TRANSPORTA UN SAKARU INSTITŪTS

# Scientific Activity Report

2016

This report provides information on the aims and objectives of the research activities, scientific publications of the employees of Institute - articles in journals and collections of articles from the conferences, monographs and patents as well as it identifies priority areas of research, describes the local and international conferences held at the Institute and scientific journals published by the Institute.

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# 1. GENERAL INFORMATION

## 1.1. Mission, vision

**Mission.** The mission of the Transport and Telecommunication Institute (TSI) is adaptive to the needs of society academic and scientific activities at the international market in the interdisciplinary areas based on the fundamental achievements in the sphere of high technologies in the form of open cooperative environment.

**Our vision for the Research Strategy is:**
Research excellence and innovation are integral to the vision of the Transport and Telecommunication Institute. Our goal is to address fundamental and strategically important questions, and to deliver economic, social and cultural impact at regional, national and international levels. We engage in internationally leading research activities and collaborations.

## 1.2. Research infrastructure

The research infrastructure of TTI is coordinated by the Research Department of TTI and it is presented in Figure below.

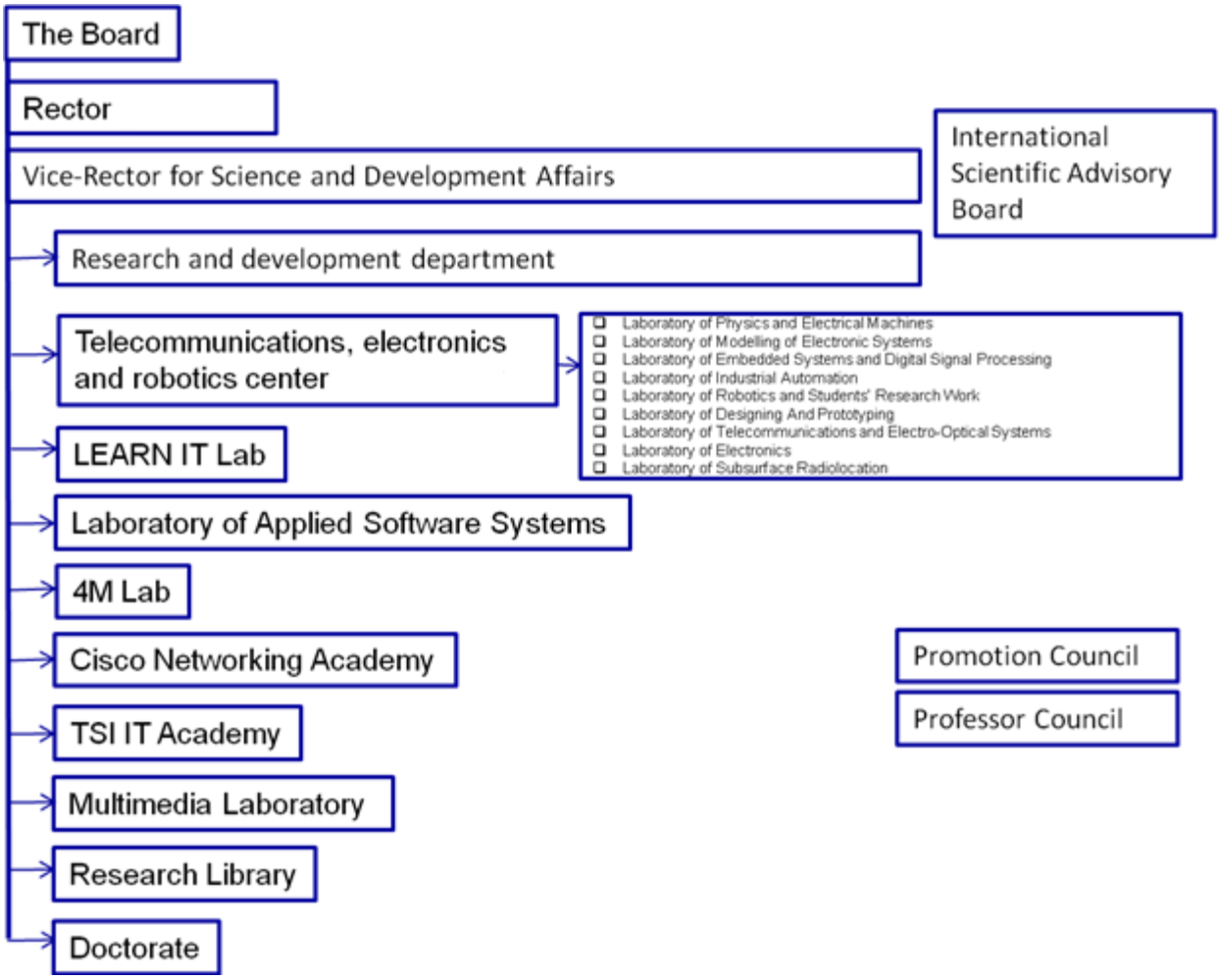


Figure 1. **Research infrastructure**

The Centre of Telecommunications, Electronics and Robotics was founded in 2013 in the framework of project IKAR with financial support of ERDF. The center includes nine laboratories equipped with the latest software and hardware widely used in academic and research activities. Each laboratory is a collection of contemporary technical, software and methodological maintenance, which allows conducting classes with students at the highest level. The following laboratories were formed and equipped as part of the center:
**Laboratory of Physics and Electrical Machines.** The laboratory is equipped with training equipment of the company PHYWE, which allows students to explore the effect of the fundamental laws of physics. At the same time, the electrical machine equipment from the manufacturer K&H MFG, helps to understand the principles and work of modern electric motors.

**Laboratory of Modelling of Electronic Systems.** Computer class with modern software, which allows to execute the simulation of the work of electric circuits and the designing of printed circuit boards. The list of software includes: Electronic Design Automation package OrCAD; Functional Modelling (Simulation) System Proteus VSM; Modelling (Simulation) System of Industrial Standard NI Multisim; Graphical Programming System NI LabVIEW; Designing System for Microcontrollers AVR Studio; Designing System for PLIC (programmable logic integrated circuits) Xilinx ISE WebPACK and others.

**Laboratory of Embedded Systems and Digital Signal Processing.** The laboratory is equipped with special debug kits with modern microcontrollers AVR, Freescale, STMicroelectronics, as well as programmable logic circuits XILINX. The equipment of laboratory allows designing and exploring of digital signal processing systems and intelligent control systems.

**Laboratory of Industrial Automation.** The laboratory is equipped with Siemens control software systems and models of the production lines. The laboratory is designed for the research of the principles of industrial networks and engineering of the systems of automation based on industrial logic controllers. Industrial manipulator Kawasaki RS03N allows learning the principles of programming of industrial robots and exploring the features of integration of the robotic devices into the automated production lines.

**Laboratory of Subsurface Radiolocation.** The laboratory is equipped with the ground penetrating radar of the company GSSI and a set of options for the research of the roadbed. There is software RADAN 7, for processing the data of ground penetrating radar, installed in the laboratory. All the equipment of the laboratory allows exploring the methods of non-destructive quality control of road surfaces and carrying out of work to assess the quality of the laying road surfaces and detection of hidden engineering communications.

**Laboratory of Robotics and Students' Research Work.** The laboratory is equipped with a variety of modern measuring equipment made by the company HAMEG and a set of debug modules for microcontrollers, PLIC and signal processors. Software and hardware platform NI ELVIS II allows carrying out the research of the operation of electronic devices through physical, semi-natural and mathematical simulation. The laboratory contains a set of functional units of the robots from LEGO, Lynxmotion, Pololu and Parallax, which allows to create autonomous mobile robots and learn the principles of the construction of control systems of robotic facilities in the laboratory.

**Laboratory of Designing And Prototyping.** The laboratory is equipped with software and hardware of production the prototypes of the electronic devices, including CNC machine tool LPKF Protomat S63, for the production of double-sided printed circuit boards. Soldering Equipment of the laboratory allows to carry out montage using PTH (Pin Through Hole) and SMT (Surface Mount Technology) technologies.

