Breaking Down Silos: Involving Various Researchers for Driving HCI Research

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CHI'17 Extended Abstracts, May 06-11, 2017, Denver, CO, USA
ACM 978-1-4503-4656-6/17/05.
http://dx.doi.org/10.1145/3027063.3052757

Abstract
Ethical, legal and social implications of HCI research require a safe system for encouraging rational dialogue between ICT and social sciences and humanities researchers. However, involving researchers from various fields remains challenging, owing to the silo formed by researchers' diversified values. The authors are forming an interdisciplinary network, called Acceptable Intelligence with Responsibility (AIR), to build a prototype system that will help researchers become aware of different senses of values, to preventively deepen their discussions. By introducing the example of AIR research policy and field study, we expect that our concept and practice will serve a beneficial bridge for HCI and SSH researchers.

Author Keywords
Interdisciplinary Research; Responsible Research and Innovation; Artificial Intelligence

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous; K.7.4 [The computing Profession]: Professional Ethics

Introduction
Human Computer Interaction (HCI) research typically involves various types of experts when designing interactions between humans and automatic systems.

Figure 1. Journal cover design evoked gender-related controversy ©JSAI. http://www.ai-gakkai.or.jp/new_name_cover/

Upstream dialogue, not only regarding products, but for discussing ethics and social responsibility in HCI research has recently become necessary, both socially and politically [13]. Especially with the increasing attention to responsible research and innovation (RRI) in Western countries, researchers are being required to incorporate public values into technological developments by conducting interdisciplinary research at early design stages [16,19]. Such situations have made urgent the construction of collaborative foundations for HCI and social sciences and humanities (SSH) researchers. However, technology topics associated with public values, such as politics, religion, ethnicity, education, gender, and environmental issues can easily cause unintended conflict. For example, Microsoft engineers might not have anticipated TAY's racist tweets when they publicized TAY.

A similar dispute occurred in Japan in December 2013 when the Japanese Society for Artificial Intelligence (JSAI) journal cover design evoked gender-related controversy with a drawing of a stereotypical female android with "hollow eyes," "dragging a cable connected to her back" and with "a broom in her left hand." Soon after the cover design was open to the public, a famous artist criticized its lack of sensitivity to gender. Twitter analysis showed that 31 of the 46 tweets about this cover that were retweeted more than 100 times over two days dealt with gender issues [20]. Japanese newspapers and even BBC News also raised this issue. The JSAI editorial board organized a special issue immediately afterward, inviting responses from gender and visual representation researchers. They indicated that the public criticism to this design which represented and reproduced a "division of sex role[s]" was reasonable and that this illustration was inappropriate for the journal cover [5]. This is a case in which gender issues were overlooked because silos have formed in academic circles and decisions made by experts in one field moved beyond their original intentions. When people and communities with different values meet, unanticipated conflicts may arise. This case demonstrates that highly controversial topics may not be accounted for by discussion within a single academic community.

Two of the five authors were on the editorial board of JSAI's journal then, and this case reminded HCI/AI researchers that it is high time to collaborate with researchers from different disciplines, especially those in SSH, and conduct upstream engagement on robotics and AI. Immediately after this case, JSAI established an ethical review board, inviting a science fiction (SF) writer, a science and technology studies (STS) researcher, and a journalist to join. The board is now discussing the creation of a code of ethics for AI researchers.

Outside of academia, the Japanese government is also eager to create research and development guidelines for AI. The Ministry of Internal Affairs and Communications has organized "a study group on AI networking" since 2015 and proposed the AI research and development guideline in 2016 by referring to the Organization for Economic Cooperation and Development (OECD) guidelines governing privacy [12]. Further, the Cabinet Office organizes an advisory board on AI and human society, promoting RRI with collaboration between various stakeholders, including the public, from early research stages. These governmental committees also include both information

