others) in year YYYY? → This includes R&D design and implementation work that your business carried out either on your behalf or on behalf of others, i.e. regardless of who paid for the work and who owns the final results of the R&D. → This excludes payments to other businesses (affiliated or not) or other organizations for R&D work they are responsible for designing and implementing (see next question INTRD_EXTRD).	Clarify concept of performance (explain difference with funding/expense) and distinction in-house / external in order, for example, to exclude externally-performed R&D, but include intramural R&D funded by others [see FM 4.2 and 7.7] Can also use additional screening questions to help identify qualifying R&D activity consistent with the 5 criteria, such as the existence of an R&D department, R&D projects, at least one researcher in payroll, etc.
INTRD_EXTRD	Did your business provide funds to other parties (including firms it is affiliated with), to carry out substantive R&D work?	Item needed to identify R&D funders who are not performers, but also dual performers and external funders. It is included in this section for screening purposes and to distinguish it clearly from INTRD_INTR to avoid double counting. Clarify that this excludes payment for services that contribute to the R&D of the company but that do not represent R&D in their own right (e.g. carry out standard tests). A key issue is whether the other party, if asked, would report to be carrying out R&D.
	If company has neither INTRD_INTR nor INTRD_EXTRD can end questionnaire	

3.1.3. Derivation of BERD from accounting measure

Code	Stylised presentation of reference question(s) / item(s)	Comments for questionnaire developers
INTRD_ACCs	The company's financial records for R&D costs may contain a combination of internal R&D efforts (which may include or not R&D paid for by other parties) as well as R&D carried out by other parties (R&D external to the business).	This text may need some adaptation with attention to the type of survey recipient as well as the prevalent domestic accounting standards and practices.

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Code	Stylised presentation of reference question(s) / item(s)	Comments for questionnaire developers
	Such financial records may contain company's own expenses in their profit and loss accounts as well as modifications to their balance sheet R&D assets.	
INTRD_INTR_HEAD	<p>Please report the company's headline accounting measure of R&D expenditure for year YYYY as reported in [other source] [if available].</p> <p>This is likely to comprise R&D expenses against Profit & Loss (P&L) plus additions to the balance sheet stock of R&D assets (i.e. capitalised R&D).</p> <p>Report which accounting standard is used.</p>	If a different (not FM) R&D expenditure figure is readily available for the firm (e.g. from business accounts, R&D tax credit reporting or other sources), it can be used as a starting point to derive the corresponding FM intramural R&D figure. Definitions and accounting procedures may differ from FM. This info is also relevant for identifying consistency issues with public statements on R&D that may be at odds with statistical results, and therefore help improve quality and confidence in statistics.
<p>[adjustments to INTRD_INTR_HEAD towards BERD]</p> <p>See Annex at end of section.</p> <p>INTRD_EXCL</p>	<p>In the figure provided above, did you (incur and) include any of the following:</p> <ul style="list-style-type: none"> • expenses for non-R&D items (ICT adoption, routine software development, phase IV trials, market studies) • expenses for R&D carried out in other countries / e.g. R&D carried out by affiliated businesses abroad [1] • cost of acquiring R&D knowledge assets (resulting from past R&D), including through acquisitions of companies, for R&D carried out in previous years • Imputed depreciation of assets used for R&D • expenses for R&D work subcontracted to other parties from own funds • deductible part of VAT or similar taxes • losses from writing off previously capitalised or acquired R&D assets <p>What is the estimated total amount for these?</p>	The questionnaire can outline the adjustments needed to establish a bridge between publicly or otherwise more readily available accounting figure for R&D to something close to the intended measure of BERD at the firm level (see Appendix 1) (e.g. exclude extramural R&D, R&D carried out by affiliated firms abroad, items outside the FM R&D boundary, etc.) [see FM 4.2 and 7.7]
<p>[adjustments to INTRD_INTR_HEAD towards BERD]</p> <p>See Annex at end of section.</p> <p>INTRD_INCL</p>	<p>Did you incur any of the following but not include them in the headline accounting measure previously reported?</p> <ul style="list-style-type: none"> • R&D expenses that were capitalized in the company's balance sheet • R&D conducted by your company on behalf of others, including affiliated companies • Costs for acquiring tangible and intangible assets to be used for R&D • [Tax credits for R&D that your firm previously deducted from the headline measure of R&D expense] 	

Code	Stylised presentation of reference question(s) / item(s)	Comments for questionnaire developers
	What is the estimated total amount for these?	
INTRD_BERD_ADJ	The resulting amount from: INTRD_INTR_HEAD – INTRD_EXCL + INTRD_INCL is your company's current and capital expenditure on its R&D performance in year YYYY in the country.	Give opportunity to revise and ensure that the amount is not negative. It may be zero if all R&D expense is outsourced. In that case go to section on extramural.

3.1.4. Direct elicitation of BERD

Code	Stylised presentation of reference question(s) / item(s)	Comments for questionnaire developers
INTRD_BERD_DIRECT	Please report your company's total current and capital expenditure on R&D performed within the country in year YYYY.	A majority of countries do not currently include a section connecting to accounting measures of R&D. Most surveys start from the following point, arriving at total BERD from sum of component costs (particularly if the surveys are targeting SMEs or small R&D performers through short-form questionnaires). If the direct or sum of costs approach is used, it is recommended to apply checks such as those used above to ensure inappropriate components have not been included in the BERD estimate [so INTRD_BERD_ADJ and INTRD_BERD_DIRECT should be equivalent].

3.1.5. Cost structure of BERD

Code	Stylised presentation of reference question(s) / item(s)	Comments for questionnaire developers
INTRD_INTR_BERD_COST (Often generating INTRD_BERD_DIRECT ; should also equal INTRD_BERD_ADJ)	Please allocate your company's total current and capital expenditure on its R&D performance in year YYYY [INTRD_BERD_DIRECT or INTRD_BERD_ADJ depending on method] in the country to the following categories:	If this is not the case, the most common approach is to produce an intramural R&D total is based on summing by type of costs. The 3 main type of cost categories can also be further broken down.
INTRD_INTR_BERD_LAB	Your company's R&D labour costs. This includes salaries, wages, benefits, and other forms of compensation.	For R&D labour costs (employment compensation in SNA terms), there should be correspondence with R&D personnel data (in FTEs) as reported in Section 6 (PERS). This also applies to the paid remuneration of external R&D personnel reported under other current costs.
INTRD_INTR_BERD_OTHC	Your company's other current R&D performance costs. This includes expenses for materials, supplies, leasing of equipment, royalties and licence fees, as well as services that do not represent R&D in their own right by the service provider, i.e. the service provider would not report such R&D services as its own R&D performance. Exclude outsourced R&D and depreciation and amortization on assets used for R&D.	Clarify that depreciation costs of R&D-related physical assets are excluded and only the share of costs related to R&D should be reported for items/services which are also used in non-R&D activities
Check:		Should include examples based on FM definitions for each category [see FM 4.2].

Code	Stylised presentation of reference question(s) / item(s)	Comments for questionnaire developers
INTRD_BERD_SUMCOST = (=INTRD_BERD_DIRECT = INTRD_BERD_ADJ)= INTRD_INTR_BERD_LAB + INTRD_INTR_BERD_OTHC + INTRD_INTR_BERD_CAPEX	Your company's capital expenditure on assets intended to be used for R&D including on: <ul style="list-style-type: none"> • Land and buildings • Machinery and equipment • Capitalized computer software • Other intellectual property products The sum of these 3 items is your company's total current and capital expenditure on its R&D performance in YYYY in the country.	Otherwise, if the concept of intramural R&D is well understood, the amount can be asked directly [INTRD_BERD_DIRECT] and the breakdown by type of costs can be included in Section 4 (INTBRK)
INTRD_DEPAM	What was your company's depreciation and amortization cost for assets used for R&D?	Optional yet recommended as a memo item to assess plausibility of figures. These are sometimes reported in R&D financial accounts under other current costs [see FM 4.2]

3.1.6. BERD nowcast and projection

Code	Stylised presentation of reference question(s) / item(s)	Comments for questionnaire developers
INTRD_INTR_BERD_NOWC	Estimated intramural R&D expenditure for current year (or year after survey reference period: t+1)	Some countries collect nowcasts on total intramural R&D expenditure to produce more timely estimates of aggregate figures (e.g. BERD). Give opportunity to firm to provide nowcast and forecast for magnitude it finds it easier to report if not possible for BERD
INTRD_INTR_BERD_PROJ	Projected intramural R&D expenditure for next year	Similar approach for forecasts.
[Expectations for R&D personnel]		In addition to BERD, comments on these proposals have raised question about potential collection of information on intentions to increase/maintain/reduce the R&D workforce

3.2. Notes

[1] Need to add territoriality clarification.

