Annual Review 2017

School of Electrical Engineering
Content

Annual Review Template

• Quality System
• Research and Innovation
• Art and Creative Practices
• Education
• Conclusions
• School’s Degree Programme Reviews
Status of the quality system: Analysis of the achievements and success of development areas based on the FINEEC Audit Report

• To ensure a wider and more depth sense of ownership of quality management process and PDCA- way of working at all levels and quarters: Quality is embedded in all management and in everyday work

• To develop unambiguous indicators for new strategy and to ensure an easy access to accurate and timely information. To clarify the use of KPIs and other data at all organisational levels: Work is still in progress. New funding system is in place for the school and departments.

• To develop academic advising and guidance practices to support the study progress at all degree levels: This is one of the main concerns in developing education at ELEC (see slides 12-14)

• To establish a standard approach to outline course descriptions, and to ensure that core requirements and standards are met by all schools: New study information system will harmonize practices (Sisu)

Analysis of achievements and success of the development actions based on key findings in previous Annual Review (spring 2016)

• Preparation for FINEEC audit went according to plan

• Programme reviews have been continued in fall of 2016

• Communication on management procedures has been open (Annual Clock in Inside, regular meetings between Dean and staff) even though work on this needs to continue

• Quality management has been streamlined; responsibility for quality has been integrated to management system

• A committee has been established for the purpose of tackling possible research ethical issues
# Development areas of the Aalto quality system and actions needed from the School’s point of view, short term (-2017)

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<th>Objective</th>
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| Transparency of management and decision making              | • Common understanding on the academic success and strategic implementation at ELEC  
• Support understanding of the decision making process at ELEC and the university | • Open data to the whole ELEC community when possible  
• Improve communication on decisions made by management |
| Programme development                                       | • Systematic programme reviews take place annually                      | • Execute reviews on the programme level  
• Making better use of information available for programme development |
# Research and Innovation

| Key achievements and challenges in respect to strategic development |  
|---------------------------------------------------------------|---|
| (based on the 2016 performance agreement)                      |   |
| • Key achievements with respect to R&I KPI’s of 2016:         |   |
|   • International refereed journal articles: Target for 2016 was 425. The actual number of international refereed journal articles was 482. Note: The number of JUFO points was 1420 with a notable rise in the highest JUFO level. |   |
|   • Doctoral degrees: Target for 2016 was 50. The actual number of graduated doctors was 55. Per professor the value was 1.04. |   |
|   • Competitive research funding: Target for 2016 was 10M€. The actual amount of competitive research funding was 11.1M€. |   |
|   • Funding from non-academic partners: Target for 2016 was 12M€. The actual amount of funding from non-academic partners was 9.6M€. |   |
| • Challenges in R&I: In terms of numeric results the year 2016 was excellent. However, |   |
|   • There was challenges in recruitment of competent fixed term staff (especially postdoc’s and research fellows) |   |
|   • Funding from non-academic partners has shown to be increasingly difficult to gain. |   |
|   • Building research spearheads was not progressing as expected partly due to YT related problems in recruitment. |   |
|   • Building strategic/systematic partnerships with non-academic partners is a challenging and time consuming task. |   |

<table>
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<tr>
<th>Key findings of feedback and external evaluations 2016</th>
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<tr>
<td>• The most important external evaluations in 2016 were the FINEEC Audit and SAB evaluation</td>
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<tr>
<td>• Key points from audit (research perspective):</td>
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<tr>
<td>• To ensure that the tenure process continues to be fair and transparent</td>
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<tr>
<td>• More developed feedback system and utilization of feedback</td>
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<td>• Key points in SAB feedback:</td>
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<tr>
<td>• Form ‘virtual centers’ that would bring together faculty and students with common interests.</td>
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<tr>
<td>• Put up an ‘Industry Advisory Board’ to bring together CEO’s and CTO’s of most important partner companies. Staff exchange and visits with industry should be promoted.</td>
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<tr>
<td>• A new dedication of ELEC to entrepreneurial efforts should be made.</td>
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# Development areas and actions needed, short term (-2017)

