FP7 ex-post evaluation PEOPLE Specific Programme (2007-2013): Rationale, implementation and achievements

by
Dr Dragana Avramov

Final: 13 August 2015

Table of Contents

ANNEX 1 –Tables and Figures

EVIDENCE BUILDING BLOCK 1: RATIONALE ("WHY")

PEOPLE Specific Programme: the legal and policy landscape

The human resource dimension, a key aspect of the European Research Area (ERA), was endorsed by the March 2000 European Council and ERA is anchored in the 2007 Treaty of Lisbon. Article 179 of the Treaty foresees a single market in which researchers, scientific knowledge and technology will circulate freely. The broader ERA aim is to achieve a unified research area open to the world, based on the internal market through which the Union and its Member States strengthen their scientific and technological bases, their competitiveness and their capacity to collectively address grand challenges. In that respect the PEOPLE Specific Programme, through Marie Curie Actions (MCAs) as a flagship programme for researchers' training and comprising the human resource dimension of ERA, is embedded in the European Union's legal basis.

The PEOPLE Specific Programme was established by the Decision of the European Parliament and of the Council of 19 December 2006 with the aim to strengthen the human potential in research and technology in Europe.[1] It was implemented through the MCAs and supported by the Framework Programme 7 (FP7) PEOPLE Programme as part of the ERA financial instruments.

The Marie Curie Actions built on the EU fellowship programme for transnational mobility of researchers created in 1990 under the Framework Programme 3 (FP3). The programme with the broadened scope of actions aimed at structuring training, mobility and career development for researchers carries the Marie Curie label since 1996.[2] MC Actions, which were implemented through the PEOPLE Programme in FP7, evolved into instruments of ERA aimed at structuring and strengthening research and innovation human resources activities in Europe. They focus on the creation of an attractive, Europe-wide single labour market for researchers and a single market for knowledge in line with the objectives of the ERA.

MCAs under FP7 have been regrouped in the PEOPLE Specific Programme with a budget of €4.75 billion (~9% of the total FP7 budget), distributed along 5 main activity lines: Initial Training of Researchers (~44% of the PEOPLE Programme budget), Life-long Training and Career Development (~28% of the PEOPLE Programme budget), Industry-Academia Pathways and Partnerships (~8%), International Dimension – World Fellowships (~18%), and Specific Policy Actions, including Researchers' Night and EURAXESS activities (2%).[3]

[1] Decision No 1982/2006/EC

[2] Under Horizon 2020 (H2020) the programme carries the label Marie Skłodowska-Curie Actions (MSCA)

[3] Data source: DG for Education and Culture (EAC), Unit B.3 – Innovation education, EIT & MSCA

Building on the MCAs and adding value to the human resource dimensions, the FP7 PEOPLE Programme as part of ERA activities was planned in support to the creation of a genuine European labour market for researchers. To achieve this objective, a coherent set of distinct accompanying actions were also implemented with a view to removing obstacles to mobility and enhancing the career perspectives of researchers in Europe. These accompanying "Specific actions" (adding themselves to the Marie Curie Actions) were aimed, in particular, at raising stakeholders and general public awareness, at stimulating and supporting action at Member State level and at complementing Union actions. These actions were also supposed to incentivise public institutions that promote mobility, quality and profile of researchers. The underpinning expectation was to ensure a structuring effect throughout Europe on the organization, performance, and quality of training, and researchers career development. The budget concerned was relatively low compared to other areas. The overall requested EU contribution for the 25 PEOPLE projects supported under FP7 until the end of 2013 was 16,24 million.[4]

The intervention logic of the PEOPLE Specific Programme was set against Europe's relative lack of competitiveness in attracting private research and development (R&D) investments and highly qualified researchers; fragmentation of the European public science and research base; insufficient funding for training and career development of researchers; and the lack of open and easy access to the scientific knowledge base.

The PEOPLE Specific Programme had as an objective to strengthen the human potential as one of the main competitive edges in science and technology. It aimed at attracting, training and retaining researchers in Europe, encouraging free mobility, collaboration and transfer of knowledge across borders, sectors and disciplines. It strived to equip researchers with key competencies that match public and private sectors' needs and set up excellent professional conditions for research career in Europe.

Although Europe hosts a large and diversified pool of skilled human resources for research and innovation, this needs to be constantly replenished, improved and adapted to the rapidly evolving needs of the labour market. Europe has the largest research community in the world, which has a rich cultural background. The EU has more researchers in absolute numbers than the US, Japan or China, but is lagging behind in the share of researchers in the total labour force. Only 46% of this pool works in the business sector, which is much lower than in Europe's main economic competitors (e.g. 62% in China, 75% in Japan and 80% in the United States).[5] In addition a disproportionate number of researchers in Europe will reach retirement age in the next few years.

Europe needs developing state-of-the-art innovative training schemes consistent with the highly competitive and increasingly interdisciplinary requirements of research and innovation. Significant involvement of businesses, including SMEs and other socio-economic actors, will be needed to equip researchers with the cross-cutting innovation and entrepreneurial skills demanded by the jobs of tomorrow and encourage them to consider their careers in industry or in the most innovative companies.

[4] Data source: DG for Research and Innovation, Unit RTD B.2 ERA policy and reform
[5] Data source: Deloitte for DG Research and Innovation, Researchers' report 2014

It is also vital to increase the mobility of researchers at all levels, including mid-career mobility, not only between countries but also between the public and private sectors. This is expected to create a strong stimulus for learning and developing new skills. It is also a key factor in cooperation between academics, research centres and industry across countries.

EVIDENCE BUILDING BLOCK 2: IMPLEMENTATION ("HOW")

The PEOPLE Specific Programme was implemented through the financial instruments of ERA, namely the flagship Marie Curie Actions, and a set of Coordination and Support Actions (CSAs), each having specific and complementary objectives.

Marie Curie Actions

Bottom-up, research-driven approach

The Marie Curie Actions follow the bottom-up approach as the applicants choose research topics freely. Calls for proposals are not challenge or topic specific. The distribution of the budget according to research disciplines was proportionate to the number of proposals submitted under different scientific areas. In FP7 life sciences accounted for the largest share of the MCA budget (LIF 27%), followed by engineering (ENG 18%), environmental sciences (ENV 11%), chemistry and physics (CHE, PHY 10% respectively) social sciences and humanities (SOC 9%), and mathematics and economics (MAT, ECO 2% respectively). Programmes co-funded by the MCAs are often multidisciplinary, thus they are grouped under a separate COFUND category and have taken up 11% of the total MCA budget (Annex 1 Figure 1).[6]

Numbers of researchers per research discipline are comparable to the breakdown of budget allocated according to disciplines as may be seen from Annex 1 Figure 2.

COFUND is often multi-disciplinary and represented as special category because proposals are not submitted, classified or evaluated under any specific disciplinary panel. Proposed and retained programmes may be linked to one or more disciplines, but may also run as bottom up programmes (e.g. incoming and outgoing fellowships inspired by MC). As a consequence, data is not collected for COFUND per research discipline.

The intervention logic of MC Actions

[6] All FP7 MCAs built on interdisciplinarity. The disciplinary classification relates to the self-declaration of the applicant wanting to be evaluated under a particular panel. In FP7 for the evaluations of proposals there was also mention of "A supra-disciplinary field as a new approach when the classical approach has reached its limit (e.g. nanotechnology)". This notion is no longer in use under H2020 and was replaced by the notion of transdisciplinarity that relates to the blend between several scientific disciplines and non-formal and informal knowledge.

The five activity lines were implemented through MCAs that comprised both host-driven and researcher-driven applications, each having specific intervention logic:

- Initial Training Networks (ITN)**,** including European Industrial Doctorate (EID) and Innovative Doctoral Programme (IDP) since 2012, were research networks supporting initial and doctoral training;
- Intra-European Fellowships (IEF) were providing support for researchers moving inside Europe;
- International Outgoing Fellowships (IOF), were providing support for researchers moving away from Europe;
- International Incoming Fellowships (IIF), were providing support for researchers moving to Europe;
- Career Integration Grants (CIG), were providing support for researchers starting a permanent position in Europe;
- Industry-Academia Partnerships and Pathways (IAPP) promoted Industry-Academia cooperation through exchange of staff;
- International Research Staff Exchange Scheme (IRSES), promoted international cooperation between Member States and Associate Countries and other Third Countries through exchange of staff;
- Co-funding of regional, national, international programmes (COFUND) promoted co-funding of regional, national and international research funding programmes for experienced researchers.

In addition, two specific actions aimed at enhancing visibility of MCAs and its achievements were Researchers' Night and the Marie Curie Prize (first awarded in 2012).

Cooperation with Third Countries was part of MCA remit. Under FP7 IRSES had as an objective to enhance EU Third Country cooperation. It set the stage and standards for opening to the world. However, it was set up to foster cooperation with only selected countries (neighbourhood, or countries that had signed S&T agreement with EU), and was not open to the whole world.

Promoting cooperation between academia and the non-academic organizations was another important task. Under FP7 IAPP (Industry Academia partnership and pathways) supported intra European and intersectoral mobility.[7]

MCAs were addressed to researchers at all stages of their careers, open to all domains of research and researchers of all nationalities, and they included mobility (international, intersectoral, interdisciplinary). Application was through competitive calls for proposals and in FP7 selection criteria included "Scientific and Technical Quality", "Training/Transfer of Knowledge (ToK)", "Implementation", and "Impact". MCAs had 100% funding rate and the budget covered generally salary, mobility, and research budget for the researcher.

Applicants and beneficiaries of retained proposals

[7] It was Erasmus not MC that was focused on Intra European staff exchange. Under H2020 the RISE MSC action is set up to support intersectoral cooperation and exchange among research staff of national systems.

Over 50,000 applications were submitted to the MCAs in FP7.[8] Over 11,000 projects have been financed. The success rate was on average 19%, ranging from 8% in ITNs to some 50% in the actions new to FP7 (IRSES and COFUND).[9]

The largest numbers of applicants were from the Member States and they also accounted for the large majority of retained proposals, namely 78% (Annex 1, Figure 3).

The success rates according to countries are not necessarily related to the size of the country. They differ significantly by action type indicating possibly different opportunities, priorities and gaps within the national research funding systems.

Overall, by far the most successful were applicants from the UK with 4,040 funded projects (23.7% of EU28 participations in FP7 MCAs), followed at a distance by Germany and France with some 2,000 funded projects each. Then came Spain, Italy and the Netherlands (Annex 1, Figure 4).

Among the associated countries Switzerland had the highest number of participations in funded projects (814), followed by Israel (627), Turkey (307), and Norway (191) (Annex1, Figure 5).

Centre National de la Recherche Scientifique (CNRS), the largest fundamental research organization in Europe, which carries out research in France in all fields of knowledge through its ten institutes, was the single most successful organization in terms of participations. CNRS had 514 successful participations followed by three UK organizations. Among top 10 organizations in terms of participations in FP7 2007-2013 five were from the UK having in total 1,180 participations. The most successful organizations from Germany and Spain had 250 participations from each country (Annex 1, Table 1). We observe some considerable differences between FP6 and FP7 in terms of the success rates among Member States institutions. In FP6 there was significantly less pronounced predominance of the UK. Only one UK University (Cambridge) figured on the list with 36 participations, and Greece and Ireland where also on the top 10 list in FP6 (Annex 1, Table 2).

Among industry participants in FP7 the most successful were large organizations such as Siemens, Philips, IBM, and NOVARTIS. Among the top 5 ranked organizations one is an SME. Namely BIOTALENTUM Tudasfejleszto KFT from Hungary had 11 participations in MCA FP7 (Annex1, Table 3).

A certain pattern is observed throughout the FP7 regarding countries of origin and countries of destination of researchers benefitting from MCA. Again, it is not the size of the population that is the key factor for the size of the mobile researchers and their choice of destination countries. The largest numbers of researchers (going to EU and Third Countries and coming from EU and Third Countries) supported by MCAs were Italian (3,330), followed by Spanish (2,527), German (2,343) and French nationals (1,945) (Annex 1, Figure 6). The favourite destination for MCA funded researchers

[8] Data source: Seventh FP7 Monitoring report 2013, European Commission
[9] Data source: DG EAC statistics as of January 2015

was the UK (Annex 1, Figure 7). Taking into account all the actions and both MS nationals and Third Country researchers 5,736 researchers chose the UK, 3,388 Germany, and 2,468 France. Italy was a predominantly outgoing country with over 3,300 researchers going abroad and only 1,822 researchers coming to train and work in Italy.

One of the novel measures under the FP7 Marie Curie Actions was the introduction of the co-funding mechanism for regional, national and international programmes (COFUND). COFUND objectives concerning the mobilisation and leveraging of national, regional and international resources and widening opportunities for individuals and research organisations relate strongly to the ERA priorities for overcoming mobility barriers and addressing fragmentation in the European research landscape.

The COFUND budget during FP7 was nearly €530 million. Once beneficiary funding are taken into account (based on an EU contribution of 40%) the total budget of co-funded programmes eventually raises to €1,3 billion. This allowed co-financing some 167 programmes and support for over 9,700 post-doctoral researchers.

The highest numbers of funded projects in FP7 MCA COFUND were from Spain (40), Switzerland (23), Italy (19) Germany (18) and France (14). However, the size of the COFUND project varied significantly and in terms of the number of fellows funded it is German nationals (1,695), followed by French (1,586), Spanish (1,457), and Swiss (879) that are at the top of the scale in terms of numbers (Annex 1, Figures 8 and 9).

The total of 17.535,67 fellow years were funded under COFUND. The co-funding is split between regional co-funding (50%), national (36%) and international co-funding (14%) (Table 4).

Under Initial Training Networks (ITNs) more than € 2 billion was dedicated to initial and doctoral training. Important steps towards enhancing career opportunities and meeting the needs of the business sector was the fast track inclusion in FP7 of the pilot programmes: the European Industrial Doctorate (EID) and the Innovative Doctoral Programmes (IDPs). A pilot on European Industrial Doctorates has been introduced in 2012 as part of the ITN scheme to enhance further the intersectoral collaboration and to involve the non-academic sector in doctoral training, so that skills of researchers better match public and private sector needs.

Researchers' Night (NIGHT) was a specific policy action aiming to bring the researchers closer to the public at large, and enhancing their role in the mainstream of society. It also aimed to demonstrate to young people that research careers are fascinating so as to stimulate them to embark on research. In order to raise visibility of the fellow's achievements during FP6 and FP7 a new Marie Curie Prize was awarded in 2012 and in 2014 under the name Marie Skłodowska-Curie (MSC). There were three categories of prizes: Communicating Science (open to all FP7 fellows); Promising Research Talent (open to FP7 ITN fellows); Nurturing Research Talents (open to all FP7 experienced researchers). The aim of the Prize is to encourage scientists to expand their field of excellence to innovation, entrepreneurship and science communication, and give visibility to the outstanding MCA outcomes.

MCA required applicant organizations to practice open and transparent recruitment of fellows and to offer attractive working conditions for early stage researchers. The requirements became embedded in the European Charter for Researchers and a Code of Conduct for the Recruitment of Researchers (Charter and Code) adopted by the Commission in 2005. The Charter and Code set out the roles and responsibilities of researchers and their employers and funders, and ways to make recruitment fairer and more transparent. The "scientific visa" package adopted in 2005 aimed to allow fast-track admission and residence of Third Country researchers.

The Research Executive Agency (REA) was in charge of managing evaluations of submitted proposals through peer-review procedures, and monitoring funded and co-funded MCA projects on a regular basis. The monitoring was undertaken via regular contact with project coordinators, via review of reporting documents and monitoring visits. Moreover, the Agency presented quarterly reports describing the management of Programme implementation tasks and presenting statistics on performance.[10]

There is evidence of the cost-efficiency of the REA management system. Taking into account REA's operating budget and funds allocated to expert evaluators and reviewers, the overall cost of MCA management in 2010-2011 was estimated to be 4.3% of the total MCA budget. Article 3 of the Council Decision on the People Specific Programme specifies that less than 6% of its total budget should be used for the Commission's administrative expenditure.[11]

Coordination and Support Actions of the PEOPLE Specific Programme

Part of the human resources dimension of ERA was implemented through Coordination and Support Actions (CSA) supported by FP7.[12] As coordination actions they were not designed to produce new knowledge or new methodologies, but to support the coordination of the activities carried out by the various project partners in the area of mobility and career development of researchers.

CSAs funded under the PEOPLE Specific Programme, with a relatively modest budget of some 16 million, need to be seen in the context of the policy related initiatives and ERA FP7 policy objectives. The open calls or grants for 25 selected CSAs have notably provided sustenance for the creation and operation of EURAXESS-Researchers in Motion activities. EURAXESS is a pan-European initiative for providing access to a complete range of information and support services to researchers wishing to pursue their research careers in Europe or stay connected to it. It aims at strengthening the attractiveness of European countries towards mobile

[10] REA was set up by the Commission in December 2007 but reached its administrative autonomy only on 15 June 2009.

[11] Comparison of costs of evaluations and monitoring between different funding agencies within EC and in other MS requires much caution because of the different remits and scope of activities. By way of example in Finland the evaluation costs of the Academy of Finland (AKA) for curiosity-driven applications stood at 3% in 2011, while for TEKES supporting value-driven research focused on innovation and growth in Finland costs stood at 8% in 2010 (for data see IMPACT-EV project National reports for Finland and Sweden, Dragana Avramov).

[12] Implemented under activities of Unit RTD Directorate B - Innovation and ERA.

researchers through different dedicated services: job opportunities, services, rights and links.

The operational dimension of the EU agenda for researchers EURAXESS evolved from the creation in 2003 of the European Researcher's Mobility Portal (as of 2008 EURAXESS Jobs); in 2004 ERA More Network (as of 2008 EURAXESS Services) and in 2005: European Charter for Researchers and the Code of Conduct for their Recruitment (as of 2008 embedded in EURAXESS Rights). EURAXESS Links continue to support European researchers but its mandate has been extended to also support non-European researchers wishing to move to Europe. Links include USA (since 2006), Japan (2008), China (2009), Singapore and India (2010), First Links "hub" ASEAN and opening of the "jobs and fellowships" dimension in the five EURAXESS Links web sites (2012), and Link Brazil (since 2013).

In addition to support for EURAXESS through CSAs, also a number of studies to capture mobility patterns and identify obstacles to mobility have been carried out under FP7 PEOPLE programme. In order to prepare new policy actions and evaluate the impact of on-going ones, feasibility studies and evaluation studies have been financed under framework contracts. Furthermore, five studies have been contracted by public tender or are in the process of being contracted.[13] In view of overcoming the lack of portability of social security when researchers move across borders and between institutions, which is seen as an obstacle to a single labour market for researchers, a study was funded and policy related initiatives were launched to set up a pan-European supplementary pension arrangement for researchers.[14]

EVIDENCE BUILDING BLOCK 3: ACHIEVEMENTS ("WHAT") – DIRECT ACHIEVEMENTS ("OUTPUTS")[15]

Mobility in a global world: attracting and retaining researchers in Europe

In FP7, MCAs have supported some 50,000 mobile researchers. MCA fellows have been representing over 140 different nationalities. Nearly 24% of MCA fellows are

[13] The five studies are: MORE Study - Mobility Patterns and Career Paths of EU Researchers; Monitor human resources, policies and practices in research, assess the impact of the "Scientific Visa" package and monitor the implementation of Pan-EU Pension Schemes targeted at Researchers, Support for continued data collection and analysis concerning mobility patterns. Source: FP7 Ex- Post Evaluation contribution From Rtd-B.2-Related to the Human Resource Dimension of the ERA

[14] The policy support not directly budgetary related to FP7 PEOPLE specific programme resulted in the creation of what is now known as "RESAVER – Retirement Savings Vehicle for European Research Institution" funded under H2020.

[15] This ex post review is based on existing data sources. No primary research was undertaken. DG EAC provided facts and figures on direct achievements based on administrative data. Two surveys about actual offerings at host institutions, the take up by fellows, benefits perceived by institutions and fellows undertaken for the two mid-term reviews, one for individual driven (by ECORYS in 2012) and one for host driven actions (by PPMI in 2013). are the main sources of data on achievements as assessed by the beneficiaries.

researchers from countries outside the EU Member States or Associated Countries.[16] Under MCAs there was no target in terms of the share of Third Country fellows. However, under FP7 25% of budget was to go towards cooperation with Third Countries, and this included EU fellows going to Third Countries. Thus, indirectly it may be concluded that the achieved 24% of Third Country nationals is a very good share of MCA fellows. By way of comparison, in FP6 the share of Third Country fellows coming to EU stood at 17%. There is a clear increase in FP7 and the impact is positive in terms of achieving a policy objective to attract best researchers to Europe. A return phase was an option available for Individual Fellowships – namely, fellows could ask for it. This option was regrettably disbanded in HORIZON 2020 (H2020). Some half FP7 fellows stayed in Europe after the end of their MC fellowship.[17] Nevertheless, one cannot talk about any significant brain drain due to MCAs from less developed regions of the world because one out of two incoming fellows (46%) were coming to the EU from industrialized countries.

Moreover, the International Research Staff Exchange (IRSES) has promoted reciprocal exchange of research staff from Europe to Third Countries (neighbourhood, or countries that had signed S&T agreement with EU). Thanks to IRSES, some 30,500 researchers could be seconded from Third Countries to EU28 to establish and strengthen scientific collaboration. In terms of host organisations, about 12.5% of the funded Marie Curie beneficiaries are localised in Third Countries. About a quarter of the total number of projects funded under the Marie Curie Actions has a non-European organisation involved. This testifies the worldwide openness of the programme and its important contribution towards enhancing the knowledge transfer and the quality of research undertaken.

COFUND fellowships have been contributing to the reinforcement of the human resource potential. The number of fellowships that have been created and filled evidences this in quantitative terms, and both individual fellows and their host institutions have also reported on the qualitative improvements. This includes the strengthening of the institutions' research capacities, of researchers' individual capabilities and of synergy within research networks. The benefits are observed in the host institution for the duration of the fellowship and in institutions where ex-fellows were subsequently employed. Establishing and managing a COFUND programme has affected the administrative and operational procedures of around a third of the organisations concerned, mostly in terms of increasing the openness of recruitment to trans-national mobility in line with the European Charter and Code and the use of independent/peer review in selection processes.[18] Mobility across borders and

[16] The figure excludes short-term exchanges under IRSES scheme. With IRSES figures included, the share of third country nationals supported by FP7 MCA increases to nearly 34%.

[17] Interim contribution related to the Marie Curie Actions (PEOPLE Specific Programme) FP7 ex-post evaluation (2014-2015), Directorate General (DG) for Education and Culture (EAC)

[18] Data source: PPMI for DG EAC, 2013, FP7 Marie Curie Interim Evaluations

between sectors and internationalization of research allowed for significant transfer of knowledge between different contexts.[19]

There are several good examples among co-funded programmes about regional impacts and the synergies with structural funds. One of them is the SoMoPro fellowship programme of the South Moravian region, Czech Republic, which could combine MCA-co-funded fellowships with other programmes funded by structural funds in order to develop knowledge-based strategy for the region. Brain drain is a concern in several Member States. Some countries such as Hungary, Bulgaria, and Estonia are already using structural funds for the ERA actions to improve their research systems.

The Specific Actions of the PEOPLE Programme related to the human resource dimension of the ERA included 25 FP7 PEOPLE projects that are being or have been carried out by participants from 34 different countries (22 Member States and 12 Associated Countries), through 89 participations (53 from Member States, 36 from Associated Countries). More than 100 cross country links have been established through these projects. During FP7 it was clear that there were numerous obstacles to mobility, such as visas for Third Country nationals, work permits, and lack of information. Several reports addressed obstacles to mobility and career advancement; they are all available on EURAXESS portal. Lessons learnt contributed to the work of the ERA Steering Group on Human Resources and Mobility (SG HRM) - which represents mainly the Ministries of Research of almost 40 countries - and were built into policy instruments such as the new EU scientific visa allowing for a fast track to research careers in the European Union.

40 participating countries support EURAXESS Researchers in Motion portal as a joint initiative of the European Commission and the countries participating in the European Union's Framework Programme for Research across Europe. Marie Curie Fellowships are automatically posted on EURAXESS Jobs.

Intra European mobility: promoting brain circulation between EU countries

European Union nationals benefitting from MC fellowship select their EU destination country based on the perceived attractiveness of the training and research landscape and career opportunities that this mobility appears to open up. In terms of numbers, the most attractive destination for the EU nationals for MC research training was the UK, followed at a distance by Germany, Spain, France and Italy. The top five most successful EU nationals whose applications were retained for MCA funding and who went to another EU country were nationals of Italy, Spain, Germany, France, and Greece (see Figures 12 and 13 and Table 7).

[19] Benefits for fellows of cross border mobility are well documented in studies undertaken under PEOPLE Specific Programme such as ECORYS for DG EAC, 2012, FP7 Marie Curie Life-Long Training and Career Development Evaluation: Individual Fellowships and Co-funding Mechanism; PPMI for DG EAC, 2013, FP7 Marie Curie Interim Evaluations; Economisti Associati for EC 2014, Marie Curie researchers and their long-term career development: A comparative study; Deloitte for DG RTD Researchers' Report 2014; IDEA Consult for DG RTD Support for continued data collection and analysis concerning mobility patterns and career paths of researchers, and ERA reports.

Nine countries have been receiving more EU research fellows to train than sending their own nationals to train in another EU country. At the top of the scale is the UK (3.041 more incoming than outgoing fellows), followed at a distance by Sweden (+294), Belgium (+325), the Netherland (+424), Denmark (+244), and Germany (+225). Italy is the country with the highest negative mobility balance (number of outgoing with respect to incoming fellows with EU nationality). Some 1.568 more Italians were going to another EU country than EU nationals coming to Italy for research training. The negative balance is marked for Poland (-679), Spain (-643), Greece (-437), Portugal (-311), and Romania (-240) (see again Table 7). As may be seen from Figures 12 and 13 and Table 7 that in some countries research training mobility is very low.

Whereas these figures may give a rough indication of the perceived 'national opportunity landscape' these merged data for all the MC Actions give only a partial picture of how nationals of different EU countries have benefitted from MC opportunities to move within EU. On the one hand, there is no longitudinal data to capture the mobility of MC beneficiaries after the end of their MC fellowship. Thus, the above data do not give a robust picture of possible brain drain from some countries and brain gain in others. On the other hand, there are considerable differences in the success rates of fellows from the Member States according to specific MC Actions.

Indeed, there is evidence that MCA have contributed to brain circulation in the European Union. Looking at figures on mobility of EU nationals, after disregarding incoming Third Country nationals, we observe that for a significant number of MC beneficiaries the destination country is the researcher's own country. On average, one out of four incoming fellows are EU nationals who fulfil the mobility rule and return to their home country. In some countries such as Bulgaria and Romania seven out of 10 incoming fellows are nationals of those countries. In the Czech Republic, Greece, Hungary, Poland between 50% and 60% of incoming fellows are nationals (see Table 5 and Figures 12 to 69).

One can assume that after completing doctoral studies, or having worked as early stage researchers in another EU country, researchers use the opportunity offered by MC fellowships to return to their country of nationality. On the basis of available data there is no way of telling whether these researchers would have returned to their country of origin had there not been for the MCA incentive. However, the fact that return fellows as share of all incoming fellows was most prominent in countries that do not have a very favourable research landscape and that offer modest research opportunities, it may be concluded that MCA have played an important role in promoting brain circulation.

In some countries such as Bulgaria, Czech Republic, Spain, Finland, France, Hungary, Poland for example, Career Integration Grants (CIG) have played a significant role in opening up opportunity for considerable numbers of talented researchers to take up research positions in their own country (see Figures 14 to 69).

The fact that Italians (and Spaniards) are most successful in obtaining MC funding tells us at least two things. First, that they receive excellent training in their home country and that they are highly competitive Europe wide. Second, the research

environment in their country is fragmented, still relatively closed, and employment opportunities for early stage researchers are scarce. They do, however, also have a higher than average percentage of fellows who fulfil the mobility rule and benefit from MC opportunities to return to their home country (43% and 39% respectively).

Training and career opportunities in academia and non-academic organisations

Over 11,000 projects were funded (€ 4,75 billion funding in total) under MCAs and research has been undertaken in some 85 countries with 22,200 participations of various host organisations.[20]

Career development for researchers and strengthening research and innovation activities in European organisations in FP7 is evidenced by survey data on industry and international dimensions of the host-driven parts of the programme. At the organisation level the impact is documented for strengthening the cooperation capacities of host institutions and their quality. Nine out of 10 respondents from the successful IAPP and IRSES projects stated that the programme provided attractive international mobility opportunities for researchers to increase research quality and outputs in their organization. Nine out of 10 of all organisation beneficiaries considered that the MCA provided attractive opportunities to create new, or join existing international research networks. Eight out of 10 indicated that it provided more opportunities to attract researchers to their organisation from abroad.[21] The results of the 2011 and 2012 Marie Curie fellows' surveys[22] show that the fellowship enabled research skill development (more than nine out of 10 respondents) and gave attractive access to scientific knowledge and databases (eight out of 10).

The FP7 Marie Curie funding has supported participations of both academic and non-academic organisations in EU MS, Associated Countries and beyond, creating opportunities for exchanges and cooperation among universities, research institutions and businesses.

Marie Curie Actions as human resource and mobility funding instrument of ERA had no special resources for reaching out to policy makers. No Actions were targeted at policy makers or government institutions. Some policy dimensions of MCAs are embedded through the Programme Committee where national representatives have a policy remit and National Contact Points (NCP) that are involved as intermediaries between the PEOPLE programme and the policy world. A small segment of the PEOPLE programme as part of ERA through EURAXES and CSA activities aimed at raising awareness and stimulating and supporting actions at national level was targeted also to the policy makers. This included visa issues for Third Country nationals and portability of social benefits for mobile researchers. Furthermore, several expert groups have been active, and common approach to doctoral studies was developed. In 2011 a highlight policy initiative of the European Commission was launched aimed at supporting, via the ERA Steering Group on Human Resources and

[20] Data source: DG EAC as of January 2015
[21] Data source: PPMI for DG EAC, 2013, FP7 Marie Curie Interim Evaluations
[22] Fellows' surveys were carried out in 2011 by ECORYS for researcher-driven actions and in 2012 by PPME for host-driven actions.

Mobility (SG HRM) the implementation of the Seven Principles for Innovative Doctoral Training.

Central to the MCA was providing support for cooperation between Universities and industry in view of their sharing of knowledge, provision of joint training to researchers and broad skills development. 6.3% of the overall FP7 MCA budget was dedicated to SMEs. 9.6% of all FP7 MCA participants were from the private sector (out of over 22,000 participations).[23] This share has been significantly higher than average in two main activities dedicated to academia-industry interactions (Initial Training Networks (ITN) where 20.8% of participants were from the private sector; and Industry-Academia Partnerships and Pathways (IAPP) where 44.6% of participants were from the private sector. Together ITN and IAPP schemes constituted 50% of the PEOPLE Programme's budget.[24] Among all businesses participating in ITN and IAPP actions, more than 50% were SMEs. Out of 10 European companies investing the largest sums in R&D, nine companies (Volkswagen; Daimler; Sanofi-Aventis; GlaxoSmithKline; Siemens; Robert Bosch; Bayer; AstraZeneca; Eads) participated in host-driven MCAs.

According to the IAPP participating organisations MCAs had contributed to research that could lead to improved products or processes in the future (acknowledged by 61% beneficiaries), helped to become more aware/confident of the commercial potential of their research (45%), as well as helped to gain new commercial contacts in the project network/partnership (including industry) (41%).[25]

The embedded intervention logic of various Marie Curie Actions strongly impacted the degree of involvement of the various types of institutions. Individual Fellowships were predominantly hosted in Higher Education Institutions (HEI) and to a lesser extend in public research organizations, while the share hosted in private company was very low. In 2010 only 1% of hosts for individual fellows under EIR, IIF or OIF were private companies.[26] Mobility opportunities between private and public organizations offered by HEI were rare in researcher-driven fellowships (EIF, OIF, IIF) as academia was not particularly involved in opening up career prospects in non-academic institutions. This indicates that academia/industry partnerships in training researchers for the future do not come spontaneously in the Europe's research landscape and that strong incentives may be needed to break down the barriers. The introduction of the pilot European Industrial Doctorate in 2012 is MCAs response to the need for expanding the research capacity of companies and broadening the range of skills acquired by doctoral graduates.

Interdisciplinary approach is a key to unlock knowledge and innovation potential in many scientific disciplines. The critical mass of knowledge in different scientific fields is often concentrated in different countries. Therefore, an action at European level was effective for increasing interdisciplinarity and sharing of knowledge

[23] Latest available data from DG EAC as of January 2015 differ somewhat from older data given in the Seventh FP7 Monitoring report: Monitoring Report 2013, European Commission where the basis for the calculation is 18,000 participations.
[24] Seventh FP7 Monitoring report: Monitoring Report 2013, European Commission.
[25] Data source: PPMI for DG EAC, 2013, FP7 Marie Curie Interim Evaluations
[26] Data source: ECORYS for DG EAC, 2012, FP7 Marie Curie Life-Long Training and Career Development Evaluation: Individual Fellowships and Co-funding Mechanism

between researchers. MCAs developed research collaboration across disciplines and promoted interdisciplinarity in all projects – this was a key aspect for the evaluation of the most important criterion (S&T Quality) in FP7 for majority of calls for proposals.

However, it must also be noted that there is no in depth analysis of the achieved interdisciplinarity for all the MCAs. Mid term survey on host driven actions, ITN, IAPP, and IRSES, included a question on types of training provided by host institutions and the most popular training received by the fellows. 81% of the beneficiary organisations reported providing training in interdisciplinary techniques. The shares stood at 78.8 for IAPP, 71.4 for IRSES and 87.4 for ITN. The most popular types of training received by the fellows were new and/or advanced scientific methods (according to 63% of the MC fellows) and interdisciplinary techniques (53% of them).[27]

Regarding measurable indicators of intersectoral mobility it is observed that some 8% of the budget was dedicated to IAPP. This action involved staff exchange between academia and industry with a minimum stay of 2 months and a maximum of 2 years (usual stay was 3 to 4 months). 16 % of all fellows participated in IAPP. In addition under ITN each fellow was expected to spend short period under secondment. This secondment varied between a few days and several weeks. However, no systematic data was collected on these intersectoral movements and their career impact.

Although there is only scattered statistical evidence, it may be concluded with confidence that MCAs have effectively supported the knowledge triangle establishing close, effective links between education, research, and innovation by exposing new generations of researchers to both public and private, and bridging the gap between academia and industry especially through dedicated actions such as IAPP, ITN and IRSES.

Modernizing doctoral training in Europe

Under Initial Training Networks (ITN) support was provided to 10,000 doctoral candidates.

The principles guiding the doctoral training offered under ITNs are recognised as best practice in Europe. International, intersectoral and interdisciplinary environment created by consortia from different countries is offering to supported researchers significant exposure to industry, development of transferable skills, such as entrepreneurship, business skills and Intellectual Property Rights (IPR), as well as attractive working and employment conditions.

The quality of training and supervision under ITNs was highly rated by eight out of 10 MC fellows in terms of the amount and the quality of supervision. 95% of the MC fellows were satisfied by the training opportunities offered during the fellowship.[28]

[27] Data source: PPMI for DG EAC, 2013, FP7 Marie Curie Interim Evaluations
[28] Ibid.

A pilot European Industrial Doctorates (EID) has been introduced in 2012 as part of the ITN scheme in view of enhancing further the intersectoral collaboration and involving the non-academic sector in doctoral training. The FP7 MCA supported 58 EID projects in which some 240 PhD candidates are trained. Each participating researcher must be enrolled in a doctoral programme and spend at least 50% of their time in industry partner(s).

