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DUAL-CAREER

CAREER RESTART

Research Careers in Europe

Study Final Report

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Contact: Julie Sainz
E-mail: EAC-STUDY-RCE@ec.europa.eu

European Commission
B-1049 Brussels

Research careers in Europe

Final Report

Prepared by: PPMI Group (Lithuania) in cooperation with CARSA (Spain)
and INOVA+ (Portugal)



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List of Abbreviations

AC	Associated Countries
CAR	Career Restart
CIG	Marie Curie Career Integration Grants
COFUND	Marie Curie Co-funding of Regional, National and International Programmes
CORDA	Common Research Data
CSIRO	the Commonwealth Scientific and Industrial Research Organisation
DCIS	Dual Career and Integration Services
DCNG	Dual Career Network Germany
DG	Directorate General
DG EAC	Directorate General for Education and Culture
DG RTD	Directorate General for Research and Innovation
EC	European Commission
EEN	European Enterprise Network
EFTA	European Free Trade Association
ERA	European Research Area
NIGHT	European Researchers' Night
EU	European Union
EU12	European Union Member States that acceded to the EU in 2004 (Cyprus, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Malta, Poland, Slovenia, Slovakia) and 2007 (Bulgaria, Romania)
EU13	European Union Member States that acceded to the EU in 2004-2013 (EU-12 and Croatia)
EU15	European Union of 15 Member States: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, the United Kingdom
EU27	27 Member States of the European Union (before the accession of Croatia on 1 July 2013)
EU28	28 Member States of the European Union
EURODOC	European Council of Doctoral Candidates and Junior Researchers
FP6	Sixth Framework Programme
FP7	Seventh Framework Programme
H2020	Horizon 2020 Programme
HEI	Higher Education Institution
HERC	Higher Education Recruitment Consortium
HERC	Higher Education Recruitment Consortium
HES	Higher or secondary education
HR	Human Resources
HRM	Human Resource Management
IAPP	Marie Curie Industry-Academia Partnerships and Pathways
ICT	Information and Communications Technology
IDCN	International Dual Career Network
IEF	Marie Curie Intra-European Fellowships for Career Development
IIF	Marie Curie International Incoming Fellowships
IOF	Marie Curie International Outgoing Fellowships
ITN	Marie Curie Initial Training Networks
LERU	European League of European Research Universities
M(S)C	Marie Skłodowska-Curie
M(S)CA	Marie Skłodowska-Curie Actions
MC	Marie Curie
MCA	Marie Curie Actions

MS	Member States
OECD	Organisation for Economic Cooperation and Development
OTH	Other
PCOCO	Project Primary Coordinator Contact
PRC	Private for profit organisations
PUB	Public body or Research organisation
R&D	Research and Development
REA	Research Executive Agency
REC	Research Organisations
RN	Researchers' Night
RTD	Research and Technological Development
SFI	Science Foundation Ireland
SME	Small and Medium-Sized Enterprises
STEM	Skills in Science, Technology, Engineering and Maths
TANDEM	Talent and Extended Mobility in the Innovation Union
ToR	Terms of Reference
UK	The United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	The United States

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Introduction

The study was prepared as part of the specific contract No. EAC-2014-0466-Research Careers in Europe, implementing the Framework Contract No. EAC/22/2013-4. It was produced on the basis of the Terms of Reference, the technical offer, the Inception and Interim Reports, the minutes of the kick-off, inception and progress meetings, the comments and suggestions from the Steering Group, as well as the results of the validation seminar.

“Research Careers in Europe” is a study with an evaluative character. It addresses the following three specific topics:

1. perception and promotion of research careers;
2. dual careers in research;
3. research career restart.

The main results and conclusions presented in this report, as well as most of the study recommendations were developed to help the European Commission to improve the design and implementation of the Horizon 2020 Marie Skłodowska-Curie actions (MSCA). This programme aims to further contribute to stimulating commitment towards research careers and to support attractive employment and working conditions for researchers in Europe.

The study was carried out by PPMI (Lithuania), in close collaboration with two subcontracted companies, namely INOVA+ (Portugal) and CARSA (Spain).

In line with requirements set in the Terms of Reference, the report consists of the following parts: 1) Executive Summary, 2) Main Report and 3) Annexes. More details about the structure of the Main Report are provided in Table 1.

Table 1. The requirements of the Terms of Reference and the structure of the Final Report

Main parts of the Final Report	Description of respective parts of the report
Part 1: Methodology of the study	This part explains in detail what data collection methods were applied by the study team, including an assessment of the collected data and a brief analysis of strengths and weaknesses of the methodology applied.
Part 2: Study findings	This part provides a general introduction to the study (i.e. the context of the study), followed by a detailed presentation of key study findings and conclusions, as well as analyses that informed these insights. This part of the study is divided into three main sections, each dedicated to a particular topic covered by the study (i.e. perception and promotion of research careers, dual careers in research and research career restart).
Part 3: Study conclusions and recommendations	This part provides a set of specific recommendations on how the MSCA could be improved to better address the challenges identified in this report. In addition it provides a set of more general recommendations (lessons that could be learnt from the analysis and inform policies/strategies at regional, national and EU levels), as well as the key study conclusions on which the study recommendations are based.
Annex 1: References	References are presented according to the Inter-institutional style guide (http://publications.europa.eu/code/en/en-000100.htm).
Annex 2: Terms of Reference	This annex provides the Terms of Reference of this study.

Main parts of the Final Report	Description of respective parts of the report
Annex 3: List of interviewees	This annex to the report provides a list of persons interviewed while preparing the study.
Annex 4: Survey questionnaires and survey results	This annex provides the final questionnaires of the survey programme, the final results of surveys that targeted individual researchers (survey A), research organisations (survey B) and national stakeholders (survey C), as well as anonymised datasets and metadata.
Annex 5: Case study reports	All reports of the case studies completed for the study are provided in this annex.
Annex 6: Inventory of relevant studies	This annex provides a list of studies, dedicated to analysing various issues related to topics covered by this study.
Annex 7: Presentation of the results of the study	The presentation gives a brief summary of the key study findings and lists out the study conclusions and recommendations.

1. Methodology of the study

1.1. Overall evaluation approach

1.1.1. Desk research

Desk research was a key source of information for the preparation of interview and survey programmes. It also informed the selection of relevant case studies and provided the study team with evidence when preparing case study reports. Desk research was also one of the most important sources of data for mapping the measures to improve the perception and promote research careers, facilitate Dual Career and Integration Services (DCIS) and measures to support career restarters in EU Member States and Associated Countries as well as third countries.

Desk research in this study consisted of the following steps:

1. literature review;
2. analysis of the monitoring and administrative data;
3. comparative analysis.

In the following sections we present a brief outline of the scope of these activities and how they fed into the data analysis process.

Literature review

Literature review involved identification, systematisation and analysis of the selected sources of information. To identify the relevant studies, evaluations, articles and similar literature on topics analysed in this study, the research team carried out a thorough screening of the scientific databases accessible to all PPMI consortium partners. All the relevant literature that was identified during the course of this process was included in the inventory of relevant studies (see Annex 6), which was updated regularly throughout the process of data collection. In total, 169 relevant studies were identified and included in this inventory.

The inventory offers some basic information on each and every study included, in particular a study title, author(s) of the publication, a reference to the internet (where possible), the type of publication, the research career management topic covered in the publication, the target group addressed by the authors of the publication, the employment sector of researchers considered in the publication, scientific disciplines and group of countries covered by the source, as well as the language in which this publication is written.

The breakdown of the inventory, which indicates the extent to which each of the three topics considered in this study were covered, is provided in Table 2.

Table 2. Types of studies according to the study topics

	Perception and promotion of research careers	Dual careers	Career restart	Two or all the topics covered	Total
Study	17	15	6	5	43
Evaluation or impact assessment	1	0	0	0	1
Academic book or article	46	6	10	1	63
Monitoring report	1	1	0	1	3
Survey report	5	4	1	1	11
Policy paper, brief or other policy study	21	4	3	8	36
Other	5	3	3	1	12
Total	96	33	23	17	169

Source: the PPMI consortium.

Analysis of the administrative and monitoring data

DG Education and Culture of the European Commission provided various sets of administrative and monitoring data to the PPMI consortium, including the following information and data:

- a list of M(S)CA key performance indicators and information on their achievement;
- statistics available to REA and DG EAC on projects funded under the MCA IEF and MSCA Individual Fellowships actions (including statistics on funded projects under the CAR panel);
- information on the impact of European Researchers' Night activities as reported by beneficiaries in their project reports;
- periodic and final project reports extracted from SESAM (in particular data on dissemination, conferences/events and other societal implications);
- information collected through evaluation and follow-up questionnaires and extracted from SESAM (mid-term questionnaires, evaluation questionnaires and follow-up questionnaires);
- data from the MORE 2 study;
- contact details of M(S)CA beneficiaries under the CAR panel;
- various datasets containing the contact details for the survey of M(S)CA researchers and non-M(S)CA researchers, including the database of FP7 MCA-related Researchers (as extracted from the Participant Declaration of Conformity documents), the FP7 MCA Researcher Registration Report for COFUND action, the list of FP6 MOBILITY participants, the list of MCA applicants whose proposals were rejected, the database of MC researchers and non-MC researchers developed in the course of the study "Marie Curie researchers and their long-term career development: A comparative study";
- various datasets containing the contact details needed for the survey of research performing organisations, including the data extracted from CORDA (the database of FP7 applicants and participants, the database of H2020 applicants and participants) and the list of H2020 MSCA-related Project Primary Coordinator Contacts.

All these datasets and information sources were reviewed and used by the study team for multiple purposes, mainly for collecting additional data as part of the survey programme and for answering the study questions:

- The final project reports were of particular importance for an in-depth analysis of outreach activities in FP7 MCA projects and identification of researchers for interviews to discuss these activities and their impact. This analysis covered 2,694 MCA project reports from the FP7 period. Every report included a section about the dissemination activities carried out in the course of the project. Based on this information, all projects where research results have been communicated to the general public were identified. The results of this analysis were summarised in the respective case study (see Annex 5 for more details) and were also used to answer related study questions.
- Similarly, the contact details of M(S)CA beneficiaries under the CAR panel were used for identifying the MCA fellows and representatives of research organisations who benefited from the CAR panel. The feedback (as collected through interviews) on their experience was used to prepare a case study on the CAR panel's effectiveness in addressing the career restart challenges faced by researchers.

For more details on how the above mentioned datasets were used for surveying purposes please refer to section 1.1.3 of this report.

Comparative analysis with non-EU countries

In order to answer some of the study questions, the study team had to analyse research career management initiatives in non-EU countries. As a result, an extensive desk research was carried out to find out how various state actors and research performing organisations (both public and private) address issues related to research career promotion, dual careers and research career restart in such countries as Australia, Canada, Japan, Singapore and the United States. Overall, 48 studies on the state-of-play and/or individual research career management initiatives implemented in the afore-mentioned third countries have been identified and added to the inventory of existing studies. In addition, interviews with representatives of the Centre for Promotion of Science Education in Japan's Science and technology Agency, the Commonwealth Scientific and Industrial Research Organisation in Australia and the US National Science Foundation were carried out to support the findings of desk research.

Content analysis

To cope with the extensive amount of data obtained from desk research, interviews and surveys, the NVivo 10 software was used to carry out the organisation and processing of all qualitative data.

Methodologically, the process consisted of the following steps:

- development of the coding framework;
- collection of all the materials to be used for content analysis;
- coding, which refers to a process of sorting the contents by topic, theme or case;
- analysing the coded information and describing the patterns, trends and connections.

In practice, the initial coding framework was developed relying on theory, findings of previous research on the topics analysed in this study, the Terms of Reference and other relevant sources. This 'concept-driven' framework was afterwards incrementally updated by adding new sub-categories that emerged from the analysis of collected data, resulting in application of the 'data-driven' coding framework.

1.1.2. Interview programme

In line with its initial plan for the interview programme, the study team carried out **48 interviews** with various stakeholders. The breakdown of planned and completed interviews at system and organisational/individual levels is provided in Table 3.

Table 3. Breakdown of planned and completed interviews

Type of interviewee	Number of interviews planned	Number of interviews completed
System level interviews		
EU level (DG EAC, DG RTD, REA, social partners)	6	7
National level (members of the MSCA Advisory Group, National Contact Points, experts from third countries)	11	9
Organisation/individual level interviews (case studies)		
Individuals responsible for implementation of analysed initiatives and/or beneficiaries of these initiatives	30	32
TOTAL:	47	48

Source: the PPMI consortium.

A full list of officials from different Commission services and experts at national level interviewed by the study team (including some additional information, such as the position of particular interviewees or the topics covered during the interview) is provided in Annex 3 to the report. The list of persons interviewed by the study team in order to collect the information needed to prepare the case study reports are provided in Annex 5, at the end of each report. On average, three interviews per case study were carried out.

1.1.3. Survey programme

Survey of individual researchers

This web-based survey was targeting the individual researchers, more particularly researchers who benefited from M(S)CA at some point and researchers who have never (or at least over the past few years) benefited from this programme. The main objective of this survey was to gather information and opinions of researchers working in Europe on the following aspects of research career management practices:

- improving perceptions and promotion of research careers;
- fostering of dual-careers;
- ensuring opportunities for research career restart.

The methodology adopted for the implementation of this survey started with the definition of its scope and the sample of respondents to be invited to participate in the survey. To proceed with this step, the study team closely cooperated with the European Commission in order to get access to the following datasets:

- database of M(S)CA-fellows (including the list of FP6 mobility participants, datasets of FP7 interim and final reports on projects and researchers that received funding, the list of FP7 MCA-related researchers and the list of H2020 MSCA-related Project Primary Coordinator Contact – PCOCO);

- database of MCA and non-MCA researchers (as compiled by Economisti Associati within the framework of a study on MC researchers and their long-term career developments).

The initial data sources obtained from the European Commission encompassed as many as 204,952 contacts. After cleaning, however, the number of contacts was reduced to 56,613. In accordance with our sampling strategy which foresaw that gender and country aggregation strata should be considered when drawing the sample, all entries in databases available to the research team that did not contain this kind of information had to be removed. Furthermore, all duplicate entries and entries with no e-mail addresses indicated were excluded from the final database. For more details about researchers retained in the final database please see Table 4.

Table 4. Final database

Sampling strata	N= 54,781
Type of researcher (/non-fellow)	
M(S)CA researcher	16,531
Non-M(S)CA researcher	38,250
Gender (Female researcher/male researcher)	
Female	19,800
Male	34,981
Country aggregation (EU13/EU15/Other countries)	
EU-13	5,825
EU-15	45,052
Other countries	3,904

Source: survey of individual researchers.

The survey was officially launched on 29 October 2015. Based on an initially estimated response rate of 10%, and aiming at a confidence level of 95% and a margin of error at 5% for each stratum, a total of 24,357 invitations were disseminated to participate in the survey. On the official survey closing date, a total of 3,904 replies had been received with an overall response rate of 16%. The collected data were weighted to adjust the sample's composition to be reflective of the population's composition and to control for over- or under-reporting from certain groups.

The overall sampling error in case of the survey of individual researchers was 1.51%. More details about the margin of error per each stratum considered when drawing the sample are provided in Table 5.

Table 5. Margin of error per stratum in survey of individual researchers

Sampling strata		N (population)	N (sample)	Margin of error
M(S)CA researcher	Female	5,666	1,047	2.73
M(S)CA researcher	Male	1,0865	1,039	2.89
M(S)CA researcher	EU-15	13,382	1,400	2.48
M(S)CA researcher	Other countries	1,313	273	5.28
M(S)CA researcher	Male	10,865	1,039	2.89
Non-M(S)CA researcher	Female	14,134	880	3.2
Non-M(S)CA researcher	Male	24,116	937	3.14
Non-M(S)CA researcher	EU-13	3,989	531	3.96
Non-M(S)CA researcher	EU-15	31,670	940	3.15
Non-M(S)CA researcher	Other countries	2,591	346	4.91

Sampling strata		N (population)	N (sample)	Margin of error
Female	EU-13	2,111	347	4.81
Female	EU-15	16,317	1,309	2.6
Female	Other countries	1,372	271	5.33
Male	EU-13	3,714	597	3.67
Male	EU-15	28,735	1,031	3
Male	Other countries	2,532	348	4.88
Total		54,781	3,903	1.51

Source: survey of individual researchers.

Survey of research organisations

The survey used the contact information extracted from CORDA. Two Excel files containing both applicants and beneficiaries of FP7 and H2020 were used as a starting point. Considering the scope of the study, for FP7 only data from calls under the PEOPLE programme were used and, similarly, for H2020 only data from calls under MSCA were used. Furthermore, only data related to Member States and associated countries were drawn from the CORDA database. After applying these initial cleaning actions, the databases included:

- 76,775 FP7 PEOPLE applicant contacts and 20,009 FP7 PEOPLE beneficiary contacts;
- 53,743 H2020 MSCA applicant contacts and 4,628 MSCA beneficiary contacts.

Several additional cleaning steps followed, aiming to remove empty or erroneous email addresses, duplicate emails and/or persons, as well as to identify the most recent email addresses. The merged database included 36,574 potential survey contact emails, consisting of 11,780 not retained applicants under H2020 MSCA/FP7 PEOPLE and 24,794 beneficiaries of H2020 MSCA/FP7 PEOPLE. After comparing the databases for surveys individual researchers and research organisations, 444 additional duplicates were cleaned, leaving a final cleaned database of 36,130 contacts.

A *stratified random sample* was drawn for this population, taking into account the following strata:

- Organisation types (2 categories):
 - *Academic*: Higher or secondary education (HES), Public body or Research organisation (PUB); Research Organisations (REC) and Other (OTH);
 - *Non-academic*: Private for profit organisations (PRC).
- Country aggregations (3 categories): EU15, EU13, other associated countries.

Based on an initially estimated response rate of 15%, and aiming at a confidence level of 95% and a margin of error at 5% for each stratum, a total of 15,727 survey invitations were disseminated on the launch day of 16 November 2015. Two weeks after this date (including one reminder) only around 680 responses had been received. Thus, it was agreed with the Commission to leave the survey open over the holiday season and relaunch it in 2016 (in a reduced format with fewer questions). The survey was relaunched on 11 February 2016 and a final reminder was sent one week later. Overall, 1,572 answers have been received (whereof 744 from the first launch,

covering all questions; the overall response rate – 10%) by the official survey closing date.

Although the overall number of received responses was sufficient to make reliable insights about the whole population, the margin of error per certain strata was higher than 5% due to the lower than estimated number of responses (see the table below for more details).

Table 6. Sampling error per strata of survey of research organisations

Sampling strata	N (population)	n (sample)	Margin of error
M(S)CA/People beneficiary organisations	24,477	825	3.35
Non-beneficiary organisations	11,653	703	3.58
Academic organisation	28,156	1,099	2.9
Non-academic organisation	7,974	444	4.52
Organisations from EU-13 countries	35,44	385	4.72
Organisations from EU-15 countries	29,528	875	3.26
Organisations from other countries	3,058	312	5.26
Total	36,130	1,572	2.42

Source: survey of research organisations.

Survey of national stakeholders

The main objective of this web-based survey was to gather information and opinions from various national (regional) stakeholders about recent programmes and initiatives implemented by the EU Member States and associated countries at system level in all three areas of research careers covered by this study (i.e. changing of perceptions and promotion of research careers, fostering of dual-careers and ensuring opportunities for research career restart).

The survey was conducted in June-July 2015 and a total of 61 replies were received during this period. Most of the respondents were either representatives of the Programme Committee for the specific programme implementing Horizon 2020 (Configuration “European Research Council, Marie Skłodowska-Curie Actions, Future and Emerging Technologies”) or the National Contact Points for the Marie Skłodowska-Curie actions (for more details, see Table 7). Geographically, respondents represented 30 different European countries (see Table 8 for more details).

Table 7. Breakdown of participants in the survey of national stakeholders

Response	Count
1. Programme Committee for the specific programme implementing Horizon 2020 (Configuration “European Research Council, Marie Skłodowska-Curie Actions, Future and Emerging Technologies”)	24
2. ERA Steering Group on HR and Mobility	14
3. National Contact Point for the Marie Skłodowska-Curie actions	24
4. Research funding institution in my country (region)	12
5. Other, please specify	12

Source: analysis of the survey C data, N=61.

Table 8. Geographical coverage of the survey of national stakeholders

Country	Count	Country	Count
Albania	1	Moldova	2
Austria	1	Netherlands	2
Belgium	2	Norway	2

Country	Count	Country	Count
Bosnia and Herzegovina	1	Poland	4
Bulgaria	2	Portugal	2
Cyprus	1	Romania	1
Croatia	1	Serbia	2
Czech Republic	1	Slovakia	3
Denmark	1	Slovenia	4
Germany	4	Spain	2
Hungary	3	Sweden	4
Ireland	2	Switzerland	4
Italy	3	The Former Yugoslav Republic of Macedonia	1
Latvia	2	Turkey	1
Lithuania	1	United Kingdom	1

Source: analysis of the survey C data, N=61.

1.1.4. Case studies of career management practices and M(S)CA projects

In line with the original plan for the case study programme, 10 case study reports were produced by the study team. An in-depth analysis of different research career management practices in relation to the three topics considered in this study (perception and promotion of research careers, dual careers and research career restart) is provided in each of these reports.

To guide the process, a common template was created and disseminated to responsible experts, outlining the main sections to be included in each case study report and providing examples of questions to be addressed during interviews. In the course of preparing each case study, however, the authors of the report were allowed to adjust this template by adapting it to the specific needs of their case.

Typically, data collection involved the following steps (in order of priority):

- 1) preliminary desk research, analysis of the administrative and monitoring data, as well as data collected through previous interviews and surveys;
- 2) interviews with case study stakeholders (personnel involved in the management of a measure/initiative, employers (academic/non-academic), researchers and scientific experts), focusing on qualitative assessment and impact of the practice;
- 3) additional desk research and review of relevant documentation.

As part of the quality assurance process, all case study reports were revised after their delivery. First by the consortium partner responsible for the specific case study and then by CARSA (as the partner responsible for the overall coordination of the case study programme) or by PPMI (as the lead partner).

The final list of initiatives analysed in these reports, as well as some basic information about each case study, is summarised in Table 9. All 10 case studies can be found in Annex 5 to this report.

Table 9. Final selection of initiatives for the case study analysis

Topic	Title	Country
Topic 1	Science-Bus "Big Dipper"	Estonia
	SFI Discover	Ireland
	M(S)CA Outreach activities	EU-wide
Topic 2	Higher Education Recruitment Consortium	US

Topic	Title	Country
	(HERC) Jobs	
	Dual Career Network Germany (DCNG)	Germany
	International Dual Career Network (IDCN)	International
Topic 3	Daphne Jackson Fellowships	UK
	Returning Carers Scheme – University of Cambridge	UK
	Career Restart Panel (EU)	EU
Multiple topics	L’Oréal Foundation	International

Source: the PPMI consortium.

1.1.5. Validation seminar

To present the study findings and validate its conclusions and recommendations with a wider audience, an international validation seminar was organised by the study team in close cooperation with the Commission. The event took place on 3 June 2016, in Brussels at premises of the Research Executive Agency. In total, **50 experts** attended the event, including experts from different EU Member States, representatives of EU-based stakeholder organisations, EU-level officials (DG EAC, DG RTD and REA officers) and members of the study team.

The following items were on the agenda of this one-day event:

- a **presentation by the keynote speaker** (Dr Katie Perry, Chief Executive of the Daphne Jackson Trust);
- **presentations** of the key study findings on all three topics covered by the study;
- a **panel discussion** to reflect on the study conclusions;
- three **workshops** (organised in parallel) to agree on study recommendations.

This format of the validation seminar proved to be very effective as it provided means 1) to brief the participants on evidence collected by the study team and 2) to engage them in meaningful and structured discussions on the relevance and validity of the study conclusions and recommendations. Furthermore, a wide spectrum (i.e. officials involved in policy-making, members of relevant advisory bodies, practitioners, researchers, university representatives, etc.) of stakeholders attending the event ensured that interests of all sides are reflected in the discussions.

As a result of this seminar, the study team revised a few of its recommendations on the basis of suggestions provided and backed by all participants to the event. Also, insights gained from discussions with experts were used to triangulate some of the study findings – where relevant, a note was added that in addition to other sources of evidence, the specific insight is also supported by the collective opinion of experts who attended the seminar.

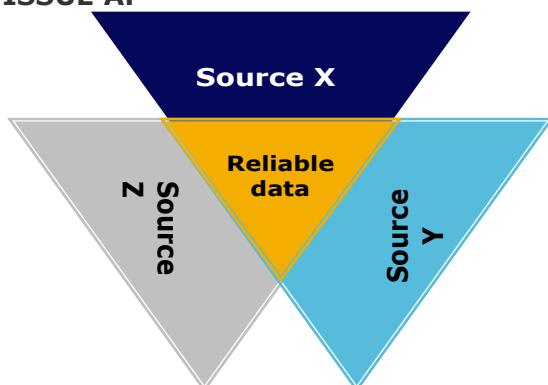
1.2. Strengths and weaknesses of the methodology

The main strength of the applied methodology is the fact that it employed *a number of recognised research methods*, combining qualitative (through literature review, interviews, content analysis and case studies) and quantitative (through analysis of the administrative and survey data) approaches to data gathering and analysis. The mixed method approach allowed connecting quantitative and qualitative data and verifying study results based on the triangulation principle (a joint analysis of different evidence sources (see Figure 1)). In order to avoid subjectivity and partiality of the data, the study team applied the following three steps:

- 1) all potential sources of information were identified in order to answer the operationalised study questions;
- 2) each source of information was exploited in order to obtain evidence on a particular question;
- 3) the data from various sources were compared.

Figure 1. Triangulation of data

ISSUE A:



Source: Compiled by PPMI.

Moreover, the study featured intensive steering of the study progress from the Steering Group and benefited from the active involvement of the interview respondents in the finalisation of the case studies, as well as insights provided by participants of the validation seminar.

Despite the aforementioned strengths, a few methodological limitations of the overall study approach as well as some weaknesses of the specific methods should be acknowledged:

- due to insufficient number of responses, a few strata in the surveys of individual researchers and research organisations could only be analysed with margin of error slightly above 5%;
- a few groups of respondents in the survey of individual researchers were under- or over-represented in the sample. In order to adjust the sample's composition to be reflective of the population's composition and to control for over- or under-reporting from certain groups, a 'weighting' variable was developed.

Table 10. Strengths and weaknesses of the main evaluation methods

Method	Strengths	Weaknesses/limitations
1. Literature review	<ul style="list-style-type: none"> - Allowed harvesting the publicly available data and eliminated the possibility of repetition; - Was useful in the preparation of interview and survey questionnaires as well as guidelines for case studies; - Application of the dedicated software led to a more systematic analysis of available qualitative data; 	<ul style="list-style-type: none"> - It was time-consuming and a large amount of time was spent on sorting and systematisation of the available qualitative data; - The official documents do not necessarily reflect the perceptions of decision-makers and target groups or are not detailed enough to inform the analysis.

Method	Strengths	Weaknesses/limitations
	<ul style="list-style-type: none"> - Was useful for contextualisation of findings based on statistical analysis of the quantitative data; - Was useful in providing an overview of the previous relevant studies and their results. 	
2. Analysis of the administrative data	<ul style="list-style-type: none"> - Provided reliable data on individual researchers and research organisations (both beneficiaries and non-beneficiaries of M(S)CA); - Contact lists of survey respondents were extracted from the administrative data provided by the Commission; - Information extracted from the administrative data allowed the study team to optimise the length of survey questionnaires; - It was an important source of evidence for the analysis of MCA outreach activities and CAR panel. 	<ul style="list-style-type: none"> - Analysis of the outreach dimension of M(S)CA was restricted due to the fact that H2020 MSCA final project reports are not yet available; - Information on the impact of European Researchers' Night activities which was provided by beneficiaries in their project reports lacked consistency and comprehensiveness.
3. Interviews	<ul style="list-style-type: none"> - Were useful for collecting detailed and comparable information; - Allowed to explain or clarify questions to interviewees, minimising the chances of misinterpretation; - Were useful for clarifying and juxtaposing information obtained using other methods; - Served as a key source of information for case studies; - Were useful for explaining the institutional and individual viewpoints of stakeholders. 	<ul style="list-style-type: none"> - Were resource-intensive, as required long-distance travel and lengthy telephone calls, factual information had to be cross-checked in writing with the interviewee; - The answers are given from a personal point of view and may be mindful of the interests of a particular institution; - The study team was challenged by difficulties in identifying, contacting and meeting stakeholders and strongly depended on the availability of interviewees.
4. Case studies	<ul style="list-style-type: none"> - Were useful for presenting a holistic view of initiatives and projects selected; - Combined both quantitative and qualitative evidence; - Allowed a longitudinal analysis; - Were useful for explaining the "causal mechanisms" behind certain correlations; - Were useful for identifying and 	<ul style="list-style-type: none"> - Were difficult to generalise upon because of the small sample; - Since the initiatives/projects were identified by name, it is possible that some participants tended to present their projects and organisations more favourably; - Many contextual and institutional factors do not allow

Method	Strengths	Weaknesses/limitations
	documenting good practices.	the establishment of clear causal links.
5. Surveys	<ul style="list-style-type: none"> - Data collected using this method enabled quantitative measurement of main hypothesis on study questions; - Various target groups were addressed by the survey programme, allowing analysis on relevant issues at system, organisation and individual levels; - Survey data allowed multiple comparisons, cross-tabulations and statistical analyses showing important links between statements and parameters of respondents. 	<ul style="list-style-type: none"> - "Survey fatigue" of the target audience; - In order to increase the response rates, some of planned questions were not included in the relaunched survey of research performing organisations. Therefore, collected data on these questions is not representative.

Source: the PPMI consortium.

Overall, the study results and conclusions are considered to be robust. No weakly supported conclusions or recommendations are provided in the report.

2. Study findings

Competent and talented researchers are vital for creating and satisfying a competitive knowledge-based economy. In order to support achievement of the ERA target of one million additional research jobs in the EU by 2020, there is an evident need to improve the perception of research careers and promote them in Europe. Besides attracting young people to science and experienced researchers to European research, there is a need to consider unconventional paths in the research career in order to avoid any barriers or obstacles that could prevent a researcher from his/her career development. Significant national, institutional and personal investments are put in place to educate and train researchers and these investments are lost if researchers fully abandon research activities. Therefore, it is important to gain insights on the needs of, and opportunities for, dual careers and career restart, as well as to look into different approaches used to address potential challenges in these areas.

The most important objectives of research career development in the policies of European national (regional) governments in the period 2010-2014 were the following: promoting equal opportunities and gender balance in research (88%), encouraging young people to embark on a career in research (87%) and improving research career conditions (84%). The policy objective of promotion of research career restart and/or facilitating reintegration after a break was least frequently pursued in these countries: only 51% of respondents agreed that this objective was very or rather important in the policy of their national (regional) government.

Also, according to the results of the one-way ANOVA test, the objectives of improving skills and competences of researchers ($F=7.228$, $p<0.05$) and improving practices of researcher recruitment ($F=6.197$, $p<0.05$) were more common in the EU13, candidate countries and potential candidates from western Balkans countries compared to the EU15 and EFTA countries (for more details see Table 11). This indicates that the former countries recognise the importance of these objectives related to research career development in the decision-making process, but it does not always translate into specific programmes and initiatives aimed at improving the current situation (see parts 2.1.-2.3. of the report).

The Terms of Reference grouped all study questions into three sets of questions dealing with:

- 1. perception and promotion of research careers;**
- 2. dual careers;**
- 3. career restart.**

These study themes are considered to be both separate and interlinked with each other. While improving dual careers and resuming research careers are important topics in their own right, they also serve as instruments for promoting research careers by removing obstacles to researchers' mobility and career progression. Also, there is a link between topics 2 and 3 because dual careers can prevent career breaks, especially for female researchers. Therefore, in answering the study questions we, where necessary, combine topic-specific empirical evidence.

Table 11. Importance of research career development objectives in the policy of European national (regional) governments in the period 2010-2014 (answer choices of 'very important' and 'rather important')

Objectives	Total		Country groups			
			EU15 and EFTA countries		EU13, candidate countries and potential candidates from western Balkans	
	% of Total	Count	% of Total	Count	% of Total	Count
Promoting equal opportunities and gender balance in research	87.9%	51	48.3%	28	39.7%	23
Encouraging young people to embark on a career in research	86.9%	53	41.0%	25	45.9%	28
Improving research career conditions (more opportunities for international, intersectoral and interdisciplinary mobility, more financially attractive salaries, etc.)	83.6%	51	37.7%	23	45.9%	28
Encouraging interactions between society and research organisations	83.1%	49	40.7%	24	42.4%	25
Improving skills and competences of researchers*	80.0%	48	33.3%	20	46.7%	28
Improving practices of researcher recruitment*	72.4%	42	29.3%	17	43.1%	25
Improving work-family balance in research	67.9%	36	37.7%	20	30.2%	16
Improving the image of the researcher profession	65.0%	39	28.3%	17	36.7%	22
Promoting research career restart and/or facilitating reintegration after a break	50.9%	28	27.3%	15	23.6%	13

Source: analysis of the survey C data.

Note: * statistically significant difference found in one-way ANOVA analysis.

2.1. Perception and promotion of research careers

2.1.1. School and university-level initiatives

In this section of the report we analyse the initiatives implemented at school and university levels for the promotion of research careers in Europe. In particular, we present the most successful practices of these measures and provide a comparative analysis with initiatives implemented in third countries. We conclude this section by defining the key success factors and difficulties encountered while implementing the initiatives promoting research careers among young people.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.1.1

- In terms of motivating school-age people to pursue a research career, the most successful were those initiatives that employed interactive methods and that emphasised a practical demonstration of how science works. In particular, organised visits to research organisations, public events aimed at science popularisation, workshops and internship programmes for schoolchildren were indicated as the most successful.
 - In comparison to school-level initiatives, university-level initiatives were generally more effective in encouraging young talented people to choose a research career. In particular, attractive financial conditions were indicated as the most important and successful instrument in promoting research careers among the university students. Other effective instruments identified in this area were public events to popularise science and research profession (conferences, science fairs, public lectures by scientists), initiatives aimed at improving the quality of doctoral training and supporting the international and/or intersectoral mobility of young researchers.
-
- The level of awareness and willingness of universities and local researchers' community to cooperate, as well as the right choice of appropriate science popularisation methods were found to be the key factors behind the success of measures implemented to promote research careers among the young people.
 - In terms of the key difficulties encountered while implementing the research career promotion initiatives, the study revealed that the prevailing issue is the lack of public funding for this purpose. Other important issues constraining the successful promotion of research careers were insufficient support from top decision-makers within government as well as insufficient communication of programmes to relevant stakeholders (school administration, students, parents, etc.).
-

Successful practices in EU and third countries

In terms of motivating school-age people to pursue a research career, the most successful were those initiatives that employed *interactive methods* and emphasised *practical demonstration of how science works*. When asked to name the most successful programme/initiative aimed at promoting research careers among schoolchildren, the majority of surveyed national stakeholders, organisations and interview respondents indicated initiatives and/or programmes that involved some kind of interactive methods and/or engaged schoolchildren in 'hands-on' research activities: such initiatives include live science experiments for schoolchildren, science shows, workshops, work in laboratories, internships, organised visits to research

organisations and even direct involvement of schoolchildren in research projects at universities.

For example, the case study of the Estonian Science Bus “Big Dipper” initiative, which was selected as one of the best practice examples in Europe, showed that practical demonstrations of how science works, as well as live experiments directly engaging schoolchildren in these activities guaranteed the initiative’s success. Similarly, the case study of Ireland’s SFI Discover initiative, which substantially contributed to the popularisation of STEM subjects in Ireland, included activities such as the development of an inquiry-based approach to teaching, workshops, summer schools, placements of schoolchildren in research centres and science laboratory tours. A few other examples of successful initiatives were mentioned during the validation seminar, like the “Sparkling Science” programme implemented in Austria and the “Nysgjerriger” science knowledge project supported by the Research Council in Norway.

A comparison with initiatives implemented in third countries revealed similar trends. Open-door days or organised visits to research organisations and public events aimed at science popularisation were identified as the most successful by the surveyed representatives of research organisations from third countries. In Australia, the “Pulse at Parkes” programme which allowed students to take control of the Parkes radio telescope was identified as one of the most successful initiatives because it helps schoolchildren to learn how ‘real’ science works. In the US, the “First LEGO” and “First robotics” science competitions which encouraged schoolchildren to solve real-life problems in science and engineering were identified as some of the top measures developed in the country.

Our findings that initiatives complementing traditional teaching methods at schools can be particularly successful in encouraging young people to choose a research career are also supported by other studies. For instance, a recent science education research¹ indicates that the level of students’ interest in science is greater when teachers focus on real-life applications. More specifically, students were found to be more interested in science when more activities like science clubs, extracurricular science activities or science field trips were offered by their school². The importance of such activities is also supported by the fact that around 20% of all Norwegian students who started studies in science in 2008 referred to science centres as a ‘source of motivation and inspiration to choose science studies’³. The effectiveness of these inductive or inquiry-based science promotion methods is explained by the fact that it allows discussion, observation, experimentation and teacher-guided construction of knowledge, which is conducive to the development of interests and a deeper understanding of science among schoolchildren⁴.

¹ Päivi H. Taskinen, Kerstin Schütte & Manfred Prenzel (2013). ‘Adolescents’ motivation to select an academic science-related career: the role of school factors, individual interest, and science self-concept’, *Educational Research and Evaluation: An International Journal on Theory and Practice*, 19(8), p. 719.

² Ibid.

³ Norwegian Ministry of Education and Research, 2010. ‘Science for the Future. Strategy for Strengthening Mathematics, Science and Technology (MST) 2010–2014’. [pdf] Available at http://www.regjeringen.no/upload/KD/Vedlegg/UH/Rapporter_og_planer/Science_for_the_future.pdf [Accessed 10 February 2011].

⁴ Minner, D. D., Levy, A. J. & Century, J. (2010). ‘Inquiry-based science instruction – what is it and does it matter? Results from a research synthesis years 1984 to 2002’, *Journal of Research in Science Teaching*, 47, pp.474–496.

It should be stressed, however, that school-level initiatives are more suitable for raising the general level of interest in science and technologies among schoolchildren, while university-level initiatives are generally more effective in encouraging young talented people to choose a research career. As indicated by a number of national experts, the main reason for this is that in contrast to schoolchildren, bachelor and master level students are mature enough to make decisive choices of their future career paths. This aspect was also emphasised by participants of the validation seminar, who also agreed that initiatives targeted at schoolchildren are more suited for raising the awareness and increasing their interest in studies in STEM subjects rather than encouraging them to pursue a research career. Thus, it is important to differentiate between the target groups of schoolchildren and university students in designing and executing science promotion activities.

In the case of the university-level initiatives, attractive financial conditions were found to be the most important and successful instrument in promoting research careers among the university students. When asked about the most successful university-level initiatives, the majority of national stakeholders, representatives of research organisations and interviewed individual experts mentioned initiatives and/or programmes providing direct or indirect *financial support for students and young researchers* (fellowships, grants, support covering the costs of research, salaries, publications and/or research mobility, etc.). For instance, increasing the amount of PhD stipend was identified as the key recent initiative for encouraging students to pursue a research career in the UK and Lithuania. In Norway, the key factors behind the attractiveness of research careers were suggested as the absence of tuition fees and some of the highest salaries in the world offered for both junior and senior researchers.

Moreover, according to the surveyed employers, providing *trainee* researchers with financial support is a much more effective way of motivating university students to pursue a research career (65% of the organisations' survey respondents) than improvement of the working conditions for researchers (salaries, contractual conditions, social security and research facilities), which was considered as successful by 44% of respondents. Furthermore, financial support, as a research career promotion measure, seems to be much more relevant for early-stage researchers and students, rather than researchers in the later stages of their careers. On the other hand, as stressed by participants of the validation seminar, the limited number of positions available to postdoctoral researchers, as well as absence of schemes supporting researchers at this stage of their career severely limits the attractiveness of a research career and should be addressed adequately to make full use of measures designed to attract additional PhD students.

Other initiatives identified as success stories in the area of research career promotion to university students included public events to popularise science and research profession (conferences, science fairs, public lectures by scientists), improving the quality of doctoral training and supporting international and/or intersectoral mobility of young researchers. From 60% to 69% of the representatives of research organisations identified the latter initiatives as very or somewhat successful. As in the case of the school-level initiatives, the national stakeholders indicated that the above successful university-level initiatives in their countries had high efficiency, impact and the potential to be transposed at the EU level.