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<td>• Ensure the maximum number of high quality ERC applications.</td>
<td>• Encourage professors to apply ERC grants, ensure excellent grant preparation conditions and reward support funding for 2\textsuperscript{nd} round applications.</td>
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<td>• Develop doctoral education</td>
<td>• Renewal of doctoral education is underway</td>
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<tr>
<td>Research Environment</td>
<td>• Strongly promote better use of synergies between Aalto research groups.</td>
<td>• Develop research environment according to feedback after move to new facilities</td>
</tr>
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<td></td>
<td>• Ensure that research facilities after relocation maximally support</td>
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<td></td>
<td>research groups.</td>
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<tr>
<td>Research Networks</td>
<td>• Ensure resources for upkeep and creation of research networks</td>
<td>• Develop new financial support approaches for upkeep and creation of research networks</td>
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<td></td>
<td>with world class institutions</td>
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<tr>
<td>Innovation Eco-system</td>
<td>• Further strengthen the collaboration with our strategic partners</td>
<td>• Strategic partnering is consolidated through systematic collaboration (cooperation is part of the operative annual clock).</td>
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<tr>
<td></td>
<td>(ABB, Nokia, SAAB).</td>
<td>• Improve support for research groups to start new collaboration accross Aalto.</td>
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<td></td>
<td>• Integrate new companies to our research, education and innovation</td>
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<tr>
<td></td>
<td>ecosystem.</td>
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<tr>
<td>School specific area</td>
<td>• Ensure the world class infrastructures with well organized technical</td>
<td>• Planning for reorganization of technical services will be started n 2H 2017.</td>
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<tr>
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<td>services</td>
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Art and Creative Practices

Key achievements and challenges in respect to strategic development (based on the 2016 performance agreement)

Progress in art and creative practices:
• ELEC has a new Artist in residence position at the department of Signal Processing and Acoustics (acoustics/sonic arts)
• ELEC has allocated space for artistic productions in TUAS (and before that in Otakaari 5)
• ELEC AASG member (Ville Pulkki) has regularly taken part in ELEC management team meetings and acted as a mediator between AASG and ELEC

Challenges:
• The number of research groups actively facilitating collaboration with ARTS is still small.
• Participation of ARTS researchers/artists should be more strongly promoted to industry collaboration

Key findings of feedback and external evaluations 2016

• The general feedback in the field of Art and Creative practices has been positive, however external evaluations in 2016 did not provide much feedback in this regard
• Courses that combine engineering and creative practices (such as sähköpaja and protopaja) have been popular among students and received positive feedback from the companies taking part (protopaja).
Development areas and actions needed, short term (-2017)

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<tbody>
<tr>
<td>Excellence</td>
<td>• Academic cooperation together with ARTS</td>
<td>• Launch concrete joint collaboration activity with ARTS in virtual reality.</td>
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<td></td>
<td>• PoP position together with ARTS</td>
<td>• PoP position together with ARTS</td>
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<tr>
<td>Visibility &amp; impact</td>
<td>• Make art and design visible in ELEC research and office facilities</td>
<td>• Allocate space in new ELEC offices and even labs for art and design</td>
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<tr>
<td></td>
<td>• Promote media visibility of ELEC-ARTS collaboration activities.</td>
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<tr>
<td>Broader art-based offering</td>
<td>• Mobility of students between ELEC- ARTS</td>
<td>• Promote UWAS courses among ELEC students</td>
</tr>
<tr>
<td>Mechanisms to enable creative practices and design</td>
<td>• Include creative practises and design thinking into ELEC hands-on courses.</td>
<td>• Strengthen the role of design thinking and creative practices in sähköpaja</td>
</tr>
<tr>
<td>thinking and design thinking</td>
<td></td>
<td>and protopaja -courses</td>
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Education

Key achievements and challenges in respect to strategic development (based on the 2016 performance agreement)

Key achievements:
- BSc degrees (271) exceeded the objective (230). In addition to this, the number has increased four years in a row, which indicates that curriculum renewal was successful and teaching faculty is well-motivated in improving education.
- MSc degrees (384) is the all-time record and exceeded the objective (232). In addition, the four-year long trend is also positive.
- DSc degrees (55) exceeded the objective (50) as well. 2016 was the fourth year in a row exceeding ELEC's target.

