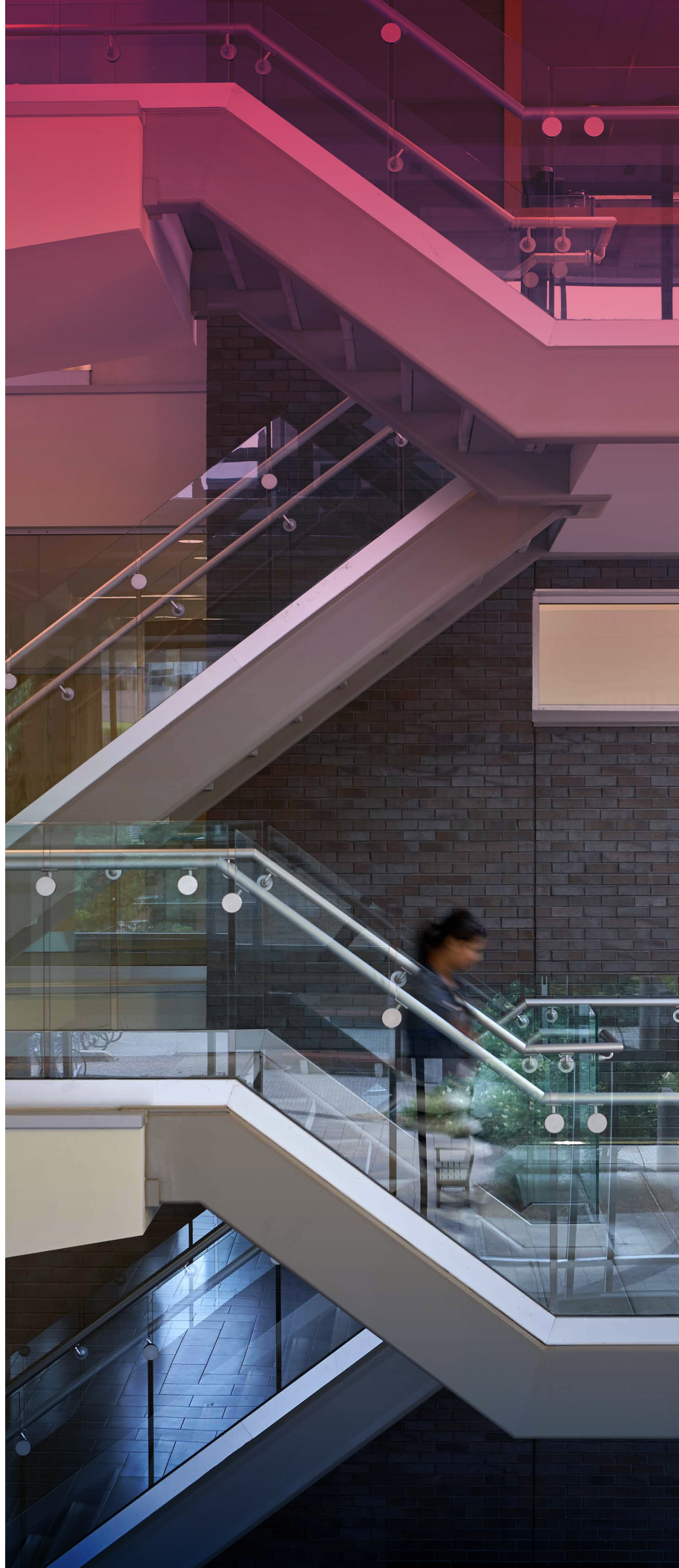


# ANNUAL REPORT 2020

CENTRE FOR INFORMATION INTEGRITY AND  
INFORMATION SYSTEMS ASSURANCE

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# MISSION

The mission of the University of Waterloo Centre for Information Integrity and Information Systems Assurance (UW CISA) is to identify, address and communicate issues related to the impact of current and emerging technologies on both information integrity and information systems assurance. Focusing on these issues, UW CISA promotes and supports:

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## RESEARCH

Investigative projects on professional, social, economic and behavioural impacts;



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## EDUCATION AND KNOWLEDGE TRANSFER

Creation, marketing and delivery of innovative informing activities and materials; and

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## INTERACTION

Dialogue among practitioners, educators, students and other interested parties.





# BACKGROUND

**The University of Waterloo is a leading university in Canada and is well known for its information technology related research, teaching and entrepreneurship. The School of Accounting and Finance (SAF) is one of Canada’s leading academic units in the accounting and finance fields and has both a Canada-wide and international reputation.**

The SAF is a strong supporter of the information integrity and information systems assurance fields, as demonstrated by its leading courses and programs in these areas and related research they have spawned. For information please visit: [uwaterloo.ca/school-of-accounting-and-finance](http://uwaterloo.ca/school-of-accounting-and-finance).

UW CISA was founded in 1998 by the School of Accounting and Finance at the University of Waterloo. The founding sponsors were the Chartered Professional Accountants of Canada (CPA Canada) and the Information Systems Audit and Control Association (ISACA).<sup>1</sup> IIA Canada joined the sponsor group on July 1, 2018. The sponsors’ objectives continue to include: (1) improving the quality of education and research in information integrity and information systems assurance; and (2) fostering a close and continuing working relationship between the SAF, the sponsors and other partners with an interest in information integrity and information systems assurance. UW CISA is an administrative sub-unit within the Centre of Accounting Research and Education (CARE), at the University of Waterloo.

<sup>1</sup>The following name changes have taken place since the founding of UW CISA. ISACA replaced Information Systems Audit and Control Association on January 1, 2006. The School of Accounting and Finance replaced The School of Accountancy on November 19, 2007. Chartered Professional Accountants of Canada (CPA Canada) replaced Canadian Institute of Chartered Accountants (CICA) on April 1, 2013. UW CISA was renamed from the Centre for Information Systems Assurance to the Centre for Information Integrity and Information Systems Assurance in 2008 (retaining the acronym UW CISA) in recognition of the need to broaden UW CISA’s mandate and activities beyond systems assurance to information integrity.

# A NOTE FROM THE DIRECTOR



To the Board of Directors:

After a very challenging year, I am pleased to present this report on the operations and activities of the UW CISA during 2020, our twenty-third year of operation.

This year marks the second year in a three-year plan approved by UW CISA's sponsors for the period 2019–2021, inclusive.

