The Luxembourg National Research Fund (FNR) is the main funder of research activities in Luxembourg. The FNR invests public funds and private donations into research projects in various branches of science and the humanities, with an emphasis on selected core strategic areas. Furthermore, the FNR supports and coordinates activities to strengthen the link between science and society and to raise awareness for research. It also advises the Luxembourg government on research policy and strategy.

www.fnr.lu
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2015 ANNUAL REPORT
LUXEMBOURG NATIONAL RESEARCH FUND

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11 BALANCE SHEET AND PROFIT AND LOSS ACCOUNT
2015 was a year of great change at the Luxembourg National Research Fund (FNR), both in terms of operations and governance. Following the legislative reform adopted in 2014, the FNR run its first year under its new operating regime, with increased autonomy and expanded responsibilities. A new Board is in place with a Chairman’s Committee, an Audit and Finance Committee and a Nomination and Remuneration Committee, which were operational throughout the year. Appointed during the year, the new Scientific Council has also been set up. The move to the Belval Research and Innovation Campus in late September 2015 symbolically marked this new stage for the FNR.

A review of the 2014-17 multi-annual contract between the Government and the FNR was negotiated with the ministry to strengthen some strategic priorities. To this end, additional resources will be allocated by increasing FNR’s budget appropriation by EUR 8 million for 2016-17 and by increasing the overall commitment ceiling by EUR 20 million.

As part of Luxembourg’s Presidency of the European Union, the FNR contributed to discussions on research integrity. The European Network of Research Integrity Offices (ENRIO) held its annual meeting in Luxembourg, at the invitation of the FNR. The Secretary of State for Higher Education and Research Mr Marc Hansen mandated institutions to set up a future national agency for scientific integrity, a key element that remains lacking in Luxembourg’s research system. The FNR led an inter-institutional working group which drew up the concept for this new agency.

The FNR undertook a number of major projects in 2015. Of particular note was the first National Centre of Excellence in Research (NCER), set up in 2015 with a focus on Parkinson’s disease. It is an essential link between fundamental and clinical research and constitutes the first NCER launched by the FNR with substantial financing covering a period of 8 years. Based on this experience, other centres of excellence will be set up in future.

The system of fellowships for doctoral students has been transformed, moving from a scheme based exclusively on individual fellowships (AFR) allocated to named individuals to a block-type fellowship programme (PRIDE), allocated to teams of researchers based on a research project. The first PRIDE call for proposals, launched in 2015, had a structuring effect on the public research landscape, notably strengthening cooperation between various research teams and institutes.

And finally, the FNR submitted its evaluation and project selection procedures to an external assessment conducted by the prestigious Evaluation Center of the University of Western Michigan. The conclusions of this report confirm that the FNR applies the highest international standards when selecting projects.

Yves Elsen, Chair of the Board
Véronique Hoffeld, Vice-Chair of the Board
Marc Schiltz, Executive Head
HOW WE WORK

Our most highly valued criteria are excellence and quality in research. In order to identify the most promising and most excellent projects and researchers, we systematically submit funding requests to an assessment by independent international experts. The FNR implements the « Principles for Scientific Merit Review », which embody the highest international standards of expert assessment, transparency, impartiality, confidentiality and integrity.
LUXEMBOURG NATIONAL RESEARCH FUND: IT’S RESEARCH WITH IMPACT

What we do
The Luxembourg National Research Fund (FNR) is the main funder of research activities in Luxembourg. The FNR invests public funds and private donations into research projects in various branches of science and the humanities, with an emphasis on selected core strategic areas. Furthermore, the FNR supports and coordinates activities to strengthen the link between science and society and to raise public awareness for research. It also advises the Luxembourg government on research policy and strategy.

Our vision
To establish Luxembourg as a leading knowledge-based society through science, research and innovation, thereby contributing to the country’s economic diversification and future prosperity.

Our mission
To set up a sustainable world-class research system in Luxembourg that will generate societal and economic impact in key strategic areas.

Our strategic priorities
The FNR aims to be a driving force for Luxembourg’s innovation capabilities and focuses on the three following strategic objectives to foster research with impact:

• Attaining scientific leadership in key areas.
  By setting the highest quality standards, the FNR contributes to establishing international research excellence in Luxembourg. By attracting and training the most talented scientists, the FNR helps to build critical mass in key research areas, thereby supporting economic development and societal progress.

• Turning public research into a competitive advantage for Luxembourg.
  The FNR supports the advancement of Luxembourg’s knowledge-based economy by supporting industry-informed research, by reinforcing co-operation between public research and innovative industries and by facilitating the commercial exploitation of research results.

• Anchoring Science and Research in Society.
  The FNR promotes the active involvement of researchers and scientists in addressing current and future societal challenges. To ensure that research is established sustainably in the public consciousness as an important pillar of Luxembourg’s knowledge society, the FNR supports an active exchange between scientists and the public at large.

How we work
Our most highly valued criteria are excellence and quality in research. In order to identify the most promising and most excellent projects and researchers, we systematically submit funding requests to an assessment by independent international experts. The FNR implements the « Principles for Scientific Merit Review », which embody the highest international standards of expert assessment, transparency, impartiality, confidentiality and integrity.

Our core values
• Towards researchers and research institutions
  We implements a fair and transparent process in our decision-making and nurture an open dialogue with the scientific community.

• Towards the government, tax-payers and donators
  We are is accountable for the usage of funds that we are entrusted with and we strive for efficiency in our operations.

• Towards the general public
  We care for the long-term interest of the country and consider engagement with society as a constitutive part of science.

• Towards our collaborators
  We aims to stimulate talent-development and competence building of our staff, who translate FNR’s vision, mission and core values into action.
03 2015 MAIN FIGURES

3 NEW INTERNATIONAL COOPERATION AGREEMENTS

44 NEW AFR PHD GRANTS

33.9 MEUR COMMITTED

568 PROJECTS EVALUATED

44 NEW AFR-PPP & CORE-PPP GRANTS

10,000 visitors @ Science Festival

16 RESCOM CONFERENCES, WORKSHOPS & LECTURE SERIES FUNDED

146,905 visitors @ science.lu

187 FUNDED PROJECTS

58 NEW CORE, INTER & POC RESEARCH PROJECTS

45,613 visitors @ fnr.lu

10 NEW INTER MOBILITY RESEARCH STAYS

258,602 pageviews @ fnr.lu

1 NEW ATTRACT FELLOW

300,392 pageviews @ science.lu

144 PAGEVIEWS @ fnr.lu

15,633 fans @ www.facebook.com/science.lu
I. KEY EVENTS

2015 was a year of important changes at the FNR, both in terms of internal operations and governance. Following the legislative reform adopted in 2014, the FNR run its first year under its new operating regime, with increased autonomy and expanded responsibilities. A new Board is in place with a Chairman’s Committee, an Audit and Finance Committee and a Nomination and Remuneration Committee, which were operational throughout the year. Appointed during the year, the new Scientific Council was also set up during the year. The move to the Belval Research and Innovation Campus in late September 2015 symbolically marked this new stage for the FNR.

The research environment in Luxembourg also underwent profound changes in 2015, with the restructuring of former public research centres and the appointment of new directors at the head of the country’s two largest research institutions.

A review of the 2014-17 multi-annual contract between the Government and the FNR was negotiated with the ministry to strengthen some strategic priorities. To this end, additional resources will be allocated by increasing FNR’s budget appropriation by EUR 8 million for 2016-17 and by increasing the overall commitment ceiling by EUR 20 million.

As part of Luxembourg’s Presidency of the European Union, the FNR contributed to discussions on research integrity. The European Network of Research Integrity Offices (ENRIO) held its annual meeting in Luxembourg, at the invitation of the FNR. At a public session organised in parallel to the meeting, the Secretary of State for Higher Education and Research Mr Marc Hansen mandated institutions to set up a future national agency for scientific integrity, a key element that remains lacking in Luxembourg’s research system. The FNR led an inter-institutional working group which drew up the concept for this new agency.

Also as part of Luxembourg’s European Presidency, the FNR organised the Marie Skłodowska-Curie conference in December, bringing together over a hundred experts from around thirty countries. An academic session included the former French Minister for Research, scientist and astronaut, Ms Claudie Haigneré, as guest of honour.

II. MAJOR PROJECTS

The FNR undertook a number of major projects in 2015. Of particular note was the first National Centre of Excellence in Research (NCER), set up in 2015 with a focus on Parkinson’s disease. This centre initiated by the FNR brings together all key stakeholders the Luxembourg Centre for Systems Biomedicine (LCSB), the Luxembourg Institute of Health (LIH), the Integrated Biobank of Luxembourg (IBBL) and the Centre Hospitalier de Luxembourg (CHL). The centre is an essential link between fundamental and clinical research. This is the first NCER launched by the FNR with substantial financing covering a period of 8 years. Based on this experience, other centres of excellence will be set up in future.

The system of fellowships for doctoral students has been transformed, moving from a scheme based exclusively on individual fellowships (AFR) allocated to named individuals to a block-type fellowship programme (PRIDE), allocated to teams of researchers based on a research project. The first PRIDE call for proposals, launched in 2015, had a structuring effect on the public research landscape, notably strengthening cooperation between various research teams and institutes.

Programmes to support knowledge transfer initiatives and partnerships between public research and private companies (PPP projects) have also been comprehensively reformed, with new calls for proposals launched in 2016.

At international level, the FNR has taken the initiative of promoting Luxembourg research beyond Europe by setting up new scientific collaborations, notably in Asia (Singapore and Japan).

Finally, the FNR submitted its assessment and project selection procedures to an external assessment conducted by the prestigious Evaluation Center of the University of Western Michigan. The conclusions of this evaluation, published in early 2016, confirmed that the FNR applies the highest international standards when selecting projects.
III. FNR GOVERNANCE

Board
Appointed in late 2014, the FNR’s new Board had its first meeting on 6 February 2015. The Board held 5 meetings in 2015.

- The Chairman’s Committee (Mr Yves Elsen [Chair of the Board], Ms Véronique Hoffeld [Vice Chair of the Board] and Mr Marc Schiltz [Secretary General] met 8 times in 2015.
- The Audit and Finance Committee of the Board (comprising Ms Andrée Billon, Ms Hjoerdis Stahl and Mr Thierry Wolter) held 3 working sessions, 2 of which by circular procedure.
- The Nomination and Remuneration Committee of the Board (comprising Mr Yves Elsen, Ms Véronique Hoffeld and Ms Christiane Hoffmann) met twice in 2015.

Mr Robert Kerger, in his capacity as government commissioner, is allowed to attend committee meetings.

Scientific Council
Appointed in June 2015, the FNR’s new Scientific Council met on 27 November 2015 for its first meeting.

