



IEEE ETHICS-2023

CONFERENCE PROGRAM

**IEEE ETHICS-2023:
Ethics in the Global Innovation Helix**

May 18-20, 2023, Purdue University
West Lafayette, Indiana, USA

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School of Engineering Education

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(PDH)**

Attendees at Workshop Sessions A4, B4, C4, D4, F4 and Tutorial Session E4 are eligible for 1.5 IEEE Professional Development Hour (PDH) Credits per workshop/tutorial attended.

To obtain IEEE PDH Credits:

1. You must be a full-conference registrant for ETHICS-2023.
2. Attend one or more of the above listed workshops/tutorial (earn 1.5 PDH credits per workshop/tutorial attended).
3. Sign-up on the Roster Sheet at the workshop/tutorial.
4. Turn in the Evaluation Form at the end of the workshop/tutorial.

Following the conference, your PDH certificate(s) will be mailed directly to you from IEEE. (Certificates sponsored by SSIT Technical Committee on Ethics & Human Values.)

WELCOME TO ETHICS-2023



Purdue and IEEE have been my dual professional homes for most of my 47-year career, so I am thrilled to welcome you to IEEE ETHICS-2023 at Purdue. I am especially proud to have ties with both co-sponsors of this year's conference, as a member of the IEEE Society on Social Implications of Technology and as a professor by courtesy in Purdue's School of Engineering Education, the home of the National Institute for Engineering Ethics.

I think it's impossible to overstate how important ethics is in today's world, or how critical it is to engineering. In 2003, a Harris survey commissioned by the American Association of Engineering Societies reported that 31% of respondents agreed that "engineers are responsible for creating things that are harmful to society." In 2014, in an update commissioned by the US National Academy of Engineering, the number had risen to 49%.

Amid ever-accelerating technology developments in AI, ML, IoT, autonomous vehicles, cryptocurrency, and others and heightened need to address challenges including systemic racism, diversity, equity, belonging, misinformation, security, access to healthcare, and climate change, it is difficult to imagine that engineering would fare better in a "perceptions of engineering in society" survey conducted today.

I'm honored to be the **General Chair of ETHICS-2023**, which is asking these hard questions about the relationships across interplay of technology, ethics, and society. I extend my heartfelt thanks and congratulations to the superb Conference Committee led by Brent Jesiek: the Program Co-chairs Joe Herkert and Justin Hess and members of the Technical Program Committee; and the Organizing Chair Murty Polavarapu, Publications Chair Marc Cheong, and Website and Social Media Coordinator Andrew Gray; and to the ETHICS Conference Series Chair Greg Adamson. To this great team, and to all of the authors, presenters, and attendees, and to the conference sponsors – on behalf of Purdue and IEEE, welcome to ETHICS-2023!

Leah H. Jamieson
Ransburg Distinguished Professor of Electrical and Computer Engineering
Professor of Engineering Education (by courtesy)
John A. Edwardson Dean Emerita of Engineering
IEEE President, 2007

IEEE adopted its first Code of Ethics in 1912, identifying ethical behavior as part of what it means to be a technology professional. The IEEE ETHICS conference series continues that tradition. Ethical responsibility for the early electrical engineering industry may seem a world away from obligations to warn of bias and "hallucinations" in artificial intelligence. Yet these two cases separated by more than a century share the need for consideration. For example, bribery is an insidious but relatively simple ethical challenge. Today, most ethical challenges are more complex. Does a Californian technologist have an ethical duty to a Bangladeshi family impoverished by the automation of the role of the textile worker breadwinner? That is not simple; the world is a complicated and interconnected place. However, the technologist surely has an ethical responsibility to consider the question. For an individual that may be overwhelming, but through a professional association they can be made aware of such challenges and given the opportunity to consider them. ETHICS-2023 is part of a continuing series on ethical challenges in the interaction between technology and society, led by the IEEE Society on the Social Implications of Technology. In business today there is a concept of "social license to operate." If a company's behavior is legal but reprehensible, it may struggle to survive. The technology community as a whole needs such a social license. For our community, a reflective approach to ethical responsibilities is part of what grants us that community support. This conference series is a contribution to that.



Dr. Greg Adamson
School of Population and Global Health, University of Melbourne
Technical Activities Vice-President, IEEE Society on Social Implications of Technology



As the **Conference Chair** for IEEE ETHICS-2023, it is a great pleasure to welcome you to Purdue University and West Lafayette, Indiana. As a leading land grant institution, Purdue's mission has historically centered on serving the state of Indiana, as well as the nation and world more broadly. While we support this mission every day and in countless ways, hosting a conference on the social and ethical dimensions of engineering and technology seems, from my perspective, an especially apt undertaking at this moment in time. As technological change accelerates and technology assumes an ever-growing presence in our lives, interdisciplinary forums are urgently needed to open up spaces for lively discussion and critical engagement among stakeholders representing academic, government, non-profit, industry, citizen, and other perspectives. And as the conference program suggests, there is no shortage of pressing topics to explore – from artificial intelligence and automation to

weapons technology and responsible innovation, to name just a few. It is further notable that the conference features an impressive number of presenters and attendees from outside of the U.S., enabling truly globe-spanning conversations, collaborations, and impacts.

Additionally, we are proud to be hosting such conversations in affiliation with the National Institute for Engineering Ethics (NIEE), which is housed within and administered by Purdue's School of Engineering Education. Given NIEE's long commitment to the "promotion and understanding of ethics throughout the engineering profession," helping to organize and host this event is a natural fit with our mission. We very much look forward to hearing your ideas about how we can work together to raise the visibility of professional ethics and related concerns among students and practitioners in engineering, technology, and related fields.

I sincerely hope that ETHICS-2023 is a productive and fulfilling experience for you, and that you find time during your visit to enjoy our beautiful campus and support our local businesses. In closing, I would like to acknowledge the legion of support staff and volunteers who helped make this event possible, and hope you will take a moment to thank them for their service. Technical Program Co-Chair Joe Herkert deserves special plaudits for his fantastic help with coordination and planning – thank you again, Joe! Finally, I am grateful to Purdue University's Office of the Provost for a generous conference grant - which not only made the conference possible, but allowed us to enhance and improve the event in numerous ways.

Brent K. Jesiek
Professor, Engineering Education, Electrical and Computer Engineering
Director, National Institute for Engineering Ethics (NIEE)

As **Technical Program Co-chair**, it is with great pleasure that I welcome you to IEEE ETHICS-2023, sponsored by the IEEE Society on Social Implications of Technology (SSIT) and hosted by the Purdue University School of Engineering Education. I am extremely pleased with the ETHICS-2023 program, and I hope you will feel the same as the conference unfolds over the next three days. The conference theme is Ethics in the Global Innovation Helix, but the program also includes other aspects of ethics and technology and ethics in engineering education and practice. The program includes three plenary sessions, six paper sessions with a total of twenty papers, a poster session with fifteen posters, six workshops and tutorials, and an open forum on building a technology ethics community. The conference also features eight panel sessions, both invited panels and panels submitted through the conference Call for Papers. For their help in putting the conference program together, I'd like to thank my Co-program Chair, Justin Hess, the ETHICS-2023 Conference Committee, the ETHICS-2023 Technical Program Committee, the SSIT Technical Committee on Ethics and Human Values, and the ETHICS-2023 technical co-sponsors and partners, as well as all the presenters, moderators, and facilitators. In 2021, the COVID-19 pandemic caused us to meet online, but this year we are pleased to again convene the conference face-to-face. I hope to meet with many of you. In particular, if you need any assistance during the conference, please don't hesitate to ask.



Joe Herkert
Associate Professor Emeritus of Science, Technology and Society, North Carolina State University
Chair, SSIT Technical Committee on Ethics & Human Values



Welcome to IEEE ETHICS-2023! We have many prestigious speakers joining us for the conference, newcomers to the IEEE-ETHICS and NIEE communities, and many folks who live ethics in their unique sectors each day. As a result, we have a quite interdisciplinary conference program. As **Technical Program Co-chair**, I am excited to hear and learn from the perspectives of folks across sectors (academia, industry, government, communities), US regions, nations (about 10 countries!), and experience levels. The interdisciplinary nature of the conference (and the resultant interactions we shall have) is exactly what we need to identify and respond to ways forward in the quintuple helix. I attended and enjoyed IEEE ETHICS-2021 and I was delighted when my School of Engineering Education here at Purdue was asked to host ETHICS-

2023. We are also hosting ETHICS-2023 in conjunction with the National Institute of Engineering Ethics (NIEE), which now lives within the School of Engineering Education. The conference provides a unique opportunity to spotlight NIEE in its new home and will help ensure that NIEE is responsive to the needs of the engineering ethics community. I envision many outcomes of this conference will invigorate actions of NIEE.

On a personal note, I found my way to the space of engineering ethics as a graduate student in engineering education around 2012. I am amazed by the growth in the overall engineering ethics community. This is especially evident in the increase in scholarship and engagement I have witnessed throughout this community over the past decade. This sizeable conference (both in terms of attendees and international coverage) is a testament to this strong and still growing community. ETHICS-2023 will provide a unique opportunity to engage in critical conversations on numerous timely ethical issues in the engineering and education domains, including (but not limited to) equity, artificial intelligence, and sustainability. I especially welcome the newcomers to this community, who prompt thinking and seeing in novel ways. Thank you all for contributing to IEEE ETHICS-2023, and I look forward to seeing you all soon!

Justin Hess, Assistant Professor of Engineering Education, NIEE Deputy Director of Research

It is my distinct pleasure to welcome you to the ETHICS-2023 Conference of IEEE Society on Social Implications of Technology in my capacity as the **Organizing Chair**. This Conference Series dates back to 2014 but our last conference in 2021 was held virtually due to the pandemic. We are now very much looking forward to our first in-person gathering since 2016. In addition to the strong technical program, the interactions among all of you, I hope, will help renew old relationships, develop new networks, collaborate and learn from each other. Our conference organization is strengthened by our financial co-sponsor, School of Engineering Education of Purdue University and our Technical Co-sponsors, IEEE-USA and National Institute of Engineering Ethics. I hope you will find your experience at this conference professionally rewarding and personally enriching.

Murty Polavarapu, Managing Director, Virginia Microelectronics Consortium (VMEC)



As the **Publications Chair** for IEEE ETHICS-2023, I'd like to warmly welcome you to the 2023 edition of the conference, to be held in person for the first time since the pandemic started. ETHICS-2023 is an important 'meeting of minds' for interdisciplinary researchers to investigate ethical, societal, and environmental issues pertaining to the design, use, and deployment of technology. The theme "Ethics in the Global Innovation Helix" brings together contributions from scholars worldwide on crucial topics ranging from: engineering ethics education, to ethical risks of AI and emerging technologies, to safeguarding the environment and human rights, to building an inclusive community of practice. In preparing the ETHICS-2023 proceedings, I am delighted to see such high-quality research in the form of papers, posters, panels, and special sessions, and am looking forward to networking with participants at Purdue. My thanks to fellow Chairs, committee members, participants, co-

sponsors, and all who have made the ETHICS-2023 conference a reality.

