

## JRC TECHNICAL REPORTS

# Technical note on the robustness of a modified research excellence index

*A Feasibility Study for the  
European Research Area  
Committee*

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## Abstract

This technical note summarizes the feasibility study which was performed in response to a request by the European Research Area Committee (ERAC)'s Working Group on Monitoring the ERA Roadmap (henceforth WG in short). The ERAC aimed to use a modified version of the Research Excellence composite Index to measure country progress with respect to ERA priority 1, "Effective national research systems". The ERAC WG and DG RTD requested to test whether a robust composite indicator can be constructed by replacing the indicator measuring country performance in terms of world class universities and research institutes with one measuring Marie Skłodowska-Curie (MSC) grants by countries. The main advantage of adding such an indicator was to (1) increase variance for the set of countries, and (2) to capture capacity building and attractiveness, two desirable features of effective national research systems. From the various potential specifications of the MSC indicator, the version which is defined as "All MSC fellows by country of host organization divided by the total number of national (by country of residence) MSC fellows" was found to fit best conceptually and statistically in the framework.

## 1. Introduction

This technical note summarizes the feasibility study which was performed in response to a request by the European Research Area Committee (ERAC)'s Working Group on Monitoring the ERA Roadmap (henceforth WG in short). The ERAC aimed to use a modified version of the Research Excellence composite Index<sup>1</sup> to measure country progress with respect to ERA priority 1, "Effective national research systems". The ERAC WG and DG RTD requested to test whether a robust composite indicator can be constructed by replacing the indicator measuring country performance in terms of world class universities and research institutes with one measuring Marie Skłodowska-Curie (MSC) grants by countries. The group argued that this change adds two desirable features of effective national research systems: their ability to attract researchers and to further develop research capacities. Furthermore, it could help further distinguish East and South European Member States lacking world class universities or research institutes. This feasibility study was conducted in collaboration between Commission services DG RTD and EAC as well as the ERAC WG, and concentrates on the conceptual and statistical validation of the proposed framework.

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<sup>1</sup> A composite index of 4 pillars that aims to measure the excellence of national research systems, developed by the JRC's Unit of Econometrics and Applied Statistics in support of DG RTD – see Hardeman et al (2013).

## 2. Interpretation and measurement

Before moving to statistical tests, it is important to briefly discuss the policy rationale for using an indicator measuring participation in MSC actions. This would be a new indicator in the sense that it has not been used in other composite indicators or set as policy targets and has not received feedback from policy users. MSC statistics have been published by the European Commission in country fiches. But if used in a different context, there are two risks: first, that there may be different intuitive interpretations of the indicator leading to confusion, and second, that the introduction of a new indicator for policy evaluation entails the unintentional consequence that the indicator becomes the target, not what it aims to measure (see "Goodhart's law"). Thus, the first conceptual question for the validation of the framework was the following:

*In what way can the Marie Skłodowska-Curie actions based indicator contribute to monitoring the implementation of Priority 1 "more effective national research systems" of the ERA Roadmap?*

In the context of ERA priority 1, the MSC indicator should be seen as a proxy for capturing an aspect of effective national research systems that has not been measured in other indicators of research excellence (which was identified as potentially a relevant indicator). In the email exchanges with ERAC Working Group members, it emerged that **an MSC variable could measure "capacity building" as well as "how well organised and attractive a research system already is when dealing with people who represent the future of research and innovation in Europe"**.

MSC actions are important EU-level competitive funding instruments, but are outside the influence of national research policies. There are other significant research funds (at the EU- as well as national level) from which researchers can choose, which brings up a number of pertinent questions to clarify before adopting such an indicator: Is there any policy rationale to make MSC a special indicator? Could there be no other similar indicators? Is there any evidence on the impact of MSC actions on capacity building or whether it in fact measures attractiveness?

From a practical point of view, the key question is how to operationalize the definition stated above. The two elements (capacity building of a country's researchers and organization/attractiveness of a country's research system) imply that (a) the greater the number of resident researchers of a country participating in MSC actions the better; and (b) the greater the number of researchers hosted in a country's universities and research organizations the better. Obviously, effects of differences in country size need to be addressed by scale-normalization.

