

HISTORY OF TECHNOLOGY IN GLOBAL PERSPECTIVES

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Global developments influence the concepts and content of scholarly research. The article aims to make these influences visible by analysing changes in the ideas and concepts of the history of technology. Thus, the paper presents different approaches to, and topics of, the history of technology, as developed by nine researchers, embedded in their characteristic cultures of scholarship all over the world. In doing so, the paper contributes to a transnational comparison of methodologies and contents of the history of technology. It also reflects on how the history of technology sees itself as an academic discipline and how it contributes to ongoing discourses on broader societal challenges.

Introduction¹

Some debates in recent years have hinted that the understanding of the history of technology (HoT) is undergoing profound changes. To mention one of the most important ones *pars pro toto*: the debate on inherent racism and discrimination of epistemic structures. It touches the concepts and structures of history, especially of the history of technology: technology has been and is involved in processes of discrimination.² The example demonstrates that ethical considerations and methodological reflection are becoming more important in the history of technology. When the *International Committee for the History of Technology*, *ICOHTEC*, was founded as a Scientific Section within the *Division for the History of Science and Technology* of the *International Union of History and Philosophy of*

¹ Contribution by Stefan Poser.

² Bhimull et al., “Systemic and Epistemic Racism.”

Science and Technology (IUHPS/DHST) in Paris in 1968,³ ICOHTEC's general theme, the history of technology, was already more than a hundred years old. The focus of the early approaches had been on a history of engineering as represented, for example, by early museums of technology in the period of their founding in the late 19th and early 20th centuries. By the 1960s, the French journal *Annales* was already influential, and social history was gaining in popularity. This new development was reflected, for example, in *Technology and Culture*, founded in 1959, and the journal *Technikgeschichte*, which replaced an earlier German journal on the history of technology in 1965. The history of nuts and bolts—as the engineering-centric approach was called by contemporary historians in those days—was increasingly being replaced by approaches to social and economic history of technology, although not completely.⁴ These opened new perspectives for HoT—especially in connection with economic developments and changing working conditions. The same happened in the 1970s, with an increase in interest in gender studies,⁵ environmental history,⁶ and cultural approaches to the history of technology.⁷ These four approaches still belong to the groundwork of the history of technology. Thus, the following contributions develop different perspectives on the history of technology and its future linked to these approaches. Some authors introduce new fields and approaches, others invite to rethink the whole history of technology.

³ In 1968, the name of the society was “Division for the History of Science” of the “International Union of History and Philosophy of Science” (IUHPS/DHS); “Technology” was added in 2005, in a collaboration of Alexandre Herlea and Juan José Saldaña.

⁴ Thompson, *Making of the English Working Class*; Kranzberg and Pursell, *Technology in Western Civilization*; Hausen and Rürup, *Moderne Technikgeschichte*.

⁵ Beauvoir, *Le Deuxième Sexe*, published in 1949, is regarded by many authors as the initial book of gender studies; it was widely recognised since the 1980s. Other influential works include: Butler, *Gender Trouble*; Haraway, *Primate Visions*; Haraway, *Simians, Cyborgs, and Women*; and Hausen, *Geschlechtergeschichte*.

⁶ The influential works on early environmental history include Corbin, *Le miasme et la jonquille*; on the early design of a new field see Troitzsch, “Historische Umweltforschung”; White, “American Environmental History”; Poser, “Umwelt und Technik”; see also Winiwarter and Knoll, *Umweltgeschichte* and Melanie Arndt, “Environmental History,” *Docupedia-Zeitgeschichte*, August 23, 2016, http://docupedia.de/zg/Arndt_environmental_history_v3_en_2016, <http://doi.org/10.14765/zzf.dok.2.700.v3>.

⁷ See Chickering, *Karl Lamprecht*. Influential on the development of cultural history and microhistory were Ginzburg, *Il formaggio e i vermi*; Burke, *What is Cultural History?*; Daniel, *Kompendium Kulturgeschichte* (translations to Spanish and Hungarian available); Hård and Jamison, *Hubris and Hybrids*.

The *International Committee for the History of Technology*, ICOHTEC, and the *Society for the History of Technology*, SHOT, will hold a joint meeting in Viña del Mar, Chile, in summer 2024. Thus, the first contribution of this article is dedicated to the history of technology in Latin America. The general theme of ICOHTEC's and SHOT's bi-lingual conference, "Reparando / Repair,"⁸ touches upon the experiences of people living in different regions of the world. Thus, the joint conference is an invitation to intensify transnational exchange and research.

Nelson Arellano-Escudero's contribution is dedicated to the development of the history of technology in Latin America. He focuses on the institutional framework and mentions key subjects of scholarly discussion. *Saara Matala* analyses how interaction through disciplinary boundaries is vital but often difficult. To address the challenges, she proposes three simple ways to explain the contributions of historical research to a non-historian. *Hugh Slotten* discusses how to conduct research on a global level. He underlines how important it is to ensure that the history of technology embraces inclusiveness and avoids privileging certain parts of the world. This goal means moving away from Eurocentric narratives and writing integrated, expansive, and connected histories that seek to include the participation of the entire world. *Jethron Akallah* argues that the history of technology needs to shift from the focus on *origin* and *invention* that privileges the North, to *meaning*, *use* and *effect*—fields of research which are suitable for analysing developments in quite different regions of the world. Methodologies should be employed that lend voice to people, working under quite different conditions in rural areas, surviving on subsistence farming, running local industries, and employing indigenous knowledge. *Starwomir Łotysz* discusses the results of the pandemic for scholarly societies and asks how to integrate experiences from online conferences of this period in post-COVID events. He particularly highlights the accessibility of online conferences for colleagues who cannot participate in in-person events, and asks how to stay inclusive now. *Magdalena Zdrodowska* argues for a new history of technology that recognises the expertise of marginalised groups—people with disabilities, of different ethnic or gender identities, from non-privileged places. Her approach redefines the established way of being involved in history of technology. *Min Fanxiang's* paper is dedicated to the history of increasingly technology-based medicine. It makes the point that, in a sense, the history of human medical development is a history of iatrogenic harms and disasters, and the future writing of medical history should not only continue to pay attention to the various "victories" and "progress" in medical history, but also focus on the countless "medical failures," "medical harms," and "medical disasters." He argues that the

⁸ "Reparando / Repair in the History of Technology." Joint annual meeting of the International Committee for the History of Technology (ICOHTEC) and the Society for the History of Technology (SHOT), 9–14 July 2024, Viña del Mar, Chile, <https://www.icohtec.org/w-annual-meeting/vina-del-mar-2024/call-for-papers-en/>.

development of medicine is based on such disasters. *Stefan Poser* examines playful approaches to and playing with technology as a subject, suitable for research on a global level: since playing is a fundamental human activity, it can be analysed across different societies. *Animesh Chatterjee* calls for critical adjustments to the history of technology and traditional perspectives associated with the term ‘technology.’ He suggests rethinking some basic assumptions, arguing for a shift in focus from ‘technology’ to ‘material culture,’ and for approaches that give voice to different actors and perspectives.

The following paper is written by the historians of technology living in different parts of the world. They present their own perspectives on this academic field and invite to compare them with their colleagues’ statements. Since the *International Committee for the History of Technology* offers a framework to explore the core themes by organising sessions over several years, the subjects and approaches mentioned in this paper might influence the development of ICOHTEC’s scholarly discussion as well as the development of the history of technology.

The Positioning of the History of Technology in Latin America⁹

A key facet of the discourse emerging from the 2023 meeting in Tallinn pertains to the geographic landscape of HoT research in Latin America.¹⁰ Within this panorama, there exists a discernible disjunction or partial connectivity spanning from Mexico to Tierra del Fuego, encompassing the Greater Caribbean.

This observation, however, is nuanced by a dual dynamic: a flow originating from the northern hemisphere, where Latin American researchers gain visibility through training initiatives, collaborative research endeavours, publications, and, occasionally, outreach beyond the confines of academia. Conversely, a second movement originating from Latin America and the Caribbean tends to be fragmented, encapsulated in methodological nationalism, potentially directed towards the northern hemisphere, often remaining unknown within the broader continental context.

