REPORT ON THE WORKSHOP

DISCURSIVE AND MATERIAL DIMENSIONS OF THE DIGITAL TRANSFORMATION: PERSPECTIVES FROM AND ON JAPAN

MONDAY SEPTEMBER 11 – WEDNESDAY

SEPTEMBER 13, 2023

REPORT ON THE WORKSHOP

DISCURSIVE AND MATERIAL DIMENSIONS OF THE DIGITAL TRANSFORMATION: PERSPECTIVES FROM AND ON JAPAN

Moderators: Jiré Emine Gözen | Celia Spoden | Harald Kümmerle | Noriyuki Yanagawa |

Keynote Speakers: Shoko Suzuki | Shintaro Miyazaki

Presenters: Gentiane Venture | Hirotaka Osawa | Yashima Yugen | James Wright | Daniel White | Kerry McInerney | Kojiro Honda | Chihyung Jeon | Rebecca Carlson | Tobias Matzner | Chizuru Suga | Masakazu Masujima | Tatsuhiko Inatani

Organized by:
German Institute for Japanese Studies
https://www.dijtokyo.org
The Nippon Institute for Research Advancement (NIRA)
https://english.nira.or.jp
German Center for Research and Innovation (DWIH) Tokyo
https://www.dwih-tokyo.org/en/
Sophia University, Graduate School of Global Studies
https://www.sophia.ac.jp/eng/gpgs/
University of Europe for Applied Sciences
https://www.ue-germany.com

Editor: Jonathan Webb, Research Coordinator and Research Fellow, NIRA

Table of Contents

DAY I – ROBOTS & AI **5**

SESSION I *ENVISIONING FUTURE SOCIETIES: ROBOTS AND AI IN SCIENCE FICTION, THE LAB, AND REALITY* 6

Introduction - Envisioning Future Societies: Robots and AI In Science Fiction, the Lab, and Reality *7*

Jiré Emine Gözen 7

Presentation I - How Do Autonomous Robots Transform our Present and Future Societies? Reflections on Societal Challenges from the Lab *10*

Gentiane Venture 10

Presentation II-I - Sci-Fi Prototyping and The Ai Alignment Problem (Part I) *14*

Hirotaka Osawa 14

Presentation II-II - Sci-Fi Prototyping and The Ai Alignment Problem (Part II) *17*

Yashima Yugen 17

Presentation III - Growing Gaps Between Sci-Fi Visions and Material Realities of Digital Transformation *20*

James Wright 20

SESSION II *SOCIOCULTURAL PRACTICES OF SITUATING THE SELF AND OTHER: ROBOTS WITH HEART, VIRTUAL HUMANS, AND MATTER WITH SOUL* 24

Introduction - Sociocultural Practices on Situating the Self and the Other: Robots with Heart, Virtual Humans and Matter with Soul *25*

Celia Spoden 25

Presentation I - Making Emotional Connections with Robots and AI in Japan's Digital Transformation *28*

Daniel White 28

Presentation II - From 'Japan Panic' to 'Chinese Peril': The Shifting Location of the Techno-Orient in the US *32*

Kerry McInerney 32

Presentation III - Japanese Robot Culture and Ancient Shintoism *36*

Kojiro Honda 36

Presentation IV - Alive Again, Digitally: Turning Dead Persons Into Virtual Humans in South Korea *40*

Chihyung Jeon 40

KEYNOTE **43**

Keynote Speech I - Rediscovering 'Glocal' Cultural Resources for the Digital Future *45*

Shoko Suzuki 45

Keynote Speech II - Counter-Dancing Digitality! Practicing CommOnistic Cooperativity *49*

Shintaro Miyazaki 49

DAY II – DATA & INFRASTRUCTURES **53**

SESSION III *ALGORITHMS, DATA, AND THE IN-BETWEEN: FASHION CULTURE AND TRANSNATIONAL SCIENCE* 54

Introduction - Algorithms, Data, and the In-Between: Fashion Culture and Transnational Science *55*

Harald Kümmerle 55

Presentation I - Infrastructuring (Trans)National Bioscience: From Humans to Cells to Code in A Japanese Laboratory *58*

Rebecca Carlson 58

Presentation II - The Co-Constitution of Machine Learning Algorithms and Training Data *62*

Tobias Matzner 62

SESSION IV *DATA POLICY AND AGILE GOVERNANCE* 66

Introduction - Data Policy and Agile Governance *67*

Noriyuki Yanagawa 67

Presentation I - Insights *70*

Chizuru Suga 70

Presentation III - Analysis *74*

Tatsuhiko Inatani 74

DISCURSIVE AND MATERIAL DIMENSIONS OF THE DIGITAL TRANSFORMATION: *PERSPECTIVES FROM AND ON JAPAN*

DAY I – ROBOTS & AI

MONDAY SEPTEMBER 11, 2023

SESSION I

ENVISIONING FUTURE SOCIETIES: ROBOTS AND AI IN SCIENCE FICTION, THE LAB, AND REALITY

SPEAKERS

JIRÉ EMINE GÖZEN

PROFESSOR, UNIVERSITY OF EUROPE FOR APPLIED SCIENCES

GENTIANE VENTURE

PROFESSOR, THE UNIVERSITY OF TOKYO

HIROTAKA OSAWA

ASSOCIATE PROFESSOR, KEIO UNIVERSITY

YASHIMA YUGEN

WRITER

JAMES WRIGHT

VISITING LECTURER, QUEEN MARY UNIVERSITY OF LONDON

DAY I – SESSION I

Introduction - Envisioning Future Societies: Robots and AI In Science Fiction, the Lab, and Reality

Jiré Emine Gözen

The pandemic showed predicting the future is an uncertain, sometimes impossible endeavor, yet also underscored our ability to model, anticipate and influence it. We're aware of the growing threats from global warming, species extinction, and persistent colonialism, stemming from detrimental qualities like racism and exclusion. Given that technological advancement, particularly AI, can perpetuate societal biases, there is an urgent need to steer the future actively, rather than passively watch it unfold.

Focusing on how future scenarios are depicted in art, literature, and popular culture, these representations form part of our collective imagination, shaping societal and technological expectations. These 'social technical imaginaries' are the collective, institutionally and publicly performed visions of desirable futures notionally attainable through advances in science and technology. These imaginaries influence political decisions and scientific endeavors. Our cultural narratives deeply affect these visions, shaping our reality. Fiction and art significantly impact discussions around AI and robotics ethics, contributing to how we address upcoming technological shifts. Recognizing these works as valuable knowledge informs both academic and societal discourse, particularly regarding the digital transformation.

That said, discussing perspectives from and on Japanese introduces diverse viewpoints and narratives influenced by different philosophical backgrounds like Christianity, Shintoism, and animism. Integrating concepts such as Orientalism, Occidentalism, and post-colonialism offers a more nuanced understanding. Nevertheless, disentangling these complex perspectives is challenging, as they're deeply ingrained in our collective knowledge and thought.

In the next part of my talk, I will explore the interconnectedness of nature, culture, technology, ethics, and knowledge in the context of AI and robotics narratives. This also

implicitly relates to our visions of the future. The three laws of robotics, introduced by Isaac Asimov in 1942, are well-known to those in the field of human-machine interaction. These laws were not just an ethical framework for professionals but have permeated popular and high culture, becoming a fundamental part of discussions about the human-machine relationship. Asimov's influence extends beyond entertainment to pivotal ethical and philosophical debates on this interaction.

Asimov's laws reflect the traditional Western humanist approach to separate humans from machines. However, his work's reception in Japan suggests a more intricate interplay between Eastern and Western thoughts on robots and AI, transcending simple cultural dichotomies. Masahiro Mori's concept, known as the 'uncanny valley', further investigates the boundaries between humans and robots, suggesting a blended coexistence rather than a clear divide. This idea, emerging from a cross-cultural collaboration, highlights the complex ties between scientific, artistic, and philosophical realms, challenging our understanding of the familiar and the alien.

In the 1980s, cyberpunk emerged as a radical inquiry into uncanniness, challenging the prevailing humanist narratives on the human-machine interface and envisioning alternative realities where these boundaries blur. William Gibson's "Neuromancer" epitomized this with its depiction of a world where human consciousness could merge with a digital reality called the matrix, a space separate from the physical realm. Cyberpunk posited a future where humanity evolves beyond its current form, eventually merging with technology to achieve a post-human state. Entrepreneurs and inventors often draw heavily from cyberpunk literature (i.e. also Elon Musk and Mark Zuckerberg), its concepts and terminology in designing AI and robotic systems.

That cyberpunk, an idea rooted in the 1980s, wields such influence today poses certain challenges, along with specific cultural and philosophical biases. As Rosi Braidotti remarks, this trend could be seen as a form of cultural recolonization, with cyberpunk’s Americana dominating the landscape, where the space travelers are even dubbed “cowboys”. This portrayal underscores the genre’s anchoring in a Western, masculine ethos, shaping how we conceptualize and engage with future technologies. On further problem is the that such narratives appeal to our desire for technological solutions that allow us to pursue an escape from our exploited planet into the matrix of cyberspace.

Yet in 2010, Ray Naito presented a contrasting vision with his installation also named

'Matrix.' Influenced by critical post-humanism and new materialism—concepts from theorists like Donna Haraway, Rosi Braidotti, and Karen Barad—Naito's work envisions a humanity intertwined with technology but rooted in the material world.

'Matrix,' set within the Teshima Art Museum, erases the divide between indoors and outdoors, integrating natural elements like rain and wind into the exhibit. This blurring of boundaries exemplifies a post-humanist ethos where even the weather participates in the art, reflecting a deeper connection between technology, nature, and human experience. The building itself, intertwined with sophisticated yet invisible high technology, allows water to travel through it, symbolizing the flow of life and the interconnectedness of all elements.

Naito's 'Matrix' redefines technology as part of our ecological system, proposing a symbiotic relationship with the earth, air, and water, forming a collective consciousness akin to artificial intelligence. By acknowledging the active role of all material entities, Naito challenges us to rethink our relationship with the world, recognizing non-human entities and objects as active participants in our existence and co-creators of our reality.

In conclusion, the perceived boundaries between nature, technology, and culture are being questioned, prompting a reevaluation of conventional thought processes. This includes breaking down rigid categories such as gender, the divide between human and non-human, and the separation of different knowledge types. Naito's 'Matrix' presents an alternative view to the traditional understanding of artificial intelligence—not as mere data or algorithms as Gibson's cyberpunk suggested—but as part of a living, evolving post-human condition that is material, vital, feminist, and post-colonial, entwined with both visible and invisible technologies.

This reimagining of our relationship with technology, art, and literature opens up new avenues for understanding and challenges the current status of robots and AI. It highlights the importance of integrating diverse and often marginalized knowledge into our technological design and thinking. Artistic and literary expressions are not just reflections of our technological aspirations; they actively shape our societal visions and contribute to the discourse, providing epistemologies that inform the development of beneficial technologies in AI and robotics.

DAY I – SESSION I

Presentation I - How Do Autonomous Robots Transform our Present and Future Societies? Reflections on Societal Challenges from the Lab

Gentiane Venture

When I was introduced earlier today, I noticed a sentence in my biography was changed from 'an art of living together' to 'an art of coexisting.'
Although coexistence is not a term I use often, it piqued my interest and I want to discuss it today.

To begin, I believe broad collaboration across diverse disciplines is necessary for developing artificial intelligence and robotics as engineers alone have blind spots and miss crucial elements.

Throughout my career, I have worked alongside French philosophers to explore and conceptualize the creation of robots and how these may alter our future. While uncertainty exists, it is essential that we consider diverse possibilities.

Today, I will share my perspectives from an engineering laboratory standpoint, discussing how autonomous robots are transforming our society today and into the future.

Before going any further, I would like to briefly touch upon the term 'robots,' coined by the Czech writer Karel Čapek a century ago in his 1920 play 'Rossum's Universal Robots' (R.U.R.) In the play, robots (Czech for forced labor) symbolized the exploited working class. A robot was conceived as a human that had become machine-like, not the other way around. Ironically our society now imagines roboticists making humanlike machines. While industrial robots have seen broad adoption, replacing many blue-collar jobs, robots can serve functions beyond production, including keeping us company, and in doing so profoundly change the relationships we have with machines.

My lab imagines what such a society could look like, designing robot for daily life to enhance our engagement with the world. They can accompany children, help cook, carry objects, and even lead you on a walk, encouraging you to look up from your devices and appreciate the beauty around you.

Communication, through which we express ideas, feelings and information, is critical to my research. Just as we communicate with pets or across language barriers, we aim for meaningful interaction with robots.

A key point here is the importance of nonverbal cues which comprise a majority of communication. Robots must be able to interpret these silent signals. Darwin noted the universality of such nonverbal expression, fear, anger, joy, across cultures and species. By integrating this, robots can go from tools to companions capable of authentic responses.

Emotion, while subject to cultural norms, possess a universality that modern social science has strove to model and understand. Paul Ekman identified five basic emotions in his pioneering model of emotion—joy, fear, anger, disgust, sadness—which would later be used in Pixar's 'Inside Out.' The model's simplicity sparked debate; are there not more than five emotions, with more nuance and ambiguity?