During the year, we continued our thought leadership role through service on the Association of International Certified Public Accountants (AICPA) Trust Services Information Integrity and Cybersecurity Task Forces. We started major projects on assurance innovation and internal audit competencies and continued our research activities related to data analytics, blockchain, business model and business process documentation, cybersecurity, data quality and information integrity, IT governance, risk and internal control, machine learning, mobile computing and social networks, and use of specialists in auditing. During the year, we presented our research at a number of conferences resulting in a number of publications, as detailed in this report. Our work in progress includes projects addressing IT governance, risk and internal control, cybersecurity, machine learning, AI and robotics, information integrity, business model representation for extended external reporting, and data analytics and visualization.

During the year we held an extremely successful online professional development (PD) session on Robotic Process Automation (RPA), co-sponsored

by the Accounting Information Systems (AIS) section of the American Accounting Association (AAA) and the UW CISA. We are planning to expand our PD offerings in the areas of data value creation and measurement, data/text analytics and machine learning, cybersecurity reporting and assurance, data integrity criteria and assurance, and blockchain and crypto assets during the coming year.

We continue to work with other Centres with similar purposes, strengthening an international network for mutual support of our respective missions. We are members of the University of Waterloo's Cybersecurity and Privacy Institute (CPI) and Waterloo.AI. We also expanded our relationship with the Institute of Internal Auditors Canada (IIA Canada). Theophanis (Theo) Stratopoulos and I began a three-year stint as senior editors of the American Accounting Association's *Journal of Information Systems* (JIS). We have also started planning for our 12th Biennial Research Symposium on Information Integrity and Information Systems Assurance, to be held virtually October 14-16, 2021.

We continue to welcome new partners to share in our mission. I thank UW CISA's Board members and sponsors for their continued support and look forward to another productive year.

A handwritten signature in black ink, appearing to read 'J.E. Boritz', written in a cursive style.

DR. J.E. BORITZ, FCPA, FCA, CISA  
EXECUTIVE DIRECTOR

# RESEARCH

## THOUGHT LEADERSHIP

UW CISA provided thought leadership in several areas during 2020.

### ASSURANCE INNOVATION

*Assurance Solutions and Services: Current and Future Opportunities.* Research team is Tim Bauer, Efrim Boritz, Alec Cram, Krista Fiolleau, Brad Pomeroy, Adam Vitalis and Pei Wang. The objective is to research the marketplace of assurance services and solutions currently being offered by CPA firms and non-CPA firms.



TIM BAUER



ALEC CRAM



KRISTA FIOLLEAU



BRAD POMEROY



ADAM VITALIS



PEI WANG



VEENA BROWN

### AUDIT QUALITY

#### *Mandatory Disclosure of Engagement Partner Identity: Insights from Practice.*

Research team is Veena Brown, University of Wisconsin, Jodi Gissel, University of Wisconsin and Adam Vitalis. The object is to examine the effects of new mandates that require public identification of audit engagement partners in the U.S. and Canada on audit quality and on partners' perceptions of accountability. This paper was presented at the Canadian Academic Accounting Association (CAAA) Annual Conference, June 3-5, 2020



JODI GISSEL



ADAM VITALIS

and is being prepared for publication.

### BIG DATA/DATA ANALYTICS

*Addressing Anomalies in Audit Data Analytics.* Research team is Efrim Boritz, Greg Shields and Adam Vitalis. The objective is to investigate how auditors assess which anomalies to investigate in an audit data analytics context.



GREG SHIELDS

### BLOCKCHAIN

*Blockchain Technology Adoption.* Research team is Theo Stratopoulos, Xiaoqi (Victor) Wang and Hua (Jonathan) Ye. The objective is to leverage textual information from firm disclosures to predict blockchain technology adoption. The paper was presented at the Blockchain Technology Symposium, The Fields Institute, Toronto, ON, September 2018; the Mediterranean Conference on Information Systems, Corfu, GR, September 2018; and the American Accounting Association (AAA) AIS Midyear Meeting in San Antonio, TX, January 2019. This paper is forthcoming in *Accounting Horizons*.



THEO STRATOPOULOS



XIAOQI (VICTOR) WANG



JESÚS CALDERÓN

*What Accountants Need to Know About Blockchain.* Research team is Jesús Calderón and Theo Stratopoulos. The objective of this paper is to provide a working example of a blockchain

implementation that would help accounting professionals understand the way blockchain works in a business setting. Building on evidence indicating that the most promising use cases are from the logistics industry, we use a supply-chain based scenario of blockchain implementation. The paper was published in *Accounting Perspectives*, 19(4), 2020.

### BUSINESS RISK ASSESSMENT

#### *Business Models and Business Model Descriptions: A Research Synthesis.*

Research team is Efrim Boritz, Louise Hayes, University of Guelph and Giselle Durand, Wilfrid Laurier University. This paper addresses a series of research questions aimed at exploring the nature of business models and business model descriptions to better understand how they are and can be used in accounting and auditing. It was presented at the AAA Annual Meeting in New York, NY, August 2016 and the ISAIS in Valencia, ES, May 2017. This paper was presented at the AAA SET Midyear Meeting in Orlando, FL, January 23-25, 2020 and is being prepared for journal resubmission.



LOUISE HAYES

### CYBERSECURITY

#### *Factors Affecting Individuals' and Susceptibility to Cyber Attacks.*

Research team is Efrim Boritz, Chan (Jessie) Ge and Katharine Elizabeth (Kate) Patterson. The objective is to explore personality traits related to susceptibility to cyberattacks. This paper was presented at the International Symposium on Accounting Information Systems (ISAIS) held at Michigan State University, East Lansing, MI, June 2019 where it received the best paper award. The paper is under review at the *Journal of Information Systems*.



CHAN (JESSIE) GE



HE (STANLEY) LI

***Are External Auditors Concerned about Cyber Incidents? Evidence from Audit Fees.***

Research team is He (Stanley) Li, Southwestern University of Finance and Economics, CN, Won Gyun No, Rutgers University, and Efrim Boritz. The objective is to explore issues related to cybersecurity with relevance to risk management, internal control, and assurance. This paper was presented at AAA Midyear Meetings of the

Auditing Section and AIS/SET Section in Orlando, FL, January 2017; Monash University in Melbourne, AU, March 2017; and at the ISAIS held in Valencia, ES, May 2017. This paper was published in *Auditing: A Journal of Practice & Theory*, 39(1), 2020.



