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Introduction to the *Technikstudien* — Science & Technology Studies (STS) Research Initiative on Japan

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We compiled this special issue of *ASIEN* on "*Technikstudien* and STS: Launching a Research Initiative Regarding Intersections between Technology and Society in Japan" in order to (re)open a discussion on "technical things Japanese" with a wider academic audience. All of the articles included address the question of in which ways technical devices are shaping everyday life in a modern society like Japan, and of how, conversely, the social and cultural contexts influence technological developments.

Previous Japanese Studies research has already drawn attention to technology-related aspects in Environmental Sciences, as well as in Economics, Ethics, Historical Science, Philosophy and Political Science too. Technical artifacts were, however, seldom examined as the main object of study therein; also, a deeper understanding of how processes of science and technology construction proceed and how technology shapes, changes, or reproduces specific constellations of societal order and governance in Japan is badly needed. Recently, the example of the nuclear disaster of 2011 at the Fukushima Daiichi Power Plant has made clear again that the interdependence of technology and society is of high relevance to contemporary Japan — and as such should receive much closer scholarly attention.

Consequently, we have seen a strong need for a technology-related research initiative. A symposium at the Freie Universität Berlin (FUB) conducted in January 2015 functioned as a starting point for reflecting on issues such as the demographic shift and medical technologies, gender and technology, as well as energy technology in Japan (Brucksch and Wagner 2015).[1] The symposium had in fact been preceded by the inauguration of an STS section (Fachgruppe Technik) within the German Association for Social Science Research on Japan (VSJF), at the annual conference in November 2014. Furthermore, panels convened at the "Japanologentag" conference 2015 at Munich University as well as at the Japan Anthropology Workshop (JAWS) conference on "Nature and Technology in Japan" in Istanbul in

1 A conference report in German can be found on the H-Net website (https://www.h-net.org/reviews/showrev.php?id=44671) or the H/Soz/Kult website (http://www.hsozkult.de/conferencereport/id/tagungsberichte-6066).

September 2015 allowed examples of Japan-related STS research to be discussed with a wider audience. During these discussions, we argued that the mutual (re)shaping of knowledge, interactions, thoughts, identities, norms, culture, as well as political and economic systems are not sufficiently analyzed and understood as of yet. As a research methodology, we proposed the basic ideas of STS as a point of reference — specifically by focusing on the co-construction and intersection of technology and modern society. While taking into account their material characteristics, this transdisciplinary approach understands technical artifacts as sociocultural phenomena. More precisely, technological development is viewed not only as a "rational" process and artifacts not as "neutral objects." On the contrary, in fact, the former is rather perceived as a process wherein social actors with varying visions, values, and concepts of usage inscribe their ideas into product designs and reconstitute a specific socioeconomic order within sociotechnical infrastructures.

The analysis of the Japanese *technotop* — by avoiding exoticization and stereotyping (*techno-orientalism*), as well as also avoiding universalism and essentialism — enables a critical understanding of the production and usage of technical devices, technologies, and sociotechnical infrastructures to arise. What is more, it highlights how this intersects with the cultural and societal contexts. Focusing on the geographical, cultural, and societal locale of Japan facilitates a reflection on underlying principles, unchallenged narratives, perceptions of societal values, and economic modes of modernity — as well as de-orientalized explanations for the development and implementation of technology. Moreover, such an approach helps to decenter STS research from its prevailing European and North American contexts.

While exploring the manifold roles of knowledge and technology in modern societies and depending on the specific research questions, methods are employed from Cultural Studies, Ethics, Historical Sciences, Humanities, Philosophy, and Social Sciences — as well as Cultural Anthropology. In this way, STS encourage a joint transdisciplinary research program, which also requires scholars to reflect on how their research designs and outcomes contribute to configurations of reality. At the same time, as there is no fixed STS-methodology canon it requires STS scholars to keep a "methodological openness" for conducting research (Beck et al. 2012: 16).[2]

Variety of terminology

Launching a special issue on Technology Studies on Japan in an Asia-specific journal in Germany inevitably entails translation work for terminology between three languages: German, Japanese, and English. While German and Japanese seem

2 For a thorough discussion of the methodology spectrum of STS refer to the comprehensive introductory reader edited by the social anthropologists Stefan Beck, Jörg Niewöhner and Estrid Sørensen (2012).

obvious choices at first glance, English fulfills its function as a working language in conferences, international academic settings, and/or publications on Technology Studies among the various countries involved. Therefore, publishing this special issue in English allows a discussion to take place on Technology Studies in and on Japan with scholars from abroad. However the various terms used are not identical, nor do they always imply the same thing. For instance, in German we favor the term *Sozial- und Kulturwissenschaftliche Technikstudien* (Social Sciences and Cultural Studies approaches to Technology Studies) for our research initiative — or in short *Technikstudien*.

