



# ICOHTEC 2020 DIGITAL 15-17 JULY 2020 SESSIONS BOOK OF ABSTRACTS

(version 16 July 2020)

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1.1 DISABILITY / BODY / HISTORY OF TECHNOLOGY – REPRESENTATIONS

Organizer: Magdalena Zdrodowska

Chair: Jan Hadlaw

Commentator: Donna Drucker

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ANDREA BERGER AND SOPHIE GERBER

Technology, Bodies and Norms on Display

**Abstract:** *Social and cultural sciences nowadays deal with disabilities and bodily experiences as a matter of diversity and move further away from the notion of crisis – for the affected individuals as well as for societies. At the same time, disabilities are often marginalised and invisible not only in the historiography of technology, but also for the public eye. Therefore, this presentation will ask how museums of technology display and furthermore represent body images and norms. What does the idea of the “normal” or “healthy” body mean for questions of equality and how did it change over time? How can a museum display different body realities and their needs without reproducing the current exclusive positions of mainstream body politics it tries to challenge?*

*The presentation will analyse the displays on disabilities and the measuring of bodies at Technisches Museum Wien (Vienna Technical Museum), reveal gaps of representation, and point out desiderata. After a deconstruction of the texts, images and objects shown in the exhibition, we will discuss possibilities to historicize bodily norms and make their social construction visible. For example, engaging with communities, collecting their objects and usage (hi)stories, and oral history can create multifaceted narratives and exhibitions.*

*Asking these questions in a critical and activist manner means to take responsibility for inclusion and diversity in a plural society. We suggest that in times of societal and global crisis, museums as parts of society play an important and responsible role, providing space for discourse, debate and education on issues of inequality.*

**Abstract:** *In the 1960s, spectacular accomplishments in space research and breakthroughs in computer science heightened blind activists' awareness of technological progress and its impact on their community. Modern technology was at the center of attention at the 1969 General Assembly of the World Council for the Welfare of the Blind in New Delhi. In this venue, presenters showed prototypes and gave details about the equipment that was under development in their countries. Some activists highlighted the advantages technology would soon bring not only in ophthalmological care and the restoration of eyesight but also in the rehabilitation, education, training, and employment of blind people. Others were worried about the by-products of scientific development and pronounced sobering words of caution concerning the successful use of technology. However, whether they had an excited or cautious approach, all of them agreed that isolated research in the design and production of aids for the blind was wasteful because it needlessly duplicated work.*

*This paper addresses the ambition of the World Council for the Welfare of the Blind and especially its European Regional Committee to serve as instruments of technology cooperation across the Cold War divide that marked the 1970s-1980s. Drawing on research in the archives of the European Blind Union, the All-Russian Society of the Blind, and the East German Union of the Blind, I analyze the ways in which Western and Eastern European blind activists exchanged practical knowledge across national and ideological borders. Moved by their common aspirations, they succeeded in setting up a documentation center on "typhlo-technology" in Berlin and creating a network of contacts that connected all European research centers and manufactures of auxiliary equipment for the blind. Ultimately, however, the effectiveness of their cooperation was limited by the political realities of the Cold War as blind activists from socialist Europe were not simply disability advocates but also state officers pursuing the foreign policy interests of their governments.*

**Abstract:** *My presentation investigates how the problem of body in extreme situations is explored in art&science projects based on medical imaging technology. I would like to show from a historical perspective that medical imaging had the status of a biopolitical tool from the very beginning. Initially it was used to eliminate plants and animals that showed pathologies, and one of the first applications in human medicine was to diagnose infectious diseases such as tuberculosis, especially to detect patients with active disease for management and infection control (C. Miller.). Today, medical imaging is one of the techniques that socially constructs the so-called ethos of health (P. Rabinow) and co-creates biopolitical society of illness (Thomas Lemke), which can be seen as an exceptional form of the body's condition and a "state of emergency" (Giorgio Agamben). Body visualization through medical imaging is also a tool of the global politicization of the body and affective experiences (Knudsen and Stage).*

*Referring to the presented theoretical findings, I would like to show how artists use medical imaging in a subversive way, treating it not as an exclusion or compassion tool, but as an epistemological tool and as a source of shaping creative, collaborative platforms for sharing diverse and embodied experiences. I will focus on artistic projects created by Diane Covert (Inside Terrorism) and Salvatore Iaconesi (La Cura), which present two different variants of the body in crisis: in the first project it is a body injured as a result of terrorist attacks, in the second ones, a body attacked by brain cancer. In both projects, the technology generally contributing to the isolation of the patient and management of his biological life has become the basis for a subversive look at the victims and a tool for the emancipation of the individual from the institutional biomedical regime.*

Chair: Ruth Oldenziel

Organizer: Martin Emanuel

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SUE-YEN, TJONG TJIN TAI

Singapore rickshaws, 1880-1940: Struggles to control privately run transport for the public

**Abstract:** *This paper will present findings of my research on Singapore's mobility history in the early 20<sup>th</sup> century, which is focusing on human traction (walking, cycling, rickshaws, trishaws). From its introduction in Singapore in 1880, rickshaw transport was very popular as cheap and accessible. At the same time, it was a job opportunity for newly arriving Chinese immigrants, even though it meant hard physical labour in harsh circumstances. They also had to pay a considerable amount of their earnings as rent to the rickshaw owners, as they could not afford to buy these themselves. For the British colonial government, rickshaw transport became a source of chaos in public space, which they tried to control in many ways, through a new municipal department. This paper will follow various interventions of the local government, like rules, licensing, inspections, rickshaw specifications and rickshaw stations. It will review responses of rickshaw coolies and their association, the rickshaw owners and the passengers. The findings are based on archival research, literature research and articles in the daily press. One of the findings is that in the decades before motorized transport was available, rickshaw transport was such a crucial transport mode, that collective action of rickshaw pullers and owners was effective in backing-off government control. However, from the 1920s, cars and motor cycle transport weakened their negotiation position. Another finding shows how these constant struggles made rickshaw transport a perceived nuisance, so that its function as cheap and accessible transport (e.g. for children, elderly) was undervalued.*

**Abstract:** *The decision to open the first touristic road in Portugal (the coastal road Lisbon-Cascais), led to the invitation in 1933 by the minister Duarte Pacheco to the architect-urbanist Alfred Agache to draw an urbanization plan for that area (later called the “Sun Coast”). Following Agache’s suggestion to study the problem from a “broader angle,” the Sun Coast became one of the extensions of the new urban plan for Lisbon, studied after 1938 by one of Agache’s co-workers, Etienne de Gröer. Both Agache and De Gröer, members of the French Urbanists Society and advocates of the garden city concept (with adaptations), shared ideas present in the anti-urbanization rhetoric of the Portuguese New State right wing dictatorship (1933-74), to which they worked for, namely the need to fight the compact city (with high population densities), materialised in urban sprawl based on vehicular mobility.*

*The expensive, high traffic routes, framed as parkways, connecting Lisbon to the Sun Coast concentrated investment in an already privileged area of Lisbon surroundings, creating more regional asymmetries and helping to build an elitist automobile tourism. Furthermore, Agache’s and De Gröer’s prescriptions were normative and carried the future social uses translated into the layout of the city, contributing to forms of mobility injustice regarding the accessible and clean (with no air or noise pollution) city and the right to the street. Counteracting what they perceived as an urban crisis (the compact city) they contributed to future urban mobility and land use crises caused by the sprawl solution based on private car use.*

*Using archival material from the Municipality of Lisbon and roads’ administration, as well as governmental and technical reports, legislation and plans, and journals’ and newspapers’ articles, this article shows how architect-urbanists projected new (auto)mobilities in the planning of Lisbon and its surroundings.*

**Abstract:** *This paper will present the findings of my ongoing research on the introduction of pedestrian activation of traffic signals in Stockholm in the early 1950s. It is part of a larger research project on attempts to govern and safeguard pedestrians by means of traffic technologies and street designs—and pedestrians’ scope to challenge such control. Pedestrian activation was forwarded by experts as a response to the exposed position of pedestrians due to the introduction of traffic signals and their automation. On the one hand, it was promoted as an innovation that would more fairly distribute waiting and moving times in city traffic. On the other hand, it was supposed to “script” pedestrians into better compliance with traffic signals: respecting the red light. These different aims—helping and/or controlling pedestrians—and their relative weight and precedence will be at the core of the paper. Preliminary findings based on articles in the daily press show diverging responses to the novelty: motorists argued it was being misused by pedestrians to unfairly obstruct other mobility; pedestrians felt that they were often not helped and expressed frustration about long waiting times; experts, finally, complained that pedestrians as well as motorists often misunderstood the novelty, which caused new problems as old ones were solved—and which prompted further innovation in traffic signal technology. Further research will complement these findings using city council debates, archive material from Stockholm’s traffic department and the engineering firms that supplied the traffic signal technology, and photographs from the sites that were the first in Stockholm to be equipped with pedestrian activation.*

**Abstract:** *The goal of this paper is to look at how social movements in the Netherlands attempted to put what they considered a safety crisis in traffic on the agenda in the 1970s. During the early 1970s, the number of traffic victims reached records highs. Cyclists were particularly vulnerable as a group; school children cycling to school were disproportionately at risk. Many spontaneous local protests took place in this period, leading to the formation of local action groups, which then congealed into larger social movements like Stop de Kindermoord (Stop the Child Murder) and the Eerste Enige Echte Nederlandse Wielrijders Bond (First and Only Real Dutch Cyclists' Union). These social movements argued that cyclists were actively put at risk by a negligent government whose focus was on providing the fastest route for drivers at the expense of cyclists.*

*The central focus of the paper is the repertoire of action employed by these action groups, such as protests and memoranda. This repertoire of action consisted of a combination of highly visible protests, showcasing the large backing of these social movements, and the use of lay expertise to approach the dangers of everyday cycling from a different point of view than that of state-employed engineers. Making use of these protests and written documents I ask how the safety crisis was framed by the activists, who was assigned blame, and what were the arguments and ideas about solutions to this crisis? The final part of the paper will briefly consider the interaction between the social movements and the local and national policymakers and engineers involved in traffic planning in order to judge how effective the social movements were in putting the safety crisis on the agenda, and achieve policy measures to combat the crisis.*

Chair: Dick van Lente

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DOUWE SCHIPPER

“Government Is Not Created to Serve Experts”: The Baltimore Highway Revolt as Resistance against a Technopolitical Regime

**Abstract:** *In the late 1960s and early 1970s, several American cities experienced what historians and journalists call a ‘highway revolt’. In Baltimore, too, several anti-highway activist groups and coalitions emerged in this period, such as the Movement Against Destruction (MAD) and the Southeast Council Against the Road (SCAR). These groups used legal, political, and rhetorical strategies to obstruct the city council’s 3-A Highway Plan (1968), which proposed a set of highways running through the inner city. According to activists, 3-A would disproportionately impact historic neighborhoods and predominantly poor and African American areas. While Baltimore’s highway revolt has received some attention from historians of technology, I use my paper to offer a new interpretative framework. I argue that the movement is best understood as a reaction, not against a technology—highways—per se, but rather against a technopolitical regime, a term I borrow from Gabrielle Hecht. Technopolitical regimes are interlinked sets of individuals, practices, technological artifacts, political strategies, and ideological ideas that collectively enact technopolitics, politics pursued through technological means, in this case highway construction. I suggest that the technopolitical regime involved in the Baltimore highway revolt roughly corresponds with what Christopher Klemek calls the urban renewal order, an ideological and political movement that mobilized the notion of expertise in order to undemocratically implement its modernist policies in America’s public space. Situating highway revolts in this context reveals connections with a broader anti-authoritarian, countercultural wave which also produced, for instance, the civil rights movement and various forms of environmental activism. In other words, highways protest were entangled in a larger, informal and incoherent project aimed at democratizing the public sphere by dismantling the hegemony of the prevailing technopolitical regime.*

**Abstract:** *In 2001 British artist Jeremy Deller worked with the residents of the English village Orgreave to re-enact a historic episode that is considered a turning point in modern British history. The “Battle of Orgreave” was a violent confrontation between police and striking workers at a coking plant in June 1984. Described as “almost medieval in its choreography” the battle brought the British public’s attention to the violent power of Thatcherism. Deller’s re-enactment managed to address a historic moment in British history, making it tangible for a whole community, and bringing it to a wider audience to open up the underlying social, societal and political dimensions to discussion.*

*In 2008, mounted police officers in uniform patrolled a transient space at Tate Modern. Tactics of crowd control were applied to an assembly of people during a weekend of art performances. The widely discussed piece, Tatlin’s Whisper #5 by Cuban artist Tania Bruguera confronted the audience with common police tactics. Bruguera created a shift in context by transferring mounted police into an art space, exhibiting their violent gestures, weapons, and equipment while focusing on interactions with the audience.*

*Bruguera and Deller are only two examples from an increasing number of artists who incorporate the aesthetics of riot control and protest movements into their work. The proposed paper follows the thesis that the intensified interest in protest aesthetics and technology takes place against a background of economic and political crises—subsumed as neoliberalism—with the police, society’s first line of defence, being a vital actor in a social anxiety and a re-installment of social order.*

*The paper discusses specific works of art in the broader field of cultural production in order to analyse the common development as well as the breakpoints of the crisis-proneness of neoliberalism since the 1960s, the development and the transnational market of riot control equipment, the use of media technology as well as the aestheticization of protest.*

## 1.4 ENERGY AND THE ENVIRONMENT

Organizer and Chair: Anthony N. Stranges

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ANTHONY N. STRANGES

Pioneering Studies on Acid Rain

**Abstract:** *Scientists who made important contributions to our understanding of acid rain include Robert Angus Smith (1817-74) in Manchester and London; Søren Sørensen (1868-1939) at the Carlsberg Laboratory in Copenhagen; and F. Hubbard Bormann (1922-2012), Noye Johnson (1930-87), and Eugene Likens (b. 1935) at the Hubbard Brook Experimental Forest in New Hampshire.*

*Smith's 1852 paper "On the Air in Towns" provided the first experimental evidence of rainfall's acidity and its harmful consequences. He coined the expression acid rain in his 1872 book Air and Rain. Sørensen in 1909 introduced the term pH to indicate the strength of an acidic solution. He defined pH so that it would have a 0 to 14 range.*

*During the 1850s-1950s industrializing nations did little to limit the passage of sulfur dioxide and nitrogen oxides into the atmosphere. The earliest regulations in the United States, in 1955 and 1963, placed no restrictions on sulfur dioxide and nitrogen oxides emissions. The year, 1963, however, marked a turning point in the history of acid rain. Bormann, Johnson, and Likens, at Dartmouth, began their long-term Ecosystem Study at the twelve-square mile Hubbard Brook Experimental Forest in New Hampshire's White Mountains. Hubbard Brook was the first study since Smith's linking air pollutants to the acidity of rain. It became the model for ecological science studies. Bormann and Likens experimentally varied an entire ecosystem and evaluated human influence on the chemistry of soil, plants, trees, precipitation and clouds, and the ecology and biogeochemistry of aquatic ecosystems. Their 1974 paper in Nature showed that the acidity of rain had increased over 20 years and had an annual pH value of 4. It initiated the passage of national acid rain legislation, such as the Clean Air Acts of the 1970s-2000s. The studies of these scientists laid the foundation for later research on acid rain.*

**Abstract:** *The Swedish chemist Svante Arrhenius (1859-1927) at Uppsala, one of the founders of physical chemistry and the first Swede to win the Nobel Prize in Chemistry (1903), is known for having calculated the thermal effect of rising carbon dioxide levels in the atmosphere over a hundred years ago. In that capacity he can be said to be one of the founders of today's climate science.*

*But Arrhenius is also remembered for an equation that bears his name. The Arrhenius equation that he published in 1889 specifies how the rates of chemical reactions depend on temperature. The higher the temperature the faster the reaction. With the climate debate centred around the rise in global temperature, the Arrhenius equation should come into play. However, it does not seem to be a major part of mainstream climate science. Instead it has been taken up by some non-mainstream representatives to emphasize the role of degassing from the oceans. The equation, in their view, proves that human activities only account for about half the increase of atmospheric carbon dioxide, the rest coming from the oceans. With nature partly responsible for the situation there would seem to be less cause for alarm.*

