Performance agreement 2017

School of Electrical Engineering
1 School's strategic plan

1.1 School's strategic plan in a nutshell

The School of Electrical Engineering is characterized by world-class research, up to date infrastructures and education that effectively combines theory and hands-on learning in close cooperation with the research community. This unique combination leads to graduates that successfully serve the whole society as key players and game changers. One of our key competitive edges is the long tradition of industry collaboration that has equipped us with wide networks to global companies. Recently, through many success stories, we have also become an increasingly strong contributor in Aalto entrepreneurship ecosystem and we are committed to continuously strengthen the entrepreneurship dimension in our education and research.

The ELEC roadmap towards 2020 is summarized in the figure below. Our ultimate goal is to consolidate our position among the 20 best electrical engineering schools in Europe by 2020. In the Nordic setting our aim is to be the best electrical engineering school. Following the framework given by Aalto strategic objectives and development actions we have formulated three main objectives for research, innovation and education in ELEC. In addition, objectives for creative practices and enablers have been briefly stated.

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**ELEC strategic roadmap towards 2020**

**Research**
- Excellence through high quality research; solid academic reputation and strong community spirit
- Societal impact emerging from industry collaboration, challenge-driven entrepreneurship and multidisciplinary research platforms
- World class infrastructures promoting success in research, education and innovation

**Education**
- Widely acknowledged study programmes that attract Finnish and international talents
- Students success is ensured through blended learning methods and effective digital tools
- Real life projects and multidisciplinary education give students competence for the working life

**Creative practices**: Driving a renewal of community mind-set by facilitating artistic activities in ELEC and by integrating creativity in hands-on education

**Enablers**: Ensuring the quality and technical support of infrastructure; adopting new ways of working, shared spaces and moving towards lean and customer-oriented practices

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**ELEC is among the 20 best electrical engineering schools in Europe**
1.2 Focus areas and key development actions

1.2.1 Key focus areas

1) Information and Communication Technologies
   - Enabling technologies and functions for ICT: micro- and nanotechnology, microelectronics and radio engineering
   - Communications engineering and signal processing: combines hardware (electronics) research with computer science to resolve grand challenges of digitalization and to develop technology for future ICT infrastructure.
   - Cross-disciplinary and applied research: studies the use of technology and utilizes synergy of different research fields to integrate digital and hardware assets for future ICT and applications

2) Advanced Energy Solutions
   - Smart energy systems, smart grid, energy harvesting and distribution
   - Control and automation of distributed and renewable energy production
   - Electric and hybrid vehicles and drivetrains, motor drives;
   - Lighting, smart building technologies and services, sensors for monitoring the use of energy

3) Materials and sustainable use of natural resources
   - Advanced materials for electronics and photonics, such as tailored semiconductors, graphene and nanostructured materials
   - Innovative device concepts for sensors, solar cells, lasers, LEDs etc.
   - Micro- and nanotechnology based future ICT, intelligent micro and nanosystems (e.g., nanorobots, integrated circuits for IoT, micro/nano/bio interactions)

4) Health and Wellbeing
   - New value driven models of health care delivery utilizing modern ICT
   - Methods to identify individuals at the highest risk for atherosclerosis, heart failure, cancer, diabetes, and neurodegenerative and psychiatric disorders
   - Technology for independent and safe living of aging population and for rehabilitation of post-traumatic people

Positioning of key focus areas wrt Aalto platforms:
Currently ELEC is most active in Health & Wellbeing platform, Energy platform and Digi platform. In addition ELEC has strong incentive towards Materials platform that is in ramp-up phase. Incentive in Living+ platform exists but is clearly smaller. We look forward to actively contribute also to the Entrepreneurship platform.
1.2.2 Key development actions

Development actions towards excellence

- Increase constantly the fraction of high quality publications (strong emphasis on JUFO points), use international benchmarks whenever possible.
- **Renew doctoral education:** Targets: a) decrease study times, b) keep the number of quality publications high, c) decrease the number of low quality papers, d) emphasize impact. International benchmarking extremely important.
- In the personnel structure the balance is moved somewhat from doctoral education towards more senior researchers (postdocs, research fellows, adjunct/PoP/visiting professors).
- Maintain and develop ELEC world-class research infrastructures. World class is understood only through benchmarking.