3.3. Annex material on estimating BERD: From accounting R&D to intramural R&D

Global R&D expense of the business's group is the headline accounting business R&D measure, often publicly disclosed, which is the likely starting point for a business respondent. This measure, typically one of business expense, will:

- potentially include
 - non-R&D items (technology, phase IV trials, market studies, non-R&D innovation expenditure) / to exclude from R&D
 - non-domestic R&D / e.g. R&D carried out by affiliated firms abroad / to exclude from a domestic measure
 - the cost of acquiring new R&D assets (arising from past R&D), including through acquisitions of companies / to exclude from flow measure of R&D
 - depreciation of other assets used for R&D / to avoid double counting with acquisition of assets used for R&D
 - R&D subcontracted to other parties from own funds
 - losses from writing off acquired R&D assets and placed in the balance sheet (for example writing off a patent asset acquired during M&A)
- potentially exclude
 - R&D expense capitalised (some company reports include this in the less often reported expenditure measure but not on the expense part)
 - some R&D conducted on behalf of others (treated in accounts as income and costs of sales), including parts of the same global group
 - acquisition of assets to be used for R&D (in balance sheet)
 - subsidies or tax credits received for R&D activities that may have been netted out of R&D expense, or the part of R&D partly or fully covered by grants whose income is netted out

4. Main breakdowns for intramural R&D (INTBRK)

This section includes questions on the main breakdowns used to collect information on other relevant components of intramural R&D expenditures after the total has been derived. Currently, the level of detail collected varies across countries, and even within countries it may vary by type of firm (e.g. small firms/R&D performers which may reply to a shorter version of the BERD survey questionnaire).

4.1. Question items

Code	Reference question(s)	Comments for questionnaire developers
INTBRK_TYPE	<p>Breakdown by type of R&D How much of the amount reported in INTRD_BERD (adjusted or direct) was for:</p> <ul style="list-style-type: none"> • Research [Recall what is Research] <ul style="list-style-type: none"> ○ Basic research ○ Applied research <p>The difference between INTRD_BERD and Research, should correspond to (experimental) development work in your company [May need to recall what D is]</p>	<p>Well-known issues remain regarding the distinction between types [see FM 2.5 and 7.6]. A proposed approach for business surveys is (when appropriate) to consider a sequence of steps which starts with the largest components or those which companies are more familiar with. For example, asking companies to identify first any research, and then development as a residual. Likewise, within any reported research, identify any Basic research, as most will be presumed Applied. If such an approach is followed, it should be made clear that all three components should be given equal importance and that the sequencing proposed is only to simplify reporting by the firms. Reference can be made to the FM definitions of the 3 types as outlined in Section 1. Need to include examples and clarify boundary cases</p> <p>Although ideally data should be collected for total BERD (including both current and capital costs), some firms may only be able to report this breakdown for current expenditure, therefore a distinction could be made between INTBRK_TYPE_TOTAL and INTBRK_TYPE_CURR. In the absence of more precise internal data, the business may be encouraged to allocate on a pro rata basis capital costs that may contribute to both R and D.</p>
INTBRK_IND	<p>Breakdown by industry-orientation of R&D Please allocate the amount reported in INTRD_BERD according to which economic activities are most likely to make use of the outcomes of your R&D activity. You may indicatively allocate the amount based on the responsible business areas within your company. If you are carrying out R&D as a service, please identify the most likely beneficiary activity or industry (industries), based on your R&D target customer base. [Industry list or prompt for codes]</p>	<p>This refers to the nature/use of the R&D in terms of industry, which may differ from the firm's main economic activity, particularly for firms carrying out R&D on behalf of third parties (see FM 7.4 and 7.6). The FM recognizes two approaches for allocating R&D by industry orientation: product field (linked to the nature of the product which incorporates the output of the R&D), and industry served (linked to the industry in which the results of the R&D will be applied/used).[1]</p> <p>The proposal favours the industry served perspective as done currently in a majority of countries, but leaves room for adaption as long as use orientation is clear (see FM 7.6).</p> <p>Clarify the approach used (product field / industry served) and explain how it may differ from the firm's main economic activity, particularly for certain large / multi-activity firms or those providing R&D services for others (firms in ISIC Rev.4 72) since firms may</p>

Code	Reference question(s)	Comments for questionnaire developers
		carry out R&D in various domains, or on behalf of firms in various industries
INTBRK_GEO_DOM_REGION	Breakdown by geographic location (domestic) Please allocate the amount reported in INTRD_BERD according to where the R&D activity is principally located (e.g. as centres of R&D activity). [Provide list of regions or prompt for cities / postal codes, etc.]	It is recommended to include a sub-national breakdown, at least at the level of large regions (see for example OECD TL2 regions which generally correspond to state/province level) Additional breakdowns can be included, for example R&D by type of costs AND geographic location. If a full breakdown by region is not feasible, surveys may collect the location of the firm's single most important R&D activity There are significant differences in approaches, so it may not be feasible to have a strong recommendation on exactly how this should be carried out. Nonetheless it is important to recommend that a subnational breakdown by region be included, particularly for large firms (or those with significant R&D activities) [see FM 7.6].
INTBRK_SOFT	Please report how much of your company's R&D expenditure (INTRD_BERD) corresponds to work on new software (and database) development. [can also include examples and exclusions]	This category is singled out since software is a key policy priority for users of R&D data (also for National Accounts purposes). Clarify that it is not any software development, but software development that qualifies as R&D, i.e. R&D associated with software as an end-product, or software embedded in an end-product which meets the criteria for R&D [see FM 2.7]. The software and data being developed may be the ultimate target outcome and must aim for the properties listed in the R&D definition. Alternatively, the software developed may be instrumental to the pursued R&D project objectives and may therefore include routine components. However, it must be part of an R&D project that meets the definition's criteria. Software and data development costs can comprise labour, other current expenses and capital.

Additional breakdowns

These correspond to breakdowns which are not collected systematically across countries for the BES and with wide variation across countries in terms of classifications and level of disaggregation

Code	Reference question(s)	Comments for questionnaire developers
INTBRK_TECHAPPL	Identification of R&D in selected technologies / area of application: Please report the share of your company's R&D expenditure (INTRD_BERD) that corresponds to the following (not mutually exclusive) [technologies / areas of application]: <ul style="list-style-type: none"> • Biotechnology • Nanotechnology • ICT/software • Artificial Intelligence (AI) [4] • Environment (differs from INTBRK_SEO) 	Not mutually exclusive categories. The wording and phrasing should clarify that these categories correspond to potentially overlapping domains. Questions will correspond to country priorities, but it is desirable to collect a common set across countries which are highlighted in the reference question [see FM 7.6] For some categories, reference can be made to national or international definitions such as OECD's definitions for biotechnology and nanotechnology R&D data collection.[2] Definitions can be general or list-based, with different levels of detail depending on countries' experience with eliciting appropriate replies from respondents