*The presentation will look into the legacy of Arrhenius as a champion for both sides in the climate debate.*

**Abstract:** *The paper analyses the connection between the energy technologies and environmental crises. The evolution of energy technologies at the beginning of the twenty-first century in Europe and their impact on environment is examined and compared to other regions of the world.*

*During the twentieth century and at the beginning of the twenty-first century, the typical technological chain of a product usually included the stages of research, design, manufacture and use of the product. All these stages require specific energy consumption. At the end of their life, the degraded products are disposed of as waste. Thus, the pollution of the environment is amplified by the waste objects and by the need of energy carriers which should ensure the operation of the technological chains. These issues have intensified and have shown signs of a major environmental crisis.*

*Starting from the fact that technological development is the main cause of triggering dramatic climate change, the paper analyzes the solutions by which energy technology can remedy and reduce the negative impact on the environment.*

*One of the powerful solutions consists in improving energy efficiency. As case study, the European and world energy policies and technological innovations in electric machines are analyzed. The advantages of using these machines in electric vehicles are the reduction of the gas emissions by replacing internal combustion engines and, on the other hand, the possibility of saving energy which means the reduction of the electricity demands. The paper also summarizes the current models for forecasting energy development by 2050 and how renewable energy sources, together with measures to reduce energy intensity, can reduce the impact on the environment. For the countries of Europe, they are currently moving from a fossil fuel-based energy system to a consumer-oriented, renewable energy-based system that complies with the Paris Agreement.*

2.1 DISABILITY / BODY / HISTORY OF TECHNOLOGY – PROTHESES

Organizer: Magdalena Zdrodowska

Chair: Slawomir Lotysz

Commentator: Donna Drucker

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MAGDALENA ZDRODOWSKA

Martial Law, Propaganda and Sign Language. Unexpected benefits of the 1981 political crisis for television accessibility in communist Poland

**Abstract:** *In December 1981, martial law was imposed in Poland. Its consequences were profound and far-reaching in terms of politics, social changes and community trauma. Television, which was already a powerful indoctrination tool, turned into a crude propaganda instrument full of hours-long news programs featuring high rank military officials, hosted by presenters in military uniforms. Due to the boycott of television by actors, writers, and entertainers, broadcasting was limited to endless reruns of 'golden oldies'. The managers of public television were desperate to gain new content. I pose a hypothesis that live sign-language interpreted news for the deaf that appeared in February 1982, followed by television program *In the World of Silence*, addressed to deaf audiences, were a consequence of boycott of Polish Television and lack of programs to be broadcasted.*

*Until then, deaf citizens had no representation on TV as they were not even considered a potential audience. They were in a way the beneficiaries of this critical and disturbing event in Polish history gaining access to information and, no less important, the mainstream entertainment. Before 1980s Polish deaf communities were beyond the reach of state propaganda and control due to communication in sign language. The media accessibility brought deaf viewers exposure to state indoctrination - in this aspect they gained equality with hearing Poles.*

*The presentation will be based on primary sources: archives of Polish Television, interviews conducted with the main figures behind sign interpretation, and the press articles. As the representation of sign language, and placing the interpreter somewhere within the TV screen were a technological challenge for the broadcaster, technological aspect of introducing signing into television, and its communicational consequences will be investigated.*

**Abstract:** *In the year 1970 big group of managers, scientists and engineers get USSR's States prize «for creating a bioelectric-controlled forearm prosthesis». And it's been well-deserved reward for long period work in close co-operation for few institutions: Central Research Institute of Prosthetics and Prosthetics Industry of Ministry of Health care, Moscow prosthetic and orthopedic factory, Institute for information transmission problems of Academy of Sciences, All-Union Research Institute of Film Materials and Artificial Leather. Researches in bio-cybernetics and medical cybernetics been a scientific basis for that technology. In 1957, Israel Moiseevich Gelfand (1913–2009) and Michael Lvovich Tsetlin (1924–1966) organized an interdisciplinary mathematical and physiological seminar, which was convened at the Institute of Neurosurgery named after N.N. Burdenko of the Academy of Medical Sciences of the USSR. The medical part of the seminar was led by Victor Semenovitch Gurfinkel (b. 1922). The main topic of the seminar was the physiology of the heart, and the neurophysiology of the motor apparatus (movements). In 1960, I.M. Gelfand and Gleb Michailovich Frank (Director of the Institute of Biophysics of the Academy of Sciences of the USSR) (1904–1976) decided to create a permanent interdisciplinary department based on the seminar. This department — the subsequent Interfaculty Laboratory of Mathematical Methods in Biology of Moscow State University — was organized in 1961, and in addition to Gelfand and Tsetlin from the mathematical side, it included V.S. Gurfinkel and M.L. Shik from the medical side.*

*Paper will focus on history of interdisciplinary co-operation to resolve complex issues in creation of artificial body parts.*

**Abstract:** *The paper draws attention on orthopaedic devices used by people with polio-related impairments. It addresses the general question, how medicine-based objects: leg-braces, crutches, orthopaedic boots, corsets have been enacted in daily-life routines of so called “poliosurvivors” and in consequence: in what ways such materiality has interfered with their biographies. In approaching these issues, the life-course perspective is utilized.*

*The analysis is grounded in 25 interviews recorded by the author between 2013 and 2015. The oldest interviewee was born in 1946, the youngest in 1959. Most of them were born in 50’s and caught polio as infants. Broadly speaking they belong to the same post-war generation. The source basis of presentation is enriched by employing Ministry of Health reports and articles from peer-reviewed medical journals.*

*Catching polio meant life-long consequences. Polio virus altered bodies by paralysing various parts of muscles. In most cases legs were affected. Restoring motor functions required forceful and persistent rehabilitation, implementing surgical procedures and finally: using orthopaedic devices.*

*Various pieces of orthopaedic equipment became temporal or constant components of daily life of people with polio-related impairments/disabilities. The paper discusses the modes of this coexistence and ways in which “polio-survivors” cooperate with materiality attached to their bodies.*

*In conclusion, two main and intersecting domains of enacting supportive aids are identified and analysed:*

- 1) Dis/continuity mode: devices have played two complimentary roles in diachronies of biographies: a) silent background of embodying and maintaining the discursive norm and b) factors of change – personal, individual breakthroughs in biographies*
- 2) Agency mode: in life-long perspective orthopaedic devices seems to be ambiguous objects. They have triggered bunch of attitudes from rejection to total acceptance. The practical results of that ambivalence are studied broadly in the presentation.*

Organizer: Stefan Poser

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DICK VAN LENTE

Nothing New from the Robot's front? Predictions of Automation in the Nineteen Fifties and Recent Times

**Abstract:** *Debates about robots and their effects on society seem to come in waves. The recent one, which started about ten years ago, was preceded by a wave in the 1950s (anti-automation strikes), and before that in the 1920s (RUR, Metropolis). At first sight the arguments advanced then and now seem to be very similar, in spite of technological and social change – a case of repetition of arguments that is a recurring feature of debates about technology, at least since the industrial revolution. The purpose of this paper is to test this hypothesis by examining the wave in the 1950s with the recent one, and to propose some explanations for the pattern found. My main witnesses will be two authors who reached a large audience in their time: Fred Polak, the 1950s pioneer of future studies, and the business professors Brynjolfsson and McAfee whose 2014 *Second machine age* made a big splash.*

**Abstract:** *In the 1990s, when the first Japanese humanoid prototypes were making news, Lisa St. Clair Harvey ("Mr. Jefferson's Wolf: Slavery and the Suburban Robot" 1994) was already drawing analogies between the history of human slavery and what Isaac Asimov once called a "C/Fe society" - one in which any sort of robot - embodied or not- would be subject to ethical dilemmas that society needed to prepare itself for. Already, governments and engineering associations are working on standards for human-robot interaction to protect the user and also to protect the machine from misuse. Further, during the last quarter of a century, a number of collected essays including, Robot Ethics (Lin, Abney, Bekey, 2011) have raised questions surrounding the development and use of autonomous machines. As recently as 2018, Leben, Ethics for Robots: How to Design a Moral Algorithm considered such questions in the wake of robotics trends. Yet many decades earlier, as manufacturing became more automated, these questions were already raised by science fiction writers. Embedded in these depictions of future intelligent machines was the question of personhood, as in Harrison's Adam Link series, or Asimov's Millennial Man. My aim here is to provide a comparative analysis of the discussion, and to consider, given the present state of robotics, which realm - fact or fiction - better addressed this topic.*

**Abstract:** *The perception of robots is linked to deep, conflicting emotions. Those emotions are triggered by the anthropomorph shape of robots, combined with technological appearance and technology-based “acting”. Recently developed robots, upgraded by AI, increased the emotional perception since they are imitating human emotions. Many robots, presented on exhibitions of the 1930s and 1950s evoked visitor’s attention not only by walking and talking, but by imitating human activities of well-being; it was fashionable to perform drinking and smoking. In order to generate (positive) emotions, the scheme of a young child’s face seems to be used by designers of robots, today. Movies, popular print media and robot toys from the 1950s onward mediated fascination as well as fear. Why was and is the emotional perception of robots so strong? Are there typical sets of emotions, which changed during the last 80 years? What does the strong emotional impact mean for nowadays reception of robots?*

*Sources of the paper are exhibitions of robots as well as popular media and toys. The methodological tools of emotion history will be applied in order to understand the perception of robots better. Such a knowledge is valuable for mapping pros and cons and thus guidelines of robot development.*

## 2.3 CRISIS FOR WHOM? STRUCTURAL CHANGES

Organizer: Thomas Schütz, Nicolai Ingenerf

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NICOLAI INGENERF

Downwards – a Way out of the Crisis? The modernization of the West German coal industry in the 1970s

**Abstract:** *At the beginning of the 1970's, the West German mining industry already had suffered an existential crisis. It began at the end of the 1960's and resulted in an intense concentration process. Half the mines were closed and almost half the miners lost their job. However, despite an enormous increase in productivity German coal still was much more expensive than its competitive energy resources like oil or imported coal.*

*In this situation, the oil price shock of 1973 revealed a new perspective for domestic coal. In its reformulated energy program West Germany's administration strengthened the coal industry's position and offered financial support for new research and development in coal mining and established instruments to stabilize the mine's sales. Henceforth the state compensated the price difference between world market and domestic coal production so that the iron and steel industry as well as electricity industry used coal from German collieries without financial disadvantage.*

*Thus, the German coal industry continued in modernizing their highly specialised equipment for further increase of productivity. It invested in research and development to get access to unexploited and geologically undisturbed coal deposits in greater depth. At the beginning of the 1980's German collieries were regarded as the world's most modern and productive coal mines. However, coal mining in Germany still was not competitive with the global coal markets. Furthermore, due to an adverse development of exchange rates the administration's compensation of the German coal price difference had proverbially become a bottomless pit.*

*This microscopic view reveals that at least with regard to technology coal industry became a profiteer of the 1970's crisis. It strengthened the industry's preference for technological fixes. By its focus on the role of technology the paper amends the common narrative of economic decline with a perspective on successful technological development as a futile crisis management strategy.*

**Abstract:** *In the second half of the 20th century the watch industry underwent a fundamental change in the Federal Republic and the GDR. In both cases it was mainly located in peripheral regions where complete cities depended on this industry. A large part of the local population earned their living from the production of mechanical clocks while this technology was of great impact in creating identity. In this phase, the watch industry was confronted with three fundamental innovation processes: The substitution of metals by plastics in manufacturing, the automation of production and finally the replacement of mechanical by electronic watches. In addition to the generally challenging framework conditions of this time, it also suffered from superior substitution competition from Asia and Switzerland. In the long run, the industries in both German states that were oriented towards a Fordist ideal of production were not able to withstand this economic pressure. However, the decline in the Federal Republic dragged on for decades and was also a political issue, at least at the local level. The GDR's watch industry, as a currency earner and showpiece industry, was protected from developments on the world market by the state and received considerable subsidies in order to remain internationally competitive. The fact that this goal could not be achieved in the end was by no means part of the public discourse in the surveillance state of the GDR and so the decline came as a surprise to those involved after the collapse of the GDR. Nowadays only small and highly specialized companies have survived, who are mainly focused on the luxury market, while the local tradition of the vanished industry is of great importance for the identity foundation. The paper is intended to illuminate the crisis phenomena and consequences on the basis of the case study in order to gain a deeper understanding of the historical implications for current and future economic developments based on an interdisciplinary comparison with a similar case and subsequent developments.*

**Abstract:** *The year 1990 acts as a starting point for two divergent developments within the history of German watch making. Starting with 114 companies or manufacturers in the German watch industry in 1990, the overall development of watch making companies decreased significantly to 39 in year 2017.*

*Nevertheless, this decrease is not equally distributed across Germany. Within the analysis of the developments, two clusters can be distinguished: the first accumulation of watch manufacturers in western Germany in the area around the black forest (inter alia Schramberg and Villingen-Schwenningen) and, secondly, in the region around Glashütte close to Dresden in the former GDR. After 1990, watch manufacturers around Glashütte were able to rebuild and re-establish their business and are nowadays mostly located in the luxury segment. In contrast, companies in western Germany are now almost entirely closed or have downsized staff and production. Accompanying to this, the number of employees in the watch industry in Baden-Wuerttemberg has shrunken dramatically from 1959 compared to 2009. The presentation is therefore intended to outline the divergent developments and to illustrate possible causes for this.*

Chair: Kamna Tiwary

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HUGO PEREIRA

Harbinger of Progress: Portuguese illustrated journal O Occidente and the imagery of technology and engineering (1878-1899)

**Abstract:** *In the 1850s, after thirty years of political turmoil, Portuguese technocrats agreed to put investment in science and technology before sterile ideological disputes and to set progress as the aim everyone should aim for. Benefitting from the adherence to the gold-standard in 1854, the country began an ambitious public works program, spearheaded by railways. Throughout the second half of the nineteenth century, the main branches of the Portuguese railway system, which extended for roughly 2,500 km, were built and surveyed (Alegria 1990). Historiography about Portuguese railways usually considers the rationale behind their discussion as entirely technological and focuses mainly on their outputs, taking railways for granted, or black-boxed. However, the planification of large transportation systems depends on the sociotechnical context and on hierarchies of power of their time (cf. Latour 1999: 304- 306 and Kranzberg's Fourth Law – Kranzberg 1986: 550). In this paper, I propose to open the black box of Portuguese railways. I use technical and military reports, parliamentary debates, and sundry bibliography to analyse the influence different stakeholders (or system-builders to use the expression of Hughes 1983: X), like engineers, army officers, policymakers in the central government, and corporations, had in the final design of the Portuguese railway network, considering their expectations, priorities and agendas. Specifically, I will focus on the input of Portuguese engineers (most with specialized training in the Saint-Simonian schools of France and Belgium, Matos 2009: 180-181) and compare it with the lobbying of decision-makers at central government, local caciques, and private financiers and entrepreneurs. I claim that engineers played a decisive role in the planning of the network (besides being responsible for the transfer of knowledge about railway construction and operation from the European core), but a large part of its design was due to non-technical issues, including political and diplomatic machinations, budgetary constraints, and corporative lobbying. I aim to add to the debate about the co-construction of society and technology, the importance of social factors to technological implementation and how technology is a sociotechnical construction (Hackett et al. 2007).*

**Abstract:** *Between 2001-2005, times of frenzy in the private debt securities and structured financial product markets, authorities worldwide were busy preparing themselves for incidents more serious than a global financial meltdown. The new threats were unrelated to the old and allegedly obsolete problem of economic crisis. Billions were being spent preparing societies to cope with nightmare scenarios like another terrorist attack on the scale of 9/11, or bio attacks using high-risk pathogens such as the anthrax bacillus or the smallpox virus. This paper focuses on the various disaster scenarios employed to influence policy decisions in the fields of public health and national security in the USA and the EU in the first decades of the 21st century. The language and rationale used in the "script" of bioterrorism exercises such as Dark Winter [June 22-23, 2001], a bio attack with a "smallpox weapon", were similar to those used by Hollywood script writers responsible for popular 1990s biotech movies and early 21st century TV series, including Fringe [2008-2013] and Strike Back [2010]. Public health is now deemed too lucrative a sector to be left to purely political management. Given that the privatization of defense services has progressed to a point almost inconceivable to earlier critics of the military-industrial complex, the imposition of states of emergency related to public health crises emerges as the natural conclusion of an ongoing process whereby private corporate interests take precedence over the social interest.*