Robotics engineers including my team, favor a three-dimensional model utilizing the axes of pleasure, arousal, and dominance to mathematically represent emotions. Pleasure ranges from sad to cheerful, arousal from quiet to active, and dominance from independent to dependent.

An example of how the three axes interreact is a hot and humid summer day in Tokyo; the oppressive weather (dependence), lessens your activity and cheerfulness.

As understanding emotion requires understanding the environment, we equip robots with various sensors—microphones, cameras, touch, distance, force, temperature, humidity, brightness, and noise to interpret these dimensions. Processing that data through basic machine learning, we gauge the environment and its impact on the axes of emotion and on the robots themselves.

We send this information to a blackboard system with decision making controlled via a feedback loop. A few years ago, at the International Robot Exhibition in Tokyo we showed our robot that cares. It engages with you; when you get close, it looks at you, discerning if you desire interaction from you expression and offering you presents if you do, and alternatives if you don't like the presents.

Thousands come to the exhibit as we were the only group where people could interact with the robot and have it responded in a non-pre-programmed way. Our robots convey meaning and communicate through action.

Our robots can express their inner state or relay information about their environment. They might alert a human to unseen danger. We do this through the robot's movements—its extension, gait, the smoothness or jerkiness of its motion, and the energy of its movement.

By altering the robot's pleasure, arousal, and dominance levels, its movement changes, affecting how people perceive it. The end state remains constant, but the altered demeanor can completely change the human's perception of the robot’s intentions. Nuanced communication through movement is an easy but important innovation.

This method is much more granular and authentic than the canned “emotion” others are doing which is more like animations in a 3D rendered movie.

To demonstrate how subtle changes impact people perceptions of robots, we conducted an experiment where participants were invited to fill out a questionnaire, unbeknownst to them administered solely by a robot. People's physical proximity to the robot varied with its displayed emotions—distant when it appeared sad and closer when it appeared happy.

While this is a useful observation, sustaining human interest in robots is the real challenge. Robots often bore people because they lack engaging attributes. That's why we're focusing on physical, dynamic interaction with robots, to touch them and experience intuitive responses that aid or surprise them without advance cues.

Another aspect, we're investigating is the concept of slow technology, deliberate interaction with technology emphasizing presence, robots that enhance life rather than

just a tool or toy. An example of this is Yokobo, a robot designed to be a part of the home's entrance area, not to dominate the space but to contribute to it. Yokobo welcomes you, interacts with environmental data, and subtly communicates changes, like shifts in weather, providing a layer of interaction beyond simply responding to verbal commands.

Our ambition is to transition robots from lab settings to real-world environment and to redefine the narratives around robots, moving away from science fiction stereotypes to what robots truly are and can be. This requires sensitive design, a deep understanding of end-user needs, and seamless integration into our daily lives. Thank you.

DAY I – SESSION I – PRESENTATION II

Presentation II-I - Sci-Fi Prototyping and The Ai Alignment Problem (Part I)

Hirotaka Osawa

Today, I'll be presenting about science fiction prototyping before handing things over to my colleague Yashima-san for his talk.

To begin, I'd like to introduce myself. I have a PhD in engineering, work in the faculty of science and technology, and am researching the intersection of science fiction and innovation.

My work involves a complex mix of elements, primarily focusing on human-agent interaction, which is akin to but distinct from human-robot interaction. Here are a few examples of studies. One of my research projects emphasizes anthropomorphic qualities in objects like virtual agents or social robots, aiming to enhance their communication abilities. Through experiments modifying anthropomorphic agents, I've improved interactions across various demographics, including children and the elderly. Additionally, in collaboration with KYOCERA Document Solutions in Japan, we've advanced this technology, integrating it with virtual environments for more effective user assistance.

My second study shifts from anthropomorphizing objects to enhance their presentation to humans, focusing on assistive devices that improve social interactions, particularly for those with disabilities such as visual impairment. Another project involves implementing social robots in elementary schools to foster a book-sharing ecosystem that introduces and recommends books to children based on the recommendations of other children. This kind of agent system can act as a catalyst within society.

Additionally, I explore social intelligence through communication games like Mafia, which provide insights into how individuals perceive each other. I We also conducted research on HANABI, a card game in which participants cooperate with each other

implicitly by reading each other's intentions. This is very good material for social intelligence research and our research gained recognition from organizations like Facebook and DeepMind. My current research delves into the impact of science fiction on society and innovation, particularly on artificial intelligence and agents. I've analyzed over 100 science fiction works, categorizing how agents are represented in science fiction into four types: human-like agents, machine-like agents, body-type agents (such as drones), and infrastructure AI agents.

I'm also now the president of the Science Fiction and Fantasy Writers of Japan, which is celebrating its 60th anniversary in 2023. Many prominent Japanese writers like Hoshi Shinichi and Yashima Yugen are members.

Speaking of Yashima Yugen, my co-speaker for this session, he will later discuss an AI-themed story. As for myself, I am not a professional writer, rather I specialize in science fiction studies. I want to briefly touch on what is "science fiction?" I'm sure many of you are familiar with popular German, Japanese, and American works of science fiction including "Perry Rhodan," "Star Wars," "Astro Boy," and "Ghost in the Shell" but the genre has been instrumental in promoting science and technology since as far back as the early 19th century. H. G. Wells, who pioneered the genre with works, such as “The Time Machine”, “The Island of Doctor Moreau”, and "The War of the Worlds," was also a writer for the scientific journal "Nature," so he was both a scientist and a science fiction writer. This combination of scientific writing with fiction, was the forerunner for modern educational approaches like STEAM (Science, Technology, Engineering, the Arts and Math) used in countries like the USA and China where they now incorporate science fiction in their curricula, recognizing its value in teaching subjects like physics."

Science fiction's role, however, goes far beyond merely "propaganda for scientific progress." Japan's sci-fi grand prize for example, showcases a wide variety of works. A perfect example is Fumi Yoshinaga's Ōoku: The Inner Chambers, which is now a Netflix animation, and is highly regarded by sci-fi writers worldwide. In the story, set in an alternate Tokugawa era Japan (1603 ~ 1868), a highly transmissible epidemic disease emerges that primarily effects young men, killing around 80% of those infected and decimating the male population. This causes a broad inversion of historical gender roles, and the emergence of a female shogun. By utilizing a hypothetical situation, the story emphasizes how history, and societal roles might change under different circumstances. Such narratives in science fiction are not just about science as knowledge but as a method

for contemplating complex societal change. These thought experiments in literature, often speculative, have become a source of innovation in the field, recognized as 'science fiction visionary.' This approach, used since the 1970s, involves using science fiction as a tool for thinking and planning."

Science fiction's influence extends beyond technology, reshaping society and inspiring new concepts like Maker Movements, Technical Singularity, and Cyborg Feminism, proposed by Chris Anderson, Ray Kurzweil, and Donna Haraway respectively, have contributed significantly to these ideas. Nowadays, these sci-fi influences are consciously taken into account in an effort called sci-fi prototyping, which uses sci-fi to create visions at the start of an innovation. This movement is impacting various industries and has led to collaborations with entities like the Ministry of Agriculture, Forestry, and Fisheries in Japan. Science fiction prototyping serves as a powerful tool, for forecasting future scenarios and technologies, backcasting how we got where we are today and how we might have ended up at alternative futures, thinking about what kinds of technologies lead to certain outcomes, and even threat casting, used most famously by the United States and France to envision and prepare for potential future threats, like pandemics or wars.

Science Fiction also acts a powerful vector for social change by allowing people to step outside themselves, think about "future people," who might perceive the world very differently, and thereby challenge their existing belief, values. I think this is especially useful in societies like Japan, where high social pressure and hierarchy make it difficult to openly challenge the status quo and embrace new ideas.

In today’s exploration of science fiction prototyping, I've discussed how its value lies not just in enjoyment but in its capacity to provoke thought while often diverging from reality. Science fiction excels in sparking imagination and altering perceptions, key in generating innovative ideas. My research reveals a strong correlation between science fiction and shifting values and attitudes. The goal is not to mirror reality but to stimulate provocative, forward-thinking ideas. Science fiction serves as a platform for sharing visions and incubating new ideas, maintaining a diversity of thought and encouraging safe, open discussions. Currently, there's a trend towards publishing works that reflect contemporary issues, such as post-COVID scenarios, future dystopias, and AI's impact on society. I hope the concepts I’ve discussed provide context for Yashima Yugen's more detailed presentation. Thank you.

DAY I – SESSION I

Presentation II-II - Sci-Fi Prototyping and The Ai Alignment Problem (Part II)

Yashima Yugen

Hello, I'm Yashima Yugen, and I will be picking up where Osawa-san's presentation left off. I'd like to begin with a quote from Antoine de Saint-Exupéry, which I think captures the essence of sci-fi prototyping: “If you want to build a ship, don't gather people to collect wood, don't impose work on them. Instead, tell them to admire the endless immensity of the sea.”

My presentation will cover science fiction prototyping and the AI alignment problem. First, let me introduce myself. I've written multiple short stories, some of which have been translated into Chinese and frequently appear in anthologies. I have received awards such as the ninth Sogen SF Short Story Prize for “Tenkuseyo Hosshoji” [Hosshoji the Rocket Temple], and the fifth Nikkei Hoshi Awards Grand Prix for “Final Anchors.” However, despite winning these awards in 2018, I am only now working towards my first full novel.

The short story “Hosshoji the Rocket Temple” envisions an alternate future where “Buddhics” is developed instead of physics, and “cosmonks,” a blend of astronauts and monks, embark on a journey in a Pagoda rocket to a distant planet to see a Great Buddha. “Final Anchors” is a story that unfolds within a half second. Two autonomous cars are about to collide. Since there are only 0.5 seconds until the collision, human drivers are powerless at this point. Instead, onboard AIs have ample time because they can react 10000 times faster than humans. They discuss and decide which party should deploy the emergency brake system. This mechanism, Final Anchors pins down the vehicle on the spot destroying the vehicle and killing the driver, but the other party will be spared.

I don't have a formal background in science. I studied at the University of Chicago, writing my master's thesis on Edo aesthetics. More recently, I co-created a YouTube channel with Osawa-san, Miyamoto-san, and Hashimoto-san to showcase Japanese

science fiction, although it's currently on hold. I've also lectured at the JAXA Tsukuba Center for their fiftieth- anniversary ceremony titled “Future, Space, and Imagination.” Additionally, I've taught science fiction prototyping courses organized by Aeon and KDDI.

Science fiction prototyping is used to inspire new ideas, products, and services in business. Why do we use science fiction? Because it's fun, exciting, and can deliver a sense of wonder. In a scene from “Inherit the Stars,” a science fiction story by James P. Hogan, a corpse in a spacesuit is discovered on the moon and is later revealed to be over 50,000 years old. This kind of mysterious, evocative setting prompts the reader to expand their horizons, asking if such a thing is possible, leading to excitement. The allure of science fiction, like Hogan's works, which are popular in Japan, lies in its power to stretch our imagination, break preconceptions, and broaden our horizons. Exposure to extraordinary ideas and thought experiments pushes us to go beyond our conception of rational thinking.

Science fiction is also a genre that embraces diversity. Some science fiction works feature extraterrestrials, which can be seen as a representation of an ultimate foreign culture, unimaginably different yet with whom we must find a way to communicate. Take, for example, recent works like “Project Hail Mary” by Andy Weir, which deals the first contact scenario. Science fiction, I believe, transcends mere augmentation of imagination; it has the profound ability to reshape our perceptions of reality and the future, which is at the heart of science fiction prototyping.

Isacc Asimov's Three Laws of Robotics, proposed in 1941, demonstrate the lasting impact of a science fiction writer's power of inquiry and imagination. Neal Stephenson's novel “Snow Crush” introduced terms and concepts such as the metaverse and avatar while also predicting modern technologies like Google Earth. Such frameworks have inspired countless individuals, highlighting how science fiction can act as an innovation catalyst. However, merely predicting the future or relying on logical thinking isn't enough for innovation because too often everyone arrives at similar ideas. Instead, envisioning a disruptive future and imagining a situation that is radically different from prediction in the form of narrative, is vital. Science fiction is not just about scientific ideas and gadgets; rather, it often deals with how technology interacts with society and culture. Technological innovation might impact on our society, and its complicated consequences might be beyond scientific predictions.

When thinking about science fiction prototyping, it's important to note how, in contrast to literature, visual media such as sci-fi movies and manga, while enjoyable, can limit imagination because they are already visualized. While visualization can be useful in the end stages, I think science fiction prototyping thrives in storytelling, where imagination isn't bounded by pre-visualized ideas. The process should focus on presenting a complete story as an organic whole with interaction between characters and gadgets in specific situations. A story can address thought-provoking themes and has the driving power to inspire many discussions. Still, illustrations and other visualizations are effective tools for backcasting and forecasting, exploring the unseen in narratives.