IV. PROGRAMMES AND PRIORITY ACTIONS

The activities carried out during the year for the three strategic objectives laid down in the FNR’s current multi-annual contract with the Government are summarised as follows:

OBJECTIVE 1:
To promote scientific quality and excellence in research

CORE
The FNR received 131 proposals, 124 of which were eligible. After assessment by independent experts, the FNR selected 31 projects for funding for a total of EUR 17.8 million.

In the CORE Junior programme, 10 of the 43 proposals submitted were accepted. Under bilateral international cooperation projects implemented in CORE, 7 of the 18 proposals for bilateral projects were selected for funding.

The panels again confirmed that the assessment process is applied according to the highest international standards. The process for evaluating the CORE programme was audited externally in 2015. Western Michigan University carried out this audit under the multi-annual agreement. The audit has been completed and presented in early 2016.

OPEN
As stated in the multi-annual agreement, after calls for proposals in 2013 and 2014, the OPEN programme was suspended in 2015 and will be reactivated in 2016 and 2017.

INTER – International Cooperation
A total of 172 proposals were assessed and the FNR granted funding to 21 projects for a total of EUR 7.47 million.

Under the AAL [Active and Assisted Living] programme, 1 project was funded an amount of EUR 0.5 million and 2 projects were funded for a total of EUR 0.6 million under the EUROSTARS programme.

The FNR also assessed 27 mobility proposals, 10 of which were retained for a total budget of EUR 0.9 million.

Cooperation agreements were concluded with Japanese research centre RIKEN – one proposal is currently being assessed – and the Research Council of Norway (RCN) – the first call for proposals under this agreement will be launched in 2016.

During a visit to Singapore in June with a Luxembourg delegation, a joint call for proposals was launched and 17 proposals are currently being assessed.

RESCOM – Support for Research Communication
The FNR assessed 13 proposals, all of which were retained for a total budget of EUR 0.2 million. Three applications for monograph funding were submitted, 1 of which was accepted for funding of EUR 3,000.
The FNR undertook a number of major projects in 2015. Of particular note was the first National Centre of Excellence in Research (NCER), set up in 2015 with a focus on Parkinson’s disease.

OBJECTIVE 2: To strengthen research that generates economic and societal impact

Proof of Concept (POC)
After the pilot period for the Proof of Concept programme between 2013-2014 and the official launch in December 2014, 2015 saw the consolidation of the programme, with 7 projects assessed, 6 of which were selected for total funding of EUR 1.1 million. Two spin-offs have been set up at the Interdisciplinary Centre for Security, Reliability and Trust (SnT) of the University of Luxembourg as a direct result of POC projects: Motion-S S.à.r.l. and Black Swan Lux S.à.r.l.

Knowledge & Innovation Transfer Support (KITS)
Launched in 2015, the KITS programme is aimed at providing support to ensure knowledge transfer to capitalise on research results. It is an indispensable complement to the PoC programme. The FNR assessed 4 projects, 3 of which were retained for funding of EUR 0.9 million.

CORE and PhD/PostDoc (AFR) for Public-Private Partnerships
These two programmes involving public-private partnerships were overhauled and new calls for proposals were launched in December 2015. The FNR has set the main policy guidelines for handling intellectual property rights generated by FNR-PPP projects.

In February, the FNR signed a partnership agreement with the University of Luxembourg, Luxinnovation and Deloitte Luxembourg to launch Mind & Market Luxembourg.

Science in Society
To increase the visibility of science and research among the public, the FNR – in addition to its existing media partnerships with RTL Télé Lëtzebuerg, RTL Radio and Eldoradio – continued its collaboration with Radio 100.7 on the Café scientifique programme. The www.science.lu website continues to attract and retain visitors, with over 300,000 individual visits to the site, over 15,600 likes on Facebook and over 215,000 views on YouTube.

The FNR also organised a number of events aimed at the general public in 2015. These included the Science Festival, which had about 10,000 visitors over four days, and the Chercheurs à l’école initiative, which saw 53 researchers visiting 32 classes in 17 secondary schools in Luxembourg.

The FNR also offered a number of training courses for journalists, researchers, teachers and youth workers on communicating and popularising science.
PSP – Promoting Science to the Public

The FNR assessed 56 PSP proposals and granted funding to 44 projects for a total of EUR 0.98 million. The new PSP-Flagship programme, which aims to support the popularisation of science over the longer term and with more durable impact, was developed in 2015 and will be launched in early 2016.

FNR AWARDS 2015

The 7th FNR Awards Ceremony was held for the first time at the Belval Research and Innovation Campus on 16 October 2015, with Secretary of State Mr Marc Hansen in attendance. Six researchers were acknowledged by the FNR in the categories of “Outstanding Scientific Publications”, “Outstanding PhD Thesis” and “Outstanding Promotion of Science to the Public”. The FNR Special Award, the third of its kind, was awarded to Luxembourg physicist Claude Wehenkel, a global pioneer in public-sector research in the Grand Duchy and former director of the Henri Tudor public research centre. In his speech, the Secretary of State for Higher Education and Research underlined the importance of raising awareness of the results of research in Luxembourg, both among Luxembourg and foreign scientists and among the public at large.

Promotion of FNR activities

The FNR actively supported the Belval branding project initiated by public research stakeholders to establish a joint brand for Luxembourg public research.

OBJECTIVE 3:

To reinforce the efficiency and sustainability of Luxembourg’s public research system. Investing in human capital

PEARL

Three PEARL projects were submitted under the 2015 call for proposals. None of the applications was retained by the selection committee.

ATTRACT

Six candidates (1 from LIST, 4 from the University of Luxembourg, 1 from the National Museum of Natural History) applied for the ATTRACT programme in 2015. The FNR selected Dr Anne Grünewald (UL), who will conduct her research at LCSB, awarding her a grant worth EUR 1.5 million.

NCER - PD

The FNR allocated EUR 8 million in funding over eight years for the first national research centre of excellence studying Parkinson’s disease (NCER-PD). Under the leadership of Professor Rudi Balling, four partners (LCSB, IBBL, CHL and LIH) have pooled their expertise to work on Parkinson’s disease. Another thirty or so NCER-PD researchers and clinicians are working in close collaboration with institutes in Kassel, Tübingen, Oxford and the United States.
AFR - PhD/PostDoc Grants

2015 marked the reform of the current AFR system. The last “normal” call for individual AFR proposals took place in the first half of 2015. Of the 104 proposals, the FNR selected a total of 44 applications from doctoral students and, of a total of 20 AFR-PPP proposals submitted, it selected 13 AFR-PPP applications in collaboration with Luxembourg businesses (9 AFR-PPP PhD and 4 AFR-PPP Postdoc). Total AFR commitments were EUR 9.8 million in 2015, of which EUR 2.2 million for AFR-PPPs in collaboration with businesses.

The FNR also launched a joint call with the ILA (Institut Luxembourgeois des Administrateurs) and two candidates were selected for a mobility research residency abroad.

The FNR also took part in an international study to analyse the careers of post-doctoral AFR researchers, a study that was coordinated by the European Science Foundation.

PRIDE – Programme for Research Intensive Doctoral Education

PRIDE (Programme for Research-Intensive Doctoral Education), a new instrument for allocating collective AFR grants to institutions on top of individual AFR grants, was launched in 2015.

The FNR received 26 proposals in all from doctoral training units (DTUs) at the University of Luxembourg and three public research centres: LIST, LIH and LISER.

In 2016, the most competitive doctoral training units will be selected by panels of international experts, with projected overall funding for 135 doctoral students. These doctoral students will be recruited in 2016 and 2017 by the doctoral training units retained.

FORECAST 2016

A large part of the 2016 activities will be dedicated to the implementation of the major projects launched in 2015.

The selection and the launch of the first PRIDE projects have taken place in March 2016.

Several calls for the Public-Private-Partnership (PPP) programs will be organized during the year.

The Luxembourg Agency for Research Integrity (LARI) will be created and become operational by the end of the year.

A joint programming with the Luxembourg Ministry of Economy will allow to target PPP collaborations in key sectors of the national economy.

The FNR will continue its efforts to nurture scientific culture and literacy among the general public and one of the highlights of 2016 will be the Researcher’s Days in December.

A new initiative by the FNR will be launched in autumn, where politicians will meet scientists in order to strengthen the dialogue between those two groups.

2016 will largely focus on operational activities and the collaborators of the Executive Agency will be in the front line. Nonetheless both the Board and the Scientific Council will be called upon to start the first reflexions in order to elaborate the FNR strategy 2018-2021.
05 STATISTICS

LUXEMBOURG INVESTMENTS
Luxembourg public investments in public and private R&D (MEUR)

FNR FUNDING
FNR: Annual funding commitments (MEUR)

FNR NEW COMMITTED 2015
62 FNR-funded projects 28.70 (MEUR)

31 CORE Projects 17.78
1 ATTRACT Projects 1.50
0 PEARL Project 0
21 INTER Projects 7.47
6 POC Projects 1.10
0 OPEN Projects 0
3 KITS Projects 0.85

44 PSP | 10 INTER MOBILITY | 14 RESCOM 2.09 (MEUR)

43 PSP Classic 0.61
1 PSP Flagship 0.37
10 INTER-MOBILITY 0.90
14 RESCOM 0.21

57 AFR Grants 9.30 (MEUR)

44 AFR PhD Grants 7.14
9 AFR PPP 1.70
4 AFR PDR PPP 0.46

FNR NEW COMMITTED 2014-2015
118 FNR-funded projects 62.49 (MEUR)

61 CORE Projects 34.75
3 ATTRACT Projects 5.34
1 PEARL Projects 4.98
39 INTER Projects 13.61
9 POC Projects 1.96
2 OPEN Projects 1.00
3 KITS Projects 0.85

107 PSP | 22 INTER MOBILITY | 42 RESCOM 4.10 (MEUR)

106 PSP Classic 1.16
1 PSP Flagship 0.37
22 INTER-MOBILITY 1.90
42 RESCOM 0.67

183 AFR Grants 27.24 (MEUR)

125 AFR PhD Grants 20.64
58 AFR Postdoc Grants 6.80
### PUBLIC-PRIVATE PARTNERSHIPS

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<th>2009</th>
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<td>4</td>
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### FUNDING INSTRUMENTS 2006-2015

(Statistics of ongoing instruments)

