HAIC Report 2024

Introduction

Helsinki-Aalto Institute for Cybersecurity (HAIC) was established in 2016 as a joint strategic initiative by the Deans of Science at Aalto University (Aalto) and University of Helsinki (UH). HAIC's mission is to *ensure excellence in cybersecurity research and education* at the universities. Initially, the institute's primary function was to attract top master's students to information security master's programs the Helsinki area by offering tuition-fee waivers funded by the universities and scholarships funded by industry. Since then, HAIC's operation has evolved and extended to include a support program for the students and their career development, an industry outreach program to create connections between industry and academia, and public outreach events to disseminate cybersecurity research results and engineering knowledge more broadly to the society.

HAIC organizes an annual Secure Systems Demo Day together with the Secure Systems research group and other cybersecurity researchers at Aalto and University of Helsinki. Since 2018, HAIC has organized a public talk series under the HAIC Talks banner. HAIC also has a research program (HAIC-R) as part of Helsinki Institute for Information Technology HIIT.

HAIC has been a pioneer in helping master's and doctoral students establish industry contacts during their studies and facilitating the search for internship and thesis positions as well as jobs after graduation. The institute has achieved this by organizing company visits, Meet & Greet events, where students and academic staff mingle with company representatives in an informal atmosphere. The Demo Day and HAIC Talks include similar networking opportunities.

Activities in 2024

Fundraising for scholarships

Sources of funding in 2024:

- Industry donations from SSH towards
  - HAIC living cost scholarships
  - HAIC mobility scholarships

- Additional funding from the Dean of the Aalto University School of Science for
  - participation cost scholarships for SECCLO students from EU countries at Aalto
  - HAIC public outreach program, including HAIC Talks

Industry partners

HAIC industry partners were contacted by sending them a "letter to donors". The letter sought donation commitments by December 2023 (minimum of 5 000 €, recommended

20 000 €). It described proposed HAIC activities including the event where the donors and supporters can meet and interact with HAIC students.

Fundraising for 2024 was challenging, and only SSH continued to support HAIC.

HAIC Scholarships 2024

HAIC offers different kinds of scholarships to the best applicants specializing in information security: *living cost scholarships*, *SECCLO participation cost scholarships* and *mobility scholarships*.

HAIC *living cost scholarships* (7 500 €/academic year, that is, 750 €/month (Sep-June), in total 15 000 €/two academic years) are funded by donations from HAIC donors and supporters. The figure was chosen to cover the income requirement for the Finnish residence permit and to encourage the HAIC scholars to seek internships during summer as well as paid thesis positions. HAIC aims to offer up to four living cost scholarships per year, but the total number and type of HAIC scholarships awarded yearly depends on the magnitude of donations received that year.

HAIC offers *SECCLO participation cost scholarships* (6 000 €/two-year programme) for SECCLO (Erasmus Mundus funded Master's programme in Security and Cloud Computing) students coming from EU countries.

HAIC *mobility scholarships* are offered to Aalto University students for exchange studies in the field of information security. HAIC grants maximum ten mobility scholarships, 500 € per year, on top of Aalto Free Mover Scholarship of 1 500 € according to the School of Science policy for international exchanges (Decision 12/2019 of Manager of Academic Affairs).

HAIC Scholars 2024:

- *Living cost and SECCLO participation cost scholarships*: HAIC offered one scholarship to a self-funded SECCLO applicant, and the applicant accepted the offer.

- *SECCLO participation cost scholarships*: HAIC offered 10 scholarships to cover programme participation costs, and 5 applicants accepted the offer.

- *Mobility scholarships*: seven scholarships were granted in the January 2024 call. In the September call there were no applications. The three remaining scholarships will be available in the November call.

Table 1. Summary of HAIC scholars 2024 at Aalto University.