A comparison of practices in the EU Member States and third countries did not reveal any significant differences. Most of the surveyed representatives of research organisations from the associated countries identified such measures as scholarships

and financial support for trainee researchers, public events to popularise science and research profession as well as improving the quality of doctoral training as successful instruments for motivating the university students to pursue a research career.

For instance, one of the most successful research career promotion initiatives targeting Japanese students is the JSPS (Japanese Science Popularisation Society) scholarship. This is a three-year grant for PhD students, which includes a salary, a stipend to cover living costs and additional money to cover research-related costs. Similarly, one of the best practice examples in the US mentioned by national experts was the McNair Scholars Programme, which provides stipends and covers preparatory research courses for talented undergraduate students to become graduate students at the doctoral level. As the programme specifically targets the first generation students from low-income families and/or students from ethnic minority groups, it had a significant impact in promoting research careers among these groups of young people⁵.

Negative and positive factors

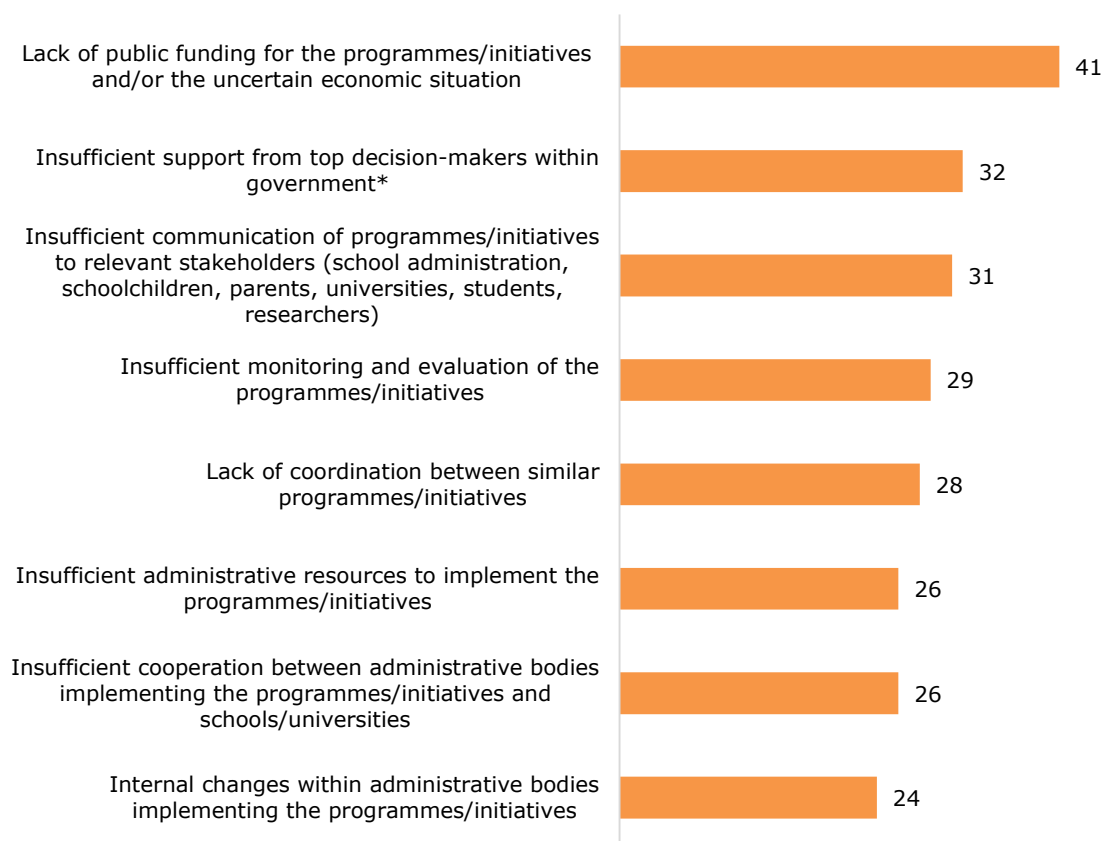
One of the main identified key success factors of the initiatives/programmes aimed at research careers promotion was the level of *awareness and willingness of universities to cooperate* for this purpose. This was identified as one of the main success factors of the "Concordat to Support the Career Development of Researchers and Vitae International programme" in the UK. In order to support the Concordat, the Vitae international programme is gathering feedback from the researchers through a survey of research staff at universities conducted every two years ("Careers in Research Online Survey"). The universities then take actions in response to this feedback about different career aspects of the researchers they employ. According to the national experts, the main factor contributing to the success of the Vitae international programme and the "Concordat to Support the Career Development of Researchers" in the UK was the willingness of British universities to cooperate and to respond to this evidence by improving various aspects of research career development. Similarly, *the active involvement of local researchers' community* in the promotion of research careers was identified as one of the key success factors in the Estonian Science Bus "Big Dipper" initiative aimed at popularising STEM subjects among schoolchildren and the general public through interactive science shows. According to the case study results, the initiative's 'embeddedness' in the local researcher and student community helped maintain high quality standards of the science shows as generations of volunteers changed.

The Estonian case study also revealed the importance of choosing *appropriate methods of science popularisation* for the overall success of the initiative: in order to attract the interest of schoolchildren, who were the main audience, the science shows had to be interactive and interesting. According to the case study evidence, live experiments and use of visual materials in science shows were well chosen for this purpose. However, workshops that involve schoolchildren even more directly in science experiments would have had an even more positive effect. The same case study also showed that a crucial success factor for any science popularisation initiative

⁵ Restad, Cristina (2013). 'Beyond the Program Year: Graduates Students' Understanding of How McNair Scholars Program. Participation Impacts Their Experiences in Graduate School', *PSU McNair Scholars Online Journal*, 7(1), Article 16 or Grimmert, Muriel A. S., Bliss, James R., Davis, Diane M. and Ray Louis: (1998): 'Assessing Federal TRIO McNair Program. Participants' Expectations and Satisfaction with Project Services: A Preliminary Study', *The Journal of Negro Education*, 67, pp. 404-415.

is the *presence of a strong team leader* who can lead and coordinate project activities. A strong leader personality was one of the key sources of motivation inspiring student-volunteers, as well as the main factor ensuring the constant flow of funds necessary for the implementation of project activities.

Figure 2. Key obstacles to implement the research career promotion programmes and initiatives



Source: the survey of national stakeholders.

Note: Based on answers to the survey question "How important have the following obstacles been during the execution of your programmes and initiatives addressing promotion of research careers (at school and university level) in your country (region)?"

In terms of the key difficulties encountered while implementing the initiatives promoting research careers among young people, the results of the case studies and the national stakeholders' survey indicate that the key issue was the *lack of public funding* for this purpose (41 or 71% of respondents). Similarly, insufficient amount and uncertainty about the funding was identified as one of the key challenges in the implementation of the Estonian Science Bus initiative. Other prevalent issues constraining the successful promotion of research careers mentioned by the national stakeholders were *insufficient support from top decision-makers* within government (32 or 55% of survey respondents), as well as *insufficient communication of programmes* initiatives to relevant stakeholders (school administration, students, parents etc.) (31 or 53% of national stakeholder survey respondents). Statistical analysis showed that, in comparison to the EU-15 group, insufficient support from top decision-makers was a more significant negative factor among the EU-13, candidate countries and potential candidates from western Balkans ($F=5.097$, $p<0.05$). For instance, according to the expert interview results, the lack of support from top decision-makers in the country was similarly identified as one of the main constraints

preventing the development of actions specifically aiming at attracting more young people to research careers in Lithuania.

2.1.2. Role of employers in research career promotion

In this section of the report we analyse the role played by employers in motivating young people to engage in research careers. In particular, we describe the most common ways academic and non-academic research organisations raise interest in science and research among schoolchildren and attract talented university students. We also provide a brief overview of practices in place to monitor the impact of their initiatives and reflect on the most common arguments used by employers when recruiting researchers. We conclude this section by defining the impact of the local presence of research organisations and how it stimulates the commitment of young people towards research careers.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.1.2

- Public science popularisation events, support to international and/or cross-sectoral mobility of young researchers, visits to the premises of research organisations and scholarships for trainee researchers are the most common research career promotion practices used by both academic and non-academic research organisations when addressing such target audiences as schoolchildren and university students.
 - While academic research organisations in general tend to be more active and more often engage at once in multiple research career promotion activities (especially when compared to SMEs), large companies also have their ways of engaging with future researchers and attracting talents aside from one-off smaller scale activities. For instance, they contribute to research career promotion through their own dedicated foundations and/or joint undertakings.
 - Employers usually employ a set of different mechanisms to monitor the implementation and success of their activities in the area of research career promotion. Furthermore, they use these instruments to collect information that is not limited to data about the inputs or outputs of their incentives, but also for measuring their impacts. On the other hand, the assessment of achieved results is most often based on simple evaluation methods, such as insights from conversations with stakeholders and on-site observations.
 - Overall employers are well aware of the arguments that young researchers find compelling and very often mention these arguments when aiming to encourage young people to pursue a research career and/or seeking to retain talents. However, arguments concerning a good work family life balance are seldom used despite the high importance of this issue for early stage researchers.
 - The strong local presence of research organisations can and quite often has a positive impact on the choices of young people to pursue a research career. However, the actual impact of this factor should not be overestimated (as certain factors are being perceived as far more important by researchers). Instead, the strong local presence of research organisations should be viewed as a factor ensuring a higher level of awareness among young people of what the research career entails. University lecturers are viewed as one of the most important source of information for young people considering the possibility of becoming a researcher.
-

Overview of research career promotion practices applied by employers

A comparative analysis of data collected through the survey of research organisations revealed that there are no significant differences between academic and non-academic research organisations in terms of variety of initiatives implemented to popularise science and to promote research careers among schoolchildren. Both types of research organisations most often choose to organise and/or participate in public events dedicated to science popularisation, offer organised visits to their premises, organise open-door days and various workshops and implement internship programmes (see Figure 3 for more details). Academic research organisations, however, engage in such activities considerably more often.

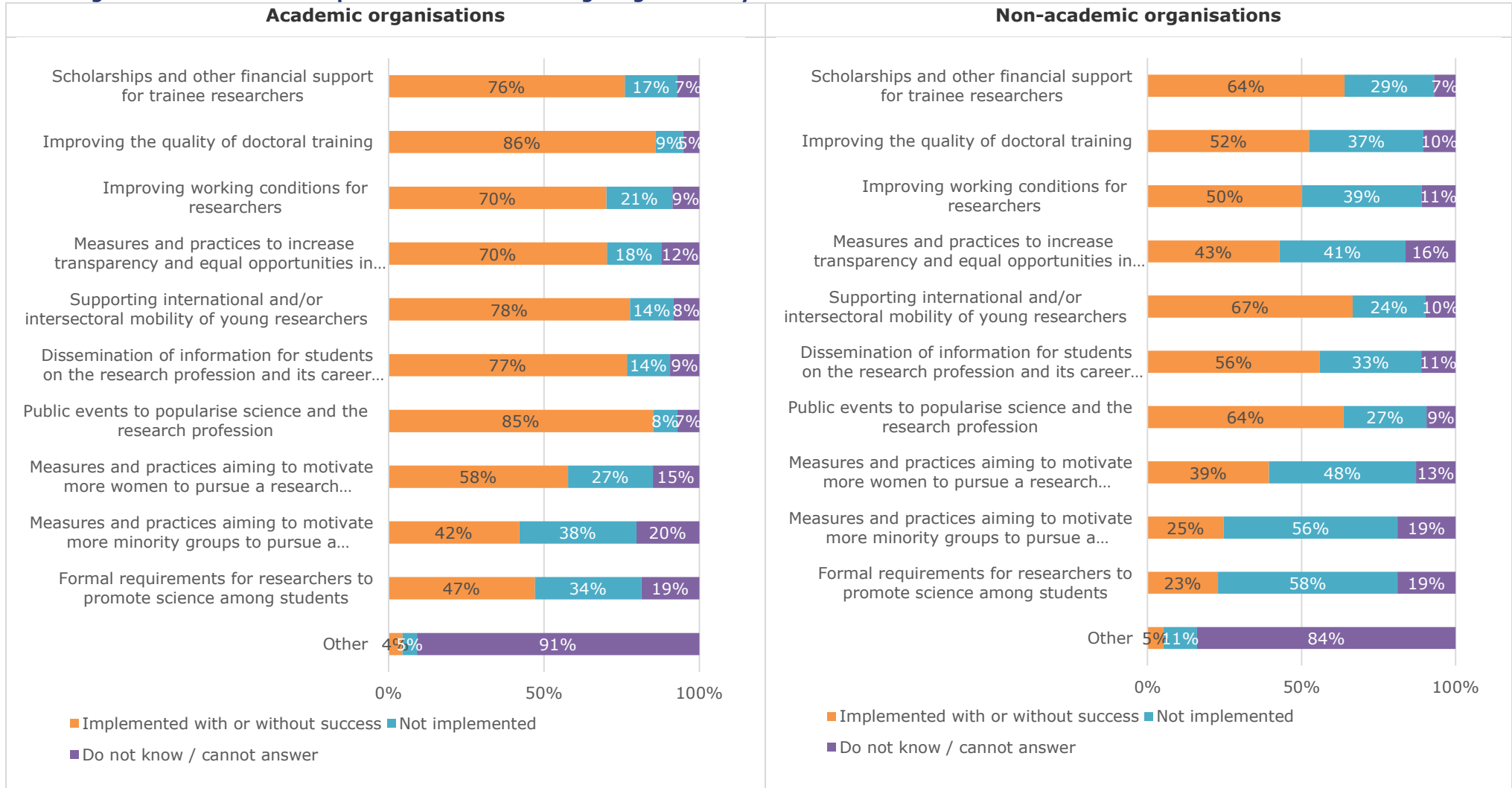
The same insights apply to initiatives targeted at university students: both academic and non-academic research organisations prioritise activities related to organising and/or participation in public science popularisation events, providing support to international and/or cross-sectoral mobility of young researchers and offering scholarships for trainee researchers, but academic organisations engage in such activities more actively (see Figure 5 for more details). It should be noted, however, that academic organisations pay more attention than their counterparts in the private sector to initiatives dedicated to improving the quality of doctoral training.

Figure 3. Research career promotion initiatives targeting schoolchildren



Source: survey of research organisations.

Figure 4. Research career promotion initiatives targeting university students



Source: survey of research organisations.

Based on analysis of the data summarised in Figure 4, it appears that in comparison to universities and research centres, non-academic organisations are slightly less versatile when targeting young people (especially university students). This insight, however, is primarily applicable to SMEs, incubators, start-ups, spin-offs, venture capital companies, NGOs and not-for-profit organisations that comprised 68% of the survey respondents from the non-academic sector⁶. Unlike these non-academic organisations, large companies quite often contribute to promotion of research careers through activities carried out by *foundations*, like Bayer Foundations⁷, Else Kröner-Fresenius-Stiftung⁸, C.Génial Foundation⁹, Deutsche Telekom Foundation¹⁰, "la Caixa" Foundaton¹¹, Velux Foundations¹², etc. Although not exclusively, this form of contribution is often favoured due to tax breaks for businesses engaged in charitable work and sponsoring of culture, promotion of research, etc. Through their foundations non-academic employers implement activities ranging from school support programmes and international fellowship programmes for talented students (primarily in STEM fields) to nationwide contests and competitions. The L'Oréal Foundation, for example, implements the FWIS programme, which supports female researchers from around the world at different phases of their careers (see Annex 5 for more details).

The innovation agency Stifterverband in Germany is a good example of how non-academic research organisations contribute to research career promotion. Stifterverband is a *joint undertaking* by multiple German companies (DAX companies, medium-sized companies, company associations, donors and active private individuals) used to reach the general public through instruments ranging from extracurricular talent promotion to detailed analyses in the field of innovation. For instance, in collaboration with *Wissenschaft im Dialog* (a non-profit limited liability company established by leading German scientific organisations, associations and research funders)¹³ as part of the initiative "Science in Dialogue" the Agency organises an annual science video competition entitled "Fast Forward Science"¹⁴. The competition is open to scientists, filmmakers, students, artists and science communicators, i.e. authors of short web videos dedicated to communicating science in an informative and attractive way.

Our analysis based on desk research also revealed that European employers contribute to research career promotion through such stand-alone initiatives as *mentoring programmes* (e.g. the Bayern Mentoring programme for female students¹⁵,

⁶ Excluding answers from respondents who chose option 'Other' when asked to define the type of organisation they represent.

⁷ Website of the Bayer Foundations, <http://www.bayer-foundations.com/en/bayer-science-and-education-foundation-overview.aspx>

⁸ Website of the Else Kröner-Fresenius-Stiftung, <http://www.ekfs.de/de/wissenschaftliche-foerderung/nachwuchsfoerderung>

⁹ Website of the C.Génial Foundation, <http://www.cgenial.org/>

¹⁰ Website of the Deutsche Telekom Foundation, <https://www.telekom.com/corporate-responsibility/social-commitment/deutsche-telekom-foundation/65148>

¹¹ Website of the "la Caixa" Foundation, http://obrasocial.lacaixa.es/laCaixaFoundation/research_en.html

¹² Website of the Velux Foundations, <http://veluxfoundations.dk/en/forskning/ojenforskning>

¹³ Website of *Wissenschaft im Dialog*, <http://www.wissenschaft-im-dialog.de/en/about-us/>

¹⁴ Websites of the initiative "Science in Dialogue" and "Fast Forward Science" competition, <http://www.stifterverband.org/fast-forward-science> and <http://www.wissenschaft-im-dialog.de/en/our-projects/inhaltsfilter/competitions/> and <http://www.fastforwardscience.de/>

¹⁵ Website of the Bayern Mentoring programme, <https://www.hs-neu-ulm.de/en/about-us/facilities-and-services/womens-representative/bayern-mentoring/>

the SciMento programme for early stage female researchers¹⁶, etc.), creative research *communication competitions* and *science popularisation events* (e.g. the “Kroto Research Inspiration”¹⁷, the Tukoke competition for young scientists¹⁸, etc.), as well as *programmes to support the development of talented students* (e.g. the Gifted and Talented development Centre established by the University of Tartu¹⁹, the Research Talent funding scheme implemented by NOW²⁰, the Talnet project²¹, the Centre for Talented Youth Ireland²², etc.), etc. Furthermore, as our case studies on the International Dual Career Network (IDCN) and Dual Career Network Germany (DCNG) showed, some employers invest in *establishment of dual services* in their organisations and strive for membership in networking structures like IDCN and DCNG, aiming to increase the overall attractiveness of the research career pathway.

Overall, the selection of initiatives implemented by employers in European countries is quite similar to those offered by employers in such third countries as Australia, Canada, Japan, Singapore or the United States. As in Europe, organising science communication and popularisation events (including various competitions and awards) seems to be the most common type of initiatives implemented by employers in these countries. The Sanofi Biogenius Canada, Sony Creative Science Award, Intel International Science and Engineering Fair, Microsoft Imagine Cup, BHP Billiton Science and Engineering Awards are only a few examples of such events, organised to foster and award talented kids and students (or, as in some cases, science and engineering teachers). In addition to these initiatives, some research organisations in third countries contribute to research career promotion by offering a whole package of activities targeting young people, like the Kids School initiative implemented by Panasonic Group or the Education Programmes offered by NASA. Other practices identified through desk research and interviews carried out in the course of this study involve bringing researchers to schools (e.g. the “Scientists and Mathematicians in Schools” programme implemented by CSIRO in Australia) or providing young people with access to research facilities, organising lectures for female students and providing grants for PhD students and female researchers.

Instruments for monitoring the impact of implemented initiatives

In general, it was found that all research organisations which implement activities dedicated to promoting research careers and/or popularising science monitor the outcome of their efforts. In particular, direct communication/conversations with stakeholders, on-site observations and monitoring reports could be pointed out as the instruments which are used most often by employers for these purposes (see Table 12). Importantly, it was also discovered that employers very often rely on multiple monitoring mechanisms in order to collect such data. Based on results of the survey, on average at least two different kinds of monitoring mechanisms were used by organisations that filled in the survey questionnaire.

Table 12. Instruments and procedures used by research organisations to monitor and evaluate the results of the research career promotion initiatives

Response	Count	Percentage	% of total respondents
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¹⁶ Website of the SciMento programme, <http://www.scimento.de/en/mentoring/>

¹⁷ Website of the “Kroto Research Inspiration”, <http://www.sheffield.ac.uk/ris/ecr/kri>

¹⁸ Website of the Tukoke competition, <http://tukoke.tek.fi/>

¹⁹ Website of the Gifted and Talented development Centre, <http://www.teaduskool.ut.ee/et>

²⁰ Website of the NOW Research Talent funding scheme, <http://www.nwo.nl/en/about-nwo>

²¹ Website of the Talnet project, <http://www.talnet.cz/home>

²² Website of the Centre for Talented Youth Ireland, <http://www.dcu.ie/ctyi/index.shtml>

Response	Count	Percentage	% of total respondents
Word of mouth replies (direct communication/conversations with stakeholders)	657	22,7%	52,2%
On-site observations	582	20,1%	46,3%
Monitoring reports	413	14,3%	32,8%
Assessments of project reports	347	12,0%	27,6%
Consultations with stakeholders	298	10,3%	23,7%
Surveys of stakeholders	270	9,3%	21,5%
Studies	232	8,0%	18,4%
Other (Please specify –in the text box below)	91	3,1%	7,2%
Total	2,890	100,0%	n/a
Total no. of respondents	1,258		

Source: Survey of the research organisations.

Note: Respondents were allowed to select multiple answers to this survey question.

Desk research also revealed that employers collect information not only about the inputs or outputs of their incentives but also consider their impact. The number of participants, projects funded or events organised are the most common output indicators used by the employers. In addition, special attention is usually paid to monitoring the results which concern the under-representation of women in research and achievements in developing countries. As for impact indicators, the satisfaction level of participants/beneficiaries, the recognition of participants' achievements in national or international competitions as well as the number of students who decide to pursue a research career or a higher education qualification are rather frequently monitored by the employers investing in research career promotion.

Based on the results of the survey of research organisations, interviews and case studies, the assessment of achieved results is, however, most often based on informal evaluation methods, such as insights from direct communication/conversations with stakeholders and on-site observations. For instance, the case study of the Estonian Science Bus "Big Dipper" revealed that the organising team mainly used informal consultations with schoolchildren and their teachers to receive feedback on their work. The idea of implementing formal instruments was perceived as an excessive burden. Employers also often rely on descriptive statistics such as the year by year comparison of figures and the composition of participants according to their age group, education level, gender, ethnicity, social class, etc. No attempts of using more advanced impact evaluation techniques have been identified.

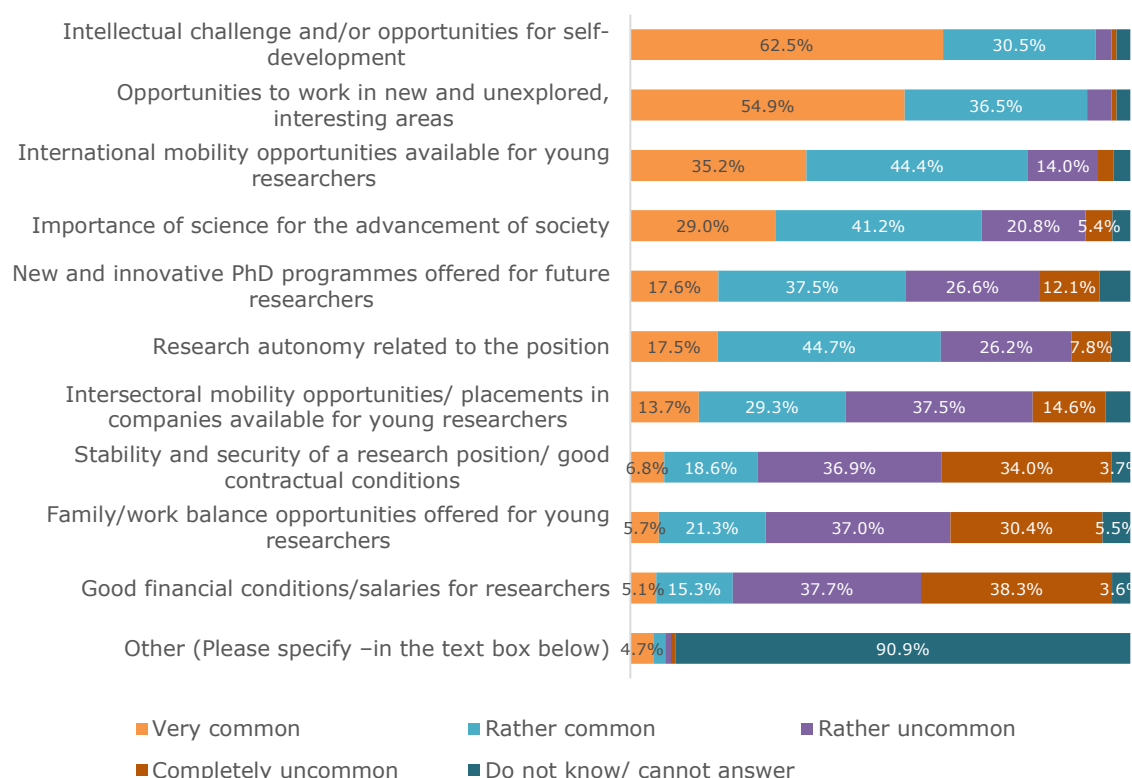
Arguments used to recruit researchers and retain talents

The evidence collected through surveys of individual researchers and research organisations indicate that overall employers are well aware of the arguments that young researchers find compelling and very often mention these arguments when aiming to encourage young people to pursue a research career and/or seeking to retain talents. As summarised in Figure 5, intellectual challenge, opportunities to work in new and interesting areas, international mobility opportunities and research autonomy are the key arguments that employers use when discussing the career opportunities with talented university students and/or young researchers already employed by their organisation. The same factors were identified as most important by researchers surveyed by the study team (see Figure 8 for more details). At the same time, it was found that such arguments as 'attractive financial conditions' and

'stability/security of a research position' are rarely used by employers when discussing a research career with students or young researchers considering their career options.

These findings are applicable to both academic and non-academic organisations, as no significant differences between arguments used by employers in these groups were identified.

Figure 5. Arguments used to encourage talented university students (undergraduate and Master's level) to pursue a PhD degree and/or to motivate young researchers to stay in their current careers



Source: the survey of research organisations.

An important mismatch between the arguments used by employers and the needs of young researchers was identified in the area of balancing work and family life. Around 44% of researchers surveyed indicated that this is an important factor for them when considering their career opportunities and options. In addition, the statistical analysis found that the latter factor was even more decisive for respondents from the EU-13 countries, as compared to the EU-15 country group. In the meantime, slightly more than 67% of employers who participated in the survey acknowledged that this argument is used rarely or very rarely to motivate young people and/or early stage researchers.

Impact of the research organisations' local presence

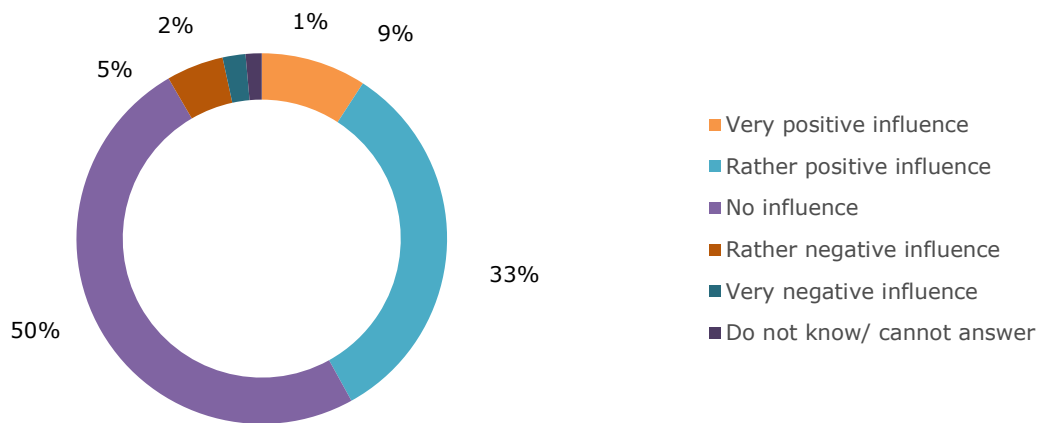
Based on the opinions of the surveyed researchers, the local presence of research companies and/or academic research organisations to some extent can be a catalyst that stimulates young people to pursue a research career. More specifically, 41% of the surveyed researchers indicated that this factor had a positive influence on their decision to become a researcher, while a further 49% of respondents claimed that it

had no influence on their decision to pursue a research career (see Figure 6 below). In addition, our statistical analysis found that the latter factor was more decisive for respondents from the EU-13 countries, as compared to the EU-15 country group.

In this respect, the representatives of research organisations seem to overestimate the impact of this factor: approx. 74% of respondents within this target group agreed that a strong local presence of universities and other research organisations had a positive influence on the decision of university students to pursue a research career.

As is pointed out in section 3.1.3, the intellectual curiosity of PhD candidates and the possibility to learn more and develop the skillset that is necessary for a research career, as well as the availability of international mobility opportunities offered are considered by researchers to be far more important factors affecting the decision of young people to pursue a research career (see Figure 8 for more details).

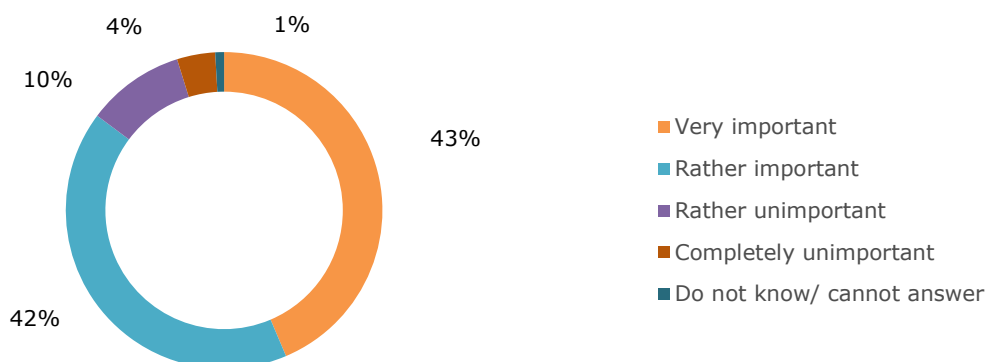
Figure 6. Opinions of the surveyed researchers on the influence of the presence of universities and other research performing organisation in the region on their decision to pursue a research career



Source: the survey of individual researchers.

Nevertheless, research organisations such as universities can effectively contribute to research career promotion and boost young people’s motivation by better exploiting their human resources. The study has found that university lecturers and/or future research advisors were viewed by researchers surveyed as the most important source of information when considering the possibility of becoming a researcher (see Figure 10 for more details). As demonstrated by Figure 7, this opinion was shared by 83% of researchers who completed the survey questionnaire.

Figure 7. Opinions of surveyed researchers on university lecturers/future research advisors as sources of information about research career and their importance on making the decision to pursue a research career



Source: the survey of individual researchers.

2.1.3. Motivation behind the decision of young people to pursue a research career

In this section we analyse the motivation behind the decision of young people to pursue a research career. This section is divided into three subsections. First, we present the study findings on the key factors that motivate or discourage young Europeans (both researchers and those not yet embarked in research careers) from committing to a career in research. Second, we identify and analyse the most important sources of information about the research careers for young people. Finally, we conclude this section with a presentation of the job categories which appear to be the biggest competitors of research careers as noted from the career decisions of recently-graduated/graduating researchers from EU Member States and Associated Countries.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.1.3

- Intellectual curiosity was by far the strongest motivating factor of European researchers to pursue a research career. Other strongly motivating factors were knowledge and skills necessary for a research career and international mobility opportunities offered to early stage researchers.
- Motives to pursue a research career differ somewhat between different scientific fields and the career stages of researchers. For instance, the negative effect of low salaries discourages students from choosing PhD studies in humanities and social sciences more than in other fields. Moreover, researchers at later career stages are more likely to value the material aspects of their job than those at early career stages.
- In terms of the discouraging factors, the instability and insecurity of research careers/contractual conditions, unsatisfactory financial conditions/salaries of researchers and competitiveness of research careers/shortage of academic positions had by far the most negative influence on young people’s decision to pursue a research career.
- The two most important sources of information about the research careers for young people considering this career path were university lecturers/future

research supervisors and other researchers. To a somewhat lesser extent, peers were also identified as an important source of information.

- A teaching career was by far the most important alternative career path for European researchers. Other strong 'competitors' of research careers included a career in healthcare/medicine, a career in consulting and management career. The researchers considering an alternative career path did not discriminate between public and private sectors.
-

Motivating and discouraging factors

Analysis of the data indicates that the main factors contributing to the decision of European researchers to choose and stay in their careers are of scientific and professional nature (see Figure 8). The survey results show that *intellectual curiosity* was by far the strongest motivating factor of European researchers to pursue a research career – as many as 79% of respondents indicated this factor to have a very positive influence on their choice, with another 19% indicating it to have a rather positive influence. Similarly, based on the insights from the academic literature review it could be concluded that the opportunity for intellectually stimulating work, passion for the selected field of study and the opportunity to contribute to new knowledge were those aspects of academic work that attract young people to the academic sector²³. For example, a recent study on the motives of British students to pursue a PhD showed that interest in the subject and research were the top reasons, whereas the motives related to career were found to be not very important²⁴. Most of the interviewed national experts confirmed that pure interest in the subject (or the specific research project) is the key motive for choosing a research career. According to one of them, 'a considerable number of PhD students simply follow their track by continuing their research topic, they 'grow into' this status and they stay in their well-known setting.' Similarly, a UK expert indicated that students 'are not thinking about the careers when they are starting the PhD. Generally, they are really not that well informed about their career decisions, just about interests.'

Other strongly motivating factors were *knowledge and skills necessary* for a research career (85% of survey respondents indicating it to have either very or rather positive influence) and *availability of international mobility opportunities* offered to a young researcher (75% of survey respondents). Recent studies showed that perceived skills and abilities were one of the most frequently mentioned factors encouraging young researchers to pursue this career path²⁵. Students' perception of their competences turned out to be more important for their career preferences than their actual competences²⁶.

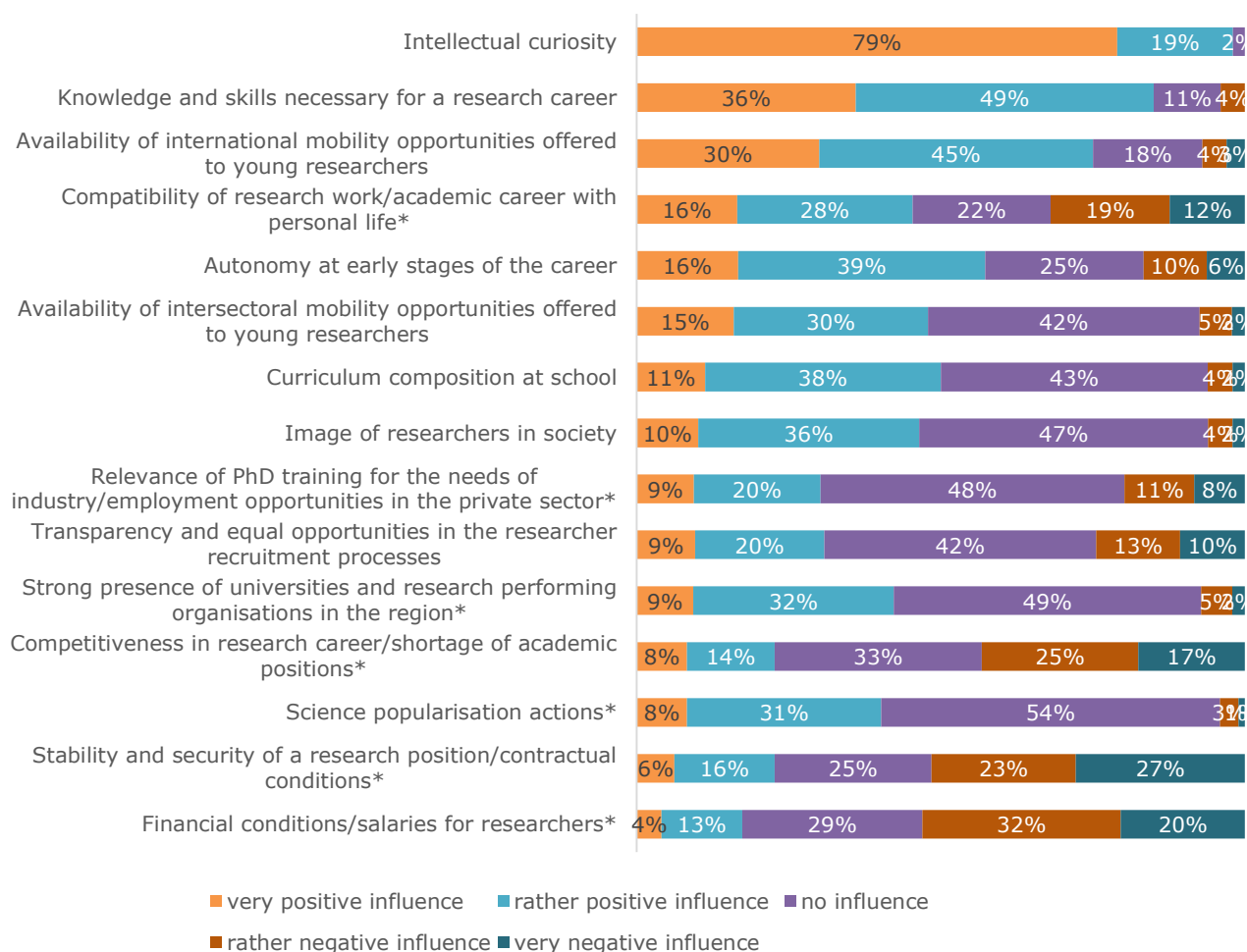
²³ Emmaline Bexley, Sophie Arkoudis, Richard James (2013). 'The motivations, values and future plans of Australian academics', *High Educ*, 65, pp. 385-400

²⁴ Vitae, 'Career-related reasons for doing a doctorate'. <https://www.vitae.ac.uk/doing-research/are-you-thinking-of-doing-a-phd/why-do-a-doctoral-degree/career-related-reasons-for-doing-a-doctorate>

²⁵ A. Reis et al. (2012). 'Attracting students to science, technology and engineering higher education', < <http://www.sefi.be/conference-2012/Papers/Papers/028.pdf>>; Päivi H. Taskinen, Kerstin Schütte & Manfred Prenzel (2013). 'Adolescents' motivation to select an academic science-related career: the role of school factors, individual interest, and science self-concept', *Educational Research and Evaluation: An International Journal on Theory and Practice*, 19(8).

²⁶ Nagengast, B., & Marsh, H. W. (2012). 'Big fish in little ponds aspire more: Mediation and cross-cultural generalizability of school-average ability effects on self-concept and career aspirations in science' *Journal of Educational Psychology*, 104, pp. 1033-1053.

Figure 8. Opinions of researchers on the factors which have influenced their decision to pursue a research career



Source: the survey of individual researchers.

Note: the figure excludes "other" and "do not know/cannot answer" options.

Note: * statistically significant difference found between EU-13 and EU-15 country groups in independent-samples T test.

The above results were confirmed by the assessment of the key motives of European researchers to *stay in the research career* and not to switch to an alternative career path. When asked to indicate up to five such motivating factors, the largest share of respondents (88%) indicated *pure interest in science and/or their research work*. Other important but somewhat less often mentioned motives included the *level of autonomy related to their current position* (57% of respondents) and *attractive international and/or intersectoral mobility opportunities* offered for them (42%). At the same time, a high level of competition in other fields, high costs related to career change and attractive financial conditions/remuneration currently offered to them were the least attractive arguments in favour of remaining in a research career path (for more details see Figure 9 below).

Recent research also showed that motives to pursue a research career differ somewhat between different scientific fields and career stages of researchers. For instance, even though intellectual stimulus is an important motive for researchers in

all the academic fields, young engineers tend to prioritise job opportunities and high salaries more than other researchers²⁷. At the same time, the negative effect of low salaries penalises choosing PhD studies in humanities and social sciences more than in other fields²⁸.