Furthermore, discussions highlighted a few choices that help define the indicator:

- use researchers, not money flow as a unit of measure
- Agree on including all fellows coming to Member States and associated countries, including also outgoing fellows in the returning phase of their fellowships
- include all fellowships<sup>2</sup>, also those with the participation of industry – and consequently, for normalization, include the total number of researchers in the system, not merely those in the public sector

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<sup>2</sup> This includes Initial Training Networks, Industry-Academia Partnerships and Pathways, Co-funding of regional, national and international programmes, Intra-European Fellowships, all types of Career Integration Grants, International Incoming and Outgoing Fellowships but excludes the International Research Staff Exchange Scheme and the Researchers' Night; see Annex II, Figure A5 for explanation.

## 2.1 Data source

The indicators relied on statistical data reported in country Fact Sheets on participation in Marie Skłodowska-Curie actions at the country level.<sup>3</sup> Such country Fact Sheets published annually by the Commission report summary figures on the number of projects, budget awarded to host and researchers going to host organizations of a given country, and the number of national researchers participating in the programs, broken down by MSC actions. The summary figures are aggregate figures starting from 2007 and ending the year before the publication of the sheets, which may be regarded as a limitation. However, it is important to keep in mind that collecting and reporting such data is complicated, given the fact that funded projects are typically multi-annual, and may involve research activity carried out in multiple locations.<sup>4</sup> Annex II, Figure A5 provides a detailed explanation of the information in the country fact sheets used for our calculations. Additionally, Eurostat data was used to measure the number of researchers measured in full time equivalents (FTEs) (total as well as those in the public sector) in some of the alternatives tested.

## 2.2 Alternative specifications

We examined 13 different versions of the Marie Curie indicator – that is, different ways for specifying the numerator and denominator. An overview is offered in Table 1; the two columns on the right in the table also indicate whether the indicator meets two of the main criteria of selection presented above – that is, measuring number of researchers by country of host organization (in the numerator), not limiting the coverage to public sector and including all research fellowships. Since many of these were highly correlated, we applied statistical techniques (principal component analyses and pairwise correlation analyses) with the aim to distinguish (a) groups of variables that would give markedly different country rankings; and (b) identify a limited number of variables (representative for a group) that could produce outcomes for different scenarios.

### Labelling of the different versions of the calculations:

- var. 1,2,5,6 use number of researchers in the public sector as denominator, variant 3,4,7,8 use all researchers
- var. 1-4 all fellowships, variant 5-8 all fellowships excluding outgoing
- var. 1, 3, 5, 7: ranking by nationality of the organization
- var. 2, 4, 6, 8 : ranking by nationality of the researcher

Numerator:	Total, by host organization	Total, by nationality	Non-outgoing by host organization	Non-outgoing by nationality
Public Researchers	v1	v2	v5	v6
Total Researchers	v3	v4	v7	v8

- var. 9, 10 and 11 use nationals participating in MSC actions in the numerator

In addition, we applied weights to two selected indicators: v3 and v7, in order to adjust for small country bias. The weights measure the share of a country in terms of host organization in total MSC host organizations (total for the list of selected countries: EU Member States plus

<sup>3</sup> FP7-PEOPLE Marie Curie Actions Country fact sheet [URL: [http://ec.europa.eu/research/mariecurieactions/funded-projects/statistics/index\\_en.htm](http://ec.europa.eu/research/mariecurieactions/funded-projects/statistics/index_en.htm); 6 Jul 2015; Retrieved: September 2015]

<sup>4</sup> For instance, the fact that “outgoing fellowships” involve a returning phase may be a source of confusion when it comes to interpreting the figures in the organization column of the country in question. Due to initial misunderstandings, these numbers were – as it turned out, contrary to the intentions – excluded in some specification of the indicator.

CH, NO, MK and RS). However, the application of the weights was considered to be of arbitrary nature and these options were eventually discarded.

