

Tuesday, 23 July

09:00—10:30

T1A Transportation: from steam power to the security lift

Location: Room 137 (A)

Organiser: Program Committee

Chair: Bruno Navarro

T1A-1 The Dublin Tramways: Wayfinding technologies in the early Twentieth Century

Mr. Glen O'Sullivan

Trams passed one another, ingoing, outgoing, clanging

James Joyce, *Ulysses* (London, Penguin Books, 1992) p.37.

At the turn of the Twentieth Century, the cacophonous sounds of the Dublin Tramways were a regular infiltration on the ears of the common urban dweller. The network manoeuvred over forty-one miles of track carrying over eighty thousand customers per day. The electrification of tram systems in major European cities marked a significant change in the way that cityscapes were organised^[SEP]. Subsequent to the implementation of Dublin's tramways, there was of course a clear disparity between the ways in which the city's inhabitants used to travel. Rituals that the citizens customarily, infrequently or possibly underwent were now altered. Thus, following its introduction alternative technologies were introduced not only to encourage use and make getting around easier, but more importantly to make each tram route distinguishable from one another. Great design efforts to achieve this can be observed in artifacts like the tram's destination boards, rocker-panels with pointing manicules, different colour-codes and contrasting symbols, some of which were unique to the British Isles and only ever seen elsewhere in Cairo. For instance, in 1904 due to the high incidence of illiteracy in Ireland, pairs of removable masonic-like symbols, held up by two metal prongs were attached to both the front and rear of each tramcar. Many of the shapes like the shamrock and the Maltese cross resonate with the language of Celtic revivalism and nationalist discussions of "Irishness" at the time. Similar to the way in which a mason's membership of an organisation is made apparent by the symbology of their signatures; in a deliberate effort to give clear evidence of their origin, each of these figurative and navigational supports were relative to one single terminus. These powerful wayfinding technologies reminded the user of the particular turn-angles of that route, the lengths and stops of parts of that one journey, the directions of motion, and even the landmarks encountered while on that specific course. Furthermore, by bestowing a separate emblem upon each route, each course of direction had now been granted its own abstract identity.

Sources: I have used primary and secondary sources and have drawn from a range of archives, including the National Transport Museum, the Irish Railway Records Society, the National Library of Ireland, the Historic Maps Collection in University College Dublin and the Map Library in Trinity College Dublin.

T1A-2 Steaming Privately vs. Publicly: Power Dynamics for Introducing the First Steam-Powered Vessels

Mr. John Laurence Busch

In 1807, the American Robert Fulton created in New York City the first commercially successful steamboat, proving that it was possible for humans to use an artificial power to alter a person's location to practical effect faster than by natural means. As such, steam-powered vessels may be considered the first "high technology" in history.

Thus, the first introduction of this first high technology was done by private interests. But it didn't stay that way. The obstacles to be overcome—and the barriers to be broken—were simply too great for private interests to do it alone. And furthermore, some of the purposes to which these new-fangled contraptions could be put were not particularly befitting of private enterprise. So from the earliest days of this revolutionary technology, one of the great questions was:

Should a particular steam venture be a private endeavor, or a public one?

This paper and presentation will analyze how the power dynamic played out during the introduction of 1st and early-2nd generation steam-powered vessels (1807~1825) in North America and Europe, both nationally and internationally. Of particular focus will be an examination of which power base (private or public) moved first, and why, and under what circumstances did one power base seek help from the other. The result will be a form of techno-power matrix that will suggest that when new high technologies are introduced, certain behaviors and outcomes are to be expected within a given society's power structure, and might even be predictable.

Sources include both manuscripts and historical newspapers from a wide variety of archives in North America and Europe.

The presentation will close by placing steam-powered vessels in the context of other high technologies, illustrating that this matrix could be used to examine power structures for the other time-and-space-altering inventions that followed.

T1A-3 Historical lifts in Poland - conforming the historical lift mechanisms to the changing security requirements and regulations.

Ph.D. candidate Katarzyna Pietrzak

At the 45th ICOHTEC Symposium in 2018, the main aim of the author was to pay attention to historic lifts as a valuable cultural heritage. This time the main purpose of the paper is how the development of lifting technology affects the shape of everyday life. It is associated with searching for solutions for enhancement of safety of vertical transport. The inventions like the first elevator driven by an electric motor were the answer for the urban space problems. Thanks to them building high-rise buildings and skyscrapers became possible. For years they have been used by people in factories, public and residential buildings. They are a document of history that brings closer the everyday life of the inhabitants of industrialized cities.

Many publications devoted to the history of technology in the area of modern Poland have been written. However, the issue of the development of the construction of lifting devices has not yet been thoroughly researched or published.

Although for the last two decades many valuable historical lifts in Poland have been removed and destroyed there are still a lot of preserved ones. The knowledge of maintaining, repairing and conforming the historical lift mechanisms to the contemporary security requirements and regulations is rare. Those devices present the subsequent stages of technical development and they are also our cultural heritage. That is why it is so necessary to find out where are the historical elevators in Poland, in what kind of building they were installed, how they work and how to repair them. Were the elevators, in fact, luxurious equipment and a sign of wealth? Based on research results, an attempt will be made to characterize the stages of development of lifts construction. In Saint-Étienne it was said that it is important to involve technical universities and contractors. Now it is possible to present the result of the research.

T1B The State: Energy, Power, Technology, and the Environment I

Location: Room 138 (B)

Organiser: Anthony N. Stranges

Chair: Anthony N. Stranges

Commentator: Anthony N. Stranges

T1B-1 The Present and Future of Solar Energy

Professor Anthony N. Stranges

Solar energy's development as an appropriate technology and a renewable energy has remained a somewhat unfulfilled promise. A breakthrough appeared close in the mid- and later nineteenth century with the solar engine researches of scientists and engineers. Two events, the discovery of large petroleum deposits and their economic transportation, quickly changed the energy picture and ended the most promising solar projects. A century later, 1950s-early 70s, solar energy, an energy as old as the universe whose roots reach back to ancient times, experienced a revival. It began to achieve a degree of general acceptability, thanks largely to the pioneering work of a few solar prophets who contributed to the development of solar cookers and stills, and to photovoltaics.

Solar scientists in the 1950s-early 1970s accepted that neither government, industry, or university had made a long-term commitment to solar development, other than photovoltaics for the space programs. The lack of commitment has continued in the 2000s. As a result, solar energy enjoyed brief revivals during times of crises only to face long periods of neglect once the crisis ended. Nevertheless, the invention of improved solar apparatus and advancement of solar science and technology has remained the motivating force behind solar programs and the commitment of scientists to the future of solar energy. Solar energy investment accounted for more than half of the 2011 global renewable energy investment, or \$147 billion, a 52 percent increase resulting mainly from strong demand for rooftop photovoltaic installations in Italy and Germany, small-scale photovoltaics in China and the United Kingdom, and large-scale concentrating solar power (CSP) installations in Spain and the United States.

The United States invested \$30 billion, 15 percent increase, in 2015. Global investment in solar energy continued to increase in the 2000s but not as significantly.

T1B-2 Robert Moses and “the Other Niagara”

Professor John B. Stranges

His admirers called Robert Moses “America’s Master Builder.” No one else could lay claim to having built thirteen bridges, 416 miles of parkways, 20,000 acres of parkland, 658 playgrounds, 150,000 housing units, the Lincoln Center for the Performing Arts, the United Nations headquarters, and two giant hydroelectric projects on the St. Lawrence and Niagara Rivers. Even his most famous critic, Lewis Mumford, conceded that for more than forty years, from the 1920s to the 1960s, Moses’ “influence on the cities of America was greater than that of any other person.” Safely entrenched in multiple appointive offices, Moses became both a brilliant visionary and a destroyer of neighborhoods, a bifurcation that haunted him for much of his career, particularly in its later years.

This paper examines a critical but neglected part of Moses’ legacy: the discrepancy between Moses’ promise to use electronic power to rescue the Niagara Frontier in upstate New York from further economic decline and the substantial and irreparable damage to the environment brought on by the power project that still bears his name. Indeed, the region lost an important part of its physical heritage. And the economic benefits expected from low-cost electric power and the opening-up of remote sections of the region never appeared.

The major published works on Moses focus almost entirely on the physical and cultural changes Moses visited on New York City. This paper, focusing on environmental damage in upstate New York, fills an important omission.

T1B-3 The Reaction of the Soviet Power to the Chernobyl Disaster

Dr. Kamil Dworaczek

In my paper, I will investigate the reaction of the Soviet authority to the Nuclear Power Plant disaster in Chernobyl on the 26th of April, 1986. To date, no one has shed sufficient light on this problem and there are also no published works that make reference to accessible Soviet documents on this topic. I managed to gain access to some declassified documents gathered in Fond 89, located in RGANI in Moscow (Russian State Archive of Contemporary History), as well as access to the protocols of Operation Group of the Central Committee of the Communist Party of the Soviet Union. This group, headed by then Prime Minister Nikolai Ryzkov, seems to have played a major role in the decision making process following the accident in Chernobyl. The aforementioned documents and existing literature on this subject will be the basis for my paper. In my presentation, decisions made by authorities in the crucial period directly following the accident in relation to the reactor fire, decontamination of polluted area, as well as the protection of the people's health and life will be assessed. Finally, information policy in the USSR and abroad will be discussed. According to the information that circulated, the key mistakes that were made, particularly in the initial hours and days, were as a result of a policy of secrecy and a reluctance to provide reliable information to the domestic and international public. It appears the main reason for the lack of quick and decisive actions could be attributed to an underestimation of the scale of the disaster by relevant authorities. This underestimation was mainly influenced by the false reports which had been delivered by the management of the power plant. Nonetheless, when the Soviet authority realized the aftermath of the accident, it took concrete steps to prevent further escalation of the situation.

T1B-4 Energy Security - Current and Future Trends

Professor Elena Helerea

The start of the digital age in the mid-twentieth century marked the beginning of an exponential global growth in energy demand, which according to different forecasts for the near future, will reach 599 EJ in 2020 and 657 EJ in 2025.

Multiple challenges, such as energy scarcity, global warming and commodity price fluctuations, led to World Energy Council drafting in 2009 of the "Energy Trilemma" agenda, with the specific objective of balancing between the three dimensions of energy sustainability: energy security; energy equity; environmental sustainability.

The energy security pillar of "Energy Trilemma" has gained increasing importance on the world's political agenda, due to the risks of energy supply disruptions, the accelerated shift of energy trade flows of energy to world markets and, associated, increased energy import needs, price fluctuations, and geopolitical risks.

The aim of the current paper is to describe diversity of approaches to energy security and how the concept of energy security has evolved across time, to structure energy security indicators used by different institutions and papers, and to discuss several case studies regarding the role of the state policy in the design of energy security.

The documentation was grounded in a series of government reports, scientific journals and books. Particular attention was paid to the reports of International Energy Agency, World Economic Forum, and World Energy Council.

The paper shows that energy security is not only the ability of the energy systems to supply energy to consumers under reasonable conditions and acceptable prices, but also is the system ability to resist potential disturbances arising due to technological, natural, economic, sociopolitical and geopolitical reasons. The evolution and trends of the dimensions of energy security, summarized into the following categories: energy availability, infrastructure, energy prices, societal effect, environment, governance and energy efficiency, can be used in energy policy regulations.

T1C Technology & Disability 1: access – emancipating or limiting technologies

Location: Room 141 (C)

Organiser: Magdalena Zdrodowska

Chair: Magdalena Zdrodowska

T1C-1 Disability and (dis)empowering modern technologies? The case of blind translators.

Dr. Wojciech Figiel

Ever since translation and interpreting were taught in Poland, there have been many successful blind translators and interpreters. Some of them have been working for public institutions (both Polish and EU), and some in the private sector. However, very little attention has been devoted to their working conditions. Particularly, how technologies, both in the past and at present, have been changing the way such translators and interpreters have been working. The paper is based on fifteen in-depth interviews with translators and interpreters from Poland conducted between 2014 and 2016. Due to the age-diverse sample of

participants, three periods based on available assistive technologies have been isolated: the analogue period (up to c.a. 1990), the transitional period (from c.a. 1990 to c.a. 2005) and the current, digital period. The presentation will include detailed description of challenges and opportunities faced by the respondents working in each of these periods, with particular emphasis on accounts of analogue period and transition into digital technologies. The theoretical framework will be that of Pierre Bourdieu's theory of capitals. It seems that there is a growing gap between the volumes of embodied and objectivised cultural capital indispensable for sighted and blind translators. The more technologically advanced the world of translators becomes, the more surplus technologies have to be mastered by the blind. And some of the digital tools which have become a blessing for sighted translators are hardly accessible for the blind. Thus, it is argued that modern technologies, far from eliminating the need for additional volumes of cultural and social capital, have actually aggravated it. Unless digital translation tools and settings are made accessible blind and low sighted translators and interpreters will continue facing exclusion from the labour market.

T1C-2 From Braille code to smart book readers: technology as a tool to reading emancipation of visually impaired persons.

Ph.D. candidate Kamila Albin

Books have played an enormous role in the lives the blind. This is because visual items, such as photos, films or paintings, are inaccessible or are only partially accessible for them. Until 19 th century, even books were accessible mainly through public lecture for the blind. This situation started to change in 1825, when Louise Braille presented the Braille code. This 6-dots writing and reading system has given the visually-impaired persons (VIPs) the opportunity to train and work as professionals. However, in the current information society, the existing book collections printed in Braille are not enough to eliminate the informational exclusion. In this paper I would like to present the development of ICTs which help the VIPs to access information, with particular emphasis on books. How technological progress change the way of Braille code usage. Is it a modern form of accessing books, or, as some people put it, just a vintage way of accessing print? There are alternatives, such as audiobooks or books in DAISY. Which of these alternative reading materials are the most preferable and why? Which devices are used by the VIPs to read books? To illustrate these changes, I will present a field study that I conducted among the blind, including expert interviews with the librarians working in the libraries for the blind and low sighted.

T1C-3 Exoskeletons and the Imperative of 'Normal' Walking: A Recent History of Technology, Mobility, and Disability

Ph.D. candidate Miryang Kang

Exoskeletons, generally understood as a type of wearable machines for facilitating the movement of limbs, are a recent addition to the list of assistive technologies and have shown intensive development for the last several decades. One of the purposes of exoskeleton development is to rehabilitate and assist the disabled by fixing their 'pathological' gaits into 'normal' ones. Researchers and promoters of exoskeletons expect this emerging technology to free paralyzed people from wheelchairs and let them walk normally, which will presumably help the disabled enjoy the same everyday life as the abled. In this paper, I argue that the promise of exoskeletons to make people walk again is an attempt to rebuild the disabled into 'fully' human. Based on exoskeleton patents, science and engineering journal articles, and textbooks of biomechanics and gait analysis, I first demonstrate how the exoskeleton systems reduce walking into a scientifically defined pattern of gait, while disregarding the notion of

walking as a multifaceted mobility that encompasses not only joint movements of hips, knees, and ankles but also rambling and socializing with other people. Scientific knowledge about normal gait and its materialization in exoskeletons design, I argue, naturalize the ideology of uprightness and pathologize other kinds of mobility of the disabled, such as sitting in wheelchairs. Within the framework of exoskeleton development, disability is treated just as an essential trait against which technologies must be employed to restore a normative mode of mobility, that is, walking. However, these assumptions and practices fail to acknowledge that walking is not the essential mobility to be a human and exoskeletons can only work well within carefully designed and maintained environment.

T1E 14th Annual Symposium of the Social History of Military Technology

Location: Room 147 (E)

Organisers: Bart Hacker and Ciro Paoletti

Chair: Ciro Paoletti

T1E-1 The Classical Greek Trireme: A Warship without a Future (In French)

Professor Jean-Nicolas Corvisier

Le pouvoir maritime athénien d'époque classique repose sur la trière, navire de guerre d'origine extérieure (perse ?) mais perfectionné par les Grecs. Sa technologie de fabrication (assemblage par tenons et mortaises et sur bordé premier), la diversité des bois utilisés, sa technique de calfatage avec utilisation du vermillon et la structure des 3 rangs de rameurs en quinconce permet d'atteindre une vitesse considérable. Mais les contraintes subies par les lames du bordé et la fragilité du mortaisage qui oblige à resserrer les ceintures, la hauteur d'un navire à fond plat, la longueur de la coque et sa faible largeur, rendent la trière sensible au roulis et au talonnage. Fait pour le combat, le navire est fragile et n'a que de médiocres qualités nautiques. Aucune véritable amélioration n'a été possible. Les modifications n'ont concerné que les éperons et les bossoirs. De plus, le navire ne pouvait être utilisé que pour une seule tactique : l'éperonnement, et, dans le cas d'une expédition navale d'envergure il ne supprimait pas le recours aux types de navires antérieurs ce qui rendait nécessaire, hors le cas d'une bataille ponctuelle, le recours à toute une flottille. Enfin, son coût élevé et l'entraînement considérable qu'il exigeait ne pouvait se concevoir que dans le cas d'une thalassocratie. Il devenait donc inadapté à l'époque hellénistique dans laquelle le navire de guerre devait couvrir de longues distances et, de plus, être aussi un transport de matériel et de troupes, et, par l'abordage, un lieu de combat. Faute de pouvoir faire de la trière un navire à tout faire, faute de pouvoir augmenter la vitesse et en changer la structure, il fallut abandonner le principe un homme-une rame et concevoir des navires moins rapides peut-être, mais plus gros, plus solides et susceptibles d'accepter l'artillerie à torsion. Dans le monde nouveau des Etats territoriaux, l'abandon de la trière, sauf pour des missions précises, était donc inévitable.

T1E-2 Firearms and militias in Italy: from an individual to a collective drill system. The case of Lucchese militias, 1400-1600

Researcher Jacopo Pessina

The introduction of small firearms in European armies at the end of the fifteenth century impacted soldiers' drill. These new weapons were inaccurate and had a slow rate of fire. Arquebusiers compensated by forming large units to deliver a high volume of fire. All of this lead to change individual training systems into a collective one: arquebusiers learned to fire in volleys and to cooperate with pikemen, who protected them from cavalry attack. This paper

demonstrates that the introduction of small firearms influenced militias' drill system in the Republic of Lucca between 1400 and 1600. During the fifteenth century, the Lucchese government organized periodical shooting competition in order to keep maintain crossbows efficacy. The institution of pike-and-shot militias, as a consequence of harquebuses' introduction, changed the infantry training system. From the sixteenth century, professional officers were responsible for drilling militiamen on the tactics and the use of weapons in weekly training. Lucca, one of the first Italian states to adopt pike and-shot militias, maintained militias from the end of Middle Ages to the Early Modern era. This type of drill influenced also the establishment of permanent militias: pike-and-shot units needed a lot of training and so could not be raised in a hurry. Moreover, in order to develop esprit de corps, necessary to unit cohesion, Lucca adopted such methods as involving local élites in company management and composing squads with members of the same family.

11:00—12:30

T2A The State: Energy, Power, Technology, and the Environment II

Location: Room 137 (A)

Organiser: Program Committee

Chair: Daniel Zapico

T2A-1 Energy politics in Greece: the lignite case

Ph.D. candidate Domna Iordanidou

In 1899 in the 1st issue of a technical magazine called “Archimedes”, lignite appeared as an antidote to the excessive logging. At that time imported coal and in the Interwar period imported coal and oil were used to meet the energy needs of the country. During the two World Wars the production of lignite increased in order to cover the local needs. In the meantime it was used even in order to produce electric energy for some local electrical enterprises. It was more of a theoretical problem in that period. During the II WW studies were undertaken by the National Bank of Greece concerning the electrification of the country. After the war and with a civil war still on, the Marshall Plan arrived to provide Greece with the financial aid needed. In order to promote the reconstruction of the country they took under consideration the problem of the electrification as well. A study was assigned to a NY company, EBASCO Services Inc. The American planners promoted the establishment of hydroelectricity and lignite projects. That led to the creation (August 1950) of a national electric network, DEI (Public Power Corporation). It was after the oil crisis of 1973 that the percentage of the lignite used, increased. Today Greece makes part of a common EU project called “Coal regions in transition”. For this paper I have used mainly technical magazines, the Official Gazette of the Greek Government and relevant literature. Conclusively, in a period a little longer than a century, the lignite came to assist with the energy problem of Greece every time there was a crisis, either war or other, and now as it seems is going to be abandoned for good.

T2A-2 Will the Idea of a Cooler Climate Wither Away?

Researcher Petter Wulff

If there are two or more theoretical uncertainties about how to explain a natural phenomenon, those uncertainties are supposed to be resolved as more and more measurements are made.

This narrowing down of theoretical options doesn't quite seem to apply to the field of Earth's climate. There is the established theory predicting rising temperatures due to an accumulation of carbon dioxide and other greenhouse gases in the atmosphere. But there is also a contrary idea predicting a cooler climate. This situation is rather amazing, considering the enormous and ever increasing amount of data that has come from earthbound (weather) stations and satellites. It is also a matter of concern with regard to which countermeasures to pursue.

The presentation will look into the techno-scientific arguments behind the existing opposition to the greenhouse theory. Comparisons will be made with earlier opposition ideas or theories, not least the Flat Earth Theory, which was developed in the 19th century, but is amazingly alive despite the introduction of long distance flying and satellites. In fact, themes like "Airplanes" and "Intercontinental Ballistic Missile" are debated on the The Flat Earth Society's homepages.

Still, when it comes to political agendas and world policy, the flat earth idea seems totally marginalized and without influence. Will that be the fate of climate cooling as well?

T2A-3 Power, Tension, and Resistance. Electrifying Canada's Industrial Capital, 1890-1930

Graduate student Clarence Hatton-Proulx

In this paper, I document the ways in which the introduction of electricity in the urban context at the turn of the 20th century has been the source of numerous conflicts, and how these conflicts have been partly addressed by the invisibilization of the electric system. I focus on the case of Montreal, Canada's then industrial capital dominated by the private monopoly of the Montreal Light, Heat and Power company, but this presentation's aim is to spark a discussion on similar studies carried elsewhere in order to establish international comparisons.

I present the major conflicts around the electrification of Montreal, addressing the themes of expropriation, nature protection and destruction, risk, and accidents. My sources come mostly from the *Montreal Light, Heat and Power* archival fonds and from newspapers and journals published in Montreal and in North America from the 1890s to the 1920s. My method is qualitative: I analyze court documents, meeting minutes, annual reports, and newspaper articles to understand how the introduction of a new envirotechnical system in the urban context has been contested, showing in passing how power, far from being top-down and immobile, is fluid and distributed.