*In my paper I will rely on a wide range of sources (including reports and depositions to the U.S. Congress, European Union documents, bio-terrorist attack simulations and exercises, series scripts, etc.) in order to explore the rationale behind potential threats, which prey on the current addiction to video games and disaster movies. I will also explore the mechanism that consolidates a sense of vulnerability and the urgent need for state funds to be disbursed in building up reserves for specialized medicinal products and vaccines, alongside the requisite surveillance and reporting systems.*

“The Overlooked and the Misunderstood”: Exploring Alternative Narratives to Technological Crises in Malcolm Gladwell’s Revisionist History Podcast

**Abstract:** *Podcasting has the ability to incite social change by facilitating inclusive testimony and curating underexamined information online while simultaneously extending global interaction through flexible programming, free accessibility, and spatially and temporally untethered playback function. Podcasts also provide an immaterial site where journalists and active citizens can question dominant perceptions of events, ideas, and technologies and provide historical revisions of hegemonic narratives.*

*Using Canadian Malcolm Gladwell’s Revisionist History podcast as a case study, this paper addresses the paradox of crisis and technology by answering the question: 1) how have media representations shaped narratives of technological crises and/or technological redemption? Revisionist History is an episodic podcast that examines “the overlooked and the misunderstood...and asks whether we got it right the first time” (“About Revisionist History,” 2019). Thus, this paper analyzes multiple episodes discussing historical technologies and asks how we as listeners can learn from alternative narratives of these technologies to better understand present-day representations of, and interactions between, the technical and the social.*

*Gladwell’s investigations into historic technological narratives and their supposed crises include: the 2009 recall of Toyota cars and consumer hysteria, the revolution of the birth control pill, and the scientific misunderstanding of viruses in the 1960s. Revisionist History’s format and its interactive, participatory nature allows us to explore how we think about technological implementation and scrutinize mainstream media narratives that frame technology’s saving power, or lack thereof, on a global scale via the internet. Therefore, this paper aims to consider how we can evaluate the dominant, historical representations of technological crises and identify what histories of technological crises have been highlighted or obscured through a 21<sup>st</sup> century perspective.*

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JAMES WILLIAMS

Humans, Technology, and Nature: A Recipe for Crises?

**Abstract:** *To understand the human/nature relationship, one must look at how people, technology, and nature interact. Because humans come from many cultures and experiences, we have not always understood our relationship to nature in the same way. Nevertheless, we are all part of nature, and our physical beings are comprised of many of the same elements and rhythms that make up the world around us. Since the Enlightenment, however, Euro-American rationalism cleaved humans from nature even as they remained a part of it. This Cartesian duality led people to harness their technologies toward exploiting the Earth for our own needs and desires, nature's agency acting as the only constraint against us. Our voracious appetite for control over nature begat an entirely new epoch, the Anthropocene, and consideration of it in the history of technology requires us to examine how the relationship of humans, technology, and nature has been and will continue to be a recipe for crises for humanity and nature.*

3.1 TOOLS TO GENERATE OR TO SOLVE CRISES? HISTORY AND PERSPECTIVES OF THE DEVELOPMENT OF ROBOTS AND ARTIFICIAL INTELLIGENCE II

Organizer: Stefan Poser

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TIINA MÄNNISTÖ-FUNK

Talking machines negotiating the role of technology

**Abstract:** *This paper studies different kinds of talking machines as discursive-material (Barad 2007) negotiations of the role technology has or should have in human life and future. I argue that recurring discourses of thinking and talking machines, and their material counterparts; talking robots, cars, computers and other consumer technologies; discuss and formulate the ideas of possible and desirable technological development from a persistently techno-utopian perspective.*

*I have studied the media coverage of different talking machines from the 1950s to the 2010s in Finland. Two decades stand out as especially lively periods of interest in robots, artificial intelligences and consumer goods with speech function; the 1980s and the 2010s. The idea that thinking machines would be just behind the corner is common to the discourse in both periods, as well as visions of speaking machines as emotionally pleasing to humans. Especially robots are both discussed and show-cased in both of these periods in a way that exaggerates their abilities and uses machine speech as a tool to feign machine intelligence.*

*I will discuss the social, economic and cultural contexts of the talking machines in the 1980s and the 2010s. What gave rise to the fad of talking cars in the 1980s? Why was Sophia the robot so famous in the 2010s? What do they and similar examples reveal about the technological visions, their origins and marketing, as well as their blind spots?*

*Talking machines are an example of the divide between optimistic, utopian technological talk and the real-life technological solutions that, more often than not, have been unspectacular, problematic, irritating or even outright hoaxes. They also highlight the way in which technological visions are strengthened by giving them material forms in robots and other machines.*

**Abstract:** *The 2010s have been overwhelmed by media articles on the so-called '4th Industrial Revolution'. These articles placed the emphasis on the role of artificial intelligence and robotics within the 4th Industrial Revolution, in a context defined by the generalized use of computers, all the way from the internet, the web, and the social media to the collection, processing and use of big data. Our paper starts by noticing that, from the 1970s to the 2000s, the assumption was that industrial revolutions have been replaced by a so-called 'Information Revolution'. This Information Revolution was strongly linked to the arrival of a 'post-industrial society'. Our paper documents the change from presenting computing as the agent that would place industry in the past (1970s-2000s) to presenting it as the agent to bring about an industrial future (2010s).*

*To explain this change, we include in our paper a comparison between the public image of artificial intelligence and robotics in the 2010s and the 1970s-2000s period. This comparison suggests that the return of the talk about an industrial revolution came along an economic and political devaluation of labor over capital, manifested as a global transition from welfare capitalism to neoliberal capitalism. This economic and political devaluation/crisis of labor was matched by an ideological devaluation of labor. Based on our primary research, we argue that central to this devaluation has been the uncontested 2010s presentation of artificial intelligence and robotics as capable of replacing labor, in marked contrast to the challenge to this presentation between the 1970s and the 2000s.*

*Our paper focuses on a paradigmatic case, Greece, a country where labor was gaining ground after the 1970s but experienced a strong crisis in the 2010s. Our primary research covered the most influential Greek newspapers and home technology periodicals of the last half-century (1970s-present).*

### 3.2 CRISIS IMAGINARIES AND TECHNOLOGICAL PASTS

Organizer: Anique Hommels

Chair: Anna Åberg

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KARENA KALMBACH

Crisis Imaginaries and Fears as Driver of Technology Development

**Abstract:** *Focusing on crisis imaginaries, there is one emotion which deserves our attention in particular: fear. Fear of terrorism, fear of mass migration, fear of global warming – to name only some of the currently most prominent fears in Europe – originate from concrete crisis narratives and are important references in public debates and political decision making. This paper aims to bridge developments within the flourishing scholarship on the history of emotions with the history of technology, focusing on fear. Even though fears are deeply inscribed in many everyday technologies, social sciences and humanities research has mainly focused on people’s fears of technologies. However, the question how fears drive technological development has received almost no attention so far. That is the question that I will explore in this paper. I shall argue that researching how fears get manifested in technological artefacts allows us to decode technologies as a mean to nurture and perpetuate fears.*

**Abstract:** *Computers are often described as a “revolutionary” technology, leading humankind into a more rational and efficient era. Their popularization as a consumer technology in the 1980s, however, coincided with the ending of the Cold War, and the consequent wave of global political and economic crises. One way to make sense of this simultaneous shaping of an imagined revolution and a real crisis is to investigate how emotions featured in the sociotechnical imaginaries connected to computers. I shall concentrate in particular on the role of fear, through a case study of the popularization of personal computers in Italy. I focus on the imaginaries produced between the 1970s and 1990s by three groups of actors: computer manufacturers, political parties and social movements. Which fears shaped their imaginaries, and which fears were produced and reproduced through them? To which sets of values were these fears connected? How were these values informed by the crises of the late 20th century?*

**Abstract:** *Emergency dispatch rooms are designed to respond as smoothly and swiftly as possible to crises and critical events, such as fires, accidents, terrorist attacks or medical emergencies. Since the 1970s, emergency dispatch rooms in the Netherlands have undergone profound changes in their design, work practices and technological equipment. Communication networks became digitized, procedures of different emergency services harmonized, regional dispatch rooms more centralised, etcetera. All these efforts were made to more effectively respond to crises. This paper seeks to find out how crises were anticipated in the sociotechnical design of emergency dispatch rooms. Which ideas about crises were embedded in the technologies used in these nerve centers of emergency communication? What were considered the most optimal ways to respond to crises and how did this change over time? How were crisis imaginaries embedded in the design of emergency dispatch rooms? This research draws on newspaper article analysis, an analysis of national governmental documents, and historical archival research in the national and regional archives of Dutch fire services and police.*

Chair: Thomas Schütz

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FANXIANG MIN

Change was Made for British Noses – The story of London Sewer system in the perspective of sensory history

**Abstract:** *With the Industrialization and Urbanization, London was full of people and became the first international metropolis. Old Father Thames was polluted and horribly stagnant. Although the pollution of Thames was taken as a social question for a long time, but little change was made. Finally, it was the stench out of Thames, especially the Great Stink of 1858, push Britain (especially the MPs of Britain) to pass new laws in Parliament and to take effective measures to clean the river. Because Londoners could not endure the foul smell just like before. As a result, the London Main Drainage was built. In this course, Sir Joseph Bazalgette, chief engineer of London's Metropolitan Board of Works in the 1850s, and his design, interception played a core and fundamental role. London's first sewer network (still in use today) , and the Albert, Victoria and Chelsea embankments, which housed the sewers, in central London, by Joseph Bazalgette, helped to banish cholera and make London habitable and fragrant. In this paper, sensory history will be employed as its theory and methodology. And Different styles of documentary, such as complaints to the offensive smell on newspapers, descriptions by novelist, will be the fundamental data.*

**Abstract:** *This paper is based on my award-winning presentation (SHOT Conference: Robinson Prize 2019) on the fire alarm telegraph in Imperial Germany, 1873-1900. By analyzing statistical data on living quarters and archival sources on the design and use of the fire alarm telegraph in Frankfurt, I have shown how this technology materialized the interests of the city administration and Prussian police. It facilitated intra-urban communication and political control over the city's inhabitants. For the case of Frankfurt, this insight was hidden within the archives as the city council had introduced the telegraph as technology strictly for firefighting.*

*In my talk at ICOHTEC, I will present a more theoretical approach to technologies of risk response, using the fire telegraph as only one example. Drawing on examples from a multitude of risk responding institutions (EMS, technical relief, fire services) and the technologies they employed in Germany and the U.S., I contribute to our understanding of infrastructure and power, capitalism, and most importantly, technology and risk.*

*From a broader perspective, I argue that risk response is dependent on social decisions and not aloof of its historical context. More specifically, I show how technologies of emergency response materialized the interests that guided society's response to risk. My investigation of such technologies provides material evidence for the social construction of risk response. Moreover, as in the case of fire telegraphs or water hydrants, it contributes to studies of infrastructure and power.*

*At ICOHTEC, I seek to open discussions about technology and risk response in urban settings. I thereby want to further our understanding of the construction of and the measures against crises.*

**Abstract:** *The power of technology has often been viewed as a crucial agent of change in the process of modernity, especially when comparing the paths of western industrial societies and China. Nevertheless, technology was not the single decisive element that determined the whole. Rather, technology was integrated with culture, society, economics, and politics. Students of technology in Chinese history are familiar with the "Needham question": Why did China's technological superiority not generate a comparable scientific or industrial revolution in this country? Part of the answer, in my view, lies in the government politics and attitudes towards technology which influenced the intellectuals' values and beliefs in technology. Despite of China's position as the homeland of numerous ancient inventions, the ruling elites of that country were Confucian-trained scholar-officials, who considered science and technology inferior to literary attainments. It was the crisis in the late nineteenth-century China that altered the governors' and elites' view of technology.*

*Around that time, China's last empire, the Qing (1644–1911) stood on the verge of collapse and had to restore power through Western Learning to resist the foreign encroachments. Technology, or western technology, was the hope and solution for saving the country. The profound late Qing educational reform attached strategic importance to promoting science and technology.*

*Based upon an original survey of the historical documents, this paper examines how the Qing governors viewed technology as a solution through institutionalizing the technical education system. In particular, in addition to studying the well-known arsenals and technical schools for elite education, this paper also addresses the role of Industrial Training Bureaus established by the Qing governors for popularizing technology among commoners, which has been paid less attention in existing scholarship. This study demonstrates how technology was re-embedded in the dynamic Chinese tradition at the age of late Qing crisis.*

**Abstract:** *Technology assessment emerged in the United States in the 1970s in response to growing unrest surrounding the unforeseen consequences of technological innovation. Population growth, resource scarcity, and environmental degradation were fast becoming global issues to which technology was considered pivotal to both their cause as well as to their solution. In 1972, the Office of Technology Assessment (OTA) officially opened its doors, with the mandate of providing expert advice to congress. Studies on TA typically begin with the passing of Congressman Emilio Daddario's Technology Assessment Act in 1972, neglecting the prehistory of TA which began in the mid-1960s, led by Harvey Brooks and other science advisors in Washington. Daddario, with the support of Brooks, set out to demonstrate the need for TA, holding a number of hearings and commissioning four reports. Critical to the establishment of OTA, was the report of the National Academy of Sciences, chaired by Brooks. Brooks brought the Washington science advisors together with academics from the growing TA "movement" who were triggered by societal concerns regarding technology "out of control" (Bimber, 1996). Turning to this prehistory of TA reveals that negotiations regarding what TA could, or should be, were a hotbed of conflict and tension, as competing visions about the aim, process and outcome of TA proliferated from the outset. In this presentation I combine insights gathered from interviews and archival research, with the analysis of official documents from Daddario's hearings and reports, in order to demonstrate how the early vision of TA, as it is known today, was by no means a given. I will illustrate how incompatible views were silenced and dissenting voices were removed from the discussion in order to create this vision. Given TA's eventual uptake across Europe (albeit in a different, more "parliamentary" form), and the important role it has played in shaping subsequent ideas around science and technology policy, exploring these competing visions illustrates how TA 'might have been otherwise'. Technology Assessment, Technological Change, Science Advisors, Experts, Movements*

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CYRIL LACHEZE

French Tileries Facing the Wood Crisis, from the Late Middle Ages to the 19th Century.  
Adaptation, innovation, opportunities

**Abstract:** *Firing in French tile ovens until the beginning of the 20th century required considerable intakes of wood (50 to 100 cubic meters per firing), while the country was marked by significant deforestation (forest cover estimated at 25% in the 16th century and 12.5% in 1825, compared to 30% at present). Preservation measures were taken as early as the 16th century, but many establishments found themselves in great difficulty from the mid-18th century. In some regions, tile makers had to adapt accordingly to avoid bankruptcy, primarily by switching fuel: at the same time, the first coal firing tests were attempted, but with mixed results due to a low coal availability, incomplete technical mastery, and cultural resistance to change.*

*In the absence of adaptation, another possibility was innovation, with furnaces consuming less fuel. In the first half of the 19th century, a large number of patents were filed for this purpose, and it was this constraint that led to the development of the continuous furnaces (Hoffmann system and tunnel furnaces) still used today. Finally, it should be pointed out that this wood crisis also created opportunities for forest cover owners, and in particular lords: standards imposed by them on the exploitation of their woods often sought not so much to protect them as to take advantage of the crisis to tax their use. In this communication, using an open corpus of historical (including patents) and archaeological sources, we propose to present a panorama of these dynamics which, although referring to a past energy crisis, are not unlike those which are taking place in the current energy crisis.*