**Table 1 Overview of the different definitions of the MSC indicator**

Version	Description	Code	Org?	Tot?
v1	All MSC fellows by country of Org divided by the nr. of public researchers	Tot_o/ResPub	Y	
v2	All MSC fellows by country of residence divided by the nr. of public researchers	Tot_n/ResPub		
v3	All MSC fellows by country of Org divided by Nr. Total Researchers	Tot_o/ResTot	Y	Y
v3w	All non-outgoing MSC fellows by country of Org divided by Nr. Total Researchers, weighted by country share in total MSC stock	Tot_o/ResTot*w	Y	Y
v4	All MSC fellows by country of residence divided by the total nr. of researchers	Tot_n/ResTot		Y
v5	All non-outgoing MSC fellows by country of Org divided by Nr. Public Researchers	(Tot-Out_o)/ResPub	Y	
v6	All non-outgoing MSC fellows by country of residence divided by the nr. of public researchers	(Tot-Out_n)/ResPub		
v7	All non-outgoing MSC fellows by country of Org divided by Nr. Total Researchers	(Tot-Out_o)/ResTot	Y	
v7w	All non-outgoing MSC fellows by country of Org divided by Nr. Total Researchers, weighted by country share in total MSC non-outgoing stock	(Tot-Out_o)/ResTot*w	Y	
v8	All non-outgoing MSC fellows by country of residence divided by the total nr. of researchers	(Tot-Out_n)/ResTot		
v9	All MSC fellows by country of Org divided by the total nr. of national (by country of residence) MSC fellows	Tot_o/Tot_n	Y	Y
v10	All non-outgoing MSC fellows by country of Org divided by the total non-outgoing MSC fellows by country of residence	(Tot-Out_o)/ Out_n	(Tot- Out_n) Y	
v11	All non-outgoing MSC fellows by country of Org divided by the total outgoing MSC fellows by country of residence	(Tot-Out_o)/Out_n	Y	

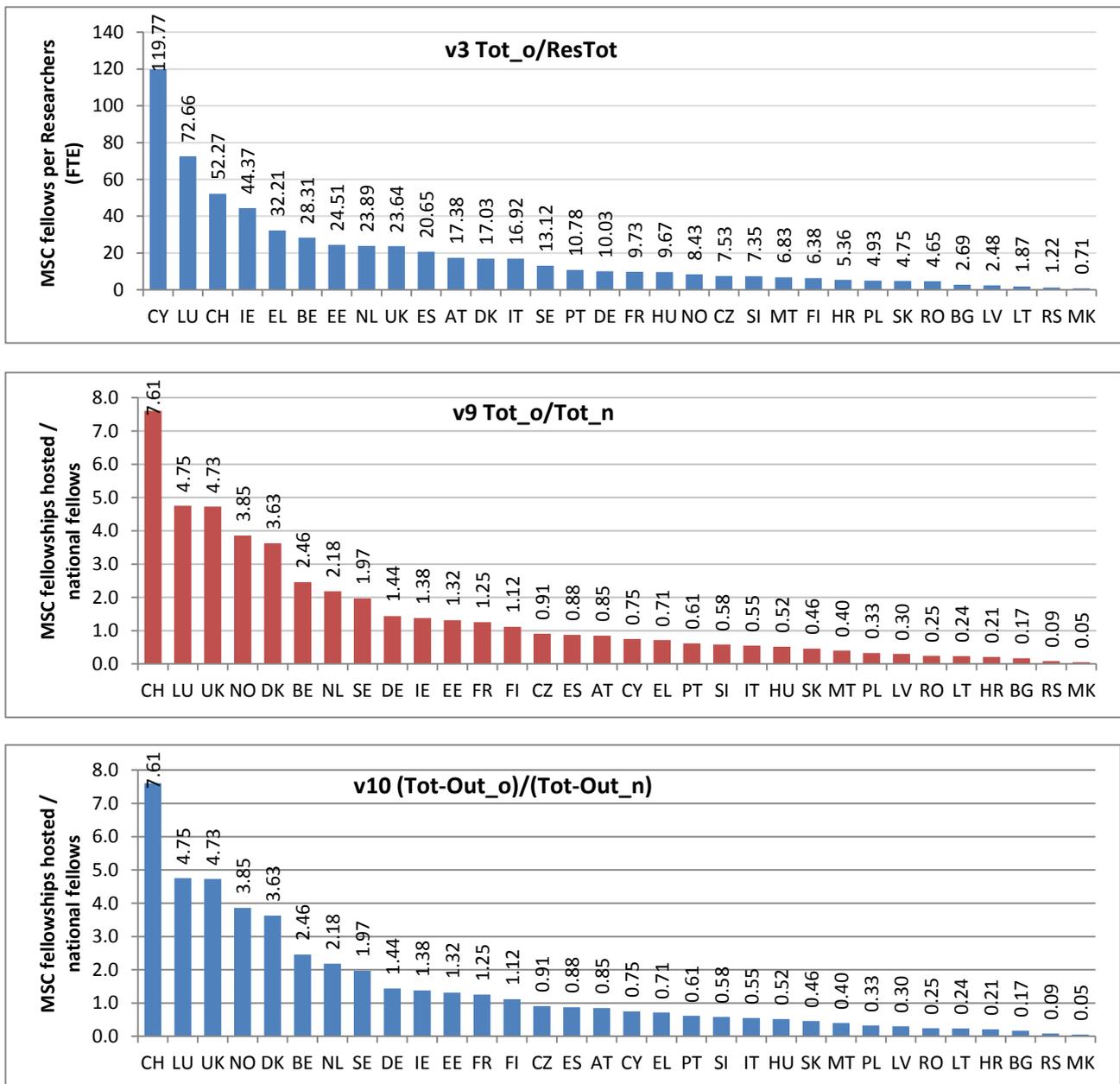
*Notes:* In the 'Org?' column, 'Y' indicates that the variable focuses on location of host organization rather than researchers' nationality (in numerator); in the 'Tot?' column, Y indicates that the variable normalized by the total nr. of researchers, not public researchers only AND includes outgoing fellowships.