**Laboratory of Telecommunications and Electro-Optical Systems.** The laboratory is intended for students to explore the principles of the construction of telecommunications equipment: Global System for Mobile communications (GSM); Global Positioning System (GPS); Radio-Frequency Identification System (RFID); Optoelectronic Systems; Digital Telephone Networks; Radio Transmitting and Receiving Devices;Antenna-Feeder Devices.

**Laboratory of Electronics.** This laboratory is equipped with typesetting fields for creating electrical circuits. All the research work is with the use of specialized laboratory measuring equipment.

**Laboratory of Applied Software Systems** of the Transport and Telecommunication Institute carries on research and offers consulting in the following fields: traffic, logistics and business processes. The research and analysis are fulfilled using nowadays simulation software. The software of the laboratory allows to do the high-quality, representative and many-sided analysis of the research systems. Such projects as the projects connected with the new bus station in Riga, three level flyover of South bridge model, Liepaja city traffic macroscopic model can be mentioned as a vivid example (see more on website las.tsi.lv).

**Multimedia Laboratory.** The laboratory is equipped with video-recording and editing equipment complex, which allows creating educational, informative and commercial videos. The filming process of video lectures for the purposes of distance studying, sound recording for video materials and their preparation for placing into e-studying environment takes place at the filming studio. Moreover, the conference presentations and lectures of the lecturers and guest lecturers are being broadcasted live on the internet.

**Cisco Networking Academy.** Cisco Networking Academy (CNA) Program developed by the specialists of Cisco Systems Company is the most fundamental and methodically worked over among other similar programs in the area of network technologies. Annually over 500 000 students use it in their learning in more than 8000 academies in 164 countries of the world. Only 29 countries do not have networking academies. The purpose of the program is the fundamental training of specialists of planning theory and practice, construction and technical maintenance of local and global networks with the use of generally recognized standards and solutions.

**Learn_IT project Laboratory**. The main goal of this Laboratory would be to test a set of tools that will help to increase the effectiveness of learning by supporting the high level of concentration in a manner adapted to the individualized rhythm of learning. The solutions offered under the framework of LEARN IT project may be a good alternative for traditional ways of stimulation of concentration and focus during the process of learning. The Learning Lab with software for mobile devices was developed so that it can be used to prepare personalized recommendations for each person who will be tested in this Laboratory.

**4M Library**, which provides access to the students and staff of TTI to the latest literature and scientific journals. The library has electronic catalogue of all information entities and it is possible to search the necessary information via internet.

## 1.3. Research journals and conferences

**Transport and Telecommunication Scientific Journal.** Journal “Transport and Telecommunication” is a peer-reviewed open-access scientific journal, owned by Transport and Telecommunication Institute. This Journal is a source of information and research results in the full scope of transport science: modelling and planning the transport systems, technical means of transport; transport infrastructure, traffic control, intellectual transport system, telematic and also concerns the interdisciplinary questions: transport and the environment, safety in transport, quality and effectiveness of transport, interoperability and intermodality. The journal aims at addressing professionals in transport and telecommunication in different types of positions in the area of industry, research and academic institutions. The Journal is published quarterly in the electronic and printed version. The papers published in Journal “Transport and Telecommunication” are included in: SCOPUS (since 2008, Vol. 9, No 1), Elsevier Database; De Gruyter Open; VINITI; The Summon; Transportation Research Board; JournalTOCs; INSPEC; TEMA (Technology and Management); ProQuest; Advanced Technologies & Aerospace Journals; ProQuest Engineering Journals; ProQuest Illustrata: Technology; ProQuest SciTech Journals; ProQuest Technology Journals; Celdes; CNKI Scholar (China National Knowledge Infrastucture); CNPIEC; DOAJ; EBSCO Discovery Service; Google Scholar; Primo Central (ExLibris); SCImago (SJR); TDOne (TDNet); WorldCat (OCLC); J-Gate; Naviga (Softweco); TEMA (Technology and Management); Cabell`s Directory.

The Figures below demonstrated the development process of the journal. The data are obtained from the Scimago Journal & Country Ranks (http://www.scimagojr.com/).


Figure 2. **Transport and Telecommunication Journal performance**

The significant improving in journal position based on the KPI values included in following Table:

Table 1.1

**Journal position based on the KPI**

| KPI | 2015 | 2016 |
|---|---|---|
| H-index of the Transport and Telecommunication Journal | 2 | 8 |
| SJR indicator | 0.19 | 0.22 |
| Cites per document | 0.21 | 0.25 |
| International Collaboration | 14.29% | 18% |
| Change the quality of the journal in following categories[1]:<br>• Computer Science application<br>• Engineering (Miscellaneous) | <br>Q4[2]<br>Q3 | <br>Q3<br>Q2 |

TTI continues to regularly hold International Conferences, which are officially recognized by the international research community. The most significant among them is the TTI's Annual International Conference "Reliability and Statistics in Transportation and Communication" that was reorganized to Multidisciplinary Conference in 2016. In 2016 RelStat-16 Conference RelStat-16 was held on 19-22 October 2016. The number of participants in 2016 was increased by 25% and the amount of participants from business was also increased by 15%. 135 authors from 17 countries (Germany; Austria; Greece; Poland; Israel; Turkey; Spain and others) presented their researches.
The Conference Proceedings from 2016 were published in Elsevier Procedia Engineering. Indexing in Web of Sciences.

[1] Based on data from SCImago Journal & Country Rank http://www.scimagojr.com/
[2] Quartiles: Q1 – top quartile, Q4 – lower quartile

## 1.3. Research staff

The research staff of TTI is registered in VIAA (Latvian State Education Development Agency) research staff database. The table below represents the table with research staff elected in TTI.

Table 1.2.

**Research staff elected in TTI**

| #. | Surname | Name | Position | Grade | Sex (M/F) |
|---|---|---|---|---|---|
| **1** | Andronovs | Aleksandrs | Senior researcher | Dr. habil. sc. ing. | M |
| **2** | Fainglozs | Ļevs | Research assistant | Mg. oec., Bc.sc.ing. | M |
| **3** | Grakovskis | Aleksandrs | Senior researcher | Dr. sc. ing. | M |
| **4** | Graurs | Igors | Senior researcher | Dr. phil. | M |
| **5** | Gromovs | Genadijs | Senior researcher | Dr. sc. ing. | M |
| **6** | Išmuhametovs | Išgalejs | Senior researcher | Dr.psych. | M |
| **7** | Jackiva | Irina | Senior researcher | Dr. sc. ing. | F |
| **8** | Jurševiča | Jeļena | Researcher | Dr. sc. ing. | F |
| **9** | Kabaškins | Igors | Senior researcher | Dr. habil. sc. ing. | M |
| **10** | Kraiņukovs | Aleksandrs | Researcher | Dr. sc. ing. | M |
| **11** | Krasņitskis | Jurijs | Senior researcher | Dr. phys.-math. sc., Dr. habil. sc. ing. | M |
| **12** | Kutevs | Valerijs | Senior researcher | Dr. habil. sc. ing. | M |
| **13** | Kuzmina - Merlino | Irina | Senior researcher | Dr. oec. | F |
| **14** | Labendiks | Vladimirs | Senior researcher | Dr. habil. sc. ing. | M |
| **15** | Ļaksa | Igors | Research assistant | Mg. sc. ing. | M |
| **16** | Malnača | Kristīne | Researcher | Mg. sc. ing. | F |
| **17** | Medvedevs | Aleksandrs | Senior researcher | Dr. sc. ing. | M |
| **18** | Mišņevs | Boriss | Senior researcher | Dr. sc. ing. | M |
| **19** | Ņečvaļs | Konstantīns | Researcher | Dr. sc. ing. | M |
| **20** | Opolchenov | Daniil | Research assistant | Mg. sc. ing. | M |
| **21** | Pavlyuk | Dmitry | Researcher | Dr. sc. ing. | M |
| **22** | Pētersons | Elmārs | Senior researcher | Dr. sc. ing. | M |
| **23** | Pozdņakovs | Anatolijs | Researcher | Dr. sc. ing. | M |
| **24** | Pticina | Irina | Researcher | Dr. sc. Ing. | F |
| **25** | Revzina | Jeļena | Researcher | Mg. sc. comp. | F |
| **26** | Roļiks | Jurijs | Senior researcher | Dr. sc. ing. | M |
| **27** | Savrasovs | Mihails | Researcher | Dr. sc. ing. | M |
| **28** | Sikeržickis | Jurijs | Senior researcher | Dr. habil. sc. ing. | M |
| **29** | Spiridovska | Nadežda | Researcher | Dr. sc. ing. | F |
| **30** | Stetjuha | Aleksandrs | Senior researcher | Dr. oec. | M |
| **31** | Stukaļina | Jūlija | Senior researcher | Dr. sc. admin. | F |
| **32** | Šarkovskis | Sergejs | Researcher | Dr. sc. ing | M |
| **33** | Tolujevs | Jurijs | Senior researcher | Dr. sc. ing. | M |
| **34** | Utehins | Georgs | Senior Researcher | Dr. sc. Ing. | M |
| **35** | Yunusov | Sergey | Researcher | Dr. sc. Ing. | M |