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<tr>
<th>Launch date</th>
<th>Programme title</th>
<th>number of submitted proposals</th>
<th>number of FNR funded projects</th>
<th>number of finished projects</th>
<th>committed (MEUR)</th>
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<td>2006</td>
<td><strong>ATTRACT</strong> Opportunities for Outstanding Young Researchers in Luxembourg</td>
<td>47</td>
<td>12</td>
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<td>2006</td>
<td><strong>INTER</strong> Promotion of International Cooperation</td>
<td>611*</td>
<td>124</td>
<td>47</td>
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<td><strong>CORE</strong> Multi-annual Thematic Research Programme</td>
<td>884</td>
<td>264</td>
<td>120</td>
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<td>2008</td>
<td><strong>AFR</strong> PhD Grants + BFR-AFR Transitions</td>
<td>1779</td>
<td>980</td>
<td>640</td>
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<td>2008</td>
<td><strong>AFR</strong> Postdoc Grants</td>
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<td>2009</td>
<td><strong>PEARL</strong> Excellence Programme for Research in Luxembourg</td>
<td>16</td>
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<td>2012</td>
<td><strong>INTER</strong> Mobility Promotion of International Scientific Exchange</td>
<td>96</td>
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<td>2012</td>
<td><strong>RESCOM</strong></td>
<td>185</td>
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<td>2012</td>
<td><strong>PSP</strong> Promoting Science to the Public</td>
<td>245</td>
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<td>2012</td>
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<td>2013</td>
<td><strong>OPEN</strong></td>
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<td>2015</td>
<td><strong>KITS</strong></td>
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* Since 2010
** 2013, 2014
## Projects by Domain

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<td>MS_New Functional and Intelligent Materials and Surfaces and New Sensing Applications</td>
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<td>8</td>
<td>5</td>
<td>4</td>
<td>10</td>
<td>7</td>
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<td>56</td>
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<td>BM_Biomedical Sciences/Regulation of Chronic, Degenerative and Infectious Diseases</td>
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<td>3</td>
<td>8</td>
<td>5</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>52</td>
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<td>SR_Sustainable Resource Management in Luxembourg</td>
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<td>5</td>
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<td>4</td>
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<td>IS_Innovation in Services</td>
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<td>SC_Societal Challenges (LM+ID)</td>
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<td>9</td>
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<td>5</td>
<td>4</td>
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<td>263</td>
</tr>
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</table>

## Sum of Committed Funding (in MEUR) / Domain

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<tr>
<th>Domain</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
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<th>2013</th>
<th>2014</th>
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<th>Total</th>
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<td>MS_New Functional and Intelligent Materials and Surfaces and New Sensing Applications</td>
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<td>3.40</td>
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<td>BM_Biomedical Sciences/Regulation of Chronic, Degenerative and Infectious Diseases</td>
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## CORE: Funding by domain, between 2008 and 2015

- **MS**: 30 MEUR
- **BM**: 25 MEUR
- **SR**: 93 MEUR
- **IS**: 29 MEUR
- **SC**: 56 MEUR

## CORE: Projects by domain, between 2008 and 2015

- **MS**: 56 projects
- **BM**: 52 projects
- **SR**: 45 projects
- **IS**: 47 projects
- **SC**: 44 projects

## CORE: Projects by institution, between 2008 and 2015

- **LIST**: 93 projects
- **LIH**: 25 projects
- **Uni.lu**: 128 projects
- **Others**: 4 projects
NCER-PD

NCER is a new multiannual programme funded by the FNR that aims to establish Luxembourg internationally as a centre of excellence in a particular research field. The first such programme, NCER-PD (National Centre of Excellence in Research on Parkinson’s disease), was approved for launch in 2015 and will focus on improving the early-stage diagnosis on Parkinson’s disease (PD) and the stratification of PD patients, two of the most important scientific and clinical challenges in this field.

All major stakeholders of biomedical research in Luxembourg are involved in the NCER-PD programme: the University of Luxembourg with the Luxembourg Centre for Systems Biomedicine (LCSB) as the coordinator, the Luxembourg Institute of Health (LIH), the Integrated BioBank of Luxembourg (IBBL) and the Centre Hospitalier de Luxembourg (CHL).

One long-term objective of the NCER-PD programme is to recruit and analyse a cohort of PD patients from Luxembourg and clinical centres in neighbouring countries to help identify predictive and progressive biomarkers of the disease.

www.parkinson.lu

ENRIO

On 22 April, the Secretary of State for Higher Education and Research Marc Hänsen officially announced the launch of a national structure for research integrity in Luxembourg during an academic session organised by the FNR. This structure will have two missions: on the one hand, it aims to promote good scientific practice, and on the other hand, it will put in place a commission of international experts that will treat cases or allegations indicating a breach of scientific research integrity. Many European countries already have similar structures in operation. The national structure will be put in place by a working group composed of delegates from the FNR, the University of Luxembourg and the three public research centres (LIH, LIST, LISER).
SINGAPORE

In June, the FNR organised a visit to Singapore together with representatives from all major national research institutions. The aim of the symposium was to lay the foundation for future collaborations with one of the leading Asian states in research and innovation and thus increase the visibility of Luxembourg as an attractive research site in Europe. Around 20 researchers and executive heads from the University of Luxembourg as well as the LIH, LIST, LISER and the Max Planck Institute Luxembourg accompanied the FNR delegation to Singapore. They met with their counterparts from top universities, including the renowned National University of Singapore and discussed potential common research projects. The FNR has launched a call in autumn where Singaporean and Luxembourg researchers can submit joint proposals. FNR has already put in place similar agreements supporting cooperation with researchers from the US and several European states.

SIGNATURE FONDATION CANCER

On 18 September, the FNR and the Fondation Cancer officially put pen to paper and signed an agreement formalising their collaboration to support scientific projects in Luxembourg. The partnership, which runs from 2015 to 2019, will enable the FNR and Fondation Cancer to develop and strengthen their collaboration to support scientific cancer research projects.

As part of the collaboration, the FNR will provide a scientific peer review service to the Fondation Cancer, enabling the institution to forward their received research proposals to the FNR for evaluation. The FNR will evaluate the proposals in line with its international quality standard, and then provide the Fondation Cancer with a suggestion for a funding decision, as well as the complete information and knowledge collected about the proposal during the peer review process.

SIGNATURE RIKEN JAPAN

On 7 October, the Luxembourg National Research Fund (FNR) signed a Memorandum of understanding with RIKEN, Japan’s largest comprehensive research institution renowned for high-quality research in a diverse range of scientific disciplines. This agreement will support the cooperation between researchers from Luxembourgish public research organisations and scientists from RIKEN by providing funding for the exchange of scientists at PhD, Post-Doc and senior level.
For the seventh year running, the FNR has presented scientists with an FNR Award to mark their exceptional contributions in the field of science and research. A total of 6 scientists were presented with awards in the categories ‘Scientific Publications’, ‘Promotion of Science to the Public’, and ‘Outstanding PhD Thesis’. The award comes with a EUR 5,000 prize.

The ‘FNR Special Award’, presented for the third time, was awarded to physicist Claude Wehenkel – a pioneer of Luxembourg’s public research landscape, and former Director of the Centre de Recherche Public Henri Tudor (now part of the Luxembourg Institute for Science and Technology). He was honoured for his long-term efforts to progress and develop the research landscape in Luxembourg.

FNR Award for outstanding scientific publication
- Prof. Dr Ivan NOURDIN and Prof. Dr Giovani PECCATI
  (University of Luxembourg – Faculty of Science, Technology and Communication)
  Normal Approximations with Malliavin Calculus: From Stein’s Method to Universality

FNR Award for outstanding PhD thesis
- Dr Shree Krishna SHARMA
  (University of Luxembourg - Interdisciplinary Centre for Security, Reliability and Trust)
  Interweave/Underlay Cognitive Radio Techniques and Applications in Satellite Communication Systems
- Dr Catherina SCHREIBER
  (University of Luxembourg – Faculty of Language and Literature, Humanities, Arts and Education)
  Curricula and the Making of the Citizens. Trajectories from 19th and 20th Century Luxembourg

FNR AWARD for outstanding promotion of science to the public
- Dr Elisabeth JOHN
  (University of Luxembourg - Luxembourg Centre for Systems Biomedicine)
  Hands-on science – The Scienteens Lab, das erste luxemburgische Schülerlabor

MANUFUTURE CONFERENCE
The Manufuture event is held every two years and is considered as the key event on manufacturing at European level. It aims to address topics of strategic importance for future challenges of the manufacturing industry and develop recommendations for national and European policy makers. The 2015 edition took place in Luxembourg and was organised by Luxinnovation under the auspices of the Luxembourg Presidency of the European Union and co-sponsored by the FNR that was in charge of the outreach programme.

SCIENCE FESTIVAL
From 12 to 15 November, 10,000 visitors attended the 10th edition of the Science Festival in Luxembourg-Grund. The Science Festival is a biennial outreach event organised by the National Museum for Natural History (MNHN) and the FNR. During four days, scientists, researchers, science communicators and the general public were invited to get together to exchange and experiment. The first two days were reserved exclusively for school classes, where some 3,600 pupils attended the various workshops and shows. The last two days of the festival were open to the general public. In total, 500 people animated 57 workshops and shows during this 10th edition.
Luxembourg Presidency of the EU

On 10 and 11 December, circa 180 participants from 30 countries participated in the Marie Skłodowska-Curie Actions (MSCA) 2015 international conference in Luxembourg on the topic of researchers’ careers.

The conference was dedicated to the specific COFUND Action which is among the more recent MSCA EU funding schemes. It was organised by the FNR in the framework of Luxembourg’s EU Presidency of the European Council, with the financial support of the European Union, in collaboration with the Ministry of Higher Education and Research as well as the Unit Innovation in Education, EIT and MSCA of the Directorate-General Education and Culture of the European Commission.

The Conference offered an important platform to discuss practical issues faced by the co-funded schemes, such as linking the co-funding of researchers to EU structural funds or problems faced by VISA regulations, to name but a few. Further to the COFUND scheme, the Conference discussions addressed the more general challenges encountered by researchers in Europe. A discussion point was the need at political and funding level to not only support a higher number of researchers, but to consider providing improved guidance for researchers and in particular offering clearer perspectives through transparent information about research careers, and through a higher number of openly announced tenure track positions.

www.msca2015.lu

MSCA AWARDS

Interpreting whistled languages through cognitive science, analysing big data for health purposes and developing innovative treatments for osteoporosis, these are three challenges addressed by the winners of the Marie Skłodowska-Curie Actions (MSCA) 2015 – COFUND awards. The winners were announced to an international audience during a gala dinner that took place in the magnificent setting of the Cercle Cité in Luxembourg City on 10 December. Three outstanding researchers, Dr Julien Meyer, Dr Aiden Doherty and Dr David Hoey, who were funded by the COFUND scheme, were selected amongst the most promising scientists and honoured for their excellent research during the Awards Ceremony.