From the statistical tests we concluded that the following 3 groups of variables provide highly similar country rankings (Table 2). The exclusion of outgoing researchers was found to have a marginal impact on country rankings, while the focus on host organization location, rather than nationality of researchers in the numerator, and the choice of denominator mattered more. A few of the results were not immune to small country bias (see right column) – which may have different interpretation, but this has been seen as a concern to the ERAC WG.

**Table 2 Groups of indicators and notes on their quality profile**

Group	Indicators	Small-country bias
1	v7 v3 v6 v2 v8 v4	CY: v3, v7; LU: v3
2	v1 v5	CY: v1; LU: v1,v5
3	v7w v3w v9 v10 v11	LU: v9, v10, v11

Figure 1 Country performance graphs for 2 selected MSC indicator specifications



Source: JRC calculations using Marie Skłodowska-Curie Country Fact Sheet data.  
 Notes: 'Tot\_o' refers to total MSC fellowships by country of host organization; 'Tot-Out\_o' refers to total non-outgoing MSC fellowships by country of host organization; 'Out\_n' refers to total number of national MSC fellows; 'Tot-Out\_n' refers to total number of non-outgoing national MSC fellows; 'ResTot' refers to the total number of researchers in full time equivalent (FTE). For country codes, see Annex III, Table A6.

We present above charts for what were labelled as versions v3 and v9 of the MSC indicator. In this way groups 1 and 3 are represented with a typical ranking; both of these groups have indicators that meet the expected qualities of the indicator. We note that small country bias potentially affects v3 more than v9 (see Figure 1). We note that v9 is virtually equivalent to v10, in which outgoing fellowships are excluded from both the numerator and the denominator. We present the scores for this indicator as well, only for information, given some confusion during the development phase.

In the following section we will test how the two alternative specifications for the MSC indicator (v3 and v9) fit in a composite indicator framework.

### 3. Fitting the MSC indicator in a derivative research excellence framework

The Research Excellence index<sup>5</sup> was developed with the aim to measure national research systems in terms of top-quality outcomes of scientific and technological research. Two 'strong' and two 'weaker' indicators were selected to measure research excellence: highly cited publications per total publications (HICIT); PCT patent applications per population (PCT); as well as the value of ERC project grants per public R&D expenditure (ERC); and top universities and research institutes per gross R&D expenditure (TOPUNIV). The structure of the latest revision<sup>6</sup> is presented in Table 3. The ERAC WG expressed its intention to use an indicator for ERA Priority 1 which is a derivative of the research excellence indicator, but replaces top universities and research institutes with the MSC indicator. The reason for this is that a large number of Member States are not represented in the top 500 list of universities and institutes, while all member States have MSCA fellowships. Extending the list to the top 1000 universities and research institutes does not solve this problem as a considerable number of Member States is still not represented. (See alternative approach on page 9).