Science fiction prototyping encompasses forecasting future possibilities and backcasting, where we envision a sci-fi future and work backward to identify necessary steps. An example of what I define as science fiction prototyping is a writer writing short stories at the request of companies; then, they use the stories and resulting discussions as innovation catalysts to develop new products and services. This is just one example of science fiction prototyping. There are other methods and approaches. Other important aspects of science fiction prototyping include open-mindedness, open source, and ongoing development.

I utilize two story types for prototyping: “catalyst stories” are written by a writer to inspire participants and are read and discussed in a reading workshop. “Down-to-earth stories” are collaborative works generated as products of group discussions between writers and participants in a writing workshop. They focus on forming loglines and plots, rather than complete stories, which a writer may flesh out into complete stories. Examples of science fiction prototyping include projects I undertook with Denso. Nihon Gaishi used my story “Final Anchors” to illustrate how their technology might be used in autonomous cars.

Today, AI hasn’t accomplished a self-sufficient, truly autonomous operation yet. In the future, the misalignment of what humans want and what AI tries to achieve will be pronounced, as shown in “Final Anchors.” The AI alignment problem presents intriguing questions for science fiction, like AI's potential independence from humans or the ethical dilemmas it might face. My role isn't to provide answers but to provoke thought and stimulate questions about AI's future relationship with humanity, explored through storytelling. Thank you.

DAY I – SESSION I

Presentation III - Growing Gaps Between Sci-Fi Visions and Material Realities of Digital Transformation

James Wright

In this talk I will examine Japan's use of sci-fi visions to guide science, technology, and innovation (STI) policies, focusing on the role of sci-fi in shaping technology strategy. I will compare the futuristic concepts promoted by the government with real technological developments.

'Innovation 25,' initiated by Shinzo Abe in 2007 and later adapted into a manga, envisioned a 2025 family's life with advanced technologies like networked robots and telemedicine. Abe further pursued this vision in the high-tech agenda of his second term, notably with the 2015 Robot Revolution Realization Council and the National Robot Strategy.

Japan has a history of leveraging sci-fi characters, like Astro Boy and Doraemon, in technology promotion, as seen in Kanagawa Prefecture's 2016 Robot Town Sagami project. This anime, set in 2028, imagines a robot-integrated society.

Innovation 25 evolved into 'Society 5.0' in 2016, outlined in Japan's Fifth Science and Technology Basic Plan. Society 5.0 represents a revolutionary vision, aiming for a super-smart society that integrates cyberspace and physical space to address economic and social issues, similar to Aaron Bastani's concept of fully automated luxury communism. This paradigm shift follows human evolution from hunter-gatherer to information societies.

Key components of Society 5.0 include AI, IoT, robotics, digital technologies, data infrastructure, and education. It serves as the cornerstone for Japan's STI policies, encompassing the Sixth Science and Technology Basic Plan and the 100-billion-yen Moonshot R&D program announced in 2019.

The Moonshot program embodies Japan's ambitious efforts to actualize Society 5.0, aiming by 2050 to create a society unrestrained by physical and temporal limitations, featuring cybernetic avatars and other futuristic technologies like neurotechnology for telepathy, cryosleep for space travel, and weather control.

As Japan pursues such programs its Visionary Council, which includes figures such as sci-fi author Fujii Taiyo, align futuristic technology goals with ethical frameworks, drawing from characters like Astro Boy for human and AI ethics. Meanwhile, the 2021 establishment of Japan's Digital Agency further highlights the country's commitment to the digital transformation. All of that said, much of the actual discourse around Society 5.0 essentially just extends the techno-utopian narratives that emerged from the 1960s' information society era albeit with a more international scope.

Government reports from 1972-2017, such as those on the Information Society, Innovation 25, and Society 5.0, emphasize ICT's impact on societal values and ethics. However, Jennifer Robertson observes that these developments often bolster socially conservative values, a trend she calls 'retro tech.'

A notable gap exists between Japan's sci-fi-inspired rhetoric and actual digital development. For instance, despite substantial investment, robotic care devices for the elderly haven't been widely implemented and fail to significantly address care worker shortages.

The response to COVID-19 further highlights this disparity. The COCOA digital contact tracing app, initially seen as key in pandemic management, faced technical glitches and flawed exposure notifications, which remained unaddressed for months. Additionally, the Ministry of Health Labour and Welfare's initial insistence on handwritten infection reports, delays in establishing a COVID-19 data database due to local government data protection concerns, limited PCR testing, and skepticism about PCR testing's accuracy, collectively weakened Japan's COVID response.

More recently, the Japanese government announced its intention to merge health insurance cards into the 'My Number' ID card system, launched in 2015 to streamline government processes and digital records. The My Number system, however, has encountered numerous setbacks including exposing the personal information thousands of people, leading to widespread criticism, slow uptake, and high levels of public distrust,

with almost half a million cards returned. This belies the idea that the public will frictionlessly accept the technologies underpinning Society 5.0. Additionally, the STI research and development landscape suffers from a lack of diversity, evidenced by the mere 17% representation of women in the research workforce and the all-Japanese male directorship of the moonshot projects, contrary to Society 5.0's promise of overcoming gender and nationality boundaries.

Further compounding these issues are the funding crises in universities, limited international scientific collaboration, inadequate compensation for ICT professionals, and legal and data protection barriers slowing AI and big data development.

The government's apprehension about lagging behind in global technological competition is palpable, and to be fair Japan's is not the only government to struggle with technology projects. However, the escalating focus on futuristic and potentially unrealizable sci-fi visions highlights a growing disparity between the hype and the slower actual progress in digital systems, AI, and robotics somewhat similar to Elon Musk's propensity to overpromise and underdeliver in his business ventures. Such problems should give us pause regarding the sharp turn towards increasingly ambitious sci-fi imaginaries in public R&D projects and prompt reflection on the role science fiction in shaping policy.

Daniel White's analysis of how anxiety about Japan's future drove bureaucrats to embrace "Cool Japan," can be equally applied to high tech Japan, with these ever more futuristic sci-fi policies perhaps a response to fears of being left behind technologically. These concerns, as articulated by policy documents and leaders like Kishida, imply Japan is at a critical juncture, contrasting the optimistic vision of Society 5.0. This sci-fi tech discourse, particularly evident since the early 2000s amidst economic and social instability, is seen as the ruling party's way to address Japan's future. However, this approach is increasingly disconnected from Japan's immediate societal needs, relying on undeveloped technologies and presenting a simplistic, tech-centric view of society that overlooks complex social and political dynamics, inadvertently perpetuating existing inequalities, unsustainable consumption, and conservative politics, a phenomenon Robertson labels 'retro tech.'

Excessive focus on forecasting future technologies without adequately considering their societal impact leads to this disconnect. This has resulted in present issues like gender

discrimination in tech being overshadowed, while a small group of engineers and developers shape the future, often unrepresentative of the broader population. Public distrust in government, privacy concerns about digital data, and lukewarm reception to concepts like cybernetic avatars highlight the gap between these sci-fi visions and public sentiment. The question remains: are people really embracing these ambitious futuristic imaginations?

SESSION II

SOCIOCULTURAL PRACTICES OF SITUATING THE SELF AND OTHER: ROBOTS WITH HEART, VIRTUAL HUMANS, AND MATTER WITH SOUL

SPEAKERS

CELIA SPODEN

SENIOR RESEARCH FELLOW, GERMAN INSTITUTE FOR JAPANESE STUDIES (DIJ)

DANIEL WHITE

SENIOR RESEARCH ASSOCIATE, UNIVERSITY OF CAMBRIDGE

KERRY MCINERNEY

RESEARCH FELLOW, UNIVERSITY COLLEGE LONDON

KOJIRO HONDA

ASSOCIATE PROFESSOR, KANAZAWA MEDICAL UNIVERSITY

CHIHYUNG JEON

ASSOCIATE PROFESSOR, KOREA ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY

DAY I – SESSION II

Introduction - Sociocultural Practices on Situating the Self and the Other: Robots with Heart, Virtual Humans and Matter with Soul

Celia Spoden

Japan is often portrayed as a land of robots, with Western media exoticizing the Japanese love for robotic technology, while the Japanese media engages in self-orientalization (for orentalizations see McInerney's presentation). This fascination is frequently linked to Shinto beliefs and the idea of animated objects (for Shinto beliefs see Honda's presentation).

Several authors have analyzed this stereotypical depiction, showing how the Japanese government, industry, academia, and media have drawn on Shinto, animism, monozukuri (artisanship) and discourses of Japanese-ness (Nihonjinron) to construct a so called 'Japanese robot tradition or culture'. Moreover, the government often uses positive robot narratives to foster social acceptance for new technologies. However, Japanese robot imaginaries are complex and ambivalent, including utopian and dystopian narratives, fraught with conflicting and competing interests and changing stories depending on who is telling them, and what perspectives or solutions they seek to emphasize or deemphasize.

An example would be the creation of 'Robokono,' a robot doppelgänger of Japan's digital reform minister, Kono Taro developed by roboticist Ishiguro Hiroshi. According to Kono "I can send my avatar to various places and talk without having to go there myself." Ishiguro Hiroshi's avatar project is funded by the government's "Moonshot Research and Development Program" under the Moonshot Goal 1, which aims for a society free from limitations of the body, brain, space and time by 2050. With its Moonshot Program the Japanese government seeks to address the challenges of the declining birthrate, aging society and labor shortages through high-impact technological solutions that also work to maintain Japan's global economic competitiveness.

These programs represent a long held Japanese government strategy of finding technological solutions for the aging society, rather than pursuing immigration to shore up the shrinking workforce. This approach is buttressed by a search for untapped human resources, such as the elderly and those, primarily women, involved in unpaid care work, encouraging their participation in the workforce.

Japan's pursuit of science and technology as a response to demographic shifts and economic challenges isn't new. The bursting of Japan's economic bubble in the early 1990s and a growing awareness of the aging society and population decline prompted the government to search for new solutions and promising economic sectors. Science and technology were seen as an area where the challenges of both aging and competitiveness could be dealt with at the same time. With Japan's success pioneering industrial robots in the 1960s as a backdrop, Japan's Ministry of Economy, Trade and Industry (METI) shifted towards social robotics in the 1990s, aiming to enhance quality of life, create new markets and secure the future foundations of an aging society.
This robot strategy has been criticized for simplistically suggesting technological band aids for complex societal issues, rather than addressing and solving their root causes through policy. For example, Jennifer Robertson criticized how Japanese government programs such as Innovation 25, appear innovative at first glance but actually revolve around reinforcing traditional values to reproduce stereotypical gender roles. While these programs have been continually funded since the early 2000s, Japan's societal and economical challenges have become more urgent.

Nonetheless, the Japanese government continues to pursue more ambitious extensions of such visions, with the robotic technologies envisioned under the Moonshot Goal One no longer limited to appliances or companions, but instead extended cybernetic avatar technologies that blur the boundaries between human and machine.

A report by the working group on the Moonshot Goal One emphasizes using cyborg concepts to enhance human capabilities, aiming for a society where physical and cognitive limitations are overcome, as inspired by sci-fi movies like 'Ghost in the Shell.' It envisions avatar technologies enabling individuals to augment their abilities, even to the extent of invasive bodily and cognitive modifications. This approach is expected to revolutionize work and participation in society, allowing anyone to contribute regardless of their background.

The Moonshot Program aligns with Japan's broader vision of Society 5.0, aiming to integrate cyberspace with the physical world to create an efficient, networked, and inclusive society. Introduced in 2016, Society 5.0 represents Japan's commitment to using science and technology for overcoming historical challenges and shaping the future. It views technological progress as synonymous with societal advancement, tracing human civilization's evolution through transformative tools from hunting, agriculture and manufacturing to information and communication technologies.

The Moonshot Goal One working group envisions cybernetic avatars as catalysts for profound societal transformations, similar to the role of data in the information society. Daniel White has shown in his book, 'Administering Effect'(White, 2022) (for emotions and robots/AI see White's presentation) how Japanese government agencies apply soft power, nation-branding strategies, and pop-cultural diplomacy to address anxieties over demographic change, and Japan's economic and geopolitical situation and transform them into hopes for the future. A similar strategy is being employed in the context of Japan's robot strategy, Society 5.0, and the Moonshot Program. The "pessimistic future" of an aging society is reinterpreted as an opportunity. Through cybernetic avatar technologies, capability complementation and augmentation are anticipated to overcome limitations of body, brain, space, and time.

DAY I – SESSION I

Presentation I - Making Emotional Connections with Robots and AI in Japan's Digital Transformation

Daniel White

The gap between fantasy and practical implementation of robots, as James's presentation earlier highlighted, is significant. Yet, integrating these fantasies into robots represents both a unique form of implementation and reflects Japanese government anxiety. Unlike typical research that separates robots and data, I aim to merge discussions on embodied robots and AI within the data context, exploring how algorithms, AI, and infrastructure intersect.

Japan, with its distinct trajectories of robots and data infrastructures, offers a unique perspective on this integration. While robots and AI are often merged in the Japanese imagination, their actual integration in engineering practices today is worth examining.

