

Strategic Basic Research Program
(R&D in Science and Technology for Society)
R&D Completion Report

“Human-Information Technology Ecosystem”
Research and Development (R&D) Focus Area

“(Emotional AI in Cities: Cross Cultural Lessons from UK
and Japan on Designing for An Ethical Life)”

R&D period: January 2020 to September 2023

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1. Project Goals

1-1. Project Background

Artificial intelligence (AI) is rapidly transforming how we work and live. One of the fastest-growing areas of its development belongs to intelligent machines that can sense, read and evaluate human emotion. More commonly known by its commercial moniker, emotional AI (EAI), the technology is quickly becoming an integral layer in smart city design. Evolving in sophistication and complexity, emotion-sensing devices are now featured in passenger cars, commercial aircraft, classroom teaching aids, smart toys, home assistants, online conferencing, email software, social media, advertising kiosks and billboards, fast food drive-through menus, empathy chatbots for online mental health consultation, care robots, as well as public and private security systems. Unlike other AI applications that rely on extracting data from a person’s corporeal exterior, emotional AI passes into the interior and highly subjective domain via biometric means. This includes the use of algorithms, biosensors, and actuators that harvest non-conscious data gleaned from someone’s heartbeat, respiration rate, blood pressure, voice tone, word choice, body temperature, galvanic skin responses, head and eye movement, and gait.

Like most AI technologies, affect recognition devices promise to augment and enhance daily existence. Emotional AI can streamline healthcare services, enhance public education and child development, curb the rise in elderly automobile accidents, harmonize social dynamics in the workplace, and optimize digital marketing and consumer personalization. In the ever-expanding sector of semi-autonomous military/air force/space force technology, emotional AI can play a vital role in ensuring that the human-in-loop is performing at his/her best. But as a far more invasive manner of surveillance capitalism, intelligent machines which attempt to make the internal emotional states of an individual visible also raises a myriad of questions about data privacy in public spaces, empathic surveillance of everyday life, and importantly, how governance mechanisms should ensure citizen’s trust as well as best protect civic values and rights. Thus, this research project adopts a transnational, interdisciplinary, and mixed-methods approach, asking critical questions about how individuals can live well and ethically with emotional AI. Our study examines emotional AI applications in five sectors: commercial, security, health, education, and public discourse.

While we are careful in assuming that with AI, there exists potential for great harm to society, we are also under the belief that it can bring great advances and benefits. This project is concerned about anticipating the social, cultural, and ethical impacts of this nascent technology, especially, as many nations around the world are at a critical juncture where social, technological, and governance structures can be appropriately prepared before mass adoption is underway. Critically, as a growing body of evidence suggests, emotions and emoting styles are not, in fact, ‘universal’ but contingent on culture, gender, ethnicity, and temporal/spatial factors. Thus, this project provides a comprehensive

and rigorous examination of the impact of emotional AI in a transnational, multi-cultural and multi-sectoral context.

As emotional AI emerges in cities around the globe, it will have profound impacts on the daily lives of citizens. By attempting to make internal emotional states visible it raises questions about data privacy in public spaces, empathic surveillance of everyday life, and how governance mechanisms should best protect civic values and rights. Thus, our project is driven by three important research questions. First, what steps are needed to empower human skills in an emotional AI world? Second, what is required to live ethically and well with emotional AI in a multi-sectoral, culturally pluralistic, and transnational context? Three, how can our insights be channeled back into regulatory and policy debates about the role of emotional AI in future society and more specifically, in a cultural context?

1-2. Project Goals

1. Understand what it means to live ethically and well with EAI in cities, by understanding the emergence of EAI in cities; its social, spatial, and temporal implications; and engaging with diverse EAI and smart city stakeholders in UK-Japan.
2. Raise awareness of UK-Japanese stakeholders (technology industry, policymakers, NGOs, security services, urban planners, media outlets, citizens) on how to live ethically and well with EAI in cities.
3. Advance collaboration between UK-Japan academics, disciplines, and stakeholders in EAI.
4. Undertake comparative cross-cultural UK-Japan analysis on how EAI impacts commercial, security and civic contexts.
5. Ascertain how EAI may impact security stakeholders and organizations in the new media ecology via interviews with these stakeholders and case studies in UK-Japan.
6. Formulate governance approaches for collection and use of intimate data about emotions in public spaces (e.g. privacy laws, ethics frameworks, technology standards, design-led regulation) to understand how these guide EAI developments, in order to build a repository of best practice on EAI in cities.
7. Advance novel scientific insights across surveillance studies, new media, information technology law, security & policing studies, science & technology studies, affective computing.
8. Constructing an online think tank to provide impartial ethical advice on EAI and cross-cultural issues to diverse stakeholders during and after the project.

2. Description of the R&D

2-1. R&D Items and Overview

(1) Schedule

Timeline	2020			2021			2022			2023		
	0-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	41-44	45
Stage 1	Literature Mapping ecology of emotional AI			Review: ecology of emotional AI								
Stage 2	Collect data: Commerce (UK done/Japan done)											
Stage 3	Collect data: Security (UK done/Japan done)											
Stage 4	Collect data: Civic discourse (UK/Japan done)											
Stage 5							National Surveys: 1. <i>Perception of emotional AI in various sectors</i> (UK and Japan done). 2. <i>Attitude toward healthcare AI in Japan</i> (Japan done)					
Stage 6							Four citizen workshops: UK & Japan done					
Stage 7	Cross-cutting themes for data collection, analysis, and dissemination: Diversity, age, health, ethics											
Stage 8											Policy workshop UK & Japan	

2-2. Description of Item Implementation

The following section charts a detailed description of the implementation of our project goals from the commencement of the project in January 2020 to its finish in September 2023.

Stage One (S1) - Mapping the Ecology of Emotional AI in Japan

S1 was based primarily on literature review, identifying potential interviewees and mapping the ecology of EAI stakeholders in Japan through desktop analysis. We started off S1 with a UK/Japan meeting in Tokyo. The entire UK team met with our Japan counterparts for an intensive four day meeting at Ritsumeikan Tokyo Campus located in Sapia Tower. The goal of this UK/Japan meet up was to organize the three year project, familiarize the team players as well as draw up a list of goals and responsibilities for each team members of this three year research project. In late January with warnings of the Coronavirus coming from government sources our team efforts became restricted to primarily literature review and desk top analysis.