In daily routines, however, *Technik* is often reduced to the meaning of (electric) machinery. Nevertheless, the well-known German technology sociologist Werner Rammert (2007: 284–486) draws attention to three dimensions of the term: (a) *Handlungstechnik* or *Technik des Machens* (technique); (b) *Sachtechnik* or *Technik der Dinge* (machines, devices, apparatus); and, (c) *Technik der Zeichen* (codes, software, algorithms). Particularly, the last dimension continues to grow in importance against the backdrop of various machines and devices now undergoing a reshaping by software integration, digitalization, information and communications technology (ICT), robotics, artificial intelligence, automatization in industry, or even manipulation in genetics and nanotechnology. In general, Rammert (2007: 486) suggests to define *Technik* as: "The collectivity of all creatively and artificially cause–effect relationships instituted in society that produce reliably and permanently intended effects due to their shape, functionality, and fixation in various carrier media".

In Japan, meanwhile, the term 科学技術 (*kagaku-gijutsu*, science-technology) was long prevalent, but has lately been substituted by 社会科学技術 (*shakai kagaku-gijutsu*, science-technology for society).[3] Moreover the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) launched an initiative called 社会技術 (*shakai gijutsu*, technology for society) in the year 2000, and then institutionalized it through RISTEX (Research Institute of Science and Technology for Society, see: http://www.ristex.jp), and the platform SciRex (Science for Re-designing Science, Technology and Innovation Policy, see http://www.jst.go.jp/crds/

3 A detailed analysis of the history of the term *kagaku-gijutsu* is beyond the scope of this introduction; however Nakayama Shigeru, an eminent historian of science, has stated in numerous studies since the 1960s that the historically derived conceptual amalgamation of "science" (*kagaku*) and "technology" (*gijutsu*) to *kaguka-gijutsu* (literally science-technology) is symptomatic of the emphasis on science and technology as state-sponsored national interests. According to him this phenomenon dates back to the Meiji era (1868–1912), and was developed, on the one hand, as a response to the colonial threat presented by western powers from the middle of the 19th century onward and, on the other, as a pragmatic way to generate revenue. In this regard, science and technology are perceived as one and the same — with which the primacy of the state promotion of science specifically as technology research promotion/the promotion of research in technological knowledge came into existence (Nakayama 2009a [1982]: 218, 2009b [2001]: 306-307).

scirex/). The STS landscape of Japan will be described in more detail below.

Eventually, *Technikstudien* is translated into English as the aforementioned Science and Technology Studies, which describes more precisely the close interdependence between both fields. However in German there is a further distinction between *Technik* (object of research) and *Technologie* (discipline for studying *Technik*). What is more, the English abbreviation STS is not always decoded in the same way. In some cases, STS is referred to as Science and Technology Studies (as in this journal). In others, STS is deciphered as Science, Technology, and Society. In addition, some scholars and institutions prefer to use the abbreviation STMS — Science, Technology, Medicine, and Society. Some publications choose the abbreviation STI — Science, Technology, and Innovation — but this is often more of an economic nature and less reflective of the intersections between society and technology. In other words, whereas technical and societal innovations have been an integral part of STS research from the beginning over the past two decades the term "innovation" has increasingly become a buzzword in Science & Technology policy in Japan (as well as in the EU) so as to encourage economic growth — a trend accompanied by a reduction of the term to merely economic ends.