Understanding Japan's digital marketplace requires focusing on robot emotionality. Working with anthropologist Hirofumi Katsuno and others on the Model Emotion project, we analyze 'emotion modelers' who adapt Western psychological emotion models for machine-based emotion recognition. This project, intersecting emotion, AI, and robotics, builds on concepts like the PAD model.

Our research (still in progress and unpublished) on integrating data infrastructure with robotics' emotional aspects has yielded several insights. Companies like Softbank with their humanoid robot Pepper, Yukari Engineering's cat-like robot Kubo, Groove-X's furry robot Lovot, and Sony's Aibo, each exemplify Japan's approach to emotional robotics. Each of these robots reflect Japan's history of connecting emotionality with robots and perceiving their sophistication as in part determined by having heart.

An important question then is, how did emotional connections between humans and robots become a discursive theme in Japanese robotics that creates material consequences for the ways data, robots, and AI are co-developing in Japan, such as the

collection of “emotional data.”

Japanese robotics history dates back to 17th-century mechanical tea-serving dolls. However, the modern concept of 'robot' was introduced through Carl Čapek's play 'Rossum's Universal Robots' (R.U.R.), first shown in Japan in 1924 as 'Artificial Human' (Jinzō Ningen). The play, portraying robots gaining emotions and revolting, marked a dark beginning for human-robot narratives in the West.

In contrast, in Japan, the play's arrival coincided with rapid modernization, leading to a unique portrayal of artificial humans in Japanese media. A pivotal moment was the creation of Gakutensoku, an 11-foot-tall robot by Nishimura Makoto, displayed at the 1928 Kyoto Imperial Exhibition. Gakutensoku performance initiated a precedent for a close relationship between robotics development and public performance in Japan. The robot also suggested the possibility for the integration of robotics with nature, suggesting harmony between robot intelligence and the natural world. Its ability to express emotions like smiling, fear, enlightenment, and compassion represented a significant leap at the time in the mechanical simulation of robotic 'intelligence.'

Nishimura's public exhibitions highlighted the evolving role of robots in Japanese society, paving the way for a tradition of robots in public spaces, contrasting the Western perception of robots as threatening. This historical context helps explain one trajectory of interest in the intersections between robotics and emotional intelligence in Japan.

AI's history in Japan differs markedly from that of robotics. The term for artificial intelligence, jinkō chinō, dates back to the 1950s but gained traction with the 1980s computing boom. The Japanese language offers two translations for 'artificial' – jinzō (人造), linked to traditional craft, and jinkō (人工), associated with modern, historically Western technology.

This linguistic nuance harkens back to R.U.R.'s Japanese title, Jinzō Ningen (人造人間), suggesting something crafted, heartful artificiality. In contrast, AI, typically translated as jinkō chinō (人工知能), conveys a technological emphasis, separate from craftsmanship. Yet, the word chinō (知能) in AI encompasses both cognitive and emotional intelligence, offering a more holistic interpretation of intelligence in Japanese AI discourse.

This cultural interpretation offers context for understanding Japan's focus on creating AI with human-like emotional qualities, diverging from the Western narrative where robot emotionality often breeds conflict. Iconic characters like Astro Boy epitomize this, celebrating emotional intelligence as a virtue enabling robots to be world-saving heroes.

This emphasis on building robots "with heart" significantly influences Japan's AI development. Designers focus on capturing emotional data, and products are marketed for their ability to understand human emotions. The consumer landscape has recently featured increasing examples of companion robots designed to connect emotionally with users, reflecting Japan's interest in integrating emotionality into AI and robotics.

In contemporary Japan, the convergence of AI and robotics focuses on incorporating the body, extending beyond mere cognition. This is reflected in a diverse array of companion robots on the market today, from humanoids to cat-like cushions, furry robots, and pet robots like Aibo, each designed for varying intimate human-robot interactions and emotional data collection.

An example is Palro, a humanoid robot for elderly companionship, designed to read emotions like happiness and sadness, and showcasing novel but still limited capabilities in emotion detection for modern Japanese robots.

The underlying model for emotional recognition in many of these robots is drawn from Paul Ekman’s theory of “Basic Emotions,” as well as a coding system he developed called the Facial Action Coding System (FACS). Despite criticism from anthropologists about cultural emotional variability, many engineers in Japan adopted upon Ekman's model, making FACS a central model for equipping robots with an elementary form of emotion detection.

Many Japanese companies, including those behind the companion robot Lovot, use Ekman's model for facial-expression reading. Lovot's advanced capabilities include over 50 touch sensors and a camera system to recognize faces, coupled with a smartphone diary app that records interactions for emotional data analysis. This method diversifies emotional data collection beyond facial recognition to include interaction-based emotional inference.

To conclude, there are various methods of emotional data collection in Japanese robotics.

This talk aimed to differentiate the historical trajectories of robots and AI in Japan and show their reconnection through emotionality. These developments are significant, as they shape new data tracking methods, influencing human-robot interactions and the collection of emotional data, guided by robot design and corporate strategies.

DAY I – SESSION II

Presentation II - From 'Japan Panic' to 'Chinese Peril':

The Shifting Location of the Techno-Orient in the US

Kerry McInerney

As someone not from a Japanese studies background, this workshop is a new and exciting experience, prompting many ideas for future research.

At the Leverhulme Centre for the Future of Intelligence, I co-chair the Global Politics of AI program, examining the intersection of international relations and AI, including global governance, geopolitics, neocolonialism, and border control. Concurrently, at the AI Now Institute in New York, I'm involved in developing an AI arms race rhetoric tracker that monitors how this narrative evolves within US policy and media.

My research at both institutes focuses on the detrimental effects of AI arms race rhetoric on safe and ethical AI development, global governance, and its role in fostering competition, racism, and discrimination. A crucial element of my work is investigating the influence of techno-orientalism, which negatively stereotypes the 'East' as hypermodern yet morally bereft, representative of both an ancient past and a dystopian future, on public discourse.

My interdisciplinary approach integrates politics, feminist international relations, Asian American and Asian diaspora studies, with critical race theory and cultural studies to understand Asian agency. I draw parallels between the 1980s Japan Panic and the current US-China AI arms race, exploring how US perceptions of Japanese and Chinese technological and cultural output affect its domestic and foreign policies.

This presentation explores two strands of techno-orientalism linking the 1980s Japan panic to the current US-China AI arms race: techno-orientalist economics and techno-orientalist politics.

Firstly, techno-orientalist economics. A key feature of the US-China AI arms race has been

the merger of economic policy with foreign policy. The U.S. CHIPS Act, aimed at enhancing domestic semiconductor production, exemplifies how public and private sector interests are merging under the guise of national security.

The AI Now Institute's tracking reveals that big tech companies exploit the US-China AI rivalry narrative to gain government subsidies and partnerships. A common, self-serving refrain is that antitrust laws give China an AI advantage. This perspective is encapsulated in an op-ed by Palantir CEO advocating closer state-tech sector collaboration, ominously suggesting "the preconditions for a durable peace often come only from a credible threat of war."

Amba Kak from AI Now suggests that such discourses transform AI policy into a form of nationalistic industrial policy. Illustrating this trend, the Special Competitive Studies Project's recent report claims generative AI's importance for US innovation and competitiveness against China, promoting intensified public-private collaboration.

This approach of treating firms more like extensions of the state is ironic in the US context, as it mirrors a critique the US often levels against Chinese firms like Huawei. Long T. Bui calls this 'monetary orientalism,' a double standard in the U.S.'s stance towards domestic and foreign tech firms.

Bui's concept of 'monetary orientalism' focuses on xenophobia in the global context, particularly the framing of China as a currency manipulator, a cheater, and an economic threat. This perception stems from the US's self-ordained identity as the global free market defender, characterizing challengers such as China as non-compliant with international norms.

Complementing Bui's work, Fan Yang's 'fiscal orientalism' concept focuses on the spectacle surrounding the US national debt held by China, suggesting a US fear of being 'owned' by China. Yang argues that this view contributes to a negative environment that hinders positive outcomes.

Bui and Yang's insights help us understand the repetition of orientalism in technology and places the US-China rivalry in historical context.

The parallels with the 1980s Japan Panic are evident, where fears of Japan "owning"

America fueled outrage over Japanese investment in America. This anxiety was reflected in cyberpunk media which portrayed a dystopian Japanese-dominated future. Japan was stereotypically viewed as a "techno cheater," echoing structural racism and the challenges non-Western countries face in Western-dominated markets.

These perceptions fueled the techno-nationalism of the 1980s, which culminated in protectionist legislation, and the absurd spectacle of Republican lawmakers smashing Japanese products on Capitol Hill.

In both the U.S.-China AI arms race today and the Japan Panic of the 1980s, a crucial intersection emerges between national identity and the economic influence of tech companies. This entanglement affects not only markets but also people, particularly the Asian diaspora. This phenomenon, termed 'techno-orientalist geopolitics', highlights how perceptions of external threats influence internal divisions and discrimination.

As the AI competition has intensified, it has taken on the contours of historical rivalries like the nuclear and space races. The Special Competitive Studies Project likens AI to a new focal point in geopolitical conflict, reminiscent of the Cold War, but centered around China. This shift towards heightened geopolitical rivalry requires critical scrutiny.

The climate of growing geopolitical tensions fosters perceptions of Chinese Americans and the Chinese diaspora as disloyal 'perpetual foreigners' in the U.S. Beth Lew-Williams and Frank H. Wu point out that these views are historically rooted in U.S. anti-Chinese and anti-Asian sentiment, a major driver for the establishment of the legal category of 'alien' in U.S. law, reminding us that this unfortunate legacy lives on today.

Feminist IR theorists like Sara Ahmed and Iris Marion Young emphasize techno-orientalism's role in shaping U.S. identity. The 'foreigner within' concept is key to constructing a national identity that merges external threats and internal dangers, thus stabilizing domestic politics and justifying external aggression. This pattern reveals recurring dynamics in U.S. politics and international relations.

The implications of techno-orientalism can be severe, especially for individuals. The 1980s saw an increase in hate crimes against Asian Americans, partly fueled by nationalistic sentiments like the "Buy America" campaign. A tragic example of this was the murder of Chinese American Vincent Chin, by two white workers blaming the

Japanese for job losses.

These incidents highlight the perils of heightened nationalism and racial stereotypes. Currently, there's a resurgence of similar patterns, with rhetoric around Chinese economic espionage fostering racial profiling against Asian Americans, particularly of Chinese origin.

These recurring themes emphasize techno-orientalism's lasting impact on how Asian communities are perceived and treated in the U.S. The cyclical nature of these issues underlines the need for awareness and a critical examination of the intersections between geopolitics, technology, and race.

Thank you.

DAY I – SESSION II

Presentation III - Japanese Robot Culture and Ancient Shintoism

Kojiro Honda

In today's presentation, I will explore the deep-seated cultural mindset behind Japan's acceptance of anthropomorphic robots. This fascination can be traced back to the Edo era with the appreciation for human-like artifacts like bunraku and karakuri. There's a notable curiosity about why Japanese culture, unlike some Western cultures, does not fear anthropomorphic robots. I answer this by examining Japan's unique cultural and philosophical underpinnings.

I also delve into Japanese perspectives on transhumanism, the concept of using robotic and AI technology to enhance human capabilities, which differ significantly from the general appreciation of robots. That difference is rooted in the theology of ancient Shintoism (distinct from modern, nationalism-adjacent Shintoism.)

A good starting point for illuminating the theological beliefs of Shintoism and how they shape Japan's relationship with robots and transhumanism is the fact that when asked if they have a religion, many Japanese will respond "no." This lack of recognition of religious belief belies how deeply Shintoism is embedded as a hidden framework in Japanese life.

Examples abound, including the phrase "Itadakimasu," said before meals, an expression of gratitude for the life provided by food, and the large crowds that gather at Shinto shrines on the first day of the new year. However, Shintoism is unique in that it doesn't have a specific doctrine but is instead a collection of mythologies compiled in works such as the Kojiki.

Several figures played crucial roles in advancing Shintoism during the Edo era including Kadano Azumamaro and his disciple Kamono Mabuchi, both Shinto priests, as well as Motori Norinaga, a medical doctor, and Hirata Atsutane an independent scholar of

Shintoism.

Today, I'll delve into the theology of Shintoism drawing from both Honda Chikaatsu, a disciple of the aforementioned Hirata Atsutane as well as Percival Lowell an astronomer and scholar of Shintoism whose 1895 book "Occult Japan," described Shintoism as quintessentially Japanese calling it "The faith of these people's birthright, not of their adoption," and continuing "Buddhist they are by virtue of belief; Shinto by virtue of being." Lowell observed how Shintoism shaped Japanese perspectives and their relation to the world around them.

To illustrate this deep connection with everyday life, I'd like to share an experience from Kanazawa, a city in northern Japan known for its sushi. Near the castle of Kanazawa lies Ishiura Shinto shrine, where you'll find unique monuments like the 'sushi grave,' dedicated to the life of fish and shellfish, and the 'knife grave,' which honors old tools.