**Figures below shows the dynamics regarding research staff in TTI staring from 2006 year.**

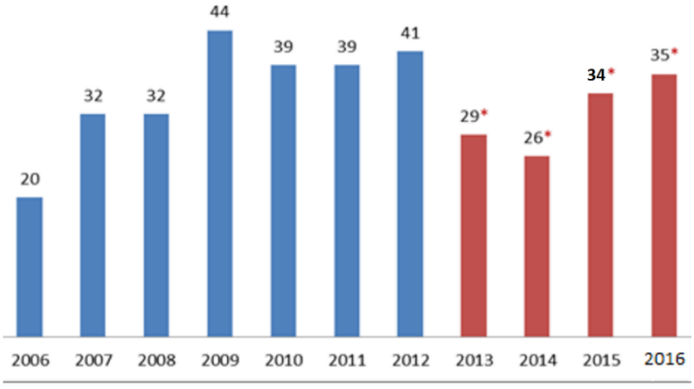


Figure 3. Research staff in TTI (* elected for the position)

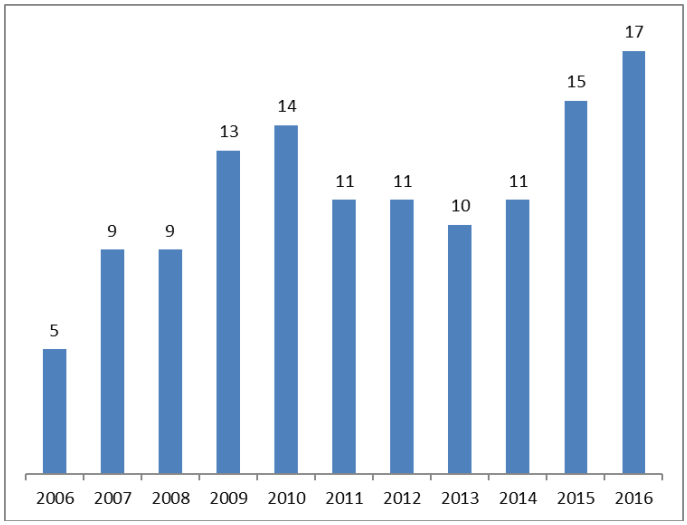


Figure 4. Research staff FTE in TTI.

# 2. RESEARCH OUTPUT

## 2.1. Number of scientific publications and other outputs

Table 2.1.

**Scientific publication / outputs, 2016**

| | |
|---|---|
| **1. Original articles in anonymously refereed scientific journals cited in Thomson Reuters Web of Science, SCOPUS, ERIH or Engineering Village** | 32 |
| **2. Articles in other refereed scientific edited journals and conference proceedings** | 16 |
| **3. Monographs published**[1] | 1 |
| **4. Other scientific publications - proceedings** [2] | 17 |
| **5. Text books and other research-related publications** | 2 |
| **6. Patents/ including international** | 2 |
| **7. Computer programs and algorithms**[3] | |
| **8. Registered cultivars** | |
| **9. Conference abstracts** | 85 |
| **10. Visiting lectures** | |
| **11. Articles, radio and television programmes and journals popularising science** | |
| **12. Other**[4] | 2 |

[1] Includes doctoral theses and monographs.

[2] Includes edited proceedings, collections and special issues of scientific journals, and unrefereed scientific articles, excluding conference abstracts.

[3] Approximates the number of programs and algorithms that have been in use outside the unit.

[4] May include design products, prototypes, artefacts, exhibitions, performances etc.

## 2.2. Lists of most important publications by academic personnel and researchers with doctoral degree.

1. **Muravjovs, A.**, **Tolujew, J.** and **Yatskiv, I.** (2016) The Use of Discrete Rate Simulation Paradigm to Build Models of Inventory Control Systems. *Second International Symposium on Stochastic Models in Reliability Engineering, Life Science and Operations Management (SMRLO)*, pp. 650-655. **Scopus, Web of Science**
2. **Yatskiv, I.** and Gromule, V. (2016) Holistic Approach to Passenger Terminal Risk Estimation. *Second International Symposium on Stochastic Models in Reliability Engineering, Life Science and Operations Management (SMRLO)*, pp. 643-649. **Scopus, Web of Science**
3. Friedrich, M., Leruent, F., Jackiva, I. et al. (2016) From Transit Systems to Models: Purpose of Modelling. In book: Modelling Public Transport Passenger Flows in the Era of Intelligent Transport Systems. Editors: Gentile, Guido, Noekel, Klaus. (Eds.). Published by Springer International Publishing, 641 p. DOI: 10.1007/978-3-319-25082-3, ISBN 978-3-319-25080-9 (Web of Science, Springer)
4. **Grakovski, A.** and Pilipovecs, A. (2016) The problem of Tyre Footprint Width Estimation by Fibre Optic WIM Sensors in Condition of Geometric Complexity. *Advances in Intelligent Systems and Computing*, Vol. 470, pp. 219-227. **Scopus, Web of Science**
5. **Kabashkin, I.** (2016) Effectiveness of Redundancy in Communication Network of Air Traffic Management System. In: *Dependability Engineering and Complex Systems*. Springer, pp. 257-265. **Scopus, Web of Science**
6. **Kabashkin, I**. (2016) Analysing of the Voice Communication Channels for Ground Segment of Air Traffic Management System Based on Embedded Cloud Technology. In: *Information and Software Technologies*. Springer, pp. 639-649. **Scopus**
7. **Kabashkin, I**. (2016) Heuristic Based Decision Support System for Choice of Alternative Routes in the Large-Scale Transportation Transit System on the Base of Petri Net Model. *Procedia Engineering*, Vol. 134, pp. 359-364. **Scopus, Web of Science**
8. Melece, L., Krievina, A.and **Sproģe, I.** (2016) Sustainability aspects of bioenergy production: Case of Latvia. *International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM, 3,* pp. 569-576. **Scopus**
9. **Yatskiv, I.**, **Savrasov, M.,** Gromule, V. and Zemljanikins, V. (2016) Passenger Terminal Safety: Simulation Modelling as Decision Support Tool. *Procedia Engineering*, pp. 459–468. **Scopus, Web of Science**
10. Laizāns, A., **Graurs, I.**, Rubenis, A. and **Utehin, G.** (2016) Economic Viability of Electric Public Busses: Regional Perspective. *Procedia Engineering*, pp. 316-321. **Scopus, Web of Science**
11. **Andronov, A.** (2016) On Nonparametric Estimation of the Mathematical Expectation of a Function of Random Variables with Identical Distributions. *Journal of Mathematical Sciences (United States)*, pp. 1-10. **Scopus**
12. Gaidash, V. and **Grakovski, A.** (2016) Mass Centre" Vectorization Algorithm for Vehicle's Counting Portable Video System. *Transport and Telecommunication Journal*, Vol. 17, pp. 289–297. **Scopus**
13. **Stukalina, Y.** (2016) Modelling student satisfaction and motivation in the integrated educational environment: An empirical study. *International Journal of Educational Management, Emerald Group Publishing Limited*, Vol. 30, pp. 1072 - 1087. **Scopus, Web of Science**
14. **Pavlyuk, D**. (2016) Implication of spatial heterogeneity for airports' efficiency estimation. *Research in Transportation Economics*, Vol. 56, pp. 15 - 24. **Scopus, Web of Science**
15. Mironov, A., Doronkin, P., Priklonsky A. and **Kabashkin, I**. (2016) Structural health monitoring of rotating blades on helicopters. *Aviation*, Vol. 20, pp. 110-122. **Scopus, Web of Science**
16. **Andronov, A.** and Vishnevsky, V. (2016) Markov-Modulated Continuous Time Finite Markov Chain as the Model of Hybrid Wireless Communication Channels Operation. *Automatic Control and Computer Sciences*, Vol. 50. **Scopus, Web of Science**
17. Bazaras, D., Čižiūnienė, K., Palšaitis R. and **Kabashkin, I**. (2016) Competence and Capacity-Building Requirements in Transport and Logistics Market. *Transport and Telecommunication*, Vol. 17, pp. 1-8. **Scopus**
18. **Medvedev, A.**, Guseynov, S. E., Aleksejevs R. and Guseinovs R. (2016) Groupage cargo transportation model. *Transport and Telecommunication*, Vol. 17, pp. 60-72. **Scopus**
19. **Krainyukov, A.** and **Ļaksa, I**. (2016) Detection of Tree Roots in an Urban Area with the Use of Ground Penetrating Radar. *Transport and Telecommunication,* Vol. 4, pp. 362-370. **Scopus**
20. **Andronov, A.** and Vishnevsky, V. (2016) Algorithm of state stationary probability computing for continuous-time finite Markov chain modulated by semi-Markov process. *Communications in Computer and Information Science,* 601, pp. 167-176. **Scopus, Web of Science**
21. **Misnevs, B.** and **Yatskiv, I.** (2016) Data Science: Professional Requirements and Competence Evaluation. *Baltic J. Modern Computing*, Vol. 4, pp. 441-453. **Web of Science**