Challenges:
- Study progress (55+ cr per year) remains a program-wide challenge in ELEC. 1st year students perform best, but the credits accumulation decreases during 2nd and 3rd year. In average MSc students perform better regarding 55+, but their study progress should be improved as well.
- The number registered students with 0 cr in BSc and MSc level is high, 324 and 230, respectively. High number of graduated students show that the backlog of students that has a studied long time has diminished considerably.

Key findings of feedback and external evaluations 2016
- The average of the course feedback has been within 3.50-3.60 over the past years.
- The positive effect of using more versatile teaching methods can be seen in course feedback statistics.
- BSc students’ performance regarding 55+ cr during 3rd study year needs specific attention and measures.
- The number of so called bottle-neck courses has diminished over the years, but a few problematic courses exist yet in BSc and MSc levels.
- Results of the national BSc feedback survey show that the two main areas needing improvement are 1) Helpfulness of teachers’ feedback and 2) opportunities to influence and participate.
- Relocation of ELEC seems to have, at least temporarily, diminished the interaction of BSc students towards faculty and students’ guilds.
Degree Programme Reviews 2016, summary of the key findings

- The total number of degrees from BSc and MSc has increased steadily over past four years. 2016 was a specifically good year regarding MSc degrees because of discontinuing old curricula.
- The amount for practical training in BSc and MSc programmes should be increased to same level as in the other technical schools.
- The summer curriculum is underutilized. It lacks new fresh courses and eLearning opportunities. A novel ELEC minor will be realized in 2018, which will offered to students from other Aalto schools as well.
- The high number of registered students with 0 cr in BSc and MSc level is alarming.
- Study progress (55+ cr per year) remains a program-wide challenge in ELEC.
- All ELEC programmes wish to have higher application pressure.
- ELEC’s presence in Life Science Technology master’s programme should be strengthened.
- The number of so called bottleneck courses has diminished. Development work is being done regarding these courses e.g. new eLearning contents are being designed.
- Tutoring of BSc is systematic and works well.
- Mentoring of MSc students by professors is a development target across the programmes.
## Development areas and actions needed, short term (-2017)

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<td>Attractive programmes</td>
<td>• Increase application pressure towards ELEC MSc programs</td>
<td>• More efforts on publishing high quality information about programs</td>
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<tr>
<td></td>
<td>• Develop curricula in terms of quality and efficiency</td>
<td>• Participation in Aalto level development actions in BSc and MSc levels</td>
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<td>• More effective high school student recruitment through LUMA and SaaS</td>
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<td></td>
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<td>activities</td>
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<td></td>
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<td>• Develop well started Metropolia collaboration further</td>
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<td></td>
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<td>• Strengthen study councils active role in programs’ quality work (PDCA)</td>
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<tr>
<td>E-learning solutions</td>
<td>• Increase the amount of eLearning contents across ELEC courses in BSc and MSc levels</td>
<td>• Pilots in AIOLE initiative from all ELEC majors</td>
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<td></td>
<td>• Exploitation of digital continuous assessment</td>
<td>• Departments’ support for teachers who develop eLearning contents for</td>
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<td>their courses</td>
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<td></td>
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<td>• Benefit eLearning for summer curriculum</td>
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<td>Success of students</td>
<td>• Confirm the equivalence of credits and workload across ELEC curricula</td>
<td>• Exploit and use program leaders’ data in identifying workload issues</td>
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<td>• Develop guidance and mentoring especially in MSc level</td>
<td>• Improve specifically MSc level tutoring and guidance</td>
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<td>• Foster interaction between faculty and students</td>
<td>• More choices of attractive summer study opportunities</td>
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<td>• New eLearning opportunities for summer period</td>
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<td></td>
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<td>• ELEC BSc minor crossing the Electrical Eng. Disciplines</td>
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<tr>
<td>Working life competences</td>
<td>• Acknowledgement the value of training as part of education</td>
<td>• Academic support for summer training needs to be increased in BSc and</td>
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<td></td>
<td>• The amount of training as a part of studies should be increased to the</td>
<td>MSc levels as well as the maximum amount of study credits</td>
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<td>same level as in the other Aalto technical schools</td>
<td>• Increase visibility in students’ model schedules and HOPS</td>
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<td>School specific area</td>
<td>• Fostering summer studies: ELEC BSc minor for</td>
<td>• Planning finished by the end 2017</td>
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<td>the summer period</td>
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Status of the strategic development 2016