WON GYUN NO



KATE PATTERSON

***How Reliable are the Hurtt Professional Skepticism Scale and Rotter Interpersonal Trust Scale for Audit Experimental Research?***

Research team is Efrim Boritz, Kate Patterson, Kristian Rotaru, Monash University, and Carla Wilkin, Monash University. The objective is to compare the results obtained from two well accepted scales that have been designed to measure stable personality traits – the Hurtt Professional Skepticism Scale (HPSS) and the Rotter Interpersonal Trust Scale (RITS). This paper was presented



KRISTIAN ROTARU



CARLA WILKIN

at the AAA Auditing Section Midyear Meeting, Portland, OR, January 2018; the Annual Congress of the European Accounting Association (EAA) Conference, Milan, IT, May 2018; the CAAA Annual Conference, Calgary, AB, June 2018; and the AAA Annual Conference, Washington, DC, August 2018. Additional data is being collected and the paper is being revised.

***Neuro-Cognitive Measures of Professional Skepticism.***

Research team is Efrim Boritz, Kristian Rotaru, Kate Patterson and Carla Wilkin. The objective is to examine the moderating role of neurocognitive measures such as risk-taking propensity, cognitive (inhibitory) control and social cognition during the decision-making process to

reveal the impact of these neurocognitive traits on professional skepticism during individual decision-making processes associated with audit risk judgments. This paper was presented at the Annual Congress of the EAA Conference in Paphos, CY, May 2019. New data is being analyzed and the paper is being revised.

***Neuro-Physiological Measures of Professional Skepticism.***

Research team is Efrim Boritz, Kristian Rotaru, Kate Patterson and Carla Wilkin. The objective is to examine the mediating role of neurophysiological measures commonly associated with the degree of cognitive and/or emotional arousal experienced during the decision-making process to reveal the mechanism through which professional skepticism affects individual decision-making processes associated with audit risk judgments. This paper was presented at the AAA Annual Conference, San Francisco, CA, August 2019. Currently, additional data is being analyzed.

***Cybersecurity Fatigue.*** Research team is Alec Cram, Jeffrey Proudfoot, Bentley University and John D’Arcy, University of Delaware. The objective is to understand how employees become tired and disillusioned with security-related initiatives in organizations. A paper from this project is forthcoming in *Information Systems Journal* (ISJ). Currently, data collected in November 2020 is being analyzed.



ALEC CRAM



JEFFREY PROUDFOOT



JOHN D'ARCY

***Cybersecurity Policy Compliance.***

Research team is Alec Cram, John D’Arcy and Jeffrey Proudfoot. The objective is to clarify the drivers of employee compliance with cybersecurity policies. The project includes a paper presented at the 50th Hawaii International Conference on System Sciences, Waikoloa, HI, January 2017; a paper published in the *European Journal of Information Systems*, June 2017; and a paper published in *MIS Quarterly*, June 2019. Alec Cram was interviewed for Cybercrimeology podcast (E18) published July 15, 2020 and another paper Maximizing Employee Compliance with Cybersecurity Policies was published in *MIS Quarterly Executive*, 19 (3), 2020.

*Cybersecurity Research in Accounting Information Systems*. Research team is Alec Cram and Tawei (David) Wang, DePaul University. The objective is to uncover the unique insights that AIS research has contributed to the study of cybersecurity and what promising directions for AIS research into cybersecurity remain untapped. A literature review was performed, covering 56 articles published in 11 AIS-oriented journals and a paper is currently under review at *Journal of Emerging Technologies in Accounting*.

### COVID-19



**BIN (BETTY) XING**

#### *Does the Accounting Information of COVID-19 Disclosures Matter?*

Research team is Theo Stratopoulos, Xiaoqi (Victor) Wang and Bin (Betty) Xing, Baylor University. The objective is to analyze firm reactions in the first

quarter (January–March) of 2020, as they are manifested in firm disclosures and the value of accounting information, in a setting where there was no prior disclosures to follow, nor, guidance from the Security and Exchange Committee (SEC). This paper has been accepted for presentation at the joint Midyear Meeting of the AIS and SET, February 4–6, 2021 and is being prepared for journal submission.

### DATA QUALITY



**EFRIM BORITZ**

#### *How Significant are the Differences in Financial Data Provided by Key Data Sources? A Comparison of XBRL, Compustat, Yahoo! Finance, and Google Finance.*

Research team is Efrim Boritz and Won Gyun No, Rutgers University. This paper was presented at the 25th XBRL International Conference in Yokohama, JP, November 2012; the AAA IS Section Midyear Meeting in Ft. Lauderdale, FL, January 2013; the 26th XBRL International Conference in

Dublin, IE, April 2013; and the AAA Annual Meeting in Anaheim, CA, August 2013. It was on SSRN's top download list for several months in the spring and summer of 2013. This paper was published in the *Journal of Information Systems*, 34(3), 2020.



**WON GYUN NO**

### EXTENDED EXTERNAL REPORTING

#### *Communicating Value Creation in Integrated Reporting.*

Research lead is Efrim Boritz. The objective is to review and evaluate the presentation of value creation information in integrated reports. This project is in pilot testing.

### INFORMATION INTEGRITY



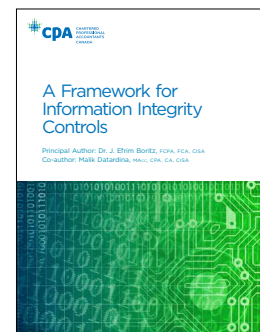
**MALIK DATARDINA**

#### *Information Integrity Control*

*Guidelines*. Project team is Efrim Boritz and Malik Datardina, Avenir. The objectives are to: 1) define information integrity and to identify information integrity risks and controls for

mitigating those risks; 2) define assurance practices for information integrity services; 3) interview or survey audit team members about their views on information integrity risks, controls and assurance practices. Funding is being provided by CPA Canada.

*The Framework for Information Integrity Controls* was published by CPA Canada in April, 2019. In addition, the Executive Director assisted the AICPA to develop forthcoming guidelines.



### INTERNAL AUDIT COMPETENCIES



**ADAM VITALIS**

Research team is Adam Vitalis,

Efrim Boritz and Laura Simeoni with assistance from the University of Waterloo Survey Research Centre.

The objective is to research the current and future competency requirements for internal audit professionals and to envision curriculum requirements for developing entry level career opportunities in this field.



**LAURA SIMEONI**

## IT BUDGETS



DUANE KENNEDY

***Does Industry Classification Matter? Evidence from IT Budgets.*** Research team is Duane Kennedy, Kevin Kobelsky, University of Michigan-Dearborn, Byron Song, Hong Kong Baptist University and Theo

Stratopoulos. The objective is to discover if the industry classification and/or the level of aggregation within a selected classification matter. Empirical studies tend to control for industry structure using proxies from one of the common industry classifications (e.g., SIC, Fama-French, NAICS) and select a level of aggregation within this classification (e.g., SIC2 or SIC3). Given these choices are not justified, one could assume that they do not seem to matter. The paper was presented at the CAAA Annual Meeting, June 3-5, 2020.