Because of the worsening global pandemic, we had to devise alternative methods of research because there were many cancellations of events and interviews as well as closure of industry expos. However, utilizing alternative research techniques were able to map state of the art in emotional AI in Japan. S1 was led by PI Mantello in its examination the emergent industry of emotional AI technologies both in Japan and abroad as well as identifying key stakeholders in the emerging empathetic AI industry. In S1 we were able to build build a regional analysis of companies and organizations operating in emotional AI that impact on Japanese smart cities, how they connect and collaborate, and what their interest is in civic life. During S1 both our team and our UK counterpart focused on continuance of our literature review based on journal articles, books, government white papers, corporate reports: mapping the ecology of EAI stakeholders in Japan through desktop analysis; attending Zoom workshops and conferences. We also had a series of Japan/UK collaborative Zoom meet ups. The goal of these S2 meet-ups was to discuss continuing strategies and solutions to overcome the obstacles presented to us by travel restrictions and research problem in light of COVID 19.

Stages 2 (S2), Stages 3 (S3) and Stages 4 (S4) – Collect Data: Commerce, Security, & Civic Discourse

During S2, S3 and Stage Four S4 we conducted a series of Zoom interviews in the commercial and security sector. Some of our interviews included: TalentA, HIREVU Japan, EMPATH, Japan. Softbank Robotics, Preferred Networks, Japan, IBM Japan, Human Resource Research Institute Japan, Talented People Laboratory, Business Research Lab, Japan, ELSYS Japan, AI Security Firm, Walcul Japan, Dentsu R&D, Toyota Japan. From the data gleaned from these interviews we were able to produce many research papers published in top international journals. These articles include the impact of emotional AI on a diverse range of issues such as about security, gender, race, ethnicity, class, [dis]ability, age, health, and ethics. Please see section 6-2-1.

Because of travel restrictions due to COVID, our team did our best to participate in online overseas conferences, trade shows, attend proof of concept demos with international AI companies. Please see section 6-3-1. At the same time, current with a partial project goal in Stage 8 (S8) online think-tank repository, we took the initiative of enlisting the services of a professional web-builder to build the final research goal of an online think tank: ethical.ai. The online think tank serves as a repository of our qualitative and quantitative and qualitative efforts meant to inform and advise emotional AI stakeholders in Japan and internationally. The website serves as a guide for ethical best practices to create emotional AI for cities. It also fulfills our S8 research goal of establishing criteria for living ethically with emotional.

Stage Five (S5) National Surveys: 1. Perceptions of Emotional AI in various sectors (education, domestic, security, & commerce). 2. Attitudes of Japanese citizens of Emotional AI healthcare

In S5, we commissioned two online national surveys by the polling company Cross-Marketing Japan. The first survey was to gauge citizen’s attitudes toward empathetic technologies. The second survey was specifically focused on emotional AI and healthcare. Collecting survey data for research **is** not an easy feat in Japan. To get high quality survey data from Japanese citizens, Cross-Marketing, a polling company, was contracted to collect a minimum of 2000 full responses per survey questionnaire. The questions were designed in a friendly format to facilitate a response at a relatively short time; most questions provided a 7-point Likert scale from ‘Strongly disagree’ to ‘Strongly agree’. The questionnaire included 94 questions in 10 categories, plus 5 demographic questions covering age, gender, income and education level, and the structure of household (whether they lived alone or with a spouse, children, other relatives, or friends). As the surveys aimed to examine especially the age-related differences in responses to the questions on new technology, the company was instructed to provide a minimum of 400 responses from each age group of Japanese citizens in their 20s, 30s, 40s, 50s, and 60s. Thus, although the responses were collected randomly at a wide national scale, the final sample would have a comparable number from various age-groups to make statistical comparison meaningful. The results of these surveys were published in leading journals. Please see section 6-3-1.

Stage 6 (S6) – Citizen Workshops

In S6 we conducted citizen workshops by utilizing an innovative approach to collecting rich qualitative data from participants in an online setting. Through the use of a multimodal narrative created through Twine, an interactive fiction writing tool, we developed a day in the life of emotional AI interactive exercise that participants played together. The narrative was developed drawing on ideas and concepts from Design Fiction, chiefly the use of diegetic prototypes, and incorporates elements of ContraVision, a method that has been found to encourage a greater range of responses. Introducing an unfamiliar topic can cause issues for participants, limiting discussion or contributing to a focus on technical aspects rather than the practicalities and impacts of actually using the technology. By taking this narrative approach, participants were able to better engage with the implications of living with emergent technologies.

Stage Seven (S7) Cross-Cutting Themes for Data Collection, Analysis, and Dissemination: Diversity, Health, Age and Ethics

Efforts in S7 have seen fruition in the numerous research outputs from this project, especially in terms of high-quality publications and conference papers. Please see section 6-2-1 and 6-3-1.

Stage 8 (S8) Policy Workshop

In S8 we conducted a policy workshop with stakeholders from the security, health, and commercial (advertising/auto industry) sectors. The goal of the workshop was to create a common space where stakeholders could brainstorm ideas and opinions, deliberate on the challenges, risks, and rewards of emotional AI technologies, identify key aspects or concerns regarding regulation, and come up with ideas for solutions to tackle some of the current obstacles facing the smooth integration and acceptance of empathetic technologies in society. The main problems that were discussed dealt with non-conscious data harvesting, data collection, data privacy, data management, data retention, diversity, transparency, algorithmic bias, standardization, interoperability, explainability, and viability of establishing international ethical frameworks. Of important note was recognition by stakeholders of vital importance of public outreach initiatives to ensure public trust.

(3) Outcomes

Research outcomes:

1. Mantello, P., Ho MT, Nguyen, M. & Vuong, Q (2023) *Machines that feel: Behavioral determinants of attitude towards affect recognition technology—Upgrading technology acceptance theory with the mindsponge model*. Humanities and Social Sciences Communications, 10(1), 1-16. Nature.com <https://doi.org/10.1057/s41599-023-01837-1> (Q1)
2. Mantello, P & Ho MT (2023) *Losing the Information War to Adversarial AI*. AI and Society, Springer Nature. In Press. doi.org/10.1007/s00146-023-01674-5 (Q1)
3. Ho, MT. & Mantello P. (2023) *Smart technologies and how they create the reality feared by Orwell and Huxley*, AI and Society, Springer Nature. doi.org/10.1007/s00146-023-01652-x (Q1)
4. Ho MT, Mantello, P, Ho Toan, (2023), *An analytical framework for studying attitude towards emotional AI: The three-pronged approach*, MethodsX, Elsevier <https://doi.org/10.1016/j.mex.2023.102149>. (Q2).
5. Mantello, P., Ho MT, (2023) *Emotional AI and the Future of Wellbeing in the Post-Pandemic Workplace*, AI and Society, Springer Nature. DOI: 0.1007/s00146-023-01639-8 (Q1).
6. Mantello, P., Ho MT, Podoletz, L (2023) 'Automating Extremism: Mapping The Affective Role of Artificially Intelligent Agents in Online Radicalisation' in E.Pashentsev's, *The Palgrave Handbook of Malicious Use of Artificial Intelligence*, Palgrave McMillan. ISBN: 9783031225512