The prizes were jointly remitted by Claudie Haigneré, astronaut and former French Minister for Research and for European Affairs; Martine Reicherts, Director General of DG Education and Culture of the European Commission, and Marc Schiltz, Secretary General of the FNR, in the presence of Luxembourg current Minister Delegate for Higher Education and Research Marc Hansen and of a gathering of experts and stakeholders in the field of research. A monetary prize of EUR 1,000 complemented each award.
Better driving made easy thanks to Motions App

The MotionS business model is aimed at promoting safer, more environmentally friendly and more economical driving. To do so, the app uses data collected by smartphones and vehicle sensors.

MotionS’s business idea is all about promoting responsible driving. The Luxembourg based tech startup has developed an app which analyses the driver’s behaviour behind the wheel and helps driving to make it safer and better for both the environment and the wallet. The only things it requires are a car and a smartphone – and of course a driver who is willing to play the “game”.

Taking pleasure in safer driving

The solution was deliberately conceived as a game, as co-founder Raphael Frank explains: “It’s not about control by third parties; it’s about drivers wanting to improve. This app allows all users the possibility of safer, more eco-friendly and more efficient driving. To do so, it combines and analyses the data collected by the sensors in your smartphone and your car. The app collects information on the driver’s behaviour and on external factors, in order to create a complete picture.”

The FNR has played an essential part in making this possible. Motion-S was developed with the support of the POC (Proof of Concept) Programme, which, over a period of up to two years, helps to bridge the gap between research and marketable prototypes.

Raphael Frank says:
“The idea came about at the Interdisciplinary Centre for Security, Reliability and Trust (SnT) of the University of Luxembourg. With the financing we received from the FNR, we developed the prototype for a marketable app. And in 2014, we founded our company.”

A concept with a clear impact

To be marketable, an app needs to offer a clear added value to the relevant target groups. In this case, the main target group are the drivers themselves, who can use this solution to make their driving safer, more eco-friendly and more efficient. In Luxembourg, Motion-S has already established a partnership with an insurance company which, as a multiplier and marketing partner, wants to encourage its customers to drive more responsibly.

According to Raphael Frank, the insurance sector holds great potential for the app, for instance with regards to novice drivers: “Instead of registering their first car through their parents, young drivers could obtain better conditions by voluntarily agreeing to use our app to improve their driving.” Other possible multipliers are fleet managers, who could benefit from the solution in many different ways, according to the company co-founder: “The data collected by our app could help them coordinate their fleet more effectively and make sure vehicles receive regular maintenance, for instance.” These examples already show that the FNR’s claim to promote impactful research is being realised through Motion-S.

A smart solution directed at people

In general, Raphael Frank thinks the app has the potential to be marketed worldwide: “Safety and the environment are very current topics. Through our playful, educational approach, we can help improve traffic in a simple, cost-effective way.” He puts special emphasis on the interface between people and technology that is central to the app: “It is a smart solution, but more than that, it is a solution that is directed at people and that focusses on increasing their sense of responsibility.”

The app is as much about transparency as it is about individual responsibility and personal development. And it is a success, as the Luxembourg based company got to experience at the Mind & Market startup competition organised in cooperation with the FNR in 2015. MotionS came out on top, providing further encouragement for the challenge, which will be to effectively position the product in the world market – thus promoting innovation “Made in Luxembourg.”
Damien Lenoble is conducting research into the optimisation of tyre components at the Luxembourg Institute of Science and Technology in cooperation with Goodyear.

Like so many things in life, the manufacture of tyres comes down to composition. The correct proportion determines characteristics such as grip, rolling and wears resistance. The problem however is that there is a dependency between these factors. An increased input of one feature usually results in a reduced input of another.

Damien Lenoble knows about this. The scientist conducts research at the Luxembourg Institute of Science and Technology (LIST) and carries out intensive research into certain tyre components as part of one project. For quite some time, rubber-strengthening chemicals have been applied, such as carbon black and silica nanoparticles. As Dr Lenoble explains, that within the tyre industry research has been carried out for a number of years in order to improve the properties of tyres with the application of carbon nanotubes.

Natural diatoms instead of synthetic silica

These tubes with a diameter of only a few nanometres have a honeycomb structure and a high thermal and electrical conductivity together with impressive mechanical properties. Ideally, using carbon nanotubes in tyres makes their structure firmer, but also more pliable, in order to reduce the material abrasion on the treads and improve traction. This goal has been pursued since more than fifteen years in the tyre industry, without any significant success.

Mr Lenoble pursues this aim in his research project whereby, through the use of the nanotubes, no synthetic silicon dioxide particles is used, but instead diatoms (siliceous algae) and thus a purely natural product. “Diatoms have the advantage of being very porous, and they can therefore enhance the rubber penetration into their core easily”, he explains. That is how it differs from synthetic products currently in use.

The carbon content can be reduced considerably

Diatoms are usually found in water, “However, we cannot of course simply take them from our rivers”, he states. For this reason, diatomite - a white, powdery substance consisting mainly of the shells of silicon dioxide of fossil diatoms - is used. As the scientist explains, it has the same structure and there are various areas in the world in which sufficient quantities are found. In this way, the availability of environmentally friendly tyre components is ensured.

“Additionally, through the use of diatoms or diatomite, the carbon content can be considerably reduced, whereby the environmental impact of the tyre is similarly improved. Laboratory testing has already proven that this combination is successful,” he explains. “The next step will be to develop the production processes for industrial use.”

Several patents already filed

The research project is a cooperation between LIST and the research department of the tyre manufacturer Goodyear. The researcher was supported by the FNR for his “Green Nanonano Project”. He was funded specifically by the FNR funding programme CORE, with a total of EUR 761,000 over three years. The aim of CORE is to support the scientific quality of the key research areas in Luxembourg.

The researcher is delighted with the “excellent collaboration” with Goodyear and the FNR are concerned. Even though it may be a long time before his idea is put into production, Damien Lenoble has in the meanwhile filed already four patents. In a few years, people might drive cars benefiting from the application of these patents. Moreover, several scientific publications have been published and a doctoral student has qualified in the project subject.
Lionel Briand has a strategy—and is part of a strategy. The researcher, a dual national of France and Canada who has been living and working in Luxembourg since 2012, is regularly ranked as one of the world’s top experts in software systems engineering. He is vice director of the SnT, the Interdisciplinary Centre for Security, Reliability and Trust at the University of Luxembourg. Briand is surrounded by other experts, who are working on ensuring reliability and security of information technology, and who have close connections to Luxembourg’s private sector.

Briand’s strategy is to be wherever is best for conducting the most successful research. So, what brought him to Luxembourg? Is Luxembourg’s scientific infrastructure truly mature enough to attract a researcher of such stature to the Grand Duchy, a scholar who has been showered with international awards and distinctions? “Internationally, Luxembourg is absolutely competitive in research areas such as IT security,” says Briand. “With colleagues like Björn Ottersten, we can conduct our research at the highest level here. Also—at the risk of being cliché and although Luxembourgers have probably heard this a countless number of times—the paths are short here! In next to no time, one can sit down at a table with ministers, the research heads of big companies, and other relevant players to get research projects rolling. That makes Luxembourg especially attractive,” explains Briand, smiling with his arms crossed as he reclines in his chair with his characteristic energy and enthusiasm.

It appears Luxembourg’s strategy is working: Anyone who can turn a Professor Briand into a pillar of the local scientific community, who can increase and promote the attractiveness of the country to the international research community through hosting a researcher of such reputation, must be doing a lot right. Certainly, Briand’s decision to move to the Grand Duchy was reinforced by the FNR PEARL Chair awarded to him: the grant is well endowed with EUR 4.6 million over five years. Equally important, however, was the fine IT research infrastructure at the SnT. Now that Luxembourg’s investment in Briand is paying off, with him having received prestigious grants, it is easy to applaud both strategies—that of Luxembourg’s research promoters and that of the world-class researcher.

So, what is your research about, Prof. Briand?

“My goal is to make software systems reliable, secure, and safe. An aircraft’s autopilot ought to work more reliably than a home computer. A system crash at an inopportune moment could bring about a crash of whole different proportions. And this reliability has to be reliably and automatically tested.”

Such testing is Briand’s field of expertise. Complex software systems are now at the core of not only aircraft, but also banks, power plants and governmental institutions.

To continue his research on testing complex software systems, in the spring of 2016, Briand was awarded an “Advanced Grant” from the European Research Council (ERC)—one of the highest distinctions Europe awards to researchers. Those who know Briand know that he won’t be hiding behind his computer, conducting his research in solitude. Rather, he is already thinking out loud about how to get industrial partners actively engaged in his projects. That is good for Briand—and good for Luxembourg.
“We want to support high quality research with impact and the cooperation of national research actors.”
Dr Marc Schiltz, Secretary General of the FNR

NCER - Funding allocated to the most effective research consortia based around a research theme with a long-term socioeconomic impact.

A CENTRE OF EXCELLENCE IN RESEARCH ON PARKINSON’S DISEASE (NCER-PD)

A new funding programme of the FNR facilitates the creation of a national clinical research centre with a direct impact for patients with Parkinson’s disease.

In 2015, the FNR launched the National Centre of Excellence in Research on Parkinson’s disease (NCER-PD). The aim of this new 8-year programme, which involves all national actors in biomedical research, is to identify new methods for the early diagnosis of Parkinson’s disease (PD) and the stratification of patients in sub-groups. One key element of the programme is a national long-term clinical PD study, which already started in 2015.

A research programme with a direct impact for patients

PD is the second most common neurodegenerative disease of the brain and it is likely that an increased number of people will suffer from it in the coming years due to the ageing of the population. A major problem with PD is that it is usually diagnosed when the disease has already progressed significantly. If there were methods for an earlier detection, doctors could treat patients with protective therapies and thereby increase the patients’ quality of life. Why people become ill, and whether the disease will progress fast or slowly, is also difficult to predict.

In order to understand this better, the NCER-PD conducts a long-term clinical study with PD patients from Luxembourg and neighbouring countries as well as healthy control subjects. The study compares results from clinical tests and specific laboratory measurements (i.e. metabolic products or genetic information) from patients and healthy controls. This may lead to the identification of new methods for the diagnosis and stratification of the disease.

Another project carried out in collaboration with partners in the USA foresees the creation of a central computing platform for the analysis of genetic data from international PD studies.

First National Centre of Excellence in Research of the FNR

The PD research centre is the first National Centre of Excellence in Research (NCER) of the FNR. Dr Marc Schiltz, Secretary General of the FNR explains the motivation behind this new initiative: “We want to support high quality research with impact and the cooperation of national research actors. Through the creation of a common research programme in a domain that is strategically important for Luxembourg we can federate existing competencies to work efficiently on a relevant socio-economic problem.”

In light of the investments and developments in the field of personalised medicine, the FNR has identified the early diagnosis of PD with the help of systems biological tools as an attractive topic for a first NCER.

