1st Evaluation of FNR's AFR Programme

Final Report

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Bonn
December 2010
FOREWORD AND ACKNOWLEDGEMENTS

Readers who are familiar with the Aides à la Formation Recherche programme by the Fonds National de la Recherche of Luxembourg feel reminded of the AFR scheme's aims in reading the subsequent paragraph:

"Increase the number and share of graduates enrolling in PhD training along with the diversification of PhD profiles and the reinforcement of quality assurance mechanisms

- Stimulate the increase of the number and proportion of PhD students, with due respect to the autonomy of universities;
- Increase the proportion of PhD fellowships awarded through open competition at national or international levels;
- Attract to Europe graduates from third countries for PhD training;
- Enlarge the perception of the newly acquired importance of PhD training to attaining high levels of professional competence and leadership beyond R&D careers, namely in administration, engineering, ICT, medicine, architecture and new interdisciplinary fields;
- Promote innovation and quality in PhD training, namely in conjunction with industry whenever appropriate."

Not surprisingly, these sentences were formulated by the Minister for Higher Education and Research François Biltgen together with his Portuguese colleague José Mariano Jago in their action plan for 'An European partnership to improve the attractiveness of RTD careers and the conditions for mobility of researchers in Europe' of April 2009.

In this evaluation it was our task to analyse to which extent the AFR programme which was only launched in October 2008 was able to reach the above mentioned goals in its two funding lines for doctoral candidates and for postdocs. Given the newness of the scheme it should be acknowledged that we are only able to describe first trends. However, thanks to the large commitment of applicants who contributed to our survey and interviews, and of all different groups of actors involved in the AFR process during all phases of the evaluation, not the least FNR staff and directorate and officials of the Ministry for Higher Education and Research, we were able to develop a picture of the AFR programme's reality.

This report builds on the support of many people. I would like to express my special gratitude for their trust, support and patience to Ulrike Kohl, Helena Burg, Marie-Claude Marx, Asaël Rouby and Raymond Bausch from FNR, to my reviewers Maresi Nerad and Philipp Schimek, to Josyane Entringer from the Ministry for Higher Education and Research, to Fritz Ohler from Technopolis, to my collaborator Michaela Dreike and to my husband Matthias Scholz.

Beate Scholz
Bonn, December 2010
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SUMMARY

1. Aims and steps of the AFR evaluation

This report summarises the results of the first evaluation of the AFR programme which was carried out between March and December 2010. With the evaluation the following aims and objectives are to be reached:

Overall the evaluation seeks to
- assess the correspondence between the legal framework, the goals as defined in the FNR Performance Contract and the AFR procedures on the one hand with the reality of the scheme since its launch in 2008 on the other,
- analyse the ‘customer satisfaction’ by asking for the feedback from both successful and unsuccessful applicants,
- benchmark the AFR programme internationally, especially in comparison with similar schemes by other agencies.

More specifically the AFR evaluation aims to
- achieve better understanding of the applicant and grantee population in both funding streams: doctoral candidates and postdocs,
- gain insight into the quality of doctoral education and postdoc qualification in the framework of the AFR scheme and
- get a better understanding of the functioning of intersectoral public-private research cooperation.

This report summarises the results of the following seven evaluation steps: document analysis, analysis of the demographics of the AFR population, applicant survey, semi-structured interviews, international context analysis and benchmarking of the AFR scheme, review of results by international experts and workshops with FNR representatives and officials of the Ministry for Higher Education and Research:

1. We conducted extensive analyses of documents relevant to the programme (especially the legal texts underlying the scheme) and of selected applicants’ files with the aim to achieve a comprehensive view of the AFR scheme, its origins, and relevant processes and procedures (calls, peer review, decision-making, management).

2. A survey based on existing data (provision by FNR staff) generated in the selection process and the administration of fellowships was carried out with the aim to gain information on the demographics of the AFR population (both successful and unsuccessful applicants): e.g. gender, age, nationality, disciplinary background.

3. A survey encompassing six calls for PhD and postdoc grants in the framework of the AFR scheme which FNR conducted during 2008 and 2009 started on 22 April 2010. Until the final deadline of our questionnaire exercise (18 May 2010, noon) we received 170 questionnaires by doctoral candidates which equates to a response rate of 55% and 56 by postdoctoral applicants, equivalent to a response rate of 44%.
As we might have expected, the share of AFR beneficiaries answering our questionnaire was larger than the rate of rejected candidates. We therefore need to acknowledge that our results primarily build on the replies by AFR beneficiaries. Considering the postdocs in our sample we find that 88% (=49) successfully applied for an AFR grant, whereas 12% (=7) were unsuccessful. Given the very small sample size for unsuccessful postdoc applicants we have to treat any results referring to this group with reservations. Hence, it was important to distinguish between the replies of grantees and refused applicants wherever possible.

4. Semi-structured interviews with selected representatives of each group involved in the AFR scheme (applicants, supervisors (in public institutions and companies), reviewers, panel members, FNR staff, and ministry officials) took place between 17 and 28 September 2010. The primary objective of the qualitative approach was to complement the results of the quantitative evaluation and to identify room for improvement both with regard to the scheme itself and with respect to its processes. It was also our interest to gain more profound insight in the research career development system in Luxembourg (taking into account the university, the public research centres and private companies) in general.

In total nine semi-structured interview rounds were conducted involving 27 persons representing the following groups: AFR beneficiaries (PhDs, postdocs, BFR transitions), unsuccessful applicants (PhD & postdoc), supervisors, AFR panel members, FNR directorate, FNR staff and officials of the Ministry for Higher Education and Research.

5. Of course we are aware that we can build on the experience of other countries that went through similar re-thinking and re-structuring of their doctoral education and training the next generation of researchers, in order to avoid reinventing the wheel. We therefore contextualised the AFR programme on an international scale in view of current trends and developments. We also aimed to benchmark the AFR scheme, especially its programme features and the performance of its processes, to similar schemes which are offered by other national funding organisations in Europe and beyond.

For this purpose we analysed relevant international surveys, evaluation reports and selected international research literature. In addition, with the support of FNR staff1, we compared the AFR doctoral funding scheme with programmes to support PhD level research training by funding organisations in Austria, Belgium, Canada, Finland, Germany, Ireland, the Netherlands, Switzerland, the United Kingdom and at European level with the European Commission's Marie Curie Initial Training Networks.

6. The evaluation process was supervised by two external experts, Professor Maresi Nerad (director of the Centre for Innovation and Research in Graduate Education at the University of Washington at Seattle), and Mr. Philipp Schimek (director of

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1 We owe special thanks to Dr. Helena Burg from FNR for her support in this exercise.
beraterinnengruppe naschmarkt). The external experts provided feedback and shared suggestions at crucial stages of the evaluation and during the reporting phase.

7. Workshops: In the course of this evaluation process three workshops took place in order to involve the expertise of FNR and the Ministry Higher Education and Research in the broadest possible sense, present and discuss the results of each step and to develop a concept for AFR programme development in view of the renewal of the FNR Performance Contract covering the years 2011 until 2013.

The workshops took place on 8 March 2010 as kick off of the AFR evaluation involving FNR representatives, Ministry officials and the members of the AFR panel, on 8 July 2010 as intermediary workshop to present and discuss the preliminary results and recommendations of the quantitative evaluation stage involving FNR representatives and Ministry officials and on 6 October 2010 as final workshop to present the results of all evaluation stages and discuss next steps of AFR programme development with FNR representatives and Ministry officials.

2. The AFR Programme

The most important elements of the current AFR programme are outlined in the legal framework underlying the scheme. A close reading of the respective documents shows that the authors foresaw programme developments which have not been realised as yet, especially with respect to quality assurance and to rewarding scientific excellence. The texts also depict the ambiguity of the programme in terms of quantity (i.e. contributing to national capacity building) and quality-orientation.

- Avant-projet de loi of April 2007: In the ‘Comment on the articles’ doctoral candidates and postdocs are referred to as ‘chercheurs en formation’. This corresponds to the so-called Salzburg Principles in which the EU Member States recommend to treat doctoral candidates as ‘early career professionals’. The ‘Exposé des motifs’ stresses the need for building up the national research capacity. In addition, the principles of the selection procedure are laid down: “évaluation ouverte, efficace, transparente, comparable aux normes internationales” and the need for career tracking and quality assurance by means of an output evaluation are highlighted.

- FNR Performance Contract of 28 July 2008: Among other aspects the Performance Contract which is to be renewed for the period 2011 until 2013 defined the turnaround times for the selection of candidates in the AFR programme: 2 months for PhDs and 4 months for postdocs.

- Law of 19 August 2008: The law specifies the selection criteria which are to be applied in the AFR programme: scientific quality of the project, potential of the ‘chercheur en formation’ and ability to carry out the project, scientific competence of the host institution, quality of the research and qualification environment, im-
pact and possible applications of the project in the general research context and for the technological development and the innovation of Luxembourg.

- Règlement grand-ducal of 6 October 2008: The Règlement prescribes specific procedural aspects and programme features like the establishment of an evaluation committee for selection of candidates (article 4) or the duration of the grants (up to four years funding for doctoral candidates and a maximum of 2 years for postdocs, article 8). It also opens up future programme perspectives by mentioning the opportunity to grant merit-based scientific awards to outstanding AFR beneficiaries (article 6).

3. Findings of the quantitative and the qualitative evaluation

3.1. The AFR population

Personal background and professional experience of applicants

- **Age and career progression**: When doctoral candidates applied for the first time, the majority (72%) were below the age of 30. Half of the postdocs (52%) were 30 to 34 years old, 29% were younger. Thus, AFR applicants are rather young; only about 20% decided to do a doctorate or a postdoctorate at a more advanced age. AFR applicants have fairly linear careers. In matching the date of the last university degree with the call in which they originally submitted their proposal, we found that the majority of either group had applied no more than two years after they had graduated or completed their doctorate.

- **Gender**: In line with the so-called scissor’s diagram which documents the increasing drop-out rates of women as they climb higher on the academic ladder, fewer women apply for a postdoc grant than they do for a PhD grant: 39% (=53) of the postdoc applications were women, 61% (=81) were men. However, women were slightly more successful in receiving postdoc grants as compared to female applicants at PhD level.

- **Work experience**: The majority of the fellowship applicants had work experience. Two thirds of the doctoral candidates and 73% of the postdocs had worked either before they started their studies, while they were studying, or after they completed their studies. Postdocs had mostly worked during or after their doctorate. The majority of postdocs worked in the publicly funded research sector. Doctoral candidates mainly worked either in the public research sector or in the private non-research sector. It is likely that the work experience in the latter field refers to jobs in the service sector which for many is an important source of income to fund their studies.

- **Disciplinary background**: The AFR programme seems to be especially attractive for doctoral candidates who had earned a degree in the social sciences or economics and to graduates from computer science and informatics. Postdoc appli-
cants came from more fields of study, they had completed degrees in social sciences, economics, in computer science, informatics, and also the life sciences.

- **Nationalities**: Luxembourg’s citizens represent the dominant group at the doctoral level and are the second largest group at the postdoc level. At the doctoral level we observe a strong representation of the neighbouring countries with German citizens being the second and French citizens being the third largest group. Notably, at the postdoc level French citizens outnumber even citizens from Luxembourg, followed by Germans at the third rank. Not counting Luxembourg’s citizens there were at least 11 nationalities represented in the PhD programme and at least 14 in the postdoc programme.

3.2 Quality of the scheme: overall customer satisfaction

- **Motivation to apply for AFR**: Intrinsic motivations prevail when it comes to the decision to apply for an AFR grant: Interest in research in general and/or in a specific field are leading motivations for both PhDs and postdocs, followed by the wish for personal development. Notably, both groups indicated they had close to no higher income expectation in future employment. The main interest of both doctoral candidates and postdocs lies in the opportunity to freely design their research project. The encouragement by supervisors comes second, whereas the level of funding, still important, ranks only third in the priorities of applicants. These findings were underlined in the interviews where applicants pointed out that the opportunity to concentrate on research as well as the high degree of autonomy and scientific independence which the AFR grant enabled had induced them to apply. In contrast, supervisors and host institution representatives were convinced that the job security of grantees during the AFR funding period and the level of social security which the programme offered made it attractive to applicants.

**Destinations**

- **Location of the host institution**: The majority of AFR grantees decided to move to or stay in Luxembourg. 89 of the doctoral applicants and 33 of the postdocs submitted their proposals for an institution in Luxembourg, 50 doctoral candidates and 14 postdocs aimed at going abroad. Considering the number of funded PhD and postdoc proposals, the University of Luxembourg is the major beneficiary of the AFR scheme: 74 doctoral and 41 postdoc grantees went to the University. This even outweighs the total number of outgoing grantees: 65 doctoral candidates and 19 postdocs. CRP Henri Tudor is the preferred non-university host institution in Luxembourg both for PhD and postdoc grant holders.

- **Public Private Partnerships**: Statistics provided by FNR show that only 17 doctoral candidates applied for a project in the framework of a Public Private Partnership, of which 12 grants were funded. In this survey 14 respondents at doctoral level, but only 1 postdoc indicated they had applied for a joint project with a company. The few grantees that worked in or collaborated with a company, however, seem
to be rather satisfied with this cooperation. Especially in the interviews some beneficiaries stressed, however, that they encountered difficulties in particular with regard to Intellectual Property Rights (IPR).

- 'Thematic mobility': 28 of the PhD beneficiaries indicated to have changed their fields of research in relation with their AFR projects, at the postdoc level only 5 changed disciplines. However, most of these changes occurred within the same broad scientific area, e.g. within the Humanities and Social Sciences. This applies to all of the postdocs as well which is understandable given that the funding is only for two years which makes an interdisciplinary move more difficult. Indeed some of the doctoral candidates moved between disciplines rather than staying within the same broad field.

Employment conditions and future expectations

- Work contracts vs. stipends: For more than 80% of the doctoral candidates and postdocs the AFR grant is based on a work contract. The fraction of postdocs having a work contract (89%) is slightly higher than the fraction of doctoral candidates (82%). It is not surprising that with the progression of a researcher's career social security issues tend to get more relevant. Data provided by FNR show that the vast majority of AFR beneficiaries work on contract basis. Not surprisingly, for a stay abroad, the fellowship is still the preferred funding opportunity. FNR staff and FNR directorate pointed to a difficulty which they encountered in offering work contracts to beneficiaries: It turned out that the provision of work contracts created a lot of problems with the labour laws of the respective host countries. Consequently, in such cases FNR has chosen to offer stipends with an additional coverage for health insurance. However, this social security package does not include provisions for a pension scheme as yet. In the future should be explored to which extent such provisions could be included. This insight is not new and applies to other mobility schemes, too. Hence, it points to the necessity of realising the envisaged 'Pan-European Pension Fund' as part of the European Commission's Partnership for Researchers.

- Career prospects: AFR grantees are very optimistic about their future career prospects, especially when it comes to their opportunities for a research career: 86% of the doctoral candidates believe that their opportunities for a research career are excellent or good. Postdocs are even more optimistic about their research career prospects: 93% think their opportunities are excellent or good. All groups seem to be more sceptical about their career opportunities in Luxembourg than abroad. Nevertheless a major fraction of both groups – postdocs in Luxembourg or abroad – would prefer continuing their research career in Luxembourg. This also applies to the option of a research career at a non-university research institution in Luxembourg. Through our interviews we were in the position to throw more light on these findings. AFR applicants and AFR panel members (all of whom worked abroad) agreed in that they considered a research career in Luxembourg was a 'dead end' due to the lack of permanent positions for researchers in the university and the public research institutions. AFR panel members even
argued that FNR should be enabled to fund tenured positions in order to achieve a high quality impact on research capacity building in Luxembourg. There is obviously a strong need for the research system in Luxembourg to inform about career opportunities and demands, but also to depict visions for the future and potential for development of the R&D system. Of course policy makers should not underestimate the 'windchill factor', meaning that researchers’ perceptions of career opportunities do not always fit with the realities.

- Overall customer satisfaction: The AFR scheme is highly appreciated by its beneficiaries: PhD grantees even seem to be slightly more satisfied than their postdoc colleagues: 78% of the doctoral candidates and 73% of the postdocs find their conditions better or far better when they compare their conditions internationally.

3.3 Quality of AFR procedures, decisions and administration of grants

On the way to preparing an AFR proposal

- Information about the AFR programme: For both groups supervisors still play a central role in alerting their "apprentices". The information by colleagues seems to be equally important as the AFR website. Other sources of information, especially the EURAXESS portal, do not play a role. Although the variations are not very large the communication via the supervisors seems to be particularly relevant to the candidates who chose a host institution in Luxembourg. Only 50% of the applicants for PhD grants and 43% of postdoc grant applicants indicated they were aware of other funding offers. Even less used the opportunity to apply to other programmes before or while submitting their AFR proposal. This might be due to the very high success rates in the AFR scheme.

- Contact with FNR: Of those who had been in contact with FNR 67% of the PhDs and 59% of the postdocs stated they received good or very good help from FNR. However, 15 % (=26) of the doctoral candidates and 25% (=14) of the postdocs pointed out that they received little or no help. As the qualitative interviews revealed a high level of satisfaction with the information and guidance by FNR we can assume that this finding is in line with the usual degree of dissatisfaction that it is expressed in customers surveys.

Perception of the selection procedure and feedback culture

- Concerning the efficiency of the selection procedures a clear-cut goal was formulated by the FNR Performance Contract of 2008: The turnaround time between the proposal submission deadline and the announcement of selected proposals was fixed at less than 2 months for applications by doctoral candidates and at a maximum of four months for postdocs. Only 25% of the doctoral candidates and 13% of the postdocs thought this goal was reached. In the interviews applicants and supervisors agreed in that they considered the duration of the procedures as too long given the limited availability of other funds. Supervisors regretted that
they had lost promising candidates due to the fact that these had received other attractive job offers or funding opportunities from abroad. Nevertheless, the majority of both groups was satisfied with the duration of the selection procedure or even thought it went faster than they had expected. FNR’s data show that the envisaged average durations of 2 months in the doctoral programme and 4 months in the postdoc programme are more explicitly exceeded in the PhD scheme (2.52 months) as compared to 4.18 months in the postdoc scheme.

- **Selection criteria and feedback**: Applicants of both groups seem to know especially well what to expect from criteria such as 'scientific quality of the research project'. However, PhD applicants are somewhat more uncertain when it comes to criteria such as 'profile of the applicant' and 'quality of the host institution'. For both groups the criterion 'interest of the research project in the Luxembourg R&D setting' seems less tangible. In comparing the applicants' views on the clarity of the selection criteria with their observations regarding the feedback on each of the criteria we notice strong analogies: In general, doctoral candidates find the feedback on the different items less helpful as compared to their colleagues at postdoc level. Both groups feel slightly less comfortable with the 'interest of the research project in the Luxembourg R&D setting' and postdocs kept their reservations regarding the criterion 'potential of the project for career development'. Mandatory and suggested modifications are an inherent part of FNR's feedback to applicants. Overall there seems to be a slightly greater willingness to accept modifications if they are formulated as suggestions rather than as obligations.

- **'Quality of the research project'**: We find a surprising unanimity when it comes to the focus on the research project as substantial part of the proposal and consequently of the review: In our interviews applicants (successful and unsuccessful), host institution representatives as well as the FNR directorate and FNR staff members expressed that the project description was too detailed, given the early stage of the researcher's career. However, whereas FNR staff and directorate highlighted the need to better address the conditions at the respective host institution, representatives of these institutions and supervisors stressed that already too much attention was paid to this aspect. From their point of view such criteria as 'Quality of the host institution' or 'Interest of the research project on the Luxembourg R&D setting' gave the application and the selection procedure a bureaucratic touch.

- **Reporting requirements**: Of the PhDs only 46% are satisfied with the clarity and equally 46% with the appropriateness of the reporting requirements. The percentages are very similar for postdoc grantees: 49% are satisfied with the clarity and 51% with the appropriateness of the reporting requirements. The high rate of grantees that have no opinion on this matter might be explained by the fact that the vast majority received no feedback on their reports. This is the case for 80% of the doctoral grantees and 75% of the postdocs. In those cases where grantees received feedback, most of them were satisfied: Three quarters of the PhD grantees and all of the postdocs.
Reality of AFR grant management

- **Start of the project**: Although the time span between the communication of the funding decision and the start of the project cannot be influenced by the FNR alone, it is important to note how satisfied AFR grantees are in this respect. We find considerable variations between the Calls, but on average the time spans are no longer than two months.

- **FNR's handling of grants**: 86% of the doctoral candidates and a fraction of 75% of the postdocs are satisfied or very satisfied with the support which they receive from FNR. 9% of either group have no opinion on this matter, whereas 5% of the PhD grantees are dissatisfied (only one grantee indicated to be very dissatisfied). Of the postdoc grantees a larger fraction of 17% is somewhat dissatisfied, nobody being very dissatisfied. Thus, grantees in general seem to be very satisfied.

- **European Charter and Code (C&C)**: Even half a decade after the European Commission issued both documents only 20% of the doctoral candidates and 22% of the postdocs are aware of their rights and obligations according to the C&C. Comparably large groups think the C&C have not been implemented at their host institutions. Here we see urgent need for improvement.

3.4 Quality of doctoral education and postdoc qualification in the framework of the AFR programme

Working conditions of AFR beneficiaries

- **Membership of PhD candidates in a structured doctoral programme**: 44% belong to a structured programme, as compared to 45% who do not, 11% had no opinion. If we disaggregate the results according to the location of the host institution we find that a slight majority of the outgoing PhD grantees form part of a structured programme as compared to a slight minority in Luxembourg. Recipients of AFR PhD grants whom we interviewed regretted the lack of structured doctoral schools. What they most explicitly missed was the broadening of their scientific scope despite the fact that their projects generally formed part of a larger project. In this regard being a member of a doctoral school or could have provided them with structured research training in a wider disciplinary or interdisciplinary area.

- **Involvement in a larger research context**: Once more we observe remarkable discrepancies between doctoral candidates and postdocs: 43% of the PhD candidates applied for a project which is part of a larger research endeavour, 52% of the postdocs did so. Despite the fact that a substantial number of beneficiaries are involved in larger research programmes the freedom to design an own project seems to be considerable: 70% of the doctoral candidates and 73% of the postdocs indicated they had been free in developing their own research endeavour. These findings are relativised if we consider statements by applicants and AFR panel members during the interviews: Applicants admitted that in most cases the project already existed. However, they were offered a certain degree of freedom.
in designing their own projects in this framework. AFR panel members were convinced that the projects are usually suggested by the supervisors rather than by the candidates themselves.

- **Satisfaction with working conditions**: Overall postdoc grantees are again more satisfied than PhD beneficiaries. All groups are particularly satisfied with the infrastructure at the host institution, their opportunities to pursue an own project and with the supervision of their research work. This also applies to the ownership of their research results; we offered this answer option only to the postdocs. Beneficiaries of both groups who are based at a host institution in Luxembourg are less satisfied with the lab and the office space which they have at their disposition. The same applies to the quality of the scientific training which they experience. However, they seem to be more pleased with the availability of administrative personnel than their colleagues abroad. Notably, all groups are rather dissatisfied when it comes to the quality of the transferable skills training offered. This deficit seems to be particularly severe for postdocs who work in Luxembourg. Against this background AFR staff and directorate formulated the need to introduce clear requirements to be fulfilled by the respective host institution. This has to be seen in the context of the government's initiative to introduce minimal requirements for HR management in the research institutions in Luxembourg – the CRPs and the university. However, we need to acknowledge that even the best requirements will only show very limited effects without qualified personnel and resources in the respective institutions which are available for HR development.

**Supervision and transferable skills provision**

- **Postdoc qualification**: It is remarkable that only a very limited number of postdocs actually have the opportunity to supervise doctoral candidates or to gain experience in people and budget management, thus, competencies which are undoubtedly important for a further research career. In fact only 30% of the postdocs are in the position to supervise doctoral candidates, 37% gain experience in people and budget management.