7. Ho MT, Ngoc-Thang, B., Mantello, P., M-Toan Ho, Ghotbi, N. (2023) *Understanding the acceptance of emotional artificial intelligence in Japan healthcare system: A survey of clinic visitors' attitude*, *Technology in Society*, Elsevier (Volume 72).
<https://doi.org/10.1016/j.techsoc.2022.102166> (Q1)
8. 翻訳 Christopher Kuner and Massimo Marelli 『人道支援におけるデータ保護ハンドブック 第2版』(赤十字国際委員会駐日代表部・2023) (翻訳協力)
9. シンポジウム発表日本弁護士連合会「個人情報保護の仕組みと組織の在り方を考える～個人情報保護を実効あらしめるために～」Japan Federation of Bar Association, “Symposium on ‘Thinking of the Structure and Supervision of the Protection of Personal Information -For an Effective Protection of Personal Information- Co-Sponsored by Japan Federation of Bar Associations, Information Issues Committee”, 2023年6月30日
10. 学会発表 Sweet Dreams Are Made Of This: latest trends in facial recognition 11th EDEN Conference on Data Protection in Law Enforcement, 19 September 2023 (Madrid, Spain)
11. 学会発表 Data Free Flow with Trust -Human Rights and Trade-, 12th Asia Privacy Bridge Forum, 13 October 2023 (Seoul, Korea)
12. 学会発表 Bridging AI Act and Data Protection Law: A Lesson from the EU debate, 27th Technology Law Conference, 29 November 2023.
13. 学会発表 NBTC, Regulatory Network Meeting, Privacy Regulations, Cross-Border Data, and Digital Trade, 7 December 2023 (Phuket, Thailand).
14. 学会発表 2023 Seoul Digital Trade Law and Policy Expert Roundtable Cross Border Data Flows in the Context of Digital Trade Law and Policy: China, Japan and Korea, 16 December 2023 (Korea University, Korea (online)).
15. Ghotbi N. 2023. Ethics of Artificial Intelligence in Academic Research and Education. In: Eaton, S.E. (eds) Handbook of Academic Integrity. Springer. https://doi.org/10.1007/978-981-287-079-7_143-1
16. Tanaka, H. (2023). Artificial intelligence and gender. Paper presented at the Roundtable on Gender, Media and Culture in a Digital Age, International Society for Gender Studies (ISGS) Annual Conference, Saitama, Japan, 2-3 September. [In Japanese]

17. Ho, M. S. H., & Tanaka, H. (2023). Azuma Hikari, My Healing Bride: Tracing gender and human-machine intimacies in contemporary Japan. Paper presented at International Communication Association (ICA) Annual Conference, Toronto/Online, 25-29 May.
18. Tanaka, H. (2023). Digital technology and gender: Towards an analysis of power in social media, data, and artificial intelligence. In H. Tanaka, K. Koma & O. Takamine (eds.), *Diversity and creativity in digital society*. Meiji University Press, pp. 153-181. [In Japanese]
19. Mantello, P. & Ho, MT (2022) *Why We Need to Be Weary of Emotional AI*, AI & Society, Springer Nature. DOI:10.1007/s00146-022-01576 (Q1)
20. Bakir, V., Ghotbi, N., Ho, T.M., Laffer, A., Mantello, P., McStay, A., Miranda, D., Miyashita, H., Podoletz, L., Tanaka, H. and Urquhart, L. (2022). Emotional AI in Cities. In *Machine Learning and the City*, S. Carta (Ed.). <https://doi.org/10.1002/9781119815075.ch51>
21. Ho, MT. What is a Turing test for emotional AI? *AI & Society* . <https://doi.org/10.1007/s00146-022-01571-3>.
22. Ho MT, Disillusioned with artificial intelligence: a book review. *AI & Society* <https://doi.org/10.1007/s00146-022-01588-8>
23. Ho MT, Thinking about the mind-technology problem. *AI & Society*. <https://doi.org/10.1007/s00146-022-01588-8>
24. Mantello, P., Manh, T. Vuong, Q (2021) *Bosses without a Heart: A Bayesian analysis of socio-demographic and cross-cultural determinants of attitude toward the Automated Management*, AI & Society. Springer Nature. DOI: 10.1007/s00146-021-01290-1 (Q1).
25. Ho, M.T., Mantello, P. Nguyen, H. K. T., & Vuong, Q. H. (2021). Affective computing scholarship and the rise of China: a view from 25 years of bibliometric data. *Humanities and Social Sciences Communications*, 8(1), 1-14. Nature.
26. Mantello, P. (2021) *Fatal Portraits: The Selfie as Agent of Radicalization*, Sign Systems Studies, Tartu University Press, 2021 <https://doi.org/10.12697/SSS.2021.49.3-4.16> (Q1)

27. Mantello, P., Manh, T. Vuong. Q.H. (2021) *Attitudes of college students toward ethical issues of artificial intelligence in an international university in Japan*. 'AI and Society'. Springer Nature (Springer Nature). doi.org/10.1007/s00146-021-01168-2 (Q1).
28. Mantello, P. & Ponton, D. (2021). 'Virality, Emotion and Public Discourse: The role of memes as prophylaxis and catharsis in an age of crisis' in Discourse and Rhetoric amid COVID 19 Pandemic:Dis/Articulating The 'New Normal,' special issue for Journal of Rhetoric and Communication E-Journal, Issue 47, Jan.46 ISSN 1341-4464.
29. Miyashita, H., EU-Japan Mutual Adequacy Decision in Yumiko Nakanishi & Olivia Tambou (eds.), The EU-Japan Relationship, 2020
30. Miyashita, H. Human-centric Data Protection Laws and Policies: A Lesson from Japan, Computer Law and Security Review, October 2020.

3. Results of R&D

3-1. Goal Achievement

1. Understood what it means to live ethically and well with EAI in cities, by understanding the emergence of EAI in cities; its social, spatial and temporal implications; and engaging with diverse EAI and smart city stakeholders in UK-Japan (S1-S8).
2. Raised awareness of UK-Japanese stakeholders on how to live ethically and well with EAI in cities, via: co-designed, citizen-led, qualitative visions fed into Stakeholder Policy Workshops (S5-S8).
3. Advanced collaboration between UK-Japan academics, disciplines, and stakeholders in EAI.
4. Undertook comparative cross-cultural UK-Japan analysis on how EAI impacts commercial, security and civic contexts (S5-S6).
5. Understood commercial activities, intentions and ethical implications regarding EAI in cities via interviews with industry, case studies and analysis of patents in UK-Japan (S2,S3, S4).
6. Ascertained how EAI may impact security stakeholders and organizations in the new media ecology via interviews with these stakeholders and case studies in UK-Japan.
7. Formulated governance approaches for collection and use of intimate data about emotions in public spaces to understand how these guide EAI developments, and to build a repository of best practice on EAI in cities (S8).
8. Understood diverse citizens' attitudes to EAI in cities via national surveys and workshops with citizens in UK-Japan (S5-S6).
9. Advanced novel scientific insights across surveillance studies, new media, information technology law, security & policing studies, science & technology studies, affective computing (S7).

