EHITUSTEADUSKOND
EHITUSTOOTLUSE INSTITUUT
TEADUS- JA ARENDUSTEGEVUSE AASTAARUANNE 2012

1. Instituudi struktuur

Ehitustootluse instituut, Department of Building Production
Instituudi direktor Irene Lill

- Ehitusmaterjalide õppetool, Chair of Building Materials, Lembi-Merike Raado
- Ehitustehnoloogia õppetool, Chair of Building Technology, Irene Lill
- Ehitusökonoomika ja -juhtimise õppetool, Chair of Construction Economics and Management, Roode Liias
- Ehitusmaterjalide teadus- ja katselaboratoorium, Laboratory of Building Materials, Rosenberg Margit

2. Instituudi teadus- ja arendustegevuse (edaspidi T&A) iseloomustus

(NB! punktid 2.1- 2.6 täidab struktuuriüksus)

2.1 struktuuriüksuse koosseisu kuuluvate uurimisgruppide

2.1.1 teadustöö kirjeldus *(inglise keeles*);

The main research focus in the **Chair of Building Technology** is simulation modelling of construction information and knowledge (construction management and process management strategies, integration of design-construction-operation information, engineering education and lifelong learning, BIM, socio-technological interfaces, etc.).

Chair of Construction Economics and Management coordinates research in the area of construction management (contracting, procurement strategies, BIM, cost calculation), but also housing management and energy efficiency when renovating buildings (building life-cycle studies, surveys on technical conditions of housing, development of standards, construction maintenance etc.).

Research focus of the **Chair of Building Materials** is on the technologies of complex use and utilization of oil shale ash in the production of building materials. Their research is tightly connected with the **Laboratory of Building Materials**, which is accredited in the field of building materials since 1997. The accreditation certificate L004 issued by the Estonian Accreditation Centre (EAC) certifies that the laboratory has competence according to EN/ISO/IEC 17025:2005 to conduct testing of building materials. The Lab passes annually the accreditation inspection in order to evaluate the competence according to the scope and conditions specified in the annex of accreditation certificate L004 issued by EAC.
The Laboratory performs academic and standard testing in the field of building cements, mortars, building dry mixes, sand, gravel, crushed stone, concrete, concrete mixes, natural stone, manufactured stone, thermal insulating products and other building materials to determine various physical, mechanical and chemical properties and also conducts research work in the same fields.

2.1.2 aruandeaastal saadud tähtsamad teadustulemused *(inglise keeles).*

Chair of Building Technology

Two international projects continuing:

- **Central Baltic Interreg IV A project DigiEduET - Digital Processes for Education and Management of Construction.** The project contributes to research and competence development in civil engineering higher education and practice, by improvement of teaching methodology and curriculum development through implementing contemporary digital methods. The DigiEduEt project raises the level of building know-how in regard to the building standards followed in the programme area, harmonizes prevailing technology and quality demands, as well as enhances the use of common building terminology.
- **LARGE - Learning Augmented Reality Global Environment.** The project is designed to create a new type of learning environment that supports the educational institutions in delivering their curriculum in the most attractive and effective way. Aim of the project is to build a global environment, based on AG (augmented reality) technology.

Two new international projects were started:

- **"CENEAST-Reformation of the Curricula on Built Environment in the Eastern Neighbouring Area**
  The goal of the project is to upgrade curricula of BSc, MSc, PhD building and civil engineering programmes with new modules, to create a virtual interuniversity networked educational system, to support the skills development of staff and students training in the partner countries.
- **ANDROID- Academic Network for Disaster Resilience to Optimise Educational Development**
  ANDROID (Academic Network for Disaster Resilience to Optimise Educational Development) is an Erasmus academic network which aims to promote co-operation and innovation among European higher education institutions to increase society's resilience to disasters. The ANDROID network will:
  • Promote discourse among European scientists to share their results and findings, discuss methods and develop interdisciplinary explanations.
  • Describe, analyse and compare the capacities of European cities and higher education institutions to address disaster risk.
  • Build the capacity of higher education to address emerging challenges in disaster resilience.
  • Strengthen the link between research and teaching.
  • Inform policy development.
  The ANDROID disaster resilience network comprises 67 partner organisations from 31 countries. These include higher education institutions, national and local government departments, non-governmental organisations and independent research organisations

