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Seen from the Workbench – Capacity Building for Excellence[*]

Abstract

Academies are valuable and proven means to shape the scientific and academic life. To that end Academies were formed bottom-up or top-down as soon as scientific constituencies and scholar activities reached initial maturity. Academies can drive their constituencies, activities and individuals towards better performance. Commonly recognized highest performance and best performer, thus „excellence", is naturally encouraged also in that due course. The European Research Council is determined to be part of such encouragements, and will provide substantial financial support to that end. By mid of next decade several thousand ERC grantees will be hosted by several hundred research establishments throughout Europe. But regional and topical distribution of ERC grantees will be heterogeneous filling „basins of attraction"; as excellence is distributed neither evenly nor steadily. Experience shows that Academies are able to influence the formation of „basins of attraction" by capacity building; addressing those scientific constituencies, scholar activities and individuals that can move form from better to best performance.

Introduction

The European Research Council (ERC) is a new feature of the 7th Framework Programme for Research and Development of the European Union, which is endowed with a total budget of 7510 M€ to be invested during the period 2007

[*] The paper is printed as submitted.

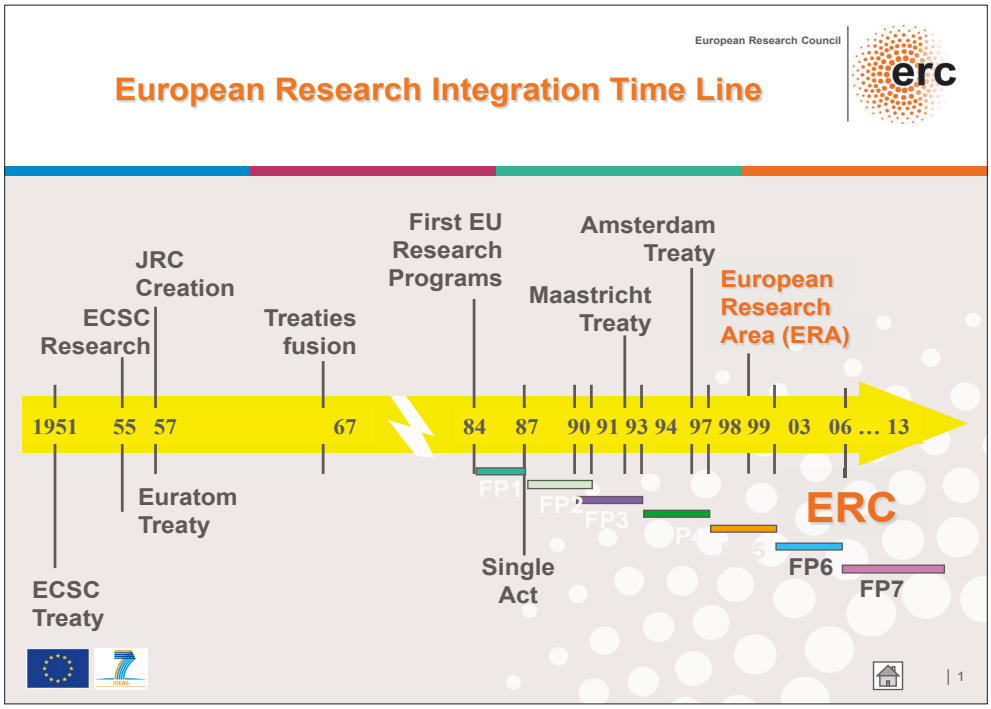


Fig. 1. Time line

– 2013 and corresponding to 15% of the total budget of the 7th Framework Programme.

Setting up the ERC was proposed by the European Commission as a further step in the development of the European research landscape (Fig. 1), the European Research Area. Scientific Academies, in their various historical forms in Europe, are an intrinsic part of the European Research Area, although today possibly operating below their potential.

Excellence in frontier research is the target set out by the European Legislator for the ERC; it is this specific target, which research projects funded by the ERC shall meet. To achieve this, the Scientific Council of the ERC has set up an evaluation methodology based on peer-review to identify best research and scholarship activities.

