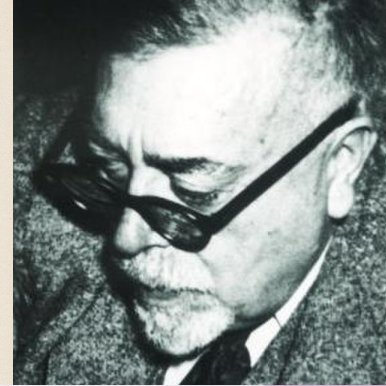




CYBERNETICS

OR CONTROL AND
COMMUNICATION
IN THE ANIMAL
AND THE MACHINE

Norbert Wiener
PROFESSOR OF MATHEMATICS
THE MASSACHUSETTS INSTITUTE
OF TECHNOLOGY



2023 IEEE Workshop on Norbert Wiener in the 21st Century

The Future of Work in the Age of Automation

Purdue University, 18 May 2023

Event Organizers: Greg Adamson, Brent Jesiek, Heather A. Love, Iven Mareels, Michael Rigby

iee.org



What is 21CW2023?

Workshop Overview



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. 21CW2023 will take place on **Thursday, 18 May 2023**, as a pre-conference event in affiliation with IEEE ETHICS 2023.

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 3–4 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.

21CW2023 Schedule

Location: Purdue University, WALC 3138 (map [HERE](#))



Morning Sessions

- ▶ 8:30 – 9:00: *Meet/Greet/Eat*
 - Coffee, tea, light breakfast available
- ▶ 9:00 – 10:30: Session 1
 - Welcome: Greg Adamson
 - Workshop Logistics Overview: Iven Mareels
 - Speakers: Heather A. Love, Daniel S. Schiff, Mallory James, Jeremy Reynolds
- ▶ 10:30 – 10:45: *Short Break*
- ▶ 10:45 – 12:00: Session 2
 - Speakers: Jason Lajoie, Thirumala Arohi, Stéphanie Camaréna
- ▶ 12:00 – 1:00: *Lunch (provided in WALC 3121)*

Afternoon Sessions

- ▶ 1:00 – 2:20: Session 3
 - Speakers: Greg Adamson, Ketra Schmitt, Zach Pearl
- ▶ 2:20 – 2:40: *Short Break*
- ▶ 2:40 – 4:00: Session 4
 - Speakers: Marten Kaevats, John Buchanan, Iven Mareels
- ▶ 4:00 – 4:30: Session Wrap-up
 - Facilitators: Greg Adamson, Iven Mareels, Heather A. Love
- ▶ 5:30 – 7:30: ***ETHICS-2023 Opening Reception and Plenary (Debbie Chachra)***



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21CW2023 Detailed Schedule

Speakers will present for approximately 5-minutes each.

The remainder of each session will be dedicated to a moderated discussion based on questions posed by the speakers.

Session 1 (9:00 – 10:30 am)

Welcome Remarks: **Greg Adamson**

Workshop Logistics Overview: **Iven Mareels**

1.1 **Heather A. Love**: “Applying Wiener's Thinking Today: Technologists' Ethical Obligations”

1.2 **Daniel S. Schiff**: “How will AI impact worker well-being: Beyond harmful substitution or beneficial complementarity”

1.3 **Mallory James**: “Thinking beyond “the systemic edge”: Observed difficulties for experts in comprehending and responding to industrial change”

1.4 **Jeremy Reynolds**: “Thank Goodness for Bad Jobs?”

Applying Wiener's Thinking Today: Technologists' Ethical Obligations

Heather A. Love, University of Waterloo

Drawing on her work in the Norbert Wiener archives at MIT, Love's presentation constellates a series of examples from Wiener's published and unpublished writing that communicates his conviction in the ethical obligations that tech developers have to their society and the environment. Working from this mini-archive, she will sketch out a series of potential parallels between his responses to what he saw as unethical or irresponsible requests (e.g. to contribute to the creation of autonomous technology that would put humans out of work) and the types of questions, conundrums, and dilemmas that face tech developers today. She will invite workshop participants to explore the relevance and resonance of Wiener's approaches and frameworks for their own areas of work (academic, industry, or otherwise oriented) as well as for the sectors that their fields of interest implicate.