## IT GOVERNANCE, RISK AND INTERNAL CONTROL



LOUISE HAYES

***Understandability of Auditors' Internal Control Reports.*** Research Team is Efrim Boritz, Louise Hayes, University of Guelph and Lev Timoshenko, University of Calgary. The objective is to evaluate information content of SOX 404 internal control reports. This paper was presented at the AAA Annual Meeting in Atlanta, GA, August 2014; the AAA Annual Meeting in Chicago, IL, August 2015; the World Banking

and Finance Conference in Hanoi, VN, December 2015; the AAA Annual Meeting in New York, NY, August 2016; and as an invited presentation at Monash University, AU, April 2018. This paper was published in the *International Journal of Accounting Information Systems*, Vol.39 (December), 2020.



LEV TIMOSHENKO



MARTIN WIENER

***Technology-mediated Control.*** Research team is Alec Cram, Martin Wiener, George Mason University and Alexander Benlian, Technische Universität Darmstadt. The objective is to better understand how digital technologies are used to influence workers to behave in a manner consistent with organizational objectives. The project includes a paper presented at the 23rd Americas

Conference on Information Systems in Boston, MA, August 2017; a paper presented at the 5th International Conference on the Outsourcing of Information Services in Mannheim, Germany, June 2019; a paper published in the *Communications of the Association of Information Systems*, Vol.46, 2020; and a paper presented at the International Conference on Information Systems, December 13-16, 2020.



MAGNUS MÄHRING

***Senior IT Executive Control of Information Systems Projects.***

Research team is Alec Cram, Martin Wiener, Ulrich Remus, University of Innsbruck and Magnus Mähring, Stockholm School of Economics. The objective is to understand how senior IT executives control complex information systems projects under high levels of uncertainty. The project includes a paper that was presented at the 25th European Conference on Information Systems, Guimarães, PT, June 2017. As well, a paper is under review at *Information & Management*.

***A Framework for Predicting Emerging Technology Adoption.*** Research team is Theo Stratopoulos and Hua (Jonathan) Ye. The objective of this study is to develop a framework for predicting technology diffusion and expected duration of competitive advantage for the average adopting firm. The paper is currently under review at *International Journal of Accounting Information Systems*.

## MACHINE LEARNING, AI AND ROBOTICS



LOUISE HAYES

*Classifying Restatements: An Application of Machine Learning and Textual Analysis.* Research team is Louise Hayes, University of Guelph and Efrim Boritz. The objective is to explore uses of machine learning technologies with applications to accounting and auditing. This paper was presented at the AAA Annual Conference in New York, NY, August 2016; the AAA Midyear Meeting in Orlando, FL, January 2017; the EAA

Conference in Valencia, ES, May 2017; and the World Banking and Finance Conference in Sardinia, IT, July 2017. An updated version of this paper was presented at St. Mary's University on Nov 19, 2020 and has been accepted for presentation at the Midyear AIS/SET conference Feb 4-6, 2021. This paper is forthcoming in the *Journal of Information Systems*.

*Do Differences in CFO Background Matter to Financial Statement Quality? An Application of Machine Learning and Textual Analytics.* Research team is Louise Hayes and Efrim Boritz. The objective is to explore uses of machine learning technologies with applications to accounting and auditing. This paper was presented at the CAAA Annual Conference in Montréal, QC, June 2017; the AAA Annual Meeting in San Diego, CA, August 2017; the EAA Annual Conference in Milan, IT, May 2018 and the Future of Accounting Symposium CPA Ontario Centre for Public Policy, Goodman School of Business, Brock University, February 21, 2020. This paper is being revised.

## MOBILITY

*Value Co-creation for Service Innovation: Examining the Relationships between Service Innovativeness, Customer Participation, and Mobile App Performance.* Research team is Hua (Jonathan) Ye and Atreyi Kankanhalli, National University of Singapore. This paper was published in the *Journal of the Association for Information Systems*, 21(2), 2020.



HUA (JONATHAN) YE



ATREYI KANKANHALLI

## SOCIAL MEDIA

*Content Commercialization on Social Media Platforms: Exploring the Viewership of Paid Q&A.* Research Team is Hua (Jonathan) Ye, Xueping Yang, Auckland University, Xinwei Wang, Auckland University and Theo Stratopoulos. The objective of this study is to enlighten content providers and platform organizations on how to facilitate individual users to commercialize content for profits. This paper was presented at the AAA AIS Midyear Meeting in San Antonio, TX, January 2019 and is being revised for resubmission to the *Journal of Management Information Systems*.

*Using Gamification Elements for Competitive Crowdsourcing: Exploring the Underlying Mechanism.* Research Team is Congcong Yang, Dongguan University of Technology, Hua (Jonathan) Ye and Yuanyue Feng, Shenzhen University. This paper was published in *Behaviour and Information Technology*, February, 2020.

## USE OF SPECIALISTS IN AUDITING



NATALIA KOCHETOVA

*Auditors' and Specialists' Views about the Use of Specialists during an Audit.* Research team is Efrim Boritz, Natalia Kochetova, St. Mary's University, Linda Robinson and Chris Wong, Wilfrid Laurier University. The objective is to describe current practices in using specialists in the audit. This paper was presented at the CAAA Annual Conference in Edmonton, AB, May 2014; the AAA Auditing Section Midyear Meeting in Miami, FL, January 2015; the EAA Annual Conference in Glasgow, UK, April 2015; the Public Company Accounting Oversight Board (PCAOB) Standards Advisory Group



LINDA ROBINSON



CHRIS WONG

Meeting in Washington, DC, June 2015; and the International Symposium on Audit Research (ISAR) in Boston, MA, June 2015. This paper was published in *Behavioral Research in Accounting*, 32(2), 2020.

*Improving Specialists' Contributions to Audits of Fair Values.* Research team is Tim Bauer, Cassandra Estep, Emory University and Emily Griffith, University of Wisconsin-Madison. The objective is to examine how to motivate specialists to deliver high quality work and communication to auditors even in situations where specialists may otherwise feel coerced or compelled to contribute in a limited fashion. This paper was expanded to include data collected from valuation specialists. This was completed in December 2020. Further analysis is planned.



