

**TAL
TECH**

IT ACADEMY - ESTONIAN WAY TO SHAPE ICT EDUCATION

Gert Jervan, Dean, School of IT
Tallinn University of Technology (TalTech)

1

GERT JERVAN

- MSc TalTech 1998, PhD Linköping University, Sweden 2005
- Professor 2012, Dean 2018
- Ca. 150+ papers, ca. 20+ projects as PI (incl. ca. 10 EC projects), supervised 8 PhD theses
- Since 2011 regularly consulted and served REA (EC Research Executive Agency)
- Research interests: Dependability and reliability of computer-based systems (microelectronics, fiber-optical networks, IoT, biomedical engineering)

**TAL
TECH** | TALLINN UNIVERSITY OF TECHNOLOGY

2



3

SCHOOL OF IT

- 4 departments and 1 college:
 - Departments of Computer Systems, Software Science, Health Technologies, and Electronics
 - IT College (center of studies)
- Ca. 370 staff members, of what 232 academic
 - incl. 24 professor and 65 junior researchers (total 108 PhD students)
- Ca. 2800 students (2/3 of all Estonian ICT students)
- The School revenue is ca. 60% research and 40% teaching.

4

SCHOOL OF IT

- **6 Bachelor's programmes (3 years)**, ca. 500+ freshmen annually
 - 5 in Estonian
 - 1 in English
- **12 Master's programmes (2 years)**, ca. 400+ freshmen annually
 - 8 in Estonian
 - 4 in English
- **1 PhD programme**
 - in English

SCHOOL OF IT FOCUS AREAS

- Security and trust
 - cyber security, trustworthy software, systems safety, secure and reliable hardware systems
- Digital transformation of the society
 - e-governance technologies, digital health, language technologies
- Smart environments
 - 5G, IoT, (bio)robotics, intelligent electronic systems



7

- **Multidisciplinary**
 - In a multidisciplinary approach, multiple disciplines work independently on a common topic or problem
 - The synthesis responsibility is on learner

- **Interdisciplinary**
 - Interdisciplinary education involves integrating knowledge and methods from different disciplines to create a unified understanding of a complex issue
 - The synthesis responsibility is dividend in-between the learner and the teacher

TAL TECH | TALLINN UNIVERSITY OF TECHNOLOGY

8

WHY WE ARE TALKING ABOUT MULTIDISCIPLINARY EDUCATION?

Estonia is not a small country

Estonia is a VERY small country

It's difficult to provide taylor-made, program specific courses
Much bigger role on individual student to tailor his/her education