Marc Cheong, Senior Lecturer, Computing and Information Systems, University of Melbourne

Thursday May 18

Pre-Conference Workshop, Thurs. May 18, 9:00 AM – 4:30 PM, WALC 3138

Norbert Wiener Symposium: Discussion of the Future of Work (Requires Invitation or Pre-Registration)

The 2023 IEEE Workshop on Norbert Wiener in the 21st Century (21CW2023) is the fourth iteration in SSIT's 21CW series and is being held as a by-invitation event focused on the theme "The Future of Work in the Age of Automation," a topic about which Wiener had many things to say. In the spirit of the Macy Conferences through which Wiener developed many of his ideas, 21CW2023 will be deliberately multi-disciplinary, with participant expertise encompassing fields that span STEM, HSS, and fine arts. The workshop will be divided into four 75-minute sessions, each of which will include brief (5-minute) prepared remarks from 4-5 presenters followed by a moderated group discussion. Those discussions constitute the essence of the workshop; their content will be captured by designated scribes and video recording. Following the workshop, notes will be distilled into a coherent "Proceedings" text for publication. More details at <https://attend.ieee.org/ethics-2023/norbert-wiener-symposium/>

Registration, Thurs. May 18, 5:00 – 7:00 PM, outside PMU East/West Faculty Lounge (2nd floor)

Welcome Reception, Thurs. May 18, 5:30 – 6:30 PM, PMU East/West Faculty Lounge (2nd floor)

Host: **Brent Jesiek**, Purdue University (ETHICS-2023 Conference Chair)

Opening Plenary Session, Thurs. May 18, 6:30 – 7:30 PM, PMU East/West Faculty Lounge (2nd floor)

Active Human Interface: Technology, Uncertainty, and Hope

Welcome and Speaker Introduction: **Leah Jamieson**, Purdue University (ETHICS-2023 General Chair)

Speaker: **Debbie Chachra**, Professor of Engineering, Olin College of Engineering



Deb Chachra is a Professor of Engineering at Olin College of Engineering, where she was among the earliest faculty. Her book, *How Infrastructure Works: Inside the Systems That Shape Our World* (supported by a grant from the Alfred P. Sloan Foundation) will be published by Riverhead in October 2023. Her research interests are wide-ranging and include critical design, equity and inclusion issues, and engineering education (for which she received an NSF CAREER grant). Prior to joining Olin, she held a postdoctoral fellowship at MIT, and she earned her doctorate in materials science and engineering at the University of Toronto.

Friday May 19 - Morning

Registration, Fri. May 19, 7:45 AM – 4:00 PM, WALC 1087 (Hospitality Room)

Breakfast, Fri. May 19, 7:45 – 8:30 AM, WALC 1087 (Hospitality Room)

Plenary Session, Fri. May 19, 8:30 – 10:00 AM, WALC 1018 *Ethical and Legal Frameworks for Automation*

Welcome: **Brent Jesiek**, Purdue University (ETHICS-2023 Conference Chair)

Speaker Introduction: **Greg Adamson**, University of Melbourne (SSIT Technical Activities Vice President)

Speaker: **Iven Mareels**, Executive Dean, Institute of Innovation, Science and Sustainability, Federation University Australia



Since Oct 2022, Iven Mareels is the Executive Dean, Institute for Innovation, Science and Sustainability, Federation University Australia. He is also a Director of the Australian Academy of Technology and Engineering, and a non-executive Director of Rubicon Water. Previously, he was a partner in IBM Consulting and Director of the Centre for Applied Research, IBM Australia (April 2021-Aug 2022); Director of IBM Research in Australia (Feb 2018- Mar 2021); Dean of Engineering at the University of Melbourne (2007-2018). Iven received the PhD in Systems Engineering from the Australian National University (1987), and the Master of Engineering (Electromechanical) from Gent University (1982). He has co-authored over 500 refereed publications, including 5 monographs. He is a co-inventor of a suite of patents related to the automation of large scale, gravity fed, irrigation systems. Iven has received a number of awards, including a 2021 IBM Research Achievement Award (bronze level); 2017, Harold Chestnut Control Engineering Textbook Prize; 2014 IEEE Control Systems Society Technology Award; 2013 Asian Control Association Wook Hyun Kwon Education Award; 2008 Clunies Ross Medal. He was made a Commander in the Order of the Crown of Belgium, and received the Centenary Medal of Australia for contributions to engineering education and research. He is a Fellow of The Academy of Technological Sciences and Engineering Australia; The Institute of Electrical and Electronics Engineers (USA), the International Federation of Automatic Control (Austria) and Engineers Australia and he is a Foreign Member of the Royal Flemish Academy of Belgium for Science and the Arts.

Refreshment Break, Fri. May 19, 10 – 10:30 AM, WALC 1087 (Hospitality Room)

Session A1, Fri. May 19, 10:30 AM – Noon, WALC 2124 – Panel: The Ethics of Weapons Technology Development (Conference Chair's Special Session)

Moderator: **Greg Adamson**, School of Population and Global Health, University of Melbourne
Panelists:

John Emery, Assistant Professor, International and Area Studies, University of Oklahoma

Cameron Tracy, Research Scholar, Center for International Security and Cooperation (CISAC), Freeman Spogli Institute for International Studies, Stanford University

Aditi Verma, Assistant Professor, Nuclear Engineering and Radiological Sciences, Univ. of Michigan

As technologies become increasingly complex they also become less intelligible to non-experts. This necessitates greater trust, on the part of publics, that those who create, operate, and oversee these technologies will develop them in a manner that serves public interests. This is particularly true of weapons of war, given the dire consequences of their use—the destruction of infrastructure, environments, and human bodies. Yet engineering ethics is commonly neglected in this domain, as the exigencies of warfare and national defense are often thought to override such concerns. The ethical challenges that

arise from this tension will only become more acute with the rising threat of conflict between major military powers armed with ever-more-advanced weaponry.

This panel will explore ethical challenges in weapons technology development, drawing on case studies of three technologies: nuclear explosives, hypersonic missiles, and algorithms for the estimation of collateral damage. These cases highlight key ethical failings in prior weapons development including the embeddedness of racist values in weapons systems, incompatibilities between practices of weapons development and principles of democratic governance, and hazards of overreliance on computational models for war planning. Ultimately, this panel will illustrate a pressing need for greater attention to the ethical implications of weapons technologies to ensure that they benefit the human security of the publics on whose behalf they are developed and used.

Session A2, Fri. May 19, 10:30 AM – Noon, WALC 2051 – Panel: The Arc of a Global Engineering Education

Panelists:

Laura MacDonald, Managing Director, Mortenson Center in Global Engineering & Resilience (Moderator)

Jessica Rush Leeker, Faculty Director of Undergraduate Education, Lockheed Martin Engineering Management Program

Brenton Kreiger, Bridge Program Education Manager, Engineers in Action

Erin Peiffer, Program Coordinator, Engineering For Change

Since 2009, the Mortenson Center in Global Engineering & Resilience has been training global engineers to improve the lives of vulnerable people through technological innovation, forming global partnerships, enacting policy changes, and humanitarian service. In 2021, The Mortenson Center hosted over 100 participants from universities, donors, government agencies, and industry partners for a virtual workshop series as part of a National Science Foundation grant to advance engineering education. Together, that group established a comprehensive global engineering body of knowledge. The paper *Aligning learning objectives and approaches in global engineering graduate programs: Review and recommendations* by an interdisciplinary working group were recently published in *Development Engineering*.

Fifteen priority learning objectives emerged from the workshop. Among them was Global Engineering Ethics. Students receiving global engineering education need to be able to examine the ethical implications of global research and development, including considering power imbalances and recognizing the limitations of engineering in guiding global development efforts. Our panel will encompass the intersection of industry, academia, and government and the social and ethical responsibilities of the global engineer. Global engineering ethics is a thread that runs throughout the arc of global engineering education, and our panel will speak to the future of socially responsible innovation, as that is also foundational to the field of global engineering. Global engineering ethics is a thread that runs throughout the arc of global engineering education, and our panel will speak to the future of socially responsible innovation, as that is also foundational to the field of global engineering. We will discuss four essential pillars in the arc of becoming a global engineer. More details at <https://attend.ieee.org/ethics-2023/the-arc-of-a-global-engineering-education/>.

Session A3, Fri. May 19, 10:30 AM – Noon, WALC 2088 - Papers: Exploring the Ethics of Utilizing Artificial Intelligence

Chair: **Nael Bakar**, University of Texas at Tyler

1. *Artificial Intelligence & Smart City Ethics: A Systematic Review*, **Connor Phillips** (University of Texas at Austin) and **Junfeng Jiao** (University of Texas at Austin)

Abstract. Smart city technologies have enabled the tracking of urban residents to a more granular degree than previously was possible. The increase in data collection and analysis, enabled by artificial intelligence, presents privacy, safety, and other ethical concerns. This systematic review collects and organizes the body of knowledge surrounding ethics of smart cities. Authors used a keyword search in 5 databases to highlight 34 academic publications dated between 2014 and 2022. The work demonstrates that articles are generally focused on ethical concerns of privacy, safety, and fairness, specific technology-based reviews, or frameworks and lenses to guide conversation. This paper helps to organize a cross-disciplinary topic and collects the body of knowledge around smart city ethics into a singular, comprehensive source for practitioners, researchers, and stakeholders.

2. *Artificial Moral Advisors: enhancing human ethical decision-making*, **Marco Tassella** (LUMSA University), **Rémy Chaput** (Lyon, France) and **Mathieu Guillermin** (Université Catholique de Lyon, France)

Abstract. This short paper focuses on understanding moral dilemmas, Artificial Moral Advisors, and their possible roles in ethical decision-making. After a brief analysis of the philosophical debate around dilemmas, we propose three different classes of dilemmas. We then discuss how AI-based advisors could be used to enhance human ethical decision-making, with a particular focus on three possible AI skills (identifying, presenting, and settling dilemmas), as well as on their role as ethical experts. The resulting proposal opens up to new possible uses of AI moral advisors, and to the help they might offer in difficult decisions.

3. *Speech Act Theory and Ethics of Speech Processing as Distinct Stages: the ethics of collecting, contextualizing and the releasing of (speech) data*, **Jolly Thomas** (Indian Institute of Technology-Dharwad), **Lalaram Arya** (Indian Institute of Technology-Dharwad), **Mubarak Hussain** (Indian Institute of Technology-Dharwad) and **S. R. Mahadeva Prasanna** (Indian Institute of Technology-Dharwad)

Abstract. Using speech act theory from the Philosophy of Language, this paper attempts to develop an ethical framework for the phenomenon of speech processing. We use the concepts of the illocutionary force and the illocutionary content of a speech act to explain the ethics of speech processing. By emphasizing the different stages involved in speech processing, we explore the distinct ethical issues that arise in relation to each stage. Input, processing, and output are the different ethically relevant stages under which a spoken item or a speech navigates within the range of speech-processing modules. Employing the illocutionary force-content distinction, we specify and characterize the input-related ethical issues, the output-related ethical issues, and the processing-related ethical issues involved in speech processing. Together with illocutionary force-content distinction, we employ the data-information distinction to characterize the stage-wise ethical issues in the phenomenon of speech processing as the ethics of collecting (speech) data, the ethics of contextualizing (speech) data/information, and the ethics of releasing the contextualized information (processed speech). Immediate ethical issues that arise from the range of speech processing modules are distinguished from distant ethical issues. We also indicate the nature of ethical issues that arise from Speaker Independent speech technologies.