During FP7 a consistent set of activities took place for elaborating a common approach to doctoral training in Europe. Training of doctoral candidates has a particular role in bridging the European Higher Education Area (EHEA) and the European Research Area (ERA). Important milestones were the 2005 Salzburg Principles for Doctoral Education, the 2010 Salzburg II regarding funding, institutional autonomy, legal framework, and intersectoral collaboration. The process reached a key milestone in 2011 with the policy initiatives of the European Commission aimed at supporting, via the ERA Steering Group on Human Resources and Mobility (SG HRM) the implementation of the Seven Principles for Innovative Doctoral Training.[29]

The Seven Principles endorsed in the Council conclusions in 2011 encapsulate: Research excellence, Attractive institutional environment, Interdisciplinary research options, Exposure to industry and other relevant employment sectors, International networking, Transferable skills training, and Quality assurance. The principles are expected to contribute pushing the boundaries of frontier research, cross-fertilisation between disciplines and exposure to all fields of future employment, and encouraging mobility. The goal of quality assurance in doctoral education should be to enhance the quality of the research environment as well as promoting transparent and accountable procedures for topics such as admission, supervision, awarding the doctorate degree and career development.[30]

The actions implemented through the financial instruments of ERA in general and FP7 PEOPLE Programme in particular and MCA regarding PhD were relevant for the elaboration of a consistent set of principles affecting early stage researchers. MC as one of the main funding programmes for doctoral training in FP7[31] with embedded mobility as eligibility criterion was a forerunner in including the principles of the Charter and Code, interdisciplinarity and exposure to non-academic research ecosystem, among the requirements and the evaluation criteria. The principles of

[29] "Report of Mapping Exercise on Doctoral Training in Europe "Towards a common approach" of 27 June 2011(final), adopted by the ERA Steering Group on Human Resources and Mobility. The Principles were defined with the help of experts from university associations; industry and funding organizations. They reflect the Salzburg Principles of EUA, good practice in Member States and the Marie Curie experience. The Principles have been endorsed in the Council conclusions on the modernization of higher education, Brussels, 28 and 29 November 2011.
http://ec.europa.eu/euraxess/pdf/research_policies/Report_of_Mapping_Exercise_on_Doctoral_Training_FIN AL.pdf

[30] Directorate B - European Research Area Unit B.2 "Skills", Principles for Innovative Doctoral Training

[31] Erasmus Mundus Joint Doctorates (EMJD) operated outside the FP7 and PEOPLE Programme during the 2007-2013 period

Innovative Doctoral Training were further formally embedded in the Programme as of 2012.

During the 2009-2013 period there was some overlap between the EC funding instruments for doctoral studies with mandatory mobility. Namely, the FP7 PEOPLE Programme under its Initial Training Networks (ITN) supported initial and doctoral training, while Erasmus Mundus programme funded Erasmus Mundus Joint Doctorate (EMJD). Whereas the two instruments both provided fellowships for doctoral research and included mandatory mobility their intervention logics were somewhat different. Namely, ITNs were project-based and the duration of the project was normally 48 months from the start date of the grant agreement. Once the research project was completed there was no encouragement for supporting the renewal of the project or ensuring sustainability through EC funding of the network as such. By contrast, EMJD having the primary aim to develop structured and integrated cooperation in higher education in order to design and implement common doctoral programmes that lead to the award of mutually recognised joint, double or multiple doctorate degrees, supported networks through funding five, sometimes six consecutive cohorts of students. EMJD supported renewals under the standard conditions of competitive calls open also to first time applicants. This commitment to longer term funding of EMJD was motivated by the fact that achieving joint degree requires longer-term commitment of HEIs and financial support by the EC. EMJDs that had been running for several years had implicitly a relative advantage of experience in jointness with respect to the first time applicants submitting proposals under the same call. As consequence, many renewals have been funded under Erasmus Mundus. Under H2020 EMJD are integrated in the Innovative Training Networks (ITN). European Joint Doctorates (EJD) as part of ITN, similarly to former Erasmus Mundus Joint Doctorate, require a minimum of three academic organisations forming a network with the aim of delivering joint, double or multiple degrees. Joint supervision of the research fellow and a joint governance structure are mandatory. In that respect the intervention logic of EMJD is perpetuated through EJD under H2020.

Project based host-driven ITNs whereby doctoral students were selected by the network organizations for the project needs, were well complemented at the MCA level by researcher-driven Individual Fellowships that left full freedom to researchers to choose the topic of their post-doc and/or research training and to select the single best host that can tailor training to the individual needs and aspirations of a fellow.

Open recruitment and attractive working conditions for researchers

From the very beginning of the fellowship programme in the 1960s, and in particular under FP6 and FP7, MCAs have been fostering open recruitment procedures, equal opportunities and offering attractive employment and working conditions for researchers. MCAs are seen as best practice in setting professional standards for researchers.

Under FP7 MCA requirements have been fully in line with principles of the Charter and Code. In FP7 under MCAs guidelines the implementation of the Charter and Code were recommended, and were included under evaluation sub-criteria giving a clear advantage to HEIs abiding by the Charter and Code. However, they were not

made mandatory for all the partner organisations in the retained proposals.[32] Flexibility was necessary to allow time for national legislation to be aligned so that stipends could be phased out and replaced by early stage work contracts. It is estimated that the large majority of MCA host organizations in FP7 implemented fully or in part the principles of open recruitment and professionalization of early stage research in line with the Charter and Code ensuring that researcher's rights and obligations are upheld.

There is evidence of a spill-over effect in organisations participating in the MCA from their projects to other organisational practices as may be seen from the survey among organizations participating in the host-driven MCAs. The following practices of MC beneficiaries for managing the careers of other (non-MC) researchers were most affected: offering more mobility opportunities for researchers (48%), introducing new types of training for researchers (41%), better public advertising of research job vacancies (41%), advancing career development, advice and job placement services for researchers (35%), introducing new methods for the supervision of researchers (31%) and introducing new welcoming or support services for researchers (also 31%). Contracts with full social security were introduced to researchers (13%), working conditions for researchers were improved and made more flexible (19%) and salaries of researchers were made more financially attractive (21%). The spill over effect of the MCA on the beneficiary organisations is quite considerable in the latter areas, taking into account the challenges faced by research institutions.[33]

Marie Curie Actions also have had a pronounced structuring impact on ERA by setting standards for research training, attractive employment conditions and open recruitment for all EU-researchers, and by aligning national resources as well as influencing regional or national programmes through the co-fund mechanism.[34] The extent of spreading of open recruitment practices may be illustrated by the increase in numbers of publicised research vacancies on EURAXESS portal from some 7,500 in 2010 to over 40,000 in 2013. Together with Coordination and Support Actions under ERA PEOPLE programme they have been contributing to more open transparent, merit-based recruitment practices across Europe. They are answering to demands from the research community especially in countries where researchers are not satisfied with the prevailing recruitment practices.[35]

Gender related achievements

The FP7 target was to achieve 40% women participation. MCA have practically achieved this target, as 37% of MCA fellows are women.[36] This is a significant enhancement of opportunities, and in particular for attracting women to embark and stay in research careers by promoting open recruitment and improving working

[32] The New Model Grant Agreement for H2020 funding includes an obligation under Article 32 requiring that Charter and Code principles be applied.
[33] Data source: PPMI for DG EAC, 2013, FP7 Marie Curie Interim Evaluations
[34] Contribution from RTD-B2 related to the human resource dimension of the ERA, FP7 ex-post evaluation, DG for Research and Innovation
[35] Empowerment of the Next Generation of Researchers, MSC Actions 2014 Conference Report drafted by Dragana Avramov for the Italian Ministry of Education, University and Research
[36] Data source: DG EAC as of November 2014

conditions and career prospects. Transparent methods for recruiting researchers are known to be a powerful tool against hidden discrimination of women.[37]

Women, on average represent 33% of EU researchers but there are many disparities between countries. Increase towards a balance in research organisations is very slow despite the fact that women represented more than 40% of the PhD graduates for a long time.[38] MCA engage strongly in promoting gender equality in research. They have been contributing to gradually levelling off the gender gap in the research community both through MCA evaluation methods and a spill over effect through COFUND Action. However, gender differences between scientific fields remain significant as women remain underrepresented in Science, Technology, Engineering and Mathematics (STEM). This may be seen from data on the gender distribution according to MCA panels (Annex 1 Figure 10).

The MC Career Restart Panel offered opportunities for researchers to resume their career after a break. Some 100 projects were funded in FP7 MCA. The number of submitted applications has been increasing as 223 applications were received in 2013, which constitutes an increase of 48% as compared to 2012 figures.[39]

All MCA projects have a dedicated family allowance for researchers with family obligations. This is particularly important for supporting early stage researchers in the career phase that coincides with couple formation and early parenthood. Fellows' surveys indicate that prior to taking up the fellowship, as many as seven out of 10 fellows were living with a partner or spouse, or partner/spouse and children.

The value of the family support is documented by data showing that among beneficiaries of Individual Fellowships (EIF, OIF, IIF) 42% fellows were with family charges (equal spread among men and women). In ITNs the shares are understandably lower as fellows pursuing doctoral studies are slightly younger that early stage researchers benefiting from Individual Fellowships as may be seen from Annex 1 Figure 11. There were only 15% of fellows with family obligations (68% of those with family obligations are men). For IAPP 44% of fellows are with family obligations (again majority of those 77% are men). In total, figures show that almost one in three fellows in Individual Fellowships, and host driven actions IAPP and ITN have family charges. Family allowance, no doubt contributed to removing some obstacles to researchers' mobility and to better professional/family life balance.

Skills and expertise acquired by fellows

MC fellowships have definitive beneficial effects on improving fellows' skills and enhancing expectations towards career prospects in research. Information about career development of MC researchers confirms that an overwhelming majority of fellows are satisfied with the scope and quality of training received. According to the FP7 MC

[37] Avramov Dragana, 2011 Structural Changes in Order to Improve Gender Equality in Research Organizations in Europe, report for DG RTD

[38] European Commission, She figures 2012 Statistics and Indicators and Innovation Gender in Research; and DG Research and Innovation, Gender Equality Policies in Public Research, 2013, Based on a survey among Members of the Helsinki Group on Gender in Research and Innovation

[39] Seventh FP7 Monitoring report: Monitoring Report 2013, European Commission.

fellow survey for both researcher-driven and host-driven actions the programme mostly contributed in terms of providing attractive opportunities to develop their research skills, as well as by providing attractive access to scientific knowledge and databases and supervision arrangement.

The overwhelming majority of ITN fellows, eight out of 10, are awarded a PhD during their fellowship.[40] This is a significant achievement in view of the duration of the fellowship and the fact that PhD has as core the original research output that pushes frontiers of knowledge in a particular area and enhances significantly employability and career prospects of fellows.

The quality of training and supervision under the ITN was highly rated by 78% of the MC fellows in terms of the amount of supervision and by 82% of the fellows in terms of the quality of supervision. 95% of the MC fellows were satisfied by the training opportunities offered during the fellowship.[41]

In addition to acquiring advanced knowledge in theories and methods that are a basis for cutting edge original research, MCA fellows are expected to receive more than traditional doctoral training. Additional skills are as a rule tailored to the specific needs of each fellow. Not all fellows need and wish to acquire all the so-called transferable skills. It is noteworthy that a variety of training relevant to private sector was also offered such as intellectual property rights (IPR), commercialisation of research outputs and entrepreneurship.

During FP7 quite a large share of the ITN fellows benefited from training in the particular set of transferable skills – notably public speaking and communication (65%). Around half of the fellows indicated that they received skills useful for their research management, such as proposal and report writing, as well as publishing. IPR, and research ethics training were given to 35% of fellows, research project and human resource management to 24%. Commercialization of research outputs and entrepreneurship was offered to 14% and 9 % of fellows respectively (Annex 1, Table 6).

Employability and career prospects of fellows

Long-term career effects of MC fellowships were addressed in a comparative study among MC fellows funded under FP4, FP5 and FP6 and beneficiaries of other types of fellowships conducted in 2013. [42] MC fellows reported that the fellowship contributed significantly to their long terms career prospects and quoted as drivers of career progress: access to high quality research facilities and labs, enlarging their professional network, and improving their interdisciplinary skills.

[40] Fellowship duration is limited up to 3 years. Some fellows argue that three years is rather short, as the project involves moving to a different country, changing labs and sectors in the middle of the project. However, since the majority of fellows manage to complete their doctorate during the fellowship the foreseen maximum duration is considered to be adequate.

[41] Data source: PPMI for DG EAC, 2013, FP7 Marie Curie Interim Evaluations

[42] Data source: IDEA Consult, IFQ, and PPMI for European Commission, 2013, Study on assessing the contribution to the development of human research capacity, RTD-Human Research Capacity

The survey shows that fellowships have a high reputation in the research environment as talented researchers benefit from education in prestigious universities. The degree of affiliation of former fellows remains high, even many years after the end of fellowship. It is also evidenced that MC mitigate some aspects of the gender gap.

Furthermore, on average, among former MC fellows there is higher overall satisfaction than among former non-MC fellows, notably with progress opportunities, benefits, and resources for research, job location, job security, working conditions, and status/prestige.[43]

Based on results from FP7 and desk literature it may be concluded that MCAs have enhanced employability of fellows. There is mainly evidence of improved short-term employability. Some 95% of MCA fellows have employment positions two years after the end of their fellowship.

Results of the study indicate that MC fellowship can improve fellow's immediate employability slightly better than other types of fellowship, as in many instances former fellows have been offered an employment in the host institution after the end of MC fellowship.[44] However, differences in terms of outcomes between MC fellows and the control groups are small. There are inconclusive explanations about reasons for lack of significant measurable long-term outcomes of MC and non-MC fellowships and they are partly based on the way samples were constructed (both groups had access to equivalent mobility schemes, which produced similar effects). Also, both groups were entering the research careers after the end of the fellowship under similar research market conditions at the times of the downturn in economies and will have encountered similar difficulties.

Communication and outreach

Beneficiaries of MCA are required to plan suitable public outreach activities to enhance dissemination and public engagement.

Furthermore, at the programme level, the Researchers' Night activities are increasing awareness of the general public about the role of researchers and the key benefits they bring to society. Researchers' Night was a unique-event taking place all over Europe on the last Friday of September. The success and impact of this annual event since 2005, both in terms of number of people reached and the benefits to the Marie Curie programme, justifies its annual frequency. In 2013 nearly 1,3 million people of all ages participated in the Researchers' Night. This number included 600,000 children, who could take part in experiments and interactive science shows, as well as try out equipment in research laboratories that are normally restricted.[45]

[43] Data source: IDEA Consult, IFQ, and PPMI for European Commission, 2013, Study on assessing the contribution to the development of human research capacity, RTD-Human Research Capacity

[44] Data source: Economisti Associati for EC, 2014 Marie Curie researchers and their long-term career development: A comparative study.

[45] Data source: Seventh FP7 Monitoring report: Monitoring Report 2013, European Commission.

The Marie Curie Prize promoted the achievements of the best Marie Curie Actions grant holders during FP6 and FP7 in three categories: Communicating Science; Innovation and Entrepreneurship; Promising Research Talent. It raised the profile of the winning researchers and their host institutions and the award ceremonies in 2012 and 2014 were given considerable media coverage. On the one hand, they were bringing research closer to the general public, and increasing the prestige of the Marie Curie Actions. On the other hand, the prize category for communicating science has put in the spot light significant achievements in innovative communication tools and partnerships.

The Specific Actions of the PEOPLE programme related to the human resource dimension of the ERA

The Coordination and Support Actions as part of FP7 financial instruments have contributed to the ERA policy objectives by inspiring or providing evidence for policy-related initiatives within the broader context not necessarily limited to FP7.

The EURAXESS portal has significantly contributed to open recruitment across Europe and removing of barriers. In 2013 more than 40.000 research job vacancies have been posted.

As part of ERA activities, EURAXESS network has contributed to opening of ERA to the world by providing information on policy instruments such as Scientific Visa Directive, Human Resources Strategy for Researchers based on the Charter and Code, European Principles of Innovative Doctoral Training and support for a new pan-European supplementary pension fund for researchers.

EURAXESS supported by the PEOPLE programme helps boosting researcher career development. Information is instrumental for removing barriers to relocation, such as visa, residence permit, social security, and to speed up procedures. It helps researchers at an early stage research career with finding a job, grant or fellowship, helps them connect with other researchers experiencing similar challenges. It assists experienced researchers with posting job vacancies, finding a good candidate, acquiring funding for their projects, getting a better understanding of their rights. EURAXESS can significantly enhance job and funding providers' visibility in Europe and overseas.

Concerns over potential negative side effects of PEOPLE programme under FP7

Two concerns have been voiced over EC mobility programmes. One is that FP funding leads to an increase of short-term contracts (as ITNs for example are mostly 3 years project based, compared to longer term PhD or Post-Doc positions). The second is that PEOPLE Programme reinforces brain drain from weaker regions by helping excellent researchers move to the top Universities who later do not move back.

We found no evidence to substantiate these concerns.

Regarding the status of doctoral candidates it is a fact that in most MS, most if not all PhD candidates were considered students and did not have employment contracts. At best they had stipends, which did not provide social security. Under FP7 MCAs have

in fact contributed to the professionalization of PhD candidates as a special category of fellows having both study and work status.

One can advance an informed hypothesis that only a small fraction or doctoral students would have held a PhD or post Doc position had there not been for the PEOPLE Programme to incentivize national institutions to replace grants with work contracts. Indeed, no more than 5% of PhDs can expect to have a Post-Doc position in academia and the Code and Charter provided social protection to those who will embark in research careers also outside traditional academia. Regarding the duration of the study/work contracts, as mentioned above a three-year work contracts under ITNs have shown to allow the majority of PhD candidates (eight out of 10) to obtain the degree during their fellowship.

There is no evidence that PEOPLE Programme induces brain drain from weaker regions. Firstly, because there are no systematic tracer studies to see to which country fellows go to after the end of their MC fellowship. Secondly, on the basis of intra-European mobility data the opposite may hold true. Namely that MCA favour brain circulation (see Table 5 and figures 12 to 68). Furthermore, there is much scope for national research systems to align their priorities with MCA opportunities.

Regarding brain drain in general it must be acknowledged that talented students and good researchers emigrate anyhow towards better opportunities within their own country or internationally. Problems lie with the poor infrastructure and weak overall research ecosystem. Ways forward for overcoming these problems may include creating pockets of excellence by using instruments for funding hubs, creating favourable research environments for researchers to go to in own region or country, and use of structural funds for the creation of hubs. Hungary, Bulgaria, Estonia are already using structural funds for these purposes.

EVIDENCE BUILDING BLOCK 4: EUROPEAN ADDED VALUE

Contribution of MCA to structuring European research landscape

MCAs have made remarkable progress to promote mobility, both transnational and intersectoral, and to open research careers at European and international level, with excellent employment and working conditions following the principles of the European Charter and Code. There is no equivalent in Member States as far as their scale and scope, funding, international character, generation and transfer of knowledge are concerned.

The added value of the MCAs was high in terms of providing beneficiary researchers with better career development and mobility opportunities, increasing the volume and scope of research, and providing the example of good practice for national authorities. MCAs have strengthened the resources of those institutions able to attract researchers internationally and thereby encouraged the spread of centres of excellence around the European Union.

MCAs have fostered excellent training environment, best employment and working conditions, including professionalization of early stage career and full employment contracts in line with the Charter and Code for Researchers. MCAs have encouraged and promoted offerings of transferable skills in academia and non-academic organizations, through courses, workshops, conferences, secondments, and international networking.

Social network analysis revealed the dense nature of the MCA network: the majority of organisations participating in the host-driven MCA (ITN, IAPP and IRSES) were directly or indirectly interconnected among themselves. These connections facilitated networking and knowledge transfer inside the networks. The social network analysis also revealed that research organisations from the EU15 (e.g. Italy, Spain, Germany and the UK), as well as large third countries, such as the United States, Japan or Turkey, acted as central "gateways" for the weakest participants (those with the lowest number of connections).[46]

The MCAs have gathered together the best European and non-European actors in research. In FP7 all the 100 best-ranked European universities in the Shanghai ranking list have been actively involved in Marie Curie projects. At the same time, the 65% of the outgoing European researches have carried out part of their research projects in the top 50 world universities. These results cannot be compared with national programmes that do not offer the same means and influence in terms of international openness.

MCAs have also demonstrated the strength of dissemination of good practice by influencing the initiation of similar programmes at the national level and by spreading the best practices in terms of research training and career development Europe wide.

By way of example, the Research Council of Norway that channels nearly 30% of public funding for Norwegian research and development to universities, institutes and industry, decided to support mobility for researchers early in their careers. In 2014 an entirely new mobility grant under FRIPRO for young researchers seeking to work abroad was launched. The grant scheme is open to applicants in all fields and disciplines and is cofounded and inspired and influenced by the Marie Curie Actions. The evaluations merge criteria, which meet the national standards and internationally implemented criteria, in particular FP7 MC requirements.[47]

In terms of the contribution to the European innovation systems the key evidence of impact of the PEOPLE programme are innovation in research training encompassing innovative research training schemes, innovative doctoral principles, and empowerment of researchers through Charter and Code. Innovation was not a selection criterion in FP7 MCAs. Overall in FP7 the notion of innovation was not so central and was not an omnipresent evaluation sub-criterion/factor as it is in H2020. It may be said that innovation was pursued in MCAs through creation of new pathways

[46] Data source: PPMI for DG EAC, 2013, FP7 Marie Curie Interim Evaluations

[47] Per Magnus Kommandantvold: Research funders' change of policy to meet future training needs: The case of Norway: in Empowerment of the Next Generation of Researchers, MSC Actions 2014 Conference Report drafted by Dragana Avramov for the Italian Ministry of Education, University and Research

to enhance employability of fellows (e.g. European Industrial Doctorates as part of ITN). Innovation in teaching, more particularly transferable skills for early-stage researchers and involvement of industry via IAPP may also be quoted as examples preparing new generations of researchers for innovation.

ITNs as project based initial training networks enhanced interdisciplinarity, transfer of best practices across Europe regarding supervision/tutoring, internships, inclusion of visiting scholars from non-academic research organizations, and offering of training in transferable skills. Since 2012 European Industrial Doctorate (EID) and Innovative Doctoral Programme (IDP) are embedded in ITN.

Evidence from the MC mid-term review shows that in some countries there was a structuring effect of ITNs at the national level. It occurred in terms of expansion of doctorate curricula by including transferrable skills, more exchanges with industry, or more focus on employability. Additionally, by implementing the ITN projects participating organisations reported that they could test new ways of managing research careers and could later support policy initiatives aimed at introducing new types of employment contracts or increasing transparency in the recruitment processes.

The bottom-up approach taken by MCAs has also allowed a large majority of those institutions to train and upgrade the skills of a new generation of researchers able to tackle a broad range of current or expected societal challenges. Although MCA are research-driven projects (in some quarters they are referred to as curiosity-driven research), a significant share, some half of the budget, was dedicated to projects that chose to address specifically grand societal challenges identified by the EC during FP7. Addressing one or more societal challenges was not a requirement under MCA, as it was for example under COOPERATION. However, an exercise was carried out by MCA in 2010 to tentatively align the MCA funded topics and FP7 topical grand challenges. Based on this an estimation was made which indicates that in bottom up calls a significant share of the research community had spontaneously, without being required to, addressed EC identified grand challenges. This may indicate that a bottom up approach focused on achieving scientific excellence, does also address policy and social objectives.

According to the mid-term survey among beneficiary institutions of host-driven actions, long-lasting research collaborations between participants from private and public sectors have been created in the programme. Institutions reported that MCA allowed industry and academia to collaborate on risky and innovative research projects on European scale, which otherwise would have not been supported nationally. Networking opportunities and collaboration with academic institutes, as well as with other non-competing companies in excellent interdisciplinary environment, has been highly appreciated by industrial partners. By funding companies at the European level, the MCAs also increase the competition between European companies (not always existing at the national level), leading to higher levels of quality and excellence.[48]

[48] Data source: PPMI for DG EAC, 2013, FP7 Marie Curie Interim Evaluations

There is ample evidence that MCA evaluations are considered among the best and most transparent peer review practices in the world. Through the COFUND projects good practice in selection of fellows has been broadly disseminated among Member States.

On the downside, due to budgetary constraints, a large number of excellent proposals do not get funded. Oversubscription for MCA results in a huge loss for Europe. Evidence from host-driven MCA shows that only 1% of projects rejected due to budgetary reasons were subsequently implemented as originally planned. Some went ahead with the projects after changes to the original design. 82% of non-successful applicants have abandoned the projects.[49] The European Added Value would significantly be enhanced by a commitment by national authorities for supporting excellent international training mobility applications, which are highly ranked on the European evaluation list, but not retained for MCA because of the EC budgetary constraints.

Concerning the participants that went ahead with the projects as originally planned or with some changes, the majority of the projects were implemented using own funds (36%) or by obtaining funding from national/regional R&D funding schemes (35%). Only 6% of respondents received funding from other international R&D funding schemes. However, all of the projects financed under international R&D funding schemes were implemented with some changes to their design. The findings thus suggested that no directly comparable to MCA international R&D programme existed that could have financed the same projects.[50]

The MC activities tended to have broader and more long-term research objectives, ran on a financially larger scale, had stronger networking and collaboration capacity and involved a larger number of international, industry and academia partners. For a significant majority of the MCA beneficiaries, the projects strengthened their ability to do research beyond short-term needs, contributed to establishing R&D as a regular part of their day-to-day activities, and helped to achieve efficiency gains in terms of conducting research.

There is evidence of the overall superiority of PEOPLE programme over national systems as MC fellows benefit from mandatory international mobility; broader choice of topics; broader choice of host organizations; and guaranteed open and transparent recruitment. At the level of institutions there is ample evidence of internationalization, transfer of knowledge, harmonization of curricula and teaching and research evaluation practices including ex ante, in itinere, and ex post.

As stated by one of the beneficiaries:

> *"Compared to what is available nationally, you can have much more variety of research, more researchers moving, more countries, and more industry partners involved. The national scheme is rather limited as regards the choice of topic. In comparison, [MCA funding] is much more flexible towards this and this has to be appreciated."*

[49] Ibid.
[50] Ibid.

It may be said that the MCAs were a catalyst for improvements of many national funding systems. Positive changes include: knowledge sharing, standard setting, and overcoming rigidity of national research systems. There is much evidence that national gatekeepers tend to protect their power by operating in closed and unconnected systems sheltering their prestige and power. Difficulties in achieving Joint doctoral or master degrees under Erasmus Mundus testify to this effect,[51] as do testimonials by the gatekeepers themselves.[52] MCA played an important role in setting best practice examples and transposing them into standards (e.g. Code and Charter). It may be concluded that MCAs accelerated the rate of positive change and precipitated events. COFUND for example contributed to generalizing robust ex ante peer evaluation – influencing also the setting of national and regional programmes.

The key highlights and lowlights summarized

The key achievements of FP7 in general and the PEOPLE Programme in particular may be identified as:

- Contributions towards overcoming fragmentation of the European public science and research base;
- Empowerment of early stage researchers;
- Support of researchers at all stages of research career.

Considering PhD as early stage research, namely as third cycle education with specific features of work, MCAs contributed to making research careers more attractive as numerous obstacles associated with lack of protection are removed and early stage researchers are covered by social security.

MCAs are a model of open transparent and merit-based recruitment, which stimulate people to enter researcher profession. Recruitment is based on authentic peer review and no conflict of interest. Best practice working and employment conditions in line with the European Researchers Charter and Code for Researchers have contributed to the professionalization of early stage career by including social security and ensuring recognition for their work in the research community. This model is fully supported by organizations such as the European Council of Doctoral Candidates and Junior Researchers (EURODOC).[53]

It may be said that the principles implemented and lessons learnt under the PEOPLE Specific Programme have, on the one hand, contributed to the identification of best practices that inspired new policy guidance that was endorsed by the European Council. They have also inspired many national programmes and peer reviewing practices. On the other hand, the PEOPLE Programme has been a gateway for

[51] See: Joint International Master Programmes, 2013, EACEA synthesis report, European Commission, drafted by Dragana Avramov

[52] See: Empowerment of the Next Generation of Researchers, MSC Actions 2014 Conference Report drafted by Dragana Avramov for the Italian Ministry of Education, University and Research

[53] The European Council of Doctoral Candidates and Junior Researchers (EURODOC) representing early stage researchers from 35 countries, encourages institutions to implement the European Charter and Code and employment conditions similar to those offered through MCA.

implementing in a coherent way all the key ERA principles via the MCA funding instruments.

The impacts of FP7 have been reinforced through the PEOPLE programme as it:

- Contributed to bridging European Higher Education Area (EHEA) and European Research Area (ERA);
- Promoted the awareness in academia in Europe that excellent traditional disciplinary doctoral training is indispensible but an insufficient requirement for forming researchers for meeting 21st century challenges in a global world;
- Set standards for equipping researchers with key competencies that match public and private sectors' needs and set standards for enhancing employability of researchers;
- Contributed to modernizing doctoral training in Europe;
- Contributed to attracting and retaining researchers in Europe;
- Promoted and set standards for research and training cooperation between academics, research centres and industry across countries;
- Promoted open recruitment and attractive working conditions for early stage researchers and achieved professionalization of PhD studies;
- Contributed to internationalization of research training as may be seen from the nationalities of researchers and countries involved in projects.

Evidence that MC is not only a capacity building programme but an excellence programme is testified by outputs of beneficiaries but also by the selection procedure where only a tiny proportion of Europe's best and most talented early stage researchers and experienced researchers are selected.

Some experts would like to see MCA better linked to other specific programmes in particular by funding the development of proposals for IDEAS out of PEOPLE. However, there is already evidence that former MC fellows are rather successful when applying for European Research Council (ERC) grants. They are highly motivated to do so as ECR provides generous grants and stable career prospects. Some two years after obtaining a PhD post doc set a team under ERC grant and fellow is funded generously for a 4 years period. ERC starter grant can have mobility but it is not mandatory. This author saw no scientific or policy justification for giving former MC fellows preferential treatment for accessing ERC grants and no budget link in a strict way is recommended.

However, there is scope for better linking targeted research projects (formerly COOPERATION under FP7) with mobility by earmarking mobility resources to allow for a creation of greater synergy and transfer of knowledge between institutions participating in joint research projects. This can be achieved independent of MCAs.

Some would like to see national organizations applying and running evaluation procedures for EIF, OIF, IIF, rather than individual fellows applying under EC calls. However, the rationale for individual researcher applying under direct EC call is strongly justified by researcher driven authentic bottom up approach, fellow's freedom of choice of the topic, country, institution, all having as impact an authentic empowerment of early stage researchers. In FP7 the MC Actions rightly followed two intervention logics: host driven actions (ITN, IAPP, IRSES, COFUND), and researcher driven actions (Individual Fellowships which include intra European EIT,

international outgoing OIT, and international incoming fellowships IIT). The latter action is rather unique as there are very few programmes in Europe that are fully bottom up with respect to the choice of topic, and destination institutions best tailored to meet individual's need. The limitations of host driven actions is not that they do not run transparent and open application procedures, but that they limit choice. By way of example, ITN are project-based networks, so if a fellow does not fit into one of the on going projects which is discipline and subject matter bound, they have no opportunity for applying.

In many countries, research-funding agencies (often linked to specific Ministries) fund certain topical areas, and frequently some disciplines, in particular social sciences and humanities (SSH) are underrepresented.[54] The value of Individual Fellowships under FP7 was that they were truly bottom up, and they filled gaps in opportunities at national level at various stages of career (early post-doc but also experienced researchers). Delegating to a limited number of national institutions, or topical networks, the recruitment of EIF, OIF and IIF fellows would be a huge loss of opportunities for early stage researchers.

The main non-achievements of FP7 in general and the PEOPLE programme as part of it are:

- Europe's relative lack of competitiveness in attracting private research and development;
- Lack of a significant transfer of knowledge and insufficient two-way mobility of researchers between academia and the non-academic research organizations.

There is no measurable evidence of the impact of the economic crisis on the MCA in terms of implementation or participation. There may have been a greater pressure on actions with 100 % funding such as ITN and Individual Fellowships. Also many SMEs were not eager to commit to multi-year projects, which do not guarantee immediate return of investment, or to commit to secondment of staff several years in advance under conditions of market uncertainty.

While one may have expected that the economic crisis that has hid hard some southern European Member States would be observed through lower interest for the COFUND Action for which applicants need to put up 60% of funding, this was not the case. Spain had an outstanding number of successful COFUND applications and none have been disrupted by the economic downturn. Reasons for some countries to turn towards COFUND may lie in the facility to apply. Namely, a single University may submit a proposal and no EU links are required.

Objections advanced in some circles that there were too many MC actions, in our view were not justified. The intervention logic of each MC Action in FP7 was well defined. It addressed different research career stages, and aimed at achieving a broad range of objectives, ranging from structuring effects at the level of institutions to enhancing employability of fellows.

[54] See: Independent Observer Report for FORMAS Sweden, 2014, by Dragana Avramov (Rapporteur), Maja Povrzanovic Frykman and Anette Nyqvist

In our view, the lowlights of MCAs in FP7 are embedded in the measurement of the magnitude of intervention and commitment of resources. There are some 1.63 million researchers in EU-28 and it is estimated that EU needs 1 million more by 2020. Under FP7 the MC Actions supported some 50 thousand mobile researchers. The number is impressive but in the words of Xavier Prats Monné, Director General of DG EAC this is "a drop in the ocean".[55]

Furthermore, the low success rate is a lowlight as it testifies to a significant loss of talents since large numbers of excellent proposals were not funded due to budgetary constraints.

Under FP7 the MCAs funded joint research programmes implemented by Higher Education Institutions but did not encompass a specific objective of jointness whereby Universities were expected to award a joint PhD degree (or at least double or multiple degrees). This was a lowlight. As a consequence MCAs could not do more to structurally enhance complementarity and produce long lasting added value among HEIs. Furthermore, sustainability of research training networks was not a specific objective and hence this was not an issue addressed under evaluations. Funding of renewals was rather an exception than an objective. Many networks gathered around one off projects and there is little evidence of their longer-term impact for structuring EHEA.

Finally, insufficient resources were allocated to the MC Programme for monitoring outcomes and assessing impact. As consequence there is little evidence of measurable longer term benefits for institutions and there is striking lack of systematic tracer studies to statistically document benefits for fellows.

Up to date the task of assessing the value of outputs and outcomes, and benefits for the fellows and for the participating organisations has been predominantly with the EC research-funding agencies. HEIs appear not to have been sufficiently interested for elaborating their business plan and taking measures for sustainability beyond MCA funding (or Erasmus Mundus for that matter). Moreover, former and current beneficiaries of MCA funding seem to have little motivation for providing evidence about their achievements in terms of enhancement of quality of training and employability of gradates. Their feedback has been largely limited to formal *in itinere* and end-of the EC funding reporting as part of their contractual obligations. Beneficiaries of EU funding have been reluctant to contribute to ex-post assessments. Non-response rates by the beneficiaries of EU funding to MCA and other EC funded surveys are very high. This decreases significantly the representativity of the surveys and weakens the relevance of the monitoring studies. It also shows that a significant part of academia still tends to document its success by output numbers rather than by outcomes and scientific, policy and social impact.

Evidence about longer-term impacts of MCA, or FP7 for that matter, remains fragmented.

[55] See: Empowerment of the Next Generation of Researchers, MSC Actions 2014 Conference Report drafted by Dragana Avramov for the Italian Ministry of Education, University and Research

Examples of evidence of longer-term scientific value and societal impact of MC fellowships

The full value and impact of mobility and opportunities opened up by MCAs is often revealed after many years.

Stefan W. Hell, one of the winners of the Nobel Prize for Chemistry 2014 "for the development of super-resolved fluorescence microscopy" was awarded a post-doctoral MC Individual Fellowship in 1996. He was MCA fellow at the University of Turku, and then coordinator for three MCA Individual Fellowships. His latest MCA project ended as recently as May 2014. In an interview to a Swedish radio station Stefan W. Hell revealed that the MC post-doctoral fellowship in 1996 came at a critical moment in his career when he was discouraged by lack of support and contemplated abandoning research in the area in which he wanted to develop it, or even abandoning research all together. The awarded MCA fellowship gave him an opportunity to pursue research in the desired direction.