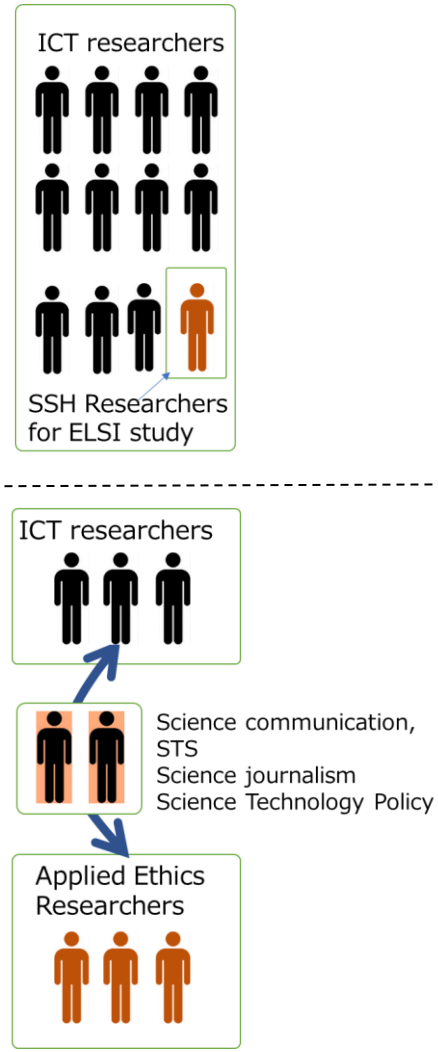

Figure 2. A model for traditional (top) and AIR (bottom) collaboration styles.

and communications technology (ICT) and SSH researchers from various disciplines.

However, these ethical codes and guidelines are only a rough standard. If a researcher would like to interactively and interdisciplinarily discuss the implications and innovation in their research from early stages, it is both indispensable and difficult to create a network that offers diverse perspectives. For example, there is an imbalance in the number of researchers: there are many more ICT researchers than SSH researchers in Japan, and even fewer SSH researchers who specialize in ICT issues. Therefore, the authors organized a special working group, called Acceptable Intelligence with Responsibility (AIR, http://sig-air.org) in 2014. This paper lays out our research aims, policies and agenda to offer HCI researchers a safe place and a prospective system through which to encourage rational dialogue with other disciplines.

Research aims, policies and agenda

Research aims

AIR is an ad hoc network formed in response to the JSAI cover design incident, not a center or research platform. We aim to create an interdisciplinary network and frameworks that can indicate problems in HCI research and prevent problems them from being overlooked. We believe that obtaining foresight into and knowledge of diverse values from beginning in the prototyping phase will not only prevent conflict, but also encourage creativity in research.

Concerns about the potential benefits and risks of AI and robots have led to a supportive push forward to establishing AI research institutions around the world, such as the Future of Life Institute (2014), the Strategic Research Center for Artificial Intelligence (2015) and OpenAI (2016) in the U.S. and the E.U. In Japan, private enterprises have also launched AI research institutions. For example, the Recruit Institute of Technology (2014) invited AI researcher, Tom M. Mitchell as an advisor and the Toyota Motor Corporation established a new company located in Silicon Valley focused on AI and robotics in 2016. Advanced Industrial Science and Technology, affiliated with the Ministry of Economy, Trade and Industry, established an AI center in 2015 and the Institute of Physical and Chemical Research, affiliated with the Ministry of Education, Culture, Sports, Science and Technology launched the Advanced Integrated Intelligence Platform Project Center in 2016. Some of AIR members are involved in AI centers and governmental committees of this type; however, our goal is to construct an interdisciplinary, bottom-up platform that remains free of the biases created by profit motives or policy predispositions.

Group management policy

We have organized AIR to manage professional networks in a manner that escapes from stereotypical collaboration styles. Traditionally, when ICT researchers collaborate with SSH researchers, ICT researchers have a budget and hire a few SSH researchers, expecting the researchers' contribution to "promote" their research by offering expert knowledge. However, AIR consists of three equally sized groups, each with different expertise: HCI/AI researchers (e.g., those working in machine learning, human-agent interaction, speech recognition, multi-agent systems, etc.); applied ethics researchers (including information ethicists, philosophers and phenomenologists); and social science researchers, especially those with an expertise in

dialogue design and ICT research (e.g., in science communication, ethnomethodology, STS, cultural anthropology, science journalism, science technology policy, etc.).

In addition to the core member of AIR, various stakeholders (such as journalists, SF writers, companies, and venture corporations) and experts (in law, medicine, service robotics, and automobiles) are involved and have created ad hoc networks for each topic. These members are about 30-40 years old, and we made it a rule to call each other by name, without titles, to create a friendly atmosphere.

