

State of CPI 2022

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Executive Director, CPI



CYBER INSTITUTE
SECURITY
AND **PRIVACY**
UNIVERSITY OF WATERLOO

Cybersecurity and Privacy at UWaterloo

Longstanding tradition of innovation in cybersecurity/privacy

- From the days of Bill Tutte through Certicom, BlackBerry, etc.

Outstanding Expertise in cybersecurity/privacy technologies

Multidisciplinary approach

Outstanding expertise

World-class in cybersecurity/privacy technologies (within top-15 in the world)

#1 in in Canada, by far!

CSRankings: Computer Science Rankings

CSRankings is a metrics-based ranking of top computer science institutions around the world. Click on a triangle (▶) to expand areas or institutions. Click on a name to go to a faculty member's home page. Click on a chart icon (the 📊) after a name or institution) to see the distribution of their publication areas as a . Click on a Google Scholar icon (🔍) to see publications, and click on the DBLP logo (📄) to go to a DBLP entry. Applying to grad school? Read this first. Do you find CSrankings useful? Sponsor CSrankings on GitHub.

Rank institutions in by publications from to

All Areas [off | on]

AI [off | on]

- ▶ Artificial intelligence
- ▶ Computer vision
- ▶ Machine learning & data mining
- ▶ Natural language processing
- ▶ The Web & information retrieval

Systems [off | on]

- ▶ Computer architecture
- ▶ Computer networks
- ▶ Computer security
- ▶ Databases
- ▶ Design automation
- ▶ Embedded & real-time systems
- ▶ High-performance computing
- ▶ Mobile computing
- ▶ Measurement & perf. analysis
- ▶ Operating systems
- ▶ Programming languages

#	Institution	Count	Faculty
1	▶ CISA Helmholtz Center 🇩🇪 📄	55.1	21
2	▶ Georgia Institute of Technology 🇺🇸 📄	38.9	19
3	▶ Carnegie Mellon University 🇺🇸 📄	30.0	19
4	▶ Cornell University 🇺🇸 📄	29.2	15
5	▶ ETH Zurich 🇨🇭 📄	27.2	14
6	▶ Purdue University 🇺🇸 📄	27.1	18
7	▶ Univ. of Illinois at Urbana-Champaign 🇺🇸 📄	26.8	19
8	▶ Northeastern University 🇺🇸 📄	24.4	17
9	▶ University of Maryland - College Park 🇺🇸 📄	22.8	13
10	▶ University of Michigan 🇺🇸 📄	22.4	16
11	▶ Pennsylvania State University 🇺🇸 📄	22.1	16
12	▶ Indiana University 🇺🇸 📄	21.6	10
13	▶ Univ. of California - San Diego 🇺🇸 📄	20.5	24
14	▶ University of Waterloo 🇨🇦 📄	19.6	13
15	▶ TU Darmstadt 🇩🇪 📄	17.6	10