Elsewhere, even everyday objects, such as old dolls, are honored with funeral ceremonies, reflecting the Shinto practice of acknowledging and respecting the spirit or soul in all things, animate or inanimate.

Such beliefs are a cornerstone of Shintoism and permeate the Japanese way of life, influencing their unique approach to robotics and technology.

This tradition of Shintoism is very old, dating back to possibly before the Jomon era. As recorded in the Kojiki (compiled around AD 720), its worldview centers on panpsychism, the belief in a universe animated by spiritual forces.

In Shinto cosmology, the universe initially had a singular deity, Amano-minaka-nushi, representing the spirit of the universe, unlike the creator God concept in Hebraism. From Amano-minaka-nushi emerged two forces: Takami-Musubi (expanding force) and Kami-Musubi (contracting force), together known as the three deities of creation.

These deities produced four types of souls: Aramitama (courage), Kushimitama (intelligence), Nigimitama (fraternity), and Sakimitama (love). They also manifested in three forms of bodies: fluid, soft, and rigid. This combination of souls and bodies resulted in eight cosmic forces: motion and stillness, aggregation and division, tension and relaxation, combination and separation that together represent the foundation and

dynamism of the universe in Shinto belief.

Within this belief system, not only do animals and plants possess the capacity for spirituality, thought and expression, but so too, does inorganic matter like rocks, mountains, rivers, and seas. Meanwhile, humans derive unique qualities from each of the four souls of the universe: Aramitama grants decision-making and bravery; Kushimitama fosters curiosity and learning; Nigimitama allows for harmonious living with others and state affairs; and Sakimitama enables love. Balance between the souls is key to inner peace, while its absence leads to problems.

Furthermore, humans are uniquely endowed with 'Naohi,' a portion of the universal deity's spirit, which allows us to reflect on ourselves and realize the balance of four souls. When the Naohi works well, our inner peace gives us an understanding of one's mission in life, referred to as 'Koto-yozashi' in the Kojiki.

Another important aspect of Shintoism is purification, seen as crucial for maintaining mental and physical health. Shrines often feature mirrors, not idols, symbolizing self-reflection and the need for purification through which one can align with the deity's intentions and express one's own intentions towards the universe.

Ok, so moving onto how all of the abovementioned impacts robots, in contemporary Japan, robots evoke nostalgia, a sentiment anthropologist Takuji Okuno terms 'techno-animism'. This nostalgia reflects a reconnection with the ancient Shinto belief that every material possesses a mind. The Japanese subconsciously accept that objects, even robots, have a spiritual essence composed of four souls. This cultural framework explains why Japanese people generally do not fear robots and view them as potentially possessing a mind.

This deep-rooted belief in coexistence and communication with all things makes robots familiar and comfortable in Japanese society. They are accepted as pets, friends, or partners. The same cannot be said, however, regarding Japanese views towards transhumanism – the idea of enhancing humans with technology. Japanese reluctance towards transhumanism is rooted in Shintoism, which views the body as a shrine for one's spirit. The notion of altering one's body with robotic technology conflicts with the principle of maintaining bodily purity to house one's spirit. Thus, while robots as external entities fit comfortably within Japanese cultural beliefs, using robotics to transform the

human body is met with hesitation due to the sacredness and necessity for purity of the physical self.

Mechanical parts inside one's body go against the essence of Shintoism, and we can thus anticipate that the Japanese will have a very conservative attitude toward transhumanism.

Thank you.

DAY I – SESSION II

Presentation IV - Alive Again, Digitally: Turning Dead Persons Into Virtual Humans in South Korea

Chihyung Jeon

As a researcher affiliated with KAIST as well as the University of Tokyo, I offer insights from South Korea that may supplement this workshop's focus on Japan.

Currently, I'm investigating the creation of virtual humans from deceased people in South Korea. This research examines the motivations, selection processes, and societal implications of digitally resurrecting individuals. I'm particularly interested in understanding how these virtual representations affect family dynamics, individual and social mourning, and societal norms, exploring the broader impacts and reasons for these digital recreations.

A striking example is "Meeting You," a South Korean virtual reality (VR) documentary that first aired on a nationwide TV network in early 2020, and received global attention for its unique premise, where a mother reunites with her deceased daughter in a virtual setting. Utilizing extensive data, including images, videos, voice clips, and family interviews, a team of producers, writers, and engineers created a realistic virtual avatar of the daughter. The documentary highlighted the emotional journey of the family, especially the mother, in her longing to reconnect.

The climax of the documentary featured the mother, using VR equipment, "meeting" with her virtual daughter, engaging in activities like shared meals and birthday celebrations, and establishing a simulated yet profound connection.

This television episode achieved remarkable success, gaining over 35 million views on YouTube and several awards, while sparking international interest as well as ethical concerns about virtual resurrection. The television audience, along with the family, embraced the virtual representation's imperfections. Particularly impactful was the mother's interaction in VR, where she re-experienced her daughter's presence, including

a voice synthesized from her recordings, leading to a profound emotional encounter and closure. This reunion underscored the power of virtual reality in providing emotional solace and closure, marking a poignant moment in the program.

The success of "Meeting You" led to a second season in 2021, featuring diverse relationships, including a widowed husband reconnecting with his late wife and a daughter revisiting memories with her deceased mother. Unlike the first season's global impact, the reach of these new episodes is less clear. But the producers continued the approach of working closely with families, gathering extensive personal information and interviews to meticulously reconstruct meaningful environments, like a family home or a forest path, and facilitating deeply personal virtual encounters.

Key to these episodes was the emphasis on capturing the true essence of the deceased loved ones. Producers involved families throughout the process, striving for authenticity in both appearance and emotion. This focus on detailed family interviews and recreating accurate personalities and interactions was crucial, ensuring that participants genuinely felt the presence of their loved ones, like recognizing "this is my wife" or "this is my mother." This commitment to the human and affective aspect of virtual reunions underpinned the production of the series' second season.

In the same year, however, the producers also attempted to go beyond their initial focus on deeply personal loss. In one of the new episodes titled “Meeting Yong-kyun,” they introduced a digital avatar of Mr. Yong-kyun Kim who tragically died in a 2018 coal power plant accident. While his family participated somewhat in the production, Yong-kyun's recreation primarily served as a vehicle for societal mourning of his death and raising awareness of industrial safety issues rather than a family reunion.

Yong-kyun died while working alone to clear debris on a fast-moving conveyor belt, and his death remained unnoticed until a colleague discovered his body late at night. This tragic incident highlighted safety concerns and corporate disregard for rules to protect workers in Korea and ignited a national debate on industrial safety.

For Yong-kyun's virtual recreation, producers collaborated with the colleague who discovered his body, meticulously reconstructing the perilous plant conditions and his final tasks. Unlike earlier episodes, the participants experiencing this virtual world were ordinary people who had not met Yong-kyun before. In the virtual reality, they

vicariously witnessed the hazardous conditions of the factory, and came to understand the circumstances of Yong-kyun's death. This immersive experience provided a platform for societal education, encouraging participants to empathize with Yong-kyun's plight and contemplate the broader implications of such industrial tragedies.

The creation of virtual humans from deceased individuals that I described today encompasses two primary themes: family reunion and social mourning. Intriguingly, a 2022 project by a newspaper used AI to digitally age deceased individuals for inclusion in family photos. For instance, a young man who died in a 2014 ferry sinking was virtually aged for a 2022 photo with his parents, and a woman killed in a 1995 department store collapse was similarly aged in a photo with her family. This project memorialized these disaster victims as well as some victims of state violence by virtually aging them to join present-day family images.

These AI-created photos transcend mere technological achievement; they symbolize ongoing societal mourning and the quest to remember and address historical tragedies. They resonate with the Korean public's lingering trauma from catastrophic political and social events in recent decades. By visually bringing the deceased into the present, these projects highlight unresolved societal grief and the quest for truth and justice.

Virtual human projects aim to preserve both individual and collective memories and spark discussion on unresolved societal issues. Aided by digital technology, they offer a visual and auditory dimension to mourning. While they provide some families with a closure or condolence, their efficacy in prompting actionable change regarding unresolved social issues is less clear. These projects elicit emotional responses, but it remains to be seen whether they can translate these emotions into tangible societal change.

Thank you.

DISCURSIVE AND MATERIAL DIMENSIONS OF THE DIGITAL TRANSFORMATION: *PERSPECTIVES FROM AND ON JAPAN*

KEYNOTE

KEYNOTE

SPEAKERS

SHOKO SUZUKI

PROFESSOR EMERITUS, KYOTO UNIVERSITY

SHINTARO MIYAZAKI

JUNIOR PROFESSOR, HUMBOLDT-UNIVERSITAT ZU BERLIN

Keynote Speech I -

Rediscovering 'Glocal' Cultural Resources for the Digital Future

Shoko Suzuki

Today, I will discuss AI, data, and IT's transformative impact, focusing on the challenges and the distinction between artificial and natural intelligence. This discussion probes what it means to be human, a concept central to my work in educational philosophy, particularly the immediacy of human perception, tact or tactfulness.

In my work, I'm particularly interested in the unique sense of touch, where the simultaneous acts of touching and being touched alters our perception, exemplifying the depth of human experience. Consider for a moment bringing your hands together, as you move them around the perception of which hand is active vs passive changes. As Immanuel Kant suggested, tactility is a key sensation for maintaining balance in instability, akin to intuitive balancing by a tightrope walker. Exploring tactile sense alongside human rationality reveals its role in our subtle bodily knowledge, impacting how we interact with the world.

Touch is not just about the sensation that occurs by directly touching something. As it resonates through the air, my voice reaches all of you. The wavelengths of everyone here, who resonates, nods, and synchronizes while listening to my words, reverberate through the air in this space and return to me. Tact, in essence, enables resonance with others, an understanding of emotional distance, and the sense of interacting – truly making communication possible. It falls into the category of knowledge, like Polanyi's tacit knowledge, embodying prudence that manages situations as part of the situation.

Within this context, the relationship between the active subject as the one who touches and the passive object as the one being touched creates a sense of "Betweeness," establishing a balance that seeks the reversal of roles and dynamic harmony. This aligns with the concept of "subject-object undivided knowledge" in the philosophy of the Kyoto School in Japan. Clarifying the significance of such knowledge in the context of today's

advancing digitalization is the focal point of my research.

Since 2016, my AI research at the Institute of Physical and Chemical Research has explored the tactile aspect of human interaction with AI. I introduced "The Answer" to represent human traits essential to maintain in the digital age. This forms part of my broader project on 'Glocal' cultural resources. A crucial concern is the endless cycle of technology creating and then solving its own problems, raising questions about what we're missing. The emergence of AI with potential emotions and consciousness brings risks to human labor and purpose, challenging our role and identity in the face of AI's efficiency.

The discourse on AI echoes science fiction, mirroring the human ambition to create and control superhuman entities, as seen in "Frankenstein." This dynamic of hope and fear around AI calls for a balanced approach. Since 2015, organizations like UNESCO and OECD have been framing AI regulations and ethics, focusing on human-centered principles, rights, and transparency, though these remain somewhat abstract.

In practical AI development, ethics now require forward-thinking and risk assessment, yet AI practitioners' insights are often overlooked, and ethical guidelines struggle to keep pace with rapid tech advancements.

Human toolmaking has led to environmental control, but AI's development risks self-centeredness. We've become "Homo Technicus," integrating technology for survival, yet facing the problem cycle AI creates. In this respect, our approach to problem solving begins to resemble drinking seawater to quench thirst. Technologies like nuclear energy and AI have grown beyond human scale, presenting unforeseen consequences and making AI's Singularity a concern. As these technologies outpace our understanding, we must rethink our interaction with them.

Concerns and criticisms are often expressed regarding the discussions on ethical principles and regulations for AI, with some fearing that such debates may stifle technological innovation. However, viewing regulation and innovation as binary oppositions does not open up a promising future. There must be a path for all stakeholders to grow together, such as promptly recognizing the side effects of self-developed technologies, sharing them with stakeholders, and leveraging the intuitive risk perception of end-users. I believe there is a way for everyone involved to evolve

collectively.

Focusing on human uniqueness, memory, and creativity are key. With digital storage like Wikipedia, the role of memory has shifted. Historically, memory involved sensory experiences, including recitation of stories, song and poetry, with these processes being deeply ingrained in our physical being. These sensory memories, intertwined with experience, form the core of discovery and imagination. Over-reliance on digital memory storage may reduce our creative abilities, as creativity stems from processing lived experiences, a human trait not replicable by technology.
Emotion, another unique human aspect, is explored in "Emotion AI". In Japan's techno-animism culture, emotional connections with robots are common. While robots can imitate emotions for superficial communication, they lack true emotional depth, leading to potential emotional dependence. The phenomenon of "robot loss" indicates the need for balanced relationships with technology.

Discussing "glocal cultural resources," I focus on two aspects in Japanese culture. Firstly, the unique perception of nature, where, before the scientific revolution, Japan maintained a deep understanding of nature as a distinct entity. This is visible in Japanese gardens, where natural elements and aging, like moss growth, illustrate the harmony between technology and nature.