Moreover, studies show that researchers at later career stages are more likely than those at early career stages to value the material aspects of their job: salary, attractive grant systems, minimal administrative burden and the ease of starting new lines of research²⁹. The latter findings were partly confirmed by the statistical analysis of the responses of surveyed researchers. It was found that the importance of financial conditions increases at later career stages with one exception: first-stage researchers saw the latter motive as more important in comparison to more experienced researchers. Statistical analysis also revealed that experienced researchers tend to value the stability and security of a research position as well as the compatibility of research work/academic career with personal life more positively than early-stage researchers. On the other hand, such factors as availability of international/intersectoral mobility opportunities offered to young researchers, transparency and equal opportunities in the researcher recruitment processes, relevance of PhD training for the needs of industry/employment opportunities in the private sector were more decisive factors for researchers at early-career stages, as compared to more experienced researchers.

Figure 9. Factors which have been the most important in motivating researchers to stay in their research career and not to switch to an alternative career path



²⁷ A. Reis et al. (2012). 'Attracting students to science, technology and engineering higher education', p. 4 < <http://www.sefi.be/conference-2012/Papers/Papers/028.pdf>>

²⁸ Juan Francisco Canal Domínguez & Manuel Antonio Muñiz Pérez (2012). 'Professional Doctorates and Careers: the Spanish case', *European Journal of Education*, 47(1).

²⁹ European Commission Research Directorate-General (2013). 'Final report MORE2: Support for continued data collection and analysis concerning mobility patterns and career paths of researchers.'

Source: the survey of individual researchers.

In terms of the most discouraging factors, most of the respondents to the survey of individual researchers indicated *financial conditions/salaries of researchers* (53% of respondents). According to the interview results, a research career does not offer what youth aspires to: in comparison to alternative career paths, it is not very well compensated. As a consequence, promising research talents leave academia to pursue careers in business, banking and other better remunerated fields.

The second most frequently mentioned discouraging factor was the *stability and security of research careers/contractual conditions* (50% of respondents indicating it to have either very or rather negative influence on their choice) (for more details see Figure 8). Based on the evidence gathered during the interview programme, research careers are considered insecure because of too many temporary positions and no predictable career perspective for young researchers including tenure tracks after obtaining a PhD. In addition, even after receiving a grant, there is no guarantee that the researcher will get another post-doc grant providing an opportunity to continue his/her career.

Finally, *competitiveness of research careers/shortage of academic positions* (42% of respondents) was also frequently mentioned as a discouraging factor. According to British national experts, there are far fewer academic posts than there are PhD graduates in the UK and this situation deters young people from pursuing a research career.

In sharp contrast to more economically advanced countries, our statistical analysis revealed that the latter three factors are evaluated much more positively by researchers from EU-13 countries, as compared to the EU-15 country group.

The analysis of recent studies revealed that another important negative factor is *the shortage of information* for those considering a research career. The shortage of information is equally important for young researchers and young people who have not yet embarked on research careers³⁰. Similarly, those researchers who decide or desire to leave the academic track during or after the post-doctoral stage complain about the lack of systematic information on research career development in non-academic environments³¹. This may represent a real obstacle for those wishing to bridge the industry-academia gap.

In addition to the problem mentioned above, *gender issues* is a frequently mentioned factor discouraging young female researchers from advancing their career in research in recent studies. Very few girls think of a career in science³². One reason is the perceived masculinity of disciplines that require competences in physical sciences and advanced mathematics³³. The fact that there are very few role models for women in science³⁴ may also worsen the situation³⁵. Moreover, a disproportionate number of

³⁰ A report by the ESF Member Organisation Forum on Research Careers (2010). 'Research Careers in Europe Landscape and Horizons'.

³¹ Ibid.

³² ICSU (2011). 'Report of the ICSU Ad-hoc Review Panel on Science Education', International Council for Science, Paris.

³³ Su, R., Rounds, J., & Armstrong, P. I. (2009). 'Men and things, women and people: A meta-analysis of sex differences in interests', *Psychological Bulletin*, 135, pp. 859–884.

³⁴ Cheryan, S., Siy, J. O., Vichayapai, M., Drury, B. J., & Kim, S. (2011). 'Do female and male role models who embody STEM stereotypes hinder women's anticipated success in STEM?' *Social Psychological and Personality Science*, 2, pp. 656–664.

promising female PhD's do not continue an academic career because of insecurity and difficulties in combining an academic career with family life³⁶. On the other hand, difficulties in reconciling work and family life were mentioned by national experts as a factor which discourages researchers of both genders.

Most important sources of information about research careers for young people

The results of the individual researchers' survey showed that by far the two most important sources of information about research careers for young people considering this career path were *university lecturers/future research supervisors* (85% of surveyed researchers indicated it as either very or rather important source of information for them) and *other researchers* (77% of researchers). Most of the interview respondents agreed that professors who are supervising students and acting as role models constitute a very influential source of information. Professors at universities usually notice apt students already at an early stage and start guiding them individually. Similarly, the case study of MCA outreach activities revealed that having an outstanding researcher (such as a Marie Curie fellow) is very inspiring for young scholars and academic candidates in terms of their future career.

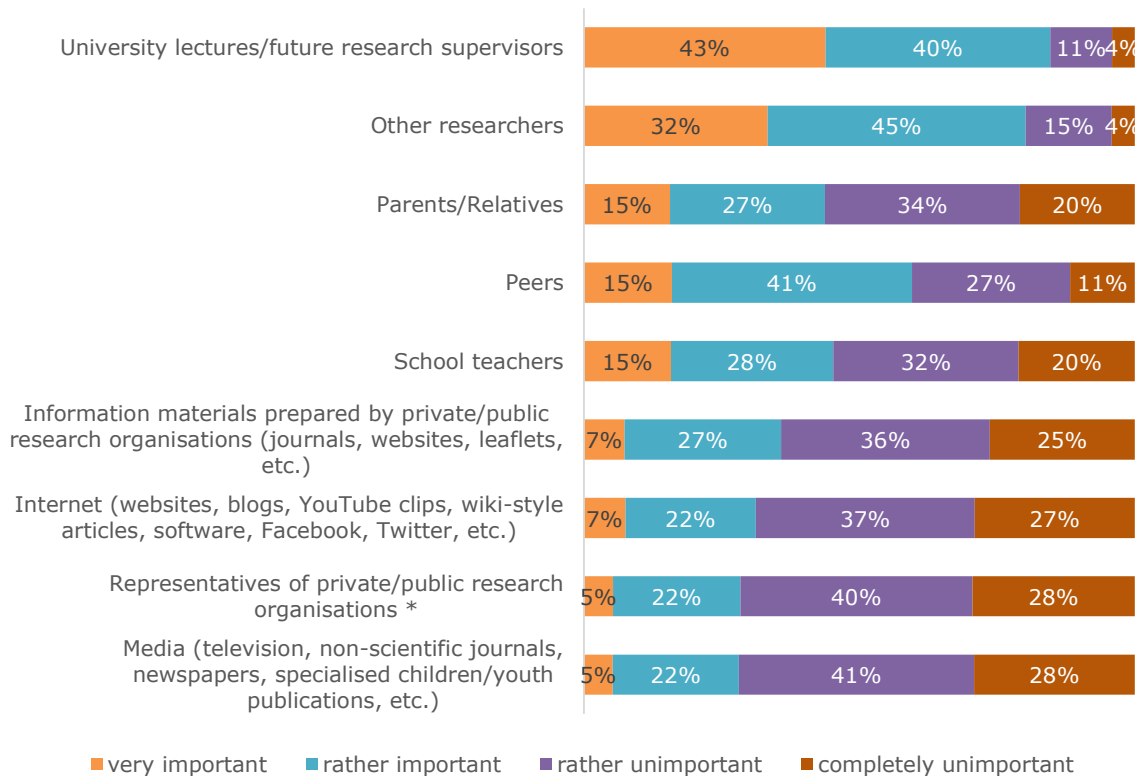
Various studies indicate that science professionals could provide valuable information on possible careers in science by acting as positive role models for students. In contrast, career advice services often do not correspond to young people's needs. Research studies often conclude that career advisors are not well-informed about science careers themselves and are therefore not well-equipped to advise students on these issues³⁷. In this respect, researchers are better equipped than most career advisors.

³⁵ Päivi H. Taskinen, Kerstin Schütte & Manfred Prenzel (2013). 'Adolescents' motivation to select an academic science-related career: the role of school factors, individual interest, and science self-concept', *Educational Research and Evaluation: An International Journal on Theory and Practice*, 19(8), p. 719.

³⁶ Bernd Fitzenberger, Ute Leuschner (2012). 'Up or Out: Research Incentives and Career Prospects of Postdocs in Germany', <<ftp://ftp.zew.de/pub/zew-docs/dp/dp12020.pdf>>; Jung, S. (2011). 'Unbefristet, perspektivenreich, frauenfreundlich? Karrieren im Wissenschaftssystem und ihr Gender-Bias', in *Traumjob Wissenschaft?*, Volume 117, pp. 31–44. W. Bertelsmann Verlag, Bielefeld:

³⁷ Education, Audiovisual and Culture Executive Agency(2011). 'Science Education in Europe: National Policies, Practices and Research', p. 33 <http://www.indire.it/lucabas/lkmw_file/eurydice/sciences_EN.pdf>

Figure 10. Key sources of information about the research career path



Source: the survey of individual researchers.

Note: Based on answers to the survey question “Before your decision to pursue a research career, which of the following sources of information about this career path and its future prospects were the most important for you?”

* statistically significant difference found between EU-13 and EU-15 country groups in independent-samples T test.

To a somewhat lesser extent, *peers* were also identified by survey respondents as an important source of information before the decision to become a researcher is made (56% of respondents). For instance, some studies show that university freshmen rely heavily on the opinions of peers, especially those of former students³⁸. On the other hand, other studies conclude that secondary school students rely more on other means of information, such as the information disseminated by the ministries of education, visits to higher education establishments, in-school disseminations, programme guides and higher education fairs³⁹.

The most popular alternative career paths

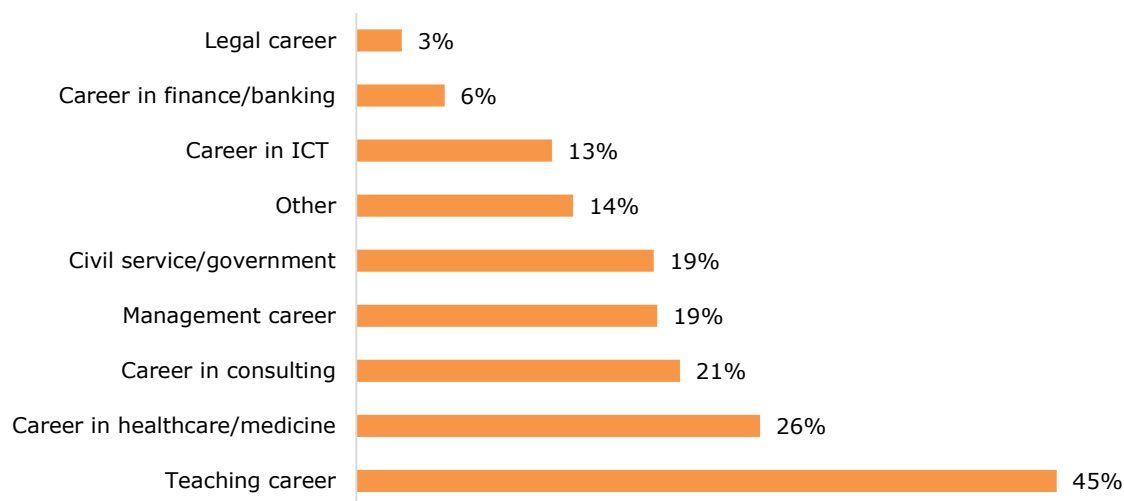
The survey of individual researchers (at all stages of their careers) asked its respondents to identify up to three alternative career options that they considered before and after their decision to become researchers. According to the survey results, by far the most important alternative career path for European researchers was *teaching career* (45% of respondents). Other indicated strong ‘competitors’ of research careers included *career in healthcare/medicine* (26% of survey respondents), *career in consulting* (21%) and *management career* (19%).

³⁸ A. Reis et al. (2012). ‘Attracting students to science, technology and engineering higher education’, SEFI 40th Annual Conference.

³⁹ Ibid.

The same survey also demonstrated that most of the researchers considering an alternative career path did not discriminate between public and private sectors. When asked to indicate in which sector they were inclined to work (if they considered any of the previously mentioned alternatives), the majority of surveyed researchers (41%) indicated *both sectors*, with another 29% indicating *the public sector* and slightly less (19%) suggesting they were considering only *the private sector*.

Figure 11. Options considered by researchers as an alternative to their research career



Source: the survey of individual researchers.

2.1.4. The results of M(S)CA and NIGHT in terms of motivating young people to commit to a research career

This section deals with the effectiveness of M(S)CA outreach activities and NIGHT publicity events in terms of motivating young people to commit to a research career. In accordance to the definition provided in the guidelines on outreach activities in M(S)CA projects⁴⁰, outreach entails research-related communications initiatives directed to the non-specialist audience. The goals of outreach are defined as ‘raising the profile of MCA with the general public as well as encouraging students to pursue careers in science’⁴¹. Since university lecturers and other researchers are the two most important sources of information about research careers among young people (see above in our report), the direct engagement of MSC fellows in outreach activities as an integral part of their fellowship constitutes an effective way of achieving these goals.

NIGHT is the occasion for a Europe-wide public and media event taking place every year. As defined in the Horizon 2020 Work Programme⁴², one of the aims of the European Researchers' Night is to encourage young people to embark on scientific

⁴⁰ Outreach Activities Working Group, ‘Guidelines for Outreach Activities in the FP7 Marie Curie Actions(MCA’s)’, <http://ec.europa.eu/research/mariecurieactions/documents/documentation/publications/guidelines_en.pdf>

⁴¹ Ibid.

⁴² European Commission, HORIZON 2020 WORK PROGRAMME 2014–2015: Marie Skłodowska-Curie Actions Revised, 2014.

careers by bringing researchers closer to the general public and increasing awareness of research and innovation activities.

This section is divided into two subsections. The scope of outreach activities reaching out to the young people, communication forms and channels used by M(S)CA beneficiaries, as well as their suitability (e.g. relevance of messages communicated to the target audience) for reaching out to young people are analysed in the first subsection. The main findings about the effectiveness of the NIGHT initiative in terms of positively influencing the perceptions of the researcher personality and work as well as research careers among the general public and in the long term encouraging young people to choose a research career are presented in the second subsection.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.1.4

- The study findings on the scope and effectiveness of the M(S)CA outreach and other dissemination activities targeting young people are mixed. On the one hand, some of the M(S)CA beneficiaries believe that this audience was reached. On the other hand, the number of MCA project reports where youth is prioritised or directly mentioned as the key target audience of outreach and other dissemination activities is quite small, partly due to the requirement to limit reporting on the beneficiaries to dissemination activities.
 - The most popular forms of outreach activities were public talks and participation in lectures, while interactive/experiential activities were pursued less frequently and carried out mainly in a wider framework of science popularisation initiatives.
 - The actual attempts to reach out to young people were more common under the FP7 MC IRSES, IAPP as well as FP7 and H2020 M(S)C ITN and COFUND actions.
 - There were important differences between the host-driven and individual actions in terms of the prevailing types of communication channels. Fellows supported under the individual actions preferred one-way communication channels (such as mass media) to reach the scientific audience, while two-way, live interactions with young people were more common under the host-driven actions.
 - In addition to the goals of outreach activities, active societal engagement of MSC fellows and their collaboration with different civil society groups can advance the agenda for Open Science in Europe.
-
- Although the collected evidence suggests that NIGHT activities were useful for reaching out to the general public and positively influenced the views of young people about researchers in general and research careers, it was concluded that a one-day event per year is not enough to achieve any tangible long-term effects in this area.
 - The most successful activities of NIGHT were 'hands-on' experiments, shows, workshops, simulations and other activities which require the active involvement of attendees. Activities oriented towards university students put more emphasis on science promotion and technical aspects of a researcher's work.
 - Despite the overall satisfaction with the events, some features of NIGHT could still be improved by expanding their duration and implementing other project-level changes (organising the activities in more central venues; increasing the capacity of venues to accommodate more visitors; improving advertising, more detailed mapping of the activities and reduction of the
-

number of parallel activities).

The results of MCA in terms of motivating young people to commit to a research career through outreach activities led by its fellows across the different schemes

Our evidence on the scope of outreach activities is not straightforward. On the one hand, 62% of the surveyed M(S)CA beneficiaries implemented activities which qualify as outreach. The findings of the case study on outreach activities in MCA projects, however, are more moderate in this aspect. Only a small fraction (approx. 9% of the analysed FP7 MCA projects⁴³) of the MCA beneficiaries indicated in their project reports that they carried out dissemination activities targeting audiences outside the scientific community. This discrepancy can be attributed to the fact that the MCA beneficiaries were not asked to report specifically on outreach activities – in their reports they focused on dissemination activities implemented throughout the course of their projects.

At the same time, it was revealed that it can be difficult to make a difference between the outreach and dissemination activities in M(S)CA projects. Analysis of the MCA project reports showed that the same types of activities were sometimes reported as dissemination to the scientific audience by some beneficiaries and as outreach by others. Based on the insights from interviews, the key reason behind this trend is that beneficiaries found it difficult to separate university students from the general scientific audience.

In addition, not all implemented activities which targeted non-academic audiences would qualify as outreach⁴⁴. Communication activities, which according to the MSCA guidelines are characterised as a one-way interaction between the sender and receiver, were as common as outreach. Around 66% of surveyed M(S)CA beneficiaries mentioned that they implemented activities which qualify as communication: various information materials, online communication activities, TV broadcasts, CDs/DVDs and books were used to communicate project results. Similarly, the analysis of project reports revealed that 52% of reported activities which targeted the non-scientific audience could be characterised as communication activities. According to interviewees, MSC fellows often prioritise communication activities over outreach activities because the latter not only cost more to implement but also require better communication skills. In addition, despite the official requirement for all applicants to plan outreach activities in their application, a clear definition of outreach activities and their distinction from communication activities was not provided during the FP7 period⁴⁵. The guidelines for outreach and communication activities in the MSCA under Horizon 2020 are more specific in this respect. This could improve the execution of outreach activities under the MSCA projects supported in the 2014-2020 programming period.

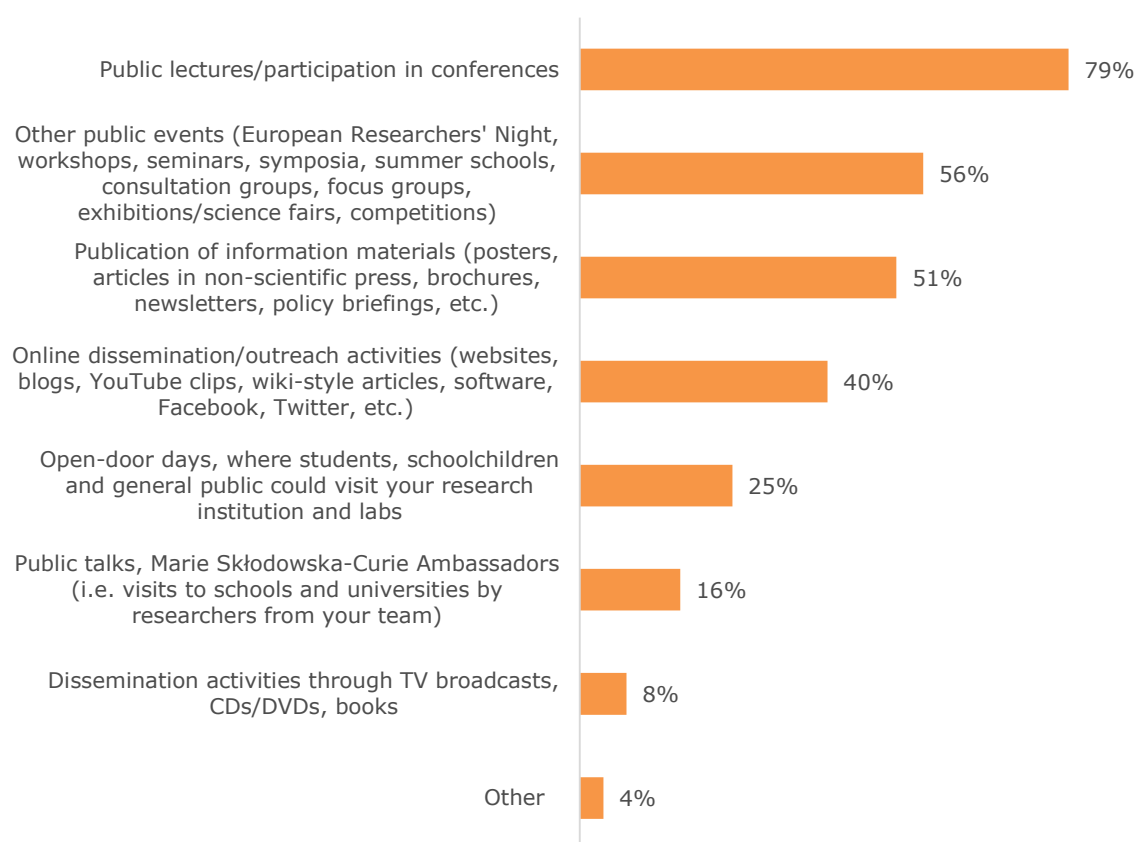
⁴³ The main source of information used was FP7 IAPP, IRSES, ITN, IRG&ERG, IEF, IIF, IOF and CIG project reports. In total, 2,694 reports were analysed. For a more detailed analysis see Annex 5.

⁴⁴ In comparison to the situation in the FP7 period, the definition of outreach activities was slightly revised in the 'Guidelines for Outreach and Communication Activities in the MSCA under Horizon 2020': a previously non-existent distinction between outreach and communication activities was introduced. In comparison to the communication activities which are defined as a one-way interaction, outreach implies an interaction between the sender and the receiver of the message, there is an engagement and a two-way communication between the researcher and the public.

⁴⁵ PPMI (2013). FP7 Marie Curie Actions Interim Evaluation (European Commission, DG Education and Culture).

The most popular forms of outreach activities were public talks and participation in lectures. Although these activities are poorly suited to reaching out to young people, they were actively used by the beneficiaries of individual MCA because they require less financial and human resources to implement. Meanwhile interactive activities, such as M(S)CA ambassadors, M(S)CA project open-door days and scientific festivals, were mainly carried out in a wider framework of science popularisation initiatives (such as annual science festivals or university open days). According to interviewees, branding, advertisement and the overall coordination of similar events should be centralised in order to exploit the economy of scale and secure the highest possible interest of the public.

Figure 12. Tools used for outreach and/or dissemination of the M(S)CA project results



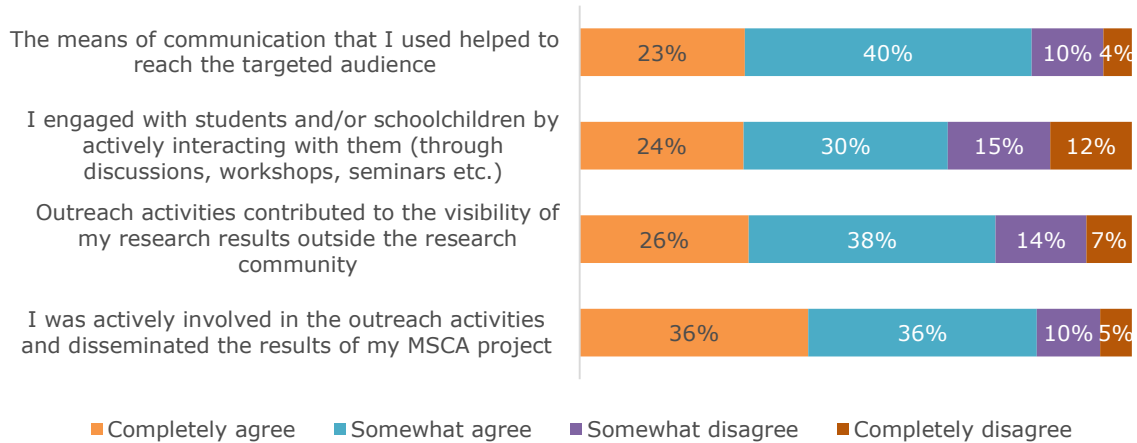
Source: the survey of individual researchers.

Note: the figure excludes a 'do not know/cannot answer' option.

The outreach and other dissemination activities implemented by the beneficiaries of M(S)CA had a great potential to reach the young people, especially students. As many as 63% of surveyed M(S)CA beneficiaries indicated that students were among the target audiences of their dissemination activities. Furthermore, 54% of these beneficiaries indicated that they were engaged personally in activities targeting students and/or schoolchildren (see Figure 13 for more details). Nevertheless, activities targeting students are usually not reported as 'outreach' in the project reports as university students are not considered as a non-scientific audience. Schoolchildren, however, were targeted considerably less often. Only 25% of survey respondents agreed that attempts to reach this particular segment of the general public were made. Similarly, only 71 out of 277 outreach activities reported in the

MCA project reports (about 26%) were targeting schoolchildren. According to researchers interviewed for this study, dissemination of their research results is usually regarded as a more important task than motivating young people to commit to a research career.

Figure 13. M(S)CA fellows’ involvement in outreach activities



Source: the survey of individual researchers.

Note: Based on answers to the survey question “Please indicate to what extent you agree with the following statements related to your participation in the MSCA project(s)”. The figure excludes ‘do not know/cannot answer’ and ‘missing values’ options.

Furthermore, the beneficiaries of the host-driven M(S)CA were more prone than fellows of individual M(S)CA to reach out to young people and implement dissemination activities which are better suited to motivating young people to commit to research careers. The actual attempts to reach out to young people were the most common under FP7 MC IRSES, IAPP and ITN actions, as well as H2020 MSC ITN and COFUND actions. For example, 65% of surveyed IRSES beneficiaries agreed that they engaged with students and/or schoolchildren by actively interacting with them in relation to their participation in the M(S)CA project(s). The respective number for the beneficiaries of IF or IOF actions was only 29% and 30%.

As indicated by interviewees, projects which involve universities or large companies (or teams which include a communication expert) are better equipped and have more capacities to implement outreach activities, since they have communication offices which can support MCA fellows in this task. In addition, universities and research institutions are motivated to perform outreach activities in order to recruit students and researchers. On the other hand, interviewees indicated that individual researchers prefer dissemination to a scientific audience rather than to the non-scientific public as it is only scientific acknowledgement that is important in their future research careers. Therefore, dissemination to the non-scientific public is carried out mostly as a result of the formal MCA requirement to include outreach activities in each proposal⁴⁶.

Finally, besides raising the profile of MCA with the general public as well as encouraging students to pursue careers in science, the engagement of MSC fellows in outreach activities can contribute to the implementation of Open Innovation and Open Science,⁴⁷ which recently became new priorities of the Commission. It is possible to explore in the future how the active societal engagement of MSC fellows and their

⁴⁶ European Commission (2012). ‘2013 Work Programme: People’.

⁴⁷ More details available at <<http://ec.europa.eu/research/openvision/index.cfm>>

collaboration with different civil society groups could advance the agenda for Open Science in Europe. For instance, participants of the validation seminar suggested that MSC fellows should be provided with relevant training to better prepare them for the implementation of the European Open Science Agenda.

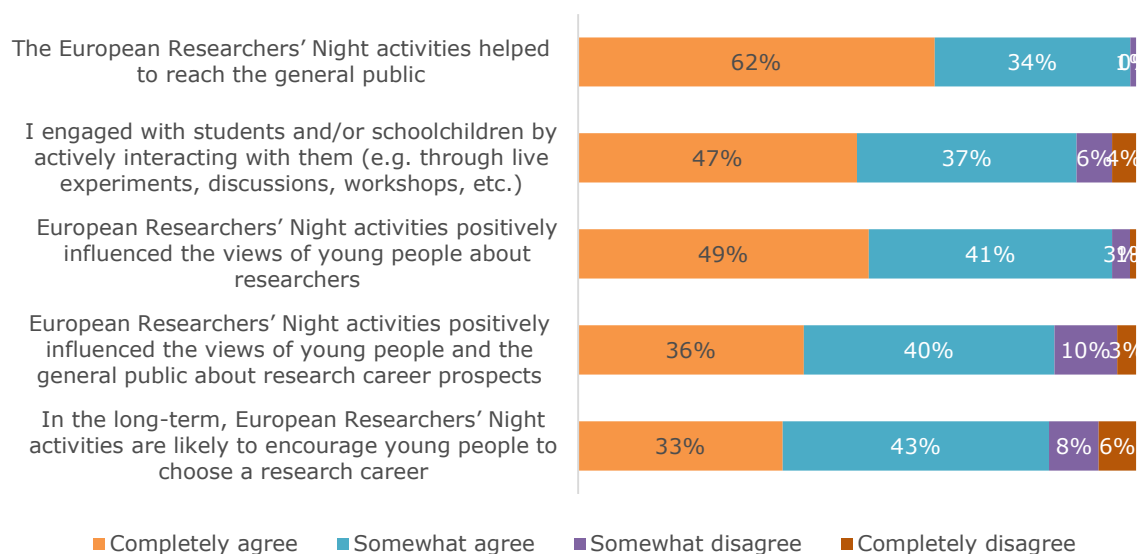
The results of the European Researchers' Night (and its predecessor the Researchers' Night) initiative in terms of motivating young people to commit to a research career

The collected evidence suggests that NIGHT activities were useful for reaching out to the general public and positively influenced the views of young people about researchers in general and research careers. An absolute majority of surveyed researchers who contributed to organising NIGHT events agreed that NIGHT activities reached out to the general public and positively influenced the views of young people about researchers in general (see Figure 14 for more details). The respondents were also positive about the effect of NIGHT events on the views of young people about research careers. In particular, 36% of researchers who were involved in the activities of NIGHT events completely agreed and 40% somewhat agreed that NIGHT activities had a positive impact on the views of young people about the prospects of a research career (see Figure 14 for more details).

It should be noted that such events alone cannot have a significant effect on young people's motivation to choose research careers. Surveyed respondents recognised that in the long-term NIGHT events are likely to positively affect young people's attitudes towards choosing a research career. However, most of the interviewees agreed that a single event per year is not enough to achieve any tangible long-term effects in this area. The latter insight is also supported by the results of the survey of researchers. It revealed that only 39% of respondents agreed that science popularisation actions (such as NIGHT and similar) had a positive influence on their decision to pursue a research career. While 54% believed it had no influence. Moreover, based on insights from the interview at the Research Executive Agency, the latter effect is not an explicit goal of NIGHT events but rather a side effect of interactive activities, involving direct contact between researchers and their target audiences. Furthermore, NIGHT coordinators indicated that they could only observe the immediate effect of NIGHT activities on young people as there are no monitoring data available about the long-term impact of NIGHT events.

NIGHT events are better suited to attracting the interest of teenagers and children than that of university students. Teenagers and pre-school children constituted about 50% of all visitors at 2014 NIGHT events. Event coordinators indicated that the very young generation was the best target group as it was comparatively easy to impress them with various 'hands-on' experiments which became the main attraction of the NIGHT activities. On the other hand, university students were less likely to participate in the NIGHT activities. Interview respondents indicated that the types of messages used in NIGHT events are less appealing to adults than children.

Figure 14. Contribution to organising and/or participation in the European Researchers' Night activities by surveyed researchers



Source: the survey of individual researchers.

Note: Based on answers to the survey question "Please indicate to what extent you agree with the following statements related to your contribution to organising and/or participating in the European Researchers' Night activities". The figure excludes 'do not know/cannot answer' and 'missing values' options.

Schoolchildren and university students are usually treated as different target audiences, and the messages to be communicated are adapted accordingly. In particular, the very young generation enjoyed various entertaining experiments, while university students required more sophisticated scientific information. In addition, RN activities were a rare opportunity for schoolchildren to meet real scientists. Therefore, RN activities targeting teenagers aimed to create a positive image of the personality of researchers and to fight stereotypes that scientists are usually 'boring, unsociable males in their late 50s with thick glasses'. Visitors' surveys carried out in 2014 showed that one of the results of NIGHT was the improved image of researchers amongst school kids, which was achieved notably through the representation of young, female, smiling and not isolated researchers. On the other hand, activities oriented towards university students put more emphasis on science promotion and the technical aspects of a researcher's work. Nevertheless, the organisers admitted that they found it challenging to find the right balance between education and entertainment or between science popularisation and research career promotion activities.

In order to pass on the above discussed messages to their target audiences, various forms/channels of communication were used by organisers of the NIGHT events, starting from presentations, live experiments and ending with video materials. Based on findings of the visitors' surveys, activities that were most interactive were also found to be the most attractive and were most appreciated by the visitors. Respondents indicated that the most successful activities were 'hands-on' experiments, shows, workshops, simulations and other activities which require the active involvement of attendees. This is in line with the key findings and conclusions of section 2.1.1 (see above in this report). Less interactive communication channels such as lectures, presentations or publications were evaluated less positively (especially by schoolchildren).

Based on the analysis of the monitoring data, NIGHT events organised in 2014 were evaluated positively. This feedback was collected by organisers through surveys of visitors, who often suggested that these events were beyond their expectations. Depending on the country, from 74% to 97% of respondents indicated that they would like to attend similar events and participate in similar activities in the future. The general satisfaction with the NIGHT activities could be also illustrated by the fact that the participation rates steadily increased in most of the countries. From 2011 to 2013, there was a steady increase in the number of visitors every year (from 800,000 to 1,200,000 visitors respectively)⁴⁸.

Despite the overall satisfaction with the events, survey respondents suggested that some features of NIGHT could be improved. First, in order to attract more schoolchildren, students and working adults, the duration of the events could be expanded (dedicating a whole weekend rather than one day for these events) and some of the activities should take place in the evenings and at night. Second, the events could be made accessible to more people if the number of cities/locations/venues was increased and some of the events were organised in more central venues. Third, as the numbers of visitors are increasing, respondents indicated that there is a need for venues with greater capacity. Fourth, improved advertising, more detailed mapping of the activities, reduction of the number of parallel activities would also increase the overall visitor satisfaction according to the surveys' results.

⁴⁸ Ec.europa.eu, Research and innovation: European Researchers' Night 2015, http://ec.europa.eu/research/researchersnight/about_en.htm

2.2. Dual careers

2.2.1. Researchers facing dual-career problems and their situation with regards to mobility

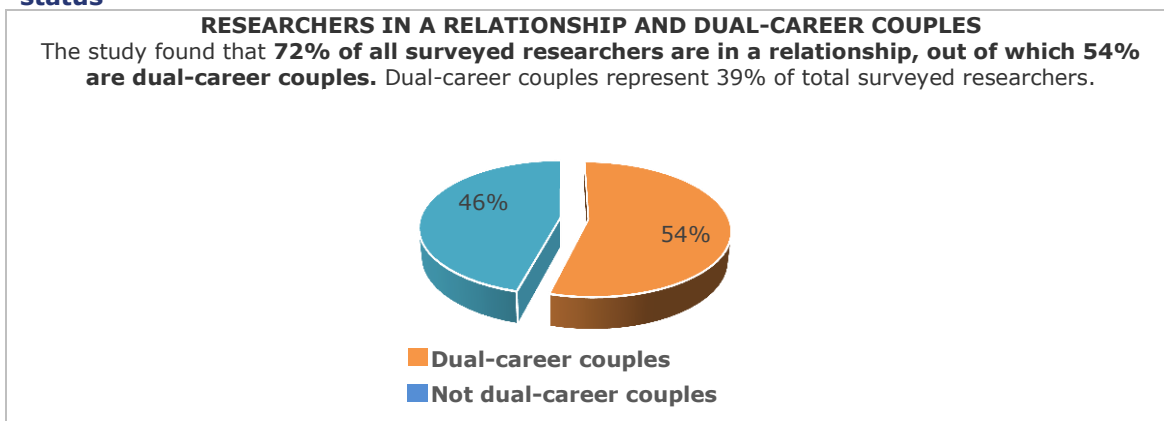
In this first section dedicated to dual careers, we outline the profile of researchers dealing with difficulties due to being in a relationship, particularly dual-career couples, and how this impacts their career paths/personal life choices. We also analyse the relation between dual-career issues and mobility.

Within this and further sections of the study three essential concepts are defined. Firstly, **dual-career couples** are defined as couples (for example, a wife and a husband), where both life partners pursue a career or seek jobs that are highly demanding and strongly oriented at career progression, and at least one of them is a researcher. Secondly, **difficulties due to being in a relationship** are defined as problems that can potentially affect the professional and/or personal life of the researchers or their partners in a negative way (for instance, their mobility, their **recruitment process and outcome of the negotiation, their jobs, etc.**). Thirdly, **mobile researchers** are defined as researchers who have moved at least once to another country in their professional lives.

Some examples of the explored links between these three concepts are drawn below, using as reference the responses of individual researchers to the survey carried out within this study.

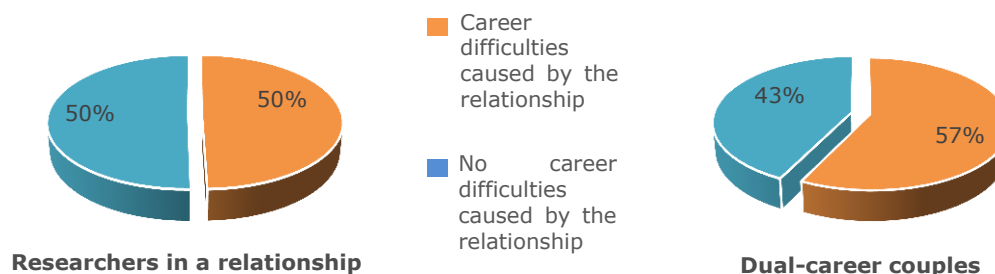
Moreover, within this study **four career stages** are used, as follows: first stage researcher (in training leading to PhD or equivalent); recognised researcher (PhD holders or equivalent who are not yet fully independent); established researcher (researchers who have developed a level of independence); and leading researcher (researchers leading their research area or field)

Figure 15. A comparison of results obtained for researchers in a relationship and dual-career couples in what regards to relationship-based career difficulties and mobility status



RELATIONSHIP-BASED CAREER DIFFICULTIES

50% of researchers in a relationship encounter difficulties directly related to the fact that their relationship impacts their career choices. This figure represents 36% of total researchers surveyed. The number even increases to 57% if one considers specifically dual career-couples.



SITUATION WITH REGARDS TO MOBILITY

Whether researchers are in a relationship or in a dual-career couple does not have a major impact on the mobility rate. Similar level of mobility was also to be found among the single researchers.



Source: the survey of individual researchers.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.2.1

- The majority of the surveyed researchers (representing 72% of total respondents) are in a relationship. Out of these, 58% have children and 54% are dual-career couples. Therefore, dual-career couples represent 39% of total surveyed researchers.
- At least half of researchers who are in a relationship encounter difficulties directly related to the fact that the relationship impacts their career choices. The number increases to 57% if one considers specifically dual career-couples.
- Based on the evidence gathered, a typical researcher exposed to difficulties directly related to their dual-career relationship is likely to be a recognised or established male researcher working in the areas of Life Sciences or Physics at a university under a full-time fixed-term contract.
- This profile is similar to the general profile of researchers in a relationship or specifically facing relationship-based problems.
- 'Mobile researchers' represent 73% of all the researchers in a relationship and 78% of the dual-career couples. They have a similar profile to the one observed for respondents in general.
- No significant differences were observed in the mobility rates of single researchers, researchers in a relationship and researchers in dual-career relationships. However, considering the researchers in a dual-career relationship, the number of respondents who have never moved abroad or

plan to never move abroad increases while progressing the career ladder (i.e. from first stage researchers to leading researchers). No differences were detected between genders on the matter.

- The main motives/drivers for moving to another country are related to personal/family reasons, career progression and working with leading individual experts and laboratories. Similarly, personal/family reasons are also the aspect that weighted the most in the case of respondents that never moved to another country.
- Although in some ways dual-career couples report similar motives for their mobility, slight differences exist with regards to their career stage and gender. For instance, established researchers were most likely to mention personal/family reasons as the main motive/driver for their mobility. Furthermore, female respondents were found to put more emphasis on the career opportunities at the new location than the salary and other financial incentives.
- Issues specific to dual-career are involved in the decision-making process when considering moving to a different country. From these, finding a job for the partner, ensuring that he/she adapts well to the new environment and availability of necessary childcare services or other family support services were those with the highest impact on the decision of researchers. For mobile dual-career couples finding a job for the partner was highlighted by 90% as a relevant dual-career issue in the decision-making process.
- The majority of researchers with mobility problems linked to relationship-based issues are still investing in mobility opportunities, but personal/relational and professional costs are evident. Additionally, at least 20% of the respondents with a partner have resigned from their jobs and/or refused a job vacancy due to challenges caused by a dual-career relationship. In this context, though mobility-related problems are mentioned by leading researchers more frequently, they reported having refused a job vacancy less regularly. At the same time, more male respondents than their female counterparts report problems related to dual-career issues.