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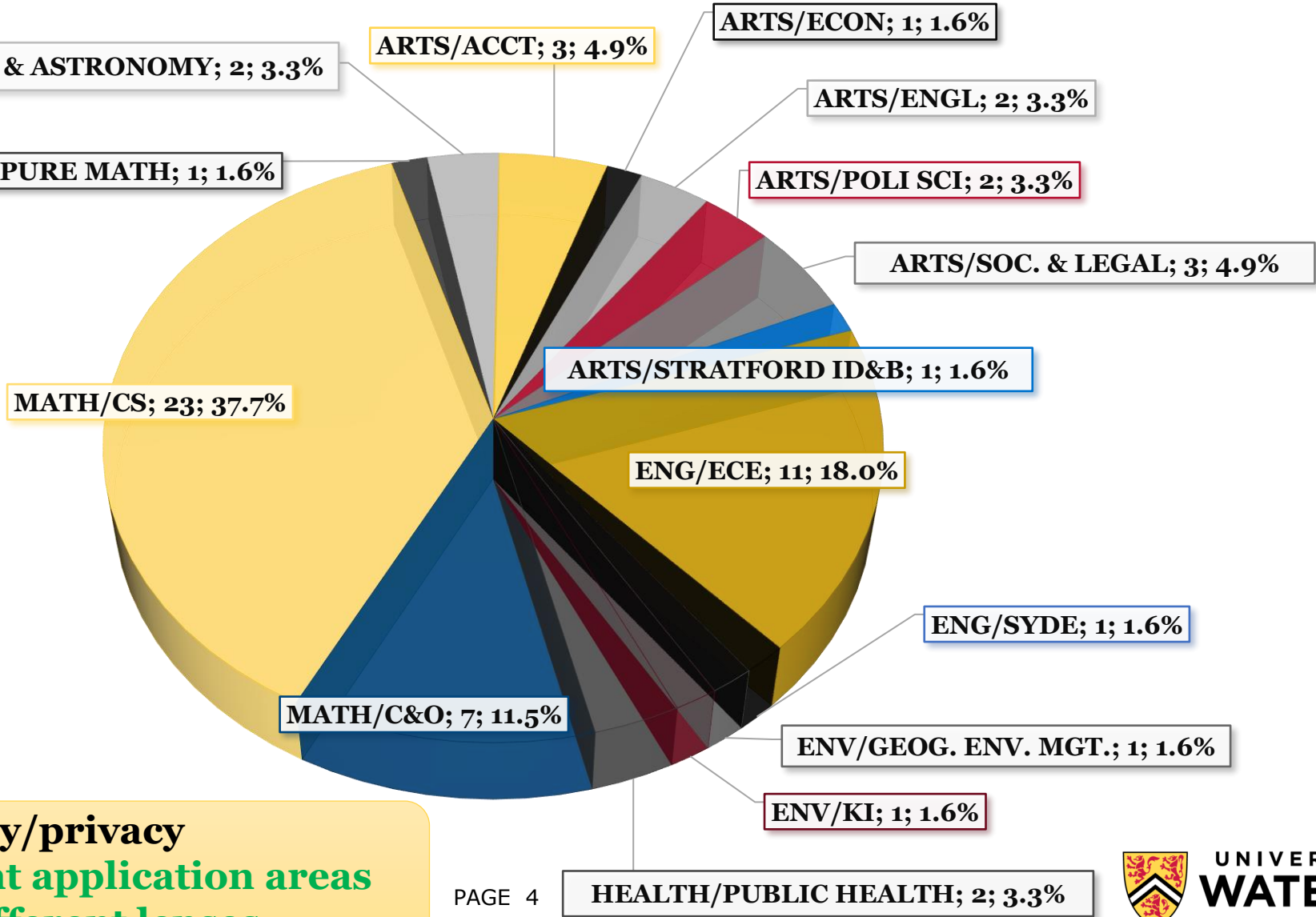
#	Institution	Count	Faculty
1	▶ University of Waterloo 🇨🇦 📄	19.6	13
2	▶ University of Toronto 🇨🇦 📄	5.5	5
3	▶ Carleton University 🇨🇦 📄	4.1	4
4	▶ University of British Columbia 🇨🇦 📄	3.6	7
5	▶ University of Calgary 🇨🇦 📄	3.4	3
6	▶ Simon Fraser University 🇨🇦 📄	3.0	2
7	▶ University of Guelph 🇨🇦 📄	1.4	2
8	▶ McGill University 🇨🇦 📄	1.2	1
8	▶ University of Regina 🇨🇦 📄	1.2	1

Source 2022 csrankings.org

Multidisciplinary Approach

~60 faculty members across all faculties

- ARTS/ACCT
- ARTS/ECON
- ARTS/ENGL
- ARTS/POLI SCI
- ARTS/SOC. & LEGAL
- ARTS/STRATFORD ID&B
- ENG/ECE
- ENG/SYDE
- ENV/GEOG. ENV. MGT.
- ENV/KI
- HEALTH/PUBLIC HEALTH
- MATH/C&O
- MATH/CS
- MATH/PURE MATH



Cybersecurity/privacy
 (a) of different application areas
 (b) through different lenses



CPI Represents cybersecurity/privacy at UWaterloo

Vision

To significantly broaden Waterloo's strength, reputation, and impact in cybersecurity and privacy.

Mission

To facilitate collaborative research, training, and commercialization initiatives in cybersecurity and privacy, across the entire University of Waterloo community and in conjunction with companies, research centres and other institutions, both in Canada and internationally.

CPI Expertise Areas cover a broad spectrum

 Legal & Policy Aspects of Security and Privacy

 Human & Societal Aspects of Security and Privacy

 Data Science Security & Privacy

Privacy Enhancing Technologies



Cryptography



Quantum Safe Comms.



Network Security



Operational Security



 Software, Hardware, & Systems Security

CPI Expertise Areas cover a broad spectrum



Strategic Goals and Objectives: 2018



Extend UWaterloo's Strength and Impact in Cybersecurity and Privacy

Strengthen Existing [Internal] Research Collaborations

Foster External Research Collaborations

Facilitate Applications for Institutional-level Grants and Funding

Increase Visibility of Research and Attract Best New Faculty and HQP

National Cybersecurity Consortium (NCC)

- 2020: **Co-founded by CPI** as a federally incorporated not-for-profit
- 2021: CPI **led** the business development committee of NCC
- 2022: **Named lead recipient** for Cyber Security Innovation Network (**\$80 million**)
- 2023-2026: **NCC funding** of proposals in full swing
- Purpose: Research, Training, and Commercialization