The Phantom Menace of an Oil Crisis and the New Hope of Forest Fuels: the gasifier technology in the interwar France (1918-1939)

**Abstract:** *In the 1920s the French government felt that a new radical shift in the nation's energy policy was necessary. The geologists warned that the oil peak approached inevitably, and the skyrocketing number of automobiles deepened the country's dependence on imported fuels. Prominent political figures argued for autarchy and favored the development of a "National Fuel" produced from the raw materials extracted domestically. An important lobbying group emerged in favor of a promising alternative: wood.*

*The prospect of forest-based fuels gave hope to the entire impoverished forest communities, as the French forests were to be transformed into "living refineries" and generate prosperity on an unprecedented scale. But wood fuel is not a single technology. Wood can be transformed into methylic or ethylic alcohol, but it can also serve as a raw material for the manufacture of charcoal for gasifiers. A whole range of technological alternatives emerged, each promising to solve the French energy dependence and protect the country from the upcoming oil crisis. This paper examines a variety of technological alternatives from the period, basing on the unpublished sources from the archives of the scientific institutions based in the 1920s near the largest forest massive in France: la forêt landaise.*

*And yet, in spite of the massive innovation, and the involvement of both public and private sectors, the forest fuels failed to dethrone fossil ones. The paper argues that it is precisely the overabundance of different technologies that prevented them from gaining: a story that may serve as a lesson for those looking at alternative fuels as a solution to the environmental crisis today.*

**Abstract:** *Shortly after the recent outbreak of the ‘Greek crisis’ in 2010, the discussion concerning hydrocarbon exploration in Greece resurfaced and is currently enjoying widespread propagation. It is a particularly complicated discourse, wherein notions of hydrocarbons as ‘subterranean treasure’, ‘instrument of fiscal salvation’ and ‘method of geopolitical empowerment’ are firmly intertwined with opaque technical terms borrowed from the discipline of petroleum geology.*

*This is not the first time that this recourse to the Greek ‘unexplored subterranean wealth’ poses as a remedy for an acute economic or social crisis. In fact, oil exploration in Greece has been attempted in various instances since the mid-nineteenth century, invariably accompanied by remarkably similar discussions.*

*Our paper focuses on two such instances, namely (a) the oil exploration attempts that transpired in the isle of Zakinthos between 1890 and 1905, and (b) the various oil exploration attempts that took place during the Metaxas’ dictatorship (1936-1940). We will show that both of these attempts transpired during periods of acute socioeconomic and fiscal crisis and in anticipation of an oncoming war; that they involved international petroleum experts, as well as local entrepreneurs, scientists, bankers and politicians; that they were accompanied by a vocal public discourse of ‘fiscal salvation’ and ‘geopolitical empowerment’.*

Chair:

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ERIK VAN DER VLEUTEN

Panelists:

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AARTHI SRIDHAR

ARWEN MOHUN

CLAITON MARCIO DA SILVA

KARENA KALMBACH

This plenary roundtable discusses the ICOHTEC2020 Conference theme—A History of technology for an Age of Crisis—from the perspective of the current COVID-19 global crisis. The roundtable discusses what insights the field of History of Technology has to offer for making sense of today’s crisis. And conversely, it asks what lessons from present-day crisis debates could inspire novel and relevant history of technology research. The audience can submit questions via the Zoom chat function.

*Four panelists contribute a variety of expertises to discuss these questions. Aarthi Sridhar combines her academic interests in the history of fisheries science in India with practical engagement with environmental problems and actors. She is one of the founder-trustees of Dakshin Foundation, a multidisciplinary NGO in India focused on conservation, development and community well-being especially of fisher communities. Since March, she has assisted Dakshin and its partner networks in India in tackling the fallout of COVID-19 related lockdowns on India's fishers. The pandemic has made her think (yet again) about connections between academic HoST research and 'real world' problems. Arwen Mohun is the author of *Risk: Negotiating Safety in American Society* (2013). Her research highlights the historical tensions between expert risk discourses and popular 'risk vernaculars' that are again in play in today's crisis. Arwen appears in and co-produced the Youtube video blog series *Technology's Storytellers: COVID-19 Edition*. She is the President-elect of the Society for the History of Technology. Claiton Marcio da Silva's is currently completing two books on the technological, scientific and environmental history of soybean expansion in 'the Soyacene'. In the panel he discusses how health and socioecological crises are currently (re)negotiated in the Brazil context—and how historians of science and technology can speak to such 'competing crises'. Karena Kalmbach's latest book *The Meanings of a Disaster. Chernobyl and Its Afterlives in Britain and France* (in press) discusses how commemoration of the 1986 Chernobyl crisis shaped and negotiated subsequent political priorities in various European countries. In her recently co-authored article in *Technology and Culture* she highlighted the triple temporality of crisis—how during a crisis such as COVID-19, representations and*

*interpretations of past, present and future are simultaneously renegotiated. Finally, she applies her current research on fear and the history of technology to the COVID-19 situation.*

4.1 CRISES, TECHNOLOGY AND SOCIETY I

Chair: Jacopo Pessina

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ANDREW BUTRICA

“The ‘Social Question’ and Industrialization in France, 1800-1850”

**Abstract:** *The commonly repeated history of the Société d’encouragement pour l’industrie nationale, founded in Paris in 1801, is that it was established as a privately-funded private society, for the encouragement of French industry and agriculture, inspired by the Royal Society of Arts of London (the Royal Society for the Encouragement of Arts, Manufactures and Commerce) founded in 1754.*

*In fact, this paper shows that the Société d’encouragement originally saw itself as the continuation of a French organization, the Société libre d’émulation pour l’encouragement des arts, métiers, et Inventions. The Société libre d’émulation and the Société d’encouragement both aspired to improve industry and agriculture as well as to promote humanitarian goals by addressing the material needs of the poor.*

*I also will show how the Société d’encouragement achieved these humanitarian goals by incorporating the membership and aims of the Société Philanthropique—known for its soup kitchens—within its Comité des arts économiques—and of the Conseil de Salubrité—an agency of the Prefect of Police concerned with health and safety issues—largely within its Comité des arts chimiques (among others). The officers of the Société d’encouragement were also officers in the Société philanthropique and members of the Conseil de Salubrité.*

*The paper also discusses several of the notable humanitarian efforts of the Société d’encouragement aimed at helping the poor and the unfortunate in general during the first half of the nineteenth century. It also points out that these efforts also benefited industry and the arts by introducing new technologies and practices. In a few cases, these efforts resolved questions that had been the subject of prize competitions run by the Société libre d’émulation during the 1770s and 1780s, thus reinforcing the links between the Société libre d’émulation and the Société d’encouragement.*

**Abstract:** *For the Czechoslovak government was necessary to unify the infrastructure after the new state was established in 1918 because regions (Czech lands, Slovakia, Subcarpathian Ruthenia) were on a different level of development. Transport infrastructure was the issue with the highest priority as good connections between the West and the East were missing. They were important for economic and military reasons. New roads and railroads plans were made by the experts, however, progress made during the 1920s was only a little. The new driving force for the development of the infrastructure was, paradoxically, an economic depression in the 1930s. More than 250 kilometers of the new railways, 320 kilometers of modern paved roads were finished and more than 30 % of the houses were connected to electricity until 1939 when the existence of the interwar Czechoslovak republic ended. The state used thousands of unemployed workers as a very cheap labor force, to finish the plans from the early 1920s. Next to it, diesel engines were put into use in case of railroads, as they were more efficient and thus cheaper than steam locomotives. Also, modern buses were bought and used by the state railroads company instead of trains as more economic. So the economic crisis together with the social crisis helped to implement new technology and helped to unify transport infrastructure as well. Our paper is based on an analysis of archival sources. We want to show on this case study from interwar central Europe how these processes happened and if they were somehow specific. Finally, we try to understand the relation between technology and the crisis.*

**Abstract** *In 1989 the communist states of Central and Eastern Europe were falling apart as a domino. The system that was until then could not stop the reality from the inside, but neither the one from the outside.*

*The idea of the single planning body, common to all countries in the C.A.E.R., had economic implications and for Romania, the Soviet Union could not sustain the socialist countries like the Marshall Plan for the democratic ones in the West.*

*The Declaration of independence, from April 1964, of the Romanian leader Gheorghe Gheorghiu-Dej clearly represented a distancing from the Soviet Union and the continuation of the "socialism building " following a "Romanian original" model, a process continued by Ceausescu.*

*After 1971, Ceausescu went to a tough political dictatorship: the concentration of power, the rate of forced and exaggerated economic growth, the too large role reserved for the metallurgical and petrochemical industry; the lack of interest of the employees for the work has led to a severe economic crisis.*

*Ceaușescu relaunched in the 80s a monumental project on research, development and technological innovation. Large amounts of money went into this sector, but without finality. If in the years 60s-70s he managed to have a purpose especially in the industry development, in the years 80s Ceausescu implemented the "idea of the bottomless forms". Many technologies, coming from the West, have become obsolete and no new ones have been purchased. Romanian scientists were forced to invent everything overnight, to prove the superiority of Romanian socialism.*

*Ceausescu had a national-socialist discourse that did not catch any Romanian. Romania at the end of the 1980s was a closed country on all levels.*

*The fall of the communist regime in Romania was part of the complex process of collapse of East European communism, although it had some particularities that we will discuss in this paper.*

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KATERINA VLANTONI

Ensuring the Safety of the Blood Supply Technology during Crises: A historical approach

**Abstract:** *This paper addresses critical dimensions of the history of a preeminent public health issue, that of blood safety. The medical practice of blood transfusion has been part of a large and complex sociotechnical system. The paper focuses on the history of the development of policies in the governance of the blood supply by exploring the role of promoting technology-based approaches. The blood supply represents a critical infrastructure of a health system. In this paper, we elaborate on instances from the recent history of transfusion medicine and blood banking, which may help to shed light on the role of technology during public health crises. At the same time, we pay attention to debates regarding technology-based approaches against alternative approaches, which did not focus on expensive new technologies (in this case, diagnostic and screening technologies). The paper follows processes of standard-setting and of producing risk calculations as they stabilized in tandem with public health policy priorities. By acknowledging that putting forward common policies is not a straightforward process, it introduces to instances of negotiation and tensions. The empirical material has been drawn from research on a major public health crisis: the HIV-crisis and its aftermath in European countries and in the US. It is also drawn from research on local crises, like the seasonal blood shortages in a national setting, that of Greece. Through these cases, we examine critically the history of competing sociotechnical orientations and we signpost the reasons behind the prevalence of technology-based solutions.*

**Abstract:** *On April 15, 1929, Dr. Hannah M. Stone (1893–1941) and four female coworkers were arrested at the Margaret Sanger Clinical Research Bureau (MSCRB) for possessing illicit contraceptives. While the case was dropped, Stone was arrested again in 1933 for receiving a package of contraceptives from Japan in a case that Sanger (1879–1966) deliberately provoked. When that second case, U.S. vs. One Package of Japanese Pessaries, arrived at the U.S. Supreme Court in December 1936, the judges’ ruling in Stone’s favor weakened the last remnants of the 1873 Comstock Act. While the case itself is well-known as a critical moment in the liberalization of access to sex-related technologies and information in the U.S. across the twentieth century, the physician behind the case is not. Stone and her husband Abraham (1890–1959) both worked with Sanger to not only fit and prescribe birth control for Manhattan women in need, but also to drive research on the spermicides and diaphragms that were then available.*

*This presentation focuses on the research and publications of Hannah Stone, who used her position at the MSCRB clinic to research different brands and sizes of diaphragms, to test the reliability of watch-spring vs. coil-spring diaphragms, and to field requests from independent researchers asking to test their contraceptives on the clinic’s patients.*

*The Comstock Act and subsequent reinforcement legislation structured American scientific and medical research on sex and reproduction for sixty years.*

*This paper draws on Stone’s own publications, her correspondence in the Margaret Sanger Papers at Smith College, and secondary literature on the American contraceptive movement. The Comstock Act and subsequent reinforcement legislation structured American scientific and medical research on sex and reproduction for sixty years.*

*This paper draws on Stone’s own publications, her correspondence in the Margaret Sanger Papers at Smith College, and secondary literature on the American contraceptive movement.*

**Abstract:** *When contraceptive technologies became widely available in the 1970s, conflict over their use was carried out differently in South Korea than in Western countries. The Park Jung Hee military government tried to actively convince people to accept contraceptives through a campaign which reflected the contemporary global population control movement. Although the Catholic Church, a strong opponent of contraceptives in the West, continued to oppose artificial contraceptives, the Protestant Church officially supported the government's Family Planning campaign. However, this does not mean that contraceptive technologies were accepted offhand. Young people who wanted to use contraceptives struggled with the older generation who thought it was better to have more children. Women, especially in rural areas, had poor knowledge of how to use contraceptives and they often faced uncooperative husbands or rumors about contraceptives' side effects.*

*This presentation illustrates the conflicts over new contraceptives as it appeared in the monthly magazine Happy Home, published by the Korean Family Planning Association. This magazine included not only knowledge produced by experts, but also ordinary peoples' voices and practices expressed through readers' letters and the narratives by social workers. I argue that the tension surrounding new contraceptives represented a change of the ideas about nurture in South Korea's industrialized era. Symbolized by the slogan "Let's have proper children and raise them well," these ideas were based on a new meaning of parenthood rather than religious attitudes toward human life or sexual liberation.*

**Abstract:** *Last five years awareness has grown that the chemical industry has to transform itself in a fundamental manner in order to respond to the challenges posed by climate change. In many countries projects have started to steer the industry away from its dependence on oil and natural gas, and to explore new feedstocks and energy sources such as biobased materials, CO<sub>2</sub> and electricity.*

*The present paper will investigate three earlier great transitions of the chemical industry, in order to better understand which factors have played crucial roles:*

- a) from plant and animal inorganic feedstocks to mineral resources (e.g. soda ash)*
- b) from plant and animal organic feedstocks to coal (e.g. dyes)*
- c) from coal to oil and natural gas (e.g. the transition of the West-Germany industry).*

*The analysis is based mainly on a synthesis of existing secondary sources, the one of the cases (dyes) is also based on original research.*

*Several cases from these three transitions will be analyzed in depth with the help of the so-called Multi-Level Perspective (MLP) developed by Rip, Geels, and Schot.*

*On the basis of the cases studies a few general conclusions can be drawn:*

- transitions take ca. 50 to 100 years;*
- there are long periods of co-existence of two technological regimes;*
- scaling-up, cost-prices reductions, and market development take time;*
- there are large national differences.*

*The MLP distinguishes between 'landscape factors' and the creation of 'niches'.*

*Important 'landscape' factors were: scarcity, or abundance, of natural resources; growth of other industries and infrastructures; government policies; wars; and labor costs.*

*Niches in their turn related to disturbances of trade; differential market demands; and availability of low-cost technologies.*

**Abstract:** *In 1957 Soviet leader Nikita Khrushchev declared that Soviet industry had to catch up and overcome America in the volumes of production of milk and meat. It was one of many declarations which showed that the Cold War was a challenge and trigger for economic and technological development of socialism. The aim set by the Soviet leader in front of the industry was both to increase the production and make the products themselves more modern. Many Soviet producers saw the processes of making food, in particular, milk and meat, and its qualities as backward and not meeting the present day compared to Western industries which already widely used scientific achievements in producing food. From their point of view, both production and goods gained new qualities: they should be kept fresh longer, contain no bacteria, be well packaged, etc. Also, the production had to be hygienic and rational: no wastes were allowed anymore. And all these qualities were attributed to food modernity. My paper will examine how Soviet industry tried to make milk and meat, two basic food products, modern. It will focus on two issues: first, how Soviet ideologists, scientists, and producers explained the Soviet production as being in a critical situation and ways to make it modern; and, second, experiments on making milk and meat longer fresh, vitaminized, and better looking, conducted at various research and industrial institutions and their societal effects. My analysis will be based on archival sources, such as various reports and correspondence produced by the Ministry of milk and meat industry, Committee on Science and Technology, as well as the Institute of Milk and milk making factories. Also, I will use published reports of institutions, professional articles and books.*