The announcement of the Nobel Prize for Professor Hell came only a few days after the award in Physiology or Medicine went to John O´Keefe, May-Britt Moser and Edvard I. Moser. Both May-Britt and Edvard Moser are recipients of European Research Council grants, and all three have participated in EU-funded research projects including MCA. Moreover, Hiroshi Amano, one of 2014 laureates of the Nobel Prize in Physics awarded on 7 October, closely collaborated in the past with an EU-funded Marie Curie Initial Training Network.

Examples of Marie Curie success stories in terms of outstanding project outputs are numerous. One can be singled out as EU-backing researchers in teams behind Higgs boson 'God particle' discovery. 30 scientists supported by the FP7 MCA were involved in the discovery of the Higgs Boson at CERN, the European nuclear research facility. The discovery has been hailed as one of the most important breakthroughs in the history of science. The 30 scientists were part of two specific EU grants: the Initial Training Networks ACEOLE and TALENT.

It is particularly difficult to ascertain the specific impact of any single MC grant, as there are well-known problems of causality and attribution and assessment time scale. There is multiplicity and complexity of causes and outcomes of career choices and societal impacts of science.[56] Difficulty to document impact of MC on long term career patters is additionally embedded in the fact that MC addresses all four stages of research career and they have different effects at different research stage.

Nevertheless, there are outstanding success stories and overall evidence of the longer-term value for individual fellows and how MCA have positively affected their research outcomes. MC is an excellence programme as much as it is capacity building programme.

Value of PEOPLE Coordination and Support Actions for ERA policy initiatives

[56] See: IMPACT-EV project Report 1. State of the art on scientific, policy and social impact of SSH research and its evaluation, www.impact-ev.eu

The relatively modest budget allocated for Coordination and Support Actions, and a relatively small number of funded studies under PEOPLE Specific Programme need to be seen as evidence base supporting policy related initiatives. In addition to outputs of studies, the broader outcomes relevant for the human resource dimension are seen through their policy impact. By way of example, a "Human resource Strategy for Researchers" (HRS4R) actively promoted via EURAXESS Rights is supporting research institutions and funding organisations in the implementation of the Charter and Code in their policies and practices. The logo "HR Excellence in Research" delivered identified the institutions and organisations as providers and supporters of a stimulating and favourable working environment. Since the adoption of the Commission Recommendation on the Charter and Code in 2005 during FP7, over 1,200 institutions from 35 countries in Europe and abroad (and European/international organisations) have expressed their explicit support for the Charter and Code and 102 have obtained the Commission's "HR Excellence in Research" badge (in 2014).

EVIDENCE BUILDING BLOCK 5: CONCLUSIONS ON FP7, OUTLOOK FOR H2020 AND RECOMMENDATIONS

Concluding remarks

The MCAs have been highly effective in terms of contributing to the ERA and realising the goals of the Europe 2020 strategy. The evidence demonstrates the positive influence of the programme in terms of enhancing employability and mobility of researchers in Europe and beyond, contributing to free movement of knowledge and opening of the ERA to the world, increasing the number of researchers in Europe and creating more attractive opportunities and preconditions to choose a research career, as well as in terms of promoting excellence of research training in Europe.

The distinct policy initiatives launched under the "Specific actions" of the PEOPLE programme of the FP7, CSAs aimed at enhancing the career and the mobility of the researchers and improving the attractiveness of the research profession were also particularly dynamic and successful in consideration of the means engaged.

Outlook for H2020

Under HORIZON 2020, the MCAs, are re-named as Marie Skłodowska-Curie Actions (MSCA), and are part of the Excellent Science priority. The programme continues its focus on excellent opportunities for career development of researchers. The MSCA's overall ambition is to empower talents and create a new framework for researchers' training in Europe.

In addition to the industrial doctorates introduced under FP7, the MSCA in H2020 will also support joint doctorates and co-funding of doctoral programmes to increase the leverage effect on regional, national and international funding programmes, thus bringing structural change to the way doctoral candidates are trained in Europe.

Based on lessons learnt in FP7 under H2020 Marie Skłodowska-Curie Actions (MCSAs) include the Industrial Doctorate as a novel-funding scheme under Innovative Training Networks (ITN). It is expected that this will give European doctoral candidates the skills to meet 21st century employment needs. Implementation of Industrial Doctorate under ITN is underpinned by opening up Structural Funds to support universities to take up industrial doctoral training principles.

Under H2020 a simplification streamlining the MSCA funding schemes and unifying the rules for have made effort:

- Innovative Training Networks (ITN): support for innovative initial training of researchers at doctoral level;
- Individual Fellowships (IF): support for experienced researchers undertaking mobility between countries, optionally to the non-academic sector;
- Research and Innovation Staff Exchange (RISE): support for international and intersectoral cooperation and transfer of knowledge through the exchange of research and innovation personnel;
- Co-funding of regional, national and international programmes (COFUND): support for fellowships at doctoral and post-doctoral level involving mobility to or from another country.

Simplifications quite rightly related to Participant Portal as one window, and streamlining rules and procedures. Under FP7 there were different requirements for different types of mobility. Under H2020 changes were introduced regarding beneficiaries, partner organizations, and requirements for applying. Funding unit costs are now applied to all categories, there is one call for Individual Fellowships and fewer Model grant contracts (for ITN, Individual Fellowships, RISE, and COFUND).

PEOPLE is a complex programme with broad objectives addressing human resources. There are lots of expectations, numerous objectives, and mobility relates to all stages of research career. Any simplification in terms of merging of action lines, and bundling of intervention logics would risk that at the ends of the day they will not achieve all the expected goals. Indeed under H2020 MSC did not reduce actions in H2020 also because there was a strong objection from the MS.

One of the main shortcomings of MCA identified in FP7, namely too little involvement of industry has partly been taken on board for H2020 with the Industrial Doctorates and Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE), for example.

H2020 tools like ERA Chairs, and Teaming and Twinning schemes are expected to contribute to attracting leading researchers to institutions fostering also brain circulation.

The European Researchers' Night, a specific MSCA policy support action, will continue financing outreach activities to communicate science to the general public, with special emphasis on pupils and students.

Through funding mechanisms in H2020 the Commission will support up to 70,000 doctoral candidates in Innovative Doctoral Training (IDT). Calls worth €25 million

will be launched in H2020 for 'Institutions with innovative concepts', which will include IDT. Under the MSCA programme in H2020, which includes industrial doctorates and supports researchers at all stages of their career, the Commission will fund over 25,000 PhDs. MSCA will become the main funding programme for doctoral training. Under H2020, the Commission has proposed to open COFUND to national schemes for doctoral candidates as well.[57]

8% of the H2020 budget has been allocated to the MSCA, worth EUR 6,162 billion (current prices) for the 7-year period. This represents a 30% increase compared to FP7 and is a clear sign of recognition from the Member States of a strong added value of the programme and its long-track success record – the final amount allocated to MSCA is comparable to the original 2011 Commission proposal, even though the overall budget for Horizon 2020 was decreased during the negotiations by 12%.

It has been brought to the attention of the policy and research circles that it does not suffice that research organisation publicise research job vacancies on the EURAXES portal. It is necessary that they truly implement merit-based recruitment, which is not always the case as may be see in the ERA Progress Report 2014. To meet this quest for identifying good recruitment practice the Commission services have initiated a working group, led by Member States with the participation of stakeholder organisations, which will develop a practitioner's toolkit on open recruitment practices to be ready by 2015, to assist those countries in which researchers remain dissatisfied with the way research vacancies are advertised.

The distinct policy initiatives could be continued and further developed in addition to MCSA, as a mean to progress towards a more open and transparent labour market for researchers within the ERA.

Recommendations

Following recommendations are put forward for future consideration.

- The relatively high number of awarded fellowships and a considerable budget allocated to MSCA are, nevertheless, far and few in respect to the Europe's needs for investment into human capital and research and innovation in the context of the global world. MSC inspired actions need to be significantly scaled up by the national research funding organizations of Member States. The scale of the challenge is illustrated by the estimation that EU needs 1 million more researchers to add to the present 1.63 million researchers by 2020.
- The seven principles for Innovative Doctoral Training implemented by the MSCA can have full effect on ERA if taken up by the national authorities in Member States in view of incentivizing HEIs to implement the principles.

[57] Source: European Research Area (ERA) Policy and Reform, Directorate General (DG) Research and Innovation, European Commission

- HEIs beneficiaries of MCSA should be incentivized to document the value of their learning outcomes for potential employers. HEIs could be encouraged to systematically implement tracer study to track and measure longer-term impact on the employment status and career advancement of their doctoral graduates and post-docs. Requirement to monitor impact could become part of the MSCA Grant Agreement.
- In the light of the fact that no more than 5 % of doctoral graduates will have the opportunity to pursue career in academia, it is important to remove barriers to mobility, more particularly intersectoral mobility, for all the four career profiles (R1 first stage researcher, R2 recognised researcher, R3 established researcher, and R4 leading researcher).
- It is important to start collating robust evidence that research training in academia combined with research training in the business and industrial sectors is not of lesser quality than research and training in academia only.
- The prevailing practices for evaluating the scientific and social impact of training and research and productivity of researchers need to be effectively aligned with the ERA objectives. The quest for supporting the knowledge triangle by establishing close, effective links between education, research, and innovation by exposing new generations of researchers to both public and private, and bridging the gap between academia and industry needs to be supported by innovative indicators for the assessment of value and impact of research.
- Bibliometrics and citations are neither sufficient for assessing the value of research for society, nor for measuring achievements of researchers. Work on open scholarship appraisal is needed to include accomplishments outside traditional academic environments. It is also necessary to effectively valorise mobility across countries, disciplines and sectors of economy as part of assessments for career advancement of researchers.
- ERA monitoring mechanisms are valuable for forward looking and identifying where structuring efforts should be directed. Developing mechanisms for permanent evaluation of the structuring effects for institutions in terms of their scientific, social and policy impacts, and sustainability of internationalization after the end of MCSA funding, are recommended.

ANNEX 1 – Tables and Figures

Table 1: Ranking of top 10 organisations in FP7 MCA 2007-2013 in terms of counts of participations (data DG EAC, November 2014)

Organisation Name	Country	Participations	Rank in terms of budget
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	FR	514	1
THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE	UK	300	3
THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD	UK	299	2
IMPERIAL COLLEGE OF SCIENCE, TECHNOLOGY AND MEDICINE	UK	261	4
MAX PLANCK GESELLSCHAFT ZUR FOERDERUNG DER WISSENSCHAFTEN E.V.	DE	250	7
AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS	ES	250	9
UNIVERSITY COLLEGE LONDON	UK	177	12
EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZUERICH	CH	163	6
KOBENHAVNS UNIVERSITET	DK	163	8
THE UNIVERSITY OF BIRMINGHAM	UK	143	10

Table 2: Ranking of top 10 organizations in FP6 MCA 2002-2006 in terms of counts of participations (data DG EAC, July 2015)

Organisation Name	Country	Participations	Rank in terms of budget
MAX PLANCK INSTITUTES	DE	115	1
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE - CNRS	FR	73	3
RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN	DE	66	2
AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS	ES	45	4
FOUNDATION FOR RESEARCH AND TECHNOLOGY - HELLAS	EL	38	7
NATIONAL UNIVERSITY OF IRELAND	IE	38	9
THE CHANCELLOR MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE	UK	36	12
UNIVERSITY OF COPENHAGEN	DK	35	6
INSTITUT NATIONAL DE LA SANTÉ ET DE LA RECHERCHE MÉDICALE - INSERM	FR	30	8
COMMISARIAT A L'ENERGIE ATOMIQUE	FR	28	10

Table 3: Ranking of top 10 industry participants in FP7 MCA 2007-2013 in terms of counts of participations (data DG EAC, November 2014)

Organisation Name	Country	Participations	SME status
Siemens Industry Software NV	BE	23	N
Philips Electronics Nederland B.V.	NL	18	N
IBM Research Gmbh	CH	18	N
NOVARTIS Vaccines and Diagnostics S.R.L.	IT	12	N
BIOTALENTUM Tudasfejleszto KFT	HU	11	Y
Siemens Aktiengesellschaft	DE	11	N
Miltenyi Biotec Gmbh	DE	10	N
Astrazeneca AB	SE	9	N
Islensk Erfdagreining EHF	IS	7	N
UNILEVER Research and Development Vlaardingen BV	NL	7	N

Table 4: COFUND Action by geographical scope and beneficiary type (data DG EAC, July 2015)

		Beneficiary type									
Geographical scope		Public authority		Funding agency		Research organisation		University		Total	
		Abs.	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%
Regional	Abs.	8	80	17	26	20	39	39	91	84	50
	%	*10*		*20*		*24*		*46*		*100%*	
National	Abs.	2	20	38	59	18	35	3	7	61	36
	%	*3*		*62*		*30*		*5*		*100%*	
International	Abs.	0	0	9	14	13	25	1	2	23	14
	%			*39*		*57*		*4*		*100%*	
Total	Abs.	10	100%	64	100%	51	100%	43	100%	168	100%
	%	*6*		*38*		*30*		*26*		*100%*	

Table 5: Intra European mobility - researchers who fulfil the mobility rule and return to their home country as percentage of incoming EU fellows, by country (own calculation on basic data set of DG EAC, 2015)

Country	Share of incoming fellows who return to their home country as percentage of incoming EU fellows
AT - Austria	19%
BE - Belgium	13%
BU - Bulgaria	71%
CY - Cyprus	18%
CZ - Czech Republic	50%
DE - Germany	19%
DK - Denmark	7%
EE - Estonia	30%
EL - Greece	58%
ES - Spain	39%
FI - Finland	22%
FR - France	23%
HR - Croatia	70%*
HU - Hungary	57%
IE - Ireland	34%
IT - Italy	43%
LT - Lithuania	60%*
LV - Latvia	17%
MT - Malta	25%*
NL - Netherlands	14%
PO - Poland	59%
PT - Portugal	38%
RO - Romania	75%
SE - Sweden	19%
SI - Slovenia	19%
SK - Slovakia	56%
UK - United Kingdom	10%

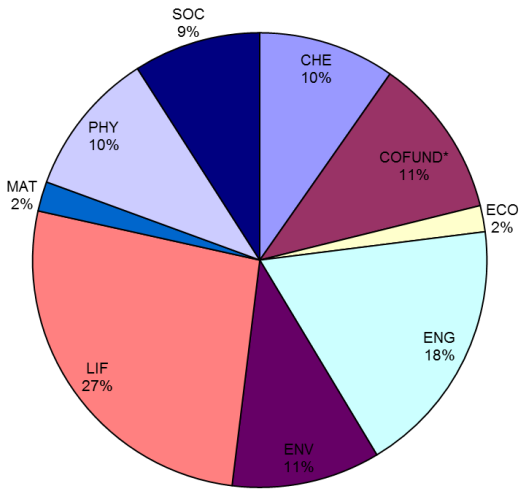
* Small number

Table 6: Share of ITN fellows who received training in transferable skills

Transferable skill	Share of ITN fellows who received training
Public speaking and communication	65%
Foreign languages	49%
Publishing	50%
Proposal and report writing:	53%
Training and supervision of students	31%
Intellectual property rights	35%
Research ethics	35%
Research project and HR management	24%
Commercialisation of research outputs	14%
Entrepreneurship	9%

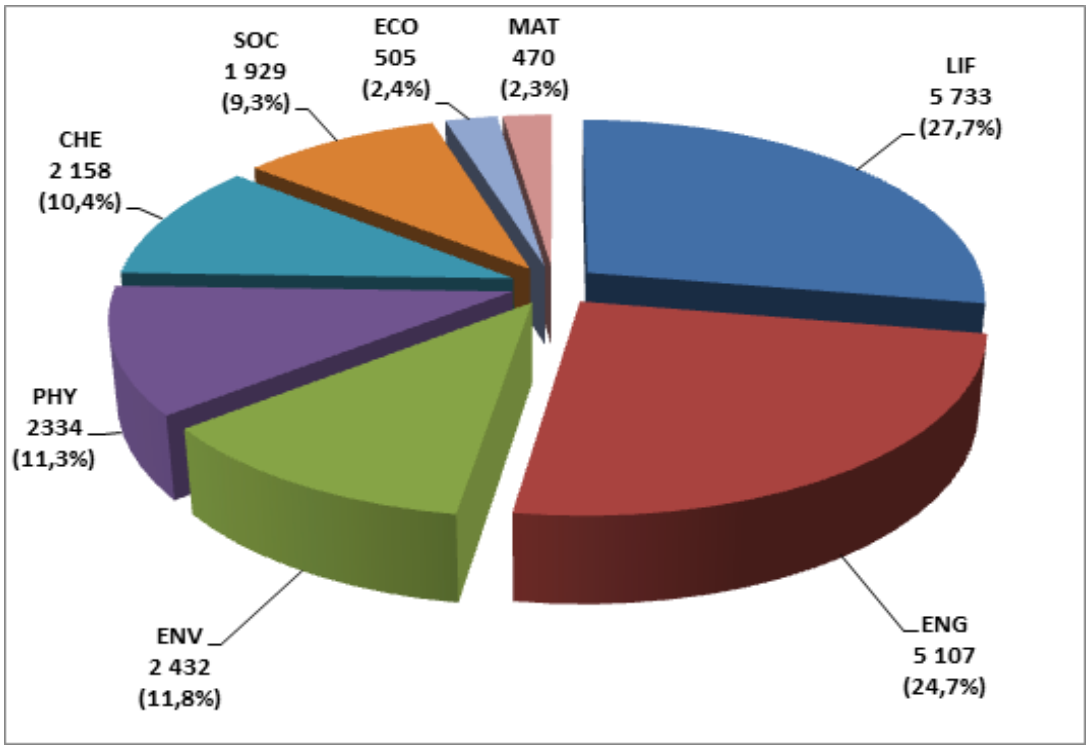
Source: PPMI for DG EAC, 2013, FP7 Marie Curie Interim Evaluations

Figure 1: Distribution of the budget (MCA 2007-2013) per research disciplines (data DG EAC, November 2014)



Acronyms: CHE chemistry; ECO economics; ENG engineering, ENV environmental sciences; LIF Life sciences; MAT mathematics; PHY physics, SOC: social sciences and humanities.

Figure 2: Distribution of the researchers' participation by panel in all MCA FP7 (data DG EAC, July 2015)



The figure is for a population of 20.668 out of a total of 21,477 fellows (DG EAC).

Figure 3: Numbers of participations in funded projects in FP7 MCA 2007-2013 by country grouping (data DG EAC, November 2014)

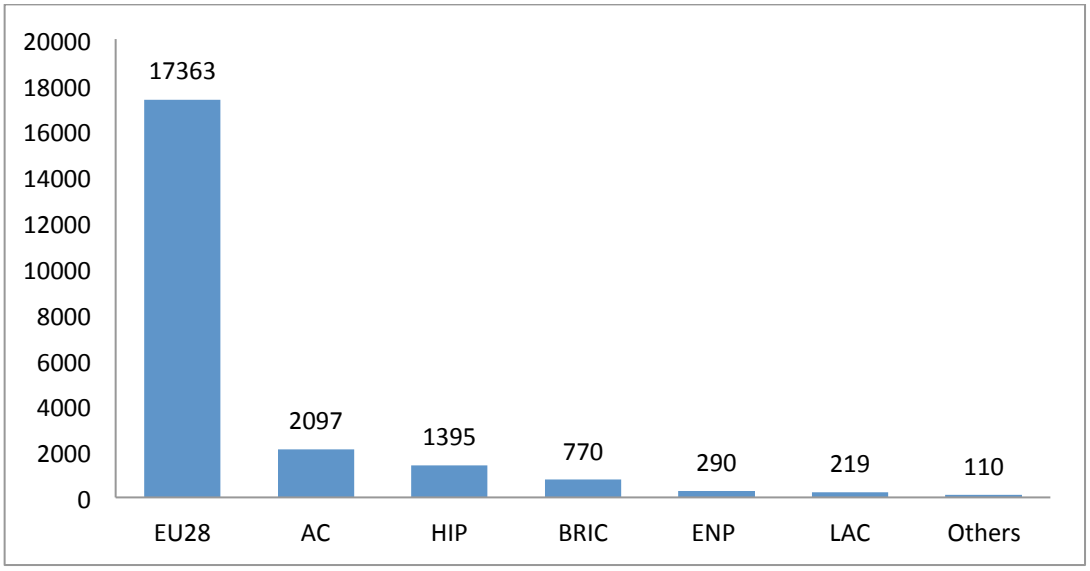


Figure 4: Numbers of EU28 participation in FP7 MCA funded projects by country (data DG EAC, November 2014)

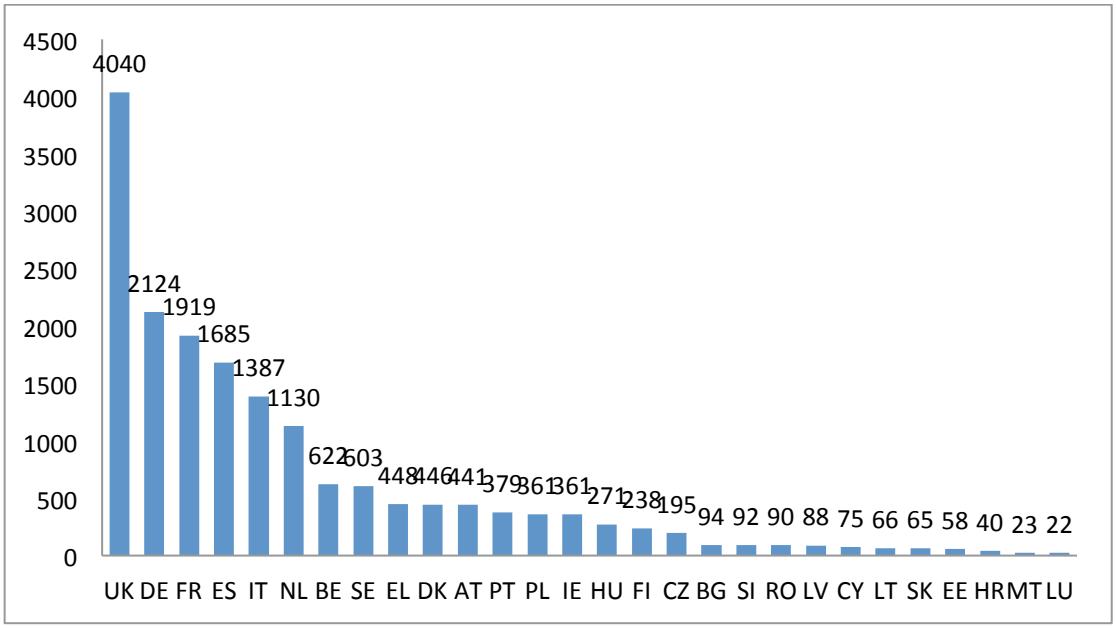


Figure 5: Numbers of AC participation in FP7 MCA funded projects by country (data DG EAC, November 2014)

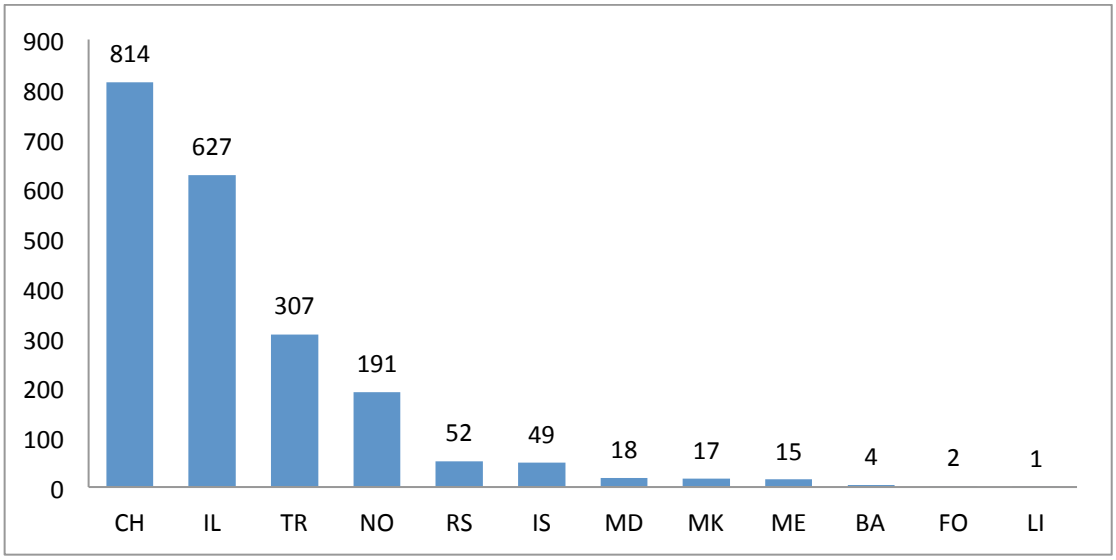


Figure 6: Top 25 nationalities of researchers (including EU and Third Country nationals) supported by FP7 MCA (DG EAC, November 2014)

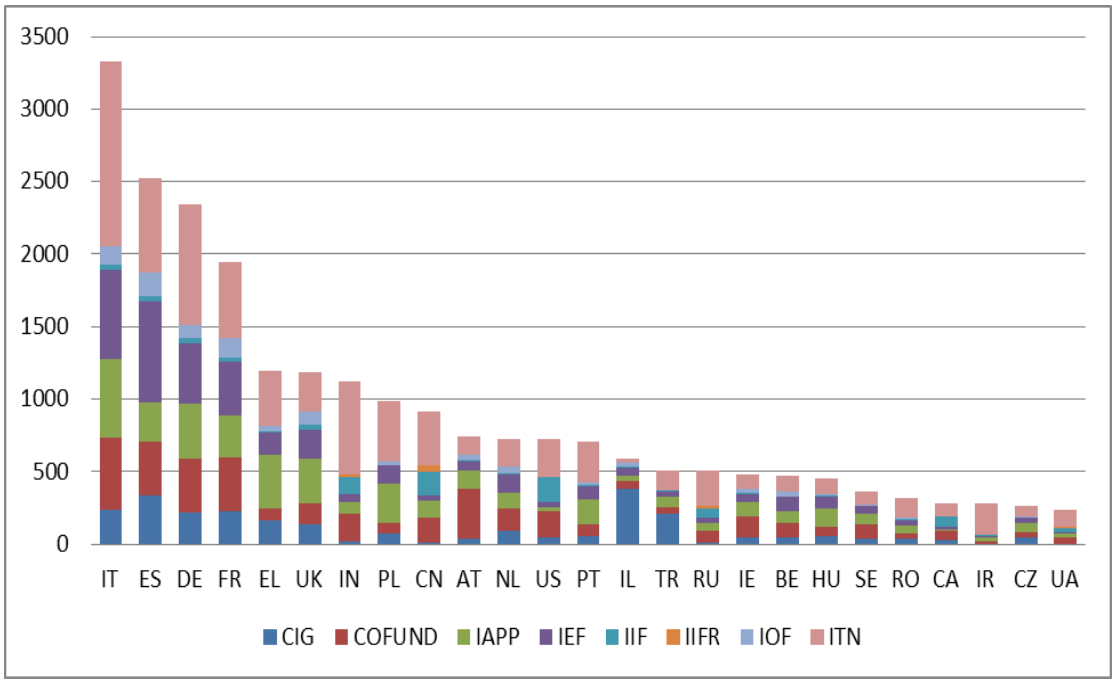


Figure 7: Top 25 destination countries of FP7 MCA researchers (including EU and Third Country nationals) (DG EAC, November 2014)

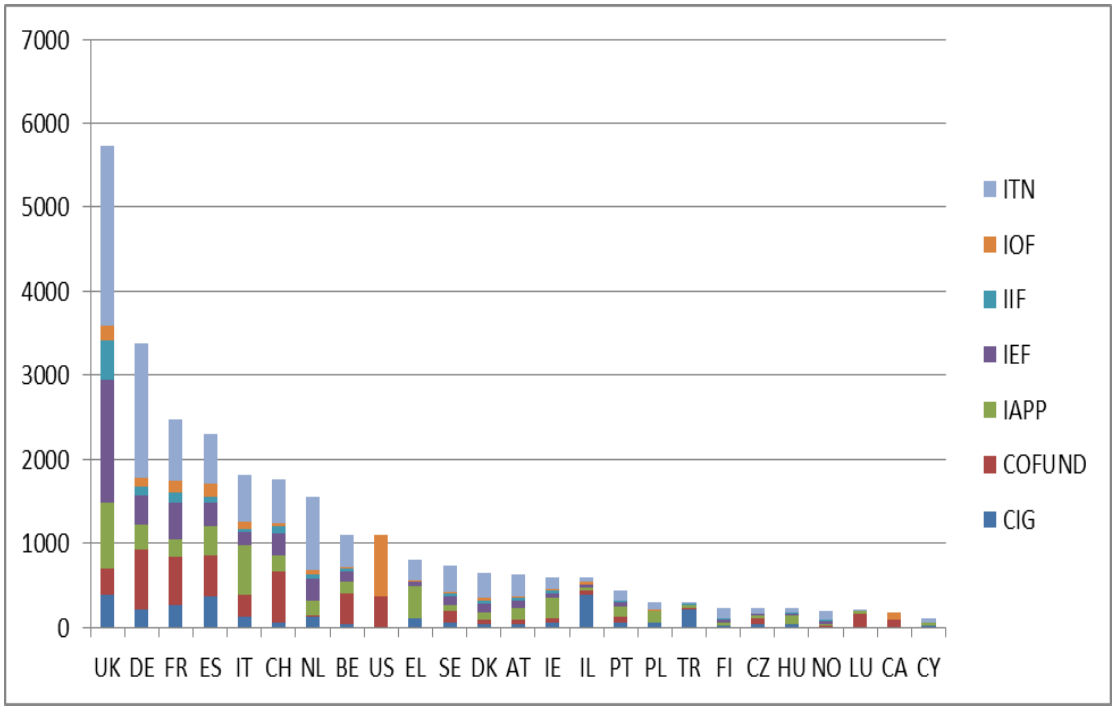


Figure 8: Number of retained COFUND programmes according to country (own calculation based on data from DG EAC, January 2015)

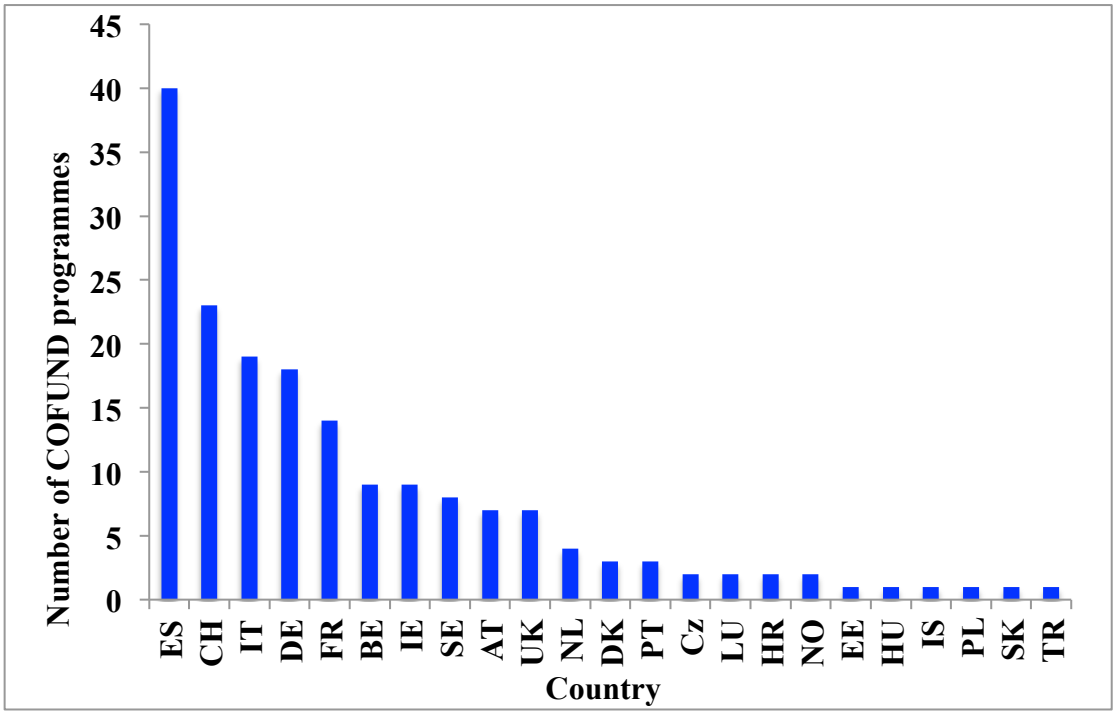


Figure 9: Number of fellows supported by COFUND according to country (own calculation based on data from DG EAC, January 2015)

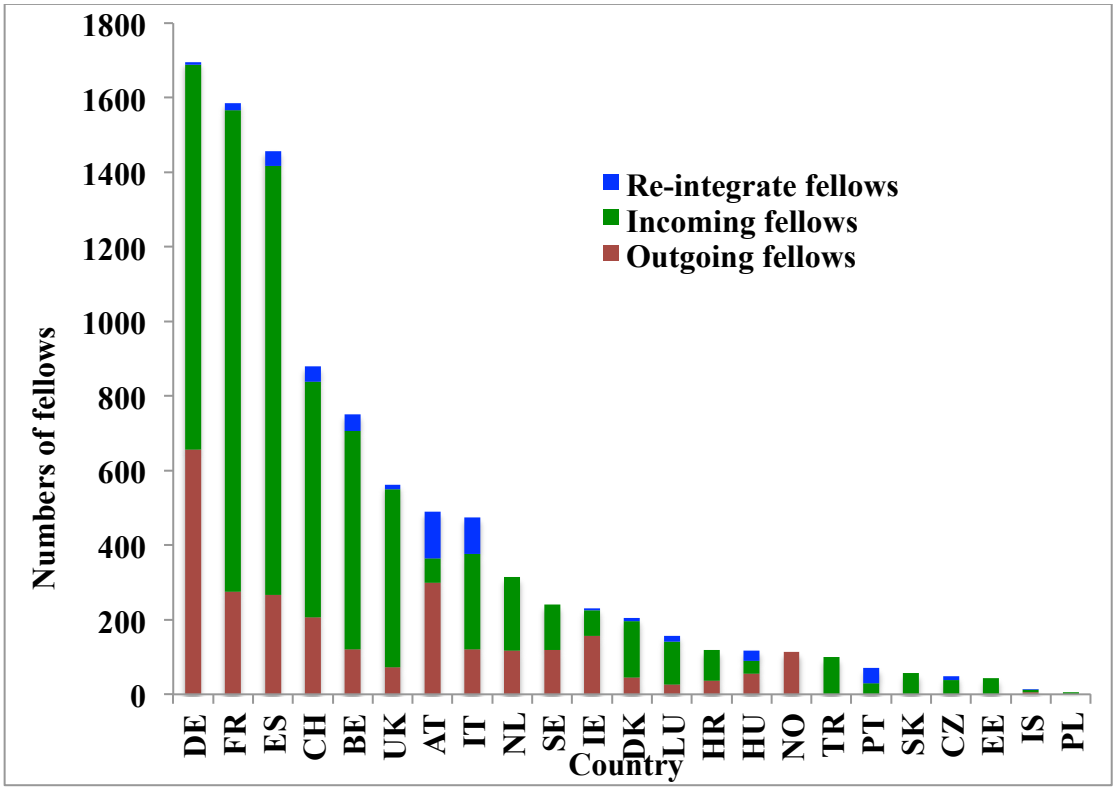


Figure 10: Distribution of fellows according to gender by evaluation panel (DG EAC, January 2015)

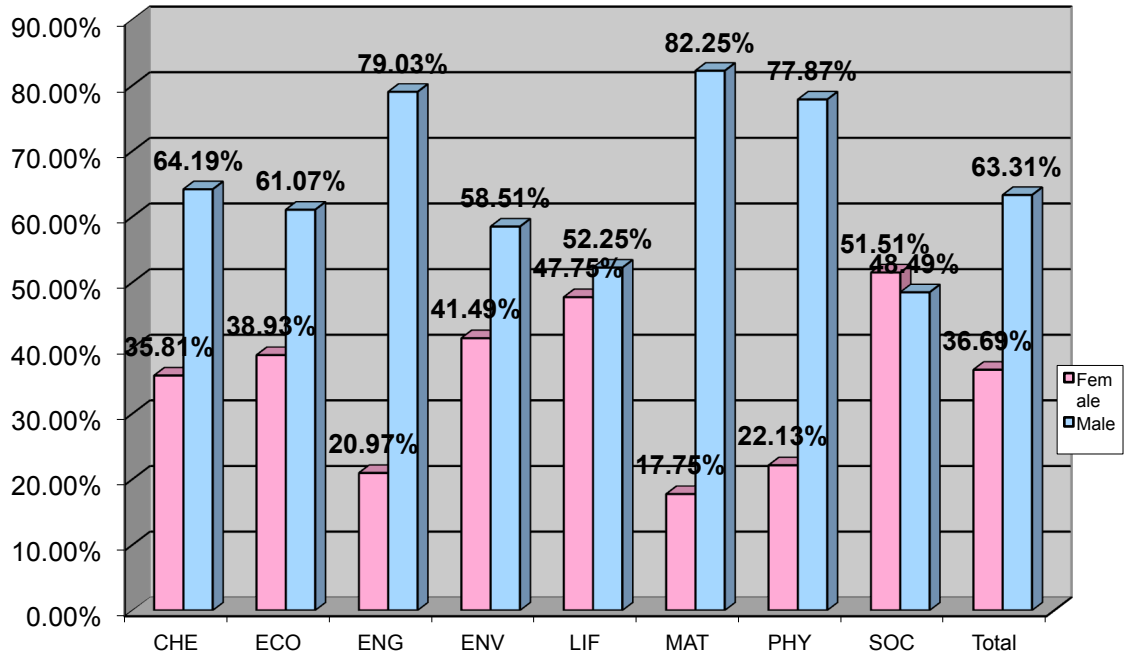
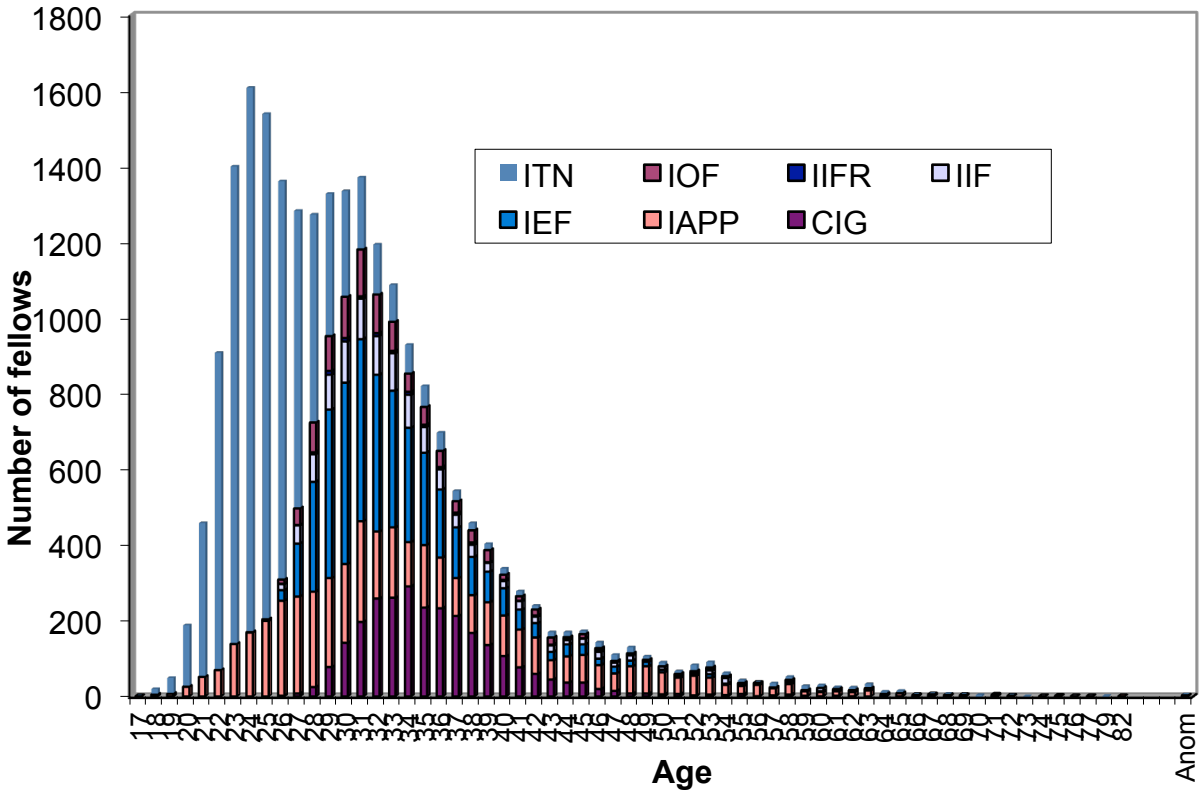


Figure 11: Distribution of fellows according to age by MC Action (DG EAC, January 2015)



Figures 12-69: FR7 Mobility patterns of EU national within EU (own calculations on basic data set of DG EAC, July 2015)

All data are based on the nationality of fellows. For each country two sets of DG EAC data are used: 1) fellows of various EU nationalities going to a EU country x; 2) fellows from a EU country x going to various EU countries. It may be that nationals of a given EU country fulfil the mobility rule and return to their home country - they will be represented in both figures, namely incoming and outgoing (with obviously the same set of data). Figures 12 and 13 are presented according to country and merged all MCAs. Figures 14 to 69 are presented according to country and type of MC Action.