**Table 3 The structure of the Research Excellence Indicator 2015**

Numerator	Denominator	Outlier Treatment	Normalization	Weighting and Aggregation	Data Source
Nr. of highly-cited publications (top 10%)	Nr. of publications	-			Science Metrix (Scopus)
PCT patents	Population	-	Min-Max (10-100)	Geometric average using nominally equal weights	OECD, Eurostat
Value of ERC grants	GOVERD + HERD	WinsORIZATION			DG RTD
Top universities & research organizations	GERD	WinsORIZATION			Scimago IR

Source: Hardeman and Vertesy (2015)

Here we present an estimate on the impact of replacing TOPUNIV with one of the three versions of the MSC indicator (v3 and v9, the two main options for comparison, as well as v10, which excluded outgoing fellowships from both the numerator and denominator). The resulting rank may change in the future if more 1 time points can be considered, or if new data is used for the other components.

The main issues to address with the aggregation:

- Excessive kurtosis was observed for the indicators analyzed as alternatives; for treatment, we applied winsORIZATION on the first largest country score
- We applied the min-max normalization in the same way as in the Research Excellence index, which transforms country scores for each indicator to the 10 to 100 scale, where 100 shows best performance.
- We observed positive, from moderate to strong correlation between the different versions and 3 of the original research excellence indicators (Table 4). Considering the 2 strong indicators of excellence (HICIT and PCT), version 9 of the MSC indicator fits mostly in the composite framework.
- For similarity with the existing structure, we applied the geometric aggregation; this may be revised to a more simple linear aggregation that allows full compensation between scores in the various pillars.

<sup>5</sup> For details on the conceptual framework, please refer to Hardeman *et al* (2013).

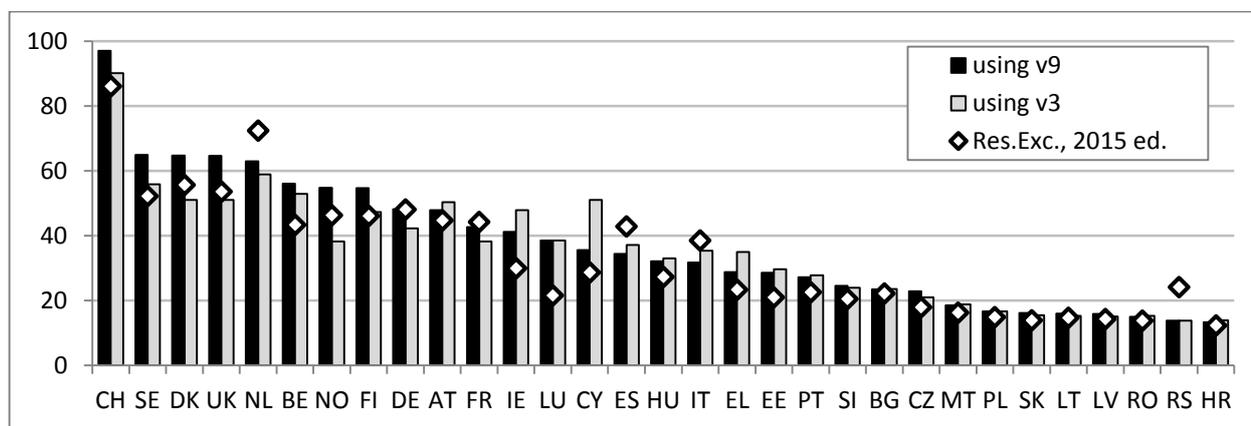
<sup>6</sup> See Hardeman and Vertesy (2015)

**Table 4 Correlation between research excellence indicators and the 3 selected MSC indicators**

	MSC v3	MSC v9
	Tot_o/ResTot	Tot_o/Tot_n
HICIT	0.446	0.689
PCT	0.176	0.592
ERC	0.488	0.365
TOPUNIV	0.011	0.321
RES_EXC	0.286	0.661

The resulting scores are shown in the graph in Figure 2, which distinguishes the 3 alternative specifications and contrasts them with the scores of the research excellence index’s latest edition. While there are certain differences in the country ranks, the 3 scores charted in the figure are highly correlated. Thus, the outcome using the Marie-Skłodowska Curie indicator will not result in a significant difference from the currently established research excellence scores.