4. *AI Based Real-Time Privacy-Aware Camera Data Processing in Autonomous Vehicles*, **Shagun Bera** (Indian Institute of Technology Dharwad) and **Kedar Khandeparkar** (Indian Institute of Technology Dharwad)

Abstract. The three V's, namely volume, velocity and variety of sensor data are ubiquitous for decision-making in autonomous self-driving vehicles. The sensor data contain information about living and non-living entities in the neighbourhood of the moving vehicle. While identifying these objects are essential, details such as faces, vehicle number plates, building names, etc., are not necessary for decision-making. Thus, we consider the following issues related to data collection, 1) the problem of data privacy, and 2) the problem of misuse of data by an adversary having unauthorized access. This paper proposes a method that first locates private objects (non-essential for decision-making) from frames captured by cameras installed on self-driving cars and then augments it with noise and blurring effects to make them unrecognizable. The performance results show that a combination of blurring and noise can hide private data while retaining information essential for the car to drive. Also, as the proposed approach processes within the limits of the inter-frame capture time, it is feasible for use in real-time. Moreover, results show that the proposed method can defend the adversarial attacks for the reconstruction of image frames from a given augmented frame.

Session A4, Fri. May 19, 10:30 AM – Noon, WALC 2121 – Workshop: Exploring Mental Models of Ethics and Diversity, Equity, and Inclusion in Engineering

Facilitators:

Isil Anakok, Graduate Research Assistant, Virginia Tech

Justin L. Hess, Assistant Professor of Engineering Education, Purdue University

Andrew Katz, Assistant Professor of Engineering Education, Virginia Tech

Sowmya Panuganti, Graduate Research Assistant, Purdue University

Workshop Objective

The aim of this workshop is to (1) provide an overview of mental models in engineering ethics education and (2) use the mental models framing to engage attendees in a conversation around how ethics and diversity, equity, and inclusion (DEI) connect in engineering. Attendees will leave the session with an understanding of mental models, engineering faculty mental models in engineering ethics education, and greater clarity regarding one's own way of connecting ethics and DEI in engineering.

Workshop Overview

This 90-minute workshop will include four primary parts: (1) an introduction to mental models, (2) synthesis of mental models in engineering ethics education, (3) activities aimed to elicit participants' mental models of ethics, diversity, equity, and inclusion (DEI) in engineering, and (4) preliminary results from a study on academic faculty members' and engineering practitioners' mental models regarding connections between ethics and DEI in engineering. More details at <https://attend.ieee.org/ethics-2023/exploring-mental-models-of-ethics-and-diversity-equity-and-inclusion-in-engineering/>.

Friday May 19 – Afternoon/Evening

Lunch, Fri. May 19, 12:00 – 1:00 PM, WALC 1087 (Hospitality Room) – Sponsored by the National Institute for Engineering Ethics (NIEE)

Session B1, Fri. May 19, 1:00 – 2:30 PM, WALC 2124 – Panel: Perspectives from Liberal Arts on the Practical Turn in AI Ethics

Moderator: **Daniel Schiff**, Assistant Professor of Public Policy, Purdue University

Panelists:

Ekaterina Babintseva, Assistant Professor of History, Purdue University

James Messina, Assistant Professor of Philosophy, Purdue University

Kaylyn Jackson Schiff, Assistant Professor of Political Science, Purdue University

Sorin Adam Matei, Professor of Communication, Purdue University (Panel Organizer)

The increasing proliferation of advanced digital technologies like artificial intelligence (AI) capable of performing tasks and making decisions previously reserved for humans has surfaced important ethical questions. Emerging transformative applications like generative and multi-modal AI systems and automated decision-support systems in government have raised the stakes as developers, regulators, researchers, and civil society have worked to respond. Current discourse emphasizes issues like the distribution of costs and benefits across groups and contexts, the translation of principle-based frameworks to practices, the role of diversity and public participation, and trade-offs between goals like innovation and the protection of human rights. Yet dominant responses in scholarly and policy discourse have emphasized some perspectives and solutions while other approaches have arguably not been fully explored.

The present panel offers theoretically rooted perspectives on the ethical understanding and practice of AI according to scholarship in the liberal arts: historical and sociotechnical analysis, public policy, communications, and moral philosophy. For individuals focused on computing and engineering as well as researchers and practitioners who see the value of interdisciplinary thinking, this panel will provide insight into how scholars in the social sciences and humanities are approaching AI's social and ethical dimensions, and an opportunity for dialogue. More details at <https://attend.ieee.org/ethics-2023/perspectives-from-liberal-arts-on-the-practical-turn-in-ai-ethics/>.

Session B2, Fri. May 19, 1:00 – 2:30 PM, WALC 2051 – Papers: Bridging the Social and the Ethical in Engineering

Chair: **Andrew Taylor**, Tennessee Valley Authority

1. *Reifying Dominant Ideologies: Consequences of Decoupling Ethics and Equity in Engineering*
Cindy Rottmann (University of Toronto), **Emily Moore** (University of Toronto) and **Andrea Chan** (University of Toronto)

Abstract. In this paper, we conduct a critical, secondary analysis of three engineering leadership research projects to explore the consequences of separating ethics from equity in engineering education and practice. Our findings suggest that by pairing ethics with equity, the Canadian Engineering Accreditation Board (CEAB) has raised the profile of professional responsibility among engineering education administrators. Unfortunately, by treating ethics and equity as distinct skillsets rather than integrated epistemological practices, we fail to disrupt powerful ideologies in the profession. In the process, we run the risk of universalizing ethical dilemmas faced by socially advantaged engineers, masking career mobility penalties faced by marginalized members of the profession and leaving engineering leaders with strong social impact records off the hook for inequity. In short, by decoupling equity from professional ethics, we leave societal patterns of privilege intact in workplaces designed for something other than teaching and learning.

2. *Integrating Altruistic Values into the Engineering Research Center for Innovation and Strategic Transformation of Alkane Resources (CISTAR)*, **Denise Driscoll** (Purdue University) and **Maeve Drummond Oakes** (Purdue University)

Abstract. Engineering Research Centers (ERCs) are funded to work on big challenges facing the United States. This work in progress encourages ERCs to highlight, as CISTAR has done, the altruistic nature of the research that they do to attract, inspire, and bring together individuals from diverse backgrounds to help meet the big challenges that are facing our nation.

3. *Development of Social Impact Considerations during Engineering Internships*, **Malini Josiam** (Virginia Tech), **Sophia Vicente** (Virginia Tech) and **Taylor Johnson** (Virginia Tech)

Abstract. Internships are known to be valuable experiences for engineering students, as they provide students with hands-on engineering experience and development of professional skills. However, less is known about internships in terms of how they develop engineering students' skills related to social impact considerations. In this work in progress paper, we conducted semi structured interviews with 10 engineering students who participated in engineering internships during the previous summer. Our preliminary results indicate that while students believe that engineers should consider the social impact of their work, those same engineering students are not always equipped with the tools to discuss the social impact of their internship projects. Thus, we demonstrate a need for more intentional development of connections between engineering work and social impact during internships and in engineering curriculum.

Session B3, Fri. May 19, 1:00 – 2:30 PM, WALC 2088 - Papers: Understanding and Mitigating Ethical Risks of Emerging Technologies

Chair: **Grant Fore**, IUPUI

1. *ABCs: Differentiating Algorithmic Bias, Automation Bias, and Automation Complacency*, **Amanda Potasznik** (University of Massachusetts, Boston).

Abstract. Algorithmic bias, automation bias, and automation complacency have been identified as culprits of a variety of human-computer interaction missteps, ethical offenses, and societal harms. However, these three terms are often mistaken and conflated. Students and professionals alike may have difficulty differentiating between the terms and fully understanding the impact of such psychological phenomena on their work and research. A review of relevant literature is conducted in order to establish an overview of historical documentation and analysis of the underlying themes; definitions and examples of each concept are then synthesized in order to provide a holistic understanding of the meaning behind this set of terminology.

2. *What Is a Subliminal Technique? An Ethical Perspective on AI-Driven Influence*, **Juan Pablo Bermúdez** (Imperial College London), **Rune Nyrup** (Independent Researcher), **Sebastian Deterding** (Imperial College London), **Laura Moradbakhti** (Imperial College London), **Céline Mougnot** (Imperial College London), **Fangzhou You** (Imperial College London) and **Rafael A. Calvo** (Imperial College London)

Abstract. Concerns about threats to human autonomy feature prominently in the field of AI ethics. One aspect of this concern relates to the use of AI systems for problematically manipulative influence. In response to this, the European Union’s draft AI Act (AIA) includes a prohibition on AI systems deploying subliminal techniques that alter people’s behavior in ways that are reasonably likely to cause harm (Article 5(1)(a)). Critics have argued that the term ‘subliminal techniques’ is too narrow to capture the target cases of AI-based manipulation. We propose a definition of ‘subliminal techniques’ that (a) is grounded on a plausible interpretation of the legal text; (b) addresses all or most of the underlying ethical concerns motivating the prohibition; (c) is defensible from a scientific and philosophical perspective; and (d) does not over-reach in ways that impose excessive administrative and regulatory burdens. The definition provides guidance for design teams seeking to pursue responsible and ethically aligned AI innovation.

3. *Value Sensitive Design meets Participatory Value Evaluation for autonomous systems in Defence*, **Christine Boshuijzen-van Burken** (UNSW), **Shannon Spruit** (Populytics), **Lotte Fillerup** (Populytics) and **Niek Mouter** (Delft University of Technology)

Abstract. We use Value Sensitive Design for the development of an ethical framework for autonomous systems in Defence in the Australian context. Two novel empirical data gathering methods are deployed for mining stakeholder’s values, namely Group Decision Room (GDR) and Participatory Value Evaluation (PVE). GDR findings reveal a general concern for environmental values, geo-political and economic stability. A PVE based on these and other values is designed around an autonomous mine counter underwater vessel and an autonomous drone that drops bombs.

4. *The Need for an Enhanced Process Methodology for Ethical Data Science Projects*, **Sucheta Lahiri** (Syracuse University) and **Jeff Saltz** (Syracuse University)

Abstract. This paper proposes a practice-based approach to ethics by expanding the scope of process framework CRISP-DM for managing ethical risks arising in data science projects. The paper discusses the benefits and shortcomings of CRISP-DM with respect to minimizing ethical risks during data science project execution. Next, to help ensure ethical data science projects, CRISP-M is enhanced to minimize ethical risks. This refinement offers viable and specific work actions for data science practitioners. Furthermore, future research to integrate this enhanced CRISP-DM with a collaboration framework such as Scrum or Data Driven Scrum (DDS) is proposed to enable better coordination and efficient testing before final deployment of data science system.

Session B4, Fri. May 19, 1:00 – 2:30 PM, WALC 2121 – Workshop: Critical Design for Responsible Innovation

Facilitators:

Heather Love, Assistant Professor of English Language and Literature, University of Waterloo
Alexi Orchard, University of Waterloo
Rebecca Sherlock, University of Waterloo

This 90-minute workshop will introduce participants to the concept of “Critical Design” and its potential as strategy for fostering responsible innovation in the tech field. Session facilitators will share findings from an ongoing project focused on developing hands-on “toolkits” for teaching critical design methods to students and professionals in the tech sector. Attendees will then have a chance to try out these methods and collaboratively reflect on how they might be integrated into the design process within various academic, professional, and industry settings to cultivate more responsible and ethically oriented approaches to innovation. More details at <https://attend.ieee.org/ethics-2023/critical-design-for-responsible-innovation/>.