Particularities of STS communities in Germany, Austria, and Switzerland

As a research methodology, Technology Studies have a long history in Germany and beyond. STS research itself first trickled into Germany over 30 years ago. However, similarly diverse as terminology is the picture of institutionalized research on technology in Germany. In sharp contrast to other places such as the Netherlands, Belgium, or Northern Europe, the research landscape in Germany has remained fragmented until today between different disciplines like the Cultural and Medical Anthropology, Design Studies, Economics, Environmental Studies, History and Philosophy of Technology, Innovation Studies, Sociology of Technology, Technology Assessment, as well as History, Philosophy, and Sociology of Science. In 2008 DESTS (*STS im deutschsprachigen Raum*) was founded as a loose network of German language-based STS researchers to overcome the discrepancy between a missing disciplinary identity and the manifold research activities referring to STS on an international level.

Only recently have research institutes explicitly referring to STS — such as the STS laboratory at Humboldt University Berlin (HUB) and at the Technical University Munich (TUM) — been established in German academia. In contrast, the picture looks different in Austria — where, for example, Alpen-Adria University Klagenfurt, Vienna, Graz is substantially supported by public funding and has conducted STS conferences in English for more than 15 years by now. Even though their counterpart in Switzerland, the Swiss Association for the Studies of Science, Technology, and Society (STS-CH n.d.), was already founded in 2001, the

landscape partially reminds us of Germany — the hosting institute for History of Science Studies at Basel University was recently closed down (*Tageswoche* January 6, 2014). All in all, despite being a German language-based academic community, the strong linkages to international STS research manifest itself through the common use of English as the *lingua franca* for an increasing number of related publications and conferences.

Technology studies on Japan in Germany and beyond

Technology studies on Japan have been conducted by various scholars of the German-speaking academic community for several decades now. Well-known examples are the History of Technology Studies by Erich Pauer (esp. 1973, 1983, 1988, 1992, 1995, 2009) and Lothar Müller (1988) with a focus on Engineering; sociohistorical research by Regine Mathias (1978, 1993) on intersections of coal mining and society in Japan; an analysis of the role of the computer on industrial employment from a Gender Studies perspective by Ilse Lenz (1987a, 1987b, 1990); Environmental Studies by Gesine Foljanty-Jost on antipollution, the nuclear state, ecology, and economy in Japan (e.g. 1979, 1986, 1995); Robert Horres' monography on the Japanese space technology program (1995); and, Technology Foresight by Kerstin Cuhls at Fraunhofer Institute for Systems and Innovation Research ISI (1998, 2005, 2007, 2012). Lately, research can also be found on: the intersections between bioethics and medicine and/or technology by Raji Steineck (2009, 2015); studies on the acceptance of robots in Japan by Cosima Wagner (2013); and, work on geography and transportation infrastructure, air traffic, and energy technology in Japan by Thomas Feldhoff (1998, 2000, 2015). Moreover there by now exists a large body of Japan-related scholarship that refers more to the economic ends of technological progress and less to its social implications; due to space constraints this cannot be addressed here in further detail, unfortunately.

The Great East Japan Earthquake and the nuclear disaster in the Tōhoku region in 2011 caused an increase, still ongoing, of research referring to (energy) technology and its intersections with politics, economy, and society in the German-speaking Japanese Studies community. Within the framework of this introduction it is not possible to provide a more detailed bibliography at length on German and international scholarship on Japan, even though there are certainly many relevant contributions to the field.[4] Still, we argue that currently there is no coherent field of STS research on Japan nor of transdisciplinary research approaches in the Japanese Studies communities of Germany, Austria, and Switzerland. To some extent, there seem to be similar tendencies on an international level too.

4 As selected examples, we want to highlight the research of Margret Lock (2002), Morris Low (2005), Tessa Morris-Suzuki (1994), and Sharon Traweek (1988).

STS research in Japan

Until the 1970s the study of science and technology was notably influenced by Marxist thoughts, but this trend lost out against the "popularization of Kuhnian STS" with the translation of Thomas Kuhn's book *The Structure of Scientific Revolutions* into Japanese in 1971 by Nakayama Shigeru (Kihara 2013: 149; Murakami 2011: 13; Remedios 2013: 124). Itō (2012: 550) states that Nakayama tried to find an alternative to the "social determinist approach" of Marxist interpretations. Nakayama's focus of research on the history of science changed to the study of the Social History of Science from 1975 onward. To counter the "industrialization" of science in general and of the field of technology research in particular, he first called for the establishment of a "service science" as early as 1979. This was based on the idea that the citizens of a state should become more involved in processes of large-scale technical planning (for example in the fields of the military or of nuclear technology). What is more, according to him industrialized science subsidized with taxpayers' money should no longer take place behind closed doors in ministries, governmental research institutes, or private industries (Nakayama 2009c [1981]).