I argue that these conflicts — around competition, pollution, accidents, breakdowns, and the grid's spatial layout — pushed the electricity sector to invisibilize its operations, partly under pressure from the municipal government. Electric central stations were moved from the city's core to its fringes. Their gigantic turbines were camouflaged behind neo-classical facades. Power lines were buried. These actions rendered the supply of electricity, and of energy more broadly, magical by masking the link between production — with its important environmental impact — and consumption, which would grow exponentially in the following decades.

T2C Technology & Disability 2: inventing against normalization

Location: Room 141 (C)

Organiser: Magdalena Zdrodowska

Chair: Jan Stasienko

T2C-1 Multimodality in the Digital Environments of Deaf Education (DE2)

Lecturer Michael Skyer

Deafness is unbound by geography. Deaf people constitute a heterogeneous, globalized ethnic minority who are singularly linked. Often thought to be rendered powerless by disability, deaf people generate forms of power that disrupt conventional ontology and epistemology by way of divergent adaptations of visuospatial language modalities. As creators and users, deaf people have positioned themselves at the cutting-edge of innovation by developing and repurposing digital technologies to secure insurgent power in the face of sociopolitical oppression. This paper establishes digital environments of deaf education (DE2) as an object of study. Research reviewed in this study (Bauman & Murray, 2014; Thoutenhoofd, 2010; Young and Temple, 2014), demonstrates that multimodality is a critically important but undertheorized concept related to power in deaf education. The paper reviews multimodality theory, entrained as a lens to examine DE2. Findings are subdivided into three categories: (1) the purposes for which DE2 are used, (2) the practices constitutive of DE2, and (3) the characteristics of learners and educators within DE2. The paper closes by examining DE2 exemplars via multimodality.

This paper contextualizes multimodality theory in digital-epistemological paradigms and analyzes their combined effects upon operations of power in deaf pedagogical practices, including how knowledge is created and shared by deaf people using digital technologies and pedagogical practices derived thereof. This investigation examines how technosocial tools are embedded in a nexus of historical, social, political, and educational changes—at key times, deaf people effectuate change with celerity. This paper argues that theoretical deaf research is clarified by multimodality; likewise, multimodality benefits by considering deaf ontologies/epistemologies. Converging domains illuminate the dynamism and synergy of technosocial changes in history, and contributes to literatures on the history of technology by documenting complex, interdependent relationships between digital knowledge modalities and the deaf users who drive their development.

T2C-2 Reusing as inventing: adoption of teletypewriters (TTY) by the American deaf community

Dr. Magdalena Zdrodowska

At the turn of the 1950s, the offices in the US gained access to new communication devices, which caused problems with the storage and disposal of the old equipment – the teletypewriters (TTYs). What used to be a cutting edge appliance in the 1930s, became a very expensive garbage merely 30 years later. The burden of TTY owners became, however, a chance to solve a long-lasting problem of the deaf community: the lack of access to the telephone services. It turned out that hacked TTYs are the perfect interface for deaf communication over the regular telephone network.

I will investigate how the deaf community adopted the TTYs, and point out the impact of collective repair and reuse practices on the economies, dynamics, and emancipation of this group. I will argue that in the case of excluded communities practices of repairing and reusing may be considered inventing.

I will concentrate on:

transition of the obsolete TTYs from the office users to the deaf community; the role of the deaf activists-tinkers-enthusiasts in re-inventing the TTYs as telephone technology for the deaf; networks of knowledge; strategies of knowledge and skills sharing, especially on the self-guides and workshops provided by deaf organizations, that aimed at creating the system of local TTYs maintenance and repair specialists; emancipative impact of this obsolete equipment on the deaf community.

TTYs revolutionized the communication of the deaf people in the United States. These antiquated machines handed on with relief to the deaf became a symbol of access and independence. The history of their adoption suggests that repairing and reusing may in fact be inventing. What is more, it may show that these inventions fit the minority users' needs far better than the ones provided by the mainstream creators.

T2D Technology and Health I: Surveillance & Management

Location: Room 143 (D)

Organiser: Program Committee

Chair: Natasha Szuhan

T2D-1 Constructing the Neoliberal Citizen: The Domestication of (Health) Surveillance

Graduate student Sarah MacLean

Introduction. Digital health technologies are packaged and sold as a means of putting patients in charge of their own healthcare and disease prevention. However, these technologies are part of a larger discourse of health surveillance in which patients are disciplined into self-monitoring and regulation. Most studies that explore digital health technologies extoll the potentials of these technologies to improve patient outcomes. Critical approaches which explore how digital health technologies fit into larger regimes of power are badly needed.

Objective. In this paper, using the BEACON platform as a case example, I will advance the argument that mental health technologies are intended to construct self-disciplining neoliberal citizens by design through a domestication of surveillance.

Methods. In this paper, I will provide an overview of the contributions of critical perspectives to understandings of digital health technologies; trace the theoretical history of surveillance studies; and, finally, using science and technology studies (STS) approaches, explore how digital health technologies have led to the domestication of surveillance.

Conclusions. Through their existence within a larger culture of health surveillance, digital health technologies encourage changes to the patient-provider relationship, shifting the onus for healthcare from the provider to the patient. On the surface, we see a shift from an emphasis on the instrumental knowledge of the provider to the introspective knowledge of the patient. However, in using digital health technologies, providers have a greater ability to monitor and act upon their patients as a result of the volume of data collected about them.

T2D-2 Re-valuing and Re-describing the Significance of the Advent of Modern

Anesthesia: the Perspective of Sensory History

Dr. Fanxiang Min

The Advent of Modern Anesthesia was a great milestone for the development of surgery, and also a great benefit to the patients who need surgery to help them overcome pains and save their lives. With the help of modern anesthesia, surgery transformed into a routine treatment from the final choice without alternative. Patients could be comparatively comfortably cured by surgical operation but no pains. In this article, sensory history will be employed as the basic approach. By Comparing what they (patients, doctors, doctors' assistants and observers) saw, heard and felt, and contents of certain paintings of operation scenes, the concerned persons' reports, diaries and memories, the cultural importance and influence of modern anesthesia will be thickly described and showed in details. By exploring the changes and differences took place in operation scene and personal operation experiences, focusing on the comparing them before and after the modern anesthesia was employed in surgical operations to control the subsequent pain, the significance of the advent of modern anesthesia will be re-valued and re-described. We hope it will provide new insights into the understanding and cognition of the benefit to patients and the development of surgery resulted from the modern anesthesia. And I also hope my work could show that medical technology is the closest one among all technologies to mankind because it is directly used on our bodies. Good patient sensory experiences could help medical technologies give more benefit to patients, and as a result, they could be priority accepted as a choice of treatment by more patients.

T2E 14th Annual Symposium of the Social History of Military Technology II

Location: Room 147 (E)

Organisers: Bart Hacker and Ciro Paoletti

Chair: Ciro Paoletti

T2E-1 An Image of Power and Glory. The Neapolitan Aragonese Artillery and the 'Book of Armaments' of King Ferrante

Dr. Fabrizio Ansani

The rediscovery of a unique «Books of armaments» belonged to King Ferrante offers a significant opportunity to examine the production of guns and the management of arsenals in Renaissance Naples. Multiple technical innovations, for example, are revealed by the one hundred and thirty-five illustrations of the codex. Apparently, local craftsmen experimented with more transportable and more effective guns, testing pivoting trunnions and mobile carts long before the appearance of the infamous French cannons over Italian battlefields. Forward-looking statesmen provided an adequate context for all of these technological advances, promoting the circulation of ideas and hiring renowned foreign gunmakers, including the talented engineer and eclectic artist Guglielmo dello Monaco. Moreover, the attempt of the crown at monopolizing the possession of firearms resulted in the creation of a “royal office of artillery”, entrusted with the fabrication of bombards, the purchase of materiel, and the administration of magazines. The political ambition of Ferrante is also evident in the celebratory and the propagandistic use of both the ordnance and the «book», according to a visual ideology of military power shared with all of the fifteenthcentury governments of the Peninsula. In this sense, the “great house of artillery” represented another significant, symbolic element of the ceremonial route which led foreign ambassadors, hostile barons and humble subjects into the royal palace. Conceived as an introduction to the Castel Nuovo, the arsenal announced to all visitors the magnificence and the strength of the monarchy.

T2E-2 The professionalization of the English gunpowder acquisition process from 1787 to 1793

Ph.D. candidate Sabrina Fröhlich

In 1784, the Comptroller of the Royal Laboratory Woolwich received sole authority over English gunpowder production. At the same time, the state department of the Office of Ordnance allowed the Comptroller to “make further alterations” to gunpowder. The state mill at Faversham and the private sector were to adopt these “alterations”. The state was in short-term need of gunpowder, which only the private powder makers could satisfy. Although the Office of Ordnance depended on private manufactures, the private suppliers needed to conform to state requirements. The unpublished correspondence between the Deputy Comptroller of Woolwich, William Congreve Senior, and the Master General of the Office of Ordnance from September 1787 reveals the nature of this state intervention. My paper shows how the Office of Ordnance sought to create and implement a unified framework of government norms. It defined raw material purity (particularly for saltpetre), the production processes and reorganized test procedures. However, the discussion was only theoretical, until Congreve transferred its conclusions to the gunpowder production at Waltham Abbey, the gunpowder mills taken over by the Office in September 1787. Six years later, in 1793, another contract discussion reflected the need to adjust procedure in the light of practical experience, which shows how the theoretical requirements and the production processes at Waltham Abbey differed. A comparative study of the correspondence from Waltham Abbey and the laboratory reports from Woolwich reveals the development of “expert knowledge” in gunpowder production. This explains how practices evolved and how the transfer of expertise to contract negotiations were regulated. In conclusion, I argue that the professionalization of the gunpowder acquisition process was essential to the development and implementation of regulations for private gunpowder makers.

T2E-3 Engineering of the Highest Caliber: Kazimierz Siemienowicz and the Culmination of the Military Revolution

Dr. Paul Wlodkowski

The interregnum between the death of Galileo and the publication of Newton’s *Principia* produced great advances in military technology. Particularly noteworthy are the contributions of Kazimierz Siemienowicz, a Lieutenant General of the Ordnance to the King of Poland Władysław IV. What distinguishes Siemienowicz, as an engineer, from many contemporaries who were self-taught experimentalists, is the breadth of his scientific, mathematical, and practical knowledge. Analyzing his monumental work, *The Great Art of Artillery*, the historian of technology recognizes that Siemienowicz was integrating a number of Baconian sciences with their Classical counterparts, and thus was accelerating the development of natural philosophy through useful inquiry. Although an expert on all facets of the artillery, Siemienowicz achieved fame as a pioneer of rocketry. The dominating nature of this weapon system remains as relevant today as it did in 1650 with the publication of his opus. Rocket technology defines power relations, whether fired indiscriminately as artillery across a national border or positioned menacingly in a silo as an intercontinental ballistic missile. Siemienowicz’s designs, namely his multi-stage rockets with delta-wing stabilizers and ejection nozzles, became instruments of state power for the Polish-Lithuanian Commonwealth in its wars with other European kingdoms and the Ottoman empire. The legacy of Siemienowicz is his culmination of the military revolution. A comparative assessment of his 17th century rocket technology with that of Tipu Sultan from the late 18th century, and William Congreve in the early 19th century indisputably reveals Siemienowicz’s novelty and prior art.

14:00—15:30

T3B The State: Energy, Power, Technology, and the Environment III

Location: Room 138 (B)

Organiser: Program Committee

Chair: Anna Agafonova

T3B-1 PV politics: European funding and technologies, 1975-2013

Ph.D. candidate Efi Nakopoulou

Professor Stathis Arapostathis

The paper examines the changes in European research funding priorities and how they determined the character of the photovoltaic technologies, covering the period of 1975-2013. The paper focuses on the research funded and promoted through the European Research and Development (R&D) programmes, namely the Framework Programmes (FPs) and their corresponding non-nuclear energy (NNE) sub-programmes.

We address the following two research questions: What has been the role of European energy policy in steering European research policy? How did the European research funding priorities define the character of the selected photovoltaic technologies? We argue that by examining the funding and changes in funding priorities we can offer insights into technical choices for photovoltaics. Moreover, we argue that through the analysis of the aims and objectives of the R&D programmes and their corresponding NNE sub-programmes we can track shifts in the meanings of the technologies and characteristics in the renewable energy sources field, which are connected to the political economy for research and the translation of visions to specific technical choices for RES technologies.

We distinguish between two periods. During the first period (1975-1998), research was aiding industry's (international) competitiveness by strengthening its scientific and technological basis. During the second period (1998-2013) research had to respond to a plethora of challenges and problems; ranging from environmental problems to economic development. The above resulted in various changes in the research priorities for photovoltaics. More specifically, photovoltaic research priorities shifted towards large-scale production and had a strongly industry-led character. Additionally, emphasis was given to projects that defined end-products and could be directed towards assisting the industry's global competitiveness in terms of manufacturing quantity capacity.

In the case of photovoltaics, politics of materials had a prominent role in defining priorities and shaping the technical characteristics. We illustrate how the changes in the funding priorities affected the selection and the character of the specific photovoltaic technologies (e.g. c-Si and thin-film). These changes are directly associated with the changing political economy for research and the corresponding visions that favoured specific technological choices in each period.

The material analysed is drawn from the first two Energy R&D programmes, the seven FPs, their respective NNE sub-programmes, the selected/funded projects for solar photovoltaic technologies for electricity production, as well as various assessments, reports, legislative material and secondary sources.

T3B-2 Electricity, regeneration and national building during the Spanish Restoration (1873 – 1931): an engineering approach

Dr. Daniel Zapico

The last third of the XIXth century was marked by the Restoration of the Bourbon Monarchy in Spain, inaugurating a period of political stability after decades of turmoil. The regime had to deal with the loss of the Empire in 1898 and the national crisis that followed. Therefore, the desire for regeneration was at its peak, once constated the backwardness of the country, including a failed industrialization. The question raised in the public arena was how to build a modern nation and reconstruct the national identity?

In that context, electricity was received, captivating the dreams of many social, political and technical actors. In this regard, the engineers were aware of its potentialities and tried to promote this sector. Influenced by some *Regenerationist* thinkers, some of them saw in the hydraulic policy a key for national recovery, while the setting of the grid could not only implement a delayed industrialisation but even establish the foundations of a strong State and literally sew an increasingly fragmented country. Nonetheless, the engineer's attempt to boost a technocratic agenda was not easily achieved and the relation with the State was not always friendly.

Therefore, this talk aims to discuss four research questions:

Was electricity and electrification perceived as a tool for modernisation, regeneration or even national integration? Why and since when?

How (if this is the case) was electricity incorporate/appropriated by the political project of the liberal Bourbon Restoration as a tool for regeneration?

What was the stand of the Spanish engineers? Did they develop any consciousness about the political role of the energy in a *regenerationist*/nationalist fashion?

What ideological and political implications had the development of the grid?

To achieve these goals the talk will analyse *La Energía Eléctrica*'s journal (1899-1931), which contains the core of the debates among the Spanish engineers.

T3B-3 Oily impacts. State power, oil extraction, and their effects on the indigenous Wayúu community in Venezuela, 1940s to 1970s

Ph.D. candidate Martin Schröder

After the oil extraction started on a large scale in the 1920s, the Venezuelan society was overwhelmed by fundamental changes in the economic system, touching almost every sphere of political and social life of both urban and rural inhabitants: Firstly, a massive migration of workforce and capital from the traditional *hacienda* system towards the new centres of capitalist appropriation emptied the already sparsely populated rural *hinterland*. Secondly, the development of oil extraction (resp. the thereby caused social and economic changes) set another development in motion: establishing the nation state as an important player in social and economic affairs even among peasantry and indigenous population. Thus, the importance of the traditional ways of organizing rural economy and social life declined, in some cases drastically.

The new interest of the Venezuelan state in *its* rural inhabitants (which never before had been in focus of politics and policy) was based on the idea of the diversification of the economic sources of national (and private, of course) prosperity and wealth, especially by establishing a more productive, intensive and capitalist agriculture; thus to avoid the so called »Dutch Disease«.

In fact, none of the launched programs from the 1940s to 1970s succeeded in this diversification. But, the long-term changes in the rural societies of Venezuela were immense as the state's authorities used the technological, spatial, financial and social effects of the oil extraction to increase its power and influence.

The presentation discusses the social, spatial and ideological impacts of oil extraction technology and its consequences based on the case study of the indigenous Wayúu community. Beyond the few existing works on this topic the presentation is based on archival records and interviews, both collected during a field research related to the PhD project of the submitter.

T3C Technology & Disability 3: medicine - art – cyborgs

Location: Room 141 (C)

Organiser: Magdalena Zdrodowska

Chair: Wojciech Figiel

T3C-1 “Quantified-me” in art@science projects. Medical bio-tracking strategies in reference to disability, disease and extension of disabled body

Dr. Ewelina Twardoch-Raś

My presentation proposes to investigate the problem of disability and chronic diseases in several artistic projects that combine art and science. All of the projects use specific medical tools and methods to provide a better image of disability and to consider some forms of dysfunctions' therapy – also included some processes of body extension. These tools and methods are usually the necessary elements of a general process of bio- or self-parametrization and monitoring – they present disability as biodata, obtained with the help of special sensors and reconstructed with use of various models of data's creative visualization. Therefore they trigger question on algorithmic reductionism of such forms of diagnosis and representation. I will consider them in a historical perspective as a development of phrenology and technology based on biosignals toward self-medicine.

In my speech I will focus on:

1) Laurie Frick's „7 Stages of ALS”, that presents the possible pattern of the disease and other projects focused on the problem of general monitoring of the organism's function (global trend of quantified-self practice), included her own application “Frickbits” (a kind of an assistive technology).

2) Project “The Machine to be Another” which main goal is to give disabled people a chance to feel the movement of another person's body by synchronizing sensory-motor perception and cognitive processes.

In my speech I will refer to the category of ethos of health (Paul Rabinow, Nicolas Rose) – vision of body's vitality that is categorized as an absolute social duty. Disabilities and

disfunctions are therefore considered as a specific “state of emergency” that should be normalized, but only as an exceptional form of the body’s condition (Giorgio Agamben). Moreover, I will consider categories of self-cultivation (Michel Foucault) and self-invigilation (Thomas Lemke) as a binary opposition that constitutes contemporary, dissonant biopolitical thinking about body’s development, especially the disabled body.

T3C-2 The past and the present of film and animation production as inspired by disabilities studies

Professor Jan Stasięńko

Various technologies which have been invented through late XIX and the entire XX century directly or indirectly for the cinema industry seems to be inspired by disabilities studies. This history of cinematic technologies might be called an alternative one since there’s no as much awareness of these achievements in traditional histories of film and animation. This process of transferring inventions from technologies for people with disabilities to cinema production has been pushed forward throughout CGI era in film development. Thus this presentation is firstly an attempt to organize and to synthesize historical knowledge about such technologies and secondly it’s an analysis of contemporary digital cinema incomes from disabilities studies field.

I’m going to put special attention to such technologies like XIX and XX century medical tracing of bodies with motion disabilities that have a lot in common with contemporary motion capture technologies. I will also present case from the origins of film technology connected to deaf disabilities therapy. It is also worth mentioning how collaboration with actors with disabilities on a movie set turned out to be productive for technological inventions. Another case will be historical and contemporary development of animation through studies on disability with a focus on how CGI technologies has been used to present body with disabilities. All of these technological achievements will be studied and presented through cyborg studies perspective treated as a part of posthuman approach to disabilities studies.

T3D Technology and Health II: Pills, reproduction, biocybernetics

Location: Room 143 (D)

Organiser: Program Committee

Chair: Sarah MacLean

T3D-1 Scientific cooperation of POLFA Poznan Pharmaceutical Works (1961-1989)

Researcher Piotr Skalski

During World War II, the Poznań pharmaceutical industry was almost completely destroyed. The remaining pharmaceutical manufactures soon became part of the POLFA, a national company, which had a monopoly on the production of medicines and medical materials in the People's Republic of Poland. In Poznań, a large factory was established over several years, which was responsible for the production of surgical sutures, vitamin preparations and suppositories for the needs of the entire country. POLFA Poznań Pharmaceutical Works (POLFA Poznań) played an important role in the production of medicines in Poland.

The operation of the pharmaceutical industry was closely related to the planned economy, nonetheless many factors influenced the modernization of the production of POLFA Poznań medicines and medical materials. One of them was cooperation with state scientific

institutions and universities. Cooperation with the Pharmaceutical Faculty at the Medical Academy in Poznań was particularly intensive. Therefore, the research problem is the scope of cooperation, the subject of research and measurable results of cooperation.

The basic source used to prepare the paper are archival materials deposited in the State Archives in Poznan, scientific articles from the Polish pharmaceutical press and reports of academic associates and POLFA Poznań employees.

T3D-2 The Power of Contraceptive Science: The British Family Planning Association's use of Pure and Applied Research to Standardise and Guarantee Contraceptive Technology, 1929-1959

Dr. Natasha Szuhan

Between 1929 and 1959 the British Family Planning Association (FPA) was heavily invested in developing and employing scientific methods to standardise and regulate the various contraceptive products and technologies currently available and in development. Association clinics became the primary sites of scientific data collection, statistical assessments and laboratory and applied research into contraceptive effectiveness and safety.

These efforts stemmed from the FPA's appreciation that in the contemporary social, political and cultural environment some form of indisputable power needed to be asserted to support the proliferation of contraceptive technology and education. This was contraceptive science.

This talk offers an account of the two avenues of scientific enquiry and testing the Association founded and pursued in order to validate contraception as both a medically and scientifically acceptable practice, and one that facilitated and promoted sexual knowledge transfer. I will argue that through the co-development and implementation of both 'pure' scientific and 'sociological or applied' research into contraceptive products and practices, the FPA gained a monopoly on the local contraceptive market, as both a customer and authority.

Through the FPA archives, I will illuminate the Association's work to define and prove the chemical and biological processes of various contraceptive technologies. This was achieved through laboratory investigations which pursued a 'pure' scientific understanding of the contraceptive practices and methodologies the Association advised; and the development of a scientifically sanctioned 'perfect contraceptive'. Concurrently, a sociological research agenda emerged, wherein patient's data was collected on 'case cards' to assess questions of ease of use, acceptability, sexual and reproductive health comprehension, and contraceptive effectiveness in actual use.

FPA contraceptive clinics became the sites through which contemporary twentieth century methods of contraception gained prominence and public trust and support. This talk will elucidate the relationship between theoretical and applied contraceptive science that developed within and emanated from the contraceptive clinic to medicalise, legitimise and teach the practice, and eventually allowed the FPA to officially dictate and shape standard contraceptive practice and prescription, and approve and veto products from the British market.