10. Set up a think tank to provide impartial ethical advice on EAI and cross-cultural issues to diverse stakeholders during and after the project (S8).

3-2. Results of R&D

1. Examined the impact of emotional AI systems in a cross-disciplinary context.
2. Clarified issues of potential bias in training data on emotional AI in a cross-cultural and global context.
3. Understood the role and views of ordinary citizens on emotional AI in a global context.
4. Created better data governance initiatives (e.g. transparency, control, contextual integrity, privacy by design mandates) in an international context.
5. Identified core emotional AI opportunities, challenges, and risks required for the attention of global policymakers.
6. Recommended pro-social usage of these technologies, serving the best interests of all stakeholders.
7. Built a framework of best practice as emotional AI crosses national and regional borders.
8. Published over 28 scientific articles in peer-reviewed, high impact, internationally recognized journals.
9. Presented our findings at 22 international and domestic academic conferences.

3-3. Future Utilization and Evolvement of Results

Our interrogations have explored an array of questions of which minds, exactly, are extended through emotion-sensing AI and other digital technologies? That is, what agendas drive EAI development? Who are the empowered and, possibly, disempowered agents in this process? Is it possible to create a universal framework for EAI ethics and is there really a widespread desire to create such a framework? If so, then what is needed to create ethical frameworks for AI that embrace local knowledge, cultural pluralism, and global equality? Finally, comes the important question regarding the shaky science on which the EAI industry is built on - how can emotions be made computable if the science community cannot agree on exactly what emotions are and how they manifest themselves across cultures? The problem might stem from the need and tendency of engineering design to construe human feelings and behavior as quantifiable so that these can be included as parameters of a problem and its solutions. Empathy is the ability to feel and experience other people’s emotions. Empower AI with empathetic ability will be critical for creating and deepening human-machine relationship. This is especially true of empathetic technologies in the field of healthcare where elderly and patients suffering cognitive illnesses and disorders will need AI that is able to relate to them on an affective level. This is why oversight is important.

4. Contribution to Focus Area Goal Achievement

On the role of cross-cultural awareness, societal differences and bias, our team's complementary expertise enables us to unpick cross-cultural issues key to understanding how Japanese and UK societies can learn to live well with Emotional AI in cities and emergent modern life. The need for this turn towards social context is recognized not just by scholars but, increasingly, by industry. E.g. Microsoft researchers state that: 'Incorporating context and personalization into assessment of the emotional state of an individual is arguably the next big technical and design challenge for commercial software systems that wish to recognize the emotion of a user'.

There are many current concrete uses of emotional AI by legacy and start-up companies. It is deployed in social media to track sentiment of text-based conversations, images and video. Many wearables have biometric features that allow personal and medical mental health tracking. In the UK, face-based emotion tracking is widespread, installed in many leading high street retailers. Related, facial recognition (not just emotion recognition) is becoming increasingly present. Each vendor (e.g. Japan's NEC - a leading facial recognition provider in the UK) also has expertise with emotional analytics. Robotics is another long-standing area: e.g. Softbank's Pepper robots (with expression recognition capacity) are increasingly present in retail (including Uniqlo, Carrefour, Migros).

Other legacy companies using emotional AI include: Amazon (their 'Rekognition' service analyses images and live video); Microsoft's cognitive services uses computer vision of emotion in diverse contexts, e.g. schools and workplaces; IBM's Watson detects customer sentiment for sales and customer service; and Honda's 'Automated Network Assistant' uses computer vision to gauge in-car moods to personalise in-car experience (and potentially inform insurance rates). Meanwhile, start-ups such as Tokyo's Empath (there are many more) detect emotional states of callers and workers at call centres (Empath is used by NTT Docomo and Marubeni Information Systems). Near future cases (in our grant proposal) point to an info-sphere where emotional AI is standard practice. Certainly, current methods and techniques (especially, those involving faces) are flawed and developing, but this is a fast growing market because there is personal, economic, policing and security-based reasons to understand emotions of individuals and groups.

On societal impact, the technologies are 'multistable' (Idhe 2010): they are not innately positive or negative, but nor are they neutral. Positive impacts will include enhanced human-technology/content interaction (e.g. better services from personal devices to call centers; enriched media experiences; and greater understanding of self and others). Negative impacts may involve appropriation of data about bodies, unconsented-to data collection and manipulation of emotions (e.g. in retail, advertising and on a civic level, as evidenced by abuse of emotional data in social media during the UK's 2016

referendum on leaving the European Union). Ultimately, the ethical charge of emotional AI technologies emerges in relation to the context of how they are used. Any judgement of positive/negative impacts must be informed by understanding the specifics of the situation. E.g. workplace surveillance of emotions may appear invasive; but stress monitoring of a firefighter (via heart rate sensors) may save their life if their heart rate is unhealthily high during a fire. On ubiquity, as key industry players recognize the importance of social context in understanding emotions, this will inevitably also involve a turn to data, especially in quasi-private ‘smart’ spaces. As industry recognises the increasing value of contextual data on emotions, this will require careful governance.

Insight One - Unlike many smart technologies, emotion-recognition systems sense, monitor, harvest and analyze data extracted from a person’s non-conscious, psycho-physical state. Thus, as a far more invasive manner of surveillance capitalism, the societal adoption of emotional AI is problematized by a myriad of legal, ethical, cultural, scientific, and cultural issues. For example, affect tools are designed to harvest intimate data from an individual’s subjective state without necessarily their awareness. This creates multiple possibilities for its malicious or harmful misuse. For example, emotion-sensing devices in the workplace may lead to bias or discrimination against a worker for their lack of ‘attitudinal conformity’. In turn, affect tools may lead to emotional policing, creating coercive pressure on individuals to always be happy, authentic, and positive. Concomitantly, depending on the country, individuals may be exposed to empathic surveillance without their knowledge or consent.