Hospital and research institutions working together

The national partners are the University of Luxembourg with the Luxembourg Centre for Systems Biomedicine (LCSB), the Institute IBBL (Integrated BioBank of Luxembourg), the Luxembourg Institute of Health and the Centre Hospitalier de Luxembourg (CHL). Their common goal is to continue to integrate research into the national health system and to establish Luxembourg as an excellence centre in research on PD beyond the country’s borders.

International partners are the Oxford Parkinson’s Disease Centre, the Hertie-Institut für klinische Hirnforschung in Tübingen, the Paracelsus-Elena-Klinik in Kassel and the National Institutes of Health in the USA.

International recognition for the research location Luxembourg

For Prof. Dr Rudi Balling, Director of the LCSB and coordinator of the Parkinson-NCER consortium, the programme is also an international recognition of the local research community. In particular the close collaboration between doctors, biologists and computer scientists was highlighted as unique by the panel of international experts that examined the programme proposal.

The funding allocated by the FNR for the programme is EUR 8 million for a first phase of 4 years; the total budget estimated for the 8-year programme amounts to EUR 20 million.
Nearly zero energy buildings: how do we make industrial buildings energy efficient?

Many residential houses are built so that they scarcely use energy. This can also be done with industrial buildings. It just needs a different approach.

When preparing soup this is no problem: if you need to make a double portion, you simply add double the amount of ingredients. And if you need 10 portions then you need 10 times the amount.

This principle of proportionality can be applied to many areas - but not to all. Pascal Brinks has special expertise in one field in which the latter is the case.

While taking his AFR-PPP doctorate, the 35-year-old specialised in nearly zero energy industrial buildings, i.e. in industrial buildings where the energy consumption is or should be as minimal as possible.

His thesis was completed under the supervision of a professor at the Technical University of Kaiserslautern. However, the doctoral candidate spent most of his time with Luxembourg-based Astron, a company specialising in industrial buildings that forms part of the Lindab group.

Insulation: sometimes less is more

Should you follow the same planning approach as a chef, then all you need to do is make a projection of the cost of saving energy for residential homes onto the size of industrial buildings. That however is the wrong approach according to Dr Brinks.

The construction engineer informs us that it starts with the base plate. For a residential building the base plate is usually of a uniform insulation thickness. This prevents heat from escaping into the ground.

With a large base plate, Dr Brinks says that it is not much use insulating the middle with the same thickness as the edges, since the earth below is significantly warmer in winter than it is below the edges of the base plate. From an energetic point of view, therefore, it can be more useful in some circumstances to work without insulation in the middle.

“Another problem is that industrial buildings are used in a completely different way to residential buildings”, he explains. “For example, where many machines are producing a great deal of heat in a building, this must be taken into account in the planning.”

Nearly zero energy buildings: mathematical model identifies weaknesses

In the evaluation of overall energy efficiency, Mr Brinks investigated where the weaknesses are, and developed a mathematical model based on this with the aid of which possible energy losses could be identified more clearly.

Among other factors is the differing heat conductivity of the various parts of the building that results in “thermal bridges” and thus loss of energy.

“There are many “thermal bridges” in steel constructions which cause complications”, says the construction engineer. He added that this offers considerable research potential.
An academic approach to research with a high degree of practical application

Pascal Brinks had the opportunity to complete his doctorate as a research fellow at a university. But the structural engineer found a way of combining academia and industry.

The best way forward for the 35-year-old was in public/private partnership. "Practical application is a huge advantage", says Pascal Brinks. "At Lindab I could test my research findings thoroughly", he added, which would not have been possible by just graduating at university.

The doctoral candidate was helped by an AFR-PPP grant from the FNR. "This involved a great deal of work, since I had to produce a complex exposé", says Pascal Brinks. On the other hand, the FNR facilitated his efforts with a very non-bureaucratic approach. "I had a budget for further training and conferences that I could allocate as I wished", he says. This way, he was able to gain experience and knowledge, not only in large buildings, but also abroad.

Having completed his doctorate he is still at Astron, where he can put the fruits of his research into practice.
STIMULATING IMMUNE CELLS TO FIGHT CANCER

Working towards a more potent cellular vaccine for patients with cancer was the aim and success of AFR-PhD researcher Tammy Oth.

A promising new cancer treatment strategy is immunotherapy. It works by stimulating or restoring the ability of the body’s own immune system to specifically destroy tumour cells, causing fewer side effects than conventional chemo- or radiotherapy.

One approach is a therapeutic cancer vaccine made up by a particular type of the receiving patients’ own white blood cells, dendritic cells (DCs), which have been “instructed” to alert other immune cells to recognise and eventually attack tumour cells.

Tammy Oth from Luxembourg worked on optimizing those vaccines during her AFR-funded doctoral studies at the University of Maastricht in the Netherlands. She identified a method, which could make such vaccines more potent, and together with the research group filed a patent to protect this discovery.

"Cancer vaccines work, but their efficiency is low”

"In clinical trials these therapeutic cancer vaccines have been proven to be safe and non-toxic, however, the overall clinical outcome is still limited. This is illustrated by the first vaccine against advanced prostate cancer, Provenge®, which was approved by the American Food and Drug Administration in 2010. It prolongs the patients’ life only by several months without destroying the tumour”, Oth explains.

Her project focused on enhancing the interaction between DCs and helper cells of the immune system, called natural killer (NK) cells and T “helper” cells, which are necessary to eliminate cancer.

Inside the body, these cells normally work together in the response against microbes such as viruses or bacteria. The key cells are the DCs; they identify parts of the foreign invader or transformed cell and relay the information.

Getting immune cells to interact better

To obtain the cancer vaccine, white blood cells are isolated in the laboratory from the patients’ blood samples and are grown into DCs. These are then stimulated artificially to be able to interact better with other immune cells and to induce responses specifically targeting cancer cells.

To stimulate DCs, Oth tried different pathogen-associated molecular patterns (PAMPs), which are parts normally found on pathogens, until she found a combination that made DCs interact best with NK cells and helper T cells.

She discovered that the potential of DCs to communicate with NK and T helper cells is linked with their capacity to produce a protein called IL-12. “Current clinical studies with cancer vaccines employ mainly DCs that do not show this capacity”, Oth points out. She identified a combination of activation stimuli maximizing the capacity of DC to produce this factor.

Publications, poster prizes and a patent

Oth published the findings of her PhD in several papers in highly ranked journals and received three “Best Poster” prizes at conferences, including one in Luxembourg.

“The knowledge acquired in this project as well as preceding research by the group will be translated in the near future into clinical trials”, Oth reports. The findings are validated and tested at CiMAAS, a biotech company focusing on the development of cellular immunotherapy against cancer. The company is a spin-off from Maastricht University and is largely based on the patent filed by Oth and her colleagues.

Oth herself is currently employed as an Application Specialist at Biomérieux, an in vitro diagnostics company. She was keen to broaden her horizon after her PhD and to acquire a different set of skills and knowledge.

She does, however, follow the progress of her former lab and the associated company and does not exclude that she may consider a position between industry and academia in the future.
Massimiliano Esposito was recently awarded the renowned “Consolidator Grant” of the European Research Council (ERC), one of the most sought-after grants for research in Europe.

STOCHASTIC THERMODYNAMICS:
CONTROL OF MOTION IN THE NANO SCALE
Nano systems are constantly in motion due to thermal fluctuations. This motion has to be understood in order to use the systems effectively.

Basically, it is rather like the industrial revolution in miniature. It must be said that using the term “miniature” only goes part of the way. Since that which concerns us is located in the nano scale. That is, there where they can only be observed using an electron microscope.

Massimiliano Esposito is familiar with this area. The physicist at the University of Luxembourg roams the nano scale. He is by no means alone. “Nano systems are constantly in motion due to thermal energy fluctuations”, explains Mr Esposito. “We need good strategies so that these systems move to our benefit.”

The examination of thermodynamic processes is not new. In the early 18th century, scientists were already investigating the steam engine, for example, with the redistribution of energy between its various forms. “In those days, people wanted to know how many trees they would have to fell in order to obtain a given amount of energy”, says the researcher. “These days, we are able to find out how much energy a cell has to use in order to get food in its environment.”

When dealing with the effects resulting from thermal fluctuations, scientists in those days had already reached their limits. With the investigation of thermal fluctuations in the nano scale, this was also the case for a long time. “There is great statistical variability in the behaviour of the nano systems”, explains Mr Esposito. “What we see with the naked eye is the average behaviour of the microscopic components of a system”, he says. “But, when we look more closely we see extreme fluctuations.”

Therefore, Mr Esposito works with his team on a theory of stochastic thermodynamics. “Biological systems have found ways through evolution to function effectively at molecular level”, he says. “Through stochastic thermodynamics, I would like to understand how they do that but, at the same time, develop powerful synthetic nano systems which could be useful for energy-efficient and fast information technologies.”

Research conducted as part of the FNR’s ATTRACT programme brought the 38-year-old to Luxembourg. The programme’s aim is to gather young and outstanding scientists for strategically important fields of research. They are recruited internationally and receive start-up financing in order to build up their own research groups in Luxembourg.

The physicist Esposito, who grew up and studied in Brussels and then worked in California, fulfilled all these preconditions and therefore applied for the funding programme. He was successful. Since the beginning of 2012, the FNR has provided him with over EUR 1.6 million for his research work. It was a real stroke of luck for Mr Esposito. “I have a free hand, am fully provided for and I can concentrate completely on my work”, he says.

The funding programme runs until the end of 2016. The physicist at the University of Luxembourg has no reason to worry about how his research will be subsequently funded. He was recently awarded the renowned “Consolidator Grant” of the European Research Council (ERC), one of the most sought-after grants for research in Europe. Therefore, the expert on the thermodynamics of nano systems will be granted another EUR 1.7 million for the next five years.

“After almost four and a half years of research work in Luxembourg that’s a terrific distinction”, he says. “It's also proof that we’ve done some good work.” Mr Esposito is convinced that this new theory will be of decisive significance for nano technologies and molecular biology. Just like traditional thermodynamics were for the production of powerful and dependable sources of energy during the industrial revolution.
PUPILS EXAMINE BRAIN CELLS AND DISCOVER THE WORLD OF RESEARCH
Together with scientists from the University of Luxembourg, secondary school pupils examine brain cells in order to better understand therapeutic approaches to neurodegenerative diseases.

In cooperation with the University of Luxembourg, 16 final-year pupils from the Lycée Michel Rodange in Luxembourg (LMRL) had the chance to discover, as part of their optional subject, theoretical and practical biotechnology as well as genetic engineering using established laboratory methods.

The aim of the project was to examine inflamed brain cells and healthy “control cells” for differences in terms of form, genes and proteins, thus bringing the pupils into contact with the world of research.