Type of scholarship	Scholarship amount	Number of accepted scholarships
HAIC scholarship to cover living cost and SECCLO participation	15 000 € + 6 000 €	1
HAIC scholarship to cover SECCLO participation costs	6 000 €	5
HAIC mobility scholarships	500 €	7

HAIC scholarships 2024 were open to all applicants applying to the SECCLO – Master's programme in Security and Cloud Computing (Erasmus Mundus) at Aalto University, and for the Master's Programme in Computer Science at the University of Helsinki. Scholarship information was published on HAIC website (https://haic.fi/scholarships/) and on program websites (https://www.aalto.fi/en/admission-services/scholarships-and-tuition-fees; https://secclo.eu/scholarships-and-fees/scholarship-and-fees/).

Information about the HAIC mobility scholarships was advertised on HAIC website (January call: HAIC mobility scholarships 2024 – HAIC; September call: https://haic.fi/september-call-for-haic-mobility-scholarships/), in the Aalto University student newsletter "Tuutti" published by the Department of Computer Science, and on the Aalto University exchange studies page https://www.aalto.fi/en/other-studies/funding-for-exchange-studies. Learning Services at Aalto also advised eligible students who were planning exchange studies to apply for the mobility scholarships.

Background statistics for application round 2024

Aalto University, School of Science

SECCLO – Master's programme in Security and Cloud Computing (Erasmus Mundus) received 910 eligible applications out of which 80 students were selected. 32 students enrolled for the academic year 2024-2025 representing 19 nationalities. The number of eligible applications increased 60 % compared to application round 2023.

University of Helsinki

University of Helsinki has two master's programmes in which it is possible to study a major within the HAIC scope. These are "master's programme in Computer Science" and "master's programme in Data Science". The primary program is the former. It includes the "Networking and Services" study line with information security as one of the main ingredients. Recipients of the scholarships are selected as part of the university-wide process. All applicants for the master's programme in Computer Science are considered for the HAIC scholar positions.

Master's programme in Computer Science received 1400 applications (the number of applications increased 77 % compared to 2023 application round) out of which 110 were selected. Finally, 33 students started in the programme, 17 with a full tuition fee waiver and three with a half tuition fee waiver.

For the master's programme in Data Science, the numbers are: 1251 applications (the number of applications increased 59 % compared to 2023 application round), 71 were selected, and 28 started, ten with a full tuition fee waiver and two with a half tuition fee waiver.

Altogether 61 new students started their master's studies in autumn 2024.

Cyber security study info

From 2024, cybersecurity studies at Aalto are offered as a Secure Systems study track within the Computer Science major in the CCIS master's program. The change in the program structure will allow students to focus on security or to combine security studies with other areas of computer science. Previously, we offered a separate major that combined security with one specific application area, most recently cloud computing. Over time, it has become apparent that master's students need more flexibility in planning their studies to match their personal learning goals. Implementing cybersecurity master's education as a part of the broader CS major provides this flexibility. Current students enrolled in the Security and Cloud Computing major have the option to transfer to the new Secure Systems study track or continue in the existing security major, which will remain available for the next two years.

The change in the program structure requires a new approach from HAIC to reaching cybersecurity students. Instead of focusing on students in one narrow major, we need to support a larger body of students with more diverse interests in security and its applications. Students in the CS major can move between tracks and select content according to their personal learning goals. Additionally, students from many other programs and majors are taking cybersecurity courses and want to combine security knowledge with expertise in their own focus area. For example, the introductory course CS-C3130 Information Security had students from 20 different bachelor and master programs across Aalto University as well as life-wide learners through FiTech.

As the first step towards reaching the broader body of students, we organized two cybersecurity study information events at Aalto. The first event, held on March 13th, 2024, was primarily aimed at students already enrolled in the security major or those intending to transition into master's studies during the current year. The agenda revolved around the future of information security studies at Aalto, providing students with guidance for their personal study plans. The second event, scheduled for October 8th, 2024, focused on cross-university studies and master's thesis projects. The feedback from students was positive, prompting HAIC to commit to organizing similar events in the future.