Secondly, the Japanese view objects/ artifacts as if alive, demonstrated in how we treat them and often thank them for their service. Japan has a tradition of disposing of long-used items such as brushes and eyeglasses by having them memorialized at temples. This practice, known as "mono-kuyo" or the memorializing of things, involves reflecting on the days spent with cherished items and expressing gratitude for the shared experiences. Recently, the topic of conducting memorial services for dog-shaped robots at temples has also gained attention. Expressing gratitude for their role in shaping the narrative of one's life and personal meaning enriches the individual's heart. This ingrained practice signifies the philosophical importance of the interconnection among humans, animals, objects, and algorithms.

Since the Scientific Revolution of the 17th century, technology has come to be seen as capable of controlling nature. In the pre-modern era, in the Christian world, nature was considered God's creation, while in the Buddhist world, nature had a sense of self-evident being. The various insights surrounding traditional craftsmanship, cultivated and passed

down through the pre-modern era, can be found in Japan, Germany, and the world. It is crucial not only to adhere to a technologically and instrumentally oriented mindset based on a modern scientific worldview but also to rediscover the value of wisdom that has been somewhat overlooked in the modern era.

Under the modern scientific worldview, the desire for knowledge, involving information collection and expanding one's intellectual horizons, has been considered a virtuous pursuit. Bringing back and showcasing flora and fauna discovered in exotic lands manifests this desire for knowledge. Also, colonial powers historically compelled their colonies' inhabitants to learn the colonizing nation's language. This geopolitics of knowledge is deeply ingrained and continues to influence today.

Translating cultural understandings with continuous feedback is crucial, merging local insights with global views. Overcoming the homogenization of knowledge brought about by globalization requires updating and sharing each region's diverse, indigenous cultures as "glocal" wisdom. This brief overview highlights the importance of cultural integration in our digital future.

Keynote Speech II -

Counter-Dancing Digitality! Practicing CommOnistic Cooperativity

Shintaro Miyazaki

Thank you for the introduction. My work is focused on media technology and computation from the perspective of critical humanities, advocating for solidarity-oriented computation that prioritizes human needs over profit. Thus, what I will discuss tonight aligns well with the themes of today's workshop, emphasizing a digital transformation that pursues alternative possibilities. The challenge lies not only in knowing what we want to avoid but defining what better approaches could look like, and finally find alternative means to practices them in order to be prepared.

To spark real transformation, we need convincing new models, ideas, and theories, differing from profit-driven methods. My goal is to introduce elements of a critical media theory of futureing, highlighting agent-based modeling's potentials in social learning and social change. This way of modeling, involves from 200 to 10,000 simulated agents, enables exploring organizational and resource-sharing methods and is crucial for testing new bottom-up strategies. It requires competences and skills in programming and open knowledge infrastructures, which are adaptive and accessible to everybody. Current digital technologies by contrast, seem to be user-friendly, but in reality, are impositions and they often overlook or even work against our needs. This highlights the need for radically different approaches to the development of critical technology.

One such approach is the 'counter-dancing' that appears in my presentation title. It represents a resistance to digitality, which includes all binary-based operations like algorithms and blockchain. This concept suggests that opposing digitality is possible, yet requires practice.

Commonist cooperativity, an alternative life-form of digitality, is seen in small communities and open-source projects like Supercollider and Firefox. However, Firefox's reliance on external funding shows that this model has limitations. This idea also applies

to non-tech areas, such as Japan's 'Teikei' agriculture movement, which blends technology with cooperative production. I use 'commonist cooperativity' to describe community-focused digital approaches, opposing traditional big tech models.

Commons, which are collaboratively maintained resources affecting everyone, embody cooperation. Originating from resistance to land enclosure, the concept might extend to all life, as in endosymbiosis. Digital commons include shared data and processes, often forming networks within networks, and represent communal sharing activities.

Returning to my initial point, media, encompassing networks, devices, and systems that handle information, are influential, not neutral. They are not merely instruments of those, who control these technologies, but often have their own agency, which unfold in time and space through accidents such as network breakdowns. Networks and systems of media heavily impact other complex systems and can provide a crucial point of resistance to capitalist value extraction machinery. This perspective informs my approach to modeling commons for transformation, a topic gaining global relevance of late.

Critical theory focuses on analyzing the entire communication ecosystem, not just the messages. This underpins my work in 'futureing' – shaping the future through academic models, a concept highlighted by the COVID-19 pandemic's modeling successes and limitations. Mainstream economic models, which belief in the power of free markets and deregulation often overshadow alternative approaches necessary for challenging traditional models.

I advocate for using computational modeling for self-driven predictions and self-determined community life. This involves programming and simulating our own futures, leading to knowledge production independent of heavy computing resources. Researchers and activists world-wide are using agent-based modeling, particularly in socio-ecological and economic fields, for participatory projects globally, including in African countries, where stakeholders develop context-specific models.

My research focuses on the theoretical aspects of computer modeling to envision commonality, aiming to make modeling engaging and protected from commercial and political influences. It addresses issues like private poverty versus commons, which challenge market principles. A key point is reimagining decision-making processes, but also distribution processes moving away from market-centric, price-driven models to

alternatives free from market failures.

I draw from Robert Kurz a German Marxist from the School of Value Criticism, who critiqued the commodification in society and predicted capitalism's collapse due to unsustainable wage labor. His theories, once seen as implausible, gained traction since 2008.

Robert Kurz, in 1997, proposed a 'microelectronic natural economy', diverging from traditional market values and integrating Marxism with microelectronics. Kurz advocated for repurposing technology for socialist goals and focusing on microelectronics, which would mediate the link between consumers and producers without applying exchange value (price) and monetary media, but other forms of mediation. His concept aligns with the teikei agricultural model, suggesting a decentralized, digital commons, though details of this mediation weren't fully explored in his paper. I stress the importance of modeling and simulating these ideas, despite challenges. We should aim for complexity in data use, not simplification as seen in market-driven models (reduction of all aspect to the price value). This approach involves considering messengers as agents with influence and agency, not just data carriers, crucial for developing new digital social structures. In agent-based modeling, agents act with agency, an idea from the late 1990s computational social sciences. This field includes concepts like emergent behavior and non-linear dynamics, with examples like the game of life and cellular automata. I reference Thomas C. Schelling's segregation model, which originally aimed to explain segregation by low tolerance thresholds. Modifying this model to include a diversity factor challenges the initial segregation outcome, promoting the possibility of mixed communities by introducing diversity rules. Finally, there's a parallel with viruses and computer worms, which, despite being pathologized, demonstrate distributed intelligence, akin to agent-based models. Their behavior, unlike confined models, extends across networks, offering insights into distributed systems.

Agent-based models have evolved alongside constructivist learning theory, influenced by pioneers like Seymour Papert, who developed the programming language Logo for children's education. Paperts's work aimed to engage sensory-motor learning, inspiring others to develop similar educational methods. Agent-based modeling, while expanding since the 1990s, is still emerging in humanities. I suggest adopting it for future-oriented thinking. These models can incorporate playful interactions, as demonstrated by Mitchel Resnick and Uri Wilensky's conference exercises from the 1990s, which illustrated

decentralized decision-making through group dynamics and the importance of computer models to understand complexity. Discussing the role of dancing in learning, we can draw from business game simulations used in business and management education, which combined operational research with creative planning. To enhance learning, we should merge experimental pedagogy with innovative, but critical programming. To prevent the commercialization of commonist cooperativity, we can use protective licenses and embrace activities like dancing, which foster communal spaces and resist commercialization, as discussed by dance theorists like Gabriele Klein. To promote commonist cooperativity, I recommend exploring media arts, live coding, and collaborative gaming. In Japan, this includes community agriculture and degrowth communism, influenced by Marxist thinkers like Kohei Saito, who linked environmentalism with Marxism, continuing a tradition of socialist thought and materialism in Japan, exemplified by still quite unknown figures like Tosaka Jun.

DISCURSIVE AND MATERIAL DIMENSIONS OF THE DIGITAL TRANSFORMATION: *PERSPECTIVES FROM AND ON JAPAN*

DAY II – DATA & INFRASTRUCTURES

TUESDAY SEPTEMBER 12, 2023

SESSION III

ALGORITHMS, DATA, AND THE IN-BETWEEN:

FASHION CULTURE AND TRANSNATIONAL SCIENCE

SPEAKERS

HARALD KÜMMERLE

SENIOR RESEARCH FELLOW, GERMAN INSTITUTE FOR JAPANESE STUDIES (DIJ)

REBECCA CARLSON

ASSOCIATE PROFESSOR, TOYO UNIVERSITY

TOBIAS MATZNER

PROFESSOR, PADERBORN UNIVERSITY

SESSION III

Introduction - Algorithms, Data, and the In-Between: Fashion Culture and Transnational Science

Harald Kümmerle

I will begin with a discussion on field classics, then shift to Japan's COVID-19 response. After this, I will address the controversial question "Can Japanese think?"—a variation of the well-known phrase “Can Asians think?” in Asian studies, thus less contentious than it appears.

Let me start by highlighting two infamous cases of what could be, colloquially, described as the “fallout” of social media, and thus, of big data business: The first case is the US Capitol riots on January 6, 2021, where tensions exacerbated by social media most likely played a bigger role than President Trump’s speech itself. The second case is the 2017 Fyre Festival, where an advertising campaign almost weaponized the reach of social media influencers and created expectations that the ill-prepared organizers could not fulfill by a wide margin.

The 2016 book "Weapons of Math Destruction" by Cathy O`Neil, a mathematician who worked in the finance industry and became an activist in the Occupy Wall Street movement, critiques big data's role in exacerbating inequality and its impact on democracy, in a way forecasting the US Capitol riots. Susan Leigh Star's 1999 seminal article "The Ethnography of Infrastructure" builds on insights of software development failures and highlights multiple access points of how to study information infrastructure. It was followed up in 2000 with the book "Sorting Things Out," which Star coauthored with Geoffrey Bowker, on practices of classification, racial classifications in apartheid South Africa being one of the examples.

The 2010s marked a shift to infrastructure more generally, as shown in Anne Blair`s 2010 book "Too Much to Know," indicating information overload in scholarship isn't a new issue, and Frederic Kaplan’s and Isabella di Lenardo’s 2017 article "Big Data of the Past," pointing out that big data and information overload have roots in antiquity.

The discussion includes infrastructure and policy frameworks like Society 5.0, with the most recent Osiris series' "Beyond Craft and Code: Human and Algorithmic Cultures, Past and Present" serving as a vital resource. This volume offers updated historical insights, focusing on algorithmic culture and its roots in labor history and science.

"Beyond the Craft" goes beyond the simplistic craft-versus-code binary that is present in critiques like those by Cathy O'Neil's, suggesting a new lexicon that blends algorithmic and human aspects. This perspective helps to refine historical research and better understand algorithmic governance and development.

The forthcoming session on data policy and agile governance presents a chance to engage with these ideas among professionals, promoting advanced dialogue in line with this progressive outlook.

In the field of critical data studies, for example in its most prominent journal "Big Data and Society", Japan is hardly ever discussed. Amidst analytical frameworks like data colonialism, which posit the US and China as the main players, Japan's trajectory remains under-explored.

In my own research, I have uncovered an interesting big data dimension in Japan's response to COVID-19, which involved limited testing but conformed with the vision of Society 5.0. With emphasizing the avoidance of the 'three Cs', public cooperation, and non-binding requests to stay home during surges, its measures focused on environments rather than individuals. This response, not just cultural but in fact data-driven, calls for a more refined understanding than the WHO's call to "test, test, test".

For example, Japan's use of the Fugaku supercomputer for aerosol and droplet simulations in a variety of environments, and their impact on local decision-making, contrasts with the approach of Germany which tended to employ uniform rules based on case incidence. Here, Japan's use of digital technology allowed it to avoid the kind of long-term school closures pursued elsewhere and later deemed unnecessary.

Let me now reference the 2002 book "Can Asians Think: Understanding the Divide Between East and West" by the Singaporean diplomat Kishore Mahbubani. Discourse on Asia's rising global influence that relates to his work usually emphasizes China`s role,

although Mahbubani is sympathetic towards India as well.

Situating Japan correctly in this picture requires caution. Sebastian Conrad, a notable global historian, observed that Japan has created its own version of Orientalism within Asia, particularly regarding China and Korea. This is evident in Japan's tendency to compare itself with the West rather than with other parts of Asia, which also became manifest during the COVID-19 response.

In May 2020, virologist Hitoshi Oshitani made a notable statement in the official journal of the Japanese foreign ministry. In an interview, he said that being unable to get tested may be hard to bear for Westerners, but that limiting access to testing was necessary based on the characteristics of this virus. While he acknowledged the success of different approaches in countries like China, South Korea, Taiwan, and Vietnam – which, in fact, emphasized widespread testing – his framing managed to connect the WHO's universal call to "test, test, test" with the West, and criticize it from this perspective.

Although the testing strategy received much critique inside and outside of Japan, Oshitani still considers it to be justified. In contrast, China's zero-covid strategy, which at its core fundamentally relied on equal access to testing, has resulted in a dramatic failure, an outcome that its former advocates in the West and the WHO now find difficult to address.