The FNR subsidised the project as part of the PSP Classic funding programme. Its purpose is to financially assist public research institutions, schools, associations and foundations, or even private persons with science communication projects and ideas, thereby encouraging exchanges between science and society.

Everyday laboratory practice up close!
From cell cultivation to the isolation of ribonucleic acid, protein analysis, the staining of cells through immunofluorescence, to the bioinformatic analysis of data, the pupils undertook the key analysis phases on their own initiative and under the supervision of teachers and researchers.

The courses consisted of six units, of which four were practical. They were completed over several weeks in the laboratories of the Faculty of Science, Technology and Communication of the University of Luxembourg or in the Biological Department of the LMRL.

Before starting each unit, the pupils were given an introduction to the subject. In order to get a better understanding of neurodegenerative diseases such as Alzheimer’s and Parkinson’s and their treatment, and to compare the results obtained with current research follow-up, teaching sessions were encouraged after each unit had been completed.

Exchanges with scientists
The pupils had the opportunity to taste the daily routine of research through direct contact with the scientists, and to gain an idea of the future in this field.

The project’s crowning conclusion was an exhibition on neurodegenerative illnesses at the Lycée Michel Rodange. It included discussion panels featuring researchers who took part in the project and who are dealing with research currently being conducted in Luxembourg.

Science in Society & PSP - The FNR offers platforms and funding to foster the exchange between science and society. Researchers may benefit from trainings in science communication, take part in events for the general public, and use the FNR media and web channels to communicate their research. In addition to these exchange platforms, the PSP programme provides researchers with funding for their own science outreach activities.
A MODERN APPLICATION OF KANT’S PHILOSOPHY: ETHICAL PROBLEMS IN MEDICAL RESEARCH

What can we learn from Kant today? An INTER Mobility project on the significance of philosophy for questions with significant relevance to society.

Professor Heidemann of the University of Luxembourg developed an INTER Mobility project on the subject of “healthcare” and “contemporary Kantian philosophy” in a long-term cooperation with Dr Jens Timmermann from the University of St Andrews in Scotland.

According to Professor Heidemann, Kantian philosophy and its particular methods provide a sound basis to find answers to application-specific questions relevant to society.

Ethical problems in medical research

The questions are: What is cognition? What is consciousness awareness? What are perceptual judgements? Such questions lead to specific sub-projects, such as: What is the ethically appropriate behaviour towards patients suffering from Parkinson’s disease?

Within the scope of the exchange programme, these kind of ethical problems resulting from the medical research are tackled in Luxembourg, with the researchers from the Luxembourg Centre for Systems Biomedicine (LCSB).

Do we have a moral duty to healthcare? Or can we limit our duty of care? This is a question that assumes increasing significance in view of an ageing society.

This is where the Kantian writings on “the duty of ethics” come into play.

Professor Heidemann elaborates on his ideas: “Here, for instance, the question arises: Is it ethically and morally justifiable to relay all the knowledge gained in an experiment or examination and their consequences to the patient? Or is it morally justifiable to withhold certain data from him?”

Imparting skills that may lead to a solution

There are no simple answers to these questions. “That is exactly the point”, says Professor Heidemann, adding “we should not be so naive - neither as philosophers nor neutral observers - to expect that philosophy can provide a concrete model that tells us: In this case do this and refrain from that.”

He adds: ”We do not make predefined the decisions, but we impart the ethical skills that pave the way for a solution, and can be applied in practice by researchers or doctors.”

How does one conduct research as a philosopher?

Philosophers have no laboratory in which they can conduct experiments and test hypotheses. How does a philosopher conduct research?

“We, too, have our laboratories”, says Professor Heidemann and adds “but these are not physical, but mental spaces in which we carry out thought experiments. The key is: we are not concerned with abstract fantasies but thought processes and conceptual contexts, within a realistic framework for action.”

There are, according to him, two experimental approaches: One is in the free-ranging thoughts, for example, on whether we have a soul; the other through reference to the historical writings of for instance Plato, Aristotle, Saint Thomas Aquinas, Spinoza, Kant or Hegel.

In the same way as in natural sciences, thought experiments are published in scientific journals and presented at international scientific congresses.

“The main difference to the natural sciences is that our research is tested through observation, rather than empiricism”, explains Professor Heidemann and continues: “in philosophy, empiricism is not a sufficient prerequisite for the development of theory or real judgements about the world - as philosophy is, rather like mathematics, a science of ideas.”

INTER Mobility - Funding researchers based in Luxembourg for a mobility period at leading research institutions abroad, or excellent researchers from abroad to integrate Luxembourg research teams (mobility periods up to 1 year).
Programmes to support knowledge transfer initiatives and partnerships between public research and private companies (PPP projects) have been comprehensively reformed, with new calls for proposals launched in 2016.

At international level, the FNR has taken the initiative of promoting Luxembourg research beyond Europe by setting up new scientific collaborations, notably in Asia (Singapore and Japan).
## FNR Funding by Career Stage

| PhD and Postdoc grants in Luxembourg and abroad | AFR PhD Grant | AFR Postdoc Grant |
| Regular project funding with thematic focus | | CORE Junior |
| Grants to establish research groups in Luxembourg | AFR Postdoc Grant | CORE* |
| Grants to establish research groups in Luxembourg | ATTRACT Starting | ATTRACT Consolidator |
| Funding of bi- or multilateral research projects | PEARL |
| Secondments and research stays in Luxembourg and abroad | INTER |
| Support for research communication | INTER MOBILITY |
| Block Grant Scheme for PhD Grants | RESCOM** |
| Support for promoting science to the public | PSP |
| Facilitation of the commercialisation of innovations | PROOF-OF-CONCEPT |
| Knowledge & innovation transfer support | KITS |
| Public-Private Partnerships | AFR PPP PhD |
| Public-Private Partnerships | AFR PPP Postdoc |
| | CORE PPP |

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* In general, collaborative projects with German, Swiss and Austrian partners are possible through funding agreements with e.g. DFG, SNF and FWF; ICT: possible collaboration with Poland; Biomed: possible collaboration with EMBL.

** The organizer/applicant has to be a public institution or a public body with a research mission in Luxembourg or a non-profit association pursuing activities of a scientific nature in Luxembourg.
RESEARCH PROJECT FUNDING

CORE – Multi-annual thematic research programme
CORE is the central programme of the FNR. The prime objective of CORE is to strengthen the scientific quality of Luxembourg’s public research in the country’s priority research domains: ICT, Sustainable Resources Management, Material Sciences, Biomedical and Health Sciences, Societal Challenges. In the eyes of the FNR, high quality research capacities form the essential pool of knowledge and expertise from which social, environmental and economic impact can emanate. CORE projects therefore aim to directly contribute to the strengthening research competences in the priority fields and will have to demonstrate to be of international competitiveness. Hence CORE aspires to create strategic national resources and an increased visibility in the international research community.

www.fnr.lu/core

CORE JUNIOR – Core for starting independent researchers based in Luxembourg
CORE is the central programme of the FNR. The prime objective of CORE is to strengthen the scientific quality of Luxembourg’s public research in the country’s priority research domains. The submission of projects by young researchers is fostered by CORE Junior Track, a dedicated framework for starting PIs.

www.fnr.lu/core

OPEN
The OPEN programme intends to support evolving research directions in Luxembourg which are currently not covered by the five CORE priority domains. It provides funding for a limited number of high quality research projects and aims at supporting established researchers to pursue innovative research projects in emerging research areas in Luxembourg.

www.fnr.lu/open
INTERNATIONAL RESEARCH COOPERATIONS

INTER – Promotion of international cooperation

The INTER programme aims at giving Luxembourg’s public research a higher profile in the international context by providing funding for international collaboration. INTER answers the needs of researchers in Luxembourg for the implementation of joint projects between foreign research centres and their own institutions in order to increase their visibility and competitiveness.

www.fnr.lu/inter

AFR Bilateral

The AFR Bilateral programme strengthens the cooperation between Luxembourg and selected international research partners through PhD and postdoc grants.

www.fnr.lu/afr-bilateral-grants

INTER MOBILITY – Promotion of international scientific exchange

The aim of the INTER Mobility Programme is to promote the exchange between research groups of the Luxembourg public research institutions and research groups abroad in order to foster innovative, internationally competitive research and support the exchange of key knowledge and technological know-how.

www.fnr.lu/inter-mobility

STRATEGIC RESEARCH PRIORITIES

PEARL – Excellence programme for research in Luxembourg

With the PEARL funding programme, the FNR offers Luxembourg institutions a highly competitive programme to attract established and internationally recognized researchers in strategically important areas: thus, the recruitment of excellent PEARL grantees aims to accelerate the development and strengthening of the national research priorities.

www.fnr.lu/pearl

NCER - National Centre of Excellence in Research

In the NCER programme, funding is allocated to the most effective research consortia based around a research theme with a long-term social-economic impact.
TALENT ATTRACTION AND CAPACITY BUILDING

**ATTRACT – Attracting outstanding junior researchers to Luxembourg**

Bringing excellent researchers with a high level of expertise in science and technology to Luxembourg is a key mission of the FNR. The ATTRACT programme aims to support the Luxembourgish research institutions to expand their competences in strategic research areas by attracting outstanding young researchers with high potential to Luxembourg.

[www.fnr.lu/attract](http://www.fnr.lu/attract)

**AFR INDIVIDUAL**

Through its AFR grant scheme 'Aides à la Formation-Recherche', the FNR supports research training at doctoral and postdoctoral level in Luxembourg and abroad.

[www.fnr.lu/afr](http://www.fnr.lu/afr)

**PRIDE**

PRIDE is FNR’s programme for funding doctoral research in Luxembourg. Under PRIDE a block of non-nominative PhD grants is awarded to a consortium of excellent researchers regrouped around a scientific theme.

[www.fnr.lu/pride](http://www.fnr.lu/pride)

INNOVATION PROGRAMMES

**CORE PPP**

The objective of the CORE PPP programme is to support the public and private research community in pursuing high quality, high impact and innovative research in areas that demonstrably enhance and underpin enterprise competitiveness and societal development in Luxembourg.


**AFR PPP**

The AFR scheme for PhD and Postdoc Grants supports researchers who carry out their PhD and/or postdoc training in collaboration with a company in Luxembourg.