The means to apportion the funds of the ERC to selected research and scholarship activities have been put fully in the hands of the ERC Scientific Council, which is independent from the ERC administration which shall in turn

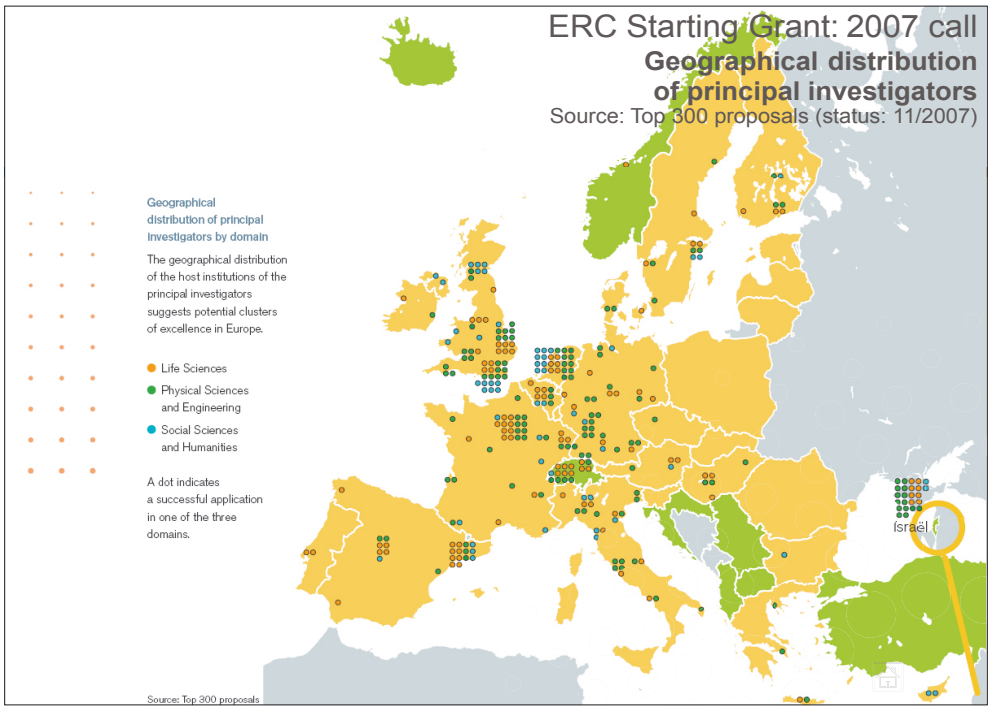


Fig. 2. Map Starting Grants 2007

manage these funds accountably. Thus the unique core task of the Scientific Council of the ERC is to design an approach which is appropriate to identify excellent, most promising research and scholarship activities undertaken by individuals (Principal Investigators). Therefore, the topical and regional distribution of hosts of ERC grants could be a means (among others) to see where excellent frontier research is located in Europe.

At date, the ERC supports individual researchers in a European-wide competition either at an early stage of development of their own research field (ERC Starting Grants) and at leading edge (s) of established research fields (ERC Advanced Grants). These two funding schemes, which were developed by the ERC Scientific Council, have been used for the first time in years 2007 (ERC Starting Grants) and 2008 (ERC Advanced Grants). The cumulated budget of these two first calls was about 900 M€ going to Principal Investigators and their teams to conduct about 3000 years of research. This portfolio of activities will be explored here to arrive at first indications where excellence was found

by the ERC. To take a first view the spatial distribution of ERC grant holders after the 1st call is looked upon.

In November 2007, the ERC Scientific Council had identified 300 Starting Grants, most of them having a duration of five years and an average budget of 1.1 M€ each. The spatial distribution of host institutions for these grants throughout the European Union and countries associated to the 7th Framework Programme provide a view where excellence seems to be located.

On first view, a quite dense band of locations of grant holders stretches from northwest to southeast, starting in England and ending in northern Italy, leaving large parts of Germany and France aside. East and west of that band, density falls off. On the Iberian Peninsula two clusters appear: around Madrid and in Catalonia. In Eastern Europe, only Hungary appears on the map. In the quite homogenous Nordic countries, Norway seems to be much less attractive than regions around Helsinki and Stockholm. Since November 2007 nineteen Principal Investigators changed their host organization prior to the start of the project.

Questions and Considerations

What is excellence in research? „Excellence" means „exceptionally high quality" (Merriam-Webster Online). Excellence in science is the outcome of research visible for example in publications, presentations, awards or social networks.

However, excellence is not an absolute term but a relationship that depends on a benchmark, which has to be defined. Thus excellence is not given „objectively", and excellence is also not easy to sustain. It is variable over time and depends on the judgment of a stakeholder community. Thus excellence is a consensus.