Chair of Construction Economics and Management

Continuing cooperation with Tartu University when developing the Estonian spatial planning curricula (acronym: EPA):

- **Development of Estonian spatial planning curricula (EPA) sector co-operation for establishing joint courses, practice and training system.** The project is aimed to

develop an unified study-programme in spatial planning for Estonian universities. In parallel to this it is scheduled to start up the training courses keeping in mind the lack of spatial planning professionalism in the field in Estonia. Also involvement of practitioners in academic lecturing is foreseen. The project if fully following the guidelines set up in Estonian development plan when assuring the quality of education.

- **Nearly zero energy buildings (nZEB) in Estonia: energy, durability and indoor climate performance analyses combined with cost optimality assessment for transformation**. Technical solutions for nZEB most urgently needed in Estonia are studied. These include new heating and ventilation solutions suitable for specific operation conditions in nZEB, verified with laboratory measurements. New external wall assembly solutions are studied with computational analyses and climate chamber tests. Office building solar shading and façade analyses will use energy simulations, field measurements and full scale measurements at TUT technological facility. Energy simulations are combined with economic and cost optimal analyses.

One important national project has come to the end succesfully:

- **Surveying the technical condition of apartment buildings commissioned during 1990-2010 in different regions of Estonia**. The project is aimed to carry out the condition survey of extremely different dwellings commissioned during 1990-2010 in different regions of Estonia. During the surveys the technical condition of the structures and the attitude of the residents are to be studied. The results highlighted in the project have become enormous public response.

Chair of Building Materials

The main national projects were focused on improving of fluidized bed burnt oil shale ash puzzolanic character used as main constituent of Portland cement and resulting substantial impact on concrete properties:

- **Burnt oil shale of fluidized bed combustion as constituent of new type of Portland cement**. It studies impact of various constituents of burnt oil shale on concrete properties as frost-, sulfate, water resistance etc. in purpose to develop composite cement composition for high durability concrete.
- **Basics of new utilization processes for oil shale combustion solid wastes**. The basics of new oil shale ash utilization processes (binder in aggregates and filler in polymeric compounds, soil conditioner) including solutions for supporting the abatement of CO_2 emissions and enhancing mining efficiency will be worked out.
- **Study of composition, chemical, physical and structural properties of chemically bonded phosphate ceramics and their possible raw materials in Estonia.** Study and methods for testing of phosphate ceramics compounds based on oil shale.
- **Testing methods and tests of historical lime plasters.** Composition and properties. Part of project Central Baltic Interreg IV A Programme 2007-2013 “Project Sustainable Management of Historic Rural Churches”
- **Methods of testing glass laminates.** Creating methods for laminated glass testing. Main goal is improve durability of laminated glass structures

2.2 Uurimisgrupi kuni 5 olulisemat publikatsiooni läinud aastal.

Kaklauskas, A.;Trinkunas, V.; Amaratunga, D.; **Lill, I.**; Gudauskas, R.; Jackute, I.; Daniunas, A.; Urbonas, V.; d'Amato, M. (2012). Life cycle process of a market-oriented and student centered higher education. International Journal of Strategic Property Management, 16(4), 414 - 430.

Witt, E.; **Lill, I**. (2012). Lifelong Learners in Engineering Education – Students' Perspectives. International Journal of Education and Information Technologies, 6(1), 9 - 16

Kalamees, T; Ilomets, S; **Liias, R**; **Raado, L-M**; Kuusk, K; Maivel, M; Ründva, M; Klõšeiko, P; Liho, E; Paap, L; Mikola, A; Seinre, E; **Lill, I**; **Soekov, E**; Paadam, K; Ojamäe, L; Kallavus, U; Mikli, L; Kõiv, T-A. (2012). Eesti eluasemefondi ehitustehniline seisukord – ajavahemikul 1990–2010 kasutusele võetud korterelamud.