- **Reality of supervision**: The frequency of interactions with supervisors and scientific advisors is obviously considerable: 42% of the PhDs are in contact with their supervisors at least once a week or more often, 37% once or twice a month. Contacts between postdocs and their scientific advisors are even more frequent: 70% interact at least once a week, 24% once or twice per month. Both groups are satisfied with the quality of supervision, though, slightly less with the frequency. Surprisingly, the frequencies of supervision are as high in the humanities and the social sciences as in the natural sciences and engineering, but slightly lower in the life sciences. Evidence supports that the common assumption of lower frequency of supervision in the humanities and social sciences is incorrect.

- **Publications**: It is striking that more than half of the beneficiaries in each group did not agree on any specific achievements to be reached during their doctorate or postdoctorate: Only 44% of the PhD grantees did, as compared to 47% of the postdocs. Most doctoral candidates are expected to publish between 1 and 3 pa-
pers, in general in international peer reviewed journals, and to give an equal number of presentations at conferences. At the postdoc level the numbers of envisaged publications are a bit higher (in general up to five), again mostly in international peer reviewed journals.

- **International experience**: On average the duration of envisaged research stays abroad is between 1 and 6 months. Surprisingly, the frequency of presentations at conferences is almost the same as for the doctoral candidates, whereas stays abroad are rather shorter (on average 1 to 2 months) at the postdoc level. Although the results regarding the actual achievements are still very limited we observe that AFR beneficiaries seem to be on the right track when it comes to publications, presentations at conferences and international research stays. Notably, postdocs are more reluctant when it comes to research stays abroad. This might be due to the rather short AFR funding period of two years.

- **Provision of transferable skills**: 61% of the PhD beneficiaries confirmed to receive transferable skills training, but only 44% of the postdocs. This finding clearly indicates that transferable skills provision is seen as an integral part of doctoral education, but not yet as component of continuous professional development throughout a researcher’s career. Only 27% of the postdocs pointed out to benefit from a Human Resources Development Programme at their host institution. Postdocs at non-university research institutions in Luxembourg and their colleagues at universities abroad seem to be somewhat better off in this respect. In the interviews we used the opportunity to ask AFR beneficiaries as well as host institution representatives and supervisors about their respective experience and their expectations regarding transferable skills provision. Both groups agreed that qualification measures for transferable skills were only occasionally offered and lacked consistency. Addressing the issue of who should be responsible for such measures both groups pointed out that they should at best be embedded in structured doctoral programmes. Whereas the applicants were in favour of a more active role of FNR in financing or even organising transferable skills courses, host institution representatives and supervisors advocated assigning the task of carrying out such courses primarily to the Université de la Grande Région.

- **Needs assessment**: For doctoral candidates 'communication' as well as 'project and time management' are the preferred skills which they would like to be trained in. At postdoc level the skills which beneficiaries would wish to achieve are rather similar, but priorities are different: Research management and leadership were seen as most important, followed by ‘grant writing’, ‘communication’ and ‘teaching’. In fact, FNR could use this training needs analysis in order to plan the skills agenda for its beneficiaries.

### 3.5 Messages to FNR and the Ministry

At the end of the questionnaire we provided all doctoral candidates and postdocs who participated in the survey with the opportunity to

- share suggestions with FNR how the AFR scheme could be further improved and
• make additional comments on whatever they felt was necessary.

The number of remarks is very limited and the contents are not always very clear. Quite some respondents used the opportunity to express their satisfaction about the AFR programme and the handling of applications and grants by FNR. The reply "Very happy, thank you!" can be seen as symptomatic in this regard.

Generally we do not find any surprises considering the findings we reported above. This also applies to the interviews where in the end we generally provided the opportunity to make suggestions for AFR programme development. At this stage usually the same suggestions were made which we already reported in the findings above. In addition, within the group of supervisors individual voices advocated to return to more calls for proposals in the AFR scheme. AFR panel members wished a stronger emphasis on quality in the selection even if fewer candidates could be funded.

4. The AFR Programme in an international context

4.1 Trends of research training in the era of globalisation

- **Impact of globalisation on doctoral education**: Globalisation has undoubtedly led to an increase in PhD production. The qualification of doctoral candidates is thereby driven by the expectation of wealth creation, i.e. appropriate returns on investment. Not surprisingly, especially in very successful knowledge-based economies PhD production rates correlate with the national spending on research and development as percentage of the Gross Domestic Product.

- **Doctoral research training in Europe**: Much debate has been going on in the recent years about integrating doctoral education in the Bologna Process. Nowadays consensus has been reached that PhD qualification with its focus on original research needs to be seen as a strong link between the European Research Area and the European Higher Education Area. Important features and quality standards of doctoral education were defined by the EU Member States in the Salzburg Principles which stressed among others that the advancement of knowledge through original research has to be the core of the doctorate, that doctoral education needs to be embedded in institutional strategies and provide skills which qualify for a labour market wider than academia. These principles were recently endorsed by the European University Association's Council on Doctoral Education in its Salzburg II declaration. In addition, it was emphasised that doctoral education needs to remain highly individual and flexible and requires to be performed by autonomous and institutions which are accountable vis-à-vis their funders and society. Any advancement of the doctoral qualification system in Luxembourg should by all means acknowledge and build on the Salzburg principles.

- **Societal relevance of doctoral education**: The League of European Research Universities in its vision of the 'Doctorate Beyond 2010' requests besides the focus on original research to prepare doctoral candidates for driving complex changes
in society and to become intellectual risk-takers. Providers of doctoral education are called upon to foster and enable the mobility of doctoral candidates, both internationally and between sectors, also by providing the necessary skills to be mobile. Of course the LERU recommendations are primarily tailored to the target group of universities, but they also give advice to funding institutions and policymakers on what to look at in discussing forward looking programmes to support doctoral research training. In this sense they are clearly valid for further considerations regarding the advancement of FNR's AFR programme.

- **Provision of transferable skills and career development:** Although the supply of transferable skills is strongly demanded, there had been for a long time uncertainty about what transferable skills provision actually meant and what it should encompass. This was recently solved by the European Science Foundation's Member Organisation Forum on Research Careers which was able to deliver a definition of 'transferable skills in a research context' which was supported by more than 30 research funding and performing institutions all over Europe and is widely acknowledged at European level: "Transferable skills are skills learned in one context (for example research) that are useful in another (for example future employment whether that is in research, business etc). They enable subject- and research related skills to be applied and developed effectively. Transferable skills may be acquired through training or through work experience." ESF's Research Career Forum also worked out a jointly agreed list of transferable skills which can serve as a framework for training needs analyses in the AFR programme. Meanwhile the UK has moved an important step further by introducing the 'Researcher Development Framework' (RDF) and the 'Researcher Development Statement' (RDS) which is derived from it. The Researcher Development Framework is different from the Joint Skills Statement in that it takes a closer look at what is actually needed from a researcher's career development point of view. In the case of Luxembourg should be considered in which way a framework for (research) career development skills could be defined and who should take the responsibility for providing corresponding training measures.

- **Public Private Partnerships and inter-sectoral collaboration in research qualification:** The collaboration of public research institutions and companies in the framework of Public Private Partnerships is immensely boosted by the European Commission in its recent initiative to realise a 'European Innovation Union'. Notably, a common approach concerning the "quality of doctoral training" is the first item which is mentioned in the context of the projected 'European Research Area framework' to be realised from 2012 onwards. In principle, the AFR scheme seems well prepared for the European Innovation Union in that it has envisaged the incorporation of Public Private Partnership right from its start in October 2008. However, as we have seen in our 'customer survey' such Public Private Partnerships are still limited to few exceptional cases and even then still leave a lot to be desired. Thus, we perceive the need for FNR to take into account recent recommendations and guidelines especially by the European University Association and its partner organisations on how to fill inter-sectoral collaborations with life and keep them manageable for all parties involved. This applies especially to a check-
list for collaborative doctoral education which was published by the European University Association in its 2009 report of the DOC-Careers project.

- **Monitoring and quality assurance:** In the future for Luxembourg to be able to measure the impact of such programmes like AFR we see the need for setting up a national monitoring system. It should in any case be able to provide data on doctoral and postdoctoral qualification and related research outputs, to monitor the mobility of researchers of all stages into and out of Luxembourg and between sectors with a special emphasis on doctoral candidates and postdocs and to track the careers of former beneficiaries which had been supported through national R&D and/or additional European funds. Luxembourg may refer to a number of international examples in this respect, especially in Germany, the UK, the US or Brazil. In general flourishing careers are seen as an important indicator of success of research funding schemes. In this sense it will be essential for the AFR scheme to keep track of its alumni's career progression. FNR can build on a number of good practice examples in this respect like the ground-breaking career tracking surveys by the Center for Innovation and Research in Graduate Education at the University of Washington in Seattle.

Of course in-depth discussion is needed to which extent a small country like Luxembourg will be in the position to set up a comprehensive monitoring system of ongoing doctoral qualification and of career paths of all PhDs and postdocs. However, we recommend that the above mentioned examples of existing good practice be studied and used as a ‘tool box’ for developing a quality assurance and monitoring system which is in line with the needs of Luxembourg.

### 4.2 International benchmarking of the AFR scheme

- **National approaches to doctoral education:** Despite the international trend of convergence in doctoral education we recognize a continuing diversity of doctoral programmes around the globe. This is important in view of the different circumstances and needs in the respective countries, given that doctoral education still remains in the realm of the nation-state regardless of increasing inter- and supranational collaborations. In considering the launch of a pilot programme to support structured PhD training within the framework of the AFR scheme especially research training networks as they exist in Finland or Ireland might serve as model for a small country like Luxembourg.

- **Individual vs. structured PhD funding programmes:** In several European countries, at EU level and in Canada there seems to be a clear trend towards structured doctoral programmes. The AFR programme is unique insofar as it is the only nation-wide scheme to support individual doctoral candidates.

- **International benchmarking of AFR features and procedures:** In comparing the current AFR features and procedures with those of similar individual programmes in Canada, Belgium and Ireland we find that the AFR scheme is rather competitive. The admission rates in most other programmes are obviously substantially
lower, whereas the duration of the selection procedures on average – with the exception of Ireland – is considerably longer than in Luxembourg. AFR also seems to be better placed when it comes to the duration of the grant of up to four years as compared to an average duration of 3 three years in most of the other countries. Belgium and Luxembourg offer work contracts while in Canada and Ireland individual stipends still prevail. Besides Luxembourg the Canadian research councils still make use of remote reviews. This practice has been questioned in Luxembourg anyhow and will be changed during the next AFR calls. A detailed comparison of the amount of funding which the AFR programme offers is beyond the scope of this evaluation. However, it can be said that the annual contribution is on the high end of awards on an international scale.

4.3 Postdoc Level European challenges and solutions

- **Predictability of career paths:** Extreme heterogeneity of career steps and confusion about terminology are major factors distracting researchers from a career in the public research sector. This state of disorientation together with relatively low salary levels as compared to the private sector, employment on fixed-term contracts and fierce competition for permanent positions has induced researchers over the past years to either leave the academic or public research sector at all or head for systems, mainly in North America, which still allow for stability. Given these trends it is not surprising that a number of actors in Europe have simultaneously taken the initiative to define taxonomies for research careers with the aim of providing orientation and transparency about this career track. Both the ESF’s Member Organisation Forum on Research Careers and the League of European Research Universities came up with rather similar models of research careers. With respect to Luxembourg we recommend to take these taxonomies as basis for explaining to researchers how the system for career development in research works, which funding opportunities are offered for the respective career stages and what the individual researcher needs to fulfil. In fact, looking at FNR's portfolio we recognise a ‘funding chain’ for research careers which is rather similar if we compare it to the systems of neighbouring countries, such as Belgium, Germany or the Netherlands.

- **Reliability of funding schemes in view of achieving tangible results:** Since the goal of the postdoc stage is to foster geographic, thematic and perhaps also intersectoral mobility two years are a rather short period to acquire the necessary knowledge and skills to conduct a research project and achieve tangible results. Therefore, the funding period of the AFR postdoc grant should be reconsidered taking into account that internationally visible publications which are the "admission ticket" for the next career step usually take more time. Comparable schemes as the DFG’s Individual Grants Programme typically allow for three years funding and sometimes even for new proposals which build on the preceding project.
OVERALL CONCLUSIONS AND RECOMMENDATIONS

I. General principles for advancing the AFR programme

In its current form the AFR programme has a lot of strengths which should be assured:

- Quality-orientation: It supports quality-oriented individualised projects. Funding decisions are taken on the basis of a sophisticated, quality-oriented selection procedure.
- Independence: Beneficiaries have a substantial degree of independence due to having acquired their own salaries. In general they show a high degree of satisfaction with the programme, their host institutions and with the handling by FNR.
- Social security: The AFR programme was one of the first in Europe to offer social security benefits.

This evaluation also revealed shortcomings which should be addressed in the future:

- Individuality: Very often applicants acquired funding not for their individual, but for pre-existing projects which were designed and often written by their supervisors. In this respect the AFR scheme could be seen as “just” another source of funding, all the more if individual beneficiaries were not integrated in a structured institutional context of Human Resource development.
- Selection: The selection procedure including remote reviews and a panel decision developed a high complexity which sometimes led to a time-lag between proposal submission and decision and occasionally to a loss of the candidate. Both for applicants and for reviewers the criterion ‘interest of the research project in the Luxembourg R&D setting’ seemed fuzzy.
- Limitations to independence: The degree of independence which beneficiaries are actually able to achieve depends to a large degree on the respective institutional framework and supervision arrangements which are sometimes unclear or might even be detrimental. In the few cases were Public Private Partnerships are in place beneficiaries’ have faced restrictions due to Intellectual Property Rights (IPR) issues.
- Work contracts: On an international scale work contracts are sometimes difficult to handle.

Conclusions for the advancement of the AFR doctoral programme

The above mentioned strengths and downsides call for a diversification and simplification of the AFR scheme. However, it is important to note that future programme developments, specifically structured programme elements, should in any case cr-
ate a loose framework offering room for abundant bottom up initiatives in order to meet the needs of the respective scientific communities as well as of individuals and institutions.

Yet, the following general principles should at least be taken into account:

- original research as core component of the doctorate and the postdoctorate,
- easy (selection) procedures and thereby increase of efficiency,
- tailor programmes to individual needs,
- provide resources structures to embed the individual qualification in a flexible institutional framework,
- provide transferable skills beneficial to career development inside and outside academia,
- foster the culture of Human Resources development in research institutions and the university,
- integrate future employers and societal stakeholders,
- build bridges between research (training) in universities, non-university research institutions and companies,
- encourage intellectual risk-taking and the creation of new science fields (mode II),
- be open and attractive both to nationals and early career researchers from abroad,
- select excellence,
- implement suitable quality assurance and career tracking mechanisms.
II. Towards a new culture of 'formation de recherche'

1. Research qualification pyramid

In order to address the AFR programme's dual objectives of national research capacity building and of fostering high quality in doctoral education, we suggest the advancement of the current individual funding for doctoral candidates by implementing a 'research qualification pyramid' (figure 1).

Figure 1 Suggested scenario for the advancement of the AFR doctoral funding scheme

We are advocating a gradual programme development which has already started following FNR's decision to include funding for doctoral positions in its CORE programme.

The projected development of the doctoral scheme within AFR should encompass the following elements:

a. Focus on the individual (ongoing): AFR individual incoming grants should primarily be offered to doctoral candidates with specific research topics which do not (yet) form part of larger research projects or programmes. AFR outgoing grants should be kept in order to allow for international mobility of grantees.

Procedural implications:

- Shortening of proposal descriptions: In order to accelerate selection procedures and with respect to the limited research experience of applicants the description
of the envisaged doctoral research project should be limited to a maximum of three pages.

- Host institution commitment: With the aim to guarantee a high degree of commitment and accountability host institutions should be asked to describe the precise conditions which they provide for the qualification of doctoral candidates and postdocs. These should be tailored to the respective applicant's needs. FNR could prepare a model contract to be signed between AFR beneficiaries and their supervisors encompassing e.g. a supervision agreement, an agreement on scientific targets to be reached during the qualification (e.g. publications, presentations at conferences, stays abroad).

- One-step review procedure: For the sake of further increasing the efficiency of the selection procedures for doctoral applicants remote reviews will have to be avoided in the future and be replaced by panel review.

- 'Stipends with a backpack': In view of the difficulties in handling work contracts for outgoing candidates stipends which are supplemented by social security allowances should be offered, including the Luxembourg public pension. The feasibility of this proposal needs to be checked by FNR in collaboration with the Luxembourg Social Security Administration Office.

b. Structured research qualification in all FNR programmes based on AFR principles: In addition to the CORE programme all other FNR funding instruments (ATTRACT, INTER, PEARL) should also be in the position to offer grants to doctoral candidates and postdocs. In order to assure that early career researchers in these programmes experience the same level of quality in research training the AFR principles should be incorporated into the funding regulations of the respective schemes. Thereby, developing a high level research workforce in Luxembourg will become an essential element of FNR's funding portfolio (figure 2).

Figure 2 AFR principles to become an essential element of FNR's programme portfolio
Procedural implications:

- **Host institution commitment:** With the aim to guarantee a high degree of commitment and accountability host institutions are to describe the precise conditions (elucidating the scientific qualification, plans for transferable skills provision and supervision) which they provide for doctoral candidates and postdocs.

- **Quality assurance by FNR:** In an easy procedure the quality of doctoral education as part of proposal assessment has to be assured. A potential involvement of the AFR panel should be envisaged if suitable.

c. **Doctoral research networks (pilot programme to start 2012/2013ff.):** Taking into account experience gained in small countries like Ireland or Finland we favour the launch of collaborative networks for doctoral education. These networks should adhere to the three "I" principle (international, interdisciplinary, intersectoral) and should as a minimal requirement have an international component. In addition, they should be either interdisciplinary or intersectoral or both. In order to allow for a competition of ideas only a 'light' set of criteria should be defined.

Procedural implications:

- For the research institutions in Luxembourg, namely the university and the public research centres, to take ownership of the new scheme the programme features should be jointly worked out.

- The launch of the 1st call for proposals is envisaged at the earliest in 2012.

d. **Promotion of scientific excellence (from 2013 onwards):** The opportunity to introduce AFR Excellence Awards was already depicted in the Règlement grand-ducal of 6 October 2008. We would like to endorse this concept and suggest offering specific support to outstanding doctoral candidates (no more than three per year and AFR funding line) while they achieve their PhD or postdoc. Focus should be on the potential of candidates and their achievements in the starting phase (first or second year) of their doctoral education or postdoctorate. Awardees should be allowed for a first experience of scientific independence, e.g. by receiving an amount of research money at their disposition.

Procedural implications:

- The precise award criteria need further discussion based on an international mapping of comparable schemes.

e. **Institutional block grants (beyond 2014):** Concerning the forthcoming FNR performance contract for 2011-2013, it is considered premature to shift more individual grants towards institutions; it should be envisaged to introduce a pilot project (on PhD research networks) and to draw the conclusions of the experiences gained, in order to decide on the potential options under the next performance contracts beyond 2014.

Depending on the development in the respective institutions, more or less institutional block grants for doctoral positions could be supplied in the next performance beyond 2014 contract, provided that the institutions in question develop a coherent PhD recruitment and qualification strategy. In preparation of this step it will be necessary to work out how objectives, procedures and instruments of Human Resources management in the host institutions could become still more
transparent and customer-oriented. At the same time needs to be checked whether the receiving institutions have the necessary resources for realising a future oriented HR policy for researchers. This requires a consistent policy by the Ministry for Higher Education and Research vis-à-vis the University of Luxembourg and the public research centres, especially with the definition of achievable targets and appropriate quality assurance instruments.

2. Future allocation of PhD grants in FNR’s programmes

In 2010 FNR expects to grant 120-130 new PhD grants. The subsequent projection (table 1) describes how these could be distributed between different FNR programmes, in addition to PhDs funded by institutions over the next years until end 2013:

Table 1 Suggested allocation of annual grants by type of grants

<table>
<thead>
<tr>
<th>Type of grant</th>
<th>Approx. number per annum</th>
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<tbody>
<tr>
<td>AFR Excellence Awards</td>
<td>3</td>
</tr>
<tr>
<td>AFR doctoral research networks</td>
<td>12</td>
</tr>
<tr>
<td>PhDs in FNR’s programmes</td>
<td>40-50</td>
</tr>
<tr>
<td>AFR Individual Grant</td>
<td>60-80</td>
</tr>
<tr>
<td>Outgoing</td>
<td>30-40</td>
</tr>
<tr>
<td>Incoming</td>
<td>30-40</td>
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III. Research career development beyond the doctorate

1. Modification of the AFR postdoc scheme:
   a. In principle, the scheme should keep its focus on funding for individuals with a strong emphasis on quality.
   b. Given the need to come up with decent internationally visible research results the two years duration of the grant seems to be rather short. Hence, possibilities for prolongation of the grant upon application and report should be explored.
   c. However, in those areas where CORE programmes exist, part of the AFR postdoc scheme might be integrated in the CORE Junior scheme.
d. With the aim to allow for more scientific independence all applicants should have the opportunity to ask for suitable amounts of research money in addition to their salaries or stipends, including money to participate in international conferences and to finance stays abroad. Specially earmarked research money should be provided to outstanding AFR postdocs in the framework of the above mentioned AFR Excellence Awards.

e. Given the uncertainty of postdocs concerning their future prospects for a research career in Luxembourg more information on funding and job opportunities after the postdoctorate should be provided. Luxembourg should also consider starting a policy debate on introducing tenure track procedures which adhere to international standards of scientific quality. International examples of good practice should therefore be taken into consideration.

f. Contracts by FNR with the respective host institutions should ensure the scientific independence of beneficiaries and allow them to (co-)supervise doctoral candidates as well as to gain experience in people and budget management.

2. Beyond the AFR scheme

At the level of research institutions in Luxembourg we see the need to provide orientation and to develop opportunities for career advancement. Given the international competition for highly qualified researchers Luxembourg will have to offer reliable career tracks, preferably linked with tenure track offers. Of course any kind of career advancement will have to be based on evaluations of the individual researchers' performance in accordance with international standards of scientific quality.

IV. Issues requiring additional thoughts and discussion

1. Quality assurance

Quality assurance consists of two components: one is the tracking mechanisms that tracks people during and after their studies, the second is the analysis of the quality of outcomes.

a. Quality assurance framework: Before the renewed FNR Performance Contract comes to an end in 2013 a quality assurance framework for research career development should be established. It should in any case be able

- to provide data on doctoral and postdoctoral qualification and related research outputs, but also attrition,
- to monitor the mobility of researchers of all stages into and out of Luxembourg and between sectors with a special emphasis on doctoral candidates and postdocs and
- to track the careers of former beneficiaries which had been supported through national R&D and/or additional European funds.
b. Output measurement: FNR has started working on a database which registers research results of beneficiaries, for instance publications or conference papers. Data have to be stored by grantees whose interest it should be to provide most up-to-date information. By this means reporting requirements could become obsolete.

c. Career tracking: From 2012 onward, the AFR scheme will put a career tracking system into place. It will analyse the career development of former AFR beneficiaries as well as of PhDs who received funding in the framework of FNR projects. We recommend that international practices be considered in establishing a quality assurance framework responding to the needs of Luxembourg.

2. Transferable skills provision and continuous professional development

Considering the provision of transferable skills FNR should discuss in which way the quality of non-scientific training could be improved, taking account of international examples such as the British Vitae® programme. In any case supervisors could be offered training courses in supervision. Career advice to AFR beneficiaries might be offered by AFR alumni as well as by career centres at the respective host institutions.

3. Public Private Partnership (PPP)

a. It might be easier to handle Public Private Partnership in the framework of structured research training programmes which define reliable sets of rules, especially with respect to Intellectual Property Rights.

b. Any policy concerning PPP should build on internationally acknowledged principles and recommendations such as the EUA’s “messages for developing collaborative doctoral programmes”.