Code	Reference question(s)	Comments for questionnaire developers
	<ul style="list-style-type: none"> Energy (general and low carbon) (differs from INTBRK_SEO – see under Special topics section #8 for detail) <p>[others according to national priorities]</p>	<p>In addition to stable categories, this section can be used to identify new /emerging /current areas of policy concern on a one-off or temporary basis (e.g. COVID-19)</p> <p>Countries are likely to experiment with this section across different survey waves. Such experimentation could be best done in a coordinated fashion with other countries using common definitions.</p>
INTBRK_FORD	<p>Breakdown by Fields of R&D (FORD)</p> <p>Please report the share of your company's R&D expenditure (INTRD_BERD) that corresponds to the following Fields of R&D:</p> <p>[FM Table 2.2] [full table at the 1-digit level, or subset at the 1 or 2-digit level]</p>	<p>Breakdown= mutually exclusive categories</p> <p>Not collected systematically for BES since a breakdown by Field of R&D (FORD) may be problematic (or irrelevant) for businesses, particularly in the case of experimental development [see FM 2.6 and 7.6].</p> <p>Nonetheless, given that a full breakdown of GERD by FORD may be of high policy interest^[3], countries that wish to collect such breakdown for the BES are encouraged to follow the FM FORD classification, at a minimum at the 1-digit level, either for all fields, or for those most relevant to their interest (e.g. health, agriculture) [see FM Table 2.2]</p> <p>Interpretation of data reported as mutually exclusive categories may not match user interest in field relatedness, e.g. for ICT work in applied engineering contexts.</p>
INTBRK_SEO	<p>Breakdown by Socio-economic Objectives (SEO)</p> <p>Please report the share of your company's R&D expenditure (INTRD_BERD) that corresponds to the following Socio-Economic Objectives (SEOs):</p> <p>[FM Table 12.1 (full excluding GUF or partial) or list based on compatible national classification]</p>	<p>Breakdown= mutually exclusive categories</p> <p>For countries wishing to apply this breakdown to R&D expenditures, the FM recommends following a distribution based on NABS (or compatible national classifications) to ensure some level of international comparability. Clarify that categories are mutually exclusive.</p> <p>Not collected systematically for the BES [see FM 7.6 and 12.4] although there is a growing interest in some areas of application which may overlap with SEOs [see also INTBRK_APPL], so some recommended categories could be highlighted</p> <p>Can also consider a Y/N question for some/all categories, without a full breakdown of R&D expenditure.</p> <p>In countries with a significant amount of defence-related R&D (particularly if it is carried out within the BES), a recommended breakdown Civil/Defence R&D should be considered (as for GOVERD) [see FM 4.5 and 8.4]</p>

4.2. Notes

[1] An example is R&D to design a new electronic component that could either be reported in the industry that reflects the product field, i.e. “Manufacture of computer, electronic and optical products” (ISIC Rev.4 division 26) or the industry of use (e.g. transport equipment).

[2] See <https://doi.org/10.1787/085e0151-en>.

[3] Including in the context of the UN Sustainable Development Goals (SDGs).

[4] An AI system is defined in the OECD AI principles as a machine-based system that is capable of influencing the environment by producing recommendations, predictions or other outcomes for a given set of objectives. It uses machine and/or human-based inputs/data to: i) perceive environments; ii) abstract these perceptions into models; and iii) use the models to formulate options for outcomes. AI systems are designed to operate with varying levels of autonomy (OECD, 2019). Proposals for questions on AI R&D are expected to be developed by NESTI.

5. Sources of funds for the company's R&D performance (SRCS)

This section includes questions that aim to capture the sources of (intramural) R&D funding as recommended in the FM. The questionnaires should also include various clarifications, definitions, and examples to assist firms. This section also includes some elements that are not strictly speaking sources of funds for intramural R&D but refer to income connected to R&D activity or assets.

5.1. Question items

5.1.1. Core question on sources of funds for R&D

Code	Reference question(s)	Comments for questionnaire developers
SRCS_TYPE (Core source of funds question)	<p>What part of your company's total estimated costs of R&D performance in year YYYY [recall total BERD figure] were directly funded by others?</p> <p>To the best of your ability, please break down your company's R&D performance costs by the following sources of funding, excluding overheads and profit margins in excess of R&D performance costs, funds for R&D that you have outsourced, as well as funded amounts that need to be repaid</p> <p>A. Funds provided by unrelated (arms-length) external parties with the explicit objective of funding R&D performance (i.e. earmarked for R&D your company has carried out)</p> <ul style="list-style-type: none"> • Non-affiliated companies within the country • Non-affiliated companies outside the country • National, regional or local government institutions, excluding anticipated tax credits or allowances [Code: SRC_GOV] • Foreign government and public international organisations (e.g. EU programmes) • Other institutions (non-profits, Higher Education institutions) (domestic and abroad) <p>B. Funds provided by affiliated businesses (affiliates, parents, or business with other affiliation linkages)</p> <ul style="list-style-type: none"> • based in the country • based abroad <p>C. The residual leftover amount represents the component of R&D performance that is funded by your own company through its own resources, which may in part originate elsewhere.</p> <p>That includes: Internal company funds discretionarily allocated by the business to R&D (residual), resulting e.g. from retained earnings, advances on sales, raised equity or debt, general intra company loans or past or expected tax credits and allowances.</p>	<p>Questionnaire developers should note a number of elements of guidance around the reference question and its components.</p> <p>It is helpful to clarify to respondents that this section aims to identify the general provenance of funds contributing to the R&D performance by the firm, with particular emphasis on sources external to the domestic firm.</p> <p>The questionnaire can provide some additional indication about the notion of "directly funded", namely along the lines of the definition:</p> <p>"Being provided by others to the firm towards meeting the costs of the R&D it has carried out" – notion of earmarked funds received for R&D.</p> <p>The notes may also point to concrete exclusions in line with the methodological points in section 2.1. "Please exclude funds that are expected to be repaid and expected tax rebates".</p> <p>The proposed approach begins by identifying various possible external sources of funding, leaving internal sources as a residual leftover amount. This can be adjusted by focusing first on the most common sources, although care should be taken that respondents fully consider all of them and attempt to provide reliable data or estimates for each.</p> <p>Accounting data on funding sources may include overheads and profit margins that may not align with</p>

Code	Reference question(s)	Comments for questionnaire developers
	Excludes internal (and other) funds used to purchase extramural R&D (see Section 4)	<p>performance cost estimates. It is therefore important that respondents try to align with the R&D performance estimates previously reported/obtained.</p> <p>Foreign funding from various sources can be aggregated ex-post from data collected to identify the broader category “Rest of the world” [see FM 7.6 and 11.3]</p> <p>Clarify distinction between internal funds and those from affiliated firms, which should be reported separately as external funding (if possible)</p> <p>It is important to provide guidance on how to deal with funds originating from outside the firm that are hard to attribute to any of the specific categories, for instance in the case of funding received from private-public consortia.</p> <p>It is possible to include examples of internal funds: retained earnings, sales of (non-R&D) products, raised capital, deductions from income tax liabilities from past R&D activities, etc. [see FM 4.3]</p> <p>Can include more detailed breakdowns by type of sources (e.g. equity, loans, etc.)</p>

Nature of funds received from [domestic] government

Code	Reference question(s)	Comments for questionnaire developers
SRC_GOV_TRANSF	<p>If your company receives any form of funding connected to R&D performance from domestic government institutions, please report its value as follows:</p> <p>[Code: SRC_GOV_TRANSF- transfer funds] Value of grants for R&D and other contributed amounts provided without expectation of reimbursement or provision of services in return.</p>	<p>This question is the proposed implementation of the distinction between transfer / exchange funds for government funding [see FM 4.3 and 7.6]. It may not be appropriate to refer to such terms as such in a survey, hence the preference to alluding to R&D grants and contracts for R&D services.</p> <p>Questionnaires may be adapted to better reflect the domestic provision of R&D funds by government and to clarify how to deal with specific schemes and funding sources. When specific government funders or programmes are of one type or another this does not represent any problem, but if that is not the case, a detailed funder/programme</p>
SRC_GOV_EXCH	<p>[Code: SRC_GOV_EXCH – exchange funds] Value of R&D performance explicitly funded by contracts for the provision of R&D services to government institutions.</p>	
	<p>[Code: SRC_GOV] The sum of the two entries should equal the value reported for domestic government above.</p>	

SRC_GOV		approach may make it impossible to separate TRANSF and EXCH.
Alternative with level of government information embedded	<p>Code: SRC_GOV_TRANSF_CENG] Value of grants for R&D and other contributed amounts provided by central government institutions without expectation of reimbursement or provision of services in return.</p> <p>[Code: SRC_GOV_TRANSF_REG] Value of grants for R&D and other contributed amounts provided by regional / local government without expectation of reimbursement or provision of services in return.</p> <p>[Code: SRC_GOV_EXCH_CENG – exchange funds] Value of R&D performance explicitly funded by contracts for the provision of R&D services to central government institutions.</p> <p>[Code: SRC_GOV_EXCH_REG – exchange funds] Value of R&D performance explicitly funded by contracts for the provision of R&D services to regional/local government institutions.</p> <p>[Code: SRC_GOV] The sum of the four entries should equal the value reported for domestic government above.</p>	One possible derivation of SRC_GOV_TRANSF and SRC_GOV_EXCH breaks each down by the level of domestic government, according to the country's specific nomenclature. This is effectively the model adopted in Canada and the United States.

