



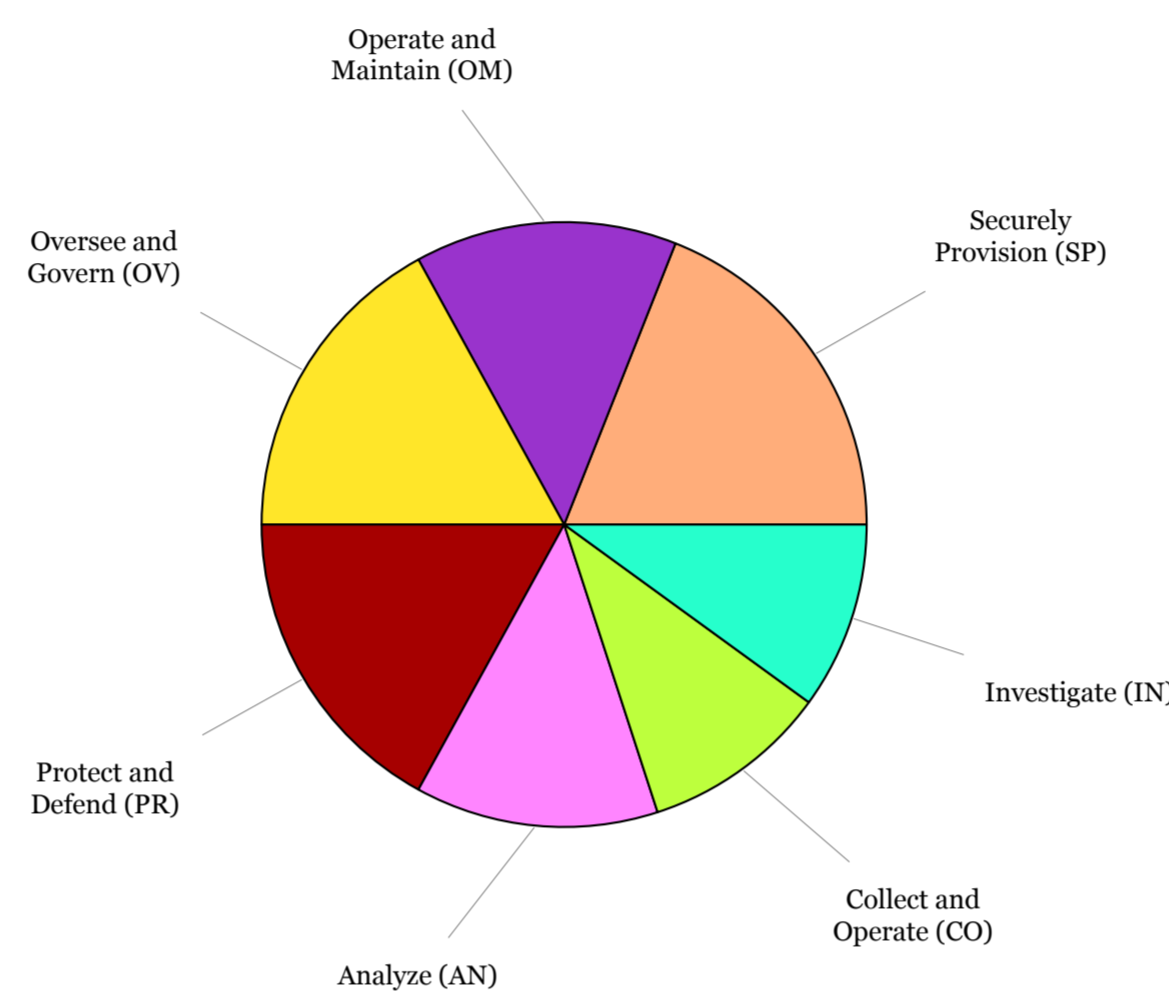
## CYBERSECURITY EDUCATION NETWORK

A project "Building a national cybersecurity education cooperation network" is funded by Ministry of Education and Culture, Finland. The project is coordinated by University of Jyväskylä. Other universities in the network are Turku, Helsinki, Vaasa, Oulu, Åbo, Tampere, Aalto, and LUT. The project aims to:

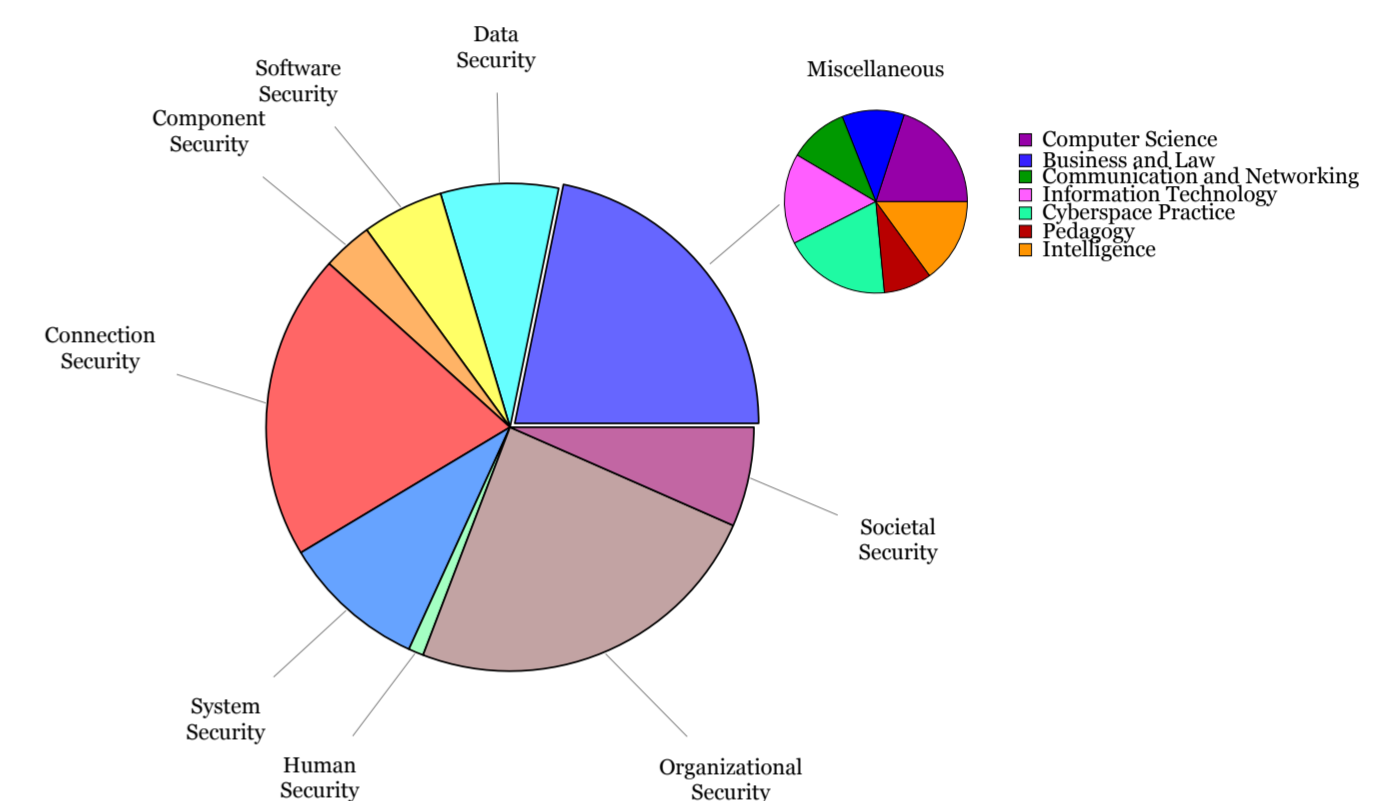
- ▶ Increase cooperation between higher education institutions.
- ▶ Develop and expand research-based cybersecurity education.
- ▶ Increase the number of cybersecurity study modules for degree students.
- ▶ Expand cybersecurity studies for non-degree students.
- ▶ Enable students from different institutions to participate in unified studies, reducing overlap.
- ▶ Expand activities and study opportunities, including cooperation with foreign institutions.

## CURRICULUM DEVELOPMENT

We [3] show how our measurement system can develop a cybersecurity curriculum that meets workforce needs and supports lifelong learning for professionals. Lehto et al. [1] found weights for 7 Job Categories (JC) of NICE Framework [2]. Using the weights, we derived weights of Knowledge Areas (KAs) and Knowledge Units (KUs) of Curriculum. Based on the weights, we mapped Knowledge Descriptions to Knowledge Units.



The percentages of cybersecurity professional needs in seven main competence categories.



Weight distribution of the Knowledge Areas based on their importance to cybersecurity work role competences.

Two main sources are used for the mapping.