Figure 12: EU nationals coming for research training to a EU country, all MC Actions (own calculation on basic data set of DG EAC, July 2015)

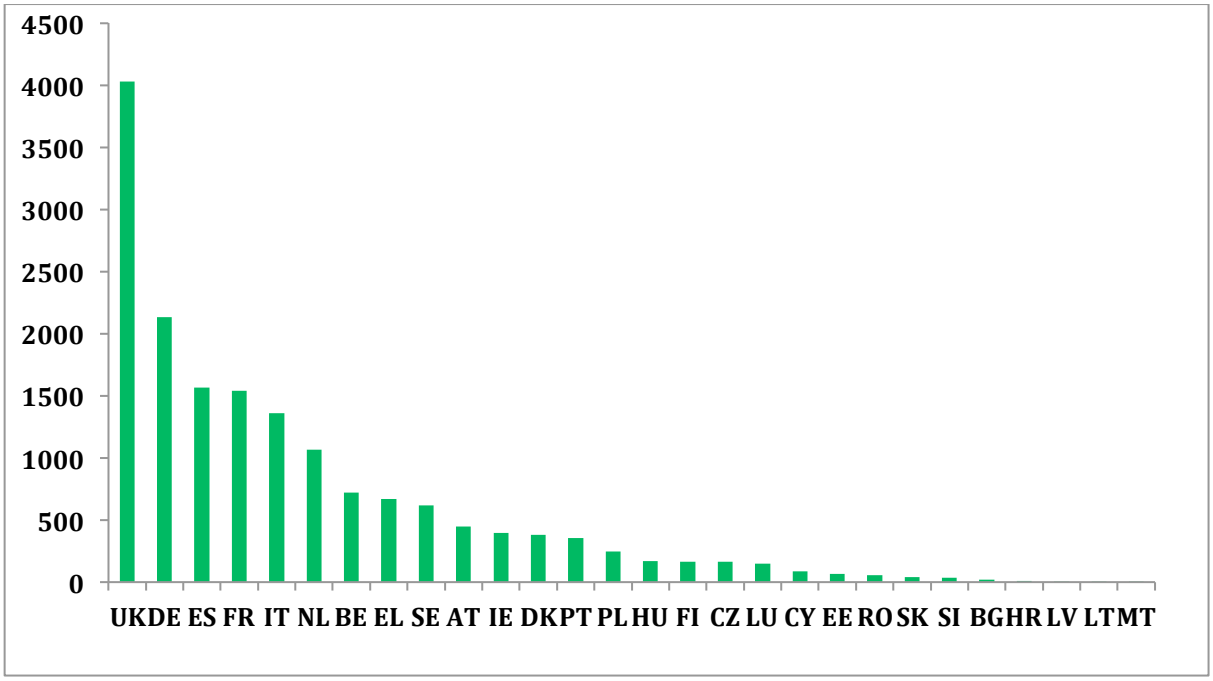


Figure 13: EU nationals going for research training to another EU country, all MC Actions (own calculation on basic data set of DG EAC, July 2015)

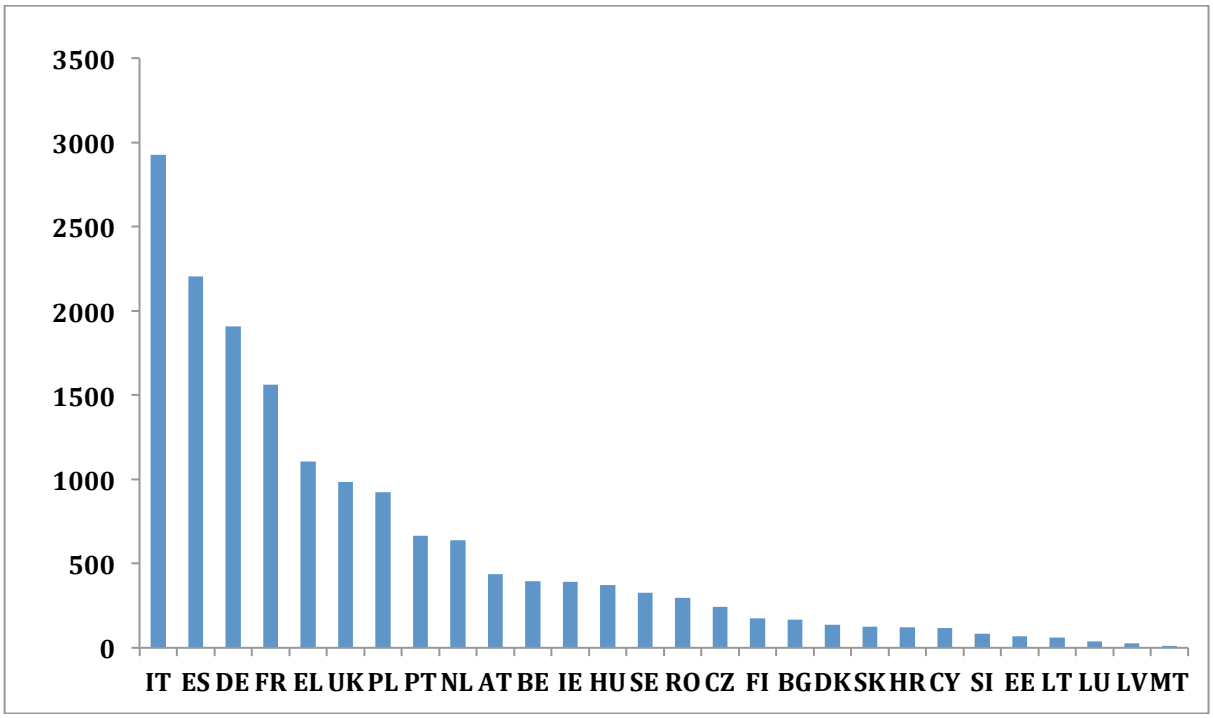


Figure 14: EU nationals coming to Austria by MC Action (445 fellows) (own calculation on basic data set of DG EAC, July 2015)

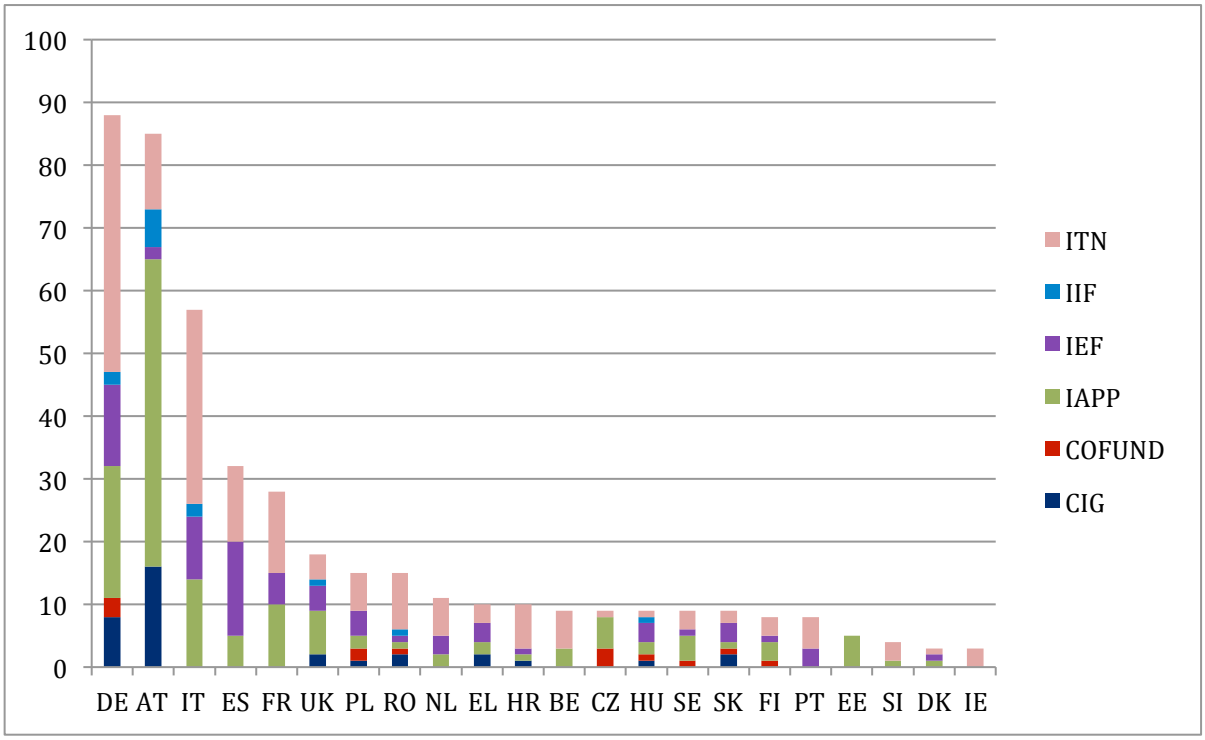
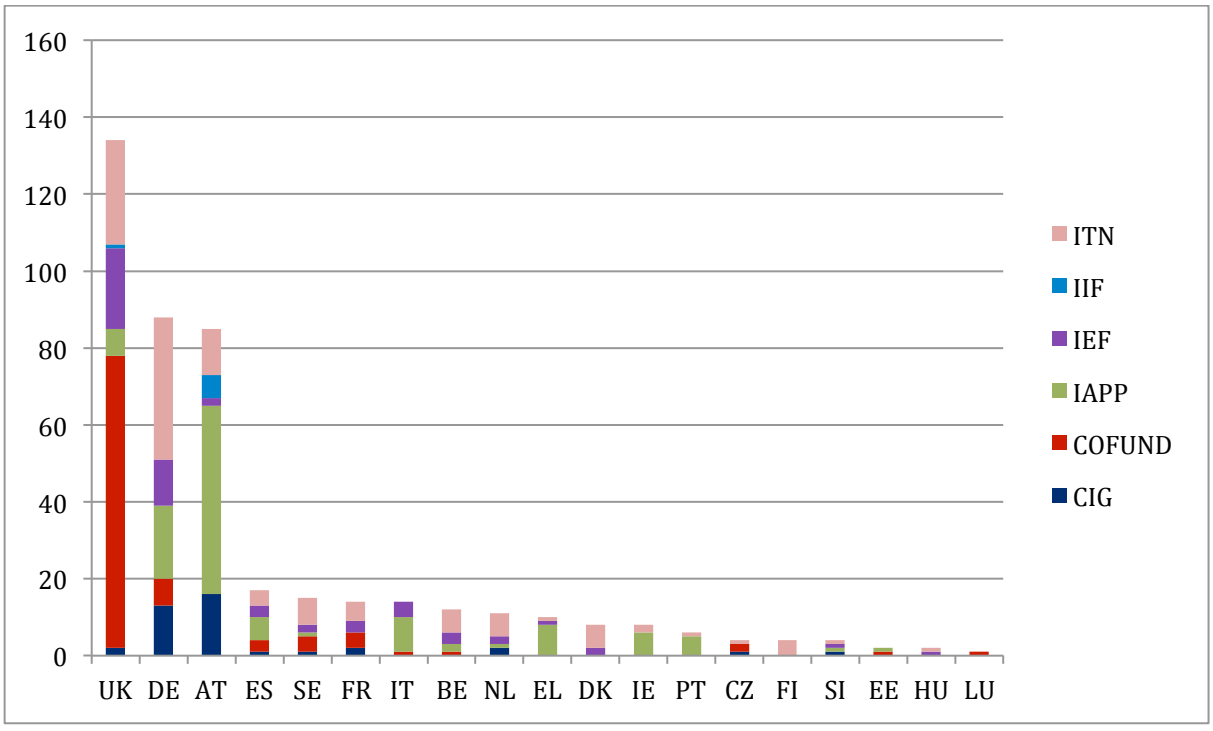


Figure 15: Austrian nationals going to EU countries by MC Action (439 fellows) (own calculation on basic data set of DG EAC, July 2015)



Austrian researchers who fulfil the mobility rule and return to their home country are represented in both figures (incoming and outgoing) and the number stands at 85.

Figure 16: EU nationals coming to Belgium by MC Action (721 fellows) (own calculation on basic data set of DG EAC, July 2015)

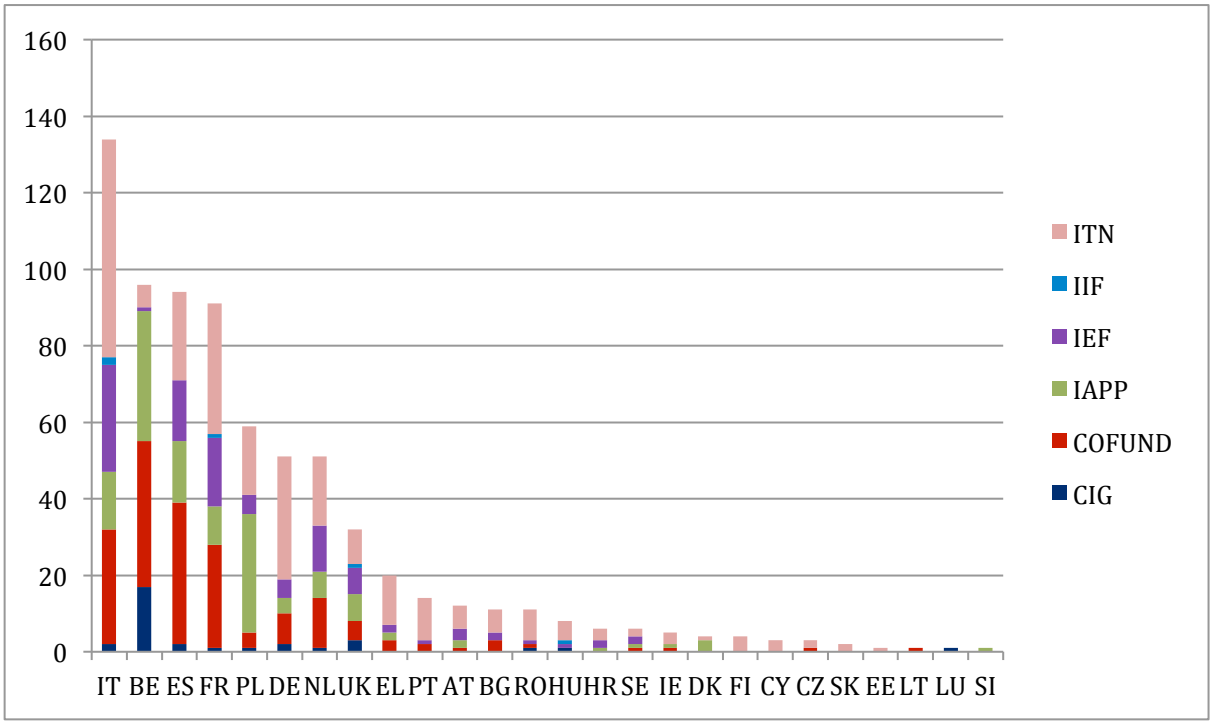
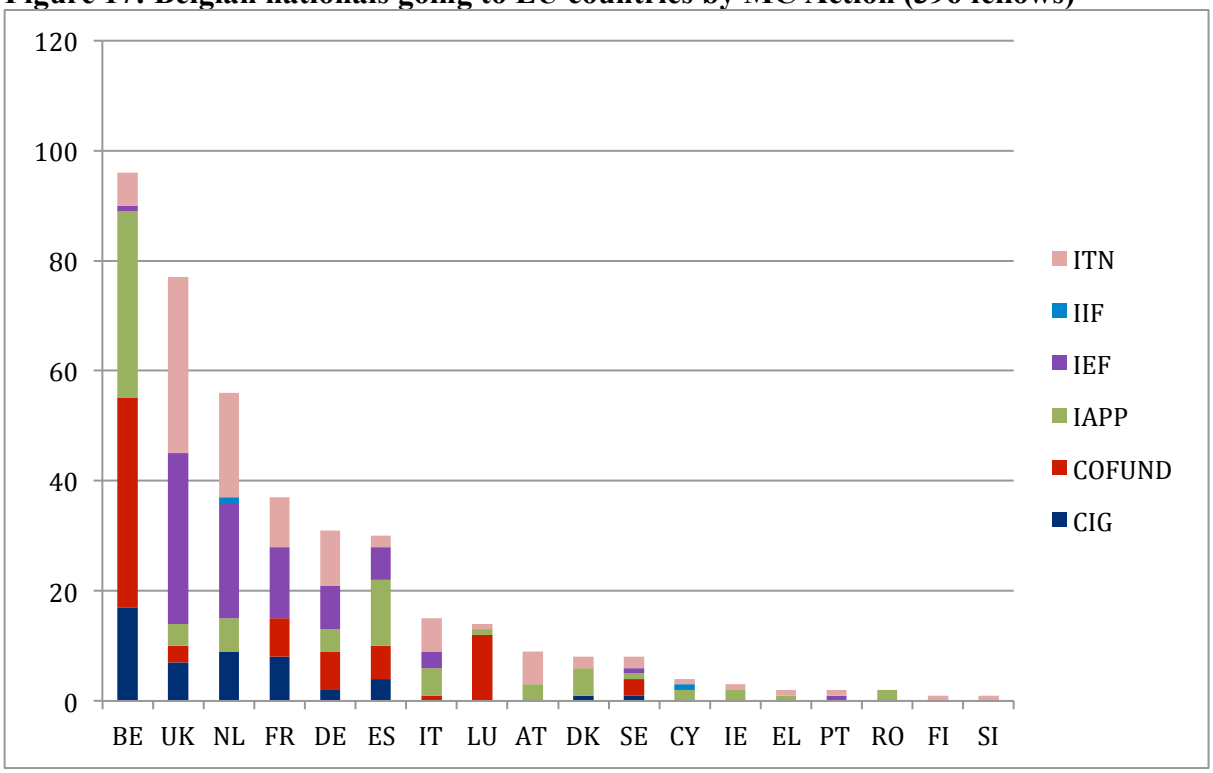


Figure 17: Belgian nationals going to EU countries by MC Action (396 fellows)



Belgian researchers who fulfil the mobility rule and return to their home country are represented in both figures (incoming and outgoing) and the number stands at 96.

Figure 18: EU nationals coming to Bulgaria by MC Action (21 fellows) (own calculation on basic data set of DG EAC, July 2015)

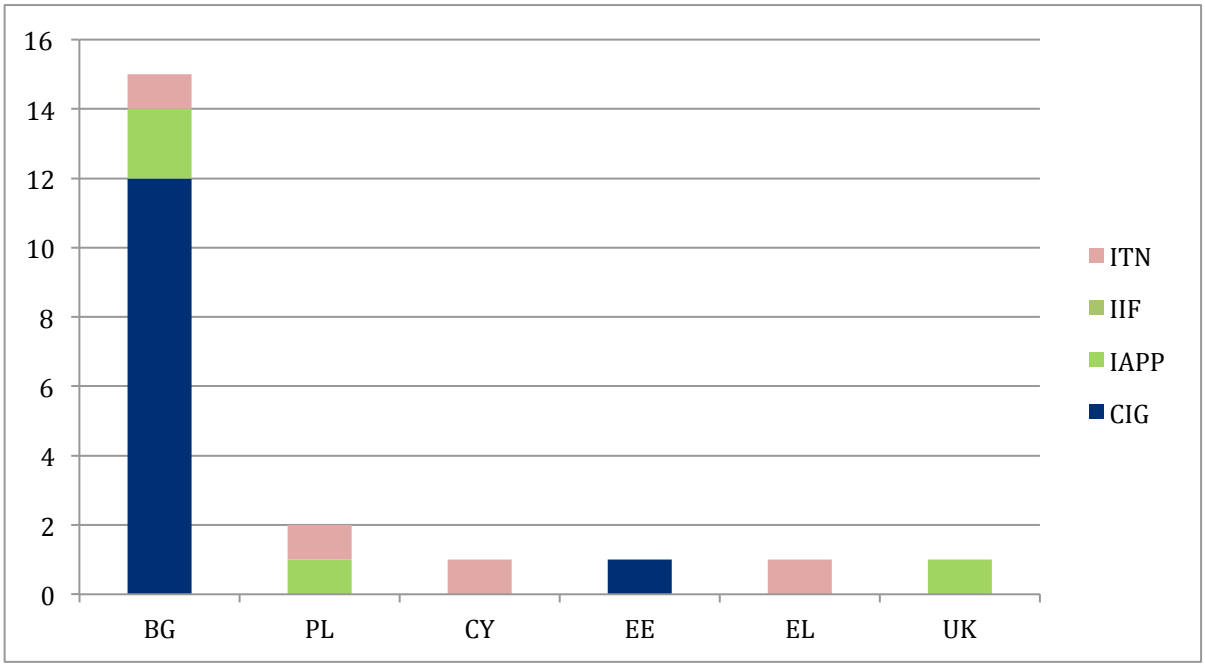
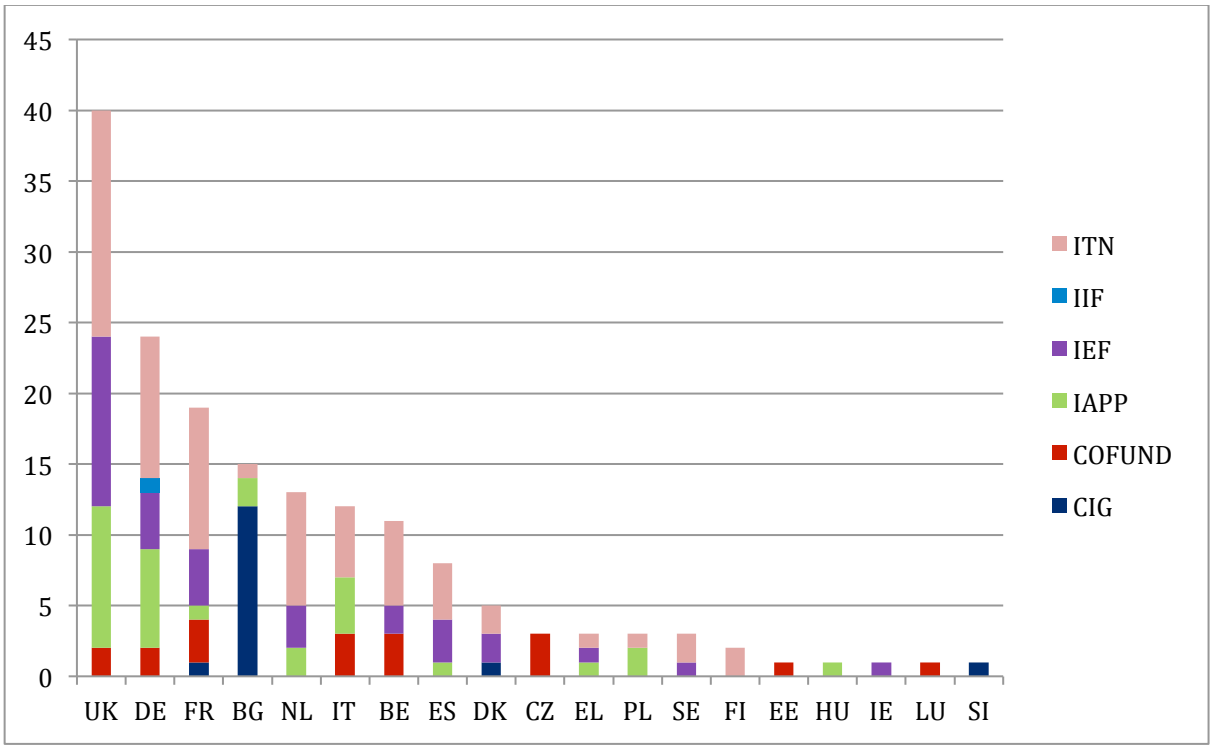


Figure 19: Bulgarian nationals going to EU countries by MC Action (166 fellows)



Bulgarian researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 15.

Figure 20: EU nationals coming to Cyprus by MC Action (87 fellows) (own calculation on basic data set of DG EAC, July 2015)

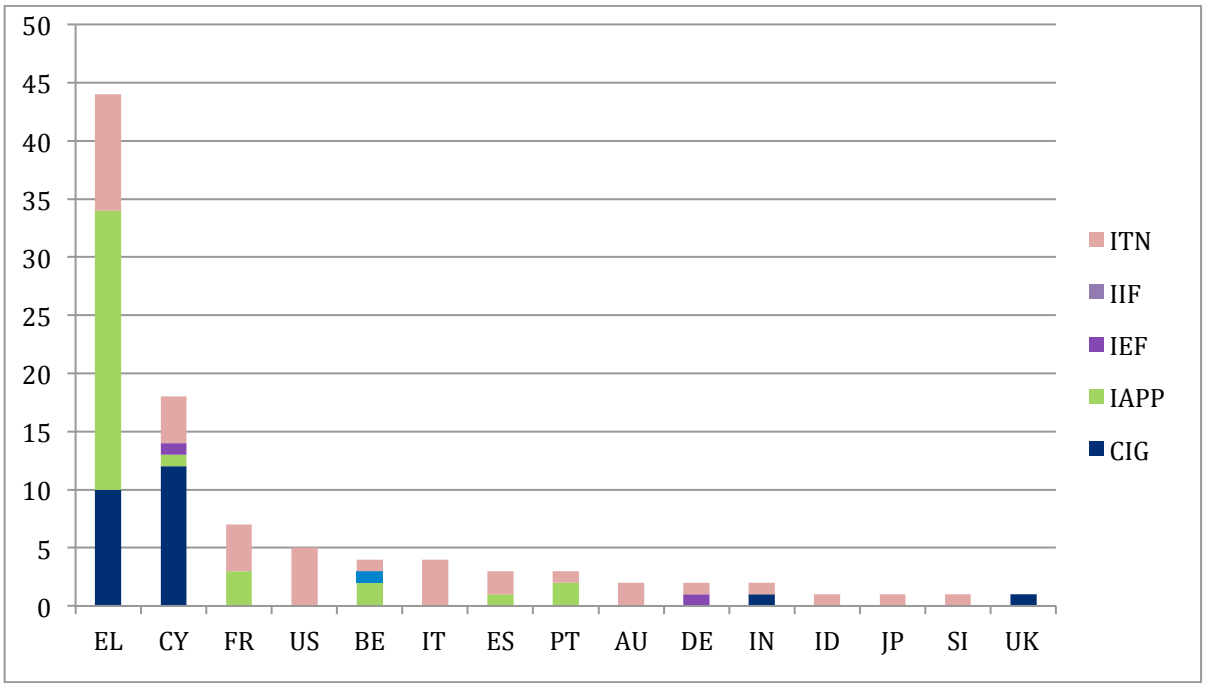
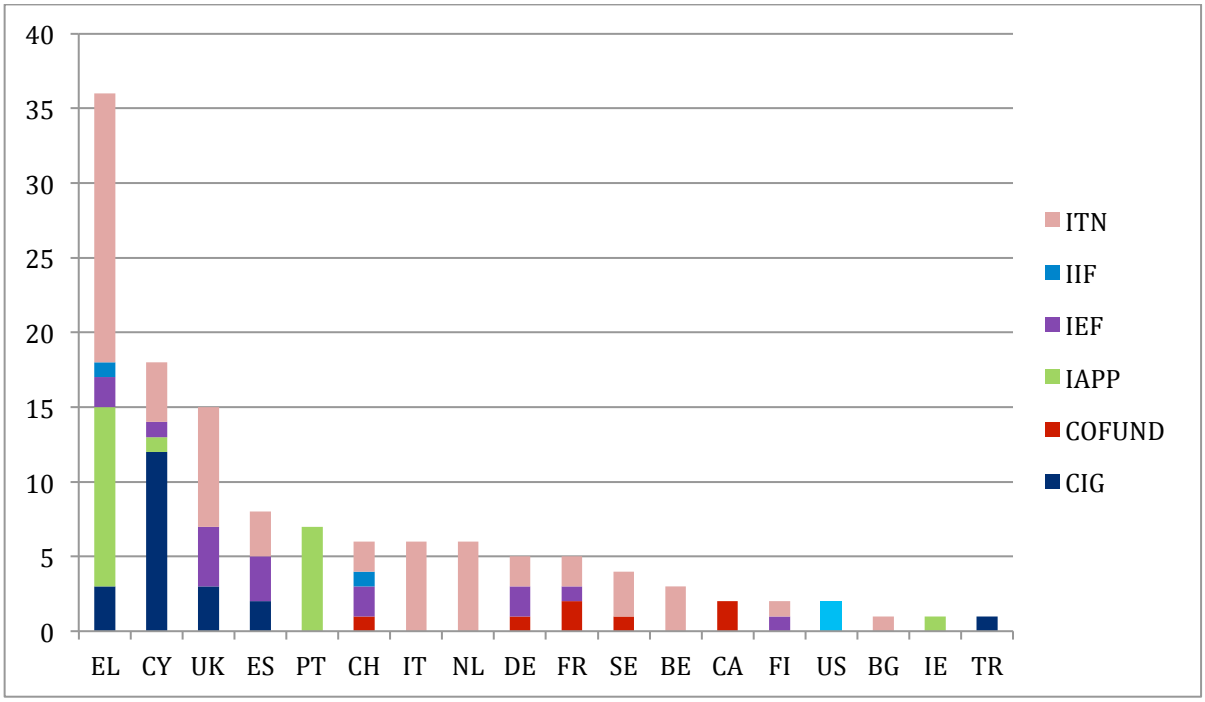


Figure 21: Cypriots going to EU countries by MC Action (117 fellows)



Cypriot researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 18.