5.1.2. Other funds and support from government

Code	Reference question(s)	Comments for questionnaire developers
EXTRA_SRC_GOV	<p>Funds received from government for outsourced R&D</p> <p>In YYYY, did your business receive government funds, as grants or contracts, for R&D that your business outsourced to a third party? Please report how much.</p>	<p>For completeness, surveys may consider including this item which does not directly map onto the business's intramural R&D but is still relevant at the level of microdata for analysis.</p> <p>It is suggested to exclude funds that the firm simply administers and distributes according to predefined rules in contexts such as R&D consortia. In those cases, it is expected that the actual performer would be capable of identifying the provenance of funds as originating in government.</p>
SRC_GOV_IND_RDTAX	<p>Indirect support received from government</p> <p>Did your company receive or expect to receive any tax credits or allowances for R&D costs, internal or outsourced, that it incurred in year YYYY, in terms of foregone taxes or possible refunds?</p> <p>If so, what was or is expected to be the combined value of such tax benefits?</p> <p>[In the case of countries with IP regimes in place – add following note] Please exclude tax benefits that may arise from a more favourable</p>	<p>In order to obtain information from firms of high policy and research relevance on other forms of support, it is recommended to implement separate questions on this subject after securing information on direct sources of funding. Since it is indirect R&D support that is being measured in this case, no attempt is made to distinguish between support used for R&D by the firm or outsourced to third parties.</p>

Code	Reference question(s)	Comments for questionnaire developers
	<p>tax regime for income generated as an output to your past R&D activity]</p>	<p>This represents a meaningful mechanism for identifying tax support for R&D as received by the firm. Since the reference period is YYYY the survey is likely carried out in YYYY+1, by which time it may have some expectation about the size of the tax rebate or eventual refunds, but it is still possible that the tax position of the firm for that year may not have been finalised. Indeed, the challenge with this question is that the survey may be carried out before the exact amount is known. An alternative might be to ask about the value for reference year YYYY-1 for actual amounts, settling for a qualitative measure (yes/no) in YYYY.</p> <p>A separate type of support that would require special accommodation is the entitlement to tax benefits that arise from outcomes of the R&D activity of the firms, as in the case of IP regimes that lower the corporate tax rate of firms for income considered to meet specific conditions. A hybrid type of regime concerns situations in which companies meeting a specific R&D intensity threshold may be eligible to a more favourable tax conditions on their total income. In both cases, these are incentives that are not directly connected to a specific volume of R&D activity, so they fall outside the scope of this document's recommendations.</p>
SRC_GOV_IND_PROC	<p>Government procurement of goods or services supporting R&D</p> <p>Did your company fund its own or external R&D activity out of general government procurement contracts for goods or services in year YYYY?</p> <p>If so, what was the value of those contracts that the company allocated to R&D?</p>	<p>The proposed text suggests asking for both a Y/N reply, as well as estimates for the amount of indirect funding through various means, since it is acknowledged that some firms may not be able to easily separate such funding from their own funds.</p>
SRC_GOV_IND_FIN	<p>Other government financing for R&D</p> <p>In year YYYY, did your company obtain any equity or loans from government institutions, or obtained government guarantees for private capital, to help finance its own or outsourced R&D activity?</p> <p>If so, please report what was the gross value of the financing made available, without netting out repayments, interest, charges or dividends paid.</p>	<p>In this case, it is proposed that the gross amount is requested since this is the value most easily reported by the firm.</p>

5.2. Income from R&D services or assets

Code	Reference question(s)	Comments for questionnaire developers
SRC_INCOME_RD	<p>What was your company's gross income, if any, for R&D services provided by your company to other parties in YYYY?</p> <p>If so, how much was from?</p> <ul style="list-style-type: none"> • Affiliated businesses (domestic/abroad) • Non-affiliated firms (domestic abroad) • Other (e.g. Government) 	No strong FM recommendation [see FM 4.3]. For cross-border trade in R&D services, the FM recommends using other sources such as surveys of international trade in services, or Balance of Payments (BOP) [see FM 11.5]
SRC_INCOME_ASSETRD	<p>What was your company's income, if any, for selling or licensing rights to use your company's IP arising from its R&D portfolio?</p> <p>How much of this amount corresponded to buyers based in different countries?</p>	<p>Important for tracking reasons of R&D asset consolidation separately from performance.</p> <p>Consider splitting affiliated and non-affiliated.</p> <p>The income question has also an expenditure equivalent for company acquisitions.</p>

6. Payments for external performance of R&D (Extramurally-performed R&D) (EXTR)

These questions cover payments for the external performance of R&D. They are connected to answer to question INTRD_EXTRD. Practitioners indicate it is important to isolate the extramural component early on in the survey process. Most countries derive the detail however only after requesting the key intramural breakdowns, hence the position of this section in the document.

Code	Reference questions(s)	Comments for questionnaire developers
EXTR_AMT	<p>Please report your company's payments to others in YYYY earmarked for their performance of R&D. This may comprise the:</p> <ul style="list-style-type: none"> a) purchase of R&D services, excluding payments for services where the provider does not assume responsibility for the co-design and implementation of the research work b) contributions to collaborative R&D work on which your business may have a stake, as well as contributions for R&D performance in affiliated businesses, domestic and abroad c) levies and membership-related contributions to industry R&D institutes and facilities d) philanthropic donations for third party R&D activity (e.g. universities or hospitals) in which your company has no direct stake. <p>Please exclude amounts initially provided by third parties that your business is just passing through to others.</p>	<p>Clarify distinction with intramural [see FM 4.2]</p> <p>Be explicit in highlighting it has to be earmarked for R&D. Funds that the recipient may not end use for R&D (indirect funding) not meant to be included.</p> <p>Consider being explicit in excluding amounts that are expected to be repaid.</p> <p>Consider examples.</p> <p>Category d is the only one considered in BE to represent transfer funds.</p>
EXTR_DEST	<p>Please break down any payments for externally performed R&D by type of ultimate recipient (domestic and abroad):</p> <ul style="list-style-type: none"> • Enterprises in the same group / include cost sharing contributions: <ul style="list-style-type: none"> ○ Domestic ○ Abroad • Other domestic enterprises, including joint ventures with other parties, if your company does not have a majority stake • Government research and development organisations • Higher Education institutions in the country • Other domestic • Other abroad (different types) 	<p>Should align with FM categories [see FM 7.7]</p> <p>Clarify flows between affiliated companies [see FM 4.3]</p> <p>Distribution of EXTR_DEST should add up to EXTR_AMT, including other and non classified.</p>
EXTR_PROJ	<p>What is the projected amount of such payments for year YYYY+1 (year after survey reference period t)</p>	<p>This information should help make sense of comparisons with publicly reported business R&D expense amounts</p>

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EXTR_IP_COST	<p>What was your company's expenditure in YYYY, if any, for buying or licensing-in rights to use another party's IP arising from its pre-existing R&D portfolio?</p> <ul style="list-style-type: none"> - IP costs incurred as component of your company's R&D - Other IP costs not qualifying as R&D. <p>How much of this amount corresponded to sellers based in different countries?</p>	<p>Important for tracking reasons of R&D asset consolidation separately from performance. Consider splitting affiliated and non-affiliated.</p> <p>Note: some but not all of these expenditures may be part of intramural R&D, current and capital, if they contribute to the R&D of the firm. Some companies count as R&D expense the cost of acquiring R&D assets from other parties.</p> <p>This question has income counterpart that is included inside section on Sources of funds.</p>
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7. R&D personnel (PERS)

This section can be introduced to respondents as a section dedicated to the human resources of the business that contribute to its R&D effort. It includes questionnaire items for Total R&D personnel, as well as breakdowns related to personnel characteristics (e.g. sex, function, education), and other human resource features (e.g. geographic location). An over-arching issue is the appropriate terminology to use for questions on R&D personnel since there are concerns that some of the FM terms (e.g. researchers, technicians) may not be fully understood by respondents, or may need further clarification and possibly adaptation. Survey practitioners should be sensitive to the alignment with R&D labour expenditure figures.