**Figure 2 Composite indices measuring ERA Priority 1, using alternative MSC indicators; contrast with the latest version of research excellence index (2015)**



Source: JRC calculations; Hardeman and Vertesy (2015). Note: For country codes see Table A6.

### 3.1 Sensitivity Analysis

The coherence of the structure can also be seen from the results of the **non-invasive sensitivity test**.<sup>7</sup> The tests show that the new MSC indicator contributes significantly more to the overall variance of composite scores when it is specified as v9 rather than v3 (see Figure 3). Furthermore, the use of v9 specification offers a more balanced contribution of each component to the overall variance; nevertheless, the ‘strong’ indicators (HICIT and PCT) retain a somewhat stronger influence than the ‘weak’ indicators, similarly to the statistical properties of the “original” research excellence indicator (see Hardeman and Vertesy, 2015).

**Figure 3 First-order sensitivity indices for the four components**

	v3	v9
HICIT	0.45	0.69
PCT	0.18	0.59
ERC	0.49	0.37
MSC	0.01	0.32

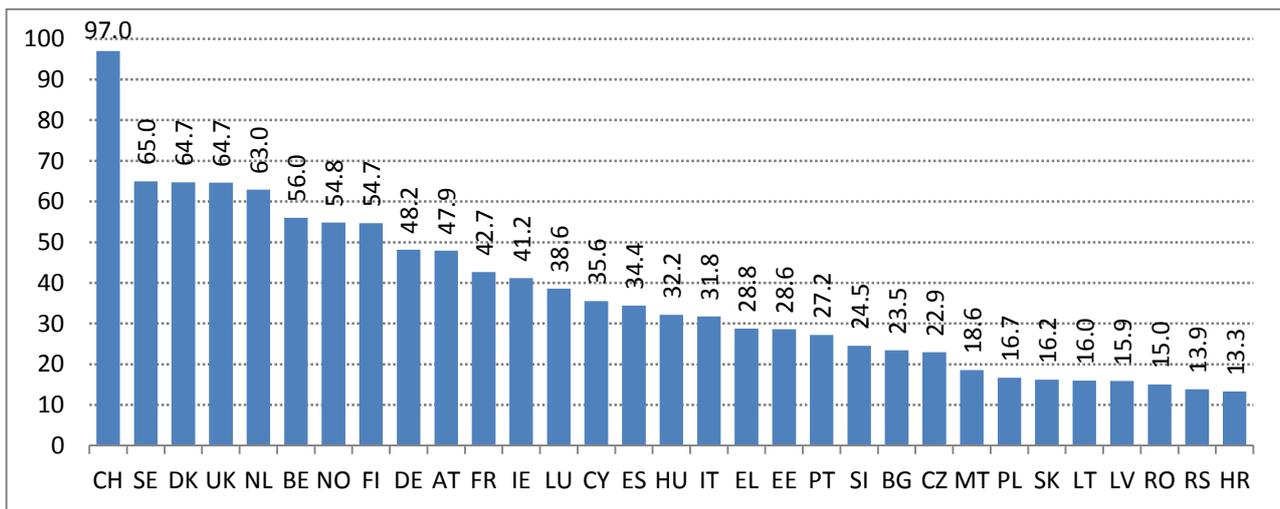
Note: Bars range between 0 and 1; the longer the bar, the larger the variance explained by a component

<sup>7</sup> For details on the methodology, see i.e. Paruolo *et al* (2013).

## 4. Conclusion

These tests indicate that it is possible to produce a modified research excellence index meeting the needs of the ERAC to measure country performance with respect to ERA Priority 1. The resulting framework – when using Total MSC fellows by organization country, divided by total MSC fellows by nationality (v9) – differs conceptually from the established research excellence framework, which may imply that this difference could be reflected by using a different name for the indicator in order to avoid confusion. At the same time, the resulting country ranking does not differ substantially from that obtained by using the established Research Excellence Index framework. Notwithstanding the statistical properties of the framework, selecting from among the alternatives remains as much a policy choice, as a statistical one.

**Figure 4 The Composite Index for ERA Priority 1 (using the statistically most robust 'v9' specification for the MSC indicator)**



Source: JRC calculations

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## ANNEX I. An alternative approach: expand the list of Top Universities?