These disparities in the production, dissemination, and recognition of HoT research in Latin America provided the rationale for ICOHTEC and SHOT to unite forces in sponsoring a groundbreaking continental workshop in Santiago, Chile. The workshop drew participation from researchers representing five countries: Mexico, Colombia, Peru, Brazil, Argentina, and the host country. This unprecedented gathering underscored a collective interest in fostering an academic community capable of showcasing Latin America’s noteworthy contributions to

⁹ Contribution by Nelson Arellano-Escudero.

¹⁰ Galles, “La Sociedad Latinoamericana de Historia de las Ciencias y la Tecnología.”

the global history of technology.

The dates of November 21 and 22, 2023 marked a significant milestone, as the ICOHTEC's and SHOT's sponsorship complemented contributions from the Universidad Nacional Autónoma de México and Universidad de Chile. The event, conducted with enthusiasm both in-person and online, coincided with the spontaneous publication of the four-volume work, *Historia de la ciencia y de la tecnología en Chile* (published only in Spanish), featuring approximately 60 chapters. This project, initiated in 2018 and scheduled for release in 2023, has hopes for widespread dissemination in 2024. This overarching context set the stage for the Latin American workshop on the history of technology, centered around five fundamental themes: Energy, Engineering, Innovations, Infrastructure, and the Technical World. Conceptualised in 2022, the workshop served as a crucial preliminary step for the forthcoming joint ICOHTEC-SHOT World Congress, slated for 2024 in Chile.

The trajectory of HoT in Latin America experienced an initial phase in tandem with the history of science in the 1980s, which waned with the generation maintaining the Latin American Society for the History of Science and Technology into the early 20th century. A subsequent strand of HoT aligned with economic history, often exploring business or market history within the context of economic development.

At present, the potential revitalisation or new phase of HoT in Latin America represents a distinctive chapter in economic history, with its trajectory yet to be fully defined. In the words of Nestor García Canclini, it is a quest for its place in the century. While the eventual outcome remains uncertain, it is crucial to note the gradual emergence of an internal network within the continent. Although many geographies remain unconnected, the generosity of colleagues worldwide is facilitating connections and shared learning.

A parallel, yet closely intertwined process involves the training of researchers who are beginning to recognise their case studies as integral to the history of technology. Fields such as Science, Technology, and Society (STS) or Science, Technology, and Innovation (STI) currently hold sway over the interests of young researchers, with history serving as more than mere illustrative information. In this context, the establishment of the RECSLAC network¹¹ offers new avenues for interdisciplinary exchange. The HoT experience within this network can yield significant transnational contributions, fostering a conducive environment for exploring Latin America and the Caribbean's global and internal dynamics that are still awaiting elucidation.

The dialogues in Tallinn, along with those in Saint Etienne (2018) and Rio de

¹¹ Red de Estudios de Ciencias y Saberes en Latinoamérica y el Caribe, RECSLAC network, accessed January 10, 2024, <https://cienciasysaberes.org/about/>.

Janeiro (2017), have paved the way for ICOHTEC to bridge connections, offering Latin America an opportunity in the 21st century to craft its narrative regarding its substantial contributions to itself and the world.

Interaction through Disciplinary Boundaries¹²

I was not invited to contribute to this paper because of my lifelong career in the field of the history of technology, but to represent the younger generations who will come and take over the field in the future. As historians, we are well aware that there is no break between the old and the new. Science is not a monologue of any single author, but essentially a co-production of knowledge over time and across borders. It is only through interaction that we can add nuances and perspectives to the accumulated understanding of this crazy, complex world.

Hugh Slotten and Jethron Akallah, in this article, address the importance of going beyond traditional geographical frames. In my contribution, I will focus on interaction across disciplinary boundaries. Disciplines are not islands, and, as historians of technology, we share common ground with other historians: we often engage in lively border trade with historians and philosophers of science and scholars of industrial heritage, and we have had a high-speed landline connection to the corners of STS, as established in the bright yellow classics *The Social Construction of Technological Systems*.¹³ Yet, sometimes it feels that there is an ocean between historians of technology and engineers. Even though we often study engineers and their work, or are employed by universities of technology, we speak a different language than engineering students and have different practices than our colleagues in natural science departments.

As historians, we study the past. The question we need to address constantly is why a university of technology should invest resources in experts of the old when they need to prepare the students to take care of future technologies.¹⁴

Universities of technology do not need a history department to put things and stuff in chronological order. While we know that finding potentially interesting and practically useless facts from archives and locating them on a timeline is hardly a good description of our profession, it is usually safe to assume that the student of mechanical engineering forced to sit in a history of technology course, the management scholar in the coffee room, and the physicist on the university board of directors have their understanding of history shaped primarily by elementary school readings or historically inspired Netflix series. They will not know what modern history of technology is or why it is essential unless we explain it. We need

¹² Contribution by Saara Matala.

¹³ Bijker, Hughes, and Pinch, *The Social Construction of Technological Systems*.

¹⁴ Williams, *Retooling: A Historian Confronts Technological Change*.

to try to cross this ocean to interact and create interdependencies with other facets of technical universities.

I understand the underlying frustration of being the discipline constantly asked to build bridges and make itself visible in higher education. It is not the physicist, economist, or medical scientist who must justify their projects in public discussions or university strategy meetings, but historians and other humanists. However, justifying our existence would help other people understand our work better, help us find collaborators and allies, assist in the competition for scarce resources, and clarify to ourselves the advances of historical methods.

To promote the role of the history of technology in future-oriented discussions, we need concrete arguments that go beyond the standard statement, “by understanding the past, we can understand the present.”

I propose three additions to this standard elevator pitch, and I would like to invite everyone to revise them and add new ones. As marketing claims, they are short and straightforward. They are not meant to credit the long and multifaceted scholarly tradition, but to build a simple bridge over the troubled waters of the disciplinary divide.

1) History as a study of transformation over time

Historians are best known for their interest in old things, but more often, the research is driven by their interest in historical transformations. Historians, as Sewell pointed out,¹⁵ have a special relationship with time, differently from most other social scientists. Our methods enable us to increase our understanding of the changes, breaks, and continuances of technological systems over long periods of time. There are other disciplines that can introduce a technological innovation, propose a strategic response to a market collapse, or analyse the risks of an energy system in contemporary conditions. Historians of technology put the technology in their real-life, messy, and complex context.¹⁶ We have great innovations that became great disasters; we have companies that have survived depression and failed the boom, and energy systems with unexpected accidents and unimaginable consequences. Truly important things take time, and historical methods are especially well-fitted to study these long transformation processes.

2) History as methodological source criticism

Historians are obsessed with sources and source criticism. History students learn to take a book, learn about the author, check the context of the publication year, the reputation of the publisher, and the reliability of the references, and then determine what to think of the piece of information presented on its pages. This year, the

¹⁵ Sewell, *Logics of History*.

¹⁶ Hughes, “The Seamless Web.”

developed AI chat tools have completed what Wikipedia started in the students' learning practices by providing easy access to loads of anonymous information in a format that hides the origin behind the algorithms. More than before, university graduates need to learn to differentiate reliable information from what looks good. No other discipline takes source criticism as seriously as historians.

3) Historians as experts at finding data

Today, the internet is full of digital sources, and computers are improving at finding and analysing those. However, the internet does not cover everything. Investigating the world based only on machine-readable text leaves the understanding biased and incomplete. Historians are experts at finding other sources, too: the small collections in remote archives that are open only on Tuesday afternoons, maybe written in shaky handwriting and in an old dialect, using words that are lost or have changed their meaning. While digital collections and tools are becoming a vital part of the historian's craft, it does not make the information printed on paper obsolete.

To summarise, during the 55-year history of the ICOHTEC, the history of technology has solidified its position as a well-established discipline. However, to strengthen our contribution to higher technological education and research, we need to make an effort to communicate across the great divide between the humanities and engineering. We need to tell future strategists that historians of technology continue to be important. The future will require historians to do many new things, but we also need to continue doing the old stuff we are good at, and do them better than others.

Moving Away from Eurocentric Narratives¹⁷

ICOHTEC's statutes emphasise the organisation's commitment to the global study of the history of technology. Article 5 highlights the goal of establishing "itself in the greatest number of countries." Article 4 clarifies that it is committed to serving scholars "in all countries in the history of technology." International cooperation is also one of the main aims of the organisation. It was established to "foster international cooperation for the study and development of the history of technology."¹⁸ Given the global emphasis of the organisation, it is especially appropriate to think about future efforts to promote the global history of technology. The following comments will discuss several aspects of the global history of technology that I believe are especially important in thinking about the

¹⁷ Contribution by Hugh R. Slotten.