4. Information and communication

a. As supervisors and colleagues are obviously crucial in conveying information about the AFR programme and in providing help and guidance in preparing proposals, FNR might develop measures to directly address and instruct these target groups.

b. The suggested measures for programme development should enable the AFR secretariat to spend even more time on providing advice to applicants and grantees and on assuring the quality of the AFR programme.

c. AFR network meetings should be used to regularly inform beneficiaries about relevant European issues, such as the services offered by EURAXESS or the European Charter for Researchers or national topics such as current labour market developments in Luxembourg.
d. FNR might form a working group involving committed grantees to further improve AFR programme information, especially the description of peer review criteria.
1. FIRST AFR EVALUATION: BACKGROUND, AIMS, STEPS, METHODS

1.1 Overall aims, specific objectives and expected outcomes of the evaluation

According to the FNR performance contract with the Government of Luxembourg signed on 28th July 2008 a first evaluation of the AFR scheme has to be carried out in 2010.

In view of the strategic goals and the management objectives of the AFR scheme this evaluation altogether seeks to

- assess the correspondence between the legal framework, the goals as defined in the FNR Performance Contract and the AFR management logframe on the one hand with the reality of the scheme since its launch in 2008 on the other,
- analyse the 'customer satisfaction' by asking for the feedback from both successful and unsuccessful applicants,
- benchmark the AFR programme internationally in comparison with similar schemes by other agencies.

More specifically the AFR evaluation aims to

- achieve better knowledge about the applicant and grantee population in both funding streams: doctoral candidates and postdocs,
- gain insight into the quality of doctoral education and postdoc qualification in the framework of the AFR scheme and
- get a better understanding of the reality of intersectoral public-private research cooperation.

In parallel to the evaluation of the AFR scheme, also in the framework of the FNR Performance Contract with the Government, an evaluation of the FNR management was programmed for 2010, including general aspects of the AFR management and the AFR selection procedure. In line with the aims defined by the terms of reference underlying the overall FNR evaluation this AFR evaluation also seeks to throw light on the following issues:

- How does the FNR convey information on the AFR programme and communicate with the relevant actors, especially applicants, grantees and host institutions?
- In which way could procedures be accelerated with the aim of optimising the current cost-benefit relations?
- How do the different actors involved in the AFR selection procedure contribute to the quality of the funding decisions?
In which way do the different steps of the application and selection procedure influence the quality of the funding decisions?

Beyond the implications for the FNR the present evaluation is focused on the impact of the AFR programme on the quality of doctoral and postdoctoral training and career development as promoted by the scheme. In addition, certain aspects of career development of young researchers will be analysed by the Ministry of Research in the “National Action Plan on Human Resources” and the performance contracts prepared by the Ministry of Research in 2010 with the Luxembourg research institutions concerning the period 2011-2013.

In view of the above mentioned goals of the evaluation this report contains both
- the results of the different evaluation stages (analyses of data and application files, quantitative survey, qualitative interviews) and,
- a set of recommendations referring to the future development of the AFR scheme in the context of advancing doctoral education and research careers of postdocs in the wider framework of the research and development system of Luxembourg.

1.2 Evaluation procedure and survey methodology

The evaluation of the AFR scheme was based on a multi-level mixed method approach and was performed within a timeframe of just nine months:

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>08-03-10</td>
<td>Launch workshop</td>
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<tr>
<td>03/10-06/10</td>
<td>Quantitative evaluation phase</td>
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<tr>
<td>08-07-10</td>
<td>Intermediary workshop</td>
</tr>
<tr>
<td>15-07-10</td>
<td>Submission of Intermediary report</td>
</tr>
<tr>
<td>08/10</td>
<td>Review of report by external experts</td>
</tr>
<tr>
<td>09/10</td>
<td>Qualitative evaluation phase</td>
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<tr>
<td>06-10-10</td>
<td>Final workshop</td>
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<tr>
<td>10/10-11/10</td>
<td>Preparation of final report</td>
</tr>
<tr>
<td>12/10</td>
<td>Review of report by external experts</td>
</tr>
<tr>
<td>15-12-10</td>
<td>Submission of final report</td>
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It encompassed the following steps and methodological approaches:

1. Extensive analyses of documents relevant to the programme (especially the legal texts underlying the scheme) and of selected applicants’ files with the aim to
achieve a comprehensive view of the AFR scheme, its origins, and relevant processes and procedures (calls, peer review, decision-making, management).

2. Data analysis (provision of data by FNR staff): A survey based on existing data generated in the selection process and the administration of fellowships was carried out with the aim to gain information on the profile of applicants (both successful and unsuccessful): e.g. gender, age, nationality, disciplinary background.

3. Quantitative survey based on an online survey tool: The survey addressed all applicants of the 2008 and 2009 calls for proposals. The questionnaire focused primarily on customer satisfaction, namely
   ▪ The applicants’ perception of the AFR scheme and its relevance to their specific stage of qualification (doctoral or postdoctoral) and in the case of unsuccessful applicants: their awareness or use of alternative funding opportunities,
   ▪ Their view on the application and selection procedures, especially with respect to appropriateness and effectiveness,
   ▪ The grantees’ observations regarding their training and research environment for the AFR project at the respective host institutions in Luxembourg or abroad.

In line with the aims of the evaluation the questionnaires to applicants of both funding lines contained the following subsections:
   a. Information regarding the applicants’ background before applying to AFR,
   b. Their experience while preparing the application,
   c. Their views on the selection procedure,
   d. For grantees: the experience they gained in the framework of the AFR scheme.
   e. Basic statistical information regarding gender and age group.

It was our aim to involve the broad expertise of relevant groups of actors who are involved in carrying out the AFR selection procedure and in managing the PhD and Postdoc grants. Thus, in preparing the questionnaire we received very helpful input by FNR staff and Ministry officials, the AFR panel who discussed the questionnaire in their meeting of 8th March, the external experts who supervise the evaluation process (see: paragraph 6 below) and by Mr. Fritz Ohler (Technopolis).

For our survey the questionnaire was sent to 306 doctoral candidates and 125 postdocs on 22 April 2010. The discrepancies with the overall numbers of proposals during the 6 calls (352 for PhD and 134 for postdoc grants) can be explained by the fact that more than 40 PhD applicants resubmitted their proposals after they had failed in earlier calls; the same applies to more than ten of the postdoc applicants. Some applicants resubmitted their proposals even more than once.

Of the 306 doctoral candidates who were invited to participate in our survey 204 had been offered a grant (of which 7 did not accept), 96 had been unsuccessful and 6 withdrew their applications in the course of the selection process. Numbers are comparable for the postdoc group: 87 applicants had been accepted for funding (which
11 refused), 37 proposals had been declined 1 applicant pulled out in the course of the competition.

Until the final deadline of our online questionnaire (18th May 2010, noon) we received 170 questionnaires by doctoral candidates which equates to a response rate of 55% and 56 by postdoctoral applicants, equivalent to a response rate of 44%. Of the doctoral applicants who participated in the survey 27 had resubmitted their proposals, of the postdocs 6 had reapplied.

As we might have expected, the share of successful applicants answering our questionnaire is larger than the rate of successful candidates in the programme in general. 79% (=134) of the 170 doctoral candidates who participated in the survey were successful and 21% (=36) were not. Considering the postdocs in our sample we find that 88% (=49) successfully applied for an AFR grant, whereas 12% (=7) were unsuccessful. Given the very small sample size for unsuccessful postdoc applicants we have to treat any results referring to this group with reservations.

Disaggregated by gender we find a quite well balanced relation in our sample, at least with respect to PhD applicants: 46% (=78) of the doctoral candidates are female which mirrors the application rate of women which is at 45%. However, female applicants in the postdoc group were more likely to reply than their male colleagues: Looking at the overall applicant population for postdoc grants the share of women is 40% as compared to 48% female respondents in our survey (see: figure 3 and 4).

Figure 3 Doctoral candidates, distribution of the survey sample per gender, age group, success of the application and call for proposals

![Diagram](image-url)
4. Interviews: In total nine semi-structured interview rounds were conducted involving 27 persons representing the following groups:

- Three different groups of AFR beneficiaries (PhDs, postdocs, BFR transitions),
- Unsuccessful applicants (PhD & postdoc),
- Supervisors,
- AFR panel members,
- FNR directorate,
- FNR staff,
- Ministry officials.

In the selection of interviewees – specifically beneficiaries, unsuccessful candidates, supervisors, AFR panel members – we paid special attention to achieving an appropriate coverage of disciplines, equal gender distribution, to address persons of Luxembourghish and foreign nationalities, residing in Luxembourg or abroad.

The objectives of the qualitative approach were

- To complement the results of the prior evaluation stages,
- To analyse the performance of the AFR scheme with respect to its initial aims and objectives, as defined in the AFR law and the “exposé des motifs” as well as in the performance contract and the AFR logical framework,
- To identify room for improvement both with regard to the scheme itself and with respect to its processes,
- To gain more profound insight in the research career development system, as supported by AFR, in Luxembourg (taking into account the university, the public research centres and private companies), with the aim to suggest improvements for the AFR programme.

5. The AFR programme in context: The major aims of contextualising the AFR scheme internationally were

- To benchmark the AFR scheme in view of comparable schemes which are offered by other national research funding organisations in Europe and beyond,
- To consider the current development of the qualification system for doctoral candidates and postdocs as supported by AFR in Luxembourg in view of international trends and developments.

For this purpose we analysed relevant international surveys, evaluation reports and selected international research literature. In addition, with the support of FNR staff, we compared the AFR doctoral funding scheme with programmes to support research training at PhD level by research funding organisations in Austria, Belgium, Canada, Finland, Germany, Ireland, the Netherlands, Switzerland, the United Kingdom and at European level with the European Commission’s Marie Curie Initial Training Networks.

6. Involvement of external experts: The evaluation process was supervised by two external experts, Professor Maresi Nerad (director of the Centre for Innovation and Research in Graduate Education at the University of Washington at Seattle), and Mr. Philipp Schimek (director of beraterinnengruppe naschmarkt). The external experts provided feedback and shared suggestions at crucial stages of the evaluation, namely with respect to

- the questionnaires,
- the intermediary report,
- this final report and
- the recommendations for the advancement of the AFR scheme and for the system of research career development in Luxembourg.

7. Workshops: In the course of the evaluation process three workshops took place with the quadruple aim to

- ensure the transparency of each evaluation step,
• involve the expertise of FNR and the Ministry of Culture, Higher Education and Research in the broadest possible sense
• present and discuss the results of each step and
• develop a concept for AFR programme development in view of the renewal of the FNR Performance Contract covering the years 2011 until 2013.

The workshops took place on

• 8 March 2010 as kick off of the AFR evaluation involving FNR representatives, Ministry officials and the members of the AFR panel,
• 8 July 2010 as intermediary workshop to present and discuss the preliminary results and recommendations of the quantitative evaluation stages involving FNR representatives and Ministry officials,
• 6 October 2010 as final workshop to present the results of all evaluation stages and discuss next steps of AFR programme development. It took place in three rounds with Ministry officials and FNR representative at first in separate rounds and eventually in a joint session.
2. THE AFR PROGRAMME

Based on the law of 18 August 2008, the FNR started the AFR (Aides à la Formation Recherche) Grants programme on 1st October 2008. The scheme addresses doctoral candidates and postdocs, irrespective of their nationality. Beneficiaries may carry out their research projects in any thematic field for up to four years (PhD candidates) resp. two years (postdocs) at a host institution of their own choice in Luxembourg or abroad. In the latter case the project needs to be of interest to research and development in Luxembourg. Research may also be performed in collaboration with a private company in Luxembourg.

The AFR programme builds on the former BFR (Bourses de Formation-Recherche) scheme which had been introduced by law of 18 March 1987 and was administered by the Ministry of Higher Education and Research. Unlike the AFR grants the BFR funded stipends without social security coverage. In the absence of a higher education institution which was able to grant doctorates fellows usually went abroad. In this respect a new reality was created through the foundation of the University of Luxembourg in 2003. With success rates of 80% or even more the BFR programme had a major focus on scientific capacity building.

1. AFR legal framework

The most important elements of the current AFR programme are outlined in the legal framework underlying the scheme, specifically the law « Loi du 19 août 2008 sur les Aides à la Formation-Recherche » and the « Règlement grand-ducal du 6 octobre 2008 relatif aux modalités d’attribution, de calcul et de gestion des aides à la formation-recherche », as well as the FNR law « Loi du 31 mai 1999 portant création d’un fonds national de la recherche dans le secteur public ». In addition, the performance contract between the Government and the FNR defines the objectives of the AFR scheme within the portfolio of activities of the FNR and indicates the budget allocated by the Government to the AFR scheme.

A close reading of the respective documents shows that the authors' imaginations of what the programme should be like, went beyond the scheme's present form, especially in terms of quality assurance and of awarding scientific excellence. The texts also reveal the ambiguity of the programme in terms of quantity (i.e. contributing to national capacity building) and quality-orientation.

- Avant-projet de loi of April 2007: In the 'Comment on the articles' doctoral candidates and postdocs are referred to as ‘chercheurs en formation’: "Les étudiants diplômés (« postgraduates ») ayant des activités de R&D sont également considérés comme des chercheurs, dénommés « chercheurs en formation » dans le contexte de la présente loi. Ce sont des titulaires d’un diplôme de premier cycle

2 Cf. [http://wwwde.uni.lu/](http://wwwde.uni.lu/).
universitaire qui font de la recherche dans le cadre d’une formation doctorale ou postdoctorale.”3

In this respect the AFR scheme is in accordance with the so-called Salzburg Principles in which the EU Member States recommend to treat doctoral candidates as ‘early career professionals’. The ‘Exposé des motifs’ stresses the need for building up the national research capacity. In addition, the principles of the selection procedure are laid down: “évaluation ouverte, efficace, transparente, comparable aux normes internationales” and the need for career tracking and quality assurance by means of an output evaluation are highlighted.

- FNR Performance Contract of 28 July 2008: Among other aspects the Performance Contract which is to be renewed for the period 2011 until 2013 defined the turnaround times for the selection of candidates in the AFR programme: 2 months for PhDs and 4 months for postdocs4.

- Law of 19 August 2008: The law specifies the selection criteria which are to be applied in the AFR programme5:
  - scientific quality of the project,
  - potential of the ‘chercheur en formation’ and ability to carry out the project,
  - scientific competence of the host institution,
  - quality of the research and qualification environment,
  - impact and possible applications of the project in the general research context and for the technological development and the innovation of Luxembourg.

- Règlement grand-ducal of 6 October 20086: The Règlement prescribes specific procedural aspects and programme features like the establishment of an evaluation committee for selection of candidates (article 4), the duration of the grants (up to four years funding for doctoral candidates and a maximum of 2 years for postdocs, article 8). It also opens up future programme perspectives: The introduction of merit-based scientific awards to outstanding AFR beneficiaries (article 6).

2. AFR as part of FNR’s portfolio

Annual budget
During its short existence the AFR programme has developed a major importance within FNR’s portfolio and budget (table 2).

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3 Avant-projet de loi relatif aux aides à la formation-recherche, p. 5.
4 Cf. Agreement FNR/CP1-08-10, p. 12.
5 Loi du 19 août 2008 relative aux aides à la formation-recherche, art. 1 (i), 12.
6 Règlement grand-ducal du 6 octobre 2008 relatif aux modalités d’attribution, de calcul et de gestion des aides à la formation-recherche.
Table 2 AFR dedicated annual budget (in €) as compared to the FNR total budget (in €) in 2009 and 2010 (Source: FNR)

<table>
<thead>
<tr>
<th>Year</th>
<th>AFR</th>
<th>FNR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>27,930 m</td>
<td>52,190 m</td>
</tr>
<tr>
<td>2010</td>
<td>19,580 m</td>
<td>53,660 m</td>
</tr>
</tbody>
</table>

The higher AFR budget in 2009 as compared to 2010 can be explained by the fact that the AFR programme had to account for a large number of transitions from the BFR to the AFR scheme. With the expiry of former BFR grants the allocated budget is shrinking. In 2008, the FNR was able to acquire co-funding of the AFR postdoc scheme from the European Commission, under the Marie-Curie Actions of the 7th EU Framework Programme. A substantial sum of 3.1 million EUR was allocated to the AFR scheme for the period 2009 to 2012.

**FNR's Programme structure**

According to its mission statement the "FNR serves all branches of science and the humanities with an emphasis on strategically aligned research domains. [...] With its current funding activities for public research, the FNR pursues a three-fold strategic objective:

- supporting researchers to build up scientific quality and excellence;
- improving Luxembourg’s research environment and institutional framework;
- promoting scientific culture, particularly among the young.”

In its funding paradigm the FNR distinguishes between 'people’ and project funding (figure 5). Some programmes (AFR, ATTRACT and INTER) allow for researcher driven bottom-up proposals, whereas the CORE and the PEARL programme follow a top-down paradigm. In line with its mission the FNR has defined six thematic domains, namely

- Innovation in Services
- Sustainable Resource Management in Luxembourg
- New Functional and Intelligent Materials and Surfaces and New Sensing Applications
- Biomedical Sciences / Regulation of Chronic, Degenerative and Infectious Diseases
- Labour Market, Educational Requirements and Social Protection
- Identities, Diversity and Integration.

These priority areas provide the framework for the CORE research programmes. Also the PEARL programme which is geared at supporting outstanding established researchers who intend to work in Luxembourg aims to strengthen priority areas of research in Luxembourg. With their bottom-up approach both the AFR programme

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and the ATTRACT programme, the latter can be seen as national equivalent to the European Research Council's Starting Independent Researcher Grant, offer utmost flexibility to the individual grantee.

Figure 5 FNR's programme portfolio, distinction between individual vs. project funding and bottom up vs. top down funding

<table>
<thead>
<tr>
<th>Individual Research Funding</th>
<th>Research Project Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom up</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AFR</td>
</tr>
<tr>
<td></td>
<td>ATTRACT</td>
</tr>
<tr>
<td></td>
<td>INTER</td>
</tr>
<tr>
<td>Priority Areas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PEARL</td>
</tr>
<tr>
<td></td>
<td>CORE</td>
</tr>
</tbody>
</table>

3. Review and decision-making procedures under AFR

Basically, the review process in the AFR programme consists of four steps or elements which are displayed under 'Review' in figure 6 below:
Figure 6 AFR grant life-cycle (Source: FNR)

a. Remote review: In the first stage, each project proposal is sent to two remote reviewers who are asked to submit their evaluations by using the “AFR review form”. Table 3 displays the average number of remote reviews per call for proposals. PhD proposals are remotely evaluated by panel members, in addition to external experts. Only in cases where no expertise in the domain of the PhD proposal is available among the panel experts, the PhD proposals are evaluated by two external experts. Over the calls it became obvious, though, that more and more external reviews had to be asked for as the proposals proofed to be rather specialised. Postdoc proposals are evaluated mainly by external experts fitting closely the domain of the research projects, and only exceptionally by the panel
members if their domain of expertise is sufficiently close to the field of the AFR application.

Table 3 Average number of remote reviews per call (Source: FNR)

<table>
<thead>
<tr>
<th></th>
<th>N° of eligible proposals</th>
<th>Remote reviews by panel members</th>
<th>Remote reviews by external experts</th>
<th>Total remote reviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD proposals</td>
<td>57</td>
<td>65</td>
<td>41</td>
<td>106</td>
</tr>
<tr>
<td>Postdoc proposals</td>
<td>24</td>
<td>17</td>
<td>32</td>
<td>49</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>82</td>
<td>73</td>
<td>154</td>
</tr>
</tbody>
</table>

b. Written evaluation synthesis: In the second stage, one of the domain experts of the AFR panel (= in general the panel presenter of the project) summarises the remote reviews in the form of a written evaluation synthesis which is the draft for the panel discussion.

c. AFR panel discussion: The third stage encompasses the meeting of the AFR panel in Luxembourg. Each proposal is presented by a panel member and discussed by the panel, in view of the final funding recommendation. The panel synthesis of each proposal is eventually finalised after the meeting by the panel presenter, taking up the conclusions of the panel discussion, including the funding recommendation.

The AFR panel is nominated annually by the FNR board of administration. It consists of distinguished researchers covering the broad range of scientific domains from the humanities and social sciences, to the natural and technical scientists. Most of the AFR panel members are expatriates from Luxembourg.

d. The funding decision was delegated by the FNR Board of Administration to the FNR secretary general. The panel recommendations were followed without exception during the calls which we examined. PhD and postdoc applicants and their hosts received the notification letter of the FNR funding decision together with the panel synthesis. In the case of PDR proposals, the applicants also received the full remote reviews.

Looking from the outside the selection process seems sophisticated and thorough, but also rather ponderous. Given the complexity of the review and the decision-making procedure it is rather surprising that the targeted duration from proposal submission to information on results is not exceeded by several months, but only by a few weeks or even days.

4. Recent developments in the AFR programme

Since its launch in October 2008 the AFR programme underwent a number of minor procedural adaptations which are normal in the administration of a research funding
scheme. Hence, we would like to mention only two developments as they pinpoint the need for gradual programme advancement of the next few years:

- **Reduction of calls per annum**: The AFR programme took an ambitious start with already two calls for proposals in October and in December 2008. In 2009 four calls were run by FNR. Given the huge efforts which are being made for each individual proposal and, thus, the permanently increasing workload for FNR staff, the decision was taken to limit the number of calls to two from 2010 onwards.

- **Positions in the CORE programme**: In 2010 the opportunity to apply for doctoral and postdoc positions was introduced in the CORE programme. These measures can be seen as reaction to the criticism by applicants, especially in the CORE programme, who until then had only been able to employ doctoral candidates or postdocs who had previously succeeded in the AFR programme. This did not only raise the number of AFR proposals, but often led to a delayed start of the CORE projects which was even worse if the candidate decided against a position in Luxembourg due to the long duration of the procedures.
3. FINDINGS OF THE QUANTITATIVE AND THE QUALITATIVE EVALUATION

3.1 The AFR population

3.1.1 Calls for proposals: overall application and success rates

This survey encompasses six calls for PhD and postdoc grants in the framework of the AFR scheme which FNR conducted during 2008 and 2009. As Table 1 shows, 352 applications were submitted by doctoral candidates, of which 205 were approved for funding. This equates to a success rate of 58%. At the same time FNR received 134 applications for its postdoc scheme, of which 87 were accepted (equivalent to a success rate of 65%).