Code	Reference item(s)	Comments for questionnaire developers
PERS_INTRO	<p>[Explain types of potential contributions to R&D effort, esp. from a functional perspective so there is clarity about the scope (see Annex material below). Give examples of R&D roles including part-time roles.]</p> <p>[Allude also to different possibilities of contractual relationship to the business as either internal to the business (owners/managers/employees), whose costs have been reported as labour costs above, or external (individuals contracted to provide a service or working for organisations contracted by the business to provide a service). Clarify that these categories refer to personnel supporting intramural R&D, and are distinct from human resources linked to any extramurally performed R&D.]</p> <p><i>Does your company keep records on the human resources that contributed to its R&D effort in YYYY?</i></p> <p>[Provide definitions of units with examples: Headcounts and Full-time equivalents (FTEs). Explain differences and reasons for using each with different breakdowns, in particular for the BES - see FM 5.3]</p> <p>[Define / elicit the unit/scope of reporting, favouring representative annual average data and full-time equivalents when appropriate, allowing "representative" or fixed point in time reports if no alternative is possible.]</p>	<p>Question to be asked to firms that report internal R&D activity.</p> <p>Can link to R&D cost categories: labour costs for internal R&D personnel, other current costs for external R&D personnel [see FM 4.2]</p> <p>Highlight main categories with examples [see FM Tables 5.1 and 5.2]</p>

7.1. Core human resource R&D indicators

The proposed questions start with the core R&D personnel indicators (in both FTEs and HCs), separately for internal and external personnel, obtained by highlighting explicitly the functions that are considered eligible R&D personnel, which in this guide have translated into more business-friendly concepts (see annex at the end of this section). A noted problem with BERD surveys is that business researchers in several domains are under-reported as researchers because of the academic connotations of the terms (lack of connection with experimental development). Total R&D personnel totals and functional components can be obtained by adding the respective internal and external components, helping to clearly identify which companies cannot report on specific categories.

Code	Reference questions(s)	Comments for questionnaire developers
<p>PERS_INT_FNCT_HC/FTE</p> <p>Categories adding up to PERS_INT_HC/FTE</p>	<p>Please report the internal personnel of the business contributing to its internal R&D effort (FM internal R&D personnel) under the following possible functions:</p> <ul style="list-style-type: none"> • R&D managers and professionals [standing concept for FM concept of researchers] [None, HC, FTE] • Scientific, engineering, and technical personnel supporting R&D implementation [standing for concept of Technicians and equivalent staff in FM] [None, HC, FTE] • Ancillary R&D support personnel [standing for concept of Other supporting staff] [None, HC, FTE] <p>The sum of these three functions corresponds to your business internal R&D personnel. [None, HC, FTE]</p> <p>[can include definitions, “translations” and examples for each category]</p>	<p>Align with FM categories [see FM 5.2], can reference the FM concepts and definitions, while using language that facilitates understanding (see Annex within this section)</p> <p>Emphasis is made in arriving at relevant personnel indicators through the addition of component functions, which if respondents cannot provide separately, they should at least be able to take note of before providing the corresponding sum.</p> <p>It is important for quality assessment and international comparisons to understand when companies might be under- or over-reporting ancillary R&D support personnel.</p> <p>The questionnaire may recall that employment costs of internal personnel should broadly correspond to the R&D labour costs reported in INTRD_INTR_BERD_LAB</p>
<p>PERS_EXT_FNCT_HC/ FTE</p> <p>(Breakdown lower priority given reporting challenges)</p> <p>Categories adding up to PERS_EXT_HC/FTE</p>	<p>Please report the number of individuals that are external to the business (neither proprietors nor employees) but contribute to and are integrated in the internal R&D activity of the firm (external R&D personnel) under the following possible functions:</p> <ul style="list-style-type: none"> • R&D managers and professionals [standing for FM concept of researchers] [None, HC, FTE] • Scientific, engineering, and technical personnel supporting R&D implementation [standing for concept of Technicians and equivalent staff in FM] [None, HC, FTE] • Ancillary R&D support personnel [standing for concept of Other supporting staff] <p>The sum of these three functions corresponds to your business external R&D personnel. [None, HC, FTE, Do not know]</p> <p>The cost of engaging these individuals is not part of the responding firm’s labour costs but it should be reflected as the cost of a service supporting your internal R&D under other</p>	<p>This breakdown may be more challenging for companies to report given a potential lack of HR records as engagement is based on service contracts or other non-employment-based modalities.</p> <p>Some countries may prefer not to ask about the functional breakdown if a large proportion of firms do not have records about external R&D personnel.</p> <p>Additional distinction between permanent / temporary employment also mentioned in FM, but rarely found in surveys</p> <p>Ensure consistency with FM guidance [see FM 5.3] FTEs should be prioritised for PERS_EXT because HC of external personnel may be HC of internal personnel of other R&D units.</p>

Code	Reference questions(s)	Comments for questionnaire developers
	current costs of R&D performance INTRD_INTR_BERD_OTHC. [can include definitions, “translations” and examples for each category]	
PERS_TOTAL_HC PERS_TOTAL_FTE PERS_EXT_FNCT HC/ FTE	Your total R&D personnel is the sum of internal and external R&D personnel PERS_INT_HC/FTE PERS_EXT_HC/FTE: <ul style="list-style-type: none"> • R&D managers and professionals [standing for FM concept of researchers] [HC, FTE] • Scientific, engineering, and technical personnel supporting R&D implementation [standing for concept of Technicians and equivalent staff in FM] [HC, FTE] [HC, FTE] • Ancillary R&D support personnel [standing for concept of Other supporting staff] [HC, FTE] 	In line with FM guidance [FM 5.2, 5.4 and 7.5], the total R&D of the unit includes internal and external R&D personnel who contribute to intramural R&D. This item should be preferably the result of adding the previous internal and external items. Some countries may prefer not to separate and they can derive the functional breakdown for total R&D personnel but they should be extremely careful in particular in the application of criteria with respect to external ancillary R&D support personnel, which if reported with error can distort comparative analyses. E.g. onsite cleaning and admin personnel working for contracted agencies. PERS_TOTAL_HC for a unit will include HC potentially reported by other R&D performing units. Additional note / note of caution. The sum of PERS_TOTAL_FTE across firms may overstate the the number of R&D personnel. This may also apply in FTE levels as the same FTE may be reported as internal by one firm and as external by another.

Primary breakdown on sex

Code	Reference questions(s)	Comments for questionnaire developers
PERS_INT_FNCT _SEX_HC	<p>R&D personnel by function / occupation and sex:</p> <p>R&D managers and professionals [standing for FM concept of researchers] Men/women/Total.</p> <p>Scientific, engineering, and technical personnel supporting R&D implementation [standing for concept of Technicians and equivalent staff in FM] Men/women/Total.</p> <p>Ancillary R&D support personnel [standing for concept of Other supporting staff] Men/women/Total.</p>	<p>The focus should be on internal personnel but if possible also include external. The business may not have detailed information about the roles of service providers let alone their demographic characteristics.</p> <p>Data availability in a business survey will depend on the types of records collected by the company and reporting restrictions related to privacy. It may be only possible to collect binary information (men vs women or either vs total) at the level of a given firm. Non-binary categories may not be available for institutional reporting.</p> <p>Data compilers may also wish to check if data have been reported by the company on biological sex or on gender/gender identify.</p>
PERS_INT _SEX_FTE	PERS_INT_HC/FTE distributed by sex	Responds to interest in distinguishing differences terms of full and part time dedication to R&D among different sex groups of R&D personnel.

7.2. Breakdowns of indicators on human resources for R&D

For various breakdowns included below, the level of international reporting consistency is currently low. Therefore, the proposal seeks to focus references to **internal R&D personnel** (researchers and Total R&D personnel) in headcounts (consistent with FM stated priorities) and reduce the number of interactions of breakdowns to minimise respondent burden.