TIM BAUER



CASSANDRA ESTEP



EMILY GRIFFITH

**We welcome new partners to help us achieve UW CISA's mission.**

## FELLOWSHIPS AND SCHOLARSHIPS

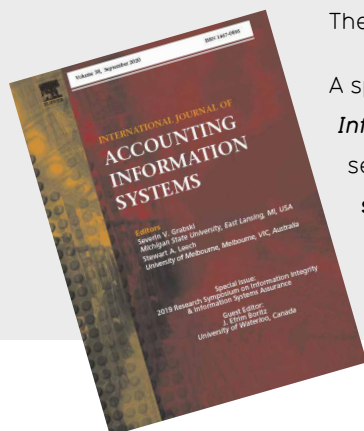
UW CISA makes funds available for Visiting Fellows and doctoral students. Our next fellow will be announced post-pandemic. Interested applicants should contact the Executive Director.

## SPONSORING RESEARCH SYMPOSIUM

### Information Integrity and Information Systems Assurance Symposium

The Symposium is held every two years. The 11th Biennial Research Symposium was held October 24-26, 2019 at the Marriott Downtown at CF Toronto Eaton Centre Hotel, 525 Bay St., Toronto, Canada. The symposium was sponsored by the University of Waterloo, CPA Canada, ISACA Toronto Chapter, IIA Canada, Richter LLP, CaseWare Analytics IDEA, the Canadian Academic Accounting Association, and the *International Journal of Accounting Information Systems*. The next symposium will be held in October 2021.

A special issue of the *International Journal of Accounting Information Systems* was published in September 2020, containing selected papers from UW CISA's 2019 Symposium, available at: [sciencedirect.com/journal/international-journal-of-accounting-information-systems/vol/38/suppl/C](https://www.sciencedirect.com/journal/international-journal-of-accounting-information-systems/vol/38/suppl/C).





# EDUCATION AND KNOWLEDGE TRANSFER

## DEVELOPING COURSES, WORKSHOPS, CASES AND OTHER TEACHING MATERIAL

### COURSES

#### BLOCKCHAIN

“Teaching Block Chain to Accounting Students” by Theo Stratopoulos was published in the *Journal of Emerging Technologies in Accounting*, Vol 17(2), 2020. The objective of these teaching notes is to provide an outline for offering blockchain related foundational knowledge to accounting students, so they can evaluate and prepare for the effect of blockchain on the accounting profession.

#### CYBERSECURITY

Led by Alec Cram, Malik Datardina and Won Gyun No of Rutgers University are developing an online course that will cover cybersecurity risk management and controls.

#### INTERNAL AUDIT COMPETENCIES

Adam Vitalis is developing an internal audit course with the assistance of an advisory committee with representatives of IIA Canada and the Toronto Chapter of the IIA.

#### IT CONTROLS AND ASSURANCE

Under the leadership of Malik Datardina of Avenir, UW CISA sponsored the development and implementation of a course on technology, assurance and innovation. The

course covers core concepts of IT control and assurance and also explores technologies; such as, the Internet of Things (IoT), blockchain and AI.

#### IT LAW

Under the leadership of Darren Charters, UW CISA sponsored the development and implementation of a course in IT Law.

#### DATA ANALYTICS AND VISUALIZATION

Under the leadership of Theo Stratopoulos, UW CISA sponsored the development and implementation of a Data Analytics & Emerging Technologies (DA&T) curriculum within the accounting program at the University of Waterloo. In addition to pre-requisite foundation courses in Statistics, Business Systems and Accounting Information Systems, the program includes the following courses: Introduction to Data Analytics and Visualization; Intermediate Data Analytics and Visualization; Data Analytics for Assurance and Fraud Detection. For more information please visit:

[uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/education-and-knowledge-transfer](https://uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/education-and-knowledge-transfer)

## MENTORSHIP

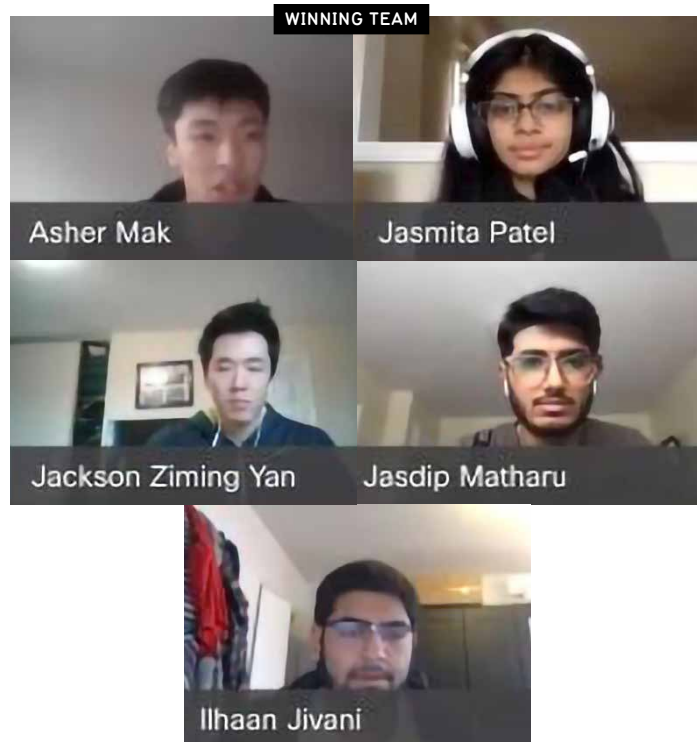
Sponsored by ISACA, Toronto Chapter, UW CISA created the PhD & Academic Career in Audit, Assurance, Accounting Information Systems (AIS), or Enterprise Risk Management (ERM) Mentorship Program. Its purpose is to provide UW undergraduate and MAcc School of Accounting and Finance students who are interested in pursuing a PhD with an opportunity to learn more about an academic career in audit, assurance, accounting information systems (AIS), or enterprise risk management (ERM). Specifically, the program will expose students to the research and teaching responsibilities of accounting professors in one (or more) of these areas and provide students with valuable information about benefits and costs of pursuing a PhD in the applicable area(s). For more information please visit:

[uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/scholarships-fellowships-awards/phd-academic-career-audit-assurance-accounting-information](https://uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/scholarships-fellowships-awards/phd-academic-career-audit-assurance-accounting-information)

## INTERACTIVE BUSINESS DASHBOARD COMPETITION

Approximately 400 first year students from the School of Accounting and Finance (SAF) at the University of Waterloo, organized in 82 crews/teams, competed in the inaugural interactive performance dashboard competition. The competition was co-sponsored by ISACA Toronto Chapter. Crews had to develop an interactive business dashboard for a wine and liquor retailer. The main objective of the dashboard was to enable store managers to drill down and understand the effect of the lockdown on the relative performance of their store. All teams started with the same data set, which had daily sales transactions from 12 stores for March 2018, March 2019, and March 2020. The winners of the competition shared the top prize of \$500.00. Congratulations to: Ilhaan Jivani, Asher Jing Fei Mak, Jasdip Singh Matharu, Jasmita Patel, and Jackson Yan. Information about other Top 5 teams is available on the UW CISA website at:

[uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/scholarships-fellowships-awards/interactive-business-dashboard-competition](https://uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/scholarships-fellowships-awards/interactive-business-dashboard-competition)



## WORKSHOPS AND PRESENTATIONS



UW CISA co-sponsored a virtual JIS workshop on Robotic Process Automation on September 25, 2020. The aim of this workshop was to bring together Accounting Information Systems (AIS) researchers, representatives from leading RPA product and service providers, RPA users and practitioners working with or considering working with RPA, to have a conversation on RPA related challenges and research opportunities. Industry and academic panelists were involved.