Heather A. Love is an assistant professor of English at the University of Waterloo, where she conducts interdisciplinary research and teaches courses on topics related to literature, culture, technology, health, and engineering education. This work has been funded by several SSHRC grants. Her first monograph, *Cybernetic Aesthetics: Modernist Networks of Information and Data*, is forthcoming from Cambridge University Press, and her work has appeared or is forthcoming in both literary studies venues and more tech-focused publications. Heather is an elected Member-at-Large on the Board of Governors for the IEEE Society on Social Implications of Technology (SSIT), an IEEE TechEthics Ambassador, and Associate Editor for the *IEEE Technology and Society Magazine* (TSM). She has been involved with the 21CW conference series since 2014 and has served as guest co-editor for special issues of TSM or Proceedings based on all three previous iterations of the conference.



How will AI impact worker well-being: Beyond harmful substitution or beneficial complementarity

Daniel S. Schiff, Purdue University

Public and scholarly discourse around AI is often marked by utopian and dystopian thinking. This is certainly true in the context of trying to anticipate the impact of AI and automation on labor. In recent years, the discussion is often framed as a binary one: technological substitution of jobs is 'bad,' and technological complementarity is 'good.' This talk complicates this narrow story, focusing on the diverse and mixed possible impacts of AI on worker well-being. I discuss five non-exclusive hypotheses: that advanced AI in labor will lead to 1) creative freedom, 2) cognitive overload, 3) loss of meaning, 4) surveillance and control, or 5) job insecurity. In light of recent advancements that have shifted the frontiers of AI's impacts on tasks and skills, this talk hopes to spur debate about the complex factors influencing how work could evolve, and the agency we have to shape this trajectory.

Daniel S. Schiff is an Assistant Professor of Technology Policy at Purdue University and is currently on industry leave serving as Responsible AI Lead at JP Morgan Chase. At Purdue, he is co-director of the Governance and Responsible AI Lab where he studies the formal and informal governance of AI through policy and industry, as well as AI's social and ethical implications in domains like education, labor, and criminal justice. Daniel studied Philosophy at Princeton University before completing an MS in Social Policy at the University of Pennsylvania and a PhD in Public Policy from the Georgia Institute of Technology.



Thinking beyond “the systemic edge”: Observed difficulties for experts in comprehending and responding to industrial change

Mallory James, Technical University of Munich

In this talk, I bring Wiener’s moral urgency regarding automation together with Saskia Sassen’s concepts of “expulsions” and “the systemic edge.” Many are concerned with the loss of dignity, meaning, and livelihood for those who, as Sassen describes, “cease being of value as workers and consumers” (2014:10) and are “expelled” from life-giving systems. Such processes create a quandary: experts are called upon to pragmatically organize, optimize, and care for the system that remains, yet are also socially pressured to self-describe as holistic thinkers. We become at risk of assuming our categories are more holistic than they actually are. I use two examples from my social research to explore how the very categories by which we conduct knowledge-work may endanger our abilities to think beyond the systems in which our own expertise is nurtured. Doing so reaffirms Wiener’s concerns about technological change, while updating cybernetics-era reflections on expert roles and limits.

Mallory James is a Postdoctoral Research Associate at the Technical University of Munich, who received her PhD in Anthropology from University of Chicago. She studies how technoscientific institutions configure definitions of responsibility for innovations that can become publically known as harmful, thereby pursuing engineering studies research contextualized within political-economic analysis. Mallory is currently working on a book project regarding knowledge cultures and technological change in Australian carbon capture and storage engineering, based on extended ethnographic fieldwork. In collaboration with Munich colleagues, she is also investigating how European scientists construct concepts of “excellence” while applying for early-career scientific research grants.