*My paper will show that due to comparisons with the West Soviet producers in 1960s onward conceptualized their decades as the time of crisis in Soviet food making. They attempted to use modern science and technologies – ranging from conservation to transporting – to make basic food products more compatible with new standards. At the level of experiments, these were successful attempts which made Soviet levels more advanced than Western. But in practice, these results were not translated into industrial production due to deficiencies of planned economy. My presentation will, thus, address two sub-themes: how crises “reveal” that technology is deeply integrated into society and how technology-based specialists constructed the crises.*

**Abstract:** *In mid-1950s-1960s the Soviet state proposed to ensure the mass production of goods including clothing. My paper will contribute to the debate about peculiarities of formation of consumer society in the Soviet Union. I would like to consider the unique situation of the production of working clothes that were distributed from above and were received for free by consumers. On the basis of archival documents and discussions in professional and popular journals I analyze how authorities, designers and consumers understood the quality of distributed clothes which were produced on textile factories. I am trying to answer the question: could the Soviet state create and distribute products of a certain quality within the planned economy in a situation when consumers did not have any choice? Was there any mechanisms by which consumers could influence the quality of such products? How the crisis with delivering of diverse working clothes especially for women was described and what measures were proposed to overcome this crisis.*

**Abstract:** *While gender is rarely considered a variable behind the digital divide in the developed world, previous studies from scholars such as Walterová and Zalisová and institutions such as the United Nations Development Programme have shown that in the Czech Republic, the widest digital divide has historically been between men and women. Although the digital divide along gender lines has narrowed substantially in recent years in terms of access to ICTs, it persists with respect to both skill level and participation in the information technology workforce. This paper explores the ways cultural norms, the transition to capitalism, and information policy in the Czech Republic have shaped the digital divide in the country and the impact these factors have had on women's education and employment in information technology, as well as their usage of ICTs more broadly. This paper draws from both the existing literature and original interviews with Czech women to examine how these factors have come together to discourage women from pursuing an interest in information technology. The findings demonstrate that while cultural expectations of women, the rigid structure of the Czech education system, and the gender wage gap prevent many women from acquiring the higher skills needed to qualify for a job in the information technology sector, several organizations throughout the country are actively working to increase the presence of women in information technology with positive results.*

Organizers: Frank Veraart, Stathis Arapostathis

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ROBRECHT DECLERCQ

Natural Resource Companies and Copper Mining (1900-1960): the mining industry as an industrial metabolism

**Abstract:** *This paper considers the development and industrialization of resource frontiers in the beginning of the twentieth century focusing on copper. This paper seeks to understand why and how mining frontiers industrialized. The central assumption is that industrial frontiers coalesced with the development of modern natural resource companies as complex organizations. In particular, this paper focuses on how organizational principles of the copper mining industry transformed from mining itself into encompassing economic and social activities that organized wider regional economic spaces. Crucially, large-scale mining not only revolved around extraction, but also about weaving the peripheral-regional economy and environment around it. This is what mining historian Kent Curtis described with mining companies as “a kind of industrial metabolism, containing its own vast, internalized mineral production material economy”. This model of industrial metabolism became organized on the American West by the late 19<sup>th</sup> century, but was transferred in the following decades. There are good reasons to investigate this shift. In the creation of resource dependencies, the role of industrial metabolisms is largely underestimated. On the other hand, from a business history point of view, the organization and development of natural resource companies has received little attention. The paper focuses on how industrial metabolisms came to mark the modern copper mining industry as the dominant form, by looking at the activities, supplies, technological policies and industrial organization of the Union Minière du Haut Katanga (UMHK), the largest copper mining firm in central Africa. In particular the paper highlights the interplay between the appropriation of technologies and business organization on the resource frontier.*

**Abstract:** *The paper's aim and scope is to provide a historical reconstruction of the entangled history of agrochemicals, raw materials drawn from extraction activities and water management in the Greek Agrifood industry since 1920 and until 2000. The paper has three relevant objectives that inform its main aim. Firstly, to unravel the visions and technological promises relevant to the intensification of the use of agrochemicals and its linkage to developmental policies prioritizing economies of scales and industrial patterns of agriculture. Major engineers, scientists and industrialists played important role in the making of the visions that would drive the development patterns and dominate relevant public policies. Secondly, to show the importance of flows of raw materials and policies of resource extraction in relation to minerals that were important and necessary for agrochemical construction. The extraction of lignite and pyrite became major priorities for local industrial interests since the interwar period. The extraction activities of minerals by both private concerns and state corporations were linked both for securing energy and the primary sources for the production of agrochemicals (fertilizers, pesticides and insecticides). The emphasis on the role of native natural resources that were linked with the industrial policies of the agrochemical industries and with discourses of both the character and the future of the agri-food industry. Our third objective is to unfold the linkage of the intensive use of agrochemicals that was part and parcel of the emergence of the model of industrial agriculture in the post-WWII Greece, with the management of water. We study the development of large scale dams and irrigation channels in the Greek provinces that started to be planned and constructed since the 1960s. The paper is a tale of three entangled sociotechnical regimes that involve agriculture politics and policies, politics of natural commons and politics of scale in technological infrastructures. The paper covers eighty years that comprised of two dictatorships, several democratic governments and a world war. Yet our emphasis is on the history of entangled sociotechnical regimes thus we unravel the interrelation between regimes as well as the materialities that configure the interrelations define sociotechnical transformations and the environment. We study the way that the flow of extracted minerals was coproduced with industrial priorities in the agrochemical industries, with developmental patterns in the agri-food industry and the management of water. The paper is based on research in published sources, corporate and state archives as well as technical and popular press.*

**Abstract:** *This paper investigates technological development of catalysis technologies changed global feedstock markets of whale, fish and vegetable oils and fats of margarine industries. Catalysis technologies developed around 1910 allowed the hardening and de-flavoring of liquid bio-oils. For Dutch-British Unilever and its predecessors its development opened up new international feedstock markets and increased the company's resilience in highly volatile markets.*

*Businesses applied different market strategies and technological innovations to increase the control over resources and markets. With investments in plantations and whaling companies margarine industries worked on the vertical integration of their supply chains. Cartel contracts forged bonds and stability in purchase and sales in the international competitive markets. The volatile markets of margarine and soap feedstock in the 1920s resulted in Unilever, a merger of two Dutch margarine multinationals and the British Lever Brothers. In the second half of the 20th century the Unilever concern developed in a global player in the food, soap and cosmetics.*

*Unilever and its predecessors invested in research and development of catalysis to create feedstock alternatives and company resilience in volatile commodity markets. The paper analyses Unilever's research agenda of catalysis research. Catalysis technologies developed by Unilever focused on hardening and de-flavouring of bio-oils and fats. This opened avenues in the application of a wide variety of animal and bio-oils as a resource. At the supply side these developments put geographically disconnected and seemingly unconnected economic activities in one context. Southern Ocean whalers, fishing industries, palm oil plantations in Africa and Asia, European sunflower, olive oil producers became competitors in the margarine, soap and derived production.*

*The paper investigates the interrelation between research and development of catalysis and developments of global markets and resource territories. By analyzing the changes in bio-oil and animal fat trade to the Netherlands, the effects and global impacts of this technology development can be traced. The paper combines research by the Eindhoven History Lab on Unilever research; secondary research about Unilever's resource, market and diversification strategies; and, international resource flow analysis of animal and bio-oils to the Netherlands*

LEONOR ZUIDERVEEN BORGESIUŠ

Infrastructures of empty space and productive space in the Netherlands and Surinam, 1870-1905

**Abstract:** *The Dutch administration commissioned agricultural and hydraulic technologies in colonial spaces like Surinam and the Dutch East Indies, but also in internal colonies of the IJsselmeerpolders until well into the 20th century. Irrigation, transportation, and landreclamation-works enabled both the access to and construction of 'empty spaces'; rain forest, marshland, and seabed was turned into 'new' productive space. When after the abolition of slavery in Surinam the colony plummeted into economic crisis, infrastructural expertise legitimized prevailing colonial presence by the promise of development and enhanced productivity through the use of technology.*

*This paper focuses on civil engineering as a way of enhancing the productive potentials of colonial territory, and takes post-abolition Dutch presence in Surinam as a case study, especially focusing on the works commissioned by Governor Cornelis Lely (1902-1905). It then contrasts overseas colonial engineering to internal colonization practices that were going on within the Netherlands. The grand-scale land reclamation scheme of the Zuiderzee Works (constructed between 1928-1972) included far reaching spatial and social planning efforts on newly created 'empty land'. This paper investigates these enviro-technologies and narratives of modernity and development that were manifested through environmental knowledge production in documents and correspondence, expertise in practices, ideologic principles in consultancy reports.*

*By applying a similar analytical frame to both geographical contexts, the paper discusses the overlap in progress-thinking in enviro-technical imagination and practice between internal and external colonization. The aim of this research is to expand the understanding of landreclamation practices as a quintessentially Dutch history, both when it comes to the proclaimed locality of water technologies, as well as the particular cultural discourses surrounding them. Instead, it takes a perspective that addresses the wide and extensive geographies and infrastructures that are connected through Dutch imperialism.*

**Abstract:** *The question of reclaiming the Pripet Marshes caused a lively discussion in interwar Poland, including among political and military circles. While the politicians saw it as an opportunity for economic development of this previously idle region, the generals were sceptical about draining the marshes because of their crucial role as a natural defence system on the eastern border. The key issue in considering the feasibility of the reclamation plan was to determine whether it was possible to drain the area without accessing the downstream Pripet river, which was controlled by Soviet Russia. A negative answer to this question would make it necessary to seek an agreement with the Soviets. Because of the prevailing opinion that such an agreement was not achievable at that time, the Poles looked for alternative technical solutions, such as diverting certain rivers to the West, or by creating huge polders and pumping water out. This paper argues that amongst the reasons that caused the Polish attempts to drain Polesie to fail, uncertainty about the Soviet policy on hydraulic engineering in the border area also played a role.*

**Abstract:** *The recent history of South-East Asia is designated through the Great Britain and French colonialism, a complicated and complex conflict in and around the former Indochina and a distinct antagonism between Thailand and Laos, Cambodia and Vietnam. The Lower Mekong River Basin, which is the most dominant topographical formation in this area, embodied at the same moment the frontier between Cold War bloc structures on a regional measure. Particularly, the huge Mekong River, which was nearly untapped at that time, was qualified for a multiplicity of developing visions from every political faction. In addition, provision of economic and technical assistance was an important tool in global Cold War on both sides of the iron curtain. In line with the complex conditions of the political structures in the area, a focus on technical aspects was the only appropriate strategy to cope with the enduring struggles in the region, because the idea of modernisation through technical progress was consensual and the hope for development through technology was a transnationally and cross-system constant. The aim of the paper is to show that, despite the political tensions, crisis and conflicts, a project, which was constructed to develop a common water resource, could be lasting, if it focuses on the technical aspects of such a development project. Likewise, it was necessary that for the states, the calculated benefit of the cooperation outstrips the cost of the political differences. This proceeding of highlighting technology and development was under the political circumstances in South-East Asia, the only possibility to launch such a large scale technical infrastructure project like the development of the Lower Mekong River Basin.*

**Abstract:** *In his 2006 speech to the Canada-U.K. Chamber of Commerce in London, the usually laconic Canadian Prime minister Stephen Harper grandiosely declared that the development of Alberta Oil sands is “an enterprise of epic proportions, akin to the building of the pyramids or China’s Great Wall,” and would transform Canada into an “energy superpower.” While, in the minds of most, perhaps, the link between the oil sands and some of the greatest monuments of human civilization is not immediately intuitively obvious, nonetheless, the comparison is quite revealing. Historians have frequently noted that the role played by monumental architecture and epic engineering projects in earlier civilizations was not simply pragmatic or utilitarian, but political as well. Through such epic building projects authorities sought to evoke a sense of sublime awe and unquestioning reverence towards the transcendent underpinnings of their regime. Though the religious frameworks these monuments expressed no longer hold much allegiance among contemporary audiences, these monumental works still retain an ability, even amongst the most avowedly secular, to evoke an experience of sublime awe. Nor should this be surprising, for scholars have observed the aesthetic category of the sublime is the modern secular attempt to articulate the experience of transcendence. For both Edmund Burke and Immanuel Kant, the two predominant modern theorists of the sublime, the sublime was inextricably connected to our experience of nature, but historically the sublime has also been used to describe our experience of industry and technology. Indeed, as both Leo Marx and David Nye have argued, the conflation of technology and the sublime has had a pronounced tendency to accord technological achievement an almost reverential and transcendent status, while simultaneously obscuring its more negative consequences. Drawing on these historical conceptualizations of the sublime, this presentation will examine how Harper’s and others’ promotion and defense of oil sands development can be seen as employing the rhetoric of the technological sublime. In various speeches and public relations campaigns the oil sands are touted as an epic example of Canadian technological ingenuity, which future generations will marvel at. Furthermore to the extent that the environmental and social costs of the oil sands are acknowledged, they are seen as either a small sacrifice to pay for such a sublime achievement or temporary inconveniences which themselves will be overcome through our unwavering adherence to the technological sublime. Consequently, this presentation will argue that Harper and other advocates of oil sands development, by promoting this project in terms of the rhetoric of the technological sublime, are seeking to circumvent debate on the oil sand’s environmental, social and economic consequences by presenting it as an object of transcendental and sublime importance.*

5.1 CRISES, TECHNOLOGY AND SOCIETY II

Chair: Jan Hadlaw

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MATTHEW SCHANDLER

"Atari Democrats" and the Outsourcing Solution to American Industrial Decline, 1983-1985

**Abstract:** *In the early 1980s, declining industrial sectors like steel and automobiles elicited the attention of American politicians; yet, so too did seemingly ascendant high-technology industries like digital gaming. Some neoliberal politicians hoped to revitalize the American economy by outsourcing consumer electronics production to Taiwan and Hong Kong. Modernization of traditional industrial production sites did not offer the needed panacea, so they argued. These so-called "Atari Democrats" viewed the growth of consumer electronics like video games as potential sources for much-needed jobs.*

*Ironically, the emergence of these "Atari Democrats" coincided with both the declining fortunes of the gaming industry in the US and its shift to overseas production. Even liberal economists like Robert Reich argued paradoxically that outsourcing production while simultaneously laying off American workers made sense for Atari and its competitors. To Reich, the move overseas could actually help Atari "create more jobs than have been eliminated in the US" through expansion of its market share.<sup>1</sup> In a clear rebuke of the "Atari Democrats" position, AFL-CIO research director Rudy Oswald addressed the news of Atari layoffs by stating that it "clearly indicates that the high-tech firms are also moving abroad and that there is no guarantee for absorbing the nation's jobless."<sup>2</sup> So, instead of offering a solution for declining American industrial competitiveness, consumer electronics sectors like digital gaming contributed to a deepening of the crisis.*

*Through a close reading of Congressional and labor union speeches, popular periodicals, and the related economic, technological, and business literature, my proposed topic addresses the conference's major theme and at least six of the nine subthemes.*

**Abstract:** *Entrepreneurs know well that new technologies have the power not only to cause disrupt social and economic patterns but that technology can also be used to stabilize social relations as well. A compelling example of disruption and stabilization can be seen in how an Irish engineer, John Ryan, developed anti-piracy technology for videotape industry in the 1980s.*

*In 1976, Sony introduced the Betamax videorecorder which allowed consumers to record movies and television shows at home. Betamax greatly alarmed Hollywood since new copyright laws in the US seemed to indicate that home recording was did not violate copyright and was a form of "fair use." In response, Universal Studios and Disney sued Sony, and the case went all the way to the US Supreme Court. In 1984, the Court ruled in favor of Sony and that home recording was indeed fair use. In response to the Supreme Court ruling, John Ryan, a former engineer at Ampex developed techniques that prevented the illegal duplication of movies. With Victor Farrow, Ryan launched a new company, Macrovision, and together they convinced the Hollywood studios to add their technology in the course of manufacturing videotapes. Thanks to Macrovision, the Hollywood studios were able to create videotapes that could be rented or sold, and video sales soon became a major source of revenue for the studios. Ryan's technology became the standard for video copy protection and can be found today in virtually every DVD player and cable/satellite decoder.*