Industry outreach

Meet-and-Greet events

HAIC organises Meet-and-Greet events once a year, where information security students can meet and mingle with representatives from industry. During the Meet-and-Greet event HAIC presents its yearly report; selected industry partners present their companies and advertise available internships and thesis positions. The 2023 event was held on November 2nd and the 2024 event on November 12th.

Company visits

HAIC started to organise company visits from the beginning of 2018. The idea is to connect information security students with the local information security companies, so that they can learn about available thesis and internship positions, part-time jobs, and eventually full-time jobs after graduation.

Two company visits were organised in the end of 2023 to visit HAIC sponsor companies, WithSecure (4.12.2023) and SSH (29.11.2023). The maximum number of students per company, 25 and 15, respectively, attended the visits.

Public outreach "Information security affects everyone"

HAIC Talks

HAIC has organised **HAIC Talks**, a series of public lectures on contemporary topics in information security, since 2018. In the style of *studia generalia*, these lectures are free and open to everyone. The talks are often on technical topics and attract audience from the ICT industry, but no specific technical background knowledge is assumed. The talk events start with a coffee and *pulla* reception that gives the participants an opportunity to mingle.

HAIC Talks are made possible through the generous support of the Aalto University School of Science.

HAIC Talks 2024:
- 29 October, 2024: Learning from cybersecurity exercises — the case of Locked Shields – with Rain Ottis
- 25 September, 2024: Time and Place in Digital Forensic Science – with Matthew Sorell
- 17 April, 2024: Challenges and Practical Approaches to Design Private and Scalable Information Data Management Systems – with Amr El Abbadi

HAIC talks have been successful with ~100 registrations per each talk. Turnout has been high with ~80 participants in each talk and discussion active.

In October 2024, the talk was experimentally streamed to a limited number of remote participants via Zoom. The trial was successful, and future talks can be streamed on demand to other Finnish educational institutions. There are currently no plans to stream them to the general public because we want to maintain the community-meeting role of the events.

Secure Systems Demo Days

Secure Systems Demo Days are annual events to showcase on-going security research at Aalto and UH. The events intend to bring local academia, students, and industry together and give an excellent opportunity to network and search possibilities for collaboration and for open positions within the local infosec industry and academia. Secure Systems Demo Days are public events and free of charge. Events are organized by the Secure Systems research groups at Aalto University and University of Helsinki in collaboration with HAIC. Secure Systems Demo Day 2024 was held in the CS building at Aalto University on June 17th with 30 research posters/demonstrations and 11 company desks (Cyber Citizen, Elisa, Ericsson, Huawei, Nokia Bell Labs, Nvidia, SSH, Traficom (NCC-FI), Vaisala, VTT and Women4Cyber Finland). Almost 140 participants registered for the 2024 event.

HelSec September Meetup

To facilitate students' integration into Finnish job market and to establish industry contacts during studies, HAIC has joined forces with the Helsinki region cybersecurity community HelSec to organize the September meetup on September 12th, 2024. The event took place in Dipoli on the Aalto University campus. HelSec meetups are get-togethers with low threshold for participation for people interested in cybersecurity. The event was fully booked with 300 registered participants. To ensure that students had the opportunity to participate, HAIC negotiated 50 reserved places for Aalto and UH security students, whose costs HAIC covered. HAIC director Tuomas Aura and doctoral researcher Jacobo Bufalino from Aalto University gave talks on their research on eSIM provisioning and cloud network security.

Cybersecurity Base MOOC

University of Helsinki runs a Massive Open Online Course (MOOC) under the title Cyber Security Base. The course was originally developed together with F-Secure. The course runs continuously and is open to everyone. The course series consists of 6 smaller courses, each with a specific theme, making 10 study credits in total. Themes include the introduction to cybersecurity, operational security, web software development, types of vulnerabilities typical of web software, discovery and mitigation of such vulnerabilities, and advanced topics such as secure software architectures and cryptography. The MOOC incorporates several case studies as well as projects for the participants. The 2023 edition opened in February. The introductory part is also suitable for public who want to learn the basics of cybersecurity.