Profile of dual-career researchers

Results from the survey targeted at researchers supported outlining a profile for the dual-career researchers. The results reveal that nearly 72% of the respondents are in a relationship (of whom around 58% have children) and that almost 39% of respondents are in a 'dual-career couple' relationship⁴⁹. The data also shows that at least half of the researchers in a relationship (including the ones in a 'dual-career' relationship) have faced (or their partners have faced) problems deriving from it affecting their career paths/personal life choices⁵⁰.

⁴⁹ These results are in line with the ones presented by the 'MORE II Study – Follow-up of the MORE Study on Mobility Patterns and Career Paths of Researchers'. Published in 2013, the study revealed that near 74% of EU27 researchers live in a couple and around 69% have children. (More details on the study can be found at http://ec.europa.eu/euraxess/pdf/research_policies/MORE_final_report_final_version.pdf).

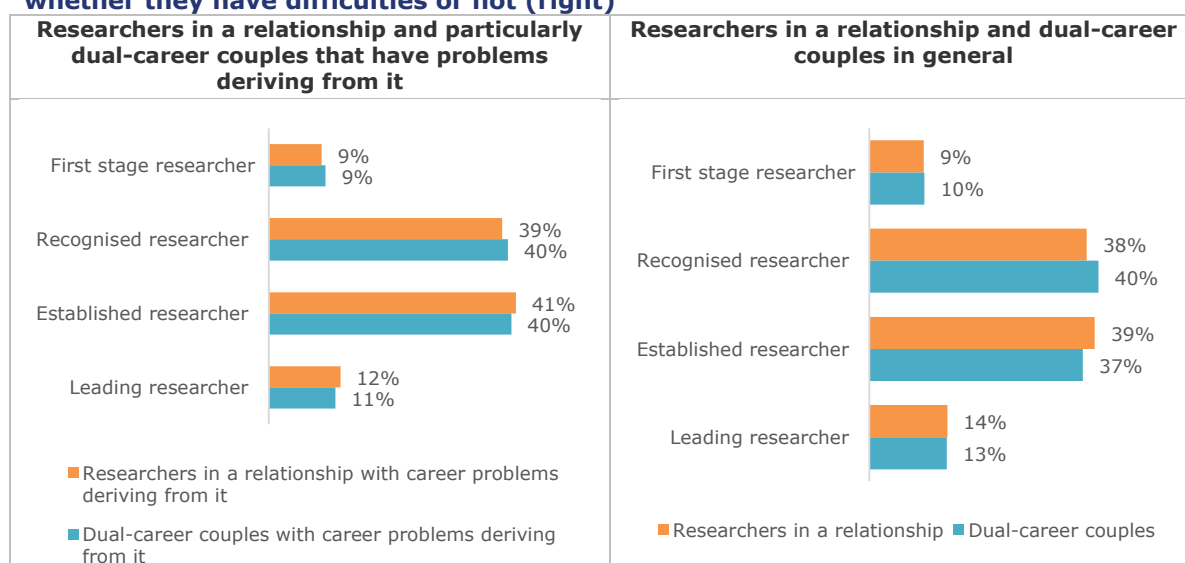
⁵⁰ These researchers are respondents in a relationship and respondents that are part of a dual-career couple and that expressed having faced at least one problem in question 20 of the survey: 'Have you and/or your partner ever faced the following problems? 1. Never moved to a different country; 2. Was/were offered a job but the offer was withdrawing; 3. Refused a job vacancy; 4. Resigned from a job; 5. Currently face/faces problems at work that are affecting our relationship'.

A detailed profile is presented for researchers in a relationship (including dual-career couples) who mention themselves or their partner having problems deriving from the relationship and having the relationship affect their career paths/personal life choices.

One of the main findings of this study is that there are no major differences when looking at respondents having problems impacting their career paths/personal life choices due to being in a relationship and due to being a dual-career couple. However, there are some specificities when comparing researchers in a relationship (including dual-career couples) in general, and those who mention having difficulties deriving from it.

The study also investigated the career stage of the respondents in relationships and respondents having problems because of their dual-career relationship. The results reveal that around 80% are either recognised researchers or established researchers⁵¹. There are no major differences when looking at researchers facing problems whether they are caused by relationship in general or dual-career relationship. Nevertheless, when comparing the profiles of those having problems (Figure 16, left) to the profile of researchers in relationships in general (Figure 16, right), the results indicate slight differences: the percentage of leading researchers in dual-career relationship and having problems is slightly smaller in comparison to the percentage of leading researchers in relationships in general.

Figure 16. Career stage analysis of the researchers in a relationship (particularly dual-career couples) and that have career problems deriving from it (left). Comparison with the career stage profile of the researchers partnered in general, regardless of whether they have difficulties or not (right)



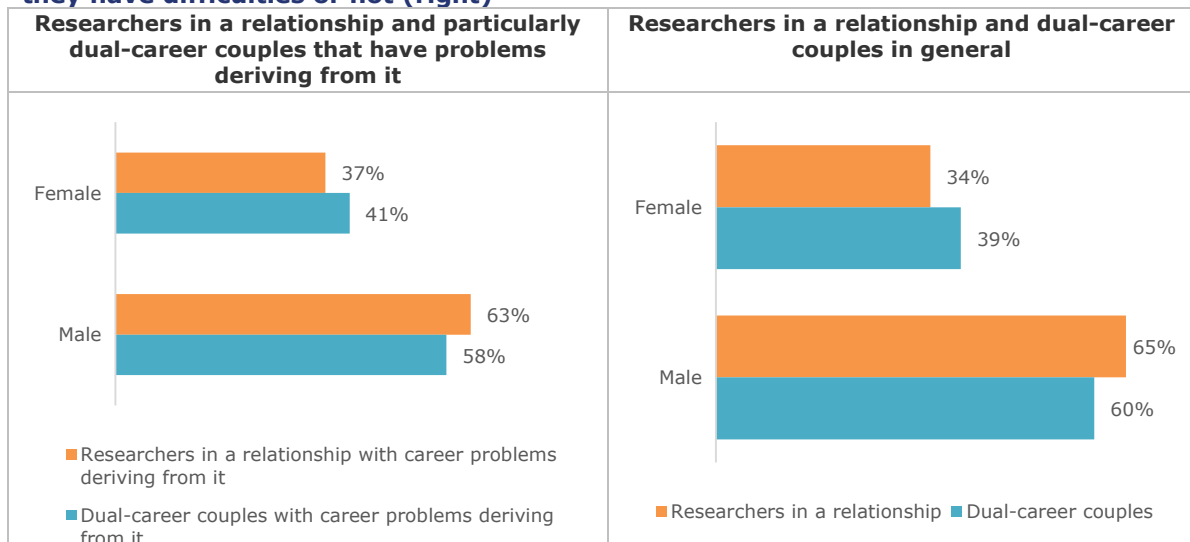
Source: the survey of individual researchers.

The perceptions of experts gathered during the interview programme are aligned with these results. In their suggestion for a possible profile of researchers dealing with difficulties deriving from being partnered, the experts believed that recognised and established researchers (and researchers aged between 30 and 35 years) could be more prone to facing those problems.

⁵¹ Additionally, as far as age is concerned, most (around 90%) are between 25 and 50-years old, with over a half (close to 61%) falling into the category between 31 and 40-years old.

Concerning the gender, the majority of respondents who mention having relationship-based problems (themselves or their partner) were male researchers (Figure 17, right). When compared to partnered researchers in general, the number of female respondents with difficulties due to being in a relationship is somewhat higher.

Figure 17. Gender analysis of the researchers in a relationship (particularly dual-career couples) and that have career problems deriving from it (left). Comparison with the gender profile of the researchers partnered in general, regardless of whether they have difficulties or not (right)

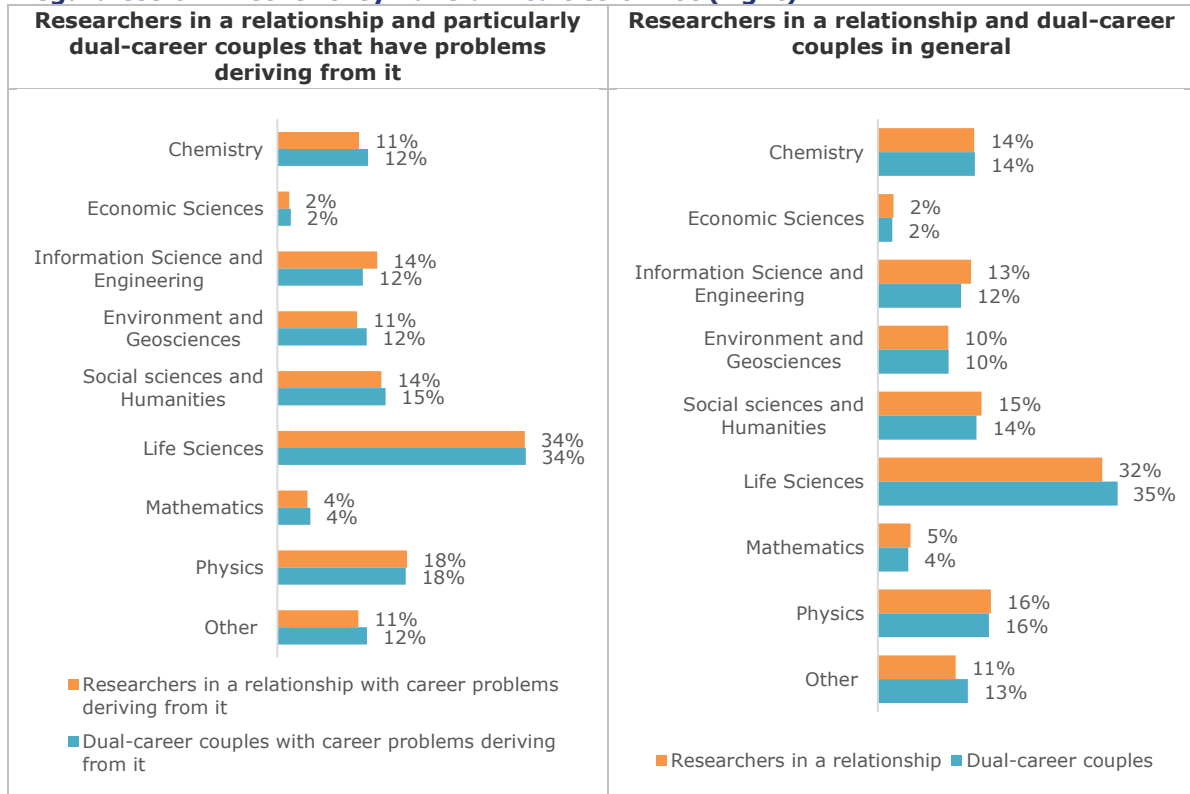


Source: the survey of individual researchers.

The interviewed experts predicted that more female researchers would report dual-career problems. This suggestion, which was regularly mentioned during the interview programme, was not directly confirmed by the survey data. In fact, and as emphasised by some interview experts, although traditionally the 'typical' researcher is a male and his wife goes along with him, today more of them face the fact that both partners have a high level of education and in many cases both work in research organisations.

As regards the research area(s) of the profiled researchers, more than 30% of the profiled researchers are linked to Life Sciences and more than 15% to Physics. The respondents' research areas were very similar for researchers in a relationship and dual-career couples facing relationship based difficulties (Figure 18, on the left). The same can be observed when comparing researchers in relationships in general (Figure 18, right).

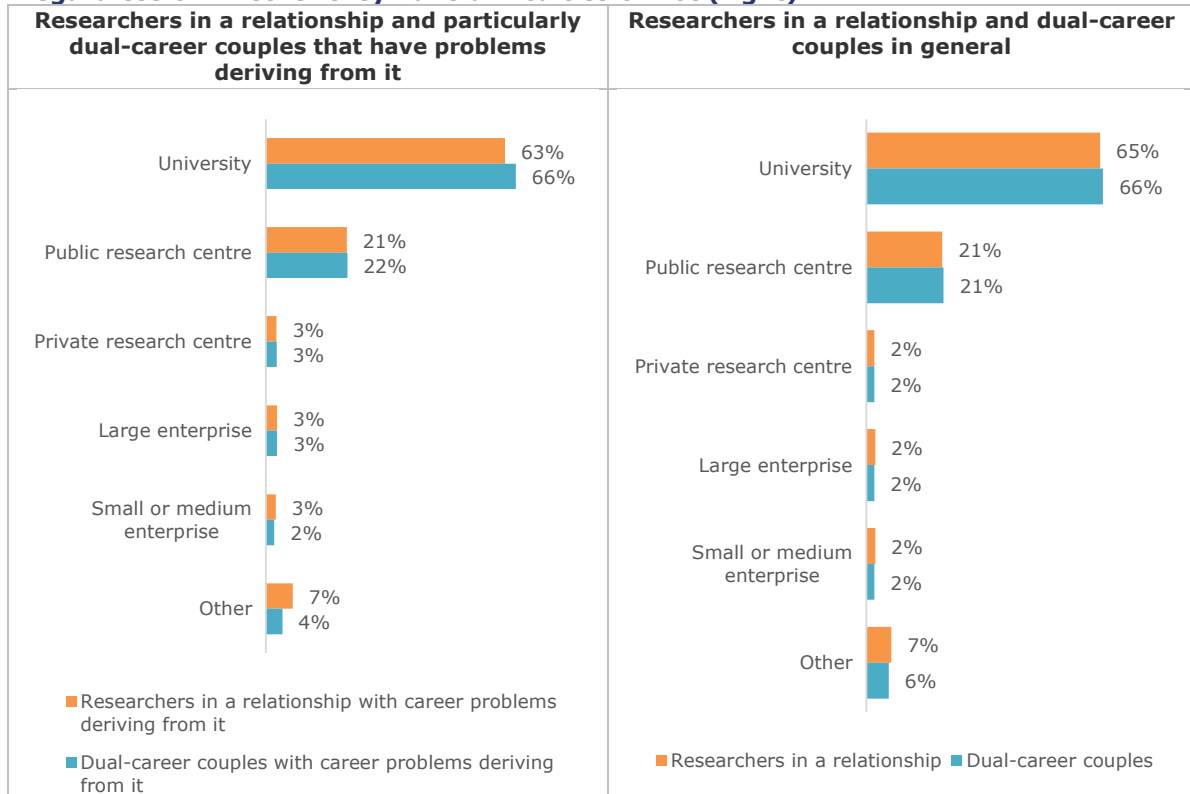
Figure 18. Analysis of the research area of the researchers in a relationship (particularly dual-career couples) and that have career problems deriving from it (left). Comparison with the gender profile of the researchers partnered in general, regardless of whether they have difficulties or not (right)



Source: the survey of individual researchers.

Furthermore, most of the profiled researchers work at universities (more than 65%) or public research centres (around 20%). There are no major differences when comparing dual-career couples and researchers in a relationship either generally speaking (Figure 19, right) or focusing on the specific cases of respondents reporting difficulties due to being a partner (Figure 19, left).

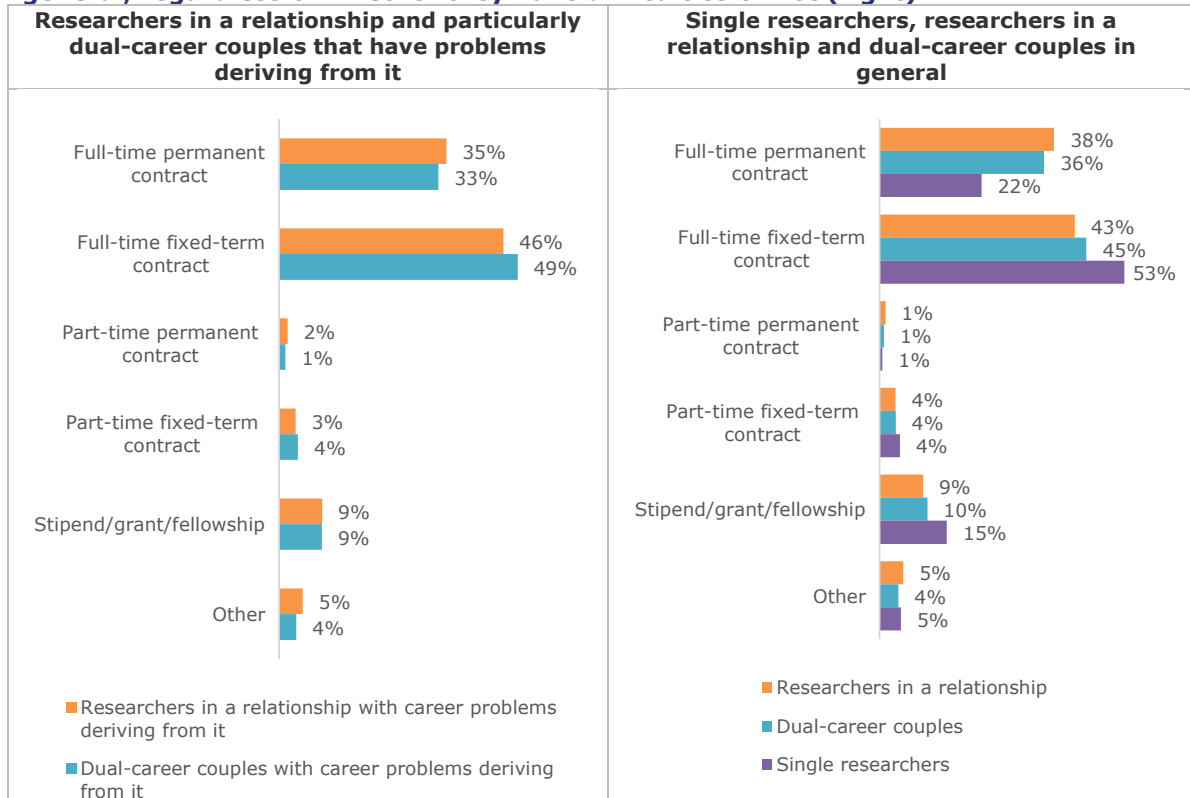
Figure 19. Analysis of the type of organisation hosting researchers in a relationship (particularly dual-career couples) and that have career problems deriving from it (left). Comparison with the gender profile of the researchers partnered in general, regardless of whether they have difficulties or not (right)



Source: the survey of individual researchers.

Finally, considering their type of work contract, more than 80% of the profiled researchers had a full-time contract with their employers (mainly fixed-term contracts). Moreover, when comparing researchers in a relationship in general and those having difficulties (Figure 20, right and left, respectively), a slight difference exists in the percentage of those working with a full time-time fixed contract: the proportion of respondents in a relationship and having difficulties have larger representation here than with researchers in a relationship in general, but smaller than with single researchers.

Figure 20. Analysis of the type of work contract owned by the researchers in a relationship (particularly dual-career couples) and that have career problems deriving from it (left). Comparison with the gender profile of the researchers partnered in general, regardless of whether they have difficulties or not (right)



Source: the survey of individual researchers.

Links between dual-career and researchers' mobility

The large majority of surveyed researchers have moved to a different country at least once within their research career and dual-career couples are no exception. These researchers, hereafter referred to as 'mobile researchers', represent 73% of the researchers in a relationship and 78% of the dual-career couples. They have a similar profile to the respondents in general.

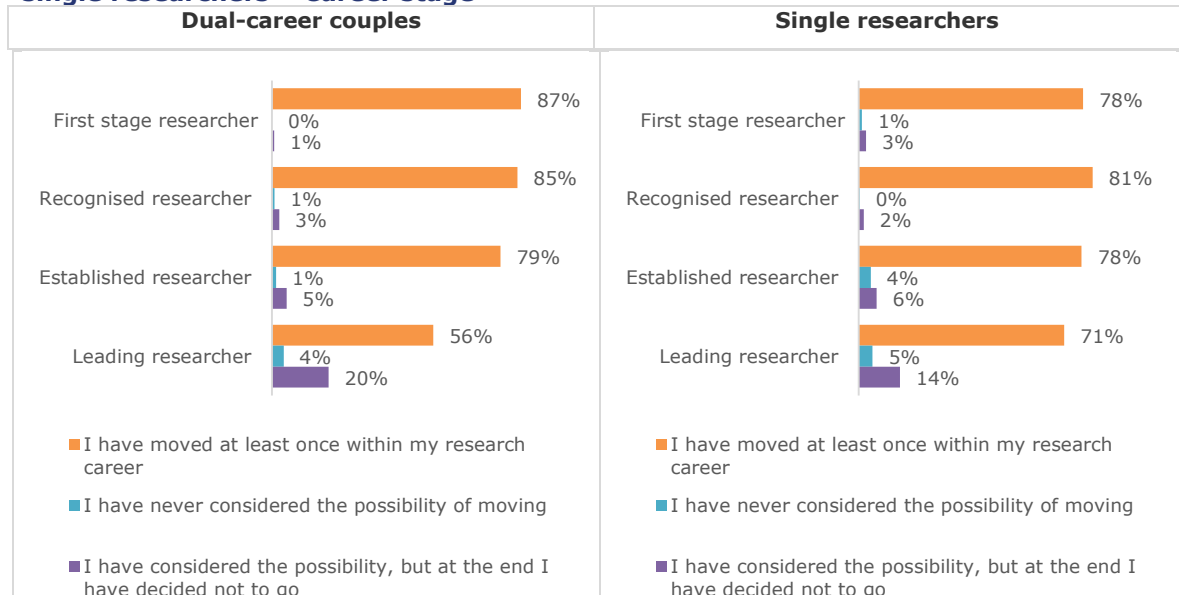
When studying the attitude of dual-careers couples towards mobility in particular, the results indicate that while the large majority of these researchers have moved to a different country at least once within their careers, a small part (6%) have considered that possibility but in the end decided not to go. The percentage of respondents that are part of a dual-career couple and that never considered the possibility of moving is very small (1%). Similar responses are observed for single researchers, researchers in a relationship and dual-career couples.

Although the fact of whether researchers are in a relationship or not does not seem to have a great impact on the mobility rate, the stage at which they are at in their career influences their answers⁵². More concretely, the results show that the number of respondents who never considered the possibility of moving and that have decided not to move after considering the possibility increases with career progression, from first stage researcher to leading researcher (Figure 21, left). Additionally, there are some

⁵² No similar differences were found when considering the gender of the respondents.

specificities in the way leading researchers that are partnered and leading researchers that are single answer: while in the first case less 56% can be considered mobile researchers, in the second case 71% have moved at least once within their careers (Figure 21, right).

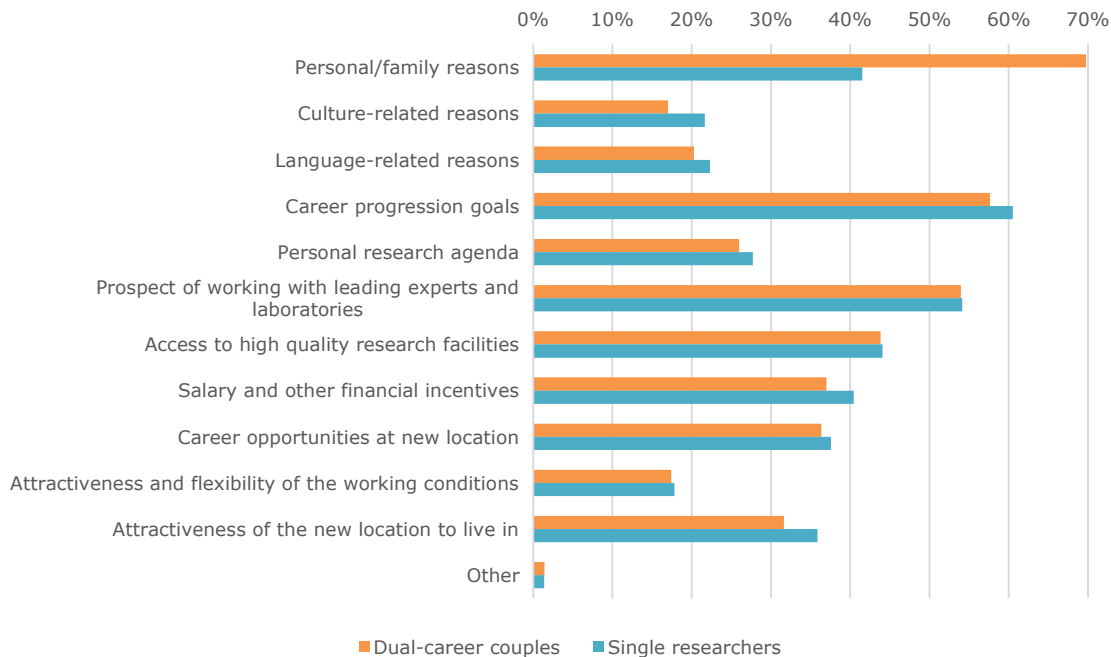
Figure 21. Situation of dual-career couples towards mobility compared with the one of single researchers – Career stage



Within this study we also analysed motives/barriers to mobility. The results of the individual survey indicate that the aspects that weighed the most when deciding to move to a different country were 'personal/family reasons'⁵³. The majority of the respondents (either dual-career couples or single researchers) included them among their top five factors influencing their decision on whether to move abroad or not. This main driver was followed by 'career progression goals' and the 'prospect of working with leading individual experts and laboratories'. The top five motives also included aspects related to 'access to high quality research facilities' and 'salary and other financial incentives'. These results are to some extent consistent with the MORE II findings, where career progression was *most frequently identified as being an important motive for international mobility, followed by access to leading experts and facilities and equipment*. However, in the present study, personal/family reasons precede all factors influencing their decision and are particularly highlighted by researchers that are part of a dual-career couple (Figure 22).

⁵³ Results presented are linked with question 18 of the survey of individual researchers: 'Which of the following aspects weight the most when deciding to move or not to move to a different country? (Select up to 5 options). Personal/family reasons; Culture-related reasons; Language-related reasons; Career progression goals; Personal research agenda; Prospect of working with leading experts and laboratories; Access to high quality research facilities; Salary and other financial incentives; Career opportunities at new location; Attractiveness and flexibility of the working conditions; Attractiveness of the new location to live in; Other (please specify)'. Closed options were based on the findings of the MORE II Study regarding the main motives for mobility.

Figure 22. Drivers/barriers to mobility for dual-career couples and single researchers



Source: the survey of individual researchers.

In general, the same main drivers/barriers (and hierarchic relationships between them) can be observed when considering the different career stages (of dual-career couples and single researchers). Nevertheless, and although in some way the same motives are reported by first stage, recognised, established and leading researchers, some slight differences exist:

- established researchers in dual-career relationship are the group with the highest percentage of researchers mentioning personal/family reasons (74%, compared, for instance, with 63% observed for first stage dual-career couples);
- first stage researchers in dual-career relationship are the group with the highest percentage of researchers reporting salary and other financial incentives as a main driver (53%, compared for instance, with 29% observed for leading researchers in dual-career relationship);
- although with a smaller percentage of respondents, personal/family reasons are indicated by single researchers (in all career stages) as one of the top-five drivers/barriers;
- with the exception of first stage researchers, single researchers in all stages of their careers included career opportunities at the new location in their top-five main drivers/barriers.

Some specificities can also be highlighted when considering the gender of the respondents:

- female respondents that are part of a dual-career couple tend to emphasise more the career opportunities at the new location than the salary and other financial incentives;
- while female single researchers include personal/family reasons in their top-five main drivers/barriers to mobility, male researchers that are single include career opportunities at the new location.

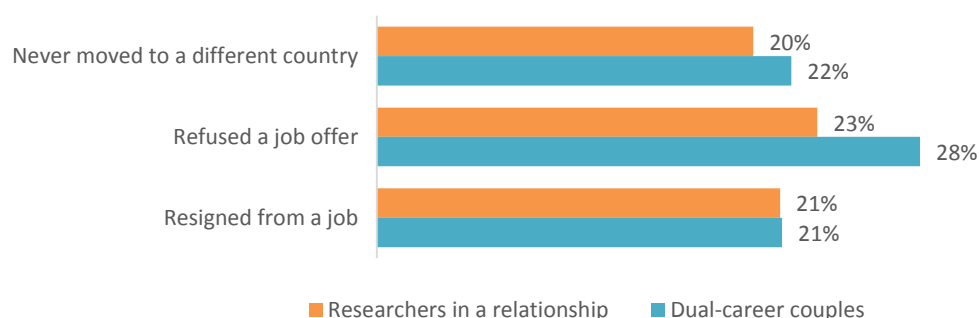
This study also analysed the particular cases of dual-career couples who decided not to move to a different country after considering this possibility. Evidence collected suggests that the majority (70%) of couples facing difficulties due to being in a relationship that are linked also with mobility choices are still investing in mobility opportunities and have moved to a different country: only 14% of the researchers with mobility problems linked to dual-career issues decided not to move after considering the idea. Altogether 96% of these researchers pointed to personal/family reasons as the factor that weighed the most on their decision.

When specifically focusing on dual-career issues that might have some influence on the decision to move to a different country⁵⁴, dual-career couples emphasised the importance of the following three factors: finding a job for the partner (reported by 90% of the respondents as very or rather relevant), ensuring that he/she adapts well to the new environment (82%) and ensuring that necessary childcare services or other family support services can be found (75%). The responses were the same irrespective of the researchers' career stage and gender.

In general, these results confirm and complement the findings of the TANDEM project ("Talent and Extended Mobility in the Innovation Union"). This international initiative, which was aimed at analysing the chances and risks of mobile researchers and their partners/families within Europe, indicates that *childcare/school, dual-career services and living/housing are among the most important topics*.

Recognising that researchers in a relationship and dual-career couples face particular obstacles when considering moving to a different country, the experts interviewed within the study stated that there is a need for increased flexibility of mobility supporting schemes in order to address dual-career issues and mitigate these barriers. These issues and barriers are in some cases forcing researchers to decide between their professional and personal life. In this case, the evidence collected reveals that at least 20% of the partnered respondents resigned from their jobs, refused a job offer and/or have never moved to a different country (Figure 23).

Figure 23. Problems encountered by researchers in a relationship and dual-career couples



Source: the survey of individual researchers.

⁵⁴ Question 19 of the survey: 'Please consider the following list of dual-career issues and indicate the relevance they had or could have on your decision to move to a different country: 1. Finding a job for my partner; 2. Overcoming the language barrier for my partner; 3. Ensuring that my partner has a good adaptation to the new environment; 4. Ensuring that necessary child-care services or other family support services can be found; 5. Other (please specify below)'.

Although similar trends are observed when comparing the responses of researchers in a relationship and researchers that are part of a dual-career couple, when analysing the results by career stage and gender, the following differences are detected:

- Mobility-related problems are mentioned by leading researchers more frequently than by first stage researchers: 25% of the leading researchers in dual-career relationships reported that they have never moved to a different country due to dual-career issues. However, less than 15% of the first stage researchers in the same type of relationship mentioned this problem.
- Situations where the respondents or their partners refused a job vacancy are less mentioned by leading researchers (18%) when compared with respondents in other career stages, in particular the established researchers (30% of whom reported this specific problem).
- More male respondents than their female counterparts report problems related to dual-career issues: whereas less than 5% of the female respondents mentioned that they had never moved abroad, refused a job vacancy and/or resigned from a job, around 15% of their male counterparts referred to those situations.

Key problems highlighted by the respondents, regardless of their career stage or gender, are mainly related with being confronted with the need to choose between investing in their professional careers and their partners/family. In several cases, the options were to either end their relationships or live separately and maintain a distance relationship. In other situations, the couple decides to pursue only one of the careers, this meaning that the other partner resigns from his/her job or accepts a job offer that is less demanding and oriented at career progression.

2.2.2. Approach to dual-career concerns at recruitment stage and outcome of the negotiations

In this section we present an overview on how and when dual-career issues are raised during the recruitment processes and analyse the possible impact of addressing these concerns in the outcome of the negotiations. For this latter question, the cases of researchers who were offered a job but the offer was withdrawn due to dual-career issues as well as newly hired researchers are discussed in detail. In this study, **newly hired researchers** are defined as researchers who were hired over the last five years. Additionally, the section also examines potential gender differences in the way dual-career concerns are addressed during recruitment and in the way these may affect the outcome of negotiations.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.2.2

- Less than a half of the researchers facing dual-career problems discuss their concerns during recruitment processes. Those who do, usually do it at the first interview, although the differences in responses was found to depend on the stage of the respondent's career. For instance, recognised and established researchers tend to address those issues more frequently during the first job interview, while the leading researchers do so often only when conditions are being negotiated. The absence of structured recruitment processes that address dual-career issues might be one of the reasons behind these numbers.
 - With some minor differences, responses from the research performing organisations suggest that the number of applicants raising dual-career issues is rather small. The surveyed organisations have some uncertainty
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with regards to the moment when the researchers bring up dual-careers issues during recruitment.

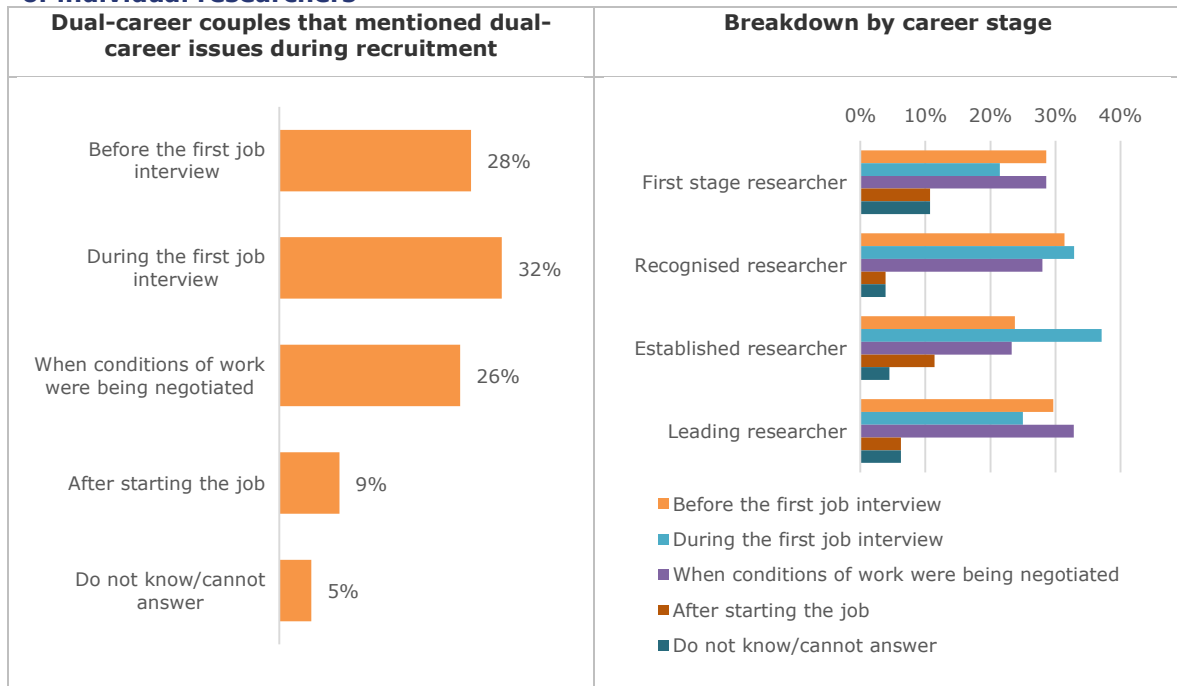
- Moreover, research performing organisations stated that there is a reduced number of cases of concerns being raised on the inexistence of dual career services in the organisation and by employees on the dual-career hiring of other researchers.
 - Collected evidence seems to suggest that mentioning dual-career issues does not have a significant impact on the outcome of the negotiations.
-
- Male researchers, more than their female counterparts, reveal to have (or their partners have) addressed dual-career issues during their recruitment process. They also represent the greater part of researchers who, despite having raised such concerns, were recently hired together with their partner. Male researchers addressing dual-career issues at the recruitment stage also outnumber female researchers in the very particular cases where an offer was withdrawn due to dual-career issues. Although in general the proportion of male researchers that mention to have (or their partners) been facing dual-career problems affecting their professional career is higher than the one observed for their female counterparts, it is relevant to note that in several cases, respondents are actually referring to their partner situation.
-

Dual-career issues during recruitment processes and outcome of negotiations

Perspectives on how and when dual-career concerns are addressed at the recruitment stage differ somewhat when comparing researchers and research performing organisations.

For instance, 34% of the researchers in dual-career relationship have addressed dual-career issues at the recruitment stage and those concerns are more frequently mentioned before starting the job, i.e. before or during the first job interview, or when conditions are being negotiated (Figure 24, left). Although the gender of the respondent does not seem to influence the responses, their career stage does: a third of the recognised and established researchers and 21-25% of the first stage and leading researchers choose to address dual-career issues during the first interview. However, leading researchers more frequently address them only when conditions are being negotiated (Figure 24, right).

Figure 24. Recruitment step during which dual-career issues are raised – perspectives of individual researchers



Source: the survey of individual researchers.

Nearly 20% of the research performing organisations indicated that over the past five years, concerns had been raised by applicants during recruitment procedures⁵⁵. However, although 10% admitted that hired researchers had raised concerns on the inexistence of dual-career services in their organisation, only 5-10% of them indicated that concerns had been raised by employees on the dual-career hiring of other researchers, suggesting that explicitly expressed nepotism remains rather infrequent (Figure 25).

Figure 25. Main concerns relating to dual-career issues, as addressed by research staff towards employers – perspectives of research performing organisations

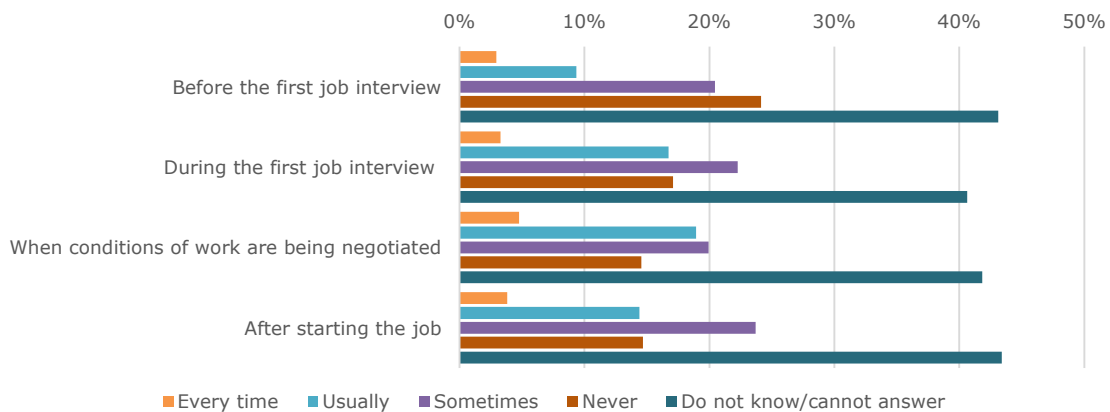
⁵⁵ Representatives from research performing organisations were asked to indicate whether 'Over the past five years, have any of the following groups of researchers in your organisation raised concerns about dual-career issues?': Concerns raised by applicants during recruitment procedures; Concerns raised by employees on the dual-career hiring of other researchers; Concerns raised by hired researchers on the dual-career services offered by the organisation; and Concerns raised by hired researchers on the inexistence of dual-career services in the organisation.



Source: the survey of research performing organisations.

When considering the moment when dual-career issues are raised at the recruitment stage, the larger part of the respondents did not know whether the researchers would approach dual-careers issues at any step of the recruitment process led by their organisation. However, whenever the issue was brought up, it was usually during the first interview, during negotiations or after the job would start, not so much before the first job interview (Figure 26).

Figure 26. Recruitment step during which dual-career issues are raised – perspectives of research performing organisations



Source: the survey of research performing organisations.

Despite the small differences, the results gathered in both groups reveal that the share of researchers addressing dual-career issues at recruitment stage is rather small. Although the reasons for these numbers are not examined in the present study, the fact that the majority of the organisations do not have structured recruitment processes that address dual-career issues might be one of the influencing factors⁵⁶.

In order to assess the possible impact of addressing dual-career concerns on the outcome of negotiations, this study examined the cases of researchers who were offered a job and then the offer was withdrawn due to dual-career issues. It is

⁵⁶ Representatives from research performing organisations were asked to indicate if any of the following options was applicable to their organisations: 'Sufficient attention is paid to dual-career issues by the management'; 'There is a specialised Human Resources team/person dealing with dual-career issues'; 'There are dual-hiring policies or procedures in place' and 'There are several services available to researchers facing dual-career issues'. More than half of the respondents mentioned that none of the options was applicable.

relevant to note, however, that this specific dual-career related problem was mentioned only by 12% of the researchers, while more than 20% of the respondents described a situation where researchers themselves had refused job offers or had resigned.