Assessing the quality of scientific research and scholarship and thus identifying its best as excellent, is difficult. Work, institutions, and individuals must be evaluated, e. g. by peers or other groups of stakeholders, in order to conclude whether they can be considered excellent or not. Thus excellence is in the „eye of the beholder".

Excellence aggregates. Individual excellence requires creativity, curiosity, a sound knowledge of specific methods, a broad work spectrum and the

will to succeed. Knowledge of team and personnel management as well as communication skills are also important elements, thus drawing on the social and organisational competence of the individual.

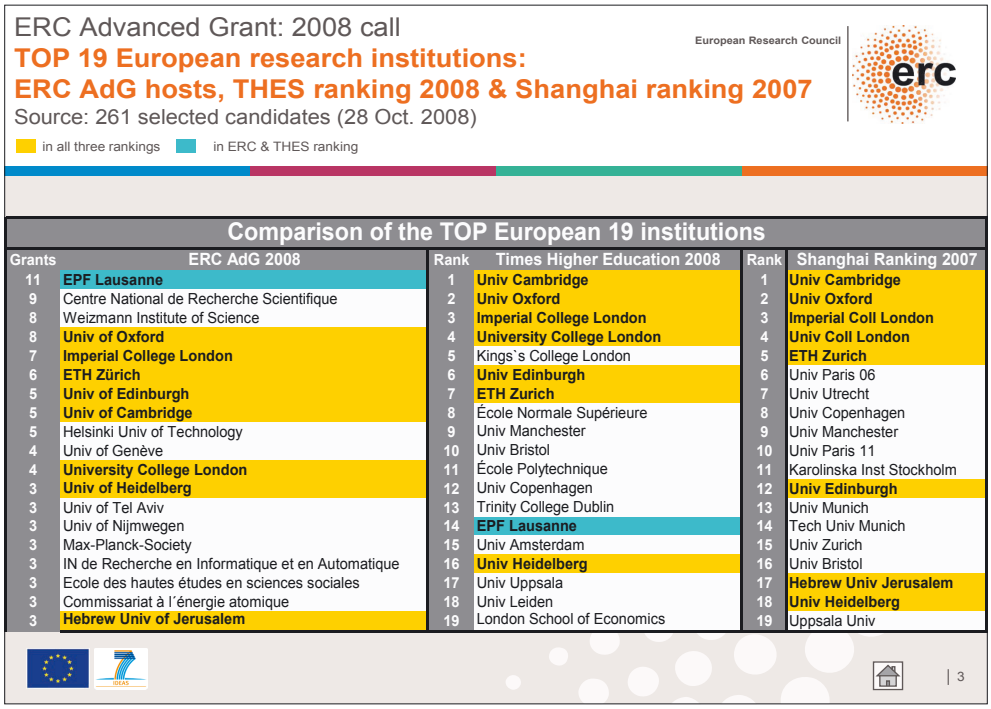
What is paramount however is a „milieu" to grow, e. g. good infrastructure, time, adequate wages, social atmosphere, a lively culture that fosters discussion etc. In other words, individual excellence requires excellent „environmental conditions" provided by the organisation which hosts the individual researcher. Therefore, excellence of the individual and institutional excellence are interdependent variables. Individual excellence generated in a stimulant environment will enhance institutional excellence by attracting other excellent researchers which in turn increases the stimulant character of the working environment.

When institutional excellence and individual excellence are going together then they favour stable „basins of attraction" for incoming excellence.

How can we identify excellent researchers? Individual research quality can be assessed, e. g. through publication activities, citation dynamics, the number of research grants or award nominations, the reputation in the scientific community, the recognized disciplinary breadth or depth, or the participation in networks etc. It is particularly difficult, however, to identify the quality of individual excellence in unconventional, path-opening fields. There is a high risk that new ideas are vulnerable to negative judgements concerning their research quality. Habitual measures often favour well established fields with longstanding publication traditions and clear boundaries.

The ERC has set up its own evaluation system based on peer review of merit of the applicant and merit of the proposed research project. In addition – for young investigators – interviews with a panel of experts (peers) is conducted. Thus, the ERC panel members attempt to identify those individuals and projects which are likely to be at the (global) frontier of their respective research fields. Thus the „judgment" of peers working jointly in the ERC evaluation system intends to set the mark: „excellent".