Break, Fri. May 19, 2:30 – 2:45 PM, WALC 1087 (Hospitality Room)

Session C1, Fri. May 19, 2:45 – 4:15 PM, WALC 2124 – Panel: Careers in Technology Ethics

Moderator: **Jason Borenstein**, Georgia Institute of Technology

Panelists:

Chloe Autio, The Cantellus Group
Ed Carr, Siemens

Kelly Laas, Illinois Institute of Technology
Daniel Schiff, JP Morgan/Purdue University

When the topic of having a career in the realm of technology ethics is raised, the standard focus tends to be on being a faculty member within a college or university. However, there are various ways in which a professional with expertise in ethics can operate outside of the confines of an academic classroom. Practitioners, for example, can have work responsibilities directly tied to examining the ethical dimensions of engineering practice. Thus, the focus of this panel session is not only to discuss the types of careers those who work in the realm of technology ethics can have at an academic institution but to go beyond that typical focus to shed light on other career possibilities. The panel should enable the audience, especially students and junior professionals, to learn about a range of technology ethics career possibilities. More details at <https://attend.ieee.org/ethics-2023/perspectives-from-liberal-arts-on-the-practical-turn-in-ai-ethics/>.

Session C2, Fri. May 19, 2:45 – 4:15 PM, WALC 2051 – Panel: Socially Responsible Innovation for Climate Change Mitigation and Adaptation (Sponsored by IEEE Technical Activities Board Climate Change Program)

Panelists:

Wei-Jen Lee, University of Texas Arlington (Moderator)

Irene Samy, Nile University

Ravinder Dahiya, Northeastern University

In the 2018 Intergovernmental Panel on Climate Change (IPCC) Report, the 1.5oC goal would require the world to reach net zero emissions by 2050. COP26 concluded with nearly 200 countries agreeing to the Glasgow Climate Pact, which aims to limit the global temperature rise to 1.5oC and finalize the outstanding elements of the Paris Agreement and COP27 calls for action and implementation. For example, Apple commits to be 100 percent carbon neutral for its supply chain and products by 2030. Other manufactures have established similar goals. This will have a revolutionized impact on the entire society.

In November 2019, IEEE Board of Directors precisely acknowledged this dilemma and issued an extraordinary Declaration. The resolution calls upon IEEE members and Operating Units to create frameworks to foster global cooperation within and across disciplines by developing and promoting, in IEEE's fields of interest, technically feasible and economically viable solutions to sustainability. As the host of global technical communities, IEEE members have sensed the urgency of the issues and many technical societies and councils have established/launched climate changes programs within their domain of expertise.

Even with good intention, history has shown us that technology can have unintended consequences. For example, Mark Zuckerberg didn't start Facebook with the anticipation for third-party abuse and political interference to run rampant on the platform. This panel will discuss the roadmap and guiding principle to create a socially responsible innovation for climate change mitigation and adaptation.

Session C3, Fri. May 19, 2:45 – 4:15 PM, WALC 2088 - Papers: Developing and Negotiating AI Guidelines and Governance

Chair: **Elaine Englehardt**, Utah Valley University

1. *Exploring Approaches to Artificial Intelligence Governance: From Ethics to Policy*, **Dayoung Kim** (Virginia Tech), **Qin Zhu** (Virginia Tech) and **Hoda Eldardiry** (Virginia Tech)

Abstract. There has been a trend among various stakeholders for AI governance, such as the government, industry, and academia, that advocates for a shift from AI ethics to AI policy. In this paper, we briefly introduce the motivation for such a change and two complementary reports about AI ethics policy development to help AI ethics researchers operationalize abstract AI ethics principles into actionable policy items. We also discuss the implications of the policy approach to AI governance for training the next generation of AI professionals.

2. *Design of an Ethical Framework for Artificial Intelligence in Cultural Heritage*, **Sofia Pansoni** (University of Macerata), **Simona Tiribelli** (University of Macerata), **Marina Paolanti** (University of Macerata), **Emanuele Frontoni** (University of Macerata) and **Benedetta Giovanola** (University of Macerata)

Abstract. In recent years Artificial Intelligence (AI) has found its way into the creative and cultural industries, opening up new challenges and opportunities, poorly sufficiently explored today. However, when it comes to culture and creativity, many social and political cost factors should be taken into account. It is crucial to identify the opportunities that AI can offer in terms of the preservation, use, promotion, and accessibility of Cultural Heritage (CH). However, ethical concerns should be outlined when applying AI in cultural settings, such as for the digital replica of official UNESCO heritage sites or an unbiased explanation and interpretation of a work of art. This paper provides a first attempt to define the main ethical findings on this topic and propose it as an ethical framework to assess different risks arising from the use of AI in the CH domain. The application of this disruptive technology in the arts is evaluated through the lens of ethical principles for trustworthy AI and it explores whether the wider accessibility and improved preservation techniques enabled by AI come at some cost in terms of interpretation, social and cultural inclusion, subjectivism, or other forms of bias. The main ethical principles that emerge from the literature for the application of AI in the cultural domain are the following: Shared Responsibility, Meaningful Participation, Explainability, Accessibility, Sustainability, Reliability and Dignity. The findings underline the importance of establishing specific sectoral ethical guidelines for AI in the field of tangible and intangible CH to support and enhance its sustainable development without compromising its values, significance, sense of belonging and strong social impact.

3. *The potential for co-operatives to mitigate AI ethics catastrophes: perspectives from media analysis*, **David Marino** (McGill University) and **Ajung Moon** (McGill University)

Abstract. Would the world have seen less AI-related scandals if more AI companies operated as co-operatives? As a response to multiple high profile tech scandals within the last decade, there has been an increased call for introducing more accountability in the AI industry. However, it is unclear to what degree the proposed efforts have been or will be effective in practice. The question remains whether these incremental, multi-stakeholder AI ethics efforts are in fact trying to address a fundamentally systemic issue inherent to the existing corporate power structure. As an attempt to address this question, we gain an understanding of the major themes in high profile AI-related catastrophes in the last four years (2018-2021) through an inductive media analysis. We then investigate how the principle of democratic governance and distributive executive power – core to co-operative organization structure – could have prevented or mitigated the contributing factors of the reported events. We find that vast majority (71%) of the recent AI ethics scandals are not results of a lack of knowledge or tools, but attributed to power dynamics that hinder the ability of internal stakeholders from taking action. We present the co-operative governance structure as a possible mitigating solution to addressing future AI ethics catastrophes, and provide a critical look at practical challenges inherent to AI co-operatives.

Session C4, Fri. May 19, 2:45 – 4:15 PM, WALC 2121 – Workshop: STS Postures as a Framework for Teaching Ethics Throughout the Engineering Curriculum

Facilitators:

Nicole Mogul, Senior Lecturer, Electrical and Computer Engineering, University of Maryland

Tim Reedy, Lecturer, Science, Technology and Society, University of Maryland

Participants will walk away from this workshop with insights and confidence to apply a socio-technical systems (STS) approach (“STS Postures”) to engineering ethics. STS Postures calls for the design of learning experiences around three areas of practice: analytical approaches, data collection, and body/mind engagement, and is rooted in the interdisciplinary field of the same acronym, Science and Technology Studies (STS) (Tomblin and Mogul). Workshop attendees will practice STS thinking during interactive demonstrations of classroom-tested activities, debriefs for reflection and listening, and studio time during which they propose “tiny experiments” to test this approach in their own fields. No matter the participants’ disciplinary field, work setting, or type of class (capstone, introductory course, ethics-as-a-stand-alone class, upper-level electives, or fundamental principles of engineering) participants will imagine ways to operationalize this framework in pursuit of their workplace/classroom goals. More details at <https://attend.ieee.org/ethics-2023/sts-postures-as-a-framework-for-teaching-ethics-throughout-the-engineering-curriculum/>.

Break, Fri. May 19, 4:15 – 5:15 PM

**Poster Session, Fri. May 19, 5:15 – 6:30 PM, PMU North Ballroom (1st floor)**

1. **Kelly Laas** (Illinois Institute of Technology), **Rosalyn Berne** (University of Virginia), **Justin Hess** (Purdue University) and **Karin Ellison** (Arizona State University). *OEC Resources: Using and Submitting Resources.*
2. **Aidan McLoughney** (The University of Melbourne), **Jeannie Paterson** (The University of Melbourne), **Marc Cheong** (The University of Melbourne) and **Anthony Wirth** (The University of Melbourne). *'Emerging proxies' in information-rich machine learning: a threat to fairness?*
3. **Wenda Bauchspies** (National Science Foundation), **Alex Romero II** (National Science Foundation), **Jason Borenstein** (National Science Foundation) and **Michael Steele** (National Science Foundation). *Introduction to NSF's Ethical and Responsible Research (ER2) Program.*
4. **Athena Lin** (Purdue University) and **Justin Hess** (Purdue University). *Developing a Method to Distinguish Between Normative and Ethical Behaviors in Engineering.*
5. **Désirée Martin** (Karlsruhe Institute of Technology), **Michael W. Schmidt** (Karlsruhe Institute of Technology) and **Rafaela Hillerbrand** (Karlsruhe Institute of Technology). *Implementing AI Ethics in the Design of AI-assisted Rescue Robots.*
6. **Lucas J. Wiese** (Purdue University), **Daniel S. Schiff** (Purdue University) and **Alejandra J. Magana** (Purdue University). *Being Proactive for Responsible AI: Analyzing Multiple Sectors for Innovation via Systematic Literature Review.*
7. **Kantwon Rogers** (Georgia Institute of Technology) and **Ayanna Howard** (The Ohio State University). *Tempering Transparency for Human-Robot Interaction.*
8. **Ziqing Li** (Purdue University), **Ike Obi** (Purdue University), **Shruthi Sai Chivukula** (Indiana University), **Matthew Will** (Purdue University), **Janna Johns** (Purdue University), **Anne C. Pivonka** (Purdue University), **Thomas Carlock** (Purdue University), **Ambika R. Menon** (Srishti Institute of Art, Design, and Technology), **Aayushi Bharadwaj** (Srishti Institute of Art, Design, and Technology) and **Colin M. Gray** (Purdue University). *Co-designing Ethical Supports for Technology Practitioners.*
9. **Elizabeth Strehl** (University of Michigan), **Megan Ennis** (University of Michigan), **Corin Bowen** (California State University, Los Angeles) and **Aaron Johnson** (University of Michigan). *Macroethics in Aerospace Engineering: Implementing Ethics Lessons into Undergraduate Courses and Analyzing Student Perceptions of Issues within the Discipline.*
10. **Ayse Ocal** (Syracuse University). *Perceptions of AI Ethics on Social Media.*
11. **Lazlo Stepback** (Purdue University) and **Brent Jesiek** (Purdue University). *Early Career Engineers' Perception of Social Justice in Engineering.*
12. **Davis Chacon Hurtado** (University of Connecticut), **Shareen Hertel** (University of Connecticut), **Alexandra Paxton** (University of Connecticut), **Daniel Burkey** (University of Connecticut), **Minju Lee** (University of Connecticut) and **Sophie Fenn** (University of Connecticut). *Teaching Engineering for Human Rights: Understanding attitudes and motivations of college students towards society, engineering, and human rights. .*
13. **Maya Menon** (Virginia Tech) and **Marie Paretti** (Virginia Tech). *Comparative Study on Faculty Decision-Making in Engineering Education for Sustainable Development.*
14. **Pablo Rivas** (Baylor University), **Jorge Ortiz** (Rutgers University), **Daniel A. Diaz-Pachon** (University of Miami) and **Laura N. Montoya** (Accel AI). *Bridging Industry, Government, and Academia for Socially Responsible AI: The CSEAI Initiative.*
15. **Ashish Hingle** (George Mason University) and **Aditya Johri** (George Mason University). *Using Fictional Role-Plays for Engineering and Computing Ethics Instruction.*

Dinner, Fri. May 19, 6:30 – 8:00 PM, PMU North Ballroom (1st floor)

Saturday May 20 – Morning

Registration, Sat. May 20, 7:45 AM – 12:00 Noon, WALC 1087 (Hospitality Room)

Breakfast, Sat. May 20, 7:45 – 8:30 AM, WALC 1087 (Hospitality Room)

Plenary Session, Sat. May 20, 8:30 – 10:00 am, WALC 1018 *Thinking Like an Engineer: Twenty-Five Years Later*

This year marks the 25th Anniversary of the publication of Michael Davis' seminal book on engineering ethics, *Thinking Like an Engineer: Studies in the Ethics of a Profession*. In this session the author and three commentators will discuss the book, its impact on engineering ethics scholarship and teaching, and how well it has held up over the past quarter century.