22. **Sproģe, I.** and Joppe, A. (2016) Modern Trends in Tax Planning and Minimization. *New Challenges of Economic and Business Development – 2016,* pp. 736-746. **Web of Science**
23. **Stukalina, Y.** (2016) Management of the LEARNIT international research project implementation: Main challenges and focus areas. *New Challenges of Economic and Business Development – 2016*, pp. 789-800. **Web of Science**
24. **Stukalina, Y.** and Roskosa, A. (2016) The New Challenge for Higher Education Institutions of Latvia: Directing Students' Professional Career Development. *Rural Environment. Education. Personality (REEP) Proceedings of the 9th International Scientific Conference*, pp. 239-246. **Web of Science**
25. Joppe, A. and **Sproģe, I.** (2016) Global Tax Competition in Off-Shore Companies. *New Dimensions in the Development of Society Marketing and Sustainable Consumption Finance and Taxes*, pp. 257-265. **Web of Science**
26. **Orlov, S.,** Vishnyakov, A. (2016) Decision Making for the Software Architecture Structure Based on the Criteria Importance Theory. *Procedia Computer Science 104,* pp. 27-34*.* **Scopus.**
27. **Kabashkin, I**., Kundler, J. (2016) Reliability of Sensor Nodes in Wireless Sensor Networks of Cyber Physical Systems. *Procedia Computer Science 104*, pp. 380-384. **Scopus.**
28. **Nechval, N.A**., Nechval, K.N. (2016) Efficient planning: In-service inspections of fatigued structures under parametric uncertainty. *Mathematical Concepts and Applications in Mechanical Engineering and Mechatronics* pp. 328-349. **Scopus.**
29. **Nechval, N.A**., Nechval, K.N. (2016) Effective optimization of statistical decisions for age replacement problems under parametric uncertainty. *Mathematical Concepts and Applications in Mechanical Engineering and Mechatronics* pp. 1-16. **Scopus.**
30. **Andronov, A.M**., Jurkina, T. (2016) One problem of the risk control. *Communications in Computer and Information Science 678*, pp. 162-167. **Scopus.**
31. **Nechval, N.A**., Nechval, K.N., Prisyazhnyuk, S.P., Strelchonok, V.F. (2016) Tolerance limits on order statistics in future samples coming from the Pareto distribution. *Automatic Control and Computer Sciences 50(6)*, pp. 423-431. **Scopus.**
32. **Kabashkin, I.** (2016) Resilient Communication Network of Air Traffic Management System. *Advances in Wireless and Optical Communications (RTUWO),* pp. 156-160

## 2.4. Patents

Table 2.2.

**Patents, confirmed in 2016 (hold by TTI)**

| Title | Inventor | Applicant | Nr./Year |
|---|---|---|---|
| Device for registration of low-density magnetic fields | Jurijs Roliks | TTI | LV15134 (B) 2016-07-16 |
| Device for noise control of wind electric device | Jurijs Roliks | TTI | LV1 5107 (B) 2016-04-20 |

# 3. DOCTORAL TRAINING

## 3.1. Number of students

Table 3.1.

**Master and Doctoral degree students**

| | 2016 |
|---|---|
| Completed their Master degree | 37 |
| Enrolled in doctoral studies | 2 |

# 4. NATIONAL AND INTERNATIONAL COLLABORATION

## 4.1. National collaboration

The table below indicates the most significant activities in collaborations and cooperation with research and academic organizations, enterprises and companies, both local and international levels. In compare with 2015 annual period, increased activities with enterprises, as well as numbers of joint projects and collaboration with research/academic organizations.

Table 4.1.

**Scope of national and international collaboration**

| ORGANIZATION | COLLABORATION |
|---|---|
| **National Research Organizations** | Type of collaboration / projects |
| Institute of electronics and computer science | - Cooperation agreement |
| Institute of Physical Energetics (IPE) | - Participation in "RelStat16 "Program Committee<br>- TTI Participation in Baltic Dynamics -2016 with presentation "Networking and cooperation as core elements of the TTI research strategy and basis for sustainable development", 15 September 2016 |
| **ORGANIZATION** | **COLLABORATION** |
| **National Research Organizations** | Type of collaboration / projects |
| Riga Technical University | - Common Project Participation (NextIT, Cross Border Cooperation Program EduRail);<br>- 2 joint scientific articles<br>- Participation in Doctoral Review Committee |
| University of Latvia | - 2 joint scientific articles |
| Latvian Maritime Academy | - Mobility, 5 students<br>- 1 Doctor Program student |
| Vidzeme University of Applied Sciences (ViA) | - Participation in "RelStat16 "Program Committee<br>- Development of joint Dr.Eng. Degree Program<br>- Participation in robotic competition organization |
| Latvia University of Agriculture | - Common Project participation (NextIT)<br>- 2 joint scientific articles<br>- Development of joint doctoral program |
| Ventspils University College | - Joint Project participation (NextIT) |
| **Local Enterprises** | Type of collaboration / B2B projects |
| "Accenture" | - "Java" training development in TTI<br>- Participation in TTI "career day"<br>- Open lectures (Java programing) in TTI<br>- Scientific seminars |
| "EcoTelematics" | - Common Project for Riga International Coach Terminal |

Table 4.1. (continue)

**Scope of national and international collaboration**

| Local Enterprises | Type of collaboration / B2B projects |
|---|---|
| "X INFOTECH" | - Joint Competition of scientific works for TTI Students<br>- Joint development of Identification Technologies Laboratory in TTI<br>- Participation in TTI "career day"<br>- Scholarships grants for TTI Students<br>- Open lectures in TTI (IT; ICT) |
| "Riga International Coach Terminal" | - Joint Project Participation: public transport and passengers flow organization imitation-model development<br>- Joint Project Participation: Interrogation of passengers<br>- 3 joint scientific articles<br>- Participation in Workshop: "Social and physical safety of passengers on public transport and transport infrastructure"<br>- Participation in Assembly of Association of Paneuropian Coach Terminals<br>- Participation in TTI international Project "ALLIANCE", Council of External Experts |

## 4.2. International collaboration

The table below indicates activities in international projects programs. In compare with 2015 annual period, numbers of running projects increased to 40% (total 13 international projects in 2016). Additionally, in 2016 TTI started the "ALLIANCE" project by HORIZON2020 program, with position as the Project Coordinator.

