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Mapping Careers and Mobility of Doctorate Holders: Draft Guidelines, Model Questionnaire and Indicators – Third Edition

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MAPPING CAREERS AND MOBILITY OF DOCTORATE HOLDERS: DRAFT GUIDELINES, MODEL QUESTIONNAIRE AND INDICATORS – THIRD EDITION
THE OECD/UNESCO INSTITUTE FOR STATISTICS/EUROSTAT CAREERS OF DOCTORATE HOLDERS PROJECT

STI WORKING PAPER 2012/7

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Making the most of knowledge

MAPPING CAREERS AND MOBILITY OF DOCTORATE HOLDERS: DRAFT GUIDELINES, MODEL QUESTIONNAIRE AND INDICATORS – THIRD EDITION

THE OECD/UNESCO INSTITUTE FOR STATISTICS/EUROSTAT CAREERS OF DOCTORATE HOLDERS PROJECT

ABSTRACT

Human resources are recognised as being key to the creation, commercialisation and diffusion of innovation. Among them, doctorate holders are not only the most qualified in terms of educational attainment, but also those who are specifically trained to conduct research. In 2004, the OECD launched a collaborative project with the UNESCO Institute for Statistics and Eurostat aimed at developing internationally comparable indicators on the labour market, career path and mobility of doctorate holders.

This Working Paper presents the third edition of the technical guidelines used in the framework of the Careers of Doctorate Holders (CDH) project. The technical guidelines are composed of: *i)* the methodological guidelines; *ii)* a core model questionnaire and instruction manual; and *iii)* the output tables used for reporting data at the international level and related definitions. This third edition builds on the experience resulting from the two first large scale data collections, which were based on the previous editions of the technical guidelines released in 2007 and 2010. In addition to a number of basic adjustments, it proposes improvements in the wording of the survey questions as well as new ways to measure competencies and skills of doctorate holders both at the time of their advanced research degree completion and in their current employment.

The current draft has been funded by the EU Directorate for Research and Innovation as part of the 2011-2012 FP7 KNOWINNO project and is the result of discussions among the members of the CDH expert group. Its aim is to provide guidance to countries that wish to carry out dedicated surveys and produce internationally comparable indicators.

Making the most of knowledge

SUIVI DES CARRIÈRES ET DE LA MOBILITÉ DES TITULAIRES DE DOCTORATS : PROPOSITION DE DIRECTIVES, QUESTIONNAIRE MODÈLE ET INDICATEURS – TROISIÈME ÉDITION

LE PROJET OCDE / INSTITUT STATISTIQUE DE L'UNESCO / EUROSTAT SUR LES CARRIÈRES DES TITULAIRES DE DOCTORATS

RÉSUMÉ

Les ressources humaines ont un rôle déterminant pour la création, la commercialisation et la diffusion d'innovations. En particulier, les titulaires de doctorat sont à la fois ceux qui sont es plus qualifiés en terme de niveau d'éducation, mais aussi ceux qui ont été spécifiquement formés à la recherche. En 2004, l'OCDE a lancé un projet en collaboration avec l'Institut statistique de l'UNESCO et Eurostat ayant pour objectif de développer des indicateurs sur le marché du travail, les carrières et la mobilité des titulaires de doctorat comparables au plan international.

Ce document de travail présente la troisième édition des lignes directrices utilisées dans le cadre du projet sur les Carrières des Titulaires de Doctorat (CTD). Les lignes directrices se composent : *i)* des directives méthodologiques ; *ii)* d'un questionnaire modèle et manuel d'instruction ; et *iii)* des tableaux de sortie utilisés pour recueillir les données au niveau international et des définitions qui y sont associées. Cette troisième édition résulte de l'expérience acquise au cours des deux premières collectes de données de grande échelle, lesquelles étaient fondées sur les premières éditions des lignes directrices datant de 2007 et 2010. En complément d'un certain nombre d'ajustements de base, elles proposent des améliorations dans la formulation des questions de l'enquête, ainsi que de nouvelles pistes de mesure des compétences des titulaires de doctorat au moment de l'attribution de leur doctorat et dans leur emploi.

Ce document a été financé par la Direction générale de la recherche et de l'innovation de l'UE dans le contexte du projet KNOWINNO 2011-2012 du 7e Programme Cadre. Il est le résultat des discussions menées par le groupe des experts CDT. Il est destiné à guider les pays qui souhaitent mener une enquête dédiée et produire des indicateurs comparables au plan international.

TABLE OF CONTENTS

Background 6
Methodological guidelines 9
Core model questionnaire 35
Instruction manual for complementing the questionnaire 63
CDH output indicators tables 77
Variables in proposed output tabulations-definitions and sources 81

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Making the most of knowledge

MAPPING CAREERS AND MOBILITY OF DOCTORATE HOLDERS: DRAFT GUIDELINES, MODEL QUESTIONNAIRE AND INDICATORS – THIRD EDITION

THE OECD/UNESCO INSTITUTE FOR STATISTICS/EUROSTAT CAREERS OF DOCTORATE HOLDERS (CDH) PROJECT

Background

The Careers of Doctorate Holders (CDH) project was initially designed in the framework of the OECD activities on human resources in science and technology (HRST). Many studies have demonstrated the link between technological innovation and economic growth and highlighted the role played by highly skilled workers in a knowledge and technology based economy. As early as 1995, the OECD and Eurostat released a *Manual on the Measurement of Human Resources Devoted to S&T*, otherwise known as the *Canberra Manual*. This manual gives guidelines on the measurement of stocks and flows of HRST along various dimensions as well as on the data sources to be used. Because of the breadth and heterogeneity of the HRST population and as recommended in the *Canberra Manual*, focusing on certain subsets of this population was nevertheless deemed necessary.

In addition, the interest for certain skills and characteristics of specific populations has kept growing over the years. In particular, the 2004 meeting of the OECD Committee for Scientific and Technological Policy (CSTP) at Ministerial level urged the OECD to launch new work in the area of human resources in science and technology (HRST), notably "*Improving data on the development and mobility of human resources in science and technology: Using existing data sources and developing new statistical approaches, especially on mobility; Collecting and exchanging information on the career paths of holders of doctorates.*"

The training of doctoral graduates and of researchers is indeed a long and costly endeavour, and is regarded as essential in a knowledge-based and complex economy. Since 2000, doctoral awards have increased at the same pace as, and even slightly more rapidly than other degree awards. Doctoral graduates are considered the best qualified for creating, implementing and disseminating new knowledge and innovation. The question of the return on investment of such a long education and training is, however, a policy concern. Until recently, not much was known about the employment patterns of doctoral graduates. It is with this in mind that the OECD, together with the UNESCO Institute for Statistics and Eurostat, has, in response to the above 2004 Ministerial mandate, launched a project aimed at measuring the labour market outcome, career path and mobility of this highly qualified population in the framework of the CDH project. Particular effort in this project was also deployed for measuring international mobility.

After a thorough review of the user needs in terms of indicators, a network of experts, comprising official statisticians, worked at identifying the various data sources that could be utilised at national level to build registers of doctoral graduates or produce statistical data. The expert group also worked with the three intergovernmental organisations to develop the three components of the technical guidelines: a model survey questionnaire, methodological guidelines and a set of output tables for collecting data at international level.

After a pilot in 2005, two large scale data collections were conducted in 2007 and 2010 in which 25 countries participated each time and a rich set of data was made available and analysed.[1]

Over the 2011-2012 bienium, the OECD activity on CDH has been partly sponsored by the European Union's Seventh Framework Programme as part of the broad OECD KNOWINNO project. This supported the development of the CDH database and indicators, the exploitation of CDH micro data and the revision of the present guidelines.

In the context of the 2010 CDH data collection cycle, the OECD has attempted to encourage the use of microdata for purposes other than benchmark-type indicator construction and reporting, although participation in this strand of work was constrained to a limited number of countries. Co-ordinated microdata analysis can potentially secure policy relevant insights by discriminating between competing explanations for observed patterns of research demand and supply in a way that indicators cannot.

With very limited exceptions, CDH microdata remain by and large inaccessible to a very large pool of potentially interested researchers. Countries should seriously consider the possibility of (a) anonymised data being made available in standard research microdata repositories; (b) encouraging data linking to other information such as bibliometrics data from within secure data enclaves; (c) encoding available information such as company names to identify industrial activity codes and other information which are currently missing from most surveys' digitised data.

This working paper presents the third edition of the technical guidelines used in the framework of the CDH project. Numerous comments and interactions with the participating countries following the 2007 and 2010 data collections have allowed adjustments to be made to the definitions used, wording of the survey questions, presentation of the output tables, data to be reported and other methodological aspects. In particular, this edition has benefitted from in-depth comments from the participants to the 2011-2012 EU FP7 funded KNOWINNO project and presents new ways to measure competencies and skills of doctorate holders through their knowledge, attributes and behaviours both at the time of their advanced research degree completion and in their current employment.

This working paper is thus aimed at providing guidance to the countries that wish to participate in the next CDH data collection exercise. It is also expected that new experiences with the model survey and comparative analysis of the data, as they become available, will continue to shape the CDH guidelines in the future.

1. See *www.oecd.org/sti/cdh* for the complete set of indicators and analyses.

STATISTICS ON THE CAREERS OF DOCTORATE HOLDERS (CDH)

METHODOLOGICAL GUIDELINES

TABLE OF CONTENTS

1. INTRODUCTION 11
2. PURPOSE OF STATISTICS ON CDH 12
2.1 Why doctorate holders? 12
2.2 Needs expressed by users 12
2.3 The output harmonization approach 13
2.4 Output tables and national methodology description 13
3. THE TARGET POPULATION 15
3.1 Introduction 15
3.2 Definition of the target population 15
3.3 Reference Year 15
3.4 Reference Day 15
3.5 Reference periods 16
3.6 Statistical units 16
3.7 The age dimension 16
3.8 Active and inactive doctorate holders 16
3.9 Structure of the target population 17
3.10 Recent doctorate recipients 18
4. SURVEY METHODOLOGY 19
4.1 Data collection at the national level 19
4.2 Sampling frames for surveys on doctorate holders 19
4.3 Survey types 21
4.4 Stratification 23
4.5 Allocation and Sampling 23
5. COLLECTION AND PROCESSING OF DATA 24
5.1 Data collection methods 24
5.2 The CDH survey questionnaire 24
5.3 Coding of data values 25
5.4 Data editing 25
6. ESTIMATION OF RESULTS AND DATA QUALITY 26
6.1 Response rates 26
6.2 Unit non-response and non-response survey 26
6.3 Imputation 26
6.4 Weighting and calibration 26
6.5 Over-coverage 27
6.6 Under-coverage 27
7. DATA TRANSMISSION 28
7.1 Data to be transmitted 28
7.2 Transmission tools 28
7.3 Deadlines 28
ANNEX 1: POSSIBLE DATA SOURCES FOR BUILDING SAMPLING FRAMES 30
ANNEX 2: NATIONAL METHODOLOGY DESCRIPTION FOR STATISTICS ON THE CAREERS OF DOCTORATE HOLDERS (CDH) 32

1. INTRODUCTION

Statistics on careers of doctorate holders (Statistics on CDH) are compiled with a view to measure the demographic, employment, international and intra-sectoral mobility, career and earnings characteristics of holders of advanced research qualifications at national and international level. In the present document, we use the term "doctorate holders" for persons with an advanced research qualification, in possession of an ISCED 1997 level 6 degree.

These statistics aim to answer questions about international mobility, which is an important aspect of the labour of highly skilled workers and frequently referred to as brain drain, brain gain, or brain circulation. In addition, issues about the qualitative and quantitative match of the education of doctorate holders with the labour market are addressed. These statistics also deal with questions on how well the competencies of the highest educated are used by the society as well as with the attractiveness of different career paths for doctorate holders. Such questions are of interest at the worldwide level.

Based on an output-harmonised approach, the tabulated data to be delivered by countries to international organisations may be compiled using different methodological approaches. Already existing national surveys can often be used, which sometimes may need to be complemented or extended. These guidelines therefore provide the general framework for national data production.

On the one hand, the guidelines should help countries to improve and align their national survey methodologies. On the other hand, countries that are newly introducing CDH surveys will find directions on how to do this at national level.

2. PURPOSE OF STATISTICS ON CDH

2.1 Why doctorate holders?

Doctorate holders are the most highly educated group, and as such considered to have a high potential to contribute to the advancement and diffusion of knowledge and technologies. They are often seen as key actors behind the creation of innovation and knowledge-based economic growth.

CDH statistics mainly focus on doctorate holders, but the same type of statistics may of course be collected for other types of "highly qualified people". This could for example be the case in some developing countries where highly qualified non-doctorate holders may constitute a crucial part of the S&T workforce and thus a target group of policy interest. Some OECD countries have even started collecting similar information for university graduates below the doctoral level.

2.2 Needs expressed by users

The user needs for statistics on CDH were thoroughly discussed during a series of workshops between 2003 and 2011.

One of the aims of these workshops was to define links between research questions and data needs thus setting the objectives for the data collection of statistics on CDH. The policy questions of interest at the national and international level are summarised under the following four headings:

- *The role of doctorate holders in innovation and the knowledge economy*

  Where do doctorate holders work as compared to other tertiary graduates? Do they follow research careers and in what sector and field?

- *Labour market supply and demand*

  Do we train too many or too few doctorate holders? Are there mismatches in the labour market? Why do doctorate holders choose a research career in the public sector, or in the private sector or leave research? What is their perception of career opportunities and employment in the public versus the private sector? Do they earn more than the average citizen and which sectors of employment are the most profitable?

- *Education to work*

  How long is the time of transition to employment or post doctoral experience? How related is the job to the doctoral degree?

- *Mobility*

  How mobile are doctorate holders between sectors? When do doctorate holders leave research for a career in management? How big are the flows of doctorate holders between countries? How common is it for doctorate holders to reside in a country on a non-permanent basis? What are the reasons for doctorate holders to return to their country of origin?

With CDH statistics, policy makers should get much better information to address these questions. Countries will be able to share information at the international level, having their expatriates covered in the doctoral population observed by other countries.

2.3 The output harmonisation approach

As national data compilation methods may be heterogeneous between countries, reflecting the diversity of national statistical systems, a harmonisation effort is conducted on the output of the CDH statistics together with a quality control.

The aim is therefore to obtain high quality results through a harmonised list of variables and indicators, together with their related definitions. The methodological guidelines additionally provide guidance on the target population, sampling frames, sampling design, survey instruments etc. that should be adopted at the national level.

2.4 Output tables and national methodology description

The output tables to be compiled by countries consist of about 41 predefined tables available as Excel spreadsheets, to be compiled at national level only.

A preliminary table is included to fill in metadata and country specificities, like reference year, data collection method, coverage issues, contact details for institution and person responsible for CDH statistics. The tables are organised in five broad groups, dealing with different aspects of doctorate holders. This set of tables is expected to evolve as the project develops.

- *Personal characteristics P1-P8*

  Break down the population of doctorate holders according to personal characteristics like age, sex, country of citizenship and country of birth.

- *Educational characteristics ED1-ED6*

  Information on the educational history of the doctorate holders: the population of doctorate holders is broken down by country of doctorate award, country of prior education, field of doctorate degree and source of funding during completion of doctorate. The compilation of average and median age and number of years to completion of the doctoral degree are also part of the tables, as well as information on the acquisition of certain competencies.

- *Labour force status and employment characteristics EMP1-EMP10/PERC1-PERC2*

  Employment characteristics of doctorate holders, such as employment status (situation in employment, type of contract, working time), employment in research, institutional sector, median and average gross annual earnings, job mobility, competencies. Data on doctorate holders' perception of work and satisfaction are also requested in this group of tables.