Responsibility is largely on student



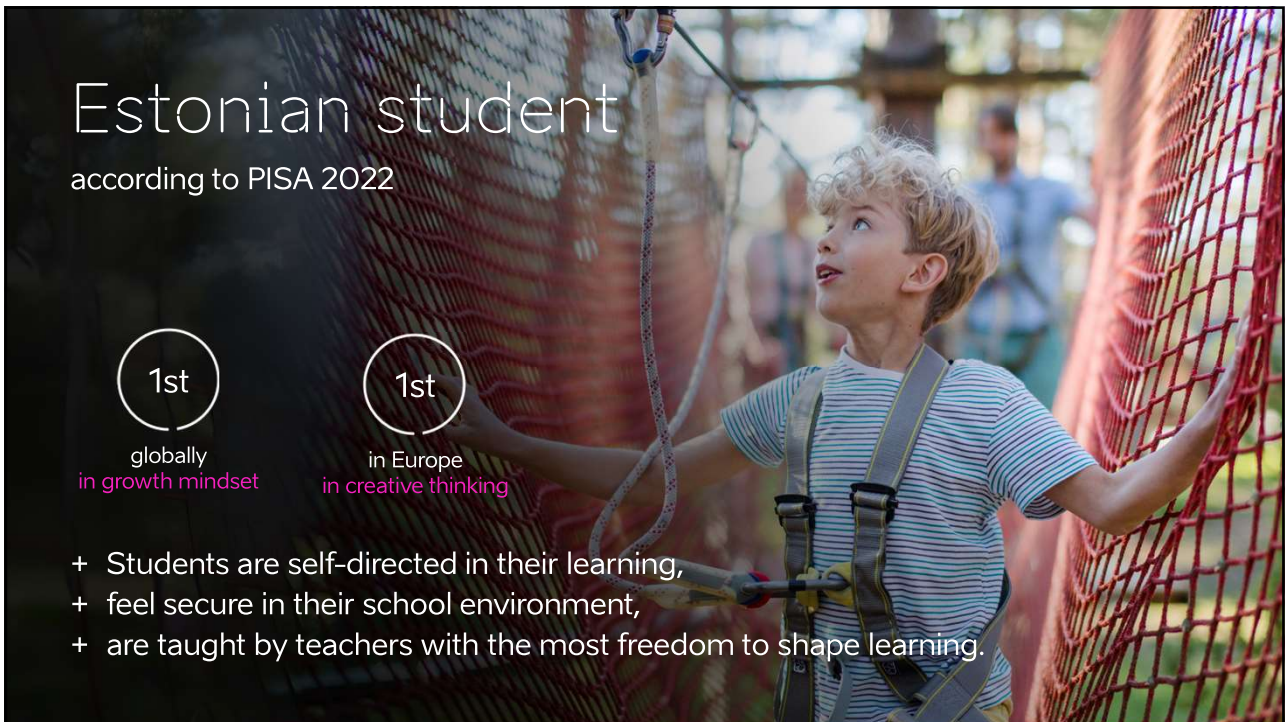
TALLINN UNIVERSITY OF TECHNOLOGY

9



BACKGROUND

10



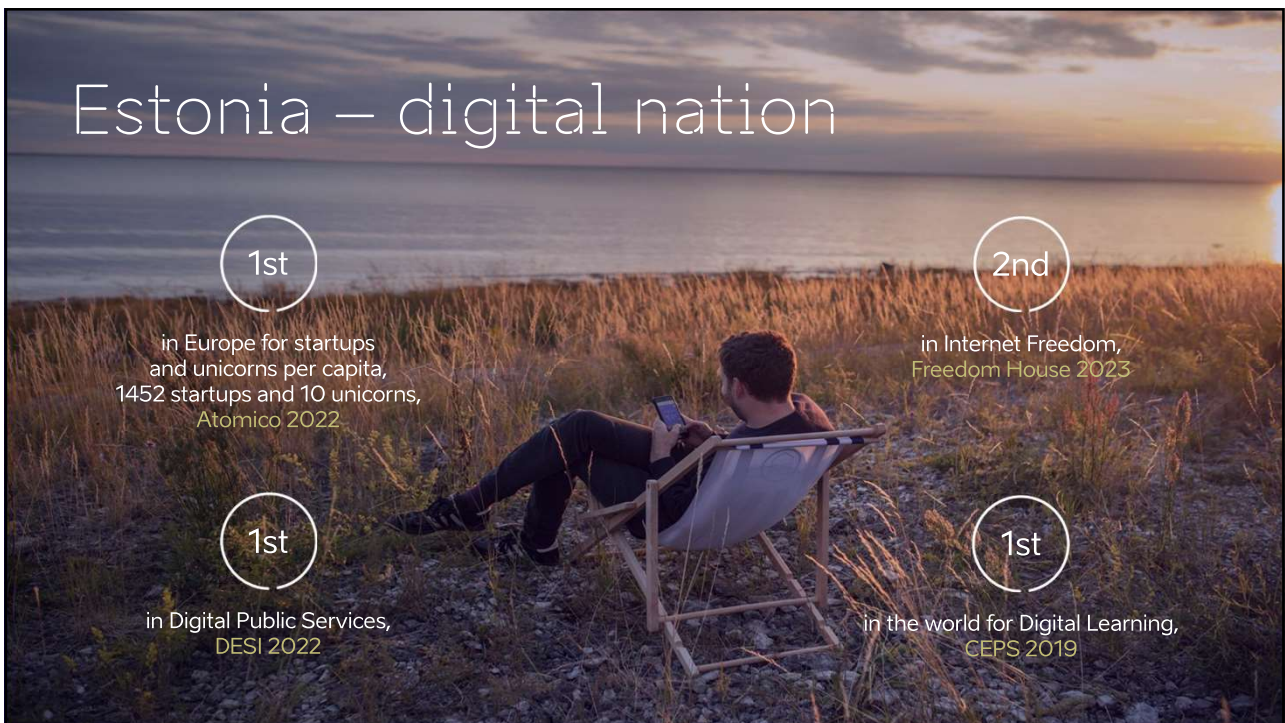
Estonian student

according to PISA 2022

- 1st globally in growth mindset
- 1st in Europe in creative thinking

- + Students are self-directed in their learning,
- + feel secure in their school environment,
- + are taught by teachers with the most freedom to shape learning.

11



Estonia – digital nation

- 1st in Europe for startups and unicorns per capita, 1452 startups and 10 unicorns, Atomico 2022
- 2nd in Internet Freedom, Freedom House 2023
- 1st in Digital Public Services, DESI 2022
- 1st in the world for Digital Learning, CEPS 2019

12

Digital solutions are in everyday use in education

- + E-diaries for schools and kindergartens: Eliis, eKool, Studium
- + Digital learning materials and platforms: e-Schoolbag, OPIQ
- + Student admission systems: DreamApply, SAIS
- + Examination Infosystem EIS for digital tests
- + Estonian Education Infosystem EHIS

13

The numbers Estonia's tech education

99%

of Estonian kindergartens
take part in technology
education programme
ProgeTiger

1 in 3

students pursues STEM
in higher education

11%

of students study ICT
in Estonia (BA+MA) —
twice as many as EU average
[Education Estonia 2023](#)

43%

of ICT Master's students
are female — this is
highest share in Europe
[Informatics Europe 2022](#)

14

But it's not enough!

Companies do not have enough skilled workforce

There is a huge gap with other sectors
(not enough „smart clients“)