Table 4.2.

**Scope of international collaboration in projects**

| Program | Type of collaboration | Field of science |
|---|---|---|
| HORIZON 2020 | International Project Enhancing excellence and innovation capacity in sustainable transport interchanges (ALLIANCE) | Research / education |
| IEE | International Project "EU-wide establishment of enduring national and European support networks for sustainable urban mobility" | Research / education |
| ERASMUS+ | Project Implementation of Software Engineering Competence Remote Evaluation for Master Program Graduates (iSecret) | Research / education |
| ERASMUS+ | Project Learning with ICT use (LEARN IT) | ICT / Education |
| INTERREG | "Harmonized and Modernized Multidisciplinary Railway Education" (EDU-RAIL) | Research / education |
| INTERREG | Smart Logistics and Freight Villages Initiative (SmartLog) | Research |
| COST | Project (15221) European Network for Research Evaluation in the Social Sciences and the Humanities (ENRESSH) | Social Sciences and Humanities |
| | Project TU1305 Social networks and travel behavior | ICT / social |
| | Project 15221 Advancing effective institutional models towards cohesive teaching, learning, research and writing development | Research / education |
| | Project TU1305 Social networks and travel behavior | ICT / social |
| | Project TU1408 Air Transport and Regional Development (ATARD) | Air Transport |
| | Project TU1306: Fostering knowledge about the relationship between Information and Communication Technologies and Public Spaces supported by strategies to improve their use and attractiveness (CYBERPARKS) | ICT |
| | Project TU1208: Civil Engineering Applications of Ground Penetrating Radar | Engineering / Electronics |

Table 4.3.

**Scope of international conferences, workshops and seminars**

| International conferences, workshops and seminars organised by the institution/unit | |
|---|---|
| **Event** | **Date / time** |
| "Research and Technology – Step into the Future." TTI Research and Academic Conference | Riga, TTI, 21 - 22 April 2016 |
| TTI - KEIO Joint Workshop | Riga, TTI, 4-6 June 2016 |
| TTI Research and Academic Conference "Research and Technology – Step into the Future." | Riga, TTI, 9 December 2016 |
| TTI Mathematical Seminar | Riga, TTI, April-May 2016 |
| ECTRI (European Conference of Transport Research Institutes) Assembly meeting | Riga, TTI, 24-25 November 2016 |
| INDUSTRY 4.0 Technologies to Logistic Networks seminar (by Fraunhofer Institute IFF) | Riga, TTI, 13 October 2016 |
| "RelStat-16" the 16th International Multidisciplinary Conference "Reliability and Statistics in Transportation and Communication". | Riga, TTI, 19-22 October 2016 |
| BIM2016, "Information Modelling in Construction and Transportation", 1st Baltic International Conference. | Riga, TTI, 29 September 2016 |
| International Scientific and Educational Conference "Actual problems of Education, MIP2016" | Riga, TTI, 25- 26 February 2016 |
| Workshop Sustainable urban mobility and transportation planning (in frame of ENDURANCE project) | Riga, TTI, 24 February 2016 |
| Cooperation in Aerospace research workshop (in cooperation with National Company Kazkosmos and National Centre of Space Research and Technology, Kazakhstan) | Riga, TTI, 14 September, 2016 |

In compare with 2015 annual period, by 50% increased of international conferences, workshops and seminars activities in TTI. Few of them has very important and significant outcomes, such as ECTRI Assembly meeting held by TTI, INDUSTRY 4.0 seminar, etc. The KPI above shows the TTI R&D sector progress in communication, cooperation, networking and knowledge sharing/transfer in international levels, which is very important for strengthen scientific and research activity and development progress.

## 4.3. Visits abroad (minimum duration of visit: one month)

Table 4.4.

**Visits abroad by TTI research Staff**

| Name | Target organisation | Country | Purpose of the visit | Duration in months |
|---|---|---|---|---|
| I. Kabashkin | Immanuel Kant Baltic Federal University | Russian Federation | Guest lectures | 2 months |
| I. Kabashkin | TTK University of Applied Sciences | Estonia | Guest lectures | 1 month |

## 4.4. Most important foreign collaborators

Table 4.5.

**Scope of important foreign collaboration**

| Organization | Type of collaboration | Country |
|---|---|---|
| **Academic organizations** | **Cooperation** | |
| Wroclaw University of Technology | - Cross-participation in conferences (RelStat'2016, DepCos-2016)<br>- Collaboration Agreement in scientific and academic activities<br>- Mobility-program activities | Poland |
| Deusto | - Sign of Collaboration Agreement (ERASMUS program) | Spain |
| KEIO | - TTI - KEIO Joint Research Workshop in Riga;<br>- support in postdoc Proposal | Japan |
| Tallinn University of Technology (TUT) | - Collaboration Agreement in scientific and academic activities<br>- Joint Project collaboration (EDU-RAIL) | Estonia |
| University of Zilina | - Researcher and academic mobility | Slovakia |
| The University of Thessaly, Greece | - Collaboration Agreement in scientific and academic activities (Design of Doctoral program, researchers' mobility in EU Project Horison-2020, etc.)<br>- Joint participation in H2020 Project Alliance<br>- Participation in to joint Project Proposals development (Horizon2020 Program)<br>- Training school within UTH's Graduate Program (student's mobility)<br>- 3 Joint scientific publications | Greece |
| Kyiv National Economic University named after Vadym Hetman; department of Strategic Management | - TTI participation in organizing committee of the International scientific-practical conference | Ukraine |
| Bulgarian Association for Management Development and Entrepreneurship, BAMDE | - TTI Membership of the Advisory Committee of the Annual International Scientific conference | Bulgaria |
| VSEI of Lublin | - Researcher and academic mobility | Poland |
| VILNIUS GEDIMINAS TECHNICAL UNIVERSITY (VGTU) | - Participation in to RelStat16 Conference<br>- Joint scientific publications<br>- Dean of VGTU Transport Faculty – guest editor for RElStat'16 Proceedings | Lithuania |
| ADMIRAL MAKAROV STATE UNIVERSITY OF MARITIME AND INLAND SHIPPING | - Cross-participation in conferences: (RelStat'2016 and Logistics: Current trends of development) | Russia |
| ST. PETERSBURG STATE UNIVERSITY OF CIVIL AVIATION | - Cooperation in the development and publishing of the book " Construction of the Air Vehicles" | Russia |
| **Research Institutes** | **Cooperation** | |
| FRAUNHOFER-GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN | - Collaboration in scientific and academic activities (Design of Doctoral program, researchers' mobility in EU Project Horizon2020,<br>- Seminar "Industry 4.0" | Germany |

| | | |
|---|---|---|
| FORSCHUNG E.V. | - Common participation in H2020 Project ("Alliance")<br>- Participation in to RelStat16 Conference<br>- PhD workshop in Magdeburg, participation of students | |
| UPM, TranSyt | - Preparing joint Project proposals Horizon 2020 program | Spain |
| DeustoTech | - Visited researcher<br>- Sign of Collaboration Agreement (ERASMUS program)<br>- Joint development of Project proposals Horizon 2020 program | Spain |
| CERTH | - Joint development of 2 Project proposals Horizon 2020 program | Greece |
| ESC-AEROSPACE | - Joint development of Project proposals SESAR2020 program | Czech |
| **Enterprises** | **Cooperation** | |
| National Company Kazkosmos | - Collaboration Agreement<br>- Cooperation workshop | Kazakhstan |
| National Centre of Space Research and Technology | - Collaboration Agreement<br>- Cooperation workshop | Kazakhstan |

## 4.5. Most important outcomes of the visits and collaboration contacts

Table 4.6.