How can we identify excellent research institutions? Institutional excellence can be assessed e. g. through the amount of external funding, the quality of the research infrastructure, the visibility in press and media, or the number of patents. Different rankings (e. g. THES) use these indicators but they all have weaknesses and have to be used carefully. The award of an ERC grant may



ERC Advanced Grant: 2008 call

TOP 19 European research institutions:
ERC AdG hosts, THES ranking 2008 & Shanghai ranking 2007

Source: 261 selected candidates (28 Oct. 2008)

European Research Council

in all three rankings in ERC & THES ranking

Comparison of the TOP European 19 institutions

Grants	ERC AdG 2008	Rank	Times Higher Education 2008	Rank	Shanghai Ranking 2007
11	**EPF Lausanne**	1	**Univ Cambridge**	1	**Univ Cambridge**
9	Centre National de Recherche Scientifique	2	**Univ Oxford**	2	**Univ Oxford**
8	Weizmann Institute of Science	3	**Imperial College London**	3	**Imperial Coll London**
8	**Univ of Oxford**	4	**University College London**	4	**Univ Coll London**
7	**Imperial College London**	5	Kings`s College London	5	**ETH Zurich**
6	**ETH Zürich**	6	**Univ Edinburgh**	6	Univ Paris 06
5	**Univ of Edinburgh**	7	**ETH Zurich**	7	Univ Utrecht
5	**Univ of Cambridge**	8	École Normale Supérieure	8	Univ Copenhagen
5	Helsinki Univ of Technology	9	Univ Manchester	9	Univ Manchester
4	Univ of Genève	10	Univ Bristol	10	Univ Paris 11
4	**University College London**	11	École Polytechnique	11	Karolinska Inst Stockholm
3	**Univ of Heidelberg**	12	Univ Copenhagen	12	**Univ Edinburgh**
3	Univ of Tel Aviv	13	Trinity College Dublin	13	Univ Munich
3	Univ of Nijmwegen	14	**EPF Lausanne**	14	Tech Univ Munich
3	Max-Planck-Society	15	Univ Amsterdam	15	Univ Zurich
3	IN de Recherche en Informatique et en Automatique	16	**Univ Heidelberg**	16	Univ Bristol
3	Ecole des hautes études en sciences sociales	17	Univ Uppsala	17	**Hebrew Univ Jerusalem**
3	Commissariat à l´énergie atomique	18	Univ Leiden	18	**Univ Heidelberg**
3	**Hebrew Univ of Jerusalem**	19	London School of Economics	19	Uppsala Univ

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Fig. 3. Institutional Ranking

develop into a practical „gauge" for the excellence of research institutions. Acceptance of this „gauge" by the research communities however will depend on how the collective view of ERC peer reviewers represents the consensual view of relevant stakeholder communities throughout Europe regarding what is „perceived as excellent research institution".

Taking the „Times Higher Education ranking (2008)" and the „Shanghai Ranking (2007)" as reference for comparison, a first, tentative check is made whether ERC grants go more likely to institutions, which are ranked high in these two rankings. The sample studied is composed of successful host institutions of the first ERC call for Advanced Grants, which targets established researchers.

The call was issued in 2008 and first results are available in early autumn of the same year; 261 grants (of likely 275 grants) were allocated. Ranking institutions by number of ERC grants attracted („ranking by attractiveness") shows a top group, which attracts between five to ten grants; an intermediate group, which attracts three to four grants; and a lower group, which attracts more