Figure 22: EU nationals coming to the Czech Republic by MC Action (162 fellows) (own calculation on basic data set of DG EAC, July 2015)

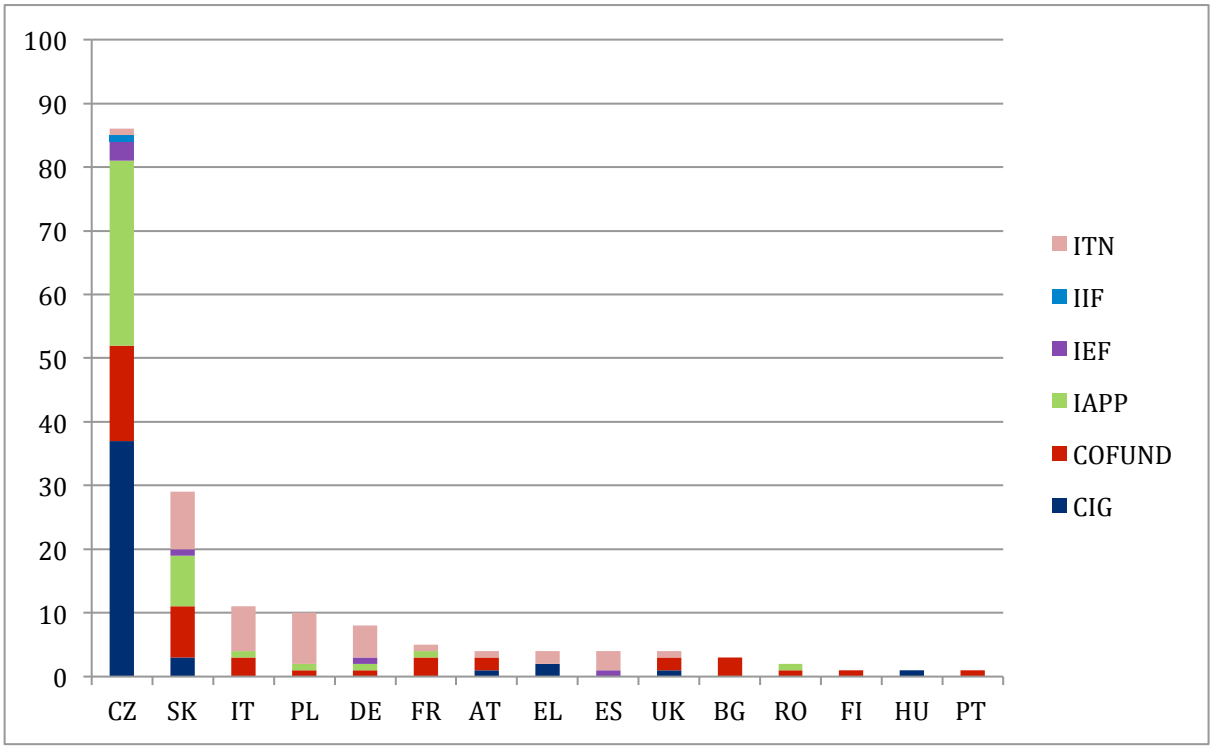
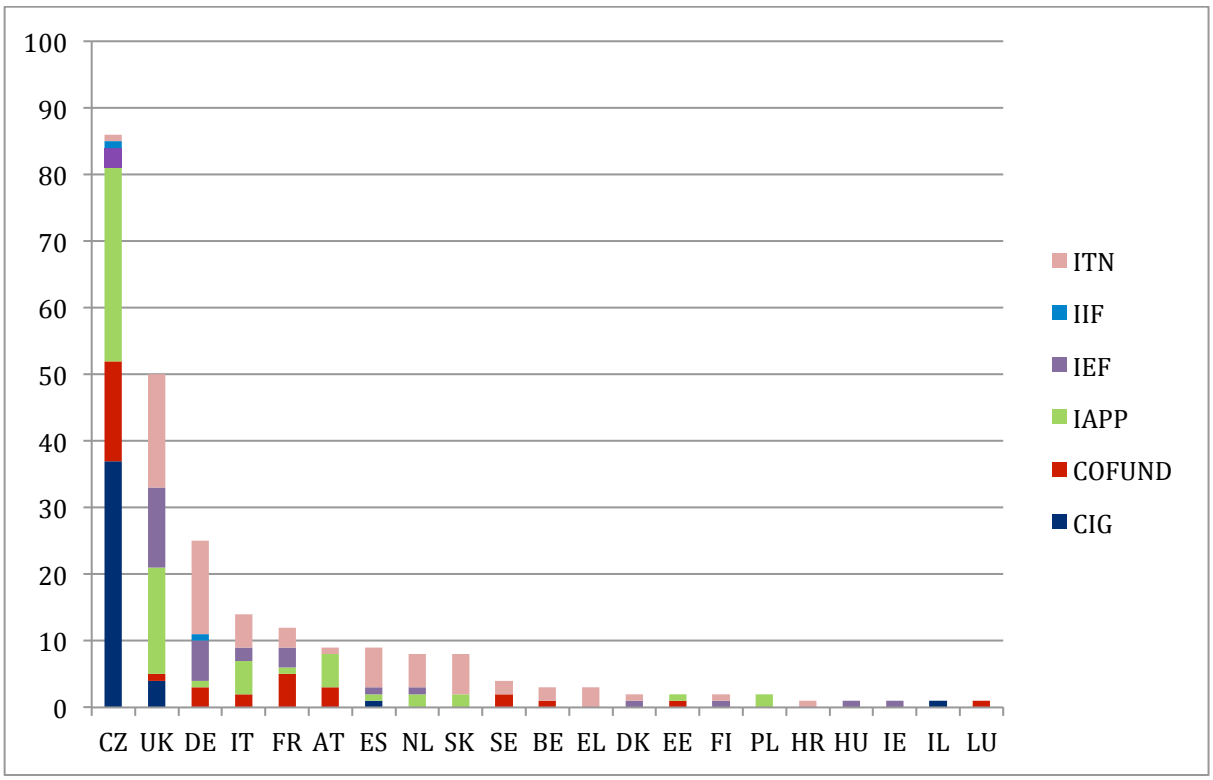


Figure 23: Czech nationals going to EU countries by MC Action (243 fellows)



Check researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 86.

Figure 24: EU nationals coming to Germany by MC Action (2.132 fellows) (own calculation on basic data set of DG EAC, July 2015)

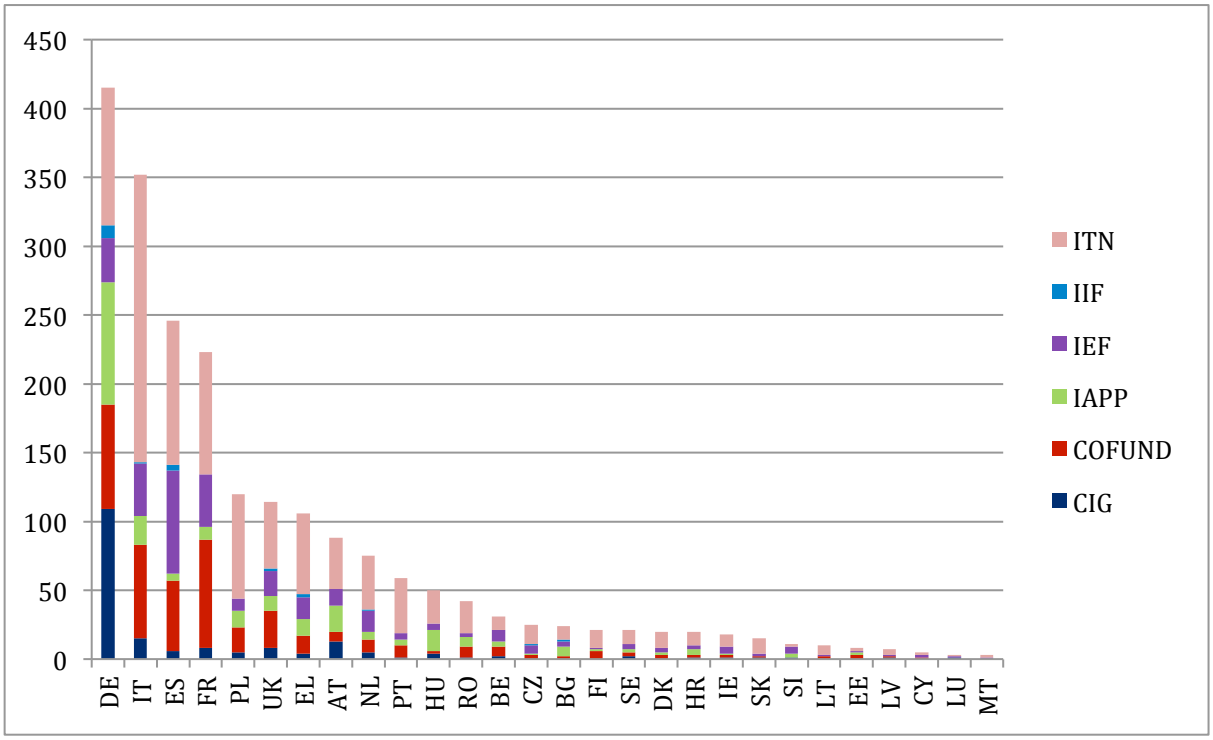
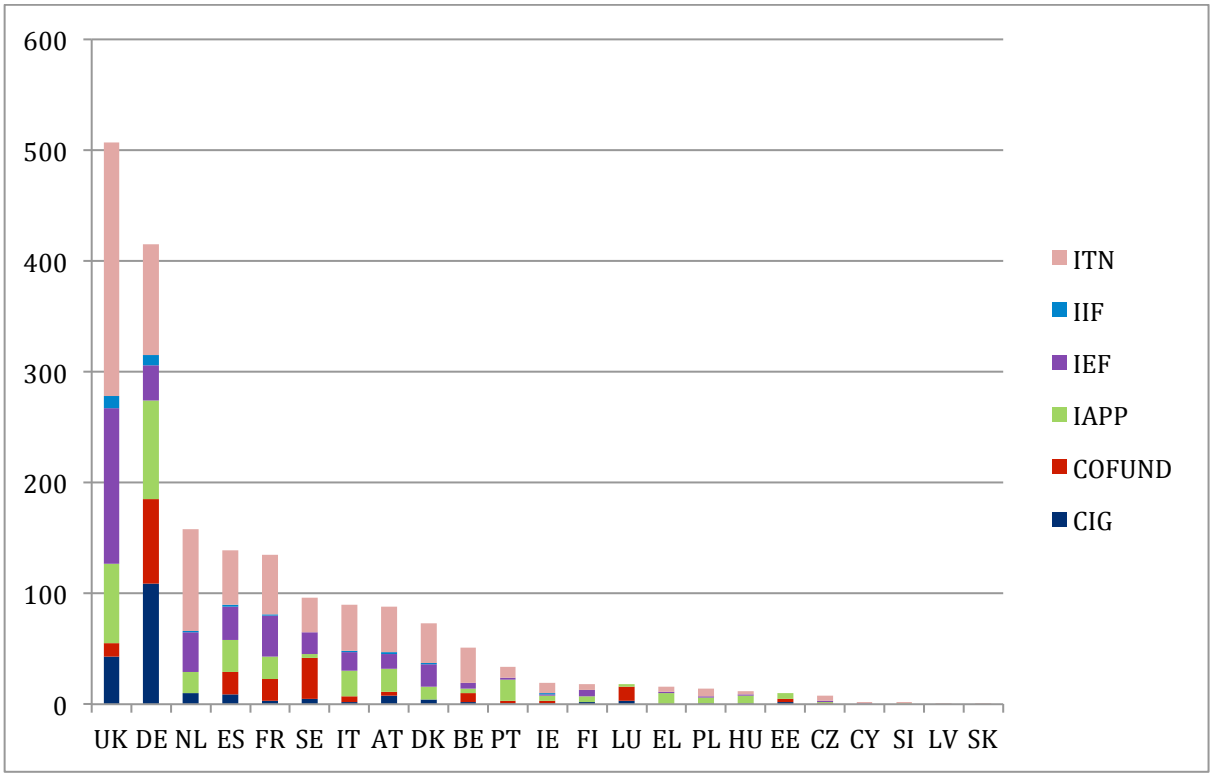


Figure 25: German nationals going EU countries by MC Action (1.907 fellows)



German researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 415.

Figure 26: EU nationals coming to Denmark by MC Action (379 fellows) (own calculation on basic data set of DG EAC, July 2015)

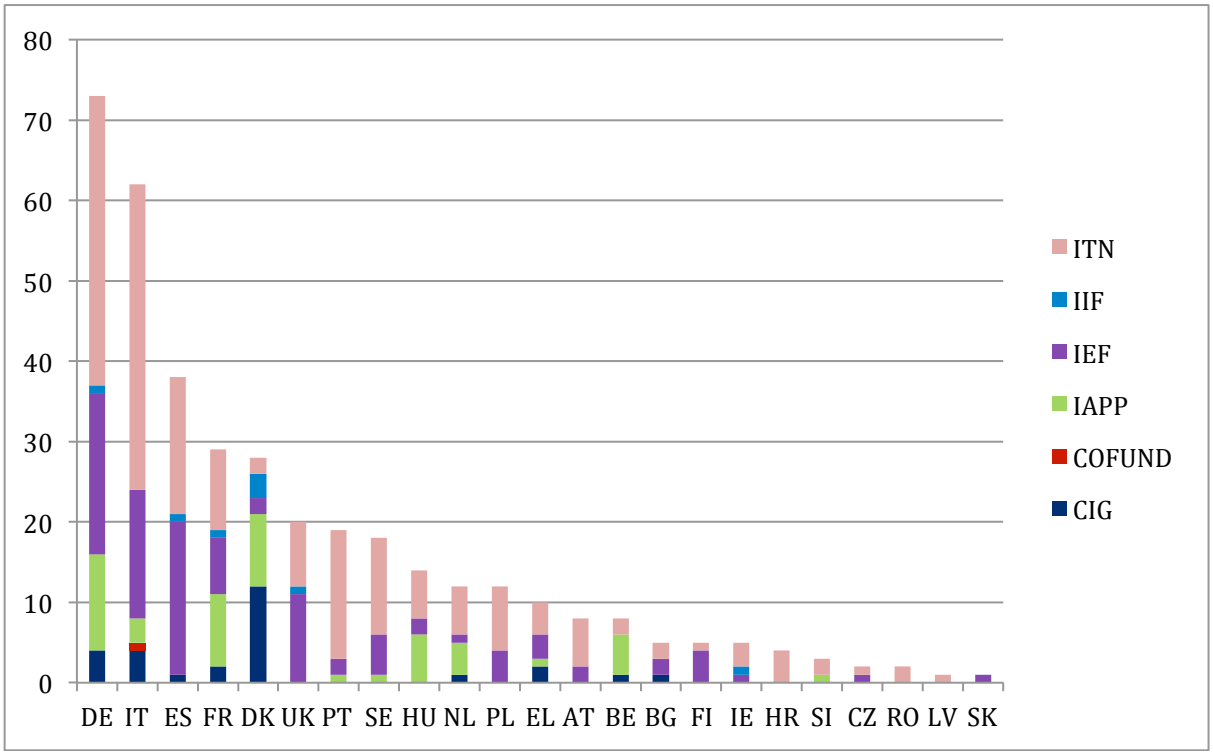
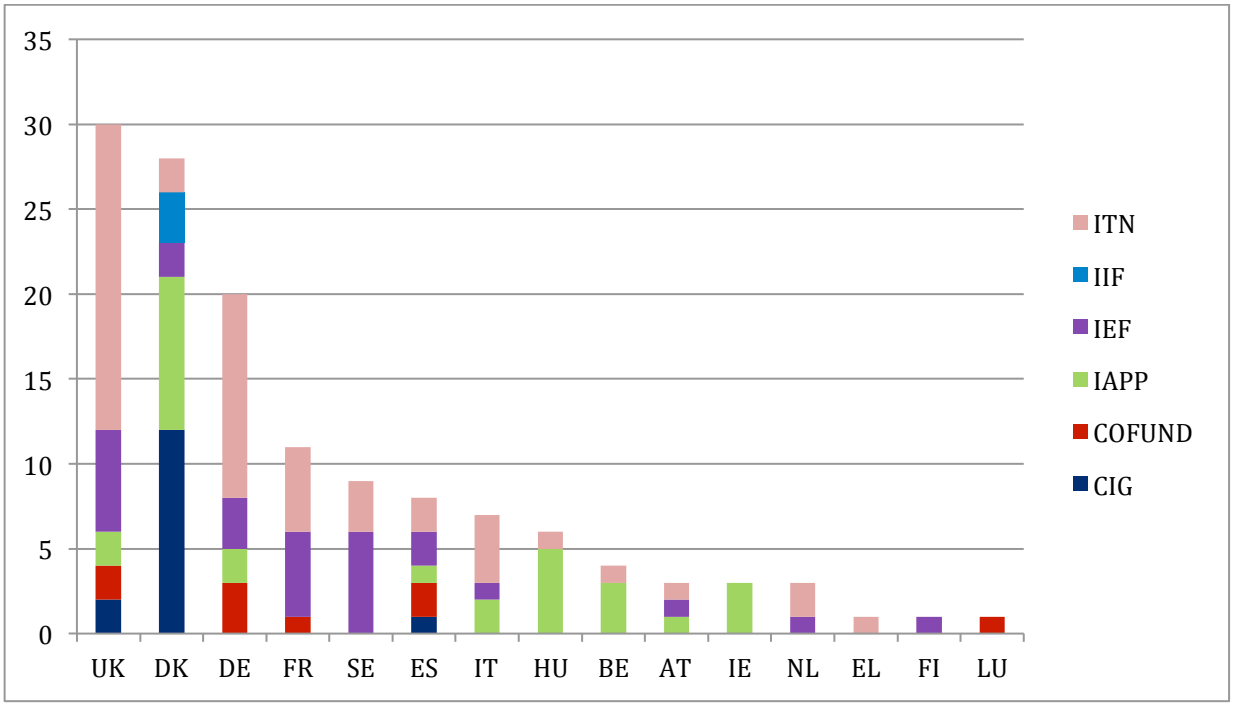


Figure 27: Danish nationals going to EU countries by MC Action (135 fellows)



Danish researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 28.

Figure 28: EU nationals coming to Estonia by MC Action (67 fellows) (own calculation on basic data set of DG EAC, July 2015)

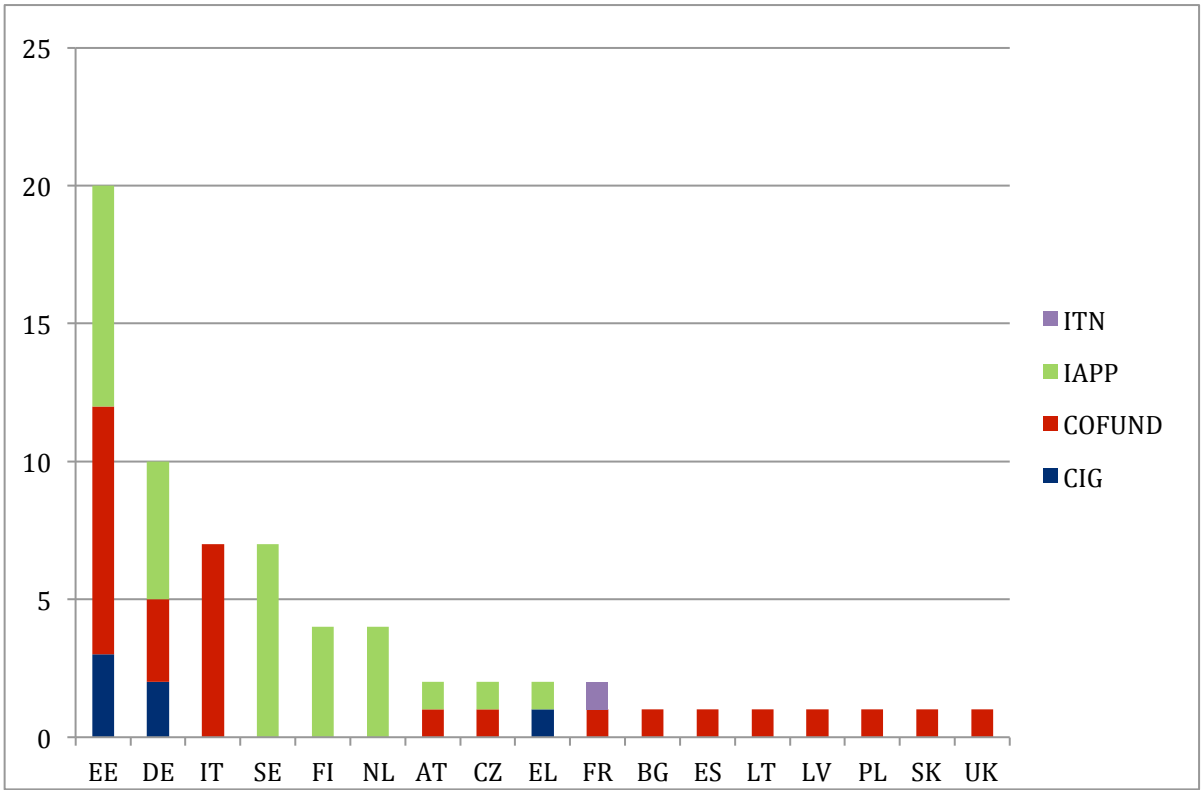
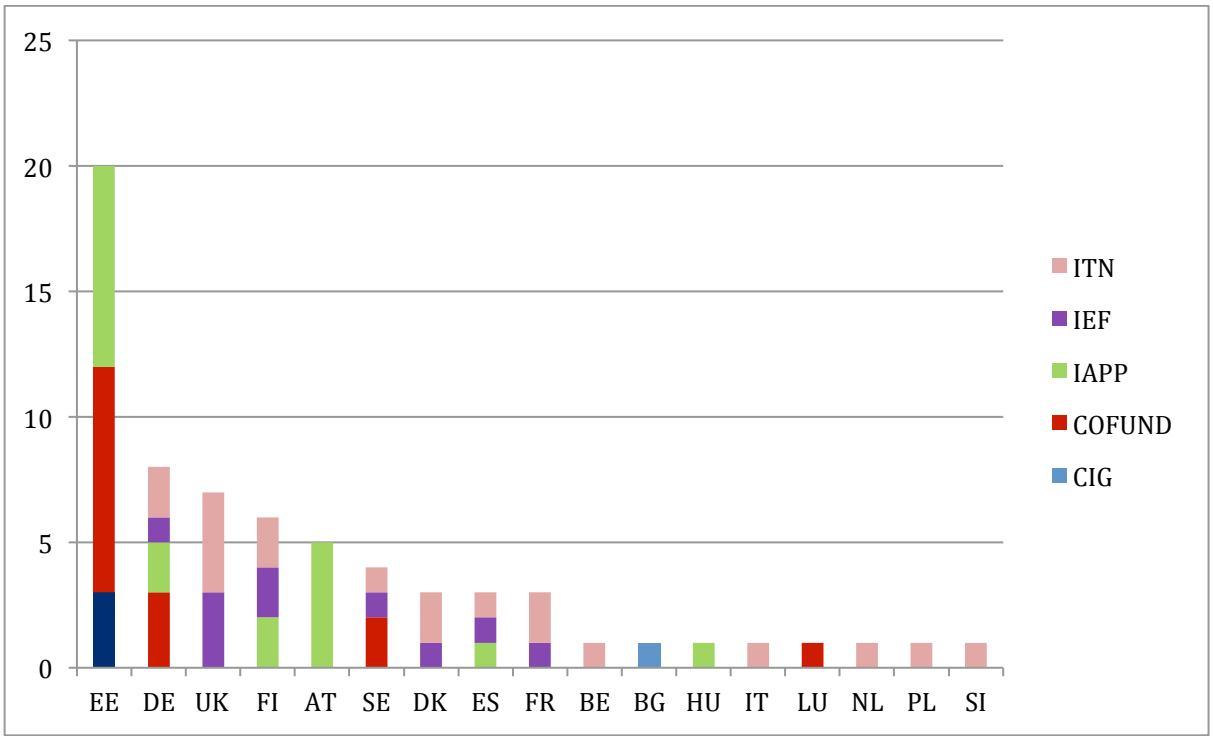


Figure 29: Estonian nationals going to EU countries by MC Action (67 fellows)



Estonian researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 20.

Figure 30: EU nationals coming to Greece by MC Action (668 fellows) (own calculation on basic data set of DG EAC, July 2015)

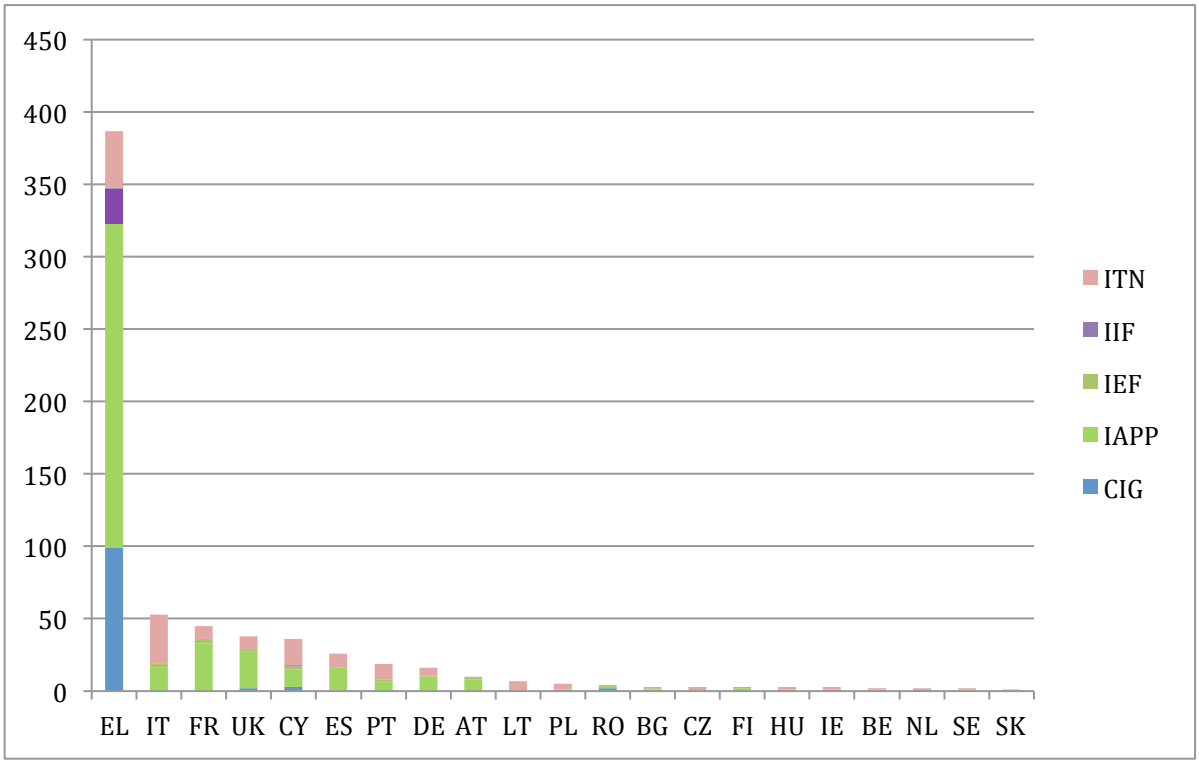
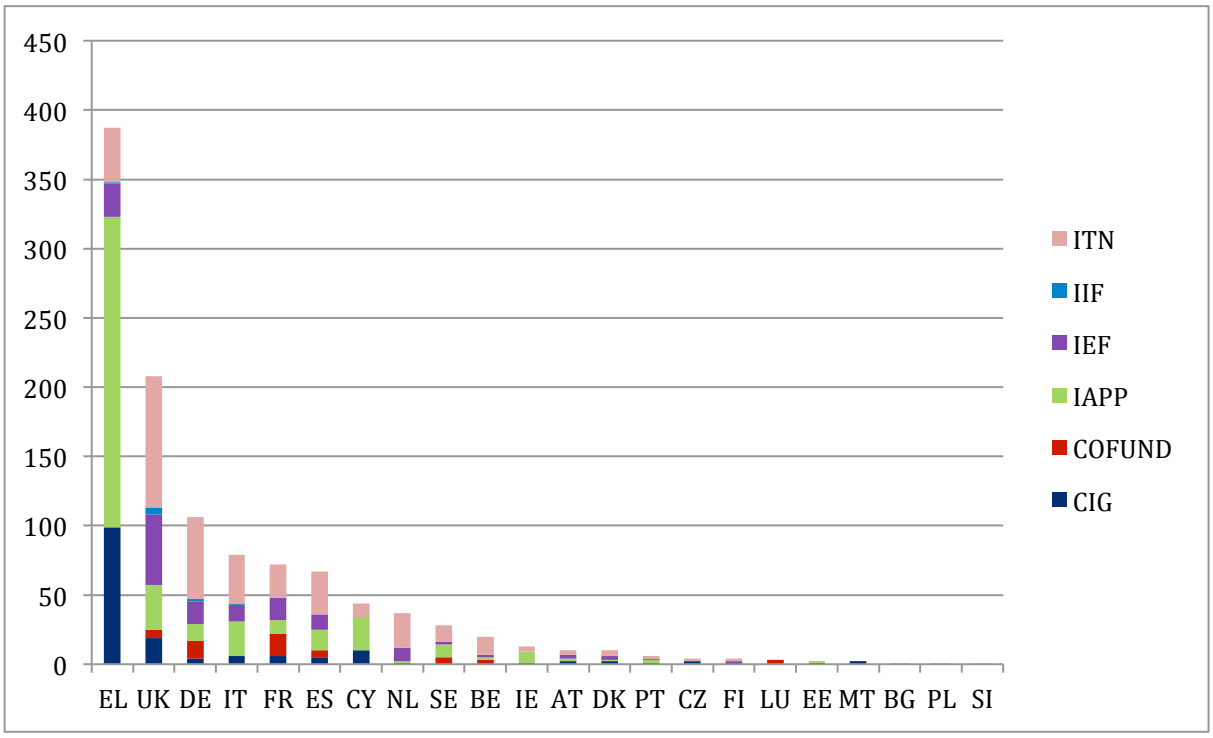


Figure 31: Greek nationals going to EU countries by MC Action (1.105 fellows)



Greek researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 387.

Figure 32: EU nationals coming to Spain by MC Action (1.564 fellows) (own calculation on basic data set of DG EAC, July 2015)

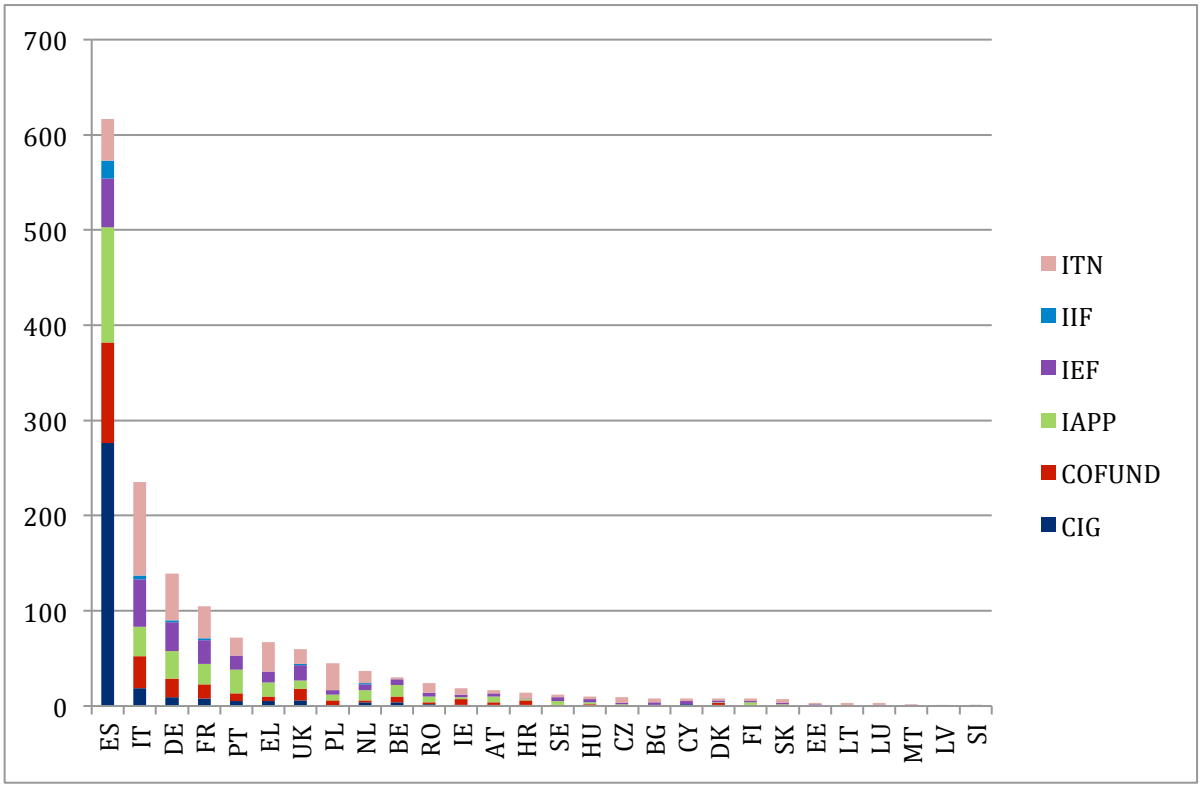
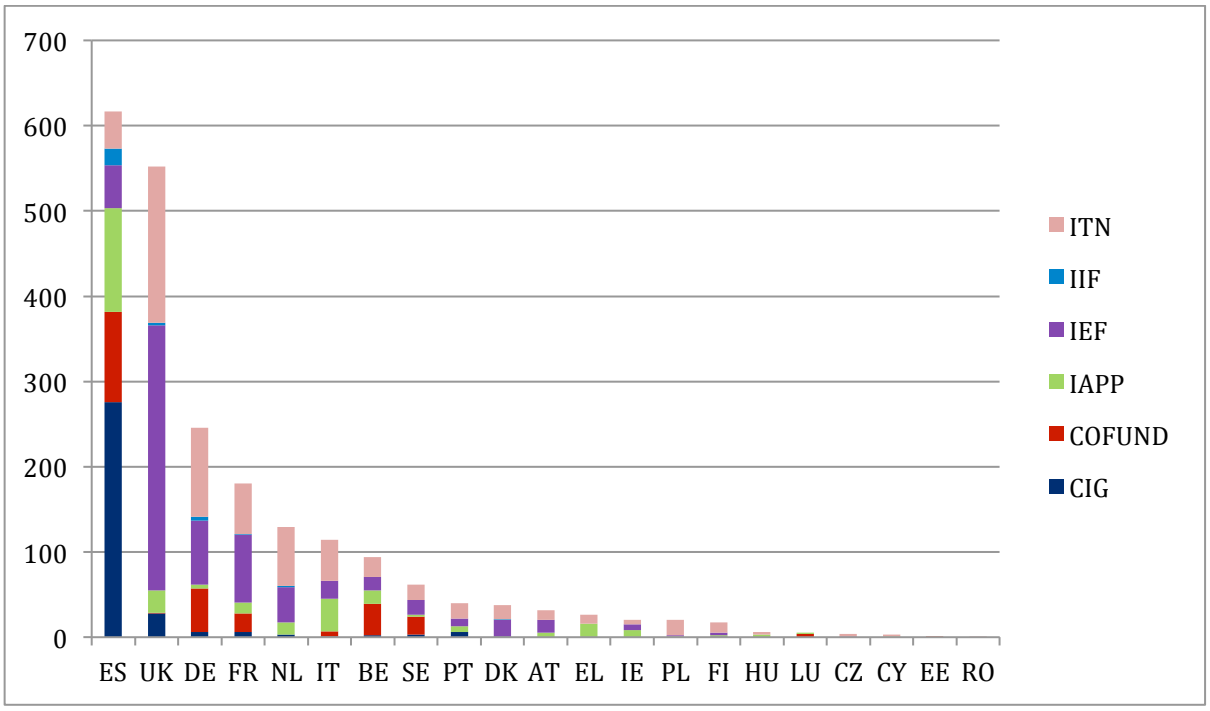


Figure 33: Spanish nationals going to EU countries by MC Action (2.207 fellows)



Spanish researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 617.