Japan also enriches discussions on the geopolitics of digital technology, at least if China alone is taken as the *other* of the West in the sense of Edward Said's orientalism. A German international relations scholar in 2020 critiqued Donald Trump's campaign against Huawei as an example of "digital orientalism", noting the often-overlooked similarities between Chinese and Western surveillance practices. Interestingly, the Chinese National Intelligence Law, previously highlighted by Trump, was later problematized in Japan following a data leak incident in 2021, leading to support for economic security measures. This raises the question: does criticism of China's intelligence law in the Japanese public also constitute an example of "digital orientalism", and would a positive answer to this question position not fundamentally undermine Japanese agency?

I look forward to exploring these questions further in the upcoming session.

SESSION III

Presentation I - Infrastructuring (Trans)National Bioscience: From Humans to Cells to Code in A Japanese Laboratory

Rebecca Carlson

My research in Japanese bioscience explores the transformation of materials into data. Initially a visual anthropologist studying video games, my pivot to bioscience, driven by a consistent interest in how knowledge is produced and disseminated, examines the role of gatekeepers in shaping our understanding.

Previously, I investigated the process of video game localization, exploring classification schemes and infrastructures and highlighting how media circulating across borders reveals boundaries as challenged or porous.

My current work explores these boundary dynamics, particularly in reaction to cross-border movements. This thematic focus on boundary negotiation underpins my theoretical approach.

My transition to wet lab research began in 2019 with a two-year ethnographic study in a Tokyo genetics lab. The pandemic shifted my focus to remote work and subsequently, to bioinformatics, as the lab adapted to computational methods.

That research examined the Japanese government's push for globalization, especially for the 2020 Olympics, and its impact on scientific practices in the country.

My work extends into transnationalism and globalization, building upon my previous studies on Japanese migration. Currently, I'm examining the gap between globalization promotion and actual bureaucratic practices, echoing what James's presented yesterday.

I've introduced the term "Inverted Globalization" to describe this phenomenon with the "Cool Japan" initiative, being a prominent example in the context of Japanese policymaking. Despite professing openness, these policies often resemble Japan's prior

"internationalization" (kokusaika) efforts, prioritizing disseminating Japanese practices over true global integration.

I'm focused on the disparity between globalization's objectives and the realities, particularly in transitional scientific collaborations. This includes a broad look at how scientists manage data transfer across boundaries and infrastructures.

I propose the term 'infrastructureing' to describe the transformative process in scientific research when crossing infrastructural borders, emphasizing the role infrastructures as active technologies needing management.

Furthermore, I'm exploring 'infrastructure joins' – points where differing infrastructures meet, creating unique transformations and decisions. These junctions are key in understanding the movement and alteration of materials and ideas in infrastructural networks. An example is how water interacts within these networks, illustrating the broader concept.

To illustrate infrastructural interactions, I use images, sourced from the internet, focusing on water system transformation, in line with my expertise in visual anthropology.

I discussed three transformation types: First, material transformation, exemplified by changes in water's characteristics as it flows through pipes, highlighting the influence of infrastructure on material properties.

Second, processional transformation, evidenced by human-induced changes, like adding chemicals to water, demonstrating decision-making impacts on infrastructure functionality.

Lastly, conceptual transformation, illustrated by the distinction between private and public water lines. This separation, more ideological than material, is critical in scenarios like water main breaks, where it defines responsibility despite the pipes' material similarity. This shows how infrastructural boundaries are both tangible and ideological, influencing interaction and management.

My research in genetics, genomics, and bioinformatics centers on biobanks, such as Biobank UK, as biometric data repositories. The critical transformation in my study is

converting physical tissue samples into digital data, primarily focusing on the laboratory phase.

Accessing digitized tissue data from biobanks involves a challenging bureaucratic process, particularly in Japan for international data. This complexity illustrates the intersection of material transformation with procedural and bureaucratic dimensions in scientific data sharing.

Contrary to the belief that digital data transfers effortlessly, for scientists, especially bioinformaticians, it's a lengthy, intricate process. Data is processed through a computational pipeline, often Python-based, created by the bioinformatician. This pipeline, their intellectual property, processes data for specific hypotheses and experiments, aiming for publishable results.

In terms of material transformation, this refers to converting human cellular data into genetic codes and computer files. Various models define this transformation, with the resulting data files too complex for direct human interpretation. These files undergo processing and analysis via the bioinformatician’s pipeline.

Scientific data perception is evolving, moving away from traditional approaches towards a more compartmentalized, closed approach. This is evident in bioinformatics, where data is pre-processed and cleaned, then post-processed for quality control, reflecting both procedural and conceptual changes.

This shift requires scientists to embrace new conceptual frameworks, such as viewing digital genetic codes as valid representations of biological diversity, marking an epistemological transition in scientific methodology.

My research highlights challenges in a Japanese lab involving access to international biobank data. Despite a diverse team, bureaucratic attitudes hindered external data access, showcasing a preference for local data over foreign sources. This limited the team's ability to use UK biobank data, problematic given the distinct nature of each biobank which primarily contains genetic information from its respective population.

This situation reveals the need to investigate such bureaucratic and cultural nuances, and bridge the differences between countries unique scientific processes, cultures and

concepts of scientific kinship.

For example, Japanese scientific culture is hierarchical, with supervisors often possessing a kind of virtual ownership over their postdocs' intellectual work. This tight kinship system also operates on a horizontal logic of inside versus outside (Japan.) While it eases data transfer within networks, it complicates external collaboration, particularly outside of Japan. This is pronounced in bioinformatics, where local sourcing prevails over transnational resources, despite the need for diverse data.

The aforementioned case where use of the biobank data from the UK was discouraged, illustrates how infrastructures regulate material flow. These regulations are apparent at various infrastructural intersections.

Methodologically, this concept applies beyond bioscience. In collaboration with German researchers, I fused qualitative analysis with code and algorithm studies, converting theoretical ideas into practical methods.

This approach, adaptable to multiple disciplines, urges researchers to consider the nuances of data border-crossing. Looking at COVID-19, for example, it means closely examining RNA sequence data origins and transformations.

By understanding how data is produced and tracing its journey through infrastructural networks reveals the complex transformations it undergoes we can create a comprehensive and robust framework for analyzing data in various research contexts. Thank you.

SESSION III

Presentation II - The Co-Constitution of Machine Learning Algorithms and Training Data

Tobias Matzner

Today I will discuss the theoretical but crucial topic of discriminatory effects in machine learning.

Discrimination in AI and machine learning is well-known, with cases frequently emerging, such as the ones collected in Cathy O'Neill's "Weapons of Math Destruction". While much of the discourse in the English-speaking world focuses on discrimination against black and darker-skinned individuals, there are also cases anti-Asian discrimination and many other forms of discrimination.

A notable example is the output of generative AI based image synthesis such as Stable Diffusion and DALL-E. These models, while advanced, have raised concerns over biased outcomes. You may be familiar with the case of Rona Wong, a 24-year-old Asian American graduate student who gave such a model a photo of herself and prompted it to give the girl from the original photo a professional LinkedIn profile photo. The result, which gained attention on Twitter, was her appearance dramatically altered to resemble a Western, blue-eyed individual. This example underscores the need to address and rectify biases within AI systems.

This is not a novel problem. For example, New Zealand's biometric passport system, which upon introduction a decade ago struggled to accurately recognize Asian and indigenous faces. This incident illustrates the critical role of diverse training data in AI development. While biased datasets largely consisting of Western subjects are a known issue, broader solutions are needed to tackle the inherent complexities in algorithmic bias and to advance equitable AI.

Cultural biases in algorithms are not limited to training data. In one interesting example from several years ago, some Western users of a high-end Fujifilm cameras (actually the

predecessor to the one being used to photograph this event), noted that its noise reduction algorithm seemed to make skin tones appear artificially smooth and “waxy” as those complaining called it, leading to speculation about supposed Asian preferences for smoother skin influencing algorithm design.

Fujifilm never officially commented and later adjusted the algorithm, but, regardless of whether this was intentional or a misinterpretation by users, the point is that a programmer's intention doesn't solely define an algorithm's impact but also the discourses and practices of its use. Theoretically, this has been highlighted in Wendy Chun's paper 'On “Sourcery” or Code as Fetish’, that emphasized how the results of execution are what matters in the and, which can digress comparably from the intended purposes of programming. This case, unique in that it was Western users who felt impacted from supposed bias, illustrates how algorithmic decisions, our perceptions of them and how we debate them, reflect cultural biases as well as race and gender preferences.

The importance of this intersection of these cultural practices with machine learning can be seen when discrimination is framed as 'bias' that is, deviation from expected outcomes. Joy Boulamwini and Timnit Gebru's study on gender classification algorithms revealed they were less accurate for women and performed worse when identifying darker-skinned individuals. This highlights how pre-existing cultural assumptions and machine learning can combine to reinforce discriminatory outcomes. Boulamwini and Gebru’s work was of great value in making the issue of algorithmic bias more broadly accessible in academia, computer science and policy-making circles.

However, it's important to acknowledge that testing these algorithms involves temporarily adopting their foundational assumptions, such as the binary gender concept and racial categorization based on skin type and facial features. These assumptions, critiqued by feminist and queer studies, are a necessary prerequisite when analyzing discrimination as bias: in order to know how the algorithm deviates from the presupposed outcome, one needs to define this outcome. Yet, within this framework this can only be done regarding the way the algorithm classifies – here binary gender and skin color. The authors of the gender classification study recognize the limitation of this binary reduction. This situation underscores a key challenge in AI research: the need for critical evaluation and potential revision of these basic assumptions to address their broader societal implications.

To address the deeper, structural discrimination within algorithms, we must rethink how data and algorithms are conceptualized. Algorithms often contain explicit decisions leading to discriminatory outcomes. The process of converting data into training sets for these algorithms inherently involves adopting these biases. Therefore, even if an algorithm appears to perform flawlessly, it may still be reinforcing problematic bias.

Put another way, if the algorithm requires specific, biased inputs, then the production process for the training data, a critical but mundane task often passed off to low paid workers, will undoubtedly reflect this. This isn't a "mistake" in the traditional sense, the data is being categorized as requested, but it often results in hidden Eurocentrism and classism being embedded into AI systems. Lily Irani's research on the screening process for click workers, demonstrates how biases are inbuilt in the process.

As part of a holistic solution, I advocate viewing data as performative, echoing Judith Butler's concept of performativity in language. Data should not be seen merely as representing the world but as actively shaping it through repeated cultural practices. For algorithms to be recognized as legitimate tools, they must align with the prevailing cultural understanding of key concepts.

Algorithms don't arbitrarily assign meaning to data. Instead, data gain significance through repeated algorithmic processing, akin to how language derives meaning from repeated acts of speaking. Just as individual speakers can't solely dictate the meaning of language, programmers can't control the meaning outcomes of their algorithms. These algorithms must connect to established forms of meaning, echoing Butler's concept of the performativity of language.

A critical reevaluation of Boulamwini and Gebru's findings reveals that algorithms perpetuate a binary concept of gender into the digital realm. Combined with training data, this perpetuation takes on an intersectional dimension, emphasizing how the production of gender is historically intertwined with race. This echoes feminist critiques that mainstream feminism often centers on white women, a bias also reflected in these algorithms.

This is not merely a repetition but a shift in practices, introducing gendered and racial biases into new areas of life, like unlocking smartphones with facial recognition. Such

algorithms transform previously neutral actions into gendered and raced experiences, highlighting the importance of understanding the deep-rooted societal implications of algorithmic decisions.

For those interested in exploring these ideas further, these concepts are detailed in a book coming out on October 1st, which delves into the intersection of technology and societal norms, as demonstrated here.

SESSION IV

DATA POLICY AND AGILE GOVERNANCE

SPEAKERS

NORIYUKI YANAGAWA

PROFESSOR, THE UNIVERSITY OF TOKYO,

EXECUTIVE VICE PRESIDENT, NIRA

CHIZURU SUGA

DIRECTOR, MINISTRY OF ECONOMY, TRADE AND INDUSTRY

(METI)

MASAKAZU MASUJIMA

ATTORNEY AND PARTNER, MORI HAMADA AND MATSUMOTO

TATSUHIKO INATANI

PROFESSOR, KYOTO UNIVERSITY

SESSION IV

Introduction - Data Policy and Agile Governance

Noriyuki Yanagawa

Hello, I'm Noriyuki Yanagawa from the University of Tokyo and a member of the Nippon Institute for Research Advancement (NIRA). This session, titled "Data Policy and Agile Governance," focuses on Japan's policy on innovation and digitalization. We're in an era of significant technological innovation, where practical applications are crucial. A challenging yet essential step to fostering innovations is setting up adequate legal rules and regulations in areas like data analysis and artificial intelligence.

However, laws are not the only thing that can hinder innovation; sometimes technological advancements or certain types of data analysis themselves may impede progress. Therefore, we must look beyond just legal rules and consider agile governance as a key factor in promoting innovation. This session includes presentations from members of our research group and discussion group at METI, focusing on the policy of innovation for the future.