- *International mobility: Inward and outward IMOB1-IMOB4/OMOB1-OMOB2 (outward tables are optional)*

  Tables on inward mobility collect information on the international mobile population of doctorate holders according to their previous country of residence, their reasons for moving into or returning to the country and the frequency and length of their mobility (either reported in number of years or in number of months). Tables on outward mobility present the population of doctorate holders broken down according to their intention and reasons to move out of the country in the next year.

- *Scientific output OUTP1- OUTP2.*

  The scientific output of doctorate holders during the last three years in terms of total number of articles, books, patents, start-up companies and commercialisation of patents.

  For each output table, two columns are allocated to each variable, the first one to enter the data, the second one devoted to standard flags attached to selected data. Reporting countries are invited to use the flags where relevant in the columns next to the data when filling in the output tables.

  At the end of each separate table, space is also allocated to enter information on data sources and applied definitions and classifications. Where relevant, the variables from the questionnaire that were used should be reported. Countries are also asked to provide additional information on the statistical surveys and administrative data sources used in a separate document, *the national methodology description (Annex 2)*. This metadata information together with the preliminary table information is critical to interpret the data in the tabulations.

3. THE TARGET POPULATION

3.1 Introduction

The target population is a decisive element of the international comparability of CDH statistics. The survey frame and the statistics itself are often put together from different national sources and surveys, each with its own survey population.

Different countries are at different stages of development of the CDH statistics as regards the full coverage of the target population. In a transitional phase where countries make efforts to fully implement the methodological guidelines, incomplete coverage of the target population is accepted. This is however at the expense of comparability of the data between countries. Care should be taken to limit incomplete coverage as the project evolves and national practices are harmonised.

3.2 Definition of the target population

The total target population of the CDH statistics consists of all individuals with an education at ISCED 1997 level 6. This global population of holders of advanced research qualifications is divided into national populations, which are considered the target populations of national surveys in each country. The national target populations consist of individuals that at the reference date are fulfilling the following criteria:

- having an education at ISCED 1997 level 6 (doctorate) obtained anywhere in the world, and
- being resident (permanent or non-permanent) within the national borders of the surveying country.

With these definitions and the (theoretical) assumption that all countries are conducting the survey and using the same date of reference, the whole population of doctorate holders resident in all countries is covered without any overlaps.

3.3 Reference year

The recommended reference year is 2012.

3.4 Reference day

The recommended reference day, *i.e.* point in time to which the measured observation (*e.g.* length of stay in the reporting country) refers, is 1 December of the year before the year that the survey is conducted at national level. The recommended reference day therefore for the 2013 data collection is 1 December 2012. In exceptional cases, the data compiling country is free to choose another reference date, but it should preferably be chosen as close to 1 December as possible, between 1 October and 31 December.

3.5 Reference periods

For the sake of international comparability, it is recommended that countries collect data in a way that the requested reference periods are equal to calendar years and start or end as close to the reference date as possible.

3.6 Statistical units

The statistical unit is the single individual having a formal education at ISCED 1997 level 6 (awarded doctorate) and being resident (permanent or non-permanent) in the reporting country on the reference date.

3.7 The age dimension

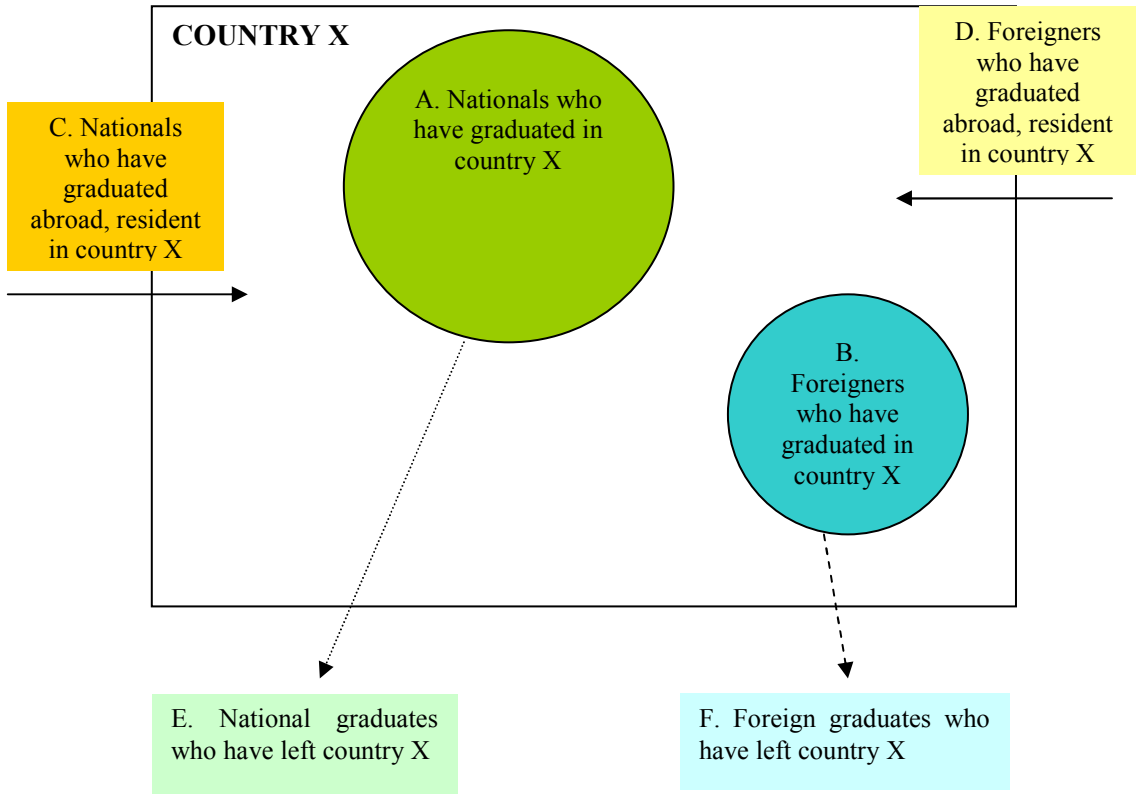
Countries should only include doctorate holders with an age below 70 years (*i.e*. up to 69 years old) in the target population. Although many highly skilled people tend to work, and contribute to society with skills and knowledge at higher ages, one of the main aims of the CDH data collection is to look at the situation of doctorate holders in the labour force (*i.e*. before retirement).

If countries want to study doctorate holders over 70, they should be sampled separately and not reported in the output tables. Countries should leave this category out of the figures reported as national totals.

3.8 Active and inactive doctorate holders

The national target population should include economically active doctorate holders as well as the economically inactive as long as they are below the age limit.

3.9 Structure of the target population



The population of doctorate holders residing in the surveying (country X) is structured in four broad groups namely:

Target population, residents in country X:

A. Citizens of country X with a doctorate awarded within country X.
B. Citizens of foreign countries with a doctorate awarded in country X.
C. Citizens of country X with a doctorate awarded abroad.
D. Citizens of foreign countries with a doctorate awarded abroad.

Two additional groups of doctorate holders related to, but not belonging to the target population of country X, are defined as follows:

Non-target population, residents outside country X:

E. Citizens of country X with a doctorate awarded within country X who have left country X.
F. Citizens of foreign countries with a doctorate awarded in country X who have left country X.

In general, the sub-populations E and F are taken into consideration in the reporting countries where these doctorate holders are resident. For this reason and because of the general difficulties to trace these doctorate holders across borders, countries are not requested to report information on the doctorate holders, resident outside the national borders.

3.10 Recent doctorate recipients

A sub-population of particular interest are recent doctorate recipients. These are defined as the population of doctorate holders that have been awarded their doctoral during the last two years. Therefore, a recent doctorate recipient is a person who received his/her doctorate degree at any time between January 201X-1 and December 201X, where 1 December 201X is the reference date for the survey. Indicators specifically related to this population are age at graduation, time to completion, source of funding, employment status and gross annual earnings.

4. SURVEY METHODOLOGY

4.1 Data collection at the national level

Data compilation methods are expected to differ from one country to another as a consequence of the different types of data sources or registers available to identify and survey doctorate holders.

Possible national data sources are surveys targeting university graduates, housing and population censuses, labour force surveys, migration statistics, R&D statistics, etc. Gaps between the data available and the data requested need to be identified and addressed. Existing surveys could be extended or new complementary surveys launched.

Metadata on CDH statistics are collected in order to assess the quality of the tabulated data delivered.

4.2 Sampling frames for surveys on doctorate holders

In order to obtain the best possible coverage of the target population, statisticians may have to rely on several national sources to build their sampling frames since these sources are targeting different sub-groups of the population of doctorate holders.

Possible overlaps between sources should be identified and remedied. For this purpose, information that makes it possible to unambiguously identify the same individual in multiple sources like *e.g.* name, year of award and date of birth could be used.

The establishment of a national register of doctorate holders, resident in the country, irrespectively of country of doctorate award, with a mechanism to update it systematically, is recommended for the elaboration of complete sampling frames. Some countries have already invested effort and resources in that direction.

A list of possible sources for building sampling frames for CDH related surveys is presented below. More sources may be identified as the project evolves (when more national metadata become available).

- *National registers of education*

  If a national register of education is available, this is one of the best possible sampling frames. The Swedish register of education, constantly updated with information on postgraduate exams from national universities and annually with information on the educational attainment of new immigrants, is an example of a source for a sampling frame that includes the entire target population.

- *National universities*

  University information systems provide sources for sampling frames that usually consists of high-quality administrative-based information on the educational characteristics of doctorate holders as well as on personal data, including addresses and phone numbers. These types of sources however are not sufficient to cover doctorates awarded many years ago or doctorates awarded abroad. These types of sources are for example used as sampling frame in the Canadian *Survey of Earned*

Doctorates, the Danish survey *PhDs in Natural Sciences* and the Italian survey *Employment of PhDs of the University of Rome*.

- *Previously conducted surveys on doctorate holders*

  This type of source can serve as a good basis to build the future sampling frame when supplemented with recently awarded doctorate holders and other subgroups of the target population not covered initially. The longitudinal panel *Survey of Doctorate Recipients* in the United States is for example based on a sample of the annually conducted *Survey of Earned Doctorates.*

- *International and national funding institutions*

  Doctorate holders that have received scholarships during their studies might be identified and reached through the funding organisations. For example, the Portuguese foundation for Science and Technology is used to build a sampling frame in the survey *PhDs in the labour market.*

- *National libraries*

  National libraries may be able to provide a list of theses of doctorates awarded within the country together with information like name, university, field of science, and award year. In order to use this list for the building up of the sampling frame, it probably needs to be complemented with contact information from other sources. Iceland uses the list of PhD dissertations available to the National and University Library in combination with other sources to compile the national register of doctorate holders (*RANNIS* database).

- *Alumni organisations*

  Since membership is not compulsory, alumni organisations will not provide a complete list of all doctorate holders. Name and address registers can however hold recently updated information making it suitable for tracing of individual doctorates holders. Alumni databases were used as sampling frame in the German *Brain Drain – Brain Gain Survey on International Job Careers*.

- *Population and housing censuses*

  One important source for building up a sampling frame is the housing and population census. This survey in principle covers the complete target population, but some limitations can be expected: *e.g.* low frequency of these surveys and, more importantly, the non-systematic separate identification of doctorate holders in some countries. The *2005 Belgian CDH survey* has used the population and housing census as a sampling frame.

- *Central registers of foreign citizens*

  If registers of foreign citizens are available, they should be used for building up the sampling frame for CDH surveys, in particular with regard to doctorate holders with foreign citizenship. This is only possible when the educational background of foreigners is registered, which is not always the case. In combination with population and housing censuses, register of foreigners could provide the link to population changes among foreign citizens (including doctorate holders) which occurred since the reference date of the census.

- *R&D statistics*

  If an R&D data collection is conducted, information on citizenship, field of science, formal qualification and sector of employment might be available for doctorate holders that are employed in research positions. The OECD requests this information and so does the European Commission, where the concerned variables are included in the Commission regulation 753/2004 that applies to the EEA countries.

- *Employment/business register*

  National employment and business registers are used for approaching doctorate holders through their employers. The registers comprise enterprises, organisations, institutions, etc., a first contact where it is envisaged to identify those which employ doctorate holders. In combination with other sources (*e.g.* university information systems), this approach works efficiently for tracking doctorate holders awarded abroad. However, it is not sufficient to capture unemployed and inactive doctorate holders.

- *Other surveys (LFS, EU-SILC, SBS, etc.)*

  Other established surveys can be exploited in several ways for building the CDH sampling frame: identify doctorate holders, identify firms, institutions, etc. which employ doctorate holders, supplement administrative information (addresses, phone contacts, names, etc.) or other information related to CDH (*e.g.* LFS collects information on education level and employment status).

4.3 Survey types

Beside the extensive use of administrative sources (which is possible in some countries), different survey types could be considered when compiling information on educational history, mobility and careers of doctorate holders. It is recommended to use all possible available sources that allow filling in the information corresponding to the mandatory questions in the CDH model questionnaire. Described below are the three main types of existing surveys: *graduate surveys, cohort surveys* and *cross-sectional retrospective surveys*.

These three survey types are ordered according to their degree of coverage of the target population. Cross-sectional surveys are the most efficient in terms of coverage but some specific advantages could also be identified in each of the other types. The three surveys should thus not be seen as mutually exclusive, but rather complementary. Countries could opt for one or for a combination of surveys that provides the most cost-efficient national data collection.

The sampling frames and their qualities are of course of crucial importance for the quality of the results. The complementary coverage of the different sampling frames used in the different survey types needs to correspond to the CDH target population.

4.3.1 Graduate surveys

Graduate surveys are surveys that capture information at the time upon graduation. This type of survey is especially suitable for collecting information on the doctorate programme, the education history and conditions during the years of study. A graduate survey is also the appropriate means for obtaining information on post-graduation plans and could be the only point of contact with doctorate holders that plan to leave the country, including those that return to their country of origin. No information however can be gathered on long-time career developments and international mobility.

A graduate survey should preferably be conducted regularly on all nationally awarded doctorate holders, including foreign citizens, as soon as possible after graduation. Information on educational history and the doctorate programme itself (*e.g.* source of funding and time to completion) is best obtained as soon after graduation as possible. Co-operation with the educational institutions should be sought to take advantage of their information systems and establish contact with the respondents. If the educational institutions could obtain survey results pertaining to their own graduates, their motivation to participate should be high.

Records obtained through a graduate survey should be stored and used to build a register of nationally awarded doctorate holders, which will not cover doctorate holders awarded abroad or doctorate holders having graduated a long time ago, although the latter problem will diminish with the passage of time. Due to this limitation, graduation surveys should always be used in combination with other survey types. Besides being a useful source of information, such a register could also be used in the future to construct sampling frames for cohort and cross-sectional surveys.

4.3.2 Cohort surveys

Longitudinal cohort surveys have advantages in collecting up-to-date information about the training and working activities undertaken by doctorate holders, by following a homogeneous population over time. For instance, it can be assumed that individuals graduated in the same year will experience similar conditions of the labour market in approaching job searching. Such longitudinal surveys should be ideally carried out every two to three years.

On the other hand, surveys on recent cohorts of doctorate holders can provide only limited information about long-time career developments and international mobility, which can be better investigated through a cross-sectional retrospective survey.

A cohort survey could be conducted as a sample survey or a census. It should in principle include doctorates awarded from all national institutions, including foreign citizens, currently unemployed and inactive as well as doctorates entering the country having being awarded abroad. A cohort survey should be based on a sampling frame where year of graduation is available.

When new cohorts are regularly introduced and surveyed in parallel to older ones the coverage with regard to the CDH target population will increase over time.