T3E 14th Annual Symposium of the Social History of Military Technology III

Location: Room 147 (E)
Organisers: Bart Hacker and Ciro Paoletti
Chair: Bart Hacker

T3E-1 Usage of Telegram and Ciphering in Modernizing the Military Intelligence Section of the late Ottoman Empire

Ph.D. candidate Somer Alp Şimşeker

The technological developments after the Industrial Revolution (railways, photography, telegraph, radio etc), military defeats, the problems with the management, the economical and military necessities, the 18th and 19th centuries represents the tendency of Western type of modernization in the Ottoman Empire. Similar to European countries, Ottoman Empire also felt the necessity of a military intelligence service after series of crisis. Abolishment of the Jannisary Organization, the centralization steps and establishing the new army can be counted as the first steps for institutionalizing military intelligence. The modernization policies also caused a systematic, bureaucratic and technological changes in the intelligence policies. In the history of Ottoman Empire the statesman and palace members had done spying and counter-spionage. However the French Revolution and the Industrial Revolution were the important rupture points for the technical terms of modernization of intelligence. The establishment of the modern armies and the modern mass weapons raised the value of gathering intelligence regarding amount of coal or iron, manpower, health, weaponry and everything that a country could produce. The industrial and political innovations led the sources of intelligence to reach different objectives. Developing technological devices took part in gathering intelligence. In the symposium we will focus on the usage of telegram in the military intelligence section of the General Headquarters of Ottoman Army. Ciphering and transmitting the gathered intelligence by using telegram through cipher office in Embassies, Military Attaches and other army commandships became essential for the Empire. Decoding signals and telegrams through counter-intelligence activities became essential to prepare movements of the armies. Our study will deal with the usage of telegram, ciphering and intelligence-counter intelligence in the military intelligence section of the late Ottoman Empire.

T3E-2 Kriegsspiel Takes to Sea – Early Naval Wargaming, 1870 to 1898

Professor Jorit Wintjes

The Prussian successes in the wars of 1866 and 1870/71 caused European armies to rapidly adopt various elements, methods and operating procedures of the Prussian military; these included the Prussian employment of wargaming – Kriegsspiel – for the training of officers, which was rapidly introduced into European armies in the decade the victory of 1871. The idea of using simulations also caught on among naval officers, and while developing a naval wargame poses challenges significantly different from those of a wargame on land, by the end of the century Fred T. Jane's Naval Wargame was introduced into the Royal Navy; it had been first published in 1898 and forms the beginning of a continuous line of development down to presentday naval simulations. Despite its importance for the history of naval warfare however, the history of naval wargaming has so far only seen limited attention. The paper focuses on the wargaming activities in the Royal Navy prior to the introduction of Jane's Naval Wargame. Royal Navy officers experimented with simulative approaches to the development and training of fleet tactics and ship manoeuvres already in the early 1870s and grappled – with varying degrees of success – with the considerable challenges posed by naval wargames. The paper will give a brief overview over the fundamental differences between a naval wargame and a wargame focussing on land warfare and then take a closer look at various wargames developed in the 1870s and 1880s and at the professional background of

the inventors. Some of the relevant source material was published at the time – for example, wargames presented at RUSI meetings were published in the RUSI journal; for information on wargame inventors and others involved in designing wargames in the Royal Navy archival material has been used.

T3E-3 Mythicizing Cook: On the Interaction of Military, Technoscience, and the Cultural Narrative of Discovery and Exploration

Graduate student Friederike Frenzel

The talk aims to problematise the role of Captain James Cook (1728-1779) in Western collective memory and historiography. Simon Marshall for instance calls Cook the "indefatigable navigator and explorer" and shows that the name Cook has become a symbol within a specific presentation of European expansion and world discovery. Cook's exploration was supposedly strictly scientific and not motivated by desire for profit or interests, be they selfish or military-strategic. It is commonly distinguished clearly from the looming European colonialism and imperialism of the 19th century.

In the 1990s, anthropologists Marshall Sahlins und Gananath Obeyesekere argued about the death of Captain Cook at the hands of Hawaiian natives, as well as about the question of his precedent apotheosis. In response to Sahlins theory – that the Hawaiian natives worshipped Cook as one of their gods – Obeyesekere declares that Cook's apotheosis is not a case of Hawaiian, but of European mythology. With this, he points out the issue of myth in the so-called modern Western culture and its need of an embodiment of its values. The apotheosis of Cook, attributed to native Hawaiians by American and European anthropologists, is in that sense a projection.

Adding John Darwin's *Unfinished Empire*, for example, it becomes clear that this line of thought can be taken further: because largely, Sahlins and Obeyesekere omit Cook's military position as well as the specifics of his scientific interests. The British *Royal Navy* and the *Royal Society* assigned Cook his mission: the mapping of the globe. This has a specific prelude, e.g. advanced mathematics, cartography and astronomy. It also has a postlude: the colonial expansion of the United Kingdom, and its economic and industrial hegemony. To examine the mythification of Cook as a result of this expansion means connecting him directly with the rise of science, technology and the colonization of the non-Western parts of the world by the British Empire, questioning his role and the subsequent narrative about his work. It also means - in a broader sense - to use Cook as an example and a starting point for a critical rethinking of the European self-image and what we perceive as the groundwork of our modern, technical and cultural existence.

16:00—17:30

T4B Concrete and Politics

Location: Room 138 (B)

Organiser: Program Committee

Chair: Nikolay Rudenko

T4B-1 A Concrete Success for FDR's New Deal, TVA Engineers fast-track concrete production logistics at The Norris Project (1933-35)

Professor Tracy Walker Moir-McClean

Engineers, scientists and other professional elites can easily direct the technocratic tools of *logistical planning* at political, social, and economic targets. *The Norris Project*, Tennessee Valley Authority's (TVA) first dam construction project, and a key element of Franklin D. Roosevelt's New Deal demonstrates how successful fast-track planning by Authority engineers provides jobs and public-relations materials essential to FDR's re-election campaign goals. During FDR's first term as president and subsequent re-election campaign (1933-1935), *The Norris Project* provides four daily shifts of well-paid jobs, vocational training, and modern housing to American workers and families allied with the Democratic Party.

To meet the political mandate to complete Norris Dam in 29 months, TVA's engineers identified concrete production as a limiting factor, and that "an average 350 cubic yards per day" of concrete mixed to precise standards was required to meet the March 1935 deadline. (source: *The Norris Project*, 1941) Thus, the logistical flow of men, material, and equipment during concrete production serves as the organizing example for this discussion.

At Norris, TVA engineers planned detailed workflow processes for concrete production and other operational aspects of the construction plant, frequently using military-style logistics they had learned during prior work with the U.S. Army Corps of Engineers on navigation and hydro-electric projects. These practices included use of dedicated material supply chains, standardization of workflows and crews, quality control, and just-in-time supply. It is of interest that *The Norris Project* slightly pre-dates the World War II military-industrial collaborations responsible for widespread transfer of military-style logistics to civilian industries.

This case is informed by material from the TVA archives, as well as the considerable literature available on the history of military enterprise and logistics by authors and editors such as Merritt Roe Smith, David Noble, Deborah Cohen, Thomas Misa, Paul Edwards, Charles F. O'Connell, Manuel DeLanda, and others.

T4B-2 Industrial architecture: Rethinking reinforced concrete structures during the Franco's Regime (Spain)

Ms. Sheila Palomares Alarcón

Given the difficulty of acquiring iron during the Franco's regimen, there were an appreciable variety of engineers and architects who will sharpen his ingenuity to use the minor possible quantity of this material in the construction of its works.

During this period, in industrial architecture projects in Spain, different constructive solutions were taken to design diaphanous and large spaces where machinery and its disposition would organize the areas, using the less amount of iron as possible. Nevertheless, we can find a constructive typology which is repetitive and usual in factories and industrial units: the marsá structure.

This constructive system, which was an Agustín Marsá's patent in 1949, was often used after the Fifties of the XX century. The main objective of its inventor, who patented other elements and perfection systems, was to create a new installation with the purpose to replace iron beam. Due to the fact, they were costly and too difficult to acquire. The marsá structure was a low cost and lightweight reinforced concrete structure system. Besides, specialized workforce was not needed to build it and it had a great aesthetic effect.

This communication aims to show the importance and value which have marşá structure, one of the most used during the “industrial Spain” in the Franco’s regime, in the context of a society which had the necessity to invent new creative solutions to make up for the lack of accessibility to different materials.

T4C Material Regimes of Power: Technocracy and Political Struggle in Egypt, Turkey, and Sudan

Location: Room 141 (C)

Organiser: Program Committee

Chair: Piotr Fuglewicz

T4C-1 Technics and Subjects: Notes Toward a Materialist Approach to Secularity at the Turn of the 20th Century Ottoman World

Graduate student Ali Ugurlu

The nineteenth century for the Ottoman world was indeed a period of much tumult and transformation. Even a scant transdisciplinary perusal of journals published in the empire during this period betrays unanimous acknowledgement of a problem posed by an emergent Europe. The Sublime Porte, of course, in similar vein identified an encroaching Europe and scrambled, so the common narrative goes, to “catch up” financially and technologically. While the literature on this century has duly noted the series of administrative reforms aimed at centralization (Tanzimat), quotidian ramifications of specific reforms such as the abolishment of tax farming and the institution of regularized taxation, for instance, are only now surfacing. While the Porte’s wrangle with autonomous tax-collectors, perduring until the Empire’s dissolution, meant an increasing indebtedness of farmers in Anatolia, the Empire’s integration into the “world economy” in this century furnished a collective identity around the concept of work in cities like Istanbul, Izmir and Salonica. Moreover, the exponential rate at which technological transfer occurred as part of this process of reform has been left unexplored with regard to the emergent subjectivity of workers in this period.

This perhaps has to do with an anthropocentrism still coloring much thinking in the social sciences and humanities, wherein the relationship between worker and machine consists one between an agentive human and a passive technical tool. By heeding Marx’s suggestion that the immediate effect of the advent of the machine on the worker is that the worker’s activity ends up being determined and regulated by the rhythm of the machines—not the opposite, this paper contends that a theory of the secular subject as decoupled from the technological is insufficient. By turning to the material by way of an appraisal of technological transfer and its attendant bearings on shifting conceptions of work and time during the second Constitutional era, I argue that conceiving of the secular subject in the last days of the Empire is unimaginable without a consideration of a coeval change in production apparatuses, technological tools, logics of extraction, as well as a temporal reconfiguration of the soul ushered in by capitalization. To do so, I bring together the existing historiography of the period bifurcated into ‘the economic’ and ‘ideological,’ as well as focus on a short-lived publication of the Ottoman Socialist Party, İştirak. This turn toward the history of capitalization in the empire, then, not only complicates the familiar story of secularism as an ideological imposition, but also provides an occasion to reconsider the regnant dualisms that structure our conceptualization of the subject.

T4C-2 Waterways in the Age of Overland Traffic: British Colonialism and Resistance in Egypt

Graduate student Rana Baker

The construction of the Egyptian railway in 1851 is usually explained by Britain's interest in securing a faster commercial and military route to India. Yet, the railways were abandoned as an imperial project almost as soon as they were constructed. By 1870, Britain had shifted its traffic to the newly-opened Suez Canal. And by 1918, the railways were practically reserved for domestic civilian use.

What explains this dramatic shift? The standard answer is that the Suez Canal provided a better route to India. In many parts of the world, however, the railway ended the era of canals. Moreover, the railway and Suez Canal projects both were under scrutiny in the 1830s, but Britain argued relentlessly for the former on the grounds of their technical and financial superiority. Britain's eventual endorsement of the Suez Canal also seems counter-intuitive in the context of its imperial competition with France. Being a French proposal, Britain saw the Canal as a threat to its monopoly of Oriental traffic. In short, the shift to the Suez Canal presents a paradox: if the railway was technically, financially, and politically more favourable to Britain, why shift to the Suez Canal?

Using archival material from Egypt and the UK, I propose that this paradox can be resolved by paying attention to the specific materiality of the railway and to the different political possibilities engendered or foreclosed by it. The railway enabled an oppressive regime of labour exploitation, debt, and surveillance. Disgruntled, labourers and ordinary Egyptians launched a series of strikes and rebellions aimed at sabotaging it. Primarily concerned with protecting its geographic and political integrity, Britain realised that it could no longer rely on the railway. Maritime traffic, because it floated on water, was less vulnerable to sabotage. This, I argue, is why Britain shifted to the Suez Canal.

T4C-3 The “Indebted Peasant”: Human Capital, Development and Neoliberalism in Sudan’s Gezira Cotton Irrigation Scheme

Graduate student Henny Ziai

My paper investigates attempts to produce neoliberal subjectivity amongst the peasants in the Gezira Agricultural Scheme in Sudan—the largest irrigated farm in the world under a single management. Following falls in global cotton prices in the 1960s, the World Bank attempted to increase agricultural efficiency on the Gezira Scheme in the 1980s by producing farmers as “entrepreneurs”, enacting of newly-dominant neoliberal ideas about agricultural development (particularly those of the Chicago School). Consequently, some 40,000 farmers have found themselves in debt, and the entire Scheme being on the brink of disintegration. I investigate how mass indebtedness emerged on the Scheme as—not just an economic relation but—a mode of political subjectivation, producing political quietude in a region known for decades for its strong unionisation. I place this subjectivation--and resistance to it—in the context of its long-standing echoes in Sudanese history, particularly, the 19th century Mahdist uprising which, too, was predicated on indebtedness. In doing so I situate the “neoliberal moment” in terms of a longer history of credit and debt relations on the Gezira plain. My project also presents an alternative genealogy to present-day understandings of “human capital” as the homoeconomicus of neoliberalism. Largely portrayed as a Western figure, with incomplete and distorted translations and iterations in non-Western settings, I investigate how the concept of human capital originally emerged within the field of development economics and in relation to theorising the role of poor farmers in development. In doing so, I ask how ideas about the peasant as “human capital” were subject to early experimentation by the

World Bank through the agricultural reforms it implemented on Sudan's Gezira Scheme in the 1980s. I investigate the ramifications of these experiments—and the mass indebtedness produced—producing the counter-point to the West's "indebted man": the "indebted peasant."

T4E 14th Annual Symposium of the Social History of Military Technology IV

Location: Room 147 (E)

Organisers: Bart Hacker and Ciro Paoletti

Chair: Ciro Paoletti

T4E-1 The Glory of a Gun: the French Soixante-quinze in Popular Culture

Researcher Bruno De Corte

The aim of the paper is to analyze the impact of the French Soixante-quinze cannon on popular culture in WW1 France. The French 75 mm modèle 1897 cannon was the first field gun to include a hydro-pneumatic recoil mechanism, which kept the gun's trail and wheels perfectly still during the firing sequence. The French 75 set the pattern for almost all early-20th century field pieces and was the backbone of the French field artillery units in 1914.

At the outbreak of World War I, in 1914, the French Army had about 4,000 of these field guns in service. The total war production was about 12,000.

The gun was officially presented in 1899 and strongly acclaimed by press and public. It became quickly famous during the China campaign (1900-1901) and the colonial war in Morocco (1903-1911).

In 1914 the German advance after the destruction of the Belgian and French fortresses seemed unstoppable. To everyone's surprise the Kaiser army was halted at the Marne.

The French public attributed the victory to two expressions of "le Génie français": general Joffre and the 75 mm gun. As trench warfare started, the gun became rather soon less effective than howitzers and field mortars. But when Joffre in the enduring war saw a decline in sympathy from press, politics and public, the Soixante-quinze stayed popular till into WWII.

The author has made a profound study of the various sources of popular culture (newspapers, images d'Epinal, postcards, songs,) to analyze the immense popularity of the 75mm gun. His thesis is that the glorification of the Soixante-quinze was a reaction to German propaganda which boasted the supremacy of the Krupp siege guns. French propaganda depicted the German heavy artillery as tools of barbarism. In French eyes, by the "75" le Génie français had saved civilization.

T4E-2 The First Ottoman Electronic Warfare Techniques in Dardanelles War

Professor Esat Arslan

Turkia which was still technically neutral state in 1914 had nonetheless laid sea mines across the Dardanelles at German insistence; though it left a small channel open for transit of specially piloted other countries' ships. When one dreadnought of British Navy boarded a Turkish destroyer exiting the Dardanelles on September 27th, 1914 and they found out Germans on board, thereby violating Turkia's neutrality. One month later, in response to this incident and a later one involving the shelling of Russian ports by Turkish ships which had

been donated by Germany, especially 2 ex-German Goeben and Breslav namely Yavuz and Midilli dreadnoughts Britain and Turkey formally declared war against each other. Ottoman State entered the Great War through *fait accompli* in this way.

Not long after, Winston Churchill who as the First Lord of the Admiralty suggested a combined sea and land operation plan against the Dardanelles and the Gallipoli peninsula. This plan was accepted by the War Council, going so far as to add Queen Elizabeth, the first of a series of new dreadnought battleships with 15-inch guns, and the two latest pre-dreadnoughts as well. Electronic warfare technique was first used in this war. The electronic security measures (ESM), the electronic counter measures (ECM) and electronic reconnaissance measures were applied in this campaign. On March 5th 1915, the jamming technique was used against Queen Elizabeth from Yıldız telegram and intercept station situated on the way Kilitbahir. Therefore, the overhead fire initiative of Queen Elizabeth towards the Turkish artillery was spoilt.

In this paper, it'll be presented, with making the wireless interception and the first jamming in the context of the history of the Electronic Warfare.

T4E-3 Visualizing War: Art and Technology in Shaping Public Perceptions of the Great War

Dr. Bart Hacker

Like virtually everyone else during the Great War, artists, illustrators, photographers, and filmmakers were enthralled by the new technologies of industrial warfare. And for the first time they enjoyed state patronage to record images of the war, predominantly for propaganda purposes but also in recognition the Great War was a world-historical event. Governments commissioned artists and illustrators to propagandize the war effort through colorful and ubiquitous posters. The art poster, only two or three decades old when the war began, had increasingly blurred the line between commercial art and fine art. It was based on the revolutionary changes in color printing technology, especially lithography, which like military technology, had also developed in the half-century before the war. The prewar revolution in printing technology had also fostered the explosive growth of the popular illustrated press. The new printing technologies also provided a way for state-sponsored war art programs to reach a mass audience. Germany was first to establish such a program. Austria-Hungary was not far behind and by 1916 France had followed suit. So had Britain, which ultimately eclipsed all the others in the amount of art created and its quality. The Great War also represents a watershed in the history of war photography and cinematography. It was the first conflict to be photographed in detail by all participants. Governments with growing success attempted actively to exploit and control photography in support of the war effort. When war broke out in 1914, many of the skills and technical resources required to photograph it were already in place. Introduced in the 1880s, the half tone printing process, enabled publishers to reproduce photographs in newspapers, magazines and books. Professional photographers were joined by amateur, especially after George Eastman introduced the Kodak camera, to meet the public demand for photo images reshaped such established publications as *Illustrated London News* (1842) and encouraged new outlets like the *Berliner Illustrierte Zeitung* (1891). But suitable infrastructures capable of managing photography as a mass medium in wartime were lacking. The gradual evolution of such infrastructures shaped the nature and impact of photography during the First World War. Despite many constraints and limitations, professional and amateur photographers of all nationalities combined to create a significant body of work which informed public understanding during the war itself.

Filmmakers, like photographers, also for the first time sought to record the Great War, especially in the novel form of newsreels. And again like photographers, submitted to government control.

Wednesday, 24 July

09:00—10:30

W1B Technocracy and Water

Location: Room 138 (B)

Organiser: Program Committee

Chair: Erich Pauer

W1B-1 ‘Ripe for development’ – The Mekong River Basin during Cold War

Ph.D. candidate Anja Westermann

At the peak of the global Cold War different actors constructed an image of the Mekong River Basin as a river ripe for improvement and development. In post-war economic boom and in times of Techno-optimism it seemed that the transformation of the Mekong into a ‘working’ river by means of human manipulation was just a question of time if appropriate technologies and knowledge could be applied. The Mekong became of high-minded symbolic value for western developing visions in the newly independent states of South-East Asia. This image was grounded in complex intermingling contexts and experiences like, for example, the Marshall plan, the domino theory or the modernization paradigm. Various documents in the archives of different United Nations agencies (e.g. TAB, ECAFE, DESA), as well as the Bureau of Reclamation of the United States of America show that especially the idea of massive large scale infrastructures, like dams for water resource development, was extremely attractive for the varying purposes. Particularly for the United States of America provision of economic and technical assistance were important components for the broader geopolitical strategy to get political, economic and ideological influence in South-East Asia. Furthermore, the documents shed light on negotiations on large scale infrastructure projects like dams during the dynamics of the Cold War, as well as on the emerging dichotomy between technological knowledge and expertise and broader, in particular political visions. In line with the imagination of various actors, the extensive infrastructure programs at the Mekong were the key for the transformation of society and politics in South-East Asia during Cold War.

W1B-2 He-Chaluc means Pioneer. The question of Jewish agricultural colonization in Pripet marshes.

Professor Sławomir Łotysz

When Poland contemplated draining the Pińsk (or Polesie) Marshes in the late 1920s, some parts of the country’s Jewish community hoped to gain access to the reclaimed land and engage in agricultural activity there. Being assured by certain officials that the government would favour such action, and knowing the state treasury was empty, Jewish leaders offered to secure foreign loans to help make the costly venture happen. But when a nationalist press

learned of the deal, they used it to heat up an anti-Semitic campaign and the government stepped back. On this wave of hostility, even the He-Chaluc organization for training Jewish pioneers for farming in Palestine was then banned in Polesie, after being accused of secretly preparing them to take farms in Poland instead. This paper analyzes how political power was used to gate access to national resources on the basis of ethnic background. I will argue that Polish nationalists considered the arable land (even in spe) part of their identity, and a 'last asset'. By limiting the Jews' legitimate ability to buy farms and engage in agriculture, the nationalist government sought to prevent them from blending into society and force them to leave the country.

W1C Historiography and Theoretical Perspectives I

Location: Room 141 (C)

Organiser: Program Committee

Chair: Eduardo Beira

W1C-1 Science, Technology and Power - Revisiting Lewis Mumford

Dr. Peeter Mürsepp

The idea of the paper is to show the changing relationship between technology and power in modern times.