While prior studies of collaborative research groups primarily focused on funded programs [3], AIR began with almost no budget: as the old Japanese saying indicates, "Relations formed by wealth will end when the money ends." That is, many traditional collaboration styles have problems sustaining inter-disciplinary networks when their budget runs out. Therefore, for the first two years, we applied funds that supply travel expenses for our meetings. Also, we have promised to continue our network for at least 10 years, with or without a budget.

Setting agendas and engaging in activities

Contrary to traditional collaboration styles, in which issues to be solved are given to SSH researchers by ICT researchers, we set an agenda to conduct research that would be a "win-win situation" for all those who take part. We meet at least once a month in person to discuss not "which problems should be solved," but "which questions involve the collaborative research of many people." Therefore, we emphasize the importance of dialogue; if one member asserts "that is not relevant and interesting to my research field," we discuss why this is it so and how to make it relevant and interesting. Therefore, we encourage each other to learn one another's research fields. We have also chosen to consider the near future (within 10-15 years), not to deal with SF-like agendas.

In the first year after our network's creation, we dedicated time to trust-building dialogue. In the next year, 2015, our discussion reached a consensus: that we would produce a system prototype to help ICT researchers understand different value systems by getting feedback, and to preventively and confidently deepen their discussions of such topics. We describe this project below.

To support our research, and to learn from past AI booms, we established an oral history project by holding discussions with their participants. This project not only aims to record and learn from the past but also to support collaborative research. Each member asking an interviewee about their own research interests has promoted members' mutual understanding. We also found that we share many of the same pioneers of the field. This means that although we are now in different research fields, these distinctions have generally been formed within the past 30 years. In the 1980s, some researchers were experts in broader aspects of AI/HCI, information ethics, STS, and philosophy, and combinations thereof. We share our interview data on our website (though only in Japanese for now). In addition, we have submitted a questionnaire to various stakeholders including AI and SSH researchers, policy makers, SF writers, and the public, asking how much one could rely on machines in

eight scenarios such as driving, childcare, and disaster prevention (in English: [6]).

We also encourage in collaborative publishing. For instance, we submitted an article to a Japanese journal listing every researcher's name who engaged in conducting this survey. However, a journal editor asked to reduce the number doubting everyone was a full author. We answered that every member took part in writing the report and that listing every member is essential. Contrary to gift authorship that abuses a vertical relationship (junior researchers including senior researchers as authors who have not contributed to the study), we believe listing all contributed members is important to build up and strengthening the horizontal relationships in interdisciplinary research. The journal supported our opinion. This opportunity reminded us that collaborative research can be realized not only by participating researchers but also through the understanding of colleagues and support from research grants and evaluation systems.

In 2016, our research received governmental funding from the Japan Science and Technology Agency Research Institute of Science and Technology for Society (JST-RISTEX) to create an interdisciplinary network and frameworks that could identify problems and prevent them from being overlooked. The funding agency determined that AIR is building a unique and important network, and also expected that our proposed system would be useful for AI/HCI researchers, particularly those experiencing difficulty in interactively and interdisciplinarily discussing the implications and innovations of their research from early stages. Next we introduce the concept of this system, which we call the AIR Value Awareness Support (AIR-VAS) System.

Creating the VAS System

As a research group, we emphasize the importance of software agents' influence on human-human relations [14]. Therefore, we considered building a creative thinking support system, the AIR-VAS. The system is a hybrid of human and machine that elucidates the nuance of value differences through feedback from the interdisciplinary dialogue.

Although machine ethics researchers aim to create machines that generate ethical behavior or calculate the best action in ethical dilemmas using ethical principles [2]. We do not design the AIR-VAS system to give a "correct ethical answer": such as how to make a product more "ethical," nor produce machines that behave ethically. Rather than "ethics" that are a set of prescriptions, we focused on "values" that are tied to action [10].

Because technology and society are co-designed, both technology and moral standards undergo change through interaction [9]. Therefore, we must be conscious of values into design that might guide such interaction [11]. Yet while incorporating values into systems is a topic in fields including HCI, media studies and STS, prior studies indicate the terminology for discussing values and the role that values play in design contexts differs [18]. Therefore, we concluded that rather than sticking to abstract definitions or disciplines, we should start building concrete systems and doing field studies.