Thank Goodness for Bad Jobs?

Jeremy Reynolds, Purdue University

People who work in the gig economy often do so to supplement the income they earn in other jobs. This talk will highlight the opportunities and risks associated with gig work, why those opportunities and risks vary, and why gig arrangements can be so appealing to workers and organizations. It will consider how the growth of precarious gig jobs can, paradoxically, reduce worker precarity and whether we should celebrate the growth of the gig economy.

Dr. Jeremy Reynolds studies how workplaces contribute to inequality. He is particularly interested in the degree of fit between people's work schedules and their lives outside of work. He is currently studying work schedules and well-being among Americans who were earning money through Amazon's Mechanical Turk platform (MTurk) in early 2020. The project examines several topics including: how people combined MTurk with other work, whether people got the MTurk schedules they preferred, how experiences varied by gender and race, and the extent to which MTurk helped people manage the health and economic crises caused by the COVID-19 pandemic.



Session 2 (10:45 am – 12:00 noon)

2.1 **Jason Lajoie**: “Generative AI Tools and Responsible Innovation: Designing for Ethics and Equity”

2.2 **Thirumala Arohi**: “Amplifying Human Potential – The Infosys Perspective”

2.3 **Stéphanie Camaréna**: “Reclaiming human agency from an AI-powered future”

Generative AI Tools and Responsible Innovation: Designing for Ethics and Equity

Jason Lajoie, Engineering Change Lab

Where does human labor fit in the future of work? By automating creative tasks once reserved for human workers, artificially intelligent content creator tools like ChatGPT have the potential to significantly impact the future of work, particularly white-collar employment which has historically benefited from AI automation. Decisions made today will determine the impact of these A.I. tools on the future of work. This talk will explore some of the ways to promote the ethical and equitable integration of AI tools into the fourth industrial age, including: designing standards that take into account the values of individuals and societies, embracing A.I. tools to improve productivity and create new employment opportunities, refocusing retraining and upskilling employees away from routine work towards tasks requiring innovation and human interaction, as well as developing new laws, labor acts and organizations that protect workers from job disruption and loss due to automation.

Dr. Jason Lajoie is an early career scholar in responsible innovation, research-creation design and equity, and queer media theory who holds a PhD in English from the University of Waterloo (Ontario, Canada). Jason was the Research Associate for the Council for Responsible Innovation at the University of Waterloo, spearheading research projects related to social justice, equity, and technological stewardship, and currently works with Engineering Change Lab, a non-profit that convenes stakeholders from across the engineering community and beyond to address systemic challenges by promoting sustainable and equitable approaches to technology.



Amplifying Human Potential – The Infosys Perspective

Thirumala Arohi (Thiru), Infosys Limited

Research published by the Infosys Knowledge Institute* shows the Future of Work is hybrid, human centric, skills driven and automated. The Knowledge Economy is now pervasive and talent across all business sectors are knowledge workers. The Future of Work will be an exciting medley of skills, talent imperatives, and the ability to tap into a massive social talent pool to create solutions for a BANI-dominant world. We believe the confluence of workspaces, workforce and work on a foundation of lifelong learning is critical to every enterprise. The future of workspace & workforce is digital with the spotlight moving from business focused to Employee focused approach.

The skilling needs will have to be highly hyper-responsive & personalized to engage the mobile workforce and meet the dynamic business needs. Talent, too, has a role to play in adopting an attitude of Z-shaped learning approach where Learn, Unlearn and Relearn in their quest to be lifelong learners. Infosys thrives as a Live Enterprise where sentience is a dominant trait, especially in creating an engaging AI-first, digital ecosystem that helps employees nurture their lifelong learning aptitude. Join us as we share perspectives on the role of competency development in this Future of Work conversation from the lens of Infosys Limited.