Ilomets, S; Kalamees, T; **Raado, L-M** (2012). Performance testing of frost damage model by hygrothermal simulation. In: Proceedings of the 5th International Building Physics Conference (IBPC). Kyoto, Japan, May 28-31, 2012: 5th International Building Physics Conference. Kyoto, Japan, May 28-31, 2012. (Toim.) The 5th IBPC organizing committee., 2012, 73 - 80.

2.4 Loetelu struktuuriüksuse töötajatest, kes on välisakadeemiate või muude oluliste T&A-ga seotud välisorganisatsioonide liikmed.

- professor Roode Liias AECEFi juhatuse liige
- emeriitdots. Toomas Laur Eesti Betooniühingu auliige
- CIB (International Council for Research and Innovation in Building and Construction) erinevate töögruppide liikmed: Roode Liias, Irene Lill, Lembi-Merike Raado, Jüri Sutt, Ljudmilla Drõkina, Tiina Nuuter .

2.5 Aruandeaasta tähtsamad T&A finantseerimise allikad.

- **Euroopa komisjon**
- **EACEA (Education, Audiovisual and Culture Executive Agency)**
- **SA Archimedes**
- **Keskkonnainvesteeringute Keskus**

2.6 Soovi korral lisada aruandeaastal saadud T&A-ga seotud tunnustusi (va punktis 2.3 toodud tunnustused), ülevaate teaduskorralduslikust tegevusest, teadlasmobiilsusest ning anda hinnang oma teadustulemustele.

Rahvusvahelise konverentsi korraldamine

TTÜ ehitustootluse instituut korraldas 17. – 19. Oktoober 2012 Tallinna Õpetajate majas rahvusvahelise konverentsi "ANDROID 2012".
Osavõtjaid saabus 30 riigist. Tegemist oli EL poolt rahastatava projekti ANDROID (Academic Network for Disaster Resilience to Optimise Educational Development) avakonverentsiga.
ANDROID'i katastroofiresistentsuse teadusvõrgustikus osaleb 67 partnerorganisatsiooni 31 riigist, mis hõlmab põhiliselt ülikoole, kuid esindatud on ka riiklikud ja omavalitsusasutused,valitsusvälised ühendused ning sõltumatud teadusorganisatsioonid.

Isikunäitused Tallinna Tehnikaülikoolis

- Prof.Lembi-Merike Raado isikunäitus TTÜ peamaja fuajees, märts 2012
- Emeriitprof Jüri Sutt isikunäitus TTÜ Raamatukogu fuajees, mai 2012
- Emeriitdotsent Toomas Laur isikunäitus TTÜ peamaja fuajees, august 2012

Ehitusteaduskonna doktoriseminari korraldamine

TTÜ ehitustootluse instituut korraldas 4.-5.mai 2012 Laulasmaa Spas ehitusteaduskonna doktoriseminari. Osales 32 doktoranti ja juhendajat.

Ülevaade teaduskorralduslikust tegevusest

Prof. Lembi-Merike Raado

retsensent rahvusvaheliste teadusajakirjades:

- Journal of Civil Engineering and Management (Taylor and Francis),
- Baltic Journal of Road and Bridge Engineering,
- Oil Shale (Estonian Academy of Science)
- Journal of Materials and Structures, (Springer)

Prof. Irene Lill

retsensent rahvusvaheliste teadusajakirjades:

- "Land Use policy" (Elsevier),
- "Automation in construction" (Elsevier)
- "Journal of Civil Engineering and Management" (Taylor and Francis),
- "International Journal of Strategic Property Management" (Taylor and Francis),
- "International Journal of Disaster Prevention and Management " (Emarald),
- "Technological and Economic Development of Economy" (Taylor and Francis)
- Archives of Civil and Mechanical Engineering" (Wroclaw Univerity of Technology)

Prof. Roode Liias

retsensent rahvusvaheliste teadusajakirjades:

- Journal of Civil Engineering and Management (Taylor&Francis)
- International Journal of Strategic Property Management (Taylor&Francis);
- Technological and Economic Development of Economy (Taylor&Francis);
- Construction Economics and Management; (Taylor&Francis),
- Journal of Facilities Management (Emerald)