**Scope of important outcomes and collaboration contacts**

| EVENT | COLLABORATION |
|---|---|
| **INTERNATIONAL SEMINARS** | Description |
| ECTRI | On 24-25 November 2016, Transport and Telecommunication Institute (TSI) was held the ECTRI (European Conference of Transport Research Institutes) Assembly meeting. Discussed topics included development of transport research and the review of the transport sector in Latvia, national transport politics, etc. Seminar activities included 6 workgroups in areas: Mobility; Logistics; Economics and Politics; Security; Cybersecurity and risk analysis; Traffic management. |
| "How You Can Bring INDUSTRY 4.0 Technologies to Logistic Networks" | On 13 October 2016, Prof. Michael Schenk, Director of Fraunhofer Institute for Factory Operation and Automation IFF (Fraunhofer-Institut für Fabrikbetrieb- und automatisierung, Magdeburg, Germany) conducted a seminar at Transport and Telecommunication Institute (TSI). The Professor addressed the representatives of the logistics business in Latvia, PhD students and teachers of TSI with a report on How You Can Bring INDUSTRY 4.0 Technologies to Logistic Networks. |
| **GUEST LECTURES** | DESCRIPTION |
| Data Science (from data to products) | On 10 September – 20 October 2016 Professor Neil Rubens guest lectures: Data Science. Professor Neil Rubens, PhD in Computer Science from Tokyo Institute of Technology, MSc in Computer Science from the University of Massachusetts, has about 7 years' experience as an assistant professor of the University of Electro-Communications, Tokyo. |
| **INTERNATIONAL DELEGATION** | DESCRIPTION |
| National Company Kazkosmos<br><br>National Centre of Space Research and Technology | On 14 September 2016, a delegation from Kazakhstan visited Transport and Telecommunication Institute (TSI). On the delegation were: representatives of the National Company Kazkosmos: Aidin Aimbetov, General of the Air Force, Vice-President of the Corporation for creation and operation of space systems, and Alan Kazkenov, Adviser to the President of the Corporation for creation and operation of space systems; representatives of the National Centre of Space Research and Technology: Prof., Dr. Baurzhan Bekmuhamedov, Vice President, and Prof., Dr. Marat Ismailov, Director of the Space Materials Department. In the course of the visit, the guests visited scientific laboratories and centres of the Institute and discussed questions related to the scientific and technical collaboration in the field of aerospace, information technology. |
| TTI - KEIO Joint Workshop | On June 4-6, 2016 representatives of Keio University (Japan) visited Transport and Telecommunication Institute (TSI) for joint workshop. Under the guidance of Yasushi Kiyoki, Professor of Keio University, the working group hase taked various ambient measurements using the latest sensors, as well as show the process the data obtained. Professor Kiyoki is known in the field of environment with the use of the latest technology, mathematical model of measurements, as well as in the field of signal processing. Moreover, Professor Kiyoki is one of the organisers of the GESL programme at Keio University. The key event of this visit was a seminar with the active participation of master's and doctoral candidates of Transport and Telecommunication Institute (TSI) and Keio University. Presented and discussed topics included: simulation for transportation and other purposes, 5D world map for the effective exchange of information, use of Data Mining to analyse the environment, environmental monitoring with the help of a drone, analysis of the quality of water in the rivers of Latvia, etc. |
| **COOPERATIONS** | DESCRIPTION |
| Sathyabama University (India) | On 3 April 2016, the signing ceremony of the Memorandum of Understanding between Transport and Telecommunication Institute (TSI) and Sathyabama University (India) was held at Chennai, India. The purpose of this Memorandum is to develop academic, educational, research co-operation and to promote mutual understanding between universities. |

| | |
|---|---|
| International Telecommunication Academy | On 24 February 2016, Transport and Telecommunication Institute (TSI) hosted the meeting of Igors Graurs, Rector of TSI, and Anastasia Ositis, President of the International Telecommunication Academy. In the course of the meeting the parties summed up the results of their successful 15-year cooperation and discussed the prospects for joint work in the field of science and research. |

## 4.6. Non-academic collaboration

TTI continues to actively participate in national and international associations, realizing knowledge sharing and transfer through the invited lectures, mutual consultations, joint projects, common research and B2B R&D activities. In 2016 TTI officially joint Latvian Association of Remotely Piloted Aircraft Systems (LARPAS). TTI is one of the founders of LARPAS, as well as one of the most active participant and Member of the Board. Decision regarding LARPAS establishing was supported by SA "Latvian Civil Aviation Agency" (CAA), SJSC "Latvijas Gaisa Satiksme" and more than 50 other private and legal persons. This included RPAS manufacturers, operators, universities, training units, R&D, insurance companies, as well as other stakeholders from public sector.

The main goal of LARPAS is to bring together, coordinate and provide support to different stakeholders for the purpose of promoting safe and responsible use of RPAS in Latvia. LARPAS is also taking active participation at international level and is open for everyone connected with or interested in RPAS. The communication with international organizations all over the world has already been established to exchange experience and focus on possible cooperation.

Table 4.7.

**Non-academic collaboration**

| Name and Organisation | Type of collaboration | Country |
|---|---|---|
| Latvian Electrical Engineering and Electronics Industry Association (LETERA) | Membership, common research | Latvia |
| Latvian Information and Communications Technology Association (LIKTA) | Membership, common research | Latvia |
| Latvian Telecommunication Association (LTA) | Membership, invited lectures, common research | Latvia |
| Informatics Europe | Membership, information exchange | Switzerland |
| European Conference of Transport Research Institutes (ECTRI) | Membership, information exchange, reviewing | Belgium |
| The European Council for Small Business and Entrepreneurship, ECSB | Collaboration. The Network of the ECSB – more than 30 countries. | International Network; Secretariat in Turku, Finland www.ecsb.org |
| Association Latvijas Auto | Consultation | Latvia |
| Latvian Association of Remotely Piloted Aircraft Systems | Membership, Co-founder, Consultation, Projects. | Latvia |
| Latvian Aviation Association | Membership | Latvia |
| Scientific Training Consultation Center of Transport and Logistics (ZMKTLC) | Consultation | Latvia |
| Association of Paneuropa Coach Terminals | Member of Expert Board | Germany |
| Ltd. LEO Research Centre | Membership, invited lectures, common projects | Latvia |
| LVCA (Latvian Venture Capital Association) | Scientific experience exchange; TSI students' Master thesis supervision. | Latvia |

# 5. Memberships

## 5.1. Memberships in editorial boards of scientific journals

TTI research and academic staff continue actively participation in the various conferences scientific committees, as well as in editorial boards of scientific journals, which is very important for continuously growth of expertise area and advanced knowledge sharing.

Table 5.1.