Please, summarize the status of the School’s strategic development within the frame of cross-cutting themes (excellence, multidisciplinarity, entrepreneurship and societal impact) based on the review (previous slides concerning core activities).

- **Excellence:**
  - ELEC is progressing very well in terms of research related KPI’s.
  - ELEC has been very successful in gaining Academy funding in 2016
  - There has been challenges in recruitment of high quality fixed term staff (especially postdoc’s and research fellows)
  - Building research spearheads was not progressing as expected.
  - Excellence in education shows in the positive feedback that results from using versatile teaching methods (course feedback)

- **Multidisciplinarity:**
  - Active participation to creation of Aalto platforms.
  - Artist in Residence at the Department of Signal Processing and Acoustics and recruitment of Professor of practice together with ARTS (acoustics; ongoing)
  - *No clear measure for the volume/quality of multidisciplinary research activities*

- **Entrepreneurship:**
  - AVP studies for first year students taking part in sähköpaja –course
  - ELEC BSc. students study together with BIZ students in Entrepreneurship and Innovation Management
  - ELEC is generating a steady flow of start ups and entrepreneurship is widely promoted to all students

- **Societal impact:**
  - The large number of BSc. and MSc. graduates in 2016 creates a great impact to surrounding society
  - Research at ELEC continues to lead to numerous new innovations for business and society
  - ELEC continues to have a strong bonding with business and industry. Relationship has been strengthened and systematized during Aalto fundraising in 2016
Prioritized list of the most critical development areas (3-5) and actions needed, short term (-2017)

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Summary of the Degree Programme Review (ELEC BSc Programme)

- Actions related to Educating Game Changers strategy
  - Attractive programmes
    - Electronics and Electrical Eng. major has applied to participate in this strategic initiative. The target is to increase application pressure and enrollment of talented students in this field
  - E-learning solutions
    - New courses of the BSc programme will participate in A!OLE in order to develop methods and study material suitable for eLearning
  - Success of students
    - Study wellbeing survey was performed in February 2017. A follow-up workshop for ELEC students will be organized by the study psychologists. A workshop for ELEC programme leaders, professors and lecturers will be arranged as well in order to plan and decide actions based on the survey results
  - Working life capabilities
    - The academic contents of students’ practical training will be developed and the maximum study credits for training will be increased

- Actions to improve the number of students earning ≥ 55 cr pa.
  - BSc students have personal guidance and feedback discussions with his/her tutor twice a year
  - Highlight the role of practical training as a part of studies
  - Teachers and ELEC LES identify registered inactive students in BSc course and take contact with them
  - Scholarships (500€) will be awarded for BSc students earning 60+ study credits per academic year
  - Develop ELEC BSc curriculum for the summer semester
  - Continue the development of the most difficult “bottle-neck” courses by increasing eLearning and balancing study workload
  - Reconsider the intake number of students in ELEC BSc majors
Summary of the Degree Programme Review (ELEC BSc programme)