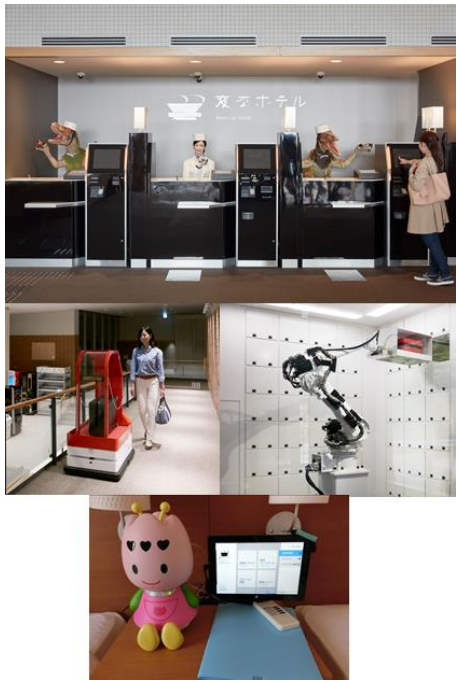

Figure 3. Robots used at the Henn-na hotel. Pictured here are the front desk robots (top: dinosaurs and women), a porter robot (right), a robot bellhop (left), and a communication agent robot (bottom). Pictures were offered by the hotel.

At this moment, AIR-VAS still a work-in-progress "Wizard of Oz experiment"; that is, human AIR members, not the system, are collecting cases and setting agendas to provide feedback to AI/robotics researchers. However, we plan to move to a phase that, to a certain extent, automatically gives feedback from interdisciplinary viewpoints. To build such a system, which includes learning from the past, we began to generate discussion agendas by visiting fields that are introducing AI/robotics.

Field study to set agendas

AI/robotics technologies have rapidly penetrated human society, so AIR collects case studies of AI/robots that (1) have already been introduced and (2) are still in research and development. In this paper, we refer to field studies to explain the steps required to build an AIR-VAS system.

Step 1: Select a field

Studies have warned that jobs will be taken over by AI/robots, a prospect that causes anxiety for the public [7]. To examine job replacement, we visited a robot hotel, called Henn-na hotel ("strange/changing hotel" in Japanese) in February 2016. We thought the hotel would be a great field to observe not "jobs," but how workers' tasks and environment are divided and reorganized. The hotel introduced a robot bellhop, front desk robots, a porter robot, vending machines for amenities, a cleaning robot, and a communication agent robot. According to the Guinness World Records, this is the first ever robot hotel. We interviewed the (human) hotel manager. At present, we are selecting fields and requesting permission for interviews, but have also recently been approached by researchers and companies (e.g., self-driving car researchers) that want to hear comments from AIR members, especially regarding the ethical, legal, and social implications of their research.

Step 2: Visit field and conduct an interview

After conducting a survey of the field (in this case, the hotel), AIR members created a questionnaire from each expertise perspective and sent it to interviewees. Nine members from various fields visited the hotel and conducted a semi-structured interview based on the questionnaire. However, it may have seemed more like a discussion rather than an interview, because each member asked questions throughout.

Transcriptions show that the phrase "about the previous comment you [interviewee] mentioned" was often used, because members asked questions about previous part of the conversation from a different perspective. For example, when an STS researcher asked which rating the robot hotel is aiming for and how they view the future of the hotel industry, the manager answered that it will polarize, into a high-end hotel and an inexpensive hotel with a budget reduced by mechanizing. He continued that by inexpensive, they do not mean lacking hospitality, but that by introducing robots, they can offer homogeneous service to visitors, because robots treat every human being equally, whether they are arrogant, nice, elderly, young, foreign, etc. After some conversation between the STS researcher and the manager about the vision of the future hotel industry, a human-agent interaction researcher interrupted to ask whether homogeneous service decreases employees' emotional labor [8]. The reception robot cannot perform complicated and emotional interaction with human beings. By reducing emotional labor, the manager says that employees are more likely to work. Listening to this conversation, an