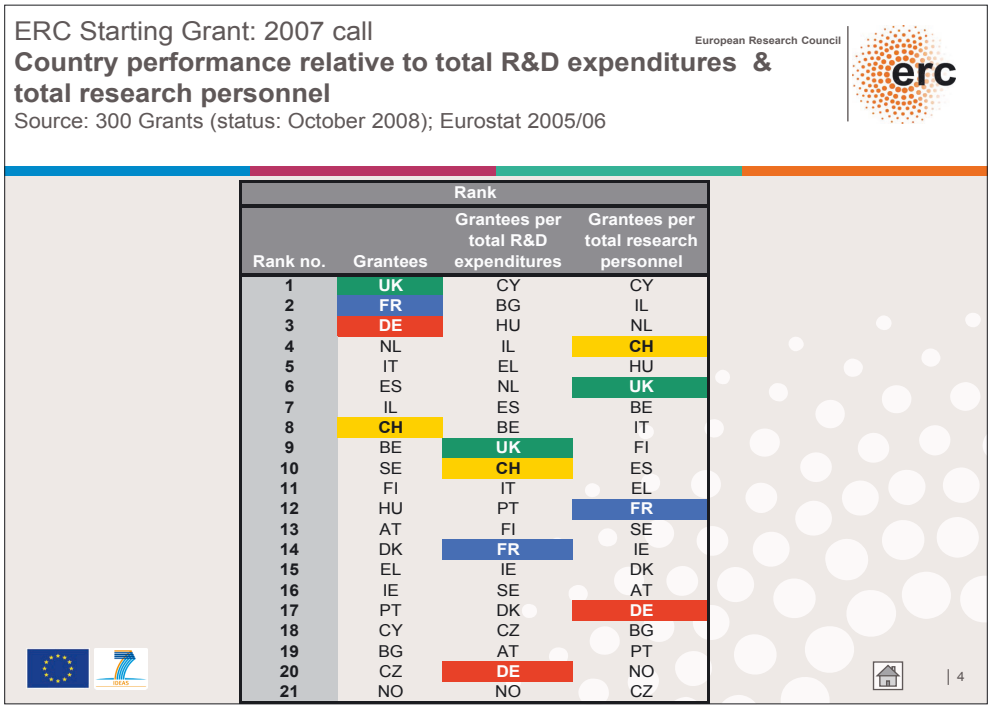

Fig. 4. Ranking by national research intensity

than two grants each. Final allocation may slightly change because of early mobility of researchers, who transfer their project to another research institution before the project starts.

It results that about 50% of the institutions ranked among the top 19 positions in these rankings are found also among the group of most successful institutions in the first ERC call for Advanced Grants (fig. 3). On the other hand, there were entities, which quite successfully attracted ERC-grants, but have a low position in „Times Higher Education ranking (2007)" and the „Shanghai ranking (2007)". The degree of overlap between established ranking schemes and the „ranking by attractiveness" for ERC grants is much encouraging.

The number of grantees compared to national research intensity can be looked upon to establish a relative ranking of success (fig. 4). The sample analysed is the number of ERC Starting grants allocated, for which the geographical distribution was shown (fig. 2).