Results of the analysis carried out reveal that only 25% of the researchers in a relationship who have been offered a job and subsequently withdraw due to dual-career problems, have in fact expressed their concerns at the recruitment stage, mostly during the first job interview or when conditions of work were being negotiated. Details provided by the researchers suggest that in the majority of the cases they were actually describing situations where they themselves declined the opportunities due to dual-career issues (such as finding a job for their partners).

Moreover, the cases of researchers who were hired over the last five years (hereafter referred to as 'newly hired researchers') and those having discussed those concerns were also analysed⁵⁷. Results indicate that 64% of the researchers raising their dual-career concerns at recruitment stage were newly hired researchers, suggesting that addressing these issues does not have a substantial impact on the outcome of the negotiations.

Gender differences on dual-career issues at recruitment processes and outcome of negotiations

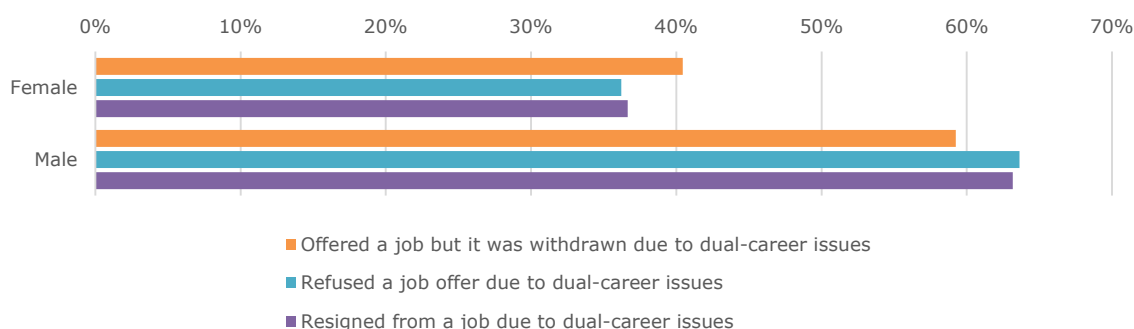
As previously outlined, less than half of the researchers address dual-career concerns during the recruitment process. The majority of them are male researchers, while female researchers represent less than 40% of the respondents. Likewise, in line with the preceding section, results reveal that similar gender distribution exists for the cases of researchers who mentioned the fact that they themselves or their partners had faced a situation of being offered a job that was withdrawn, and who also have addressed dual-career issues at the recruitment stage. The same happens for the cases of researchers who are newly hired (together with their partners) and who also addressed dual-career concerns at the recruitment stage.

Moreover, and considering the big picture on gender differences, evidence gathered within the study also reveals that more male respondents than their female counterparts stated they or their partners have experienced at least one of the following situations (for more details see Figure 27):

- they were offered a job position that was subsequently withdrawn due to dual-career issues;
- they refused a job offer due to dual-career issues;
- they resigned from a job due to dual-career issues.

⁵⁷ Researchers in a relationship (including those in dual-career relationship) were also asked to indicate whether both of them (researchers and their partners) have been newly hired over the last five years (question 22 of the individual research survey).

Figure 27. Gender distribution of researchers with dual-career problems affecting their professional careers

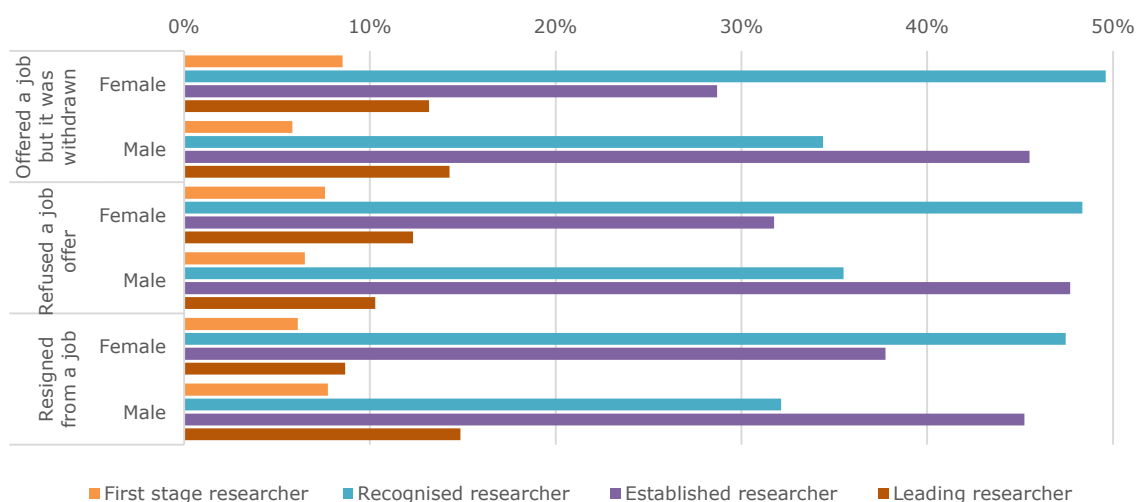


Source: the survey of individual researchers.

However, as they were reporting both their own and their partner’s experiences, these results only suggest that more male researchers reported situations where their or their partner’s professional careers were affected by dual-career issues. In fact, details provided by the respondents in their open answers reveal that in at least more than 25% of the situations, male respondents were mentioning their partner/spouse/wives’ professional careers⁵⁸.

With regards to the career stage of the researchers with dual-career issues, results reveal that the majority are recognised or established researchers. However, while for female researchers the first represents the greater number of cases, for male respondents the second prevails (for more details see Figure 28).

Figure 28. Career stage distribution and gender analysis of researchers with dual-career problems affecting their professional careers



Source: the survey of individual researchers.

These quantitative results are also supported by the qualitative analysis and are in line with the findings highlighted in the Eurodoc Policy Paper on dual-career opportunities for doctoral candidates and early stage researchers. This shows that *dual-career opportunities are of special importance to young female researchers as women tend to gradually drop out of the research profession and most of them before the post-*

⁵⁸ At the same time, at least in half of the cases, female researchers mentioned their partner/spouse/husband.

doctoral phase, and stating that female scientists often prioritise their partner's career over their own and that female early stage researchers tend to follow their partner and decide to undertake posts based on their partner's location decisions so as to allow them to simultaneously fulfil family and career objectives.

2.2.3. Dually-hired researchers

This third section presents an overview of procedures and supporting measures for dual-hiring established in research performing organisations in EU Member States, Associated Countries and non-EU countries. It also includes an analysis to the proportion of **dually-hired researchers**, defined as dual-career couples hired over the last five years, jointly or sequentially, by the same employer in approximately the same or in a different geographic location.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-section.

Key findings and conclusions of section 2.2.3

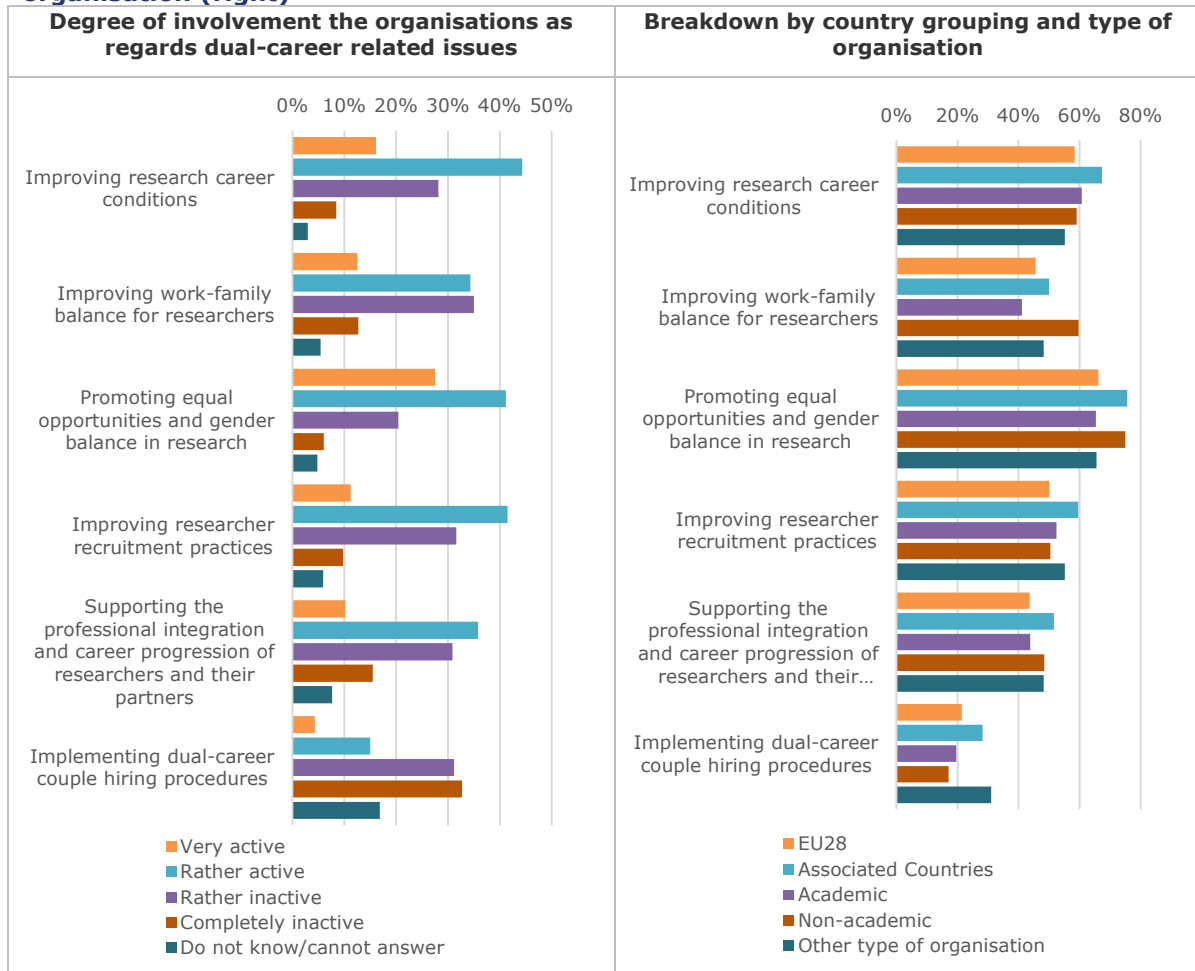
- Lack of policies, strategies, procedures and services in favour of or facilitating dual-hiring is emphasised by the majority of the research performing organisations. In fact, any formal recruitment procedures or informal practices for dual-career issues existed in less than 10% of the cases analysed.
 - Organisations who responded as having some procedures in place for dual-career issues had some variance in their responses depending on the type and country of the organisation. For instance, a large number of the respondents representing private research centres believe that sufficient attention is paid to dual-career issues by their management and that there are several services available to researchers facing dual-career issues. Furthermore, universities had a larger number of respondents stating that there is a specialised Human Resources team/person dealing with dual-career issues and that dual-hiring policies or procedures are in place. Respondents from Germany and from Switzerland are among those to gather the highest percentage in all the topics covered.
 - Generally perceived as being in an early stage of recognising the importance of addressing dual-career issues in their recruitment practices, the majority of the research performing organisations do not have dual-career couple hiring solutions.
 - When asked if their organisation's recruitment procedure addresses dual career issues, 57% of the respondents stated that it does not, 15% say it does and the rest did not know. Of those that do, only a third does it with a formal procedure. The occurrence at which rather formal procedures or informal ways of addressing dual-career issues were used varied depending on the type of the organisation. For instance, only in the cases of the universities are formal and informal ways of addressing dual-career issues similarly referred to by respondents.
 - The absence of recruitment procedures is also reflected by the fact that less than 20% of the newly hired researchers were jointly hired and around 80% were hired by different employers (in approximately the same or in a different location). Dually-hired couples represent 19% of the newly-hired researchers. There are no major differences when comparing the results by gender or career stage.
-

Dual-hiring procedures and dually-hired researchers

The findings of this study show that the majority of the research performing organisations are active in improving research career conditions and promoting equal opportunities and gender balance. Nearly half of the organisations are perceived by their representatives as being active in fields such as improving work-family balance for researchers or recruitment practices and supporting the professional integration and career progression of researchers and their partners. However, only one third of the respondents recognise that dual-career couple hiring procedures are being implemented (Figure 29, right). The results differ depending on the location of the organisation: in general, for EU28 the results are lower than those observed for Associated Countries. At the same time, when taking into account the type of organisation, results tend to be similar between academic and non-academic organisations. The only exception to this is the level of activity of non-academic respondents as regards improving work-family balance for researchers and promoting

equal opportunities and gender balance in research, which are quite above the proportion obtained for academic respondents.

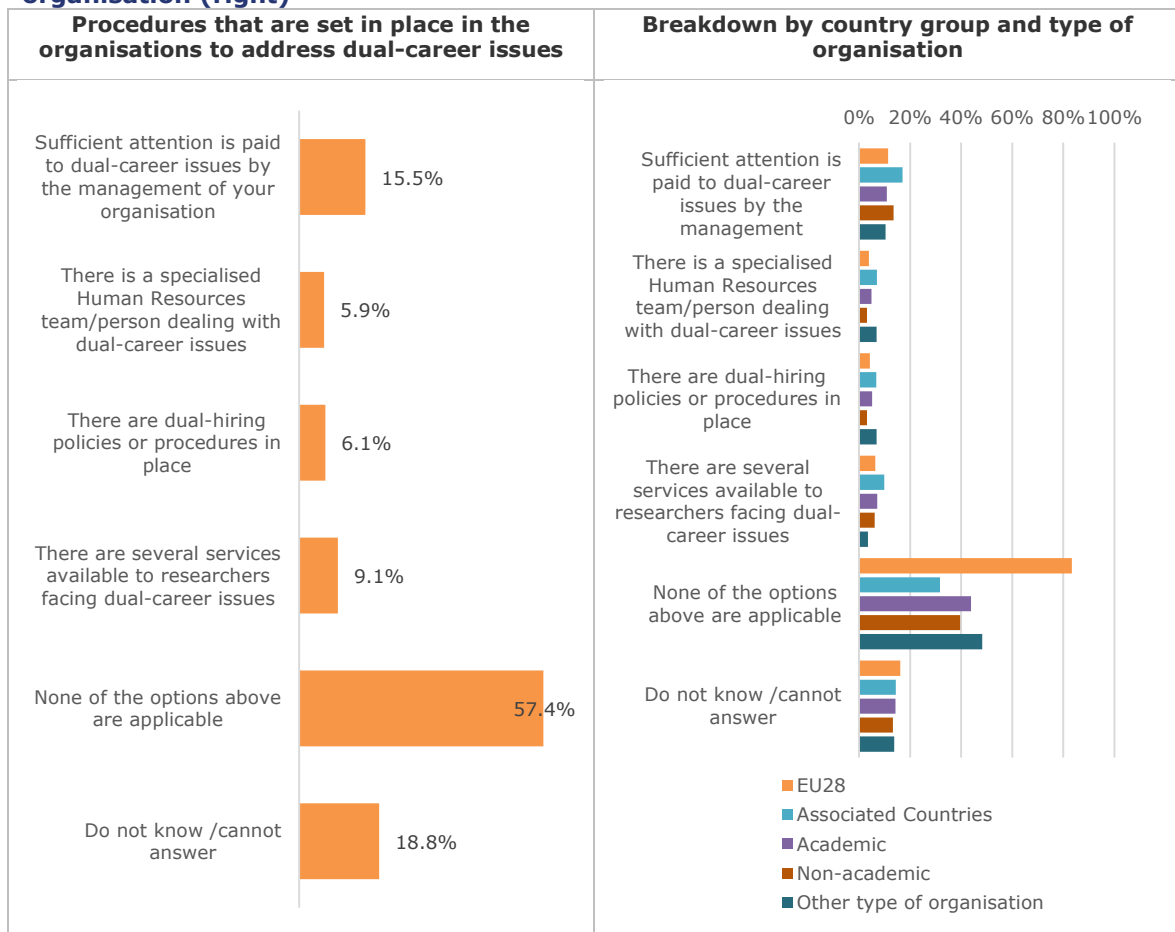
Figure 29. Degree of involvement of organisations in implementing measures to address dual-career issues (left). Breakdown by country grouping and type of organisation (right)



Source: the survey of research performing organisations.

Moreover, findings of the survey targeted at research performing organisations suggest that the recruitment procedures set in place do not properly address dual-career issues. It is important to note that for 57% of the respondents nothing is in place in their organisations to address dual careers. More concretely, less than 20% of the respondents indicated that sufficient attention is paid to dual-career issues by the management and even fewer mentioned the existence of a specialised Human Resources team/person dealing with dual-career issues, dual-hiring policies or procedures and services available to researchers facing dual-career issues. Again, these results are different when comparing organisations from EU28 with organisations from Associated Countries, where larger number of respondents reported the existence of procedures to address dual-career issues (for more details see Figure 30).

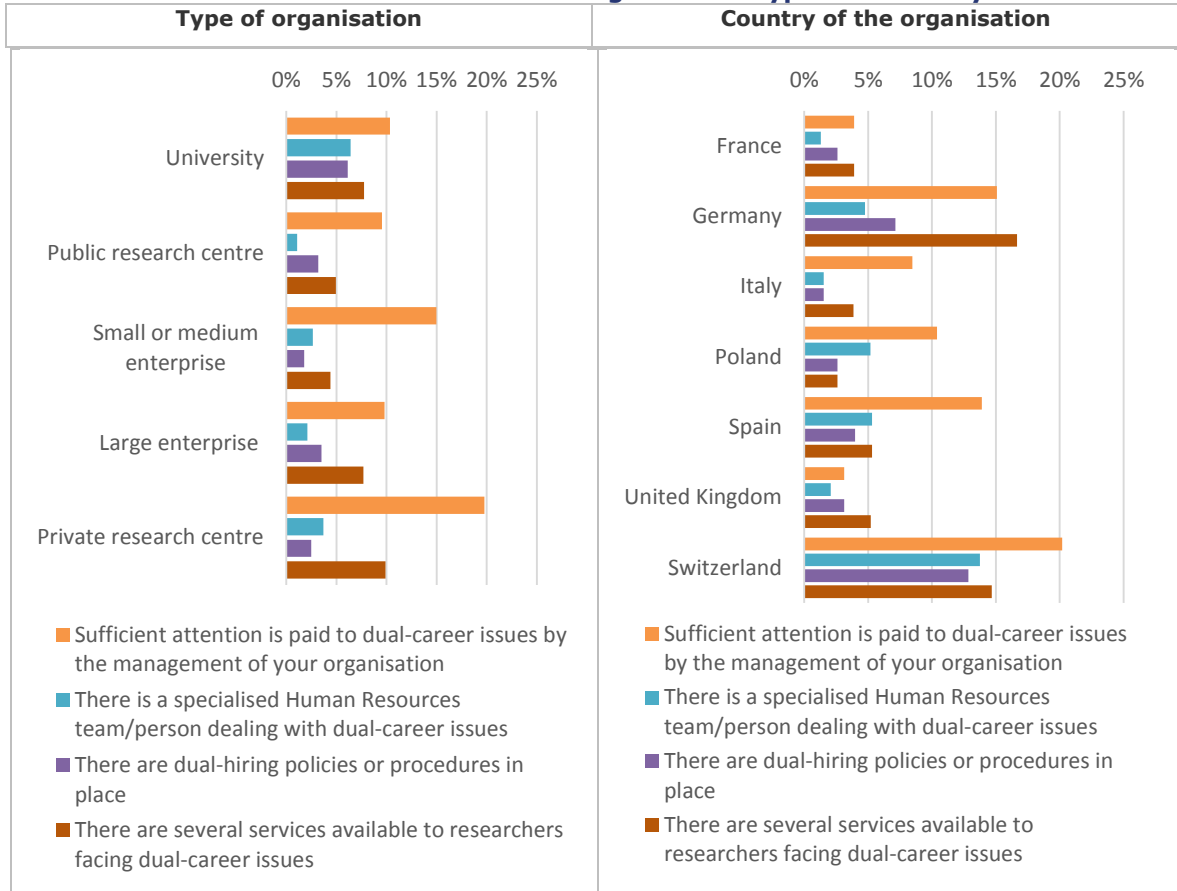
Figure 30. Procedures and support that are set in place in the organisations to address dual-career issues (left). Breakdown by country grouping and type of organisation (right)



Source: the survey of research performing organisations.

Further analysis to the responses reveals differences in the way respondents considered dual-career procedures taking place in their organisations. For instance, private research centres have a larger number of respondents considering not only that sufficient attention is paid to dual-career issues by the management in their organisations, but also that there are several services available to researchers facing dual-career issues. At the same time, universities gather a large number of respondents indicating that there is a specialised Human Resources team/person dealing with dual-career issues and there are dual-hiring policies or procedures in place (Figure 31, left). While the size of the organisation/number of researchers working does not seem to influence the responses, the country where the organisations are based does. For instance, respondents from Germany highlight that several services are available to researchers facing dual-career issues and that sufficient attention is paid to those issues by the management. Although respondents from Switzerland gather the highest percentage in all the topics covered, the rates still indicate that in general not much is in place in the surveyed research performing organisations (Figure 31, right).

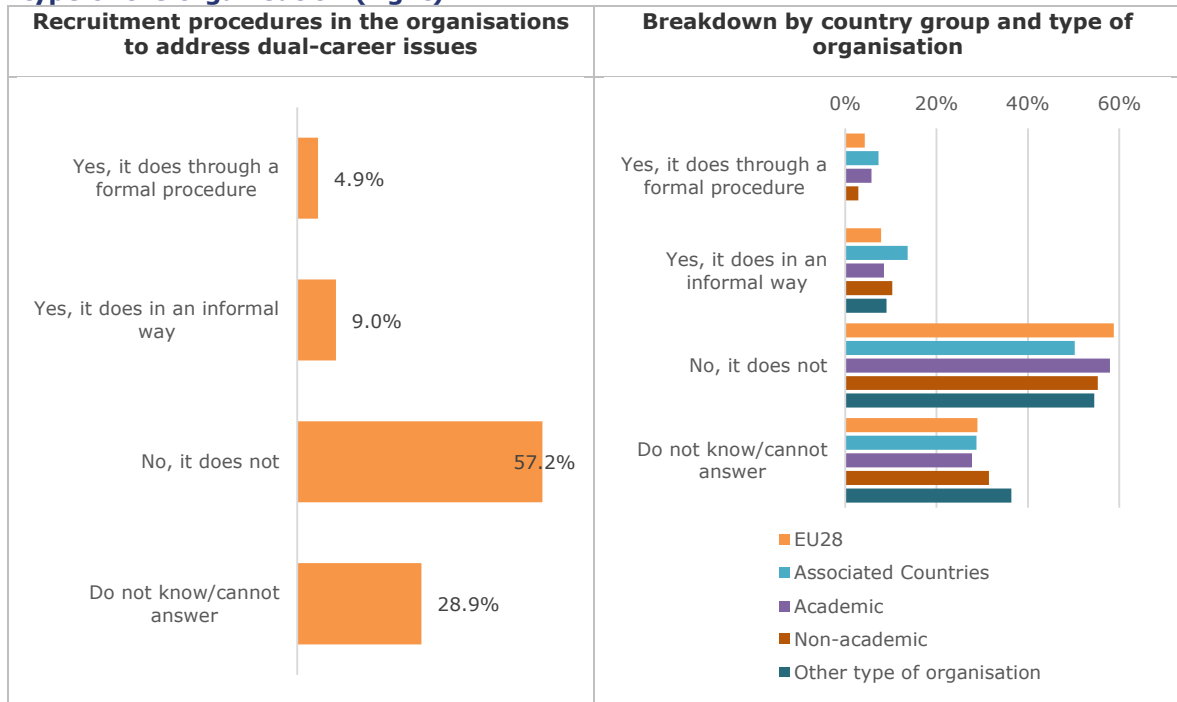
Figure 31. Procedures and support that are set in place in the organisations to address dual-careers –trends in terms of organisation type and country



Source: the survey of research performing organisations.

When asked if their organisation’s recruitment process addresses dual-career issues, 57% of respondents say that it does not, 15% say that it does and the rest do not know. Among those that do, only one third does it through a formal procedure (representing 5% of the total respondents). While the differences between country groups present the same trend as outlined before (hence, in Associated Countries the formal procedures are set in place or informal ways exist more than in countries from EU28), responses from academic and non-academic organisations are similar. Together, formal procedures and informal ways of addressing represent 12% of the responses in both cases (Figure 32).

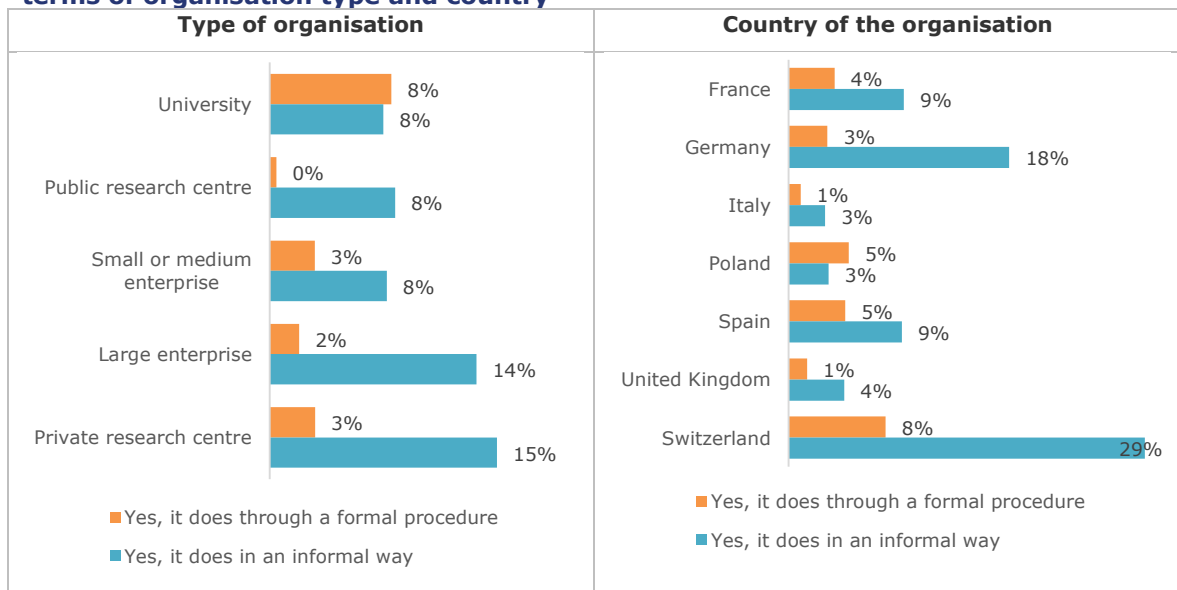
Figure 32. Analysis of whether and how dual-career issues are addressed during recruitment procedures (left). Breakdown of the responses by country grouping and type of organisation (right).



Source: the survey of research performing organisations.

Cases where formal procedures or informal ways of addressing dual-career issues during recruitment were mentioned are somewhat different depending on the type of organisation. For instance, it is only at universities both, formal and informal, that ways are similarly referred to by respondents, whereas in other types of organisations informal ways clearly prevail (as it does also when considering the country of the organisations) (Figure 33).

Figure 33. Organisations that formally or informally address dual-career – trends in terms of organisation type and country



Source: the survey of research performing organisations.

Moreover, results gathered through the surveys were confirmed and complemented by empirical evidence collected during the interview programme. The interview respondents indicated that while some good practices already exist in the EU Member States and Associated Countries, research performing organisations are generally in an early stage of recognising the needs of dual-career couples as an essential part of recruiting and retaining the most talented human capital. Nevertheless, experts believe that dual-careers are clearly becoming a relevant issue for these organisations, who need to accommodate a 'new type of researcher' to whom work does not implicitly mean renouncing their personal/family life.

Additionally, the comparative analysis carried out within the study provided some examples of procedures for dual-hiring developed by research organisations in the USA, Australia and Canada.

For instance, generally speaking, there are three different forms of dual-hiring procedures set in place at research organisations in the USA: academic appointment at the same research organisation for the researcher's partner; academic and non-academic employment at other universities/ research organisations and non-academic employment in other sectors (industry, public administration etc.). In the academic context the assistance for dual-career couples can be arranged in different ways (such as bridging positions/temporary fellowships, providing a permanent position for a faculty partner, supporting the relocation of partners, etc.) and several universities have dual-career programmes and policies on partner hiring. The University of Berkley is one of many to clearly state their position on how these matters should be dealt with: the website of the institution states that 'The partner hire needs of a candidate should never be discussed or considered by the department in the selection process. Candidates for faculty positions should be considered on their individual merits without regard to marital or partner status. The challenges or opportunities associated with a partner hire must not be a factor in the decision to make an offer to a candidate.'

The attraction and retention of highly qualified employees has also become an area of concern for the universities and research organisations in Australia and the related-work-family balance is considered a priority for several organisations and particularly the Commonwealth Scientific and Industrial Research Organisation (CSIRO), which attempts to help finding an adequate job for the researcher's partner by cooperating with other organisations and partners from industry. At the same time, and considering the recruitment procedures, the Australian National University (ANU) has a comprehensive statement for 'dual-career hire application and appointments' indicating that: 'A candidate applying for an advertised position may make a request for dual-career hire consideration at any stage of the recruitment process. The request should be submitted to the hiring College, School or Division for the advertised position. [...] In cases where the candidate's partner or spouse has held an academic post, the hiring College, School or Division for the candidate will be responsible for identifying and investigating appointment possibilities in consultation with the Recruitment and Appointments Branch, as appropriate. [...] The hiring and receiving College, School or Division are jointly responsible for initiating a recruitment process for the possible second hire appointment.'

Moreover, quite a number of Canadian universities promote spouse hiring strategies on their websites. In the 2012 report "Strengthening Canada's Research Capacity: in the Gender Dimension, published by the Council of Canadian Academies", it is written that a 'variety of policies and practices have been developed in Canadian universities, from positions against spousal hires, to ad hoc policies (handling appointments on a

case-by-case basis), limited term appointments or tenured or tenure track positions. The services of McGill University may act as a good practice example: in addition to tenure-track jobs, the university offers tenured positions, contract-based positions, and non-academic positions, based on the merit of the potential spousal hire and the needs of the receiving unit. For the first six years of a spousal appointment, costs are shared between the department of the original hire, the department of the spousal hire and the Office of the Provost. After that period, the department of the spousal hire assumes full financial responsibility for the appointment.”

The findings reflect different approaches regarding the policy on partner hiring. Particularly considering the recruitment stage, procedures clearly differ on the possibility of addressing or not dual-career concerns.

Complementing the evidence gathered, which suggest that dual-hiring procedures are quite uncommon in the research performing organisations, results also indicate that dually-hired researchers (i.e. researchers who are jointly or sequentially hired by the same employer, in approximately the same or in a different geographic location) represent only a small part of the group of newly hired researchers.

Newly hired researchers⁵⁹ represent 40% of the total surveyed researchers and almost half of the researchers in a relationship. In the majority of the cases (85%), they were employed sequentially and only in 11% of the situations were they hired at the same time (jointly). When considering the location and the organisation that hired them, more than half of the respondents (52%) indicate that they were hired by different employers in approximately the same geographical location and almost one third (28%) by different employers in different locations. Dually-hired researchers represent 19% of the newly-hired researchers and 18% of the respondents were hired by the same employer in the same location. There are no major differences when comparing the results by gender or career stage.

2.2.4. Strategies, policies and measures to deal with the dual-career problem and barriers to their implementation

This section is dedicated to analysis of the strategies, policies and measures undertaken at a country and organisation level to address dual-career issues, as perceived by national stakeholders, individual researchers and representatives of research performing organisations. The section also examines the recognised efficiency and impact of these strategies, policies and measures, as well as discusses the main barriers faced by key actors.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.2.4

- Although dual-career issues are becoming more important at the organisation level, the majority of research performing organisations do not have yet internal procedures and practices set in place. This is reflected in the responses of research performing organisations as well as in the responses of researchers. In most cases, respondents of both groups either do not know whether measures were implemented or confirm that they are not set in place.

⁵⁹ In this context, newly-hired researchers are researchers that have both (they and their partners) been hired over the last five years.

- In the reduced number of cases where measures exist (e.g. provision of facilities for work-family balance, family-friendly benefits for researchers and their partners, language training services for partners and information services on local employment opportunities), their perceived efficiency is recognised only by a small number of respondents (organisations and researchers).
 - Additionally, in most cases, it was not known whether instruments and procedures are being used to monitor the practices addressing dual-career issues. When the practices were known to take place, they are usually monitored more through word-of-mouth feedback than through structured and analytical approaches.
 - These results support the opinions of the representatives of organisations and researchers, but unveil small differences when comparing country groups and type of organisations. Respondents from Associated Countries and academic organisations consider existing measures and practices somewhat more effective.
 - Perceptions of the surveyed national stakeholders complement these results and are in line with the feedback collected during the interview programme where experts highlighted the importance of collaborative strategies (networks) between research organisations. Different case studies provide evidence on the successful examples at this level.
-
- The most common barriers faced by organisations and thus preventing the implementation of dual-career practices and procedures were found to be funding availability, concerns about equity, nepotism, favouritism and conflict of interest and communication, coordination and administrative barriers are, by this order. These challenges were mentioned by 45%, 23% and 21% of the respondents, respectively. Some differences in the responses are observed when comparing the types of respondent organisations, such as the fact that universities and public research centres tend to emphasise more the funding availability than private organisations and in particular the large enterprises, whereas the opposite happens in the case of communication, coordination and administrative barriers.

Strategies, policies and measures to deal with the dual-career problems

The results of this study indicate that national/regional measures implemented to provide dual-career services for international mobile researchers and their partners are perceived by national stakeholders as less common than measures for popularising science and/or motivating schoolchildren or university students to become researchers. While half of the respondents consider that measures in these last areas are very frequent or rather common, less than 20% recognise the same for measures addressing dual-career issues. In fact, in 50-65% of cases the listed measures⁶⁰ were rather or completely uncommon.

⁶⁰ National stakeholders were asked to assess how common were the following in their countries national (regional) measures (programmes, initiatives and other actions) implemented with the aim of providing dual-career services for internationally mobile researchers and their partners: 'Language training services; Tax/pensions advice; Information services on local employment opportunities; Initiatives supporting training allowances for the partner looking for a job; Supporting facilities for work-family balance and family-friendly benefits for researchers and their partners; Partnerships between research institutions and/or local firms in order to coordinate job opportunities for the partners of incoming researchers; Issuing legal acts and other regulations incentivising universities/research centres to adopt dual-career support services; Dissemination of information on dual-career support services on web-sites, social media, leaflets; Other (Please specify)'.

In this context, the most frequently implemented measures (assessed by nearly 30% of the respondents as very or rather common) are information services on local employment opportunities for the partners of researchers and supporting facilities for work-family balance and family-friendly benefits for researchers and their partners.

In contrast, national programmes/initiatives supporting training allowances for the partner looking for a job are very rare. Moreover, the evidence collected shows that stakeholders from Germany, The Netherlands, Slovenia, Spain and Switzerland, were the respondents who more recurrently assessed the measures as very or rather common.

Additionally, when asked to name and describe at least one recent (2010-2014) programme/initiative that has proved to be successful in terms of addressing dual-career issues in their country or region, the respondents indicated some examples of initiatives operating at national level (e.g. Dual-Career Network Germany), regional level (e.g. Dual-Career Service Wien) and organisational level (e.g. the Styrian Career Service). Although limited examples were identified, the perceived efficiency, impact and potential for replication were high for all the initiatives described.

Complementing these findings, the interviewees stressed the importance of research performing organisations in addressing the needs of dual-career couples, as they are most interested in competing for high talented researchers. In general, the need for national policies or programmes was questioned, as networks of research performing organisations could effectively provide a dual-career support targeting a specific region. Cooperation between organisations, including universities and industry, was pointed out as a solution already being implemented with success as highlighted in the case studies⁶¹ and comparative analysis, as well as by the participants of the validation seminar.

For instance, the Higher Education Recruitment Consortium (HERC), consists of a collaborative effort of different organisations all working together towards the same goal: 'to recruit and retain the most diverse and talented workforce and to assist dual-career couples'. HERC started as a relatively small initiative of 19 regional organisations from northern California, and it currently involves over 700 member institutions that are concerned about the promotion of equity and excellence in the field of higher education recruitment. Through the network, which gathers jobseekers, institutional members and partner organisations, jobseekers get interviews and find jobs within a commutable distance of their partners whereas HERC partner organisations receive visibility and build relationships with higher education decision-makers. Besides the dual-career search tool and related dual-career resources, the initiative core activities comprise webinars for jobseekers and representatives of the member organisations (for instance, human resources professionals). These events are customised to the needs of both target groups and in the perspective of the interviewed members their high attendance reflects the importance of the dual-career and diversity/inclusion topics within the higher education community in general.

The International Dual-Career Network (IDCN), a non-profit association with the purpose of facilitating job searches for the partners of mobile employees, and providing member companies access to a turnkey pool of talent, is also a successful

⁶¹More details can be found in the following case studies: "The Higher Education Recruitment Consortium (HERC)", "The International Dual-Career Network (IDCN)" and "The Dual Career Network Germany (DCNG)". These example also demonstrate that new social realities are being taken into account.

example. All corporate members of IDCN (whether a company, an international organisation, a non-governmental organisation or any other legal entity with international assignees and an interest in recruiting experienced talent) can have access to a qualified talent pool and a mobility support service while becoming a dual-career friendly organisation. On the other hand, mobile employee partners (in dual-career situations) of the corporate members get support when moving to a new country and benefit from the access to several professional opportunities and to an extensive network of HR professionals. The IDCN model facilitates dialogue between companies/academic institutions and talented unemployed resources through the organisation of events promoted by corporate members. While working as matching opportunities, these events also contribute to the improvement of the job search skills of mobile employee partners and their knowledge about the local job market. In addition, as the corporate members are supported by a group of volunteers, these events (organised in turn by the local organisations) have an interesting cost-benefit ratio for the companies. The network is fast expanding to several locations, with over 70 active member organisations, more than 1,900 partners registered and nearly 160 partners employed with the support of IDCN.

In Germany, the Dual Career Network Germany (DCNG) gathers almost 40 members, most of them Dual-Career Service Centres implemented at German universities. DCNG carries out two important functions: firstly, the exchange of best practice examples between the service centres concerning operational and organisational aspects and, secondly, improving the international visibility of support programmes for dual-career couples. By organising networking activities at the national level, but also by collaborating and exchanging ideas with international partners, the DCNG actively promotes the debate on increasingly relevant dual-career issues both at national and international levels. The network's website also provides information on dual-career issues and thereby contributes to the elimination of knowledge gaps and reservations against dual career-issues. One of the most important achievements of the DCNG so far is its best practice paper published in 2013. For this paper the network successfully worked out criteria and structures for high-quality dual career work to be applied nationwide by its member universities in areas such as transparency (selection based on merit, no nepotism), confidentiality, process operation, and data protection. The best practice paper sets standards as well as ethical guidelines for Dual Career support services in Germany. All DCNG members are committed to applying the standards summarised in this guide.

Experts interviewed also emphasised that while research performing organisations continue to increasingly offer different forms of dual-career services, in many cases dual-career issues are left for informal arrangements between the organisation and the incoming researcher. As such, and although some successful practices already exist at national/regional level (as reflected in the abovementioned examples), there is room for improvement: for instance, and as highlighted during the validation seminar, an ICT-based solution for jobseekers (allowing searches for two job vacancies within a commutable distance) supported by a wide database of job opportunities fed by research performing institutions of different countries could significantly contribute to facilitate the job searchers of dual-career couples.

In order to triangulate their success in addressing dual-career challenges, the surveyed representatives of research performing organisations in EU Member States and Associated Countries also provided their perspectives on the measures and

practices implemented in their organisations over the past five years⁶². Additionally, researchers were also asked to assess the measures and practices implemented at organisational level.

The results show that most of the organisations do not have specific measures and practices to address dual-career issues. This assessment is valid for half of the organisations and one third of the researchers.