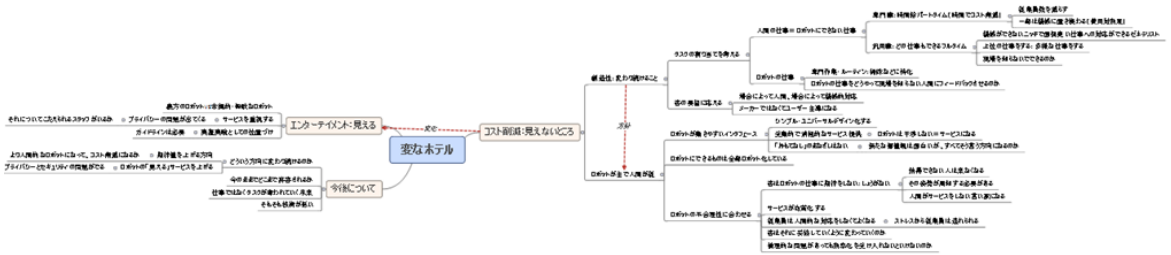

Figure 4. Report contents were categorized as shown.

anthropologist later said that reducing emotional labor may decrease the burden for workers but it may also reduce signs of gratitude from guests, which may be the true pleasure of working in the service industry [15].

This interdisciplinary interview enables the examination of a case from a variety of perspectives and has the further merit of being collaborative work. Each member, including the interviewee, obtained different perspectives by listening to questions and answers. Because members are from various fields, not only technological, but also ethical, legal, social, economic, and political questions were asked. We walked around the inside and outside of the hotel and stayed overnight, because we emphasize not only interviews but also experiences.

Step3: Writing a report

Each discipline has a different approach to setting and answering questions. We share and publicize our obtained knowledge and diverse values and write reports as a group. To compile a report, first, each member submits comments. Then, one member categorizes every comment and proposes a report structure. We did not predefine the content to be written by an academic background, (e.g., "IT researchers report on technology" or "ethical points of view from ethics researchers"); but simply instructed members to, "write what has left an impression."

When classifying each impression by issue, we found that interestingly, even with different academic backgrounds, the topics of interest overlapped. We ultimately divided the issues into three categories: vision, context and interaction. The hotel name "henn-na hotel" means "strange/changing hotel," and they aim to keep changing by introducing robots and services to offer inexpensive, equal and unobtrusive service to visitors. Realizing that vision requires creativity and ingenuity to rearrange the environment, technology, and skills based on changing contexts. It is inevitable that humans will encounter tasks that are somewhat complex or unexpected nonrutine events. Therefore, it is difficult to create a manual for employees on how to interact with robots.

It also requires visitors to adapt and evaluate robots that, as designed, cannot afford complex operations. For example, the hotel once introduced cleaning robots to guest rooms but they did not meet the Japanese guests' requirement: "beautiful as if one's hair were not falling." For this reason, part-time human workers continue to clean the guest rooms. However, the hallways in front of the lobby and shared facilities are cleaned by robots because standards of cleanliness there are not as high as in guest rooms. These human-machine interactions feedback to the hotel's vision and context, which continues to change. Visiting the hotel suggests that our society requires more creativity in designing environments and new work styles.

Step 4: Feedback and publication

We sent our report to the interviewees and asked to ascertain any problems or misunderstandings. Then, we

publicized our report in (1) our newsletter on the website (http://sig-air.org/publications) and (2) academic journals both in Japanese and English [1, 15]. Again, we listed every researcher's name who visited the hotel to a Japanese magazine, but the editors told us that nine authors were too many. Instead, they suggested to publish under the AIR group name and we accept it.

Prospects for the AIR-VAS system

For now, every step of the AIR-VAS system is conducted by humans. However, our goal s to make this step a hybrid system of human and machine. It may sound counterintuitive to replace a creative collaboration with machines. Certainly, we do not mean to say that each expert's viewpoint is stereotypical or replaceable by machines. However, we have two good reasons for tackling this project. First, as previously stated, there is an imbalance in the number of ICT and SSH researchers, so there is not always enough trained social scientist to inform the ICT researchers. Additionally, we are concerned that academic disciplines have formed silos, separating disciplines. We therefore expect AIR-VAS to become a support tool to allow researchers to get a sense of other disciplines and support their early conversations with people from different disciplines.

Second, we believe that attempting to create a hybrid human-machine system would help to describe our interdisciplinary activity in detail. We not only consider our interdisciplinary activity to be a tool for research, but also want to reflexively analyze the mechanism of our activities. Creating a system would be one methodology for identifying what we see as unique to human experts and what aspects are replicable elsewhere.