¹⁸ Statutes of ICOHTEC, www.icohtec.org/a-homepage-section/statutes/.

future of the discipline.

A global emphasis is important to ensure that the discipline embraces inclusiveness and avoids privileging certain parts of the world. This goal means moving away from Eurocentric narratives and writing integrated, expansive, and connected histories that seek to include the participation of the entire world. An important aspect of this program is the pursuit of local studies of neglected parts of the world as a “path toward a more polyvocal and encompassing narrative” about the development of technologies in a global context.¹⁹ This approach is also consistent with the call to write histories of technology “from below.”²⁰ Hård has argued that historians of technology need to focus on “local processes and developments” in all parts of the world before striving to understand big-picture global connections. Our understanding of local history, he contends, “is not advanced enough for us to start crafting analyses of global interdependencies.”²¹

Hård’s point here is very good, but I would argue that it is also important to consider additional approaches that might be pursued to gain a better understanding of big-picture global accounts. This goal remains important to avoid fragmentation in the field. The first is building on studies focused on an analysis of imperial connections. These studies often are interested in global interdependencies or in exploring connections across regions. Although this focus on imperialism and colonialism in the history of technology has produced valuable work, one weakness has been a tendency in some cases to privilege Western understandings of technology.²² To avoid this potential weakness in future work, scholars could seek to understand more fully the active role of local actors in non-Western contexts with respect to technological developments. As Siddiqi has argued, it is not sufficient to trace “the mobility of Western artefacts and practitioners, situating them in the Global South, and commenting on their behavior in different environments,” but historians of technology need to take “seriously what technology means from the perspective of people of the South.”²³ In addition, instead of focusing on a particular imperial context, future studies could seek to gain a fuller understanding of technological developments on a global scale through a comparative analysis of

¹⁹ Nappi, “The Global and Beyond.”

²⁰ Hård, *Microhistories of Technology*.

²¹ Mikael Hård, “Between Globalization Narratives and Microhistories of Technology,” Abstract, Kranzberg Lecture, 50th Symposium, International Committee for the History of Technology 50th Annual Meeting, 14 August 2023, Tallinn, Estonia, <https://www.icohtec.org.org/w-annual-meeting/tallinn-tartu-2023/kranzberg-lecture-by-mikael-hard/>.

²² An exception would include studies that explore non-Western empires. See, for example, Wittner and Brown, *Science, Technology, and Medicine in the Modern Japanese Empire*.

²³ Siddiqi, “Competing Technologies;” also especially Hård, *Microhistories of Technology*.

different empires.

One of the main reasons why global projects seeking to understand connections among different parts of the world are challenging is the need for specialised knowledge of multiple regions. A potential solution that could be considered more fully would be to employ teams of experts working collaboratively. Scholars with specialised knowledge of different regions of the world could collectively write broader essays or books on topics highly relevant to the global history of technology. The discipline would greatly benefit from more synthetic studies that also draw on the expert knowledge of multiple scholars, especially for use in teaching but also as reference sources.

To link local studies to broader big-picture accounts, future research might also more explicitly explore the relationship between local and global perspectives. Historians of technology could be more sensitive to how different histories can be written depending on different geographical frames of analysis. How do local historical accounts change if they are analysed using a global framework? This emphasis on being sensitive to the use of different spatial frameworks has been an important theme in other fields of history and could be explored more deeply by historians of technology.²⁴

Another area for future research could be based on the recognition that certain topics in the history of technology are global by definition. The best example would be infrastructure technologies. Most studies of infrastructure have focused on regional and national technological systems, including roads, canals, railroads, electricity systems, water distributions systems, and air transport. But some infrastructure projects span the world. Global infrastructure also usually involves the establishment of technical standards that are required for smooth operation and seamless interconnection. Researchers could seek to understand the complex work involved in creating technical and organisational standards on a global scale. My current research has sought to do this by looking at the construction of the first global satellite communications system, established during the mid-1960s. Called *Intelsat* (the International Telecommunications Satellite Organisation), it had a global mandate to use the new technology of satellite communications to relay international television broadcasts, telephone calls, data, facsimile, and other forms of electronic communications.

These brief comments touch on issues I believe are important to think about for the global history of technology as a field, and, I think, are especially relevant to ICOHTEC as arguably the most important institution committed to global inclusion and international cooperation in the history of technology.²⁵

²⁴ In U.S. history see, for example, Bender, *Rethinking American History in a Global Age*.

²⁵ Slotten, *Beyond Sputnik and the Space Race*.

Cantering the Global South: Towards *Meaning, Use and Effect*²⁶

The history of technology is a relatively new field of interest for the Global South, particularly Africa. A huge gap exists in African historiography in terms of technology studies together with other critical sub-disciplines like environmental history and history of medicine. The question of what the future of History of Technology (HoT) holds is worth asking from both a methodological and theoretical point of view. Be that as it may, *place* (context) and *time* become important substrates with which to refocus the future of HoT. Garth Myers' proposition that it is the historicity and particularities (of South Cities, in his case) that should concern contemporary studies rather than the attempt to view the Global South as exceptional,²⁷ should guide how we approach the subject and practice of research in and about the South. The bracketing of African-lived experiences in the literature emerging from the research carried out on the continent, for example, occurs either by design or default. History as a discipline in Africa is a phenomenon of the latter half of the 20th century.

The slow pace in the growth of the history of technology as a domain is established firstly as emanating from a methodological dilemma and, secondly, as a result of the obsession by nationalist historiographers to concentrate on socio-political histories and the neocolonialist debates that have focused more on the colonial (dis)continuities persistent in the post-colonial world. In terms of methods, the belief is that the attempt to study local societies within certain predetermined frameworks that are popularised under Western scholarship has, many times, led to misconstrued or subjective conclusions. The unilateral approach to knowledge in technology studies that visualises users, especially in the Global South, as either passive recipients or as incapable of invention, continues to propagate notions of the superiority of *things, ideals, and ideas* from outside. This leads to the production of what Adele Afigbo, in his attack on colonial historiography of Africa, conclusively referred to as “bastard historiography.”²⁸

The linearity in the approach to the subject of travelling ideas, ideals, and technologies has minimised the scope of knowledge, especially on how the process of invention, innovation and appropriation unfurls. The inertia in the history of technology in the Global South has become a major impediment to filling the historiographical and knowledge gap that exists in this sphere. Edgerton, in what he refers to as “creole technologies,” prompts us to engage with history and not just the question of technology, suggesting that this ought to be done in a particular

²⁶ Contribution by Jethron Akallah.

²⁷ Myers, *African Cities*.

²⁸ Afigbo, “Colonial Histography,” 46.

way that offers a new way of post-contextualist history to those already available. The historian's focus should be on writing a "history of content and context together."²⁹ This is with respect to what indigenes, rather than colonisers, make of new technologies that are, as yet, little understood. Perhaps, it is by borrowing from such histories that the lenses need to be refocused sharply on the experiences of indigenes in their day-to-day interactions with technologies as inventors, users, and tinkerers. Acknowledging the local processes and platforms of innovation is a step in the right direction towards a comprehensive history of technology that explores the socioeconomic and political facets of technologies.

However, this is not about drawing a line between the "North" and "South" as distinct categories to be theorised independently.³⁰ To do that would mean to not only promote exceptionalism on scholarship on history of technology but also to perpetuate geographical exclusionism. The South, like all spaces, is relational and exists through a complex network of connections that are always unstable.³¹ For the case of Africa, Clapperton Chakanetsa Mavhunga draws attention to the inadequacy of conventional (Western) STS at redressing itself to non-Western contexts. The explanation is that while STS in traditional practice is good at identifying banal forms of science and technology, it is severely limited in the Global South societies in which the black and white of things that are technological and scientific are not or may not be readily recognisable.³² The binary division of North and South that is presented asymmetrically by being skewed towards the North ordinarily distorts both theory and practice by "treating places outside the Anglo-American (read as Euro-American) heartland as sources of data rather than sites for theorisation in their right."³³

All in all, David Arnold's view that history of technology needs to shift from the focus on *origin* and *invention* that privileges the North, to *meaning*, *use*, and *effect*³⁴ holds greater traction in terms of the future for HoT. For the future, the field has to place at the centre methodologies that lend voice to people who continue to operate on the fringes of cities, thrive within forests, explore the valleys through novel irrigation technologies and generally the rural communities in many parts of the South that survive on subsistence farming, local industry, and indigenous knowledge. These people possess greater knowledge of their environment and continue, through their everyday experiences, to appropriate *things* and exploit

²⁹ Edgerton, "Creole Technologies and Global Histories."