CPI strengthening collaborations

- Expanded to ~60 researchers (+20 members, ~+150 supervised students)
 - Top-15 worldwide: research in technological aspects of cybersecurity/privacy
 - Unique multidisciplinary perspective
- Bootstrapping excellence
 - Seed grant program, scholarships and awards, Chippie cluster
- Several new community-building initiatives
 - CPI Talks, CPI RoundTable Discussions, CPI Spotlight series, mailing lists, websites
- Facilitating external collaborations and institutional level funding



CPI's engagement

Students



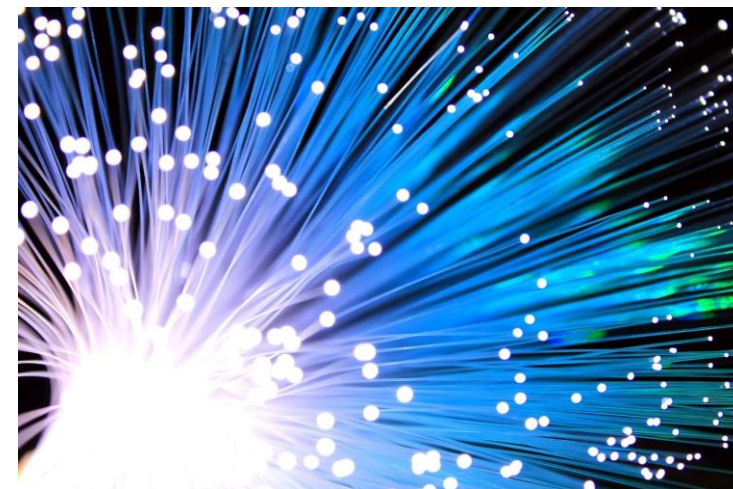
Annual conference, website,
newsletters, mailing lists, social media

Spotlight series, CPI Talks

Scholarships/Awards, Seed Grants,
Chippie Compute Servers

Faculty and Student Advisory
Committees

External



Faculty



RoundTable
Discussions

CPI facilitates grant proposals

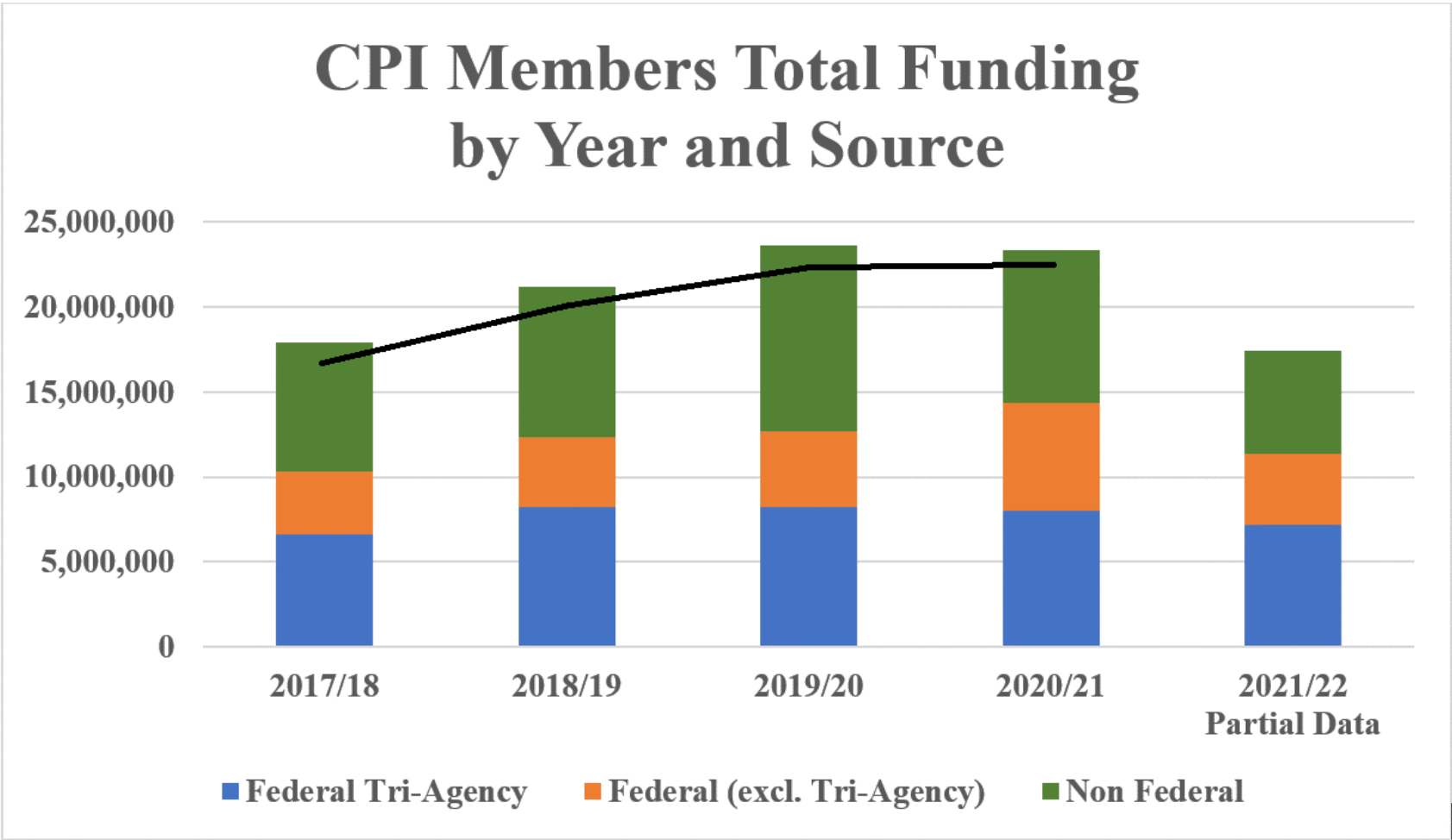
Examples of **CPI-Initiated** grant proposals