### INDUSTRY PANEL:

- › Tony Abel, Managing Director at Protiviti  
[www.protiviti.com/CA-en/tony-abel](http://www.protiviti.com/CA-en/tony-abel)
- › Kashif Mahbub, VP Product Marketing at Automation Anywhere  
[www.linkedin.com/in/kmahbub/](http://www.linkedin.com/in/kmahbub/)
- › Tran Nguyen, Senior Manager, Digital Transformation Technologist at Adobe  
[www.linkedin.com/in/tran-nguyen-86648932/](http://www.linkedin.com/in/tran-nguyen-86648932/)
- › Jacob Summers, Data Automation Associate at PwC  
[www.linkedin.com/in/jacob-summers-535999122/](http://www.linkedin.com/in/jacob-summers-535999122/)



### ACADEMIC PANEL:

- › Dan O'Leary, University of Southern California  
[www.marshall.usc.edu/personnel/daniel-oleary](http://www.marshall.usc.edu/personnel/daniel-oleary)
- › Ralf Plattfaut, South Westphalia University of Applied Sciences  
[www4.fh-swf.de/de/home/ueber\\_uns/standorte/so\\_fb\\_eet/doz\\_eet/profs\\_eet/plattfaut/Index.php#](http://www4.fh-swf.de/de/home/ueber_uns/standorte/so_fb_eet/doz_eet/profs_eet/plattfaut/Index.php#)
- › David Wood, Brigham Young University  
<https://marriottschool.byu.edu/directory/details?id=1076>
- › Abigail Zhang, Rutgers  
[www.ifac.org/who-we-are/leadership/abigail-zhang](http://www.ifac.org/who-we-are/leadership/abigail-zhang)



Behram Farooq, Director, Academic Relations & Research, ISACA Toronto Chapter presented two lectures on Edge Computing on June 30, 2020 and Quantum Computing: A basic introduction on October 1, 2020.



BEHRAM FAROOGH

Efrim Boritz presented Criteria for Assessing and Reporting on Data/Information Integrity at the Annual Audit, Risk and Governance Opportunities, Challenges and Way Forward Conference of the Associated Chambers of Commerce and Industry of India (ASSOCHAM), October 27-28, 2020.



EFRIM BORITZ

Malik Datardina presented Data Tsunami or Data Trickle: How do we deal with data deluges and the data deficits? at both the AICPA Engage Virtual Conference, September 21 and to ISACA Toronto Chapter, November 25, 2020.



MALIK DATARDINA

Andrew Bauer presented How does non-GAAP reporting alter the incentives to manage GAAP earnings? a workshop held virtually by Hong Kong University, December 9, 2020.



ANDREW BAUER

## SHARING MATERIAL WITH OTHER EDUCATORS

A variety of materials is available for use by academics and practitioners. For information, please contact the Executive Director.



# INTERACTION

## ALLIANCES AND RELATIONSHIPS

As part of its mission to interact with academe and practice, UW CISA seeks to create and sustain relationships with academic units with similar objectives and professional associations with an interest in information integrity and information systems assurance. We have joined the University of Waterloo's Cybersecurity and Privacy Institute (CPI) and Waterloo.AI.

**During the year, UW CISA supported the following activities:**

### AICPA

- › Efrim Boritz is a member of the AICPA's Trust Services Information Integrity Task Force and Cybersecurity Assurance Task Force.

### AIS

- › Alec Cram is a member of the Association for Information Systems Curated Collections Task Force and President-Elect for the Special Interest Group for Accounting Information Systems (SIG-ASYS).

### CPA CANADA

- › Tim Bauer is a member of the Audit Evidence Advisory Group, a group commissioned by and assisting with CPA Canada's Auditing and Assurance Standards Board and CPA Canada's Value Creation Working Group.
- › Malik Datardina is a member of CPA Canada's Audit Data Analytics Committee, Technology Advisory Committee, and Audit and Assurance Technology Committee.
- › Louise Hayes is a member of CPA Canada's Audit and Assurance Technology Committee.
- › Theo Stratopoulos is a member of CPA Canada's Audit Data Analytics Task Force.

### IIA

- › Adam Vitalis is our liaison with IIA and is leading the Centre's initiative in assisting the School of Accounting and Finance to maintain its accredited program under the IIA's IAEP (Internal Audit Education Program). Adam and Tim Bauer are updating course offerings to continue this initiative.

# DISSEMINATING BEST PRACTICES

## CONFERENCES

Centre personnel made presentations at a number of conferences during 2020:

- › AICPA Engage Virtual Conference
- › American Accounting Association (AAA) Accounting Information Systems (AIS) Section Midyear Meeting
- › AAA Auditing Section Midyear Meeting
- › AAA Strategic and Emerging Technologies (SET) Section Midyear Meeting
- › Canadian Academic Accounting Association (CAAA) Annual Conference
- › Conference of the Associated Chambers of Commerce and Industry of India (ASSOCHAM)
- › European Conference on Information Systems (ECIS), AIS Virtual Conference Series
- › Future of Accounting Symposium CPA Ontario Centre for Public Policy
- › International Conference on Information Systems (ICIS), AIS Virtual Conference Series
- › University of Strathclyde and University of Waterloo Virtual Research Colloquium

# COMMUNICATION

## WEBSITE AND SOCIAL MEDIA OUTREACH

UW CISA's website, [uwaterloo.ca/uwaterloo-centre-for-information-system-assurance](http://uwaterloo.ca/uwaterloo-centre-for-information-system-assurance), serves as UW CISA's portal. It includes calls for papers and research proposals, a resources section, a number of links and downloadables, and the IS Assurance blog.

UW CISA's most current Annual Report is posted to the website and summarizes the current year's activities. The reports are disseminated both electronically and in hardcopy formats. Past reports can be requested online at: [uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/annual-reports/request-annual-report](http://uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/annual-reports/request-annual-report).