³⁰ Furlong and Kooy, "Worlding Water Supply."

³¹ Akallah, *In the Technological Footprints of Urbanity*.

³² Mavhunga, *What Do Science, Technology, and Innovation Mean from Africa?*

³³ Mavhunga, *What Do Science, Technology and Innovation Mean from Africa?*

³⁴ Arnold, "Europe, Technology, and Colonialism."

the unique environments they occupy, innovating ingeniously for their own sustenance. As we seek to write global histories of technology, local histories have to be mainstreamed through understanding different peoples' ways of producing knowledge and applying that knowhow in their everyday survival if not thriving.

The Future of ICOHTEC Meetings – How to Be Inclusive?³⁵

More or less round anniversaries, so eagerly celebrated by scholarly societies, although organised to commemorate the achievements of the past, always make one think about the future. It was no different in hospitable Tallinn and Tartu, where ICOHTEC celebrated its 55th anniversary and held its 50th annual symposium. The meeting was of exceptional importance to our community, mainly because ICOHTEC members and sympathisers met in person for the first time after a four-year gap caused by the COVID-19 pandemic. For many of us, it was also the first academic event since the outbreak of the pandemic. Thus, the conference in Estonia was an opportunity to reunite as well as to reactivate normal scientific activities. It was an excellent opportunity not only to look at the state of our organisation, but more generally to reflect on the challenges facing scholarly societies today and their main form of activity, the periodically held symposia. ICOHTEC survived this period, although online meetings were held three times in a row. This is the case whether or not we agree with Joshua Kim's assertion that the conference—held in person, to be precise—is more a habit than a necessity.³⁶

That the pandemic had a huge impact on the functioning of academic associations is a banality that needs no proof.³⁷ We all experienced it. This was particularly acute in 2020, when meetings that had already been prepared were cancelled, postponed, or moved to online platforms.³⁸ This resulted in major financial losses, especially for associations for which the profits from the organising of annual meetings were an important part of the budget. If such a cancelled

³⁵ Contribution by Sławomir Łotysz.

³⁶ Joshua Kim. "Academic Conferences After the Pandemic. Is flying to disciplinary and professional academic conferences a habit we might lose?," accessed October 13, 2020, <https://www.insidehighered.com/blogs/learning-innovation/academic-conferences-after-pandemic>.

³⁷ But let me give here at least one: Robert Service, "The Disruption is Enormous." Coronavirus Epidemic Snarls Science Worldwide," *Science*, accessed February 17, 2020, <https://www.science.org/content/article/disruption-enormous-coronavirus-epidemic-snarls-science-worldwide>.

³⁸ Scott Carlson, "Will Coronavirus Cancel Your Conference? The Chronicle of Higher Education," accessed March 9, 2020, <https://www.chronicle.com/article/will-coronavirus-cancel-your-conference/>.

meeting was to be held in a hotel (and it was, in many cases), the generally high contractual penalties had to be added to the losses incurred. It is not known how much these losses amounted to for the academy as a whole, but in the early days of the pandemic, it was reported that one or another association had come close to bankruptcy as a result. ICOHTEC has come through this difficult time intact—the meeting, originally scheduled to take place in Eindhoven, was flawlessly moved to the online platform by the same team that was about to welcome us in the Netherlands.³⁹

It was then that the phrase “in-person meeting” gained full agency—a phrase that did not even need to be used before, as basically all meetings assumed the physical presence of participants. A new phrase also quickly emerged—“digital meeting fatigue”—to describe the exhaustion caused by constantly sitting in front of online conferencing platforms, which we used not only for symposia, but also for examination boards, faculty research councils and, above all, regular classes and lectures for students.⁴⁰ Time zones also proved to be a major challenge, and organising even single panels with participants from Asia, Europe, and the Americas without dragging someone out of bed in the middle of the night proved almost impossible. As time went on, the lack of “serendipitous hallway conversations” and impersonal interactions, as pleasant as they were inspiring, also became very irritating.⁴¹

Surprisingly, the new situation turned out to have a kind of unexpected positive side.⁴² The transfer of academic activity into the virtual space has allowed people who were previously unable to participate in person, either because of disability or lack of resources, to come and take part. Before the pandemic, these less privileged people were only allowed to participate digitally in exceptional situations. During the lockdown, when even all able-bodied and well-funded scientists could not come in person, this was suddenly no longer a problem. Will this “silver lining” of increased accessibility be maintained now that the threat of the pandemic has passed? There is already a tendency to emphasise the in-person aspect of designed scholarly meetings as an advantage. Increasingly, organisers are even declaring a move away from the hybrid format.

However, it seems that once started, the discussion on the accessibility of scholarly conferences cannot be stopped. Moreover, critiques of the traditional format of doing scholarship predate the pandemic, particularly around issues of accessibility for early career researchers and those from under-resourced institutions.⁴³

³⁹ For the full report on how it went, see Bergman et al., “ICOHTEC’s First Digital Meeting.”

⁴⁰ Bullock, Colvin, and Jackson, “Zoom Fatigue in the Age of COVID-19.”

⁴¹ Moss et al., “Forging a Path to a Better Normal.”

⁴² Vervoort et al., “Conference Cancelled.”

⁴³ Jöns, “Transnational Academic Mobility and Gender.”

Undoubtedly, virtual conferences offer much of the benefits for a fraction of the cost of a traditional event. Even before the pandemic, the need to make academic meetings more accessible to people with disabilities was recognised.⁴⁴ Since at least the 2010s, a major argument against holding conferences in the traditional format has been environmental concerns.⁴⁵

An analysis that takes all these considerations into account, and in particular draws on the experience of the pandemic, was undertaken by Ithaka S+R and JSTOR Labs. In a research project funded by the Sloan Foundation, the two organisations sought to answer questions about the future of scientific conferences and scientific societies in general, and through surveys, workshops, and debates with 17 scholarly societies came to some interesting conclusions. The findings have largely been formulated as guidelines on how to approach the issue of a possible change in the format of this type of scientific activity.⁴⁶

The report concludes that decisions about the structure and theme of a scientific conference are too often made on the basis of tradition, usually long-standing, rather than real need. The report advises that a clear statement of purpose should be established before experimenting with conference formats. Another finding is that the structure and content of conferences strongly reflect an organisation's priorities and values. The decision-making process regarding conferences should then be aligned with the mission and goals of a specific society. Thirdly, the report highlights that while there is a degree of risk associated with significant changes to meeting formats, novel conference modalities offer even greater prospects for enhancing the visibility and influence of scholars, fostering the development and empowerment of diverse research communities, and promoting societal sustainability. Finally, the study acknowledges the existence of hybrid conferences, but suggests that hybrid should be conceptualised as a flexible set of possibilities rather than a singular format.

As an organisation in its prime (as we would say of a person of this age), we cannot afford to ignore these findings as we think about our future conferences and the future of ICOHTEC in general. And while we have many reasons to be

⁴⁴ Brown, Thompson, and Leigh "Making Academia More Accessible"; Sang, "Without Accessible Conferences."

⁴⁵ Green, "Are International Medical Conferences an Outdated Luxury," 1467; Fraser et al., "The Value of Virtual Conferencing." Such concerns were raised, for example, by scientists attending a conference on global warming in 2010. One of the 4,000 attendees at this meeting calculated that the environmental cost of their travelling to the venue was 1,000 tonnes of carbon dioxide. See Burke, "Travel Trade-Offs for Scientists," 1476.