We note that the ERAC WG expressed concern with the use of the TOPUNIV indicator due to the large number of EU Member States with 0 universities or research institutes in Scimago's list of global Top 500. For research excellence, this was considered as a "meaningful 0" (thus giving incentives for countries to create 'excellent locations' to perform outstanding research). Yet, in order to increase variation between countries with lower scores, we also tested whether expanding the list of universities and research institutes to 750 and 1000 would significantly reduce the number of countries with 0 values.

The results of this test are shown below in Table 5 for various editions of the Scimago Institute Ranking report. Broadening the scope from 500 to 750 will hardly make a difference on the number of 0s in most years. A threshold of 1000 will on average expand country coverage by four, however, will still result in 0s for about 11 Member States.

**Table 5 Impact of the cut-off threshold on the number of EU MSs with 0 universities or institutes in the top considered**

Threshold	2009	2010	2011	2012	2013	2014
<b>500</b>	14	14	15	17	15	16
<b>750</b>	13	14	14	13	14	13
<b>1000</b>	11	12	12	11	10	11
<b>Countries affected:</b>	CZ, HU, IE, PT	CZ, HU, LU, IE, PT	CZ, HU, LU, IE, PT			

*Source:* Scimago Institute Ranking (covering universities and research institutes), various editions

## ANNEX II.

Figure A5 Understanding Marie Skłodowska-Curie country fact sheets

Data for the various specification of the MSC indicator was taken from FP7-PEOPLE Marie Curie Actions country fact sheets published by the European Commission. Through the example of the United Kingdom, we explain below which numbers were used and what they refer to. This fact sheet, dated 06 July 2015, reports cumulative figures for the period 2007 to 2014.

**1** The number of MSC fellows (from all participating countries) going to a country's organizations (i.e., universities, research institutes) include all *fellowships* (International Training Networks, Intra-European Fellowships, etc.), but not other MSC actions such as International Research Staff Exchange Scheme or Researchers' Night.

**2** The number of national researchers who were granted MSC fellowships.

**3** International Outgoing Fellowships are counted under a country's host organizations in the returning phase of the fellowship.



**FP7-PEOPLE Marie Curie Actions**  
Country fact sheet: United Kingdom  
06 July 2015

Number of British researchers funded in Marie Curie Actions (2007-2014)<sup>1</sup>: 3454

- Number of fellowships: 1297
- Exchanged staff (IRSES): 2157<sup>1</sup>

EU budget awarded to British organisations (2007-2014): € 1086.4 million

Number of British organisations participating in Marie Curie Actions (2007-2014): 4053

- This figure includes the 13 participations in the European Researchers Night science communication events

In detail, the number of organisations and the budget awarded to them, as well as the number of researcher mobilities involving these organisations:

Marie Curie Actions (2007-2014)	Number of organisation participations <sup>2</sup>	Budget <sup>3</sup> (€ million) awarded to British organisations	Number of Projects	British researchers	Researchers going to British organisations
Initial Training Networks	962	472.7	512	300	2383
Industry-Academia Partnerships and Pathways	232	85.7	150	376	894
Co-funding of regional, national and international programmes	6	21.7	6	157	349
Intra-European Fellowships	1467	301.3	1469	194	1469
Career Integration Grants <sup>4</sup>	403	33.818	389	139	389
International Incoming Fellowships	486 <sup>5</sup>	106.3	476 <sup>5</sup>	40 <sup>6</sup>	476
International Outgoing Fellowships	172 <sup>5</sup>	46.3	172	91	172
<b>Sub-Total (fellowships)</b>	<b>3728</b>	<b>1067.818</b>	<b>3151</b>	<b>1297</b>	<b>6132</b>
International Research Staff Exchange Scheme	312	17.4	240	2157 <sup>7</sup> (8629 Months <sup>7</sup> )	1988 <sup>1</sup> (7953 Months <sup>7</sup> )
Researchers' Night	13	1	11	N/A	N/A
<b>Total</b>	<b>4053</b>	<b>1086.4</b>	<b>3425</b>	<b>3454<sup>1</sup></b>	<b>8120<sup>1</sup></b>

<sup>1</sup> IRSES number of exchanged personnel has been included since April 2014 and is an estimation based on the number of researcher months expected to be exchanged until the end of FP7. Furthermore this is not based on nationality but on location.  
<sup>2</sup> This is the number of participations by organisations i.e. the total number of times that organisations in this country have participated in each Action  
<sup>3</sup> Refers to budget planned at the start of the project. Actual figures are only obtained once projects have ended  
<sup>4</sup> CIG includes Reintegration Grants (RG, IRG, ERG)  
<sup>5</sup> This figure includes both the incoming phase and the possible return phase  
<sup>6</sup> Includes also the number of "return phase" fellows  
<sup>7</sup> Refers to the number of researcher months expected to be exchanged.