Chair: **Justin Hess**, Purdue University (ETHICS-2023 Co-Program Chair)

Author: **Michael Davis**, Senior Fellow at the Center for the Study of Ethics in the Professions and Emeritus Professor of Philosophy, Illinois Institute of Technology

Commentators:

Dayoung Kim, Assistant Professor of Engineering Education, Virginia Tech

Colleen Murphy, Roger and Stephany Joslin Professor of Law and Director, Women and Gender in Global Perspectives Program, University of Illinois Urbana-Champaign

Michael Pritchard, Professor Emeritus of Philosophy, Western Michigan University



Michael Davis is Senior Fellow at the Center for the Study of Ethics in the Professions and Emeritus Professor of Philosophy, Illinois Institute of Technology, Chicago, IL 60616, USA. Among his recent publications are “Marketing Body Parts: Morality, Law, and Public Opinion”, in Anja Matwijkiw (ed.), Special Issue “Paving the Biolaw Path in International Criminal Law”, *International Criminal Law Review* 17 (2017): 1102– 1115; *Engineering as a Global Profession*, Rowan & Littlefield: Lanham, Maryland, 2021; *Codes of Ethics and Ethical Guidelines: Emerging Technologies, Changing Fields*, ed. (with Kelly Laas and Elisabeth Hildt), Springer, 2022.

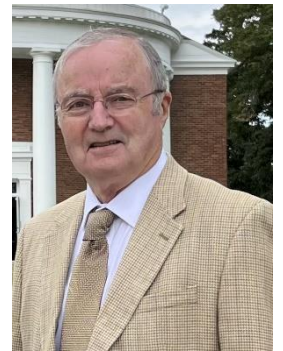
Dayoung Kim is an Assistant Professor in the Department of Engineering Education at Virginia Tech. She is broadly interested in engineering practice (e.g., practices and experiences of engineers across various employment settings, including business organizations), engineering ethics (e.g., social responsibility of engineering professionals), and related policy concerns. She received her Ph.D. in Engineering Education at Purdue University (2022) and her B.S. and M.S. in Chemical Engineering at Yonsei University (2017) and Purdue University (2021) respectively. She was the 2022 Christine Mirzayan Science & Technology Policy Graduate Fellow of the National Academies of Sciences, Engineering, and Medicine.





Colleen Murphy is the Roger and Stephany Joslin Professor of Law, Professor of Philosophy and of Political Science, and Director of the Women and Gender in Global Perspectives Program in the Illinois Global Institute. She is the author of two books and more than 70 peer-review journal articles, law review articles, and anthologized book chapters; and co-editor of three volumes on engineering ethics. Professor Murphy is an Associate Editor of the Journal of Ethics and Social Philosophy, Journal of Moral Philosophy, and Science and Engineering Ethics, and serves on the Editorial Boards of Ethical Theory and Moral Practice, Law and Philosophy, Sustainable and Resilient Infrastructure, and the Palgrave Handbooks in the Philosophy of Law Book Series.

Michael S. Pritchard is Emeritus Professor of Philosophy and former Co-director of the Center for the Study of Ethics in Society at Western Michigan University. BA, Alma College; PhD, University of Wisconsin. Former director of NSF projects on engineering ethics, ethics in pre-college science teaching, and research ethics. Former co-editor of Teaching Ethics. Among his recent publications are: Professional Integrity (2007) (Kansas); Engineering Ethics: with C.E. Harris, Michael Rabins, Ray James, Elaine Englehardt (Cengage: 1995, 2000, 2005, 2009, 2013, and 2019); Ethics Across the Curriculum, co-ed. With Elaine Englehardt (Springer: 2018); Everyday Greed: Assessment and Appraisal, with Elaine Englehardt (Springer: 2021); Importance of Sentiment in Promoting Reasonableness in Children, (Anthem, 2022).



Justin L Hess is an assistant professor in the School of Engineering Education at Purdue University. His vision is to inspire change in engineering culture to become more socially responsive, environmentally friendly, and inclusive, thereby providing opportunities for all current and prospective engineers to reach their maximum potential. Dr. Hess's research focuses on empathic and ethical formation in engineering education. He received his PhD from Purdue's School of Engineering Education, as well as a Master of Science and Bachelor of Science from Purdue's School of Civil Engineering. He is the editorial board chair for the Online Ethics Center, deputy director for research for the National Institute of Engineering Ethics, and past-division chair for the ASEE Liberal Education/Engineering and Society division.

Refreshment Break, Sat. May 20, 10 – 10:30 AM, WALC 1087 (Hospitality Room)

Session D1, Sat. May 20, 10:30 AM - Noon, WALC 2124 – Open Forum: Building a Technology Ethics Community

Facilitators:

Thomas Creely, Director, Ethics and Emerging Military Technology Graduate Program, U.S. Naval War College

Heather Love, English Language and Literature, University of Waterloo

Jason Borenstein, School of Public Policy, Georgia Tech

Ketra Schmitt, Concordia University

Scribe: **Marc Cheong**, Computing and Information Systems, University of Melbourne

This session will be an open forum where audience members will be invited to participate in discussions of a number of themes with relevance to ethics and technology and to future conferences in the IEEE ETHICS series. Depending on attendance, the discussions may take place in small groups. More details at <https://attend.ieee.org/ethics-2023/building-a-technology-ethics-community-an-open-forum/>.

Session D2, Sat. May 20, 10:30 AM - Noon, WALC 2051 – Panel: The Role of Human Rights in the Global Helix for Technology Innovation and Justice

Moderators: **Davis Chacon-Hurtado**, University of Connecticut; **Kelly Bohrer**, University of Dayton; **Shareen Hertel**, University of Connecticut

Panelists:

Mic Johnson, Technology, Data, and Architecture at BNY Mellon (industry representative)

Theresa Harris, Program Director of the AAAS Center for Scientific Responsibility and Justice, American Association for the Advancement of Science

Anja Lanz, Design Engineer for Haakon Industries Ltd. Founder and CEO of Global Women in STEM

Molly Land, Catherine Roraback Professor of Law, University of Connecticut (academia representative)

Discussant: **Dan Burkey**, Associate Dean for Undergraduate Education and Diversity, University of Connecticut

Engineering and technological developments are at the core of societal change, influencing and being influenced by society's cultural, political, economic, and socio-technical contexts. However, various engineering educators and philosophers have pointed out that traditional engineering ethics education tends to focus on micro-ethics rather than macro-ethical issues. Therefore, this panel aims to discuss the broader implications of engineering and technology in society using a human rights framework. The United Nation's Universal Declaration of Human Rights has served as a globally recognized standard that briefly outlines the fundamental rights, including life and liberty, and the right to work and education, among other civil, political, economic, social, and cultural rights. Those rights are realized within systems where governments and industry play a key role as duty-bearers, and academia plays a crucial role in educating and researching ethical principles and promoting and protecting human rights. All three form part of the triple helix innovation model, where a common theme is the protection and promotion of human rights.

This panel will discuss not only critical thinking perspectives and tools necessary for interpreting engineering obligations in relation to codes of professional ethics and the duty to hold paramount the safety, health, and welfare of the public but also illustrate successful case studies where engineering has become essential to achieve human rights for everyone. Attendees will learn about a new framework to assess and guide engineering ethics based on human rights, learn about successful case studies of their implementation in technology innovation and application, and hear about industry, academia, government, and professional organizations' perspectives on the role of human rights within the global innovation helix

Session D3, Sat. May 20, 10:30 AM - Noon, WALC 2088 - Papers: Implementing "Ethics by Design"

Chair: **Cindy Rottmann**, University of Toronto

1. *Auditing Practitioner Judgment for Algorithmic Fairness Implications*, **Ike Obi** (Purdue University) and **Colin M. Gray** (Purdue University)

Abstract. The development of Artificial Intelligence (AI) systems involves a significant level of judgment and decision making on the part of engineers and designers to ensure the safety, robustness, and ethical design of such systems. However, the kinds of judgments that practitioners employ while developing AI platforms are rarely foregrounded or examined to explore areas practitioners might need ethical support. In this short paper, we employ the concept of design judgment to foreground and examine the kinds of sensemaking software engineers use to inform their decisionmaking while developing AI systems. Relying on data generated from two exploratory observation studies of student software engineers, we connect the concept of fairness to the foregrounded judgments to implicate their potential algorithmic fairness impacts. Our findings surface some ways in which the design judgment of software engineers could adversely impact the downstream goal of ensuring fairness in AI systems. We discuss the implications of these findings in fostering positive innovation and enhancing fairness in AI systems, drawing attention to the need to provide ethical guidance, support, or intervention to practitioners as they engage in situated and contextual judgments while developing AI systems.

2. *A Quantitative Model for the Assessment of Ethics Risks in Information Technology*, **Giulia Rafaiani** (Marche Polytechnic University), **Giorgia Barchiesi** (Marche Polytechnic University), **Ludovica Ilari** (University of Macerata), **Marco Baldi** (Marche Polytechnic University) and **Benedetta Giovanola** (University of Macerata)

Abstract. The management of sensitive and personal data in the healthcare sector must guarantee the widest respect of patients' fundamental rights. However, some quantitative evaluation framework for assessing the level of ethical compliance of a technology to the most important ethical principles is still missing. In this work, we first provide a model to quantitatively assess constitutive ethics, i.e., the intrinsic ethical compliance of a technology. Secondly, we propose a method for quantitatively assessing circumstantial ethics risks of a technology, when used in some specific context. Our ethics risk assessment model is based on the evaluation of the compliance of the technology to a defined set of controls about some ethical principles and about the robustness of the technological infrastructure underneath. Then, we validate our model by applying it to some recent health-related blockchain frameworks, and we compare a qualitative ethical assessment with the quantitative assessment made with the proposed model for constitutive ethics compliance. Through our assessment, we identify some technical choices that achieve the highest ethical scores, such as using a permissioned blockchain, off-chain storage, and encryption of data. Finally, we observe that the principles of privacy and data governance turn out to be the most satisfied ethical principles, contrary to fairness.