Teadlasmobiilsus

- R.Liias; 6.02-9.02; loengud ja nõupidamised koostööpartneri Hochschule für Technik und Wirtschaft, Berliin juures (Berliin, Saksamaa)
- R.Liias; 14.03-17.03, esinemine Riia Linnavalitsuse ja Läti Kinnisvara Korrashoidjate Assotsatsiooni elamute korrashoiualasel rahvusvahelisel konverentsil, (Riia, Läti)
- I.Lill; E.Soekov; E.Witt 2.04.-5.04, ASEV Empolese Valdesa Development Agency, LARGE projekti töökoosolek, (Empoli, Itaalia)
- R.Liias; 15.04-18.04, Vilnius Gediminas Technical University (Vilnius, Leedu)
- I.Lill; 24.04-25.04, Central Baltic INTERREG IVA uurimisprojekt DigiEduET töökoosolek (Helsingi, Soome)
- I.Lill; E.Soekov 04.06, Central Baltic INTERREG IVA uurimisprojekt DigiEduET töökoosolek (Helsingi, Soome)
- I.Lill; 14.05-17.05, UKRO: UK Research Office, ANDROID projekti kick-off meeting (Brüssel, Belgia)
- I.Lill; E.Soekov 20.06, Central Baltic INTERREG IVA uurimisprojekt DigiEduET töökoosolek (Helsingi, Soome)
- E.Soekov 05.08-07.08, Central Baltic INTERREG IVA uurimisprojekt DigiEduET töökoosolek (Helsingi, Soome)

- I.Lill; E.Soekov 06.09, Central Baltic INTERREG IVA uurimisprojekt DigiEduET töökoosolek (Helsingi, Soome)
- R.Liias; 11.09-15.09, City University London; Oslaemine "The Association of European Civil Engineering Faculties" sümpoosionil " Global Issues in Enhancing Civil Engineering Learning, Teaching, Reaseach and Practice. (London, Suurbritannia)
- I.Lill; 27.09-29.09, St Petersburg State Polytecnical University, töökoosolek (St. Peterburg, Venemaa)
- I.Lill; E.Soekov; 27.11, Central Baltic INTERREG IVA uurimisprojekt DigiEduET töökoosolek (Helsingi, Soome)
- I.Lill; 09.12-13.12, University of Bologna, CENEAST projekti avakoosolek (Bologna, Itaalia)

Hinnang teadustulemustele

Positiivseks tuleks lugeda seda, et instituudi töötajatel on head rahvusvahelised sidemed ja tehakse koostööd teiste ülikoolidega nii kodu- kui ka välismaal. Professorid on leidnud rahastamisvõimalusi nii erinevatest Euroopa Liidu programmidest kui ka uurimistellimusi ettevõtetelt ja ministeeriumitelt.

- jätkub koostöö TTÜ Sertifitseerimisasutusega
- jätkub koostöö Tartu Ülikooliga ühisõppekavade väljatöötamisel
- jätkub koostöö Vilniuse Gediminase Ülikooli ja Salfordi Ülikooliga
- jätkub koostöö Eesti Energiaga
- erinevate projektide raames lisandunud koostöö Aalto Ülikooli, Riia Tehnikaülikooli, Lundi Ülikooli, Bologna Ülikooli, Moskva Ülikooli, St Peterburg Tehnikaülikooli, Kaliningradi Tehnikaülikooli ja Ukraina Tehnikaülikooliga
- lisandunud koostöö Keskkonnainvesteeringute Keskusega
- lisandunud koostöö Viru Keemia Grupiga

Eesmärgid 2013.aastaks:

- jätkuvalt leida noori teadussuutlikke ja pedagoogiliste eeldustega inimesi õppe-ja teadustöö jätkamiseks
- aktiviseerida publitseerimist
- oluliselt intensiivistada tööd doktorantidega

Üldine hinnang – hea

2.7 Instituudi teadus- ja arendustegevuse teemade ja projektide nimetused *(Eesti Teadusinfosüsteemi, edaspidi ETIS, andmetel)*

Siseriiklikud lepingud:

- **LEP10067**, Eesti erinevates piirkondades aastatel 1990-2010 kasutusele võetud korterelamute kaardistamine, **Roode Liias,** (teaduskonna leping, 30.06.2010 - 21.05.2012)

Välisriiklikud lepingud:

- **VIR506**, Digitaalsed protsessid ehitusjuhtimises ja koolituses, **Irene Lill** (1.01.2011 - 31.12.2013)
- **VERT559**, Katastroofiresistentsuse teadusvõrgustik, **Irene Lill** (1.11.2011 -31.10.2014)
- **VER535**, Augmenteeritud reaalsuse metoodika globaalses ehituskeskkonnas, **Irene Lill** (1.11.2011 -31.10.2013)

- **VY582**, CENEAST - Euroopa hoonestatud keskkonna õppekavade harmoneerimine Idanaabrite ülikoolidega, **Irene Lill** (15.10.2012-14.10.2014)

2.8 Struktuuriüksuse töötajate poolt avaldatud eelretsenseeritavad teaduspublikatsioonid *(ETIS klassifikaatori alusel 1.1, 1.2, 1.3, 2.1, 2.2, 3.1, 3.2, 3.3, 4.1 ja 5.1).*

1.1

Kaklauskas, A.;Trinkunas, V.; Amaratunga, D.; **Lill, I**.; Gudauskas, R.; Jackute, I.; Daniunas, A.; Urbonas, V.; d'Amato, M. (2012). Life cycle process of a market-oriented and student centered higher education. International Journal of Strategic Property Management, 1 - 12.

1.2

Witt, E.; Lill, I. (2012). Lifelong Learners in Engineering Education – Students' Perspectives. International Journal of Education and Information Technologies, 6(1), 9 - 16.

2.2

Kalamees, T; Ilomets, S; **Liias, R**; **Raado, L-M**; Kuusk, K; Maivel, M; Ründva, M; Klõšeiko, P; Liho, E; Paap, L; Mikola, A; Seinre, E; **Lill, I**; **Soekov, E**; Paadam, K; Ojamäe, L; Kallavus, U; Mikli, L; Kõiv, T-A. (2012). Eesti eluasemefondi ehitustehniline seisukord – ajavahemikul 1990–2010 kasutusele võetud korterelamud.

3.2

Ilomets, S; Kalamees, T; **Raado, L-M** (2012). Performance testing of frost damage model by hygrothermal simulation. In: Proceedings of the 5th International Building Physics Conference (IBPC). Kyoto, Japan, May 28-31, 2012: 5th International Building Physics Conference. Kyoto, Japan, May 28-31, 2012. (Toim.) The 5th IBPC organizing committee., 2012, 73 - 80.

2.9 Struktuuriüksuses kaitstud doktoriväitekirjade loetelu *(NB! struktuuriüksus lisab struktuuriüksuse töötaja juhendamisel mujal kaitstud doktoriväitekirjade loetelu)*

1) Emlyn David Qivitoq Witt, ehitustootluse instituut
Teema*: Risk Transfer and Construction Project Delivery Efficiency - Implications for Public Private Partnerships* (Riskijuhtimise delegeerimise mõju avaliku ja erasektori ühiste ehitusprojektide tõhusale juhtimisele)
Juhendaja: **prof Roode Liias**
Kaitses: 11.06.2012
Omistatud kraad: filosoofiadoktor (ehitus ja keskkonnatehnika)

2) Tiina Hain, ehitustootluse instituut
Teema: *Characteristics of Portland Cements for Sulfate and Weather Resistant Concrete* (Sulfaadi- ja ilmastikukindla betooni tootmiseks vajalike portlandtsementide iseloomulikud parameetrid)
Juhendaja: **prof Lembi-Merike Raado**
Kaitses: 20.12.2012
Omistatud kraad: filosoofiadoktor (ehitus ja keskkonnatehnika)

2.10 Struktuuriüksuses järeldoktorina T&A-s osalenud isikute loetelu *(ETIS-e kaudu esitatud taotluste alusel) - 0*

2.11 Struktuuriüksuses loodud tööstusomandi loetelu - 0

3. Struktuuriüksuse infrastruktuuri uuendamise loetelu