- **Raouf Boutaba (MATH/CS)** – DnD IDEaS 5G Micronet, **\$1.5M** ✓: “Faster, Stronger, More Secure: Advancing 5G capabilities and concepts for defence and security”
- **Plinio Morita (Health/SPPHS & ENG/SYDE)** - Mitacs + Region of Waterloo, **\$500,000**: “Distributed ledger for children and youth to access services and data analytics”
- **Guang Gong (ENG/ECE)** – OCI VIP + Fxland, **\$160,000**: “Design and analysis of efficient security layer for Fula decentralized cloud storage ecosystem”

Examples of **CPI-Supported** grant proposals

- **Adam Molnar (ARTS/Soc & Legal)** component of the CFREF proposal
- **Sebastian Fischmeister (ENG/ECE)** DnD IDEaS, **\$230,000** (1a) ✓: “Remaining Vigilant: Identifying Cyber Dependencies, Vulnerabilities and Threats”

CPI members' success at attracting research funding



CPI facilitated CFI, ORF-RI, CRC, and CFREF grants/applications

NCC expected to bring significant grants

Strategic Goals and Objectives: 2018

Examples of progress

Extend UWaterloo's Strength and Impact in Cybersecurity and Privacy

NCC CSIN

Top-15 in cybersecurity/privacy technologies

Unique multidisciplinary approach

Strengthen Existing [Internal] Research Collaborations

Comms revamp (websites, social media, newsletter, et.)

Seed Grants, RoundTable Discussions

Foster External Research Collaborations

Facilitating major industry partnerships (Industry chairs, Targeted projects, Alliance, ORF-RE)

Facilitate Applications for Institutional-level Grants and Funding

Facilitating major grant applications (CFI, CRC, CFREF)

Increase Visibility of Research and Attract Best New Faculty and HQP

+20 new members (~+150 students)

Strategic Directions and Initiatives 2022 - 2027

- 1. Strengthen Engagement with CPI Community**
- 2. Nurture the NCC**
- 3. Facilitate Excellence in Research**
- 4. Facilitate Strengthening & Broadening Training**
- 5. Build Partnerships**
- 6. Influence Public Policy**
- 7. Promote Cybersecurity and Privacy Awareness**

CPI brings unique value to its members and UWaterloo

Leverages UWaterloo's cybersecurity/privacy expertise towards larger goals

- Example: UWaterloo's role in the success of National Cybersecurity Consortium

Facilitates cybersecurity/privacy research and training at UWaterloo

- Seed grants, Student scholarships/awards, new training initiatives

Promotes UWaterloo's cybersecurity/privacy strengths

- CPI Talks, Spotlight articles, newsletters, mailing lists, social media

 [Draft Progress and Renewal Report at the CPI Internal Website \(UWaterloo login required\)](#)

CPI 2022 Annual Conference

Twin themes:

(1) The Talent Gap and (2) Data Collection & Effective Public Policy

- Panels featuring academics and practitioners (from industry, public sector)

Talks

- **Industry experts:** Neil Desai, Magnet Forensics; Andrew Walenstein, BlackBerry
- **CPI experts:** Diogo Barradas, MATH/CS; Guang Gong ENG/ECE
- **Invited academic expert:** Ninghui Li, CERIAS/Purdue

Panel on NCC: featuring NCC Directors

Poster session