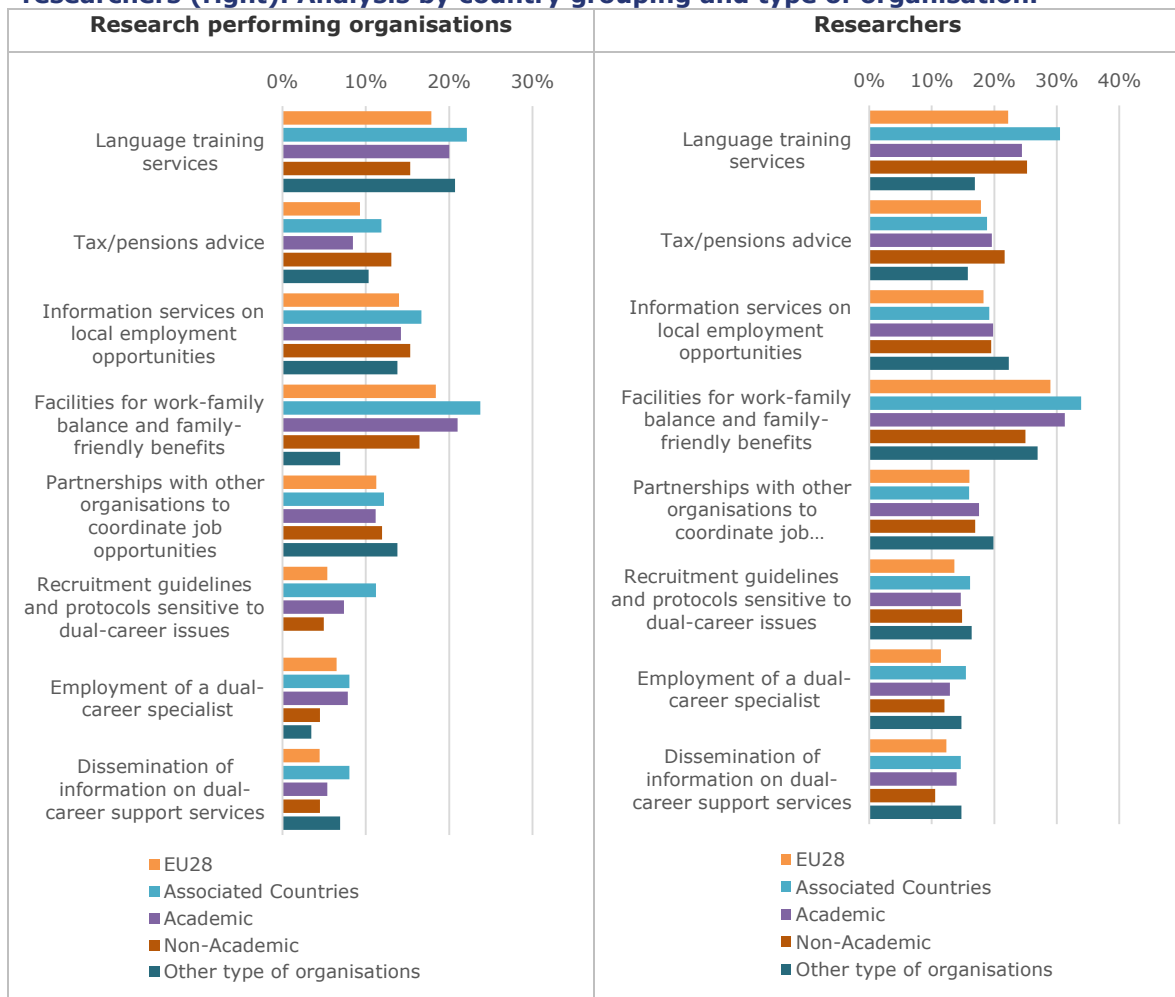
In particular, results reveal that in 20-25% of cases, respondents from the surveyed organisations did not know whether the illustrative measures (language training services, tax/pensions advice, information services on local employment opportunities, etc.) had been implemented by their organisation and in 45-50% of cases they were aware that had not been implemented at all. In the reduced number of cases where the measures had been implemented, respondents assessed them mostly as very successful or somewhat successful in addressing dual-career issues. At the same time, results of the surveyed researchers show that around a third of the respondents mostly do not know whether the measures were efficient, while another third do not believe such measures were applied.

In general, measures that were considered effective were related to facilities for work-family balance and family-friendly benefits for researchers and their partners (childcare facilities, family allowance), language training services for partners (mainly highlighted by research organisations) and information services on local employment opportunities, including CV advice, career-counselling, job search, self-employment advice and/or other guidance services (mainly highlighted by researchers).

When taking into account the country group of the respondents, it is possible to see that in Associated Countries the results are generally higher. At the same time, the assessments of researchers from academic and non-academic organisations are more similar and consistent for several measures and practices when compared to the ones of research performing organisations. In this later case, results of respondents from academic organisations are higher for the majority of the measures and practices assessed (for more details, see Figure 34).

⁶² Respondents were asked the following question: 'Over the past five years, has your organisation implemented any of the following measures and practices? If so, please assess their success in addressing the dual-career challenges. Language training services for partners of researchers; Tax/pensions advice for partners of researchers; Information services on local employment opportunities for the partners of researchers (CV advice, career-counselling, job search, self-employment advice and/or other guidance services); Facilities for work-family balance and family-friendly benefits for researchers and their partners (childcare facilities, family allowance); Partnerships with other organisations to coordinate job opportunities for the partners of incoming researchers; Recruitment guidelines and protocols sensitive to dual-career issues among researchers; Employment of a dual-career specialist; Dissemination of information on dual-career support services on web-sites, social media, leaflets; No specific measures/practices were implemented; Other (Please specify)'.

Figure 34. Measures and practices implemented by organisations to address dual-career issues, from the perspective of organisations (left) and the perspective of researchers (right). Analysis by country grouping and type of organisation.



Source: the surveys of research performing organisations and individual researchers.

Main barriers faced when dealing with the dual-career problem

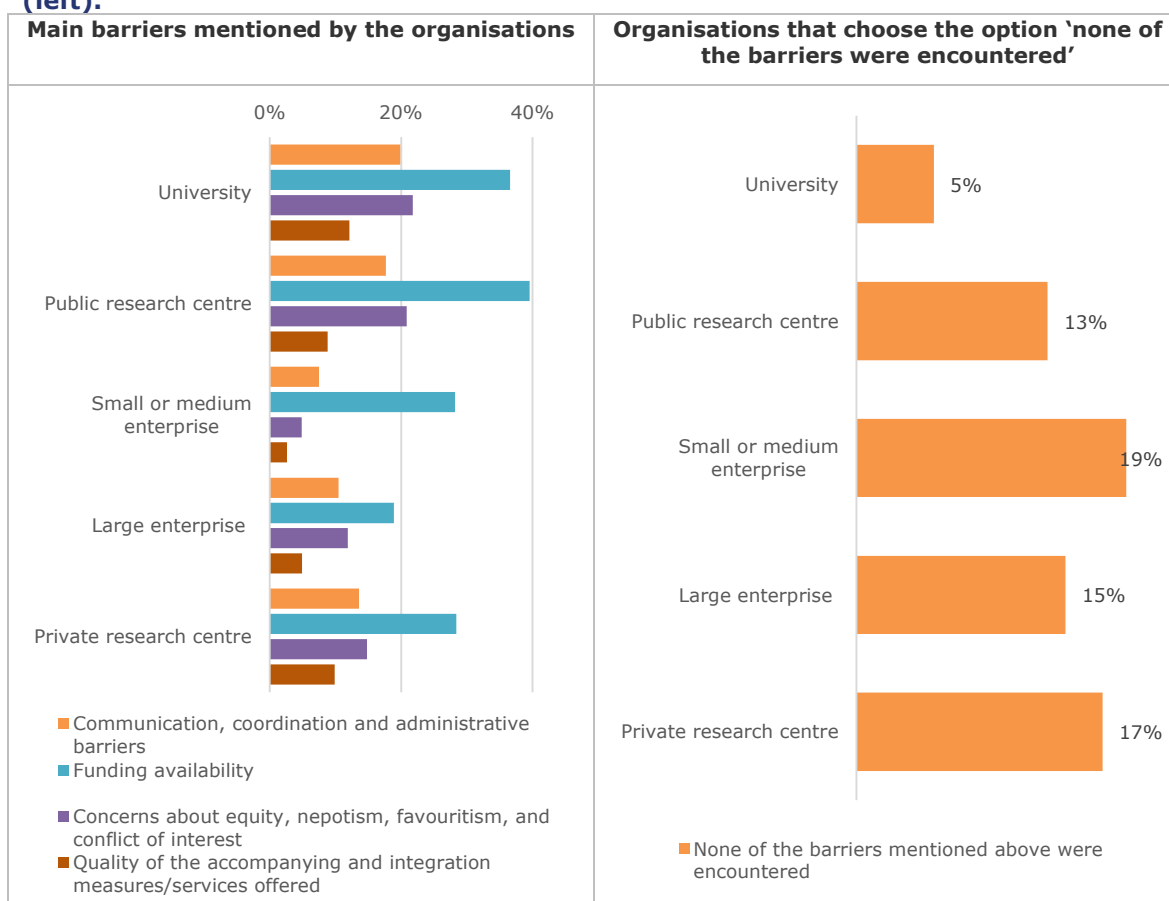
As previously described⁶³, around half of the representatives of research performing organisations perceive their organisation as active in promoting several research career development aspects related to dual-career issues (such as improving work-family balance for researchers, promoting equal opportunities and gender balance in research, supporting the professional integration and career progression of researchers and their partners and improving researcher recruitment practices). Evidence collected within the study, however, also indicates that despite this general positive appraisal, less than 20% consider that sufficient attention is paid to these aspects by the management and even fewer mention the existence of a specialised Human Resources team/person dealing with dual-career issues. In fact, less than 10% recognise that their organisation has procedures and services available to researchers facing dual-career issues. Moreover, the existing measures and practices are generally assessed as effective by less than a third of research performing organisations and individual researchers. These results show that research organisations are not

⁶³ For more details, please see section 2.2.3. about dually-hired researchers.

equipped to properly address the needs of dual-career couples, representing almost 39% of the surveyed individual researchers.

Reflecting on the barriers faced by their organisations, the respondents stressed the relevance of financial aspects. In almost 45% of the cases, funding availability was listed as a barrier that organisations faced or are facing that are hampering the implementation of dual-career practices and procedures. The second most important barrier (mentioned by around 20% of the respondents) was related to concerns about equity, nepotism, favouritism and conflict of interest, followed by communication, coordination and administrative barriers. Some differences in the responses can be observed when comparing the types of respondent organisations: universities and public research centres tend to emphasise more the funding availability than private organisation and particular large enterprises, whereas the opposite happens in the case of communication, coordination and administrative barriers (Figure 35, left). At the same time, universities are the type of organisation that collected the smaller number of responses (5%) to the option of the survey: 'none of the barriers were encountered' (Figure 35, right).

Figure 35. Main barriers faced by organisations. Analysis by type of organisation (left).



Source: the survey of research performing organisations.

In most cases, respondents from surveyed organisations were not aware of specific instruments/procedures used to monitor the practices to address dual career issues. But whenever respondents knew about them, it was usually more through word-of-mouth feedback than through structured and analytical approaches.

The above survey results were confirmed and complemented by the national stakeholders, although the majority of the respondents were not aware of any obstacles constraining the execution of the programmes/initiatives addressing dual-career issues in their countries or regions. Nevertheless, those who were, also indicated financial aspects and concerns about equity, nepotism, favouritism and conflict of interest. Other reasons included a lack of demand and concerns about fairness and legality.

The evidence is also aligned with the analysis by the experts, who think that funding is among the main difficulties in the implementation dual-career activities together with ensuring fairness (selection based on own merit) in recruitment processes.

The analysis of relevant studies and evaluation confirm the above findings and provide some additional inputs on the most common reasons that institutions without policies use to explain why they do not formally assist dual-career couples. For instance, in the book *Two-Body Problem: The Dual-Career-Couple Hiring Policies in Higher Education*⁶⁴, the following reasons are discussed: a lack of demand, lack of resources, concerns about fairness, concerns about legality and inertia and faculty resistance. Particularly focusing on dual-career hiring practices, the same source reveals that the most frequently mentioned institutional concerns are related to ensuring that those practices are aligned with the policies on equity (including concerns such as 'charges or perceptions of favouritism' and 'concerns about nepotism, favouritism, and conflict of interest'). The book also highlights the fact that *institutions with dual-career hiring policies have created some safeguards in their policies that protect them from violating basic notions of equity*. Some of these mechanisms include reflecting those policies in public official documents that ensure that their implementation is transparent.

2.2.5. Sources of support to dual-careers

In this final section we examine the perspectives of researchers and research performing organisations on their familiarity with the dual-career support-measures available to them and most frequently reported channels of information about these measures.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-section.

Key findings and conclusions of section 2.2.5

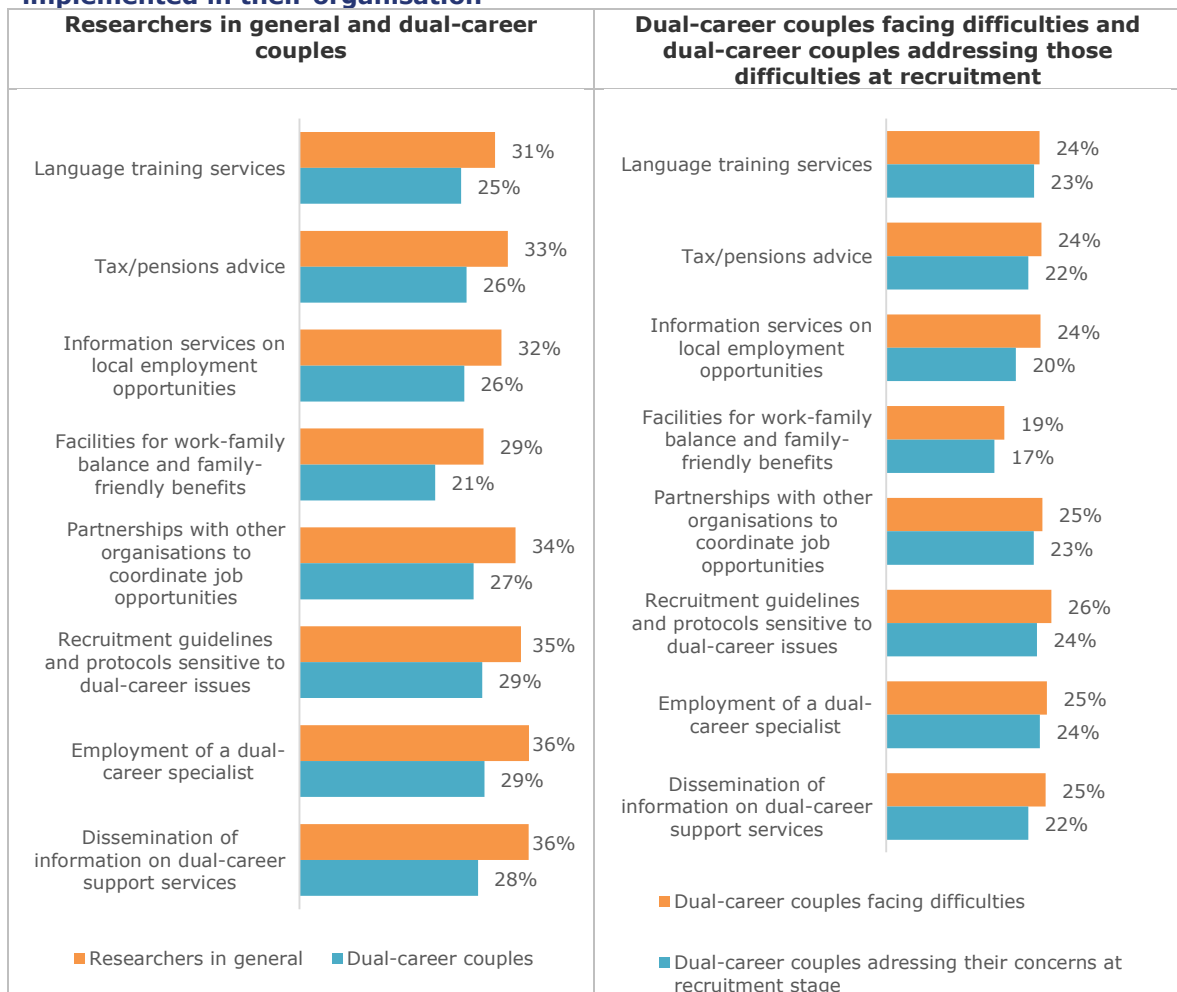
- Nearly one third of the researchers are not aware of specific measures or practices that support dual-careers in their organisations. However, the level of awareness is higher among the researchers facing dual-career issues and who have addressed them at the recruitment stage. Effective communication of information on the existing measures and practices seems to fail and needs to be improved, a finding confirmed by the researchers based on their experience.
-

Awareness of researchers towards the existence of sources of support

⁶⁴ Lisa Wolf-Wendel et al. (2003). *The Two-Body Problem: Dual-Career-Couple Hiring Policies in Higher Education*, The Johns Hopkins University Press: Baltimore & London. <http://dualcareer-nordbayern.de/wp-content/uploads/2013/01/The-Two-Body-Problem-Dual-Career-Couple-Hiring.pdf>

The evidence collected in the study, particularly in the survey targeted at individual researchers, indicate that at least a third of researchers are not aware of specific measures and practices implemented in their organisations (Figure 36 right) ⁶⁵. Results gathered also show that the dual-career couples most informed on existing measures and practices are those who indicated having faced dual-career problems and who actively mentioned their dual-career concerns at recruitment stage (Figure 36, left).

Figure 36. Proportion of espondents who declared not being aware of whether the specific measures/practices to address dual-career issues and listed below were implemented in their organisation



Source: the survey of individual researchers.

Furthermore, only around 15% of researchers and 30% of research organisations state that dissemination of information on dual-career support services is done on websites, social media and leaflets. Results also indicate that even fewer research organisations (7%) and researchers (14%) thought that the current dissemination of

⁶⁵ In this context, examples of support measures include the following: language training services for partners of researchers; tax/pensions advice for partners of researchers; information services on local employment opportunities for the partners of researchers; facilities for work-family balance and family-friendly benefits for researchers and their partners; partnerships with other organisations to coordinate job opportunities for the partners; recruitment guidelines and protocols sensitive to dual-career issues among researchers; and employment of a dual-career specialist.

this information is effective. It can then be assumed that other channels are being used to inform and obtain information about the support provided.

When considering the most effective measures implemented by the organisations, similar perspectives were presented both by researchers as well as research organisations. In general, the results obtained at this level show that both groups considered that the availability of facilities for work-family balance and family-friendly benefits for researchers and their partners is one the most successful measures and practices implemented to address dual-career issues were. On the opposite side, dissemination activities were among the measures that were appreciated as effective only by a minor proportion of respondents⁶⁶.

⁶⁶ For more details, please see section 2.2.4 about strategies, policies and measures to deal with the dual-career problem and barriers to their implementation.

2.3. Career restart

2.3.1. Reasons for career breaks

This section of the report focuses on aspects related to the different reasons for career break. In particular, we present the most common reasons for taking a break in research as well as the average duration of the break and the research stage where it is normally taken. We then describe the degree to which researchers return to their former employers after the break or decide to change instead.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.3.1

- The main reasons for researchers deciding to take a career break include primarily the end of temporary contracts, the lack of research position and childcare commitments. To a lesser degree the willingness to diversify and explore a non-research environment as well as other family reasons (e.g. related to partners) have also been reported as relevant reasons for a career break.
 - For most of the reasons identified the duration of the break is normally between 6 and 12 months or less than 6 months. However, where the break is voluntarily taken to work in a different field, its duration is usually longer, often more than 2 years.
 - The most common career stage during which researchers take a career break is at a post-doctoral/recognised researcher stage. In addition, a break is also often taken in the transition phase, when moving from doctoral to post-doctoral research. On the other hand, breaks become rarer in more advanced career phases, particularly as a leading researcher.
 - The majority of the surveyed individual researchers who have taken or are planning to take a break are not going back to their previous working place or are undecided as to whether or not to return to their former employers.
 - Only 40% of the researchers from non-academic organisations answered affirmatively when asked if they have returned/are planning to return to their previous working place after the break, while the corresponding figure was a bit higher (43%) for researchers from academic organisations.
 - These seemingly low percentages can be linked to the fact that involuntary reasons for the career break, such as the end of temporary contracts and the lack of research positions, are among the most common.
-

Main reasons for career breaks and average durations of the break

For the purpose of the study, both *voluntary* (i.e. childcare, parental leave, eldercare, travel, study & training, family reasons/partner, willingness to diversify career experience in a non-research position) and *involuntary* (i.e. illness, lack of research positions, temporary contract, no career break policies) *reasons* have been considered, as corresponding respectively to intentional and unintentional breaks. On the contrary, the situation in which a researcher leaves the academic sector to continue a research career in non-academic settings (i.e. large company or SME) was not considered a career break.

The data collected through the survey of individual researchers show that the majority of respondents (around 61%) never experienced a career break and are not planning to take one in the near future. From a gender perspective, career breaks seem to be

much more common among female than male researchers: around 47% of the surveyed women have already experienced or are planning a career break, in comparison with 29% of the surveyed men.

As shown in Table 13, the main reasons for career breaks identified by the researchers participating in the survey are the following:

- end of temporary contract;
- lack of research positions;
- childcare commitments (parental leave, maternity, paternity);
- willingness to diversify career experience in non-research positions;
- other family reasons (e.g. related to partner).

Table 13. Reasons for career breaks

Response	% of total	Count
End of temporary contract	36%	465
Lack of research positions	36%	462
Childcare commitments (parental leave, maternity, paternity)	35%	458
Willingness to diversify career experience in a non-research position	13%	167
Other family reasons (e.g. related to partner)	12%	160
Studying & training (different from research training)	8%	100
Travelling	7%	93
Illness (personal health problems)	4%	58
Eldercare commitments (parent, grandparents, spouses' family)	2%	31
Other reason (please specify)	12%	157
Not applicable / cannot answer	2%	29

Source: the survey of individual researchers.

The responses provided showed that indeed voluntary reasons, such as childcare as well as other family reasons have a strong influence on the decision to take a break.

Nonetheless, involuntary reasons – such as the termination of temporary contracts and the shortage of research positions in Europe overall – seem to be an even more common cause for a career break. These data convey the researchers’ perception that the research community doesn’t offer enough employment opportunities and forces them to work in other areas. The fact that many contracts are short-term – which seems nowadays a common feature across all Europe because of the crisis and austerity measures – increases a context of instability and insecurity regarding the future.

In addition to the options provided in the survey, some researchers have also stated that another important reason for taking a break or – in the worst case scenario – leaving research, is that the work opportunities in the field are mainly underpaid or sometimes unpaid. This often also obliges researchers to take up a career in a different field, at least for some time. This trend has further been confirmed by the open comments of respondents to the survey of research organisations. Equally, during the final validation seminar, it was highlighted that an additional issue for researchers is linked to social security regulations: in the majority of EU countries,

fellowships and grants still do not include social security contributions for future pensions (with some exceptions, e.g. Austria, where this is already possible at the PhD stage).

Another relevant remark made through open comments in the survey of individual researchers is that - research being such a highly competitive environment where full commitment is required and little space for any other kind of activity is given - psychological illnesses such as excessive stress and anxiety, leading to burn-out or depression are not rare phenomena and eventually a common reason for a break.

According to the data collected through the survey of individual researchers and during interviews carried out within the scope of case studies, the career break taken or planned is normally up to six months (32%) and between 6 and 12 months (30%). For 15% of the respondents planning to or who have taken a break it is between 12 and 24 months. A similar percentage of respondents indicated that it exceeds 2 years.

The length of a break may vary quite significantly, depending on the different reasons, as illustrated in the table below.

Table 14. Duration of the break in percent of total applicable answers per reason

Main reasons for the career break	Up to 6 months	Between 6 and 12 months	Between 12 and 24 months	More than 24 months
End of temporary contract	32,9%	33,3%	19,1%	14,7%
Lack of research positions	27,0%	29,9%	21,6%	21,4%
Childcare commitments (parental leave, maternity, paternity)	45,1%	33,6%	13,8%	7,6%
Willingness to diversify career experience in a non-research position	16,8%	34,2%	12,9%	36,2%
Other family reasons (e.g. related to partner)	33,1%	31,7%	10,8%	24,5%
Studying & training (different from research training)	15,2%	43,8%	15,2%	25,8%
Travelling	37,3%	42,1%	9,2%	11,5%
Illness (personal health problems)	22,2%	42,4%	20,5%	14,9%
Eldercare commitments (parent, grandparents, spouses' family)	23,6%	54,2%	13,9%	8,4%
Other reason	17,8%	28,1%	25,0%	29,1%

Source: the survey of individual researchers.

Note: in bold, the highest percentage per reason.

When the break is voluntarily taken to explore a different field it might often last more than 2 years. On the other hand, the end of a temporary contract and the lack of research positions most frequently cause breaks of between 6 and 12 months, or up to 6 months. According to the data collected, if the break is related to childcare commitments, it normally lasts up to 6 months. Nevertheless, this is strongly influenced by the practices and policies in place at organisational and/or national level. In particular, parental leaves in EU Member States are regulated very differently depending on the country: the length of maternity leave (including paid and unpaid) might vary from 14 to 60 weeks (in the UK), while paternity leave might last up to 13

weeks, although in many countries no regulation on paternity leave exists⁶⁷. Similarly, in most of the Scandinavian countries it is the national legislation - rather than the voluntary actions of the employer - which regulates many aspects related to career breaks (e.g. childcare is provided by the municipalities, not by the employers; the employer must guarantee parents a certain number of weeks of family leave, etc.)

Career stages when a career break is taken

The data collected through the survey of individual researchers show that, among those having taken or planning to take a career break, the most common career stage during which the break is taken is at a post-doctoral/recognised researcher stage (around 39%) and in the transitional phase, when moving from doctoral to post-doctoral research (around 15%).

Table 15. Research career stages when the break is taken/planned

Response	Percentage	Count
Researcher in doctoral training	11%	151
In the transition phase, when moving from doctoral to post-doctoral research stage	15%	198
Post-doctoral/recognised researcher	39%	517
In the transition phase, when moving from post-doctoral/recognised to independent/established researcher stage	10%	129
Independent/established researcher	11%	139
In the transition phase, when moving from independent/established researcher to leading researcher	2%	28
Leading researcher (professor, research professor, director, senior scientist, etc.)	3%	44
Not applicable/cannot answer	9%	115
	Total Responses	1321

Source: the survey of individual researchers.

Similar data emerge also from the responses of the survey of organisations (first launch), where, however, researchers in the transition phase moving from the post-doctoral/recognised to independent/established research stage seem to be more keen to take a break compared to researchers in doctoral training or independent/established researchers.

As confirmed by further feedback collected through open-ended questions (survey of individual researchers) and case study interviews, these data indicate that career breaks are more common for researchers in the early career stages compared to more advanced stages. This seems to be mainly due to the shortage of post-doctoral opportunities in Europe as well as to the fact that most of post-doctoral positions offer temporary and low paid contracts. Furthermore, according to the data collected from both the survey of individual researchers and the survey of research organisations, we can notice a quite high incidence of breaks in transition phases from different stages.

According to the weighted results of the survey of individual researchers, 87% of the total researchers in the stages *Doctoral training* and *Post-doctoral/recognised*

⁶⁷ For more details, see European Parliament Infographic 'Maternity and paternity leave in the EU', 2014, available at: http://www.europarl.europa.eu/RegData/etudes/ATAG/2014/545695/EPRS_ATA%282014%29545695_REV1_EN.pdf

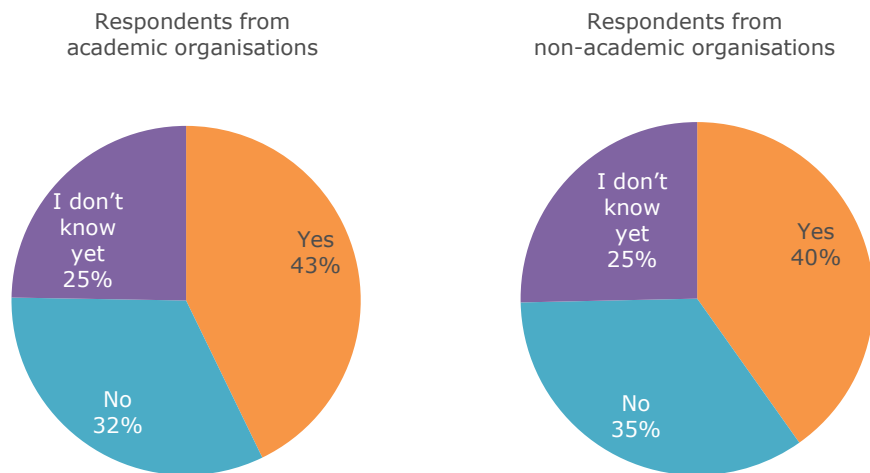
researchers who participated in the survey are between 25 and 40 years old, whereof 28% are between 25 and 30 years and 59% are between 31 and 40 years. Breaks taken for childcare commitments can clearly be associated with the age range of these categories of researchers, corresponding to the time people normally start having a family and children⁶⁸.

Our interviews also confirmed that post-doctoral researchers often find themselves in the position of restarting a career after a break, and this is particularly detailed in the corresponding case study report on the Returning Carers Scheme implemented by the University of Cambridge (see Annex 5 for more details). Indeed, although the initial target group of this scheme was women with permanent academic positions, the majority of beneficiaries have turned out to be female post-doctoral researchers.

Returners in academic and non-academic environment

Based on the weighted results of the survey of individual researchers, around 40% of the respondents (having taken or planning to take a break) have returned or are planning to return to their previous working place after the break (see Figure 37 for more details). Furthermore, a comparison of answers provided by respondents that were employed by academic and non-academic organisations revealed that the return rates to academic organisations were slightly higher (note that the answers provided by respondents selecting 'Others' to the question 'For what type of organisation do you work?' have not been considered).

Figure 37. Return to the previous working place after a break



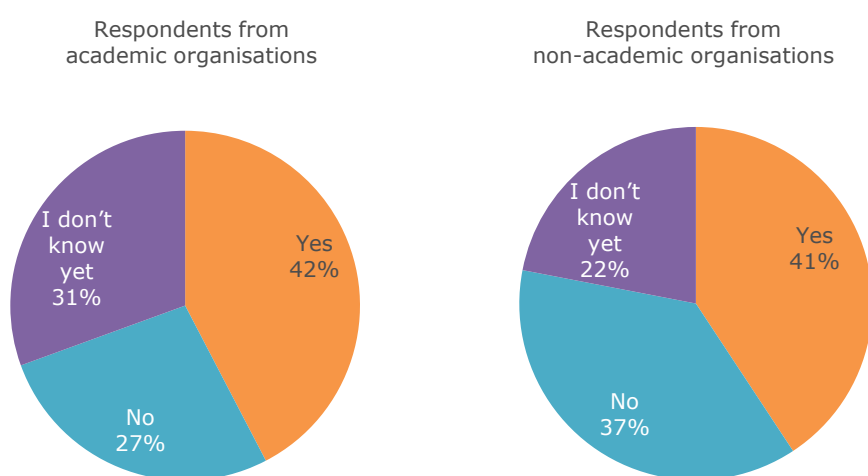
Source: the survey of individual researchers.
 Note: Based on answers to the survey question "Have you returned/are you planning to return to your previous working place after the break?"

Contrary to the described trend, a number of open comments to the survey of research organisations indicated that overall, once one leaves academia for industry, it is generally unlikely that he/she will ever come back, given the wage/work pressure ratio.

⁶⁸ See Eurostat Newsrelease 'Women in the EU gave birth to their first child at almost 29 years of age on average', 2015, available at: <http://ec.europa.eu/eurostat/documents/2995521/6829228/3-13052015-CP-EN.pdf/7e9007fb-3ca9-445f-96eb-fd75d6792965>

Similarly, excluding the answers 'Not applicable/cannot answer' (corresponding to 40% of the total), around 42% of those who have changed country during the career break have returned or are planning to return to the country where they were last employed. No major differences in the positive answers have been observed between respondents from academic and non-academic organisations. Instead, the share of negative answers of respondents from non-academic organisations was relatively higher, indicating that those respondents are less keen on returning to their previous country after the break (see Figure 38 for more details). As for the previous figure, note that here again, the answers provided by respondents selecting 'Others' to the question 'For what type of organisation do you work?' have not been considered.

Figure 38. Return to the previous country after a break



Source: the survey of individual researchers.

Note: Based on answers to the survey question "Have you returned/are you planning to return to your previous country after the break?"

2.3.2. Programmes promoting career-restart

In this section of the report we describe the main features of the programmes to promote career-restart implemented both in EU Member States, Associated Countries and elsewhere. Moreover, we present the level of awareness of researchers towards this kind of programmes, with a special focus on the MCA/MSCA career restart panel.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.3.2

- On the basis of the information collected through different sources, the number of existing programmes addressing career-restart issues in the considered countries is quite limited. Those initiatives are mainly implemented, in the form of fellowships or grants, by foundations, research institutes and universities, rather than national bodies. However, due to unstable financing, most research organisations are under severe financial strain and do not have resources to implement such programmes.
 - The survey results show that, although these kinds of programmes and initiatives are overall not so common, they seem to be even rarer in EU13,
-

candidate countries and potential candidates from western Balkans, than in EU15 and EFTA countries.

- Based on the collected feedback, the level of awareness of researchers in relation to programmes and initiatives supporting career restart is quite low. In particular, with regard to the MCA/MSCA career restart panel, it seems that this specific initiative is much less known in comparison with other MCA/MSCA. However, according to the consulted stakeholders and especially its beneficiaries, fellowships awarded under the CAR panel were quite successful.

Programmes to promote career-restart implemented in EU Member States and Associated Countries and elsewhere

The existing programmes aimed at promoting career-restart in EU Member States and Associated Countries as well as in certain third countries (e.g. Australia, Canada, Japan, Singapore and the United States) have been mainly identified through in-depth desk research. This information has then been complemented by the findings of the surveys, targeting national stakeholders and targeting research organisations, and by further input collected through interviews (particularly of national and European stakeholders) as well as other interviews in the development of the case studies. Based on the collected information, an inventory of programmes has been created.

According to the results of the survey of national stakeholders, representing in total 30 EU Member States and Associated Countries, it is still quite uncommon to have in place national (regional) measures with the aim of motivating researchers to return to their career after a break (the share of answers very common and rather common for the measures implemented or being implemented is 20%). In terms of country groups considered, the following table also shows that those measures are more common in EU15 and EFTA countries than in the EU13, candidate countries and potential candidates from western Balkans.

Table 16. Answers of national stakeholders on how common the following national (regional) measures (programmes, initiatives and other actions) are in their respective countries.

National (regional) measures	Total		Country groups			
			EU15 and EFTA countries		EU13, candidate countries and potential candidates from western Balkans	
	% of Total	Count	% of Total	Count	% of Total	Count
Support for researchers returning after a maternity leave (maternity pay, guaranteed return to the same position after the leave, etc.)	58.1%	25	32.6%	14	25.6%	11
Support for researchers returning after a paternity leave (paternity pay, guaranteed return to the same position after the leave, etc.)	45.2%	19	23.8%	10	21.4%	9
Development of legal and other incentives for research organisations to implement measures to reduce career exit (flexible working time, job sharing,	27.5%	11	17.5%	7	10.0%	4

National (regional) measures	Total		Country groups			
			EU15 and EFTA countries		EU13, candidate countries and potential candidates from western Balkans	
	% of Total	Count	% of Total	Count	% of Total	Count
childcare facilities, career break policies)						
Awareness-raising, publication and distribution of guidance materials for researchers who are returning from a career break (information leaflets, websites, social media, guidelines on how to manage career breaks, checklists)	16.2%	6	8.1%	3	8.1%	3
Identification and promotion of best practices implemented by research organisations to address the career-restart issues among researchers	14.7%	5	8.8%	3	5.9%	2
Programmes supporting career counselling services, mentoring schemes and individual career advice for researchers who were/are currently on a break	13.9%	5	8.3%	3	5.6%	2
Awareness raising programmes/measures targeting employers of researchers and focusing on different issues related to the recruitment of career-restarting researchers	13.5%	5	8.1%	3	5.4%	2
Specific fellowship programmes, grants and re-entry schemes for researchers restarting their careers after a break	11.9%	5	7.1%	3	4.8%	2
Provision of charitable funds for researchers returning after a career break caused by reasons other than maternity/paternity leave (career-break grants for conferences and/or training, reduced membership fee/course fee, etc.)	2.9%	1	0.0%	0	2.9%	1
Introduction of specific panels evaluating grant applications submitted by researchers restarting their career	0.0%	0	0.0%	0	0.0%	0

Source: analysis of the survey of national stakeholders.

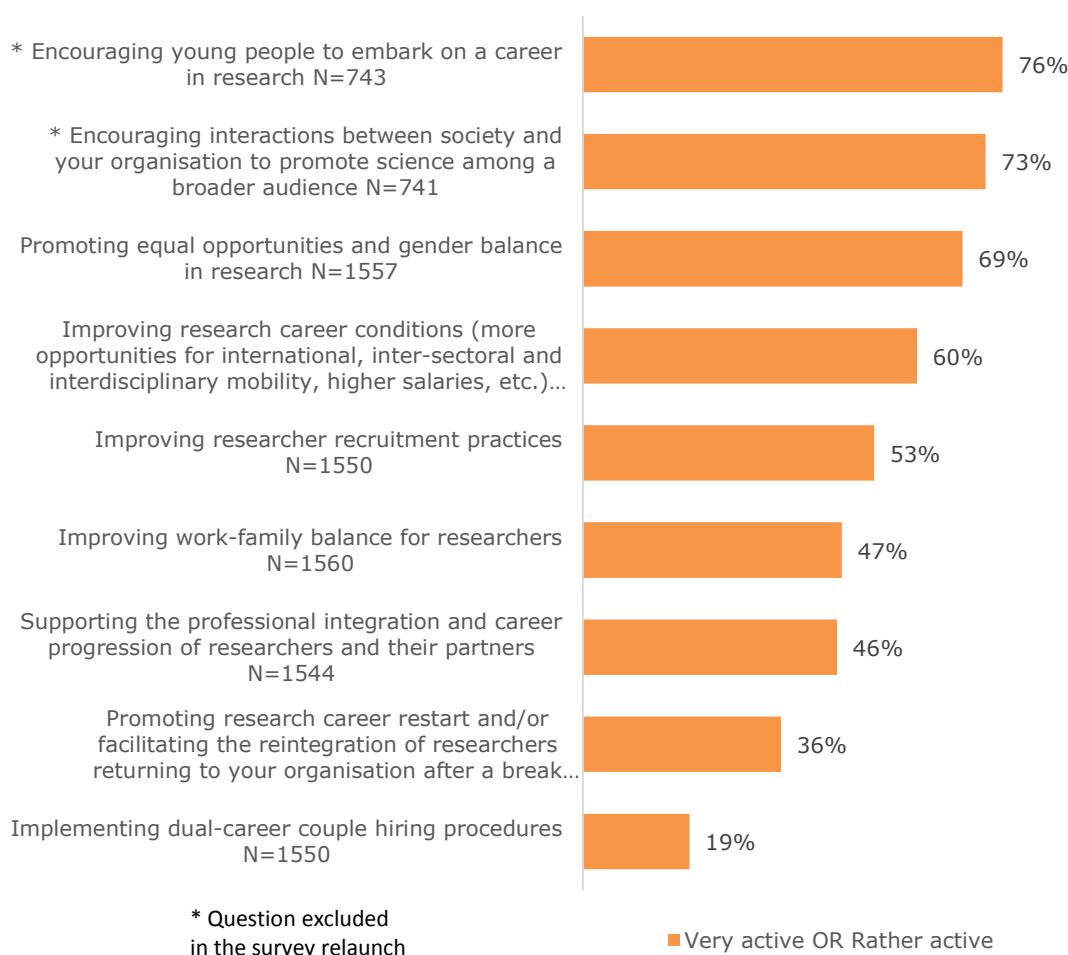
Note: the number of times and the percentage of total that 'Very common/Rather common' answer choices were selected by the respondents.

As detailed in the previous table, the measures most frequently designed with this specific purpose in the policy of national governments in the period 2010-2014 were the following: support for researchers returning after a maternity leave (58%) and support for researchers returning after a paternity leave (45%). On the other hand, none of the respondents indicated that introduction of specific panels evaluating grant applications submitted by researchers restarting their career was implemented in their country.

Considering the organisational level, as showed in Figure 39, only 36% of the surveyed research organisations said that they are very or rather active in promoting research career restart and/or facilitating the reintegration of researchers returning

after a break. On the other hand, based on a number of open comments to both the survey of individual researchers and the survey of research organisations, particularly in small organisations, issues related to career-restart (as well as dual career) are usually addressed and discussed on a person-to-person basis through informal conversations and no particular regulation or support is provided if not individually.