With 3 decades of corporate experience in building and managing large portfolios, account relationships and amplifying human potential, Thirumala Arohi (Thiru) strongly advocates that learning, collaboration and innovation are complementary forces. Currently Senior Vice President & Head of Education, Training & Assessment (ETA) at Infosys Limited, Thiru drives innovation to empower platform-driven learning interventions to enable future-ready talent within Infosys, client organizations, and societal communities. Thiru anchors the AI-First Live Enterprise charter for AI-First Learning and Change Management. Thiru's association with Infosys of over 25 years spans a variety of business roles both in India and the United States. Thiru's experience in managing software delivery projects across the globe made him a natural choice to transform Infosys education offerings through digital learning platforms and apps to improve educator and learner experience. Thiru serves on the board of I.E Business School, Madrid and anchors Infosys Springboard, the digital inclusion and learning platform delivering the digital skills to succeed for millions of people and creating an equal digital future for all.



Reclaiming human agency from an AI-powered future

Stéphanie Camaréna, Source Transitions

In 1999, Tony Fry, a design theorist and philosopher wrote a book about what he called a new design philosophy: an introduction to Defuturing. What he referred to is the negation of world futures. We are taking away futures for ourselves and for non-human others. For example, a future where my 20-year-old daughter can live and thrive in a world without consequences of climate change does not exist anymore. Artificial intelligence (AI) in food systems research is disproportionately focused on the “usual suspects”: industrial farms and monocrops, retailers’ big data, the digitally literate, large R&D funding sources. The type of data sets needed for algorithms to be efficient rarely exist in the “unusual suspects” context: small farms, cooperatives, communities, decentralised organizations, not for profit. AI-powered unusual suspects could be the key to futures where human agency, creativity and wisdom are integral to technological advances in sustainable food systems.

Stéphanie is the founder of Source Transitions, a special purpose company enabling communities, businesses and organisations to use artificial intelligence for radical transitions to sustainable systems. She designs solutions for sustainability impact since 2009 with a human-centered focus guided by participatory approaches to futures and to design, and the strong consideration of ethical issues. Her doctoral research at RMIT University investigated how to engage with artificial intelligence to transition to sustainable food systems. The research generates practical outcomes for food rescue, institutional food programmes, digital agriculture research and farmers’ markets. Stephanie's publications also contribute to the fields of systems thinking, transdisciplinary research, ontological design, codesign, and interaction design. Stéphanie is also a strategic adviser for Source Agility where she provides a strong research arm for the business agility and sustainable ways of working boutique consultancy. A seasoned facilitator and practitioner, Stéphanie helps detect, shape and deliver differentiated perspectives in a fair and ethically responsible manner.



Session 3 (1:00 – 2:20 pm)

3.1 **Greg Adamson:** “What can we lose if we abdicate human responsibilities to AI?”

3.2 **Ketra Schmitt:** “What motivates you when money is no longer the object? Project Management Under a UBI”

3.3 **Zach Pearl:** “Programming for Failure: AI, Negative Feedback, and the Future of Creative Work”

What can we lose if we abdicate human responsibilities to AI?

Greg Adamson, University of Melbourne

How do we take the Future of Work discussion beyond "what jobs are needed next?" This assumption that jobs will always be needed, regardless of how disruptive technology becomes, is a substitute for the attention that is needed. A haphazard approach threatens societal chaos. Can we be less haphazard? Can we steer the development of technology towards that which assists us to undertake our work, rather than that which substitutes for our work, leaving us surplus to the needs of our own society? This presentation will offer workshop participants provocative big-picture questions that are inspired by Adamson's multi-disciplinary, multi-sector career experiences and in-depth knowledge of Wiener's technical and philosophical writing.