Therefore, by conducting field studies, we are determining which steps machines can and cannot support. For example, we consider that Step 2, generating questions from various perspectives, could be supported by AIR-VAS. After 3 years of collaborative research, AIR members are now familiar with questions that other members would like to ask; it may be possible to create a chatbot from each discipline.

However, we understand that creating a chatbot that produces useful conversation is difficult. We therefore seek to create a simple commenting chatbot with a moderate degree of abstraction. To get a sense of that degree, we are performing field studies, exchanging viewpoints, and verbalizing the research interests and tacit knowledge embraced by each specialty. In addition, this is a great opportunity to reflect on our own research fields and seek new topics of discussion. Step 3 could be the main part of AIR-VAS: summarizing and categorizing various opinions and showing them to the user. The interface is also important for persuading users. For now, humans are verbalizing and writing reports, but we aim to build a system prototype that supports this within 2 years.

Further research and limitations

Our goal is to create a prototype system that, to some extent, automatically produces feedback from the perspectives of various disciplines, to encourage rational dialogue before initiating discussions with other humans. After all, the JSAI journal cover design incident reminded us that decisions made by only one type of expert can have unintended consequences.

Works conducted by a single discipline may overlook risks as well as chances for creative new research ideas. In that sense, our approach is similar to designing

multiple interpretations among the user, system and designer [17]; however, our approach is more narrowly focused on differences in interpretations among disciplines. For example, ICT and tourism studies researchers often criticize the robot hotel for the robots' technical immaturity: robots in the hotel do not meet common expectations of satisfactory service. In fact, some AI researchers in our group had low expectations for visiting the hotel. However, discussion from varied perspectives reinterpreted the impact of the hotel. An AI researcher commented that apart from the technical level, it was interesting to know how the introduction of technology affects humans and system design. We believe that our activity and the AIR-VAS concept will generate fruitful discussion in the HCI community, because HCI research requires multiple assessments before bringing new technologies into society.

To encourage creative research and prevent conflict, we are constructing an interface that can overcome silos by focusing on shared values. However, there remain concerns about whether we can create the AIR-VAS system as a useful interface; more case studies need to be conducted and more ICT and SSH researchers should be involved in our studies in the future. Therefore, in addition to building AIR-VAS, we are encouraging researchers and students to become involved in our projects.

Because AIR-VAS is still at the conceptual phase, there much to still design. We especially think that the AIR-VAS interface is crucial; it must be persuasive, but not impose values onto users. However, we consider AIR-VAS to be merely a support tool for becoming informed of other people's values and establishing the chance to actually start talking with people from different disciplines.

Although the members of AIR are from different disciplines, the fields of HCI, philosophy and STS are close, and much collaborative studies have spanned these disciplines. However, unlike previous studies, the uniqueness of our activity is that it was not initially directed by a funded mandate, so we spent almost two years building trust and establishing topics of mutual interest. As in [4], we found that this experience reduced the negative impact of distance and disciplinary differences in our group once funded. We also decided to publish our activity before clear results and prototypes are ready, because we consider that collaborative research methodologies may not be easily transferred when culture and circumstances are different. However, what we are doing and what we think is important are aspects of the output of our research. By publishing our activities, we are constantly reflexively analyzing our research. We have also learned from our oral history project that provides insight into how past collaborative research succeeded/failed. Therefore, locality based on case studies, transparency and reflexivity are key to our activities. We also welcome the involvement of other and analysis of our project by third-parties. By doing so, we would like to build a system that breaks down silos and involves various researchers in driving HCI research forward.

Acknowledgements

This work was supported by International Institute for Advanced Studies, National Institute of Informatics, the JSPS KAKENHI Grant Number 15K12435 and the Japan Science and Technology Agency Research Institute of Science and Technology for Society (JST-RISTEX).