**TTI staff memberships in editorial boards of scientific journals**

| Name | Journal | Period |
|---|---|---|
| Igor Kabashkin | • Computer Modelling and New Technologies (ISSN 1407-5806), Latvia<br>• Transport and Telecommunication (ISSN 1407-6160), Latvia<br>• Journal of Air Transportation (ISSN 1093- 8826), USA, University of Nebraska at Omaha<br>• Transport (ISSN 1392-1533), Lithuania, Lithuanian Academy of Science<br>• Technological and Economic Development (ISSN 1392- 8619), Lithuania, Vilnius Gediminas Technical University<br>• Aviation" (ISSN 1392-1534), Lithuania, Vilnius Gediminas Technical University<br>• Journal "Transactions on Transport Sciences" (ISSN 1802-971X), Czech Republic, Ministry of Transport<br>• Sustainable Spatial Development" (ISSN 1691-6174), Riga Technical University<br>• Journal of Aviation Technology and Engineering" (ISSN 2159-6670), published by Purdue University Press, USA<br>• Baltic Journal of Modern Computing (ISSN 2255-8950 electronic; ISSN 2255-8942 paperback), Estonia-Latvia-Lithuania | 1997 – present<br>1999 – present<br>1999 – present<br>1999 – present<br>2002 – present<br>2002 – present<br>2007 – present<br>2010 – present<br>2011 – present<br>2012 – present |
| Irina Yatskiv | • Transport and Telecommunication (ISSN 1407-6160), Latvia<br>• Mathematics in Engineering, Science and Aerospace (ISSN 2041-3165)<br>• Maintenance and Reliability, Polish Maintenance Society, Warsaw<br>• Transport (ISSN 1392-1533), Lithuanian Academy of Science, Lithuania<br>• Economics of Development, Kharkiv National University of Economics, Ukraine | 2005 – present<br>2005 – present<br>2011 – present<br>2012 – present<br>2014 – present |
| Alexander Grakovski | • Transport and Telecommunication (ISSN 1407-6160), Latvia | 2015 – present |
| Juri Tolujew | • Transport and Telecommunication (ISSN 1407-6160), Latvia | 2012 – present |
| Alexander Andronov | • Automatic Control and Computer Sciences (ISSN 0146-4116), Latvia | 2005 – present |
| Stetjuha Aleksander | • Economic Alternatives", ISSN 1312-7462 University of National and World Economy, Sofia, Bulgaria http://www.unwe.bg/eajournal/en | From 2010 |
| Kuzmina-Merlino Irina | • International Management Journals, United Kingdom, London. ISSN: 1742-528X (on-line Journals), IMJ Editorial Advisory Board http://www.managementjournals.com/editorialteam.htm<br>• The Clute Institute, Journal of Business Case Studies, ISSN 1555-3353 (print); ISSN 2157-8826 (online) Reviewers' team http://journals.cluteonline.com/index.php/JBCS/about/displayMembership/39<br>• Emerald Emerging Markets Case Studies Journal, Reviewer http://www.emeraldgrouppublishing.com/reviewers/index.htm | From 2005<br>From 2012<br>From 2015 |
| Aleksandr Medvedev | • Journal of Traffic and Transportation Engineering. David Publishing Company. New York, USA – editorial board member<br>• Interstate aviation committee member of Coordinating Council | From 2015<br>From 2014 |

## 5.2. Memberships in Programme and Organization Committee of scientific conferences

Table 5.2.

**TTI staff memberships programme and Organization Committee of scientific conferences**

| Name | Journal | Period |
|---|---|---|
| Igor Kabashkin | • Member of the Programme and Organization Committee of the International Conference "Reliability and Statistics in Transport and Communication", (RelStat), Riga, Latvia<br>• Member of the Programme Committee of the International Conference "European-Asian Transport Corridors: Trends. Strategies. Practices"<br>• Member of the Programme and Organization Committee of the Conference "Research and Technology – step to the future, Riga, Latvia<br>• Member of the Programme Committee of the Conference "Actual Problems of Education", Riga, Latvia | 1999 – present<br>2015 – present<br>2006 – present<br>2009 – present |
| Irina Yatskiv | • Member of the Programme and Organization Committee of the International Conference "Reliability and Statistics in Transport and Communication", (RelStat), Riga, Latvia<br>• Member of the Scientific Committee of the 3rd International Conference on Sustainable Urban Mobility – 3rd CSUM in Volos, Greece on 26 – 27 May 2016.<br>• Member of the Programme Committee of the International Conference on Information and Digital Technologies 2016 (IDT'2016). July 5 - 7, 2016, Rzeszów, Poland<br>• Member of the Programme Committee of the International Conference on Dependability and Complex Systems (DepCoS-RELCOMEX), Wroslaw, Poland<br>• Member of the Programme and Organisation Committee of the International Symposium on Stochastic Models in Reliability, Safety, Security and Logistics, Beer Sheva, Israel,<br>• Member of the Programme and Organization Committee of the 16 International Conference for junior researchers «Science-Future of Lithuania. Transport", VGTU (Lithuania)<br>• Member of the Programme and Organization Committee of the Conference "Research and Technology – step to the future, Riga, Latvia.<br>• Member of the Programme Committee of the Conference "Actual Problems of Education", Riga, Latvia | 1999 – present<br>2016<br>2016<br>2012 – present<br>2005, 2010, 2016<br>2015 – present<br>2006 – present<br>2009 – present |
| Alexander Grakovski | • Member of the Programme Committee of the International Conference "Reliability and Statistics in Transport and Communication", (RelStat), Riga, Latvia<br>• Member of the Programme and Organization Committee of the Conference "Research and Technology – step to the future, Riga, Latvia.<br>• Member of the Programme Committee of the Conference "Actual Problems of Education", Riga, Latvia | 2014 – present<br>2009 – present<br>2012 – present |
| Juri Tolujew | • Member of the Programme and Organization Committee of the International Conference "Reliability and Statistics in Transport and Communication", (RelStat), Riga, Latvia. | 2014 – present |
| Boriss Mishnevs | • Member of the Programme and Organization Committee of the Conference "Research and Technology – step to the future, Riga, Latvia.<br>• Member of the Programme Committee of the Conference "Actual | 2009 – present |

| | | |
|---|---|---|
| | Problems of Education", Riga, Latvia | 2012 – present |
| Irina Kuzmina-Merlino | • Member of the Peer review committee of International Strategic Management Conference, Turkey;<br>• Member of the Bulgarian Association for Management Development and Entrepreneurship; Member of the Advisory Committee of the Annual International scientific conference | 2013 – present<br>2006 – present |
| Aleksandr Medvedev | • Member of the Programme Committee of the Conference "Actual Problems of Education", Riga, Latvia<br>• Member of the Programme Committee of the Conference "Research and technology – step into the future", TTI Research and academic conference. | 2012 – present<br>2012 – present |
| Georgs Utehins | • Member of the Programme and Organization Committee of the Conference "Research and Technology – step to the future, Riga, Latvia<br>• Member of the Programme Committee of the Conference "Actual Problems of Education", Riga, Latvia | 2011 – present<br>2011 – present |

## 5.3. Prizes awarded to researchers, honours and scientific positions of trust

| Name | Prize, position etc. |
|---|---|
| N / A | N / A |

## 5.4. Memberships in committees and in scientific advisory boards of business companies or other similar tasks of no primarily academic nature

One of the most important outcomes and goals for TTI Research & Development program is support and knowledge sharing for business. R2B connections and communications is supported by participation of TTI Research/Academic Staff in business company's scientific advisory boards.

Table 5.4.