HAIC communications

HAIC communicates about its activities and news on its website https://haic.fi/. In addition, HAIC has an opt-in "HAIC Talks" mailing list to announce coming events. Internal communication for Aalto community happens via Aalto Personnel Newsletter, Tuutti Newsletter (for computer science students), and CS News.

People behind HAIC

There were a couple of chances on the HAIC team. The Director and the Deputy Director of HAIC changed in the beginning of 2024. Associate Professor Janne Lindqvist's four-year director term ended and HAIC's Deputy Director and the Head of Public Outreach Program Mohit Sethi stepped down in the end of 2023.

Professor Tuomas Aura started as the director from the beginning of 2024. Tuomas has a long history in information security research and teaching. Before joining Aalto University in 2008, he worked for Microsoft Research in the UK. His research interests are related to user privacy, network protocols and distributed systems. Tuomas is the Programme Director of the security study track and the Erasmus Mundus master's programme SECCLO at Aalto University and invests a lot of time in teaching and student supervision. Tuomas collaborates actively with the local ICT industry and has potential to foster the highly valued industry contacts during studies that help especially foreign students to find internship positions and enter Finnish job market after graduation.

University Lecturer Lachlan Gunn stepped in from the beginning of 2024 and took over as the Head of the HAIC Public Outreach Program. Professor of Practice Mikko Kiviharju served as a co-head of the program from January to July 2024.

The current HAIC leadership:

- Professor Tuomas Aura, Aalto University – Director of HAIC
- Professor Valtteri Niemi, University of Helsinki – Director of HAIC Research Program at Helsinki Institute for Information Technology (HIIT)
- University Lecturer Lachlan Gunn, Aalto University – Deputy Director of HAIC, Head of HAIC public outreach program
- Professor of Practise Mikko Kiviharju – Deputy Director of HAIC, Head of HAIC public outreach program (January - July 2024)
- Eija Kujanpää, Aalto University – Manager, international relations, coordinator of the HAIC scholarship schemes at Aalto University
- Niina Idänheimo, Aalto University – HAIC Coordinator

HAIC leadership team had an annual strategy meeting with the Dean of Aalto University School of Science on April 23rd, 2024. The meeting covered HAIC's mission and activity plan, funding scheme, and added value to the university.

HAIC leadership team's meeting with HAIC sponsors for feedback on HAIC activities, study programs, and to further develop joint research activities will be held on November 12th, 2024.

Outlook

HAIC's mission is to ensure excellence in cybersecurity research and education at the two universities. The ways HAIC operates have evolved over time, and the gradual development will continue in response to new opportunities and changing demands.