4.3.3 Cross-sectional retrospective surveys

A cross-sectional survey should cover doctorate holders from many different cohorts, awarded within the country and abroad. Through retrospective questions, the cross-sectional survey should provide a good picture of the career paths of doctorate holders at different stages of their career. The cross-sectional survey is thus the most appropriate tool if information on the entire target population is to be obtained through one single survey or a follow-up of other established surveys which sufficiently cover doctorate holders (e.g. LFS). In the latter case a sample or the total population of the identified doctorate holders will be surveyed for the CDH specific needs.

Cross-sectional surveys have the potential to ensure complete coverage of the target population and moreover to collect CDH specific information. Countries should make strong efforts to assure the full coverage of all groups, including those that are more problematic to capture (doctorate holders awarded abroad, inactive doctorate holders, unemployed doctorate holders, etc.).

The relevance of this type of survey should however be carefully assessed in terms of cost-effectiveness, given that a survey for the needs of CDH needs to be established from scratch. Another drawback with these surveys that should also be considered is the risk of recall bias; countries should make an effort to minimize that risk.

4.4 Stratification

Cohort surveys and *graduate surveys* should, if they are carried out as sample surveys, be stratified according to at least two main criteria, graduating institution and sector of employment.

For *cross-sectional sample surveys*, stratification is needed with regard to the structure of the target population and the original data sources used to build the sampling frames.

In statistical surveys, the number of domains needed often determines the number of strata. However, for multipurpose statistics like the CDH statistics, the number of domains will often exceed the desirable number of strata. Since too high a number of strata could lead to a problem with too few observations in some strata, it is important to keep stratification at a reasonable level.

The most obvious and significant stratification is to break down the population according to the sampling frames applied. As strata should be as homogenous as possible with respect to the principal variables analysed, further recommended breakdowns are according to the characteristics year of graduation, fields of science, and gender.

4.5 Allocation and sampling

The allocation of the sample on the strata may be in principle **proportional** to the stratum size. If the allocation ends up giving too small sample sizes in some strata, over-sampling may be considered. Over-sampling might also be considered in strata where high levels of non-response could be expected.

The total sample size should be chosen taking into account the detailed breakdowns in the output indicators template. The selection of the sample should be based on random sampling techniques, with known and equal selection probabilities being applied within each stratum. The random sampling techniques should be without replacement within each stratum.

It is recommended that the total sample fraction (ratio of total sample size to total population size) exceeds 20%. Smaller fractions could be accepted as long as the variance of estimation is restricted to ensure accurate results.

5. COLLECTION AND PROCESSING OF DATA

5.1 Data collection methods

When collecting CDH statistics, a mixed-mode data collection adapted to the possibilities available within each country could be considered. This includes the use of existing data, postal and Internet surveys, telephone interviews and personal interviews.

Postal surveys are commonly used and have the advantage to be relatively inexpensive. Under some circumstances, the delivery agent also may bring back information on the new addresses of people who moved during the most recent past. Both postal and telephone reminders may be used to increase the response rate.

Computer assisted telephone interviews (CATI) and personal interviews (CAPI) are techniques where interviewers play an active role in collecting information from respondents. Although quite costly, they could be justified by the higher rates of response that they normally achieve. CATI and CAPI techniques are especially useful in boosting the response rates of a postal survey.

Many national practices exist where countries give the respondent the opportunity to fill in the questionnaire in an electronic version on the Internet. The use of questionnaires that can be accessed on-line is recommended as an alternative to other means of collection after contact with the respondent has been established.

In the special case of *graduate surveys* the relevant institutions should preferably be involved in the data collection. The institutions could considerably facilitate the data collection process by distributing and collecting the questionnaire together with their administrative requirements for graduations.

5.2 The CDH survey questionnaire

Since CDH statistics are based on an output-harmonised approach, statisticians may decide what survey instruments to use. However, a full model questionnaire is available, in an English version, with questions adapted to the output indicator templates and definitions. A CDH dedicated survey using this questionnaire is the best fitted instrument for providing the full range of CDH variables and should preferably be adapted by the participating countries.

The questionnaire is divided into six different modules dealing with different aspects of the careers of doctorate holders: *doctoral education* (EDU), *early career research positions* (ECR), *employment situation* (EMP), *international mobility* (MOB), *career related experience* (CAR) and *personal characteristics* (PER). In order to facilitate answering the questionnaire for the respondents, an instruction manual has been developed as well.

The model questionnaire is recommended for countries that are going to launch a self-standing CDH survey. In addition, countries that want to revise their existing national questionnaires are encouraged to align it by using the selection of questions presented in the model questionnaire. The first section of the core model questionnaire presents *instructions for adaptation of the model questionnaire to national needs*,

pointing out necessary adaptations as well as options for the drafting of some questions. These instructions should be carefully followed when applying the core model questionnaire at the country level.[2]

5.3 Coding of data values

The definitions and the breakdowns within the CDH output tabulation determine what classifications and nomenclatures are to be used. Complementary to the output tables, a list of the variables' definitions are available in the document *Output indicators variables and definitions*.

5.4 Data editing

Throughout the data processing cycle, there should be a systematic and sustained follow-up with respondents to make sure that the data provided is of good quality. Data quality checks have to be done both at micro- and macro-level, before the data are finally processed and disseminated.

2. The model questionnaire is available on CIRCA site of Eurostat and the OECD CDH electronic discussion group, and will soon be available on the UIS website as well.

6. ESTIMATION OF RESULTS AND DATA QUALITY

6.1 Response rates

Doctorate holders who do not respond to the CDH survey questionnaire may not only differ from respondents in the characteristics measured, but non-response generally does not occur completely at random. Therefore, all efforts have to be made to minimise unit non-response. Nevertheless, survey budgets and potential non-response bias may influence the decisions made about the acceptable degree of non-response and its treatment.

6.2 Unit non-response and non-response survey

A non-response survey is recommended if the non-response rate, as an un-weighted percentage of all sampled doctorate holders, exceeds a certain limit (*e.g.* 30%). The aim of a non-response survey is to identify systematic biases about the groups of non-respondents. Therefore non-respondents should not be replaced in the sample by other doctorate holders from the survey population. If the results from the non-response analysis indicate that there is a difference between respondents and non-respondents indicators, this information should be used when calculating the weighting factors.

6.3 Imputation

Item non-response should be kept at a minimum. Imputation should be the last option after every attempt is made to get the needed information from other data sources *i.e.* census data, administrative or register data or from the respondent.

Item non-response imputations are recommended. Imputed values need to be flagged as for the non-response analysis. The imputation methods to be used for handling missing values should be specified in the national methodology description.

6.4 Weighting and calibration

In order to produce estimates for the surveyed population as a total, the data collected from a sample survey have to be weighted. Even if the survey is a census survey, with total enumeration of the frame population, weighting is appropriate to compensate for non-response or over-coverage.

The simplest weighting technique is to use the inverse of the sampling fractions of the sampling units, the inclusion probability, corrected for non-response. If a stratified sampling technique with different sampling fractions is used, weights have to be calculated individually for each stratum. If appropriate auxiliary information is available, it is recommended that estimates are built on models or calibration for better precision and reduced bias.

If a non-response analysis is carried out (and the results indicate that there is a difference between respondents and non-respondents), then the results of the non-response analysis should also be used when calculating the final weighting factors. One approach is to divide each stratum into a number of response homogeneous groups with (assumed) equal response probabilities within groups. A second approach could be to use auxiliary information at the estimation stage for reducing the non-response bias.

The methods that were mostly used in the previous CDH data collections were the Horvitz-Thompson estimator, the Huang Fuller method and the method of propensity score weighting.

For the calculation of weights, there are various software packages that can be used, based on SAS macro commands. These include the following:

- CLAN. This was developed by Statistics Sweden and is a suite of SAS-macro commands.
- CALMAR (Calibration on Margins). This is another SAS macro developed by INSEE in France.
- CALJACK. This is also a SAS macro developed by Statistics Canada.

6.5 Over-coverage

The extent of over-coverage could be difficult to estimate, but if over-coverage can be identified among respondents, this could have implications. If a non-negligible amount of over-coverage is present in the surveyed sample, the estimation weights have to be adjusted in order to reduce bias in the estimates.

6.6 Under-coverage

With the aid of suitable auxiliary information and calibration techniques, adequate estimators are obtained even when under-coverage is present in a survey. As it is difficult to recommend which auxiliary information to use, surveying countries will have to find their own auxiliary information to use. Another approach less advanced but maybe more practical, could be to not try to correct for under-coverage in the estimates, but discussing its occurrence and implication in the national methodology description. Numerical estimation of the not covered proportion of the target population and of its magnitude in the survey figures would very much facilitate the analysis of the results and comparison with data from other countries.

7. DATA TRANSMISSION

7.1 Data to be transmitted

The aggregated (tabulated) statistics to be delivered to the OECD and the UNESCO Institute for Statistics are determined in close co-operation with the *expert group on careers of doctorate holders*. All variables and their breakdowns in the output tables are to be compiled at national level, following the definitions provided.

For those countries which are undergoing a transitional phase to the full implementation of the CDH methodological guidelines, the reporting of the aggregated CDH statistics for only part of the CDH target population will be accepted. However, this has to be explicitly stated in the accompanying national metadata.

Aggregated statistics have to be treated in accordance with the standard confidentiality rules at national level, before transmission to the international organisations. National authorities are requested to submit a file excluding confidential data, which indicates the cells suppressed for reasons of confidentiality protection.

Countries are also requested not to change the Excel template of the output tables requested (*i.e*. standard names used, breakdowns, etc.) or the consistency checks inserted in the form of conditional formatting. Changing the template entails extra burden for data compilation, increases the risk of errors and complicates comparison between countries.

Countries wishing to send revised data should submit a revised complete file instead of delivering only the revised figures.

In addition to the tabulated aggregated statistics, national metadata are requested by the international organisations. These metadata should cover type of sources used, types and degree of under-coverage of the target population, national deviations from definitions or other key quality indicators such as non-response rates, coefficient of variation, etc. A specific structure to be used in the metadata compilation will be distributed together with the indicator templates and will also be made available at the CIRCA site of Eurostat and the OECD CDH electronic discussion group.

7.2 Transmission tools

The CDH statistics are to be transmitted within an Excel file provided by the international organisations to the countries concerned.

UIS, OECD and Eurostat determine a common delivery format scheme, including the name of Excel sheets, name of the submitted files, numbering of revisions, etc. to which countries should fully comply.

The special metadata structure for CDH statistics should be used when reporting on survey methodology and data quality issues to the international organisations.

7.3 Deadlines

Countries are asked to return the CDH output tables 12 months after the end of the reference year at the latest.

In addition:

For more detailed information on the methodology of CDH statistics, please also consult the CIRCA site of Eurostat and the OECDCDH electronic discussion group, where useful background documents will be loaded on a regular basis.

ANNEX 1: POSSIBLE DATA SOURCES FOR BUILDING SAMPLING FRAMES

Institution	*Available information*	*Remarks*
National library	• Author • Title of the thesis • Type (dissertation or habilitation) • University • Field of degree • Year of graduation	Addresses are generally not available
Population census	• Employment status • Occupation • Educational attainment (the possibility to identify doctorate holders has to be assessed) • Civil status • Sex • Date of birth • Citizenship • Country of birth	Could provide a good base for identifying doctorate holders resident within a specific country at the time of the census. There is a problem with timeliness since the censuses are in many instances only conducted every 10th year. Therefore it is recommended that the information is updated from other data sources to capture recent changes in the target population.
Universities	• Name • Year of graduation • Field of education	Could provide a list of awarded doctorate holders that have completed the doctorate at their premises.
Universities and research institutes	Might provide a list of doctorate holders employed.	Addresses should be available.

Institution	*Available information*	*Remarks*
Information-system of higher education (Switzerland, France, Italy)	• Sex • Year of graduation • Field of degree • University • Length of the doctoral training • Country Citizenship • Country of birth • Year of birth	Availability of addresses has to be checked. Data protection could be a problem.
Educational registers	• Age • Sex • Country of birth • Highest education • Completion year	In some countries educational registers are held by statistical agencies as a complement to population registers. Addresses could be obtained through a match with the population registers.
Central register of foreigners in a given country	Could contain demographic variables and geographical information about foreigners living in the surveying country.	Addresses could also be available. Probably no information on the formal educational level.
Unemployment register	Possible data source for unemployed doctorate holders. Information available has to be checked.	Availability of addresses has to be checked.
Professional organisation	Information available has to be checked.	Could be helpful to identify the addresses of the units in the survey frame. But are hardly suitable for defining the survey frame since not all doctorate holders are member of such an organisation.
ALUMNI	Know the addresses of former students	The data available from such sources may not be complete as membership is voluntary. Not every university disposes records of former students.

ANNEX 2: NATIONAL METHODOLOGY DESCRIPTION FOR STATISTICS ON THE CAREERS OF DOCTORATE HOLDERS (CDH)

0. Reporting country

1. Institution

1.1 Institution(s) responsible
1.2 Contact person(s) for CDH statistics

2. Main data sources used for the compilation of CDH statistics

2.1 Enumeration of the statistical survey(s) used
2.2 Enumeration of the administrative data source(s) used

3. Main variable definitions and classifications used

3.1 For doctorate holder
3.2 For resident status
3.3 For time to completion of doctorate
3.4 For post-doc (proposal for recommendation is under development)
3.5 For researcher
3.6 For gross annual earning
3.7 Other definitions and classifications used

4. Statistical units

5. Detailed information on the CDH survey(s)

5.1 Name of the survey(s)
5.2 General information about survey frame(s) used

- Name of survey frame(s)
- Type of survey frame(s):
  1. National registers of education
  2. Universities information system
  3. Previously conducted surveys on doctorate holders
  4. National libraries
  5. Alumni organisations
  6. Censuses
  7. Central registers of foreigners
  8. Other (please explain)

- Date(s) of creation and major changes
- Limits of legal right of access to information within the survey frame(s)
- Population coverage
  1. Population covered, jointly and respective, by the survey frame(s)
  2. Updating of the survey frame(s)
  3. Identified overlaps if multiple survey frames are used
- Information available within respective frame (please describe)

5.3. Population coverage

- Observation unit(s)
- Geographical coverage (national territory only or inclusion of abroad also)
- Ages covered
- Other specific inclusions or exclusions

5.4. Time span covered by data

5.5. Primary data collection method

- Frequency of data collection
- List of recent reference years
- Timetable of data collection
- Survey or census
- Media used for data collection
- Criteria for stratification
- Threshold values and sampling percentages
- Actions to speed up or increase the rate of response
- Expected changes in data collection methodology

5.6. Production of results

- Imputation methods to compensate for non-response
- Estimation methods for grossing–up
- Confrontation with other data sets
- Other calculations made
- Criteria for the identification of confidential data
- Expected changes in production methods

5.7 Quality

- Description of the calculation procedure of the coefficients of variation, including any procedure applied thereby to take into account misclassification or imputation of missing survey data.
- Summary description of quality criteria calculated for national purposes
- Expected changes in quality evaluation

5.8 National dissemination

- Name and media of national dissemination used
- Description of standard tables produced
- Timetable for the dissemination
- Expected changes in national dissemination methods
- Treatment of confidential data, *i.e.* are confidential data suppressed or aggregated?

6. Detailed information on other data sources

(For each of the other data source(s) enumerated in section 2, please give the following information)

6.1 Name of the survey or of the administrative data source

6.2. Population coverage

- Observation unit(s)
- Reporting unit
- Geographical coverage (national territory only or inclusion of abroad also)
- Ages covered
- Other specific inclusions or exclusions

6.3. Time span covered by data

6.4 Typical use of the survey or of the administrative data source

6.5. *Please, explain how this data source is used in combination with the others enumerated in 2 to produce the required statistics*

STATISTICS ON THE CAREERS OF DOCTORATE HOLDERS (CDH)

CORE MODEL QUESTIONNAIRE

INSTRUCTIONS FOR ADAPTATION OF THE MODEL QUESTIONNAIRE TO NATIONAL NEEDS

The present questionnaire has been drafted in accordance with the definitions and methodological guidelines prepared in the framework of the Careers of Doctorate Holders (CDH) project. Please consult the accompanying manual comprising the definitions and other guidelines which should be followed in order to facilitate international comparison of the statistics provided by different countries.