At the very end of 1960s Lewis Mumford published the second volume of his „The Myth of the Machine“, that he entitled „The Pentagon of Power“. The book is an ambitious attempt to make a close connection between advancement of the modern scientific method, development of technology and changes in the implementation of political power. Mumford's approach is strongly based on Galilean and Newtonian science as well as on Baconian and Cartesian philosophy. Here, the intimate connection between science and technology is obvious and 'knowledge is power'. The early modern age was the era when even biological organisms were treated as machines. The same attitude extended to human activities. For instance, mass production was enormously more efficient than any kind of productive activity before. According to Mumford, all this mechanisation of life had strong impact on power relations in society, creating the impression that political power can also be manageable and controllable. All major walks of life became instruments of power. Science and technology gave momentum to each other and had a direct impact on power relations.

Today we know that even the methods of exact sciences often fail in enabling accurate predictions. Technology, however, is still under human control, at least seemingly. We like to believe that we can design and implement technological solutions to facilitate our activities in the precalculated way. Technology is still deterministic in its behaviour, although not necessarily fully predictable. Therefore, today the power relations cannot cohere with both, science and technology, any longer. Power relations in democratic societies can hardly be deterministic. Thus, they should rather adhere to the essence of contemporary science than of technology today. However, it is not necessarily the case in the post truth world. Knowledge, at least scientific one, is not power any longer. Technological determinism would not help either. Individual political freedom that presumes free decision has to be retained. The picture is considerably more complicated than in early modern times. However, one issue still remains. Possessing more sophisticated technology enables to implement power more effectively.

W1C-2 Petre Sergescu, science historian and promoter of the discipline

Professor Alexandre Herlea

Born in 1893 in Romania, the mathematician Petre Sergescu played an important role in the development of the history of science, especially in its institutional organization on the international level after the Second World War. From 1932 on, P. Sergescu, professor of mathematics in the University of Cluj – Romania, who studied in France, participated in the activity of the group of Sciences historians formed around Aldo Mieli who had created "The International Academy of the History Science (IAHS) institution of which he was elected vice-president in 1937. P. Sergescu published a lot, participated in many conferences and international congresses of mathematics and history of sciences not only in Romania and France, where he was very often, but also in other countries namely Poland with which he had privileged relationships. Sergescu was member of the Polish Mathematical Society, honorary president of the second and third of its congresses, in 1931 & 1937. He speaks Polish and holds courses and conferences in several universities. After the second WW and Romania's occupation by the soviets, P. Sergescu sought refuge in France. From 1946 on, while being very active in the Romanian emigration in Paris (President of the academic institution „la Fondation Universitaire Roi Charles Ier”) P. Sergescu was the driving force in the development of the international collaboration in the History of Science. He played a main role in the resuscitation of IAHS of which he was elected President in 1947 and Perpetual Secretary in 1950. In parallel, he acted for the establishment of the UIHS (International Union of History of Sciences) of which he was elected Secretary-General in 1947, the year of its creation. The same year he became editor-in-chief of the "International History of Science Archives" whose first issue appeared thanks to him and of which he became director in 1951. But, in Paris, P. Sergescu also developed other activities in the field of science, its history, teaching and dissemination. He died in 1954, his activities and achievements had received already general recognition.

WIC-3 Technology as indication of state power. Powermetrics perspective

Ph.D. candidate Malwina Hopej

Technology is a measure of the progress and development of society – changeable human needs, awareness or political orientation concentrated on create a state based on high-technology exports and service industry, currently one of the most significant components of GDP, though extraordinarily susceptible to economic fluctuations. At present also technology exemplify the indications and indicators of power of state. Power as well as globalization, is presumably undefinable notion. This concept is extremely multiplanar which manifests in forms and types of powers, as well as multivariate especially in qualitative analysis – components called factors of power.

The aim of speech is to present a technology comprehend as a component of the power of the state. The speech consists of three principle parts. The first is the theoretical introduction to the subject *exempli gratia* select ideas, outlook on technology or powermetrics. The second part analyzes powermetrics reports include definement of technology as component of the power (Elcano Global Presence Report 2018, Military Strength Ranking 2018, Global Ranking of Soft Power 2018). The final item describes part of the results of a questionnaire survey conducted in the United States of America (2017) on research sample (500 citizens). The number of respondents corresponds to the rules adopted in to selected research methods (Polish ethnolinguistic school of Lublin). This empirical research concerns sectoral powers from political, economic, military and soft perspective – respondents took cognizance of own definitions of these sectors. As well it demonstrates the importance of technology (as component of power), consult conceptions and perceptions of hegemony.

W1D Cultural Responses to Technological Innovation

Location: Room 143 (D)

Organiser: Program Committee

Chair: Dick van Lente

W1D-1 A Critical Reading of Alois Riegl's Modern Cult of Monuments or what has Science Fiction Film to do with New Monument Values?

Ph.D. candidate Gamze Okumuş Solmaz

Alois Riegl (1858-1905) wrote the "Modern Cult of Monuments" as an art historian living at the turn of the 19th century to the 20th. This text is the first chapter of the law draft for the conservation of historical monuments, which was suggested by the commission for the historical monuments in Austria and draws the theoretical frame of it. The Modern Cult of Monuments is not just a critical tool, moreover it is a key which emphasizes the notion of monument as a societal problem and makes it possible to interrogate the future of modern societies. No doubt, the community of restoration uses it still as the main text these days. But is Riegl's theory up-to-date enough to discuss conservation and the notion of monument today?

This research investigates brutalist architecture - which is highly discussed in terms of the conservation of monuments and also associated with failed socialist utopias - in science fiction film. Because they are not yet historicised by the society (like a Gothic cathedral, for example), a lot of brutalist buildings face the danger to be demolished or are already destroyed. But conversely with their disfavour, brutalist buildings are being "constructed" in (especially dystopian) science fiction films, which criticise the future society in terms of technology and power, since the 1980's. They are being used as representations of corporate power, like the Dallas City Hall building in the movie Robocop. This study examines dystopian science fiction films which use brutalist architecture from 1980 to 2000 and carries out a critical reading with Riegl's Modern Cult of Monuments in the background. It uses Riegl's text, some media coverage and the movies themselves as sources and discusses, if new values like the *cinematic-value* are being invented after Riegl's *age-value* and if science fiction movies form a basis for these buildings to become monuments thanks to technology.

W1D-2 Fear of a technologized planet: the perception of technology in Dutch speculative fiction during the Interbellum

Graduate student Gijs Altena

This paper reports on research on the perception of technological advancements and its role in societal development in the Netherlands, during the Interbellum, specifically focusing on its role with regards to power, fitting the main theme of the Symposium "Technology and Power". Especially in light of general technological development in and before this period and technological megaprojects, as for instance the Zuiderzee Works in the Netherlands, technology became an important topic in public discourse. Despite its transnational impact, effecting every (Western) society, the perception of it differs. A transnational narrative of technology therefore does not exist. Therefore a comparative approach to the national narratives is preferable. In this paper, the German perception of technological advancements, as researched by for instance Robert Leucht and Dina Brandt, will be used as a background for comparison.

Andy Hahnemann has stressed in his dissertation on German 'geopolitical fiction' in the Interbellum the importance of studying popular fiction and popular-scientific texts, as transmitters of ideology, rather than merely looking at high forms of art, which usually had a far smaller audience. Especially in speculative fiction, the possibility exists to envision a future, thus showing what Lucian Hölscher called the 'Zukunftshorizont' of a society.

Based on an analysis of speculative fiction novels and popular-scientific books by among others Maurits Dekker and Louis Hoyack, I will argue that contrary to Germany, where technocrat hopes of a revival of Germany as a world power by means of technological advancement, in the Netherlands both a religious and socialist fear of technology was dominant.

W1E 14th Annual Symposium of the Social History of Military Technology V

Location: Room 147 (E)

Organisers: Bart Hacker and Ciro Paoletti

Chair: Bart Hacker

W1E-1 From War to Peace: The Birth of Civil Aviation in Italy 1917-1927

Dr. Ciro Paoletti

Italy made her first attempt to use aviation for civil purposes in 1917 with the first air-mail test and establishing her first civil aviation company.

Soon after the end of World War I, two civil air companies were established: one in Venice, by former naval pilots, the other in Capodistria exploiting former military pilots.

Apart for private initiative, Italy issued rules for flights and tried to convert military air experience into civil service, also if the still too weak aviation engines provided poor results everywhere in the world.

After many attempts with airships and seen the lack of any private initiatives, the Kingdom of Italy established in the early 1920's its first rules and laws about flying. Since late 1922 Italy reorganized military aviation, and in early 1923 established an Air Navigation Ministry, including both civil and military aviations and their related issues.

State support proved vital to establish civil companies, as well as the new Ministry, mainly composed of, and ruled by, military personnel, proved seminal for creating and developing air transport in Italy.

Airships were built in military factories, but were definitely abandoned in 1929, and airplanes got supremacy in air communication. Intercontinental flights by military pilots – both veteran or still on active duty, alone as well as in group – showed how effective and exploitable aviation could be. Since 1926 Italy began having a stable civil aviation activity, whose root came from the military aviation born in 1908, raised during 1911-12 Italian-Turkish War, and definitely developed during World War I.

W1E-2 Airships on board: an account on the History of the Airships Carrier, 1913-1922

Professor Francisco A. González-Redondo

On 30 July 1913, Spanish Engineer Leonardo Torres Quevedo, the inventor of French 'Astra Torres' and British 'Coastal' and 'North Sea' trilobed type airships, applied in Spain for a patent for 'A new type of vessel named *camp vessel*': an airships carrier conceived for accompanying the fleet in those days when the outbreak of the Great War could be foreseen.

Torres got in contact with *Vickers Ltd.* who, after careful examination of the Report and Plans, considered on 6 November 1913 that the method of launching the airship was 'doubtless equal to its purpose, and, in view of the experience of the inventor, perhaps the best than can be devised at the present stage'. But they also stated that 'air-ships are not so reliable at all times as the water-craft for scouting purposes'. So they concluded: 'We do not think there is likely to be any demand for a vessel of this type'.

Negotiations continued, and Torres reached Rear Admiral R. H. Bacon who, on 17 March 1914, writing from *The Coventry Ordnance Works Ltd.*, considered, on different grounds, that 'The experience of the Navy has invariably been that any auxiliary craft carried on board ship are of very little real service'.

Torres's proposals seemed to be ahead of his time. In fact, airships would play a role along WWI guaranteeing the maritime supply of Britain deterring German U-boat menace. But, at last, only the Spanish Navy built an airships carrier, the *Dédalo* (1922), based directly upon Torres's 1913 designs, while only the US Navy built an airships Tender, the *Patoka* (1924).

11:00—12:30

W2A Nuclear Power and Fuel in the Non-Western World

Location: Room 137 (A)

Organiser: Program Committee

Chair: Anthony N. Stranges

W2A-1 Where did Atomshchiki disappear? Decoupling of the socio-technical ensemble of the Ignalina Nuclear Power Plant

Graduate student Iryna Lunevich

Both the Ignalina Nuclear Power Plant (INPP) and its satellite town Visaginas (Lithuania) were built simultaneously between 1975 and 1983. The common development plan, the procedural connections, and the experience of Visaginas dwellers of building the INPP with their own hands made the town and power plant an inseparable socio-technical complex. However, the operation of the INPP was stopped in 2009 due to the EU requirements. While the decommissioning of the INPP is a unique technical procedure, it is also a sensitive social process. The closure of the INPP resulted in the increase of unemployment and labor migration. Furthermore, the cost of living in Visaginas has gone up after the INPP decommissioning. Finally, the local identity is also being destroyed as it was based primarily on professional belonging. Although the INPP is still important for Visaginas, media neglect the fact that what is being dismantled is not only the object of the power plant, but the whole socio-technical ensemble of the Visaginas nuclear system.

By analyzing articles from the local news portals www.ntts.lt and the major Lithuanian internet portal Delfi.lt from the period January 2009 and December 2017, the paper aims

to demonstrate how media disembled the INPP decommissioning process from the broader socio-spatial context in which it takes place.

A key finding is that both local and national media represent the INPP decommissioning merely as a technical and institutional phenomenon. While newspapers focus on dismantling activities happening at the INPP, the equipment that is used there, and the institutions that are involved in the process, they fail to incorporate the workers of the INPP and the citizens of Visaginas in the narrative. The articles dedicated to the discussion of the social and economic consequences of the INPP shut down are almost absent. Thus, the paper argues that the media enhance the decoupling of the social and technical infrastructures of the Visaginas nuclear system.

By identifying this problematic issue, the paper demonstrates that the media have important implications for the way the social conflict around the INPP decommissioning is dealt with.

W2A-2 State, Technology and Exclusion: A study of Kudankulam Nuclear Power Plant in India

Dr. Kamna Tiwary

Nuclear energy has remained a source of enigma and curiosity for many. On one hand it obfuscates and on the other hand promises. Developing countries like India and China have tried to invest more into the nuclear energy sector. My paper will explore the narratives surrounding the nuclear power plant in a developing society. It will look into how and in what ways these narratives are shaped, suppressed and debated, how are they similar or dissimilar to nuclear debates and nuclear protests in America and Europe, especially in 1960s and 1970s. The paper will discuss the International Atomic Energy Agency(IAEA) guidelines about nuclear safety and safeguards and the difficulties associated with its implementation in India. By using the case study of Kudankulam nuclear power plant located in the Tamil Nadu state of India, the paper can seek to answer the following questions: 1) the technocratic culture espoused by nuclear installations, 2) the development discourse established by the society and state, 3) the hegemonic tendencies espoused by the large nuclear installations.

The paper also seeks to examine the public perception of the nuclear energy, especially taking into account the views of the people residing near the Kudankulam power plant in India. It tries to understand the silent understanding and relationship of the community residing in the neighbourhood of the power plant with the power plant itself. The case study is taken to explain how technology is a cause of exclusion and in what forms? The study examines the larger question of technological influence in the day to day function of the common people.

Probable conclusion:

Technology establishes a socially relative understanding of itself as it grows in size and power and establishes a manpower to protect its own interests.

W2A-3 Citizen expertise in the controversy surrounding the monitoring of former uranium mines: knowledge as power

Dr. Saliha Hadna-Bremand

This paper aims to continue a strong track that emerged from our doctoral thesis and which focused on the citizen consultation in the frame of environmental monitoring of former uranium mines. This work has highlighted, in one of its conclusions, the role of the Gamma Prospecting Detector (DG5) in citizen claims for the decontamination of radioactive areas in the commune of Piriac-sur-Mer (Loire-Atlantique, France). The democratization of measuring instruments, and the transmission of a methodology for measuring radioactivity by CRIIRAD have enabled a group of citizens to detect contaminated areas in Piriac-sur-Mer. Another group of citizen activists also against the effects of radioactivity in a neighboring town, but lacking the same human and technical resources as the first group, opted for a litigation strategy. It did not produce the results expected by the activists. Based on the analysis of two controversies, we propose to understand how "laymen" do to appropriate instruments that are initially limited to "experts". We are therefore interested in research still under-studied in Science and Technology Studies, that of the role of instruments in the production of technical knowledge (Knorr-Cetina, 1981 ; Latour, 1987).

W2B Technology and Politics I: global themes

Location: Room 138 (B)

Organiser: Program Committee

Chair: Kristýna Kaucká

W2B-1 Biotechnology, democracy and the crisis.

Professor Yiannis Kokkinakis

This paper focuses on the technology of unbridled “structuring”, whether it concerns the financial system or new products derived from genetic engineering and biotechnology, and their interrelationship with democratic policy in the 21st century. Although we are talking about two different categories of product, moving from the economy to genetics proved to be an easier task than one might have expected after 11 September 2001, in the economic climate favoring Wall Street and the pharmaceutical industry which arose in the wake of the new US national security doctrine. Just as the credit rating agencies were the vehicle for the allegedly safe navigation of complex financial products into the sea of deregulation, so new, national regulatory authorities for the authorization and supervision of medicinal products—ones more compatible with the dictates of the pharmaceutical industry—heralded a much closer link between regulators and the industry in Europe and the USA. At the same time that new profitable fields of productions were emerging, such as those which dealt with the surveillance and protection of the public against bio-terrorist attacks, civil rights and political freedoms were placed under the watchful eye of new national security agents whose orders guaranteed the profits of the biopharmaceutical industry. If the war against terror delivered a first serious blow to civil liberties and rights in “open” western societies, addressing the economic crisis in the first decade of the 21st century provided further justification for the disengagement of fiscal policies from the testing and validation of democratically elected bodies. Based on a wide range of sources (European Union documents, reports and depositions to the U.S. Congress, bio-terrorist attack simulations and exercises, EU stability support programs, etc.), my presentation will attempt to explore the missing links between the financial crisis, the rise of real and imaginary biothreats, and the retreat of political processes in the formulation and implementation of economic policy in Europe.

W2B-2 Technological Mediation: Alienated Bodies

Graduate student Abu Haque

The paper explores how repressive technologies coupled with neoliberal ideology deem marginalized bodies expendables; technological mediation of state apparatuses—both repressive and ideological (Althusser 1971)—produce anxiety in the margin. Global flows of capital, labour, and technology have created a new kind of hybrid culture in the Western nations (Bhabha 1995) that also exploits the marginalized bodies (migrants, women of colour, non-native speakers etc.), as they not only take up the jobs otherwise considered precarious but also the discursive practices reproduce the existing social relations of power and control (Foucault 1970). Within uneven and deeply contradictory globalization; moreover, new polarization continues to target the already alienated bodies to be the typical site of exploitation.

That these vulnerable bodies also use similar technologies used by power, make the relations of capital, power, and labour a paradoxical one. This paper examines the inner conflicts of the triad of three—technology, margin, and power. Spatiotemporal consideration has been deemed crucial for this study; as the production of ‘public sphere’ (Habermas 1989) is not only spatial but also temporal—purely because of the fact that any public gathering would also take up their free time, hence, “It was a space of free time for political thinking for the minority of free citizens” (Sharma 2014, 12).

W2B-3 Globalization and global governance: resistance, navigation, or negotiation? The case of foreign policy

Ph.D. candidate Pedro Ponte e Sousa

Globalization is one of the most important social phenomena in the contemporary world, shaping all dimensions of societal life. However, both among globalization theory as well as foreign policy (FP) studies (and FPA, in particular), the impact of globalization on the state, the effects of political globalization and the transformations it brings to FP have been understood as (not so relevant) contextual elements, described in a generic way or even completely excluded from those research fields and interests. Nevertheless, the particular characteristics in which FP activities are developed render essential to strengthen the study of foreign policy, seeking to assess the scope, nature and impact of globalization on its international activity.

A critical issue in this regard has to do with the more technological or political view attributed to the process of globalization, and what such views imply to an empirical study of globalization. Following a brief overview on the interaction between globalization theory and FP, as well as between FP studies and globalization, we will explore the issue of agency-structure in relation with building and shaping processes related with globalization, on two different dimensions: on how globalization (mainly political globalization) assesses politics as a shaping force, namely on issues with an international dimension; how FP studies perceive political action by nation-states on globalization as possible, relevant, or useful. In sum, this study is a discussion of theoretical statements regarding the role of political agency both on the field of globalization theories, as well as on FP studies, particularly relevant for anyone aiming to develop a study (theoretical, empirical, or both) on the links between FP and globalization. We will particularly look into the foreign policy of Southern European countries (Portugal, Spain, Italy, and Greece) in the last phase of globalization, looking for different examples and strategies of that resistance, navigation, or negotiation, as our research focus. Our claim is that FP is a realm particularly fit to assess the explanatory power of

technology and technocracy or the agency-structure dilemma, as key elements in a context of globalization and global governance. We propose a transformationalist view of globalization as well as a mutually constitutive approach of FP and globalization, where international politics carries a dialectical effect of contributing simultaneously to globalization and fragmentation, and the technological and technocratic elements can only partially explain globalization and governance.

W2C Historiography and Theoretical Perspectives II

Location: Room 141 (C)

Organiser: Program Committee

Chair: Daqing Yang

W2C-1 What is the meaning of a dam? Technology change and the critical theory of technology

Professor Eduardo Beira

Heidegger critique of Rhine hydroelectric plant in his essay “The question concerning technology” (first published in 1954) became a famous case of his theory of enframing.

We discuss how the the dam technologies have changed from Heidegger time to nowadays along with changes in public policies about energy. “Sustainable” and “clean” energies became a social concern. Meanwhile the traditional function of the dam has been changing. New dams have now turbines that may work in both ways, according to the demand in the main network, and making use of “free” wind energy not usable by the network. Its functions have changed. And also its meaning for different social actors.

Discussion of function and meaning is a traditional and important issue in philosophy of technology. We discuss the changes of function and meaning of dams relying on the ideas of the critical theory of technology (Andrew Feenberg), also now known as critical constructivism, together with insights from the “construction” concepts of the theory of technology by Georges Simondon.

This analysis is inspired in our own experience during last ten years as coordinator of a multidisciplinary project related to a new dam built in a remote and small river in the northeastern region of Portugal, an affluent of Douro river - and Douro Valley is an acclaimed world heritage site by Unesco (FOZTUA project, www.foztua.com). And also by Andrew Feenberg last books (Technology, modernity and democracy, 2018; Technosystems, 2017; Between Reason and Experience, 2010), which we have also translated.

We discuss the changes in technology of this specific case as political and public discussions and struggles evolved along time and social issues shaped the final project.

W2C-2 From Image to Inscriptions: An Actor Network Theory approach to Digital Satellite Images

Ph.D. candidate Yashaswini Jayadevaiah

Dr. Koumudi Patil

Cartography animates the relationship between technology and terrain, wherein, technology mediates the translation of observations of terrain into maps of territories. Territories, unlike terrains, have authors as actors who inscribe it with meaning and boundaries. While

discussing the case of the operators working in the French Satellite SPOT, Latour observed how the operators gaze not at Paris, but at the screen, processing wavelengths into blurred dots and pixels in which the city of Paris is black-boxed. This study investigates how Digital Satellite Images (DSI) code the terrain into pixels, and how actors decode the pixels into a territory.

This paper counters the established conception of 'Inscription' (epigraphic inscriptions) as engaged in the 'production of the past in the present' and addendums it with the concept of 'Site'; i.e, 'Site Inscription'. The paper adopts ANT approach to demonstrate how DSI are processed and analysed by the actors in a network to construct 'site inscriptions' that translate into a concise compendium of the site. As a case study, the paper examines the processing and outcomes of the DSI of an archaeological site- Sringaverpura, dating back to 1750 BCE, India.

We observed, that, in the process of translation of a geography into a sociology through the cumulative layering of inscriptions, the DSI encountered multiple actors causing transformations and materializing it into a sign, an archive, a document, a trace capable of eliciting an entire script for the site. During the process of translation, the DSI- a 'digital' image mutated into an 'analogue' image eliciting details of the site depending on the actor, institutional and academic affinities of the inquiry, queries and serendipitous discoveries.