Development actions on multidisciplinarity

- Ensure the strong ELEC contribution to Aalto platforms
- Develop professor level incentives for multidisciplinary research within Aalto but especially with international high-class partners.
- Infrastructure development and technical support will cater to multidisciplinary needs.
- Ensure success of cross-school multidisciplinary MSc programs.
- Organize actively multidisciplinary project-work courses and workshops in collaboration with other Aalto schools

Development actions for Entrepreneurship

- Identify, establish and promote best ways to support staff and student spin-offs. Offer them the possibility of conducting experimental science/challenge based entrepreneurship.
- Systematically encourage our researchers and students to commercialize their ideas, provide support in case of risk taking and celebrate entrepreneurial achievements.
- **Expose all ELEC students to entrepreneurship education**

Development actions for societal impact

- **Encourage and systematically support industry collaboration on all levels** and enlarge the span of industry partner spectrum to contain also a large number of SME’s
- **Cooperate with main strategic partners systematically and continuously** in research and education.
• Assure the societal relevance of ELEC educational programs through regular dialogue with our industrial partners
• Further develop alumni activities

1.3 Development action for all Schools during the current strategy period 2017-2020

Developing a comprehensive tutoring and counselling system, where each active student has an assigned professor who systematically facilitates the student’s study planning and follow-up. The objective is to support students’ wellbeing, study progress and employability throughout the study path. Besides the professors, the comprehensive system incorporates service personnel, fellow students, and alumni.

2 Professorships in key focus areas and funded tenure slots

2.1 Professorships (tenure track system) in key focus areas

<table>
<thead>
<tr>
<th>Key focus area</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human-centered living environments</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Advanced energy solutions</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Health and wellbeing</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>ICT and digitalisation</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Global business dynamics</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Arts and design knowledge building</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Materials and sustainable use of natural resources</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Enabling areas</td>
<td></td>
<td>7,4</td>
</tr>
<tr>
<td>Professorships (total)</td>
<td></td>
<td>59,4</td>
</tr>
</tbody>
</table>

Based on the current financial outlook of Aalto University for 2017-2020, the total number of funded slots in 2020 will be 375. The slot prices will be reviewed and possibly revised in Spring 2017 and then the School will revise its tenure track slot plan during the Strategy Dialogue process in 2017.

2.2 Funded tenure track slots

<table>
<thead>
<tr>
<th>Funded tenure track slots</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funded tenure track slots</td>
<td>55</td>
<td>55,65</td>
<td>56,65</td>
<td>55,65</td>
</tr>
</tbody>
</table>
3 KPI roadmap 2017-2020

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th>Target 2017</th>
<th>Target 2018</th>
<th>Target 2019</th>
<th>Target 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUFO publication points per research and teaching personnel</td>
<td>3.46</td>
<td>3.67</td>
<td>3.80</td>
<td>3.97</td>
</tr>
<tr>
<td>Doctoral degrees (number of) per tenure track slot</td>
<td>0.82</td>
<td>0.8</td>
<td>0.79</td>
<td>0.79</td>
</tr>
<tr>
<td>International competitive research funding (KEUR) per tenure track slot</td>
<td>73.2</td>
<td>75.3</td>
<td>75.8</td>
<td>77.4</td>
</tr>
<tr>
<td>Other competitive research funding (KEUR) per tenure track slot</td>
<td>254.4</td>
<td>248.3</td>
<td>244.1</td>
<td>245</td>
</tr>
<tr>
<td>Master’s degrees (number of) per tenure track slot</td>
<td>4.4</td>
<td>4.6</td>
<td>4.8</td>
<td>5</td>
</tr>
<tr>
<td>Bachelor’s degrees (number of) per tenure track slot</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Students with ≥ 55 credits per year (number of) per degree objective x target study time</td>
<td>55%</td>
<td>57%</td>
<td>59%</td>
<td>60%</td>
</tr>
<tr>
<td>The response rate (%) in the national student’s feedback survey</td>
<td>68%</td>
<td>75%</td>
<td>85%</td>
<td>90%</td>
</tr>
<tr>
<td>The average of the points achieved in national student’s feedback survey</td>
<td>3.80</td>
<td>3.89</td>
<td>3.94</td>
<td>4</td>
</tr>
<tr>
<td>Master’s degrees taken by foreign citizens (number of)</td>
<td>63</td>
<td>65</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>International mobility (credits, IN &amp; OUT)</td>
<td>4000</td>
<td>4050</td>
<td>4050</td>
<td>4500</td>
</tr>
</tbody>
</table>