Together with Kunio Gotō and Yoshioka Hitoshi, Nakayama (1999) later edited the series *Tsūshi Nihon no kagaku gijutsu* ('A Social History of Science and Technology in Contemporary Japan').[5] Yoshioka Hitoshi (2012) continued this effort by editing five further volumes on *Shin-tsūshi Nihon no kagaku gijutsu* 1995–2011 ('A Social History of Science and Technology in Japan at the Turn of the Century'). This addresses explicitly STS research fields such as gender, citizen participation, energy issues and nuclear power, medicine, the environment, and security — as well as digitalization and knowledge society in Japan.

Apart from the history and philosophy of science, the research on *kōgai* (industrial pollution) and its effects on Japanese society covers a crucial field. It refers to economic production and the usage/disposal of industrial technology, which need to be mentioned too. Among other scholars, Ui Jun's studies (e.g. 1968, 1985) on pollution issues and civic engagement with his series of public lectures on "principles of pollution" at the University of Tokyo may exemplify the significance that environmentalism provides to STS research in Japan. Currently it is established as a stand-alone discipline at Japanese universities, despite having several overlaps with STS research. Cornelia Reiher elaborates on Ui's commitment to industrial pollution victims as an example of "citizen science" later in this special issue.

Beside Kuhnian ideas, early STS research in Japan seem to also become influenced by the thoughts of sociology of scientific knowledge (SSK), social construction of

5 The following volumes are available in English: Vol. 1: "The Occupation Period 1945–1952," Vol. 2: "The Road to Self-Reliance 1952–1959," Vol. 3: "High Economic Growth Period 1960–1969," and Vol. 4: "The Transformation Period 1970–1979."

technology (SCOT), and actor network theory (ANT), as promoted by Bruno Latour as well as feminist and cultural studies (Shineha and Nakamura 2013: 147). However Itō points to an absence of profound empirical research, which was caused, according to him, by a presumable lack of social sciences research skills and appropriate academic journals within Japan. More precisely, Itō writes that "until recently, very few trained in sociology or anthropology participated in STS research in Japan, and many of those trained in the history of science tended to work on premodern or early modern European science, often focusing on intellectual history rather than social history" (Itō 2012: 552). With STS mainly targeting the shortcomings of empirical research, their research program fell on fertile ground in Japan.

Nevertheless, and similar to the situation in German universities, STS research is not established as a full-fledged discipline and curriculum in its own right in Japanese universities yet. It still frequently remains, rather, divided along conventional disciplinary lines. Shineha and Nakamura (2013: 156) describe the research landscape in Japan as follows:

> Several academic societies have published for over a decade specialist journals that address one or two of the items. The History of Science Society of Japan publishes two: 科学史研究 Kagakushi Kenkyu (Journal of History of Science) and Historia Scientiarum (in English); the Japanese Society for the History of Chemistry, the Japanese Society for History of Industrial Technology, and the Japan Industrial Archeology Society all have their own journals. A biological unit of the History of Science Society of Japan also publishes 生物学史研究 Seibutsugakushi Kenkyu (Japanese Journal of the History of Biology). Because each constitutes its own community, there is little intersociety communication. […] And this situation is not limited to the history of science. With regard to the philosophy of science, there are two academic societies: the Japan Association for Philosophy of Science and the Philosophy of Science Society, Japan. In the field of science policy, the Japan Society for Science Policy and Research Management has 研究技術計画 Kenkyu Gijyutsu Keikaku (Journal of Science Policy and Research Management). As to the popularization of science and technology, there is a peer reviewed journal titled 科学技術コミュニケーション Kagaku Gijyutu Communication (Japanese Journal of Science Communication), while the Japanese Association for Science Communication, established in January 2012, has just published its own journal: 日本サイエンスコミュニケーション協会誌 Nihon Science Communication Kyokai-shi (Journal of Japanese Association for Science Communication). Japan's STS community has been balkanized.