KITS
The objective of the Knowledge & Innovation Transfer Support Programme (KITS) is to provide competitive funding to public research institutions in Luxembourg that will allow them to attract and integrate highly skilled professionals in the area of knowledge transfer.
www.fnr.lu/kits

POC Proof of Concept
POC is the FNR’s facilitation programme for successful commercialisation of research results. With the goal of encouraging the translation of high impact research into commercially viable innovations, the POC programme provides financial support to universities and research institutes in Luxembourg to help them make their research ideas more attractive to potential investors.
www.fnr.lu/poc

PROMOTING SCIENCE

PSP – Support for Promoting Science to the Public
The FNR offers platforms and funding to foster the exchange between science and society. Researchers may benefit from trainings in science communication, take part in events for the general public, and use the FNR media and web channels to communicate their research. In addition to these exchange platforms, the PSP programme provides researchers with funding for their own science outreach activities.
www.fnr.lu/psp

RESCOM – Support for Research Communication
Through RESCOM, the FNR supports communication between researchers to promote scientific outcomes. The FNR awards grants for the organisation of outstanding international scientific conferences and lecture series organised in Luxembourg as well as for the publication of scientific monographs.
www.fnr.lu/rescom
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<tr>
<th>PROJECT ACRONYM</th>
<th>PROJECT TITLE</th>
<th>PRINCIPAL INVESTIGATOR</th>
<th>HOST INSTITUTION</th>
<th>DOMAIN</th>
<th>FNR CONTRIBUTION IN EUR</th>
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<td>RegeneraNet</td>
<td>A network-based approach to modelling cell-niche interactions and its application to studying salamander limb regeneration</td>
<td>Antonio del Sol Mesa</td>
<td>Université du Luxembourg</td>
<td>BM - Regenerative Medicine in Age-related Diseases</td>
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<td>microCancer</td>
<td>Non-invasive microbiome-derived multi-omic biomarkers for early-stage colorectal cancer detection</td>
<td>Paul Wilmes</td>
<td>Université du Luxembourg</td>
<td>BM - Translational Biomedical Research</td>
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<td>DANeuroGEN</td>
<td>Identifying Novel Genetic and Epigenetic Modulators of Dopaminergic Neuron Structure and Function.</td>
<td>Manuel Buttini</td>
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<td>BM - Translational Biomedical Research</td>
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<td>DB_ROS_AI</td>
<td>Elucidating the role of Glutathione in T cell driven autoimmunity and inflammation</td>
<td>Dirk Brenner</td>
<td>LfH - Luxembourg Institute of Health</td>
<td>BM - Translational Biomedical Research</td>
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<td>DifiMicMuc</td>
<td>Fiber-deprived gut microbiota erodes the colonic mucus barrier: understanding immune dysregulation, pathogen susceptibility and prospects for improvement using prebiotics</td>
<td>Mahesh Desai</td>
<td>LfH - Luxembourg Institute of Health</td>
<td>BM - Translational Biomedical Research</td>
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<td>RESIST</td>
<td>Novel mass spectrometry tools to investigate drug resistance mediated changes in cellular signaling pathways</td>
<td>Bruno Domen</td>
<td>LfH - Luxembourg Institute of Health</td>
<td>BM - Translational Biomedical Research</td>
<td>538,000.00</td>
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<td>ValCoLa</td>
<td>Value Co-creation Language</td>
<td>Henderik Proper</td>
<td>LIST - Luxembourg Institute of Science &amp; Technology</td>
<td>IS - Business Service Design</td>
<td>650,000.00</td>
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<td>BEST-RPAS</td>
<td>Robust Emergency Sense-and-Avoid Capability for Small Remotely Piloted Aerial Systems</td>
<td>Holger Voos</td>
<td>SnT [UL]</td>
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<td>3D-ACT</td>
<td>3D Action Recognition Using Refinement and Invariance Strategies for Reliable Surveillance</td>
<td>Bjorn Ottersten</td>
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<td>IS - Information Security and Trust Management</td>
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<td>COMMA</td>
<td>Combating Context-Sensitive Mobile Malware</td>
<td>Olga Gadyatskaya</td>
<td>SnT [UL]</td>
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<td>VoteVerif</td>
<td>Verification of Voter-Verifiable Voting Protocols</td>
<td>Peter Y. A. Ryan</td>
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<td>AUTOFIX</td>
<td>Automated Program Repair using Fix patterns Learned from Human-written Patches</td>
<td>Dongsun Kim</td>
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<td>Privacy Enhancing Techniques for Future Internet</td>
<td>Andriy Panchenko</td>
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<td>DIST</td>
<td>Distance Bounding: a graph theoretical and formal approach</td>
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<td>CONTACT</td>
<td>CONtext and conTent Aware CommunicaTions for QoS support in VANETs</td>
<td>Thomas Engel</td>
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<td>PLASENS</td>
<td>Confined nanoscale geometries to enhance sensitivity of plasmonic immunoassays</td>
<td>Sivashankar Krishnamoorthy</td>
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<td>MS - New Functional and Intelligent Materials and Surfaces</td>
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<td>NEWALLs</td>
<td>First-principles design of structural domain walls with targeted functionalities</td>
<td>Jorge Iniguez Gonzalez</td>
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<td>bIoREAFILM</td>
<td>A new approach towards BIO-inspired, tuneable and highly REActive thin FILMs</td>
<td>Maryline Moreno</td>
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<td>POLYPORPH</td>
<td>Conductive MetaOrganic Network Coatings from the Chemical Vapor Deposition of Porphyrin Building Blocks</td>
<td>Nicolas Boscher</td>
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<td>Black-select</td>
<td>Innovative CNT-based selective solar absorbers for high-temperature applications</td>
<td>Naoufal Bahlawane</td>
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<td>CORREKEST</td>
<td>Correlative characterization of co-evaporated Cu2ZnSnSe4 thin films</td>
<td>Susanne Siebentritt</td>
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<td>Meeting at interfaces: liquid crystals and carbon nanotubes</td>
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<td>BENELUX</td>
<td>The Power of Non-Powers: An archival analysis of the reaction to, and influence of, the BENELUX nations on American Financial intervention in Europe and its role in Early Cold War European Security Strategy (1948-1960).</td>
<td>Spero Simeen Zachary Paravantis</td>
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<td>SC - Education and Learning</td>
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<td>MuLiPEC</td>
<td>Developing multilingual pedagogies in Early Childhood Education</td>
<td>Claudine Kirsch</td>
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<td>LUXDYNAST</td>
<td>The Europe of the Luxembourg Dynasty. Governance, Delegation and Participation between Region and Empire (1308 - 1437)</td>
<td>Michel Margue</td>
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<td>SC - Identities, Diversity and Interaction</td>
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<td>IMeRSe</td>
<td>Investigating the Mechanisms of Reliance to Social Assistance</td>
<td>Alessio Fusco</td>
<td>LISER</td>
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<td>GLOBAL</td>
<td>Relational cities and enclave urbanism in the ‘Singapore of the West’ – How niche sovereignty strategies and political economy helped minor metropolises to globalise. The cases of Geneva and Luxembourg</td>
<td>Markus Hesse</td>
<td>Université du Luxembourg</td>
<td>SR - Spatial and Urban Development</td>
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<td>SMARTWALL</td>
<td>Integrated -omics and functional study of the cell wall folding mechanism in resurrection plants</td>
<td>Jean-Francois Hausman</td>
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<td>SR - Sustainable Management and Valorisation of Bioresources</td>
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<td>LEGeLIS (for Linking Environment - Genome - Lifestyle Strategy)</td>
<td>Linking environmental condition to lifestyle strategies and to population-level genetic heterogeneity</td>
<td>Emilie Muller</td>
<td>Université du Luxembourg</td>
<td>SR - Sustainable Management and Valorisation of Bioresources</td>
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<td>MOSQUITO</td>
<td>MOntoring and predicting urban flood using Sar InTerferometric Observations</td>
<td>Marco Chini</td>
<td>LIST - Luxembourg Institute of Science &amp; Technology</td>
<td>SR - Water Resources under Change</td>
<td>526,000.00</td>
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**TOTAL** | | | | | **17,782,000.00**

For a detailed summary of each project as well as other information, please refer to [www.fnr.lu/core](http://www.fnr.lu/core)
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<th>PROJECT ACRONYM</th>
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<td>New high performances medical device for ligament tears analysis of knee joint laxity</td>
<td>Yvan Devaux</td>
<td>LIH</td>
<td>BM - PUBHEALTH</td>
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<td>film_growth</td>
<td>Crystalline thin lm growth in anisotropic mixtures: a combined up-proach by experiment, theory and simulation</td>
<td>Tanja Schilling</td>
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<td>SASAL</td>
<td>School Alienation in Switzerland and Luxembourg</td>
<td>Andreas Hadjar</td>
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<td>Raymond Bisdorff</td>
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<td>C4HEALTH</td>
<td>Transparent Carbon-based electrodes for in vitro and in vivo biomedical and life sciences applications</td>
<td>Santhana Eswara</td>
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<td>LSRF</td>
<td>National Contact Point in Luxembourg on ‘Large scale research facilities’</td>
<td>Jens Kreisel</td>
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<td>MIPROG</td>
<td>Prognostic miRNA-based test for left ventricular remodelling after acute myocardial infarction</td>
<td>Yvan Devaux</td>
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<td>FunMonTrev</td>
<td>Funerary Monuments from Western civitas Treverorum in an Interregional Context The Inter-Connected Evaluation of a Socio-Historically Relevant Category of Finds</td>
<td>Andrea Binsfeld</td>
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<td>BLIZAR</td>
<td>Hybrid Visualization of Dynamic Multilayer Graphs FR/LU</td>
<td>Mohammed Ghoniem</td>
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<td>CATBIOSE</td>
<td>New biopolymers based on renewable building blocks from catalytic deoxygenation of hemicelluloses</td>
<td>Youssef Habibi</td>
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<td>SnowDEM</td>
<td>Development of a microstructure based discrete element snow model for engineering applications (SnowDEM)</td>
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<td>3DPD</td>
<td>Advanced modelling of Parkinson’s disease with three-dimensional human midbrain organoids.</td>
<td>Jens Schwamborn</td>
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<td>Antonio del Sol Mesa</td>
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<td>Nanobody-enabled structural and functional studies of Chemokine-CCR5 active-state complexes</td>
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<td>EnLightenIt</td>
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**TOTAL** 7,468,263.00

**INTER-MOBILITY 2015**

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<td>Humanity: the Kantian virtue to care for others</td>
<td>Dietmar Heidemann</td>
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<td>Prof. J.J. McDonnell at LIST: leveraging past investments into innovative research avenues in hydrological sciences and creating new opportunities for research projects, publications and market solutions</td>
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**TOTAL** 900,000.00

For a detailed summary of each project as well as other information, please refer to [www.fnr.lu/inter](http://www.fnr.lu/inter)
### POC 2015

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<td>Pouyan Ziafati</td>
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<td>Raimondas Sasnauskas</td>
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<td>HuMiX2.0</td>
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For a detailed summary of each project as well as other information, please refer to [www.fnr.lu/poc](http://www.fnr.lu/poc)