Figure 39. Extent to which research performing organisations are active addressing in various research career development-related aspects



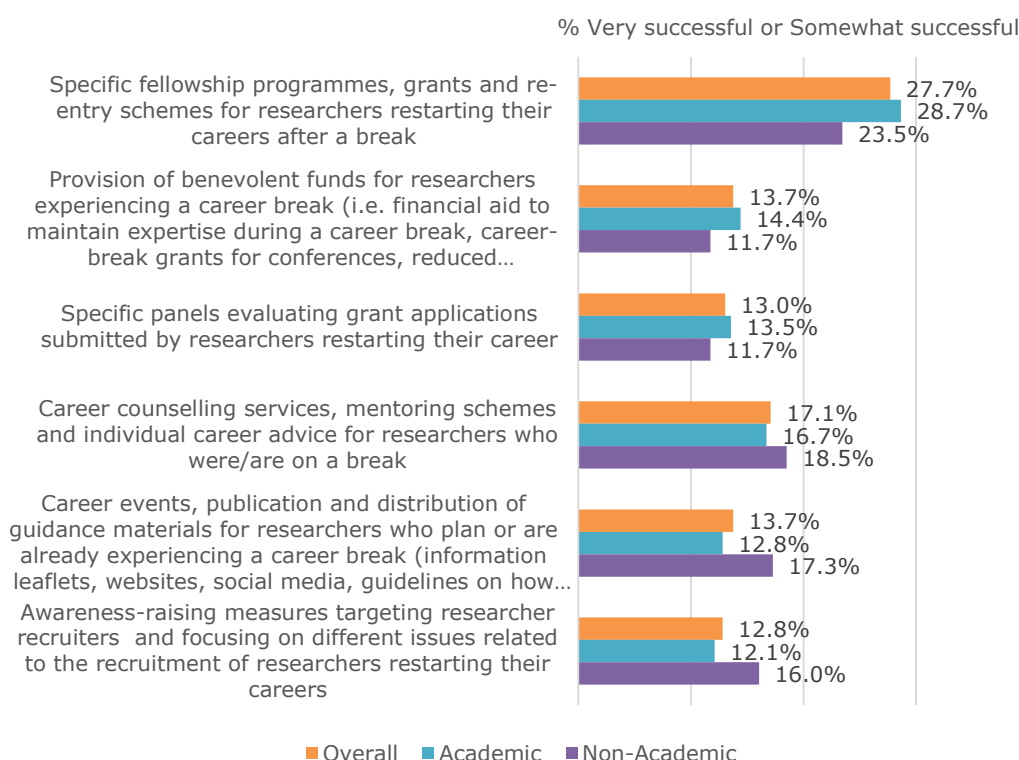
Source: the survey of research organisations.

Note: Based on answers to the survey question "How active is your organisation as regards the following aspects for research career development?"

Overall, based on the data collected, we can see that the number of existing programmes addressing career-restart issues is limited. Those initiatives are mainly implemented, in the form of fellowships or grants, by foundations, research institutes and universities, rather than national bodies. Indeed, as demonstrated in Table 17, the 'specific fellowship programmes, grants and re-entry schemes for restarters' is the most common answer in all country groups, while 'awareness-raising measures targeting research recruiters' seems to be the least common option overall, with the exception of the country group EU13 where 'Specific panels evaluating grant applications submitted by researchers restarting their career' is an even less frequent answer.

Equally, this trend is confirmed without any major differences for both academic and non-academic organisations. The only slight distinction is however, that in non-academic environments, career events and guidance materials as well as awareness-raising measures targeting researcher recruiters seem to have a more important role compared to academic organisations. Instead, the provision of specific fellowship programmes is considered slightly less successful by the non-academic than academic organisations (see Figure 40).

Figure 40. Evaluation of the success of implemented measures among different types of research organisations (academic/non-academic)



Source: analysis of the survey of research organisations.

Note: the percentage of total that 'Very successful/Somewhat successful' answer choices were selected by the respondents.

As confirmed by most of the stakeholders involved in interviews, the surveys (both of individual researchers and of research organisations) and the participants in the validation seminar, the general lack of public funding to support research organisations is indeed one of the main obstacles constraining the implementation of such initiatives. Even before focusing on supporting career-restart, it seems that the limited funds often do not allow the creation of long-term job positions, with decent wages, opportunities for career progression and/or salary increase, which is eventually an important reason for leaving research. Based on responses to the survey of individual researchers, only 35% of researchers possess a permanent contract (including full and part-time contract, respectively 34% and 1%). Indeed, research careers usually depend on external grant financing, which make them fairly precarious in terms of job security.

In light of this situation, during the validation seminar it was highlighted that perhaps it would be more realistic and fair to make researchers aware of this reality while

showing valuable alternative options – such as opportunities in the non-academic sector – by also providing training more tailored for those kinds of employers.

Table 17. Success of different measures and practices implemented at organisational level to address the career restart issues

Measures and practices implemented by surveyed organisations	Total		Country groups					
	% of Total	Count	EU15		EU13		Other*	
			% of Total	Count	% of Total	Count	% of Total	Count
Specific fellowship programmes, grants and re-entry schemes for researchers restarting their careers after a break	27.7%	240	28.3%	106	28.8%	83	25.1%	51
Provision of benevolent funds for researchers experiencing a career break (i.e. financial aid to maintain expertise during a career break, career-break grants for conferences, reduced membership fee/course fee)	13.7%	119	13.1%	49	14.9%	43	13.3%	27
Specific panels evaluating grant applications submitted by researchers restarting their career	13.0%	113	13.1%	49	12.8%	37	13.3%	27
Career counselling services, mentoring schemes and individual career advice for researchers who were/are on a break	17.1%	148	18.7%	70	13.9%	40	18.7%	38
Career events, publication and distribution of guidance materials for researchers who plan or are already experiencing a career break (information leaflets, websites, social media, guidelines on how to manage career breaks, checklists)	13.7%	119	12.8%	48	14.2%	41	14.8%	30
Awareness-raising measures targeting researcher recruiters and focusing on different issues related to the recruitment of researchers restarting their careers	12.8%	111	12.3%	46	13.9%	40	12.3%	25
Other	1.8%	16	1.9%	7	1.4%	4	2.5%	5
Total	100%	866	100%	375	100%	288	100%	203

Source: analysis of the survey of research organisations.

Note: the number of times and the percentage of total that 'Very successful/Somewhat successful' answer choices were selected by the respondents.

* *Albania, Bosnia and Herzegovina, Faroe Islands, Former Yugoslav Republic of Macedonia, Iceland, Israel, Liechtenstein, Moldova, Montenegro, Norway, Serbia, Switzerland, Turkey, Ukraine.*

Overall, the desk research performed revealed that common measures for all categories of employees exist, while only a few are specifically aimed at researchers. In particular, most programmes targeting career restarters in research are implemented in western and Central Europe, and particularly in the UK and Ireland. In this respect, during the validation seminar, it was pointed out that national policies play a key role: for instance, in the UK and Ireland childcare facilities are remarkably expensive and consequently, staying home and taking care of children is for many women the only feasible and affordable solution. In other words, the lack of national policies in those countries is often compensated by specific programmes targeting career restarters and might somehow explain this specific geographical concentration.

On the other hand, no measures have been identified in southern and eastern Europe, where the occurrence of career breaks seems to be quite high due to the shortage of employment opportunities in particular.

Below we present a brief summary of the inventory of initiatives to support career-restarters as identified through desk research.

Table 18. Summary of collected initiatives to support career-restarters

Country	Organisation	Programme
IE	Science Foundation Ireland (SFI)	Advance Award Programme (Investigator Career Advancement)
UK & IE	Welcome Trust	Research Career Re-Entry Fellowships (RCREF)
UK	Daphne Jackson Trust	Daphne Jackson Fellowships
UK	UK Institute of Physics (IOP)	Career Break Management Strategy
UK	Sheffield Hallam University (Centre for Science Education)	Women in Science, Engineering and Technology (WiSET) Project – Return to Work Programme for Women in STEM
UK	University of Cambridge	Returning Carers Scheme
UK	Biochemical Society	Stay Connected Bursaries
DE	Regional Ministry Education, Science, Further/Professional Training, Culture	Re-entry scholarships for women scientists in research
CH	Fonds National Suisse de la Recherche Scientifique (FNSNF)	Marie Heim-Vögtlin (MHV) Grants

Source: the PPMI consortium.

Among the collected initiatives implemented in **EU Member States and Associated Countries**, some have been presented in detail in the case studies reports included in Annex 5.

In particular, the **Daphne Jackson fellowship scheme (UK)** represents a good example of a programme promoting a return to research following a break. The scheme started in 1985/1986 when Daphne Jackson – the first female Physics professor in the UK – was still alive. She launched the scheme for returners as a pilot initiative to encourage female individuals to get back to their careers after their absence for family commitments. The fellowship programme helped 29 women to return to a research career until Professor Jackson passed away in 1991. A year after her death, the Daphne Jackson Trust was established as an independent charity to continue offering the fellowships.

Today, the target audience of the initiative are return STEM professionals (both women and men) returning to research after a career-break of at least 2 years, taken

for family, caring or health reasons. Applicants should have a PhD or at least 3 years of research experience – academic or industrial – prior to the career break.

The scheme provides both financial and non-financial support, which may be offered to returners based in a university or other research institute, including non-academic, anywhere in the UK. This support is offered as a combination of research, mentoring, training, including a minimum of 100 hours of re-training per year. In addition to the fellowship support costs and a salary, the fellowship also covers other expenses, such as travel or conference costs and equipment. The fellowships are usually offered part-time (0.5 full-time equivalent) for 2 years (up to 3 years in exceptional cases), during which the fellow integrates into a specific research group within the host organisation. He/she is supported by senior researchers who significantly help with the research project and is also assigned a fellowship advisor who provides tailored individual mentoring and support throughout the fellowship's duration, as well as a supervisor in the host organisation.

Another successful example of initiatives supporting career restart presented as a case study is the **Returning Carers Scheme offered by the University of Cambridge (UK)**. In particular, the scheme was selected for a number of reasons that make it quite unique among the various programmes identified. Firstly, in contrast to many other programmes, it is open to both male and female candidates, returning to research after a period of total absence or part-time/reduced hours. Secondly, it is available for both researchers going on a career break as for those returning from a career break. Thirdly, thanks to its flexibility, the scheme covers a wide variety of items and activities, including training, attendance at conferences, secondments or short-term research assignments, but it also offers other kinds of unusual support such as for instance short-term research support (for example to generate preliminary data to support research grant applications) and indirect childcare expenses.

The stakeholder interviews revealed that a number of beneficiaries mentioned the Returning Carers Scheme in their applications for promotion to senior positions. They highlighted that the support they have received from the scheme substantially contributed to facilitating their research, or even that they have been able to carry out their research only thanks to the scheme's contribution. Based on the data provided by the HR Division of the University, it can be observed that the overall perception among beneficiaries (80%) is that it was 'not at all' or 'not very likely' that they would have been able to undertake the activities they carried out without an award under the scheme.

Although researchers get promoted on the basis of the quality of their research and its impact, as well as on the basis of its value at the international level, the support provided through the scheme can be particularly relevant in order to research activity and allow researchers to progress. This reveals that, although it is a relatively small-scale initiative (the requested support is usually between GBP 6.000 and GBP 7.000 on average), its positive effects are definitely significant.

The scheme proves that even with a small amount of money it is possible to make research easier for individuals, and contribute significantly to supporting them to get back on track and considerably transform their careers. The impact of similar support on a research career is crucial and in some cases might help to completely change an academic trajectory.

In **non-EU countries**, the number of initiatives identified to promote the research career restart, in both academic and non-academic organisations, was also rather limited.

In the **US**, the most comprehensive career re-entry resource for employers, universities and individuals is “**iRelaunch: the Return-To-Work Experts**”⁶⁹, founded in 2008. iRelaunch has connected to a national network of nearly 14.500 people at more than 195 return-to-work programmes and services. In addition, a specific programme enabling women to return to physics research careers after having their careers interrupted is the “Hildred Blewett Fellowship”⁷⁰. This fellowship consists of a one-year award of up to USD 45,000 (applicants can apply in a subsequent year for one additional year of support).

The **Japan Society for the Promotion of Science (JSPS)** offers a special “**Restart Postdoctoral Fellows**” funding scheme⁷¹. This 3-year programme addresses young researchers suspending research for a period of 3 months or longer for purposes of child birth and infant nursing within the previous 5 years. In addition, depending on the particular university, women may stop their research for 2-3 years to take care of children and then they can return to their position. However, there is currently no specific programme/support for men’s career restart in Japan.

Indeed, there are further examples of programmes for restarters in the selected third countries, not necessarily targeting researchers:

- in the US, for the non-academic sector, the “Goldman Sachs Returnship Program”⁷², helps to develop talented professionals who are looking to restart their careers after an extended absence from the workforce;
- in Australia, the so-called “Restart” programme⁷³, offers support to employers who employ and retain eligible jobseekers, who are 50 years of age or older, and who have been unemployed and on income support for six months or more;
- the “Singapore Career Comeback for Professional Women Re-entering the Workforce”⁷⁴ programme, was offered by the Singapore Management University (with UBS) until 2008.

Level of awareness of researchers towards sources of support to career restart

According to the feedback collected through different research methods, the level of awareness of support sources for career restart in research, such as specific programmes or initiatives, is quite limited.

In particular, the vast majority of the respondents to the survey of individual researchers stated that they are not familiar with the Career Restart Panel of the Individual Fellowships in the context of the M(S)CA EU Programme (77%). This still limited awareness has also been reported by interviewed stakeholders, including interviewees contacted for the case studies. On the other hand, representatives of the

⁶⁹ Website of “iRelaunch: the Return-To-Work Experts”, <https://www.irelaunch.com/>

⁷⁰ Website of the “Hildred Blewett Fellowship”, <http://www.aps.org/programs/women/scholarships/blewett/>

⁷¹ Website of The Japan Society for the Promotion of Science, <http://www.jsps.go.jp/english/e-quart/17/02.html>

⁷² Website of the “Goldman Sachs Returnship Program”, <http://www.goldmansachs.com/careers/experienced-professionals/returnship/>

⁷³ Website of the “Restart” programme, <https://www.employment.gov.au/restart>

⁷⁴ Website of The “Singapore Career Comeback for Professional Women Re-entering the Workforce”, <http://www.businesswire.com/news/home/20080207005961/en/UBS-Wharton-Continue-Partnership-UBS-Career-Comeback>

European Commission, especially the Research Executive Agency⁷⁵ – which is involved in the management and implementation of the MCA/MSCA actions under H2020 (previously the FP7 People Programme), including the career restart panel – have noticed an increasing interest in the initiative from the participants at various info days and related events. Thus, to some extent the promotion of this initiative is gradually helping to enhance its visibility, as well as word of mouth, which is generally the way these kinds of initiatives are most effectively communicated. However, as highlighted in the validation seminar, it is still quite challenging to reach researchers on a career break, considering that, during this period, they are often not in direct contact with the research community.

Among those who have had one or more breaks or who are currently on a break, almost 70% said they are not familiar with the MCA/MSCA career restart panel. As expected, this percentage is even higher if we consider the answers of those who never experienced a break, as well as including those who are planning a break in the near future: 80%.

The limited awareness of the CAR Panel among researchers has been further confirmed by the stakeholders interviewed within the scope of the case study regarding this specific initiative (see Annex 5 for more details). It appears that, compared to the standard individual fellowships under MCA/MSCA, fellowships awarded by the CAR panel are not very well known, neither among researchers, nor among research organisations.

The general perception of those respondents to the survey of individual researchers who have benefited from the CAR Panel, however, is that the scheme was very successful in achieving its objectives and particularly in facilitating a smooth return to the research work for the restarter. In addition, according to the same respondents, the scheme offers appropriate coverage both for research, training, networking costs, and for living, family and mobility allowance. Thus the value of the fellowships is perceived as sufficient for achieving its purpose.

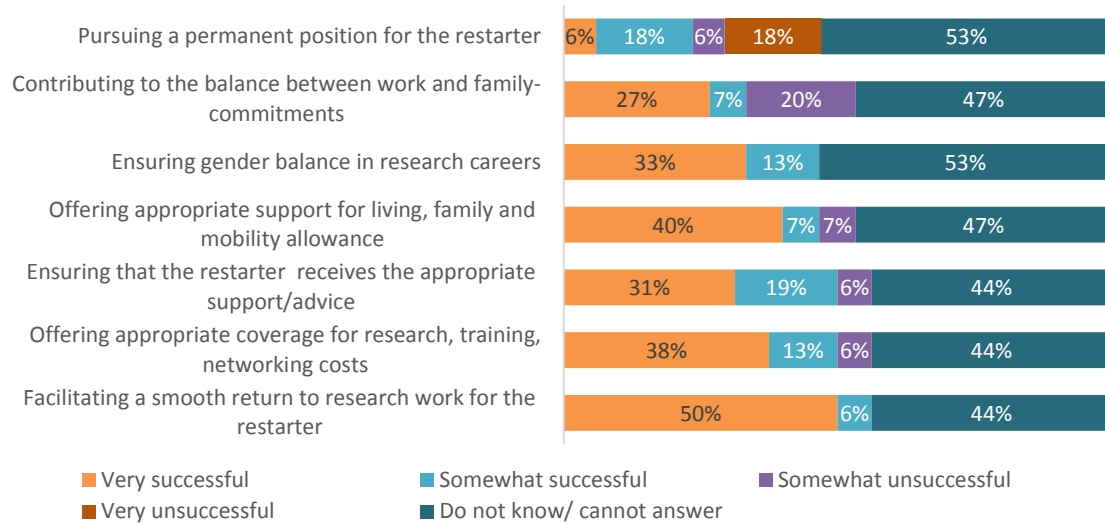
On the other hand, as illustrated in Figure 41, according to their feedback, the scheme could be further improved in the future by considering the following objectives:

- ensuring gender balance in research careers;
- pursuing a permanent position for the restarter.

Based on the comments collected, the career restart panel under MCA/MSCA offers a great opportunity for researchers willing to resume their career after a break, something that few other schemes do. Nevertheless, as highlighted by the interviewed researchers of the CAR Panel case study, and as has been noticed also in the survey of individual researchers, the two-year fellowships under this Panel are perceived as too short and restrictive for restarters. Respondents' feedback show that this duration is not considered enough to properly prepare the researchers to get back to the same level as his/her colleagues who did not take a break. In this sense, the validation seminar confirmed that an extension to three-year fellowships could considerably help the reintegration, although, it has been noticed that this would imply an overall reduced number of fellowships to be awarded, unless more funding is allocated. Furthermore, the pressure on the hosting organisations to decide whether hiring permanently or not the fellow after the end of the fellowships period, would be lower and the decision itself postponed.

⁷⁵ For more details on REA's activities, see http://ec.europa.eu/rea/about_us/activities/index_en.htm

Figure 41. Success of the CAR Panel in achieving its objectives



Source: the survey of individual researchers.

The level of awareness related to other sources of support for restarters, other than the career restart panel, is overall also very low. This conclusion is supported by the comments to open-ended questions, where the researchers convey a certain discontent about the lack of schemes and measures available to help resume a career in research.

2.3.3. Preparation of career break and restart

This part of the report focuses on the preparation for a career break and restart. It also provides an overview on the factors helping and hindering the reintegration after the break.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.3.3

- According to the collected feedback, researchers take specific actions when thinking about their career break and following restart. In particular, these preparation actions include the commitment to stay involved with the research during the break (e.g. extra-training, contact with colleagues, self-studying, and updating of skills). On a more personal level, most researchers report that they have carefully considered or consider the risks and options for the future, when preparing for the break. However, from the research organisations' point of view, the preparation for both the break and return is still not very well done and could be potentially improved to make these processes smoother.
- According to the consulted stakeholders – including both researchers and representatives of research organisations' – the personal skills, competences and attitude of the researcher is the main factor facilitating the reintegration after a break. Furthermore, access to the network of contacts in the research community also plays a key role.
- With regards to the factors making the reintegration more difficult for researchers, competition with other researchers not having undergone a

break has been identified as a major obstacle. This is also closely related to another factor hindering the reintegration, which is the implementation of recruitment procedures that do not support restarters, or sometimes even penalise them.

Actions to prepare a career break and restart

As detailed in the following figure, in terms of preparation of career breaks and restarts, the information collected through the survey of individual researchers showed that normally researchers:

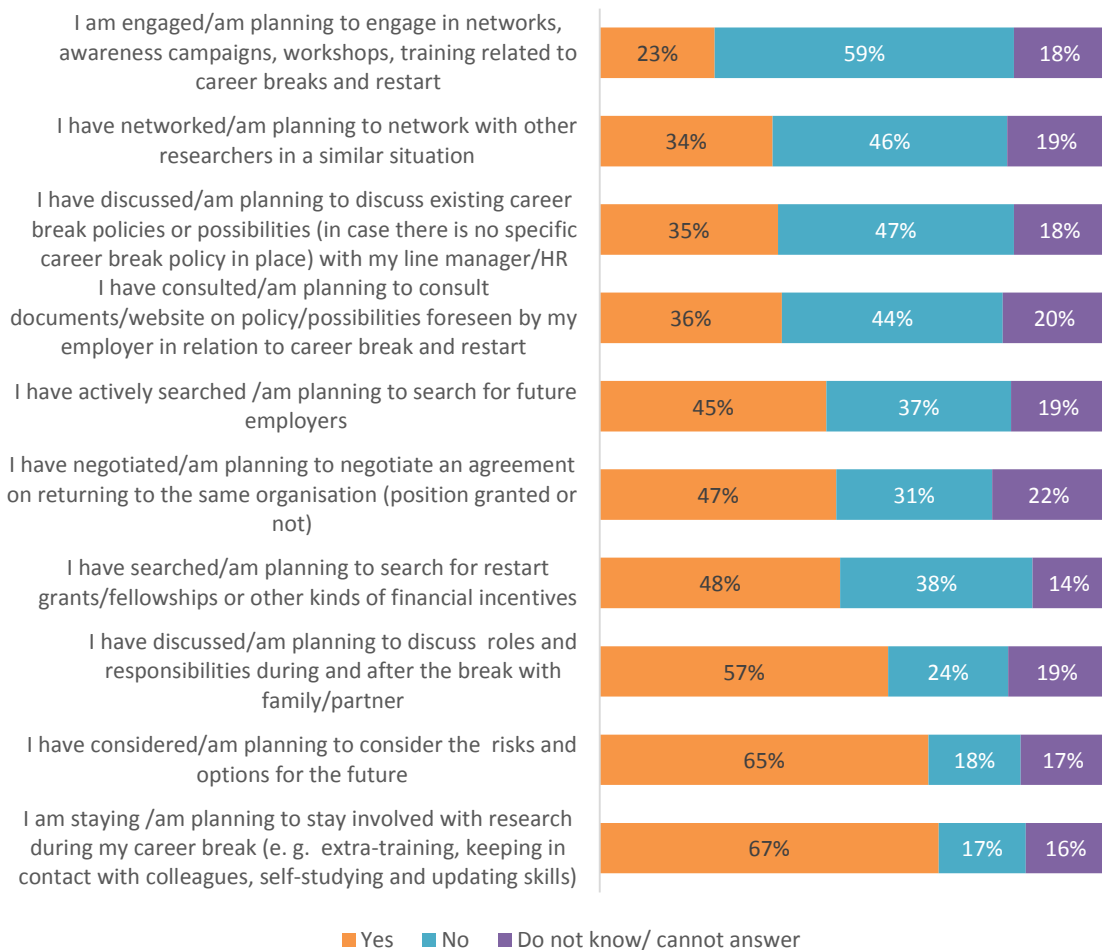
- have stayed or are planning to stay involved in research during the career break (e.g. extra-training, keeping in contact with colleagues, self-studying and updating skills);
- have considered or are planning to consider the risks and options for the future;
- have discussed or are planning to discuss the roles and responsibilities during and after the break with their family/partner.

These data reveal that the decision to take a career break normally involves an in-depth reflection for a researcher, related to the specific personal situation: it is carefully considered, the pros and cons are weighed up, and in particular possible future scenarios are analysed. The responses provided in the form of comments to open-ended questions of the survey of individual researchers also confirm that one of the main challenges for researchers planning to take a break is the need to keep up-to-date during their absence. In particular, this suggests that measures and strategies facilitating their partial involvement in research during the break would be indeed very beneficial. In general, no major differences can be detected between male and female respondents. Based on the data, the only actions where men seem to be considerably keener on (around 10% more Yes-answers), in comparison to women, are (1) the search for restart grants/fellowships or other financial incentives and (2) the active search for future employers.

Very few surveyed researchers indicated that they have been engaged or are planning to engage in networks, awareness campaigns, workshops, training related to career breaks and restart during their absence. This might be interpreted in two ways: on the one hand, these kinds of initiatives are still very limited and/or do not have a great visibility among their target groups; on the other hand, compared to other actions, this is perhaps not considered as very effective in order to prepare a successful career restart. Most probably, the low frequency is related to both reasons.

The interviewed stakeholders consulted within the different case studies reiterated that maintaining their network of contacts during the break is very important, however not always easy to do. Another remark made by our interviewees, is that the preparation of the career restart may really determine the success of the restart itself.

Figure 42. Actions to prepare for the career break and return



Source: the survey of individual researchers.

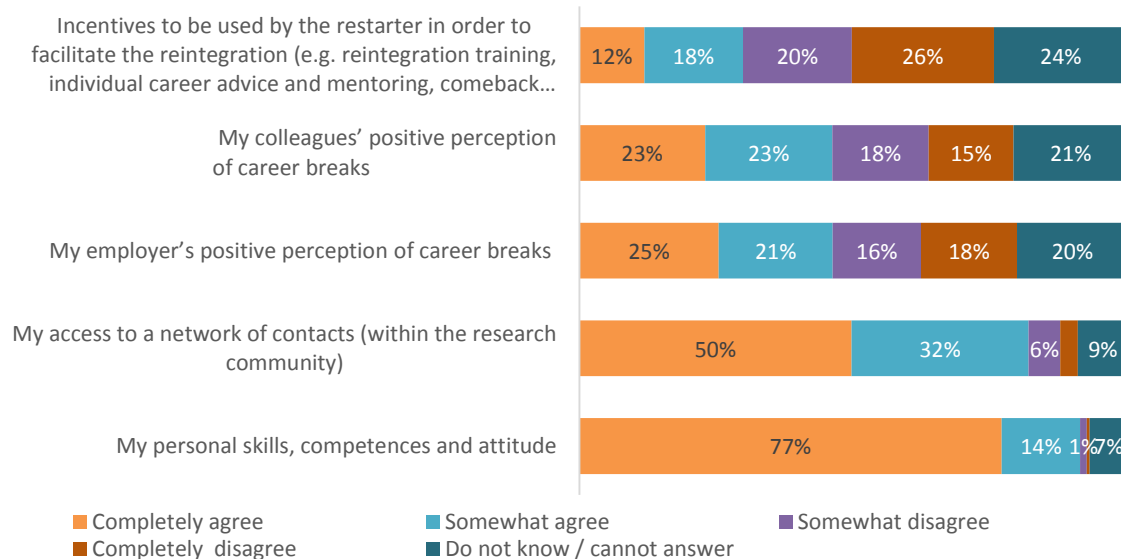
Based on the results of the survey of research organisations (first launch), actions to prepare the career break and restart should be taken respectively in advance and during the break. According to the feedback of research organisations, the break is normally prepared in collaboration with the employer (former, current or future). However, returns are still usually not well prepared. An interesting consideration made in the open comments of the survey of research organisations – in relation to actions to better prepare the break and return to work – is that the replacement appointed for a researcher taking a career break, could somehow help the reintegration.

Factors helping or hindering the reintegration

Based on the results of the survey of individual researchers, illustrated in Figure 43, the return to work after a break is generally *facilitated* by: (1) personal skills, competences and attitudes, and (2) the access to a network of contacts within the research community. These two factors are linked to and confirm the answers concerning the actions to prepare for the restart. Indeed, the more a restarter has been involved with research during the break, being pro-active, updating skills and competences in the field, keeping in contact with his/her research network, the easier his/her reintegration will be. This perception seems to be shared equally between female and male respondents. The results of the survey of individual researchers are also similar to the opinions expressed by the surveyed research organisations (see

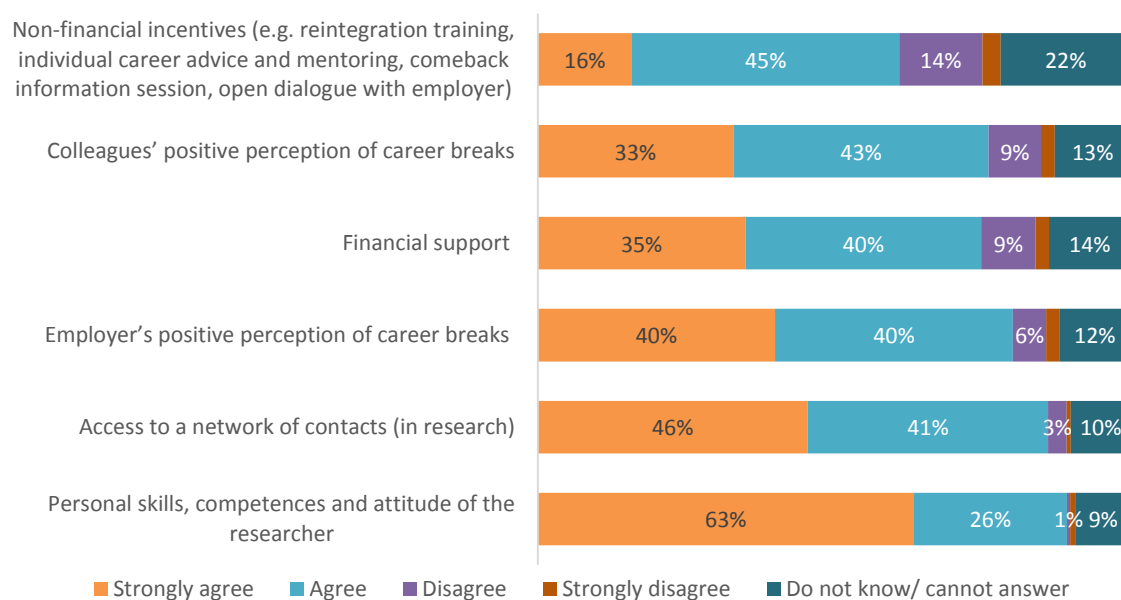
Figure 44). However, we can notice that representatives from research organisations give greater importance to the positive perceptions of employers and colleagues than to the attention given by researchers.

Figure 43. Opinion of researchers on the extent to which various factors facilitate the reintegration after the career break



Source: the survey of individual researchers.

Figure 44. Opinion of research organisations on the extent to which various factors facilitate the reintegration after the career break



Source: the survey of research organisations.

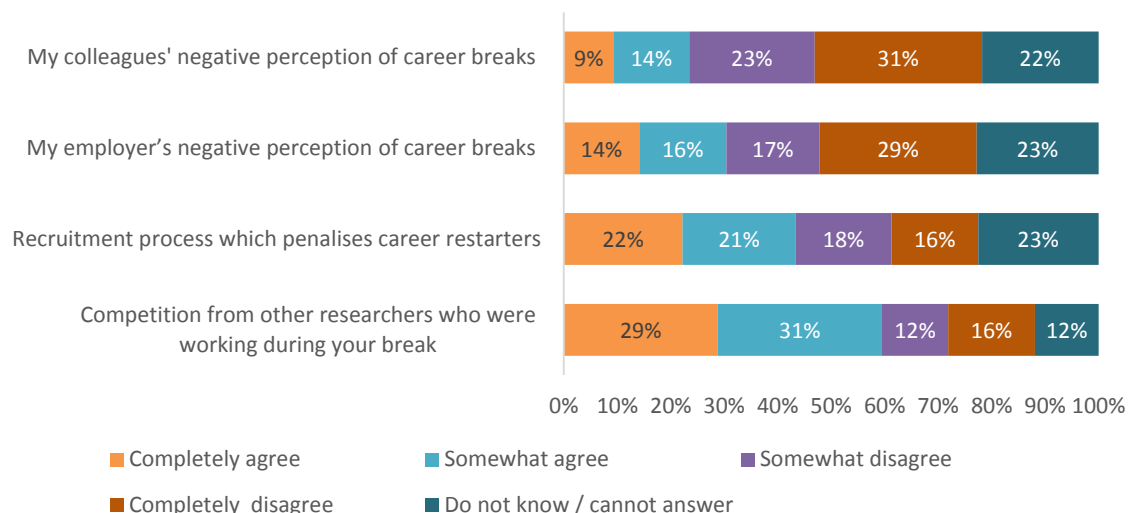
As to the factors *hindering* the reintegration after a break, competition from other researchers who were working during the break seems to be the main element identified by both the surveyed individual researchers and research organisations (for more details see Figure 45 and Figure 46). In particular, with regards to this specific factor, female respondents of the survey of individual researchers showed that they

were significantly more concerned about the competition than their male counterparts (9% more females answering Completely agree OR Somewhat agree). In line with the responses of surveyed individual researchers, similar feedback has been reported by respondents to the survey of research organisations. This confirms that it is considered essential to keep on track and update relevant skills in order to stay competitive, particularly in fast changing fields of research. It has been pointed out that the competition also implies an age issue, since the restarting researcher will usually compete for the same jobs with others who are younger, and hiring older researchers, especially at starting levels, is not common practice in some countries. Another element making the restart particularly difficult is having to face a recruitment process which penalises restarters. In this context, as well as in relation to other specific questions regarding the break, it has been noticed that the cultural mindset in specific countries – also reflected in the different national laws – is crucial when considering career breaks: for instance, parental leave may be allowed in a researcher’s contract by law, meaning this kind of leave does not imply the end of the employment (e.g. Sweden and the Netherlands).

Some respondents of the survey of individual researchers, as well as several participants in the validation seminar, have also outlined that childcare responsibilities are also often a barrier to an easy reintegration, since it might be difficult to reconcile the family commitments with a research career. This can be facilitated by a number of family friendly measures, whose availability – however – should not be taken for granted.

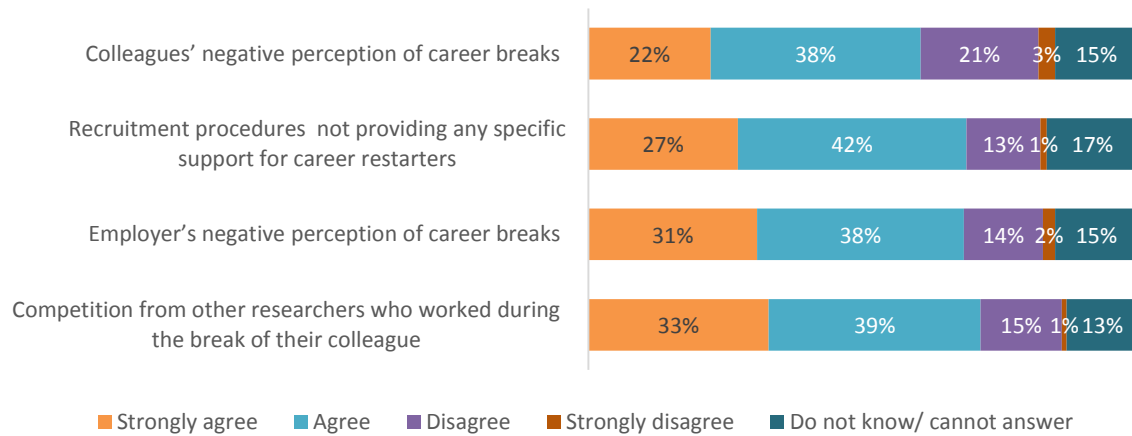
Finally, according to the surveyed individual researchers, the positive or negative perception of employers and colleagues also influences the reintegration, although not to the same extent as the previously mentioned factors. This influence seems to have a stronger impact for the respondent organisations than for researchers, in particular with regard to the negative perceptions of employers.

Figure 45. Opinion of researchers on the extent to which various factors hinder reintegration after the career break



Source: the survey of individual researchers.

Figure 46. Opinion of research organisations on the extent to which various factors hinder reintegration after the career break



Source: the survey of research organisations.

Analysing the stakeholders' interviews in the framework of the case studies development, we can also notice that similar factors have been identified. A supportive research team and a dedicated supervisor are particularly helpful for a restarter. This facilitates significantly the access to and engagement with the research community and the network of contacts. On the other hand, according to almost all interviewees the main difficulty for restarters is to remain competitive compared to other researchers, particularly in some disciplines where advances are rapid.

2.3.4. Preventive measures to exit career

This section explains to which extent particular preventive measures to exit career can contribute to minimising career breaks or avoiding full career breaks, depending on the different career stages of the researcher. Furthermore, in this section, we analyse the extent to which such measures are put in place, including a presentation of relevant examples implemented in the EU Member States, Associated Countries, or elsewhere.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.3.4

- The feedback collected shows that preventive measures such as allowing flexible work schedules or providing family-friendly benefits are perceived as particularly important in order to avoid full career breaks.
- In order to minimise the breaks caused by the shortage of employment opportunities, the most relevant measure would be to guarantee adequate funding for research and in general longer-term contracts for researchers.
- Preventive measures to exit career seem to be more common than particular programmes aiming at career restart. However, they might be more common in some countries than others, depending on national laws or regulations, and often not necessarily targeting only researchers.
- According to the data collected through desk research and case studies development, strategies aimed at preventing full-career breaks are currently in place in a number of EU Member States and Associated Countries. Similar to programmes promoting career restart, examples of these strategies may be found in western and Central Europe, and particularly in the UK and

Ireland.

- Some examples of exit career preventive strategies implemented in non-EU countries are also presented in this section. In a number of cases, for instance for Japan and Singapore, the collected data included information on strategies not only targeting researchers, but workers in general.
-

Exit career prevention measures

The preventive measures to exit career are particularly relevant when a break is planned and/or taken for childcare, eldercare, family reasons or illness. Obviously, such measures cannot prevent breaks due to lack of employment opportunities and/or end of a temporary contract, which should be primarily solved by increasing the research funding, and hence the research employment opportunities. Also, they have little impact on researchers willing to diversify their experience by exploring a different sector outside the research.

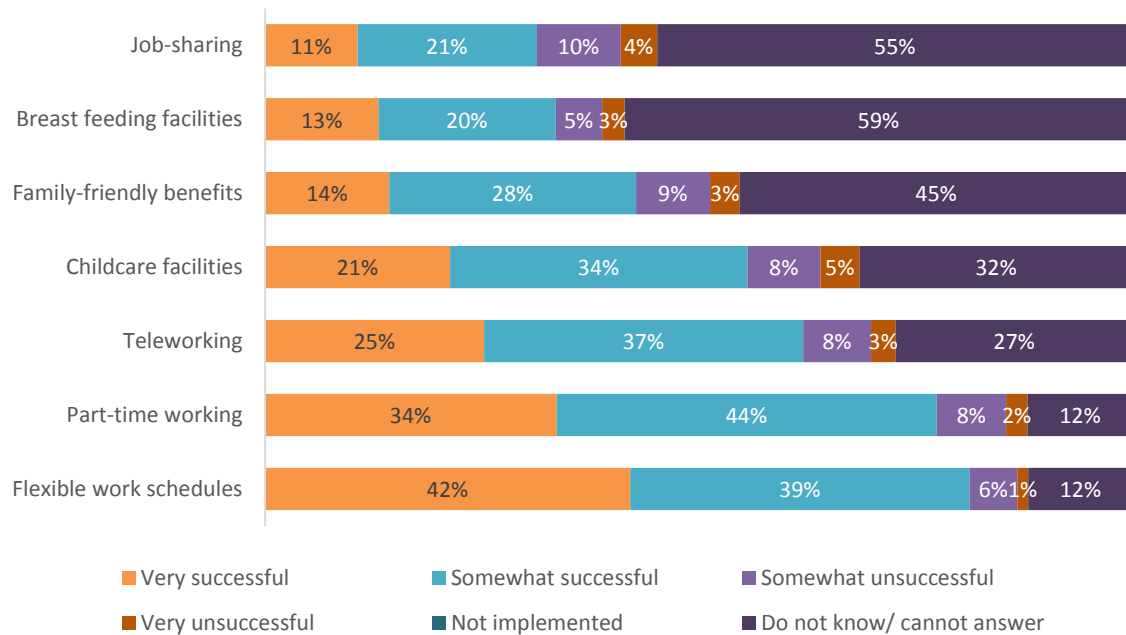
The results of the survey of individual researchers confirmed that exit career prevention measures can indeed contribute to minimise and/or avoid full career breaks. In particular, the following could help reduce career breaks:

- allowing flexible work schedules (mentioned by 73% of respondents);
- providing family-friendly benefits (e.g. family allowance, childcare allowance) (54%);
- making available childcare facilities (53%);
- allowing part-time working (42%);
- allowing teleworking (36%).