Insight Two - Although emotion-sensing technologies are predominantly designed in West, they are being sold to a global marketplace. Problematically, as these devices cross international borders their algorithms are seldom tweaked for racial, cultural, ethnic, or gender differences. A growing body of research shows that AI models that do not allow for difference or diversity can lead to unintentional bias or false positive identification, negatively impacting a target individual. A good illustration is emotional AI in the workplace - while such systems are being rolled out across the globe, nations and their respective cultures have historically different attitudes to employer-employee relationships, loyalty, corporate responsibility to workers, worker rights and unions, and precarity. They also differ in values, work ethics, and emoting styles, raising questions about the imposition of Western-centric analytics in a non-Western context. This globalization of generic AI systems is further problematized by the lack of international consensus on the values and ethics that should be encoded into intelligent machines as well as cross-cultural incongruencies arising from a country’s legal understanding of privacy. For example, Western AI tools in non-Western settings are increasingly regarded in neo-colonial terms, i.e., as elements of “algorithmic colonization”, “data colonialism” and “digital colonialism”. For non-Western countries, especially, those in the global south to build inclusive AI

ecosystems, human-centric policymaking is crucial, especially, in the case of establishing public trust. Yet in many parts of the world, AI policy discourse is still only nascent.

Insight Three - Like the hidden data-gathering activities of many smart technologies, emotional AI will be far harder to collectively regulate as it is being developed as a proprietary layer in many products. This means that algorithmic transparency and collective standards for non-conscious biometric data collection will not occur for some time. Lack of algorithmic transparency raises potential dangers of bias and discrimination against under-represented and at-risk groups such as immigrants, migrant workers and those living at or below the poverty line. This is especially important in areas such as health care where standardization and interoperability of AI software and hardware systems are critical to creating a workable AI driven medical eco-system. In Japan there are many international and national contenders vying to become the main suppliers of medical AI solutions. Many of these companies operate with proprietary technologies and are reluctant to make their systems compatible for exclusivity reasons. AI systems rely on access to massive amounts of data sets to identify correlations and patterns to form accurate predictions. Compounding this problem is the fact that existing ethical frameworks for emotion-sensing technologies lack flexibility due to different institutions in various cultural settings having differing rationales, guidelines, and goals for adoption.

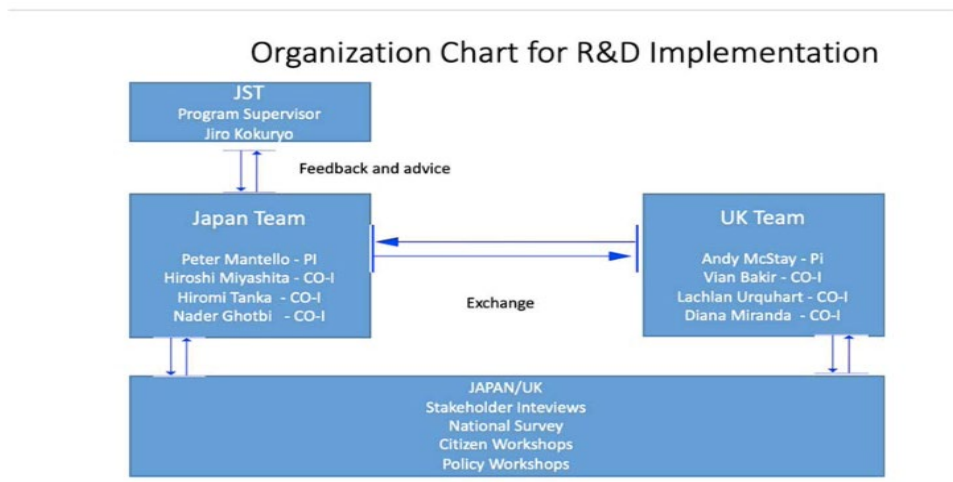
Insight Four - As AI moves toward greater levels of complexity in automated thinking, many technologists believe that it will not even be clear to the creators of these systems how decisions are reached. This means that the more authority these systems have and the more autonomous they are within a society, the less explainable, understandable, and ultimately responsible their decision-making will be. This means the more authority and complex these systems are given in society, the less explainable, and understandable their decision-making will be. Who will ultimately be responsible for errors caused by empathetic AI in health or security context? The technology’s manufacturer? The institution that relies on the technology? For competitive reasons, AI developers are not willing to divulge how their products reach decisions. Like most tech companies, the sharing of algorithmic trade secrets is not a welcomed practice. In order, for citizens to feel comfortable with sharing their intimate psycho-physical data with third party companies they have trust those systems and stakeholders responsible for maintaining data security.

Insight Five – Is emotional AI science or scientism? A growing number of critics argue how can emotions be made computable when the science community cannot agree on exactly what emotions are? How they are formed? Or how they manifest themselves? Are emotions hard-wired into the psycho-physical makeup of an individual or per socially and culturally contingent? Added to this debate is the fact that leading emotional AI companies are still relying on Paul Eckman’s now-

discredited theory of the ‘universality of emotions’. Pushing back against these arguments are affective computing engineers who insist emotions are in fact computable, and that any limitations in diversity or cultural affordance will ultimately be solved by better algorithms. Regardless of any technological advancement in AI, the increased accuracy of this technology will largely depend on its ability to shift from mining existing data sets to harvesting ‘fresh’ (unconscious) private data streams from society. Problematically, this strategy entails a greater blurring of the public/private distinction.

5. R&D Implementation Structure

5-1. Structure of R&D Implementation



5-2. Researchers

Name	Affiliated institution	Affiliated department	Post (Status)
Peter Mantello	APU	APS	
Nader Ghotbi	APU	APS	
Hiroshi Miyashita	Chuo University	Policy Studies	
Hiromi Tanka	Meiji University	Digital Media And Gender	
Tung Manh Ho	APU	APS	

5-3 Collaborators

Name	Affiliation	Position (status)	Description of cooperation
Douglas Ponton	Catania University	Professor	Collaborative Writing
Steve Zeltzer	Labor One Media	Journalist	Podcast Interview on Emotional AI as well as co-lecture at APU.

6. Status of Presentation/Dissemination of R&D Results, Outreach Activities, etc.

All the information in this report can be disseminated publicly.

6-1. Dissemination of Information to Society, Outreach Activities, etc.

Mantello, P, *Ethical AI in public spaces*, Prague City Data Congress, Prague, September 19th, 2022. https://www.youtube.com/watch?v=wKvUE1y_gr8&t=1

Mantello, P, *Emotional AI applications in Daily Life*, Presentations at Institute of Philosophy, Vietnam Academy of Social Sciences, Hanoi and AIOT Lab, Phenikha University, Hanoi, Vietnam, Feb. 8-9, 2023.

6-1-1. Events organized by the project (symposiums, workshops, etc.)