Attracting excellent students to the universities and to cybersecurity studies remains one of HAIC's main goals. As seen in Figure 1, cybersecurity programs at the two universities have been exceptionally successful in drawing applicants and, thus, top students. However, changes in the university tuition fee system mean that it will be more difficult to recruit students from outside the EU. Additionally, the highly successful Erasmus Mundus Master's Program on Security and Cloud Computing (SECCLO) had its seventh and final intake in autumn 2024. Those students will graduate in 2026. While Aalto is involved in a new Erasmus Mundus application, there will necessarily be at least one year gap in the student intake. This means that we have to take even better care of our existing students and make the regular program attractive to local and European applicants. HAIC's visibility and community creation help us recruit master's students and life-long learners from among the software professionals already in Finland. The industry-funded HAIC scholarships, on the other hand, enable us to offer international mobility opportunities to existing students and attract more European applicants to the master's programs.
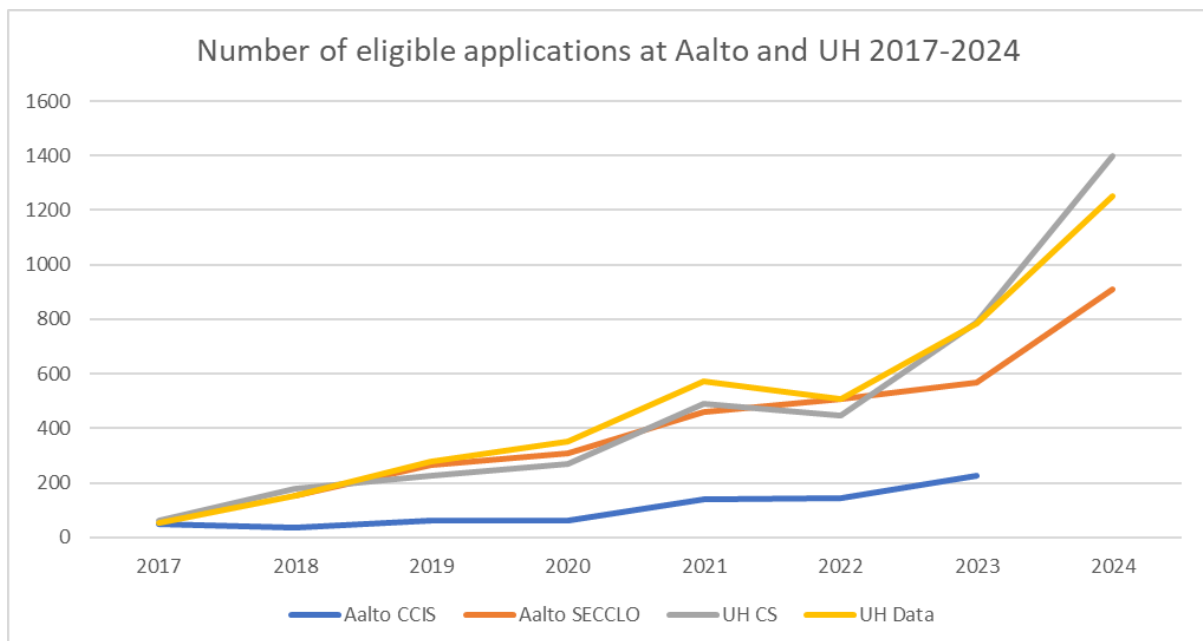

Figure 1. The number of eligible applications for security master's programmes at Aalto and UH have increased since the establishment of HAIC and during the SECCLO program.

The continuation of the scholarship scheme depends naturally on funding. The company-donated scholarships have had a significant role in motivating top applicants to accept offers in our study programs. The donations have especially enabled us to offer more financial support to European applicants. HAIC values the donations from the past and current donors and welcomes new industry partners to join the program.

The cybersecurity curriculum at Aalto has undergone major changes, and HAIC must adapt to the new environment. From 2024, master-level cybersecurity specialization is offered as a study track under the Computer Science major. Consequently, HAIC needs to reach a larger and more diverse body of students than the previous narrow majors. We have already started to develop activities that support security studies and careers among this broader student audience, such as organizing study info events for those interested in cybersecurity.

HAIC is a cross-university initiative, and it fits well into the ongoing efforts to establish broader cross-university collaboration in cybersecurity education among Finnish universities. We are taking part in a national project *Kyberturvallisuuskoulutuksen ja koulutusyhteistyön kehittäminen korkeakouluissa,* funded by Ministry of Education, on developing such collaboration. The end goal is sustainable forms for working together and disseminating the best educational content and practices across university boundaries.

Industry collaboration is at the heart of HAIC's mission. HAIC has been a forerunner in creating connections between cybersecurity students and industry employers during the studies. The need for such activities has been highlighted by the recent economic downturn. We want to make sure that students who are interested in cybersecurity integrate themselves into the local security community, and that companies that need cybersecurity expertise find our students and graduates. Summer internships, master's thesis projects, and the first job are critically important steps in any student's career, and they are vital to keep international students in Finland after their graduation. Our main asset is a lively ecosystem of security experts and students that meet regularly. We will continue to organize company visits and other events where students can interact with industry and academia experts in a relaxed setting, learn about the businesses and working culture in Finland, and meet potential future employers. We are also extending our network to volunteer-run organizations such as HelSec and Women for Cyber Finland. This enables us to offer even more networking and meeting opportunities to our students and professional community.