*Based on contemporary newspaper coverage and interviews with Ryan, this paper will narrate the crisis created by Betamax and the fair use doctrine as well as how Macrovision's technology stabilized the industry. In concluding, the paper will seek parallels in the development of iTunes and music streaming in the 1990s as well as the disruptions being caused by social media today and the ways in which new innovations might stabilize this industry.*

The 'Discovery' of Social Innovations as Means for the Solution of the Crisis in the 1970s and 1980s in West-Germany

**Abstract:** *In my paper I argue that there was an ongoing debate since the early 1970s about possible modes and forms of civic engagement, collective self-organization, volunteering, informal political participation, activating 'hidden' resources, which prepared the later neo-social politics. Although not realized on a large scale, topoi, categories and concepts of the neo-social discourse in the 1990s were coined during that time. In accordance with the widely accepted judgment about the 1970s and 1980s as the 'incubation period' in West-Germany for a neoliberal political course in the late 1990s, I regard the 1970s and 1980s as also the constitutive period for the concept of Civil Society as a means for the solution of multiple crisis.*

*I focus on two strands of the Civil Society discourse.*

*The first is the state-oriented Public Administration Research, that started to see non-government and non-profit organizations as means to overcome the crisis of governability and the deficiencies of cybernetic planning. In this context participation and social innovations were no longer seen as a threat but as a valuable contribution for the stability of the system. Within the field of theories of Policy-Making, Neo-Corporatism, Welfare-Mix and Third-Sector-Theory non-state-actors were acknowledged as co-producers of the hitherto state monopolized public good.*

*The second strand is the moral turn called for by the Conservatives at the end of the 1970s, which helped re-establish conservative values as political arguments. Civic virtues like independence, personal initiative or voluntary commitment but also willingness to make sacrifices and discipline became again socially acceptable and were used later to promote, justify and legitimize the 'activating' welfare state.*

*Conclusion: Beside technical solutions social innovations were a main element for dealing with the crisis since the 1970s until today.*

## 5.2 WOMEN IN TECHNOLOGY IN AN AGE OF CRISIS

Organizer: Maria da Luz Sampaio

Chair: Antoni Rocca-Rosell

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MARIA DA LUZ SAMPAIO

Women Graduated in Engineering: their social and professional options

**Abstract:** *In the second half of the nineteenth century the industrialization processes and technological innovations that allowed the introduction of gas, electricity, electric transport fascinated adults, children and women and men. At the same time, the circulation of knowledge and technical progress and the need to have technical training that would respond to new projects, investments in infrastructure or industrial processes. Engineering education would be decisive for experimenting new theories, testing new methods, and thus forming new generations of engineers.*

*In Portugal, in 1894, enrolled in the courses of the Polytechnic Academy of Porto the inscription Rita Morais Sarmiento (1872-1931) and she will be the first Portuguese woman graduated in Civil Engineering. But marriage and family take her from a career where she uses her new knowledge. In the early decades of the twentieth century, we found women in engineering courses and each decade increases the number of women in this courses.*

*The archival documentation consulted allows us to verify that it was not until the late 1940s that student enrollment in engineering courses increased, especially in chemical-industrial engineering. The number of women in this courses will ground year after year, most of them became teacher having an impact in the diffusion of chemical knowledge. In this project we want to analyze the trajectory of this women and we want to search for some answers to the questions: What activities do they acceded after obtain their diploma? What have change after the II W.W.? The answer to these questions constitutes a study in progress, where the data demonstrate already the obstacles to some professional options, but and give us a perspective about the context of the postwar society and their professional opportunities.*

*La primera mitad del siglo XX en Colombia se caracterizó por fuertes cambios sociales, económicos y culturales, que coincidieron con crisis mundiales tales como la Primera Guerra Mundial, la Gran Depresión y la Segunda*

**Abstract:** *Guerra Mundial. Consecuencias de estas situaciones fueron el desabastecimiento de insumos vitales para la industria nacional y la escasez de personal profesional técnico preparado para atender las múltiples necesidades de una sociedad. Estas condiciones, aunadas a los ecos que llegaban al país en cuanto a los cambios de la condición de las mujeres a nivel mundial, como el sufragismo y el acceso a la educación superior, hicieron que, a partir de los años 20, excepcionalmente, y desde los años 30, con mayor asiduidad, se fueran abriendo paulatinamente las puertas de la Universidad a las mujeres en Colombia. En ingeniería, en particular, no fue sino hasta la década de los 40 que se admitió en las aulas universitarias a las primeras mujeres. Sus historias han sido largamente olvidadas, al punto de que es común que escapen al dominio público las identidades, trayectorias y logros de esas pioneras. En este trabajo se aporta al panorama de las primeras mujeres ingenieras en Colombia, a través del análisis de los datos disponibles sobre las mujeres graduadas en las primeras décadas del programa de Ingeniería Química de la Universidad Pontificia Bolivariana, de Medellín, Colombia; y del caso de las hermanas Rebeca y Guillermina Uribe Bone. Rebeca fue la primera ingeniera del país, graduada de Ingeniería Química en la citada universidad, y Guillermina fue una de las primeras ingenieras civiles del país, graduada de la Universidad Nacional de Colombia.*

**Pioneer Mexican women in Chemistry, Engineering, Mathematics and Physical Sciences**

*María de la Paz Ramos-Lara, Center for Interdisciplinary Research in Sciences and Humanities of the National Autonomous University of Mexico*

**Abstract:** *Although Mexico has a long tradition in higher education that comes from the sixteenth century, the first women who studied a career was in the late nineteenth century. The first woman graduated was Matilde Montoya in Medicine in 1887, followed by María Sandoval in 1904 as a Lawyer. It was until the twentieth century that women began to study Chemistry, Engineering, Mathematics and Physical sciences. In 1906 the first Pharmacist graduated from the School of Medicine (created in 1883) was Esther Luque, who, due to her excellent performance as a professor at the Faculty of Chemical Sciences (created in 1915), received the honorary degree of Chemistry in 1921. The first woman graduated in Engineering Civil was Concepción Mendizábal Mendoza in 1930. In Mathematics it was Enriqueta González Baz in 1944, and the first two women who obtained the degree in Physics did so in 1961.*

Chair: Magdalena Zdrodowska

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VALERY V. SHILOV, SERGEY A. SILANTIEV

How myths are born: John V. Atanasoff, Mikhail Kravchuk and Sergey Lebedev

**Abstract:** *In recent years, in various publications in Russian, and not only in the Internet, but also in scientific journals, statements have begun to appear related to the design of the ABC electronic computer by American scientist John Vincent Atanasoff. They say, for example, that “Atanasoff, as a conscientious scientist, himself admitted that the mathematical basis of ABC computer was the ideas drawn by Soviet mathematician Mikhail Filippovich Kravchuk (1892-1942), who died in the Gulag.” Some other authors go even further and attribute to Kravchuk no less than the creation of the first electronic computer project: “Ukrainian scientist, professor Mikhail Kravchuk created the project of the first computer in the world,” “academician Mikhail Filippovich Kravchuk in Kolyma, being a political prisoner, was the first in the world who developed a theory of electronic computer” (!). Further assumptions are made that his work, in turn, gave impetus to the development of computers in the post-war USSR: “... there is the hypothesis about the existence of still undiscovered connection between the scientific heritage of Kravchuk, who worked in Ukraine, and the first Soviet MESM computer that was developed under the leadership of Sergey Lebedev in post-war Kiev.”*

*This work examines the origin of these myths, analyzes their source – the articles presented by the American scientist I. Kachenovsky. It shows the inconsistency of the thesis about the influence of Kravchuk’s work on the conception design of electronic computer by Atanasoff.*

**Abstract:** *In 1995, two cyberpunk writers penned a manifesto detailing their interest in amassing a media book of the dead. This book would include “the failures of media, the collapses of media, the supercessions of media, the strangulations of media... media that have died on the barbed wire of technological advance.” Though their proposed Dead Media Handbook was never printed, they attracted a community of media theorists, science fiction writers, and self-proclaimed futurists to a short-lived listserv that called itself the Dead Media Project. Their crowdsourced catalog of fossilized media (which included the pigeon post, pneumatic tubes, and Edison’s electric pen) reveals a community frustrated with rampant techno-optimism of the digital revolution who sought to impose a “paleontological perspective” upon contemporary understandings of media. This paper will investigate the previously untold story of how this community resuscitated dead technology to contend with their own “age of crisis”: the loss of a sense of media history surrounding the emerging internet. Mocking the ‘crypto-religious fervor’ of the internet revolution, the manifesto writers called upon the inhabitants of the early web to become more skeptical of the idyllic notion of an everlasting web. This study examines archived Dead Media Project working notes and communications as well as popular writing and interviews from participants in the project. Their work will be situated alongside theorists of media archaeology.*

*What can the Dead Media Project tell us about attempts to understand our relationship with dying, dead, and fossilized technology? In their negotiations of the meaning of media, in their discussions of media palimpsests, in their reworking of the lifespans of media, and in their commitment to media history as doing, this community was engaged in a media archaeological project that helped them grapple with the crises of the so-called digital revolution.*

**Abstract:** *Information is an important critical resource in the present age, which is accelerated by the development of the technologies that has enhanced communication quality and efforts since past few decades. Especially so, in the case of digital era, the consumption of information both in terms of flow and utility has gained expanded scope. No matter, the digital age was viewed optimistically more or less, to bring about drastic changes in what would appear to challenge a bunch of existing established order, functions and operations of the institutions. In the recent past, the digital age has however been zeroed in, as a cause that produces misinformation, alternative epistemic facts, reinforcing belief systems not backed by evidences or simply failure to establish the 'truth'. In other words, the digital age has driven humanity to question their cognitive ability once again to understand and establish what can be believed as 'Truth'.*

*The crisis also named as 'Post Truth Age' gained prominence after its effect got highlighted in the recent past. The effects, rather adverse were noticed considerably in shaping strong political opinions. The effect however can be traced to be not being fairly new, but being present in some form before as well, but the effects being not as rampant or far reaching as today.*

*My paper will trace the concept of the crisis of "post truth age" and what aspect of techno social psychological roots it can be attributed to. Many scholars have pointed that the response of the crisis would include technological solution as well. It has not been amply clear as to what role technology can play to fix the present crisis. The paper will look into, if at all crisis has a technological root and if a technological solution is possible.*

## 5.4 MILITARY TECHNOLOGY I

Chair: Michael Neufeld

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JACOPO PESSINA

Small Firearms and Soldiers' Training in the Sixteenth-Century Europe

**Abstract:** *From the end of the fifteenth century, the massive introduction of small firearms in the European armies changed the soldiers' drill towards a collective system. The new weapons performed their firepower shooting in large units, thus compensating the lack of precision with the high number of shots. For all of these reasons, shooters, both in infantry and cavalry units, should learn to make volley fire. Moreover, arquebusiers should be trained in cooperation on the battlefield with pikemen, which had the role to protect them by cavalry attacks. Scholars have pinpointed the importance of small firearms in the sixteenth-century drill, but they usually underestimate their role in warfare evolution. The more trained units could manoeuvre better during fights: for example, they could change formation, permitting commanders to realize more complex tactics on the battlefield.*

*The paper aims to show how the introduction of small firearms in Europe influenced the soldiers' sixteenth-century training to demonstrate its impact on warfare. Then, the paper will show the evolution of sixteenth-century training, which influenced the birth of new infantry and cavalry formations, and the adoption of the volley fire. Moreover, the introduction of small firearms promoted the establishment of permanent units as a consequence of the needing of training to conduct the new tactics.*

**Abstract:** *At 1030 on July 20, 1866, Austria’s greatest Admiral Wilhelm von Tegethoff sailed into history; commanding a force inferior both in numbers and in quality he inflicted a significant defeat onto the Italian navy in the Battle of Lissa. While Tegethoff’s victory eventually proved to be a hollow one, as Austria had already lost the war which would end less than two months later, his action off the small Adriatic island had a significant impact on the development of naval tactics in the 1860s and 1870s – the decades of the first technological revolution which would shape the naval history of the late 19th c., the ironclad revolution. Tegethoff’s victory was largely ascribed by his contemporaries to the use of ramming tactics, and the Battle of Lissa is usually understood as having a profound impact on both naval design and naval tactics, with ramming coming into the focus of naval thinkers of the 1860s and 1870s. Looking closer at the development of both tactical thinking and naval design however results in a picture that is far less clear-cut; naval tactics in particular were in fact characterised by a considerable amount of uncertainty, a fact that still does not get the attention it deserves. The paper will therefore focus on how naval tacticians in Europe started to consider the implications of applying ramming tactics to a naval battlefield that by the early 1870s was dominated by artillery of ever-increasing range and penetration capability.*

**Abstract:** *During World War One, technology became a major component of the conflict, in the battlefield, in the propaganda, in the global war effort of the populations. It was seen as the solution to the static trench warfare situation, and win the war required to win a technology race. Aviation, as a new tool barely used in a conflict before, took the war in the air, at a level that balloons had not been able to reach. Thus, the key role of planes have been widely discussed in the different fields of history. But the seaplanes, invented in 1910, used by the Navies in the Mediterranean Sea, the Atlantic ocean, the Adriatic Sea, the Channel, the North Sea and the Black Sea is less known. How did this hybrid machine, partly plane, partly boat, develop, and react to different warring contexts, over four years? The question of innovation is a key point to the understanding of the retroactions between the capabilities of the available seaplanes, the choice of the coastal sites to create seaplane bases, and the tactic demands, evolving with the frontline. We propose, in our communication, to show how the inscription of the seaplanes in this conflict shaped innovation for the aircraft manufacturer continuing or starting to make seaplanes during the war, and how these machines, still new and without any real purpose other than sports in spring 1914, were transformed into more and more offensive and innovative weapon in the war for air supremacy.*

6.1 THE DISCOURSE ON PLASTICS - SCHOLARLY PERSPECTIVES AND AN EXHIBITION

Organizer and moderator:

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MARIA ELVIRA CALLAPEZ

**Abstract:** *Plastics are everywhere! we take them for granted, they have helped to improve living standards, hygiene and nutrition around the world. Plastics serve positive functions in sectors as important as medicine (human tissues, organ transplants), transport (cars and ultralight aircraft), construction (insulation), food (smart packaging that monitors food content for signs of deterioration), etc. Plastics will keep playing an increasingly significant role in our lives in the future.*

*Despite the enormous potential of plastics, there are still concerns about its impact on the environment. Plastics are not enemies, on the contrary, they will be more and more the materials for all uses. This roundtable intends to discuss why, nowadays, the plastics have been demonized and to what extension the Plasticophobia impacts the consumption, the economy and, the artistic, architectural, ecological and social life. How historians of technology and science have been contributing for this debate is a central question as well.*

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CAROLIEN ADRIAANSCHÉ

Comment and Guided Tour through an Exhibition

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VALENTINA LIMINA

Technology to Save the Empire: Remedies to Late Antique 'Crisis'

**Abstract:** *The idea of technological, cultural and figurative decline in Late Antiquity has been questioned in the last decades (Bowersock-Brown-Grabar, *Interpreting Late Antiquity*, 2001). Recently, the importance of Late Antiquity as a particular age of flourishing intellectual life and original artistic sensibility has been reassessed (Oleson, *Engineering and technology in the Classical world*, 2008; Rousseau, *A Companion to Late Antiquity*, 2009). In the context of transition, the theme of technology has been investigated and the interest for innovation in Late Antiquity, both on civil and military domains, has been proved (Lavan-Zanini, *Technology in Transition*, 2007). The paper aims to demonstrate that in the fourth and fifth centuries AD the interest for technology not only led to the invention, or discovery, of machines able to correctly solve the problems of the Empire, but it was also perceived as a pivotal matter for the transmission of practical know-how to the new generations. The ultimate goal is to show that even if the perception of crisis fed the idea of an imminent end of time, the confidence in human intelligence never collapsed as Augustine's words proved (*De Civitate Dei* 22. 24). It will be argued that this confidence in technology was a peculiar link between the so-called late antique 'crisis' and the idea of State Salvation. In this sense, late antique technology was perceived by contemporaries as a fundamental requirement to grant Imperial survival in its physical and moral integrity. Thanks to literary sources (*De Rebus Bellicis*, *Epitome de Re Militari*, *Codex Iustinianus*, *Codex Theodosianus*) the paper will analyse some of the remedies suggested to save the Empire and the connection between technology and power. Ultimately, it will be possible to value which of these remedies were found to be utopian, and what kind of technological operation saved the Empire in the complex transition towards the Middle Ages.*