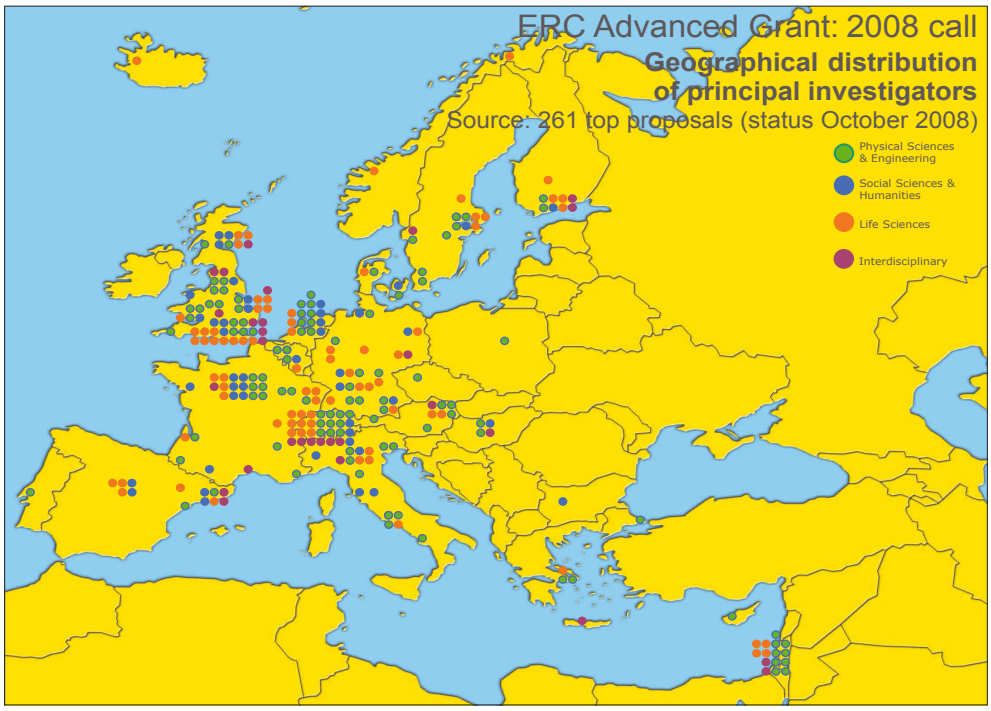

Fig. 5. Map – Advanced Grants 2008

Big countries with high levels of GDP do relatively well only in absolute terms, although with remarkable difference between them. In a ranking which uses relative measures (grantee per total R&D expenditure; grantee per total research personnel), the ranking order changes and the big and economically strong countries take middle to bottom positions. In turn, economically weaker countries seem to be not without chance. This pattern supports the frequently voiced view that individual and institutional excellence can be found everywhere throughout Europe.

Where does excellent research aggregate? ***It is perceived that excellence attracts further excellence because mutual attraction is felt. This process should lead to heterogeneities regarding standing and ranking of institutions. Host institutions will benefit from multiplier effects forming „basins of attraction", although likely in a time variant fashion. Regional and topical distribution of „excellent research" thus will be heterogeneous and therefore initiate reactions and competition „to retain or to repatriate". The competition will be on all factors that make a host institution attractive for excellent individuals,***

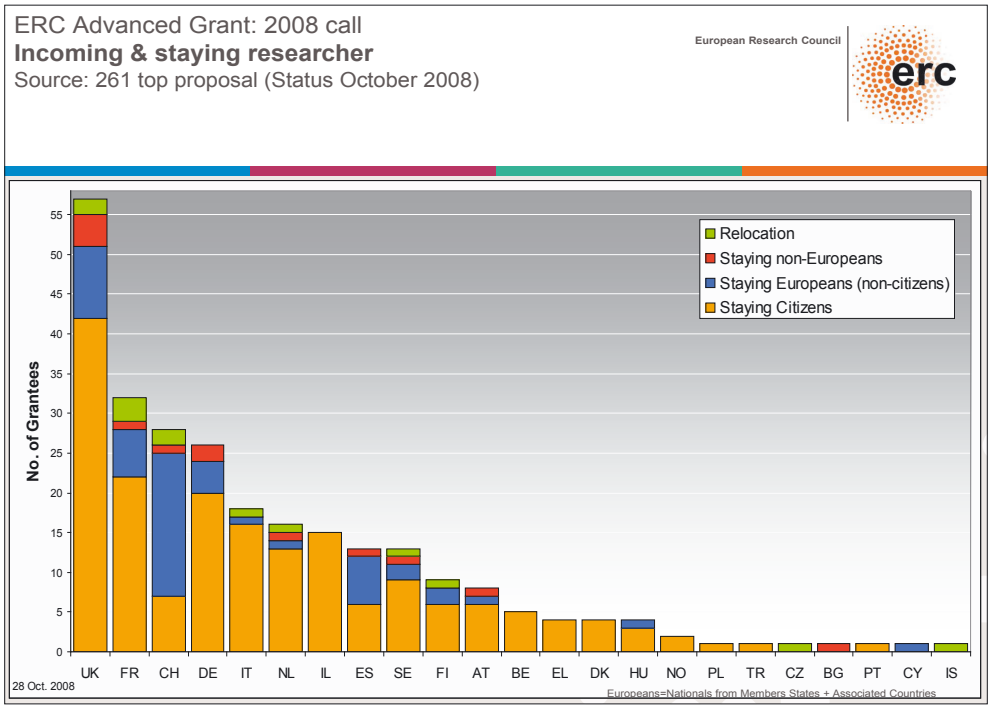

Fig. 6. Origin of Principal Investigator for Advanced Grants 2008

namely the „milieu" to grow, e. g. good infrastructure, time, adequate wages, social atmosphere, lively culture. It can be noted that several EU Member States and Associated Countries provide support to ERC applicants who were positively evaluated but could not be funded by the ERC. Head hunting is taking place.

Emerging „basins of attraction" may be visualised by looking at the distribution of the first few hundred ERC grants. However these „basins of attraction" show different features depending on the angle of view that is taken.

Taking first view – *on the geographical distribution of the ERC Advanced Grant (2008) in Europe*, as done above for the ERC Starting Grant (2007), the pattern already seen previously (fig. 2) seems to be confirmed (fig. 5).