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<td>LIH - Luxembourg Institute of Health</td>
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<td>KITS-UL-LCSB</td>
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For a detailed summary of each project as well as other information, please refer to [www.fnr.lu/kits](http://www.fnr.lu/kits)

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For a detailed summary of each project as well as other information, please refer to [www.fnr.lu/attract](http://www.fnr.lu/attract)
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<td>Polar Materials as Tunable Dielectrics for mm-Wave Applications</td>
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<td>Online and Offline optimisation techniques for Diesel Engines using Model Based Control under Real Driving Conditions</td>
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<td>Characterization of handling performance through identification of vehicle/tire models from instrumental vehicle tests</td>
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<td>Multibeam Joint Processing for Broadband/Broadcast Convergence in Next Generation High Throughput Satellite Communications</td>
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**TOTAL** 2,162,810.00

For a detailed summary of each project as well as other information, please refer to [www.fnr.lu/afr](http://www.fnr.lu/afr)
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<td>177,158.00</td>
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<tr>
<td>Anita</td>
<td>Lucchesi</td>
<td>Université du Luxembourg</td>
<td>ID</td>
<td>Shaping a digital memory platform on migration narratives: a public history project on Italian and Portuguese migration memories in Luxembourg</td>
<td>178,908.00</td>
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<tr>
<td>Violetta</td>
<td>Schaan</td>
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<td>ID</td>
<td>Social rejection in early childhood and its effects on stress responses in later life</td>
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<td>Katalin</td>
<td>Turai</td>
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<td>Significance of Nonconceptual Content in Kant’s Aesthetics</td>
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<td>Georges</td>
<td>Jacoby</td>
<td>Ruprecht-Karls-Universität Heidelberg</td>
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<td>&quot;Evaluating Artists in Late Imperial China: The Role of Prestige in the Making of Art History&quot;</td>
<td>78,250.00</td>
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<td>Olivier</td>
<td>Del Fabbro</td>
<td>ETH Zurich</td>
<td>ID</td>
<td>Individuality as individualization. Gilbert Simondon’s phenomenological process ontology.</td>
<td>78,250.00</td>
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<td>Gilles</td>
<td>Genot</td>
<td>Université du Luxembourg</td>
<td>ID</td>
<td>Gouvernance et identités, Noblesse, villes et clergé du duché de Luxembourg (milieu XVe – début XVe s.)</td>
<td>177,158.00</td>
</tr>
<tr>
<td>Andy</td>
<td>Orlando</td>
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<td>Epistemic Nonconceptualism. Nonconceptual Content and the Justification of Perceptual Beliefs</td>
<td>177,158.00</td>
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<td>Alessandro</td>
<td>Decarlì</td>
<td>Université du Luxembourg</td>
<td>ID</td>
<td>Mental health and wellbeing during adolescence: The role of child attachment and parents’ representations of their children</td>
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<td>Max</td>
<td>Greisen</td>
<td>Université du Luxembourg</td>
<td>ID</td>
<td>Assessing basic number competence without language instructions</td>
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<tr>
<td>Antoine</td>
<td>Lazzari</td>
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<td>Jamie</td>
<td>Liddell</td>
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<td>ID</td>
<td>&quot;Here come the clusters...&quot;: Linguistic reconfigurations of the local in Luxembourgish hip hop</td>
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<td>Sam</td>
<td>Klein</td>
<td>The University of Glasgow</td>
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<td>Medical Concerns and Military Thinking</td>
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<td></td>
<td></td>
<td><strong>7,144,935.00</strong></td>
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"Research with Impact" presents an FNR perspective on how far research in Luxembourg has come despite its young age, key milestones and future opportunities.

Flyer highlights facts and figures about Luxembourg, putting the country’s innovation performance in an international context.

The latest newsletter takes an in-depth look at research and technology in Luxembourg, the country’s progress since the last OECD report, as well as the new National Centre of Excellence in Research.
ONLINE PRESENCE

The FNR's online presence continued growing in 2015, visits to science.lu increased, FNR social media channels became more established and new website project started.

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twitter.com/fnrlux
linkedin.com/company/fonds-national-de-la-recherche
facebook.com/fnrlux
youtube.com/FNRLux

science.lu
facebook.com/pages/sciencelu/471930696209434
twitter.com/science_lu
youtube.com/user/ScienceLuxembourg
The FNR is a public institution created by statute (Law of 31 May, 1999) and enjoys legal capacity and full administrative and financial autonomy. Our overall strategy is laid down in a 4-year contract with the Luxembourg Government, which also defines our budget appropriation.

The Secretary General of the FNR is the chief executive of the organisation. He heads the Executive Office, implements the strategy, oversees programme development and manages all running activities. He is appointed by the Board of the FNR, subject to approval from the Government. The Executive Office is composed of more than 25 committed collaborators, who are experienced and highly qualified professionals with a strong track record in science and research management or in the field of science communication.
Our Scientific Council acts as an advisory body to the FNR. Appointed by the Government, it is composed of international experts. The current scientific council was appointed by ministerial decree in June 2015.

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Institut de Myologie, Paris (France)

Vice-Chair:
Prof. Dr Ursula LEHMKUHL,
Universität Trier (Germany)

Members:
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Pädagogische Hochschule Bern (Switzerland)
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Empa, Dübendorf (Switzerland)
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FAO/IAEA, Vienna (Austria)
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Ass.-Prof. Dr Patrycja PARUCH,
Université de Genève (Switzerland)
M. Aloyse SCHOOS,
IEE, Contern (Luxembourg)

Ex-officio (non-voting) members
Marc SCHILTZ, Secretary General of the FNR
Robert KERGER, Government Commissioner
Yves FROMES, Chair of the Scientific Council of the FNR
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(13) Ulrike KOHL, Head of Unit – AFR PhD and Postdoc Grants
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(20) Susana PINTO, Finance & Quality Assistant
(21) Sonia RAMOS, Communication Manager
(22) Susanne RICK, Programme Manager
(23) Marc ROCK, Head of Finance
(24) Joseph RODESCH, Science Communicator
(25) Asaël ROUBY, Programme Manager; Legal Advisor & Research Integrity Officer
(26) Anne SCHROEDER-VAN DEN BULCKE, Head of Unit – Science in Society
(27) Josiane STAUS, Administrative Assistant
(28) Michèle WEBER, PhD, Science Communicator
The accounts have been audited by KPMG Luxembourg, Société coopérative, Cabinet de révision agréé, and approved by the Board of Directors on 18 March 2016. Only the original French version of the annual accounts and the audit opinion is binding. For the complete annual report (in French), please refer to www.fnr.lu/annualreports

### Balance Sheet

**As at 31 December 2015 (keur)**

<table>
<thead>
<tr>
<th>Assets</th>
<th>2015</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intangible fixed assets</td>
<td>16.55</td>
<td>219.78</td>
</tr>
<tr>
<td>Tangible fixed assets</td>
<td>117.40</td>
<td>49.62</td>
</tr>
<tr>
<td><strong>Current Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budgetary allocations to be received</td>
<td>76,265.35</td>
<td>86,733.35</td>
</tr>
<tr>
<td>with a maturity less than 1 year</td>
<td>63,732.26</td>
<td>60,432.26</td>
</tr>
<tr>
<td>Other receivables</td>
<td>346.53</td>
<td>230.72</td>
</tr>
<tr>
<td>Cash at bank</td>
<td>71,729.38</td>
<td>65,270.34</td>
</tr>
<tr>
<td><strong>Deferred Charges</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEFERRED INCOME</td>
<td>14,222.73</td>
<td>3,780.82</td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
<td>148,485.33</td>
<td>152,593.77</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liabilities</th>
<th>2015</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capital and Reserves</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserves</td>
<td>4,457.82</td>
<td>3,930.06</td>
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<tr>
<td>Result for the financial year</td>
<td>558.30</td>
<td>527.76</td>
</tr>
<tr>
<td><strong>Creditors</strong></td>
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</tr>
<tr>
<td>Trade payables</td>
<td>547.91</td>
<td>392.23</td>
</tr>
<tr>
<td>Tax and social security debts</td>
<td>83.21</td>
<td>78.73</td>
</tr>
<tr>
<td>Amounts owed to beneficiaries</td>
<td>128,453.99</td>
<td>143,747.13</td>
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<tr>
<td>with a maturity less than 1 year</td>
<td>62,919.88</td>
<td>65,521.82</td>
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<tr>
<td>Other debts</td>
<td>161.37</td>
<td>137.05</td>
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<tr>
<td><strong>Deferred Income</strong></td>
<td>14,222.73</td>
<td>3,780.82</td>
</tr>
<tr>
<td><strong>Total Liabilities</strong></td>
<td>148,485.33</td>
<td>152,593.77</td>
</tr>
</tbody>
</table>
### PROFIT AND LOSS ACCOUNT

*As at 31 December 2015 (keur)*

<table>
<thead>
<tr>
<th>CHARGES</th>
<th>2015</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commitments made</td>
<td>33,916.39</td>
<td>48,744.11</td>
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<tr>
<td>Operating costs (including staff costs)</td>
<td>5,074.86</td>
<td>4,662.71</td>
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<tr>
<td>Value adjustments on fixed assets</td>
<td>240.94</td>
<td>262.98</td>
</tr>
<tr>
<td>Interest payable and similar charges</td>
<td>0.05</td>
<td>0.27</td>
</tr>
<tr>
<td>Profit for the financial year</td>
<td>558.30</td>
<td>527.76</td>
</tr>
<tr>
<td><strong>TOTAL CHARGES</strong></td>
<td><strong>39,790.54</strong></td>
<td><strong>54,197.83</strong></td>
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</table>

<table>
<thead>
<tr>
<th>INCOME</th>
<th>2015</th>
<th>2014</th>
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<tbody>
<tr>
<td>Budgetary allocation</td>
<td>39,232.24</td>
<td>53,920.80</td>
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<tr>
<td>Other operating income</td>
<td>412.15</td>
<td>30.64</td>
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<tr>
<td>Interest receivable and similar income</td>
<td>146.15</td>
<td>246.39</td>
</tr>
<tr>
<td><strong>TOTAL INCOME</strong></td>
<td><strong>39,790.54</strong></td>
<td><strong>54,197.83</strong></td>
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For the text:
Fonds National de la Recherche (Highlights AFR, NCER-PD, PSP)
Tim Haarmann (Highlight INTER-Mobility)
Dirk Hans (Highlight PEARL)
Sven Hauser (Highlight POC)
Uwe Hentschel (Highlights AFR-PPP, ATTRACT, CORE)

For the pictures ©:
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Marie de Decker [21]
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Layout: lola.lu

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L-4365 Esch/Belval

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Didier Goossens
didier.goossens@fnr.lu
T +352 26 19 25-43
F +352 26 19 25-35