3. *Ethical Biases in Machine Learning-based Filtering of Internet Communications*, **Ludovica Ilari** (University of Macerata), **Giulia Rafaiani** (Marche Polytechnic University), **Marco Baldi** (Marche Polytechnic University) and **Benedetta Giovanola** (University of Macerata)

Abstract. The use of automated systems based on artificial intelligence and machine learning for filtering and moderating online communications has become commonplace. While this allows for high levels of efficiency and fine-grained control of malicious behaviors, it could also produce unintended disparities in treatment of legitimate users. In this paper, we aim at identifying some possible field-related biases in the well-known Google Perspective API machine learning-based engine for controlling Internet communications. For this purpose, we consider communications in the fields of health, trade, finance, and defense and build a dataset collecting Twitter-based online communications of the World Health Organization (WHO), World Trade Organization (WTO), International Monetary Fund (IMF) and North Atlantic Treaty Organization (NATO). Collected data are then analyzed through Perspective API to assign them an alleged likelihood of being abusive for specific emotional concepts, referred to as attributes. Upon analysis, discrimination between the considered fields is identified for all attributes ($p \leq 0.05$). By showing that Perspective API creates discrimination for field-related content as a result of semantic biases in the data, this research highlights the need for an ethically sound design of these systems, following an ethics by design approach.

Session D4, Sat. May 20, 10:30 AM - Noon, WALC 2121 – Workshop: Taking ‘day to day’ ethics seriously outside the academy: Experiences from STS and Communication

Facilitators:

Megan Kenny Feister, California State University Channel Islands
Sean Michael Ferguson, California State University Channel Islands
Patrice Buzzanell, University of South Florida
Carla Zoltowski, Purdue University

The Liberal Education / Engineering and Society Division of ASEE has evolved with the needs of the engineering community to ensure our students and professional engineers are given holistic training that is more than technical proficiency. In that evolution, members of the LEES division bring a diversity of expertise as scholars, activists, and teachers to contend with the ethical, political, and cultural complexity of technoscience. Yet, the efforts in the LEES division do not often move beyond the classroom, leaving a gap in our understanding in how to learn with industry and professional societies to support our work on “Ethics in the Global Innovation Helix.”

Our workshop acts as an open space for dialogue with participants as we consider the “day to day ethics” in our learning and work communities. Our moderators will facilitate discussions and share some of their experiences where relevant. More details at <https://attend.ieee.org/ethics-2023/taking-day-to-day-ethics-seriously-outside-the-academy-experiences-from-sts-and-communication/>.

Saturday May 20 – Afternoon

Lunch on Your Own, Sat. May 20, 12:00 – 1:15 PM

Session E1, Sat. May 20, 1:15 – 4:30 PM, WALC 2124 – INES Intersections: Connecting International Engineering Studies Scholars

Do you study engineers and/or engineering practice? Are you looking for opportunities to connect with others doing similar work? If so, join us for this networking and professional development workshop, which will provide opportunities for Engineering Studies scholars to revitalize our connections with one another and promote avenues for future research. The International Network for Engineering Studies (INES) is an international community of scholars who study the historical, social, cultural, political, philosophical, rhetorical, and organizational aspects of engineers and engineering. Part community-building, part professional development, we hope to use the workshop to get to know more of our members, connect our members with each other, and highlight opportunities for funding and publication with various organizations and outlets. The event schedule will be divided into three parts: Publishing, Networking, and Funding Opportunities. NOTE: This workshop is co-located with ETHICS-2023, and we kindly request that all participants have an active INES membership/subscription for 2023.

Session E2, Sat. May 20, 1:15 – 2:45 PM, WALC 2051 – Panel: 4 + 1: The Impacts of Academia, Industry, Government and Civil Society on Sustainable Development (Sponsored by IEEE TechEthics Program)

Moderator: **Mark A. Vasquez**, IEEE TechEthics

Panelists:

Sara Belligoni, Rutgers University-New Brunswick, affiliated with the Megalopolitan Coastal Transformation Hub

Kelly Bohrer, Executive Director, Ethos Center, University of Dayton

Britt Redd, City of Indianapolis Department of Metropolitan Development

Carson Reeling, Department of Agricultural Economics, Purdue University

The Quintuple Innovation Helix describes interactions between the education system, the economic system, governments, the public and the natural environment. This IEEE TechEthics panel session will showcase the interaction between the first four helices and the fifth. Featuring an interdisciplinary panel of experts, the goal of this joint session is to identify ways in which the Global Innovation Helix has contributed — and can continue to contribute — to the advancement of a sustainable global environment, with the intent of inspiring impactful collaborations and action.

Session E3, Sat. May 20, 1:15 – 2:45 PM, WALC 2088 - Papers: Identifying Social and Ethical Implications of Technological Innovations

Chair: **Michael Loui**, University of Illinois Urbana-Champaign

1. *Ethical issues of community-driven blockchain systems*, **Signe Agerskov** (IT University of Copenhagen), **Migle Laukyte** (Universidad Pompeu Fabra) and **Roman Beck** (IT University of Copenhagen)

Abstract. This paper discusses the innovation and development of public-permissionless blockchain systems in the context of the triple helix model and its subsequent versions. We argue that the triple helix model fails to explain the bottom-up and community-driven innovation of this technology, which does not rely on any of the primary institutions presented in the helix models. The absence of these institutions affects the ethics of the innovation as it is left to the developers to make ethics-related design choices, which might clash with general ethical norms and values established and protected by the primary institutions. Ethical issues of public-permissionless systems are often characterized by being unaccountable and immutable, as there is no single data controller. Such design decisions can therefore have a long-term negative effect on society.

2. *Social Implications of Technological Disruptions*. **Pedro H. Albuquerque** (Aix-Marseille Université) and **Sophie Albuquerque** (Université de Sherbrooke).

Abstract. In this article we argue that the disruptive social implications of skill-replacing technological innovations are determined neither by human characteristics, such as “low skills” or “low cognition,” nor by task characteristics, such as “routine,” as it is typically assumed in the predominant economics and management science literature, but by the cybernetic characteristics of the innovations. We also propose that the negative effects of technological disruptions on human well-being cannot be fully understood without the use of a transdisciplinary approach involving cybernetics science and occupational science, and that it is urgent that policymakers look beyond their narrow effects on productivity and on the labor force, and consider instead the complexity of the interactions between cybernetic technologies and meaningful human occupations.

3. *COVID Down Under: where did Australia's pandemic apps go wrong?* **Shaanan Cooney** (University of Melbourne) and **Marc Cheong** (University of Melbourne)

Abstract. Governments and businesses worldwide deployed a variety of technological measures to help prevent and track the spread of COVID-19. In Australia, these applications contained usability, accessibility, and security flaws that hindered their effectiveness and adoption. Australia, like most countries, has transitioned to treating COVID as endemic. However it is yet to absorb lessons from the technological issues with its approach to the pandemic. In this short paper we a) provide a systematization of the most notable events; b) identify and review different failure modes of these applications; and c) develop recommendations for developing apps in the face of future crises. Our work focuses on a single country. However, Australia’s issues are particularly instructive as they highlight surprisingly pitfalls that countries should address in the face of a future pandemic.

Session E4, Sat. May 20, 1:15 – 2:45 PM, WALC 2121 – Tutorial: AI Safety, Governance, and Alignment

Facilitators:

Sherri Lynn Conklin, Post Doctoral Fellow, Public Policy, Georgia Tech

Gaurav Sett, Graduate Student (MS in Computer Science), Georgia Tech

Topic Overview: The field of AI safety, governance, and alignment (SGA) is concerned with questions about how to integrate AI with human values. Topics in this area deal with (1) the transformative capabilities of AI within the global innovation helix; (2) the difficulty of controlling AI, esp. with regard to designing & setting goals, and interpreting & explaining AI behavior; and (3) the difficulty of governing AI, esp. with regard to establishing policies that ensure we develop beneficial AI and implementing practices across the broad domains of the global innovation helix to prevent catastrophic outcomes for humanity. With this in mind, one of the greatest tools that we have for obviating any risk to humanity is to educate technologists so that they can implement strategies during the design and testing phases of AI, prior to release.

Tutorial Overview: We propose a 90 min. discussion-focused, workshop-tutorial with hands-on components on SGA, which falls into the general category of Innovation and Ethics Education. More details at <https://attend.ieee.org/ethics-2023/ai-safety-governance-and-alignment-tutorial/>.

Break, Sat. May 20, 2:45 – 3:00 PM, , WALC 1087 (Hospitality Room)

Session F2, Sat. May 20, 3:00 – 4:30 PM, WALC 2051 – Panel: The Quintuple Helix: Promoting Innovation for Impactful Socio-Ecological Interactions (Sponsored by IEEE Standards Association)

Moderator: **John Havens**, IEEE Standards Association

Panelists:

Yu Yuan, IEEE SA President

Michael Davis, CEO of Merck Security Solutions

Gabrielle Aruta, Owner / Director, Filo Sofi Arts

A key aspect of sustainable development focuses on the need to define and communicate what actions are needed to increase environmental flourishing. However, biases often exist where one set of experts representing a certain type of knowledge relevant to their community do not engage with actors representing other types of knowledge. In terms of environmental concerns, this means policy makers may not interact directly with academics, or engineers may not interact directly with lawyers when discussing key areas of sustainability or potential solutions to address climate adaptation or mitigation. This lack of knowledge sharing requires innovation and systems thinking to best address planetary and human needs.

As a means of examining and confronting this issue, this panel will bring together technology and metaverse expert, **Yu Yuan** (president of IEEE Standards Association), cybersecurity executive, **Michael Davis** (CEO of Merck Security Solutions), and art gallery owner, art advisor and philosopher, **Gabrielle Aruta** (Owner / Director, Filo Sofi Arts) to discuss how to foster interdisciplinary dialogue to achieve pragmatic actions towards sustainable development at the intersection of the Quintuple Helix. Moderated by **John C. Havens**, Sustainability Practice Lead and Staff Lead of Planet Positive 2030 for the IEEE Standards Association.

Session F4, Sat. May 20, 3:00 – 4:30 PM, WALC 2121 – Workshop: I can’t teach ethics, I’m not an ethicist: Transforming STEM ethics education begins with engaging faculty as ethical subjects

Facilitators: **Mary F. Price**, Director of Teaching and Learning, The Forum on Education Abroad
Grant A. Fore, Research Associate, STEM Education Innovation and Research Institute, IUPUI
Justin Hess, Assistant Professor, Engineering Education, Purdue University
Elizabeth Sanders, Graduate Research Assistant, Engineering Education, Purdue University
Brandon Sorge, Associate Professor, School of Engineering & Technology, IUPUI
Martin Coleman, Associate Professor, Philosophy, IUPUI

Workshop Objective: Participants will (1) engage in sample activities used as part of a faculty learning community (FLC) intended to promote the teaching and integration of ethics and Community-Engaged Learning (CEL) across two STEM departments, and (2) consider opportunities/contexts for adaptation in their own faculty development efforts.