Table 4 Eligible vs. accepted proposals with allocated budgets and success rates (Source: FNR)

<table>
<thead>
<tr>
<th>AFR PhD Calls</th>
<th>Submission deadline</th>
<th>N of eligible proposals</th>
<th>N of proposals funded</th>
<th>N of Drop-Outs</th>
<th>Committed Budgets</th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call 2008-1:</td>
<td>01.10.2008</td>
<td>49</td>
<td>26</td>
<td>1</td>
<td>2'233'061</td>
<td>53%</td>
</tr>
<tr>
<td>Call 2008-2:</td>
<td>15.12.2008</td>
<td>53</td>
<td>32</td>
<td>3</td>
<td>2'905'863</td>
<td>60%</td>
</tr>
<tr>
<td>Call 2009-1:</td>
<td>15.03.2009</td>
<td>66</td>
<td>41</td>
<td>3</td>
<td>3'353'200</td>
<td>62%</td>
</tr>
<tr>
<td>Call 2009-2:</td>
<td>15.06.2009</td>
<td>55</td>
<td>31</td>
<td>1</td>
<td>2'848'665</td>
<td>56%</td>
</tr>
<tr>
<td>Call 2009-3:</td>
<td>15.09.2009</td>
<td>62</td>
<td>35</td>
<td>2</td>
<td>2'978'652</td>
<td>56%</td>
</tr>
<tr>
<td>Call 2009-4:</td>
<td>15.12.2009</td>
<td>67</td>
<td>40</td>
<td>1</td>
<td>3'775'893</td>
<td>60%</td>
</tr>
<tr>
<td>Total PhD 2008+2009</td>
<td>352</td>
<td>205</td>
<td>8</td>
<td>18'095'334</td>
<td>58%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AFR Post-doc (PDR) calls</th>
<th>Submission deadline</th>
<th>N of eligible proposals</th>
<th>N of proposals funded</th>
<th>N of Drop-Outs</th>
<th>Committed Budgets</th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call 2008-1:</td>
<td>01.10.2008</td>
<td>25</td>
<td>14</td>
<td>1</td>
<td>1'173'002</td>
<td>56%</td>
</tr>
<tr>
<td>Call 2008-2:</td>
<td>15.12.2008</td>
<td>13</td>
<td>7</td>
<td>1</td>
<td>565'600</td>
<td>54%</td>
</tr>
<tr>
<td>Call 2009-1:</td>
<td>15.03.2009</td>
<td>24</td>
<td>14</td>
<td>2</td>
<td>1'057'560</td>
<td>58%</td>
</tr>
<tr>
<td>Call 2009-2:</td>
<td>15.06.2009</td>
<td>29</td>
<td>24</td>
<td>6</td>
<td>1'611'640</td>
<td>83%</td>
</tr>
<tr>
<td>Call 2009-3:</td>
<td>15.09.2009</td>
<td>31</td>
<td>21</td>
<td>1</td>
<td>1'905'367</td>
<td>68%</td>
</tr>
<tr>
<td>Call 2009-4:</td>
<td>15.12.2009</td>
<td>12</td>
<td>7</td>
<td>1</td>
<td>619'416</td>
<td>58%</td>
</tr>
<tr>
<td>Total PDR 2008+2009</td>
<td>134</td>
<td>87</td>
<td>11</td>
<td>6'932'585</td>
<td>65%</td>
<td></td>
</tr>
</tbody>
</table>

| Total PhD & PDR 2008+2009 | 486 | 292 | 19 | 25'027'919 |

As the AFR scheme builds on the preceding BFR (Bourses à la Formation- Recherche) programme the beneficiaries of BFR grants were offered a smooth transition: Their grants were either transferred to the AFR scheme or in case of extension
prolonged under the new conditions. In this respect we had to take into account that a number of survey participants might have gained experience in the framework of the two different schemes. Yet, we found that of the respondents to our survey only 3 doctoral candidates and 1 postdoc had received funding from a BFR doctoral resp. postdoctoral fellowship. However, there seems to be a certain inclination for postdocs who had been BFR fellows beforehand to apply for a postdoc grant under the AFR programme: 21% (=12) of the applicants to the AFR programme had previously received funding from a BFR doctoral fellowship. However, we learn from figure 7 that having been funded by a preceding BFR fellowship was not necessarily a predictor for the success of a later postdoc proposal.

Figure 7 Before applying for the AFR scheme I received funding from a BFR doctoral fellowship, replies in relation to the success in applying for an AFR postdoc grant

3.1.2 Gender balance and success rates

Science policymakers in Europe and beyond seem to be unanimous when it comes to the goal of raising the share of women in the research workforce. It was therefore essential for us to analyse to which extent the AFR scheme succeeds in encouraging applications by women and in how far the application rates correspond to the eventual success rates.

Analysing statistics by gender we see that the AFR scheme seems to be almost equally attractive to men and women, at least at the doctoral level: Over the six calls female applicants submitted 45% (=157) of the proposals for a PhD grant. Of these 87 received a grant which equates to a success rate of 55%. In terms of overall submissions and success rates male applicants seem to be selected at a higher rate than female: Men submitted 55% (=194) of the eligible proposals of which 118 were accepted for funding. This leads to a success rate of 61%. Thus, we can state a difference of 6% between the success rates of female and male applicants. Given the limited numbers of calls which we surveyed it is definitely premature to a gender bias. However, we recommend keeping an eye on the issue of gender disaggregated ap-
plication and admission rates. These should be regularly examined in the context of a future AFR monitoring system.

The data seem to be quite different for postdoctoral applicants. In line with the so-called scissors diagram which documents the increasing drop-out rates of women as they climb higher on the academic ladder, the share of women applying for an AFR postdoc grant is smaller as compared to their share of PhD applications: 39% (=53) of the postdoc applications were submitted by women, 61% (=81) by men. However, women were slightly more successful in receiving grants: 40 women were accepted in the programme as compared to 52 men. Thus, the success rate of women was 75% as compared to 64% of their male colleagues. Considering the ongoing AFR grants which are displayed in figure 8 the distribution is more balanced:

Figure 8 Distribution of ongoing PhD and postdoc grants per gender (Source: FNR)

Again these developments should be carefully monitored over time in order to explore whether a specific trend can be identified.

3.1.3 Who are they and which background do they have?

A recent report by the European Science Foundation’s Member Organisation Forum on ‘Research Careers in Europe – Landscape & Horizons’ stipulates that research careers in Europe nowadays tend be less path-dependent than they used to be “and to develop more and more into ‘portfolio careers’. In consequence, the traditional career pipeline model is increasingly replaced by the model of a ‘career tree’. It symbolises the decreasing linearity of career paths which is accompanied by the trend to combine several part-time roles building up to one full-time role, e.g. by working part-
time in different fields of employment."\(^8\) This statement suggests that researchers might achieve qualifications, such as doctoral degrees, at later stages of their careers or decide for a postdoc after having gained considerable working experience, e.g. outside academia.

**Age**

Against this background information on the applicants' age distribution, on the time span between the last degree and the proposal submission, and on the professional experience they had gained prior to applying for an AFR grant could help to throw light on these questions: At the time of submitting their first application 72% of the doctoral candidates were younger than 30 years of age and 21% belonged to the age group 30 to 34, 5% to the age group 35 to 39 and 2% were older than 39. The majority of the postdocs (52%) belonged to the age group 30 to 34, 29% were younger, 13% belonged to the age group 35 to 39 and 7% were between 40 and 44 years old (see: figure 9 and 10). Thus, AFR applicants are still rather young; although about 20% decided for a doctorate or a postdoctorate at a slightly more advanced age.

Figure 9 Doctoral candidates, distribution per age group, gender, success of the application and call for proposals

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\(^{8}\) Cf. Scholz, Beate; Vuorio, Eero; Matuschek, Susanne; Cameron, Iain: Research Careers in Europe – Landscape and Horizons. Report by the ESF Member Organisation Forum on Research Careers, Strasbourg 2010, p. 12.
Although the age group of applicants may be seen as an indicator of their straightforwardness in achieving the next research career step, the time span between the last degree (graduation or doctorate) may be even more illustrative in this respect. In matching the date of the last university degree with the call in which they originally submitted their proposal, we found that the majority of either group had applied no more than two years after they had graduated or completed their doctorate. This underlines the previous finding that until now only a comparably small fraction of AFR applicants and beneficiaries pursue a less linear career.

**Work experience**

Even if the majority of AFR applicants seem to be very straightforward in developing their careers, this is not to say that they have limited their activities to their academic qualification: Two thirds of the doctoral candidates and 73% of the postdocs have gained work experience before they started, while they were studying, after they completed their studies, and in case of postdocs during or after their doctorate. Figures 11 to 14 below display the sectors in which they gained work experience taking into account the respective phase of the academic qualification and the duration of the work experience depending on the respective qualification phase.

Notably, for the majority of both groups the public research sector is the dominant field. For the doctoral candidates the private non-research sector plays an important role. It can be assumed that the work experience in this field refers primarily to jobs in the service sector which to many is an important source of income to fund their undergraduate degrees. With respect to the postdocs we find that 78% of the AFR
grantees carry out their first postdoc, whereas 22% of the applicants have already gained postdoc experience before. For 82% of those the postdoc under the AFR programme is their second, and for 18% it is their third postdoc.

Figure 11 Doctoral candidates, phase and sector of work experience

Figure 12 Doctoral candidates, duration of work experience

Figure 13 Postdocs, phase and sector of work experience
Besides the age group, gender and work experience the disciplinary background of applicants is also important to be looked at, when it comes to analysing the target groups which the AFR scheme attracts. Figure 15 provides evidence of the science fields in which applicants achieved their respective last degrees. The AFR programme seems to be especially attractive for doctoral candidates who achieved a degree in the social sciences or economics (SH1, SH2) and to graduates from computer science and informatics (PE6). For postdocs we find a more balanced picture when it comes to the scientific area of the doctorates. Besides doctoral degrees in social sciences and economics (SH1, SH, SH3), several postdoc applicants completed their doctorates in computer science and informatics (PE6) and in the life sciences (LS1). It might be due to the smaller sample size that the spread of disciplines is more balanced than for the doctoral candidates. In addition, we have to acknowledge that doing a postdoc seems to be less common in the humanities as compared to other fields of research.
Figure 15 Research area in which applicants achieved their last degree
3.1.4 Why do they want to achieve a doctorate or do a postdoc?

As we can see from figure 16 intrinsic motivations prevail when it comes to the decision for a doctorate or a postdoc qualification: Interest in research in general and in a specific field are the leading motivations for both PhDs and postdocs, followed by the wish for personal development. To the postdoc applicants the motivations named next in the ranking (improving my opportunities at the labour market, intention to stay in academia, requirement for aspired profession) are more important than to their more junior colleagues. Notably, both groups indicated they had close to no higher income expectation in future employment. Intentions to start an own business or the absence of other job opportunities almost played no role for their decision.

These findings are remarkable in the light of other national surveys where the interest in finding a job seems to be the prime motivation for achieving a doctorate, followed by the interest in the field. A large-scale survey by Maresi Nerad et al. on career tracks of social sciences PhDs, for instance, underlines: “Graduates of social science PhD programs began doctoral education hoping to combine a passion for knowledge with the earning of a ‘bread-winning degree.’ Motivations for getting a PhD most often stated were ‘intense interest in the field’ and because a PhD ‘was a necessary credential for my desired position’.”

Figure 16 To which extent were the following reasons important for your decision to carry out a PhD or to do a postdoc? Scale from -2 to +2 (average values)

9 Cf. Nerad, Maresi; Rudd, Elizabeth; Morrison, Emory; Picciano, Joseph: Social Science PhDs. Five+ Years Out. A National Survey of PhDs in Six Fields, Center for Innovation and Research in Higher Education, Seattle 2008, p. 11.
3.1.5 Mobility: Where did they come from and where did they go to?

*International mobility*

Indicators of international mobility which we applied in this survey are: the country where applicants achieved their last degree and the location of the respective host institution. We did not ask for the applicants' nationalities in order to guarantee the anonymity of the exercise. However, we could make use of FNR’s aggregated data in this respect.

It is not surprising that the neighbouring countries, above all France and Germany, play an important role when it comes to applicants’ nationalities other than Luxembourgeois, to countries where the last degree was achieved and to the location of the host institution. With regard to the country where the last degree was made Luxembourg only plays a minor role. This is due to the fact that the University of Luxembourg was only founded in 2003 and has not yet qualified a high number of graduates or a significant number of PhDs, given that doctoral education has started only recently. All in all in terms of nationalities and countries of last degrees we find that the AFR programme seems to have a substantial international component with a strong focus on Europe. Figure 17 and 18 illustrate the moves of AFR applicants, based on a comparison between the country where they achieved their last degree and the location of the host institution which they applied for. In comparing both figures it is also remarkable that France seems to be the preferred country to achieve a doctorate, whereas Germany seems to more attractive to undergraduates.

Figure 17 Doctoral applicants, country of last degree in view of the location of the aspired host institution in Luxembourg or abroad
Looking at nationalities (figure 19) we find that Luxembourgish citizens represent the dominant group at doctoral level and the second largest group at postdoc level. Again we observe a strong representation of the neighbouring countries with German citizens as the second and French citizens as the third large group. Notably, at postdoc level French citizens outnumber even citizens from Luxembourg, followed by Germans at the third rank. Not counting Luxembourgish citizens we find 11 nationalities represented in the PhD programme and 14 in the postdoc programme.
As we can see from figure 20 below the majority of AFR grantees indeed decided to move to or stay in Luxembourg. This finding is also underlined by our sample: Of those who indicated the location of their envisaged host institution, 89 of the doctoral applicants and 33 of the postdocs submitted their proposal for an institution in Luxembourg, 50 resp. 14 aimed at going abroad. If we look at the total numbers of funded PhD and postdoc proposals we find that the University of Luxembourg is the major beneficiary of the AFR scheme: It accumulates 74 doctoral and 41 postdoc grants. Thereby, it even outweighs the total number of outgoing grantees: 65 doctoral candidates and 19 postdocs. When it comes to preferred non-university host institutions in Luxembourg the CRP Henri Tudor is in the lead both with respect to PhD and postdoc grants.
The results underline that FNR, in conducting individual calls for proposals in both funding lines, partly seems to take over the role of the University in terms of recruiting personnel at doctoral level. Hence, further discussion is required to which extent a national funding organisation like FNR should be bothered with tasks of this kind, especially at the level of doctoral applicants. Would it not be more efficient in view of the cost-benefit relation to leave such tasks primarily with the host institutions in Luxembourg, e.g. by providing research training networks and regularly monitoring the success of these measures?

**Intersectoral cooperation**

With respect to mobility we did not only focus on international, but also on intersectoral and interdisciplinary mobility. The creation of Public Private Partnerships is one of the envisaged goals of the AFR scheme. Thus, it is important to analyse to which extent the cooperation with companies really plays a role. Statistics provided by FNR show that only 17 doctoral candidates applied for a project in the framework of a Public Private Partnership, of which 12 grants were funded. In our survey 14 respondents at doctoral level, but only 1 postdoc indicated they had applied for a joint project with a company. Of those who got funded 9 PhD grantees indicated to be satisfied with the cooperation, 2 are not. The only postdoc who is involved in a public private cooperation underlined to be satisfied with this kind of collaboration. In the interviews we received feedback that AFR beneficiaries who worked in collaboration with companies suffered from the lack of clear rules, especially concerning intellec-
tual property rights (IPR). These findings lead us to the conclusion that Public Private Partnerships might be better embedded in structured doctoral programmes which would also allow for collaborations with companies and that any kind of cooperation should be based on mutually agreed standards for research in Public Private Partnerships which should be signed FNR and bodies like LUXINNOVATION.

‘Thematic mobility’
It was especially challenging to study if AFR applicants were thematically mobile in the sense that they switched the disciplinary areas of their proposals as compared to the field in which they had achieved their respective last degrees. For this purpose we compared the disciplinary areas of the last degree with the fields in which applicants successfully applied for grants: Of the PhD beneficiaries 28 indicated to have changed their fields of research, at postdoc level only 5 moved between disciplines. However, most of these moves occurred within the same broad scientific area, e.g. within the Humanities and Social Sciences. Indeed some of the doctoral candidates were more 'adventurous' in this respect in that they switched to a different field of re-search (see: table 5). However, for postdocs it might make good sense to remain in their field of expertise in order to be recognised by the respective scientific commu-nity.

Table 5 Doctoral candidates, moves between disciplinary areas

<table>
<thead>
<tr>
<th>Disciplinary area of degree</th>
<th>Disciplinary area of proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS8 Evolutionary, population and environmental biology</td>
<td>PE1 Mathematical foundations</td>
</tr>
<tr>
<td>LS9 Applied life sciences and biotechnology</td>
<td>PE8 Products and process engineering</td>
</tr>
<tr>
<td>SH1 Individuals, institutions and markets</td>
<td>LS2 Genetics, Genomics, Bioinformatics and Systems Biology</td>
</tr>
<tr>
<td>SH2 Institutions, values, beliefs and behaviour</td>
<td>PE6 Computer science and informatics</td>
</tr>
<tr>
<td>SH4 The Human Mind and its complexity</td>
<td>LS7 Diagnostic tools, therapies and public health</td>
</tr>
<tr>
<td>SH4 The Human Mind and its complexity</td>
<td>PE8 Products and process engineering</td>
</tr>
<tr>
<td>SH4 The Human Mind and its complexity</td>
<td>PE7 Systems and communication engineering</td>
</tr>
<tr>
<td>PE4 Physical and Analytical Chemical sciences</td>
<td>LS9 Applied life sciences and biotechnology</td>
</tr>
</tbody>
</table>

Figure 21 illustrates the disciplinary area in which doctoral candidates and postdocs achieved their respective last degrees as compared to the fields in which the grant was offered. Overall, we find a strong representation of the Humanities and Social Sciences, especially in the fields 'Individuals, institutions and markets', 'Computer science and informatics', 'Materials and Synthesis' and 'Institutions, Values, Beliefs and Behaviour'. This is not surprising, taking into account the University of Luxembourg's focus on a limited range of disciplines and the CRPs' respective scopes. Undoubtedly, a substantial number of projects fit in CORE thematic domains, e.g. 'Inno-
vation in Services', 'New Functional and Intelligent Materials' or 'Identities, Diversity and Integration'.

Figure 21 AFR Doctoral and postdoctoral beneficiaries, disciplinary area of grants
3.1.6 Does the AFR programme attract the right candidates?

Of course this question can only be answered in the light of the results which the grantees are able to achieve and also in view of their later career development. For a programme which has been started not even two years ago it is definitely too early to evaluate mid- or long-term impacts. In order to study long-term results continuous monitoring of achievements and career paths is required. The very high success rates suggest that the programme is rather inclusive than exclusive. However, we need to acknowledge that this is clearly in line with the AFR law.

In this regard we found diverging opinions between the Ministry of Higher Education and Research on the one side and the FNR directorate and more explicitly members of the AFR panel on the other side during our qualitative survey:

- In the interviews ministry representatives stressed the character of AFR as a nationwide programme, addressing potentially all incoming and outgoing doctoral candidates and postdocs. High success rates were not seen necessarily in contradiction to quality, if there was a broad basis of good proposals as funding scheme for individuals. AFR was considered in line with other individual FNR funding schemes like ATTRACT or PEARL.

- The FNR directorate and staff members argued for a clearer statement in favour of quality and saw the need to define measurable qualification targets. The AFR programme should not be viewed as just an additional budget contribution for the respective host institutions in Luxembourg and abroad.

- According to AFR Panel members the primary objective of the AFR programme should be to attract excellence to Luxembourg and to offer funding opportunities to especially qualified early career researchers who are citizens of Luxembourg. For this reason more attention should be paid to the quality of the respective candidates. Panel members advocated that supervisors should generally allow only very promising candidates to go for a doctorate.

If the broadness of the scheme is still appropriate in 2010 was a focal point of our discussions with the different stakeholders when we presented the evaluation results. In the light of these discussions the model of the 'research qualification pyramid' which we suggest in the chapter 'Overall conclusions and recommendations' builds both on quality and quantity. We are convinced that by carefully restructuring the AFR programme and through continuous quality-oriented selection the basis of high-quality research in Luxembourg can be broadened and the outstanding be highlighted.
3.2 Quality of the scheme: overall customer satisfaction

3.2.1 Why do doctoral candidates and postdocs apply for an AFR grant?

We asked the survey participants to describe why they chose to apply for an AFR grant. Thereby, we intended to find out which are the main attractions of the AFR programme. Figure 22 illustrates that the main motivation of both doctoral candidates and postdocs lies in the opportunity to freely design their research project. The encouragement by supervisors comes second, whereas the level of funding is still rather important, but only ranks third in the priorities of the applicants. This prioritisation underlines that the scheme obviously succeeds in addressing early career researchers with a strong commitment to the contents of their research. It is in line with the finding in the previous chapter concerning the applicants' strong interest in research as major driving force for achieving a PhD or doing a postdoc.

Figure 22 Ranked list of motivations by doctoral candidates and postdocs to apply for an AFR grant (multiple answers were allowed)

Our interviews confirmed these findings at least from the applicants' point of view: The different groups of applicants whom we interviewed – AFR beneficiaries, unsuccessful applicants, BFR beneficiaries whose grants were transferred to the AFR programme – agreed that the following features were the main attractors of the scheme:
the guaranteed level of autonomy and independence,
the focus on research.
Notably, the group of host institution representatives underlined that social security benefits and the job security for three to four years in the case of doctoral candidates and two years in the case of postdocs were the major advantages of AFR. Indeed, as precarious working conditions especially at PhD and postdoc level seem to prevail in many European countries, the opportunity to offer reliability and social security can be seen as specific advantage of the Luxembourg location.

3.2.2 Salary levels and social security

Although the applicants did not name the level of funding as primary motivation to apply for an AFR grant, salary levels and working conditions clearly have a major impact on the overall satisfaction of grantees. The AFR scheme was indeed one of the first in Europe to offer work contracts to doctoral candidates and postdocs. It was therefore referred to as example of good practice by the European Science Foundation’s Report on ‘Research Careers in Europe – Landscape and Horizons’.10

Indeed, for more than 80% of doctoral candidates and postdocs the AFR grant is based on a work contract. The fraction of postdocs holding a work contract (89%) is slightly higher than the fraction of doctoral candidates (82%). It is not surprising that with the progression of a researcher’s career social security issues tend get more relevant. Data provided by FNR show that the vast majority of AFR beneficiaries work on contract basis, whereas the fellowship is still the preferred funding opportunity for a stay abroad. This insight is not new and applies to other mobility schemes, too.

FNR staff and FNR directorate pointed to a difficulty which they encountered in offering work contracts to beneficiaries: It turned out that the provision of work contracts created a lot of problems with the labour laws of the respective host countries. Consequently, in such cases FNR has chosen to offer stipends with an additional coverage for health insurance. However, this social security package does not include provisions for a pension scheme. In the future should be explored to which extent such provisions could be included. We may expect that the introduction of a ‘Pan-European Pension Fund for Researchers’ as envisaged by the European Commission will be beneficial in this respect.11

Given the overall very favourable social conditions it is not astonishing that 81% of the doctoral candidates and 79% of the postdocs are convinced that in terms of budget and programme the conditions the AFR programme is superior to comparable schemes. It is important to note that only 1% (2 replies) of the doctoral candidates

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and 6% of the postdocs (3 replies) think the conditions are better in other schemes, whereas 18% of the PhD grantees and 15% of the Postdoc grantees marked they had no opinion on this matter.

3.2.3 Overall conditions as compared to other docs or postdocs internationally

Although the general conditions of the doctorate or the postdoctorate depend to a large extent on such factors as the situation at the respective host institution, the quality of supervision or scientific collaborations, the satisfaction of beneficiaries with their qualification in general may also be seen as an indicator of the AFR programme's impact. Here again we find that the overall satisfaction of AFR grantees is very high if they compare the quality of their qualification internationally with other doctoral candidates or postdocs. However, we have to acknowledge that their possibilities for comparison might be rather limited. PhD grantees even seem to be slightly more satisfied with their qualification than their postdoc colleagues: 78% of the doctoral candidates and 73% of the postdocs find their conditions better or far better, whereas 8% of the PhD candidates and 9% of the postdocs find them worse and 14% resp. 18% stated that they did not know.

Figures 23 and 24 display the perceptions by AFR PhD and postdoc beneficiaries, broken down by type and location of their respective host institutions. Overall we find a large degree of satisfaction by AFR grantees when they compare their situation to their colleagues internationally. This applies both to beneficiaries at a host institution in Luxembourg or abroad.

Figure 23 In general, if you compare the quality of your doctoral training internationally with other doctoral candidates, how do you consider your situation? Scale from -- (far worse) to ++ (far better)
Figure 24: In general, if you compare the conditions of your postdoc internationally with those of other postdocs, how do you consider your situation? Scale from -- (far worse) to ++ (far better).

3.2.4 Career expectations and job aspirations

Certainly, this survey cannot yet answer the question whether the majority of AFR alumni will pursue successful research careers. This should be the focus of later career tracking surveys. But, already now we find indications that the programme is on its way to fulfill some of the expectations as formulated by the 'Avant-projet de règlement grand-ducal': "L'instrument des aides à la formation-recherche est ainsi censé fournir une motivation supplémentaire pour les jeunes gens de se décider à l'issue de leur formation universitaire de base pour une carrière scientifique."

In fact, AFR grantees are very optimistic about their future career prospects, especially when it comes to their opportunities for a research career (see figure 25): 86% of the doctoral candidates believe that their opportunities for a research career are excellent (36%) or good (50%). Postdocs are even more optimistic about their research career prospects: 93% think their opportunities are excellent (36%) or good (57%).

The degree of optimism regarding their opportunities for a non-research career is still very remarkable at the PhD level: 70% of the PhD grantees are convinced they have good or excellent opportunities. In contrast, only 29% of the postdocs think their opportunities for a career outside research are good or excellent, 36% are doubtful and

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12 Cf. Avant-projet de règlement grand-ducal arrêtant les modalités relatives à l'attribution, la gestion et le suivi d'aides à la formation-recherche par le Fonds national de la Recherche, p. 6.
an equally strong fraction of 36% has no opinion on this matter. As figure 25 shows both groups share the view that their career opportunities in both categories might be better abroad than in Luxembourg.