Note: Latest figures are available from the following link:  
 [URL: [http://ec.europa.eu/research/mariecurieactions/funded-projects/statistics/index\\_en.htm](http://ec.europa.eu/research/mariecurieactions/funded-projects/statistics/index_en.htm)]

## ANNEX III. Data used for calculations

Table A6: Normalized scores applied for the aggregation and final composite scores

Country	Code	MSC indicator		Research Excellence indicators				ERA Priority 1
		V3: Tot_o/ResTot	V9: Tot_o/Tot_n	HICIT	PCT	ERC	TOPUNIV	Composite
Austria	AT	30.9	25.3	75.2	53.7	51.5	19.4	47.9
Belgium	BE	44.5	56.1	80.5	39.8	54.8	20.2	56.0
Bulgaria	BG	12.5	12.3	42.4	10.7	54.0	10.0	23.5
Switzerland	CH	74.5	100.0	100.0	88.5	100.0	62.3	97.0
Cyprus	CY	100.0	23.4	58.6	11.6	100.0	10.0	35.6
Czech Republic	CZ	18.5	26.4	32.5	13.5	23.7	10.0	22.9
Germany	DE	21.7	36.6	63.6	68.5	33.8	36.6	48.2
Denmark	DK	30.4	78.5	88.2	63.5	40.0	43.2	64.7
Estonia	EE	39.8	34.3	61.4	19.4	16.4	10.0	28.6
Greece	EL	49.4	22.7	55.5	11.8	46.2	10.0	28.8
Spain	ES	34.9	25.8	64.2	20.4	41.7	62.3	34.4
Finland	FI	17.1	30.4	76.5	85.8	44.7	15.4	54.7
France	FR	21.3	33.0	61.0	38.8	42.5	38.5	42.7
Croatia	HR	15.8	13.1	18.9	12.6	10.0	10.0	13.3
Hungary	HU	21.2	19.0	42.9	16.0	82.0	10.0	32.2
Ireland	IE	64.6	35.4	66.7	29.2	41.7	10.0	41.2
Italy	IT	30.3	19.6	58.6	23.5	37.6	42.9	31.8
Lithuania	LT	11.4	13.6	42.0	11.3	10.0	10.0	16.0
Luxembourg	LU	100.0	100.0	58.8	37.6	10.0	10.0	38.6
Latvia	LV	12.2	14.8	37.9	11.3	10.0	10.0	15.9
FYRoMacedonia	MK	10.0	10.0	n.a.	n.a.	n.a.	n.a.	n.a.
Malta	MT	17.7	16.7	51.9	13.8	10.0	10.0	18.6
Netherlands	NL	39.0	50.8	87.3	55.9	63.3	89.4	63.0
Norway	NO	19.7	82.9	73.2	49.0	30.4	42.5	54.8
Poland	PL	15.3	15.3	23.7	11.6	18.3	10.0	16.7
Portugal	PT	22.6	20.8	65.1	13.0	31.1	10.0	27.2
Romania	RO	14.9	13.8	31.2	10.3	11.6	10.0	15.0
Serbia	RS	10.6	10.7	25.8	13.4	10.0	100.0	13.9
Sweden	SE	25.5	46.7	71.5	89.0	59.9	19.5	65.0
Slovenia	SI	18.3	20.2	49.5	26.8	13.5	10.0	24.5
Slovakia	SK	15.1	17.8	32.0	12.0	10.0	10.0	16.2
United Kingdom	UK	38.7	99.6	73.9	33.7	70.6	47.0	64.7

Source: JRC calculations. Note: Normalized scores range between 10 and 100, where a score of 100 indicates best performance. 'ERA Priority 1 Composite' is the geometric average of normalized scores for HICIT, PCT, ERC and MSC (v9).

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