However there do seem to be some exceptional cases of multidisciplinary research in two to three STS laboratories in the country, such as at the University of Tokyo or Osaka University — currently both among the largest STS Centers in Japan. What is more, the Graduate University for Advanced Studies (*Sōgō Kenkyū Daigakuin Daigaku*, or for short *Sōkendai*) with branches throughout Japan seems to function as an equivalent. Still, their main focus remains on natural sciences and only few integrate humanities courses into their curricula. Notwithstanding, they do still

provide some room for STS research in Japan (interview with a board member of STSNJ and JSSTS,[6] March 24, 2016).

Currently, artificial intelligence and robotics, regenerative medicine, as well as nuclear technology and deep geological repositories are the main issues of (official) STS research in Japan (interview with a board member of STSNJ and JSSTS, March 24, 2016). Kerstin Cuhls, in her article on Foresight in this special issue, provides further proof that the topic of regenerative medicine is regarded as of high importance and key global competitiveness in Japan. What is more, for Japan in a global context further topics such as open science/innovation, data science, applied use of Big Data, support for decision making, artificial intelligence, national security and safety, as well as ELSI (ethical, legal, and social implications) issues seem to increasingly matter.

At present, three organizations can be found in Japan that function as platforms for academic exchange within the field of STS: The Sociology of Science Society of Japan (SSSJP, formerly JASTS or Japanese Association for STS), the STS Network Japan (STSNJ), and the Japan Society for Science and Technology Studies (JSSTS). The Japan Association for Science, Technology, and Society (JASTS, *Kagaku, gijutsu to shakai no kai*) was established as a research group in 1988, located in the Department of Sociology of the University of Tokyo. This association addresses scholarship within the methodological frameworks of Cultural Studies and Humanities, History, Philosophy, Sociology and Ethnography, Policy Science, Research and Development (R&D), as well as Innovation Studies on science and technology so as to produce new knowledge on the intersections between science, technology, and society. Accordingly, JASTS launched *Kagaku, Gijutsu, Shakai* (*Japan Journal for Science, Technology and Society*) in 1992 as the first regular publication on STS research in Japan, covering a variety of topics in every volume under the overall responsibility of Matsumoto Miwao (Fujigaki 2009: 512; Itō 2012: 552; JASTS n.d.). In 2012 the organization was incorporated as an academic society and renamed the Sociology of Science Society of Japan (SSSJP, *Kagaku shakai gakkai*). As a stipulated reason for this organizational change, SSSJP proclaims that this step allows for the more stable publication of the abovementioned journal in response to the current difficulties that scholarly publishing is facing as a whole (SSSJP n.d.). In general, JASTS as well as SSSJP seem to keep their distance from publically funded technology research and to instead emphasize a sociology-based approach to the field (interview with a board member of STSNJ and JSSTS, March 24, 2016). With the incorporation of SSSJP, there are currently two formal academic societies for conducting research on STS in Japan.

Besides this, STSNJ was established as an academic network in 1990 and as a "pioneering STS organization" in Japan. Nakajima Hideto was its first president; it

6 STS Network of Japan (STSNJ) and Japan Society for STS (JSSTS) will be explained in-depth below.

is currently represented by Fukumoto Eriko, from Osaka University (Kihara 2013: 150; Murakami 2011: 17; STSNJ n.d.). Due to its less formalized structure, this network continues to provide low-threshold access for early-stage researchers to the STS community in Japan with regular summer schools and symposia targeting younger scholars. Notwithstanding, Kihara points to a visible overlap between who the core members of STSNJ and JSSTS are. The latter organization was the first to advocate some years ago *shakai gijutsu* (social technology) by increasing citizen's participation and citizen science. According to Kihara's interpretation (2013: 151–154), *shakai gijutsu* should include "risk research, citizen's participation in science and technology, science and technology communication, science and technology literacy, and engineering ethics". However he levels criticism at science communication having recently become streamlined to the end of governmental interest; this is evident in the "Basic Plans for Science and Technology" of 1996, 2001, and 2006.