⁴⁶ Dylan Ruediger et al., "Of Meetings and Members: The Interconnected Future of Conferences and Scholarly Societies," Ithaka S+R, accessed August 15, 2023, <https://doi.org/10.18665/sr.319388>.

proud of the achievements of more than half a century of activity, we also have many reasons to be concerned. One of these is a lower than usual attendance at our 2023 Annual Meeting in Tallinn/Tartu. After being locked up for so long, one might have expected a real crowd, but there were less than 80 people. Before the pandemic, we used to come in hundreds—150 people who met in Katowice in 2019 was already a modest result. Of course, attendance depends on many factors—one might be uncertain about the political situation in the region, given that Russia invaded Ukraine a year earlier. The results of the virtual conferences that took place between 2019 and 2023 also do not help us figure out whether this is a downward trend or a mishap.

Whatever the answer to this question is, ICOHTEC should respond to the perfectly justified arguments for making meetings more accessible and more climate-friendly—in other words, we need to find a way to reconcile the ambition to be a truly global organisation with being responsible. We must seek a balance between a meeting that is accessible and a meeting that offers immeasurable and often surprising results from interpersonal interactions. There are still many unanswered questions; after all, we meet at our conferences to talk. The panel on perspectives on the history of technology in Tallinn was an important step in this direction.

Expertise of Marginalised Groups⁴⁷

In the face of the multiple challenges posed by the climate crisis, destructive extractivism, demographic and political changes, and the post-growth paradigm suggests that limitations and scarcity of resources and services, already a reality for some, may become a new norm. Opportunities and resources that were (at least for some communities) once considered unlimited and freely available may become less accessible, a process that Arseli Dokumaci refers to as ‘shrinkage’: “a lessening or diminishing in relation to the scope or range that was available before.”⁴⁸ For some, for example people with disabilities, poor, or indigenous people (categories that often overlap), shrinkage is an immanent context that shapes their actions. The history of technology in relation to these groups covers the practices of altering available technologies, as well as home-made creating of new solutions, when those available on the market do not meet their needs or are beyond financial reach. In this respect, the technological activities of people with disabilities can be viewed in terms of meaning, use, and effect, rather than origin and innovation, as Jethron

⁴⁷ Contribution by Magdalena Zdrodowska.

⁴⁸ Dokumaci, *Activist Affordances*, 18.

Akallah previously suggested in relation to non-Western, non-Northern regions.⁴⁹

The bodies and minds of people with disabilities appear to be an obstacle for designers to overcome, whereas Haben Girma, a deaf-blind lawyer and activist, says that disability presents an opportunity for innovation. She adds,

we can define disability as an opportunity for innovation: if you can't do something one way, come up with a new, innovative way to do that thing. People with disabilities have been doing this all throughout the history. These are hidden stories . . . we have to get these stories out there.⁵⁰

The history of technology can answer this call. Contextualising, documenting, and disseminating the grass-root, minority-led technological practices of excluded communities, based on fixing, hacking, reusing and repairing, is not only an activity undertaken in the spirit of disability justice, but is also geared towards users without disabilities. Solutions developed by people with limited resources and without access to formal industrial networks and infrastructures, such as laboratories or professional knowledge circuits, can ultimately serve the mainstream. These are the stories behind widespread technological solutions that today bear no trace of disability-led genealogy, such as automatic subtitling on social media platforms and videoconferencing software, audiobooks, OCR and speech-to-text software, or the touch screen.

Reclaiming the history of technology for innovators, hackers, and tinkerers with disabilities reveals the ambiguity of the history of specific objects, but it also re-evaluates the concept of expertise more broadly: who do we recognise as an expert and who is not considered an expert at all. Julia Watts Belser, in her lecture “Enjoying Disability as a Creative Force,” said:

[I] approach disability as a kind of knowledge. Rather than frame disability as a deficit, we ask: what does disability offer? What does it make possible? . . . What do we know as disabled folks? What skills do we have as disabled people? Not in spite of disability, but because of it. Because of the difference of our bodies and minds, because of the particular ways we navigate the world.⁵¹

⁴⁹ Arnold, “Europe, Technology, and Colonialism.”

⁵⁰ Haben Girma, “Belonging: On Disability, Technology, and Community,” part of *The Art of Flourishing: Conversations on Disability*, The Hastings Center, December 2019, accessed October 20, 2023, <https://www.youtube.com/watch?v=sEKV5kXTWwc&feature=youtu.be>.

⁵¹ Julia Watts Belser, “Enjoying Disability as a Creative Force,” part of *The Art of Flourishing: Conversations on Disability*, The Hastings Center, October 2021, accessed October 20, 2023, <https://www.youtube.com/watch?v=U0HufUjAGAc>.

She uses the term “disability expertise,” which Cassandra Hartblay defines as “the particular knowledge that disabled people develop and enact about unorthodox configurations of agency, cultural norms, and relationships between selves, bodies, and the designed world.”⁵² Innovation is a political category. A history of technology that recognises the expertise of marginalised groups—people with disabilities, of different ethnic or gender identities, from non-privileged places—redefines the established and oft-repeated scenarios of telling the history of technology, in which the roles of inventors, producers, consumers, and users are clearly and invariably dissected and valued. In these stories, people with disabilities occupy the position of consumers or beneficiaries. The role of innovator, on the other hand, is reserved for non-disabled engineers, inventors, and manufacturers. The history of technology can and should explore the versatility of these roles, but also their social and cultural underpinnings.

Research on the adaptation of everyday objects and appliances by disabled war veterans and polio survivors in the 20th century,⁵³ on the everyday improvisations that enable people with rheumatoid arthritis to navigate their built and designed environments,⁵⁴ on deaf people repairing, rewiring, and hacking obsolete teletypewriters to access the telephone infrastructure,⁵⁵ or on disability (crip) making⁵⁶ demonstrates that invention and innovation are not only achieved in terms of masculinity, whiteness, Westernness, and able-bodiedness.

It is worthwhile for the history of technology as a discipline to explore the mechanisms of production of technical knowledge and objects by people with disabilities, indigenous people, or other disadvantaged communities, which are often community-based, use social circuits of knowledge and care collectives. These communities live, work, and thrive under conditions of constant scarcity, which is becoming the likely and expected future for growing numbers of people. Building on this knowledge, the history of technology can come to the aid of the future.

⁵² Hartblay, *Disability Expertise*, S26.

⁵³ Williamson, *Accessible America*.

⁵⁴ Dokumaci, *Activist Affordances*.

⁵⁵ Zdrodowska, *Telefon, kino i cyborgi*.

⁵⁶ Hamraie, “Crip Making.”

More Attention Should be Paid to Medical Disasters in the History of Medicine⁵⁷

Compared with other fields or branches of human knowledge and technology, medicine and its allied sciences and technologies are more closely related to human health and well-being. All medical innovations and practices are directly applied to the human body in the name of maintaining individual or collective health, treatment of diseases, alleviation of pain, and prolongation of life. It is described as the “greatest benefit to mankind”⁵⁸ and is expected to effectively eliminate the discomfort, pain, and any unwanted state of the human body. As a consequence, the medical staff is depicted as “angels in white.” However, the historical or present fact is that, in medical treatment and health care, new medical knowledge and technological innovations often cause direct accidental harm to individual patients due to medical staff’s mistakes, errors, or malpractice.⁵⁹ At times, their intrinsic imperfections, even mistakes, make them the direct inducements and makers of large-scale harms, imposing various iatrogenic disasters on human beings.

Harms from innovations of medical knowledge and practice have long been recognised and discussed among the medical community. “Iatrogenic diseases” or “medical catastrophes,” “medical disasters,” “iatrogenic disasters,” sometimes called “medical scandals,” are incidents of mass harm caused by medicine during health maintenance or the diagnosis, treatment, and prevention of diseases. These do not include incidents of harm to individual patients caused by medical errors or malpractice in the course of treatments, although the term has been used in this sense.⁶⁰

These medical or iatrogenic disasters can be typologically divided into at least eleven groups based on their causes:

- 1) Mass health damages or deaths caused by false medical beliefs and corresponding practices. For example, the belief that a person could get

⁵⁷ Contribution by Min Fanxiang.

⁵⁸ In 1997, the world famous social historian of medicine Roy Porter titled his famous book *The Greatest Benefit to Mankind. A Medical History of Humanity from Antiquity to the Present*.