Code	Reference questions(s)	Comments for questionnaire developers
PERS_INT_CHAR_EDU_HC Possibly further breakdowns e.g. PERS_INT_CHAR_EDU_SEX_HC [by educational level and sex combined]	Researchers and Total R&D personnel by educational attainment or formal qualification ISCED (2011) levels: <ul style="list-style-type: none"> • Doctoral degrees (8) • Master's degrees or equivalent (7) • Bachelor's degree or equivalent (6) • Other tertiary level (5) • Other diplomas (1-4) [can include additional breakdowns such as sex]	Ensure consistency with ISCED (2011) levels [see FM 5.4] Although the FM recommends collecting information on various tertiary-level qualifications, the policy focus is on PhDs, so at a minimum this category should be collected separately (i.e. ISCED 1-4, 5-7, 8). Other national classifications may be used in addition to these, for example to track non-formal qualifications Clarify treatment of doctoral and master's level students (although less relevant for BES) [see FM 5.2]
PERS_INT_CHAR_AGE_HC Possibly further breakdowns e.g. PERS_INT_CHAR_AGE_SEX_HC [by age and sex]	R&D personnel and researchers by age: <ul style="list-style-type: none"> • Under 25 years • 25-34 years • 35-44 years • 45-54 years • 55-64 years • 65 years and over [can include additional breakdowns such as sex]	FM recommends six age categories, although countries will prioritise consistency with other demographic data at the national level [see FM 5.4] Low policy priority except for issues relating to an ageing workforce, which are mainly focused on HEIs and PROs
PERS_INT_CHAR_NAT_HC Possibly further breakdowns e.g. PERS_INT_CHAR_NAT_SEX_HC [by national characteristics and sex]	R&D personnel and researchers by geographic origin / nationality / immigration status Geographic origin: <ul style="list-style-type: none"> • Nationality (country) • Citizenship (national/foreign) • Country of birth (country or national/foreign) Additional criteria: <ul style="list-style-type: none"> • Country of previous residence • Previous occupation • Country of study at the highest level [can include additional breakdowns such as sex]	Various approaches to collecting information on the geographic origin of R&D personnel and researchers [see FM 5.4] Countries should prioritize whichever approach is better suited for policy interest and aligned with national practices, although at a minimum it is recommended to include a breakdown by citizenship (national/foreign) or country of birth (national/foreign) Additional criteria mentioned in FM are rarely applied

Code	Reference questions(s)	Comments for questionnaire developers
PERS_INT_HR_GEO_HC/FTE Possibly further breakdowns e.g. PERS_INT_HR_GEO_SEX_HC [by geographic location and sex]	R&D personnel by domestic geographic location, in line with questions on intramural R&D expenditure [see INTBRK_GEO] [can include additional breakdowns such as sex]	Personnel are easier to link to location than expenditure, hence a more reliable indicator of the spatial distribution of R&D activities (whether focusing on regional, or globalisation-related aspects). There should be consistency in the reporting of these items (e.g. with R&D labour costs) For this breakdown, units could be headcounts or FTEs.

7.3. Annex material on translation of R&D personnel terms to business language

FM term for R&D personnel function	Problem / issues	Proposed terminology for business reference survey	Extended clarifications
Researchers	In the business sector, most of researchers do not do research but actually take care of (experimental) development projects. The term is already absent from many business surveys.	R&D managers and professionals [i.e. R&D planners and managers]	R&D managers, engineers, scientists, programmers, designers and other professionals with responsibility for the formulation, planning, and/or oversight of R&D programmes, projects or significant parts thereof. The presence of one of these individuals within the firm is necessary for the identification of R&D activity within the company. Some examples may be provided.
Technicians and equivalent	The term is not aligned with reality that many individuals on this function are actually software programmers, etc... These are the professionals who get the R&D work done without being engaged on its design/conception hence the functional focus is on implementation of R&D project tasks.	Scientific, engineering and technical personnel supporting R&D implementation [i.e. R&D project tasks implementers]	Other R&D engineers, technicians, scientists, programmers, designers and other equivalent personnel, in charge of implementing R&D project tasks of a scientific or technical nature under the guidance of, or as specified by R&D managers and professionals. Equivalent to "Assistant professional" category in ISCO. Some examples may be provided.
Other supporting staff	No reference to R&D in the term. It therefore leaves considerable room for ambiguity.	Ancillary R&D support personnel [i.e. R&D enablers]	Personnel in charge of clerical and administrative tasks directly enabling internal and external R&D activities. Some examples may be provided for clarification.

8. Globalisation, energy R&D and other special topics

8.1. Globalisation: R&D and multinationals (MNE)

This section covers more detailed items used to measure R&D globalisation and the R&D activities of MNEs. In addition to current FM guidance (Chapter 11), the terminology and proposals also consider ongoing NESTI work on R&D globalisation aiming at assessing the practical implementation of this guidance in R&D surveys across countries.

Code	Reference question(s)	Comments for questionnaire developers
MNE_PAR MNE_FCA MNE_CAA	<p>Is the business part of a multinational enterprise (MNE)? [Filter question see Section 1]</p> <p>If so, is the business a parent (domestic) [i.e. it controls affiliates abroad], or a foreign-controlled affiliate (FCA) [i.e. its parent company is abroad]?</p> <p>[Provide definitions of: MNE, MNE parent, foreign affiliate, control/majority-owned affiliate, foreign-controlled affiliate, controlled affiliate abroad (CAA), etc.]</p> <p>[variable can have 3 values: e.g. 0 for not part of an MNE, 1 for parent, 2 for foreign-owned affiliate]</p>	<p>These screening questions help classify businesses in order to produce data on cross-border R&D funding flows and the R&D activities of MNEs [see FM 11.2 to 11.4] This information is already effectively captured in Section 1.</p> <p>In particular, the focus should be on enabling reporting data on R&D costs for MNEs / non-MNEs, with a further breakdown for MNEs between MNE parents and FCAs.</p> <p>Regarding the R&D funding of MNEs, a further distinction can be made between sources inside the compiling country (affiliated or not) and the Rest of the world (affiliated or not). [see FM Figure 11.2]</p> <p>Depending on the level of detail collected, this screening question could be included earlier in the questionnaire (Section 1). If the country collects additional information/breakdowns (see below), it may be preferable to include a specific section on globalisation in BERD survey questionnaires</p>
MNE_CAA_CTRY	<p>(Applicable only to MNE parents with affiliates abroad)</p> <p>Intramural R&D expenditure (total or current costs) of CAA by country</p>	<p>FM recommends that MNE R&D statistics be tabulated by the country of ultimate control and broken down by the country of location of controlled affiliates abroad (CAA), particularly if other MNE statistics are already published on this basis [see FM 11.4] although this may be better suited for other business surveys (e.g. FDI).</p>
MNE_CAA_COST MNE_CAA_SRCS MNE_CAA_TURN MNE_CAA_PERS_TOTAL_HC etc.		<p>Additional variables covering the R&D activities of CAA can be included in R&D (or other) surveys. Some examples used in some national R&D surveys include: R&D expenditure by type of costs (if collecting data on total intramural R&D, and not only current costs) [see INTBRK_COST] Sources of funds for R&D [see SRCS_INTRA_TYPE] Share of R&D performed by CAA that was sold to others (affiliated/non-affiliated) Total R&D personnel in CAA</p>

8.2. Other special R&D topics (SPEC)

This section (*work in progress*) includes various special topics which are not consistently included in BERD surveys but are outlined here in order to facilitate comparability for countries wishing to include such questions.