References

1. AIR. 2016. Changing Workplace: A Robot Hotel "Henna Hotel" Interview. *Information Processing Society of Japan*, 57, 11: 1078-83. (Japanese).
2. Anderson, M. and Anderson, S.L. 2007. Machine Ethics: Creating an Ethical Intelligent Agent. *AI Magazine* 28, 4: 15-26.
3. Aruna D. Balakrishnan, Sara Kiesler, Jonathon N. Cummings, and Reza Zadeh. 2011. Research team integration: what it is and why it matters. In Proceedings of the ACM 2011 conference on Computer supported cooperative work (CSCW '11). ACM, New York, NY, USA, 523-532.
4. Cummings, J. N., & Kiesler, S. 2008. Who collaborates successfully? Prior experience reduces collaboration barriers in distributed interdisciplinary research. Proceedings of the ACM 2011 conference on Computer supported cooperative work (CSCW '08). ACM, New York, NY, USA, 437-446.
5. Ema, A., Osawa, H., Hattori H. and Akiya, N. 2015. Ethics and Social Responsibility: Case Study of a Journal Cover Design Under Fire. In *Proceedings of the 33rd Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems* (CHI EA '15), 935–40.
6. Ema, A., Akiya, N., Osawa, H., Hattori, H., Oie, S., Ichise, R., Kanzaki, N., Kukita, M., Saijo, R., Otani, T., Miyano N. and Yashiro, Y. 2016. Future Relations between Humans and Artificial Intelligence: A Stakeholder Opinion Survey in Japan, *IEEE Technology and Society Magazine*, 35, 4: 68-75.
7. Frey C. and Osborne M. 2013. The future of employment: how susceptible are jobs to computerisation? Sept: 1–72. http://doi.org/10.1016/j.techfore.2016.08.019
8. Hochschild, A.R. 1983. The Managed Heart: Commercialization of Human Feeling. University of California Press.
9. Kiran, A.H., Oudshoorn N. and Verbeek P. 2015. Beyond checklists: Toward an ethical-constructive technology assessment, *Journal of Responsible Innovation*, 2, 1: 5–19. http://dx.doi.org/10.1080/23299460.2014.992769
10. Knobel, C. and Bowker, G.C. 2011. Values in design. Communications of the ACM, 54:7, 26-28.
11. Manders-Huits, N. 2011. What Values in Design? The Challenge of Incorporating Moral Values into Design. Science and Engineering Ethics, 17:2, 271-287.
12. Ministry of Internal Affairs and Communications. 2016. Proposal of discussion toward formulation of AI R&D guideline. http://www.japan.go.jp/g7/_userdata/common/data/ai.pdf
13. Munteanu, C., Molyneaux, H., Moncur, W., Romero, M., O'Donnell, S. and Vines, J. 2015. Situational Ethics: Re-thinking Approaches to Formal Ethics Requirements for Human-Computer Interaction. Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems - CHI '15, ACM Press, 105–114.
14. Nakanishi, H., Nakazawa, S., Ishida, T., Takanashi K. and Isbister, K. 2003. Can Software Agents Influence Human Relations? - Balance Theory in Agent-mediated Communities -. International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS2003) 717-24.
15. Osawa, H., Ema, A., Akiya, N., Ichise, R., Oie, S., Kanzaki, N., Kubo, A., Koyama, T. and Hattori, H. 2017, What is Real Risk and Benefit on Work with Robots? From the Analysis of a Robot Hotel, *Late breaking reports on ACM HRI*, accepted.

16. Owen, R., Macnaghten, PM. and Stilgoe, J. 2012. Responsible Research and Innovation: from Science in Society to Science for Society, with Society. *Science and Public Policy* 39, 6: 751–60.

17. Sengers, P, Gaver, B. 2006. Staying Open to Interpretation: Engaging Multiple Meanings in Design and Evaluation. Proceedings of the 6th conference on Designing Interactive systems, ACM, New York, NY, USA, 99-108.

18. Shilton,K., Koepfler, J.A., and Fleischmann, K.R. 2013. Charting Sociotechnical Dimensions of Values for Design Research. *The Information Society* 29:5, 259-271.

19. Taebi, B., Correljé, A., Cuppen, E., Dignum, M. and Pesch, U. 2014. Responsible innovation as an endorsement of public values: the need for interdisciplinary research. Journal of Responsible Innovation. Journal of Responsible Innovation. 1, 1: 118-24.

20. Toriumi, F., Takeshi, S. and Okazaki, N. 2014. Analyzing Tweets for Mining Opinions about the Renewal of the Cover Design of 'Artificial Intelligence.' Artificial Intelligence, 29,2: 172-181, (In Japanese).