Figure 25 How do you think are your career opportunities beyond the AFR grant? Replies by PhD and postdoc grantees taking into the account the location of the beneficiary's host institution (scale from -2 to +2, average values)

All groups seem to be slightly more sceptical about their career opportunities in Luxembourg than abroad. In order to understand whether career expectations vary depending on the location of the host institution we disaggregated the data accordingly. As a general trend AFR beneficiaries who already stay abroad seemed to be more optimistic about their career opportunities abroad, although we find only minor variations when it comes to a research career in Luxembourg. In addition, postdocs in Luxembourg were particularly doubtful with respect to a career outside research, all the more when they thought of a career in Luxembourg.

Through our interviews we were in the position to throw more light on these findings. AFR applicants and AFR panel members (all of whom worked abroad) agreed in that they considered a career in Luxembourg was a 'dead end', especially when it comes to a career in research and academia. When asked why they believed so all were convinced that this was due to the lack of permanent positions for researchers in the university and the public research institutions. AFR panel members even argued that FNR should be enabled to fund tenured positions in order to achieve a high quality impact on research capacity building in Luxembourg. In the first place this finding shows us that clearly more needs to be done to raise the awareness of researchers of all stages concerning the actual prospects for a research career in Luxembourg. Secondly, these findings point to the need to further discuss if and in which way start up finding for new tenured position could be provided, thereby considering the quality of the individual researcher and the potential of their research for the advancement of
R&D in Luxembourg. FNR's ATTRACT programme is certainly a step in the right direction, but by granting one or two applicants annually it will only have limited impact.

Finally, we intended to throw light on the job aspirations of postdoc grantees (figure 26). Again we find a strong inclination to a research career, especially a career in academia. Even if the previous figure 25 has emphasised a certain degree of scepticism about the opportunities for a career in Luxembourg we see a major fraction of both groups – postdocs in Luxembourg or abroad – who would prefer continuing their research career in Luxembourg. This also applies to the option of a research career at a non-university research institution in Luxembourg.

Figure 26 Which career objective do you currently aspire to most? Replies by AFR postdoc beneficiaries taking into the account the location of the beneficiary's host institution

<table>
<thead>
<tr>
<th>Research career in a public or private university</th>
<th>Research career in academia</th>
<th>Research career in a company</th>
<th>Research position in a public institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abroad</td>
<td>4</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>In Luxembourg</td>
<td>15</td>
<td>9</td>
<td>6</td>
</tr>
</tbody>
</table>

We find a similar distribution between aspirations to a non-university research career in Luxembourg or abroad. Notably, those 28 respondents who aim at a career in a non-university research institution predominantly wish to stay in Luxembourg. This is true for 60% (=17), whereas 40% (=11) intend to go abroad. Again we find comparable results for aspirations to a non-research career in a company. Bearing in mind that numbers are very small, 71% (=5) prefer to stay in Luxembourg as compared to 29% (=2) who want to leave the country. Overall we see that even if the expectations...
regarding career opportunities in Luxembourg are somewhat more pessimistic, the wish to stay is rather strong.

Accordingly, 49% of the AFR postdoc beneficiaries confirmed their intention to stay in Luxembourg, 6% denied this and 45% stated they did not know. There is obviously a strong need for the research system in Luxembourg to inform about career opportunities and demands, but also to depict visions for the future and potential for development of the R&D system. Of course policy makers should not underestimate the 'windchill factor', meaning that researchers' perceptions of career opportunities do not always fit with the realities. It is thus all the more important to be in constant dialogue with the research communities in order to allow for a forward looking atmosphere.
3.3 Quality of AFR procedures, decisions and administration of grants

3.3.1 Applicants’ information and awareness about AFR and other funding opportunities

The ability of a scheme to reach the right target group depends to a large extent on the channels through which programme information is conveyed. In this regard it was important for us to learn how applicants found out about the AFR scheme and if they were aware of alternatives.

As table 6 below illustrates that the applicants’ scientific environment is still a primary source of information. For both groups supervisors still play a central role in alerting their “apprentices”. The information by colleagues seems to be equally important as the AFR website. Other sources of information, especially the EURAXESS website, do not play a role. The latter is surprising as we would expect the web 2.0 generation to make use of such tools. However, this finding also pinpoints the need for the EURAXESS national contact points to make themselves and their offer better known to the respective target groups.

In our analysis we related the sources of information about the AFR programme to the location of the respective host institutions (see: table 6). Although the variations are not very large we could find that the communication via the supervisors seems to be particularly relevant to the candidates who chose a host institution in Luxembourg. This finding may well hint to an opportunity to further raise FNR efficiency by systematically providing programme information to potential supervisors who could then act as multipliers.

Table 6 Sources of information about AFR related to the location of the host institution: “How did you learn about the AFR scheme?” (multiple answers were allowed, top ten results)

<table>
<thead>
<tr>
<th>PhDs</th>
<th>Abroad</th>
<th>Luxembourg</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>From supervisor(s)/scientific contact(s) involved in the proposal</td>
<td>12</td>
<td>53</td>
<td>65</td>
</tr>
<tr>
<td>From colleagues</td>
<td>10</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>On the AFR or FNR website</td>
<td>10</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>From colleagues, From supervisor(s)/scientific contact(s) involved in the proposal</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>On the AFR or FNR website, From colleagues, From supervisor(s)/scientific contact(s) involved in the proposal</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>On the AFR or FNR website, From supervisor(s)/scientific contact(s) involved in the proposal</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Advertisement in the media, On the AFR or FNR website</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>On the AFR or FNR website, I saw the call for proposals</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>On the AFR or FNR website, I saw the call for proposals, From colleagues</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>On the AFR or FNR website, I saw the call for proposals, From colleagues, From supervisor(s)/scientific contact(s) involved in the proposal</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Postdocs</td>
<td>Abroad</td>
<td>Luxembourg</td>
<td>Total</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------</td>
<td>------------</td>
<td>-------</td>
</tr>
<tr>
<td>From supervisor(s)/scientific contact(s) involved in the proposal</td>
<td>2</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>On the AFR or FNR website</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>From colleagues</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>From colleagues, From supervisor(s)/scientific contact(s) involved in the proposal</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>On the AFR or FNR website, From colleagues</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>On the AFR or FNR website, From supervisor(s)/scientific contact(s) involved in the proposal</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I saw the call for proposals</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>At an information event, On the AFR or FNR website</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>On the AFR or FNR website, I saw the call for proposals, From supervisor(s)/scientific contact(s) involved in the proposal</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>On the AFR or FNR website, From colleagues, From supervisor(s)/scientific contact(s) involved in the proposal</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I searched the EURAXESS database</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Given the strong position of supervisors and colleagues this may also help to explain the limited awareness of doctoral candidates and postdocs about alternative funding schemes: Only 50% of the applicants for PhD grants and 43% of postdoc grant applicants indicated they were aware of other funding offers. Even less used the opportunity to apply to other programmes before or while submitting their AFR proposal: 20% of the doctoral candidates and 32% of the postdocs tried other applications. We looked at variations between successful and unsuccessful applicants, but could not find major differences. However, the strong reliance on submitting an application solely to the AFR scheme may also be explained by the programme’s high success rates.

3.3.2 On the way of preparing an AFR proposal

At this stage we wanted to inquire how satisfied applicants were with the available programme information and how they valued the advice which they received in preparing their proposals.

Figure 27 presents the average values for each of the answer options on a scale from -2 to +2. It is obvious that both groups find the AFR programme information very helpful with the guidelines for applicants in the lead. In our interviews, too, both successful and unsuccessful applicants pointed out they found the information and requirements clear and understandable. As we can see from figure 27 the degree of satisfaction is slightly lower when it comes to the AFR website, the application form and even more to the review guidelines and forms. Regarding the application form applicants especially criticised the clarity of the questions. Uncertainties about the criteria which are applied in the review process also become obvious when it comes to the applicants’ judgement on the selection procedures. These issues will be addressed in a separate paragraph. Overall we can find that uncertainties seem to diminish in correlation with the applicants’ degree of research experience. In brief: Postdocs seem to know better what to expect.
Again the role of supervisors is particularly valued when it comes to providing advice to applicants in preparing their proposals. Almost equally important is the advice by FNR which is especially asked for by applicants who chose a host institution abroad (see: figure 28).

Figure 28 Frequency of contacts with FNR in preparing the AFR proposal

Overall about 67% of the doctoral candidates as compared to smaller fraction of 58% of the postdocs had been in touch with FNR staff before submitting their proposals. Of those who had been in contact with FNR 67% of the PhD and 59% stated they
received good or very good help from FNR. As might be expected in a customer satisfaction survey 15% (=26) of the doctoral candidates and a 25% (=14) of the postdocs pointed out that they received little or no help from FNR. A fraction of 18% at PhD and 16% at postdoc level emphasised that they had no opinion.

In differentiating the answers by dissatisfied applicants between successful and unsuccessful candidates (see: figure 29) we did not find much difference between the two groups. Bearing in mind the very limited total numbers, there seems to be no obvious negative bias of unsuccessful applicants. Interestingly, in the interviews both successful and unsuccessful applicants praised the support they had received from FNR. This finding proofs the high level of subjectivity which comes into play when users are asked if they find the support by an institution sufficient. Results of this kind should therefore generally considered with reservations.

Figure 29 Critical views on advice provided by FNR, differentiation of successful and unsuccessful applicants

On its way to making the European Research Area happen the European Commission has set up the EURAXESS information portal together with a network of national EURAXESS service centres. Our findings show that these offers, however, do not seem to be well known to the envisaged users as yet. In line with our results regarding the limited awareness of EURAXESS as provider of programme information (table 6) we found that applicants did either not ask the EURAXESS service centre for advice (75%) or found that they received little or no help (24%). Only a very small fraction of 1% thought they received good or very good advice.
3.3.3 Transparency, fairness and efficiency of selection procedures

The acceptance of a programme depends largely on its users' impressions of the legitimacy and adequacy of the procedures. Consequently, it was of major interest for us to investigate the extent to which AFR applicants were in favour of the selection procedures. Of course we need to acknowledge that our results primarily build on the replies by the successful applicants. That's why it was important to distinguish between the replies of grantees and refused applicants wherever possible.

Transparency

In general we find that a large majority of doctoral candidates and postdocs found the selection procedures transparent and understandable: This applies to 76% of the doctoral candidates and even 80% of the postdocs as compared to 15% of the PhDs and 16% of the postdocs who are critical vis-à-vis both aspects. As we would expect the unsuccessful applicants are somewhat more critical. However, as figure 30 shows, even among this group there seems to be a substantial number who are rather satisfied with the selection procedure.

Figure 30 Perception by successful and unsuccessful applicants on the transparency and tangibility of the selection procedure

Efficiency

Regarding the efficiency of the selection procedures a clear-cut goal was formulated by the FNR Performance Contract of 2008: The turnaround time between the pro-
proposal submission deadline and the announcement of selected proposals was fixed at less than two months for applications by doctoral candidates and at a maximum of four months for postdocs.13

Before we display the actual durations (table 7) it will be interesting to show how different stakeholders felt about the duration of procedures: Given the envisaged durations of two months or less for the selection of doctoral applications, only 25% of the doctoral candidates thought this goal was reached. 40% of the postdocs believed that the time span between the proposal submission and the communication of the funding decision was four months or less. However, applicants at the doctoral level still seem to be rather satisfied with the duration of procedures: 60% of the respondents thought it was just as they had expected, 11% even considered that it went faster than they expected, whereas 29% found it too long. Postdocs were more critical in this respect: For 45% the duration was appropriate, but 50% believed it was too long, only 5% pointed out that it was faster than they had expected.

In the interviews applicants and supervisors agreed in that they considered the duration of the procedures as too long given the limited availability of other funds. Supervisors regretted that they had lost promising candidates due to the fact that these had received other attractive job offers or funding opportunities from abroad.

Table 7 Time to funding decisions in months per call for proposal in the AFR PhD and the AF postdoc programme (Source: FNR)

<table>
<thead>
<tr>
<th>AFR PhD call</th>
<th>Submission</th>
<th>Panel</th>
<th>Funding decision communicated</th>
<th>Time to funding decision in months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call 2008-1</td>
<td>01.10.2008</td>
<td>31.10.2008</td>
<td>28.11.2008</td>
<td>2.0</td>
</tr>
<tr>
<td>Call 2009-1</td>
<td>15.03.2009</td>
<td>15.05.2009</td>
<td>27.05.2009</td>
<td>2.5</td>
</tr>
<tr>
<td>Call 2009-2</td>
<td>15.06.2009</td>
<td>04.09.2009</td>
<td>23.09.2009</td>
<td>3.3</td>
</tr>
<tr>
<td>Call 2009-3</td>
<td>15.09.2009</td>
<td>13.11.2009</td>
<td>16.11.2009</td>
<td>2.0 *</td>
</tr>
<tr>
<td>Call 2009-4</td>
<td>15.12.2009</td>
<td>08.03.2010</td>
<td>09.03.2010</td>
<td>2.8 *</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td>2.52</td>
</tr>
<tr>
<td>Call 2010-1</td>
<td>22.03.2010</td>
<td>14.06.2010</td>
<td>15.06.2010</td>
<td>2.8 *</td>
</tr>
</tbody>
</table>

13 Cf. FNR Performance Contract, Convention FNR/CP 01-08-10, p. 12.
<table>
<thead>
<tr>
<th>AFR Postdoc Call</th>
<th>Submission deadline</th>
<th>Panel</th>
<th>Funding decision communicated</th>
<th>Time to funding decision in months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call 2008-1</td>
<td>01.10.2008</td>
<td>31.10.2008</td>
<td>28.11.2008</td>
<td>2,0</td>
</tr>
<tr>
<td>Call 2009-1</td>
<td>15.01.2009</td>
<td>15.05.2009</td>
<td>27.05.2009</td>
<td>4,4</td>
</tr>
<tr>
<td>Call 2009-3</td>
<td>15.07.2009</td>
<td>13.11.2009</td>
<td>16.11.2009</td>
<td>4,1 *</td>
</tr>
<tr>
<td>Call 2009-4</td>
<td>15.10.2009</td>
<td>08.03.2010</td>
<td>09.03.2010</td>
<td>4,8 *</td>
</tr>
<tr>
<td>Average 2008 + 2009</td>
<td></td>
<td></td>
<td></td>
<td>4,18</td>
</tr>
<tr>
<td>Call 2010-1</td>
<td>22.02.2010</td>
<td>14.06.2010</td>
<td>15.06.2010</td>
<td>3,7 *</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
* Funding Decision communicated per E-mail one business day after Panel

We learn from table 7 that the time-spans between the call deadlines and the funding decision vary considerably. Although the variations are larger in the postdoc scheme, the average duration of the selection procedure (4,18 months) is closer to the targeted duration of 4 months. In the PhD scheme we find an average duration of 2,52 months in relation to a targeted duration of 2 months. Of course, we have to acknowledge that a funding organisation in launching a new scheme needs some time to develop or adapt its procedures and to get used to the handling of calls. However, in analysing the different calls over time we cannot observe a clear trend pointing to shorter durations.

In any case it is necessary to compare the durations of AFR selection procedures with those of similar schemes offered by other research funding organisations in Europe like the Flemish Fund for Scientific Research (FWO) in Belgium or the Irish Research Council for Science, Engineering and Technology (IRCSET). Given the longer average durations in the AFR doctoral scheme we have to ask whether it is still appropriate to select doctoral candidates one-by-one, especially taking into account the global trend towards structured doctoral education programmes in universities and related funding schemes like the German Research Foundation's (DFG) Research Training Groups or the US National Science Foundation's (NSF) Integrative Graduate Education and Research Traineeship (IGERT) programme.

Clarity of selection criteria
Trust in procedures is also based on the fact that applicants feel they achieve a good understanding of the selection criteria which are applied. In the paragraph above on information policy we could find that applicants where a little less satisfied with the available information on peer review criteria as compared to other AFR programme information. The following analysis will allow us to identify where applicants feel especially well informed and where uncertainties persist.

---

14 See Chapter 4: The AFR Programme in an international context
Figure 31 illustrates that applicants of both groups seem to know especially well what to expect from criteria such as 'scientific quality of the research project'. This is true for 75% of the doctoral candidates and 80% of the postdocs. Especially PhD applicants are somewhat more uncertain when it comes to the 'profile of the applicant': 32% do not feel well informed about this criterion, whereas 64% feel comfortable. In comparison only 17% of the postdocs do not feel well informed about this criterion. We find the same discrepancy with regard to the criterion 'quality of the host institution'. For both groups the criterion 'Interest of the research project in the Luxembourg R&D setting' seems less tangible: 26% of the doctoral candidates and 21% of the postdocs do not precisely know what to expect from this criterion.

Figure 31 How well do applicants feel informed about the selection criteria? Average values on a scale from -2 (unhelpful) to 2 (very helpful), average values

![Bar chart showing the average values of selection criteria](chart.png)

Obviously, the more research experience applicants have the better they know which criteria they need to fulfil in submitting a research proposal. Yet, also for the postdoc applicants we find one exception: It refers to the criterion 'Potential of the project for career development' which is only applied in the postdoc scheme: 30% of the applicants have no clear idea. Also the applicants whom we interviewed expressed that they had been rather uncertain about the criteria 'Interest of the research project in the Luxembourg R&D setting' and 'Potential of the project for career development'.

'Quality of the research project' and 'Profile/potential of the applicant'

We find a surprising unanimity when it comes to the focus on the research project as substantial part of the proposal and consequently of the review: In our interviews applicants (successful and unsuccessful), host institution representatives as well as the FNR directorate and FNR staff members expressed that the project description was too detailed, given the early stage of the researcher's career. However, whereas FNR staff and directorate highlighted the need to better address the conditions at the respective host institution, representatives of these institutions and supervisors stressed that already too much attention was paid to this aspect. From their point of view such criteria as 'Quality of the host institution' or 'Interest of the research project...
on the Luxembourg R&D setting’ gave the application and the selection procedure a bureaucratic touch.

In addition we looked at the criterion 'profile/potential of the applicant more closely. In the applicant survey we wanted to explore whether we could find a negative bias on the side of the unsuccessful applicants vis-à-vis this specific criterion. We chose the group of doctoral candidates in order to be able to base our finding on a broader basic population. As table 8 shows we could, however, find no evidence that rejected applicants were more critical than AFR beneficiaries.

Table 8 To which extent did you feel informed about the selection criteria which were going to be applied to your proposal? Views of successful and unsuccessful applicants

<table>
<thead>
<tr>
<th>Your profile/potential.</th>
<th>successful</th>
<th>unsuccessful</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>23</td>
<td>14</td>
<td>37</td>
</tr>
<tr>
<td>--</td>
<td>11</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>+</td>
<td>46</td>
<td>11</td>
<td>57</td>
</tr>
<tr>
<td>++</td>
<td>48</td>
<td>4</td>
<td>52</td>
</tr>
<tr>
<td>no opinion</td>
<td>6</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>134</td>
<td>36</td>
<td>170</td>
</tr>
</tbody>
</table>

It is interesting in this regard that in the interviews FNR directorate and FNR staff acknowledged difficulties to estimate the scientific potential of candidates, especially at doctoral level. It might therefore be relevant to further consider a suggestion which was made by the different groups of applicants in the course of the interviews: They formulated the wish to invite promising candidates where the previous review had led to unclear results or who had submitted risk-taking projects for an interview by the AFR panel.

**Appraisal of the selection procedure**

Of course it is difficult for applicants to assume whether the selection process overall was fair and unbiased, especially in case their proposals were refused. Nevertheless we asked this question in order to gain an impression of applicants’ feelings about the quality of the AFR selection procedures. It is not surprising, though, that 29% of the doctoral candidates and 23% had no opinion on this matter, only 12% resp. 11% were sceptical about the fairness of the process. After all 58% resp. 66% thought it was fair and transparent. Yet, we received very clear statements by applicants – PhDs and postdocs, successful and unsuccessful – who underlined that they found the procedures overall transparent and fair.

Representatives of the ministry highlighted the importance of a quality-oriented selection by FNR. At the same time they suggested to reduce the complexity of the current procedures. More attention should be given to the merits of host institutions and supervisors.

Thus, we can state that the different stakeholders seem to be rather confident about the selection criteria and procedures. There seems to be room for improvement when
it comes to achieving more clarity about such criteria as 'profile of the applicant', 'interest of the research project in the Luxembourg R&D setting' and 'potential of the project for career development'. In order to accelerate selection procedures and with respect to the limited research experience of applicants the description of the envisaged doctoral research project should be limited to a maximum of three pages. In addition, the complexity of the review procedures could be reduced by avoiding remote reviews before the panel selection wherever feasible.

3.3.4 Feedback to applicants

Preparing proposals and carrying out research projects belong to the essential competencies which a researcher should have. However, continuous learning and exercise is needed in order to meet the changing demands of research funding. For applicants and grantees to make the most of peer review statements and progress reports, it is vital to receive clear feedback conveyed by the respective funding agencies. Hence, we wanted to elucidate applicants’ views on the quality of the feedback which they received following the selection procedures as well as on the modifications which they were asked to carry out. In addition, we wanted to gain insight in the grantees' perceptions of the reporting requirements.

If we compare the applicants' views on the clarity of the selection criteria (see: figure 31) with their observations regarding the feedback on each of the criteria we notice strong similarities (view figure 32): As a rule doctoral candidates find the feedback on the different items less helpful as compared to their colleagues at postdoc level. Both groups still feel slightly less comfortable with the 'interest of the research project in the Luxembourg R&D setting' and postdocs kept their reservations when it comes to the 'potential of the project for career development'.

Figure 32 Applicants’ views on the helpfulness of feedback on the different selection criteria. Average values on a scale from -2 (unhelpful) to 2 (very helpful)
Mandatory and suggested modifications are an inherent part of FNR's feedback to applicants. For unsuccessful candidates they are meant as guidance how they could improve their proposals in case of resubmission, for the successful they are seen as advice on how they could further improve their projects and achieve even better results. About 43% of the doctoral candidates received mandatory and 52% suggested modifications. However, many seemed to be rather sceptical whether these modifications would be helpful in view of improving their projects: About half (49%) found the mandatory modifications helpful, whereas 58% thought the suggested modifications were useful. The postdoc applicants seemed to be slightly more in favour of receiving advice for modifications: 47% of the postdoc applicants received mandatory modifications which 54% of them found helpful. Of the 55% who received suggested modifications again 55% thought they were useful. Overall there seems to be a slightly greater willingness to accept modifications if they are formulated as suggestions rather than as obligations.

3.3.5 Reporting requirements

As regards the reporting requirements by the grantees we see quite a different picture: Only 46% are satisfied with the clarity and an equal fraction of 46% with the appropriateness of the reporting requirements. Of the remaining only 9% are dissatisfied, but 45% have no opinion on either of the options. The percentages are very similar for postdoc grantees: 49% are satisfied with the clarity and 51% with the appropriateness of the reporting requirements, 43% have no opinion on the clarity, 45% on the appropriateness. Only 8% think the reporting requirements are unclear or inappropriate (5%). The high rate of grantees who have no opinion on the reporting requirements may be explained by the fact that the vast majority received no feedback on their reports. This is true for 80% of the doctoral grantees and 75% of the postdocs. In case grantees received feedback, most of them were satisfied: Three quarters of the PhD grantees and all of the postdocs.
3.3.6 Handling of AFR grants by FNR

Although the time span between the communication of the funding decision and the start of the project cannot be influenced by the FNR alone, it is important to note how satisfied AFR grantees are in this respect. Table 9 lists the time spans as indicated by the respondents. We find considerable variations between the Calls, but on average the time spans are no longer than two months.