A quite dense band of locations of host institutions of grant holders (Principal Investigators) stretches from northwest to southeast, starting in England and ending in northern Italy. Large parts of Germany and France are left aside; and

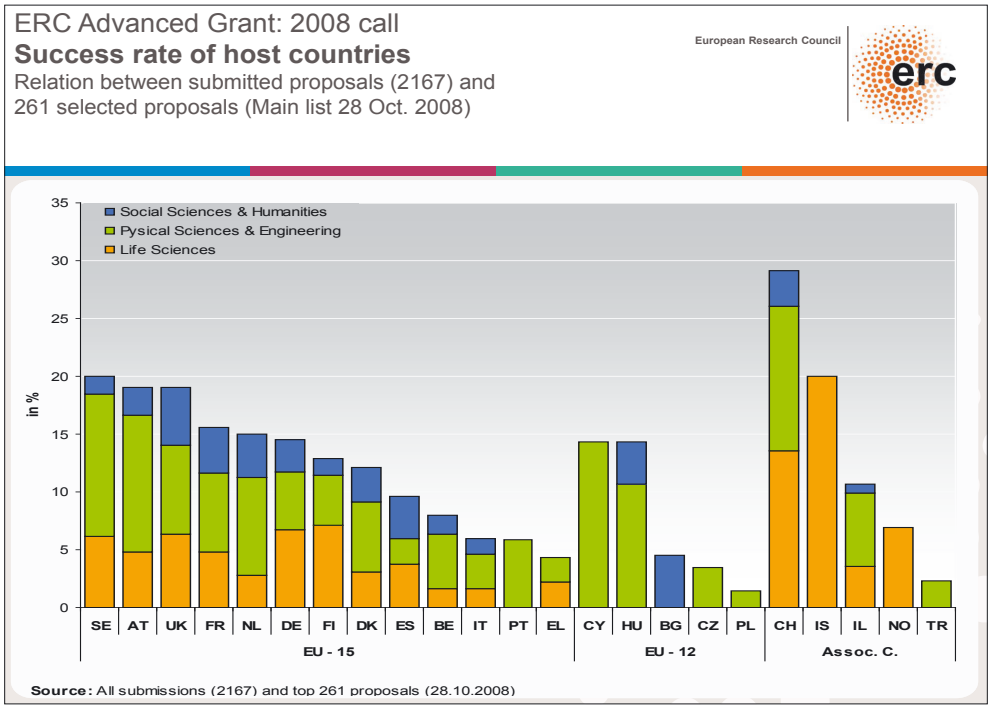

Fig. 7. Map – Applicants from outside Europe in Starting Grant 2007

a strong cluster is formed in Switzerland. East and west of that band, density falls off. On the Iberian Peninsula two clusters appear again, around Madrid and in Catalonia. In Eastern Europe, Hungary keeps putting itself on the map. In the quite homogenous Nordic countries, attractive regions around Helsinki and Stockholm are confirmed; and also Israel confirms its relative strength.

Taking a second view – *on the country of origin of the principal investigator* and using the Advanced Grant 2008 as sample, a pattern emerges: far the most principal investigators are citizens of the country in which their host institution is located (fig. 6).

Most remarkable exception to that pattern is found in Switzerland where the „bulk of success" is carried by non-Swiss citizens working (and staying) in Switzerland. The same applies, although to a lesser degree, to Spain and the United Kingdom. Thus relative success of these countries compared to others is found in their skill to have attracted in the past highly qualified researchers and scholars, which found a „milieu" to prosper. Likewise, Switzerland,