Date	Name	Place	Overview, reactions, etc.	No. of participants
Feb. 19-25, 2022	Citizen Workshops	Zoom	Four groups participated over four days. Age 18-35 Group Age +65 Group, Special Needs, Foreigner Workers. Positive reactions. Diverse opinions.	46
Apr. 20, 2023	Policy Workshop	Zoom	Security, Commercial and Health Stakeholders Positive reactions. Diverse opinions.	4

6-1-2. Books, DVDs, and other publications that are other than research papers

What Is Emotional AI? – Film, 10 minutes, HD

<https://www.youtube.com/watch?v=gQ3hCWkISho>

6-1-3. Establishment and operation of online media

After each publication from our team, we have generated public announcements via media outlets and our universities’ websites, social media outlets, to promote the results and important implications for the how to live well and ethically with EAI in cities. Our research on the non-conscious data gathering done by emotional AI has been captured in major media outlets in many different languages and countries:

1. <https://www.theguardian.com/global-development/2023/may/12/why-would-we-employ-people-experts-on-five-ways-ai-will-change-work>
2. テレビ放送「目からウロコのマイナンバー講座 マイナポータルが1番危険 マイナカードはリスク少 専門家が解説」テレビ愛知 2023年1月31日
3. 専門誌コメント Comment: Japan's facial-recognition report indicates progress but also limitations, mlex, 10 Feb 2023.
4. テレビ放送「普及が進むマイナンバーカード」MX テレビ 2023年3月15日
5. 新聞コメント「闇バイト対策、名簿業者を調査 法規制に限界、「例外廃止を」指摘も」時事通信 2023年3月23日
6. テレビ放送「誤登録7300件超来年秋マイナ保険証」テレビ朝日羽鳥慎一モーニングショー2023年5月15日
7. テレビ放送「マイナンバー公金受取口座を別の人に登録複数確認 総点検へ」NHK ニュース7, 2023年5月23日 (同2023年5月24日「おはよう日本」)
8. テレビ放送「TikTok 巡る規制広がる」NHK おはよう日本 2023年5月25日
9. テレビ放送「3大臣が異例の同時謝罪 “トラブル続出”の『マイナンバーカード』」TBS サンデーモーニング 2023年5月28日

10. 新聞コメント「マイナカード不安解消急ぐ」日本経済新聞 2023年6月2日5面
11. テレビ放送「家族名義登録 デジタル庁2月ごろ把握も対応せず」NHK ニュース7, 2023年6月6日
12. テレビ放送「約13万件も... “家族名義”口座登録」NHK ニュース7, 2023年6月7日
13. テレビ放送「マイナ問題めぐり「不安にちゃんと応えてほしい」」テレビ朝日羽鳥慎一モーニングショー2023年6月8日
14. 新聞コメント「マイナの哲学、理解不足」朝日新聞 2023年6月8日9面
15. テレビ放送「マイナ保険証どんなトラブルが？ 別人情報が登録されるリスクとは」NHK ニュース7, 2023年6月9日
16. テレビ放送「東京 台東区 一部 給付金支援で口座”利用しない”方針」NHK 首都圏ネットワーク2023年6月16日
17. 新聞コメント「マイナ普及68%全国下回る」読売新聞神奈川2023年6月27日
18. 新聞コメント「突然向けられた行政のカメラ 手袋かぶせた男性に司法が下した判断は」朝日新聞2023年6月29日
19. テレビ放送「トラブル続出 SNS で「#マイナンバーカード返納運動」も...」日本テレビ NEWS ZERO 2023年7月5日
20. テレビ放送「マイナンバーカード交付急増で負担増」NHK ニュースウォッチ9, 2023年7月18日
21. テレビ放送「「マイナ保険証」相次ぐトラブル 現状は？どうすれば？」NHK ほっとニュース北海道2023年8月7日
22. テレビ放送「保険証の紐付けミスが新たに1069件マイナ総点検・中間報告で判明トラブル再発防止策も発表」TBS ニュース23, 2023年8月8日

23. テレビ放送「マイナ保険証トラブル」日本テレビ DayDay2023年8月10日
24. テレビ放送「マイナンバー課題は？海外の実情を現地取材」NHK ニュースウォッチ
9, 2023年8月26日
25. テレビ放送「どうなってる？マイナ保険証」NHK あさイチ2023年8月31日
26. 新聞コメント「個人情報『意識が欠如』」朝日新聞2023年9月21日
27. 新聞コメント「国の対応後手ミス拡大」毎日新聞2023年9月21日
28. <https://www.eurekalert.org/news-releases/962490> EurekAlert is published by American Association for the Advancement of Science (AAAS)
29. <https://tech4future.info/intelligenza-artificiale-riconoscimento-emozioni/>
Tech4Future is a newspaper registered at the Court of Brescia, Italy (registration n. 10/2021)
30. <https://techxplore.com/news/2022-08-emotional-ai-gen-attitude-technology.html>
The Science X network is one of the largest online communities for science-minded people. Science X publishes approximately 200 quality articles every day,
31. <https://aithority.com/natural-language/emotional-ai-how-cultural-factors-influence-gen-z-attitude-toward-technology/>
AiThORITY.com covers the latest news, trends, insights and analysis related to AI ML, Blockchain and 1500+ emerging tech categories from around the globe.
32. <https://news8plus.com/emotional-ai-and-gen-z-the-attitude-towards-new-technology-and-its-concerns/> News8plus.com is a news website based in India.
33. <https://dataconomy.com/2022/08/gen-z-is-positive-toward-emotional-ai/>
Dataconomy is the leading portal for news, events, and expert opinion from the world of data-driven technology.
34. <https://www.unite.ai/new-study-observes-acceptance-of-emotional-ai-among-gen-z/>
Unite.ai is a completely decentralized organization with a team that currently offers news, interviews, and access to the best AI tools.

35. <https://techround.co.uk/news/the-socio-cultural-influence-of-emotional-ai-on-gen-z/>

TechRound is the voice of UK startups and is the UK's fastest-growing platform for startups, UK and international businesses, entrepreneurs and tech businesses, as well as anyone seeking to gain exposure to the UK startup market.

6-1-4. Invited lectures at symposiums and other events that were not academic conferences

Mantello, P, *Emotional AI applications in Daily Life*, Presentations at Institute of Philosophy, Vietnam Academy of Social Sciences, Hanoi and AIOT Lab, Phenikha University, Hanoi, Vietnam, Feb. 8-9, 2023.

Mantello, P. Emotional AI in the Workplace, Workweek Radio, San Francisco, July 23, 2022

Mantello, P, *Ethical AI in public spaces*, Prague City Data Congress, Prague, Nov. 19th, 2022.
https://www.youtube.com/watch?v=wKvUE1y_gr8&t=1

6-2. Presentation of Research Papers

6-2-1. Peer-reviewed ([22] papers)

Please note our papers were published in high impact internationally and SCOPUS or WOS recognized journals, including two in the Nature Portfolio.