⁵⁹ Since the 1950s, relevant studies have shown that the harm caused by medical errors or malpractice to individual patients is universal in medical practice, e.g., Moser, “Diseases of Medical Progress”; Schimmel, “The Physician as Pathogen”; Schimmel, “The Hazards of Hospitalization”; Brennan et al., “Incidence of Adverse Events and Negligence”; Leape, “Error in Medicine”; Thomas et al., “Incidence and Types of Adverse Events”; Makary and Daniel, “Medical Error”; Kohn, Corrigan, and Donaldson, *To Err Is Human*; Gibson and Singh, *Wall of Silence*; Wachter and Shojanian, *Internal Bleeding*; Banja, *Medical Errors and Medical Narcissism*; Ofri, *When We Do Harm*.

⁶⁰ Such as Gordon, *Great Medical Disasters*.

his strength and rejuvenation with a draught of blood led to the deaths of Pope Innocent VIII (1432--1492) and three boys.⁶¹

- 2) Mass deaths caused by limitations in medical knowledge. For example, in late medieval and early modern Europe, the lack of scientific knowledge about hysteria resulted in large numbers of women being burnt on charges of witchcraft; before the invention of vascular ligation by Ambroise Paré (1509--1590), the father of French surgery, amputation of firearm wounds and cauterisation hemostasis caused a large number of deaths of wounded soldiers from disability or postoperative infection; and in the 17th--19th centuries, the epidemic of puerperal fever in many maternity hospitals in Europe caused a large number of maternal deaths.⁶²
- (3) Man-made plagues caused by substandard vaccines. For example, the diphtheria vaccine incident in 1901 in the United States resulted in the death of twelve children. In 1930, in Lubeck, Germany, administration of BCG vaccine containing virulent tubercle bacilli resulted in an outbreak of tuberculosis. In April 1955, an unqualified polio vaccine (in which the process of inactivating the live virus proved to be defective), manufactured by Carter Laboratories, caused 40,000 cases of polio, leaving 200 children with varying degrees of paralysis and killing ten.⁶³ In 1954, the "preventive lomidinisation" campaign, carried out by the French colonial authorities in Africa, resulted in more than 300 cases of vaccine-induced gangrene and 32 deaths.⁶⁴
- (4) Mass injury events caused by new drugs, such as the infamous 1937 elixir sulfanilamide mass poisoning in the United States; the thalidomide birth defects scandal that occurred in Germany and then spread to 46 countries in the 1950s and 1960s, resulting in more than 10,000 children with birth defects (phocomelia);⁶⁵ a massive sepsis resulting from the use of intravenous fluids contaminated with bacteria in 1971 in the United States; and the "toxic cough syrup" that in 2007 in Panama caused the death of no less than 365 people.

⁶¹ Ficarra, "Evolution of Blood Transfusion"; Maluf, "History of Blood Transfusion"; Gottlieb, "History of the First Blood Transfusion."

⁶² Holmes, "The Contagiousness of Puerperal Fever." It was regarded as one of the first serious investigations of iatrogenic disasters, see Sartwell, "Iatrogenic Disease"; Holmes, *Puerperal Fever as a Private Pestilence*; Channing, "On the Contagiousness of Puerperal Fever"; Loudon, *The Tragedy of Childbed Fever*.

⁶³ Fitzpatrick, "The Cutter Incident," 156.

⁶⁴ Lachenal, *The Lomidine Files*.

⁶⁵ Stephens and Brynner, *Dark Remedy*; Magazanik, *Silent Shock*.

- (5) Iatrogenic disasters caused by erroneous medical discoveries and the public's blind faith in these, such as lobotomy, practiced in Europe and the United States in the second half of the 20th century. The introduction of prone sleeping to prevent cot death, which began in the 1960s and resulted in a global epidemic, reaching a peak with 2 per thousand deaths in England and Wales and 5 per thousand in New Zealand in the 1980s.⁶⁶
- (6) Iatrogenic disasters caused by substandard medical products. For example, the 2009 PIP silicone implant scandal in France.
- (7) Iatrogenic harm caused by severe nosocomial infections and other safety accidents. For example, the New England compounding center meningitis outbreak in the United States in 2012, and the great fire of Changfeng Hospital in Beijing on April 18, 2023, killing 29 people.
- (8) Infections and harms suffered by many blood donors and transfusion recipients and caused by many blood tainted incidents, such as the HIV-tainted blood scandal in Japan in the 1980s, which caused as many as 2,000 Japanese hemophilia patients to become infected with HIV through contaminated blood products and the tragedy of many blood donors infected with HIV in Henan Province, China, in the 1990s.
- (9) Large-scale harm from medical experiments, such as human experiments conducted by Japanese invaders in China in the 1930s and 1940s and the Tuskegee syphilis study scandal between 1932 and 1972 in the United States.
- (10) Using medicine in war crimes, such as the slaughter of Jews by Nazi Germany and the bacterial warfare by Japanese invaders in China in the 1930s and 1940s.
- (11) Ecological disasters caused by medical discoveries, such as the environmental ecological disaster in the mountains of southern Mexico caused by the discovery of the medicinal value of the wild potato called "barbasco,"⁶⁷ and the "Silent Spring," caused by the widespread use of pesticides, such as DDT.⁶⁸

These iatrogenic disasters, along with "victories," "progress," and "conquests" made by humans in medicine, exist in the development and daily practice of medicine and constitute the real history of human medical development. Therefore, in a sense, the history of human medical development is a history of iatrogenic harms and disasters. However, traditional history and the existing historical works of medicine have represented the "heroic" history of human medicine, telling the

⁶⁶ Obladen, "Cot Death."

⁶⁷ Laveaga, *Jungle Laboratories*.

⁶⁸ Carson, *Silent Spring*.

story of its continuous conquest of diseases and progress. Thousands of books on such themes have been published. In this kind of historical narrative, iatrogenic disasters are ignored or deliberately concealed. Typically, we cannot find any iatrogenic disaster in the existing works on the general history of medicine, such as those by Arturo Castiliani, Roy Porter, Kate Kelly, Kerr Waddington, Lois N. Magna,⁶⁹ and others. In most thematic works, even if their authors mention the related medical disasters for a holistic approach to the narrative, there are often brief introductions or narrative descriptions of the events without any necessary analysis and research. As of now, compared to the writings on the history of medical progress and victories, the number of specialised works on medical disasters is still a drop in the bucket. The books that contain systematic thematic research on them are even scarcer. In the few existing research works, their authors not only lack obvious awareness of the concept of “iatrogenic disasters,” but also do not fully realise their high historical significance and academic value. As a result, they do not objectively place iatrogenic disasters in the general history of medicine, nor do they give due attention and emphasis to academic research on them. Moreover, it is not positioned as an independent domain that has a significant position in the research and writing of medical history for systematic presentation and multidimensional research.⁷⁰

⁶⁹ Castiglioni, *A History of Medicine*; Porter, *The Great Benefit to Mankind*; Kelly, *The History of Medicine* (in 6 vols.); Waddington, *An Introduction to the Social History of Medicine*; and Magner and Kim, *A History of Medicine*.

⁷⁰ Danielle Ofri has displayed and discussed various daily errors in the medical process, see Ofri, *When We Do Harm*. Marc Stauch studied the medical malpractice issues in the UK and Germany from a legal perspective, see Stauch, *The Law of Medical Negligence in England and Germany*. Luc Perino focused on and discussed individual patients suffering from iatrogenic harm, see Perino, *Patients zéro*. Paul A. Offit informs readers about the background and historical impact of the Carter vaccine case and also provides us with some information on other vaccine disasters, such as the 1929 serious BCG disaster in Lubeck, Germany, and the yellow fever vaccine disaster in the US Army in 1942. See Offit, *The Cutter Incident*. Kang Mo (康墨) provides some simple information about the 1901 diphtheria vaccine incident in the United States, the 1937 sulfonamide elixir accident in the United States, and the thalidomide disaster, see Kang, *The History of Food and Drug Administration*. The book, co-edited by Eric A. Feldman and Ronald Bayer, discussed the blood contamination and the spread of AIDS in the United States, Japan, France, Canada, Denmark, Germany, Italy, Austria and other countries, see Feldman and Bayer, *Blood Feuds*. The book *Japan's Wartime Medical Atrocities. Comparative Inquiries in Science, History, and Ethics*, co-edited by Jing-Bao Nie et al. is currently the representative work of research on medical atrocities committed by the invading Japanese army during wartime. On the medical atrocities and massacres committed by Nazi Germany, see Andel, *Notorious Nazi Doctors*; Mitscherlich and Mielke, *Doctors of Infamy*; Wisely, *The Trial of a Nazi Doctor*; Spitz, *Doctors from Hell*; etc. Regarding iatrogenic ecological disasters, see Laveaga, *Jungle Laboratories*; and Carson, *Silent Spring*.