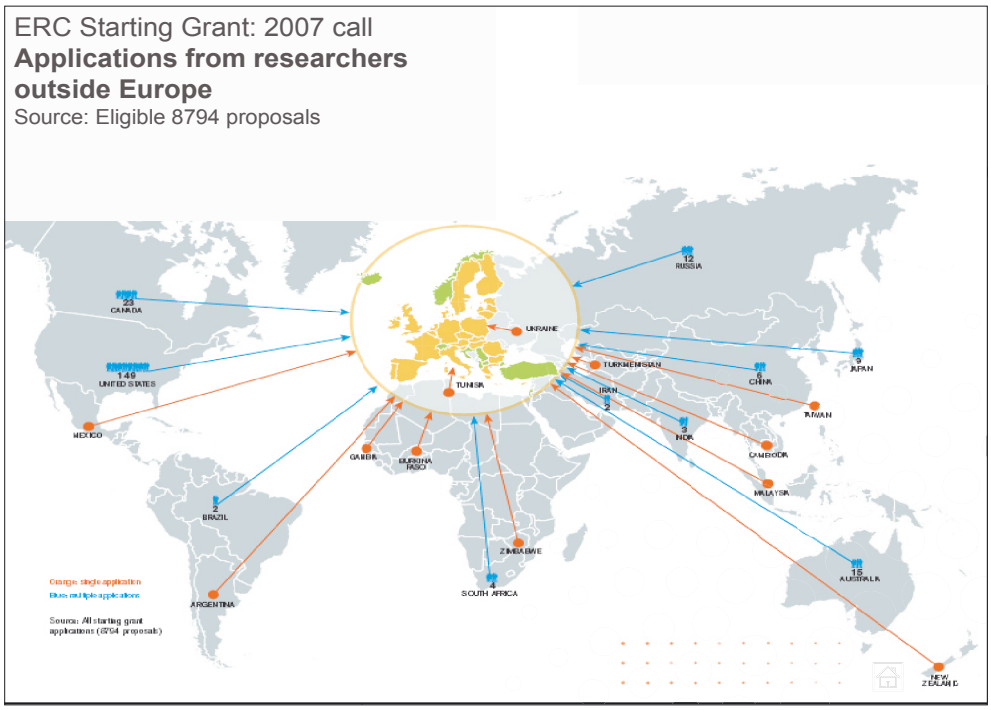

Fig. 8. Distribution of success rates

France and the United Kingdom seem to be able to continue attracting principal investigators from abroad, although their number is relatively small.

Repeating this analysis for the ERC Starting Grant reveals a similar pattern but shows also that the relatively strong position of the UK and the Netherlands is driven by their attractiveness to non-National Principal Investigators, who wish to stay in the UK or Netherlands, respectively.

Referring to the Starting Grant, the global attraction of the region „Europe" is evident looking on the applications received (fig. 7), although it has to be noted that success was found mainly for principal investigators coming from the USA.

Taking a third view – *on success rate, i. e. the ratio of allocated grants and applications*, attributable to host institutions of the same Member state, it appears that skills to submit excellent applications is variable (Fig. 8).

Remarkable differences are found among the older EU Member states as well as among the younger EU Member states. Likewise, differences are strong between states associated to the 7th Framework Programme. Good and best performances are comparable among these three groups (10% – 20%) with exception of an overshooting Switzerland (> 25%).

Conclusions

It is tempting to combine the features discussed here and to point to „basins of attraction". However, the features seen here are certainly biased by the particular situation related to the start of the ERC. The size of bias is unknown. The overall sample is small. Therefore it deems suitable to limit the summary to acknowledge heterogeneity of excellence and to state that allocating grants for frontier research to excellent Principal Investigators on a European level can be used to map this heterogeneity. By end 2009, when the second calls for ERC Starting Grants and ERC Advanced Grants will have delivered their results, a more firm assessment should be possible of which „basins of attraction" for excellent frontier research can be spotted in Europe and how these basins may evolve.

The European Legislator gave the ERC the task to support excellent frontier research undertaken by individual teams on a unified European scale and provided a substantial amount of funding to that end. The ERC shall act complementary to existing national and institutional funding programmes and other means, including National Science Academies, to shape the European Research Area.

What is the role of Academies in fostering excellence? Academies were (and are) formed bottom-up or top-down as soon as scientific constituencies and scholar activities reached initial maturity. Nowadays Academies are also been re-founded to meet better changing societal needs.

Academies can create favourable conditions in which research and scholarship can thrive; thus moving individual researchers and institutions from better to best performance by promoting favourable conditions for science and scholarship at a political and social level, by encouraging the dialogue between science, scholarship and society, but also by awarding grants and scholarships. Academies thus can take an important role in fostering capacity-building for excellence.

Now, in October 2008, the first several hundred ERC-grantees and their host institutions are identified. In a few years, several thousand ERC grantees setting up or running their own research teams will be hosted by several hundred research institutions throughout Europe. This will represent an annual investment of the European Union of ~15.000 person-years of research activities, for which excellence shall be the sole criteria for its selection. The places in Europe where ERC grants are hosted shall be „basins of attraction" for excellence, so the intention of the European Legislator.