School and programme specific items

- The amount of accepted study credits for practical training varies across Aalto schools. The current amount (5cr) needs to be doubled in the curriculum.
- Popularity of summer studies should be increased. Fostering eLearning possibilities is seen as one solution which, however, requires a considerable amount of resources for material development. The other idea forward is to develop a “ELEC summer minor” for BSc students, which offers a broader perspective to EE backed up with a hands-on project course.
- The high number of registered BSc students (324) completing 0 cr is alarming. Reasons for this should be elaborated.
- Progress of studies in view of 55+ study credits accumulation is a challenge in all BSc majors. ELEC is executing many activities addressing this issue.
- The number of applicants to ELEC BSc programme should be much higher. The intake amount of students to ELEC’s study options should be rethought.
Summary of the Degree Programme Review (AEE)

- Actions related to Educating Game Changers strategy
  - Attractive programmes:
    - AEE is one of the marketing pilot programmes in 2016
    - We made a marketing plan and executed it, this shows as a high number of applications for 2017.
    - We built high quality contents web pages for the programme (Get To Know Us)
  - E-learning solutions
    - Many courses in the programme make use of electronic material
    - All courses have adopted MyCourse system, some courses use it for bi-directional interaction with students
    - Additional actions to promote E-learning are needed. Motivation and support
  - Success of students
    - AEE introduced Professor mentors for all students in the programme
    - Bottleneck courses identified and actions are planned
    - Major specific reviews of the course feedback are scheduled.
  - Working life capabilities
    - We incorporated a project work course 10 cr in the compulsory part of the program to enhance the students working life skills
    - The outcome of the course has been assessed through exhaustive inquiry and interview of the students (published in SEFI-conference)
    - 4 lecturers involved in the development of working life skills. They are supported by special formation (tyyli-project education sessions)
    - Evaluation of the working life skills offered in each course of the programme’s majors (tyyli-project competence matrix)
  - Actions to improve the number of students earning ≥ 55 cr pa.
    - Integration of intern- and traineeship in the curricula, without being compulsory. Some instructions are being drafted.
    - Review of course feedback and actions to remove bottleneck course
    - Increase of flexibility and student choice for courses to be included in the degree
    - Providing special assignment courses and related instruction to cover summer period
School and programme specific items

- Actions taken
  - AEE is one of the marketing pilot programmes in 2016
  - Marketing plan made and executed; it shows positively in number of applications for 2017.
  - High quality contents web pages built for the programme (Get To Know Us)
  - Many courses in the programme make use of electronic material
  - All courses have adopted MyCourse system, some courses use it for bi-directional interaction with students
  - Professor mentoring for each student introduced in the programme
  - Project Work Course (10 cr) compulsory in the programme to enhance the students working life skills
  - Outcome of the course assessed through inquiry and interviews of students (published in SEFI-conference)
  - 4 lecturers involved in the development of working life skills. They are supported by special formation (tyyli-project education sessions)
  - Evaluation of the working life skills offered in each course of the programme’s majors (tyyli-project competence matrix)

- Under development
  - Major’s specific reviews of the course feedback are scheduled.
  - Bottleneck courses have been identified and actions to tackle them are planned
  - Additional actions to promote E-learning are needed. Motivation and support
  - Integration of intern- and traineeship in the curricula. Some instructions are being drafted.
  - Increase of flexibility and student choice for courses to be included in the degree
  - Provide special assignment courses and related instruction to cover summer period
Summary of the Degree Programme Review (CCIS)