Dr Greg Adamson is Honorary Associate Professor at the University of Melbourne's School of Population and Global Health and a leading Norbert Wiener scholar, having published several peer reviewed papers and conference papers on Wiener's work. He founded the IEEE Conference Series on Norbert Wiener and has been leading the initiative for more than 10 years. His qualifications include a PhD in e-commerce (RMIT University), a Master of Commercial Law (Melbourne Law School) and a Bachelor of Technology (Engineering), University of Southern Queensland. In the cyber security sector, he is Chief Information Security Officer for the Victorian Department of Transport in Australia. A Past-President of IEEE SSIT, Greg currently serves as a member of the society's Strategic Planning Committee and Chair of Technical Activities.



What motivates you when money is no longer the object? Project Management Under a UBI

Ketra Schmitt, Concordia University

Increasingly, universal basic income (UBI) is seen as a potential solution to both inequality and the loss of work due to automation. Reducing inequality is a key component of the SDGs, and necessary to support true sustainability and climate justice. Numerous civil infrastructure projects are also necessary to support the climate transition, as are other reinvestment projects and the broader work of government more generally. Even under a UBI, large infrastructure projects and unique and time-sensitive endeavours are essential and must be managed. But what does management, and mores specifically project management look like under UBI? We review the literature on UBI and both controlled and natural experiments involving basic income as well as the literature on motivation and the current tools available for managing projects. Finally, we articulate the specific and unique needs for managing projects when workers face true choice in where, when and how much to work.

Ketra Schmitt is an Associate Professor in the Centre for Engineering in Society at Concordia University. She received her PhD in Engineering and Public Policy and Master's in Statistics from Carnegie Mellon University and her Bachelor's in Environmental Sciences and Policy from Duke University. Her work applying systems methods and agent-based models to health applications, terrorism, hate speech and internet governance has been used to inform policy for federal agencies ranging from Global Affairs Canada to the Department of Homeland Security and Environmental Protection Agency. Her teaching and research on the social implications of technology led her to SSIT and to her incoming role as the editor-in-chief of IEEE Technology and Society Magazine.



Programming for Failure: AI, Negative Feedback, and the Future of Creative Work

Zach Pearl, York University

In the spheres of big tech and manufacturing, recent and rapid developments in AI promise a near-future economy of unprecedented scale in which the limits and detriments of human labour and human error are eliminated. However, in the creative sector, the increasing prevalence of AI tools like DALL-E and GPT-Chat in the making of fine art, design and literature has prompted a more ambiguous discourse about the future of human creativity as we know it. In this short presentation, I rely on Wiener's essential concept of negative feedback to argue for the importance of entropy and error as critical psychological inputs to creative output. And I propose that a ubiquitous adoption of AI in the creative sector in fact threatens to eliminate what human creativity pivots upon—failure.

Zach Pearl is a writer, designer and educator working at the intersection of art, feminism, and critical media studies. Currently, Zach is Postdoctoral Fellow in Non-Profit Arts Publishing at York University in Toronto/Tkaronto, Canada, and the Managing Editor of PUBLIC Journal (est. 1988) and PUBLIC Books (est. 2007). Zach earned his PhD in English Language & Literature from the University of Waterloo (2023) and his MFA in Criticism and Curatorial Practice from the Ontario College of Art & Design (2012), where he continues to teach as adjunct faculty in Integrated Media and Graphic Design.



Session 4 (2:40 – 4:00 pm)

4.1 **Marten Kaevats:** “IEEE Public Sector APP store?”

4.2 **John Buchanan:** “A mental wealth perspective on meeting the AI challenge: beyond the education ‘solution’”

4.3 **Iven Mareels:** “Co-adaptation in Human-Machine Interactions”

IEEE Public Sector APP store?

Marten Kaevats, GovStack, Estonia

Could and should IEEE become a neutral marketplace for public sector digital solutions? Would it be possible to share the maintenance cost of open-source software across multiple public sector organisations? Can we build the capacity to help public sector domain experts understand the technology better?