DSI layers and compresses a variety and quantity of information inaccessible to the human grasp into signs and traces that can only be processed by the computer. But, an immutable inscription like a DSI, became a mutable mobile, not only because the pixels translated into an entity, but also, the actors were able to zoom in and out of the DSI without changing position (their, image). However, with the entry of every new actor, the previous transitional inscription was black-boxed. Interestingly, DSI enabled the authors, actors to not only trace but also retrace the mutations as the visibility of DSI and its affordance to mutations serve as a significant source for exhibiting translations, and thereby, the actor-networks involved.

W2D “The Decline, Rise, and Persistence of Repair in the 20th Century”

Location: Room 143 (D)

Organiser: Jan Hadlaw

Chair: Cyril Lacheze

W2D-1 Planned Durability: Telephone Repair, Refurbishing, and Recycling at Bell Canada, 1920-1955

Dr. Jan Hadlaw

While the majority of North American manufacturers in the 20th century embraced techniques of planned obsolescence as corollaries of mass production capabilities, telephone companies and manufacturers instead established elaborate systems for the retrieval, repair, reconditioning, and reuse of telephone sets and equipment. Focusing on the Bell Telephone Co. of Canada, my presentation draws on archival sources to understand the culture of repair and maintenance that informed and organized the joint operations of these two companies. It shows the importance of repair to the company's business operations in the 1910s and early 1920s, at a time when demand for telephone service exceeded manufacturing capacity. It then focuses on the formalization and routinization of repair at Bell, with the establishment, in 1925 and 1929 respectively, of the Toronto and Montreal Telephone Distributions Houses. Tracing the life cycles of telephone subscriber sets from manufacturing to decommissioning,

the presentation demonstrates the significant influence play by repair and maintenance considerations on decisions about the design and engineering of the telephone as well as the management of its afterlife. While my paper focuses on the history of telephone repair and maintenance, it briefly comments on contemporary practices of recuperation, repair, recycling, and disposal.

W2D-2 Questioning the “Decline of Repair Businesses” Narrative: The Case of Luxembourg City and Esch-sur-Alzette

Dr. Stefan Krebs

In the historiography of maintenance and repair, it is often assumed that – in Western societies today – networks of retailers and repairers, which have for a long time shaped urban centres, are long gone, and that the decline of these repair services began with the flourishing of modern mass-consumer societies in the immediate post-war decades. However, the assumed linear relation between the rise of mass production and consumption and the decline of repair is contested, for example by statistics that show that employment in the Luxembourg repair sector still went up in the late 1970s. My paper will use Luxembourg as a case study of a Western consumer society to zoom in on the rise and decline of specialist repair shops and retailers with repair offers. I will look at the development of repair offers in two urban centres: Luxembourg City, the bourgeois capital, and Esch-sur-Alzette, the second largest city and industrial heart of the country. I will compare the development in these two cities from the interwar period to the 1980s, and through the case of Luxembourg scrutinise the relation between the emergence of the consumer society, the apparent decline of repair, and general changes in the organisation of trades.

W2E 14th Annual Symposium of the Social History of Military Technology VI

Location: Room 147 (E)

Organisers: Bart Hacker and Ciro Paoletti

Chair: Ciro Paoletti

W2E-1 Arms Race. Sport and Technical Competition in Railway Military Training 1927-1939

Ph.D. candidate Anna Turza

During the Interbellum there was a widespread tendency to militarize various areas of social life, which leads the author to propose that sports training at that time was also a form of preparation for the impending war. Public events propagating physical strength and fitness, such as the 11th Olympic Games in Berlin in 1936, were at the same time a show of military readiness of a seemingly demilitarized country. As the arms race was approaching its climax, the outbreak of World War II was gradually becoming inevitable.

The activities of Railway Military Training Organization in the areas of physical education and sport were thus a part of the Nations-at-Arms doctrine. In fact, during the Interbellum physical education and military training were closely connected. It was a time of vivid interest in the physical education of youth not only in Poland, but also in many other European countries, as well as in the United States and the Soviet Union.

The railway military training in the interwar Poland featured a sports discipline called the railway military triathlon, which included building and dismantling railway track together with shooting and marching. It combined professional training and sports competition, which

greatly contributed to its originality and its usefulness in advancing the military potential of the country. The participants demonstrated both their military capability as soldiers and their technical skills as railwaymen. It was believed that railway would play a significant role in the future war, so the transport of troops, fast repair and construction of tracks were crucial. The sports competition could at any moment become an actual armed struggle for the survival of the country.

The present study is a part of the author's doctoral research, and relies chiefly on primary sources, i.e. various materials published by railway's paramilitary organizations during the interwar period.

W2E-2 Technological evolution of aeronautics through war and peace: case study of the seaplanes

Ph.D. candidate Marion Weckerle

Aviation is most often seen as a decisive weapon developed during World War One, and throughout the XXth century, military power rhymes with aerial power. However, the possibility of using aircrafts as a weapon, especially for bombing, was studied by aircraft builders several years before World War One. Military officers attended races and exhibitions to choose aircrafts showing good performances and start to train pilots and mechanics within the Navy and the Land Forces.

The role of seaplanes as an important aerial weapon of the different navies – French, British, German, Austro-Hungarian, Italian – has been overlooked so far, in favour of the emphasis on airships and landplanes. Yet, military seaplanes stations began to be built on coasts by these different states as early as 1912, and by 1917, more than fifty had been set up in the Baltic Sea, the Mediterranean sea, the Adriatic, the North Sea, the Channel and the Atlantic. Seaplanes were used primarily, through the whole conflict, as anti-submarine weapons and bombers. They were also an essential reconnaissance tool to extend the range of action of ships. By the end of the war, the reliability and performances of seaplanes had significantly improved, simultaneously as the qualities of the landplanes. New uses had to be thought of in the civil aera, leading to the development of speed race, exploration and passenger transport.

Therefore, by the prism of the seaplanes as a case study, we can highlight the relations between the military and the aircraft industry, through several technological evolutions in key contexts : during the pioneering period of aviation and seaplanes, the first conflit in which the were used at large scale, and the post-war consequences for this technology. This study requires different types of sources : the archives held at the Historical Defense Service, publications by the manufacturers, and printed sources like journalistic material and iconography.

14:00—15:30

W3A Empowering Change: Railways in a Societal Context: Railways as a system

Location: Room 137 (A)

Organiser: Timo Myllyntaus

Chair: Hugo Silveira Pereira

W3A-1 Operating Infrastructure: Finnish Railways as a Large Technological System

Professor Timo Myllyntaus

Today, the economies consist of many nested and cross-cutting technological systems that we may not notice in everyday life, but if a system, such as electricity distribution, ceases to function, we will be shocked by our own unhelplessness and, in the worst case, the whole country will stop. With the assistance of technology, all modern countries have a basic infrastructure, on which almost all the functions of society are built. This paper discusses how the current situation has been achieved and how dependent we are on the technological infrastructure surrounding us.

A century ago in 1917, major technological systems were only under construction in Finland. The road network had been built since the Middle Ages, a telegraph network from the 1850s, a railway network from the 1860s, a telephone network from the 1870s and electricity networks since the 1880s. These systems contributed to the emergence of internal cohesion and the formation of a common national identity instead being split to separate provinces. For example, only the opening of rail transport between Helsinki and Vyborg in 1870 led to the entire country being transferred to the same time zone. Before that, there was a different time in Helsinki and Vyborg, because earlier they had followed their “natural sun” according to their location.

Railways emerged as one of the first large technological systems in Finland. The paper examines how this system was constructed and what have been its peculiarities. The result of the system building was a state owned company *Valtionrautatiet*, which in the mid-20th century was the biggest employer in the country. In addition, the density of the Finnish railway network per square km is one of the highest and the number of track kilometres per capita is the sixth largest in the world – just after Australia, Estonia, Sweden, Namibia, and Romania.

W3A-2 Aerotubexpres" – The high-speed transport system through pipes for persons and goods, the re-markable project of Coanda, materialized in Romania in the 1970s

Professor Victoria Cotorobai

Researcher Eduard Cotorobai

In the 1960s, one of the great Romanian inventors and engineers, Henry COANDĂ, initiated several revolutions in the field of transport (air, land). He had invented the Reaction Aircraft, the Coanda Effect in 1910, and received a French patent in 1934 to his research Method and apparatus for deviation of a fluid into another fluid.

Coandă Lenticular Disc project (1957), designed and supervised the testing of the high-speed transport system - 500-600 km / h – for people and goods, in tubes, based on the Coandă effect and the coordination of the implementation of such freight transport systems.

Political reasons have led to the cessation of the commissioning work. The inventor passed away (1972). This revolution of land transport will only be expanding on a large scale nowadays.

Very recently (2012), major business people in America (Elon Musk, ...) have proposed a similar project. The paper will include:

A. A summary of Henry Coanda, focusing on the great inventions and projects developed by him (707 patents, more than 250 inventions, the most prolific Romanian inventor engineer, who enriched the global creative heritage);

b. the history of the general idea of trains or other transports traveling through evacuated tubes, from the first attempts to the present, insisting on the priority of the great inventor's project;

c. assessments and interpretations on the social, economic, ecological impact ... which could have been the large-scale implementation of a project in the field of land transport, on the Romanian territory and beyond;

d. personal vision of the possibility to implement such a project on the territory of Romania and its interconnection with the rest of the world by creating a communication interconnector in Romania;

e. appreciation of the social, economic, ecological impact ... which a current project implementation in the field of land transport could have on the Romanian area and not only;

The comparative analysis of the high-speed, overhead / underground / underwater transport system with the already classic CF systems will highlight the potential for preserving positive aspects (incursion into different landscapes, ...) simultaneously with the contribution to modernization under multiple aspects of land transport and knowledge and high-speed communication between different areas of the globe.

The strictly secret nature of the research carried out by Coanda in Germany, France, America, Romania did not allow knowledge of Coanda's important contribution to many paradigm changes in the field of science and technology in general and of flight and transport in particular. The sources of documentation used were multiple: the Romanian Academy, the Ministry of Culture, the Ministry of National Defense and the National History Museum of Romania, patents databases, various publications.

W3A-3 Network Externalities – Traces in Railways and Internet

Professor Reima Suomi

Researcher Olli Sjöblom

Network externality has been defined as a change in the benefit, or surplus, that an agent derives from a good when the number of other agents consuming the same kind of good changes (Liebowitz and Margolis 1998).

According to a recent research, network externalities are one of the 10 key forces that drive information technology to the society (Andal-Ancion 2003). For economists, the theory of network externalities, or network externalities, or standardization, has wide applicability. Indeed, it has fundamental importance for competition policy, regulation, business strategy, intellectual property, and technical change in a wide range of industries; developments in these industries cannot be fully understood without an understanding of network externalities (Besen).

Network effect are a popular and important theoretical concept, yet very much neglected by the information systems research community. Because of this, there remains a risk that their

operationalization of network externalities in the field of information networks is not conducted properly. This paper discusses what different methods there could be to operationalize, measure and evaluate network externalities.

This paper comes up with four fundamental problems that are met with when network externalities are studied: the stakeholder problem, the identification problem, the arbitrator problem and the measure problem.

Networks externalities, both positive and negative, are known to be part of every network. Positive network externalities are the main reason for building networks, and a primary source of wealth for the modern society, often actually called the networked society (Castells 1996, Stalder 1998). Network externalities stemming from telecommunication networks are a primary source of wealth in the information society. Taking this seriously, it is astonishing how little effort researchers have devoted to understanding network externalities. One reason might be that network externalities have traditionally been a playfield of economists, and information system researchers have felt unease at the field. This, however, needs not to be the case. Aside the rather theoretical discussion on network externalities, the economists claim that a more practical and operative approach to the issue is needed. The paper aims to examine network externalities of railways and Internet in the real-world context.

Railways and the Internet are two critical and representative networks in contemporary society, with different background and history. In this paper, we will study comparatively whether their network externality portfolios are similar to any extent.

W3B Technology and Politics II: Planning Local and State

Location: Room 138 (B)

Organiser: Program Committee

Chair: Piotr Fuglewicz

W3B-1 Five-Year Plans – A form of Control in the Communist State Economy. Romanian Case Study

Dr. Cătălina Mariana Crețu

The economic policy of the communist regime had two important peculiarities: in the first place, it has abolished all capitalist relations, all the bourgeois structures of social, economic and political life; secondly, it has accelerated the industrialization of the economy, considered the essential element of the modernization of the society. The year 1948 marked the imposition in Romania, as well as in the other Soviet-dominated countries, of the Stalinist model of organization and leadership of society. On June 11, 1948, the law for the nationalization of the industrial, mining, banking, insurance and transport enterprises, which passed to the public ownership, was adopted, which included about 9,000 enterprises, out of which over 3500 local interests. It is clear - this law aimed at destroying private property and generalized socialist ownership in industry and other branches of the economy. According to Stalinist theory, the economy was oriented towards forced industrialization, neglecting the balance between different economic branches.

The mechanism of centralized economy organization was based on a plan management system: two annual plans were experimented in 1949 and 1950, then five-year planes (the first five-year plan was in 1951-1955). The State Planning Committee was established, which provides for economic development on a planned basis based on economic centralization,

virtually eliminating initiative and creativity of the individual. According to official assessments, the first three five-year plans (1951-1965) ensured the creation of the socio-economic and technical-material basis of the socialist society. Communists wanted the technology to reach the same stage of development as in the capitalist countries; they were convinced that this could only happen by politically controlling technology. The present research is based on the information found in: Central National Historical Archives (A.N.I.C.), Fund of Romanian Communist Party (P.C.R) Chancellery, Central Committee (C.C.) propaganda and agitation fund; as well as, specialized papers, memoirs and political notes, periodicals. An analysis is done on the thesis which had been the theoretical support for the first three five-year plans: implementation and role in the Romanian industry, the economic relations of Communist Romania with Council for Mutual Economic Assistance (COMECON), and Gheorghe Gheorghiu-Dej's independence policy in economic terms. It is shown that industrialization and collectivization were the basis of the communist economic policy and led to profound mutations in the Romanian society.

W3B-2 Participation of the local population on the planning of the dam network Nové Mlýny. The example of flooded municipality of Mušov

Dr. Kristýna Kaucká

The planning of a scientific and technological progress has occupied an important place in an economic and social life of socialist Czechoslovakia. The paper analyses a participation of non-expert public in the decision-making process of the central communist authorities during 1960s, specifically on the example of a flooded municipality of Mušov.

Considering its geographical and climate conditions, the region of South Moravia was chosen for building an extensive dam network collectively called Nové Mlýny. This decision has condemned for flooding the border municipality of Mušov. The decision-making process culminated in the second half of the 1960s, which, due to events of the so-called Prague Spring, enabled the local population to develop a very unique participation and negotiation strategies. The paper analyses both the activities of the inhabitants of municipality Mušov and their local representatives, i.e. why and how they strived for entering the decision-making process on central level. Main aim of the paper is to outline the possibilities and limits of a participation of non-expert public on one of the strategic energy and retention projects of the socialist Czechoslovakia.

The paper is based on archival sources of both central and local administration. These sources are complemented by the testimonies of Mušov's inhabitants, obtained on the methodological basis of Oral History from the Czech Memory of Nations project.

W3B-3 Philips, the Dutch government, and failed attempts to create a domestic computer industry, 1950s-1980s

Dr. Dick van Lente

Between the 1950s and the 1980s, many countries with more or less advanced economies – Western and Eastern Europe, China, Japan, Brasil, to name a few – attempted to create a domestic computer industry that would make the country less dependent on American companies. In spite of temporary successes, most of these attempts more or less failed in the end – with the signal exception of Japan. In all these countries, these attempts were strongly supported by the national government, and because these efforts involved a lot of taxpayer

money, these policies were elaborately explained to the public. We therefore know the arguments quite well, and we can study them comparatively. The Netherlands was an exception in this development, because the national government provided only weak support, or none at all. This is strange for several reasons. First, there was a small, but thriving academic community working on computers (as well as building some). Second, the Netherlands was home to one of the most successful electronics firms in Europe, Philips, considered by, for example, the widely read French journalist Servan Schreiber an ideal candidate to take on American competition. And finally, the Netherlands did pursue a vigorous policy of industrial modernization, which included subsidizing nuclear power.

This paper tries to explain this discrepancy, based on Philips' company archives and governmental archives. This may also clarify the motives of countries that did try to create a national computer industry, because in its dealings with the Dutch government, Philips often compared itself and the Netherlands to those other countries and companies. This paper fits into the subtopic 'technology, the state, and the economy.'

W3C Media and Communication

Location: Room 141 (C)
Organiser: Program Committee
Chair: Bruno De Corte

W3C-1 Telegraph Time

Ph.D. candidate Ahti Korhonen

The research of sound technology history aims to compare the developmental stages of telegraph with the development of other sound inventions during years 1793-1914. These comparable inventions are telephone, phonograph, movie, radio and mechanical television. The phenomenon in which these early sound inventions were made, could be called *the divergent era of sound*.

1793 was the year when optical telegraph became in use and before 1914 the wireless telegraph was also in use. Other early sound innovations were also introduced during these years. The most important invention was a telegraph which was in use before the First World War.

The theoretical framework of this research is formed of the five technological revolutions by Carlota Perez, Joseph Schumpeter's theory of innovations development (Creative Destruction) and the diffusion theory by Everett Rogers. Three of five Perez's technological revolutions lie in the critical years of the research. The purpose of the research is to clarify the development of early sound innovations from idea to product and finally access to the market.

These early sound innovations were part of the spirit of hope which was existence in the world before year 1914. When the war broke out, it was thought that all the beautiful was gone, also with regard to inventions. Belle Époque, World Expos' in France, using electricity with inventions and using radio frequencies, all of these had brought a feeling of a better world.

The telegraph was a revolutionary invention. It changed the structures of society and gave hope for the better future.

W3C-2 Japan and the Early Wireless in War and Peace: Contingency in Technological Development

Professor Daqing Yang

The Russo-Japanese War (1904-05) was the first military conflict in which the nascent wireless technology played a key role. In the words of the magazine *Scientific American*, “it was through wireless communication alone that it was possible for the Japanese commander to maneuver and place his fleet to enable him to strike the enemy in the most favorable position and under the most advantageous circumstances.” The article’s American author went on to praise Japan’s progress in wireless research, attributing it to the “accuracy and thoroughness which so often characterize the work of the Japanese.”

Yet, despite the widely praised successful use in war, research and development in wireless technology in Japan largely stagnated in the following decades, with the exception of research in ionosphere. Japan had to import wireless equipment from Europe for building its high-power station for long distance communication in the 1910s. Other early inventions by the Japanese, such as the so-called TYK wireless telephone, were virtually unknown outside the country. What happened?

My paper attempts to shed light on this question by examining what I call the contingency of technological development. Contrary to many popular history of technology, the latter’s trajectory is never a straight line of progress. A number of factors in Japan’s case were at work: shifting state priority, level of basic research as well as industrial capacity, as well as external factors such as threat of infringement lawsuits from German company as well as Japan’s alliance with the British Empire.

W3C-3 The Power of the Artificial Eye: Production and Reception of Aerial Photography during the World Wars

Ph.D. candidate Noemi Quagliati

On September 13, 1939, the German Air Force dropped high explosive bombs and incendiary weapons on the Polish town of Frampol.

The area functioned as military experiment where the Luftwaffe tested the effectiveness of new weapons, destroying ninety percent of the town. Two aerial photographs—taken by a reconnaissance German plane—attested the purpose of the attack: the first view preceding the air raid served to define the precise target, while the second record allowed to measure the consequences inflicted by the bombing.

Frampol was chosen both for the lack of anti-craft defenses and for its urban planning based on concentric streets culminating at the focal point of the central square, which made the town an evident landmark, clearly discernible by aerial photographic devices.

This paper explores the entanglement between photography and aerial military strategy during the World Wars, showing the effects that new visual modalities, inaugurated over the course of the warfare, had on civilians’ perception of environment and society.

These aerial photographs showed the devastating environmental impact of militarization and the topography of landscapes dominated by rigid and artificial geometries. Moreover, the “view from above” proposed a surveillant way of seeing: a distanced, penetrating, and dangerous gaze.

Using mostly the North American, German, and Polish frames of reference and interweaving military history, visual culture, and environmental studies, this paper clarifies the change in the habits of vision caused by military photo-optical technologies and examines the new conception of the landscape in the time of photography and war.

W3C-4 Behind the TV-picture: NTSC, SECAM, PAL standards in techno-political shaping of the world's map

Researcher Roman Artemenko

Article focused at the history of development of national TV-standards and related sub-themes like nation-wide broadcasting issues, global events and changes in everyday's life experience of TV-set costumers during 1930-1980ies, radio-amateurs gadgets to watch forbidden TV programs, and global technological transfer role in development of local technological solutions.

During XX century radio and TV-broadcasting technologies changed the way of information consumption by society radically. While communication technologies reached global impact, at first sight it seems to be true, that known political and socio-economical contradictions of the world (especially during so-called Cold War period) leads countries to a kind of isolation policy by special technologies applied to fight opponent propaganda and by original and incompatible standards as well. But history of TV-standards (NTSC, SECAM, and PAL, as well as experimental ones) brings us much more complex picture to observe, in which all the historical chains involved in shaping of new technology.

In article following issues explored and opened to discussion:

1. Natural and social landscapes and technological infrastructure determinism for further development and influence at standards of informational technologies.
2. Social impact of new media technologies.
3. New communication = new isolation?
4. Three standards = three worlds?
5. Technological limitations as the most valuable way of censorship.

W3D Technology and the Environment

Location: Room 143 (D)

Organiser: Program Committee

Chair: Elena Helerea

W3D-1 Using sea currents to improve the climate: some case-studies in the Pacific Ocean

Ph.D. candidate Kunzhang Gao

Professor Bertrand Guillaume

In this draft paper, we present a couple of largely forgotten technocratic projects imagined by soviet engineers and scientists in order to re-arrange ocean currents to "improve" climatic conditions in East Asia and Eastern Russia. These include the idea of steering a branch of the Kuroshiro up the coast of the Asiatic mainland to artificially increase the inflow of warm

water from the Kuroshio into the Sea of Japan, which has attracted the attention of both Russian and Japanese scientists. Another option is about building a dam across Bering Strait and pumping water into the Pacific in order to start a ‘defrosting’ process in the Arctic. Based on different written sources, including official translations into English of Russian essays by book publishing companies in Moscow during the Cold War period, we described these fantastically bold proposals, which take the shape of (alleged) concrete engineering projects. We analyze these cases regarding the historical and broader cultural context in the USSR where the state assumed a leading role in the development of large scale technological schemes and promoted a vision of nature as something to be transformed and mastered. We finally draw some conclusions regarding purposeful modifications of the climate over extensible areas of the globe today.