Based on the results of the survey of individual researchers, the perception of the above-mentioned items doesn't vary considerably with the career stage of the researcher: indeed, flexible work schedules are seen as the most effective measure to prevent career breaks. A minimal difference in the answers might be found when considering childcare facilities, which seem to be most relevant to established and leading researchers rather than first stage and recognised researchers. Equally, the results do not show any major differences between male and female respondents.

The results of the survey of research organisations show similar data. However, from the point of view of research organisations in the list of most successful measures to prevent full career break, the provision of family-friendly benefits and childcare facilities come only after the option of part-time working and teleworking. In this sense, perhaps the employers demonstrate that they are not completely in line with the needs of researchers as regards childcare responsibilities. Although overall, the perception of the most successful measures is very similar in academic and non-academic organisations, we can notice that the latter consider teleworking as more successful and the provision of childcare facilities as significantly less successful, in comparison with their academic counterparts. With regards to the different country categories taken into consideration (EU15, EU13, Other countries), the provision of childcare facilities seems to have particular importance in 'Other countries', while no other major differences have been noticed at country aggregation level.

Figure 47. Success of various measures and practices applied at organisational level in preventing full career break



Source: the survey of research organisations.

As also reiterated by the participants of the validation seminar, it is necessary to ensure more flexibility – both in terms of work schedules and possibility of part-time arrangements (according to the data collected, only 5% of surveyed individual researchers have a part-time contract) and teleworking – as well as to implement family-friendly measures. In this context it has been noticed that often job flexibility is still perceived as hardly compatible with career development and still poorly supported in real practice. Some examples of the respondents' comments are that, especially in case of maternity leave, the absence of support when coming back from this kind of leave makes permanent the disadvantage of women, since they struggle to get back to research and catch up at the level needed to be competitive while having to cope with childcare responsibilities. Probably, even before this kind of preventive measures, it would be crucial to make parental leave – ensuring both maternity and paternity leave – compulsory. In fact, as already mentioned, it has been noticed that in research paid parental leave is still the privilege of a few: for many researchers it simply determines the non-renewal of their short-term contracts. Overall, it has emerged from the comments of surveyed individual researchers, that there is a need to align research projects with the possibility of maternity leave particularly.

Other researchers have stressed that compatibility between professional and personal life at any level should be promoted in the research sector. This is in line with the good practices encouraged in the *European Charter for Researchers* and the *Code of Conduct for the Recruitment of Researchers*⁷⁶. Work-life balance is a key aspect for attracting science and technology employees – particularly women. Furthermore, it has been found that improving employee perceptions of effective work-life practices

⁷⁶

Available at: http://www.esf.org/index.php?eID=tx_nawsecuredl&u=0&g=0&t=1458322411&hash=1a18efea875feff76bfd0fb7ec87ac0aec1f3c4f&file=fileadmin/be_user/Communications/code_of_conduct/Charter_and_Code_-_EN.pdf

has the great potential to increase employee commitment⁷⁷. In research, part-time agreements would also be a valuable option in preventing breaks due to stress and anxiety leading to burnout and other similar illnesses. Finally, the value added of part-time arrangements seems also particularly relevant in relation to combined/part-time researcher positions⁷⁸, facilitating knowledge transfer, networking and research collaboration as well as links among institutions, disciplines, countries and sectors (industry/academia/public).

On the other hand, according to feedback from the surveys of individual researchers and research organisations and case study interviews, in order to minimise the breaks caused by the shortage of employment opportunities it seems important to guarantee adequate funding for research in order to fund a greater number of research positions and promote higher job security and secure better job conditions, striving for longer-term or permanent contracts, with decent pay at an earlier stage of a researcher's career. This would give researchers a real opportunity for continuation and prevent them from continuously having to look for further short-term grants and fellowships.

Some respondents to the survey of individual researchers have pointed out that, sometimes, considering the high mobility requirements for researchers, the difficulties in finding research positions due to the partner's relocation are also causing involuntary career breaks. In this sense, dual-career recruitment measures may be very helpful in avoiding this specific kind of career break, by facilitating the relocation.

Finally, it has also been noticed – both by surveyed individual researchers and interviewed stakeholders – that instead of reducing the occurrence of career breaks, it would be better to accept them and to recognise the personal enrichment and benefits related to the break. Instead of understanding how to avoid them, the point is rather to implement effective measures and strategies to support a successful return, for instance not penalising researchers for having taken a break in recruitment and promotion procedures. To do so, a cultural change in the perception of breaks and people having a different career path is needed.

Exit career preventive strategies implemented in the EU Member States and Associated Countries, or elsewhere

Given the flexibility needed by restarters, these kinds of strategies are sometimes complementing programmes to promote the career restart or in other cases are even an integral part of those programmes. **In EU Member States and Associated Countries:**

- This is the case for instance of the **Daphne Jackson Fellowships**⁷⁹ (UK) offered by the Daphne Jackson Trust, which is presented in detail in the case study report included in Annex 5. Aimed at restarters willing to resume a career in research after a break, the fellowships are usually offered for two years on a part-time basis (0.5 full-time equivalents).

⁷⁷ See EC Report 'Women in science and technology – Creating sustainable careers', 2009, available at: https://ec.europa.eu/research/swafs/pdf/pub_gender_equality/wist2_sustainable-careers-report_en.pdf

⁷⁸ See ESF Science Policy Briefing 'New Concepts of Researcher Mobility – a comprehensive approach including combined/part-time positions', 2013, available at: http://www.esf.org/fileadmin/Public_documents/Publications/spb49_ResearcherMobility.pdf

⁷⁹ Website of the Daphne Jackson Fellowships <http://www.daphnejackson.org/fellowships/>

- Another similar example is the **Wellcome Trust's Research Career Re-entry Programme**⁸⁰ (**UK and Ireland**), where fellowships are available for two to four years, depending on seniority before the career break, and may be taken up on a full or part-time basis.
- Offered by the Fond National Suisse de la Recherche Scientifique, the **Marie Heim-Vögtlin grants**⁸¹ (**Switzerland**) aimed at female doctoral students and postdocs can also be awarded as part-time grants (minimum 0.5 full-time equivalent).
- Similarly, this is also the case of the **Re-entry scholarships for women scientists in research (Germany)** offered by the Regional Ministry of Education Science, Further/Professional Training and Culture (Rhineland-Palatinate).
- The **Advance Award Programme 2014**⁸² (**Ireland**) of Science Foundation Ireland is another example of schemes integrating the re-start component and strategies preventing a full-career break: it offered grants to encourage more women with science degrees to remain in high-quality research or return to it after a break. In particular, the financial support for two years could be provided for part-time working and could also be used to cover the childcare costs.
- Finally, the **Carer Restart Scheme**⁸³ **of the University of Cambridge (UK)**, described in the in-depth case study report (see Annex 5 for more details), offers funds to assist returning carers in building up their research profiles and other academic activity after a period away from work (total absence or part-time/reduced hours. In particular, among other items, it may also cover childcare costs in relation to travel and accommodation when a researcher needs to attend specific events/conferences for work in view of facilitating personal commitments.

In addition to the above-mentioned examples, specific schemes are in place with the particular purpose of improving the work-life balance of researchers, particularly valuable for women. For instance, the **Royal Society's Dorothy Hodgkin scheme**⁸⁴. This is aimed at outstanding scientists (particularly women but not only) in the **UK** at an early stage of their research career who require a flexible working pattern due to personal circumstances such as parenting or caring responsibilities or health issues. This scheme offers the opportunity to hold appointments on a part-time basis or convert from full-time to part-time and back again. It also allows awardees to claim some funds for family support where these can be justified on scientific grounds, e.g. the cost of childcare during a conference or a collaborative visit abroad. The Society's fellowships are highly flexible and part-time working, sabbaticals and secondments can be accommodated. There is also provision for maternity, paternity, adoptive or extended sick leave. Similarly, as a research organisation, the **German Helmholtz Association**⁸⁵ commits itself to improving equal opportunities and increasing the

⁸⁰ Website of Wellcome Trust's Research Career Re-entry Programme <http://www.wellcome.ac.uk/Funding/Biomedical-science/Funding-schemes/Fellowships/Basic-biomedical-fellowships/WTD004380.htm>

⁸¹ Website of the Marie Heim-Vögtlin grants <http://www.snf.ch/fr/encouragement/carrieres/marie-heim-voegtlin/Pages/default.aspx>

⁸² Website of - The Advance Award Programme 2014 <http://www.sfi.ie/funding/funding-calls/closed-calls/sfi-advance-award-programme-2014.html>

⁸³ Website of the Carer Restart Scheme <http://www.hr.admin.cam.ac.uk/policies-procedures/returning-carers-scheme>

⁸⁴ Website of the Royal Society's Dorothy Hodgkin scheme <https://royalsociety.org/grants-schemes-awards/grants/dorothy-hodgkin/>

⁸⁵ Website of the German Helmholtz Association http://www.helmholtz.de/en/working_at_helmholtz/equal_opportunity/

compatibility of family and career, through custom-tailored solutions (mainly flexible working hours).

As highlighted by the interviewed stakeholders and confirmed by the desk research, in the UK and Ireland, gender issues are increasingly being considered at a national level. Funding agencies, most of the universities and research organisations, as well as private companies, are currently adopting the **Athena SWAN Charter**⁸⁶. The Athena SWAN Charter was established in 2005 by the British Equally Challenge Unit to encourage and recognise the commitment to advancing the careers of women in science, technology, engineering, maths and medicine (STEMM) employment in higher education and research. In particular, it is worth mentioning this initiative, since it stimulates employers to promote a variety of good practices supporting women-friendly working policies in order to achieve a better career progression for women in science. The merits of the Athena SWAN initiative were also recognised during the validation seminar and in particular its contribution to having made a difference at the national level in creating awareness of gender-related issues and changing the mindset of people.

The desk research performed revealed that a variety of examples of exit career prevention measures are also implemented **in non-EU countries**.

In the **US**, for instance, many universities commit to assist employees in developing a work-life balance by supporting the use of flexible work arrangements, when it is reasonable and practical to do so (and where operational needs will not be adversely affected). Beyond part-time, job-sharing and teleworking, there are also a series of further measures like:

- 'Adjusted Meal Periods', an arrangement that allows a full-time staff member to extend his or her meal period up to a maximum of two hours, but still work a full day, offered for example by George Washington University⁸⁷.
- 'Compressed Work Schedules', arrangements that allow a full-time staff member to work 40 hours in less than 5 working days (exempt and non-exempt employees) or work an 80 hour two-week work period during 9 days and have the tenth day off (exempt only), offered for example by George Washington University, by Northwestern University or the University of Chicago.
- 'Occasional Use Flexibility', in instances where an employee does not need a consistent flexible work arrangement, an occasional use agreement may be applicable. For this, parameters with regard to a) the frequency, b) projects/tasks and c) communication need to be established between the supervisors and the employees. This kind of flexible working arrangement is for example is offered by Cornell University.

In **Australia**, many universities promote their corresponding measures on their websites (for example: University of Sydney, University of Queensland, and University of Adelaide). Beyond part-time, job-sharing, child care and teleworking, there are also a series of further strategies in order to prevent a full career break. The following examples of one Australian university and one research organisation may be presented as examples of a good practice:

⁸⁶ For further details on the Athena SWAN Charter, see <http://www.ecu.ac.uk/equality-charters/athena-swan/>

⁸⁷ Website of the George Washington University (Colonial Community) <https://hr.gwu.edu/flexible-work-arrangements>.

- University of Adelaide, offering e.g. 'Compressed Weeks Procedure' and 'Flexi-Time-Procedures' (a formal arrangement for recording hours worked within the ordinary span of hours to allow eligible staff to: a) vary their start, finish and meal break times outside their local work area's core hours to enable them, for example, to drop children off to school in the morning, b) accrue a total of 10 credit hours during the span of ordinary hours in order to take time off (usually for the purpose of managing personal commitments) at a time that is mutually convenient for the staff member and their local work area).
- Commonwealth Scientific and Industrial Research Organisation (CSIRO) aims at offering maximum flexibility, e.g. by a) 'Flexible Working Hours'; b) 'Averaging Pay over a Reduced Working Year' (or '48/52'); c) Leave without Pay and Secondments.

Comparable to the United States and Australia, **Canada** has a range of measures to prevent a 'full' career break by offering earned day-off programmes and flexible hours to promote work-life balance as well as family-friendly leave policies that enable employees to use their sick leave in the case of illness of their children or spouse. Furthermore, family care offices (FCO) exist at several Canadian universities.

Many European countries, as well as the US, Canada and Australia have established flexible working arrangements, while in Japan such arrangements are still in the initial implementation stages. Actually, **Japan** (still) is one of the countries with the lowest percentage of companies with flexible working hours. However, gradually a trend towards changing working patterns can be observed. Nissan⁸⁸ may act as an example of good practice, offering employees a variety of work style choices so that they can achieve their ideal lifestyles while delivering their full professional capabilities. A variety of measures are offered to help them do so, including a few work programmes (like flex time without core time, the half-a-day-off programme and the work-at-home (W@H) programme), the 'Family Support Leave Program' and the 'March Land Inhouse Childcare Center'.

In recent years, the **Singapore** government has made a concentrated effort to promote flexible working arrangements. The Ministry of Manpower's (MOM) biennial employment survey showed that almost one in two firms (47%) provides at least one formal flexible working arrangement, whereas part-time work is the most common (offered by 36% of the companies), followed by flexi-time (12%), staggered hours (11%) and formal tele-working (5.8%). In the brochure 'Flexibility in the workplace. Empower your workforce through Flexible Work Arrangements'⁸⁹, published by the National Trades Union Congress (NTUC) Women's Development Secretariat, the Singapore Management University (SMU) is presented as an example of good practice. The part-time work, flexi-hours and home work arrangements are just some of the benefits available to SMU's staff. Flexi-hours have proved to be the most popular among working mothers and have become a key component in talent attraction and retention.

⁸⁸ Website of the Nissan <http://www.nissan-global.com/EN/COMPANY/DIVERSITY/WORK/>

⁸⁹ The National Trades Union Congress, "Flexibility in the workplace. Empower your workforce through Flexible Work Arrangements" http://www.ntucwds.org.sg/wps/portal/wds/home/events/mediareleases/mediareleasesdetails?WCM_GLOBAL_CONTEXT=/content_library/wds/home/events/media+releases/ae788912-d8b7-43ea-bb59-6d45eae38b9a

2.3.5. Perception of employers on people who take a career break

In this section of the report, we consider the opinions of employers on researchers who have taken a break, across EU Member States and Associated Countries, with particular attention to the differences in perception of male and female researchers. We also present the main reasons behind the reluctance of employers in relation to hiring restarters and propose a number of incentives that could contribute to overcoming this issue.

In the table below we present a summary of the key findings and conclusions of the analysis provided in the following sub-sections.

Key findings and conclusions of section 2.3.5

- Analysis of the information collected through different sources – including the opinions of researchers on the perception of a career break by employers, as well as the direct feedback of employers themselves – seems to lead to similar conclusions. On the one hand, the key positive element characterising restarters lies in their renewed motivation, enthusiasm and capacity for bringing fresh ideas. On the other hand, the main negative aspect perceived when considering restarters is that their flexibility is limited due to family commitments. This might also indicate that as women, and normally the ones taking family responsibilities, they start with a disadvantage overall. However, as previously mentioned, the culture and practice in a particular country also influence the attitude of employers towards both career break and restart.
 - Based on the data collected and presented in the previous section, the main reason preventing employers from hiring returners lies in the concern related to limited flexibility – and related productivity – a restart would show, mainly because of family commitments. On the other hand, researchers feel their employability might be particularly jeopardised because they lack updated skills on their return.
 - In view of these two findings, examples of incentives identified in order to contribute to changing the perception of employers and increase the employability of returners include – among others – financial support to implement career break policies and to assist restarters, also providing individual career advice and mentoring.
-

Perception of employers on researchers taking a career break

Respondents from research organisations (first launch) identified the renewed motivation and enthusiasm (41%), as the main characteristic describing restarters (particularly according to respondents from non-academic organisations and respondents from “Other countries” more than EU15 and EU13). Based on the organisations’ point of view, the second element characterising restarters is the limited flexibility (37%), while the third most common aspect, is that restarters tend to show a more mature attitude and higher level of loyalty (33%).

According to respondents to the survey of individual researchers, in terms of the overall perception of employers on researchers returning from a career break:

- restarters’ flexibility may be limited due to family commitments (e.g. childcare, eldercare, etc.) (38%);
 - restarters often lack the advanced knowledge required because they are not kept up-to-date with the latest developments (31%);
-

- restarters generally show renewed motivation and enthusiasm, and bring fresh ideas (29%).

The information collected reveals that perhaps researchers overestimate the degree to which employers might be concerned about their limited flexibility. Nevertheless, limited flexibility has also been identified by research organisations as a distinctive factor in restarters which is often interpreted as under-commitment in research and reduction of their productivity. In particular, it has been outlined that in research a poor publication record is a real issue, especially given the high competitiveness, and this is becoming even more serious for restarters. Indeed, some respondents to the survey of individual researchers reported that employers often focus excessively on quantity instead of quality, particularly in academia. On a positive note, many individual researchers answering the survey agreed that there is certain recognition from the employers' side that restarters are normally highly motivated and enthusiastic, which confirms the collected figures.

As highlighted by some respondents to the survey of individual researchers, the survey of research organisations and by some participants of the validation seminar, it is impossible to generalise with regards to the attitudes of employers towards researchers returning from a career break. This perception is influenced by a number of factors and can be very different depending on the type of employer, country culture and practice, attitude of the restarters, specific reasons for the break (parental leave or experience outside of research), length of the break (typically short career breaks have less impact on the reintegration process and require different re-training support than long breaks).

In this sense, the interviewed stakeholders also confirmed that there is still a certain difference in the perception of females and males taking a break, particularly in relation to maternity leave and childcare responsibilities. As already mentioned, there is no standard rule with regard to paid maternity leave for researchers, and women's childcare commitment is still not completely accepted in the research environment. Moreover, the occurrence of paternity leave and men's childcare commitment is even lower, with some exceptions in the north of Europe⁹⁰ (e.g. Sweden⁹¹).

The common feeling among the consulted stakeholders – also confirmed by the participants of the validation seminar – is that the science world is still dominated by men and that research institutions do not offer enough support for women to progress in their career and/or be promoted to higher positions. In particular, women are not provided with the necessary support to keep going without the burden of taking time off and falling out of the research loop. For instance, because of family commitments and related time-management issues, they are often unable to take full advantage of seminars, conferences, etc. that they could have otherwise. Thus, they are in a worse position in terms of networking than their child-free peers and it turns out to be very frustrating and demoralising when trying to re-enter the workforce under these conditions. As noticed by some representatives of research organisations, this often obliges female researchers to make a choice between pursuing a career in science or having children, given that combining the two still represents a major issue in many EU countries. The desk research confirmed this trend, and in particular the *data show that women of all races and ethnicities who earn STEM PhDs are also up to twice as likely as their male counterparts to leave STEM jobs, citing reasons that include a*

⁹⁰ One-europe.info, 'Paternity Leave in the European Union', <http://one-europe.info/paternity-leave-in-the-eu>

⁹¹ Europa.eu, 'Sweden: successful reconciliation of work and family life', http://europa.eu/epic/countries/sweden/index_en.htm

*desire for more work-life balance and a perception that STEM work environments are unfriendly toward women*⁹². Also, based on the gender information provided by respondents to the survey of individual researchers, female researchers represented only 36% of the total population – considerably less than their male colleagues (63%). There is indeed a need for more flexibility and support in order to advance the career of women returning to science after a career break and this is somehow also related to a deeper change of the mindset. In this context, as emerged during the validation seminar, MSCA should aim to encourage a change in this sense particularly at the national level.

On the other hand, a career break justified with experience in a sector different than research may be supported by employers, since it often enables researchers to learn diverse skills from a different context. However, so far the traditional European mindset seems to be more conservative towards these kinds of situations than for instance in the US, where this type of change is often seen very positively.

Reasons preventing an employer from hiring a returner and incentives to make them overcome their reluctances

As clarified in relation to the previous research question, although there is no common view from employers across Europe towards restarters – and some representatives of research organisations do admit sabbatical years and successful career breaks – the reasons preventing employers from hiring researchers returning after a break are often shared and rather similar among employers. In particular, there is a concern regarding the flexibility and productivity of restarters, together with a second one related to the restarter's difficulties to catch up because of the lack of updated skills. However the lack of skills is perceived more by the researchers than the employers. Since researchers are mainly evaluated in terms of publications, papers, results, projects, thesis direction. One of the major problems with restarting after a career break seems to be the lack of such publications, making the researcher less competitive in the eyes of employers.

In this context, based on the respondents' feedback, it seems crucial to make a distinction between voluntary and involuntary when evaluating career breaks in research. Indeed, most respondents are convinced that depending on the different reasons for a career break, the experience of the break as well as the perception of the employer might be totally different, for instance when the break is taken for parental leave or due to a lack of research positions and subsequent unemployment.

Overall, employers tend not to be very keen on restarters who have taken leave of absence from research because of family reasons. However, the perception of parental and especially maternity leave and family commitments depends strongly on the country's culture. Based on the open comments made by the individual researchers surveyed, it seems that for instance employers in Germany are generally sceptical about hiring mothers, due to assumptions about their availability and productivity. In Italy it is extremely difficult, if not impossible, to continue in research while having to take care of children; thus it is very likely that a researcher will be obliged to leave research and start in a different sector, for instance teaching. Similarly, in the UK parental leave is often not considered when applying for funding, meaning that researchers having taken standard parental leave, on their return to work, face

⁹²Early Academic Career Pathways in STEM: Do Gender and Family Status Matter?, Tanenbaum, Courtney and Rachel Upton, American Institutes for research, 2014 [pdf] Available at http://www.air.org/sites/default/files/STEM%20PhD%20Early%20Academic%20Career%20Pathway_March%202014.pdf

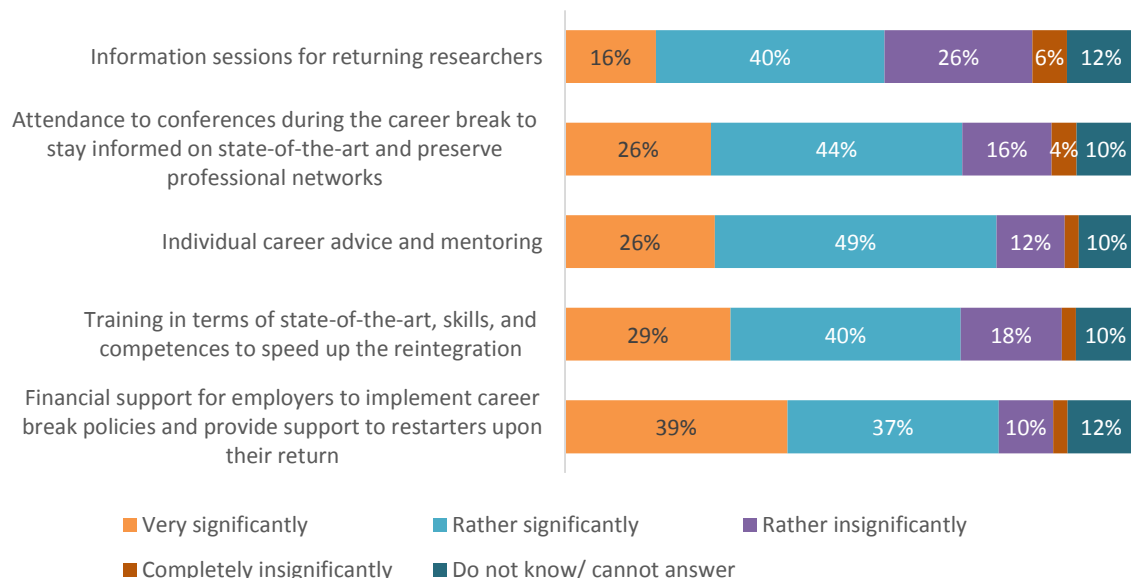
serious competition with those who did not take leave. On the other hand, most of the time, parents would not be eligible for career restart schemes because eligibility demands a career break that is longer than typical parental leave. In Sweden, parental leave of 6-12 months is widely accepted, which makes it easier to take a career break. Most fathers take at least take 3 months, most mothers at least 6 months.

The feedback collected through the survey of individual researchers and the survey of research organisations offers meaningful suggestions for improvements to overcoming the reluctance of employers towards restarters.

Based on the feedback collected through the survey of research organisations, individual career advice and mentoring, together with financial support for employers to implement relevant policies and provide support to restarters were identified as the measures having the strongest influence in fostering the employability of restarters. Indeed, each of these two options is considered very or rather significant by 76% of the respondents (see Figure 48 for more details).

Among other incentives proposed in the open comments to the survey of individual researchers to overcome the reluctance of employers related to restarters, are tax deductions available to companies and institutions for hiring researchers with children, this would further motivate employers to hire them. In addition, tax deductions may also apply to employers offering family-friendly actions as part of standard job packages for researchers. These policies would be an investment and partly solve the issue of reluctance by somehow compensating employers. Similarly, special grants and mentoring programmes for restarters could also help make them more employable.

Figure 48. Extent to which specific initiatives could enhance the employability of career restarters after their break



Sources: the survey of research organisations.

In addition, it has been observed that it is crucial that the issue of dual careers and breaks are addressed, starting particularly in the public sector, since in the private sector, with even higher demands on productivity, it is expected to be even more difficult for such issues to become widely accepted.

As emerged from the surveys of individual researchers and research organisations, the culture of the country is one of the main factors influencing the successful management of career restarters. Thus, a number of respondents pointed out that more than 'formal' tools and incentives of support (including breast-feeding facilities and other facilities related to childcare which are still very limited across Europe), it is the mindset of employers that should be shaped. Indeed, according to the valuable insights gathered during the final validation seminar, an effective tool in helping employers overcome their reluctances would be to illustrate with examples and success stories how restarters can be successful. In this context, it has been noticed that career breaks obviously concern not only the research world. The social implications (social coherence, economy and health) related to these questions are therefore not specific to the research sector. Hence, progress needs to be made at a broader level than only one professional sector such as the research one. This calls for high-level policy decisions, which are currently missing.

Indeed, according to the national stakeholders surveyed, support for researchers returning after parental leave (maternity/paternity pay, guaranteed return to the same position after the leave, etc.) is a common practice in their countries only for around 52% of the respondents (Table 16). In particular, in terms of maternity leave 58% of respondents answered it was very or rather common, while for paternity leave the percentage of similar answers is 45%. This indicates that almost half of the stakeholders still see this kind of support as rather or completely uncommon in their respective countries.

3. Study conclusions and recommendations

Research career promotion

General conclusions and recommendations

University-level initiatives were generally found to be more effective in encouraging young talented people to choose a research career, compared to initiatives that target schoolchildren. Study results also show that providing attractive financial conditions is one of the most successful type of instruments for promoting research careers among university students, whereas poor financial conditions is the single most important factor that discourages young people from choosing and remaining in research careers in Europe.

Recommendation No 1:

Continue **improving the financial conditions and opportunities for researchers, particularly those at earlier stages of their careers** (PhDs and postdoctoral researchers), in order to promote research careers and increase their attractiveness. Develop new funding schemes at both national and organisation-level or continue implementing the existing regional, national or EU level programmes and initiatives that support young talented students intending to pursue a research career (grants, stipends, scholarships etc.), while continuing to incentivise recognised researchers to stay in research. For this purpose, it is particularly important to exploit the synergies and coherence with the Marie Skłodowska-Curie Actions and the European Research Area.

Awareness and willingness to cooperate among the employers and local researchers was one of the key success factors of the measures aiming to promote research careers among young people. Study results also showed that employers of researchers are generally well aware of the most compelling arguments and very often use these arguments in encouraging young people to pursue a research career. However, the arguments concerning a good balance between work and family life are seldom used by employers, despite the great importance of this issue to researchers.

Recommendation No 2:

Raise awareness among the universities and other employers of researchers of the importance of promoting research careers among the young people. More specifically, employers should provide **more information on the possibilities of balancing work and family life**, as it is one of the most important criteria for young people considering a research career.

MSCA-specific conclusions and recommendations

The most popular forms of outreach activities in the Marie Skłodowska-Curie Actions were public talks and participation in conferences and lectures, while interactive activities were pursued less frequently and carried out mainly in a wider framework of science popularisation initiatives.

Recommendation No 3:

Increase the scope of outreach activities in the Marie Skłodowska-Curie Actions, **make them more experiential/interactive and better adapted to non-scientific audience by reviewing the guidelines for outreach and communication activities:**

- Take action to achieve a better balance between the outreach and communication activities in the career plans of the Marie Skłodowska-Curie fellows.
- Encourage cooperation between the Marie Skłodowska-Curie fellows, other researchers and research staff in host/partner organisations (especially under the projects supported by the host-driven actions) and other stakeholders (from the public sector or society).
- Emphasise the possibility of using outreach activities to address the existing gender disparities in research.
- Aim to achieve more synergies between the outreach activities in the Marie Skłodowska-Curie Actions and science promotion initiatives developed in beneficiary organisations.

Abstain from setting any mandatory instruments for outreach activities, as they should be kept flexible in order to adapt them to the local (regional) situation or different organisational contexts.

The number of Marie Skłodowska-Curie Actions project reports where youth is prioritised or directly mentioned as the key target audience of outreach and other dissemination activities is quite small, partly due to the requirement to limit reporting to dissemination activities.

Recommendation No 4:

Review the Horizon 2020 Model Grant Agreements for the Marie Skłodowska-Curie Actions and the reporting system. **Specify provisions and reporting requirements/guidelines with regard to outreach activities (as opposed to general dissemination activities)**, in order to gather more precise data at the project level and better assess the scope of outreach activities implemented under these actions. Analyse this monitoring information and discuss it with the responsible Commission and REA officials in order to exploit this follow-up information to improve the design and execution of these activities in the future.

In addition to raising the profile of Marie Skłodowska-Curie actions and promoting research careers, fellows of this programme used outreach and communication activities for reporting to the general public purposes and for keeping it informed about the ways in which research activities are performed and public funds are spent.

Recommendation No 5:

In the implementation of the new strategic priorities on Open Innovation, Open Science and Openness to the World **explore how the societal engagement of Marie Skłodowska-Curie fellows can contribute to advancing an agenda for Open Science in Europe**. More specifically, take steps to ensure that the Marie Skłodowska-Curie fellows are provided with **training on open science** in order to better prepare them for the implementation of the European Open Science Agenda.

The most successful activities of the European Researchers' Night were 'hands-on' experiments, shows and other activities of an interactive nature. Despite the overall satisfaction with the events, some features of the European Researchers' Night could still be improved by expanding their duration and implementing other project-level changes.

Recommendation No 6:

Continue **employing adequate science popularisation instruments and differentiating them according to the target groups** (interactive/experiential methods for schoolchildren and different types of public events for students) during the events of the European Researchers' Night. In order to attract more schoolchildren, students and working adults, suggest **making these events more accessible, improving their advertising and selecting larger capacity venues**. In the future consider extending the duration of these events by dedicating a whole weekend to science promotion among the general public and young people.

Dual-careers

General conclusions and recommendations

A significant number of European researchers face career difficulties linked to the fact that they are involved in a personal relationship, in particular when they hold some ambition for international mobility. Personal/family reasons and related dual-career issues, such as the possibilities of finding a job for their partner, are the main factors influencing their decision to move or not to another country. Among the researchers in a relationship and in a dual-career relationship, the share of mobile researchers is nearly the same as for researchers that are single. However, although the mobility rate of researchers involved in a relationship (including dual-career couples) does not seem significantly affected from a quantitative point of view, it may be affected from a qualitative point of view, leading researchers to make different choices in how they address their mobility and in their career development strategy.

Recommendation No 7:

Raise awareness among national authorities and employers about dual-career issues as being one of the main factors impacting the recruitment and retention of the most talented researchers in Europe. In order to achieve this, it is crucial to **continue gathering data on the number of researchers in a dual-career couple relationship and measuring other important indicators on dual careers as part of regular surveys or studies** addressing career paths and mobility patterns of researchers in Europe.

Financial aspects are reported as the main barrier faced by research performing organisations when trying to deal with dual-career issues. For the small number of employers that have established internal procedures and practices to face these issues, the most frequent measures include the provision of facilities for work-family balance and family-friendly benefits for researchers and their partners. However, only a few researchers and representatives from research organisations acknowledge the existing measures as fully effective.

Recommendation No 8:

Provide more funding for organisations or initiatives that support the implementation of effective dual-career services. Another option could be to support dual-career networks, which may involve **collaborative strategies between HR departments of academic and non-academic organisations, considering that these networks have proven to be quite useful in supporting researchers with dual-career issues.** These networks, often regionally oriented and working bottom-up, should be showcased and their results disseminated at European, national and regional level, in order to raise awareness and inspire the creation of other similar initiatives and networks across Europe.

Another way for organisations to deal with dual-career issues when the dual-career couple is composed of two researchers is to set in place dual-hiring policies, implemented through adequate measures/procedures. However, in Europe the majority of research performing organisations do not have dual-career couple hiring procedures in place and dually-hired researchers (jointly or sequentially hired by the same employer to work in the same or different location) represent only a small share of the dual-career couples. Moreover, the majority of researchers facing relationship-based career problems do not address those concerns at the recruitment stage partly due to the absence of recruitment processes that allow addressing dual-career issues in a structured and transparent way, or to the general lack of awareness among researchers of such specific processes and support services whenever they do exist.

Recommendation No 9:

Encourage research performing organisations to develop a clear and transparent position on dual-career couple hiring procedures and reflect it in formal documents. Promote the exchange of good practices (including mutual learning opportunities between human resources departments on different dual-career programmes) among the national authorities and research funding organisations. **In addition, the debate and development of a common framework** (compatible with the level of autonomy of the research organisations for the management of human resources) **to tackle dual-career issues** of researchers should be encouraged. This common framework should also be complemented by concrete measures. For instance, the provision of a job search tool built in the EURAXESS website that would enable a two-entry search allowing dual-career research couples to find their respective jobs within a commutable distance, could perhaps be considered.

MSCA-specific conclusions and recommendations

The absence of effective strategies, practices and services to address dual-career issues at European research organisations on the one hand, and the lack of awareness among researchers of the few existing measures on the other hand, contribute to underestimating the scale and impact of dual-career related issues on the personal and professional life of researchers and their partners.

Recommendation No 10:

Consider the possibility of introducing dual-career-friendly mechanisms in the existing EU-level programmes and initiatives. The explicit inclusion of such measures in the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers (Charter and Code), which are recommended to be endorsed and applied by all the beneficiaries of the Marie Skłodowska-Curie Actions, would encourage research performing organisations to give dual-career issues more serious consideration. Another potentially successful strategy would be the creation of virtual communities of practice dedicated to dual-career issues, which could encourage not only the sharing of experiences and best practices (for instance, through conferences), but also the implementation of relevant actions in this area.

Research career restart

General conclusions and recommendations

Involuntary reasons, such as the termination of temporary contracts and shortage of research positions, are the main causes of research career breaks. This effect is further strengthened by the limited research funding, as reported by most of the European stakeholders consulted during the study. This situation – sharpened by the financial crisis – does not allow the creation of long-term research positions with decent salaries. The overall precariousness of working conditions often leads talented researchers to terminate their careers.

Recommendation No 11:

At the individual level, improve employment and working conditions for researchers within the European Research Area and **ensure more long-term research positions**. At the system level, **sustain/increase the overall number of research positions**, by providing continuous funding for this purpose, and particularly encouraging non-academic employers to invest in hiring researchers, who should be properly trained for the private sector. Such an approach would support European researchers in general, including those on a career break. In parallel, **proactive actions aimed specifically at retaining talents and preventing research career breaks are needed, both at the EU and Member State level**, in order to diminish the barriers and obstacles that could prevent talented researchers from pursuing their career.

Other important reasons for research career breaks are related to childcare commitments (parental leave, maternity, paternity) and other family reasons (e.g. related to partners of researchers).

Recommendation No 12:

Considering the difficulties in reconciling work and family life, particularly for female researchers (but not exclusively), it is important to **promote effective measures aimed at preventing research career breaks** due to these specific reasons. Employers should further implement and support **flexible working arrangements, family friendly benefits, part-time working, teleworking and other similar strategies**. These practices are also encouraged by the *European Charter for Researchers* and the *Code of Conduct for the Recruitment of Researchers*, with the aim of ensuring successful research performance.

In general, there is a common negative perception among employers in relation to research career restarters, which is mainly caused by their limited flexibility due to family commitments. This limited flexibility – often interpreted as lower productivity – represents the main reason preventing employers from hiring returners. On the other hand, returners feel their employability is particularly jeopardised by their lack of updated skills on their return: the competition with other researchers who have not taken a career break was identified as the major barrier in the reintegration process.

Recommendation No 13:

Achieve greater acceptance among employers of the fact that research career breaks happen due to a number of reasons and do not represent an obstacle for talented researchers to return to their work. **Greater acceptance of research career breaks** implies a deeper change of the mindset across Europe, supported by the dissemination of relevant good practices. In particular, this process should be supported with specific initiatives and measures aimed at changing employers' perception and increasing employability of returners. Above others, these types of measures include the **financial support for research career break policies and assistance for restarters; providing individual career advice and mentoring; support for the events and conferences** helping career restarters to stay informed and preserve their networks during the career break; and training with a focus on the skills that speed up the career reintegration after a break.

MSCA-specific conclusions and recommendations

Due to the wide geographical coverage that allows researchers of any nationality to move to any EU Member State or Associated Country, the Career Restart Panel scheme is the only EU-wide scheme that addresses the researchers' career restart issue. Despite its potential for helping talented researchers to resume their career after a break, the fellowships awarded under the Career Restart Panel are unknown to the vast majority of European researchers, particularly compared to the standard Marie Skłodowska-Curie Fellowships.

Recommendation No 14:

Considering the low level of awareness among researchers of the Career Restart Panel, **increase its visibility at different levels**. At the EU level, being the key EU communication channel for the Marie Skłodowska-Curie actions, the content of the official Marie Skłodowska-Curie actions website should be improved. It currently provides very little information on the Career Restart Panel, especially once a call is closed. Moreover, information about the CAR Panel is presented as part of the IEF only, and it is recommended to present some information separately as well. At the national level, the visibility of the Panel should be increased through greater actions of host organisations and National Contact Points for Horizon 2020, including email newsletter and other promotion and dissemination activities or events in order to reach and engage restarters. To this end, the staff of NCPs should also be trained accordingly.

Although the Career Restart Panel scheme is considered overall very successful in facilitating a smooth return to research after a career break, beneficiary researchers recognise that it still difficult for a restarter to pursue a permanent position afterwards. Most of the stakeholders consulted during the study – both researchers and representatives of research organisations –highlighted that the total duration of the fellowships awarded under the Career Restart Panel is perceived as too short for resuming a career after a break, which is quite a long process. After a two-year fellowship, beneficiary restarters do not position themselves at the same level as the

researchers who have not experienced a career break.

Recommendation No 15:

Consider the possibility of **extending the fellowships awarded under the Career Restart Panel for another 6 or 12 months**: this would enable restarters to fully re-establish themselves and compete fairly for longer-term positions with other researchers. In addition, the training support provided could be tailored depending on the individual needs and particularly the length of the break, since long breaks require much more support in order to guarantee a successful restart.

The fellowships awarded under the Career Restart Panel are quite well paid, offer appropriate coverage of research, training and networking costs and provide adequate living, family and mobility allowance. On the other hand, the scheme could still be improved in terms of contributing to the better work-life balance of researchers as well as ensuring the gender balance in research careers.

Recommendation No 16:

Consider the possibility of **supporting part-time fellowships in a more systematic way, including for professional reasons, under the Career Restart Panel while also increasing their duration**, since part-time work under the Panel is currently allowed only for personal reasons. Although the common view on the Marie Skłodowska-Curie Actions is that full-time dedication on the part of the researcher is required, the part-time option may **allow restarters to gradually combine research and private life and facilitate an efficient (re)integration**. Some researchers might also be more productive under a part-time framework. In this way, the European Commission would convey the message that it prioritises quality research, while at the same time supporting work-personal life balance of researchers. In this context, Marie Skłodowska-Curie Actions could lead the way, as a successful good practice example for the EU Member States. This might also have some positive effects in terms of funding a greater number of female researchers. In addition, part-time arrangements would be particularly relevant to combined/part-time researcher positions, fostering knowledge transfer, networking and research collaboration among institutions and sectors.

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