This questionnaire consists of six modules which concern the education of those with advanced research qualifications (module EDU), their early career research positions (module ECR), employment history (module EMP), international mobility (module MOB), career-related experience (module CAR) and personal characteristics (module PER). The present document proposes the following sequence for the modules: EDU-ECR-EMP-MOB-CAR-PER. However, countries are encouraged to organise the questionnaire according to their own needs and national policy priorities. Countries are also encouraged to share their national questionnaires with the other participating countries and the three international organisations.

Remarks applicable to all modules

Questions marked with (*) are essential to cover information for filling out the CDH output tables. When organising your national questionnaire, please make sure that ALL these questions are included. You are free to incorporate extra questions in order to reflect your national requirements.

ONLY QUESTIONS MARKED WITH * ARE REQUIRED ELEMENTS FOR THE INTERNATIONAL SURVEY. ALL OTHER QUESTIONS ARE OPTIONAL AND DERIVE FROM PREVIOUS USAGE IN NATIONAL SURVEYS.

Countries are therefore encouraged to give the mandatory questions priority, and to include only those optional questions for which there is a clear policy request.

Please pay particular attention to adapting ALL filter questions (accompanied by SKIP or GO TO) with the actual order of modules chosen, even if the proposed order is adopted. <NEXT MODULE> should be substituted by the denomination of the next module in your national questionnaire design.

Many questions require respondents to refer to a table provided in the instruction manual to identify the corresponding classification code. As there are several tables of classification codes provided in the manual, it is possible that respondents could use the wrong table and enter the wrong code in their survey. The accuracy and ease with which these questions are completed may be improved by including the relevant classification table within the questionnaire itself, particularly if the questionnaires will be administered electronically. If this is not possible, the table should be referred to by its exact and complete title given in the Instruction Manual provided to the respondents (*e.g.* Classification 1: Fields of Science and Technology). These questions could also ask for plain text instead of codes. Countries are free to adapt these in both ways.

Please note that ALL elements in brackets <> should be replaced accordingly.

In <201X>, <201X-1>, <201X-2>, <201X-9>, 201X should be substituted by the year of the survey, 201X-1 with the previous year, and so on.

<The country X> should be replaced by the name of your country.

Section "SCOPE AND PURPOSE"

This section should be complemented with some information on the particular objectives of the survey in the country.

The phrase <Your response is voluntary and failure to provide some or all of the requested information will not in any way adversely affect you.> should only be included in those countries were response is voluntary. A note stating the mandatory character of the survey should be included instead, if appropriate.

<20 minutes> is the estimated time to complete the questionnaire if no other questions are added. However, countries are encouraged to estimate the time needed in each case, and give the right value in this section.

Module EDU

Question **EDU.1** could be adapted to the national context. The state or province could be removed if considered not relevant.

In question **EDU.4** <advanced research qualification work/thesis/dissertation> should be adapted to the national context according to the national education system in your country. The items given in this question could also be adapted to the national context if considered unclear in its current version.

In question **EDU.5** <Industrial interface/working with industry> should be replaced by the type of relations between academia and industry prevalent in your country.

Items in question **EDU.11** should be adapted to the institutional structures funding advanced research qualification studies in the country, while ensuring correspondence with the classification presented, also used in the output tabulations **ED5**, **EMP3** and **EMP7**. The following classification is more detailed than the one proposed and could also be applied if appropriate:

A.	1.	Fellowship, scholarship from your institution
	2.	Fellowship, scholarship from government
	3.	Fellowship, scholarship from business
	4.	Fellowship, scholarship from a private non-profit organisation (PNP)
B.	5.	Fellowship, scholarship from abroad
C.	6.	Teaching assistantship
	7.	Research assistantship
	8.	Teaching and research assistantship
D.	9.	Other occupation (full time)
	10.	Other occupation (part time)
E.	11.	Employer reimbursement / assistance
F.	12.	Loan
	13.	Personal savings
	14.	Spouse's, partner's or family support
	15.	Spouse's, partner's or family support from abroad
G.	16.	Other
H.	17.	Unknown

Module ECR

The purpose of this module is to gather data on the particular working conditions of those who are on temporary or short-term contracts, often called 'post-doctorates' which are typically held shortly after completing an advanced research qualification, but before holding a regular full time career path job.

Module EMP

In question **EMP.2** <gross annual earnings> should be replaced by the term relevant to your country.

Questions **EMP.3** and **EMP.10** could be adapted to the national context. The name of the employer, and the state or province could be removed if considered not relevant. In these questions, "Occupation" could alternatively be replaced by the following.

Using the OCCUPATIONS LIST (*see Manual: Classification 2: Occupations ISCO-08*), choose the code that BEST describes the work at this position.

CODE

If this option was chosen, the Manual should include "Classification 2: ISCO-08 Occupations" as below. With the current version, coding of ISCO occupations will have to be carried out by the national project team. In case ISCO-08 is not in yet place in the country, a correspondence table could be used from ISCO-88 to ISCO-08, such as for example the one available on the ILO site.[3]

3. See www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm.

Classification 2: ISCO-08 Occupations

Code	ISCO-08 title
1	**MANAGERS**
2	**PROFESSIONALS**
21	**Science and engineering professionals**
211	Physical and earth science professionals
212	Mathematicians, actuaries and statisticians
213	Life science professionals
214	Engineering professionals (excluding electro-technology)
215	Electro-technology engineers
216	Architects, planners, surveyors and designers
22	**Health professionals**
221	Medical doctors
222	Nursing and midwifery professionals
223	Traditional and complementary medicine professionals
224	Paramedical practitioners
225	Veterinarians
226	Other health professionals
23	**Teaching professionals**
231	University and higher education teachers
232	Vocational education teachers
233	Secondary education teachers
234	Primary school and early childhood teachers
235	Other teaching professionals
24	**Business and administration professionals**
241	Finance professionals
242	Administration professionals
243	Sales, marketing and public relations professionals
25	**Information and communication technology professionals**
251	Software and applications developers and analysts
252	Database and network professionals
26	**Legal, social and cultural professionals**
261	Legal professionals
262	Librarians, archivists and curators
263	Social and religious professionals
264	Authors, journalists and linguists
265	Creative and performing artists
3	**TECHNICIANS AND ASSOCIATE PROFESSIONALS**
31	**Science and engineering associate professional**
311	Physical and engineering science technicians
312	Mining manufacturing and construction supervisors
313	Process control technicians
314	Life science technicians and related associate professionals
315	Ship and aircraft controllers and technicians
32	**Health associate professionals**
33	**Business and administration associate professionals**
34	**Legal, social, cultural and related associate professionals**
35	**Information and communications technicians**
4	**CLERICAL SUPPORT WORKERS**
5	**SERVICE AND SALES WORKERS**
6	**SKILLED AGRICULTURAL FORESTRY AND FISHERY WORKERS**
7	**CRAFT AND RELATED TRADES WORKERS**
8	**PLANT AND MACHINE OPERATORS AND ASSEMBLERS**
9	**ELEMENTARY OCCUPATIONS**
0	**ARMED FORCES OCCUPATIONS**

Source: *International Standard Classification of Occupations (ISCO-08).*

Questions **EMP.4** and **EMP.5** should be adapted to the national context according to the national education system in your country.

Question **EMP.10** asks about the most recent previous position only. If a country wants to ask for more, or all, previous positions in the last 10 years, this has to be added to the questionnaire.

Module CAR

In question **CAR.4** <three years> should be replaced by the number of years suitable for your national needs.

Module PER

Question **PER.2**: If the full date is asked in the national questionnaire, instead of only the year, the response box should be adapted according to the standard national date format.

Question **PER.3** could be adapted to the national context. The state or province could be removed if considered not relevant.

Questions **PER.4** and **PER.6** could be adapted to national standards, since categories may vary. <marriage-like relationship> should be replaced by the expression commonly used in the national context.

Instruction Manual

The Instruction Manual also bears some sections that need to be adapted to national survey context. For example, <Introduction of institution carrying out the survey> is a place keeper for some information on the national institution carrying out the CDH survey.

For any queries relating to the adaptation of this questionnaire, do not hesitate to contact the UNESCO Institute for Statistics by e-mail: **uis.stsurvey@unesco.org** or by fax: **+1 - 514 343 6872**.

SCOPE AND PURPOSE

The international Survey on Careers of Doctorate Holders (CDH) is a joint project carried out by the UNESCO Institute for Statistics (UIS), the Organisation for Economic Co-operation and Development (OECD) and the Statistical Office of the European Commission (Eurostat).

The present questionnaire is designed to collect the most recent statistics on educational history, work experience and international mobility of holders of advanced research qualifications. The main objectives of the questionnaire are:

- To collect internationally comparable statistics on the careers of holders of advanced research qualifications.
- To establish and analyse trends in the career paths and mobility of highly qualified people throughout the world.

The improvement and harmonisation of data collection in a broad number of countries and its further analysis should enable policy makers, researchers and analysts to start the appropriate policies with regard to highly qualified people in order to ensure their career developments all over the world.

Any information publicly released (such as statistical summaries) will be in a form that does not personally identify you.

<Your response is voluntary and failure to provide some or all of the requested information will not in any way adversely affect you.>

Actual time to complete the questionnaire may vary depending on your circumstances. On average, it will take about <20 minutes> to complete the questionnaire.

Your assistance is essential to ensure that the results are meaningful. Your answers will be kept strictly confidential and used for statistical purposes only.

Thank you for taking the time to complete this questionnaire. Directions for filling it out are provided in the accompanying manual. Because not all questions will apply to everyone, you may be asked to skip certain questions.

- Please use an “X” when answering questions that require marking a box.
- In order to get comparable data, we will be asking you to refer to 1 December <201X>.
- Follow all “SKIP” and “GO TO” instructions after marking a box.

<The following two bullets should be removed if an electronic questionnaire is used>

- Either a pen or pencil may be used.
- If you need to change an answer, please make sure that your old answer is either completely erased or clearly crossed out.

Thanks again for your help; we really appreciate it.

The term "advanced research qualification" (doctorate/doctoral) is understood in this survey as equivalent to the degree obtained at ISCED 1997 level 6 (second stage of tertiary education.[4]
See Manual: Definition 1: ISCED 6 (Advanced research qualification)

Module EDU – Advanced research qualification education

*EDU.1 In which institution did you complete your advanced research qualification?

University:	
Department (or interdisciplinary committee, centre, institute):	
City:	
State or province:	
Country:	

*EDU.2 Using the FIELDS OF SCIENCE AND TECHNOLOGY list (*see Manual: Classification 1: Fields of Science and Technology*), choose the code that corresponds best to your advanced research qualification.

FIELD CODE: ☐ . ☐

EDU.3 What is the exact title of your degree?

_____

EDU.4 In which categories would you place your <advanced research qualification work/thesis/ dissertation>?

Mark (X) all that apply

A. ☐ Addressed a fundamental problem
B. ☐ Made an improvement in a process
C. ☐ Made an improvement in methodology
D. ☐ Other-*Specify* _____

4. ISCED was revised in 2011, but its implementation is not expected before 2014. Therefore this questionnaire still uses ISCED 1997. The equivalent of ISCED 1997 level 6 will be ISCED 2011 level 8.

EDU.5 Did your advanced research qualification involve...?

Mark (X) Yes or No for each item	*Yes*	*No*
A. Course work	1 ☐	2 ☐
B. Field work	1 ☐	2 ☐
C. Laboratory work	1 ☐	2 ☐
D. <Industrial interface/working with industry>	1 ☐	2 ☐
E. Other-*Specify* _____	1 ☐	2 ☐

***EDU.6 : In what month and year did you start your advanced research qualification programme?**

MONTH ☐ (mm) YEAR ☐ (yyyy)

***EDU.7 In what month and year was your advanced research qualification granted?**

MONTH ☐ (mm) YEAR ☐ (yyyy)

EDU.8 When you were studying for your advanced research qualification, did you register for:

Mark (X) full-time OR part-time study

A. ☐ full-time study → ***SKIP TO EDU.9***
B. ☐ part-time study → ***SKIP TO EDU.10***

EDU.9 Please estimate the number of months it took you to complete your qualification, excluding any week when you were not preparing for your advanced research qualification.

MONTHS ☐ (Round to whole months)

***EDU.10 In what country did you receive your previous university degree (ISCED 1997 level 5, such as <Bachelor, Diploma, Master>)?**

(See Manual: Definition 2: ISCED 5: First stage of tertiary education)

Country _____

*EDU.11 Which of the following was your primary source of financial support during your research studies?

Mark (X) which was your primary source of support (only one)

		Primary source of support
A.	Fellowship or scholarship from an institution in <THE COUNTRY X>	☐
B.	Fellowship or scholarship from abroad	☐
C.	Teaching and/or research assistantship	☐
D.	Income from employment other than teaching or research	☐
E.	Employer reimbursement or assistance	☐
F.	Loan, personal savings, support from spouse, partner or family	☐
G.	Other	☐
H.	Unknown	☐

EDU.12 How would you rate your own knowledge, attributes and behaviours at the time you completed your advanced research qualification?

Please mark one response (X) only on each row

	Very poor	Poor	Fair	Good	Very good
A. METHODOLOGY: Applying research methodologies, tools and techniques appropriately	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B. INNOVATION: Developing new ideas, processes or products, which are rooted in research	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C. CRITICAL-ANALYTICAL: Critically analysing and evaluating findings and results	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D. ENTHUSIASM: Being both passionate and dedicated to my tasks	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E. CAREER MANAGEMENT: Taking ownership for and managing my own professional development actively	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F. EMPLOYMENT CONTEXT: Understanding how organisations, institutions or businesses work	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

	Very poor	Poor	Fair	Good	Very good
G. PROBLEM SOLVING:					
Formulating and applying appropriate solutions to problems and challenges	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
H. EFFECTIVE COMMUNICATION:					
Communicating information effectively and confidently to different audiences.....	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I. CREATIVITY:					
Being imaginative, thinking beyond normal boundaries and developing new insights.....	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
J. FLEXIBILITY:					
Responding quickly to changes and adapting easily to new situations.....	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
K. RESPONSIBILITY:					
Working independently and taking responsibility for my actions.....	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
L. NETWORKING:					
Developing, maintaining and using networks or collaborations.....	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
M. SUBJECT KNOWLEDGE:					
Demonstrating a theoretical and practical understanding of my subject area and its wider research context.....	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
N. PROJECT MANAGEMENT:					
Effectively planning, managing and delivering projects in good time.....	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
O. TEAM WORKING:					
Working constructively with colleagues, acknowledging their contribution	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
P. LEADERSHIP:					
Influencing others, providing direction and encouraging their contribution	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Q. LANGUAGES:					
Communicating effectively in a language other than my mother tongue	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

GO TO <NEXT MODULE>

Module ECR – Early career research positions

ECR.1 As of 1 December <201X>, did you hold a temporary research position?
A temporary research position is a position that satisfies most or all of the conditions in question ECR.2. Often, this type of position is referred to as a postdoc position.

A. ☐ Yes → ***GO TO ECR.2***
B. ☐ No → ***SKIP TO <NEXT MODULE>***

ECR.2 Listed below are common characteristics of temporary research positions held shortly after completion of an advanced research qualification. Please indicate for each of these characteristics if it applies to the position you held on 1 December <201X>.