A crucial point in our discussion is the speed of innovation, which often outpaces the ability of legal systems to adapt. Addressing this discrepancy is vital for effective governance and the advancement of technological innovation and data analysis.

In Japan, adapting our legal system to match the rapid pace of technological innovation, especially in virtual spaces and data analysis, is a significant challenge. Our approach to legal change is traditionally cautious, focusing on avoiding mistakes, which leads to lengthy discussions and slow implementation of new rules and regulations. While this cautiousness might be suitable in a stable technological environment, the current era of drastic technological changes demands a more agile mechanism for legal adaptations and this is our first, and main point.

The second key point is dealing with the complexity introduced by these rapid technological advancements. These changes create diverse social objectives and make risk management more intricate and challenging. Establishing an effective process to

review and adapt goals in response to these complexities is crucial, yet it remains a time-consuming task.

A significant issue is the asymmetry of information between the government and the private sector. Policymakers often find themselves in positions of informational disadvantage regarding technology. Thus, a critical question is how to effectively incorporate information from the private sector and engineers, who possess more detailed technological knowledge, into policymaking. This integration is essential for developing informed and effective policies in this rapidly evolving technological landscape.

We need a mechanism that encourages the private sector to actively share their technological knowledge, applying the self-selection mechanism from economic theory. This approach can help overcome the information asymmetry between the government and the private sector. Creating guidelines, rather than concrete legal rules, provided by the private sector could be pivotal in bridging this gap.

Data analysis is increasingly vital in policymaking, with detailed data enabling more nuanced and contingent legal rules. While I won't delve into details, technologies like blockchain could significantly enhance policy development in the future. It’s also crucial to consider broader social objectives, not just economic performance, in shaping our society's goals.

An interesting aspect to consider is how technology itself can dictate governance. For instance, advanced technology in certain fields, like SpaceX's innovations in space, can establish de facto standards and influence business models. While legal rules and regulations are government-controlled, technology is a powerful factor in determining governance mechanisms. Without timely understanding and adaptation to technological advancements, we not only risk potentially hindering future innovation but also may be forced to regulate from behind, a position in which technology companies may have already established de-facto rules that are difficult or impossible to change even if the government or citizens desire to do so.

While I don't have a definitive answer, I'm deeply intrigued by the potential impact of technology on governance. It's a complex issue that merits careful consideration. Today's session features three presenters who will delve into the details of our

discussions, offering thorough insights on these topics. Thank you for your attention, and I would now like to introduce our first speaker, Ms. Chizuru Suga from METI.

SESSION IV

Presentation I - Insights

Chizuru Suga

Hello, I'm Chizuru Suga from the Ministry of Economic, Trade and Industry (METI.) I want to begin by thanking Yanagwa-sensei, to whom I owe so much, for inviting me today. My presentation incorporates the most recent findings from the Japanese government on the structure of regulations.

In examining regulations, we find a consistent structure across most of them. Firstly, each regulation has a defined purpose or policy goal. To achieve this goal, we focus on a specific object that needs to be inspected, managed, or addressed. Within this regulatory framework, three key subjects play distinct roles.

Subject A is responsible for gathering data about the object, such as assessing a building's robustness or detecting any flaws. This data is then passed on to Subject B, who makes a judgment on whether the situation is acceptable or not. Based on this assessment, Subject C takes appropriate action – intervening immediately if the situation is critical or monitoring if it's not severe. This basic structure forms the foundation of most regulatory processes.

Data has always been crucial in regulation, even before the digital era. However, the advent of digital technology has significantly enhanced data acquisition capabilities. In the pre-digital era, data gathering was limited to observable information. Now, digital technology allows continuous monitoring, enabling data collection 24/7. This wealth of data improves judgment, prediction, and prevention capabilities, reducing the need to address critical situations reactively.

Moreover, big data can provide feedback to refine the overall goals of regulation, leading to what we call 'digital regulatory reforms.' This concept of agile governance, which we're striving to integrate into our legal system, aims to create a feedback loop between data collection, judgment, and regulatory purposes. This initiative is part of a broader push for digital, regulatory, and administrative reform under the Kishida

administration, with experts like Inatani-sensei and Masajima-sensei contributing to the panel on digital administrative reform.

The digital reform in Japan has two primary goals. The first is implementing digital principles check process. We've established digital principles that all laws and regulations must adhere to, ensuring both new and existing regulations conform to these principles. The second goal is legislative digital transformation, where we envision rules and regulations becoming machine-readable, a shift that will better enable agile governance.

Currently, our focus is on ensuring regulatory conformity with digital principles. However, our future aim is to automate law enforcement and conduct regulatory simulations on digital twins by making laws machine-readable, laying the foundation for agile governance.

We have established five digital principles. Notably, the second principle emphasizes agile governance. It states that regulations should focus on desired outcomes and risk mitigation rather than rigid processes. Regulatory supervision should leverage available data and be open to continuous updates and improvements, reflecting a dynamic approach to governance in the digital age.

Our current task under Agile Governance is a thorough review of all existing regulations in Japan, aligning them with the five digital principles we've established. This is a massive undertaking, as Japan has over 10,000 statutes and laws, plus over 30,000 notices and directives at both national and local levels, along with numerous complex guidelines.

So far, we've identified 9,669 provisions from statutes and 2,536 from notices and directives that are analog in nature. These provisions often require physical presence or actions, such as written forms, in-person filings, face-to-face training, or on-site inspections, which hinder digital transformation.

We've categorized these provisions into three phases based on their digital adaptability. Phase one includes provisions that permit remote or real-time data acquisition or automated judgment, like AI. The most challenging phase, phase three, involves remote or automated correspondence. Our goal is to progressively update these provisions to

reach phase three, achieving full compliance with our digital principles. This effort is key to realizing the vision of agile governance and digital transformation in Japan.

At METI, and also in my role as a counselor at the digital agency, we are working on establishing the Uranus ecosystem, closely aligned with a data sharing platform. This initiative aims to facilitate data exchange across different industry sectors and ensure interoperability between common data platforms.

To achieve this, we've set up the Digital Architecture Design Center (DADC) within the Information Proof Agency, an affiliate of METI. The DADC is responsible for designing the basic structure of systems and ensuring their interoperability. The Uranus ecosystem is envisioned to provide rapid feedback on regulations, helping to identify outdated or obsolete rules through data analysis.

We're also planning to extend the Uranus ecosystem globally by connecting with regions outside of Japan. This includes collaborating with European initiatives like Gaia and Kichen Ix, the U.S.'s National Institute of Standards and Technologies, and ASEAN countries. The goal is to facilitate data free flow with trust, which requires standardization and certification.

The Uranus ecosystem could become a critical hub for international data exchange, aligning with our vision of agile governance and fostering a more connected and data-driven global community.

The concept of agile governance has a history, starting for me with the innovation and law study group in 2017, which Masajima-san was also part of. This group's work led to the proposal for cross-sectional digital regulatory reform across 21 different business laws spanning seven ministries. Initially, we sought only to understand emerging trends in various sectors, but it became clear that a substantial reform was necessary across industries.

Seeking partners for this ambitious project, we collaborated with the World Economic Forum. I became the founding head of their Center for the Fourth Industrial Revolution in Japan, serving for three years. During this time, I observed similar initiatives in the UK government and discussions within METI and the OECD about agile governance.

Finally, in July this year, we established five principles for agile governance at the ministerial level, as reflected in the declaration from the G7 Digital and Tech Ministers meeting. These principles underscore agile governance as a crucial area for collaboration and exploration. I'm eager to delve into these discussions further today. Thank you.

SESSION IV

Presentation III - Analysis

Tatsuhiko Inatani

Hello, I am Tatsuhiko Inatani, a law professor at Kyoto University, specializing in law and governance for emerging technologies. My work often involves collaboration across disciplines to gather evidence for legal interpretation and reform. Currently, I'm involved in committees shaping the theoretical foundations of Japanese government and society, focusing particularly on liability rules for advanced technologies.

Today, I'll discuss the features of existing legal systems and their limitations in the context of Society 5.0. Our current legal system, which I describe as a 'waterfall system,' is based on three core assumptions: the autonomy of humans with free will and reason, the ability of humans to perfectly control objects, and the effectiveness of static, pre-established legal rules in governing actions and events.

These assumptions lead to a conservative, top-down legal framework where the central government, guided by established legal rules, exerts control. This traditional system, while structured and systematic, may not adequately address the complexities and rapid changes brought about by cutting-edge technologies and societal shifts. This context sets the stage for discussing alternative approaches to digital governance.

The current legal system needs updates to address the dynamics of Society 5.0, envisioned as a human-centered society integrating cyberspace and physical space through Cyber-Physical Systems (CPS). CPS, encompassing automated systems and IoT devices, aims to enhance societal functions, but it also introduces uncertainties, particularly in human-machine interactions. These interactions can lead to unpredictable risks, such as changes in human cognition and behavior when interacting with smart machines.

Systematic risks in Society 5.0 arise not just from individual components but from their interactions, often unpredictable and difficult to foresee. Additionally, the use of AI, which operates on probabilistic statistical models, adds another layer of uncertainty.

These factors challenge the traditional, top-down 'waterfall' legal system, which relies on the government's ability to anticipate risks and establish pre-emptive legal rules. To address these challenges, we propose the concept of agile governance, also referred to as governance innovation. Agile governance emphasizes adaptability and responsiveness, a necessary shift to effectively manage the complexities and uncertainties inherent in Society 5.0.

The current legal system needs updates to address the dynamics of Society 5.0, envisioned as a human-centered society integrating cyberspace and physical space through Cyber-Physical Systems (CPS). CPS, encompassing automated systems and IoT devices, aims to enhance societal functions, but it also introduces uncertainties, particularly in human-machine interactions. These interactions can lead to unpredictable risks, such as changes in human cognition and behavior when interacting with smart machines.

Systematic risks in Society 5.0 arise not just from individual components but from their interactions, often unpredictable and difficult to foresee. Additionally, the use of AI, which operates on probabilistic statistical models, adds another layer of uncertainty.

These factors challenge the traditional, top-down 'waterfall' legal system, which relies on the government's ability to anticipate risks and establish pre-emptive legal rules. To address these challenges, we propose the concept of agile governance, also referred to as governance innovation. Agile governance emphasizes adaptability and responsiveness, a necessary shift to effectively manage the complexities and uncertainties inherent in Society 5.0.

Agile governance necessitates laws and systems that can adapt and respond swiftly to unforeseen events, based on data and feedback. This approach is crucial given the inherent unpredictability of risks in Society 5.0. However, agility alone isn't enough; responses must also be democratically defined to avoid risks associated with authoritarianism. Therefore, a multi-stakeholder approach is essential.

Our legal system has a layered structure, encompassing not only formal laws and regulations but also technical standards and other agreements. These layers influence different stakeholders to varying degrees, necessitating a multi-layered, multi-

stakeholder approach to governance, a concept recognized by the G7.

Agile governance aims to establish a better relationship between humans and Cyber-Physical Systems (CPS) through rapid, democratic control of technological influences. Implementing this agile governance system requires significant changes to our existing legal frameworks, ensuring they are equipped to handle the complexities and rapid developments of Society 5.0.

In the context of agile governance and the digital transformation of Japan, a crucial aspect is redefining liability rules. The essence of agile governance is to incentivize stakeholders who best understand Cyber-Physical Systems (CPS) to manage risks effectively. This approach aligns incentives for stakeholders to autonomously manage risks, thus establishing effective risk governance.

The current legal notions of negligence and defect, which imply risk elimination through correct actions, are not suitable for cutting-edge technologies where some level of risk is inevitable. Instead, a strict liability rule should be adopted, encouraging stakeholders to improve their systems and manage risks proactively.

However, due to the dynamic and unpredictable nature of risks associated with complex systems and AI, it's also necessary to implement immunity systems to mitigate any chilling effects on stakeholders. This approach ensures that stakeholders are not overly burdened or discouraged from innovation while maintaining responsible management of technological risks.

Accidents in complex systems like CPS are inevitable, and assigning blame for each incident can have a chilling effect on stakeholders due to reputational damage. Instead, a certified liability immunity system could be a more effective approach. However, introducing such a system raises the risk of abuse. Therefore, a criminal sanctions system is necessary to extract information and ensure cooperation in investigations, verifying whether companies have made necessary efforts to mitigate risks.

The proposed Department of Prosecution Agreement (DPA) system would incentivize companies to provide essential information and improve problematic systems, helping to prevent recurring accidents. Under this system, stakeholders would face serious sanctions unless they comply with requirements like aiding investigations or system

improvements.

This approach envisions a cycle where, upon an accident, companies are required to share information. If they fail to do so, they face fines; if they comply, the risk is assessed. Foreseeable risks may lead to immunity, with public compensation for damages, while unforeseeable risks result in the company's liability. This cycle, aimed at continuously improving laws and systems, is crucial for adapting to rapid changes and ensuring the evolution of both legal frameworks and technological systems. Thank you.