Code	Reference question(s)	Comments for questionnaire developers
SPEC_OUTP	<p>[questions on outputs from R&D activity such as:</p> <p>Patents</p> <p>Other IPRs (trademarks, copyrights, industrial designs, etc.)</p> <p>IT related: software, databases, etc.]</p> <p>Examples: Did your business [register / apply for] any [patent / trademark / etc.] as a result of its R&D activities in year YYYY? How many patents does your company currently hold? Did your business receive any payments for the use of its patents? Did your business make any payments to purchase/license [patents / trademarks / etc.] to affiliated / non-affiliated businesses or organisations as part of its R&D activities in year YYYY?</p>	<p>These can include binary questions [Y/N] as well as more detailed questions on the frequency of various outputs (e.g. number of patents), or whether these relate to transactions with affiliated firms. They can cover outward (purchases) or inward flows (payments received). Information on patents and other IP-related costs can also appear in connection with a breakdown of intramural R&D by type of costs.</p>
SPEC_IMPACT	<p>[questions on the impact of external factors on R&D activities such as:</p> <p>COVID-19</p> <p>Financial conditions</p> <p>Other...]</p> <p>Examples: Has [external factor] had a measurable impact on your business's R&D activities [Y/N]? Has [external factor] led to an increase/decrease in your R&D expenditures [or intramural R&D] for year YYYY? Can you estimate the amount/percentage change? Do you expect this to be a temporary or sustained change? Please explain Has [external factor] led to changes in the organization of your business's R&D activities? (e.g. outsourcing, collaborative R&D, etc.). Please explain</p>	<p>These can cover quantitative impacts in terms of changes in R&D expenditure/personnel, as well as other qualitative impacts (e.g. relocation of R&D activities, internal reorganisation, outsourcing, collaborative arrangements, etc.), particularly for MNEs and large R&D performers. These questions are usually phrased in terms of factors with negative impacts, but can also be used to assess those with positive impacts (e.g. R&D tax credits or other public support mechanisms)</p>
SPEC_COLLAB	<p>[questions on R&D collaboration such as:</p> <p>Use of collaborative arrangements for R&D activities [Y/N]</p> <p>Types of partners (affiliated/non; domestic/abroad)</p> <p>Types of arrangements]</p> <p>Examples: Does your business engage in formal collaboration arrangements on R&D activities</p>	<p>The most commonly used questions cover the use of collaborative arrangements (usually some examples are listed), the types of partners (in particular whether they are affiliated with the respondents), and the geographic location of these partners.</p>

Code	Reference question(s)	Comments for questionnaire developers
	<p>with other businesses? With businesses in your country / abroad? If so, what types of partners? (domestic and abroad)</p> <ul style="list-style-type: none"> • Affiliated businesses • Unaffiliated businesses such as vendors, competitors, commercial labs, etc. • Higher Education institutions • Government / public research institutions <p>Did your business make payments as part of these collaborative R&D activities? What percentage of your R&D expenditure involves collaborative arrangements with other organisations?</p>	

8.3. Energy-related R&D (ENER)

This section adapts Canada's survey model for energy related R&D, with categories aligned to IEA guidance.

Code	Reference question(s)	Comments for questionnaire developers
ENE_RD	<p>In XXX 2019, did the business's total in-house and outsourced (contracted out or granted) R&D expenditures include energy-related R&D in the following categories? If so, what were the business in house expenditures on (exclude capital depreciation)?</p> <p>Fossil fuels: crude oils and natural gas exploration, crude oils and natural gas production, oil sands and heavy crude oils surface and sub-surface production and separation of the bitumen, tailings management, refining, processing and upgrading, coal production, separation and processing, transportation of fossil fuels.</p> <p>Renewable energy resources: solar photovoltaics (PV), solar thermal-power and high-temperature applications, solar heating and cooling, wind energy, bio-energy - biomass production, bio-energy - biomass conversion to fuels, bio-energy - biomass conversion to heat and electricity, and other bio-energy, small hydro (less than 10 MW), large hydro (greater than or equal to 10 MW), other renewable energy.</p> <p>Nuclear: materials exploration, mining and preparation, tailings management, nuclear reactors, other fission, fusion.</p> <p>Electric power: generation in utility sector, combined heat and power in industry and in buildings, electricity transmission, distribution and storage of electricity.</p> <p>Hydrogen and fuel cells: hydrogen production for process applications, hydrogen production for transportation applications, hydrogen transport and storage, other hydrogen, fuel cells, both stationary and mobile.</p> <p>Energy efficiency: industry, residential and commercial, transportation, other energy efficiency.</p> <p>Other energy-related technologies: carbon capture, transportation and storage for fossil fuel production and processing, electric power generation, industry in end-use sector, energy systems analysis, all other energy-related technologies.</p>	<p>These can include binary questions [Y/N] as questions on the actual expenditure (in-house).</p>

9. Additional information on the R&D survey questionnaire completion (QUEST)

This section includes questions aimed at collecting feedback from respondents regarding the survey. These are generally collected in the final part of the questionnaire or in an Annex.

Code	Reference question(s)	Comments for questionnaire developers
QUEST_COMMENTS	Provide comments and suggestions on the questionnaire	
QUEST_TIME	Estimate the time taken by all people within your business to compile replies and complete the survey	

Depending on the instrument utilised, the survey may enquire on the ease for the company to provide the requested information, by section or item, inviting further open comments or clarifications.

Several practitioners indicate that there is a strong visualisation merit in questionnaires that compress most quantitative information survey collection to one or two pages. A potential takeaway from that for practitioners using longer digital survey forms to ensure that respondents follow guidance and provide the necessary detail is to offer at the end of the survey a type of business R&D dashboard that enables examination and review by the respondent.

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Annex A. Key concepts and issues on measuring R&D flows from government to firms

This annex material provides additional background and explanations for the guidance contained under the section on sources of funds [SRC].

Funding R&D vs other activities

A practical challenge when defining governments support for R&D from the perspective of the beneficiary firms as they respond to surveys stems from the very challenge of **differentiating R&D from other business activities** for which (or in connection with) they may receive some form of government support. The OECD/NESTI guidance emphasises the importance to make this point clear in an upfront fashion to survey respondents. This, as explained below, is why the measurement largely focuses on the sources of funds for the R&D that is undertaken by the firm.

Business and government

It is important to recall that business R&D surveys cover both **private and public enterprises**, the latter being those under government control but which, by virtue of operating in the market and charging economically significant prices for their products, can be differentiated from other forms of government institutions. In market economies there is a tendency when examining data about businesses to assume that all firms are under private ownership and to assume special funding arrangements exist between government and all types of public enterprises. This is an important point of caution, especially for mixed, transition, planned and other economies where the state plays an important role in economic production through its ownership and effective control of major enterprises. The Frascati manual recommends providing breakdowns of business R&D statistics on the basis of this private/public dimension, although unfortunately countries do not yet report indicators on such basis.

It may be more difficult for firms to **discern the provenance of funds** and attribute them to government or other sectors. Funds for R&D performed by a given firm may come from public enterprises. Such funds, while they technically originate from the public sector, do so from market-based activities and should not be treated as government funds unless the provider of the funds, although legally constituted as corporation, may effectively operate as a government institution and should be reclassified.

In addition to this, although in many countries a significant part of higher education institutions are part of government, this should not be taken for granted and, by convention, funds from the higher education sector for R&D in firms, are by convention treated as originating from the specially carved out sector in the Frascati Manual.

Levels of government

The term Government in the Frascati Manual measurement recommendations refers to the **domestic institutions of government that do not operate in the market**. The Government sector consists all units of central (federal), regional (state) or local

(municipal) government¹, including social security funds, except those units that provide higher education services or fit the description of higher education institutions where a distinct sector has been carved out. Countries differ in their internal allocation of R&D support responsibilities according to their constitutional set up. When there are shared responsibilities, R&D surveys can help illustrate in what ways central and regional and local government support differ from each other.

Foreign governments and international organisations are another type of government actor which can play an important R&D support role for business. They are all part of the broad “Rest of the world” sector, International organisations have as members either national states or other international organisations whose members are national states. They are established by formal political agreements between their members that have the status of international treaties; their existence is recognised by law in their member countries, and they are not subject to the laws and regulations of the country, or countries, in which they are located. **Supranational organisations** are a particular case, with the European Union as a particularly salient one. For the presentation of statistics, the unqualified use of the term government (or even public) is generally interpreted by users as referring to the domestic government (or public sector). It is therefore potentially misleading to combine domestic government and international government sources in country-by-country reporting without any distinction between them. In terms of data collection, the recommendations in this note focus principally on government sources and types of support. It is up to individual countries to decide whether they wish to apply the same recommendations for official R&D surveys to international government sources, but they should above all ensure an appropriate coverage of domestic R&D support and flag whenever government funding data span beyond national borders.