We believe that the writing that only focuses on the heroic, victorious, and progressive history of medicine without paying attention to its history of failures and harms, especially the history of medical disasters, is one-sided and incomplete. It is an unhealthy, not objective, unscientific, and irresponsible medical history that makes people ignore the limitations of medicine and have excessive expectations for it, leading to the prevalence of technological supremacy in the field of medical research and practice. The future research and writing of medical history should not only continue to write about various victories and progress in the history of medicine, but also focus on and leave more space for countless medical failures, harms, and disasters. A medical history that does not recognise the history of iatrogenic disasters is arrogant and inhumane, and will increase the odds of alienation in medicine and make medicine cause more and greater catastrophic damages to individuals, groups, or even the entire mankind.

Paying attention to various iatrogenic disasters and giving them the same importance as medical progress and victories in the study and writing of medical history is realistic, academically necessary and rational because they will not only reveal the nature of medicine and present the complete significance of medical history, but also help solve real social problems.

As human life and society are becoming increasingly “medicalised,” the study of iatrogenic disasters becomes more significant. It will help us more objectively understand the nature of medicine (medicine as a science and its social and cultural attributes), the hardships and twists of medical development, and the law of medical knowledge production—medical progress is achieved through countless trials, errors, and amendments. Moreover, it will reveal the uncertainty in medical development (scientific research is full of many unexpected events), disenchant the authority of medical technology, re-evaluate scientism and technicism, and emphasise the responsibility of medical scientific research and innovation. The production of medical knowledge and the innovation and application of medical technology (specific medical activities) need the assistance (support) and constraint of humanistic feelings. Medical scientists, pharmaceutical companies, health officials, clinicians, and caregivers all need to bear in mind the medical dictum “*Primum non nocere*” (First, do no harm). At the same time, it helps us to understand the ins and outs of various medical regulatory measures and institutional settings, as well as the necessity of their existence. The history of medical development is a history in which humans constantly draw lessons from iatrogenic disasters and actively build institutions to prevent them. In this sense, iatrogenic disasters are a driving force for the development of human medicine and civilisation. Modern medicine was born and developed through the sacrifices of the victims of many iatrogenic disasters.

Playing with Technology as a Subject of Transnational Research⁷¹

Since history of technology is a relatively small academic discipline, there are several fields which are worth intensified research. It is especially important to identify fields suitable for transnational research that are inclusive and avoid privileging the inhabitants of the North. Jethron Akallah and Hugh Slotten outline this task in their contributions. One suitable field is “Playing with Technology.” It is a fundamental human activity, common to all cultures, and thus can be analysed across different societies. Since technology can be seen as a tool that enables play,⁷² playing is deeply linked to the use and sometimes the development of technology. In fact, technology influences playing in a historical perspective as well as in an intercultural one. Following Johan Huizinga, playing can be viewed as the origin of culture.⁷³ The societal relevance of playing is linked to the positive emotions it evokes in playing persons: pleasure, joy, and sometimes thrill.⁷⁴ Playing creates an atmosphere that fosters new experiences, new points of view, and creative ideas. Thus, it offers not only a positive break from everyday life, but an area of freedom which allows to re-think and modify life. Creativity and self-determined action links tinkering and play/*paidia* (Caillois)—trying different solutions and improvisation are characteristic of both activities. Due to developments such as gamification, play is included in a growing number of activities nowadays. The introduction of Game Studies at universities gives a hint that playing is gaining more societal influence; links to cultural studies and history reveal that this activity is deeply integrated in culture.⁷⁵ Due to an interconnection with religion, play is at the core of ancient as well as traditional societies. Some forms of play, such as writing graffiti at the turn of the 21st century or playing chess in the 18th and 19th centuries have developed into global activities. Other games are typical for local cultures or distinct periods of history. Especially technology-based games give evidence of both—the historical period and (sometimes) the geographic region of origin. Playing enables human beings to reflect on their circumstances, to find new solutions for the tasks they have, to train themselves, to experience thrill, or

⁷¹ Contribution by Stefan Poser.

⁷² Hubig, “Homo faber und homo ludens,” 52–56. Braun and Poser, *Playing with Technology*; Maines, *Hedonizing Technologies*; Poser, *Glücksmaschinen und Maschinenglück*; Pursell, *From Playgrounds to PlayStation*.

⁷³ Huizinga, *Homo ludens*.

⁷⁴ Poser, “Spiel/en.”

⁷⁵ Experimental Game Cultures at the University of Applied Arts, introduced in 2021, is an example: University of Applied Arts, Experimental Game Cultures, Master’s program, accessed March 15, 2024, https://www.dieangewandte.at/egc_en/.

just to relax. Thus, playing can generate an intellectual or bodily surplus. Whereas some animals are capable of play as well, artificial intelligence is not: it might be programmed to imitate human play and might be even successful in the game it is trained for, but it only calculates its steps and has no surplus from playing. Thus, playing and inspiring experiences remain a unique domain of humans.

The origins of games, which are still practised today, are quite different: dice games known from ancient Mesopotamia date back about 5,000 years, chess originates in 8th-century India, games similar to soccer were played in China already in 3000 BC, and ball games with balls from *caoutchouc* date back to 6th-century Latin America. Soccer, as it is known today, was developed in England. The same holds for many kinds of sports which were exported to the European continent and to the English-speaking world in the 19th century. E-sports have gained enormous popularity within the last two decades: especially in Asia, with up to a million participants—making e-sports more attractive than soccer games.

Many jobs are simulated through play. In some cases, such as aircraft simulators, the tools for occupational training and for playful experiences are the same. Even structures of the Anthropocene can be discovered through playing. Especially role play offers a timespan of joyful leaning. Some serious games directly address social problems such as discrimination, homelessness, or acceptance of refugees. Others are dedicated to environmental pollution and invite discussions about solutions for playing purposes as well as for the world outside the games.

Whereas European Renaissance and Baroque were periods of high regard for playful approaches, the reputation of playing was relatively low during rapid industrialisation. The term “labour society” suggests that work was considerably more important than play. Thus, sports was described as the “brother of work” (and not as a form of play) by the philosopher Ortega y Gasset in the 1950s.⁷⁶ It is no wonder that clubs of model railroaders announced themselves as friends of “model railroad sports,”⁷⁷ although model railroading has not that much to do with sports. Until today, the situation has changed completely: there is a high number of offers to play quite different kinds of games. This shift began in the 1980s when high wages and increasing off-time allowed inhabitants of the Western world to spend more time on leisure activities. Today, gamification has become a strategy for several companies and institutions to improve working conditions and shift work to the consumer. Beside this, the value of games as educational tools has come into the focus of pedagogics.⁷⁸ In general, playing has gained more societal influence

⁷⁶ Lecture of Ortega y Gasset at DSB Bundestag 1954, quoted in Gieseler, *Der Sport in der Bundesrepublik Deutschland*, 29.

⁷⁷ Poser, *Glücksmaschinen und Maschinenglück*, 300–3 (emphasis added).

⁷⁸ Braches-Chyrek et al., *Handbuch Kindheit, Technik und das Digitale*; Handweg and Köhler, *Theater—Auf(s) Spiel setzen*.

in many regions around the globe but has lost its significance due to the use of elements of play for other, often commercial purposes.

What about the meaning of play in different societies? Who is playing? Are there characteristic gender-specific games? What is the role of technology in playing? Since playing is characteristic of human beings, it offers a platform for comparison between different societies: it is, in general, a positive connotated leisure pursuit, linked to freedom, joyful acting, and quite often to creativity. Playing is generation-specific and sometimes may shape generations.⁷⁹ From a historical perspective, different kinds of play mirror societal and technological developments. These special mirrors, focused on developments which were regarded as important by contemporaries, allow new perspectives on history as well as on present-day questions. They belong to the cultural background of researchers in their business of investigating history.