Table 9 How long did it take approximately from the funding decision to the start of your project? Time spans as indicated by the respondents broken down by calls

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 month</td>
<td>12</td>
<td>14</td>
<td>7</td>
<td>10</td>
<td>10</td>
<td>14</td>
<td>67</td>
<td>39%</td>
</tr>
<tr>
<td>1 month</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>9</td>
<td>3</td>
<td>26</td>
<td>15%</td>
</tr>
<tr>
<td>2 months</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>9</td>
<td>6</td>
<td>8</td>
<td>34</td>
<td>20%</td>
</tr>
<tr>
<td>3 months</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>15</td>
<td>9%</td>
</tr>
<tr>
<td>&gt; 3 months</td>
<td>4</td>
<td>2</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>10</td>
<td>28</td>
<td>16%</td>
</tr>
<tr>
<td>Totals</td>
<td>26</td>
<td>25</td>
<td>27</td>
<td>24</td>
<td>30</td>
<td>38</td>
<td>170</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 month</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>13</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>1 month</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>2 months</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>13</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>3 months</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>11</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>&gt; 3 months</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>12</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>7</td>
<td>13</td>
<td>7</td>
<td>8</td>
<td>12</td>
<td>9</td>
<td>56</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Consequently, grantees are rather satisfied with the durations as figure 33 elucidates. However, postdocs (51%) seem to be remarkably less satisfied than doctoral candidates (81%). This might be due to the fact that a larger share of postdoc beneficiaries who chose a host institution in Luxembourg was especially critical in comparison with their colleagues who went abroad. In addition, the relatively short funding period of two years pressurises beneficiaries to perform without delay as soon as they receive their granting letters.
How do AFR beneficiaries evaluate FNR’s handling of grants throughout the funding period? Here we could find a large degree of satisfaction on the side of the grantees: 86% of the doctoral candidates and a slightly smaller fraction of 75% of the postdocs are satisfied or very satisfied with the support which they receive from FNR. 9% of either group have no opinion on this matter, whereas 5% of the PhD grantees are dissatisfied (only a single grantee indicated to be very dissatisfied). Of the postdoc grantees a larger fraction of 17% is somewhat dissatisfied, nobody being very dissatisfied. Thus, grantees in general seem to be very satisfied. However, it might be worthwhile for FNR to discuss at one of the next AFR network meetings what might be optimised in terms of grant administration from the ‘customers’ point of view.

3.3.7 Impact of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers (C&C)

The European Charter for Researchers stipulates that “Researchers at all career stages should seek to continually improve themselves by regularly updating and expanding their skills and competencies. This may be achieved by a variety of means including, but not restricted to, formal training, workshops, conferences and e-learning.”\textsuperscript{16} In line with this recommendation the FNR offers accompanying measures for training and mobility to its AFR grantees, namely support for active participation in scientific conferences abroad and for one scientific training measure per year (including summer schools). We therefore wanted to inquire how these measures are perceived by the grantees.

Again the grantees’ feedback is rather positive, but at a lower level as compared to the previous item 'Handling of grants': 56% of the doctoral candidates and 66% of the postdocs appreciate the measures, whereas 12% resp. 8% find them poor or very poor. Notably, 32% of the PhD and 25% of the postdoc grantees did not have an opinion on this matter. Of course this findings needs to be closer looked at, given the limited numbers of AFR beneficiaries who have the opportunity to participate in programmes for transferable skills development (cf. the next chapter).

Five years after the publication of the Charter and Code it is important to explore to which extent both documents are known to their target groups in the framework of the AFR programme and in which impacts they have on institutional behaviour. Yet, the results of our survey are disillusioning in this respect: Even half a decade after the European Commission issued both documents only 20% of the doctoral candidates and 22% of the postdocs are aware of their rights and obligations according to the C&C. 57% resp. 48% admitted they were not aware and 23% resp. 30% stated that they did not know.

The results are even worse when it comes to the implementation of the C&C: We asked the survey participants if the they thought the C&C was implemented at their host institutions: 73% of the doctoral candidates and an even larger fraction of 83% of the postdocs confessed that they did not know. 23% resp. 13% thought the C&C was implemented and 4% of each group believed it was not. These findings lead us to the conclusion that strong efforts should be made both on the side of the FNR and the Ministry of Research in the context of its "National Action Plan for Human Resources" to raise the awareness on the side of early career researchers and equally on the side of their supervisors about their rights and obligations as they were outlined by the Charter and Code.

3.4 Quality of doctoral education and postdoc qualification in the framework of the AFR programme

3.4.1 Working conditions of AFR beneficiaries

With the aim to receive an impression of the beneficiaries "real working conditions" we asked a number of questions concerning the quality of PhD education and postdoc qualification in the framework of the AFR programme. To begin with we explored to which extent AFR applicants developed their individual projects as part of a larger research programme and should this be the case, whether they still had the opportunity to freely design their projects? With regard to the PhD grantees we also wished to inquire whether they are members of a structured doctoral programme.

Integration into a larger research project
Concerning the involvement in a larger research programme we observe differences between doctoral candidates and postdocs: 43% of the PhD candidates applied for a project which formed part of a larger research endeavour, as did 52% of the post-
docs. In order to be able to distinguish between science fields as well as between host institutions in Luxembourg or abroad we disaggregated the data accordingly. As table 10 below shows doctoral candidates who submitted their proposal for a host institution in Luxembourg were more likely to be involved in a larger programme. This might be due to the fact that they had been encouraged to apply in view of an already existing research project. It will, thus, in the future be necessary to monitor if the integration into a larger project becomes less, given FNR’s recent policy to grant doctoral positions as part of FNR funded projects.

Table 10 Does your project form part of a larger research programme? Disaggregated replies by applicants of AFR PhD grants in Luxembourg or abroad and by fields of research

<table>
<thead>
<tr>
<th>Location of host institution</th>
<th>no</th>
<th>yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abroad</td>
<td>33</td>
<td>17</td>
<td>50</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>46</td>
<td>43</td>
<td>89</td>
</tr>
<tr>
<td>n.a.</td>
<td>17</td>
<td>14</td>
<td>31</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>96</td>
<td>74</td>
<td>170</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field of research</th>
<th>no</th>
<th>yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS</td>
<td>15</td>
<td>12</td>
<td>27</td>
</tr>
<tr>
<td>PE</td>
<td>26</td>
<td>30</td>
<td>56</td>
</tr>
<tr>
<td>SH</td>
<td>37</td>
<td>20</td>
<td>57</td>
</tr>
<tr>
<td>n.a.</td>
<td>18</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>96</td>
<td>74</td>
<td>170</td>
</tr>
</tbody>
</table>

Despite the fact that a notable number of beneficiaries are involved in larger research programmes the freedom to design an own project is considerable: 70% of the doctoral candidates and 73% of the postdocs indicated they had been free in developing their own research endeavour.

These findings are slightly relativised if we consider statements by applicants and AFR panel members during the interviews: Applicants admitted that in most cases the project already existed. However, they were offered a certain degree of freedom in designing their own projects in this framework. AFR panel members were convinced that the projects are usually suggested by the supervisors rather than by the candidates themselves.

**Participation in a structured doctoral programme**

Nearly half of the AFR PhD beneficiaries indicated (44%) that they participate in a structured doctoral programme, 46% do not, and 10% had no opinion. If we disaggregate the results according to the location of the host institution (table 11) we find that a slight majority of the outgoing PhD grantees form part of a structured programme as compared to a slight minority in Luxembourg.
Table 11 Are you a member of a structured doctoral programme (e.g. a graduate school)?
Distinction between AFR beneficiaries at host institutions in Luxembourg resp. abroad

<table>
<thead>
<tr>
<th></th>
<th>Abroad</th>
<th>Luxembourg</th>
<th>n.a.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I don't know</td>
<td>5</td>
<td>8</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>No</td>
<td>21</td>
<td>41</td>
<td></td>
<td>62</td>
</tr>
<tr>
<td>Yes</td>
<td>23</td>
<td>35</td>
<td>1</td>
<td>59</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>84</td>
<td>1</td>
<td>134</td>
</tr>
</tbody>
</table>

Recipients of AFR PhD grants whom we interviewed regretted the lack of structured doctoral schools. What they most explicitly missed was the broadening of their scientific scope despite the fact that their projects generally formed part of a larger project. In this regard being a member of a doctoral school or could have provided them with structured research training in a wider disciplinary or interdisciplinary area.

**Working conditions at the host institution**

How do AFR beneficiaries evaluate the actual working conditions which they encounter? In this respect we were again interested in distinguishing between host institutions in Luxembourg or abroad and we disaggregated the data accordingly. In addition, we aimed at finding out if doctoral beneficiaries were more satisfied than their colleagues at postdoc level or vice versa. We calculated the average values for each of the answer options based on the respondents' ratings on a scale from -2 to +2. Certainly, we need to bear in mind that the basic populations (PhDs or postdocs, in Luxembourg or abroad) differ. We also need to take into account that not all of the answer options are equally relevant to the different scientific disciplines. In view of such discrepancies we disaggregated the data for the answer category (availability of) 'lab space'. Not surprisingly, the fractions of researchers representing the Humanities or Social Sciences who had no opinion on this matter are noteworthy.

Considering these limitations the results which are displayed in figure 34 are indeed remarkable: Overall postdoc grantees once more seem to be somewhat more satisfied than PhD beneficiaries. Also in our interviews the postdoc beneficiaries stated that they were particularly satisfied with their grant, especially as the funding for their own position guaranteed a large degree of autonomy to them.

All groups are particularly satisfied with the infrastructure at the host institution, their opportunities to pursue an own project and with the supervision of their research work. This also applies to the ownership of their research results; we offered this answer option only to the postdocs.
In comparing the answers by outgoing grantees to their colleagues in Luxembourg we find different views especially regarding the following options: Beneficiaries of both groups who are based at a host institution in Luxembourg are less satisfied with the lab and the office space than those abroad. This finding was underlined by the doctoral interviewees who had altogether encountered several administrative problems in the host institutions in Luxembourg, especially with regard to the availability of office space. Beneficiaries in Luxembourg are also somewhat more critical when it comes to the quality of the scientific training which they experience. However, they seem to be more pleased with the availability of administrative personnel than their colleagues abroad.
For doctoral education or postdoctoral research to become an important milestone in the individual grantee's career it is essential whether he or she finds enough time to accomplish own projects rather than being overloaded with non-research related tasks. However, only 4% of the doctoral candidates (= 5 in total) and equally 4% of the postdocs (= 2) think they are overloaded with duties other than research. 54% of the PhD and 51% of the postdoc beneficiaries reported that their workload is just right, whereas 12% resp. 13% believe they do not have enough obligations in addition to their research work.

It is remarkable that only a very limited number of postdocs actually have opportunities to (co-)supervise doctoral candidates or to gain experience in people and budget management, thus competencies which are undoubtedly important for a further research career. In fact, only 28% of the postdocs are in the position to supervise doctoral candidates, 72% are not and merely 36% gain experience in people and budget management, 64% do not. In future monitoring of the AFR programme it will have to be examined which degree of responsibility postdocs actually have in supervising doctoral candidates, given their still rather limited experience in this respect.

Are grantees at non-university research institutions or at universities better off in this respect and in which way does the situation at host institutions in Luxembourg differ from institutions abroad? Figures 35 and 36 depict existing discrepancies: Surprisingly, beneficiaries at host institutions abroad are obviously in a better position when it comes to the supervision of doctoral candidates, even those who are based at non-university research institutions. Yet, numbers are too small to come to firm conclusions.

Figure 35 Do you have the opportunity to supervise doctoral candidates (broken down by type and location of host institution)?
However, researchers at universities abroad and at the University of Luxembourg are more likely to gain experience in people and budget management than those who are based at non-university institutions in Luxembourg or abroad (figure 36).

Figure 36 Do you gain experience in people and budget management candidates (broken down by type and location of host institution)?

Notably, all groups are rather dissatisfied regarding to the quality of the non-scientific training offered. This deficit seems to be particularly severe for the postdocs who work in Luxembourg. Clearly, this finding needs to be seen as a first indication that much more needs to be done about the provision of transferable skills and the development of a framework for continuous professional development. Against this background AFR staff and directorate formulated the need to introduce clear requirements to be fulfilled by the respective host institution. This has to be seen in the context of the government’s initiative to introduce minimal requirements for HR management in the research institutions in Luxembourg – the CRPs and the university. However, we need to acknowledge that even the best requirements will only show very limited effects without qualified personnel and resources in the respective institutions which are available for HR development.

3.4.2 The quality of supervision

Overall we find large agreement with the supervision which doctoral candidates experience and the scientific advice which postdocs benefit from. Certainly, multiple supervision is more important to doctoral candidates than to postdocs: A total number of 97 PhD grantees indicated to have a co-supervisor, 17 postdocs mentioned additional scientific advisors.
The frequency of interactions with supervisors and scientific advisors is obviously considerable: 42% of the PhDs are in contact with their supervisors at least once a week or more often, 37% once or twice a month. Contacts between postdocs and their scientific advisors are even more frequent: 70% interact at least once a week, 24% once or twice per month.

As the frequency of interaction is clearly determined by the organisation of the research work in the different scientific areas we checked to which extent the frequencies of supervision might differ if they were broken down by large research areas. Our prior assumption that the frequencies of supervision are especially high in the 'laboratory' sciences has to be partially corrected in the light of the results which are displayed in figures 37 and 38: Whereas for both doctoral candidates and postdocs the frequency of supervision is especially high in the natural sciences, it is very considerable in the humanities and social sciences and surprisingly slightly more limited in the life sciences. Of course we have to acknowledge that the absolute numbers are very small for some of the research fields:

Figure 37 Frequencies of doctoral candidates' interactions with their supervisors or scientific advisors broken down by large research areas

**Doctoral candidates**

![Bar chart showing frequency of interactions with supervisors or scientific advisors by research area for doctoral candidates.](image-url)
As figures 39 and 40 illustrate both groups are obviously satisfied with the quality of supervision, though, slightly less with the frequency. Doctoral beneficiaries whom we interviewed shared the impression that their co-supervisors seemed to be less committed and that they were, therefore, principally in touch with their main supervisor.

Figure 39 To which degree are you satisfied with the supervision you receive, in terms of frequency of personal contacts and quality? Scale from -2 to +2, average values, PhDs
3.4.3 Agreed qualification targets and actual achievements

Publications, presentations at conferences and international research stays are seen as important 'currencies' when it comes to assessing researchers' careers and achievements. It was therefore vital for us to investigate to which extent beneficiaries had agreed on such targets with their supervisors or advisors at the time of starting their projects and to compare these results to the actual achievements.

It is striking that more than half of the beneficiaries in each group did not agree on any specific achievements to be reached during their doctorate or postdoctorate: Only 44% of the PhD grantees did, as compared to 47% of the postdocs. Looking at the agreed targets we find the following distribution (figures 41-44): Most doctoral candidates are expected to publish between 1 and 3 papers, in general in international peer reviewed journals, and to give an equal number of presentations at conferences. For some (8 in total) the numbers of publications and active participations in conferences amounts to more than 5. On average the duration of envisaged research stays abroad is between 1 and 6 months. At the postdoc level the numbers of envisaged publications are a bit higher (in general up to five), again mostly in international peer reviewed journals. Surprisingly, the frequency of presentations at conferences is almost the same as for the doctoral candidates, whereas stays abroad are rather shorter (on average 1 to 2 months). This might well be due to the shorter funding period of the postdoc grant.
Figure 41 Number of agreed publications in total

Figure 42 Number of agreed publications in peer reviewed journals
In considering the achievements of beneficiaries at the time of our questionnaire exercise we certainly need to take into account that the majority of respondents had started their grants no longer than a year before or even later. Therefore the results should be treated with reservations: 26% of the PhDs and 41% of the postdocs indicated they had realised first publications. Whereas the majority of doctoral candidates had been able to publish 1 paper (about half in international peer reviewed journals), postdocs had published between 2 and 4 (in general in international peer reviewed journals). Almost all of the postdocs who indicated that they had published, had achieved at least one first authorship. As we might have expected presentations at scientific conferences were more frequent: 50% of the doctoral candidates and 60% of the postdocs gave presentations, mostly in other European countries or outside Europe. With respect to research stays 20% of the doctoral candidates and 14% of the postdocs had been abroad.

Although the results regarding the actual achievements are still very limited we observe that AFR beneficiaries seem to be on the right track when it comes to publica-
tions, presentations at conferences and international research stays. Notably, postdocs are more reluctant when it comes to research stays abroad. Here again the relatively short funding period of two years can be seen as decisive in this respect.

3.4.4 Getting prepared for the next step: qualifications and career expectations

In order to be well prepared for a career in research or in another labour market segment much more is required than just being a good researcher. In accordance with the Joint Skills Statement agreed by the European Research Organisations under the umbrella of the European Science Foundation¹⁷, we asked AFR beneficiaries which qualifications they received and where they saw room for improvement.

Firstly, it was important to analyse if AFR grantees at all received training in transferable skills. Astonishingly, the situation is quite diverse for doctoral candidates and postdocs: Whereas 61% of the PhD beneficiaries confirmed to receive qualifications in these fields, this applied only to 44% of the postdocs. This finding clearly indicates that transferable skills provision is seen as an integral part of doctoral education, but not yet as component of continuous professional development throughout a researcher’s career. Thus, it was not surprising to learn that only 27% of the postdocs pointed out to benefit from a Human Resources Development Programme at their host institution, 49% denied this and 24% did not have an opinion on this matter. As figure 45 illustrates postdocs at non-university research institutions in Luxembourg and their colleagues at universities abroad seem to be somewhat better off in this respect.

Figure 45 Postdoctoral beneficiaries: “Do you benefit from a Human Resources Development programme at your host institution (e.g. courses for continuous professional development)?” Results broken down by type and location of host institution

Next, we inquired in which areas AFR beneficiaries actually received training in transferable skills and where they perceived further qualification needs. As we might expect (see: figure 46) preferences vary between the two groups: Doctoral candidates receive skills training mostly in the following areas: communication and presentation, working in a team, problem solving, project and time management. For postdocs communication and working with others also rank high in the list of skills which they actually acquire.

Beyond the actual provision skills figure 46 also helps us to conduct a training needs analysis: For doctoral candidates communication as well as project management and time management are again preferred skills they would like to be trained in. In addition, they prioritise the following skills: teaching, research management and research leadership, knowledge of research methods beyond the doctorate, career planning. At postdoc level the skills they would wish to achieve are rather similar, but priorities are different: Research management and leadership were seen as most important, followed by grant writing, communication and teaching. In fact, FNR could use this training needs analysis in order to plan the skills agenda for its beneficiaries.

Figure 46 Combined figure 'I receive training in transferable skills in the subsequent areas' and 'I would like to receive training in transferable skills in the subsequent areas', replies by doctoral candidates and postdocs (multiple answers were allowed)
Presumably, advice by supervisors and mentors on which career step to envisage next might be as important to early career research as developing specific skills and competencies. Obviously, PhD supervisors do not necessarily share this view as is underlined by the fact that only 32% of the doctoral candidates stated they received career advice, whereas 51% did not and 17% had no opinion. The situation is somewhat different but still not optimal for postdocs: A majority of 47% stated to receive career advice, 38% did not and 15% did not have an opinion. This finding points to the need to "train the trainers", e.g. by offering courses to supervisors which prepare them to be 'career advisors'.

In the interviews we used the opportunity to ask AFR beneficiaries as well as host institution representatives and supervisors about their respective experience and their expectations regarding transferable skills provision. We have to acknowledge, however, that all the views which were expressed referred to Luxembourg. Thus, it might not be surprising to find that the answers were largely coherent. Both groups agreed that qualification measures for transferable skills were only occasionally offered and lacked consistency. Addressing the issue of who should be responsible for such measures both groups pointed out that they should at best be embedded in structured doctoral programmes. Whereas the applicants were in favour of a more active role of FNR in financing or even organising transferable skills courses, host institution representatives and supervisors advocated assigning the task of carrying out such courses primarily to the Université de la Grande Région18. Hence, further discussion is required on the potential role of FNR in coordinating such activities or rather to delegate these tasks to a competent agency similar to the UK's Vitae® programme.19

3.5 Messages to FNR and the Ministry

At the end of the questionnaire we provided all doctoral candidates and postdocs who participated in the survey with the opportunity to

* share suggestions with FNR on how the AFR scheme could be further improved
* and make additional remarks on whatever they felt was necessary.

The number of replies is very limited and the contents are not always very clear. Generally, we do not find any surprises considering the findings we reported above. Thus, we limit ourselves to report the most important trends. About 20 participants of either group expressed their views on the respective issues which can be roughly clustered around the following topics. In addition, we display here the results of the qualitative interviews with different stakeholders referring to the topics below.

**Application**

* Some survey participants expressed their wish that the communication between FNR and the respective host institution – specifically the University of Luxem-

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18 For information on the Université de la Grande Région cf. [http://www.uni-gr.eu/](http://www.uni-gr.eu/).
19 For information on the British Vitae® programme cf. [http://www.vitae.ac.uk/](http://www.vitae.ac.uk/).
bourg – should be improved. Yet, it remained open where they saw specific room for improvement.

▪ Individual contributors expressed their wish for clearer guidance through the online application form; few would have preferred a later call deadline.

▪ In accordance with our findings as described in earlier parts of this report, some applicants asked for more information regarding the relevance of the project for the Luxembourg R&D setting.

In the interviews applicants expressed the wish to shorten the time to decision and to rethink the English language policy which was seen as detrimental to the Humanities. Supervisors whom we interviewed argued to return to more calls for proposals.

**Selection**
The majority of remarks addressed this item. As a trend we can find that the selection procedure was usually felt as being too long and/or too complicated. Suggestions referred to

▪ the attribution of an FNR contact person for each proposal,
▪ introduce a pre-selection of candidates in order to speed up the selection procedure,
▪ the invitation of promising candidates for oral presentation in front of the AFR panel
▪ more precise subject-related feedback and feedback with respect to the relevance of the project for the Luxembourg R&D setting

AFR panel members in our interviews called for more emphasis on quality, even if fewer candidates could be funded.

**Handling of grants and reporting**

▪ Participants who addressed this issue were generally in favour of shorter reports, more feedback and less documentation.
▪ Some beneficiaries would appreciate more direct exchange and interaction with FNR staff to monitor the conditions of their grant (also with respect to the host institution) throughout the funding period.

In the qualitative evaluation phase different groups of stakeholders suggested modifying funding arrangements:

▪ Supervisors formulated the wish to reconsider the four year funding period for doctoral candidates which might still be too short for the humanities,
▪ Postdocs asked to extend the funding period of their grants to three years and to be offered tenure track options,
▪ AFR panel members advocated to provide start up funding for tenured positions of highly qualified postdocs.

**Quality assurance**
This issue was mainly referred to in the qualitative interviews with FNR representatives and the Ministry for Higher Education and Research. All agreed that the time-span since the launch of the AFR scheme was definitely too short to study the
scheme's impact. Therefore, it seemed necessary to monitor the results of the qualification process and the evaluate the research output of beneficiaries.

**Programme**

- Concerning the accompanying measures individual beneficiaries asked for more flexibility, especially opportunities for funding of more than one conference visit annually.
- In addition, some grantees deplored the lack of training opportunities at their host institution and the lack of work space. One beneficiary asked for training of supervisors to be better prepared for their task.
- An individual doctoral candidate regretted: "Most guidelines are for pre-committed research projects, and don't foresee the case of a doctoral school, which starts with 2 years of formal course work, followed by 2 to 3 years of ongoing research. The research project will be developed after the course work."
- Better involvement of companies in the framework of the research projects was also seen as desirable.

In analysing the results of the open questions which concluded the questionnaire we found that quite some respondents used the opportunity to express their satisfaction about the AFR programme and the handling of applications and grants by FNR. The reply "Very happy, thank you!" can be seen as symptomatic in this regard.

In the interviews the different groups of stakeholders agreed that the opportunity to fund individual doctoral candidates through the AFR scheme should be kept, even if it might be limited in numbers and other funding opportunities might be added. In addition, supervisors and host institution representatives were in line with AFR staff and directorate in that more opportunities for support of doctoral candidates and postdocs should be offered in the framework of FNR's project funding, specifically in the CORE and the INTER programmes. FNR and the ministry favoured the launch of a pilot scheme for doctoral networks, but differed concerning the degree of urgency which they saw for such a programme to be launched. However, this issue could be resolved in the final workshop in the sense that a first call for proposals should be envisaged for 2012 or 2013.
4. THE AFR PROGRAMME IN AN INTERNATIONAL CONTEXT

4.1 Trends of research training in the era of globalisation

Given that the qualification of researchers in Luxembourg does not occur in a vacuum, but is interlinked with global trends and challenges, this evaluation needs to contextualise its findings internationally. In this chapter the focus will be on doctoral research training, taking into account that this phase has been most intensely surveyed.