The position…

Mark (X) Yes or No for each item	*Yes*	*No*
A. Requires an ISCED 1997 level 6, Ph.D., or <NATIONAL ISCED 6 EQUIVALENT QUALIFICATION>	1 ☐	2 ☐
B. Requires that the advanced research qualification was recently awarded	1 ☐	2 ☐
C. Is temporary	1 ☐	2 ☐
D. Is intended to provide training in research	1 ☐	2 ☐
E. Is intended to advance professional skills	1 ☐	2 ☐
F. Requires a full-time commitment to research	1 ☐	2 ☐
G. Requires that you work under the direction of a senior scholar	1 ☐	2 ☐
H. Is for a defined period of time	1 ☐	2 ☐
I. Requires publication of research in scholarly journals	1 ☐	2 ☐
J. Requires mentorship for professional development	1 ☐	2 ☐
K. Is intended to prepare you for an independent career in research	1 ☐	2 ☐
L. Is the result of financial support by a public body or not-for-profit institution, acquired through competitive submission of proposals	1 ☐	2 ☐

ECR.3 What is/was the title of this position?

Title: ☐

ECR.4 Using the Fields of Science and Technology list (*see Manual: Classification 1: Fields of Science and Technology***), choose the code that best corresponds to the activities in your position.**

FIELD CODE: ☐ . ☐

ECR.5 What is/was the total number of months of this contract?

☐ months

ECR.6 Is it/was it possible to extend this contract? If yes, for how long?

A. ☐ Yes, → another ☐ months

B. ☐ No

ECR.7 What were your reasons for taking this position/contract?

Mark (X) Yes or No for each item	*Yes*	*No*
A. Additional training in advanced research qualification field	1 ☐	2 ☐
B. Training in an area outside of advanced research qualification field	1 ☐	2 ☐
C. Carry out research independently	1 ☐	2 ☐
D. Work with a specific person or in a specific place	1 ☐	2 ☐
E. Carry out and support teaching activities	1 ☐	2 ☐
F. Other employment not available	1 ☐	2 ☐
G. This type of position ("post-doc") generally expected for career in this field	1 ☐	2 ☐
H. Other-*Specify* ↘ _____	1 ☐	2 ☐

ECR.8 What percentage of your time in this position/contract is/was dedicated to:

Please note that the sum of A, B and C should equal 100%

A. Research activities ☐ %

B. Teaching activities ☐ %

C. Other activities (such as administrative tasks) ☐ %

ECR.9 What is/was the main source of financial support for this position/contract?

Mark (X) ONLY one

A. ☐ Government/Public sector agency

B. ☐ Industry/Business

C. ☐ College or university

D. ☐ Private foundation

E. ☐ Non-profit, other than private foundation

F. ☐ Other-*Specify* ↘ _____

GO TO <NEXT MODULE>

Module EMP - Employment situation

EMPLOYMENT HELD ON 1 DECEMBER <201X>

*EMP.1 What was your labour force status on 1 December <201X>?

Mark (X) ONLY one

A. ☐ Employed → ***GO TO EMP.2***
(See Manual: Definition 3: Employed)

B. ☐ Unemployed → ***SKIP TO EMP.10***
(See Manual: Definition 4: Unemployed)

C. ☐ Inactive → ***SKIP TO EMP.10***
(See Manual: Definition 5: Inactive)

*EMP.2 Counting ALL jobs you held on 1 December <201X>, what were your <GROSS ANNUAL EARNINGS> for the year <201X>?

Gross annual earnings cover remuneration in cash and in kind paid during <201X> before any tax deductions and social-security contributions payable by wage earners and retained by the employer.

*EMP.3 Please provide the details on all jobs you held on 1 December <201X>

Position 1 (PRINCIPAL JOB) held on 1 December <201X>	
Employed since	☐ yyyy (year)
Name of employer	
Location	City ☐ State/Province ☐ Country ☐
Sector of employment *Mark (X) ONLY one (See Manual: Definition 7: Sector of employment)*	☐ Business enterprise sector ☐ Government sector ☐ Higher education sector ☐ Other education sector ☐ Private non-profit sector
Employer's main activity or business	*What did that employer make or do? Please report the type of activity or business primarily performed at the location where you worked. For example: Production of microprocessor chips, hospital, newspaper publishing, mail order house, auto engine manufacturing, bank, university, research institute.*
Occupation	*Please be as specific as possible, including any area of specialisation:*
Employment situation	☐ Employee (See Manual: Definition 8: Employee) ☐ Self-employed worker (See Manual: Definition 9: *Self-employed workers)*

Type of position	*Mark (X) ONLY one* (*See Manual: Definition 10: Temporary/permanent employment)* ☐ Permanent ☐ Temporary	*Mark (X) ONLY one* (*See Manual: Definition 11: Full-time/part-time employment)* ☐ Full-time ☐ Part-time
Number of hours per week during a typical week	☐	
Does this job include teaching activities?	☐ No ☐ Yes, less than 25% ☐ Yes, 25%-49% ☐ Yes, 50%-74% ☐ Yes, 75%-100%	

Position 2 (SECOND JOB) held on 1 December <201X>		
Employed since	☐ yyyy (year)	
Name of employer	☐	
Location	City ☐ State/Province ☐ Country ☐	
Sector of employment *Mark (X) ONLY one (See Manual: Definition 7: Sector of employment)*	☐ Business enterprise sector ☐ Government sector ☐ Higher education sector ☐ Other education sector ☐ Private non-profit sector	
Employer's main activity or business	*What did that employer make or do? Please report the type of activity or business primarily performed at the location where you worked. For example: Production of microprocessor chips, hospital, newspaper publishing, mail order house, auto engine manufacturing, bank, university, research institute.* ☐	
Occupation	*Please be as specific as possible, including any area of specialisation:* ☐	
Employment situation	☐ Employee (See Manual: Definition 8: Employee) ☐ Self-employed worker (See Manual: Definition 9: *Self-employed workers)*	
Type of position	*Mark (X) ONLY one* (*See Manual: Definition 10: Temporary/permanent employment)* ☐ Permanent ☐ Temporary	*Mark (X) ONLY one* (*See Manual: Definition 11: Full-time/part-time employment)* ☐ Full-time ☐ Part-time
Number of hours per week during a typical week	☐	
Does this job include teaching activities?	☐ No ☐ Yes, less than 25% ☐ Yes, 25%-49% ☐ Yes, 50%-74% ☐ Yes, 75%-100%	

If you have more jobs, please continue this list on a separate page.

PRINCIPAL JOB

The next set of questions (EMP.4 – EMP.9) asks you about the PRINCIPAL JOB you held on 1 December <201X>

EMP.4 What was the MINIMUM education level required for the PRINCIPAL JOB you held on 1 December <201X>?

Mark (X) ONLY one

A. ☐ Graduate (or lower) qualification
B. ☐ Post-graduate (non-research qualification)
C. ☐ Advanced research qualification
D. ☐ Postdoc
E. ☐ Other-*Specify* _____
F. ☐ Unknown

EMP.5 What was the DESIRABLE education level required for the PRINCIPAL JOB you held on 1 December <201X>?

Mark (X) ONLY one

A. ☐ Graduate (or lower) qualification
B. ☐ Post-graduate (non-research qualification)
C. ☐ Research
D. ☐ Postdoc
E. ☐ Other-*Specify* _____
F. ☐ Unknown

*EMP.6 To what extent was your work on your PRINCIPAL JOB held on 1 December <201X> related to your advanced research qualification degree?

Mark (X) ONLY one

A. ☐ Closely related
B. ☐ Partly related
C. ☐ Not related

EMP.7 To what extent are the following knowledge, attributes and behaviours important in your CURRENT principal job?

Please mark one (X) only with a number ranging from 1 (not at all important) to 5 (very important)

	Not at all important	Of little importance	Moderately important	Important	Very important
A. INNOVATION:					
Developing new ideas, processes or products, which are rooted in research	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B. TEAM WORKING:					
Working constructively with colleagues, acknowledging their contribution	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C. ENTHUSIASM:					
Being both passionate and dedicated to my tasks	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D. CAREER MANAGEMENT:					
Taking ownership for and managing my own professional development actively	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E. PROBLEM SOLVING:					
Formulating and applying appropriate solutions to problems and challenges	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F. EFFECTIVE COMMUNICATION:					
Communicating information effectively and confidently to different audiences	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
G. CREATIVITY:					
Being imaginative, thinking beyond normal boundaries and developing new insights	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
H. METHODOLOGY:					
Applying research methodologies, tools and techniques appropriately	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I. FLEXIBILITY:					
Responding quickly to changes and adapting easily to new situations	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
J. RESPONSIBILITY:					
Working independently and taking responsibility for my actions	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
K. NETWORKING:					
Developing, maintaining and using networks or collaborations	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
L. EMPLOYMENT CONTEXT:					
Understanding how organisations, institutions or businesses work	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

	Not at all important	Of little importance	Moderately important	Important	Very important
M. SUBJECT KNOWLEDGE: Demonstrating a theoretical and practical understanding of my subject area and its wider research context	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
N. LANGUAGES: Communicating effectively in a language other than my mother tongue	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
O. PROJECT MANAGEMENT: Effectively planning, managing and delivering projects in good time	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
P. CRITICAL-ANALYTICAL: Critically analysing and evaluating findings and results	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Q. LEADERSHIP: Influencing others, providing direction and encouraging their contribution	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

EMP.8 If the PRINCIPAL JOB you held on 1 December <201X> was a part-time job, were you searching for a full-time job?

A. ☐ Yes

B. ☐ No

C. ☐ Not applicable

EMP.9 Please rate your satisfaction with your PRINCIPAL JOB's…

Mark (X) ONLY one for each item	Very satisfied	Somewhat satisfied	Somewhat dissatisfied	Very dissatisfied
A. Salary	1 ☐	2 ☐	3 ☐	4 ☐
B. Benefits	1 ☐	2 ☐	3 ☐	4 ☐
C. Job security	1 ☐	2 ☐	3 ☐	4 ☐
D. Job location	1 ☐	2 ☐	3 ☐	4 ☐
E. Working conditions	1 ☐	2 ☐	3 ☐	4 ☐
F. Opportunities for advancement*	1 ☐	2 ☐	3 ☐	4 ☐
G. Intellectual challenge	1 ☐	2 ☐	3 ☐	4 ☐
H. Level of responsibility*	1 ☐	2 ☐	3 ☐	4 ☐
I. Degree of independence*	1 ☐	2 ☐	3 ☐	4 ☐
J. Contribution to society	1 ☐	2 ☐	3 ☐	4 ☐
K. Social status	1 ☐	2 ☐	3 ☐	4 ☐
L. Overall level of satisfaction	1 ☐	2 ☐	3 ☐	4 ☐

** These categories are not applicable to self-employed workers.*

PAST EMPLOYMENT

***EMP.10 If you have changed job in the last 10 years, please list your most recent previous employer here.**

Note that this section excludes your current position(s) (if any), already discussed in EMP.3.

Previous position		
Dates of employment	From: ☐ yyyy (year) To: ☐ yyyy (year)	
Location	City ☐ State/Province ☐ Country ☐	
Sector of employment *Mark (X) ONLY one (See Manual: Definition 7: Sector of employment)*	☐ Business enterprise sector ☐ Government sector ☐ Higher education sector ☐ Other education sector ☐ Private non-profit sector	
Occupation	*Please be as specific as possible, including any area of specialisation:* ☐	
Employment situation	☐ Employee (See Manual: Definition 8: Employee) ☐ Self-employed worker (See Manual: Definition 9: *Self-employed workers)*	
Type of position	*Mark (X) ONLY one (See Manual: Definition 10: Temporary/permanent employment)* ☐ Permanent ☐ Temporary	*Mark (X) ONLY one (See Manual: Definition 11: Full-time/part-time employment)* ☐ Full-time ☐ Part-time
Employer's main activity or business	*What did that employer make or do? Please report the type of activity or business primarily performed at the location where you worked. For example: Production of microprocessor chips, hospital, newspaper publishing, mail order house, auto engine manufacturing, bank, university, research institute.* ☐	
Number of hours per week during a typical week	☐	
Reasons for having left		

LABOUR MARKET READINESS, EMPLOYABILITY AND PERCEIVED VALUE OF ADVANCED RESEARCH QUALIFICATION

EMP.11 To what extent do you agree with the following statements?

Please mark one (X) only with a number ranging from 1 (strongly disagree) to 5 (strongly agree)

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
A. I was well prepared for my first job after the advanced research qualification	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B. My advanced research qualification enabled me to progress towards my career aspirations	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C. My advanced research qualification enabled me to access immediate or short-term job opportunities in my chosen career	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D. It was not clear to me what career opportunities I could aspire to after my advanced research qualification was granted	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E. My advanced research qualification enabled me to make a difference in the workplace	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F. If I could start all over again, I would not do an advanced research qualification	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
G. My advanced research qualification enabled me to be innovative in the workplace	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
H. The transition to my first job after the advanced research qualification was difficult	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I. My advanced research qualification degree was important to my current employer	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
J. I am still using the subject knowledge or methods of my advanced research qualification research	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
K. Having an advanced research qualification made no difference to my career path	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

GO TO <NEXT MODULE>

Module MOB - International mobility

IF YOU ONLY LIVED IN <THE COUNTRY X> BETWEEN JANUARY <201X-9> AND DECEMBER <201X>, SKIP TO MOB.4

***MOB.1 List the countries – in chronological order – in which you have studied, worked or carried out research for more than three months between January <201X-9> and December <201X>, including your country of origin and/or the country in which you did your advanced research qualification, and indicate the period of stay or residency (include <THE COUNTRY X>) and all reasons for staying or living out of or into <THE COUNTRY X>.**

In the last column, please use a letter/letters between A and F, according to the list of reasons under the table.

Country of stay	Period of stay (from – to)	Reason(s) for moving

If you need more lines, please continue this list on an extra page.

Reasons for the decisions to move to or out of these countries (multiple answers allowed):

A. Completion of advanced research qualification
B. End of job contract
C. Other job-related or economic factors
E.g. job search, sent by employer, guarantee or offer of a job, or postdoc
D. Academic factors
E.g. better access to publishing, development or continuity of thesis work, work in a specific area not existent inside <THE COUNTRY X>, possibility of creation of own research team or new research area
E. Family or personal reasons
F. Political or other reasons
E.g. refugee or end of residence permit or visa

***MOB.2 If you returned or arrived in <THE COUNTRY X> and plan to leave, indicate how long you plan to stay in total in <THE COUNTRY X>, *i.e.* the number of months between arriving in <THE COUNTRY X> and leaving <THE COUNTRY X>.**

☐ *Not applicable*

PLANNED TOTAL LENGTH OF STAY ☐ Months

MOB.3 Are you linked to your country of origin in any of the following ways?

☐ *Not applicable*

Mark (X) Yes or No for each item	*Yes*	*No*
A. You keep in touch with official "Diaspora" networks (*i.e.* networks of nationals from your country of origin living abroad)	1 ☐	2 ☐
B. You have a wide informal network formed by friends/ acquaintances/ colleagues from your country of origin	1 ☐	2 ☐
C. You are available for various possible linkage mechanisms (visits, training, joint projects, mentoring, fundraising)	1 ☐	2 ☐
D. You maintain business relationships with your country of origin	1 ☐	2 ☐
E. You collaborate with national professional associations in your country of origin	1 ☐	2 ☐
F. You collaborate with scientific journals in your country of origin	1 ☐	2 ☐

***MOB.4 Are you working on research with researchers in a country other than the one you are living in any of the following ways?**

Mark (X) Yes or No for each item	*Yes*	*No*
A. Working on a joint publication with people in another country	1 ☐	2 ☐
B. Collaborating at a distance on a joint research project with researchers in another country	1 ☐	2 ☐
C. You are using web-based or virtual technology to conduct this work	1 ☐	2 ☐

***MOB.5 As of today, do you intend to stay or live outside of <THE COUNTRY X> within the next 12 months?**

A. ☐ Yes, permanently → ***GO TO MOB.6***

B. ☐ Yes, temporarily → ***GO TO MOB.6***

C. ☐ **No** → ***SKIP TO <NEXT MODULE>***

***MOB.6 As of today, in which country do you intend to stay or live within the next 12 months?**

Country_____

*MOB.7 Indicate the reasons for this decision?