From ‘Technology’ to ‘Material Culture’⁸⁰

My essay begins where the contributions by Saara Matala and Magdalena Zdrodowska end—presenting an effort to make a case for the important issues they raise, in new historical meanings. While there is much to address in the future of a discipline as diverse and multifaceted as the history of technology, my essay focuses on three interrelated points. The first concerns the idea of “the future” in discussions of the future of the history of technology; the second raises questions of the term “history of technology” that define the discipline itself and the forms of narratives produced under that umbrella; and the third points to the benefits of bringing to the fore diverse histories with their distinct ontologies and temporalities.

One of the major themes in discussions of the future of a discipline such as history of technology is its place in “future-oriented” discussions. Given the risks that the humanities face in current academic systems focused on producing scientists, engineers, doctors, bankers, businessmen, and economists, there is a need to focus on the preservation of the discipline itself. In her contribution, Saara Matala makes a potent case for the history of technology in higher education beyond the simplistic argument of studying the past to understand the future. One of the valuable aims of this intervention is to propose a few radical ways to point out the benefits of the discipline and those who study it in order to bridge the ever-widening chasm between the humanities and other scientific and technical disciplines. The history of technology can always present itself as a major contributor to discussions on the life and planet-altering threats introduced by the

⁷⁹ Wachelder, “Toys as Mediators”; Poser, *Glücksmaschinen*, 324–27.

⁸⁰ Contribution by Animesh Chatterjee.

spectre of the Anthropocene. It falls on the humanities, and especially history of technology, to pull us out of the feedback loops of ahistorical approaches that focus on problem-solving through engineering and mechanical models. In his essay “The Climate of History,” Dipesh Chakrabarti, however, observes that historians will have to revise many of their fundamental assumptions in an era in which “humans have become geological agents, changing the most basic physical processes of the earth.”⁸¹ In some sense, of course, the future of the history of technology depends on addressing the narratives of historical accounts it produces.

Discussions on the future of a discipline must, nevertheless, also include an introspection of the terms that define the discipline. When the histories we write begin with a focus on “technology,” we fall into the danger of producing and reproducing system-centric histories that leave out actors and spaces beyond those in positions of power or decision. This is perhaps because the term “technology” itself is usually cocooned in narratives of progress and development, and of engineers and technologies as solutions to all the social, cultural, and environmental issues of the present and the future. The introduction of global perspectives in recent years has been key to the introduction of non-Western and non-Eurocentric histories. There are, however, still some limitations. The problematic language of “the West” and “non-West” has been replaced by terms like “Global North” and “Global South,” while trying to fit different cultures into monolithic and globalised interpretations of “modernity,” “development,” and “progress.” The “global” discussion of the history of technology also neutralises emotive issues by transforming them into technological and economic ones, especially as technologies have always been, and are more so in the present day, the main drivers of racial and social inequalities. A kind of forgetting is built into our methodologies and questions.

The history of technology is indeed changing the ways that we understand the past, but the absence of voices from below continues to both reflect a neglect of smaller scales of historical experience. In her contribution, Magdalena Zdrodowska argues for an inclusion of the voices of people disadvantaged more acutely by the crises that matter to all of humankind. What makes such inclusion important is not just *what* historians are writing about but *why* and *how*. Why are specific case studies important to learn about? Why do they matter? How are such histories being researched and written? Who is written about and for whom? As Zdrodowska argues, and a few colleagues and I have discussed elsewhere, one of the challenges of incorporating voices from “ordinary people” and addressing “mass silences” within extant historiography is the question of sources.⁸² One of the ways this issue can be addressed is through a scrutiny of the structures and

⁸¹ Chakrabarty, “The Climate of History,” 206.

⁸² I borrow the term “mass silence” from Mi Gyung Kim’s exploration of silent actors and subjugated knowledges in her critical history of ballooning in late eighteenth- and early nineteenth-century France. See Kim, *The Imagined Empire*.

contents of “archives” and building “alternative” approaches—critically rereading existing official archives, studying “alternative” sources alongside official sources and borrowing analytical and methodological approaches from other disciplines like literary and cultural histories, and curating sources when institutional archives prove insufficient.⁸³

There is a certain benefit to shifting our focus from “technologies” to “material cultures” in order to understand and appreciate the worldview of historical subjects, presenting people-centred rather than system-centred accounts of history, and making us more truthful and capable of seeing and studying our histories as they really are—complex relationships between people, societies, and the material artefacts and networks used by people.⁸⁴ My own approach within this analytical and methodological nuance has been to understand historical interactions with material artefacts as symbol-forming, and meaning-making and defining activities. This can help us introduce the language of emotion and affect, thereby empowering hitherto hidden or ignored voices and stories rather than simply reinserting them. This is not just about people’s experiences of technologies and their materialities, but also about reframing power relations in these histories and understanding personal and cultural decisions beyond simply acceptance and rejection.⁸⁵

The point of this article has been, if anything, a call for making some critical adjustments and rethinking some basic assumptions and approaches, and what it might do for the discipline. If we are going to carry any hope of a globally relevant and oriented history of technology to inform a fragile world made of interdependent human and natural systems, it will help to be more modest and open, to admit the limits of our own assumptions about “technologies,” their novelty, their prospects and their modernity, and to consider that both technologies and technologists exist within diverse yet interrelated spheres consisting of diverse social groups, individuals, and human and non-human entities.

⁸³ The “archive” is what Mi Gyung Kim defines as “the collection of documents carefully selected and preserved for posterity,” see Kim, *The Imagined Empire*, 9. For a discussion of “alternative archives,” and alternative approaches to archives, see Osorio Tarazona, Drengk, and Chatterjee, “Rethinking Global History of Technology.” For an examination of the ways multidisciplinary methodologies and analytical approaches have been included in history of technology see Jørgensen, Jørgensen, and Pritchard, *New Natures*; also Animesh Chatterjee and Daniel Pérez-Zapico, “Shifting Narratives of Electricity and Energy in Periods of Transition,” *Journal of Energy History / Revue d’Histoire de l’Énergie*, no. 8, January 16, 2023, energyhistory.eu/en/node/311; and Harrison-Moore and Sandwell, *In a New Light*.

⁸⁴ El Hariry et al., “Toward a Global History of Material Culture.”

⁸⁵ Animesh Chatterjee, “Manual and Electrical Energies in the Visualization of ‘Electrical Calcutta,’ c. 1890–1925,” *Journal of Energy History / Revue d’Histoire de l’Énergie*, no. 8, April 17, 2023, energyhistory.eu/en/node/330.

Conclusions

This article combines diverse approaches to the history of technology: Nelson Arellano-Escudero analyses movements and viewpoints in Latin American history, where HoT is a relatively new field of interest. Saara Matala analyses the challenges and importance of interaction across disciplinary boundaries. Hugh Slotten and Jethron Akallah suggest shifting the focus of HoT away from Western technologies and raise questions that could generate new outcomes in different regions without disadvantaging anyone. Sławomir Łotysz and Magda Zdrodowska emphasise the need to include groups which are outside of daily conference business; Zdrodowska makes the point that we have the chance to learn from the approaches of persons who have to struggle in their daily lives. Min Fanxiang and Stefan Poser introduce special areas: medical technology and playing with technology. Min demonstrates that a euphoric, progress-oriented history of medical technology shows only one aspect, pointing out that many people had to suffer for this “progress.” Poser develops a global approach to play and argues that this field can be analysed fruitfully in different cultures. Animesh Chatterjee suggests shifting from the focus on technology to that on material culture in order to create a not-discriminating approach to history, interacting with material artefacts.

The discussions on how to shape a global history of technology that does not focus on developments originating in the West, reflect more balanced power structures in general and hopefully contribute to equal chances in conducting scholarly research around the globe. This might have a positive effect on balancing political power structures. Organising more inclusive symposia, informed mainly by experiences during the pandemic, ties into the discussion on research equality in the Global South and the North, as the aim to be more inclusive is linked to ethical considerations.

Although the nine contributions are quite different, they share some common aims: to expand and modernise the field of history of technology, make it more inclusive, and open it to new questions. Ethical considerations are the backbone of this article. In a period of politics going backward to short-sighted and narrow-minded nationalism, increasing number of wars, and growing discrimination, these concepts for a more inclusive HoT and equal research opportunities all over the globe are especially future-oriented and essential.

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