Workshop Overview: The workshop introduces and simulates aspects of an institutional transformation project centered on fostering sustainable changes in and departmental support for STEM ethics curriculum design and delivery. Participants will engage in sample activities used in the project to support shifts in perspective about ethics, reflection and CEL among participating faculty and will consider opportunities/contexts for adaptation in their own faculty development efforts. More details at <https://attend.ieee.org/ethics-2023/i-cant-teach-ethics-im-not-an-ethicist-transforming-stem-ethics-education-begins-with-engaging-faculty-as-ethical-subjects/>.



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Parallel Session Subject Index

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- B1 - Panel: Perspectives from Liberal Arts on the Practical Turn in AI Ethics
- C3 - Papers: Developing and Negotiating AI Guidelines and Governance
- E4 - Tutorial: AI Safety, Governance, and Alignment

Engineering Education and Practice

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- B2 - Papers: Bridging the Social and the Ethical in Engineering
- C4 - Workshop: STS Postures as a Framework for Teaching Ethics Throughout the Engineering Curriculum
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- D2 - Panel: The Role of Human Rights in the Global Helix for Technology Innovation and Justice
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- F4 - Workshop: I can't teach ethics, I'm not an ethicist: Transforming STEM ethics education begins with engaging faculty as ethical subjects

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- C1 - Panel: Careers in Technology Ethics
- D1 - Open Forum: Building a Technology Ethics Community
- D3 - Papers: Implementing "Ethics by Design"

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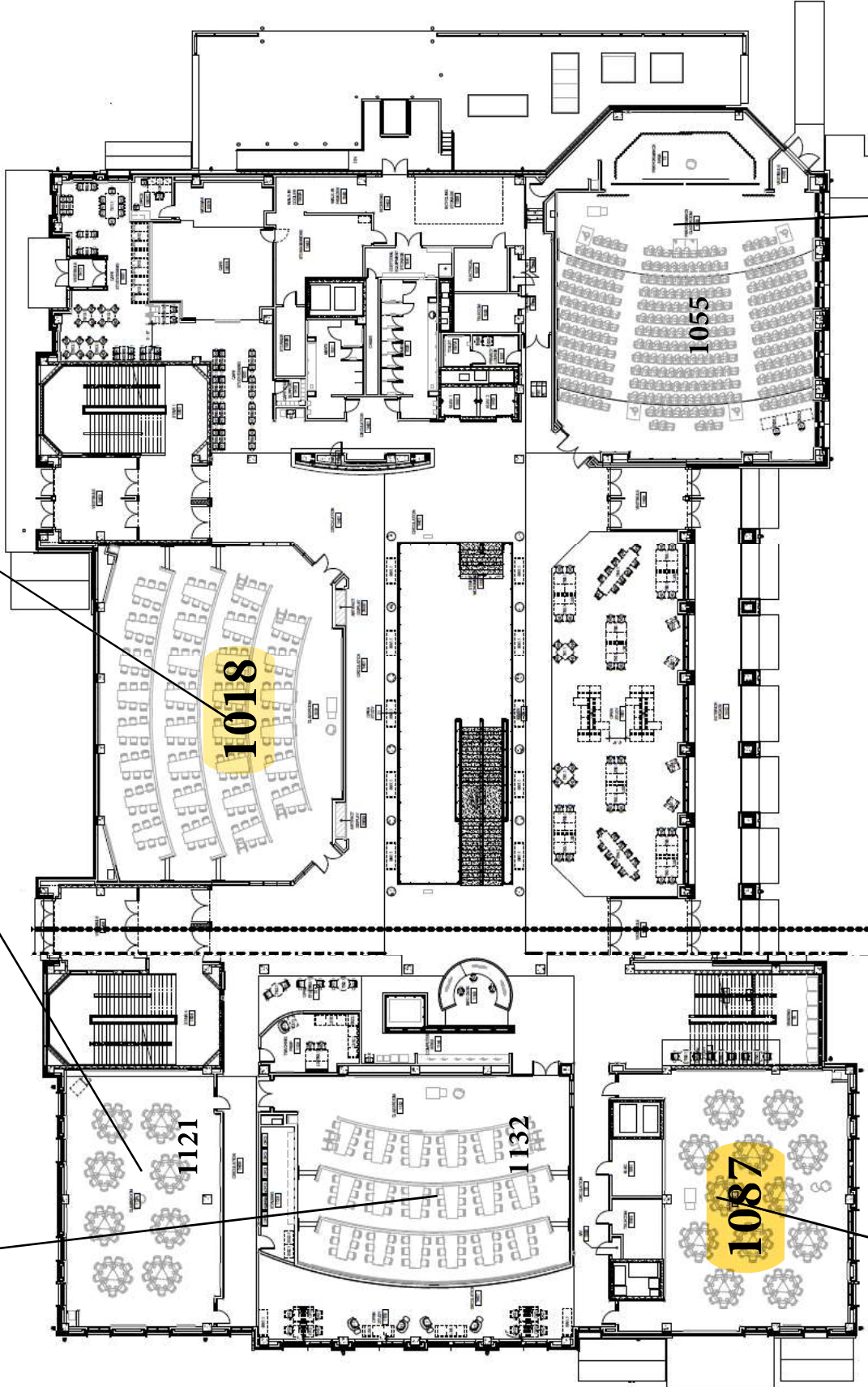
The Society for Ethics Across the Curriculum

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BoilerUp
108 Sta.
Wedge Tables for 6
Dual Projection 1 End

SCALE-UP
72 Sta. High-Tech
8 Flat Panels
Dual Proj. Both Ends

BoilerUp
180 Sta.
Wedge Tables for 6
Dual Projection 1 End



SCALE-UP
108 Sta.
Loose 120° Tables
Dual Proj. Both Ends

Wilmett Active Learning Center
FIRST FLOOR

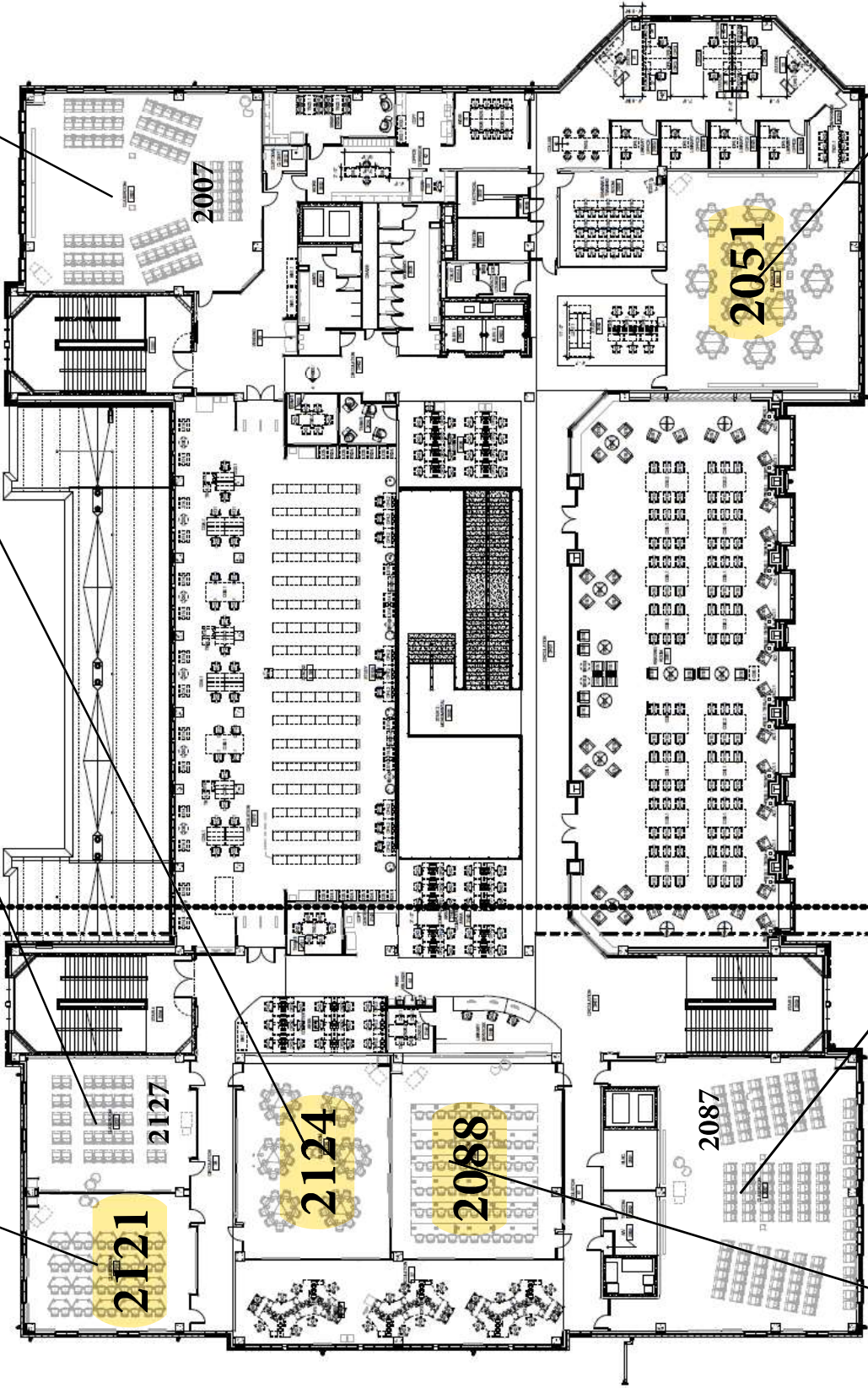
Performance
329 Sta.
Theatre Seating
Dual & 16:10 Projection

Mobile Tablet Chairs
90 Sta.
Dual Projection 1 End

SCALE-UP
54 Sta. High-Tech
Loose 120° Tables
6 Flat Panels

Mobile Tablet Chairs
45 Sta.
3 Flat Panels, 1 Touch

Flexible
40 Sta.
Loose Trapezoid Tables
2 Flat Panels, 1 Touch



6Round Mobile
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Loose Trapezoid Tables
Dual Proj. Both Ends