Mark (X) Yes or No for each item		*Yes*	*No*
A.	End of postdoc or job contract	1 ☐	2 ☐
B.	Returning to my home country *E.g.* After secondment or completion of doctorate in <COUNTRY X>	1 ☐	2 ☐
C.	Other job related or economic factors *E.g.* sent by employer, guarantee or offer of a job, or research grant	1 ☐	2 ☐
D.	Academic factors *E.g.* better access to publishing, development or continuity of thesis work, work in a specific area not existent inside <THE COUNTRY X>, possibility of creation of own research team or new research area	1 ☐	2 ☐
E.	Family or personal reasons	1 ☐	2 ☐
F.	Political or other reasons *E.g.* End of residence permit or visa	1 ☐	2 ☐

GO TO <NEXT MODULE>

Module CAR - Career related experience

"Researchers" are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned.

(See Manual: Definition 13: Researcher)

***CAR.1 In the job(s) you held on 1 December <201X>, were you engaged in research and/or experimental development work, *i.e.* were you engaged in the conception or creation of new knowledge, products, processes, methods and systems or in the management of such projects?**

Mark (X) Yes or No for each item, or not applicable if you did not hold secondary jobs

Principal job	1 ☐ Yes	2 ☐ No	
Secondary job	1 ☐ Yes	2 ☐ No	3 ☐ Not applicable
All other jobs	1 ☐ Yes	2 ☐ No	3 ☐ Not applicable

IF YOU DID NOT CARRY OUT ANY RESEARCH, SKIP TO CAR.3.
OTHERWISE GO TO CAR.2.

***CAR.2 Which percentage of your working time did you devote to research and/or experimental development work across all your jobs on average in <201X>?**

_____% → ***SKIP TO CAR.6***

NON-RESEARCHERS

***CAR.3 Why were you not working as a researcher on 1 December <201X>?**

Mark (X) all that apply

A. ☐ Not interested in research
B. ☐ Very limited job opportunities in research
C. ☐ There is no clear career structure within research
D. ☐ Low remuneration
E. ☐ Disadvantaged working conditions
F. ☐ Poor public recognition of career in research
G. ☐ Unclear long term career prospects
H. ☐ Other - *Specify* ↙

_____

CAR.4 Are you considering changing your current career for a research career in the next <three years>?

A. ☐ Yes
B. ☐ No

***CAR.5 Were you performing research activities earlier in your career?**

A. ☐ Yes → ***GO TO CAR.6***
B. ☐ No → ***SKIP TO <NEXT MODULE>***

RESEARCHERS (CURRENT AND FORMER)

***CAR.6 Why did you work as a researcher?**

Mark (X) all that apply

A. ☐ Creativity and innovativeness of work
B. ☐ Well paid job
C. ☐ Benefits
D. ☐ Opportunities for advancement
E. ☐ Job security
F. ☐ Working conditions
G. ☐ Degree of independence
H. ☐ Contribution to society
I. ☐ Other employment not available
J. ☐ Research generally expected for career
K. ☐ Specific interest for research work
L. ☐ Other-Specify _____

***CAR.7 How many years and months have you worked as a researcher since receiving your advanced research qualification degree?**

☐ years and ☐ months

CAR.8 How many months elapsed between the time you <u>completed</u> your advanced research qualification degree and the time you accepted your first CAREER PATH JOB (*if applicable*)**?**

A "career path" job is a job that will help further your career plans or is a job in a field where you want to make your career. (See Manual: Definition 14: Career path job)

NUMBER OF MONTHS ☐

Have not accepted my first career path job ☐

Accepted career path job either before or during my advanced research qualification ☐

***CAR.9 How many articles, (co)authored by you, have been published or accepted for publication in a refereed professional journal between January <201X-2> and December <201X>?**

NUMBER OF ARTICLES

***CAR.10 How many books, monographs, and book chapters, (co)authored by you, have been published or accepted for publication between January <201X-2> and December <201X>?**

NUMBER OF BOOKS OR MONOGRAPHS

***CAR.11 On how many PATENT APPLICATIONS have you been named as an inventor between January <201X-2> and December<201X>?**

NUMBER OF PATENT APPLICATIONS

***CAR.12 How many patents have been GRANTED to you as an inventor between January<201X-2> and December <201X>**?

NUMBER OF PATENTS GRANTED

***CAR.13 How many of your patents have resulted in commercialized products or processes or have been licensed between January <201X-2> and December<201X>?**

NUMBER OF PATENTS RESULTING IN COMMERCIALISED PRODUCTS OR PROCESSES, OR LICENSED

***CAR.14 Have you started up one or several company(ies) between January <201X-2> and December <201X>?**

NUMBER OF COMPANIES STARTED

GO TO <NEXT MODULE>

PER - Personal characteristics

* PER.1 Are you:

A. ☐ Male

B. ☐ Female

*PER.2 What is your year of birth?

YEAR ☐ (yyyy)

*PER.3 Where is your place of birth?

City ☐ State/Province ☐ Country ☐

*PER.4 What is your citizenship/resident status in <the country X>?

(See Manual: Definition 15: Citizenship status; Definition 16: Resident status)

A. ☐ Citizen by birth
B. ☐ Citizen by naturalisation
C. ☐ Permanent resident
D. ☐ Non-permanent resident
E. ☐ Refugee

PER.5 Please list the countries of your citizenship

Country 1 ☐ Country 2 ☐ Country 3 ☐

*PER.6 What is your current marital status?

Mark (X) ONLY one

A. ☐ Married
B. ☐ Living in a <marriage-like relationship>
C. ☐ Separated
D. ☐ Divorced
E. ☐ Widowed
F. ☐ Single (and not separated, divorced or widowed)

***PER.7 How many dependents do you have?**

Enter a number in all boxes

A. ☐ Number of dependents aged 5 years or younger

B. ☐ Number of dependents aged 6 to 18 years

C. ☐ Number of dependents aged 19 years or older

PER.8 In case we need to clarify some of the information you have provided, please list phone numbers and an e-mail address where you can be reached.

	Area Code	Number
DAYTIME:		
EVENING:		

E-mail_____@_____

INSTRUCTION MANUAL FOR COMPLETING THE QUESTIONNAIRE ON CAREERS OF DOCTORATE HOLDERS

INTRODUCTORY NOTE

The present manual has been drafted in accordance with the definitions and methodological guidelines prepared in the framework of the CDH project.

This manual should be considered as a model for countries to adapt to national needs. Countries may also include instructions or definitions directly in the questionnaire.

In the first section of this manual, countries can incorporate text describing the institution(s) carrying out the survey.

For any queries relating to the adaptation of this manual, do not hesitate to contact the UNESCO Institute for Statistics by e-mail: **uis.stsurvey@unesco.org** or by fax: **+1 - 514 343 6872.**

TABLE OF CONTENTS

INTRODUCTION 66

1. COVERAGE OF THE QUESTIONNAIRE 67

2. INSTRUCTIONS FOR COMPLETING THE QUESTIONNAIRE 68

MODULE EDU – ADVANCED RESEARCH QUALIFICATION EDUCATION 69
MODULE ECR – EARLY CAREER RESEARCH POSITIONS 70
MODULE EMP – EMPLOYMENT SITUATION 71
MODULE MOB – INTERNATIONAL MOBILITY 74
MODULE CAR – CAREER RELATED EXPERIENCE 75
MODULE PER – PERSONAL CHARACTERISTICS 75

Boxes

Definition 1: ISCED 6 : Advanced research qualification 67
Definition 2: ISCED 1997 level 5: First Stage of Tertiary Education (not leading directly to an advanced research qualification) 70
Definition 3: Employed 71
Definition 4: Unemployed 72
Definition 5: Inactive 72
Definition 6: Gross annual earnings 72
Definition 7: Sector of employment 73
Definition 8: Employee 74
Definition 9: Self-employed workers 74
Definition 10: Temporary/permanent employment 74
Definition 11: Full-time/part-time employment 74
Definition 12: Internationally mobile advanced research qualification holder 75
Definition 13: Researcher 75
Definition 14: Research career path job 75
Definition 15: Citizenship status 76
Definition 16: Resident status 76

INTRODUCTION

Introduction of institution carrying out the survey

The international Survey on Careers of Doctorate Holders (CDH) is a joint project carried out by the the Organisation for Economic Co-operation and Development (OECD), the UNESCO Institute for Statistics (UIS) and the Statistical Office of the European Commission (Eurostat). The project focuses on holders of advanced research qualifications (usually doctorate holders) who are considered to be crucial to the production, application and diffusion of knowledge.

The present questionnaire is designed to collect the most recent statistics on educational history, work experience and international mobility of holders of advanced research qualifications throughout the world. The main objectives of the questionnaire are:

- To build internationally comparable indicators on the careers of holders of advanced research qualifications.
- To identify and analyse trends in the career paths and mobility of highly qualified people throughout the world.

The improvement and harmonisation of data collection in a broad number of countries and its further analysis should enable policy makers, researchers and analysts to conduct the appropriate policies with regard to highly qualified people in order to ensure their career development all over the world.

This instruction manual has been prepared in order to help respondents completing the questionnaire. It comprises the definitions and other guidelines that should be followed in order to facilitate international comparison of the statistics provided by different countries.

The definitions and classification presented in this manual are based on different internationally recognised sources such as the *Frascati Manual (OECD)*, *International Labour Organization (ILO) Resolutions Concerning Economically Active Population*, *Employment, Unemployment and Underemployment Adopted by the 13th International Conference of Labour Statisticians (October 1982)*, *National Science Foundation Survey of Doctorate Recipients, International Standard Classification of Education (ISCED-1997)*, *International Standard Classification of Occupations (ISCO-08)* and others (see sources related to the presented definitions).

1. COVERAGE OF THE QUESTIONNAIRE

The questionnaire is designed to collect data on all individuals who on the reference date fulfil the following criteria:

- Have an education at ISCED 6 level[5] (see **definition 1**) obtained anywhere in the world; and
- Are resident (permanent or non-permanent) within the national borders of the surveying country.

Definition 1: ISCED 6 : Advanced research qualification

ISCED LEVEL 6: SECOND STAGE OF TERTIARY EDUCATION (LEADING TO AN ADVANCED RESEARCH QUALIFICATION)

Principal characteristics

This level is reserved for tertiary programmes which lead to the award of an advanced research qualification. The programmes are therefore devoted to advanced study and original research and are not based on course-work only.

Classification criteria

For the definition of this level, the following criteria are relevant:

Main criterion

It typically requires the submission of a thesis or dissertation of publishable quality which is the product of original research and represents a significant contribution to knowledge.

Subsidiary criterion

It prepares graduates for faculty posts in institutions offering ISCED 5A programmes, as well as research posts in government, industry, etc.

Includes also:

The part concentrating on advanced research in those countries where students beginning tertiary education enrol directly for an advanced research programme.

Source: UNESCO International Standard Classification of Education 1997 (ISCED-1997).

5. ISCED was revised in 2011, but its implementation is not expected before 2014. Therefore this questionnaire still uses ISCED 1997. The equivalent of ISCED 1997 level 6 will be ISCED 2011 level 8.

2. INSTRUCTIONS FOR COMPLETING THE QUESTIONNAIRE

Not all questions will apply to everyone. You may be asked to skip certain questions.

- Please use an "X" when answering questions that require marking a box.
- In order to obtain comparable data, we will be asking you to refer to your situation on 1 December <201X>.
- Follow all "SKIP" and "GO TO" instructions after marking a box.

<The following two bullets should be removed if an electronic questionnaire is used>

- Either a pen or pencil may be used.
- If you need to change an answer, please make sure that your old answer is either completely erased or clearly crossed out.

The present questionnaire has been drafted in accordance with the definitions and methodological guidelines prepared in the framework of the CDH project in order to facilitate international comparison of the statistics provided by different countries. Please refer to the definitions in this Manual for further clarification.

The questionnaire consists of the following modules:

- EDU – Advanced research qualification education
- ECR – Early career research positions
- EMP – Employment situation
- MOB – International mobility
- CAR – Career-related experience
- PER – Personal characteristics

Your assistance is essential to ensure that the results are meaningful. Your answers will be kept strictly confidential and used for statistical purposes only. Any information publicly released (such as statistical summaries) will be in form that does not personally identify you.

<Your response is voluntary and failure to provide some or all of the requested information will not in any way adversely affect you.>

Actual time to complete the questionnaire may vary depending on your circumstances. On average, it will take about 20 minutes to complete the questionnaire.

MODULE EDU – ADVANCED RESEARCH QUALIFICATION EDUCATION

The education module aims to provide information on the educational history of holders of advanced research qualifications. This module will supply information on specific characteristics of holders of advanced research qualifications, such as date of award, field of science, sources of financial support, duration of advanced research qualification programme and country of previous degree.

You will find below the relationship between the questions and related definitions and classifications.

In order to respond to **question EDU.2** which asks you to provide information on the field of science and technology corresponding to your advanced research qualification studies, please refer to **classification 1**.

Classification 1: Fields of Science and Technology

1. NATURAL SCIENCES

- 1.1. Mathematics
- 1.2. Computer and information sciences (excluding hardware development and social aspects)
- 1.3. Physical sciences
- 1.4. Chemical sciences
- 1.5. Earth and environmental sciences
- 1.6. Biological sciences (excluding medical and agricultural sciences)
- 1.7. Other natural sciences

2. ENGINEERING AND TECHNOLOGY

- 2.1. Civil engineering
- 2.2. Electrical engineering, electronic engineering, information engineering
- 2.3. Mechanical engineering
- 2.4. Chemical engineering
- 2.5. Materials engineering
- 2.6. Medical engineering
- 2.7. Environmental engineering
- 2.8. Environmental biotechnology
- 2.9. Industrial biotechnology
- 2.10. Nanotechnology
- 2.11. Other engineering and technologies (food, beverages and other)

3. MEDICAL AND HEALTH SCIENCES

- 3.1. Basic medicine
- 3.2. Clinical medicine
- 3.3. Health sciences
- 3.4. Medical biotechnology
- 3.5. Other medical sciences (forensic and other medical sciences)

4. AGRICULTURAL SCIENCES

- 4.1. Agriculture, forestry and fisheries
- 4.2. Animal and dairy science
- 4.3. Veterinary science
- 4.4. Agricultural biotechnology
- 4.5. Other agricultural sciences

5. SOCIAL SCIENCES

- 5.1. Psychology
- 5.2. Economics and business
- 5.3. Educational sciences
- 5.4. Sociology
- 5.5. Law
- 5.6. Political science
- 5.7. Social and economic geography
- 5.8. Media and communications
- 5.9. Other social sciences

6. HUMANITIES

- 6.1. History and Archaeology
- 6.2. Languages and literature
- 6.3. Philosophy, ethics and religion
- 6.4. Arts (arts, history of arts, performing arts, music)
- 6.5. Other humanities

Source: New Fields of Science Classification of the *Frascati Manual (adopted by OECD NESTI in June 2005).*

Answering **question EDU.9,** which requires that you supply an estimate of the number of months it took you to complete your advanced research qualification during the period between when you started your advanced research qualification programme and when your advanced research qualification degree was granted, please subtract periods longer than one week taken off for reasons such as irrelevant temporary jobs to sustain funding throughout the advanced research qualification programme, or for personal, family or maternity/paternity leave reasons. However, time spent on study or work abroad relevant to your advanced research qualification programme should not be counted as "taken off". When answering this question, please make sure that you round the indicated number of months to whole months.