Figure 34: EU nationals going to Finland by MC Action (165 fellows) (own calculation on basic data set of DG EAC, July 2015)

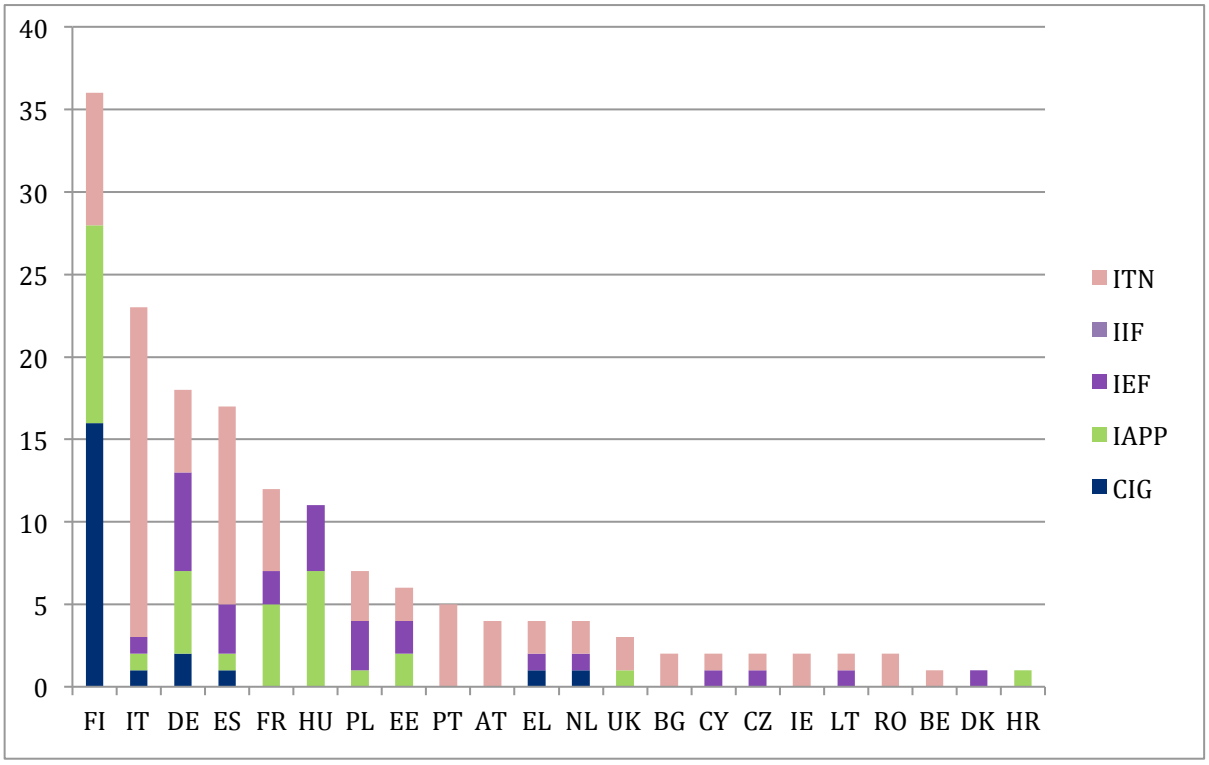
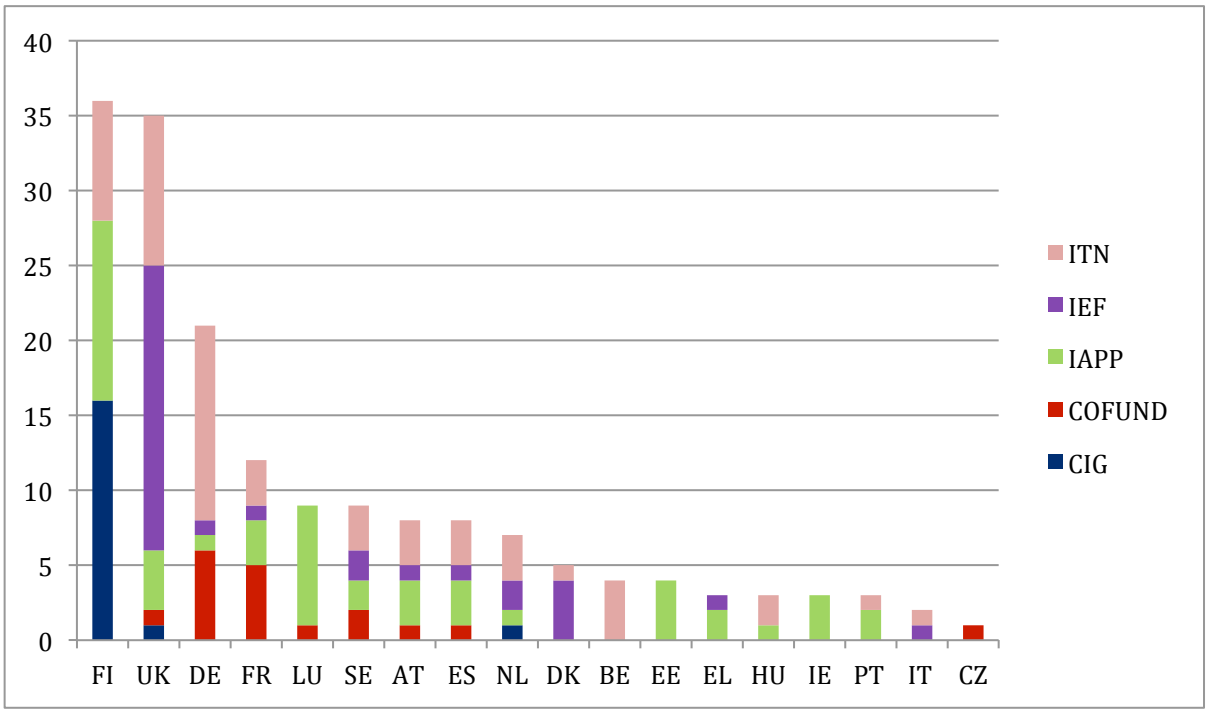


Figure 35: Finnish nationals going to EU countries by MC Action (173 fellows)



Finnish researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 36.

Figure 36: EU nationals coming to France by MC Action (1.542 fellows) (own calculation on basic data set of DG EAC, July 2015)

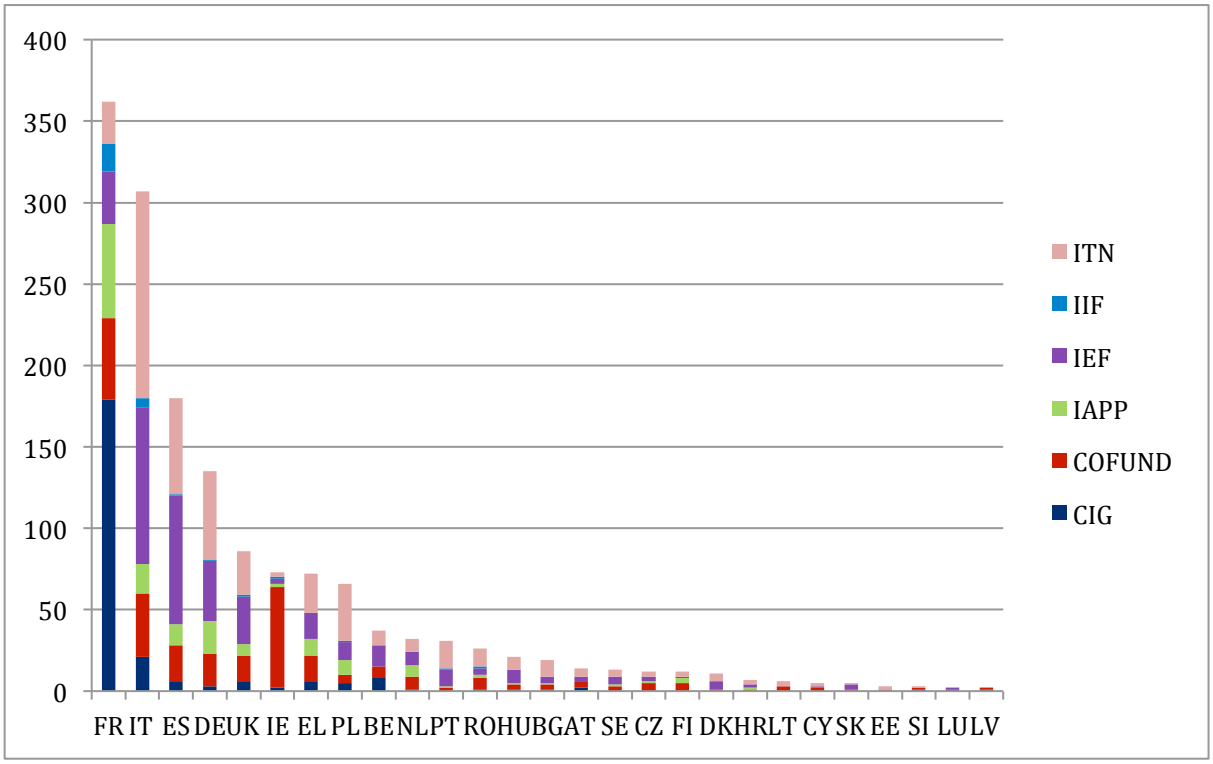
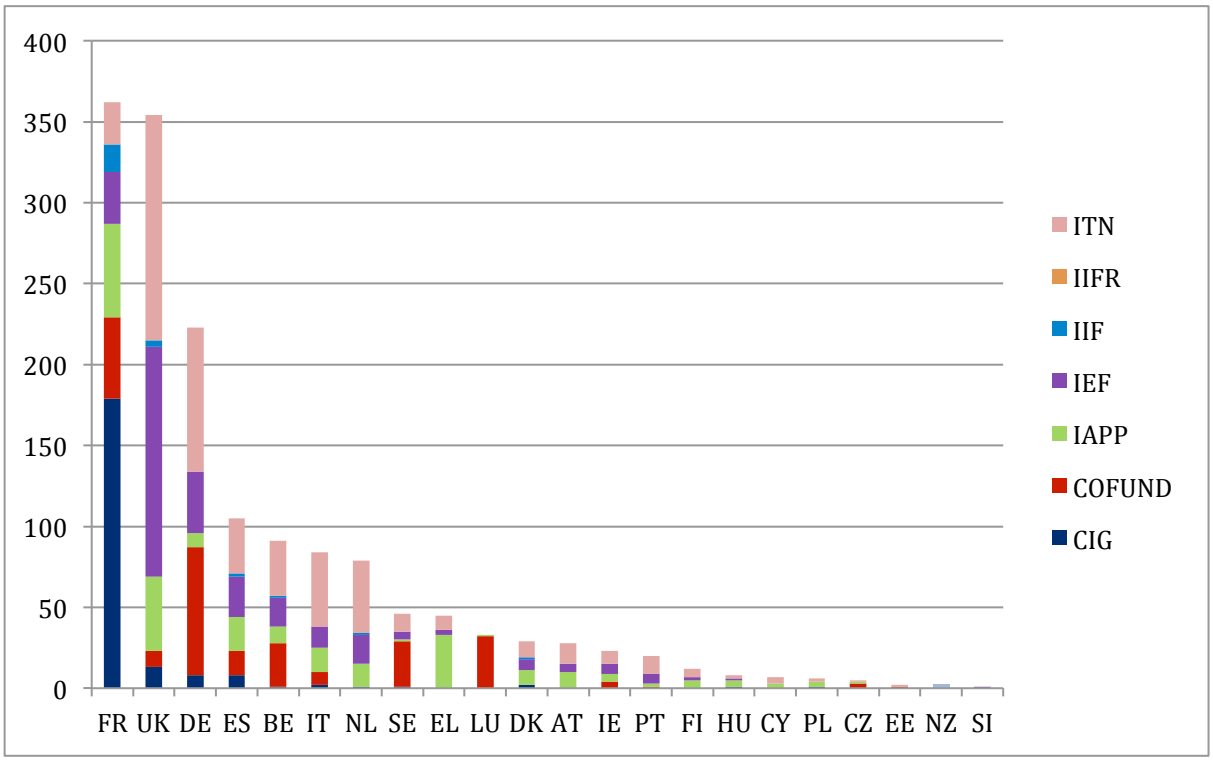


Figure 37: French nationals going to EU countries by MC Action (1.563 fellows)



French researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 362.

Figure 38: EU nationals coming to Croatia by MC Action (10 fellows) (own calculation on basic data set of DG EAC, July 2015)

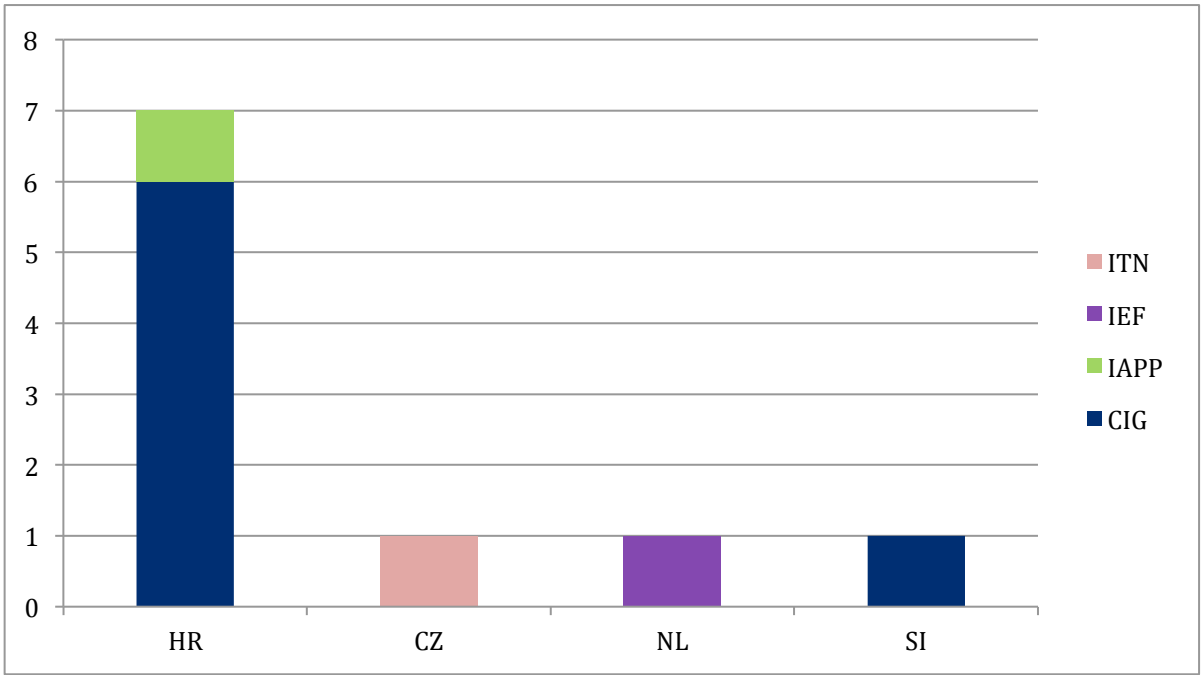
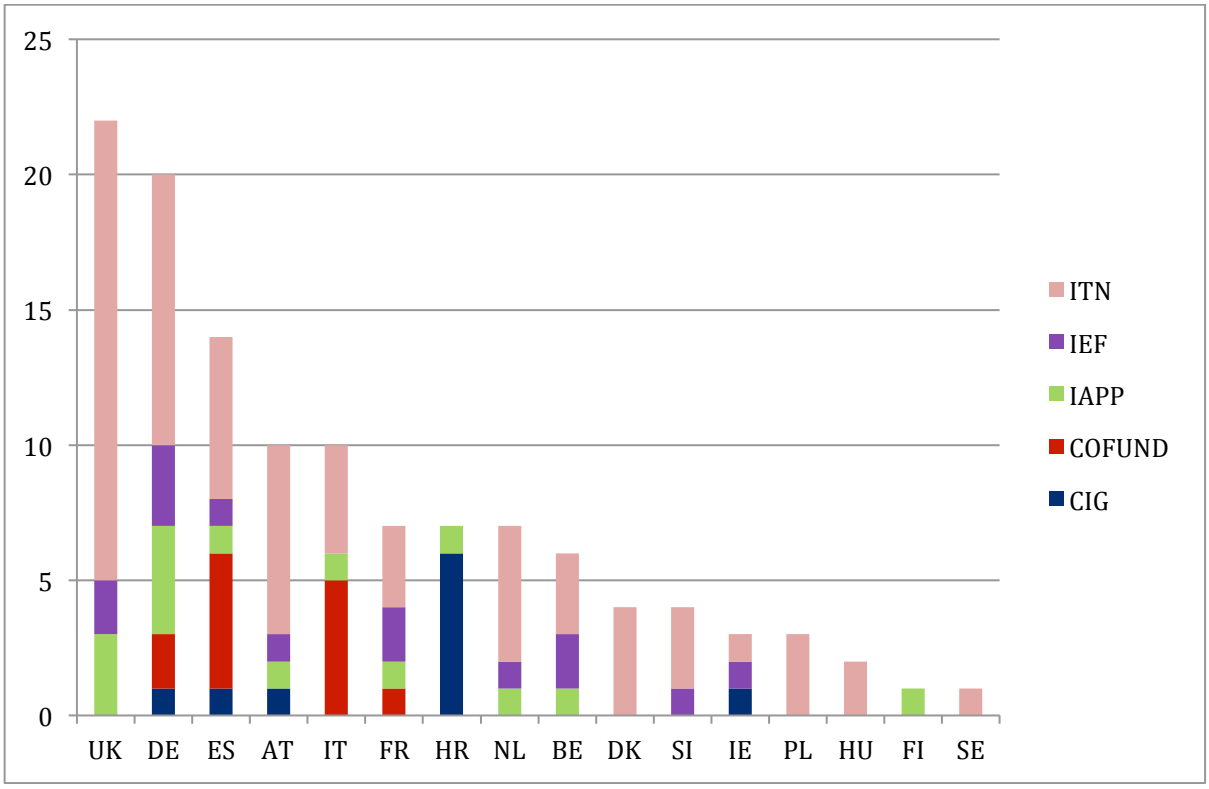


Figure 39: Croatian nationals going to EU countries by MC Action (121 fellows)



Croatian researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 7.

Figure 40: EU nationals coming to Hungary by MC Action (169 fellows) (own calculation on basic data set of DG EAC, July 2015)

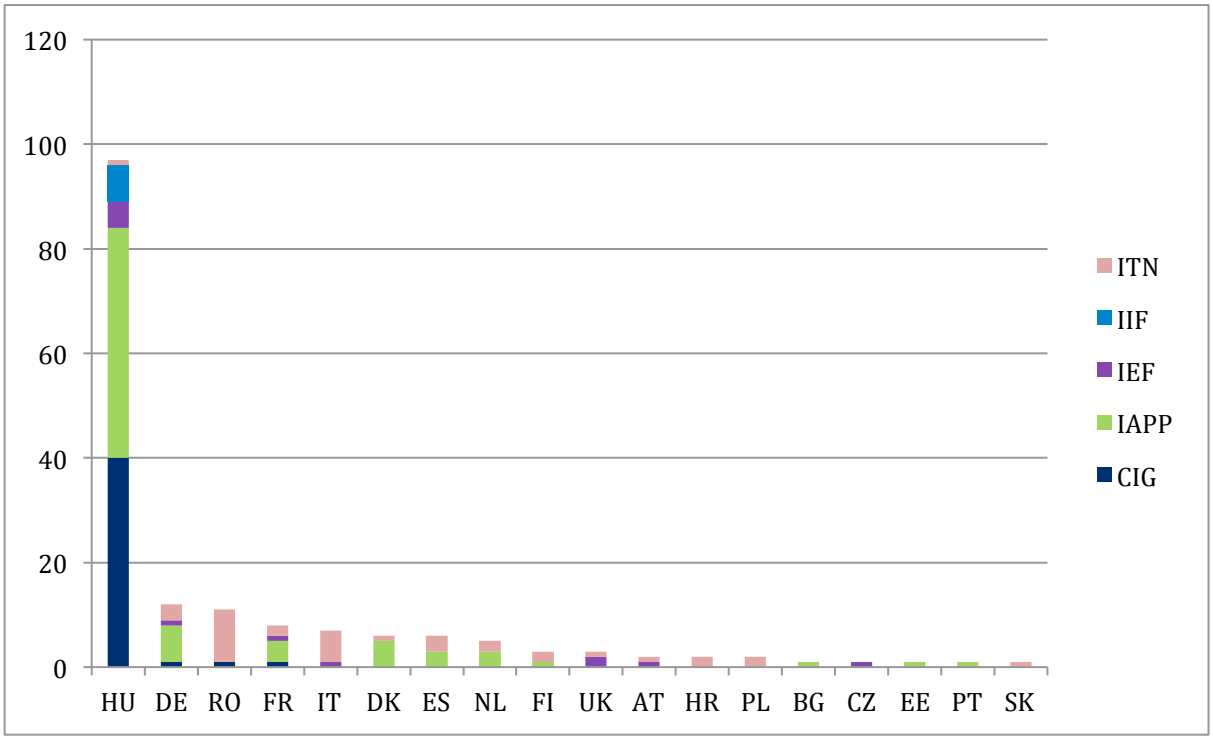
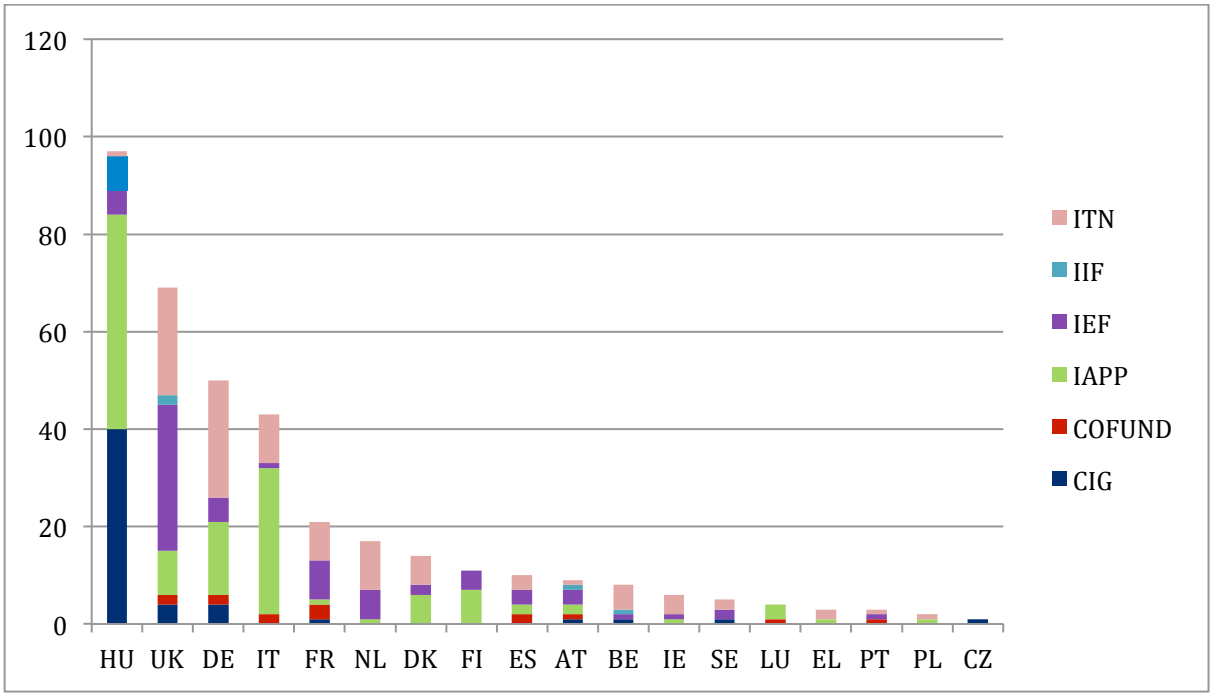


Figure 41: Hungarian nationals going to EU countries by MC Action (373 fellows)



Hungarian researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 97.

Figure 42: EU nationals coming to Ireland by MC Action (394 fellows) (own calculation on basic data set of DG EAC, July 2015)

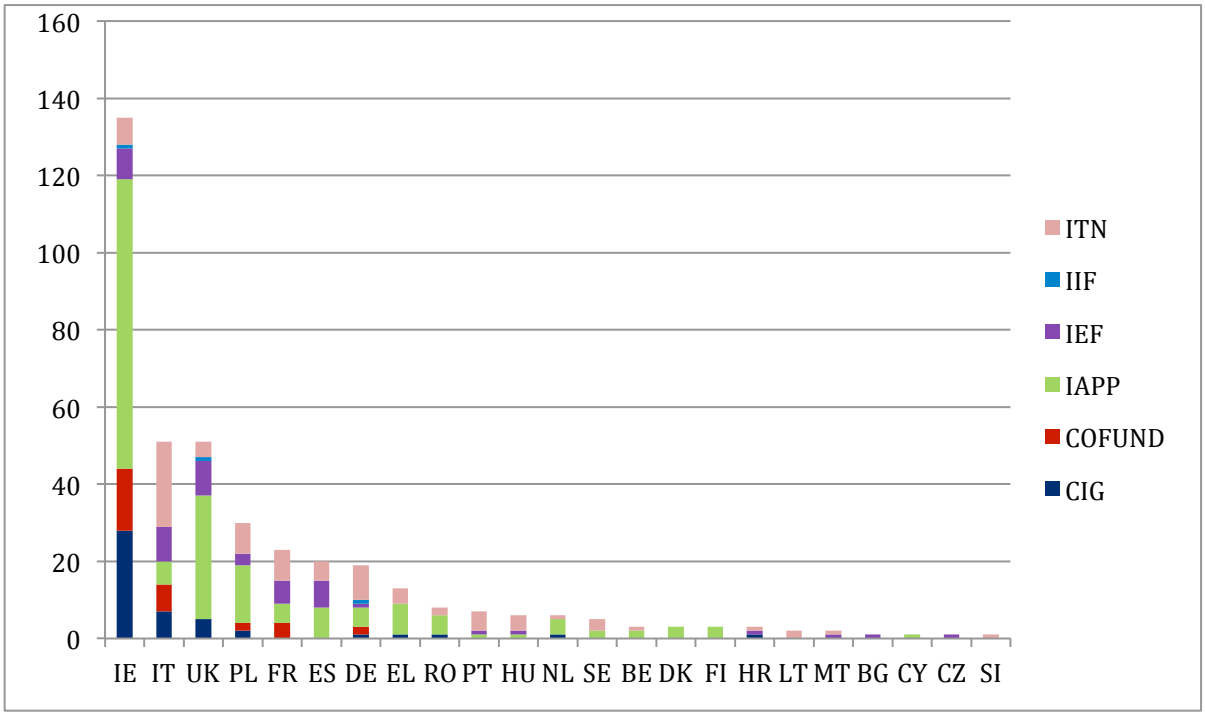
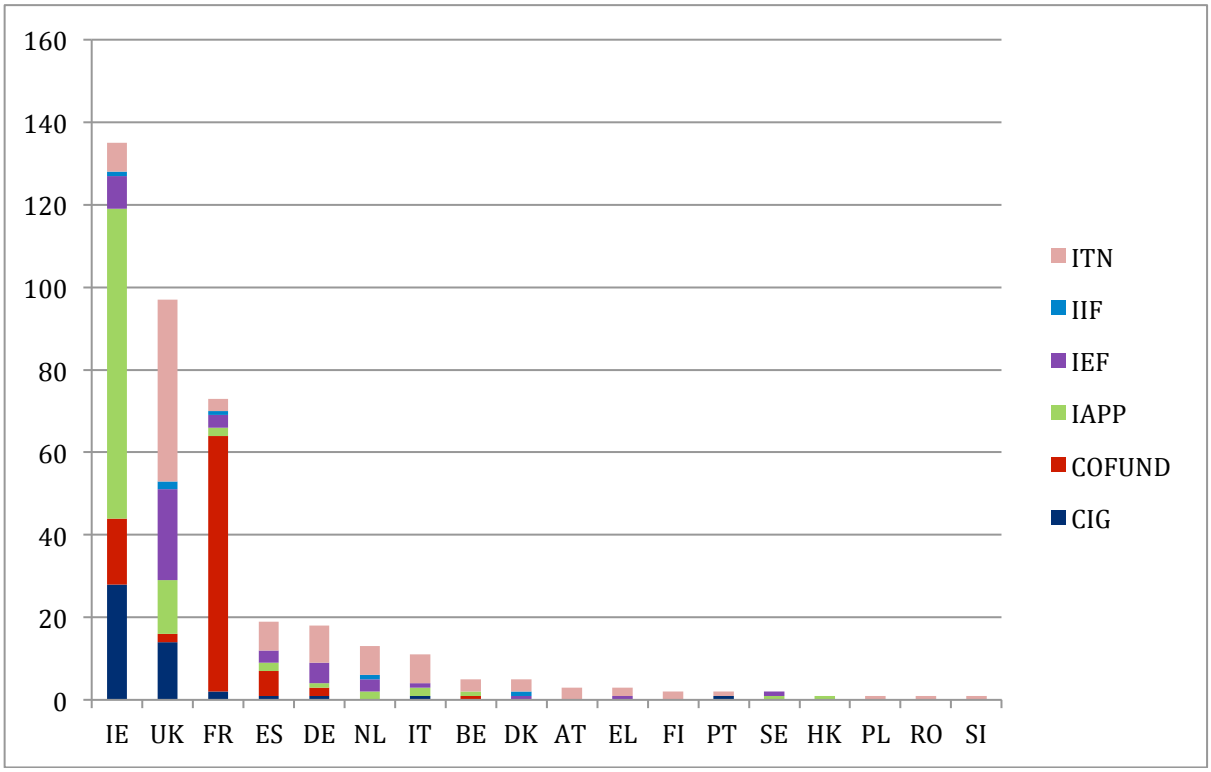


Figure 43: Irish nationals going to EU countries by MC Action (391 fellows)



Irish researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 135.

Figure 44: EU nationals coming to Italy by MC Action (1.358 fellows) (own calculation on basic data set of DG EAC, July 2015)

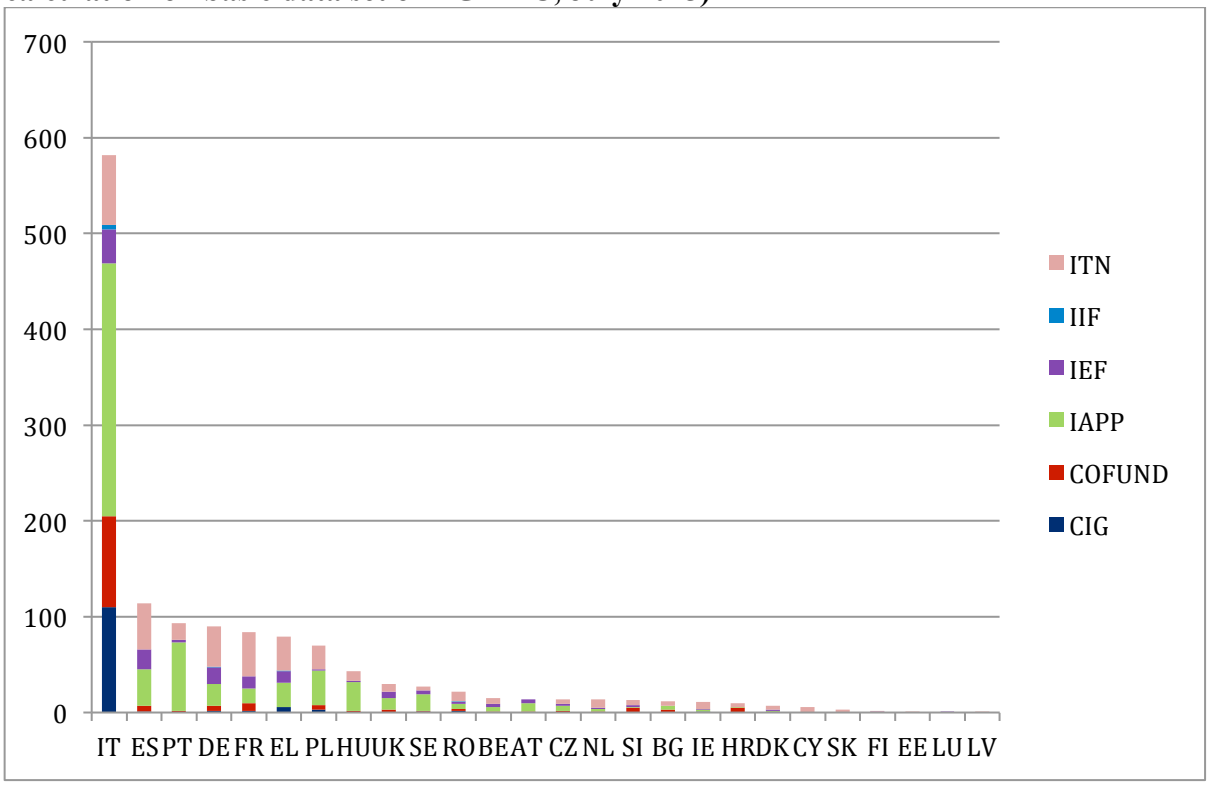
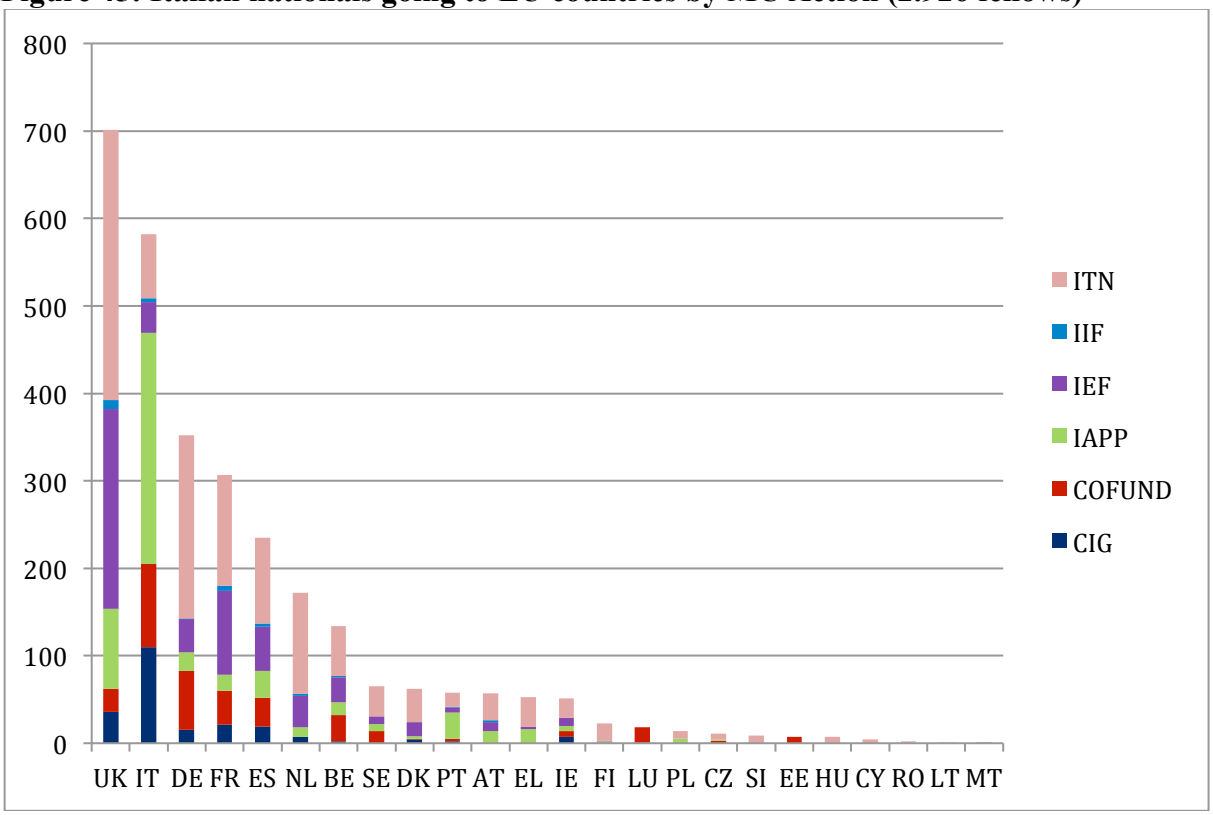


Figure 45: Italian nationals going to EU countries by MC Action (2.926 fellows)



Italian researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 582.