**TTI Staff membership in scientific advisory boards of business companies and associations**

| Name | Tasks | Period |
|---|---|---|
| Igor Kabashkin | Scientific supervisor of Latvian Centre of Competence in Transport, Energy and Manufacturing | 2015 - present |
| Irina Yatskiv | External expert in Association of Paneuropian Coach Terminals | 2014 - present |
| Alexander Grakovski | Member of Council of expert working group of the electronic communications sector (Latvian Ministry of Transport) | 2009 - present |
| Aleksandr Medvedev | Telemātikas un loģistikas institūts Ltd. – board member | 2014 - present |
| Aleksandr Medvedev | Aviation Research Center Ltd. – board member | 2014 – present |

# 6. Participation in projects

**EU Framework Program projects:**

1. Project H2020: Enhancing excellence and innovation capacity in sustainable transport interchanges (ALLIANCE), (1.01.2016 - 31.12.2018)
2. INTERREG: Harmonized and Modernized Multidisciplinary Railway Education (EDU-RAIL), (01.10.2015 - 30.09.2018)
3. Implementation of Software Engineering Competence Remote Evaluation for Master Program Graduates (iSecret) – ERASMUS+ 2015-1-LV01-KA203-013439, (01.09.2015.-31.08.2017)
4. Project „Learning with ICT use" (Project Nr. 2014-1-PL01-KA200-003353) (1.10.2014-1.10.2017)
5. EU-wide Establishment of Enduring National and European Suppor Networks for Sustainable Urban Mobility (ENDURANCE) –IEE Program, – untill 30.04.2016
6. Project The next generation information and communication technology (ICT) research state program, ("Next_IT") (1.09.2015 – 31.08.2017)
7. Project Smart Logistics and Freight Villages Initiative (SmartLog), (1.10.2016 – 31.12.2018)

**EU Framework "COST" instruments:**

- COST 15221- European Network for Research Evaluation in the Social Sciences and the Humanities (ENRESSH)
- COST TU1305 Social networks and travel behavior
- COST 15221 Advancing effective institutional models towards cohesive teaching, learning, research and writing development
- COST TU1305 Social networks and travel behavior
- COST TU1408 Air Transport and Regional Development (ATARD)
- COST TU1306: Fostering knowledge about the relationship between Information and Communication Technologies and Public Spaces supported by strategies to improve their use and attractiveness
- COST TU1208: Civil Engineering Applications of Ground Penetrating Radar

**Submitted proposals (international):**

Table 6.1.

**HORIZON2020 Program, submitted proposals in 2016**

| Program | Consortium | Project |
|---|---|---|
| HORIZON 2020 Program topic: PP-15-STAN-CERT-01 | - TTI (Latvia)<br>- EvolvSys Aerospace (Czech Republic)<br>- KC Dati Grupa (Latvia)<br>- ESC Aerospace (Germany) | STANDARDIZATION OF REMOTELY PILOTED AIRCRAFT SYSTEM (RPAS) DETECT AND AVOID (DAA). |
| HORIZON 2020 Program topic: SESAR RPAS-02 | - TTI (Latvia)<br>- EvolvSys Aerospace (Czech Republic)<br>- KC Dati Grupa (Latvia)<br>- AlgoLion (Israel) | DRONE INFORMATION MANAGEMENT. |
| HORIZON 2020 Program topic: WIDESPREAD-04-2017-TeamingPhase | - TTI (Latvia)<br>- Panepistimio Thessalias (Greece)<br>- Universidad De La Iglesia De Deusto (Spain)<br>- PANTEIA BV (Niderlandes) | CENTRE OF EXCELLENCE FOR ADVANCED TECHNOLOGIES IN SUSTAINABLE TRANSPORTATION. |

**Scope of Project activities**

Active participation in the different level projects was a key point of the research activities in 2016. TTI continued to implement already existing projects, but in the same time started to implement a number of new projects.
In total in 2016 TTI has initiated participation in 3 new COSTS actions, has developed a number of proposal in frame of ERASMUS+ projects (4 proposals in total) and HORIZON 2020 (5 proposals). In frame of HORIZON 2020 one project was supported by funding.
The supported project was in the frame of H2020-TWINN-2015 activities and is titled as "Enhancing excellence and innovation capacity in sustainable transport interchanges" (ALLIANCE). The ALLIANCE project commenced on 1st January 2016 and it is one of the first results of the TTI Research Program in action. The ALLIANCE project's purpose is to strengthen the scientific and technological capacity of TTI in research activities related to multimodal transport networks (ALLIANCE, 2016). Latvia is ranked below 70% of the EU27 average of the composite indicator on research excellence, the scope of the project is the enabling of stimulating and strengthening the scientific and technological capacity of Latvia and the raising of the profile of the research staff and their institution, by providing knowledge in the field of smart interconnecting sustainable transport networks. The objective of ALLIANCE project is to have advanced research in the field of transport in Latvia by allowing TTI to coordinate the project and cooperate with two leading research organizations in the domain of transportation: University of Thessaly (Greece) and Fraunhofer Institute for Factory Operation and Automation (Germany).
The overall methodology of the project is built around the analysis of the needs of Latvia and the surrounding region of the Baltic sea (Lithuania, Estonia, Poland) on knowledge gain about intermodal transportation networks and the development of the tools to attain this knowledge, providing at the same time excellence and innovation capacity (ALLIANCE Deliverable D2.1, 2016). The expected impacts on the overall research and innovation potential of TTI and Latvian research community will be of high importance and TTI will benefit from ALLIANCE by:

- Improving its knowledge in methodologies for preparing, writing and publishing scientific papers.
- Strengthening its research capacity.
- Establishing international research teams in specific areas of interest.
- Generating new innovative ideas for future research work through the project's activities.
- Setting up the fundamentals for the young generation of researchers.
- Being integrated in a number of existing international transportation research networks.
- Being incorporated in the European research system of transport and logistics.

The implementation of the project will result in moving the TTI in general towards the triangle principles of a research-community-innovation oriented University.

TTI continues to implement iSECRET project (Implementation of Software Engineering Competence Remote Evaluation for Master Program Graduates) in frame of ERASMUS+ programme. Expected results of the projects are the following: creation of operational prototype of Internet Portal for Software Engineering & Software Technologies (SE&ST) master program's graduates competence evaluation and certification; design of the Basic ECTS oriented Framework applicable for Joint Master Programs in SE&ST implementation and assessment; demo example of SE&ST Master Program's Education Outcome (competence) definition in terms of e-CF freely accessible for European educational community as Open Educational Resource (OER). The iSECRET project implementation is important for TTI, as it is raises the quality of the education process and therefore prepare a new generation of academic and research staff. Also should be noted, that iSECRET is a first project with TTI's leadership, it gives an opportunity to raise the skills in project management of the TTI's staff. In the same time iSECRET provides the networking opportunity as it is unites number of academic institutions from EU: WSG – University of Economy in Bydgoszcz (Poland), KTU – Kaunas Technological University (Lithuania), UM – University of Murcia (Spain), TEIEP – Technological Educational Institute of Epirus (Greece), UP – Plovdiv university (Bulgaria). This network could be used to implement more projects in the future.

Also, in 2016 TTI continue to implement the EDU-RAIL project (Harmonised and Modernised Multidisciplinary Railway Education) funded under Interreg programme. The project EDU-RAIL aims at reducing fragmentation of railway engineering, transport and logistics vocational education and training programmes in the region. By harmonising and modernising railway education through jointly developed regional specialisation modules the project contributes to the development and further integration of the Central Baltic labour market. In practice the project jointly develops aligned specialisation modules that take into account the needs of the regional labour market, including shared challenges of further integration with European railway system and joint regional aspects. The harmonised and modernized teaching process allow the railway institutions to better prepare the educate specialists for the regional employers need and demand in order to enable smooth cross-border rail transportation within the common transport area. As a result of the project five multipurpose specialisation modules are designed for full-time students and for in-service training programmes. The project contributes to reducing fragmentation of railway education in the region by harmonising railway engineering, transport and logistics programmes. Cross-border cooperation enables the educational institutions to achieve the necessary methodological strength to solve together regional challenges and to raise the quality of railway vocational education and training programmes. The implementation of the project is in the frame of the research strategy of TTI, as this project allows to get additional competences in the railway sector and prepare new academic and research staff in the area of ICT application in railway transport. The TTI could benefit much from the project's partnership, moreover the partners of the project are declared in the research strategy as a key research and academic partners for TTI for a planning period. In 2016 TTI has successfully implemented a number of consulting projects for the industry and municipalities and continue to work in this direction. TTI as research institution has participated in proposals for European Regional Development Fund (ERDF) with 3 proposals and got finances to implement one of the projects.