- ▶ Joint Task Force between ACM, IEEE, and IFIP defined Curriculum for cybersecurity with 8 Knowledge Areas, divided into total of 55 Knowledge Units.
- ▶ NIST defined NICE framework for Cybersecurity Work Requirements with 7 Job Categories divided into total of 52 Work Roles each requiring subset of 630 Knowledge Descriptions.

Based on the mappings, we produced the course distributions to a proposed cybersecurity curriculum.

Course-id	KA	Course Name	SP	OM	OV	PR	AN	CO	IN
I-1	1	Data Security I	✓	✓	✓	✓	✓	✓	✓
I-2	2	Software Security I	✓	✓	✓	✓	✓	✓	✓
I-3	4	Connection Security I	✓	✓	✓	✓	✓	✓	✓
I-4	5	System Security I	✓	✓	✓	✓	✓	✓	✓
I-5	6+8	Human & Societal Security	✓	✓	✓	✓	✓	✓	✓
I-6	7	Organizational Security	✓	✓	✓	✓	✓	✓	✓
II-1	1	Digital Forensics	✓	✓	✓	✓	✓	✓	✓
II-2	3	Component Security I	✓	✓	✓	✓	✓	✓	✓
II-3	4	Connection Security II	✓	✓	✓	✓	✓	✓	✓
II-4	4	Network Architecture I	✓	✓	✓	✓	✓	✓	✓
II-5	4	Network Defense I	✓	✓	✓	✓	✓	✓	✓
II-6	5	System Security II	✓	✓	✓	✓	✓	✓	✓
II-7	6+8	Identity Management, Cyber Law, & Privacy	✓	✓	✓	✓	✓	✓	✓
II-8	7	Risk Management	✓	✓	✓	✓	✓	✓	✓
II-9	7	Systems Administration	✓	✓	✓	✓	✓	✓	✓
II-10	0	Intelligence	✓	✓	✓	✓	✓	✓	✓
III-1	1	Cryptography	✓	✓	✓	✓	✓	✓	✓
III-2	1	Data Security II	✓	✓	✓	✓	✓	✓	✓
III-3	1	Access Control & Security Protocol	✓	✓	✓	✓	✓	✓	✓
III-4	2	Software Security II	✓	✓	✓	✓	✓	✓	✓
III-5	3	Component Security II	✓	✓	✓	✓	✓	✓	✓
III-6	4	Network Architecture II	✓	✓	✓	✓	✓	✓	✓
III-7	4	Distributed Systems Architecture	✓	✓	✓	✓	✓	✓	✓
III-8	4	Network Defense II	✓	✓	✓	✓	✓	✓	✓
III-9	4	Hardware Architecture & Physical Connections	✓	✓	✓	✓	✓	✓	✓
III-10	5	System Thinking & System Control	✓	✓	✓	✓	✓	✓	✓
III-11	7	Cybersecurity Planning	✓	✓	✓	✓	✓	✓	✓
III-12	7	Business Continuity & Incident Management	✓	✓	✓	✓	✓	✓	✓
III-13	7	Analytical Tools	✓	✓	✓	✓	✓	✓	✓
III-14	7	Security Governance, Policy & Operations	✓	✓	✓	✓	✓	✓	✓
III-15	0	Cyberspace Practice I	✓	✓	✓	✓	✓	✓	✓
III-16	0	Cyberspace Practice II	✓	✓	✓	✓	✓	✓	✓

Proposed cybersecurity curriculum.

## 5G SECURITY MOOC

The 5G Security MOOC course provides students with knowledge of the key security threats in mobile communications and how to protect against them.

The creation of the course is part of the Cybersecurity education network project and will be provided by University of Helsinki. The persons responsible for the course development are Harri Kähkönen and Valtteri Niemi.

[1] M. Lehto, ed. *Development Needs in Cybersecurity Education: Final Report of the Project*. Informaatioteknologian tiedekunnan julkaisu 96. URN:ISBN:978-951-39-9469-3. Jyväskylän yliopisto, Informaatioteknologian tiedekunta, 2022.  
[2] R. Petersen et al. *Workforce framework for cybersecurity (NICE framework)*. Tech. Rep. National Institute of Standards and Technology, 2020.  
[3] Sara Ramezani and Valtteri Niemi. "Cybersecurity Education in Universities : A Comprehensive Guide to Curriculum Development". English. In: *IEEE Access* 12 (May 2024). Publisher Copyright: © 2013 IEEE., pp. 61741–61766. ISSN: 2169-3536. DOI: 10.1109/ACCESS.2024.3392970.