The Japan Society for Science and Technology Studies (JSSTS) was not inaugurated before 2001. The presidency is held by Fujigaki Yuko from the University of Tokyo, who is well known for her edited volume on *Lessons from Fukushima* (2015). Fujigaki (2009: 512) writes that the International Conference on STS held in Tokyo, Hiroshima, and Kyoto in 1998, which was coordinated by Murakami Yōichirō, likewise a well-known STS scholar for the Philosophy of Science, "became one of the stepping-stones for the establishment [of JSSTS]". At present, JSSTS has about 600 individual members and is financially supported by the Japan Science and Technology Agency (JST, *Kagaku gijutsu shinkō kikō*) of the MEXT. JST takes a particular interest in the topic of science communication, as described in the Third Basic Plan for Science and Technology 2006–2010 (Fujigaki 2009: 512, 516). Since 2005 the Japan Society for the Promotion of Science (JSPS) has also provided funds for establishing specialized Science Communication curricula at the University of Tokyo, Waseda University, and Hokkaido University. Since the succeeding year, JSSTS has published an annual journal named *Kagaku gijutsu shakai-ron kenkyū* (*Journal of Science and Technology Studies*).[7] Unsurprisingly, many of the Japanese organizing members for the International Conference on STS in 1998 were also involved in the establishment of the international Society for the Social Study of Science (4S); a joint 4S/JSSTS conference was later organized in Tokyo in 2010 (Fujigaki 2009: 513; Murakami 2011: 13).

Generally speaking, one gets the impression of "burden sharing" between the STSNJ and JSSTS: one collaborating more closely with public bodies and the other

7 The organization addresses issues such as STS as research field (Vol. 1), responsibility of knowledge (Vol. 2), the coexistence and linkages between science-technology and society (Vols. 3 and 4), science communication (Vol. 5), nanotechnology (Vol. 6), women and gender (Vol. 7), ST policies (Vol. 8), global warming (Vol. 9), evaluation of science (Vol. 10), as well as scientific incertitude and the Great East Japan Earthquake (Vol. 11) in 2015 (JSSTS n.d.).

maintaining more distance from governmental influence (Itō 2012: 553). Fujigaki writes that:

> Among the topics covered by Japanese STS, there are many which deal with the governance of science and technology. In studying this area of STS, we need critical case studies, which deal with decision making in science and technology and throw light on the relationships between experts, citizens, policy makers, and other stakeholders. Some major examples are Minamata disease (mercury poisoning), itai-itai disease (cadmium poisoning), Monju nuclear power plant incidents, food poisoning, organ transplants, bovine spongiform encephalopathy (BSE), and genetically modified organisms (GMOs) in Japan. Thanks to funds from the Japan Science and Technology Agency (JST), my colleagues and I conducted analyzed [sic] these cases in collaboration with several international STS researchers and published an STS textbook (Fujigaki 2009: 513).

Furthermore, Shineha and Nakamura (2013: 147) point out that "the Japanese STS community has become closely connected to national science policy, and research topics have shifted to policy-related issues, attracting government subsidies". Similarly, Kihara (2013: 154) criticizes the change of meaning of *shakai gijutsu* from citizens' enactment to a "neoliberal" incorporation of citizen participation. Other authors even interpret this development as "neoliberal influences" on science and technology in Japan — to the effect of reducing citizens more and more to their role as "market players and consumers." Accordingly, they call for a "revitalization of Marxist STS as an alternative" on the one hand, or "for a revitalization of a critical function of STS in Japan" and "in favor of a more complex analysis of science and society" on the other (Kihara 2013: 146; Remedios 2013: 123–124).

Besides the Japanese STS community, the forum East Asian Science, Technology, and Society (EASTS) is also noteworthy. Founded in 2007, EASTS holds annual conferences and releases a journal of STS research in East Asia that is published by Duke University Press and sponsored by the Ministry of Science and Technology of Taiwan. Fujigaki (2009: 512–513) underscores how JSSTS "was in the process of constructing an East Asian STS network with Korea, Taiwan, and China" through conducting regular meetings among these countries in order "to have the chance to experience, interact, and understand the ethnodiversity of Asian cultures". Overall, the establishment of JSSTS and the network building in East Asia seem to have been supported by close collaboration with the European Association for the Study of Science and Technology (EASST). Shineha and Nakamura (2013: 145) write that "the diversity of the Japanese example appears to stem from a set of historical, political, and cultural contexts" and claim that "the diversity of STS and its background permits us to rethink the meaning of research within local contexts". What several authors (Chen 2012; Fu 2007; Shineha and Nakamura 2013) stress for STS research in East Asia is equally true also for technology research on Japan among the German-speaking community of Japanese Studies scholars. More precisely, they underline the necessity of a specifically East Asian research approach

— that despite the currently strong influence of European and North American STS frameworks on the Japanese, Chinese, Korean, and Taiwanese contexts respectively.