Answering **question EDU.10**, which requires that you supply the country in which you received your previous university degree (at ISCED 7 level), please take into account **definition 2**.

Definition 2: ISCED 1997 level 5: First stage of tertiary education (not leading directly to an advanced research qualification)

ISCED 5 is composed of two different types of tertiary programmes, not leading directly to the award of an advanced research qualification (such as doctorates, which are at ISCED level 6):

ISCED 5A programmes are tertiary programmes that are largely theoretically based and are intended to provide sufficient qualifications for gaining entry into advanced research programmes and professions with high skills requirements. They must satisfy a sufficient number of the following criteria:

- A minimum cumulative theoretical duration (at tertiary level) of three years' full-time equivalent, although typically they are of four or more years.
- Faculty with advanced research credentials.
- May involve completion of a research project or thesis.
- Provide the level of education required for entry into a profession with high skills requirements (theoretically based/research preparatory, such as history, philosophy, mathematics, etc., or giving access to professions with high skills requirements, *e.g.* medicine, dentistry, architecture, etc.) or an advanced research programme.

This level typically includes programmes such as "Bachelors", as well as all the research programmes which are not part of a doctorate, such as any type of Master's degrees.

ISCED 5B programmes are tertiary programmes typically shorter than those in 5A and focus on occupationally specific skills geared for entry into the labour market, although some theoretical foundations may be covered in the respective programme. The content of ISCED level 5B programmes is practically oriented/occupationally specific and is mainly designed for participants to acquire the practical skills and know-how needed for employment in a particular occupation or trade or class of occupations or trades - the successful completion of which usually provides the participants with a labour-market relevant qualification.

Source: UNESCO International Standard Classification of Education 1997 (ISCED-1997).

MODULE ECR – EARLY CAREER RESEARCH POSITIONS

If you were in *permanent* employment, self-employed, unemployed or inactive on 1 December <201X>, please skip this module.

This module addresses persons who were in a temporary research position on 1 December <201X> that satisfies most or all of the conditions in **question ECR.2**. Often, this type of position is referred to as a postdoc position. It is generally understood that a postdoc is a temporary position for holders of advanced research qualifications (*i.e.* after finalising their advanced research qualification studies) where the main activity is research, and the holder receives some kind of financial support. However, there are very different forms of postdoc positions worldwide. In order to assess the extent to which these positions have

comparable characteristics, **question ECR.2** lists a number of characteristics, which usually correspond to this type of position. Please indicate if each of these characteristics corresponds or not to the position you held on 1 December <201X> in **question ECR.2**, and provide the exact title of your position (in your own language) in **question ECR.3**.

Please use the Fields of Science & Technology Classification (see **Classification 1**) to reply to **question ECR.4**.

MODULE EMP – EMPLOYMENT SITUATION

This module aims to furnish information on the career development of holders of advanced research qualifications.

Information that should be provided is for example your employment status, your occupation, type of contract (temporary or permanent employment, part-time or full-time job) and combined annual salary (in national currency).

This module includes a section on PAST EMPLOYMENT dealing with the retrospective career history of holders of advanced research qualifications, gathering information on work experience within the ten past years (including occupation, dates, years of experience, and reasons for leaving previous positions).

In order to respond to **question EMP.1** which asks you to provide information on your employment status on 1 December <201X>, please refer to **definitions 3, 4 and 5**.

Definition 3: Employed

The employed comprise all persons above a specified age who during a specified brief period, either one week or one day, were in the following categories:

- At work: persons who during the reference period performed some work for a wage or salary, or persons who during the reference period performed some work for profit or family gain, in cash or in kind.
- With a job but not at work: persons who, having already worked in their present job, were temporarily not at work during the reference period and had a formal attachment to their job. This formal attachment should be determined in the light of national circumstances, according to one or more of the following criteria: the continued receipt of wage or salary; an assurance of return to work following the end of the contingency, or an agreement as to the date of return; the elapsed duration of absence from the job which, wherever relevant, may be that duration for which workers can receive compensation benefits without obligations to accept other jobs.
- With an enterprise but not at work: persons with an enterprise, which may be a business enterprise, a farm or a service undertaking, who were temporarily not at work during the reference period for any specific reason.

Source: Adapted from International Labour Organization (ILO) Resolutions Concerning Economically Active Population, Employment, Unemployment and Underemployment Adopted by the 13th International Conference of Labour Statisticians, October 1982, para. 9.

Definition 4: Unemployed

The unemployed comprise all persons above a specified age who during the reference period were:

- Without work, that is, were not in paid employment or self employment during the reference period.
- Currently available for work, that is, were available for paid employment or self-employment during the reference period; and
- Seeking work, that is, had taken specific steps to seek paid employment or self-employment. The specific steps may include registration at a public or private employment exchange; application to employers; checking at worksites, farms, factory gates, market or other assembly places; placing or answering newspaper advertisements; seeking assistance of friends or relatives; looking for land, building, machinery or equipment to establish own enterprise; arranging for financial resources; applying for permits and licences, etc.

Source: International Labour Organization (ILO) Resolutions Concerning Economically Active Population, Employment, Unemployment and Underemployment Adopted by the 13th International Conference of Labour Statisticians, October 1982, para. 10.

Definition 5: Inactive

The "population not currently active", or, equivalently, persons not in the labour force, comprises all persons who were not employed or were unemployed and hence not currently active because of:

(a) Attendance at educational institutions.

(b) Engagement in household duties.

(c) Retirement or old age, or

(d) Other reasons such as infirmity or disablement, which may be specified.

Source: International Labour Organization (ILO) Resolutions Concerning Economically Active Population, Employment, Unemployment and Underemployment Adopted by the 13th International Conference of Labour Statisticians, October 1982, para. 12.

In order to answer **question EMP.2** in which you are asked to provide data on your gross annual earnings for the reference year, please refer to **definition 6** or adapt this question to your national needs. Please make sure that you indicate your salary in national currency.

Definition 6: Gross annual earnings

Gross annual earnings cover remuneration in cash and in kind paid during <201X> before any tax deductions and social-security contributions payable by wage earners and retained by the employer.

Source: Eurostat.

When answering **questions EMP.3 and EMP.10** which ask you to provide information on sector of employment, occupation and type of position you held, you need to refer to **definitions 7 to 11** (see following pages).

When asked about your occupation in **EMP.3 and EMP.10**, please provide a detailed description, including any area of specialisation, for example: “College professor-Electrical engineering”, “Research mathematician” or “Network engineer, communication hardware”.

Note that question **EMP.10** asks about your most recent previous position only, even if you changed job more than once in the past 10 years.

You may not be in a position to answer **questions EMP.4 and EMP.5** unless it was a specified condition of employment. If that's the case, please tick option 6: Unknown.

Furthermore, in **questions EMP.4 and EMP.5**, the response category "postdoc" refers to the type of position as outlined under **question ECR.2**.

Definition 7: Sector of employment

The **business enterprise** sector includes:

- All firms, organisations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price.
- The private non-profit institutions mainly serving them.

The **government sector** includes:

- All departments, offices and other bodies which furnish, but normally do not sell to the community, those common services, other than higher education, which cannot otherwise be conveniently and economically provided, as well as those that administer the state and the economic and social policy of the community. (Public enterprises mainly engaged in market production and sale of goods and services are included in the business enterprise sector.)
- Non-profit institutions controlled and mainly financed by government, not administered by the higher education sector.

The **higher education** sector is composed of:

- All universities, colleges of technology and other institutions providing tertiary education, whatever their source of finance or legal status.
- It also includes all research institutes, experimental stations and clinics under the direct control of or administered by or associated with higher education institutions.

The **other education** sector is composed of all institutions providing pre-primary, primary or secondary education, whatever their source of finance or legal status.

The **private non-profit sector** includes:

- Non-market, private non-profit institutions serving households (*i.e.* the general public).
- Private individuals or households.

The market activities of unincorporated enterprises owned by households, *i.e.* consultants undertaking projects for another unit at an economically significant price, should be included in the business enterprise sector in line with National Accounts conventions (unless the project is undertaken using staff and facilities in another sector, see below). Hence, the PNP sector should only include activities undertaken by non-market, unincorporated enterprises owned by households, *i.e.* individuals financed by their own resources or by "uneconomic" grants.

Furthermore, where grants and contracts are formally awarded to individuals who are primarily employed in another sector, such as grants made directly to a university professor, unless such persons undertake the activity concerned entirely on their own time and make no use of their employing unit's staff and facilities, they should be included in the statistics of the employing unit. It therefore follows that this sector only includes activities performed by individuals exclusively on their own time and with their own facilities and at their own expense or supported by an uneconomic grant.

Source: Frascati Manual (OECD, 2002), and UIS.

Definition 8: Employee

An employee is a person who enters an agreement, which may be formal or informal, with an enterprise to work for the enterprise in return for remuneration in cash or in kind.

Source: System of National Accounts, 1993 Glossary, OECD.

Definition 9: Self-employed workers

[An unincorporated enterprise is a producer unit which is not incorporated as a legal entity separate from the owner (household, government or foreign resident); the fixed and other assets used in unincorporated enterprises do not belong to the enterprises but to their owners, the enterprises as such cannot engage in transactions with other economic units nor can they enter into contractual relationships with other units nor incur liabilities on their own behalf; in addition, their owners are personally liable, without limit, for any debts or obligations incurred in the course of production.]

Source: System of National Accounts, 1993 Glossary, OECD.

Definition 10: Temporary/permanent employment

Temporary employment comprises work under a fixed-term contract, in contrast to permanent work where there is no end-date. Employment under temporary contracts often entails a different set of legal obligations on behalf of employers; in particular, certain aspects of employment protection legislation do not apply to temporary contracts.

Source: International Labour Organization (ILO) Resolutions Concerning Economically Active Population, Employment, Unemployment and Underemployment Adopted by the 13th International Conference of Labour Statisticians, October 1982, para. 12.

Definition 11: Full-time/part-time employment

Persons usually working less than 30 hours a week are considered as part-timers.

Source: Definition of Part-time Work for the Purpose of International Comparisons, A. Bastelaer, G. Lemaitre, P. Marianna, Labour Market and Social Policy Occasional Papers – No. 22, OECD, 1997, page 12.

In question EMP.9, the response categories 6. Opportunities for advancement, 8. Level of responsibility and 9. Degree of independence are not applicable to self-employed workers.

MODULE MOB – INTERNATIONAL MOBILITY

The international mobility module is foreseen to make available information on the mobility patterns of holders of advanced research qualifications.

This module aims to measure the inflows and outflows of holders of advanced research qualifications, to distinguish temporary mobility from permanent mobility, to identify the reasons for departure and return as well as to provide data on your intentions to move out of the country within the next year including the destination planned. Of note is that mobility prior to receiving the advanced research qualification is included as well, if the qualification was earned less than ten years before the survey date.

Definition 12: Internationally mobile advanced research qualification holder

An internationally mobile advanced research qualification holder is an advanced research qualification holder who, since the award of his/her advanced research qualification, has stayed or lived in a country other than that of his or her usual residence for a period of at least 3 months, except in cases where the movement to that country was for purposes of recreation, holiday, visits to friends and relatives, medical treatment or religious pilgrimage.

Source: Adapted from the Recommendations on Statistics of International Migration, Revision 1 (UN, 1998).

In **questions MOB.1 and MOB.7**, the response category "postdoc" refers to the type of position as outlined under **question ECR.2**.

MODULE CAR – CAREER RELATED EXPERIENCE

This module is foreseen in order to provide data on your experience linked to your career path.

The module includes a section on researchers that enquires about experience in research. When answering **questions CAR.1 to CAR.8**, please refer to **definition 13**.

Definition 13: Researcher

Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned.

Source: Frascati Manual (OECD, 2002).

In addition, when replying to **question CAR.8**, please refer to **definition 14**.

Definition 14: Research career path job

A **"research career path job"** is a job that will help further your career plans in research or is a job in research, in which you want to make your career.

MODULE PER – PERSONAL CHARACTERISTICS

The personal characteristics module collects information on features such as:

- Marital status
- Number of dependents
- Place of birth, date of birth, citizenship status and resident status
- Contact information

When responding to **question PER.4** which asks you to supply data on your citizenship and residential status in <the country X>, please refer to **definitions 15 and 16**.

Definition 15: Citizenship status

Citizenship is defined as the particular legal bond between an individual and his/her state, acquired by birth or naturalisation, whether by declaration, option, marriage or other means according to the national legislation.

A citizen is therefore a person with the legal nationality of a country.

In case of dual or multiple citizenships, the person should be counted only once and reported as citizen if he holds the nationality of the reporting country and as non-citizen in any other case.

Source: Recommendations for the 2000 censuses of population and housing in the Economic Commission for Europe (ECE) region and United Nations Recommendations on International Migration.

Definition 16: Resident status

Country of permanent or usual residence is the country where the person usually resides; this may be the same as, or different from, the place where he/she actually is at the time of the survey; or it may be his/her legal residence.

Permanent or usual residence in the reporting country or in other countries should be counted according to the national legislations and no attempt is made to harmonise. Legislation concerning residence can vary widely between countries and countries are asked to complete the tables in the way they can apply the concept of "permanent or usual residence". In practice, distinguishing between “permanent resident” and “non-permanent resident” can be done in a number of ways, for example according to whether the person holds a visa or permit.

Source: Recommendations for the 2000 censuses of population and housing in the Economic Commission for Europe (ECE) region and UIS/OECD/EUROSTAT (UOE) data collection on education systems 2005 manual.