Our website is linked to key social networks such as Facebook, LinkedIn, YouTube and Twitter. These social networks give us an opportunity to share information (like the flyer for the Symposium) with people who would not normally be closely tied to our Centre.

## IS ASSURANCE WEBLOG

Malik Datardina maintains our blog at: [UWCISA-assurance.blogspot.com](http://UWCISA-assurance.blogspot.com).

## UW CISA BOARD

During 2020 we welcomed to our Board of Directors: Alec Cram, UW SAF Assistant Professor; Paul Forgues, Executive Director, IIA Canada; Yasmine Hakimpour, Principal, Audit & Assurance, Research, Guidance & Support, CPA Canada; and Ella Kila, Vice President, Audit and Risk/CAE, LCBO.



ALEC CRAM



PAUL FORGUES



YASMINE HAKIMPOUR



ELLA KILA

# FUTURE PLANS

In the next twelve months, UW CISA will maintain its current research, education and knowledge transfer, and interaction activities, and will undertake new initiatives as well. Plans for each key category are outlined below.

## RESEARCH

### THOUGHT LEADERSHIP

- › In 2021, Efrim Boritz and Theo Stratopoulos will serve the second year of their three-year term as senior editors of the *Journal of Information Systems (JIS)* with support from UW CISA.
- › An International Conference has been organized in Taiwan in March 2021, in connection with the AIS section of American Accounting Association (AAA) and *JIS*.

UW CISA will continue working on the following projects during 2021:

- › **Big Data/Data Analytics** – One paper on this topic will be completed and submitted for presentation at various conferences and publication.
- › **Blockchain Technology** – Two papers in this area are being prepared for publication and will contribute to the development of understanding of this technology among accounting, finance and assurance practitioners and academics. Related teaching materials are also being developed.
- › **Business Model Descriptions and Business Risk Assessment** – One paper on this topic will be completed and submitted for presentation at various conferences and publication.



- › **Cybersecurity** – Through membership on the AICPA Trust Services Task Force, we will contribute to the development of criteria for reporting on service organization controls and an entity’s cybersecurity risk management program. Seven papers on this topic will be presented at various conferences and submitted for publication.
- › **Data/Information Integrity** – Through membership on the AICPA Trust Services Task Force, we will contribute to the development of criteria for reporting on data integrity. One monograph on this topic is being prepared for publication.
- › **Data Value Creation** – A virtual workshop on this topic has been organized for February 2021.
- › **Extended External Reporting** – Two papers on this topic will be completed and submitted for presentation at various conferences and publication.
- › **IT Governance, Risk and Internal Control** – Seven papers on these topics will be completed and submitted for presentation at various conferences and publication.
- › **Machine Learning, AI and Robotics** – Three papers on this topic will be completed and submitted for presentation at various conferences and publication. Also, a research workshop on AI/Machine Learning in business and accounting will be offered in 2021.
- › **Use of Specialists** – One paper on this topic is being revised for presentation and publication, and a new project will be started.



## FUNDING SPECIFIC RESEARCH AND EDUCATION PROJECTS

UW CISA’s fundraising committee will continue seeking ways to expand the funding base for UW CISA. We invite partners to join us in our mission to improve the quality and reliability of information systems and the processes used to produce data/information with integrity (i.e., representational faithfulness).

### RESEARCH PROPOSALS

For Research Proposal Guidelines, visit: [uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/call-proposals](http://uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/call-proposals).

### FELLOWSHIPS AND SCHOLARSHIPS

UW CISA will make funds available for Visiting Fellows and doctoral students. For details, contact the Executive Director.

## SPONSORING RESEARCH SYMPOSIUM

We are already planning for the 12th Biennial Research Symposium to be held virtually in October 2021. We invite papers and proposals for panels on topics related to UW CISA’s mission.

UW CISA is pleased to be partnering again with the University of Waterloo Centre for Accounting Ethics, CPA Canada and the *Journal of Accounting and the Public Interest* to offer its 5th Biennial Symposium on Accounting Ethics on The Impact of Global Pandemic, Specifically COVID 19, on Ethics, Professionalism and Judgement in Accounting and Financial Reporting, to be held in April 2022.

# EDUCATION AND KNOWLEDGE TRANSFER

## DEVELOPING COURSES, WORKSHOPS, CASES AND OTHER TEACHING MATERIAL

### COURSES

Under Theo Stratopoulos' leadership, UW CISA has sponsored the development of a Data Analytics & Emerging Technologies (DA&T) curriculum at the University of Waterloo. The program will be expanded in 2021. For more information please visit:

[uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/education-and-knowledge-transfer/data-analytics-emerging-technologies-dat-curriculum](https://uwaterloo.ca/uwaterloo-centre-for-information-system-assurance/education-and-knowledge-transfer/data-analytics-emerging-technologies-dat-curriculum)

Alec Cram is developing and will offer a course on Cybersecurity in 2021.

### WORKSHOPS

PD Workshops developed by UW CISA are being planned for winter, spring, summer and fall of 2021 on Data Value Creation, Business Model Disclosures, AI/Machine Learning, and Quantum Computing for Industry Leaders and AIS Researchers.

Adam Vitalis will present a workshop on the Mandatory Disclosure of Engagement Partner Identity: Insights from Practice at Sobey School of Business, Saint Mary's University, April 2021.

Theo Stratopoulos has been invited to give a presentation on Teaching Data Analytics to Accounting Students at the University of New Zealand, Victoria, May 2021 and a presentation on emerging technologies to the Educational Division of the Greek Tax Agency, Athens, May 2021.

### CASES

Theo Stratopoulos and Nancy Vanden Bosch will present Case Study: Same Mindset, Different Tools at CPA Ontario's Data Analytics and Insights Summit, February 2021.



THEO STRATOPOULOS



NANCY VANDEN BOSCH

## SHARING MATERIAL WITH OTHER EDUCATORS

UW CISA will continue to share its material with educators around the world. For information, please visit our website or contact the Executive Director.



# INTERACTION

## ALLIANCES AND RELATIONSHIPS

As part of its mission to interact with academe and practice, UW CISA seeks to create and sustain relationships with academic units with similar objectives, professional associations and industry partners with an interest in information integrity and information systems assurance. In the coming year, we will continue our outreach to units with similar goals and objectives to develop an international network for mutual support.

## DISSEMINATING BEST PRACTICES

### CONFERENCES

Centre personnel will make presentations at a number of conferences during 2021, including: the American Accounting Association (AAA) Auditing, AIS and SET Section Midyear Meetings, the AAA Annual Meeting, and the Canadian Academic Accounting Association (CAAA) Annual Conference.