W3D-2 Switch the Sun on. A case study of recent electrification in peri-urban Burkina Faso

Dr. Roberto Cantoni

A full decade of scientific research on energy in both the Global South and North has resulted in the proliferation of concepts that are today available for the investigation of issues such as local energy knowledge, energy systems management, energy citizenship, ‘energopolitics’, and the multiple meanings and interpretations of energy. This paper applies such theorisations and reflections to an analysis of the role of energy – on-grid, solar energy in particular - in people’s everyday life in a village of recent solar-powered electrification in Burkina Faso. Through the study of the community of Zagtouli, where a solar plant was opened in late 2017, I aim to investigate three questions. These are: 1) In what ways are local energy use patterns taken into account and employed for the smooth development of renewable energy projects? (local knowledge) 2) How does local and community ownership of a technological system affect its functioning, and how do citizens participate in its definition, use, and operation? (energy citizenship); 3) How do the choice of system design and mode of operation, and strategies for implementation and system sustainability affect the project’s development? (technopolitics). The paper is based on semi-structured interviews with customers of public utilities and other energy users, and on ethnographic case studies in Zagtouli.

W3E 14th Annual Symposium of the Social History of Military Technology VII

Location: Room 147 (E)

Organisers: Bart Hacker and Ciro Paoletti

Chair: Bart Hacker

W3E-1 Nicola Tesla, Joseph Stalin, and how much the “Peace rays” came to.

Professor Vasily Borisov

In July 1934, American newspapers spread information about sensational statements of the famous inventor Nikola Tesla. The new Tesla’s invention was *beams of particles* having such destructive energy that at a distance of hundreds miles from the source of radiation they destroy everything that gets in their way.

Tesla called his invention "peace rays", because thanks to them even a small country gets the possibility to protect itself from the attack of a stronger enemy. In press reports, however, unprecedented rays were also called "death rays".

In a week after the press conference, Tesla appealed to the Consul General of the USSR in New York with a proposal to give over his invention to the Soviet Union, which was “the only country consistently fighting for peace”. In case of the positive response to his proposal, the inventor promised to provide technical details of the processes and devices. As a condition for the start of cooperation Tesla demanded payment of 25,000 US dollars.

In November 1934, the matter of Tesla's invention and his proposal to the USSR was reported to Joseph Stalin. The Soviet Government decided to accept Tesla's proposal, and in early 1935, the amount of \$25,000 was paid to the inventor in New York. Tesla refused from a trip to the USSR, pleading old age.

Despite the opinion of academician Chernyshev and other scientists that Tesla's theses are not based on reliable theoretical and experimental prerequisites, the task to investigate the possibility of creating mysterious "death rays" was assigned to the newly formed Research Institute-9. The investigation and experimental work of the Institute for a year and a half has become an additional payment for excessive confidence in the statements of an aging outstanding inventor.

W3E-2 In the Midst of Military Politics: Clarence Zener's World War II Army Research

Dr. Yoel Bergman

The American scientist Clarence Zener is renowned in theoretical and applied physics. Beginning in the 1920s, he explored and contributed to various fields as superconductivity and metallurgy. Technologists easily associate his name with the Zener effect and Zener diode. During WWII, he did research at the army's Watertown Arsenal on piercing projectiles and armor. Zener was involved 15 internal research reports, declassified gradually from the 1950s' to mid-80s. Power struggles between the army's Col. H. Zoring (Zener's superior) and civilian NDRC. The issue was who does what in developing Armor Piercing Projectiles (APS), for army's pressing needs. Rivalry was the probable reason for Zener's recruitment, guiding some of his research objectives; Zener's analytical approach is traceable to his earlier acquaintance with dimensional analysis. His work with other WWII scientists as discussed last year, shows mutual similarities in methods and conclusions. Zener admired Colonel Zoring, who allowed him to publish some material. Together with his colleague, the later renowned J. Hollomon, Zener published in civilian periodicals on basic science, based on their internal reports. One seminal 1944 paper introduced an equation that became important to material science. Another 1946 paper by Zener alone and based on the Watertown research, addressed the kinetics of the decomposition of austenite steel. It soon became a focal point for supporters and critics, influencing professionals as Yves Dardel in Paris who wrote a summary on new American conception on steel based on the paper.

W3E-3 American Pax Atomica: The American Atomic Enterprise 1945-1950

Dr. John M. Curatola

With the advent of atomic weapons, Americans increasingly looked toward airpower as the best way to defend the nation and the free world. The US nuclear monopoly was the primary military counter to the massive Soviet Red Army. Americans generally felt secure with their monopoly, and looked to future under the umbrella of an “American Pax Atomica.” However reality of a peace enforced by American atomic weapons was more form than substance.

Strategic Air Command (SAC) was America's "Sunday punch" and a key component in employing atomic weapons. However, SAC was rife with a number of operational issues that made it ill-prepared to conduct the kind of war airpower proponents envisioned. Equipment, personnel, and organizational issues precluded SAC's ability to fulfill its assigned mission. Additionally, the nation's ability to develop, produce, and store atomic weapons fell under the purview of the newly-formed civilian Atomic Energy Commission (AEC). The AEC too had problems filling its mission. Furthermore, the AEC's poor relationship with the military precluded the effective coordination of the entire atomic effort. Moreover, war plans established by the Joint Strategic Plans Division (JSPD) were devoid of realistic courses of action regarding strategic bombardment. While a multitude of war plans were developed during this time, they all failed to articulate clear military goals and objectives regarding conflict with the Soviet Union. As a result, the American nuclear monopoly was a model of dysfunction caused by a myriad of organizational disconnects.

16:00—17:30

W4A Environment, space and power: sharing and using technology on the Silk Road

Location: Room 137 (A)
Organiser: Goran Đurđević
Chair: Sławomir Łotysz

W4A-1 The competition between Technology and Nature: A Case Study of the operation of the Western Regions in the Chinese Empire

Graduate student Hao Tian Chen
Lecturer Yu Qiao

Since the 2nd century BC, the "Western Regions" (roughly equivalent to today's Xinjiang Autonomous Region and part of Gansu Province, Afghanistan, Kazakhstan, and Russia) has long been an important frontier and a part of Silk Road for China With Central Asia and West. Dynasties from Han to Qing have taken measures to maintain and consolidate the rule of the Western Region. Drought and ecological fragility are the prominent features of the natural environment of the Western Regions. The special environmental conditions are important problems faced by Chinese dynasties in the controlling and governing of the Western Regions. In fact, the change of the environment in the Western Regions has directly led to the dissolution of some parts of Silk Road and the destruction of several settlements. Therefore, in the process of operating this area and interacting with the political entities in the Western Regions, the Chinese dynasties constantly absorbed and applied new technologies, like the way of agriculture, water diversion and planting new crops, and revised the policies for the operation of the Western Regions, tried to not only adapt to nature but also control nature to maintain competitiveness in the Western Regions. This paper attempts to explore the technological renewal and institutional reforms applied by China in response to environmental changes in the history of human activities and ecological changes.

W4A-2 When Technology meets Archeology: 3D Laser Scanner and UAV LIDAR on the Historical Sites on Silk Route

Graduate student Hoang Khuong Tran
Graduate student Ali Farman

Archaeology is an important part of human history which represents valuable information about the human settlements which existed centuries ago; this includes exclusive heritages, archaeological sites, ancient town, historical past, antiquity, etc. which can be disappearing daily and there may be numerous causes for that like no right look after, climate change affects, natural catastrophe and different human elements, archaeology. It will likely be absolutely disappointing if our upcoming generation cannot see what we have gotten visible. To store our historical and cultural background to our progeny, it needs to be saved in the digital version. After any impacts, we can recover them easily. 3D laser scanner is a good method with localized describes but it takes a lot of time for big areas and cannot reach inaccessible areas. The birth of UAV LIDAR technology completely overcomes the disadvantages of the 3D laser scanner with large describes but it is limited by detailed level what 3D laser scanner can meet. This combination is extremely useful means that our heritage is digitized and documented as completely as possible with all advantages and removal disadvantages of 2 distinctive technologies. Long historical processes can be traced by technology and interdisciplinary analysis which can connect humanities and sciences. One of those long-time processes is Silk route, network of historical connection around Eurasia. Some of very important sites cannot be visible without modern technology specially sites in forest and woodlands. I will present theoretical framework and selected case studies of archaeological sites My Son Cham Ruins in Vietnam, Bagan historical site pagodas & temples in Myanmar, Angkor Wat in Cambodia where we use 3D laser scanner and UAV LIDAR. Then we will clarify the trace and connection between these archaeologies on the silk route in southeast Asia.

W4A-3 How to become partner with land: Urbanization land use impacts of urbanization on agricultural land of Gilgit city (Pakistan)

Graduate student Ali Farman

Professor Richard Greene

Graduate student Aftab Nasir

Graduate student Hoang Khuong Tran

Urbanization has unavoidably changed land use of conventional cultivating and normal land around the world. Financial effects on provincial society and physical scene have been definitely seen in thickly populated territories including Pakistan (Gilgit) and numerous different zones. Gilgit Baltistan is an important part of Silk Route in past. Gilgit-Baltistan testifies to the existence of Silk Route in the region. Historically, the Silk Road comprised different arteries connecting to main routes. Hunza, Chitral and Gilgit were one of the routes of the Silk Route. Due to Silk Road Gilgit was an important city from its early ages and its settlement was considered important. In modern days, the idea of Silk Route is going to be revitalized. Except roads and maritime communication, main contemporary structures in the modern Silk Road will be urban areas. Results of these changes can be traced by combination of humanities and science especially remote sensing and GIS.

Remote Sensing images and Geographical Information Analysis together with financial factual information can be utilized to assemble a urbanizing change way and direct a projective report. This paper reviews last 38 years (1980-2018) of urban expansion and land use of the Gilgit city, now it has grown couple of more times as in the back dates. The analysis of this paper is based on Remote sensing image taken every ten years from 1980 to 2018, historical and demographic based data.. The classification is shown about five major classes: water, agricultural land, built up, bare land and snow. Connecting analyzed data with

theoretical ideas about creating space by Edward Soja and Henri Lefebvre, I will present research about creating and developing space in Gilgit city.

Gilgit city Farm lands are the edge of creation of space in Gilgit city. They are facing problem by unplanned land use which can have ties with creation of urban space in which farmlands are excluded. According to the survey report the developing region is expanding and the cultivating land is diminishing in quick way. Expanding populace and diminishing the rural land is certifiably not a correct sign for the brilliant eventual future of Gilgit City.

W4A-4 In the local shadow of foreign mirrors: technology, trade, mirrors and space in Central Asia (1000 BC – 200 AD)

Ph.D. candidate Goran Đurđević

Mirrors are extraordinary archaeological objects which have importance for historical communities. They have been used in everyday life and put in tombs. In this paper, I will present sharing of mirrors and technology of production, creation of space on the Silk Road (Central Asia states and political entities) during first Millenia BC up to 3rd century AD. There can be found a plenty of mirrors from Far and Middle East and Europe. Based on the selected examples of Chinese, Greek and Rome mirrors, I would like to emphasize several research questions. How did foreign mirrors come to Central Asia? Scholars made three possible answers: trade between different political entities, diplomatic presents and transfer in later periods. If they are objects of trade or gifts, it can have symbolic sharing of power between sending and receiving persons. Can we perceive mirrors as sent gifts or, since the craftsmen could show the technological mechanisms in person, as objects used to transfer knowledge? Also, how did Central Asian people use it? These objects are made for human interaction, as Jody Joy wrote, user can manipulate with lightness, shadow, positions and darkness. Mirrors are reflecting both a person and a space which depends on mirrors' shape (round mirrors are making circled or rounded space and square defined space with another proportion). They can also reflect two or more persons or the whole area (room or outside area) if they are put on the stick or on the wall. Lightness (depends on daily time and weather and fire if it is dark) is yet another valuable property of mirrors, which also can be used for analysis. I am going to present the role of foreign mirrors in local communities in Central Asia based on those research questions.

W4B Technology and Politics III: Technicians as servants and Technocrats

Location: Room 138 (B)

Organiser: Program Committee

Chair: Mateusz Sokulski

W4B-1 DDT and the role of agricultural engineers during the early years of the Francoist dictatorship (1939-1953)

Ph.D. candidate Silvia Pérez-Criado

The history of DDT has been widely studied in the American context thanks to the works of several historians since the 1980s (Dunlap 1981; Russell 2001; Kinkela 2011; Davis 2014). This communication is based on these previous works but also relies on recent historical research on toxic products (Boudia & Jas 2013, 2014; Bertomeu-Sánchez & Guillem-Llobat 2017) and scholarship on agnotology and undone science (Frickel et al. 2010; Proctor & Schiebinger 2008). Our work deals with a rather unexplored context, Spain during the early Francoist regime, which has nevertheless attracted the attention of historians of science and

technology in recent years (Camprubí 2014). We offer here a collective portrayal of the community of agricultural engineers (Pan-Montojo, 2005) and their role in the introduction of new pesticides during the first years of the Francoist regime. Our focus will be on three main issues: the context co-production of technocratic projects in pest control and the authoritarian policies of the new dictatorship; the communicative practices making the virtues and risks of DDT visible and invisible; and the marginalization of other forms of pest control or preventing infectious diseases. Spanish agronomists complained at the beginning of the 20th century about the scarce use of pesticides and fertilizers, an issue which was considered to be one of the causes of the “long siesta” of Spanish agriculture (Simpson 1997). In contrast, at the turn of the 21st century, Spain, together with France, became one of the countries with the highest use of pesticides in Europe. We claim that the historical analysis of the Spanish path to the “pesticide treadmill” (Bosch 1989) can shed new light on the history of toxic products (and DDT in particular) while providing clues on the role of technocratic projects in the emergence of the Francoist dictatorship.

W4B-2 Structures of knowledge and tecnoscientific networks in the construction of the Portuguese empire (1647-1871)

Researcher Alice Snatiago Faria

Professor Renata Malcher de Araujo

The importance of scientific and technological institutions in the support of empires is a fact. The role of these institutions - and its professionals - in the shaping of the colonial administration itself have been explored by several authors. The focus of this presentation will be a research project, just starting, that looks at the creation and transformation of knowledge networks connected to the formation of the built environment in the Portuguese empire.

Departing from the creation of *Aula de Fortificação e Arquitectura Militar* (Fortification and Military Architecture class) in Lisbon in the year of 1647, it will follow a period of time where several classes and schools appeared in Portugal and its overseas. A cycle that would end in 1871 when the *Escola Matemática e Militar* (Mathematical and Military School) in Goa was closed. Our aim is to look at agents of the colonial dispositif – experts and institutions – throughout time and space in order to understand how the technoscience networks of knowledge they created are shaped by local conditions (and vice-versa) across the Portuguese empire.

This paper will discuss and explore the methodology and first results of our project, underlining how the creation of a network of classes, in the areas of engineering, architecture and urbanism, in frontier towns in Portugal and in various parts of the empire (Angola, Brazil, Cape Verde, India) is parallel to the need of the political power to impose itself in Portugal and its overseas territories. Furthermore, it will look at how these agents determined the formation of new structures of knowledge, and power, that have played a crucial role in the transformation of those territories.

W4B-3 Engineers to Power! The Rise and Fall of Technocracy in Japan, 1900 to 1945

Professor Erich Pauer

Shortly after 1900 Japanese engineers, who saw themselves as the driving force behind industrial modernization, became disillusioned. Contrary to their expectations, neither society nor politicians seemed to appreciate their role in laying the groundwork for an industrialized country.

During the First World War an organized resistance of the engineers emerged. In a first step, several groups demanded more participation in political decision-making. Later the difficult economic and social situation and the failure of the Japanese political elites to handle the world economic crisis in the late 1920ies and early 1930ies, led to an increasingly stronger claim to power by the Japanese engineering elites.

The idea of a technocracy, based on the adoption of technocratic ideas from the USA, began to gain a much stronger foothold in the 1930s and – consequently – the engineers' claim to leadership, “engineers to power”, grew louder. The idea of "planning" in the sense of technocratic thinking pushed forward by the engineering elites necessarily had to be taken up by the politic circles. Then, in 1940, with the engineers’ proposal to establish a "technical general staff" (an idea based on the American technocrat Thorstein Veblen from the 1920s) followed by the establishment of a technical steering authority in 1942 on the government level, the realization of technocratic goals regarding the leadership of engineers in Japan’s state affairs seemed imminent. The priorities, however, changed due to a changing war situation: Military goals came now into the foreground, while engineers and their technocratic demands were relegated to the background.

W4D Empowering Change: Railways in a Societal Context: Railways in Building the Portuguese Empire

Location: Room 143 (D)

Organiser: Timo Myllyntaus

Chair: Timo Myllyntaus

W4D-1 From Heaven to Hell: Portuguese railways between the technical sublime and a technological pessimism, 1880s-1890s

Researcher Hugo Silveira Pereira

From 1850 onwards, Portugal undertook an ambitious public works programme (commonly known as Fontismo, after its main promoter, engineer and statesman, Fontes Pereira de Melo), based on the saint-simonianist ideology, Portuguese engineers were engaging with since the 1820s, and in the technological sublime imbedded in the technical fix. The main feature of Fontismo was to build railways across the Portuguese landscape. The argument was straightforward: build railways to modernize the kingdom and the improved transport that followed would spur economic growth in the regions where the lines operated. In the late 1870s, Portuguese technocrats transferred that investment strategy to the overseas colonies where railways could also operate as political tools of sovereignty and territorial appropriation. After some initial hiccups, Portugal’s rail system knew an extraordinary growth in the 1880s. In the mainland, over 1,000 km of track were inaugurated, connecting every province of the country to the capital, Lisbon. Overseas, lines were set in Angola, Mozambique and Goa (India), thus demonstrating the colonial vocation of Portugal and its role in *civilising* the overseas domains. However, the following decade was disappointing. After the 1892 bankruptcy, the growth of the mainland grid was negligible while in the colonies, railways involved Portugal in diplomatic disputes and financial troubles.

In this paper, I will analyse these events and how the quasi-deterministic faith in railway technology evolved to a feeling of technological pessimism that, to some, could even threaten

the very survival of the nation. In the end, I will show which side won, the pessimistic view that blamed an exaggerated investment in technology (with no corresponding improvement of the Portuguese economy and society) or those who still believed in the technical fix to resolve the country's problems. Sources for this analysis include, parliamentary debates, correspondence between governmental and colonial officers and technical reports by Portuguese engineers.

W4D-2 Railways as tools of direct and indirect Empires in Africa Angola and Mozambique: the agricultural railway lines

Dr. Bruno Navarro

The Berlin Conference (1884-85) consecrated a new colonial order that fitted perfectly the imperial agendas of Great Britain, Belgium, France, and Germany. As “informal imperialism” based on historical rights gave place to the policy of effective occupation of African territories, the rivalries among European colonizing powers became increasingly critical. Portugal, a peripheral country in Europe, responded to this new international framework by launching a set of “civilizing outposts,” to secure the Portuguese sovereignty over the hinterland of both Angola and Mozambique and ideally linking the western and the eastern African coasts. The corner piece of the Portuguese strategy was not different from the British, the French or the German ones. Building railways was the most efficient way to “domesticate” and exploit the African natural and human landscape in situ and, at the same time, to establish an economic hierarchy among geographical spaces both within the colonies and in a worldwide context. As all colonial agendas, the Portuguese one was designed to secure the exploitation of the colonies, imposing a European worldview that implied altering the physical, social and economic structure of the colonized territory under the label of the “civilizing mission.” Railways and other infrastructures – roads, harbors, dams – designed by engineers transformed both the African landscape per se, by molding it to the needs of building the railway lines (earthmoving, changes in river beds, tunnels), and its use, by carving the way to plantations, mining, and trade outposts in the land formerly used by indigenous as pastures or hunting territories and by establishing white settlements. In my presentation I propose to discuss the strategies deployed by Portugal, a peripheral country in Europe, to use its African Empire as a token for asserting its position in the European arena. Beyond diplomatic and political demarches, technology - and particularly the building of railways - was at the core of the Portuguese imperial agenda, determining the way African territories were immersed in the global market. Engineers played a central role in this process by discussing and eventually deciding the layout of the railway lines and thus establishing an economic hierarchy among geographical spaces not only within the colonies, but also in a worldwide context. I will use the case study of the Portuguese Engineer, Joaquim José Machado, who have played a major role in this process of the definition of a technological agenda, in the former colonies of Angola and Mozambique, in the last decades of the Portuguese constitutional monarchy.

W4D-3 Railroads and Power in African Context: the Moçamedes Case, more than one Century of History

Professor Anne E. C. McCants

Dr. Bruno Navarro

Nuno Ferrand

Eduardo Beira

Hugo Silveira Pereira

Dr. Ellan Spero

We discuss the relationship between railroads, rail technologies and political power in Africa through the case of Moçamedes railroad, from its initial discussion (1881) until nowadays, when the railroad is again an important infrastructure for the economic and social development of southeastern Angola. Moçamedes railway connects the deep sea harbour of Moçamedes (now Namibe) to the Lubango agricultural region (1905 to 1923), crossing high mountains between, and then continues for more than 700 kms across the plateau until the so called “lands in the end of the world”, deep in the far jungle of southeastern Angola (1923 to 1961). The history of Moçamedes railway crosses more than one century and international policies in Africa, from the consequences of Conference of Berlin (1878) to the nowadays expansion of China business interests in Africa, especially in large public works. Meanwhile it suffered the vicissitudes of the Portuguese colonial war (1961 to 1974, when it kept running) and the internal civil war (1975 to 2002, when its operation was largely disrupted, although not completely). Most of the track and material were out of use when the war period ended. Meanwhile the reconstruction of the railroad was done by China cooperation with Angola and regular service begun again in 2015.