1. Mantello, P., Ho MT, Nguyen, M. & Vuong, Q (2023) *Machines that feel: Behavioral determinants of attitude towards affect recognition technology—Upgrading technology acceptance theory with the mindsponge model*. Humanities & Social Sciences Communications, 10(1), 1-16. Nature.com (Q1) <https://doi.org/10.1057/s41599-023-01837-1>
2. Mantello, P & Ho MT (2023) *Losing the Information War to Adversarial AI*. AI and Society, Springer Nature. In Press. doi.org/10.1007/s00146-023-01674-5 (Q1)
3. Ho, MT. & Mantello P. (2023) *Smart technologies and how they create the reality feared by Orwell and Huxley*, AI and Society, Springer Nature. doi.org/10.1007/s00146-023-01652-x (Q1)
4. Ho MT, Mantello, P, Ho Toan, (2023), *An analytical framework for studying attitude towards emotional AI: The three-pronged approach*, MethodsX, Elsevier <https://doi.org/10.1016/j.mex.2023.102149>. (Q2).

5. Mantello, P., Ho MT, (2023) *Emotional AI and the Future of Wellbeing in the Post-Pandemic Workplace*, AI and Society, Springer Nature. DOI: 0.1007/s00146-023-01639-8 (Q1).
6. Mantello, P., Ho MT, Podoletz, L (2023) 'Automating Extremism: Mapping The Affective Role of Artificially Intelligent Agents in Online Radicalisation' in E.Pashentsev's, *The Palgrave Handbook of Malicious Use of Artificial Intelligence*, Palgrave McMillan. ISBN: 9783031225512
7. Ho MT, Ngoc-Thang, B., Mantello, P., M-Toan Ho, Ghotbi, N. (2023) *Understanding the acceptance of emotional artificial intelligence in Japan healthcare system: A survey of clinic visitors' attitude*, Technology in Society, Elsevier (Volume 72). <https://doi.org/10.1016/j.techsoc.2022.102166> (Q1)
8. ・翻訳 Christopher Kuner and Massimo Marelli 『人道支援におけるデータ保護ハンドブック第2版』(赤十字国際委員会駐日代表部・2023)(翻訳協力)
9. Ghotbi N. 2023. Ethics of Artificial Intelligence in Academic Research and Education. In: Eaton, S.E. (eds) *Handbook of Academic Integrity*. Springer. https://doi.org/10.1007/978-981-287-079-7_143-1
10. Tanaka, H. (2023). Digital technology and gender: Towards an analysis of power in social media, data, and artificial intelligence. In H. Tanaka, K. Koma & O. Takamine (eds.), *Diversity and creativity in digital society*. Meiji University Press, pp. 153-181. [In Japanese]
11. Mantello, P. & Ho, MT (2022) *Why We Need to Be Weary of Emotional AI*, AI & Society, Springer Nature. DOI:10.1007/s00146-022-01576 (Q1)
12. Bakir, V., Ghotbi, N., Ho, T.M., Laffer, A., Mantello, P., McStay, A., Miranda, D., Miyashita, H., Podoletz, L., Tanaka, H. and Urquhart, L. (2022). Emotional AI in Cities . In *Machine Learning and the City*, S. Carta (Ed.). <https://doi.org/10.1002/9781119815075.ch51>
13. Ghotbi N. 2022. The Ethics of Emotional Artificial Intelligence: A Mixed Method Analysis. *Asian Bioethics Review* <https://doi.org/10.1007/s41649-022-00237-y>
14. Ho, MT. (2022) What is a Turing test for emotional AI? *AI & Society* . <https://doi.org/10.1007/s00146-022-01571-3>.

15. Tanaka, H. (2022). Development of digital technologies and emerging inequalities. *Shukan Kinyobi*, 2022.2.11(1364), 47. [In Japanese]
16. Ho MT, (2022) Disillusioned with artificial intelligence: a book review. *AI&Society* <https://doi.org/10.1007/s00146-022-01588-8>
17. Ho MT, (2022) Thinking about the mind-technology problem. *AI&Society*. <https://doi.org/10.1007/s00146-022-01588-8>
18. Mantello, P., Manh, T. Vuong, Q (2021) *Bosses without a Heart: A Bayesian analysis of socio-demographic and cross-cultural determinants of attitude toward the Automated Management*, AI & Society. Springer Nature. DOI: 10.1007/s00146-021-01290-1 (Q1).
19. Ho, M.T., Mantello, P. Nguyen, H. K. T., & Vuong, Q. H. (2021). Affective computing scholarship and the rise of China: a view from 25 years of bibliometric data. *Humanities and Social Sciences Communications*, 8(1), 1-14. Nature.com., <https://doi.org/10.1057/s41599-021-00959-8>
20. Mantello, P. (2021) *Fatal Portraits: The Selfie as Agent of Radicalization*, Sign Systems Studies, Tartu University Press, 2021 <https://doi.org/10.12697/SSS.2021.49.3-4.16> (Q1)
21. Mantello, P., Manh, T. Vuong, Q.H. (2021) *Attitudes of college students toward ethical issues of artificial intelligence in an international university in Japan*. 'AI and Society'. Springer Nature (Springer Nature). doi.org/10.1007/s00146-021-01168-2 (Q1).
22. Mantello, P. & Ponton, D. (2021). 'Virality, Emotion and Public Discourse: The role of memes as prophylaxis and catharsis in an age of crisis' in *Discourse and Rhetoric amid COVID 19 Pandemic: Dis/Articulating The 'New Normal,'* special issue for *Journal of Rhetoric and Communication E-Journal*, Issue 47, Jan.46 ISSN 1341-4464.

6-2-2. Not peer-reviewed ([0] papers)

6-3. Oral Presentations (Presentations at International and Major Domestic Conferences)

6-3-1. Invited Lectures ([3] domestic conferences, [18] international conferences)

1. シンポジウム発表日本弁護士連合会「個人情報保護の仕組みと組織の在り方を考える～個人情報保護を実効あらしめるために～」Japan Federation of Bar Association, “Symposium on ‘Thinking of the Structure and Supervision of the Protection of Personal Information -For an Effective Protection of Personal Information- Co-Sponsored by Japan Federation of Bar Associations, Information Issues Committee”, 2023年6月30日
2. Mantello, P, *Emotional AI applications in Daily Life*, Presentations at Institute of Philosophy, Vietnam Academy of Social Sciences, Hanoi and AIOT Lab, Phenikha University, Hanoi, Vietnam, Feb. 8-9, 2023.
3. 学会発表 Sweet Dreams Are Made Of This: latest trends in facial recognition11th EDEN Conference on Data Protection in Law Enforcement, 19 September 2023 (Madrid, Spain)
4. 学会発表 Data Free Flow with Trust -Human Rights and Trade-, 12th Asia Privacy Bridge Forum, 13 October 2023 (Seoul, Korea)
5. 学会発表 Bridging AI Act and Data Protection Law: A Lesson from the EU debate, 27th Technology Law Conference, 29 November 2023.
6. 学会発表 NBTC, Regulatory Network Meeting, Privacy Regulations, Cross-Border Data, and Digital Trade, 7 December 2023 (Phuket, Thailand).
7. 学会発表 2023 Seoul Digital Trade Law and Policy Expert Roundtable Cross Border Data Flows in the Context of Digital Trade Law and Policy: China, Japan and Korea, 16 December 2023 (Korea University, Korea (online)).
8. Tanaka, H. (2023). Artificial intelligence and gender. Paper presented at the Roundtable on Gender, Media and Culture in a Digital Age, International Society for Gender Studies (ISGS) Annual Conference, Saitama, Japan, 2-3 September. [In Japanese]
9. Ho, M. S. H., & Tanaka, H. (2023). Azuma Hikari, My Healing Bride: Tracing gender and human-machine intimacies in contemporary Japan. Paper presented at International Communication Association (ICA) Annual Conference, Toronto/Online, 25-29 May.