Classical „digitalization“ creates more problems than it solves



TALLINN UNIVERSITY OF TECHNOLOGY

15

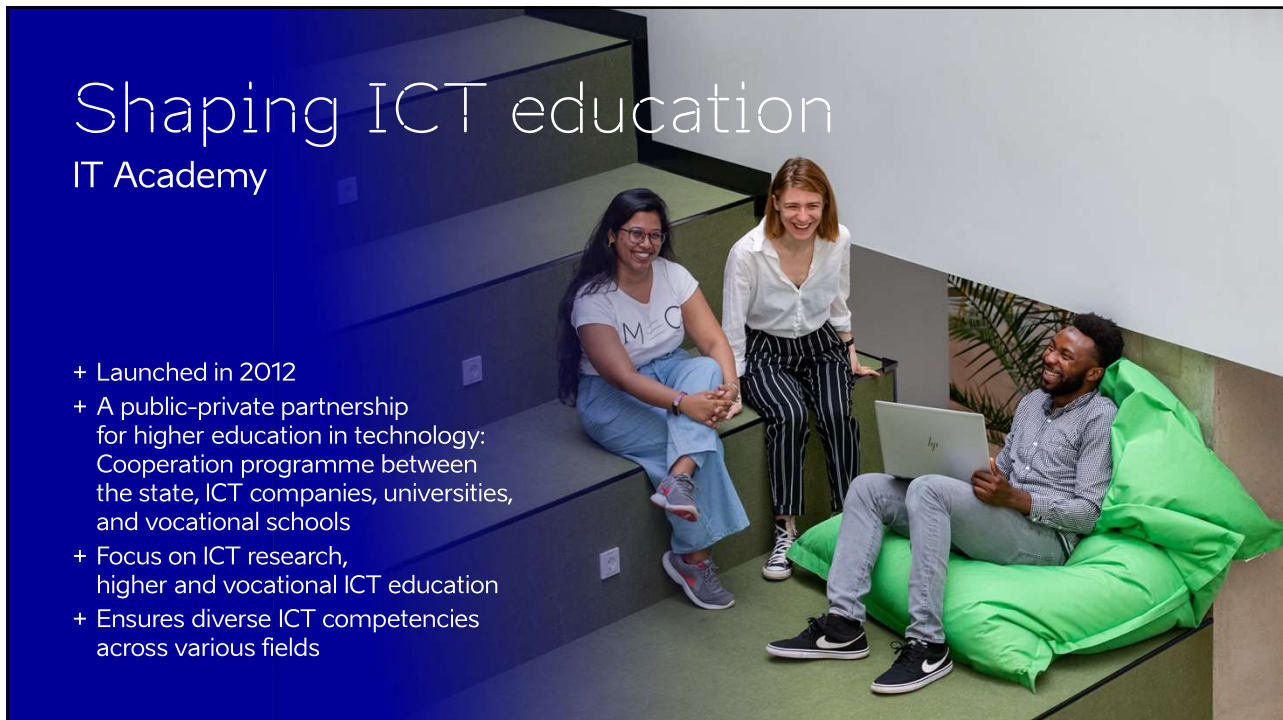


16

Shaping ICT education

IT Academy

- + Launched in 2012
- + A public-private partnership for higher education in technology: Cooperation programme between the state, ICT companies, universities, and vocational schools
- + Focus on ICT research, higher and vocational ICT education
- + Ensures diverse ICT competencies across various fields



17

IT ACADEMY

- Three main objectives:
 - Increase graduation rates
 - Increase number of MSc students -> step away from classical programs
 - Increase number of female students -> ICT is much more than coding
- Horizontal and vertical approach
 - Deeply technical programs – interdisciplinary programs
 - LLL and non-ICT learners - multidisciplinary programs

18

WHY MULTIDISCIPLINARY?

- Only three universities in Estonia have ICT programs
- We cannot afford very many different specializations, that could provide interdisciplinary education
- For very many specific specializations you need only 1-2 graduates per year
- Students are coming with very different background
 - In one program you might have together nurse, medical doctor, data scientist, ministry policy maker and big pharma employee

MULTIDISCIPLINARY PROGRAMS (MSc LEVEL) (5 OUT OF 12)

- Digital Health (in English, 2 years)
- E-Governance Technologies (in English, 1 year)
- Digital Transformation of Business (in Estonian, 1 year)
- Data and Technologies in Digital Governance (in Estonian, 1 year)
- Cybersecurity (in English, 2 years)

CYBERSECURITY

- Tallinn Manual
- NATO Competence Center
 - Technical
 - Exercises (Locked Shield, etc.)
 - Policy
- Rangeforce (start-up, valuation 120+ M€)
- CERT
- CIOs
- Law enforcement, forensics, surveillance, military, etc...



21

KEY FEATURES

- Integration of Multiple Disciplines: working independently on a common topic
- Collaboration among experts from different fields
- Broad understanding of complex issues by examining them from various disciplinary perspectives



22

BENEFITS

- Enhanced Problem-Solving Skills: Exposure to various methods and viewpoints helps students develop robust problem-solving abilities
- Students learn to recognize the interconnectedness of different disciplines.
- This approach fosters creativity and innovation. Working with peers from different disciplines fosters collaboration and teamwork skills

CHALLENGES

- Curricular Constraints: difficulties in integrating multidisciplinary approaches into curricula.
- Need for educators with expertise in multiple disciplines.
- Complexities of assessing student performance in multidisciplinary contexts.

DISCUSSION ITEMS

- When to take interdisciplinary and when to take multidisciplinary approach?
- How to convince students to choose multidisciplinary curricula? Or how to attract them to interdisciplinary programs?
- How to make sure that they „survive“ and can choose a right path?
- Is multidisciplinary also an alternative for highly technical programs?
 - Any informatics (related) programs?