Contributions by authors and their reference to STS research on Japan

The various contributors to this special issue reflect in their respective articles on the different theoretical and methodological approaches that can be employed for STS research on Japan. Between them they illustrate the manifold facets of the field, and discuss transdisciplinary approaches by using case studies from their own respective disciplines.[8]

For instance, Robertson draws attention to the fact that Japanese Studies contributes to "decenter[ing] the mostly Eurocentric focus of STS" by "exploring new vectors of technology and intersections of the humanities and sciences, and generating new methodologies and theoretical approaches in STS." Similarly, Kawamura argues that Japan has suffered numerous different experiences with technology-based large-scale damage occurring as a result of industrial pollution. Therefore, the study of these experiences provides diverse insights into how the relationship between law and technology may promote technological progress — but also "regulates its application and use, especially [regarding] the protection of health and property." More precisely, "a whole new area of tort law" has been developed through the series of civil lawsuits spanning from Minamata disease to the Fukushima disaster cases. Reiher, meanwhile, positions her article on lay–expert relations in citizen science, as one similar contribution to STS on Japan. However, based on her findings from fieldwork in Japan, she demonstrates that ultimately the discrete categories of expert and lay knowledge conceptualized by STS theories need to in fact be broadened to more procedural attributions.

Mithout goes one step further, by deframing the "supposedly technology-friendly social context" frequently attributed to Japan from both the outside and/or the inside. The author presents data from ethnographical fieldwork conducted at 20 Japanese schools nationwide, and shows that rather social than technical circumstances hamper the successful inclusion of "disabled" children in ordinary schools. Mithout calls for a user-oriented perspective, one suggested by an STS framework, on the study of joint systems of human and nonhuman actors. This is necessary so as to precisely understand the "practices and social processes that shape the use of [the] technical objects" targeting children's inclusion. Thereafter, Cuhls introduces the approach of "forward-looking" and "activity-oriented science and technology

8 All of the articles were first presented as papers either in a symposium at the Freie Universität Berlin, January 2015 (Cuhls, Reiher), at the Japan Anthropology Workshop (JAWS) conference on "Nature and Technology in Japan" in Istanbul, September 2015 (Mithout), in the STS section of the German Association for Social Science Research on Japan (VSJF) (Kawamura), November 2015, or as a GEAS open lecture at the Freie Universität Berlin, December 2015 (Robertson).

studies" in Japan, so as to contribute to the selection and co-construction of "new science and technology paths." She points out that Japan has "not only influenced [the] Western practice" of actively shaping technological futures through Foresight methods "but also began an interactive relationship that saw concepts and details of technique flowing in both directions" — particularly with the Fraunhofer ISI in Germany. However, Cuhls also stresses the fact that "the backbone" and key contribution of Japanese Studies persists in analyzing the sources in their original language, understanding the Japanese context, and, we add, translating it to an audience without this expertise. This corresponds to Chens' (2012) call for an East Asian body of STS theories, which he attributes to his deconstructive approach to Western concepts and specific shared experiences in science and technology in East Asia through their colonial history or specific sociocultural settings.

One aspect, which already featured prominently in the STS symposium at the Freie Universität Berlin (FUB) in 2015, was the role of the (Japanese) state — specifically in its relationship to society. Cuhls mentions that the Japanese government has been conducting Foresight for 50 years, in order to select the future priorities to contribute to policymaking and to lead industry through "long-term visions"; an example is the Japanese "Innovation 25" strategy that was underpinned by Foresight results. Surprisingly, Japanese policymakers have recently cast doubt on the exclusiveness of their knowledge models in these times of an information overflow particularly through the World Wide Web. Mithout underlines, similarly, the proactive role being played by the Japanese government and MEXT in finding technology-based policies by which to solve various social problems, such as ICT in education — with, for example, support given by the Ministry of Economy Trade and Industry (METI) to manufacturers of assistive devices.