STATISTICS ON THE CAREERS OF DOCTORATE HOLDERS (CDH)

CDH OUTPUT INDICATORS TABLES CAN BE FOUND IN EXCEL AT

www.oecd.org/sti/cdh

LIST OF OUTPUT INDICATORS TABLES TO BE FOUND AT
www.oecd.org/sti/cdh

1. Personal characteristics

Table P1. Doctorate Holders by Sex and Age class
Table P2.1. Doctorate Holders by Type of Citizenship, Resident Status and Place of Birth (optional table)
Table P2.2. Doctorate Holders by Citizenship and Resident Status (optional table) Table
P3. Doctorate Holders by Sex and Country of Citizenship Table
P4. Doctorate Holders by Citizenship/Resident Status and Age class Table
P5. Doctorate Holders by Citizenship and Field of Doctorate Degree Table
P6. Doctorate Holders by Sex and Country of BirthTable
P7. Doctorate Holders by Place of Birth/Resident Status and Age ClassTable
P8. Doctorate Holders by Place of Birth and Field of Doctorate Degree

2. Education characteristics

Table ED1. Doctorate Holders by Citizenship/Resident Status and Region of Doctoral Award
Table ED2. Doctorate Holders by Place of Birth/Resident Status and Region of Doctoral Award
Table ED3. Doctorate Holders by Country of Doctoral Award and of Prior Education
Table ED4. Recent Doctorate Recipients: Age at Graduation and Time to Completion by main Field of Doctoral Degree
Table ED5. Doctorate Holders by main Field of Doctoral Degree and Primary Source of Funding during Completion of Doctorate
Table ED6. Doctorate Holders: Knowledge, Attributes and Behaviours at the Time of Advanced Research Degree Completion (optional table)

3. Employment situations and perceptions

Table EMP1. Doctorate Holders by Employment Status and Year of Doctoral Award
Table EMP2.1. Doctorate Holders by Employment Status and Field of Doctoral Degree
Table EMP2.2. Doctorate Holders by Employment Status and Age Class
Table EMP2.3. Doctorate Holders by Employment Status and Citizenship/Resident Status
Table EMP3. Recent Doctorate Recipients by Employment Status and Primary Source of Funding during Completion of Doctorate
Table EMP4. Employed Doctorate Holders by Field of Doctoral Degree and Occupations
Table EMP5. Employed Doctorate Holders by Sector of Employment, Field of Doctoral Degree and Sex
Table EMP6.1. Employed Doctorate Holders: Median Gross Annual Earnings
Table EMP6.2. Employed Doctorate Holders: Average Gross Annual Earnings
Table EMP7. Employed Recent Doctorate Recipients: Gross Annual Earnings by Primary Source of Funding during Completion of Doctorate* (optional table)

Table EMP8. Employed Doctorate Holders: Job Mobility over the last 10 years by Sector of Employment

Table EMP9. Employed Doctorate Holders by Industry and Sex

Table EMP10. Employed Doctorate Holders: Knowledge, Attributes and Behaviours in Current Job by Sector of Employment (optional table)

Table PERC1.1. Employed Doctorate Holders: Perception regarding their Job Qualification by Sex and Year of Doctoral Award

Table PERC1.2. Employed Doctorate Holders: Perception regarding their Job Qualification by Sex and Field of Doctoral Degree

Table PERC2.1. Employed Doctorate Holders: Satisfaction with their Employment Situation by Sex and Criteria of Satisfaction

Table PERC2.2. Employed Doctorate Holders: Satisfaction with their Employment Situation by Research Status and Criteria of Satisfaction

4. International mobility: inward and outward

Table IMOB1. Doctorate Holders by Type of International Mobility in the Last Ten Years and Citizenship

Table IMOB2. Internationally Mobile Doctorate Holders: Previous Country of Stay in the Last Ten Years by Citizenship

Table IMOB3. Internationally Mobile Doctorate Holders: Reasons for Moving Into the Country in the last 10 Years by Citizenship

Table IMOB4. Internationally Mobile Doctorate Holders: Frequency and Length of Mobility by Citizenship

Table OMOB1. Mobility Intentions in the Next Year by Country of Intended Destination (optional table)

Table OMOB2. Reasons for Mobility Intentions in the Next Year (optional table)

5. Scientific output

Table OUTP1. Outputs of Doctorate Holders working as Researchers in the last three years by Field of Doctorate

Table OUTP2. Outputs of Doctorate Holders working as Researchers in the last three years by Age Class and Sex

VARIABLES IN PROPOSED OUTPUT TABULATIONS – DEFINITIONS AND SOURCES

Variable	Table no.	Definition	International definition - Sources
Advanced research qualification[6]	All tables (Please note that for convenience, the term "doctoral" or "doctorate" is used in the output tables and is understood as pertaining to an advanced research qualification/ISCED 1997 level 6 degree)	**LEVEL 6 - SECOND STAGE OF TERTIARY EDUCATION** **(LEADING TO AN ADVANCED RESEARCH QUALIFICATION)** **Principal characteristics** This level is reserved for tertiary programmes which lead to the award of an advanced research qualification. The programmes are therefore devoted to advanced study and original research and are not based on course-work only. **Classification criteria** For the definition of this level, the following criteria are relevant: **Main criterion** It typically requires the submission of a thesis or dissertation of publishable quality which is the product of original research and represents a significant contribution to knowledge. **Subsidiary criterion** It prepares graduates for faculty posts in institutions offering ISCED 5A programmes, as well as research posts in government, industry, etc. **Includes also:** The part concentrating on advanced research in those countries where students beginning tertiary education enrol directly for an advanced research programme (see paragraph 101).	UNESCO International Standard Classification of Education 1997
Recent doctorate recipient	ED4, EMP3, EMP7	A recent doctorate recipient is a person who received his/her advanced research qualification at any time between January 201X-1 and December 201X, where 1 December 201X is the reference date for the survey.	(NSF Survey of Doctorate Recipients)

6. ISCED was revised in 2011, but its implementation is not expected before 2014. Therefore the definition is still based on ISCED 1997. The equivalent of ISCED 1997 level 6 will be ISCED 2011 level 8.

Variable	Table no.	Definition	International definition - Sources
Age	P1, P4, P7, EMP2.2	The target population does not include doctorate holders above 70 years old. Age classes are defined as follow: • Less than 35 years old • 35-44 years old • 45-54 years old • 55-64 years old • 65 -69 years old	Adapted from United Nations Provisional Guidelines on Standard International Age Classifications (UN, 1982) and Frascati Manual (OECD).
Citizenship status	P2.1, P2.2, P3, P4, P5, ED1, EMP2.3, IMOB1, IMOB2, IMOB3, IMOB4, OMOB1, OMOB2	Citizenship is defined as the particular legal bond between an individual and his/her state, acquired by birth or naturalization, whether by declaration, option, marriage or other means according to the national legislation. A citizen is therefore a person with the legal nationality of a country. In case of dual or multiple citizenships, the person should be counted only once and reported as citizen if he holds the nationality of the reporting country and as non-citizen in any other case.	Recommendations for the 2000 censuses of population and housing in the ECE region and United Nation Recommendations on International Migration
Resident status	P2.1, P2.2, P4, P5, P7, ED1, ED2, EMP2.3	Country of permanent or usual residence is the country where the person usually resides; this may be the same as, or different from, the place where he/she actually is at the time of the survey; or it may be his/her legal residence. Permanent or usual residence in the reporting country or in other countries should be counted according to the national legislations and no attempt is done to harmonize. Legislation concerning residence can vary widely between countries and countries are asked to complete the tables in the way they can apply the concept of "permanent or usual residence". In practice, distinguishing between “permanent resident” and “non-permanent resident” can be done in a number of ways, for example according to whether the person holds a visa or permit.	Recommendations for the 2000 censuses of population and housing in the ECE region and UOE data collection on education systems 2005 manual

Variable	Table no.	Definition	International definition - Sources
Country of citizenship / birth / residence / doctorate award / prior education / …	P3, P6, IMOB2, OMOB1	Individual countries (please see list). If this poses confidentiality problems, please assign problem observations or cells to one of the requested aggregate groupings. For regional groupings, please refer to: *http://unstats.un.org/unsd/methods/m49/m49regin.htm.*	United Nations Statistics Division -- Standard Country or Area Codes for Statistical Use
Time to completion of doctorate	ED4	Gross time to completion = number of months elapsed between the start of the advanced research qualification and the award of the degree. Net time to completion = number of months elapsed between the start of the doctorate and the award of the degree, minus periods longer than one week taken off for any purpose other than preparing the advanced research qualification during this period of time. Note: This applies only to those research students registered as full-time students.	CDH project Expert Group
Researcher	EMP5, EMP6.1, EMP6.2, EMP7, EMP8, PERC2.2	Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned.	Frascati Manual (OECD)
Employed	EMP1 to EMP8, PERC1.1 to PERC2.2	The employed comprise all persons above a specified age who during a specified brief period, either one week or one day, were in the following categories: - at work: persons who during the reference period performed some work for a wage or salary, or persons who during the reference period performed some work for profit or family gain, in cash or in kind; - with a job but not at work: persons who, having already worked in their present job, were temporarily not at work during the reference period and had a formal attachment to their job. This formal attachment should be determined in the light of national circumstances, according to one or more of the following criteria: the continued receipt of wage or salary; an assurance of return to work following the end of the contingency, or an agreement as to the date of return; the elapsed duration of absence from the job	Adapted from the International Labour Organization (ILO) Resolutions Concerning Economically Active Population, Employment, Unemployment and Underemployment Adopted by the 13th International Conference of Labour Statisticians, October 1982, para. 9.

Variable	Table no.	Definition	International definition - Sources
		which, wherever relevant, may be that duration for which workers can receive compensation benefits without obligations to accept other jobs; - with an enterprise but not at work: persons with an enterprise, which may be a business enterprise, a farm or a service undertaking, who were temporarily not at work during the reference period for any specific reason. For operational purposes the notion of “some work” may be interpreted as work for at least one hour.	
Unemployed	EMP1 to EMP3	The unemployed comprise all persons above a specified age who during the reference period were: - without work, that is, were not in paid employment or self employment during the reference period; - currently available for work, that is, were available for paid employment or self-employment during the reference period; and - seeking work, that is, had taken specific steps to seek paid employment or self-employment. The specific steps may include registration at a public or private employment exchange; application to employers; checking at worksites, farms, factory gates, market or other assembly places; placing or answering newspaper advertisements; seeking assistance of friends or relatives; looking for land, building, machinery or equipment to establish own enterprise; arranging for financial resources; applying for permits and licences, etc.	International Labour Organization (ILO) Resolutions Concerning Economically Active Population, Employment, Unemployment and Underemployment Adopted by the 13th International Conference of Labour Statisticians, October 1982, para. 10
Inactive	EMP1 to EMP3	The "population not currently active", or, equivalently, persons not in the labour force, comprises all persons who were not employed or were unemployed and hence not currently active because of (a) attendance at educational institutions, (b) engagement in household duties, (c) retirement or old age, or (d) other reasons such as infirmity or disablement, which may be specified.	International Labour Organization (ILO) Resolutions Concerning Economically Active Population, Employment, Unemployment and Underemployment Adopted by the 13th International Conference of Labour Statisticians, October 1982, para. 12
Employee	EMP1 to EMP3	An employee is a person who enters an agreement, which may be formal or informal, with an enterprise to work for the enterprise in return for remuneration in cash or in kind.	System of National Accounts, 1993 Glossary, OECD.

Variable	Table no.	Definition	International definition - Sources
Self-employed workers	EMP1 to EMP3	Self-employed workers are persons who are the sole owners, or joint owners, of the unincorporated enterprises in which they work, excluding those unincorporated enterprises that are classified as quasi-corporations. [An unincorporated enterprise is a producer unit which is not incorporated as a legal entity separate from the owner (household, government or foreign resident); the fixed and other assets used in unincorporated enterprises do not belong to the enterprises but to their owners, the enterprises as such cannot engage in transactions with other economic units nor can they enter into contractual relationships with other units nor incur liabilities on their own behalf; in addition, their owners are personally liable, without limit, for any debts or obligations incurred in the course of production.]	System of National Accounts, 1993 Glossary, OECD.
Temporary/permanent employment	EMP1 to EMP3	Temporary employment comprises work under a fixed-term contract, in contrast to permanent work where there is no end-date. Employment under temporary contracts often entails a different set of legal obligations on behalf of employers; in particular, certain aspects of employment protection legislation do not apply to temporary contracts.	OECD Economic Outlook: Sources and Methods
Full-time/part-time employment	EMP1 to EMP3	Persons usually working less than 30 hours a week are considered as part-timers.	Definition of Part-time Work for the Purpose of International Comparisons, A. Bastelaer, G. Lemaitre, P. Marianna, Labour Market and Social Policy Occasional Papers – No. 22, OECD, 1997, page 12
Gross annual earnings	EMP6 to EMP7	Gross annual earnings cover remuneration in cash and in kind paid during <201X> before any tax deductions and social-security contributions payable by wage earners and retained by the employer.	Eurostat definition (Commission Regulation (EC) No 1738/2005) derived from the UN's definition (International Recommendations for Industrial Statistics, United Nations, New York, 1983, Statistical Papers, Series M, No. 48, Rev. 1, para. 121.)

Variable	Table no.	Definition	International definition - Sources
Field of doctoral degree	P5, P8, ED4, ED5, EMP2.1, EMP4 EMP5, EMP6.1, EMP6.1, PERC1.2	See tables.	New Fields Of Science classification of the Frascati Manual (adopted by OECD NESTI in June 2005)
Sector of employment	EMP5, EMP6.1, EMP6.2, EMP8	**Business enterprise sector** includes: All firms, organisations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price. The private non-profit institutions mainly serving them. **The government sector** includes: All departments, offices and other bodies which furnish, but normally do not sell to the community, those common services, other than higher education, which cannot otherwise be conveniently and economically provided, as well as those that administer the state and the economic and social policy of the community. (Public enterprises mainly engaged in market production and sale of goods and services are included in the business enterprise sector.) Non-profit institutions controlled and mainly financed by government, not administered by the higher education sector. **The higher education** sector is composed of: All universities, colleges of technology and other institutions providing tertiary education, whatever their source of finance or legal status. It also includes all research institutes, experimental stations and clinics under the direct control of or administered by or associated with higher education institutions. **The other education sector** is composed of all institutions providing pre-primary, primary or secondary education, whatever their source of finance or legal status. **The private non-profit sector** includes : • Non-market, private non-profit institutions serving	Adapted from the Frascati Manual (OECD)

Variable	Table no.	Definition	International definition - Sources
		households (*i.e*. the general public); • Private individuals or households. The market activities of unincorporated enterprises owned by households, *i.e*. consultants undertaking projects for another unit at an economically significant price, should be included in the business enterprise sector in line with National Accounts conventions (unless the project is undertaken using staff and facilities in another sector, see below). Hence, the PNP sector should only include activities undertaken by non-market, unincorporated enterprises owned by households, *i.e*. individuals financed by their own resources or by "uneconomic" grants. Furthermore, where grants and contracts are formally awarded to individuals who are primarily employed in another sector, such as grants made directly to a university professor, unless such persons undertake the activity concerned entirely on their own time and make no use of their employing unit's staff and facilities, they should be included in the statistics of the employing unit. It therefore follows that this sector only includes activities performed by individuals exclusively on their own time and with their own facilities and at their own expense or supported by an uneconomic grant.	
Occupations	EMP4	See table.	ISCO-08 (UN)
Industry	EMP9	See table.	ISIC Rev. 4 (UN) or NACE Rev. 2 (EU).
Internationally mobile doctorate holder	IMOB1 to IMOB4	A doctorate holder who, since the award of his/her advanced research qualification, has stayed or lived in a country other than that of his or her usual residence for a period of at least 3 months, except in cases where the movement to that country was for purposes of recreation, holiday, visits to friends and relatives, medical treatment or religious pilgrimage.	Adapted from the Recommendations on Statistics of International Migration, Revision 1 (UN, 1998)
Knowledge, Attributes and Behaviours	ED6 and EMP10	METHODOLOGY: Applying research methodologies, tools and techniques appropriately INNOVATION: Developing new ideas, processes or products, that are rooted in research CRITICAL-ANALYTICAL: Critically analysing and evaluating findings and results	Approach on competencies and skills developed by ECOOM (University of Ghent) based on experiences from various international surveys (see DSTI/EAS/STP/NESTI(2012)11/ANN 2/REV1)

Variable	Table no.	Definition	International definition - Sources
		ENTHUSIASM: Being both passionate and dedicated to my tasks CAREER MANAGEMENT: Taking ownership for and managing my own professional development actively EMPLOYMENT CONTEXT: Understanding how organisations, institutions or businesses work PROBLEM SOLVING: Formulating and applying appropriate solutions to problems and challenges EFFECTIVE COMMUNICATION: Communicating information effectively and confidently to different audiences CREATIVITY: Being imaginative, thinking beyond normal boundaries and developing new insights FLEXIBILITY: Responding quickly to changes and adapting easily to new situations RESPONSIBILITY: Working independently and taking responsibility for my actions NETWORKING: Developing, maintaining and using networks or collaborations SUBJECT KNOWLEDGE: Demonstrating a theoretical and practical understanding of my subject area and its wider research context PROJECT MANAGEMENT: Effectively planning, managing and delivering projects in good time TEAM WORKING: Working constructively with colleagues, acknowledging their contribution LEADERSHIP: Influencing others, providing direction and encouraging their contribution LANGUAGES: Communicating effectively in a language other than my mother tongue	