Figure 46: EU nationals coming to Lithuania by MC Action (5 fellows) (own calculation on basic data set of DG EAC, July 2015)

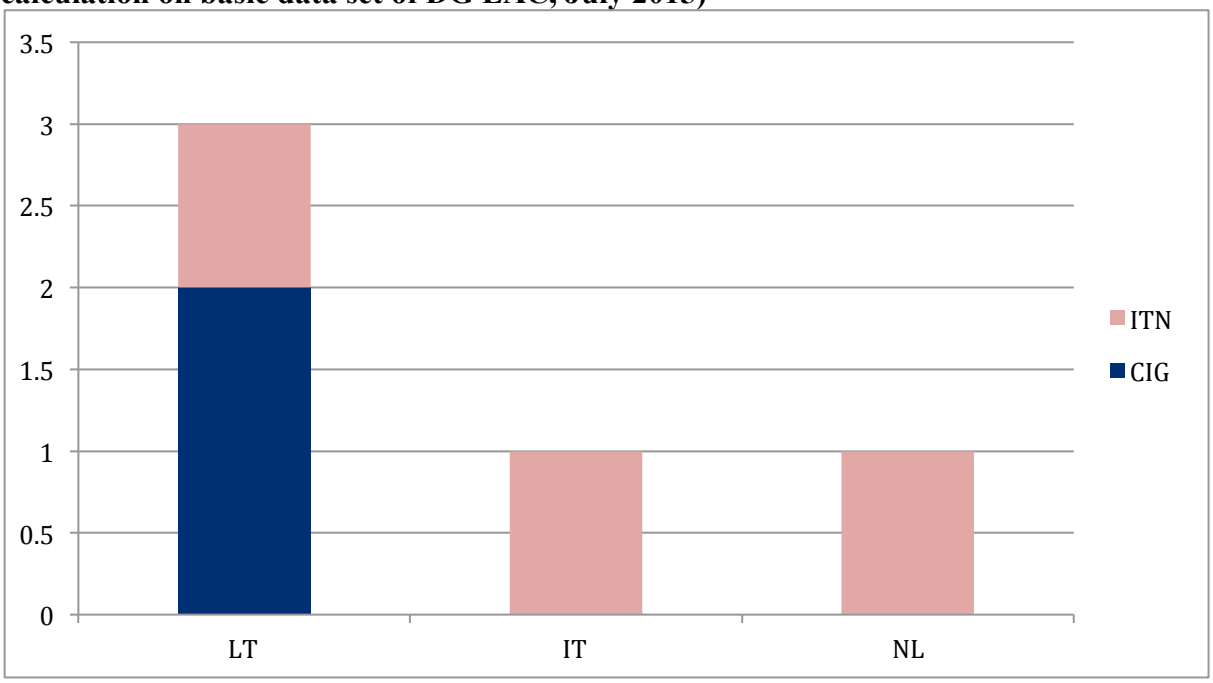
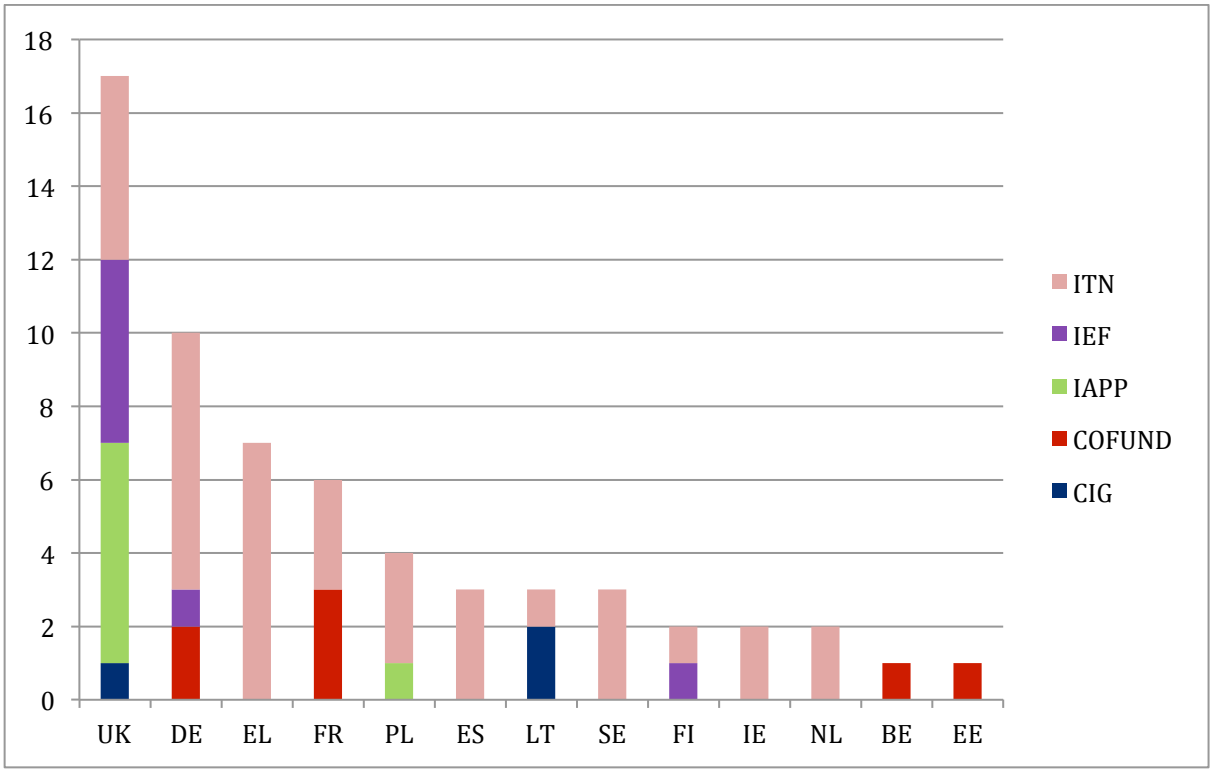


Figure 47: Lithuanian nationals going to EU countries by MC Action (61 fellows)



Lithuanian researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 3.

Figure 48: EU nationals coming to Luxembourg by MC Action (147 fellows) (own calculation on basic data set of DG EAC, July 2015)

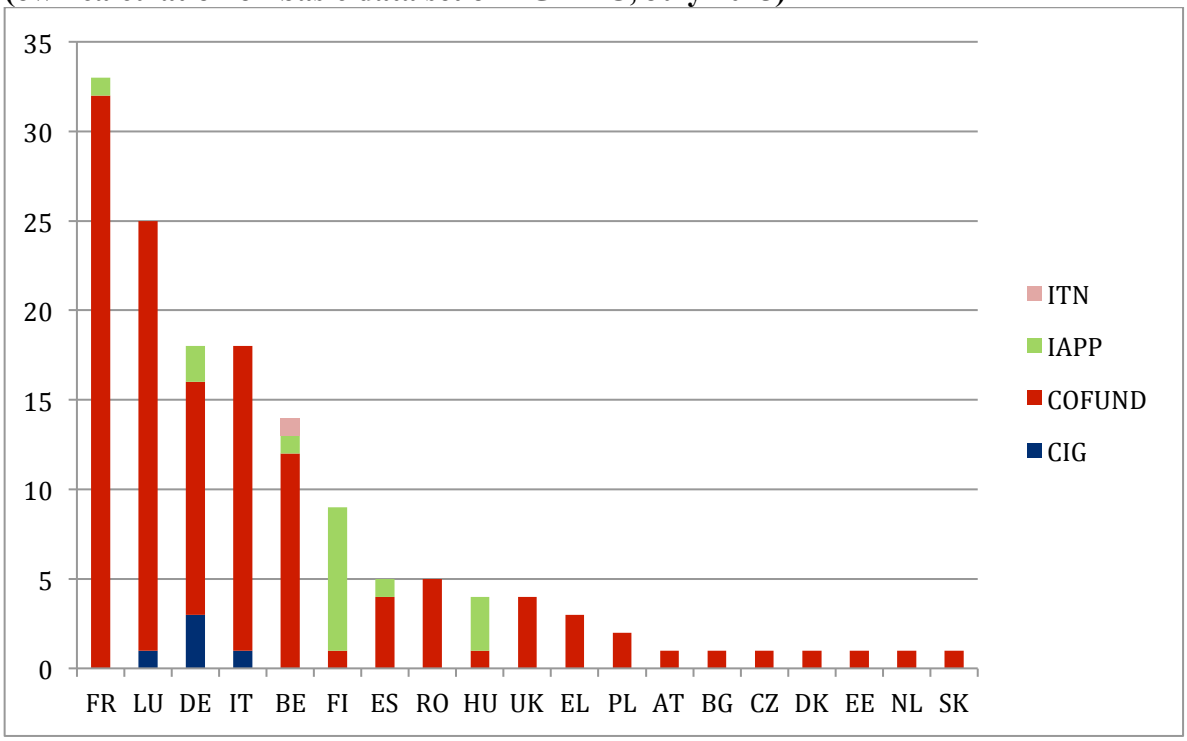
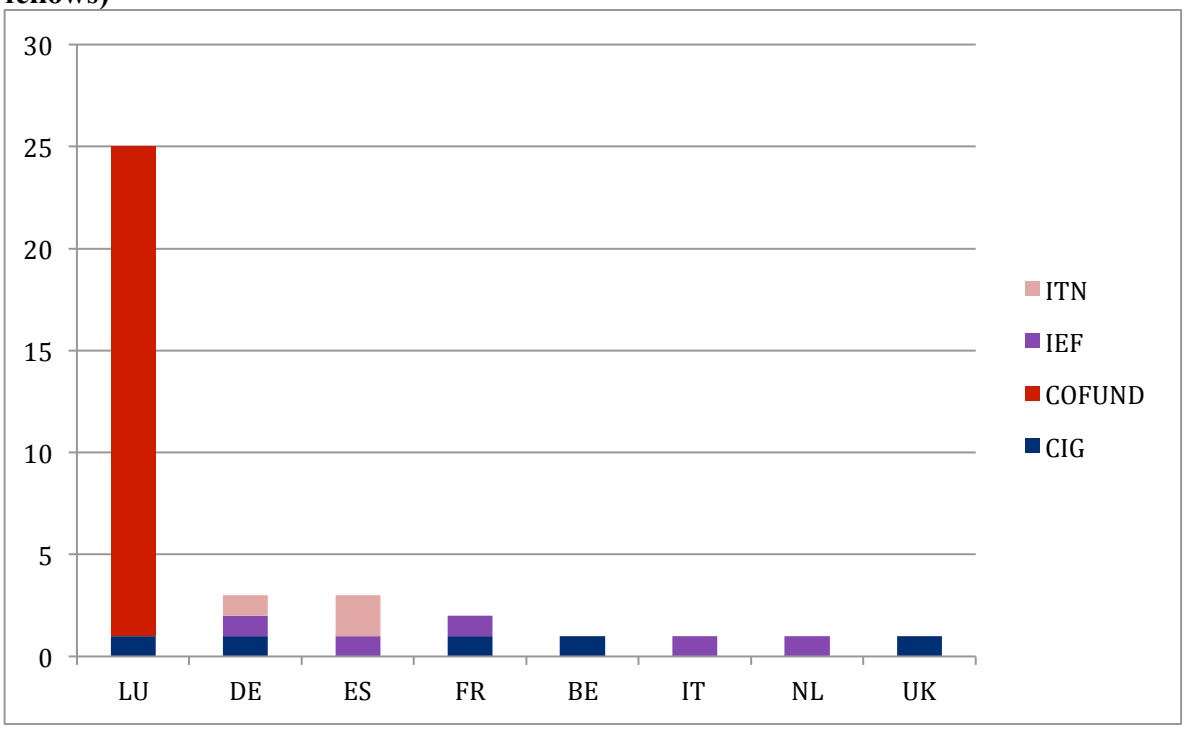


Figure 49: Luxembourg nationals going to EU countries by MC Action (37 fellows)



Luxembourg researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 25.

Figure 50: EU nationals coming to Latvia by MC Action (6 fellows) (own calculation on basic data set of DG EAC, July 2015)

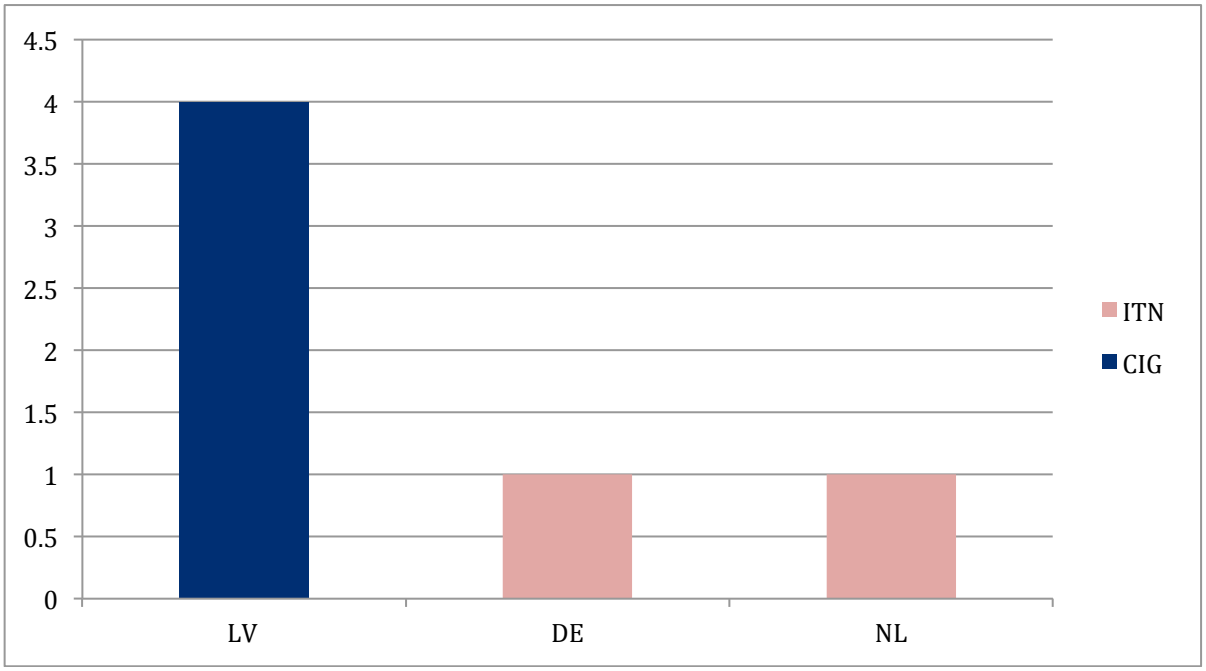
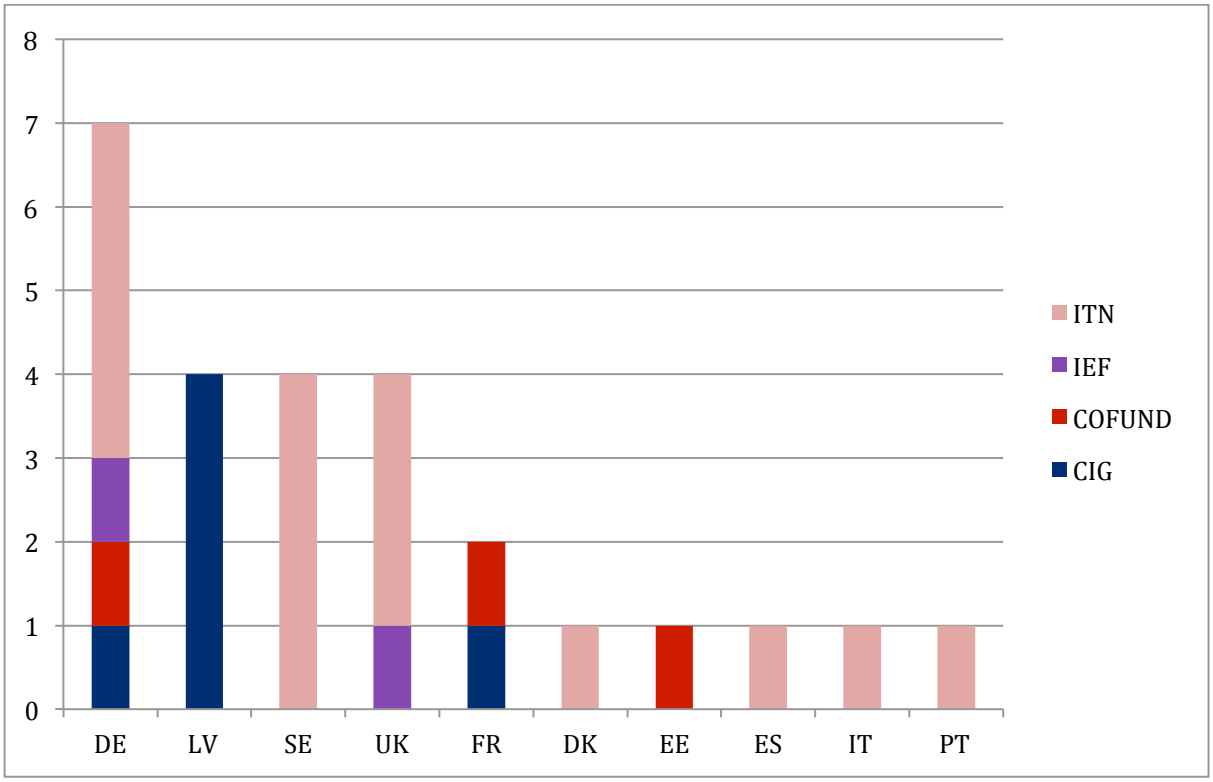


Figure 51: Latvian nationals going to EU countries by MC Action (26 fellows)



Latvian researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 4.

Figure 52: EU nationals coming to Malta by MC Action (4 fellows) (own calculation on basic data set of DG EAC, July 2015)

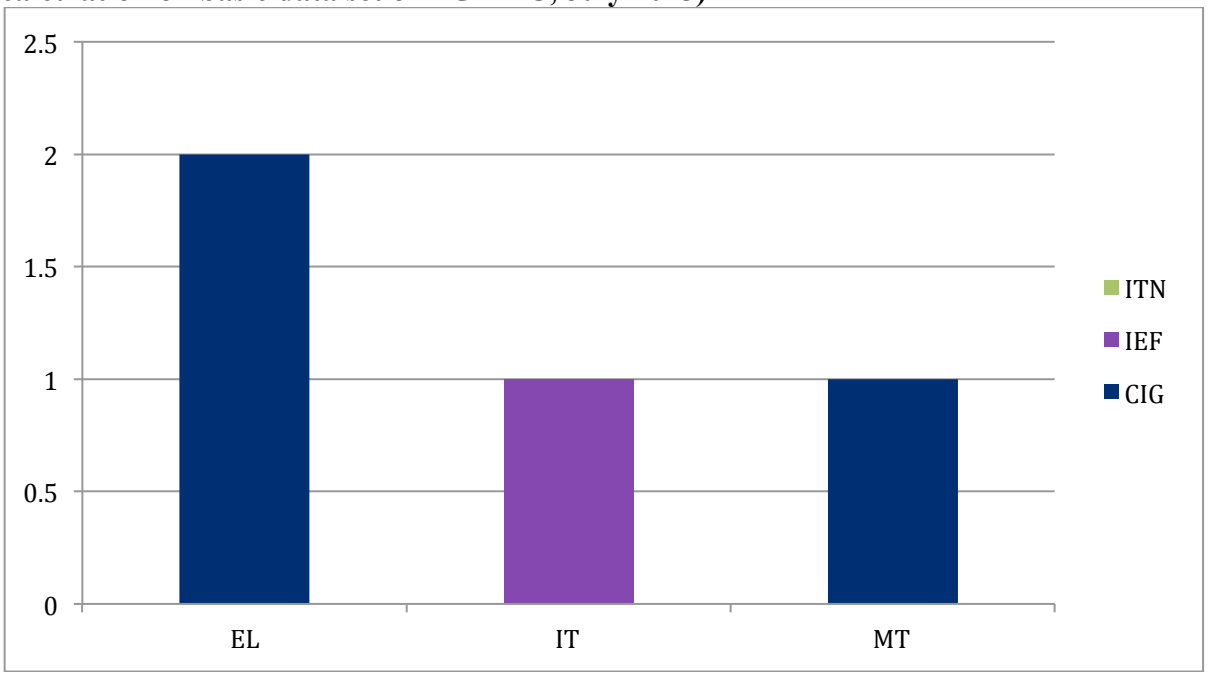
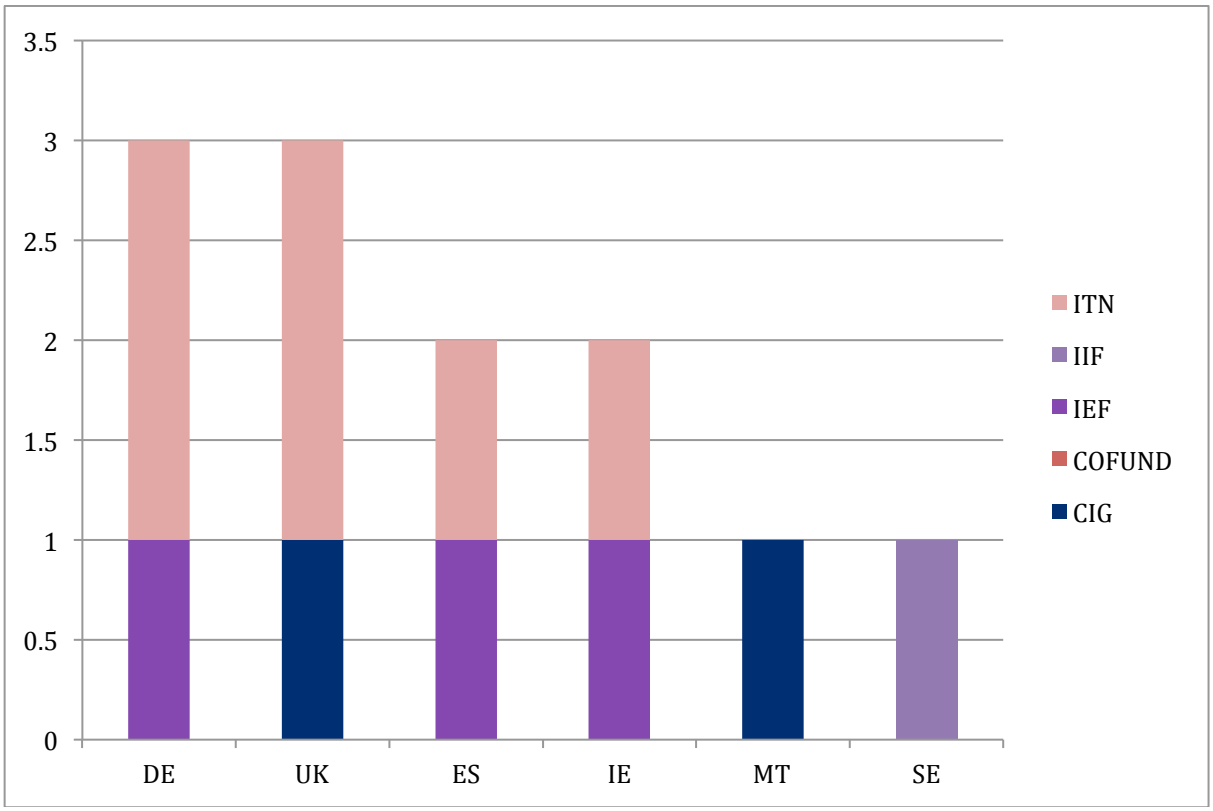


Figure 53: Maltese nationals going to EU countries by MC Action (12 fellows)



Maltese researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 1.

Figure 54: EU nationals coming to the Netherlands by MC Action (1.064 fellows) (own calculation on basic data set of DG EAC, July 2015)

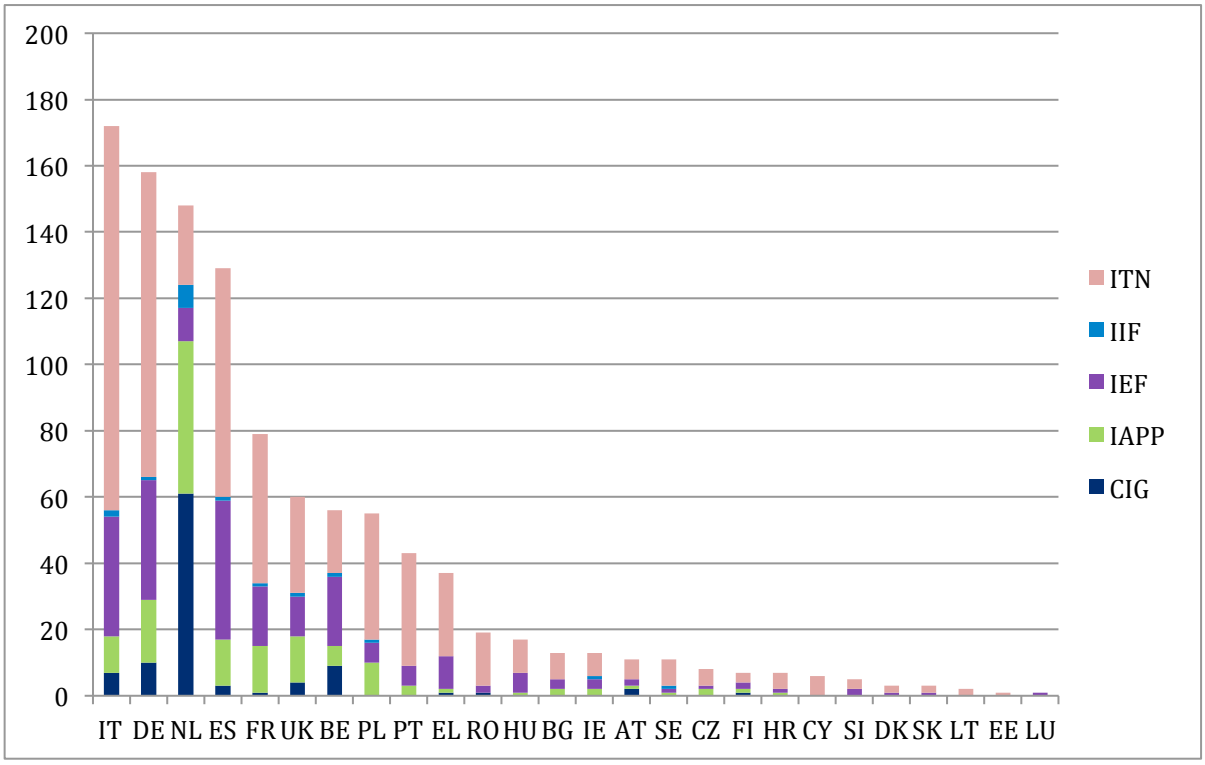
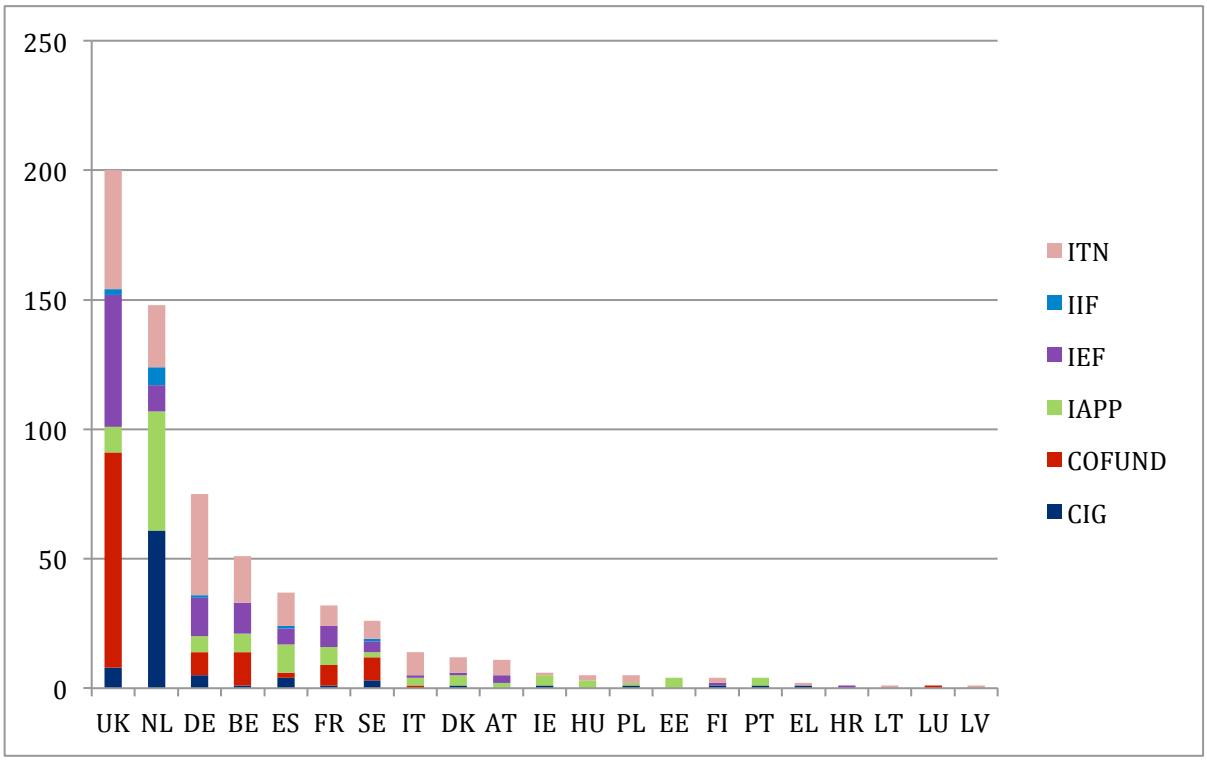


Figure 55: Dutch nationals going to EU countries by MC Action (640 fellows)



Dutch researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 148.

Figure 56: EU nationals coming to Poland by MC Action (244 fellows) (own calculation on basic data set of DG EAC, July 2015)

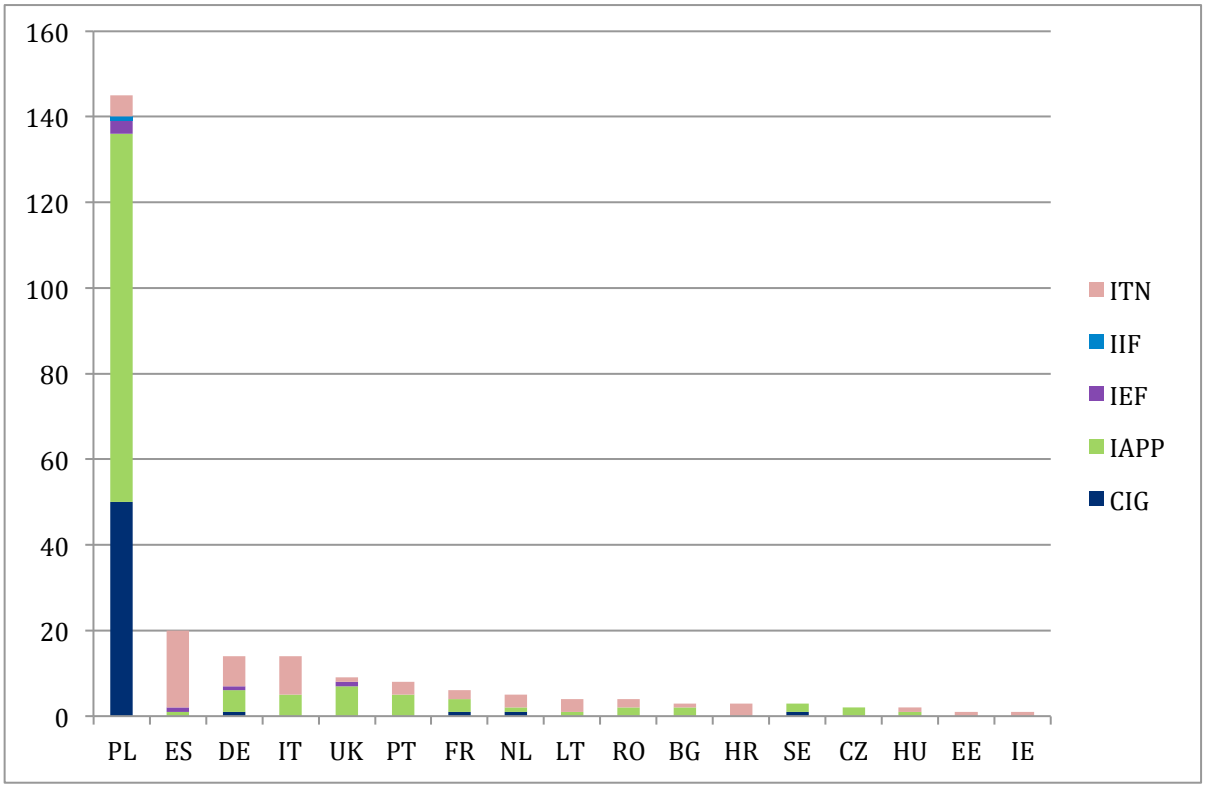
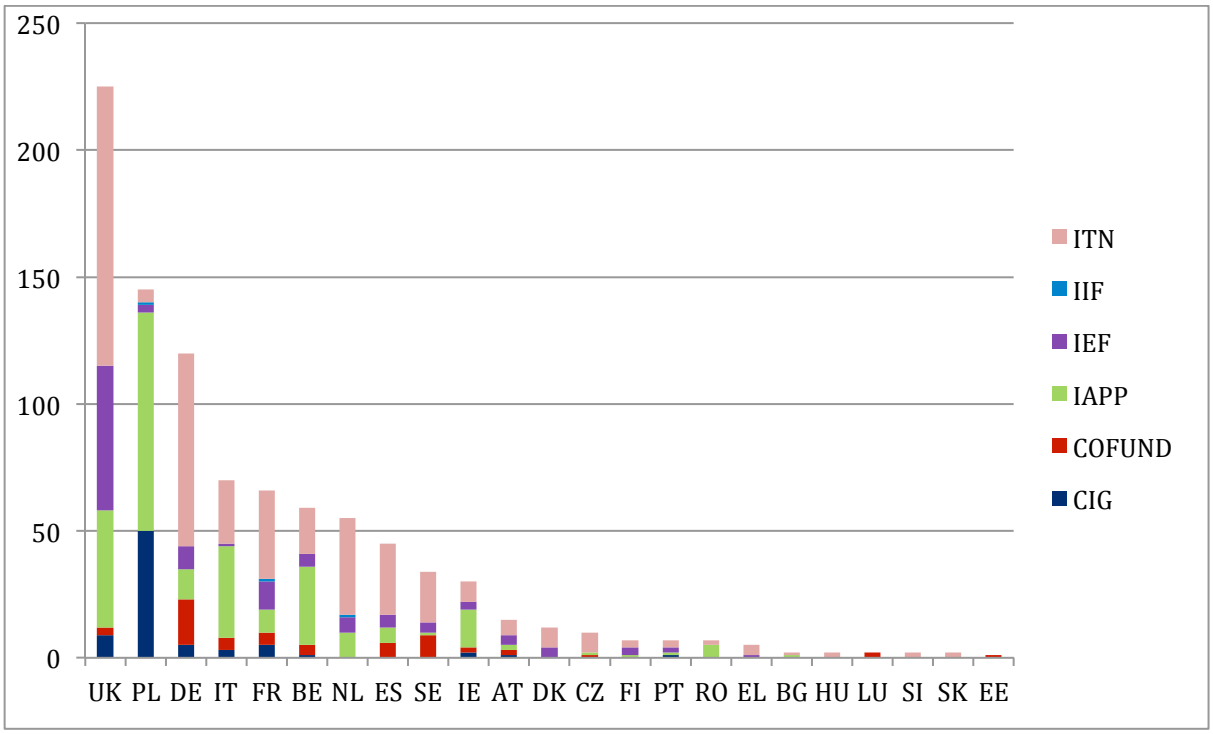


Figure 57: Polish nationals going to EU countries by MC Action (923 fellows)



Polish researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 145.