**Abstract:** *The paper deals with the catholic attitudes, uses and receptions of the technological progress in the 19th century Italy, focusing especially on the periodical press and on the apologetical narrative (newspapers, journals, reviews, pamphlets). The technological progress and the myth of the progress characterized the 19th century: Catholics and catholic press could not ignore this process and had to face it. Thanks to the publication of *La bénédiction de Prométhée: Religion et technologie* (1999) by Michel Lagrée, some studies analysed the relation between religion and technology, recognizing religious approaches as several different reactions to modernity. Assuming this perspective, the paper intends to examine the case of the Italian Catholics. Although there was a multiplicity of different positions amongst Italian catholic movement, from the enthusiastic acceptance to the intransigent refusal towards technological innovations, the main attitudes, shared by most of the ecclesiastic hierarchy and press, was a prudent opening, aware of the increasing centrality of science and technology in society, culture, politics, and economics. Rejecting the positivist celebration of the progress, they considered the technological innovation the result of the intellect given by God, inserting it in the providential design. The apologetical discourse intended to satisfy the will of information and update of a public made of catholic readers, to deny the accusation to be hostile to progress, science, and innovation: it needed to conciliate the technological progress with the catholic morals and principles, appropriating, for example, steam and electricity. Finally, the exhibitions, symbol of the positivism, became significant events in order to build and to communicate a catholic approach to the science and technology: catholic apology tried to overturn the perspective of the anticlerical accusation of obscurantism, claiming the fundamental role of ecclesiastic scientists and inventors as much as the catholic contribution to the scientific and technological knowledge.*

**Abstract:** *This study offers an overview of the history of the relations between science, technology and Islamic religion based on Ottoman Turkish-language sources. The distant attitude of the Ottomans to Western science and technology is accepted by Western orientalists -for example by Ernest Renan- as a direct result of Islamic religion by establishing a mechanical causality. This study aims to prevent a reductionist approach by emphasizing the complexity of social structures. The relations established with science and technology in the Islamic world or in the Ottomans were directly related to the Sultan or the Caliph of the period, rather than directly related to Islam. Therefore, the issue is political rather than religious. It always depends on the ruler which epistemic community's paradigm will dominate.*

*Islam was not only a religion, it was a resource that determined legal, economic and moral values and regulated social life. In this respect, all of the sciences, philosophies and technologies imported have been tried to reconcile with Islam throughout history. However, after the eighteenth century, traditional paradigm breaks and the traditional epistemic community (ulama) has lost its power. Thus, the modern epistemic community became stronger with the support of the government. All this shows that the relations between a society and science-technology implies a complex social process and that can't be explained by a single determiner like religion. Thus, for a better understanding we should focus more on the social, political, and economic conditions that gave rise to and sustained science in Ottoman civilization.*

*As a conclusion, the detailed critique of the classical orientalist narrative proves that it is time to abandon it altogether in favor of an alternative narrative that can explain the texts and the facts of history slightly better.*

Chair: Stefan Poser

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VLADIMIR KORENSKY

Introduction of a New Reinforced Concrete Construction Method in Russian Empire

**Abstract:** *As a part of the wide research field on transfer of European knowledge to Russian Empire this paper concentrates on particular aspect of technology transfer. How the unhindered use of technology becomes a public good and even leads to significant results. It describes the introduction and application of a new reinforced concrete construction technology since 1899, which was developed by François Hennebique and promoted by his worldwide active Bureau d'études in Paris. Within short time after its introduction, local engineers in 14 cities in western Russia became concessionaires of Hennebique method and applied it in their constructions.*

*Hennebique's French agent in Russia Paul de Monicourt was the main figure who introduced the method. He established the first office in south-western Ekaterinoslav where he had favourable social and logistical conditions. In this area, he specialized on industrial buildings and bridges. After sharing his construction and calculation methods with the Russian Railway engineers, he lost his exclusivity in bridge construction.*

*Moving his focus to the north, he established an additional office in Saint Petersburg, where he expanded his activity to domes construction of various important buildings. In 1904, he became a member of local construction company, what makes difficult to trace his later activity.*

*The paper discusses the causes and the circumstances for the introduction of the new construction method and the results of its application on built examples in the context of local conditions.*

*This research is based on the material found in Centre d'archives d'architecture du XXe siècle in Paris, on the journal *Le béton armé* published by the office of Hennebique as well as on the contemporary technical literature in Russia.*

**Abstract:** *Temporary housing for workers by TVA in their Villages and Camps serves as an early and seminal template of modern 'mobile living' for families whose economic displacement during Great Depression converted them into economic migrants. The temporary village housing and camps TVA staff designed for workers not only 1) serve as a travelling exhibit of modern life, but also 1) provide technical solutions and templates for fast track construction of housing, 2) explore use of new composite materials and construction techniques, 3) are easily dismantled, transported and re-erected to provide housing at the next site as TVA built successive projects, and 5) provide hope and stability in a time of great uncertainty.*

*While it was not part of TVA's intent the modern mobile lifestyle these villages, along with other government constructed housing showcased provided a template of another sort – a business model for a post-war mobile and modular housing industry that cultivated recreational and economically driven patterns of 'mobile living' and easy migration of entire families between work-sites in the post-war period in the United States. This paper utilizes graphic and text materials on demountable and prefabricated housing development from the TVA archives, as well as archival material on the early development of the post-war mobile homes and housing industry in the USA between 1941-1955.*

**Abstract:** *The conception of the Soviet society as a “repair society” (Obshhestvo remonta, cf. Gerasimova and Chuikina, 2004) has been substantiated in several recent studies that have emphasized the importance of repair in both communist ideology and daily life in the Soviet Union (Siegelbaum 2008, Golubev and Smolyak 2013). While these studies are nearly exclusively based on sources from European Russian part of the USSR, its periphery has received much less attention in terms of the material constitution of state, sociality and daily life. By focusing on Samarkand, a medium sized city in the Uzbek Soviet Socialist Republic, this paper aims at a further geographically and culturally diversifying the concept of a Soviet repair society. It focuses on practices of reconstructing, renovating and repairing houses and apartments as well as maintaining their supply with different infrastructure services between 1960 and 1992.*

*Going beyond state ideology and organized (or even state-sanctioned) repair circuits, whether in amateur clubs or state companies, the paper explores repair practices in spaces of much more limited statehood. For this purpose, it draws on in-depth oral history interviews with owners of houses and apartments that complement archival research in Tashkent and Samarkand as well as a review of contemporary Soviet literature on construction and architecture in Central Asia. Our key argument is that in the multi-ethnic cities of Central Asia, repair cultures were more multi-layered than current works on the Soviet “repair society” suggest as they encompassed or were even reliant on traditional local methods of building and renovating. Our analysis of different living modes and conditions reveals a wide scope of repair practices, some of which being inscribed into the very logic of housing in traditional neighbourhoods, others being restricted to solely mending necessities in neglected state-build apartment houses.*

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XINYUE LI

The Role of Horse Carts Played in Widening the Urban-rural Gap: Tianjin 1949-1965

**Abstract:** *This paper aims to understand the complex role played by pervasively used horse powered machinery, especially carts, in urban-rural relations in China from 1949 to 1965. In terms of the conference theme, this is a local example about geography of crisis, which involves the transfer of such tools from urban to rural areas worsening the rural crisis lasting from 1840.*

*Given priority for urgent industrial freight under the planned economy, downtown Tianjin witnessed a significant increase of carts during the first decade of the PRC while there were never adequate horses for agriculture. In the middle of 1950s, The Technical Innovation Campaign was launched to improve transport efficiency, in which the masses rather than engineers were trusted more to improve carts design. However, new horse powered tools created by rural people proved to be useless as well as a disaster for the equine, which in turn exacerbated the shortage of horses in the countryside. In 1960s, national calls for "Supporting Agriculture" provided an opportunity by coincidence for urban districts to decentralize the horse-drawn vehicles to rural villages, which had been planned to obsolete carts in 1956. And these villages had to absorb those scarred horses which were unable to farm after year-round transport.*

*Based on archives, newspapers, yearbooks and a few memoirs, this paper suggests that the geographical transfer of horse carts from downtown to agricultural areas led to a counterproductive consequence because it helped urban areas extract rural funds to renew transport means, widening the gap between urban and rural areas. And the process of improving the horse powered technology was deeply imprinted with the characters of mass movement in the Mao era.*

**Abstract:** *This paper examines the introduction of the bicycle to the United States' South at the end of the nineteenth century to consider the ways in which multiple interpretations of a new technology both challenged and help solidify the culture of Jim Crow segregation. It argues that the bicycle and the act of cycling contributed to a reorganization of southern racial relations and those racial relations reorganized the bicycle, cycling, and mobility in the South. The meanings and uses of the bicycle were dependent on a feedback loop that comprised a diverse network of actors from racial subjectivities to southern spatial politics to road quality, and finally, to the bicycle itself.*

*For some African Americans, the bicycle presented a technological opportunity to express new and modern freedoms and subjectivities. For white southerners, the fact that African Americans could not only master but excel on one of the quintessential technologies of industrial modernity challenged a whole raft of southern understandings of the capabilities of black bodies in an industrializing world. Prior to the Great Migration of African Americans out of the South during World War I, this intersection of race and technology and the social and political responses to it placed the region on the vanguard of a global modernity seeking to find solutions to the supposed problem of technological mobility and subaltern subjects.*

*Based on published and unpublished material found in archives located in Washington, D.C., Louisville, and Chapel Hill, the paper will demonstrate the ways bicycle technology threatened the social and racial hierarchies of southern society and how the politics of race shaped the production, use, and culture of cycling in the South.*

**Abstract:** *Francoise Vergés' concept of the 'Racial Capitalocene' is critical for rethinking technological histories of the bicycle in the 19th century U.S. and our current moment. In the late 19th century U.S., black subjects tethered themselves to bicycles, technologies of automobility, in part, as a response to the violent coupling of gendered whiteness and mobility on other new transportation technologies, including trains, stagecoaches, omnibuses and streetcars. For them, bicycles were an antidote to the crisis of the white supremacist state. Yet, histories of bicycles fail to situate the technological revolution alongside and central to the crises of racial capitalism and the development of the carceral state. Using Francoise Vergés' essay, "Racial Capitalocene," (2017), in which she critiques the concept of the 'Anthropocene' for its attendant whiteness, I investigate how contemporary discussions about the bicycle as a solution to current ecological crises rely on a misreading of the history of bicycles. I argue that this misreading has grave consequences for the utility of bicycles as solutions to our current crises.*

FRANCESCO GERALI

The Search for Dark Spots. Early development of the Carottage Électrique (1910-1930)

**Abstract:** *Dickey resumes a centenary of petroleum exploration and production. Since the very first years of the petroleum industry, the Cassandras predicting the imminent depletion of petroleum and gas deposits have alternated with the preachers of an incalculable abundance. If we had listened to the first, the negative trend of Pennsylvania wells in late 1870s (which at the time supplied almost the 90% of Western consumption) would have marked the end of petroleum. Little time after, a more careful cultivation of the fields of Bradford (PA) confirmed the discovery of the first classified “Giant” deposit in the world (estimated recoverable equal to 500 million barrels, or 79,000,000 m<sup>3</sup>). Ups and downs alternated between the numerous and impressive wells of Russia and Romania, the epic one of 1901 in Texas, the first huge peak for Latin America happened in Mexico in 1910.*

*These events wronged or justified the two contenders, who in most cases were not even petroleum scientists. Dickey, on the other hand, was, and also a good one, who after a long and brilliant career as a petroleum finder and educator of crops of petroleum geologists summarized a fundamental concept in a few lines. As we will see, the first decades of the world oil sector (the age of illumination described by Williamson in 1959) flourished almost exclusively using more empirical than scientific methods.*

*This presentation aims to contextualize the process of development of one of those ideas, recalled implicitly by Dickey, that between 1900s and 1920s contributed to define new boundaries for the young geophysics of petroleum exploration. This idea is the wellbore Electrical Coring (today, Wireline Log) technology based on the principle of electrical resistivity, and developed through the interplay of geology, mining engineering, physics and electrical engineering disciplines that made possible to determine that the “dark spots” detected could correspond to petroleum reservoirs.*

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**Abstract:** *The report is devoted to the analysis of the energy transition of Cherepovets, which was a typical provincial city of the Russian Empire and Soviet Russia. In the 1910 – the 1920s, there was made a transition from kerosene lighting to electric lighting of the town. The first power plant in Cherepovets was built in 1916, together with a running water supply system. Until 1918, the station served the needs of the water supply system, pumping water from the Sheksna river to the city. After the revolution of 1917, a new power plant provided Cherepovets lighting and the work of industrial enterprises. It was made at the period of the Civil war when the wood fuel crisis was in the country, and fossil fuel deposits were under the control of the White army. The technological choice of the electric system that was done for Cherepovets in such conditions influenced on possibilities and velocity of the energy transition. The electric station worked on wood fuel and generated current with two electric motors and a dynamo-machine. The availability of forest resources in the Russian North determined the choice of wood as a source of fuel. However, almost from the first years of work, this choice showed its inefficiency. There were problems with the delivery and storage of fuel. Next decades, the station operated only at 60% of the design capacity due to the shortage of fuel and the rapid deterioration of equipment. It made the unsustainability of the work of Cherepovets plants and uncomfortable of everyday life for inhabitants. The source base consists of materials of the funds of the state archives of the Russian Federation, the periodic press, and statistics.*

*The work was done with the joint financial support of the Russian Foundation for Basic Research and the Government of Vologda Region, grant number 18-49-350002 r\_a*

**Abstract:** *The role of major societal shocks such as World Wars in consolidating socio-technical systems has been recognized in various literatures (Hughes, 1983; Geels, 2005; Schot and Kanger, 2018). However, these literatures often neglect the paradoxical outcomes of system consolidation where progress along one dimension is accompanied by regress on another. The presentation offers on the basis of archival materials an example of this double movement by analysing the impact of World War II on the Estonian energy system.*

*During the WWI, oil shale mining was started in Estonia to supply St. Petersburg with alternative combustible instead coal. In 1920, the Republic of Estonia decided to start low-temperature distillation to produce shale oil. It became a profitable business in the mid-1930s when Nazi Germany began buying shale oil as fuel for its navy.*

*During the German occupation in Estonia (1941–1944) the Estonian shale oil industry continued active work but the Soviet Union started to produce shale gas in Soviet Estonia in 1945 and sent it by pipeline to Leningrad. Respective technology was developed but in 1957 natural gas arrived to Leningrad.*

*For the survival of the big scale oil shale industry in North-East Estonia, an alternative use was needed. Construction of large oil shale power plants (3200 MW) in the late 1950s and 1960s was a way out from the complicated situation. Thus, as a result of the WWII, a modern centralised energy system like in the West, based on fossil fuels, was established in Estonia. On the other hand, the direction for burning oil shale for energy production marked a qualitative step backward when compared to the production of shale oil or shale gas.*

7.1 TRANSNATIONAL HISTORIES OF MATERIAL FLOWS II

Organizer: Frank Veraart, Stathis Arapostathis

Commentator: Anna Aberg

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SERKAN KARAS

Turkey's Becoming 'Global Plastic Waste Bin': Neoliberal Transformation, Infrastructure and Plastic Value Chains 1970-2019

**Abstract:** *Since the end of the last decade, environmental concerns over the consumption and management of plastics are shifting national policies. These shifts aim to bring transformations towards a cleaner waste-management and minimized pollution in environment such as aquatic ecologies. However, such transnational changes in certain localities impact other parts of the world which are positioned with different roles in global value chains.*