## COMMUNICATION

### WEBSITE AND SOCIAL MEDIA OUTREACH

- › Our website provides additional information about our activities and, in particular, our current and past annual reports.
- › Various social media networks will continue to be used (Facebook, Twitter, YouTube and LinkedIn).

Your comments are welcome.

### IS ASSURANCE WEBLOG

- › Malik Datardina will continue to manage the IS Assurance blog on behalf of UW CISA.

## UW CISA BOARD

In 2021 we will see some change to our Board of Directors.

We want to express our gratitude to Don Cowan, Distinguished Professor Emeritus and Director, Computer Systems Group and Erik Peters, Retired Auditor General of Ontario for their outstanding service to our Board of Directors. Each completed their term at the end of 2020. They both played instrumental roles in guiding UW CISA's mission with their insights and unique expertise.



DON COWAN



ERIK PETERS

As well, in the coming year we'll be welcoming Maura Grossman, Research Professor, UW Cheriton School of Computer Science and Sharon Mohip, Director, Internal Audit, Yamana Gold, and SVP and President Elect, IIA (Toronto Chapter).



MAURA GROSSMAN



SHARON MOHIP

# CENTRE PERSONNEL



**J. EFRIM BORITZ**

PhD, FCPA, FCA, CISA  
Professor and Ontario CPAs'  
Chair in Accounting  
Executive Director



**ANDREW BAUER**

PhD, CPA  
Canada Research Chair in  
Taxation, Governance and Risk  
Assistant Professor



**TIM BAUER**

PhD, CPA  
Assistant Professor



**NANCY VANDEN BOSCH**

MAcc, CPA, CA, CMA  
Stan Laiken Teaching Fellow  
Continuing Lecturer



**DARREN CHARTERS**

JD, MBA  
Continuing Lecturer



**YIXING (IVEE) CHE**

BSACC, MAS  
Research Fellow



**W. ALEC CRAM**

PhD, MSc, CISA, CISSP  
Assistant Professor



**MALIK DATARDINA**

MAcc, CPA, CA, CISA  
Avenir  
Fellow



**CHAN (JESSIE) GE**

BBA, MSA  
Research Fellow



**LOUISE HAYES**

PhD, BSc, MBA, CPA, CA  
University of Guelph  
Research Associate



**NATALIA KOCHETOVA**

PhD, FCPA, FCMA  
Saint Mary's University  
Research Associate



**HE (STANLEY) LI**

PhD  
Southwestern University of  
Finance and Economics, CN  
Research Associate



**WON GYUN NO**

PhD  
Rutgers University  
Research Associate



**KATE PATTERSON**

HBA, CPA, CA  
Research Fellow



**LINDA A. ROBINSON**

BComm, CPA, CA, CFE,  
CPA (IL)  
Continuing Lecturer



**THEOPHANIS (THEO)  
STRATOPOULOS**

PhD  
Associate Professor of  
Information Systems &  
PwC Chair



**LEV TIMOSHENKO**

PhD, BBA, BSc, CPA, CGA  
University of Calgary  
Research Associate



**ADAM VITALIS**

PhD, CPA (MN)  
Assistant Professor



**XIAOQI (VICTOR) WANG**

MBA, BEcon, CGA  
Research Fellow



**CHRIS WONG**

PhD, BSc, MAcc, CPA, CA  
Wilfrid Laurier University  
Research Associate



**HUA (JONATHAN) YE**

PhD  
Assistant Professor



**ANN BISCH**

Administrative Support



**JENNY ROTHWELL**

Administrative Support

# BOARD OF DIRECTORS

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Chair, UW CISA

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**J. EFRIM BORITZ** PhD, FCPA, FCA, CISA  
Ontario CPAs' Chair in Accounting  
University of Waterloo  
Executive Director, UW CISA

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**TIM BAUER** PhD, CPA, CA  
Assistant Professor, Assurance  
University of Waterloo

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**DON COWAN** PhD, DSc, PEng  
Distinguished Professor Emeritus  
Director, Computer Systems Group  
University of Waterloo

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**W. ALEC CRAM** PhD, MSc, CISA, CISSP  
Assistant Professor, Information Systems  
University of Waterloo

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**BOB CUTHBERTSON** CPA, CA, CITP  
Senior Fellow, Rutgers University  
Continuous Auditing and Reporting Lab

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**MALIK DATARDINA** MAcc, CPA, CA, CISA  
GRC Strategist, Avenir

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**PAUL FORGUES** EMBA  
Executive Director, The Institute of Internal Auditors Canada

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**STEVE FORTIN** PhD, FCPA, FCA, ICD.D  
Director, School of Accounting & Finance  
University of Waterloo

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**YASMINE HAKIMPOUR** CPA, CA  
Principal, Audit & Assurance, Research,  
Guidance & Support, CPA Canada

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**DOUG JOHNSON** MAcc, CPA, CA, CIA, CISA  
Representing IIA Toronto Chapter  
Chief Compliance Officer, Haventree Bank

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Vice President, Audit and Risk/CAE, LCBO

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President, ISACA, Toronto Chapter  
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**ERIK PETERS** FCPA, FCA  
Retired Auditor General of Ontario

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**GREG SHIELDS** CPA, CA  
Retired Director, Auditing and Assurance  
Standards, CPA Canada

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**THEOPHANIS (THEO) STRATOPOULOS** PhD  
Associate Professor of Information  
Systems & PwC Chair  
University of Waterloo

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## THANK YOU

The University of Waterloo Centre for Information Integrity and Information Systems Assurance gratefully acknowledges the generous support of our founding partners and sponsors



*We welcome  
inquiries, suggestions  
and comments.*

**J. EFRIM BORITZ**, Executive Director,  
Centre for Information Integrity and  
Information Systems Assurance

School of Accounting and Finance  
University of Waterloo, ON N2L 3G1

TEL.: 519-888-4567, ext 45774

FAX.: 519-888-7562

EMAIL: [jeboritz@uwaterloo.ca](mailto:jeboritz@uwaterloo.ca)

[uwaterloo.ca/uwaterloo-centre-for-information-system-assurance](http://uwaterloo.ca/uwaterloo-centre-for-information-system-assurance)

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## **FOR MORE INFORMATION**

or to request additional copies of this report, please contact J.E. Boritz,  
Director, Centre for Information Integrity and Information Systems Assurance at:

[jeboritz@uwaterloo.ca](mailto:jeboritz@uwaterloo.ca)