4 Educational programme roadmap 2017-2020

<table>
<thead>
<tr>
<th>Educational programme</th>
<th>Programme description</th>
<th>Partners (school / department)</th>
<th>Launch (year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s programme in Advanced Energy Solutions</td>
<td>The programme is organized in four interdisciplinary majors. • Sustainable Energy Systems and Markets (ELEC+ENG+SCI+BIZ) • Sustainable Energy in Buildings and Built Environment (ENG+ARTS+ELEC) • Industrial Energy Processes and sustainability (CHEM+ENG+SCI) • Sustainable Energy Conversion Processes (ENG+SCI+CHEM+ELEC)</td>
<td>ENG (coordination) ELEC CHEM (ARTS) (BIZ) (SCI)</td>
<td>2017</td>
</tr>
</tbody>
</table>

The School reviews and reconsiders its current structure of educational programmes and application targets.
5 Long term plans 2017-2020

5.1 Financial plan 2017-2020

School's basic funding is estimated to decline by 10% from 2016 to 2020 based on the Finnish government program cuts, MEC funding model and endowment spending outlook. External funding is estimated to increase by 5% from 2016 to 2020 by targeting higher share in competitive research funding, especially EU, as well as corporate funding from long term partnerships.

School's fixed costs are targeted to be sustainable in the long term. In order to speed up strategy implementation ELEC will proactively and effectively use its surplus, without committing to long term costs. The academic core of the school is protected by increasing the share of academic activities and research infrastructure depreciations, while decreasing the share of service activities and facilities in the school cost structure.

5.2 Personnel plan 2017-2020

- The School will continue to develop its personnel according to the principles of the Aalto career systems. Special emphasis will be put on ensuring high-quality recruitments, diversity and a good balance of research and teaching personnel.
- The volume, location and organisation of service personnel will evolve in concert with the campus development and digitalization, both promoting new ways of working - shared spaces for a diverse spectrum of users, mobility, flexibility, co-creation and wellbeing as well as the development of processes and tasks.
- The School will participate in the implementation of a user centric service portfolio operating in a matrix. Shared services and service positions between schools/joint units will increase in pace with the campus development.
- High level of professionalism in every service position is a key priority, and will be achieved through continuous competence and career development including job rotation.

5.3 Facilities plan 2017-2020

Facilities in use by the school are targeted to reduce from 24,500 m² to 15,800 m² (-36%) by the end of 2020 and share of facility cost of total cost are targeted to be maximum 9% by the end of 2020.

6 Other issues

6.1 Significant infrastructure plan 2017-2020

Currently the School foresees no new infrastructure initiatives. However, the School plans reviewing its current research infrastructures.

6.2 Major structural reforms 2017-2020

The departments of Radio Science and Engineering and Micro- and Nanosciences will merge in the beginning of 2017 to form the department of Electronics and Nanoengineering.
Performance agreement is subject to the long term financial framework in the coming years.

Espoo

December 2016

Tuula Teeri
President

Jyri Hämäläinen
Dean