W4E 14th Annual Symposium of the Social History of Military Technology VIII

Location: Room 147 (E)

Organisers: Bart Hacker and Ciro Paoletti

Chair: Ciro Paoletti

W4E-1 The Total Defense of the Welfare State: Swedish Stationary Coastal Artillery of the Final Stage of the Cold War

Dr. Krzysztof Kubiak

Sweden is a country that was one of the first started building a "society of well-being" or “welfare state”. It is widely believed that this was possible thanks to Swedish pacifism. From naive point of view pacifist policy is identified with the possibility of allocating funds for other purposes. Such a look is not realistic as well as not true. Sweden was a neutral, but not pacifist, during the Cold War era. Moreover, Swedish neutrality was total neutrality. This means that the state was ready to use all its resources to defend the neutrality. The determination of the Swedes in this matter proves that until the mid-1960s, the nuclear weapons program was being implemented there. The atomic bomb was supposed to be the ultimate guarantee of neutrality. Of course, many programs of development of the conventional weapon were continued after the abandonment of nuclear weapons. One of their elements was the construction of a very modern coastal artillery. It played the crucial role as the main bone of the defense system against invasion from the sea. This issue is the subject of this article. The author tries to overcome some stereotypes about Sweden. He shows that in those conditions it was possible to build at the same time a strong, credible system of conventional deterrence while maintaining the welfare state.

W4E-2 The Roller Bridge over the Suez, October 1973

Professor Matitiahu Mayzel

From the summer of 1967 until the summer of 1974 the Egyptian and Israeli armies faced each other across the Suez Canal. Within their various operational plans, defensive and offensive, both armies were looking for the possibilities of crossing the Suez Canal in combat. Both armies were looking for landing and bridging equipment, directing their attention at the world's arms market. For the Egyptian army, whose highest strategic priority was recovering Sinai, the choice was relatively clear: Egypt applied to the USSR as her main source of

military equipment, bridges and landing crafts included. When war came in October 1973, Egyptian forces crossed the canal using Soviet-supplied crossing crafts and bridges. The Israeli army viewed the canal crossing as only one option, not a top strategic priority. Some bridging equipment was purchased abroad, but the main effort, led by Gen. Israel Tal and Col. David Laskov, was developing such equipment at home. They conceived of a mobile/moving bridge, transported to the desired location rather than a bridge built on site. The mobile bridge comprised large floatable metal cylinders linked by ball-bearings, strong enough to withstand the hardship of the terrain and flexible enough to crest sand dunes and to make road turns. It was to be tank-towed and positioned over water by the same tanks, which would then cross to enemy territory. When war came on 6 October 1973, the situation was very different from the one envisioned by the bridge inventors and operators. Later in the war two Israeli tank divisions crossed the canal using conventional, old-fashioned floating and bridging devices, considered obsolete by other armies. The Roller bridge came to use only days afterwards, deeply disappointing its inventors, putting an inglorious end to an innovative idea.

W4E-3 Thinking Through a Weapon: "Iron Dome" Missile Defense System and Israeli Polity and War Making

Dr. Ari Barell

In this presentation I will try to describe and analyze the short and remarkable history of the Israeli short-range missile defense technology known as "Iron Dome". I would like to use the Iron Dome case study, or, in other words, to "think through" Iron Dome, in order to extract some of the military and political implications of its appearance in the Israeli-Palestinian battlefield. I will argue that Iron Dome is part of the rise of a new social order and a new configuration of war.

More specifically, using Ulrich Beck's concept of *Risk Society* (1992) I will analyze Iron Dome's role in the transition of Israel's official policy from seeking to end the Israeli-Palestinian conflict to a policy that settles with managing it. Thanks to its remarkable technological success, Iron Dome produces a "calming effect" and actually reduces the public pressure to advance a solution to the conflict. It allows for the conflict's continuation at low intensity for a long period of time. As I will show, this is in fact a new configuration of military struggle which focuses on risk calculation and risk management and whose objective is stability rather than a solution. The paradox is that this technology indeed allows a military struggle with few casualties, but, on the other hand, it is a struggle without victory – an Unending or Forever War (Duffield 2007; Filkins 2008).

Furthermore, and building on Grégoire Chamayou's analysis of the Drone (2015) I will try to show how Iron Dome also takes part in writing a new social contract between citizens and the state. Iron Dome enables to maintain the daily routine of life in exchange for eroded sense of sovereignty and of personal security. As a matter of fact, it can be argued that paradoxically it takes part in a comprehensive Neoliberal regime of abandonment of the citizens of Israel.

Thursday, 25 July

09:00—10:30

Th1A Computers I: Early Decades

Location: Room 137 (A)
Organiser: Program Committee
Chair: Dick van Lente

Th1A-1 About dynamic expert forecasting in Soviet project OGAS

Ph.D. candidate Serhii Zhabin

Overcoming the global crisis requires changes in the economy, which determines the creation, distribution and consumption of material goods in society. Soviet planned economy, as the only alternative to market, failed because of its flaws: dominance of bureaucracy, impracticable planning and tendency to ignore the interests of consumers. Soviet scientists in cybernetics, recognizing these disadvantages, proposed technological solutions: computerization of management processes, electronic money, paperless document flow, long-term forecasting and flexible planning. In 1960-70-s Soviet cybernetic V. Glushkov proposed project OGAS.

The gathering and processing of information was provided both for monitoring and coordinating the work of the economy, as well as for strategic long-term forecasts in economy and science. The expert survey, conducted in 1969 by Institute of Cybernetics of the Ukrainian SSR Academy of Sciences under the guidance of V. Glushkov and G. Dobrov, on the development of a long-term forecast for the computing technology in the 1970s – 1980s showed that the further development of technology and the economy in modern conditions is largely determined by the state of electronic computers and the level of their use. In 1971 the new method of the preparation of scientific and technical forecasts (based on the “Delphi” and “Pert” methods) was approved and recommended to the ministries and departments. V. Glushkov called it the “method of building a forecast tree” or “a method of dynamic forecast”, because he desired to make the process dynamic and continuous in the computer network.

Using original project documents and memoirs, we can state, that OGAS in its essence was a project of the information society. It was supposed to create a unified state automated system for developing dynamic forecasts of scientific and technological development. This task is still important and the future project of the dynamic expert forecasting will most likely be international.

Th1A-2 Polish Solidarity and two models of encryption

Dr. Agnieszka Dytman-Stasieńko

In my presentation I would like to describe methods of technological struggle with the state communist surveillance used by Solidarity activists from the 80s. Solidarity has been reminded as a great Polish social movement, rooted in independent trade unions, which made a huge contribution to the fall of communist rule in Poland and in Europe.

In the history of the movement the period of the 80s symbolizes an evolutionary technological change involving the transition from analogue to digital technologies (without abandoning the former), in conditions of very limited access to digital technologies, especially to computers. Ones of interesting examples of technological resistance from those times have been various practices of data anonymization obtained by creating digital software that enabled an encryption of messages and this way served to defend against state surveillance. Cryptographic programs were created both for the so-called domestic use as well as for more formal communication between individual activists and Solidarity cells.

In my presentation, I would like to introduce two examples of such activities. The first one, has been represented by Ireneusz Haczewski from Lublin (Eastern Poland) He, along with his son, a high school student, had created a digital encryption program that was used to encrypt the critical information relevant to his underground activity in order to protect him and his family, also engaged in resistance.

The second example represents the software that had been created by two engineers from Gdańsk: Włodzimierz Martin and Marek Nikodemski. This kind of encryption program was used mostly in communication between Solidarity members on various levels of collaboration within their activist networks and circles of collaborators, both in Poland and abroad.

Described examples of software can be called a form of liberation technology, as Larry Diamond puts it, because they provide effective means of alternative communication and this way expand horizons of freedom.

In-depth interviews conducted with the creators of encryption programs: Ireneusz Haczewski (and his son) and Marek Nikodemski will serve as a research basis for the presentation.

Th1A-3 Preserving Software as World's Heritage

Dr. Alexios Zavras

Professor Roberto di Cosmo

Cultural heritage is the legacy of physical artifacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations. In today's world, digital technology has become for many an essential tool for social existence, communication, creation, sharing, and is increasingly indispensable for accessing public services. However, the role of software development is still largely underrated, as is the recognition of software source code as an intellectual effort and as the receptacle and expression of scientific and technological knowledge.

Software is an important intellectual product and as such it is an important part of our heritage. Furthermore, software is a key enabling factor for the preservation of other aspects of our cultural heritage that we would de facto lose without the software needed to access them. Preserving software is therefore essential for protecting and safeguarding our cultural heritage. It is our collective responsibility to ensure that the knowledge accumulated and constantly being generated is not lost.

The presentation will introduce Software Heritage, a recently-created non-profit organization dedicated to software preservation.

Th1C Infrastructures I: water supply and bridges

Location: Room 141 (C)

Organiser: Program Committee

Chair: Merve Özhan

Th1C-1 The Use of Water Infrastructure and the Making of Modern Los Angeles, circa 1900

Lecturer Jan Hansen

This proposed conference paper examines the role infrastructure played in the development of power relations in Los Angeles around 1900. Addressing the conference subtheme “design as politics,” it explores how the use of water infrastructure contributed to the making of identities and vice versa. In circa 1900 Los Angeles, the construction of an engineered water system connected to the biopolitical formation of the city population. As Mexican and Chinese Americans were excluded from supplied water, the white majority produced the “modern city” on the model of the “modern body,” both imagined in racial, classed, and gendered categories.

First, the paper surveys how city officials and social reformers approached nonwhite residents. In particular, it considers how public health advocates influenced water infrastructure and water practices of marginalized groups in order to create the sanitary city. Second, the paper examines how nonwhite residents received water technologies in their daily lives after their neighborhoods were connected to the network, and how they shaped the city as a place to build and experience their own identities. The empirical basis of this work consists of archival sources such as letters to the city council, as well as published sources such as instructional booklets, user manuals, advice literature and marketing and advertising materials.

In doing so, the paper reveals historical agency – creativity, subversion, and resistance – among nonwhite residents. Suggesting that they did not derive their poor sanitary conditions from their own imbedded cultural habits (as public health advocates did), but rather from structural discrimination by white Americans, the paper proposal argues that in using water infrastructure they actively constructed the city. In doing so, they co-fashioned Los Angeles as a multiethnic place.

Th1C-2 Prussian Masterpiece or Global Project? The 1857 Vistula Bridge at Tczew/Dirschau and its Engineers

Professor Jan Musekamp

In 1857, Prussia inaugurated its most important railroad link with East Prussia, the line between Berlin and Königsberg (today’s Kaliningrad). It would soon be extended to the Russian border, thus creating a major European transportation axis connecting Paris to St. Petersburg. At Tczew, the line had to cross the mighty Vistula River, which until this time did not have a permanent bridge. Travelers and goods had to cross via boat, which was only possible in summer and fall. The railroad bridge erected here between the late 1840s and 1857 had a major impact on local, regional, and international trade and travel, but was also itself a product of international exchange

The bridge was a major feat of civil engineering that more than one hundred years later would find its way into American Society of Civil Engineers’ registry of International Historic Civil Engineering Landmarks. Contemporaries of the mid 1900s were fully aware of its role and praised this masterpiece of Prussian civil engineering. However, they failed to mention the international dimensions of the bridge. Drawing from documents in Berlin and Washington archives and from contemporary periodicals, this paper addresses the impact of scientific exchange between Prussia, France, Great Britain and the United States on the Tczew Bridge’s design, fostered by international scientific journals and by the bridge’s engineers’ study trips to Western Europe.

Th1C-3 Narratives of power: Hydroelectric power stations in South Tirol in the first decades of the 20th century

Professor Constantin Canavas

Historiography on economic development across changing national borders is often under pressure to legitimise dominant political claims and discourses. In the case of South Tirol (Alto Adige) political discourses have been developed inside linguistic-ethnic confinements. The dominant German discourse stipulates the contrast between a “sustainable local economy” based on agriculture and small manufacturing before 1919, and an “invasion of Italian capital and skilled workers” as medium of demographic and economic assimilation in the 1920s and 1930s, the hydroelectric power stations being an emblematic instrument of this endeavour. The Italian discourse focuses on the nation-wide transition from agriculture-based to an industry-based national economy in that period. Both discourses are based on the same data, and are highly interpretative. In fact, they both constitute opposed selective narratives.

Perhaps it is impossible to have a comprehensive narrative across shifting borders and changing boundary political, social, and economic conditions. The present study proposes an overlapping of narratives including the mentioned ones, as well as those regarding the industrial context of the Habsburg Empire before 1918 (as a synchronic juxtaposition to the agricultural vision) and the radical changes in post-WWI Austrian Republic. A necessary extension in this looking-through-narratives approach regards the narrative of the national industrialisation programme of post-WWI Italian Kingdom from the perspective of the acting companies. In both sides of the changed border coal scarcity was a major concern, and water power became a key-factor for the new developments in powering electrical systems. This approach yields a plurality of focal points, some of which let aside the concerns of the local society in the name of the technological, energy-based *Zeitgeist* (especially after 1919) – independent of the specific political scheme on each side of the border.

Th1D Challenging Power through Playing with Technology I

Location: Room 143 (D)

Organisers: Stefan Poser and Artemis Yagou

Chair: Artemis Yagou

Th1D-1 Artful Play with Technology

Dr. Florian Bettel

“Hello, Today you have day off.” A friendly text message at first, but what could be an invitation to spend the day joyfully, is a disaster for the recipients: workers with zero-hour contracts. The artist Jeremy Deller confronted the audience at his exhibition at the Venice Biennale in 2015 with the harsh conditions of 19th century workers as well as with controversial current working practices in a playful setting. Spectators were invited to explore ambient sounds from factories on a gleaming blue and chrome vintage jukebox, or to discover contemporary productivity devices, such as Motorola’s WT4000, which are strikingly reminiscent of game interfaces.

Playing with technology can be a very fruitful technique for artists, and art history brings some examples of it to the surface of cultural production. Over the last decades, artists use the purposelessness (“Zweckfreiheit”) of game and apply it as a concept on contemporary technology. The results can be hilarious, intriguing, breath-taking, overwhelming, scary. As works of art, however, they have one thing in common: they promote aesthetic added value

while challenging technology in the form of production and products, infrastructure, service, etc.

The proposed contribution to the panel “Challenging Power through Playing with Technology” will be a categorization of works of art in the 20th centuries, such as Niki de Saint Phalle’s *Golem* (1972) and Jean Tinguely’s *Carnival Fountain* (“Fasnachts-Brunnen”, 1975–1977), and will use these categories to gain a deeper understanding of the play of contemporary artists with technology. The paper follows the assumption that the presented excerpt from contemporary works of art enables an analysis of the blurring boundaries between work and leisure (such as through gamification or shifting the age limit, e.g. musical.ly/TikTok) in the context of the ubiquitous Attention Economy.

Th1D-2 Gaming the Iron Curtain: Alternative and subversive practices in the Czechoslovak computer hobby movement

Dr. Jaroslav Svelch

The paper develops themes from the monograph *Gaming the Iron Curtain: How Teenagers and Amateurs in Communist Czechoslovakia Claimed the Medium of Computer Games* (Švelch, 2018), and builds on oral history interviews, archival material and the software that has been preserved in fan collections. Throughout 1980s, Czechoslovak authorities treated computer and information technologies as an industrial resource rather than a social or cultural phenomenon. While they dismissed the importance of home computing and never managed to supply enough home computers to satiate the demand, they did sponsor computer clubs whose ostensible goal was to train expert cadres for state institution and the centrally planned economy. Although these clubs were formally run by state-controlled paramilitary or youth organizations, they were only very loosely supervised, and their day-to-day activities were largely apolitical. This makes them a prime example of *vnye* spaces (Yurchak, 2006). The paper will argue that hobby computing in Czechoslovakia was in a paradoxical position – it was sponsored by the government, but at the same time it challenged its power by both offering alternative spaces, and by explicitly - and playfully - subverting its policies and ideologies. Using both imported and Czechoslovak 8-bit computer platforms, hobbyists engaged in hardware tinkering and software trading, bypassing the import embargoes and the non-existence of hardware and software market. They created games and other kinds of software to gain recognition and respect from their peers in a meritocratic environment, independent of the school and work hierarchies often dominated by the Communist Party. As games were under the radar of state censorship, amateurs could also express their own experiences and opinions through this new digital medium. In the late 1980s, some of their work became openly subversive. Several anti-regime text adventure games were made in 1988 and 1989, including *The Adventures of Indiana Jones on Wenceslas Square, January 16, 1989*, which pitted the iconic Western hero against riot police during the Palach week protests.

Th1D-3 Spraying – Challenging Activity, Art and Subversive Game in the City

Dr. Stefan Poser

Sprayers act with the help of various technologies, which influence their success and - concerning aerosols - their style: not only aerosols of colour, but different equipment for climbing and mobility belong to their equipment. Normally their picture carriers are walls of built environment. Graffiti resistant coats of painting were developed as well as improved procedures of whitewashing walls. The paper aims to analyse challenging or subversive

activities in-between the arts and games, based on the example of spraying since the 1970s. The societal impact of spraying will be investigated.

Spraying is dating back to late 1960s' Paris and early 1970s' Zürich. The actors were addressed as artists as well as criminals. This twofold reception of spraying seems to continue modified until nowadays, although the group of sprayers and their different styles developed impressively within the last forty years. Spraying was integrated in modern youth culture on the one hand, on the other hand it remained a no-go. Some sprayers describe their acting as appropriation of the urban landscape. A museum of street-art opened in Berlin recently, the Berlin wall became a carrier of graffiti and street art in the late 1980s, whereas public authorities in many cities still eliminate sprayed signs and pieces of art, being after the sprayers for damaging property.

Spraying became a subject of art journals as well as of research in the history of arts, but was not investigated as technology-based activity in-between art and play. Such an approach might be fruitful to analyse the role of technology-based subversive games for the development of society.

Th1E 14th Annual Symposium of the Social History of Military Technology IX

Location: Room 147 (E)

Organisers: Bart Hacker and Ciro Paoletti

Chair: Ciro Paoletti

Th1E-1 The Rising Tide of Silicon Beach: Socioeconomic Restructuring in Twenty-First Century Los Angeles

Dr. Layne Karafantis

During the Cold War, Los Angeles became a city that exemplified the military-industrial complex. The aerospace industry, research institutions, and federal thinktanks swarmed the region, continuing a trend that had been spurred by the prevalence of aviation companies dating back to the 1920s. Along with aviation, space systems supporting the telecommunications industry anchored Los Angeles industry. By the 1980s, 15 of the largest aerospace firms were headquartered in southern California, including the nonprofit Aerospace Corporation founded in 1960 to serve the Air Force in the scientific and technical planning and management of space-missile programs, while the elder Rand Corporation offered analytical expertise to the Department of Defense; they still do. When the aerospace industry precipitously declined in the 1990s, a number of firms folded, merged, or relocated from southern California, yet the military past of the city provided the foundation for future ventures, as well as contributed to an economic, military-based upturn in the twenty-first century. In the last twenty years, jobs related to space vehicles and missiles has climbed by more than 60 percent and a quarter of these jobs are located in southern California. The existing infrastructure and history of aerospace in the region significantly contributed to this re-emergence. Most military operations in Los Angeles are less visible than they were in the past, yet they remain prominent in the city's landscape and essential to the city's economy. The contemporary proliferation of technology companies in twenty-first-century Los Angeles, in an area that has come to be known as "Silicon Beach," was both instigated and drew success from pre-existing infrastructure and the city's legacy contributions to the defense-dependent aerospace industry. An examination of this influence provides a backstory for more recent urban changes, including how the megalopolis and its inhabitants have been impacted

by the contemporary prevalence of commercial technology ventures operating alongside their military counterparts.

Th1E-2 The Cold War as a Period of Analysis to Study Globalization and Foreign Policy: A Critical Assessment

Ph.D. candidate Pedro Ponte e Sousa

Globalization is one of the most important social phenomena in the contemporary world, shaping all dimensions of societal life. However, both among globalization theory as well as foreign policy (FP) studies (and FPA, in particular), the impact of globalization on the state, the effects of political globalization and the transformations it brings to FP have been understood as (not so relevant) contextual elements, described in a generic way or even completely excluded from those research fields and interests. Nevertheless, the particular characteristics in which FP activities are developed render essential, rather than ignoring the state and its external action, to strengthen its study seeking to assess the scope, nature and impact of globalization on its international activity. A critical issue in this regard has to do with the origins, history and the best way to capture these phenomena in a scientific study. Firstly, among those supporting both a transformationalist view of globalization as well as a mutually constitutive approach of FP and globalization, a central claim of such a worldview is that international politics carries a dialectical effect of contributing simultaneously to globalization and fragmentation. The Cold War is the main research focus of such scholars, considered both the source of contemporary globalization and as pushed by specific political-military forces leading to a political, military, economic, and legal institutional framework, constituting a global cluster. This would be a critical moment in highlighting how international politics and globalization are interconnected, and also the shift from internationalization to globalization. Secondly, it is crucial to interrelate such thesis on globalization with the five identified specific understandings and approaches to study globalization: namely, as 'hardwired' (to the history of human beings); as a long-term cyclical process (subject to expansions, contractions, and even disappear); focusing on different times or waves of globalization (sequential and with different causes, actors and formats); focusing on specific events (either of remote or recent history); or that more recent (from the second half of the 20th century) and relatively generic changes shape contemporary globalization. This paper aims to assess the impacts of both these theses and approaches to any specific study on globalization and FP. We are particularly interested in the characteristics and implications of some core prerogatives of selecting such elements, as well as the limitations and possible solutions to the challenges that studying the interaction between FP and globalization poses.

Th1E-3 Transforming advanced missile technology into a medical innovation: The case of the capsule endoscope

Ms. Sandra Ziv

The capsule endoscope, which was released commercially in the year 2000, was developed by Dr Gabi Iddan, during the time he was working as an electrooptical engineer in the Missile Section in Rafael, Israel's national laboratory for the design and development of advanced military equipment. Rafael provided the laboratory and equipment he required to perform the feasibility experiments and further development, as well as providing the expertise of some of the country's leading experts in video transmission and wireless communications. The infrastructure and expertise of the Rafael organization provided Iddan with the material and conceptual resources he required in order to develop a commercially viable product, including

the resources to write the patent. This is a case where the physical and conceptual infrastructure of Rafael, Israel's national laboratory for weapon's development, provided important knowledge and resources towards the development of a product used for non-military use, that is, a commercial medical product. This is an actual case where military technology, knowhow and resources was transformed into a product which could eventually save lives. Sources include in-depth interviews with the inventor and his colleagues from Rafael, as well as literature on military innovation, tacit knowledge and expertise, and STS studies in infrastructure. A history of Rafael, written by the organization's General Manager, during the years Dr Iddan was working Rafael, provides the political and social framework for the invention.