Impact of globalisation on doctoral education

"Since the 1990s, globalization has become a central phenomenon for all of society, as well as of graduate education, particularly doctoral education. [...] For all countries this means graduate education needs to educate its students to create new knowledge, but also to prepare them to translate this knowledge to defining and solving societal problems at home and abroad and collectively in trans-, multi- and interdisciplinary and international groups.\textsuperscript{20}\xspace Undoubtedly, globalisation has generated multiple effects on doctoral research training. Three of the most important macro-trends are:

1. The increase in PhD production: "Post-industrial societies need knowledge workers for the new economy. Should there not be sufficient domestic students readily available, international students are recruited with the hope that they will remain in the country and join the national workforce.\textsuperscript{21}\xspace"

2. The qualification of doctoral candidates is driven by the expectation of wealth creation, i.e. appropriate returns on investment: "The increase in PhD production and circulation of international students is based on the belief that knowledge and research skills lead to innovations and to direct societal and economic gains.\textsuperscript{22}\xspace Hence, emerging economies such as Malaysia or South Africa, but also European countries like Ireland have set up national goals for PhD production over the past years. In its 'MyBrain15' strategy the government of Malaysia envisages a target number of 60,000 PhD holders by 2020, from a starting point of approximately 5,000 in 2010.\textsuperscript{23}\xspace The Irish Government in its 'Strategy for Science, Technology and Innovation, 2006-2013', has set the goal of doubling the numbers of doctorates by 2013 with reference to the base of 2010.\textsuperscript{24}\xspace To which is extent such goals can realistically be reached or whether they might even be partly detrimental to the quality of doctoral is indeed difficult to predict.

We can find, however, that in a number of countries belonging to the Organisation for Economic Cooperation and Development (OECD), the total production of doc-

\textsuperscript{22}\xspace Cf. Nerad, Maresi, ibid.
\textsuperscript{23}\xspace Cf. www.mohe.gov.my.
torates correlates with domestic R&D spending as percentage of GDP (Table 12). This is especially the case for European countries like Sweden and Finland, Switzerland in Germany, whereas Japan and South Korea stand out by showing a negative correlation between high R&D intensity and low national doctoral graduation rates.

Table 12 Doctorates and domestic R&D spend (Source: OECD Science, Technology and Industry Scoreboard 2005)²⁵

<table>
<thead>
<tr>
<th>R&amp;D Intensity (R&amp;D Spending as % of GDP)</th>
<th>National doctoral graduation rates at the typical graduation age of the respective national population</th>
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</thead>
<tbody>
<tr>
<td>Sweden 4.00</td>
<td>Sweden 0.285</td>
</tr>
<tr>
<td>Finland 3.50</td>
<td>Finland 0.225</td>
</tr>
<tr>
<td>Japan 3.20</td>
<td>Switzerland 0.210</td>
</tr>
<tr>
<td>South Korea 2.70</td>
<td>United Kingdom 0.153</td>
</tr>
<tr>
<td>United States 2.65</td>
<td>Germany 0.150</td>
</tr>
<tr>
<td>Switzerland 2.60</td>
<td>Austria 0.145</td>
</tr>
<tr>
<td>Germany 2.55</td>
<td>France 0.145</td>
</tr>
<tr>
<td>Denmark 2.52</td>
<td>Australia 0.120</td>
</tr>
<tr>
<td>Belgium 2.40</td>
<td>Ireland 0.110</td>
</tr>
<tr>
<td>Austria 2.20</td>
<td>Belgium 0.101</td>
</tr>
<tr>
<td>France 2.20</td>
<td>Czech Republic 0.099</td>
</tr>
<tr>
<td>Canada 1.93</td>
<td>United States 0.092</td>
</tr>
<tr>
<td>United Kingdom 1.90</td>
<td>Netherlands 0.085</td>
</tr>
<tr>
<td>Netherlands 1.80</td>
<td>Spain 0.073</td>
</tr>
<tr>
<td>Australia 1.60</td>
<td>Canada 0.072</td>
</tr>
<tr>
<td>Czech Republic 1.25</td>
<td>South Korea 0.070</td>
</tr>
<tr>
<td>Italy 1.20</td>
<td>Japan 0.070</td>
</tr>
<tr>
<td>Ireland 1.15</td>
<td>Denmark 0.065</td>
</tr>
<tr>
<td>Spain 1.13</td>
<td>Hungary 0.040</td>
</tr>
<tr>
<td>Hungary 0.95</td>
<td>Italy 0.040</td>
</tr>
<tr>
<td>Turkey 0.70</td>
<td>Turkey 0.002</td>
</tr>
<tr>
<td>Mexico 0.40</td>
<td>Mexico 0.001</td>
</tr>
</tbody>
</table>

3. The third trend to be mentioned here at first glance seems to be of lesser relevance to Europe, at least for the time being: "Higher education has become commercial. [...] The degree can be bought and sold in the public marketplace of research development, policy information and social and institutional change."\(^{26}\)

We find most of the above mentioned developments reflected in the following paragraphs of the 'Exposé des motifs' of the 'Avant projet de loi relatif aux aides à la formation-recherche' of April 2007:

"Ainsi, à court terme, « le Gouvernement

- veillera au développement des ressources humaines de provenance intérieure et de leur mobilité, notamment par la promotion de la culture scientifique et technologique, un effort particulier sera fait au niveau de la formation des jeunes enseignants afin de garantir l’éveil de l’intérêt des futurs chercheurs dès leur plus jeune âge;

- favorisera l’immigration de chercheurs (notamment au niveau du troisième cycle, du doctorat voire du post-doctorat) et de compétences techniques, y compris de ressortissants non-communautaires (procédure allégée pour permis de travail et de séjour à des ressortissants non-UE et les membres de leur famille, à la demande d’employeurs résidants (mobilité intra-groupe), de l’Université du Luxembourg (UdL) et des Centres de Recherche Publics et encouragera l’ancrage de compétences de R&D sur le Luxembourg (double nationalité);

- transposera sans délai les directives sur l’accès au marché du travail des étudiants universitaires ainsi que des chercheurs et veillera à une homologation plus rapide des diplômes étrangers en s’appuyant sur le cycle LMD (Licence, Maîtrise, Doctorat) prévu par le processus de Bologne."\(^{27}\)

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**Doctoral research training in Europe: linking the European Research Area with the European Higher Education Area**

**Salzburg II**

In Europe the (structured) qualification of doctoral candidates has received major attention over the past decade. In fact, doctoral education can be seen as strong link between the European Research Area and the European Higher Education Area and is increasingly considered as distinct from the first two cycles of the Bologna Process, i.e. the Bachelor and the Masters’ phase. In its recently published Salzburg II Recommendations the European University Association’s Council for Doctoral Education underlines: "First of all, doctoral education has a particular place in the European Research Area and the European Higher Education Area. It rests on the practice of research, which makes it fundamentally different from the first and second cycles."\(^{28}\) In this sense we can argue that research funding organisations are well-placed in providing funds for doctoral programmes. Research is at the core of doc-

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\(^{27}\) Cf. Avant-projet de loi relatif aux aides à la formation-recherche, p. 10.

toral education and will likewise contribute to qualifying the next generation of re-
searchers.

The Council for Doctoral Education comes up with other two recommendations as
guidance for future PhD education in Europe. It thereby underlines both the need of
individual flexibility and of institutional accountability in doctoral education:
"Secondly, doctoral candidates must be allowed independence and flexibility to grow
and develop. Doctoral education is highly individual and by definition original. The
path of progress of the individual is unique, in terms of the research project as well as
in terms of the individual professional development.
Lastly, doctoral education must be developed by autonomous and accountable insti-
tutions taking responsibility to cultivate the research mindset. Institutions need flexi-
ble regulation to create special structures and instruments and continue advancing
European doctoral education."

Salzburg I
The above mentioned recommendations build on experience gained by universities
in Europe in implementing the 'Salzburg Principles' which were worked out in the
framework of the Bologna Process in order to provide orientation and guidance to all
actors involved in the qualification of doctoral candidates. The ten recommendations
of 2005 are still valid and can be seen as 'Magna Charta' which any doctoral pro-
gramme in Europe should take account of:

- "The core component of doctoral training is the advancement of knowledge
  through original research."
- Embedding of doctoral programmes and research training in institutional strate-
gies and policies.
- "The importance of diversity of doctoral programmes in Europe: the rich diversity
  of doctoral programmes in Europe – including joint doctorates – is a strength
  which has to be underpinned by quality and sound practice."
- Doctoral candidates as early stage researchers with commensurate rights.
- The crucial role of supervision and assessment: in respect of individual doctoral
  candidates, arrangements for supervision and assessment should be based on a
  transparent contractual framework of shared responsibilities.
- "Doctoral programmes should seek to achieve critical mass. [...] These range
  from graduate schools in major universities to international, national and regional
  collaboration between universities."
- "Doctoral programmes should operate within an appropriate time duration (three
to four years fulltime as a rule)."
- "The promotion of innovative structures: to meet the challenge of interdisciplinary
  training and the development of transferable skills."

29 EUA, 2010, ibid.
30 The original Salzburg I Recommendations are displayed and profoundly analysed in the Salzburg II
"Increasing mobility: Doctoral programmes should seek to offer geographical as well as interdisciplinary and intersectoral mobility and international collaboration within an integrated framework of cooperation between universities and other partners."

"Ensuring appropriate funding: the development of quality doctoral programmes and the successful completion by doctoral candidates requires appropriate and sustainable funding"

**LERU: Doctoral Degrees Beyond 2010**

Beyond this set of principles, the association of leading research universities in Europe, the League of European Research Universities (LERU), has worked out a number of recommendations which future oriented research training should take into account. Notably, the subtitle of LERU's recommendation on 'Doctoral degrees beyond 2010' is 'Training talented researchers for society'. In this regard providers of doctoral education, namely universities, are asked to ensure that original research remains the cornerstone of the doctorate and at the same time to prepare doctoral candidates for driving complex changes in society and to become intellectual risk-takers.

Internationalisation of doctoral education with the aim to contribute to the advancement of knowledge both in the host countries and the countries of origin of researchers is seen as crucial to meet the demands of globalised economies and societies. This implies that as basic requirements doctoral programmes should promote the mobility of researchers during the doctorate, to develop internationally oriented recruitment procedures and to supply appropriate internal support for international students.

At the same time universities are encouraged to work more closely with employers in order to make sure that the doctorate is a suitable preparation for the world of work inside and outside academia: "[T]here is a need to highlight to both students themselves and to potential employers the sophisticated transferable skills that researchers develop during their doctorate." Hence, the League of European Research Universities calls upon universities to "ensure that structures are configured to support doctoral students through graduate schools or doctoral schools or some similar organisation to support both candidates and their supervisors" and to "seek new sources of funding for doctoral candidates".

Of course the LERU recommendations are primarily tailored to the target group of universities, but they also give advice to funding institutions and policy-makers on what to look at in discussing forward looking programmes to support doctoral research training. In this sense they are clearly valid for further considerations regarding the advancement of FNR's AFR programme.

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32 LERU, 2010, p. 3.
Provision of transferable skills

Critics of structured doctoral programmes often see PhD qualification which once seemed to guarantee large degrees of freedom and independence both to the supervisor and the doctoral candidate endangered by institutional arrangements or, even worse, overregulation by graduate schools or doctoral programmes. Of course overarching institutional bureaucracies with strong regulative power should be avoided in any case and might indeed be the end of researchers’ creativity. On the other hand there is large consensus that doctoral qualification should nowadays provide much more than just good research qualification in order to prepare candidates for increasingly flexible and demanding labour markets and societal needs: “The next generation of PhDs has to acquire: not only the traditional academic research competencies of successfully undertaking research and publishing it, but in addition, they have to acquire professional competencies that assure effective dissemination and appropriate application of their research findings in various settings inside and outside the universities; and they have to acquire cultural competencies that allows them to work with, and function in, multi-national teams and settings.”36

Hence, higher education and research institutions are asked to define approaches for human resources development for careers in academia and beyond. The provision of transferable skills seems to be key in this respect. Of course much debate has been going on what ‘transferable skills provision’ should encompass and what it should aim to achieve. In order to again gain clarity and to serve as point of reference the European Science Foundation’s Member Organisation Forum on Research Careers was able to deliver a definition of ‘transferable skills in a research context’ which was supported by its members, i.e. more than 30 research funding and performing institutions all over Europe: “Transferable skills are skills learned in one context (for example research) that are useful in another (for example future employment whether that is in research, business etc). They enable subject- and research related skills to be applied and developed effectively. Transferable skills may be acquired through training or through work experience.”37

ESF’s Research Career Forum also worked out a jointly agreed list of transferable skills which provided the framework for our analysis in chapter 3.4.4 of this evaluation exploring actual experiences of AFR beneficiaries with transferable skills training and their future needs. The Joint Skills Statement offered by the ESF builds on the ‘Joint Statement of the Research Councils’ Skills Training Requirements for Research Students’ developed in 2001 by the British Research Councils and the UK Grad Programme38 and the ‘Irish Universities PhD Graduates’ Skills’39 which was modelled after the British example.

37 Scholz, Beate; Vuorio, Eero; Matuschek, Susanne; Cameron, Iain: Research Careers in Europe – Landscape and Horizons. Report by the ESF Member Organisation Forum on Research Careers, Strasbourg 2010, p. 47.
Meanwhile the UK has moved an important step forward by introducing the 'Researcher Development Framework' (RDF) and the 'Researcher Development Statement' (RDS) which is derived from it. The RDS "sets out the knowledge, behaviours and attributes of effective and highly skilled researchers appropriate for a wide range of careers"\(^{40}\). The organisation in charge of these developments is Vitae\(^{41}\), "a national organisation championing the personal, professional and career development of doctoral researchers and research staff in higher education institutions and research institutes."\(^{41}\) The Researcher Development Framework is different from the Joint Skills Statement in that it takes a closer look at what is actually needed from a researcher's career development point of view. In this sense it is structured in four domains with clusters of skills which are "required to be an effective researcher and employee in a world driven by knowledge production and innovation":

Certainly, discussion is needed across Europe to which extent the RDS and RDF might be suitable to the needs of other countries and specifically the respective research community. Undoubtedly, both approaches offer a good starting point for discussion at European and at national level. In the case of Luxembourg should be considered in which way a framework for (research) career development skills could be defined and who should take the responsibility for providing corresponding training measures.

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\(^{40}\) Vitae: Researcher Development Statement,  

\(^{41}\) Cf. [http://www.vitae.ac.uk/](http://www.vitae.ac.uk/).

\(^{42}\) Vitae: Researcher Development Framework, p. 1,  
The provision of transferable skills can be seen as a sign in which way academia and public research acknowledges the needs and requirements of the wider labour market, namely the private research sector as well as the public and the private non-research sector. The collaboration of public institutions and companies in the framework of Public Private Partnerships is another step in this direction.

These developments are immensely boosted by the European Commission in its recent initiative to realise a ‘European Innovation Union’. In its Communication ‘Europe 2020 Flagship Initiative Innovation Union’ the Commission sets the agenda for the decade 2011 until 2020: “The European Union should commit to creating a true ‘Innovation Union’ by 2020 by:

- Taking collective responsibility for a strategic, inclusive and business-oriented research and innovation policy, to tackle major societal challenges, raise competitiveness and generate new jobs. […]
- Prioritising and protecting investments in our knowledge base, reducing costly fragmentation and making Europe a more rewarding place for innovation and for bringing ideas to market. […]
- Agreeing to launch European innovation partnerships […].”

Notably, a common approach concerning the "quality of doctoral training" is the first item which is mentioned in the context of the projected ‘European Research Area framework’ to be realised from 2012 onwards. This illustrates the need for EU Member States to check whether their respective doctoral education systems meet the demands of the European Innovation Union. Correspondingly, the European Commission has set up a working group on Skills under the auspices of its Steering Group on Human Resources and Mobility with the assignment to carry out a mapping exercise on doctoral education in Europe.

**EUA: ‘Collaborative Doctoral Education’ and ‘Responsible Partnering Guidelines’**

In principle, the AFR scheme seems well prepared for the European Innovation Union in that right from its start in October 2008 it has envisaged the incorporation of Public Private Partnerships. However, as we have seen in our ‘customers survey’ such Public Private Partnerships are still limited to few exceptional cases and even then still leave a lot to be desired. Thus, we see the need for FNR to take into account recent recommendations and guidelines on how to fill inter-sectoral collaborations with life and keep them manageable for all parties involved.

The European University Association together with partner organisations from the industrial side has for a long time been engaged in fostering inter-sectoral research collaboration on a fair and transparent basis. In their ‘Guidelines for Collaborative Research and Knowledge Transfer between Science and Industry’ the European University Association together with the European Association of Research and Technology Organizations, European Industrial Research Management Association

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44 European Commission, 2010, ibid., p. 11.
and ProTon Europe for the first time in 2005 defined a framework for intersectoral research collaboration. These recommendations were updated and renewed in 2009\(^45\). Among other recommendations which are essential we would like to highlight two essential features as they were formulated in the Responsible Partnering Guidelines of 2009:

"One of the main challenges is to align interests sufficiently, so that people can concentrate on addressing their shared research objectives. This requires that each partner understands and respects what is truly important to others as well as to themselves and be willing to take steps to:

- Eliminate problems during project and IP management such as speed of negotiation, ownership of results, and exclusivity of use; and
- Provide for equitable compensation, including where appropriate for indirect costs and background knowledge, and/or with fair returns in the event of successful commercialisation based on a realistic understanding of value and costs."\(^46\)

In addition, the Responsible Partnering Guidelines refer to a checklist for collaborative doctoral education which was published by the European University Association in its 2009 report of the DOC-Careers project. The following "twelve messages for developing collaborative doctoral programmes" could indeed be adopted by research funding organisations and be provided to their respective research communities for launching Public Private Partnerships in research training:

1. "Identify knowledge/technological needs and challenges which need R&D input
2. Exchange views on knowledge/technological challenges with university/industry
3. Plan medium-long term R&D strategy (e.g. within five years)
4. Develop high quality research proposals
5. Know the costs of your research and identify funding sources
6. Raise your awareness of the respective research environments in which to collaborate in your field (university, industry)
7. Develop/Participate in fora for soft ways of interaction between students, researchers and industry experts with good research content (conferences, fairs, etc.)
8. Organise small-size highly-specialised workshops/meetings pooling experts from different research fields and sectors
9. Seek the right expertise to assist you (IPR issues, contractual issues, etc.)
10. Formalise doctoral collaborations in solid and fair agreements combining structure and flexibility
11. Consider physical proximity as an asset to develop mutual trust - promote face-to-face dialogue
12. Commit to excellence in doctoral education, research and management."\(^47\)

\(^{45}\) Cf. eirma, EUA, EARTO, ProTon: Joining Forces in a World of Open Innovation: Guidelines for Collaborative Research and Knowledge Transfer between Science and Industry, Brussels 2009

\(^{46}\) eirma, EUA, EARTO, ProTon, 2009, p.
Meanwhile some countries have gained considerable experience with establishing Public Private Partnerships in the field of research training. In France the public/private National Association for Technical Research (ANRT), acting on behalf of the Ministry of Research, created the Industrial Research Training Agreement (Cifre) scheme in 1981. Higher education laboratories and private companies combine to offer doctoral students the opportunity to undertake their 3 year course in a mixed public/private environment. The doctoral thesis is thereby transformed into a meaningful career qualification. Funded by the Ministry, with maintenance grants to the students and compensatory payments to the companies, the Cifre scheme, has produced more than 12,000 postdocs.48

Of course a scheme like CIFRE which has been in place for more almost thirty years underwent a number of impact studies – the results of which were published in rather short summarising documents. A survey of 2004 came to the conclusion: "Using a non parametric matching estimator to control for the selection bias due to the choice of a CIFRE programme, we show that there is a positive wage gain, three years after graduation, especially in the private sector. It also appears that implying simultaneously universities and firms in the doctoral training has a positive impact for young doctorates in the early stages of their careers."49 A more recent study of 2009 confirms the earlier results: "L’appréciation générale de la formation doctorale accompagnée par le dispositif CIFRE est globalement positive et bien servie par le taux d’emploi, par la rapidité d’accès à l’emploi, voire la reconnaissance salariale."50 Notably, around 60% of the former CIFRE PhD candidates were hired by the companies in which they carried out their research projects.

**Monitoring and quality assurance**

For the time being we are not in the position to estimate to which extent the goals of future oriented doctoral education have in fact been reached through the implementation of the AFR programme. For Luxembourg to be able to measure the impact of such programmes like AFR we see the need for setting up a national monitoring system. It should in any case be able

- to provide data on doctoral and postdoctoral qualification and related research outputs,
- to monitor the mobility of researchers of all stages into and out of Luxembourg and between sectors with a special emphasis on doctoral candidates and postdocs and
- to track the careers of former beneficiaries which had been supported through national R&D and/or additional European funds.

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49 Giret, Jean-François; Recotillet, Isabelle: The impact of CIFRE programme into early careers of PhD graduates in France, November 2004, p. 13.
Luxembourg may refer to a number of international examples in this respect: Some countries have set up national systems in order to monitor doctoral programmes and to provide continuous feedback to universities, graduate schools and funding institutions on the quality of these programmes and their impacts. The ‘ProFile’ project carried out by the ‘Institut für Forschungsinformation und Qualitätssicherung’ (iFQ) in Germany\(^{51}\) may be referred to as an example of good practice as well as the national monitoring of graduate schools in Brazil by the funding organisation Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES)\(^{52}\). The United States’ National Research Council of the National Academies offers a comprehensive assessment of more than 5,000 research doctorate programmes at 212 universities in the US and basically presents comprehensive data on many aspects of doctoral programmes. This assessment has been undertaken every ten to fifteen years since the 1950ies.\(^{53}\) In the United Kingdom the national Quality Assurance Agency is in charge of carrying out institutional evaluations, thereby also considering the quality of doctoral education within these institutions.\(^{54}\)

**Career tracking**

Several countries, specifically the United States and the United Kingdom, have gained considerable experience in tracking the careers of former doctoral candidates: In the United States the research carried out by Maresi Nerad and her collaborators at the Center for Innovation and Research in Graduate Education (CIRGE) mark a cornerstone in this kind of research. CIRGE which is based at the University of Washington at Seattle hosts three US national surveys with the aim to analyse the career paths of doctoral recipients and to investigate how these careers tracks are linked to the quality of doctoral education:

1. “The PhDs—Ten Years Later study surveyed nearly 6,000 PhDs who completed their graduate education between 1983 and 1985 from 61 doctoral granting institutions across the United States. Six disciplines were chosen to represent major fields of study: life science, engineering, humanities, physical science, and social science.”\(^{55}\)

2. “PhDs in Art History – Over a Decade Later surveyed all PhD recipients who graduated from US art and architectural history programs during the academic years 1985 to 1991.”\(^{56}\)

3. The most recent study of 2007 until 2009 concerns Social Science PhDs—Five+ Years Out. "The survey was designed to assess current employment status, type of job sector and job satisfaction, better understand career trajectories among recent PhD awardees, and evaluate graduate programs."\(^{57}\)

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\(^{51}\) For more information cf. [http://www.forschungsinformation.de/profiling/start.html](http://www.forschungsinformation.de/profiling/start.html).


\(^{54}\) Cf. [http://www.qaa.ac.uk/](http://www.qaa.ac.uk/).

\(^{55}\) Cf. [http://depts.washington.edu/cirgeweb/c/research/phd-career-path-surveys/phds-ten-years-later/](http://depts.washington.edu/cirgeweb/c/research/phd-career-path-surveys/phds-ten-years-later/).