From direct funding to total support

The measurement of government support for R&D in business under BERD has been traditionally based on the identification of funds received *by the reporting unit* from government units *for* part or the totality of the R&D performed in a reference period. **This is the Frascati notion of direct funding for intramural R&D performance**, which places emphasis on the idea that **funds have to be intended for and used for R&D**. Funds therefore must have been provided with the intention of funding R&D performance, for otherwise the views of funders and performer received the funds might be at odds. One example of “**earmarked**”² government direct funding of business R&D include funds provided on a concessional (i.e. transfer) basis for an R&D project of the firm. But consistent with this definition, also funds provided in compensation for R&D project costs carried out on behalf of government would count as direct R&D funding. In such case, the funds are provided in exchange for a service (i.e. not concessional), for instance the intellectual rights to the outcome of the R&D, a new prototype, etc.

Instances where this earmarking condition applies arise when governments buy or promise to buy a new product for which the company may need to carry some R&D. The funds are not necessarily earmarked for R&D, unless these have been spelled out separately within a contract and are compensated for. The purchase of a good or service from a firm that requires a firm to conduct R&D would not count as direct funding except for the R&D

¹ It also includes all non-market non-profit institutions that are controlled by government units, which are not part of the Higher education sector, while as previously mentioned government-controlled market institutions are categorised as business enterprises.

² The term “earmark” refers to the designation of funds or resources for a particular purpose.

costs that the seller can charge the buyer for and can itemise separately. Likewise, a general investment in the equity of an R&D performing firm is not direct funding unless the equity injection is explicitly earmarked for R&D and separately itemised.

In addition to these conceptual elements, there are also **practical reporting conventions** such as excluding flows that are known to be reversed at a later stage with certainty or very high probability. This net approach is adopted in R&D statistics because otherwise **repayable advances** contributing to the cost of R&D performance would be recorded as positive funds for the receiving firm while repayments would in theory count as negative flows. The convention to this date on R&D reporting is to avoid this type of situation by excluding repayable advances from measured direct R&D funding. It would be necessary to have in place a more complex statistical reporting system to record both stocks (e.g. outstanding loans for repayment) and flows in both directions. Such a perspective, while challenging, may be more feasible from a funder's perspective than a performer-based reporting.

In the case of instances where companies can forego part of their tax liability in proportion to the R&D efforts, the position adopted in the latest edition of the Frascati manual was that they do not unequivocally meet the requirement that funds, as received, will be necessarily used for R&D performance, even if they act to reduce the expected cost to the firm of undertaking eligible R&D activities. Under many schemes in place across countries, funds only flow as negative adjustments to taxes due by firms, and are provided as a profit-contingent ex-post compensation for the R&D performance. For this reason, **R&D tax incentives** have been generally considered and described as indirect forms of support. When R&D tax relief schemes allow for refunds to companies if their tax liability is not sufficient large as an offset – as it is increasingly the case in particular for SMEs in many countries – these may be functionally closer to R&D grants as the certainty of receiving support increases considerably, closely resembling how deferred grants would work. However, given that the link is still not entirely direct because refunds may be then used as received for other purposes³, it was ultimately decided in the latest manual revision - as a *simplifying convention* - not to attempt to distinguish on the basis of types of scheme and treat all R&D tax support in a similar vein as other forms of indirect support. The distinctive aspect of this note is to provide some indication on how to capture elements of indirect support in addition and as complement to the traditional measures of direct support.

³ It is possible for instance for the firm to use these government refunds and tax savings to repay debt plus interest to a financial intermediary who advanced funds to the firm on the expectation of the R&D tax refund.

Box 1. Government support mechanisms in the Frascati Manual

The OECD Frascati Manual covers in its chapter 12 a range of different R&D support mechanisms, i.e. mechanisms where governments funds flow to different actors directly in connection to R&D activities:

- Government funds for government intramural R&D. While these directly support R&D in the government sector, they can represent indirect benefits to businesses.
- Provision of infrastructure and services for R&D performed by non-government parties.
- Payment for R&D services provided by other parties to government.
- R&D grants to parties other than government.
- Financial (debt/equity) investments supporting R&D
- Guarantees for loans financing R&D
- Tax relief for R&D expenditures

Source: Adapted from OECD (2015).

All these examples highlight two main relevant points for the scope and detail of measurement:

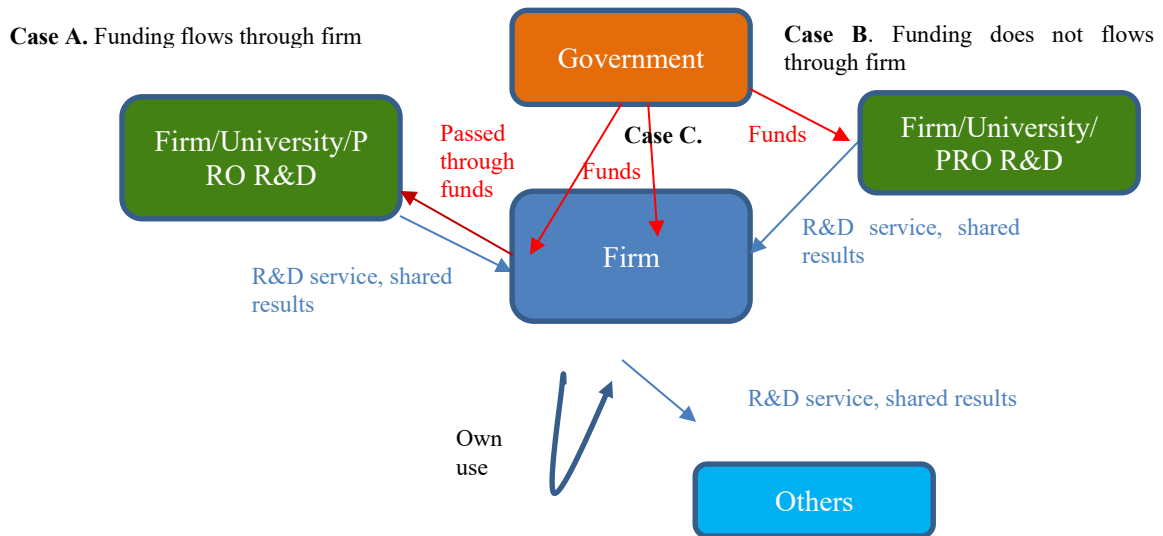
- Direct funding of R&D by government is a highly heterogeneous concept, embedding very different types of funding arrangements – it is not appropriate to describe it all as R&D “subsidies” as it is often done. The basic notion is that one refers to earmarked funds. Within those, measurement systems should attempt to capture the main distinctive dimension of transfer versus exchange-based flows.
- There are several types of indirect forms of R&D funding that can be particularly important, with different possible degrees of embedded subsidy. These are only partially covered in statistics, and require specific measurement approaches, including through survey questions that can prove effective at collecting relevant information.

Funding “extramural R&D”

Furthermore, the measurement of government funding is principally pursued from the perspective of identifying a component of business R&D performance. However, as the Frascati manual notes, government funds may be directed to R&D performance that is carried out externally to the firm, which still stands to benefit from it.

Therefore, if the conditions of funding allow for that, the reference firm may pass through government funds to other parties in the context of collaborative projects or with the purpose of outsourcing defined components of an R&D project (Case A in Figure 1 below, with reference firm in blue, passing through to actor in green on the left). Government may also provide the funds directly to the third party to provide services or share results with the reference firm (Case B in the same Figure). Case C depicts for completeness the case when the firm receives funds to be used for its internal R&D (in blue), the outcomes of which may be either for the firm itself or for others.

Figure 1. Stylised direct and indirect government support models for internal and external R&D



Note: In case A, the firm receives funds that passes through (in full or in part) to a third party which carries out R&D on its behalf or in collaboration. The funds received by the firm are fuds for extramurally performed R&D. In case B, the firm may not be exactly aware of the level of funds provided by government to the third party. It may be therefore not be reported as extramurally funded R&D by the firm, but for the third party, the resources received represent direct funding to their R&D performance.

Source: OECD own elaboration, based on Figure 4.1 OECD Frascati Manual