- Actions related to Educating Game Changers strategy
  - *Attractive programmes*
    - CCIS is one of the AALTO attractive programmes pilots. Student testimonials and marketing videos with interviews of alumni and industrial partners have been included in the CE major web-pages. Social media marketing programme has been implemented.
  - *E-learning solutions*
    - A+ and TIM platforms are used and actively developed in some of the courses
  - *Success of students*
    - Survey for students was made for students starting their M.Sc thesis. Based on a survey, the M.Sc students find it difficult to start the Master’s thesis. Especially, they find difficult to find suitable topics (industry or academic) and suitable supervisors from Aalto.
  - *Working life capabilities*
    - Meetings with industry have been organized to discuss their requirements and to actively find more industrial M.Sc thesis topics.
- Actions to improve the number of students earning ≥ 55 cr pa.
  - *Study progress is actively monitored by the planning officer. Follow-up e-mails are sent to all students.*
School and programme specific items

- Number of applicants to CCIS program has increased (5%), but the interest towards ELEC Majors (Communications engineering CE, Acoustics and Audio Technology AA, and Signal, Speech and Language Processing SSL) have declined approximately 32% from last year. The trend has been decreasing for longer time, but application fees (2015) and tuition fees have decreased the interest. The number of applicants to AA and SSL are very small.
- More attractive majors will be jointly developed by ELEC and SCI
  - New HCI major will be developed
  - Macadamia – SSL integration will be investigated
  - Possibility to jointly develop EIT Master School Majors (Embedded systems, Software & service architectures – change of focus from Smart Spaces to Digital Industry) will be investigated
Summary of the Degree Programme Review (LST)

- Actions related to Educating Game Changers strategy
  - **Attractive programmes**
    - More actors from ELEC to be involved in the Biosensing and Bioelectronics major. As a consequence wider selection of possible study paths and higher attraction.
    - More collaboration with University of Helsinki (UH) and HUS also in teaching. Joint courses.
    - Further development of the Project course (flagship course) to include also possible collaboration with UH and HUS
  - **E-learning solutions**
    - More effective utilization of available video lecture materials. However, supporting material must be provided to facilitate learning.
  - **Success of students**
    - Effective teacher tutoring/mentoring process also at the master level
    - Master thesis topic pool from companies out of which the students can apply for thesis topic (competitive funding)
    - Incorporating of students to research groups even without "actual" employment contract and salary
  - **Working life capabilities**
    - Utilization of alumni network
    - Further development of the Project course
    - More effective use of the industrial expertise of PoPs
  - **Actions to improve the number of students earning ≥ 55 cr pa.**
    - Effective tutoring, follow up of study progress, personal discussions, identification of possible bottle neck courses
School and programme specific items

- Currently presence of ELEC in the LST-program is not strong enough
- Too narrow scope in the major to really represent impact of ELEC in life science. This also makes the major less attractive for some students
- How to better attract more students from ELEC bachelor (other than BioIT) programs (see also comments above)?
- Competition from students against SCI and CHEM majors. The presence of ELEC as a school should be increased.
- First students have been graduated from the LST-program (and also from Biosensing) in target time of two years. No serious bottlenecks were identified
Summary of the Degree Programme Review (Nano and Radio Sciences)

Actions related to Educating Game Changers strategy

- Attractive programmes
  - A new and a more attractive name for the programme is being searched
  - Renewal of study pages of the programme has been started
  - NanoRad is applying to the Attractive Programmes – pilot program
  - Collaboration discussions have been initiated with University of Tartu, Estonia
  - Our programme (among some others) have been made more attractive to the B.Sc. of Metropolia University of Applied Sciences. Students of Metropolia can take a special study module containing extra math and signal processing. The module enforces students basic skills on these topics and facilitates their way to our programme.

- E-learning solutions
  - E-learning capabilities of MyCourses have been utilized on many individual courses.

- Success of students
  - Every student in our programme has a professor or teacher tutor. However, tutoring activity could still be made more systematic.

- Working life capabilities
  - We have periodically (in 2014 and 2016) collected feedback from our stakeholders and used the feedback in developing the programme.
  - Some majors (e.g., Radio Science, Micro- and Nanosciences) strongly collaborate with companies in teaching.

Actions to improve the number of students earning ≥ 55 cr pa.

- Bottle-neck courses have been identified and changes to the curriculum to balance the workload have been made accordingly.