In tracking careers of doctorate holders it is important to be aware that immediately after degree completion graduates take on temporary positions. Therefore, an assessment later than four years after PhD completion allows for capturing career outcomes that evidence more permanent employment positions of doctorate holders and, thus, a fundamental understanding of career development.

In the UK Vitae\textsuperscript{®} is responsible for career tracking surveys of doctorate holders and researchers. The report ‘What Do PhDs Do?’ originally carried out by the UK Grad Programme\textsuperscript{®} analysed for the first time ever in the UK the first destinations of PhD graduates.\textsuperscript{58} The current ‘What Do Researchers Do?’ series by Vitae\textsuperscript{®} seeks to investigate the career profiles as well as the destinations of doctoral graduates.\textsuperscript{59}

Of course in-depth discussion is needed to which extent a small country like Luxembourg will be in the position to set up a comprehensive monitoring system of ongoing doctoral qualification and of career paths of all PhDs and postdocs. However, we recommend that the above mentioned examples of existing good practice be studied and used as a ‘tool box’ for developing a quality assurance and monitoring system which is in line with the needs of Luxembourg. All in all, it is important to note that these surveys analyse a considerable time-span after completion of the degree of at least 5 years or so. Thus, with the first AFR grantees completing their doctorates in 2011 it might now be the right time for starting to develop a career tracking system.

4.2 International benchmarking of the AFR scheme

Any international benchmarking of doctoral programmes in a given national system should take into account prevalent approaches of other systems and corresponding programmes offered by research councils and research performing institutions to support doctoral education. Hence, the subsequent benchmarking of the AFR programme will in the first place briefly describe selected features of other national systems (two large and two small countries) and as a second step compare the characteristics of the AFR scheme with those of comparable schemes in other countries. Overall it is important to note that a range of countries for the sake of national research capacity building have set up funding schemes to foster structured doctoral education.\textsuperscript{60} National policies have responded to globalisation in implementing four essential elements:

- Establishment of national governmental research training schemes, research quality frameworks: Australia, Brazil, EU (Denmark, Germany, Netherlands, Norway) Canada, Finland, Japan, Malaysia, Mexico, New Zealand, South Africa, UK, US;
- Industrial representation on national PhD program evaluation: Denmark, Norway;

\textsuperscript{58} Cf. UK GRAD Programme\textsuperscript{®}: What Do PhDs Do? 2004 analysis of first destinations for PhD graduates, 2004.
\textsuperscript{59} Cf. \url{http://www.vitae.ac.uk/policy-practice/107611/What-do-researchers-do-.html}.
Innovative, interdisciplinary, theme-oriented doctoral programs: Germany, US, Australia, Netherlands;
International exchange: establishment of “sandwich doctoral programs” and exchange programs of both professors and students: Brazil, Malaysia, Mexico, Iceland, India.\textsuperscript{61}

National approaches to doctoral education

a. United States

For Europeans it is sometimes difficult to understand that in the US a graduate school is usually not the place where doctoral education actually takes place, but a central administrative body in charge of creating the framework for doctoral programmes which are as a general based in the departments. We would like to highlight the following features of doctoral education in the US\textsuperscript{62}:

- Target group: Applicants to US graduate schools need to have achieved an undergraduate degree that is generally completed during a 4-year course of study.
- Institutional embedding: “Master’s and doctoral education (also called graduate education) takes place in highly decentralised and semi-autonomous units, mainly in departments of doctoral-granting universities and colleges”\textsuperscript{63}
- Programme elements and sequence:
  a) Generally a certain number of fixed courses and a number of elective courses need to be completed terminating with an exam and the obligation to write a major publishable article.
  b) Then, a dissertation proposal has to be elaborated and original research work needs to be performed.
  c) Finally, the doctoral thesis has to be completed and presented to a dissertation committee composed of three to five faculty members plus an external advisor.
- Quality Assessment of doctoral programmes is periodically performed by members of neighbouring departments and researchers of the same field from other universities.

With the aim to establish “innovative new models for graduate education and training in a fertile environment for collaborative research that transcends traditional disciplinary boundaries” the National Science Foundation (NSF) launched the Integrative Graduate Education Research Traineeship (IGERT) programme in 1997.\textsuperscript{64} IGERTs “educate and train doctoral students in problem-oriented and theme-based research


\textsuperscript{63} Nerad, Maresi, 2008, ibid., p. 284.

programs" which are usually interdisciplinary.\textsuperscript{65} In addition to research they also provide transferable skills training to prepare doctoral candidates for the labour market inside and outside academia. This scheme has become the flagship programme of NSF and has resulted in creating an additional programme which requires Partnerships for International Research and Education (PIRE).\textsuperscript{66}

b. Germany

Whereas the individual qualification of doctoral candidates in Germany builds on age-long experience, structured doctoral education is a rather recent phenomenon of the past twenty years. The German Research Foundation (DFG) set up the Research Training Group (RTG) Scheme in 1990\textsuperscript{67}. As such, the DFG was pivotal in contributing to the creation of a new paradigm for doctoral education in Germany. This also applies to the Graduate School (GSC) programme which DFG launched in 2005 in the framework of the German Excellence Initiative. As a result of the 2005 and 2006 competition for Graduate Schools 39 programmes received funding. In the 2010 competition 98 proposals for new Graduate Schools were received, the funding decisions are to be taken in summer 2012. As an umbrella structure GSC can integrate several Research Training Groups or other structured doctoral programmes.

As we can see from table 13 Research Training Groups and Graduate Schools vary considerably in terms of size and scope:

\textsuperscript{65} Nerad, Maresi, 2008, ibid., p. 290.
\textsuperscript{66} Cf. \url{http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12819}.
Table 13 Features of RTGs as compared to GSCs

<table>
<thead>
<tr>
<th>Type of scheme Programme features</th>
<th>Research Training Groups(^{68})</th>
<th>Graduate Schools(^{69})</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope and Research Programme</strong></td>
<td>Thematic research training</td>
<td>Academic profile in the form of overarching goals, themes or principles, variety of subjects and topics, Fit into institutional strategy</td>
</tr>
<tr>
<td></td>
<td>Innovative, often interdisciplinary topics</td>
<td></td>
</tr>
<tr>
<td><strong>Actors</strong></td>
<td>In general 5-10 outstanding researchers, 10-20 doctoral candidates, 1-2 postdocs, selected undergraduates</td>
<td>At least 25 PIs, 50 or more doctoral candidates</td>
</tr>
<tr>
<td><strong>Qualification</strong></td>
<td>Study programme: tailored to research programme, provision of transferable skills Joint supervision and mentoring</td>
<td>Structured doctoral training process comprising a clearly defined supervision model (including compulsory supervision agreements) and a differentiated qualification programme</td>
</tr>
<tr>
<td><strong>Internationality</strong></td>
<td>Strong international component International RTGs as variant envisage a joint programme with at least one international partner institution</td>
<td>Development of internationally competitive research centres by promoting young researchers International visibility within a broad scientific usually interdisciplinary area</td>
</tr>
</tbody>
</table>

A first monitoring of the Graduate School programme has pointed to some characteristics and developments which most of the GSCs seem to share\(^{70}\):

- Well-defined governance: As was required by the programme rules all GSCs have set up clear structures, usually including a system of checks & balances.

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\(^{68}\) Cf. [http://www.dfg.de/en/research_funding/programmes/coordinated_programmes/research_training_groups/index.html](http://www.dfg.de/en/research_funding/programmes/coordinated_programmes/research_training_groups/index.html).


‘Joint ventures’ are common: 87% of the GSCs cooperate with non-university research performing institutions, 51% incorporate public-private-partnerships with companies.

Career structure: The pre-doc phase is partially integrated through ‘fast tracks’ which for instance allow graduates with a Bachelors degree to enter the programme. Some GSCs seem to transform to junior researchers’ centres in that they integrate postdocs, assistant professors and junior research group leaders.

Supervision is generally carried out by more than one supervisor, mostly by Thesis Advisory Committees.

Bottlenecks: Especially in the beginning GSCs were involved in a severe competition for talents. Only about 20% of the positions were filled with foreign recruitments which might be due to the limited international attractiveness of salaries and stipends which are offered.

**Doctoral education outside the university**

The establishment of doctoral programmes in Germany is not limited to universities alone. During the past decade non-university research performing organisations like the Max Planck Society and the Helmholtz Association of Research Centres started their own programmes to offer structured research training. Three major schemes are in place:

- International Max Planck Research Schools\(^71\) which require a 50% share of international candidates,
- Helmholtz Research Schools\(^72\) which are equivalent to DFG’s RTGs and
- Helmholtz Graduate Schools which largely correspond to DFG’s GSCs.

However, all of these programmes need university partners as the right to grant doctoral degrees still lies with the universities. The advantage of such programmes is that they are in any case suited to bridge the gaps between research in non-university performing institutions and in universities.

c. Finland

Two main forms of graduate schools prevail throughout Finland, i.e. the ‘inter-university/subject focused’ type versus the ‘intra-university/interdisciplinary’ type:

“The ‘inter-university/subject focused’ model serves to bring together students and academic staff working on different aspects of a single discipline or field across the country, and appears to work best when focused on established areas of research excellence. The major training focus of these graduate schools is subject related, although in some there is an element of transferable skills training. […] The ‘intra-university/interdisciplinary’ model serves to bring together students from different disciplines within a single institution. The major training focus of these graduate schools


\(^72\) Cf. [http://www.helmholtz.de/en/research/promoting_research/promoting_young_academics/helmholtz_graduate_schools_and_helmholtz_research_schools/](http://www.helmholtz.de/en/research/promoting_research/promoting_young_academics/helmholtz_graduate_schools_and_helmholtz_research_schools/).
is in transferable skills”. The option of a network-based inter-university model of doctoral education, which allows achieving a critical mass by pooling research capacity within a country or even across borders, is rather unique to Finland. The Irish Graduate Research Education programme was modelled, in part, after Finland’s example.

Graduate schools in Finland are known for the provision of grants to doctoral candidates covering the full 4 years towards completion of the degree. The main components of these doctoral programmes are: “training in subject-related content and research techniques; training in transferable skills (e.g., pedagogical training and professional writing) and career development; and the research project.” Compared to the American model, doctoral candidates in Finland seem less obliged to attend core courses. This might be due to the fact that “decisions on mandatory elements of doctoral study programs are generally the responsibility of faculties rather than the graduate schools.” The same holds true for supervision, which mainly remains in the hands of the individual departments.

In Finland, too, doctoral programmes are supported by the central research funding institution, the Academy of Finland. The central aim of the programmes which are to be funded between 2012 and 2015 is “to provide systematic, high-level and supervised doctoral training for a fixed period. [...] Doctoral programmes contribute to ensuring the supply of a sufficient number of high-level researchers and experts to meet the needs of universities, business and industry, and society at large. [...] The four-year doctoral programme positions funded by the Ministry of Education and Culture are intended for full-time work on a doctoral dissertation. Doctoral candidates are hired to these positions generally for the entire four-year term.”

d. Ireland

The introduction of structured doctoral education at large scale in Ireland dates back to 2006 when the Irish Government in its Strategy for Science Technology and Innovation (SSTI 2006) announced to double the number of PhDs between 2003 and 2013. A report on behalf of the Irish Universities Association states: “The universities have introduced structured PhD programmes and are cooperating to this end under the banner of 4th Level Ireland.” A further study which will analyse “the effects of the structured PhD programmes and probe in more depth the relationship between the PhD student and various aspects of the college structure such as supervision, infor-

74 Dill, David et al., 2006, ibid., p. 52.
75 Dill, David et al., 2006, ibid., p. 54.
77 Cf. Irish Universities Association, O’Carroll, Conor; Delaney, Liam; Gubbins, Sarah A; Harmon, Colm; Redmond, Cathy: Irish Universities Study. Report on PhD students in the Irish Universities, August 2009.
mation and facilities”⁷⁹ is still in preparation. However, this first report already draws light on doctoral education in Ireland: “PhD students in Irish universities display strong levels of interest in their topic. The mean rating on a ten-point interest scale for this group is 8.6.”⁸⁰

With the aim to foster new models of structured research education and collaboration the Irish Research Council for Science, Engineering and Technology together with the Irish Research Council for Humanities and Social Sciences launched the Graduate Research Education Programme (GREP) in 2006. In a sense the GREP is to be seen as a hybrid between the German and the Finnish models of doctoral education, in that it shall identify promising models of doctoral education on a competitive basis and it allows for setting up networks for PhD qualification in an international environment: “One of the objectives of this funding scheme is to encourage collaboration in the development of research education, either between researchers in a specific research area or discipline working in one or more institutions, or between researchers in a number of related interdisciplinary or multidisciplinary areas working in one or more institutions. In the case of proposals in specific research areas or disciplines, the Councils favour the development of networks likely to maximize the impact across as wide a range of institutions as practicable. In all cases, it is envisaged that collaboration will enhance the range and quality of the programme, particularly in the provision of high-level training in specific research areas and in a range of transferable skills.”⁸¹

Certainly, the scope of the GREP is wider than just promoting high-level research qualification. "The specific aim of the scheme is to encourage actions that will broaden and deepen the intellectual training which the student will receive; to develop innovative structures for the provision of generic skills and of high-level interdisciplinary skills. It is anticipated that specific actions designed to achieve these objectives will vary widely across the range of disciplines covered by the scheme."⁸²

As the first GREP initiatives started only in 2008 it is definitely too early to estimate their impact as yet. In acknowledging the needs of a small country, especially its societal and economic requirements, the GREP might among others be a useful model for Luxembourg to refer to in preparing a pilot scheme for structured doctoral programmes. Also the bottom procedure in which the scheme was developed in the framework of a conference hosted by the Irish Higher Education Authority in February 2006 might serve as a model of good practice.

e. Individual vs. structured PhD funding programmes: a schematic overview

In addition to the models of doctoral education as described in the previous paragraphs table 14 displays a schematic overview of funding schemes for doctoral candidates in several European countries, at EU level and in Canada. We find that most

⁷⁹ Irish Universities Association, 2009, ibid., p. 32.
⁸⁰ Irish Universities Association, 2009, ibid., p. 6f.
⁸¹ Cf. the Guidelines of the GREP Call 2007, p. 3; http://www.irchss.ie/grad/GREPapp06.doc.
⁸² Cf. the Guidelines of the GREP Call 2007, ibid.
countries seem to be heading towards structured programmes. The AFR programme is unique in that it is the only nation-wide scheme to support doctoral candidates as compared to other countries which have more than one national government-funded schemes and in addition private foundation schemes.

Table 14 Types of funding schemes for doctoral candidates in selected countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Funding agency</th>
<th>PhD individual scheme</th>
<th>PhD structured scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>FWF Austria</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Belgium</td>
<td>FWO Flanders/Belgium</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>FNRS Wallonia/Belgium</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Canada</td>
<td>Canadian Research Councils NSERC, SSHRC, CIHR</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Europe</td>
<td>ITN</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Finland</td>
<td>AKA Finland</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Germany</td>
<td>DFG</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Max-Planck Society</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Fraunhofer</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>Helmholtz</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Foundations: political parties, churches, trade unions</td>
<td>YES</td>
<td>Some: Böckler &amp; Böll-Stiftung</td>
</tr>
<tr>
<td></td>
<td>DAAD</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Ireland</td>
<td>IRCSET Ireland</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Netherlands</td>
<td>NWO</td>
<td>YES (specific fields)</td>
<td>YES</td>
</tr>
<tr>
<td>Switzerland</td>
<td>SNF Switzerland</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>UK</td>
<td>UK Research Councils</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

*International benchmarking of AFR features and procedures*

In comparing the current AFR features and procedures with those of similar individual programmes in Canada, Belgium and Ireland (Table 15) we find that the AFR scheme is rather competitive. The success rates in most other programmes are obviously substantially lower, whereas the duration of the selection procedures is on average – with the exception of Ireland – considerably longer than in Luxembourg. AFR also seems to be better placed when it comes to the duration of the grant of up to four years as compared to an average duration of 3 three years in most of the other countries. Belgium and Luxembourg offer work contracts while in Canada and Ireland individual stipends still prevail. Besides Luxembourg the Canadian research councils still make use of remote reviews. This practice has been questioned in Luxembourg anyhow and will be changed during in view of the upcoming AFR calls.
Table 15 Features and procedures of selected individual PhD funding schemes abroad

<table>
<thead>
<tr>
<th>Country</th>
<th>Name of scheme</th>
<th>N° of calls p.a.</th>
<th>Average success rate last years</th>
<th>Duration of grant</th>
<th>Selection panel?</th>
<th>Remote reviewers?</th>
<th>Average time from DL to Funding Decision</th>
<th>Fellowship (FS)/ Work contract (WC)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>NSERC - PGS &amp; CGS</td>
<td>1</td>
<td>PGS: 44%; CGS: 23%</td>
<td>2-3 years</td>
<td>yes</td>
<td>yes</td>
<td>5.5 months</td>
<td>FS; Award is paid to HI, they schedule payments to fellows, but no insurances</td>
</tr>
<tr>
<td>Canada</td>
<td>SSHRC - CGS &amp; doctoral fellowships</td>
<td>1</td>
<td>20.1 %</td>
<td>CGS: 3 years others: 1-4 years</td>
<td>yes</td>
<td>yes</td>
<td>5.5 months</td>
<td>FS; Award is paid to HI, they schedule payments to fellows</td>
</tr>
<tr>
<td>Belgium</td>
<td>FWO PhD grants</td>
<td>1</td>
<td>21.4 %</td>
<td>2+2 years</td>
<td>yes</td>
<td>no</td>
<td>4 months+3 weeks</td>
<td>WC</td>
</tr>
<tr>
<td>Ireland</td>
<td>IRCSET PhD grants</td>
<td>1 (-2)</td>
<td>N.A.</td>
<td>3 years</td>
<td>yes</td>
<td>by panel</td>
<td>2 months; in case of negative evaluation feedback within 6-8 weeks after funding decision</td>
<td>FS</td>
</tr>
</tbody>
</table>

**Preliminary conclusions for the advancement of the AFR doctoral programme**

The above mentioned trends and developments call for a diversification of the AFR scheme. However, it is important to note that future programme developments, specifically structured programme elements, should in any case create a loose framework offering room for abundant bottom up initiatives in order to meet the needs of the respective scientific communities as well as of individual institutions. Yet, the following general principles of the PhD education should at least be taken into account:

- original research as core component of the doctorate and the postdoctorate,
- easy (selection) procedures and thereby increase of efficiency,
- tailor programmes to individual needs,
- provide resources structures to embed the individual qualification in a flexible institutional framework,
- provide transferable skills beneficial to career development inside and outside academia,
- foster the culture of Human Resources development in research institutions and the university,
- integrate future employers and societal stakeholders,
- build bridges between research (training) in universities, non-university research institutions and companies,
- encourage intellectual risk-taking and the creation of new science fields (mode II),
- be open and attractive both to nationals and early career researchers from abroad,
- select excellence,
- implement suitable quality assurance and career tracking mechanisms.

4.3 Postdoc level: European challenges and solutions

In this paragraph we only emphasise two aspects which are significantly different as compared to the doctoral level:

- The predictability of career paths and
- The reliability of funding schemes in view of achieving tangible results.

*Predictability of career paths*

"Extreme heterogeneity of career steps and confusion about terminology are major factors distracting researchers from a career in the public research sector."\(^{83}\) This state of disorientation together with relatively low salary levels as compared to the private sector, employment on fixed-term contracts and fierce competition for permanent positions has induced researchers over the past years to either leave the academic or public research sector at all or head for systems, mainly in North America, which still allow for stability.

"At most North American institutions, tenure is typical for senior faculty appointments such as professors and associate professors. Achieving tenure generally requires a strong record of published research and administrative work including committee membership [...]. Most tenure systems allow junior tenure-track faculty members a period of several years to establish such a record. In addition to job security, academic tenure aims to protect academic freedom."\(^{84}\) However, an article in 'Nature' of November 2010 pointed out that the North American system of tenure track which had over the past decades been a major attractor to researchers from Europe and around the world seems to be receding not least because of tight institutional budgets.\(^{85}\)

Given these trends it is not surprising that a number of actors in Europe have simultaneously taken the initiative to define taxonomies for research careers with the aim of providing orientation and transparency about this career track. Both the ESF’s Member Organisation Forum on Research Careers and the League of European Research Universities came up with rather similar models of research careers. They

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\(^{83}\) Scholz, Beate; Vuorio, Eero; Matuschek, Susanne; Cameron, Iain: Research Careers in Europe – Landscape and Horizons. Report by the ESF Member Organisation Forum on Research Careers, Strasbourg 2010, p. 3.


\(^{85}\) Cf. Kaplan, Karen, ibid.
vary in that the ESF model tries to describe research careers in the public sector in general, whereas the LERU model is focused on academia:

Figure 48 Schematic presentation of a four-stage research career by ESF\textsuperscript{86}

Figure 49 LERU's Four-stage career framework\textsuperscript{87}

\textsuperscript{86} Scholz, Beate; Vuorio, Eero; Matuschek, Susanne; Cameron, Iain: Research Careers in Europe – Landscape and Horizons. Report by the ESF Member Organisation Forum on Research Careers, Strasbourg 2010, p. 17.

\textsuperscript{87} League of European Research Universities (Author: Geoffrey Boulton): Harvesting talent: strengthening the research careers in Europe, Brussels 2010, p. 9.
In addition, the European Commission is preparing a communication on a 'European framework for Research Careers'. The model as suggested by the EC differs from the ESF and LERU model in that it claims to be sector-neutral. As it is currently still being discussed we are not yet in the position to present a finalised version here.

With respect to Luxembourg we recommend to take these taxonomies as basis for explaining to researchers how the system for career development in research works, which funding opportunities are offered for the respective career stages and what the individual researcher needs to fulfil. In fact, looking at FNR's portfolio we recognise a 'funding chain' for research careers which is rather similar if we compare it to the systems of neighbouring countries, such as Belgium, Germany or the Netherlands to provide just a few examples:

Table 16 Programmes to support different stages of a researchers' careers by selected research funding organisations in Europe

<table>
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<tr>
<th>Stage</th>
<th>Organisation</th>
<th>Postdoc</th>
<th>Independent Researcher</th>
<th>Established Researcher</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FNR, Luxembourg</td>
<td>AFR Postdoc Grant</td>
<td>CORE Junior ATTRACT PEARL</td>
<td></td>
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<tr>
<td></td>
<td>FWO, Belgium(^{88})</td>
<td>Odysseus Programme Type I</td>
<td>Odysseus Programme Type II</td>
<td></td>
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<tr>
<td></td>
<td>DFG, Germany(^{89})</td>
<td>Individual Grants Research Fellowships</td>
<td>Individual Grants Emmy Noether Programme</td>
<td>Individual Grants Heisenberg Programme</td>
</tr>
<tr>
<td></td>
<td>NWO, Netherlands(^{90})</td>
<td>Veni</td>
<td>Vidi</td>
<td>Vici</td>
</tr>
</tbody>
</table>

The above mentioned programmes have in common that they provide temporary funding with the aim to support the individual researcher in climbing the next step on the research career ladder. The DFG's Heisenberg Programme\(^{91}\) and the German Volkswagen Foundation's Lichtenberg Programme\(^{92}\) stand out in that they provide start up funding which is geared at establishing new tenured professorships at the respective host institutions. This means that the receiving institutions bindingly have to declare their preparedness to offer permanent positions to grantees under the condition that these have successfully applied for funding and are equally successful.


in a mid-term evaluation which is conducted by the funding organisation in conjunc-
tion with the host institution.

Reliability of funding schemes in view of achieving tangible results
Since the goal of the postdoc stage is to foster geographic, thematic and perhaps
also intersectoral mobility two years are a rather short period to acquire the neces-
sary knowledge and skills to conduct a research project and achieve tangible results.
Therefore, the funding period of the AFR postdoc grant should be reconsidered tak-
ing into account that internationally visible publications which are the "admission
ticket" for the next career step usually take more time. Comparable schemes as the
DFG's Individual Grants Programme\(^93\) typically allow for three years funding and
sometimes even for new proposals which build on the preceding project.

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