10. Ghotbi, N. Ethics of Artificial Intelligence in Academic Research and Education, International Conference on Academic Integrity in AI Technology, Dhaka, Dec. 11, 2023
11. Ghotbi, N., Development of digital implantable devices for rehabilitation after orthopedic surgery (International Forum on Medical Devices Future Innovative Strategy in Chungju, Korea) 2023/10/31
12. Ghotbi, N. The Ethics of Emotional Artificial Intelligence (22nd Asian Bioethics Conference) 2023/05/16
13. Mantello, P. Emotional AI in the Workplace, (Surveillance Studies Network BiAnnual Conference, Rotterdam, Jun 3, 2022.
14. Ghotbi, N. Moral Awareness of college students regarding artificial intelligence (19th International Scientific Conference of the International Society of Clinical Bioethics (ISCB)) 2022/11/11
15. Tanaka, H. Romancing AI: Gender and new digital intimacies in contemporary Japan. Invited talk at the AI & Cultural Production Research Group, Amsterdam School for Cultural Analysis, University of Amsterdam. December 20, 2022.
16. Tanaka, H. & Ho, M. H. S. Digital intimacy in human-machine relationships: Gendered representations in Japanese fiction. Paper presented at EMTEC Conference 2022: Narrating emotional closeness between humans and machines in Japanese (popular) culture and literature, FU Berlin, Online, 14-15 October. 2022
17. Tanaka, H. Romancing AI: New digital intimacies in contemporary Japan. Invited talk for a seminar series at the Department of Communication and Media Research, University of Zurich, October 3, 2022
18. Tanaka, H., & Ho, M. H. S. (2022). Romancing AI: New digital intimacies in *contemporary Japan*. Paper presented at International Conference: Artificial Intelligence and the Human, Alexander von Humboldt Institute for Internet and Society (HIIG), Japanese-German Center Berlin (JDZB), Germany, May 11-13, 2022

19. Ghotbi, N. Ethics and Moral Awareness of Artificial intelligence (INTERNATIONAL CONFERENCE ON DIFFERENT ASPECTS OF HEALTH: "The Future of Health: Multidisciplinary Approaches") 2021/05/27
20. J. Ellermann, B. Kaiser, J. Toscano and H. Miyashita, Mass surveillance capitalism – the social (media) dilemma remains Unsolved, 5th EDEN, Data Protection in Law Enforcement, 17 December 2020.
21. H. Miyashita, Cultural Attitudes towards Privacy, 54th APPA meeting, 10 December 2020.
22. S. Room, V. Artz, P. Breitbarth, J. Jones and H. Miyashita, The Future of Data Transfers, PrivSec Global, 3 December 2020.

6-3-2. Oral Presentations ([0] domestic conferences, [0] international conferences)

6-3-3. Poster Sessions ([0] domestic conferences, [0] international conferences)

6-4. Newspaper/TV Coverage and Contributions, Awards, etc.

1. ・テレビ放送「マイナンバー公金受取口座を別の人に登録複数確認 総点検へ」NHK ニュース7, 2023年5月23日(同2023年5月24日「おはよう日本」)
2. ・テレビ放送「TikTok 巡る規制広がる」NHK おはよう日本 2023年5月25日
3. ・テレビ放送「3大臣が異例の同時謝罪 “トラブル続出”の『マイナンバーカード』」TBS サンデーモーニング 2023年5月28日
4. ・新聞コメント「マイナカード不安解消急ぐ」日本経済新聞 2023年6月2日5面
5. ・テレビ放送「家族名義登録 デジタル庁2月ごろ把握も対応せず」NHK ニュース7, 2023年6月6日
6. ・テレビ放送「約13万件も... “家族名義”口座登録」NHK ニュース7, 2023年6月7日

7. ・テレビ放送「マイナ問題めぐり「不安にちゃんと応えてほしい」テレビ朝日羽鳥慎一モーニングショー2023年6月8日
8. ・新聞コメント「マイナの哲学、理解不足」朝日新聞 2023年6月8日9面
9. ・テレビ放送「マイナ保険証どんなトラブルが？ 別人情報が登録されるリスクとは」NHK ニュース7, 2023年6月9日
10. ・テレビ放送「東京 台東区 一部 給付金支援で口座”利用しない”方針」NHK 首都圏ネットワーク 2023年6月16日
11. ・新聞コメント「マイナ普及68%全国下回る」読売新聞神奈川 2023年6月27日
12. ・新聞コメント「突然向けられた行政のカメラ 手袋かぶせた男性に司法が下した判断は」朝日新聞 2023年6月29日
13. ・テレビ放送「トラブル続出 SNS で「#マイナナンバーカード返納運動」も…」日本テレビ NEWS ZERO 2023年7月5日
14. ・テレビ放送「マイナナンバーカード交付急増で負担増」NHK ニュースウォッチ9, 2023年7月18日
15. ・テレビ放送「「マイナ保険証」相次ぐトラブル 現状は？どうすれば？」NHK ほっとニュース北海道 2023年8月7日
16. ・テレビ放送「保険証の紐付けミスが新たに 1069 件マイナ総点検・中間報告で判明トラブル再発防止策も発表」TBS ニュース23, 2023年8月8日
17. ・テレビ放送「マイナ保険証トラブル」日本テレビ DayDay2023年8月10日
18. ・テレビ放送「マイナナンバー課題は？海外の実情を現地取材」NHK ニュースウォッチ9, 2023年8月26日
19. ・テレビ放送「どうなってる？マイナ保険証」NHK あさイチ 2023年8月31日

6-4-1. Newspaper/TV coverage and contributions

See 6-4 above.

6-4-2. Awards

6-4-3. Other items

6-5. Patent Applications

6-5-1. Domestic applications ([0] applications)

6-5-2. Overseas applications ([0] applications)