Reiher and Kawamura, however, shed light on the parallel shortcomings of governmental involvement in society as well. For instance, Reiher reflects on officials from central and local government criticizing citizens' groups for collecting scientific data on nuclear contamination and food safety on the grounds that it undermines the officially presented safety standards. Moreover Kawamura precisely describes state assistance to various industries from the postwar era until present, taking the examples of the asbestos industry and nuclear energy technology. Consequently Japanese courts have identified the specific responsibility of the state to protect the life and limbs of its citizens, and to be liable for technology-based mass damage even though related legislation does not cover these aspects. Both authors underline the crucial role of civil society, as well as the mobilization and vocality of supporters from various professional backgrounds — such as legal representatives, medical experts, scientist activists, or the mass media. According to Kawamura this assemblage of expertise was central to redefining damage categories during the era of industrial pollution in Japan. Similarly, Reiher mentions the independent public lecture series on pollution organized by Ui Jun as one early example of citizen science in Japan. However the author remains skeptical about

Japan shifting from a technocratic toward a more "democratic model in science and technology decision making" nowadays.

Furthermore, Reiher describes in-depth the hierarchization of scientifically produced data on Environmental Studies, Medicine, and Physics that is "not based on the quality of the knowledge itself but on the position and affiliation of the people who produce it." More precisely, there are social mechanisms involved herein — enacted specifically through the policymakers and professionals who categorize lay knowledge as less relevant and less legitimate than that of their professional counterparts. In other words, the production of knowledge intersects once more with power relations. On the contrary, Kawamura highlights the heavy burden of providing scientific evidence to prosecutors acting on behalf of citizens in the pursuit of corporate compensation in civil trials. Ultimately, Japanese courts have limited the burden of proof and transferred it back to corporations and governmental bodies to ensure precautionary measures — through their ability to install various expert committees. In fact, according to Cuhls, these so-called "relevant" science experts and academic societies play a major role in helping to maintain the information flow to the government regarding the selection of promising technologies for addressing "future demands on national infrastructure." Hence, they are also held responsibility for their decisions over future technologies.

However, Cuhls also likewise mentions the former "information asymmetry" between government, science, and society. At present, ICT allows "the public to possess sophisticated information" and, thus, contributes to the empowerment of citizens' groups and to the questioning of lopsided interpretations of technological narratives. Referring to possible futures, Robertson mentions the fact that scientific communities such as engineers and roboticists function also as "imagineers" of these. In terms of "techno-imaginative" role models, the author noticed "posters and/or figurines of Tezuka Osamu's world famous cartoon robot, Tetsuwan Atomu (Astro Boy)" in "every robot laboratory" visited.

Robertson also introduces the point that scientists as imagineers might inscribe unquestioned assumptions and values about the contemporary socioeconomic and cultural order into both their storylines and into their sociotechnical constructions as well. For instance, "unlike most feminist researchers," the predominantly male engineers and scientists in Japan may not "interrogate their society's sex–gender system." Another example of a normative social order being perpetuated is, as addressed by Mithout, the official definitions of "normal" and "disabled" adopted, the latter of which was in Japan recently broadened to include children with "developmental disorders" — these individuals have become the main user group of assistive technologies in ordinary schools there. The author stresses that, despite the envisioned diversity in classrooms, conformity pressure still remains high in Japan. Ultimately, both authors refer to a certain extent to the healthy workforce ethos

maintained by the governmental and corporate priorities embodied in Japanese sociotechnical settings.

As a final remark, it is worth noting that there are various other aspects and issues of STS research on Japan that cannot be covered in this special issue but that certainly require more scholarly attention going forward: discourses and ethics, hegemonic concepts and visions, risk assessment and ecological impact of STI — to mention just a few. The editors contribute their share by conducting projects on robotics as health technology or studying the biomedical engineering sector in Japan, which unfortunately cannot be elaborated on here in further detail due to confines of space.

To conclude, then, let us once again stress the still outstanding need for: (a) building a network of scholars of Japanese Studies and/or various STS groups; (b) comparative research between different countries; and, (c) establishing linkages between Japanese and the German/European community of STS research on Japan/East Asia. We learned on various occasions that there is also a need to: (d) overcome the communication gap between the humanities and social sciences on the one hand and natural sciences and engineering on the other. This is particularly true in Germany, where Japan is frequently referred to as a model for societal technology futures. In order to change this status quo, research issues such as energy security, Big Data, and the demographic transition can provide sound starting points for new collaborative STS research.

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