*As far as plastic waste concerned, the most recent remarkable example is of Turkey which has become top plastic polluter of the Mediterranean, following Egypt, responsible for the 18,9% of the waste. Turkey's hunger for plastics—ranks 6th biggest producer— is currently being quenched by the new movements in the global waste economy: a. bans on plastic imports in Malaysia, China and Poland b. demand from the European markets for plastic products originating from recycled raw materials.*

*These numbers are a result of a historical process in Turkey's developmental endeavor in petrochemicals industries, waste-management policies and consumerist cultures. In this research, I want to unravel the enmeshed relations created throughout these three pillars of plastic economy in order to shed a techno-political light into the contemporary Turkey's becoming of 'global plastic waste bin'.*

*Specifically I will analyze the changes in the petroleum politics from the statist paradigm to neoliberalist order which created a robust domestic industry of petrochemicals providing the raw materials for plastics (particularly during 1970s-1990s). I will also answer through neoliberal waste-management infrastructure policies the question of why Turkey has not been so far successful in creating a circular waste economy (only 1% of domestic waste is recycled) and depends on waste imports and production. Last, I want to shed a light in the domestication of daily plastic use in packaging which amounts by far the largest plastics consumption with the European sustainable consumption trends—i.e. demand for products from recycled raw materials— in the background (1990s to 2019). Thus, the research can provide a historical understanding to Turkish state's policy and technology choices in becoming a key country in the global plastics value chain and its environmental burden upon the country itself and the Mediterranean.*

**Abstract:** *Electronic waste (E-waste) observes an unparalleled growth in the contemporary world. However, it continues to be an environmental issue which is yet to be addressed passably and thus, still a concern unversed to a significant portion of the global populace. A recent report by the United Nations University (UNU) estimated that approximately 44.7 million tons of E-waste is generated in the world in a single year, the size of which is equivalent to almost 4500 Eiffel Towers and enough to form a line covering more than 28,000 km from New York to Bangkok and back! A major trepidation in the global E-waste story is the ‘trade’ of obsolete electronic equipment. Although the “Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal” prohibits the transfers of toxic waste from the developed to the developing countries, loopholes of this convention are conveniently explored by the affluent countries to send their E-waste to the low income countries. For instance, significant amount of E-waste finds its way to the global south in the name of ‘donation’. Nevertheless, most of this donated waste is immediately directed to the informal E-waste recycling units, mushrooming in the major cities of countries such as India, China, Nigeria and Ghana among others. Here, E-waste is recycled by the urban poor using perilous methods without any health and safety measures. Our paper is an attempt to address this toxic trade where ‘waste’ from global north acts as ‘resources’ in the global south. A number of instances and experiences are taken into consideration to evaluate the motivations, drivers and challenges of such disposal behavior. Its repercussions in the developing countries are analyzed in detail. We argue that, although subjected to considerable challenges, a comprehensive solution to the present E-waste crisis is only conceivable through responsible environmental and resource-friendly efforts by both the developed and developing world.*

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KATARZYNA PIETRZAK

The Beginnings of Passenger Lifts Technology in Poland

**Abstract:** *Werner von Siemens presented the first lift driven by an electric motor in 1880. However, the installation year of the first devices of this type in Poland is still unknown. Preserved elevators from the beginning of the 20th century are already unique objects. Protecting and maintaining them as per the technological requirements of the time requires recognising the history and values embedded in them. Nevertheless, the lack of knowledge about their location, construction and history makes it difficult for heritage conservation offices to take action in this area. The literature review also shows that the history of the development of lifting devices in Poland is still an unrecognised issue.*

*The primary aim of this presentation is to analyse the lifting industry beginnings and its evolution in Poland, including the first Polish manufacturers like Roman Gronowski and the Jenike brothers. Moreover, the question about Polish contribution to the development of lifting devices technology will be discussed and systematised. Everyday use and supervision of passenger and freight-passenger elevators will also be briefly described. Another issue is the public perception of new devices, and the increased interest in elevators at the beginning of the 20th century. Sources for this analysis include archival and patent documents, individual interviews with people working with those devices, and questionnaire research in technical supervision and heritage conservators offices.*

*The research on lifting devices technology development will be worthwhile for scientists working on the history of architecture and urban planning as well for engineers studying technology development. The history of elevators, as part of everyday life of people living in multi-storey buildings, offers a promising basis for further research into social history.*

**Abstract:** *The proposed paper examines whether the state-of-the-art technology of the contemporary automotive industry is sufficient to meet the challenges of the current environmental crisis. It uses as a starting point the idea that automobility has been connected in the 20th century public discourse with a technological optimism which puts the automobile at the epicenter of a progressive narrative. This narrative has been challenged by the petroleum crises of the 1970s and the successive ecological awareness. Therefore, during the last decades, the automotive industries have included sustainability in their technological orientations. Still, what the consumers are not told, is that many technologies, which are promoted as ecologically sustainable, also create an environmental burden. For example, the electric cars' batteries are not recyclable; thus they produce toxic waste. Moreover, the continuous technological progress, so as the new generation cars are eco-friendly, promotes the idea that the consumers should change their automobile every few years. But even regardless these problems, the majority of the automobiles circulating around the planet are old technology vehicles which are sold in the used-cars market. Consequently, the idea that a sustainable automobility is possible is precarious.*

*The paper draws its conclusions from a postdoc research currently conducted at the National Technical University of Athens. This research is still on a preliminary level and it focuses on postwar automobility in Greece, a country in which, like in other Eastern European countries the private automobiles' fleet mainly consists of older technology second-hand imported cars. The sources include data from the National Statistical Service and the current automobile Press.*

*The paper aims to contribute to the discussion about how a sustainable technology which can meet the challenges of the current environmental crisis concerns –in fact- a small amount of the population worldwide. It also examines the phenomenon that technology is promoted as an omnipotent deus ex machina, to which we seek the solution to the problems that it itself creates, like the environmental crisis.*

**Abstract:** *At the end of 2019, it was announced that the us company Tesla intends to set up a "gigaf-actory" near Berlin as the new European location for the production of its electric cars. In an earlier attempt more than 100 years ago, a company in the German electrical industry tried to produce electric cars on the outskirts of Berlin as well. Taking the history of industrially produced electric cars in Berlin as an example, I want to examine the decisive factors and expectations that promoted or slowed down the develop-ment of the electric car. The focus of my work is on the barley illuminated history of the car production of the „Allgemeine Electrizi-täts-Gesellschaft“ (AEG). Around 1900 the electri-cal industry, especially AEG, played a leading role in the development of the series produc-tion of electric cars in Berlin. Cities were considered the largest markets for this power-train. My work is based on the thesis that around 1900 electric propulsion was inferior to the combustion engine, mainly for technical reasons. Its return more than 100 years later is supported in Germany - in contrast to earlier times - mainly by non-technical factors, i.e. mainly by political decisions in the course of the environmental crisis. However, electric cars today are no longer tied to a narrative of social progress. Instead, this technology should help to deal with the climate change: The electric powertrain is ex-pected to make a significant contribution to reducing CO2 emissions. However, the see-mingly triumphant return of the electric car is contrasted by contradictory political deve-lopments: Even though the switch to the electric powertrain is being promoted by the German government, some new mobility are aiming at a general minimization of individu-al traffic, at least for the inner cities.*

**Abstract:** *Starting from the end of the twentieth century, pneumatic transport has been represented as a possible solution to the pollution caused by traffic, as a way to the reduction of carbon-dioxide emissions, and as an alternative to heavy transport. In other words, it has been depicted as a “green”, “sustainable” infrastructure for the transport of both goods and people. The aim of my paper is to analyze this sustainability discourse in relation with pneumatic transport, basing both on newspaper articles and on articles published in scientific journals in disciplines such as geography, engineering, material science. At the same time, I will argue that the techno-scientific plans presented in these sources can be seen on a line of continuity with utopian representations of pneumatic transport at the end of the nineteenth century. Primary sources from scientific and popularizing publications will be analyzed in order to support this argument. Whereas pneumatic tubes have been playing an important role as (part of broader) communication and transport infrastructure, plans for extensive networks remained utopian, as did plans for the transport of massive amounts of goods or for transferring people. In the twenty-first century, these plans are reemerging and, perhaps, seem less utopian than they did one century earlier: from Elon Musk’s Hyperloop for human passengers to the project of a transalpine underground pneumatic transport network replacing trucks, pneumatic tubes are presented as an answer to climatic and environmental crises.*

*In my contribution, I would like to*

- 1. analyze recent representations of pneumatic transport as “sustainable” transport and related projects;*
- 2. uncover the diverse conceptions of “sustainability” lying behind these representations; 3) compare them to nineteenth-century projects, showing continuities in the longue durée of the (non-linear) history of technology.*

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LAURENCE BURKE

What Kind of Man? Notions of Masculinity in Early Military Aviation

**Abstract:** *In The Sky as Frontier, David Courtwright borrowed the framework of American Frontier Studies to describe the state of civilian flying in its earliest years as a “Type I frontier”: populated almost entirely by youthful men, eager to demonstrate their masculinity before their peers through risk-taking. In 1914, the U.S. Congress passed a law reinforcing the notion that aviation was for those who could afford (or sought out) risk when it restricted Army flight training to unmarried men under the age of 30. Using the record of the hearings leading up to the 1914 legislation along with a variety of archived letters between aviators and would-be aviators on the one hand, and various U.S. Army and Navy authorities on the other, this paper will explore attitudes toward who should and should not fly, exposing a division between those closest to military aviation and those with only indirect knowledge of the risks it entailed. The latter group, which included Congress, believed flying to be dangerous: reserved only for young, unmarried men. In contrast, at least one aviation chief explicitly desired married men because they would not take unnecessary risks in the air (characteristic of a “Type II frontier”). Actions of the flyers also indicate that they disagreed that married men should not fly. These differing attitudes meant competing expectations of what kind of man would make a good military pilot, and thus, what kind of masculinity would come to be associated with the technology of military flight*

**Abstract:** *During the 1950s, the US army developed the 106-mm recoilless gun, using a propellant having 6% of chemical stabilizer (M26), higher than the usual 0.5%-2%. Working on my MSc in the 1980s, I reduced the stabilizer to 3%, believing that M26 would still be stable, although unknowing the reason for the 6%. The 3% M26 showed long-term stability, in applicable tests.*

*Later, the background was found in a released US army's publication: In WWII, the army developed small recoilless guns, using a low performing propellant (M10), producing gas (mixture), having temperature of 2700°C, sufficient not to erode the bore; A better propellant was sought for the 106 mm. M26 and two more candidates, each containing some 6% stabilizer, were tested. Good stability was prized in the publication, but M26 was chosen due to best performance and acceptable erosion. In gun tests, M26 gave the same exit velocity as M10, at the same charge weight, but with 15% lower maximal pressure. Although not mentioned, the high performance was apparently due to M26's significantly higher "Force", a thermochemical parameter. A higher Force indicates a higher performance potential. Force increases with temperature and certain gas qualities. The 6% of stabilizer gas (in the gas mixture) promoted such qualities, while helping to reduce temperature, nearing M10. The M26 was probably formulated, after calculations showed its high Force and low gas temperature.*

*In the HoT context, the calculation method was likely from WWII, introduced by a group, led by Dr. J. Hirschfelder, (University of Wisconsin). Working in the new civilian NDRC, their mission was to provide understandings on erosion and high velocity guns. Analyzing vast firing data with computers, their 1942 highly confidential method, allowed developers to easily and accurately calculate Force, temperatures and gas composition, based on formulation constituents. Field tests were much reduced.*

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ACHIM KLÜPPELBERG

Combining Old Hydrological And New Nuclear Tradition. Energy complexes as the solution to Soviet electricity scarcity

**Abstract:** *This paper investigates the innovative juncture of hydropower and nuclear engineering tradition in the form of joint energy complexes in the Soviet Union in the 16-year-period of 1970-1986. Essential constituents of engineering culture in the Soviet pre-Chernobyl nuclear era will be highlighted.*

*During this period, the USSR tried to stimulate its economy with cheap electricity to counter economic stagnation. In this situation Communist politicians brought forth a grand-scheme nuclear agenda. This agenda encapsulated the civil nuclear industry as the very symbol of societal progress. Its promise of abundant cheap electricity would re-fuel the ailing economy, show the world the technological strength of the country and proof to the population that indeed further steps were being taken. Soviet nuclear decision-makers envisioned the creation of energy complexes, in which a nuclear power plant would provide the energy grid's baseload, while accompanying hydropower plants would contribute the peak-demand-regulation. These complexes were planned to be huge (5-10 GWe) and obvious lighthouses for Soviet imaginaries of advancing towards Communism. By thus combining the older hydrological with the newer nuclear tradition, these energy complexes signified a unique Soviet approach to coping with electricity shortages.*

*The paper makes use of new archival material to trace the ways Soviet nuclear and hydraulic engineers together created some of these complexes – and how they thereby also transformed the Soviet Union's natural environment. Archival Planning and projecteering documents from Gidroproekt as well as central-planning material from the Ministry of Energetics and Electrification provide the basis of this presentation. Gidroproekt in particular brings together the hydraulic and the nuclear tradition and will therefore be a key source.*

*Additionally, systems approaches and further theoretical concepts engaging human societies, material and natural environment will be discussed to reflect upon a proper analysis of the new-found archival material.*

**Abstract:** *Most nuclear power plants are dependent on water. Cooling water pumped from a river, lake or sea serves to generate electricity and to prevent a core meltdown. Yet, the importance of water technologies in nuclear power plants stands in sharp contrast with the lack of attention they have received from historians of technology.*

*This paper studies the role of water-related technologies in the development of nuclear power. In doing so, a systems-approach, and more specifically Thomas Hughes' concept 'reverse salient' will be used. Hughes proposed this military term to analyse how certain less-developed parts of an energy system can limit the overall development of that system. By looking at engineering and policy discussions within the International Atomic Energy Agency, Euratom, and the Atoms for Peace program, this paper shows that many problems in scaling-up nuclear reactors and ensuring nuclear safety were water-related. Engineers relied on 'conventional' hydraulic and thermodynamic cooling technologies, such as turbines, condensers, valves, pipes, pumps, tubes, and cooling towers.*

*However, these 'conventional' components continued to cause accidents, such as steam explosions, loss-of-coolants, and pipe breaks. These nuclear accidents therefore fit in a longer history of water or steam-induced workplace accidents that goes back to the 19th century or even earlier. It is argued that these technologies constituted a 'reverse salient' in the development of nuclear power. On a more general level, this paper shows the need for an envirotechnical approach to nuclear history, and especially nuclear safety. It also shows the necessity of a more long-term narrative of nuclear power and a reflection on what is 'nuclear' in a nuclear power plant and what is not. This kind of 'shock of the old' has already hit many studies of technologies, but for nuclear there is still a lot of work to do.*

**Abstract:** *This presentation shows the importance of solar energy in some West African countries in the aftermath of independence in the early 1960s. The aim is to observe the ways in which the States, with the help of the United Nations, used this energy to meet the environmental and energy challenges of the 1960s. This history of technology based on solar energy in Africa, the role of the United Nations and the environment in the 1960s offers a new, original and as yet little-known perspective in the history of technology.*

*My research is based on the archives of the United Nations, the Economic and Social Council (ECCOSOC) and the Economic Commission for Africa (UNECA), as well as private archives, to which I added the contribution of the French, Malian and Senegalese national archives. These documents illustrate the introduction of innovative techniques in the region. For example, Senegal created the world's first thermodynamic solar pump (1962). As for Mali, it formalized the Solar Energy Laboratory (LESO) as early as 1964, while Niger created the Solar Energy Office (ONERSOL) in 1965 in collaboration with the United Nations. Water heaters, distillers, dryers and solar pumps multiplied in the region. These developments meant to respond to the dependence on wood and fuel in these States, and to the deforestation and desertification that affected the region from 1967 onwards. These techniques were multiplied in other countries in the region, including Burkina Faso (1971), before the phenomena spread to the whole of West Africa in the 1970s following the monetary, energy and environmental crises of the early 1970s.*