Marten Kaevats is the IEEE city sherpa and the co-founder of GovStack. He is the former National Digital Advisor in the Government of Estonia or unofficially the Chief Innovation Officer of Estonia. He, being responsible for everything digital and innovation in Estonia, was working on upgrading the interoperability system architecture of his country. The goal of all his work is to build adaptable and future-proof governance architecture, while acknowledging well that predicting that future in its complexity is impossible. Estonia, being a prime example of distributed governance architecture based on human-scale values where every end user is in control of their data, is perfect in testing out new forms of governance suitable for the 21st century.



A mental wealth perspective on meeting the AI challenge: beyond the education 'solution'

John Buchanan, University of Sydney

It is commonly assumed that education is crucial for meeting the AI challenges concerning the futures of work. But education cannot make up for inadequacies in other policy domains. Prime among these are: (1) Approaches to demand management that tolerate high levels of labour underutilisation (ie not just unemployment but also under-employment concerning hours and skills available for work); (2) Approaches to income distribution that treat economic development based on deepening inequality as inevitable; (3) Approaches to the technological development controlled by the priorities of dominant market players who corner monopolies in the digital domain.

Preoccupation with human capital inspired reforms like '21st century skills' and 'micro-credentials' as central to the AI challenge distracts us from dealing with these broader issues. Instead priority should be given to promote a new policy mix that prioritises the deepening of our mental and not simply our material wealth. Especially important will be: *Reconstructing our metrics of success* so that we monitor and intervene to maximise mental wealth augmented GDP; *Reconstructing the foundational economy* – ie the infrastructure of everyday life that develops and supports the sustainable deployment of mental capital (this includes education, health, infrastructure utilities and the food supply chain); *Building new forms of solidarity* that support collective mental well being. Example of such initiatives include ethical labour hire, data cooperatives, modernised unions and a range of other innovations guided by the notion of a digital republic (not a digital marketplace) as the reference point for technological development.

John Buchanan is currently Co-Director of the Mental Wealth Initiative and a Professor in the Business Information Systems Discipline at the University of Sydney Business School. His key domain of expertise is labour market structuring and its implications for skills and education. This research involves, inter alia, using data science in conjunction with qualitative methods to generate new scholarly and policy relevant knowledge. His current major research interest is the future of expertise and social solidarity in world of mass underemployment and AI.



Co-adaptation in Human-Machine Interactions

Iven Mareels, Federation University Australia

Drawing on his expertise on learning systems, in the classical sense of cybernetics, as well as more recent work on AI and its role in the digital revolution, Mareels will introduce specific examples of some good, bad, indifferent, and perhaps unintended consequences on humans, and their work, that emerge from various human-machine adaptation-focused systems.

Iven Mareels is the Executive Dean of Federation University Australia's Institute for Innovation, Science and Sustainability comprising the disciplines of business, engineering, IT and science. He is also non-executive director of Rubicon Water, which modernises large scale irrigation systems to reduce waste and improve water productivity on farms, and Vice-President of the Academy of Technology and Engineering, where he is tasked with audit and risk for the academy. Mareels has co-authored over 500 refereed publications, including 5 monographs, and is a co-inventor of a suite of patents related to the automation of large scale, gravity fed, irrigation systems. Iven has received numerous awards and recognitions, including being made a Commander in the Order of the Crown of Belgium and receiving the Centenary Medal of Australia for contributions to engineering education and research. He has been involved with the "Norbert Wiener in the 21st Century" conference series since its inception.



Workshop Wrap-up (4:00 – 4:30 pm)

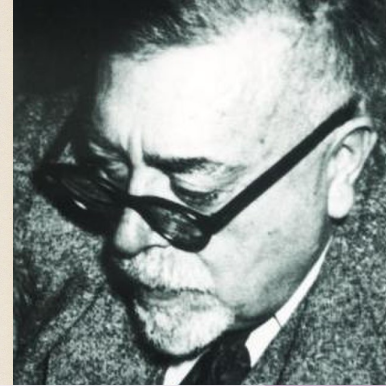
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See you at Purdue!

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