**Wilmeth Active Learning Center
SECOND FLOOR**

Mobile Tablet Chairs
126 Sta.
Dual Projection 1 End

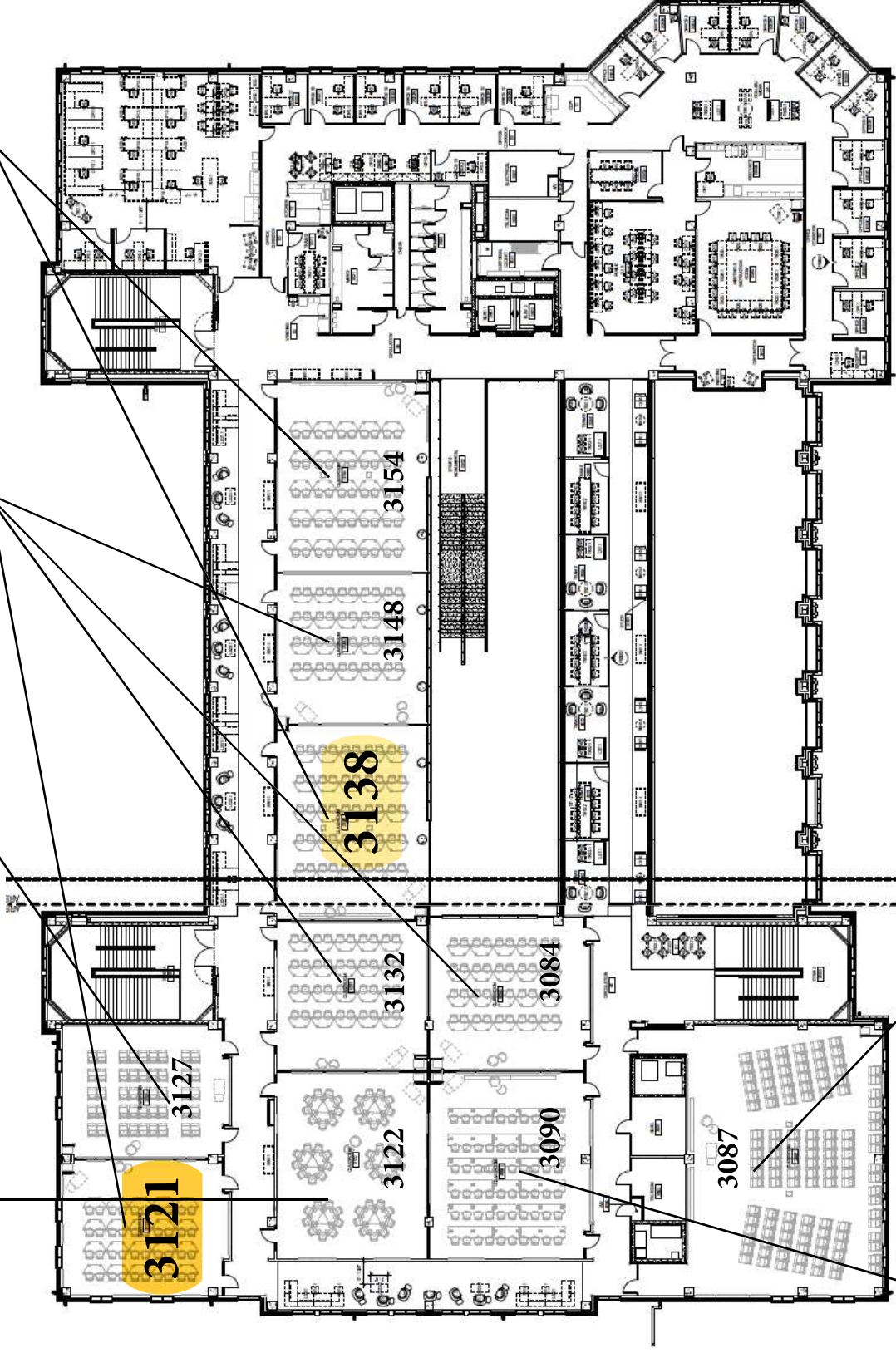
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66 Sta.
Built-In Tables
Dual Projection 1 End

SCALE-UP
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Loose 120° Tables
6 Flat Panels

Mobile Tablet Chairs
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3 Flat Panels, 1 Touch

Flexible (4)
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Loose Trapezoid Tables
2 Flat Panels, 1 Touch

Flexible (2)
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Loose Trapezoid Tables
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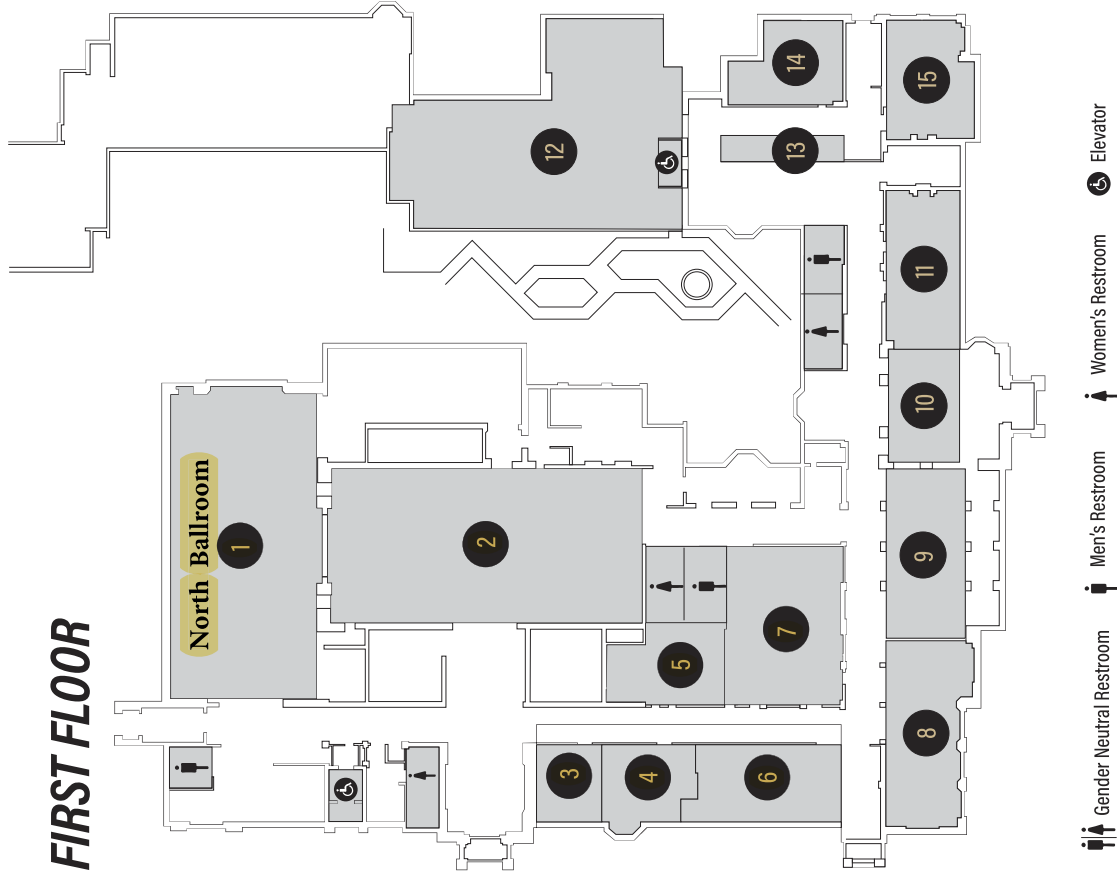


Turn2Team
60 Sta.
Built-In Tables
Dual Projection 1 End

Mobile Tablet Chairs
126 Sta.
Dual Projection 1 End

Wilmeth Active Learning Center
THIRD FLOOR

FIRST FLOOR



PURDUE MEMORIAL UNION™

EVENT VENUES

- 1 North Ballroom
- 2 South Ballroom
- 8 West Main Lounge
- 9 East Main Lounge
- 10 Great Hall (Info Desk)
- 11 118 Lounge
- 12 Union Club Hotel Lobby

RETAIL TENANTS

- 3 UPS® Store
- 4 Fidelity® Investments
- 5 Purdue Federal Credit Union
- 6 Evans, Piggot and Finney Eye Care
- 7 Amazon @ Purdue

FOOD VENUES

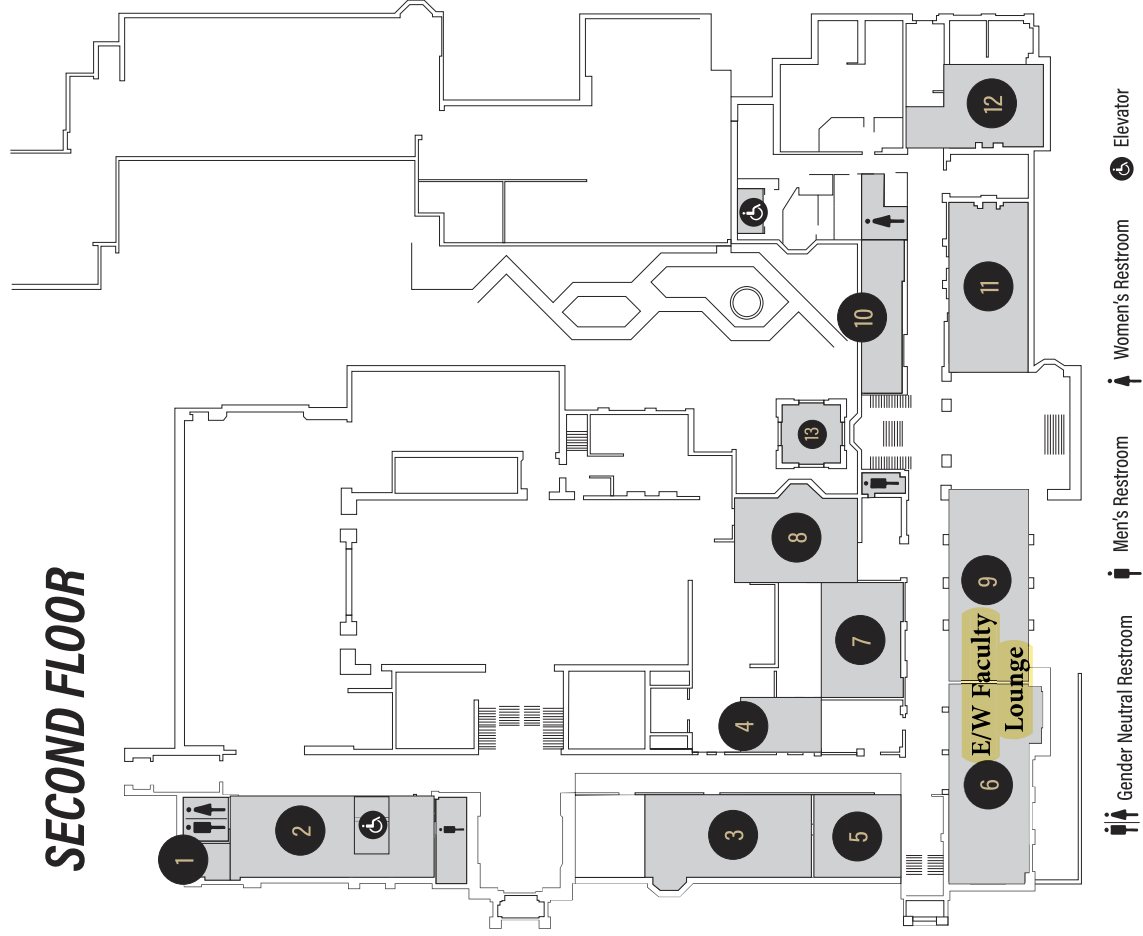
- 13 Leaps Coffee
- 14 Boiler Up Bar
- 15 8Eleven Modern Bistro



FIRST FLOOR

- Gender Neutral Restroom
- Men's Restroom
- Women's Restroom
- Elevator

SECOND FLOOR



PURDUE MEMORIAL UNION™

EVENT VENUES

- 1 288 Meeting Room
- 4 263 Meeting Room
- 5 256/258/260 Meeting Rooms
- 6 West Faculty Lounge
- 7 Director's Room
- 8 Sagamore Meeting Room
- 9 East Faculty Lounge
- 12 Anniversary Drawing Room
- 13 South Tower

OFFICE SUITES

- 2 Veteran Success Center
- 3 Purdue Student Union Board
- 10 Administration Office
- 11 UCH Sales & Event Services



SECOND FLOOR