Figure 58: EU nationals coming to Portugal by MC Action (353 fellows) (own calculation on basic data set of DG EAC, July 2015)

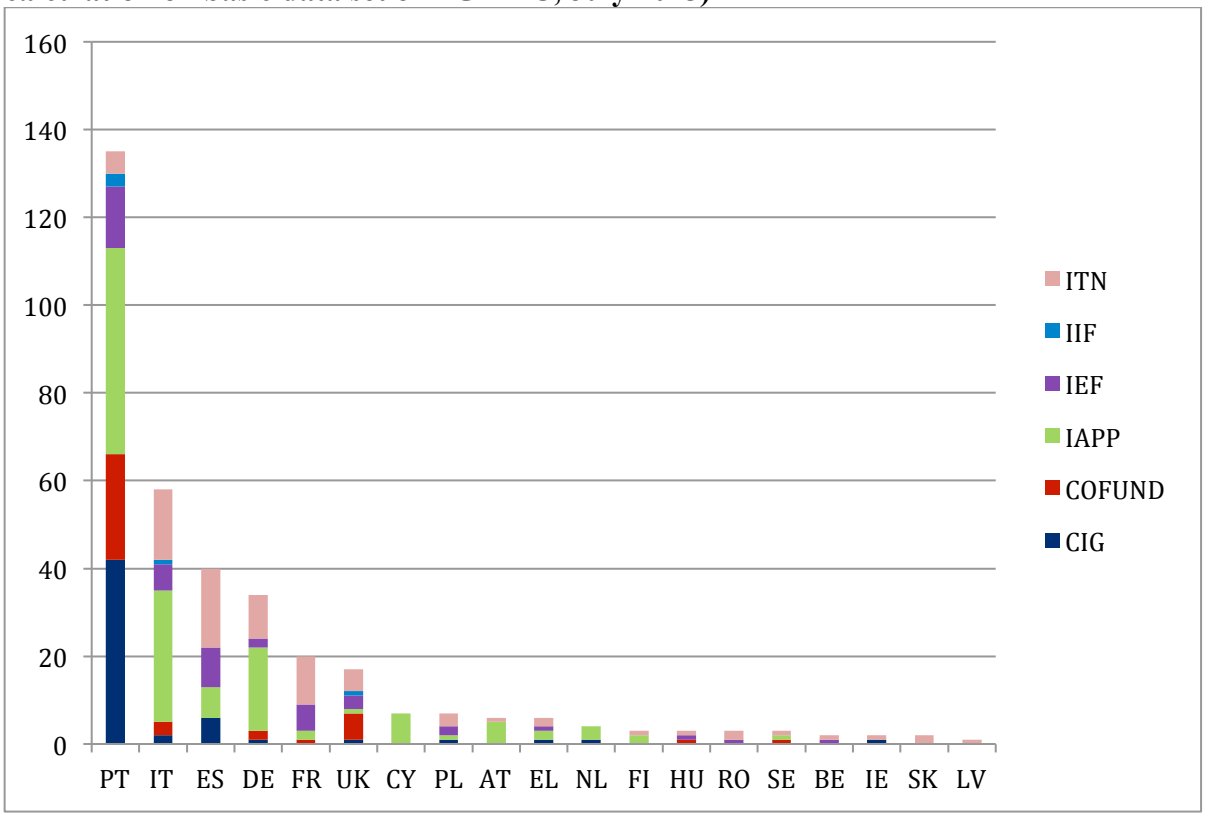
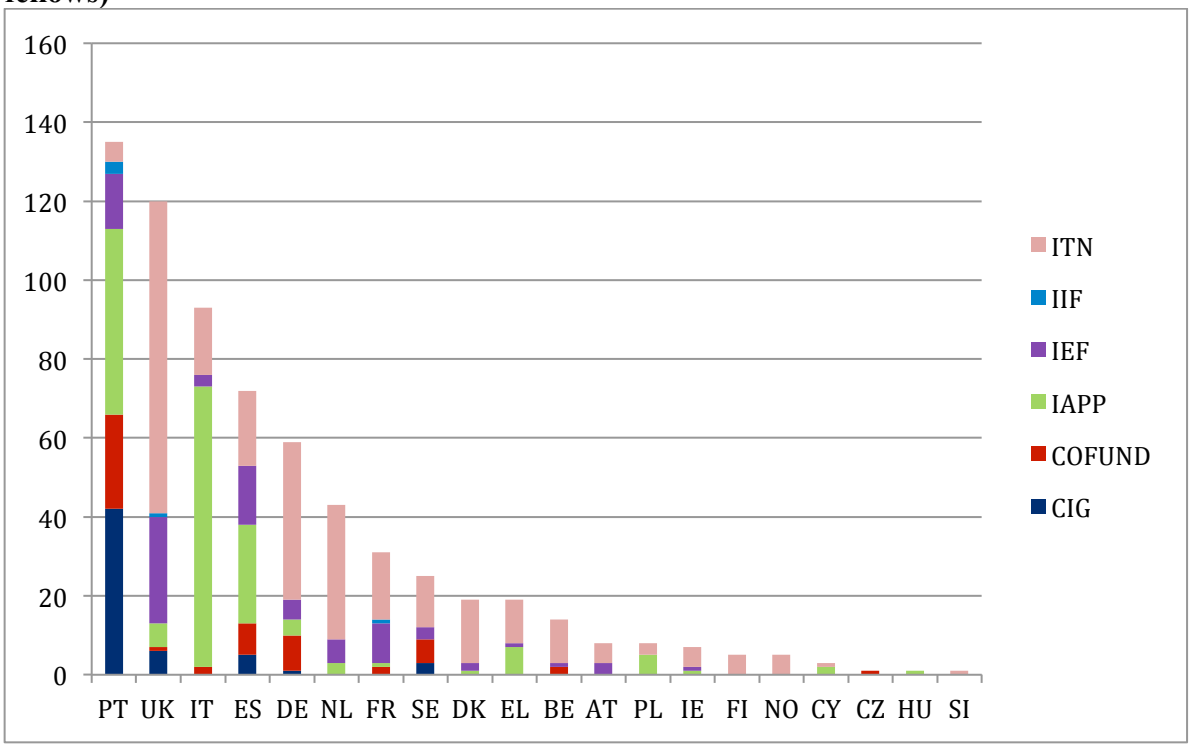


Figure 59: Portuguese nationals going to EU countries by MC Action (664 fellows)



Portuguese researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 135.

Figure 60: EU nationals coming to Romania by MC Action (56 fellows) (own calculation on basic data set of DG EAC, July 2015)

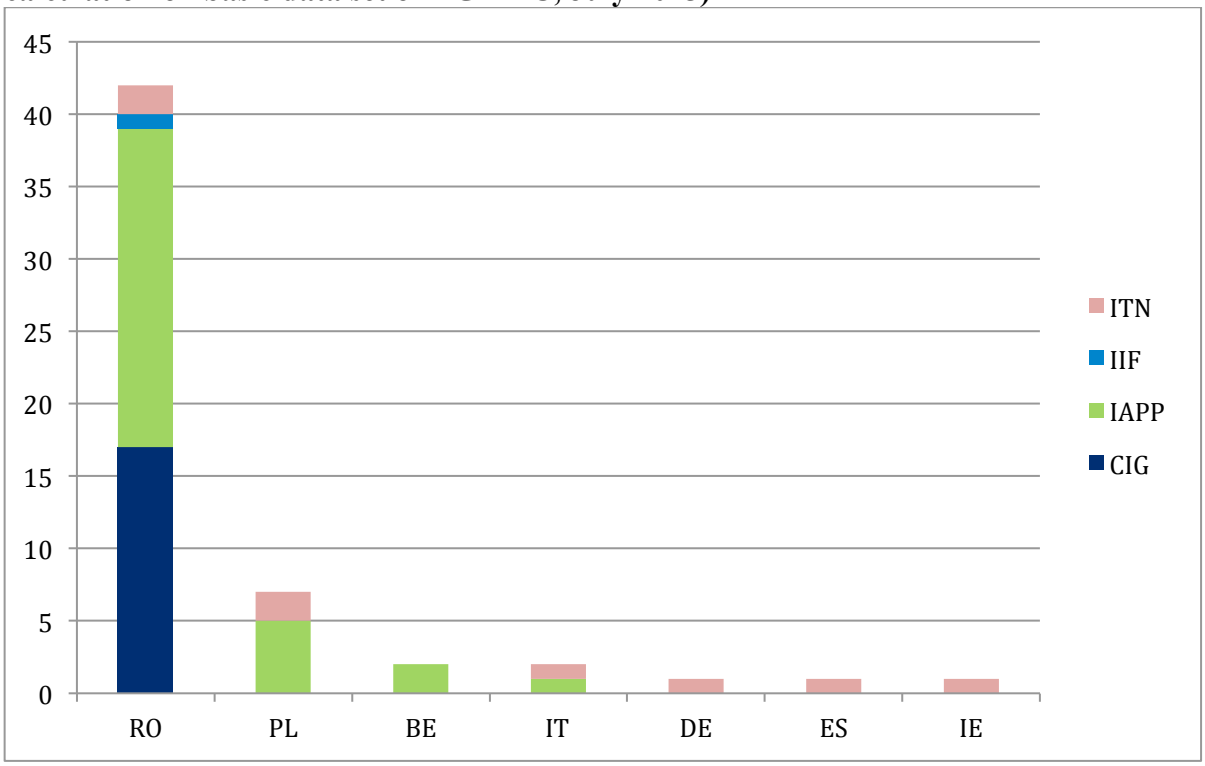
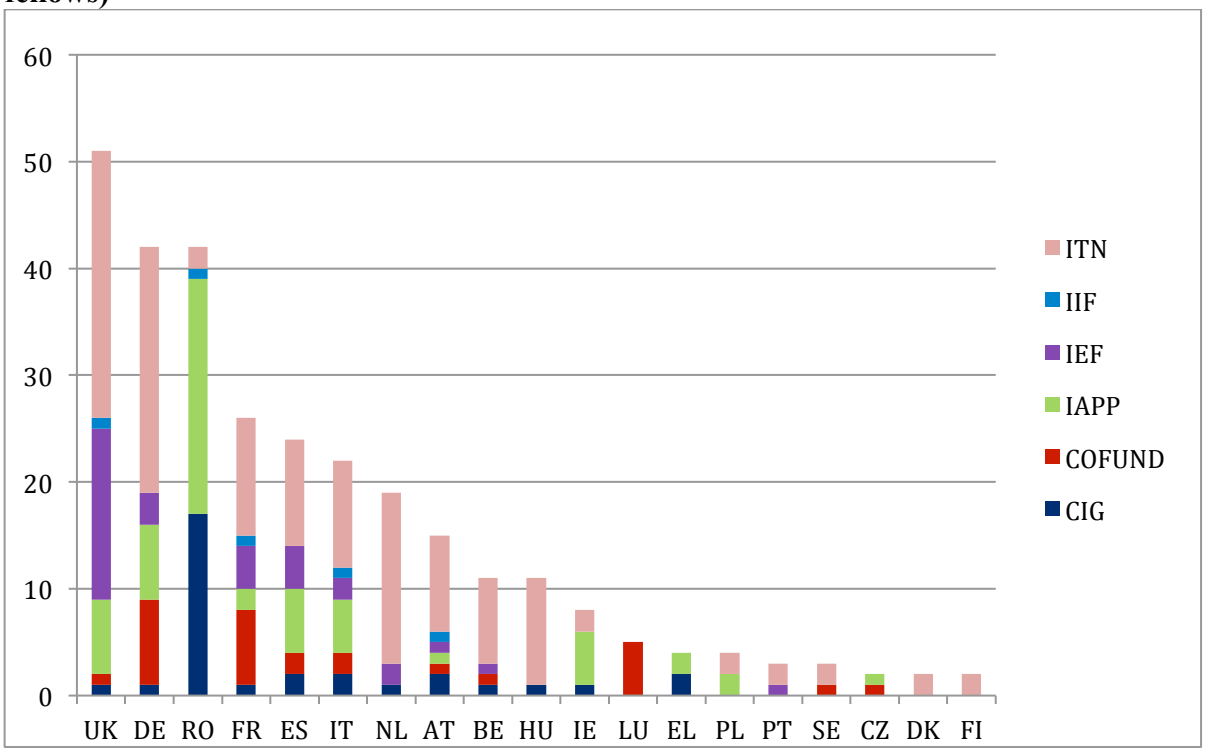


Figure 61: Romanian nationals going to EU countries by MC Action (296 fellows)



Romanian researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 42.

Figure 62: EU nationals coming to Sweden by MC Action (620 fellows) (own calculation on basic data set of DG EAC, July 2015)

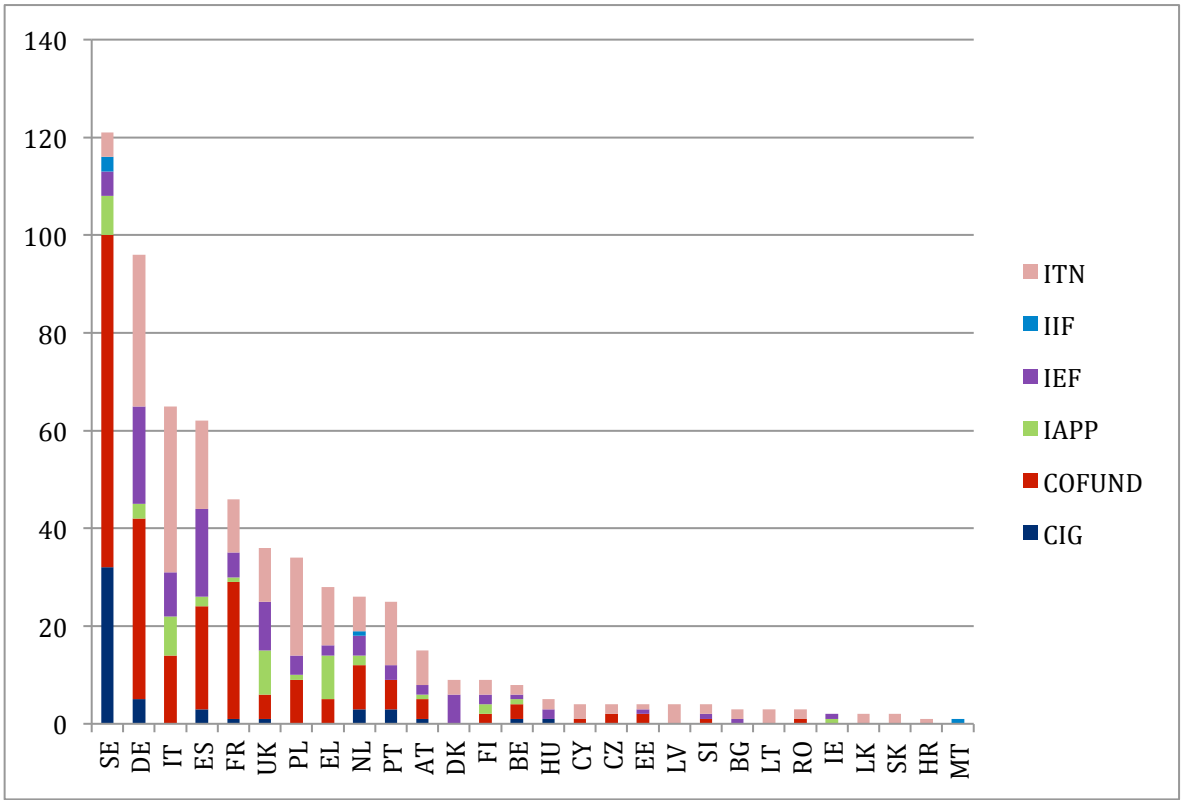
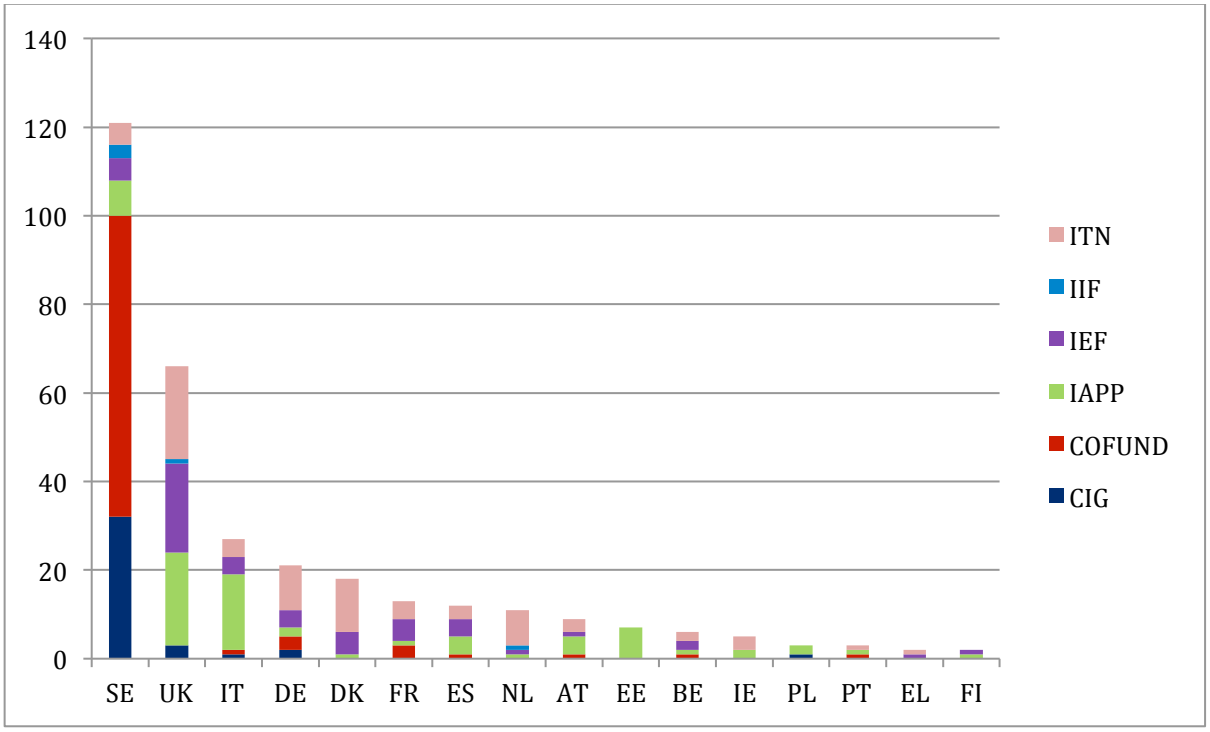


Figure 63: Swedish nationals going to EU countries by MC Action (326 fellows)



Swedish researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 121.

Figure 64: EU nationals coming to Slovenia by MC Action (35 fellows) (own calculation on basic data set of DG EAC, July 2015)

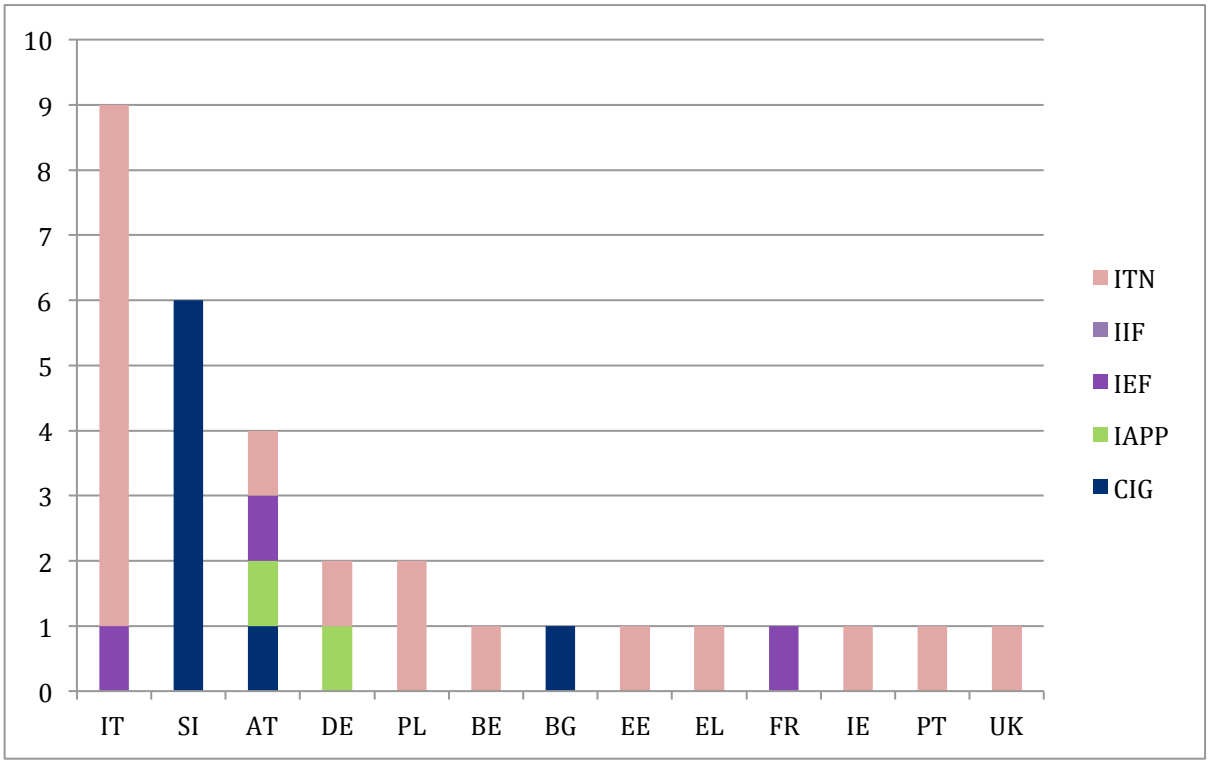
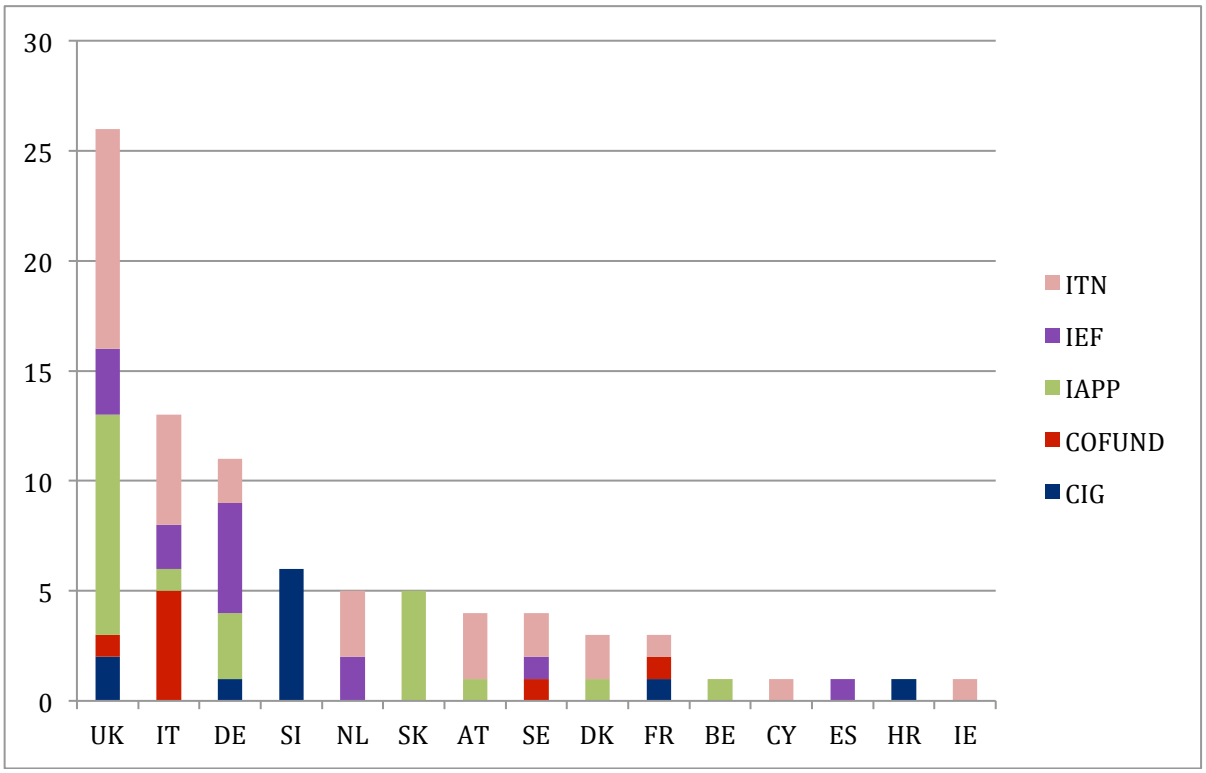


Figure 65: Slovenian nationals going to EU countries by MC Action (85 fellows)



Slovenian researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 6.

Figure 66: EU nationals coming to Slovakia by MC Action (41 fellows) (own calculation on basic data set of DG EAC, July 2015)

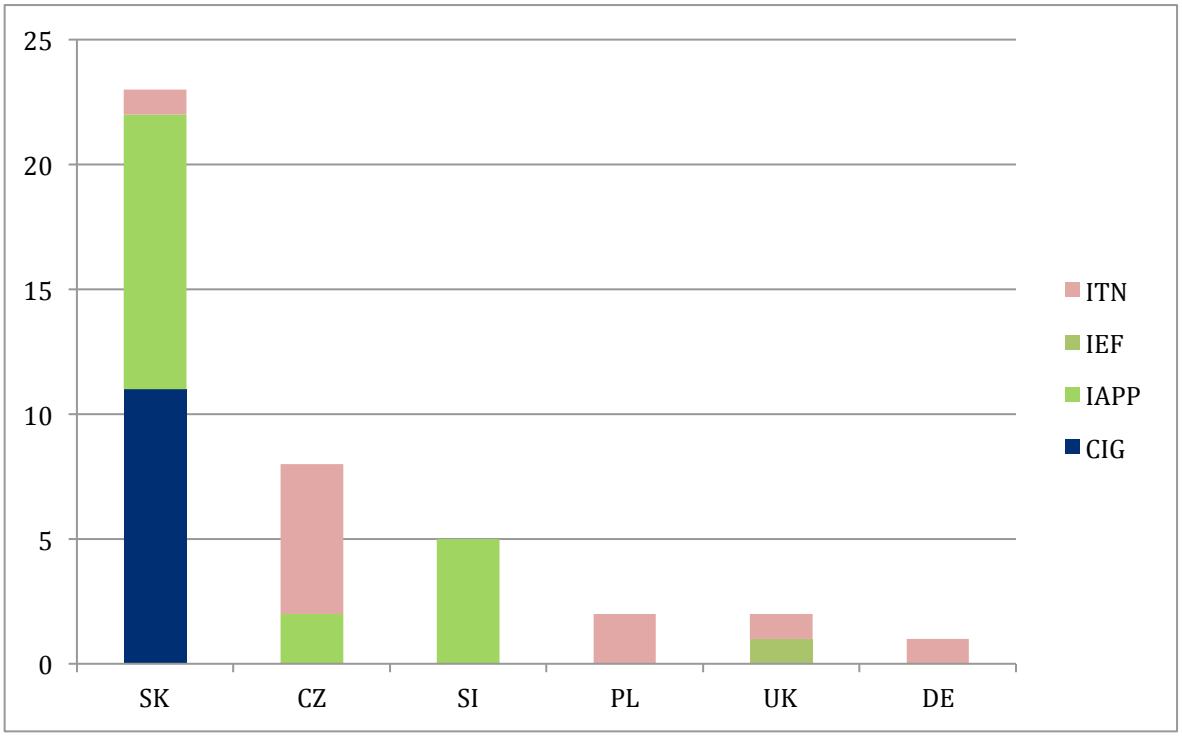
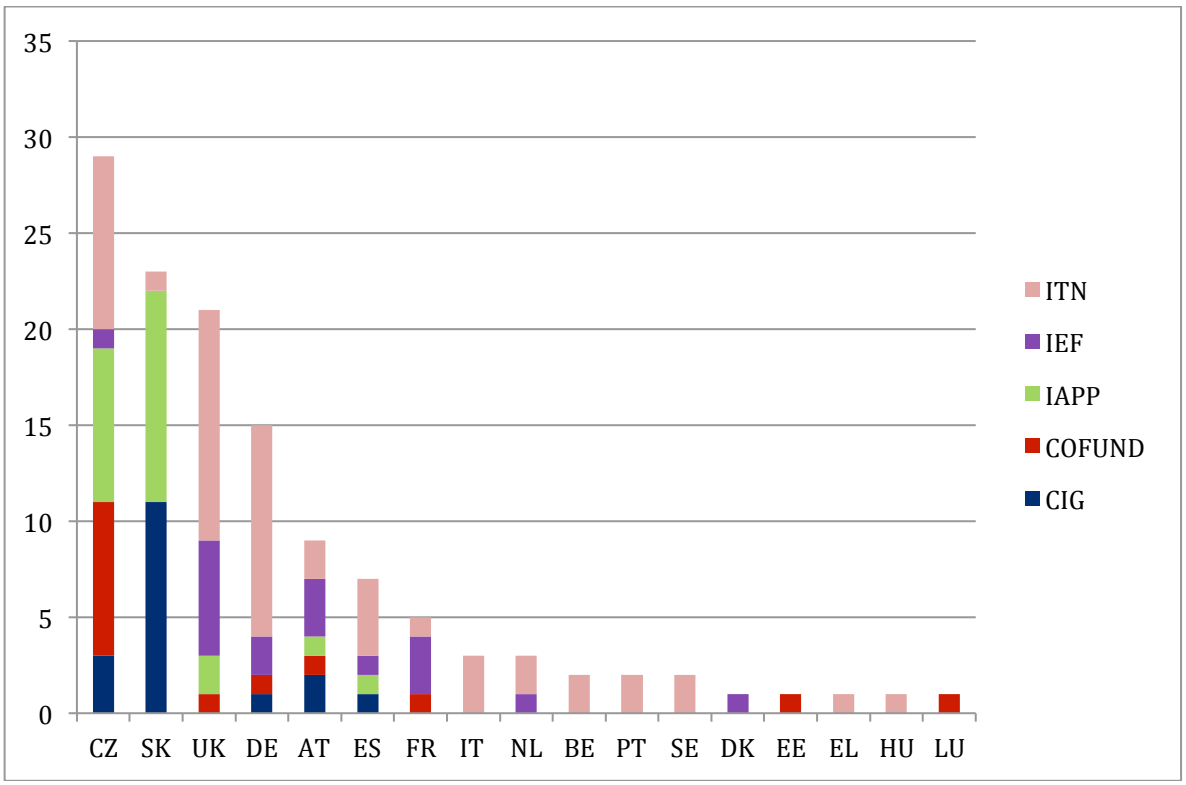


Figure 67 Slovak nationals going to EU countries by MC Action (126 fellows)



Slovak researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 23.

Figure 68: EU nationals coming to the UK by MC Action (4.027 fellows) (own calculation on basic data set of DG EAC, July 2015)

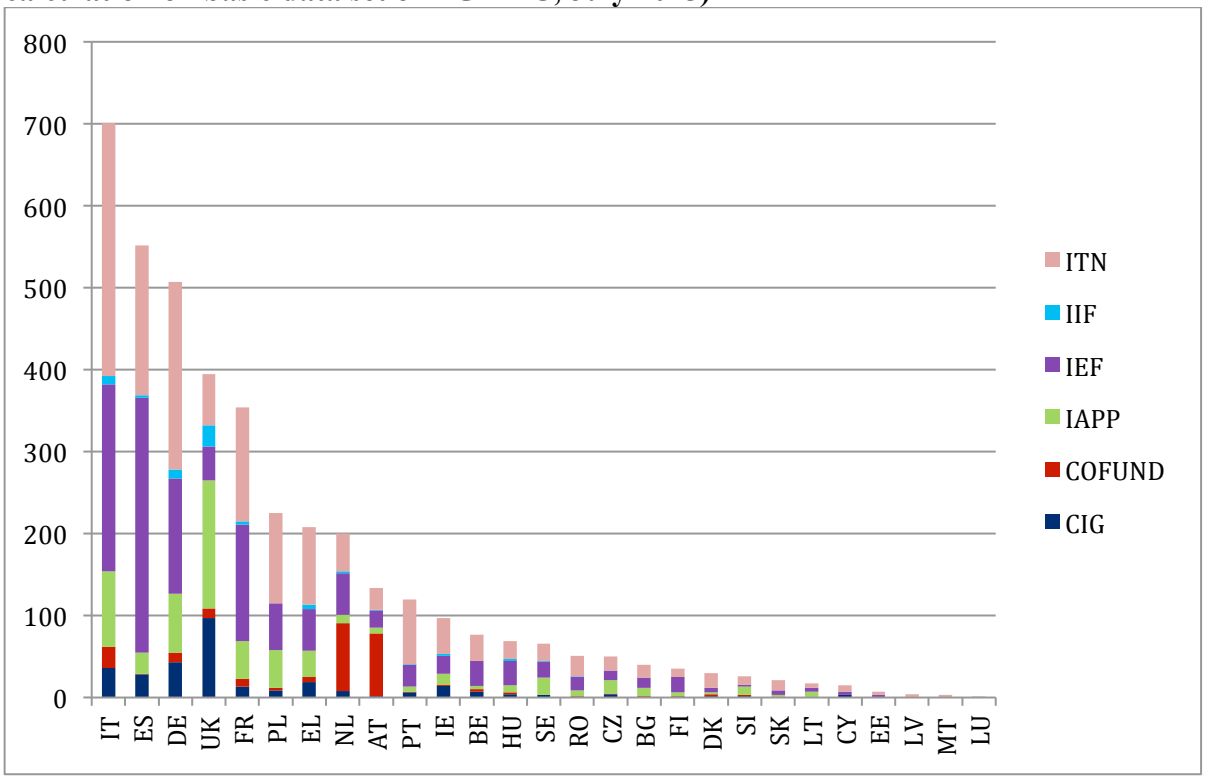
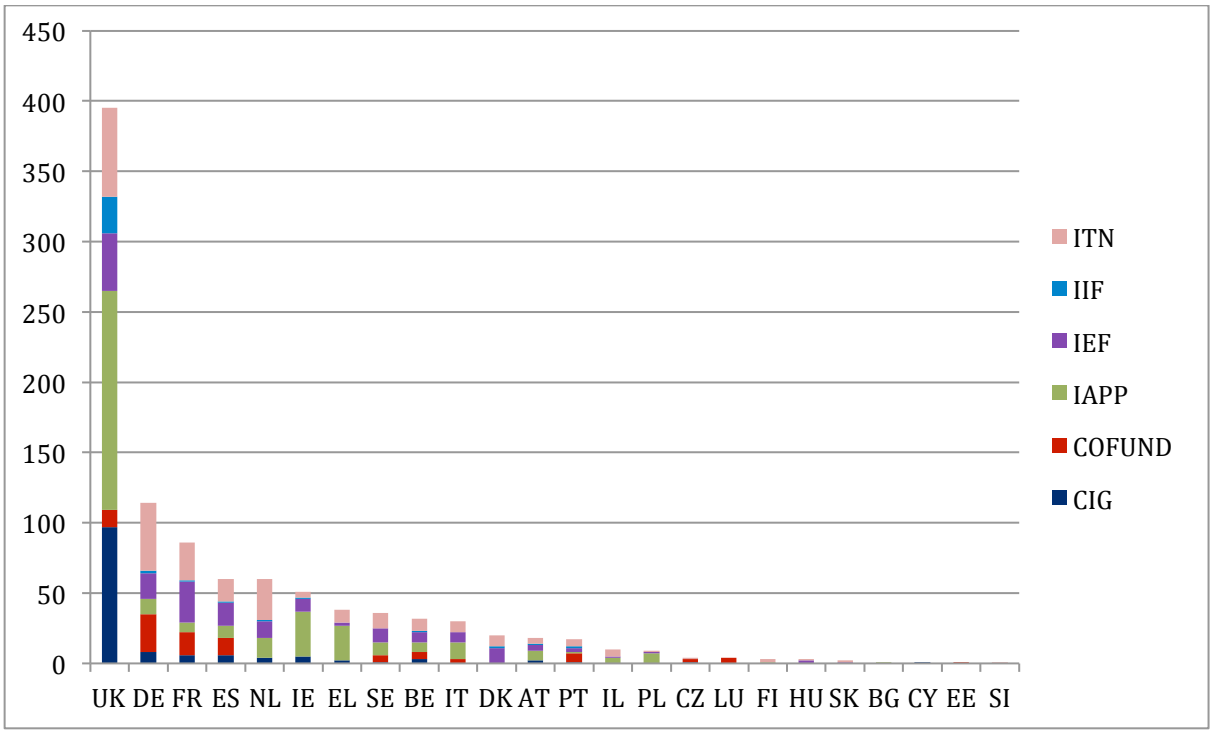


Figure 69: UK nationals going to EU countries by MC Action (986 fellows)



UK researchers who fulfil the mobility rule and return to their home country are represented in both figures (outgoing and incoming) and the number stands at 395.