11:00—12:30

Th2B Urban Technologies and Planning II: 19th and 20th Centuries

Location: Room 138 (B)

Organiser: Program Committee

Chair: Catarina Caetano da Rosa

T2B-1 First urban plans for the implementation of railway systems: the co-existence of the industry with the city (1800-1910)

Ph.D. candidate Fernanda de Lima Lourencetti

The aim of this paper is to recover the relationship between the first modern urban planning and the role of the railway based on contained descriptions. At a time when the difference between urban and rural was in evidence, and the industrial landscape was emerging as a third mode of territorial occupation, the railway was implemented as an industrial link able to connect, or to segregate, such areas. Many urban projects, as the same time as they are considered utopias, take up spatial organization that should be considered in studies about the construction, preservation and rehabilitation of railway landscapes.

Here, the industrialization will be considered as the origin point of the modern urbanism. When identifying the guidelines used to implement the railway system in the cities between 1800 and 1910, we try to give some assistance to new urban plans related to the construction or reintegration of railway landscapes in the urban grid, which became marginalized in many cases. The society and the cities experienced a huge technological development in the mobility field. Transportation became a social and economic tool. Even suffering constant changes, the contemporary cities show complications created by the old railway theories. These entanglement should be understood to be neutralized and vanished of current urban plans.

Th2B-2 Civil engineering and urbanism: disciplinary complementarities and urban policies in the second half of the twentieth century

Dr. Maria da luz Sampaio

The policy of public works and infrastructures carried out by Estado Novo (1926-1974) in Portugal was considered a reference point of its economic policy and was only possible due to the success of the financial policy. Although some projects were drawn up after 1929, their implementation will depend on the new legislative framework created after 1935, which allowed the launch of a public investment program to be carried out in the period between 1936 and 1950, mainly in the national defense area, and economic reconstruction: transport, telecommunications, electricity, water, irrigation, public buildings, urbanization and colonies.

In this context we want to understand how the ideological frameworks have shaped the public policies of urbanization in the main urban centers, and contributed to defining the role of Portuguese civil engineering in urban policies launched during the 1940s and 1950s. With this purpose we centered our analysis in the engineer and professor of the Faculty of Engineering of Porto – Antão de Almeida Garret (1896-1978), who became director of the School of Engineering. He began his career in 1930 as a professor of civil construction teaching subjects such as *reinforced concrete* and later he promoted the teaching of *urbanism*. He was the author of the *Urban Plan* of the city of Porto in 1947, approved by the minister in 1951 and later on reviewed under the guidance of prof. Robert Auzelle. Garrett followed Gaston Bardet's line of thinking, argued that urban planning teams should not be confined to architects and engineers, but should also bring together economists, sociologists, hygienists, geographers, geologists, historians, agronomists, and all together they could take decisions in defense of the common good of the citizens. As an urbanist, his idea of the city was based on the disciplinary and functional principles, and its texts denounced the cities chaos seen as consequence of the increase of the wealth and the technical means available to capital.

Th2B-3 Improving urban life of prefabricated housing estates in the crossfire of private and municipality interests

Dr. Erzsébet Szeréna Zoltán

Dr. János Gyergyák

The Hungarian Government aimed to accelerate the renewal of the housing stock by applying a new policy for newly constructed residential buildings. The policy has resulted in a building boom in the residential building segment, but unfortunately it neglects the existing units where there is a huge demand for modernization, so local initiatives have to be taken.

Local municipality of the IX. district launched a unique program for renewing the József Attila housing estate (Budapest 1957-81) which used to be a role model for most post WWII building stock developments in Hungary. The design process focused on diverse aspects: a new urban design concept with new urban zoning plans were developed, refurbishment of the existing, outdated public space system and used or unused retail pavilions, and offering new extension concepts for the existing residential units.

The paper introduces different types of the design proposal, using the design as a life-changing tool in cities, and highlighting the wide range of problems with the housing units. The originally state-owned residential building units are nowadays mostly private possessions. The refurbishment of the existing buildings has not yet been in the scope of the government, but it is a key issue for local municipalities, both as social housing units and private properties. As a great share of the inhabitants have been living there for decades, and were socialized in the era where the state took care of their housing conditions and some other services including maintenance, willingness to invest is lacking from their side. The general refurbishment strategy of these neighborhoods which include around 20% of all residential

units in Hungary, needs a comprehensive concept with the involvement of the local municipality, or the state, as the housing blocks are not able to cope with these tasks. In our case study the local municipality worked as a mediator providing and suggesting different scenarios for the owners and investors. The paper overviews the main refurbishment scenarios of the existing housing units with possible extensions which were developed with the involvement of future investors, and the design phase was supported by new urban zoning codes to result in a win-win situation for every participant.

Th2B-4 The Mechanisms of a Siege: Counter-Terrorism Technology and Infrastructure's Affects on Cities

Ph.D. candidate Alejandro Salas Strus

“He surveyed through the park railings the evidence of the town’s opulence and luxury with an approving eye. All these people had to be protected.”

– Joseph Conrad, *The Secret Agent*

The application of defensive architecture technology and military-inspired counter terrorism strategies in cities has rapidly increased since 2001, being further accelerated by Daesh inspired vehicle attacks in cities such as Berlin and Nice.

There exists however a gap in intercultural research, with the fields of policing/criminology, urbanism, and cultural studies offering separate and siloed perspectives on how security activities transform the daily life of cities. This paper will present a survey on the current state of for the following areas:

CCTV and the proliferation of camera systems in urban areas
Car barriers and anti-bombing infrastructure
The use of raid-strategies in neighborhoods, and the broader militarization of policing

Specifically this text discusses these technologies and policies in regards to their general technical effectiveness (meta-analysis of existing research), and the performance of security as a choreography intentionally or intentionally situated in the history of visual culture. This analysis draws from the work of Henri Lefebvre in regards to the production of spatial zones and potentials in cities, Clara Irazabal’s concept of revolutionary actions erupting in “extraordinary spaces”, James C. Scott’s work on the state as a cartographer of urban spaces, Eyal Weizman’s analysis on militarization of urban spaces, and artist Trevor Paglen’s work on visualizing security systems.

The general conclusions of this work point to “security” being a collaborative construction by spatial forces in cities, which is overlooked by infrastructure projects that are built in isolation of a broader social or cultural considerations.

Th2C Infrastructures II: Cycling, Air Transport

Location: Room 141 (C)

Organiser: Program Committee

Chair: Jan Musekamp

Th2C-1 Power, Place and Discourse: Analysis of New Istanbul Airport

Ms. Merve Özhan

This is a master thesis for the final semester of the masters in technology programme Mobilities and Urban Studies. It aims to reveal the realisation process of Istanbul's New Airport (INA) through Foucauldian discourse analysis. Based on a pragmatic approach, new mobilities paradigm and aeromobilities studies, the study collected diverse materials such as textual and non-textual, visuals, media coverages and interviews. The theoretical background is formed by concepts of power, discourse, socio-spatial theory and megaproject phenomena. A big part of theories refer to Foucault, Flyvbjerg and Richardson's work on power and planning. Contextual background is formed by the secondary and primary sources on the global aviation, development of Turkish aviation and spatial development of Istanbul. A narration of real events is laid to reveal power and discourse geometries between the agents of the government, aviation and local organizations. Official documentations and a timeline of interactions between the agents unmask the reality behind the one of the most ambitious projects of the decade. Finally, a discussion of the use of power in INA's realisation process, conclusions, future research and practical suggestions are authored. The thesis aimed to contribute to the ongoing research project of AirCif on Copenhagen Airport about aeromobilities management WP2.

Th2C-2 The role of technocrats in the development of infrastructure in Slovakia during first half of the 20th century

Professor Ludovit Hallon

Dr. Miroslav Sabol

Ph.D. candidate Michal Durco

Area of today's Slovakia was the part of Austria-Hungary until 1918 and the only one well developed infrastructure were the railways. Statistically there were 12.7 kilometers of the railways on ten thousand inhabitants in area of Slovakia. Modernisation process of the road network and electrification as well were lacking. Only 2.2 % of the houses were connected to electricity in Slovakia. Czechoslovakia was established in 1918 and one of its main problems was, that area of Slovakia was not on the same level of economic development. So the new development plans of the infrastructures were approved. However, only the water transport projects with building of the ports on Danube river and electrification made visible progress during 20's because the financial resources, experts and technical tools were absent. The new driving force for the development of the infrastructure was, paradoxically, an economic depression in 30's. More that 250 kilometers of the new railways, 320 kilometers of modern new 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. Slovakia declared its independence on March 14, 1939. In fact it was completely depended on Germany. Slovak state approved new infrastructure development plans and Germany helped with technical support. Length of modern roads grew from 13 % to 28 %, new railways were opened as well and production of the electric power grew. Many of the results from previous period were damaged during military operations in 1944 – 1945. Czechoslovakia was reestablished in 1945. Its regime and economy were continuously trasformed from democracy with market economy to totalitarian communist's regime where economy was planned centrally. Technocrats approved two year plan for the reconstruction of the country after WW II. It was a new starting point for the process of industrialization of Slovakia.

Th2C-3 The gendered Atlantic

Dr. Catarina Caetano da Rosa

How was the impact of gender in the transnational history of maritime towns? What were the characteristic interplays of women in maritime cities of the 19th century? According to which patterns did the gendered Atlantic take shape? The paper examines the dynamics of gendered history between Lisbon and Rio de Janeiro in the golden age of imperialisms. It's based on newspaper articles, on travel accounts of travelling women and on diplomatic correspondence. These sources relate to each other similar to a puzzle.

Following Deborah Simonton's and Emma Hart's session at the EAUH of 2016 in Helsinki it will be shown, how "[t]owns were central to migratory patterns and crucial in the transmission of ideas, while gender is fundamental to the ways many towns shaped themselves; e.g. gender tensions, over trade and political rights influenced the formal and informal economy and polity. With the physical growth of towns and the creation of new public spaces and new elites, established gender roles were challenged by new hierarchies." These presumptions will be examined in a broadly comparative context.

The paper wishes to identify the woman which travelled across Lisbon and Rio de Janeiro (such as Marianne Baillie and Rose de Pinon for example) and to consider the impact their accounts might have been on the shape of these towns and the clichés related to it. Finally there will be asked whether the urban spaces have been gendered across the Atlantic and it will be presented some reasons for this fait accompli.

Th2D Challenging Power through Playing with Technology II

Location: Room 143 (D)

Organisers: Stefan Poser and Artemis Yagou

Chair: Stefan Poser

Th2D-1 Alternative mobility: the history of sliding vehicles for wintry roadlessness

Dr. Svetlana Usenyuk-Kravchuk

The paper presents a research selection of ideas and technologies of alternative mobility in the conditions of northern/wintry roadlessness in Russia. All of them are united by a universal principle of sliding: from futuristic-looking, but almost forgotten to date, "ski-mobiles" to practical small-scale snowmachines (as we know them today).

The sector of Russian/Soviet oversnow transport emerged and developed as a "younger brother" of aircraft engineering. During the design/engineering process, it was possible to test experimental parts and materials, as well as to carry out calculations and test them at the lowest possible cost. The "secondary" role of the domestic snowmobile industry gave rise to the basic design principle – bricolage, i.e., the playful creation of technology from affordable often reused materials and spare parts in hand. Through this principle, many innovative engineering ideas were widely distributed across the vast Russian territory, and in a longer perspective, stimulated the technological imagination of local artisans.

With reference to the iconic machines of their era, i.e. the aerosleds NKL-26 and Ka-30, as well as the snowmobile "Buran," the authors aim to demonstrate that in Soviet Russia – with its grand mega-projects of the conquest of the Arctic and Siberia and the correspondingly large-scale transport vehicles – there was always a room for big discoveries in the field of small transport forms. In a broader historical perspective, these forms indirectly contributed to the development of the unique phenomenon of Soviet vernacular design, also known as the movement of DIY enthusiasts of garage-making and tinkering.

Th2D-2 From illness to satisfaction. A history of the vibrator in Germany and UK 1880-1920.

Ph.D. candidate Sarah Scheidmantel

I am stating that by playfully using medical massagers, women set the first step towards the invention of the sexually used vibrator.

Following a discussion on the invention of the vibrator lately taken place I will state that its development was not a linear one, rather, it depended on body theories of that times that led to the invention of medical departments focusing on electro- and vibrotherapy. Both practices were based on the idea that the body consisted of circulations that, in case of illness and therefore a weakened circulation, could be influenced from an outside attachment that was supposed to revitalize the circulations, either by electricity or by vibration. Different medical devices primarily used in doctors' practices allowed those vibrotherapies and were either mechanical or electromechanical. Also their shape differed from small carryable (mechanical: Veedee/Venivici, Dr Macaura's Blood Circulator; electromechanical: Weiss Vibrator) to multifunctional devices only used in the hospital (Pantostat, Multostat). They were used to cure diseases such as rheumatism, gout, neuralgia, low blood circulation, and women's complaints.

Interestingly, especially the small devices were soon sold in the free market around 1910. I believe that the reason for that was a two-sided one: physicians' bodily theories concerning medical practices and an economic thought. Following advertisements of that time shows that the names of those devices (soon called (vibro)massager) changed. Here, I state that this was connected to a playful dealing with those instruments: apart from medical usage, they implicated usages for beauty (which is explicitly written). A second hint can be found in the advertisements themselves: previously women and men, later only women advertised those devices: I assume that the ads implied sexual codes women needed to know.

I believe it was not the (only) companies inventing a (sexual) desire women could satisfy by buying those devices, it was rather women who „mis-used“ those medical devices and liberated themselves from strict power relations inside the hospital; sexuality had been (following Foucault) only allowed at certain places for a certain purpose, which they denied with these practices. On the other hand, companies got to know the potential of those devices leading to the invention of the vibrator that we know nowadays.

Th2D-3 Toy Robots: Playing with Humanity's Fears

Dr. Artemis Yagou

The word robot, introduced by Karel Čapek in his 1920 theatre play R.U.R., has come to express a technology that fascinates but also terrifies. Challenging the power of humans, the robot has been viewed as a symbol of uncontrollable mechanization and as a threat to our inner humanity. Menacing aspects of modern technology related to robots have appeared regularly in popular culture. In the film *Metropolis* of 1927 by Fritz Lang, the humanoid Maria exemplifies a futuristic dystopia of technology out of control. The theme of human creation that becomes unmanageable resurfaces in the film *Frankenstein* of 1931, based on the 1818 novel by Mary Shelley *Frankenstein or the Modern Prometheus*. The 1939 production of the film *Wizard of Oz* features the character Tin Woodman, a worker who was turned from a man to a heartless machine; this has been interpreted as an example of industrialisation's dehumanizing impact.

The first toy robot, Lilliput, was a tinplate humanoid made in Japan in 1938. Subsequently, an immense variety of anthropomorphic toy robots appeared during the 1950s and 1960s, bearing imaginative names like Robert the Robot, Star Strider and Television Spaceman. Manufacturers competed by introducing different designs, more movement, light, sound, bright colours and stunning packaging. This was a time when advanced industrialised societies were preoccupied with a second industrial revolution, based on atomic power and automation, which would presumably generate mass unemployment. In public discourse, robots appeared to be both exciting and daunting.

In this context, toy robots became part of the everyday. They helped mould peoples' expectations of technology and enabled them to negotiate both their fantasies and fears. The designs of toy robots, mostly anthropomorphic in miniature and quite different form the actual shapes of factory robots, exemplified attempts to pacify the fear of dehumanization by technology and of losing control of one's own body. Philosopher Gaston Bachelard argued that miniaturization enables values to become condensed and enriched, and in a sense empowers humans to possess the world. Producing and marketing toy robots successfully exploited the ambivalent feelings of the public, by offering an accessible, creative and playful way of coping with one's fears and of getting accustomed to the shape of things to come.

Th2E 14th Annual Symposium of the Social History of Military Technology X

Location: Room 147 (E)

Organisers: Bart Hacker and Ciro Paoletti

Chair: Bart Hacker

Th2E-1 Technology Driven "Revolutions in Military Affairs"

Dr. Azriel Lorber

The term "Revolutions in Military Affairs" was coined by the Soviets During the Cold-War, when they realized that the US endeavored to redress its numerical inferiority by utilizing electronics and computers, both in weapons' hardware and to improve Command and Control on the battlefield. Other previous developments can also be considered as RMA, including Levee-en-Masse (although not strictly a technology), the advent of aircraft, submarines, mechanized warfare, PGMs, unmanned vehicles and Net-Centric-Warfare.

While technology is still the main driver of changes on the battlefield, its fruits also affect the nation's leadership and the political and social ambience (including the Mass-Media). These in turn influence questions of war-fighting and war-termination. Consequently, an RMA should be analyzed also in terms of the wartime linkage between the rear and the front. For example, even after the mass-bombings of WWII this linkage was further strengthened with the introduction of nuclear weapons.

There are three nascent technological developments, which are already changing the current concepts and conduct of warfare, changes which in essence constitutes an RMA. This is caused by their direct effect on war fighting capabilities and by their potential effect on the public and national leaderships.

A. The huge global arsenals, available to anybody, of un-guided and guided rockets and quadcopters.

B. The growing capability to produce Home-Made chemical and biological weapons.

C. The expanding threat of Cyber-Warfare, particularly in view of the increasing dependence on computer control of basic functions, including power, food distribution, finances, communications and information services.

These developments might have an effect as strong on the Home-Front as on the military. They can create terrible chaos in the rear, then affecting the armed forces, and potentially leading to a total military collapse.

Th2E-2 Tilarids and the Daisy Cutter

Professor David Ritchie

Notches on pistols are apparently a dime novel invention, but Neptune's wooden angels and sharks on aircraft noses are the signs with which we domesticate violence. And we do it with words too. Akin to plants in this one respect, weapons often have a technical description and a common name: *Bellis perennis* (of the *asteraceae* family), a daisy; the BLU-82B/C-130 weapon system, the "Daisy Cutter."

Hilda Davidson's work on the sword in Anglo-Saxon England conjures swords and spears called, "Gaois" or "Tilarids" or "RaunijaR." These one-word names, inscribed on archeological finds, describe the weapon's chief characteristic: whirring, assailing, testing. In a sense they were a technical description.

By contrast weapons in Sagas and other literary tales have names that serve many purposes, some magical, some diversionary. Who associates Excalibur with pain? The "Brown Bess," musket or, "Old Betsy" or "Old Tick-Licker," (names Daniel Boone chose for his flintlock rifle) divert the mind. Mons Meg or Big Bertha—or even the shells, bombs and missiles—Moaning Minnie, Coalbox, Doodlebug, Fatman, Little Boy, Thin Man, sound vulgar, drawn from the language of common people.

So what has happened here? Paul Fussell argued that irony was an essentially modern response to large scale horror. And in a world characterized by scientific killing, First World War slang often did domesticate the unthinkable. But the point I'd like to make builds on themes developed in two previous talks on modernism and weapons: in re. weapons, we are indeed modern *and* we are not.

14:00—15:30

Th3NH Prize Session

Location: New Hall

Organiser: Program Committee

Chair for the Turriano ICOHTEC Book Prize: Irina Gouzevitch. The Prize will be handed over by Darina Martykanova

Chair for the Maurice Daumas Article Prize: Maria Elvira Callapez

Friday, 26 July

09:00—10:30

F1A Technology, environment and state power in Russia before and after the Revolution of 1917

Location: Room 137 (A)
Organiser: Anna Agafonova
Chair: Piotr Fuglewicz
Commentator: Gregory Afanasiev

F1A-1 Technologies in urban landscape of Cherepovets, 1860 - 1940s

Lecturer Anna Agafonova

The report is devoted to the analysis of transforming urban landscape of Cherepovets city through the technological development of the city. Cherepovets was the small town and administrative center of Cherepovets county of Novgorod province in the middle of the 19th c. Technologies and large hydro-construction projects gradually transformed the pre-industrial city, its borders. They had been giving to the city new economical functions and made it modern. By 1940s there was formed prerequisites to building here metallurgical plant despite to absent the raw material base. The plant made Cherepovets one of the large industrial center on northern-west of USSR. The state authorities and city government were played the main role in the making of technological decisions. The government had been made large hydro-construction and railway projects. The North railway and Mariinsky water system were the main transport routes, that located near Cherepovets. They had been forming the city borders, made directions for the growth of urban space or causes its reduction. The city government defended the economic interests of the city and took measures for the development of transport infrastructure near Cherepovets. Also, the city government resolved issues of technological modernization of the municipal infrastructure. Sometimes the introduction of new technologies was delayed or the selected technological decisions were unprofitable, due to the city government took unreasoned decisions are taken. The choice of the authorities and the introduction of technologies into urban life had been creating new opportunities or restrictions for the city development. The materials of the funds of the state archives of the Russian Federation, materials of the local periodical press, statistical, and memoirs are the source base of the research.

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

F1A-2 Technologies and state power in case of urban pollution: London and Saint-Petersburg (1820-1920)

Researcher Gregory Afanasiev

The paper is devoted to the comparative analysis of solving the urban pollution problems by the state authorities of the Great Britain and the Russian empire in 19th and beginning of 20th century. Through that period London and St.-Petersburg became the populous and biggest industrial centers in the world. Its rapid growth influenced the environment, generally, in case

of the increasing of water and air pollution. Water supply and drainage problems had been creating the neediness of constructing modern but expensive sewage systems that could be made only by the collaboration of the state and society. All this should have changed the benchmarks of the state policy of environment in capitals, provoked the innovation of the municipal management. Revealing harmful level of the pollution in London by the sanity inspections (1828, 1842), creation the special services as the modern type of government body (1855), forming of the legal framework in the environment, the development of democratic institutions in public health, started in 1840-s, produced the ways for compromise between the interests of state's bureaucracy, business and democratic community in the solvation of this problem. It helped the rapid construction of the modern sewage (1874), renovation of the water supplies and rubbish collect which mainly soften the sharpness of London's urban pollution. Inside out, in Saint-Petersburg, Russia, in spite of the same growth of the pollution, the lack of legal culture, conflicts between elective and appointed authorities, insufficient development of the democratic institutions in the city's society damaged the process. The absence of the modern sewer system, qualitative water supply, rubbish collect, created the conditions for urban crisis of depopulation, which was in St-Petersburg in hard times of civil war in Russia of 1918-22.

F1B Resources of artistic expression at the service of techniques: appropriation, uses and representations I: Engineering and Art in history

Location: Room 138 (B)

Organiser: Irina Gouzevitch

Chair: Mateusz Sokulski

Commentator: Antoni Roca Rosell

F1B-1 Art and Technology. The minorcan artist Pasqual Calbó (1752-1817) and his mathematical course

Lecturer Antoni Roca Rosell

The outstanding Minorcan painter Pasqual Calbó complemented his tasks as a plastic artist with private classes on pure and mixed mathematics. He was an example of the proximity of art and technology, that had flourished from the Renaissance. Calbó was educated in Venice and Rome, where he met the great artists of the Neoclassic movement and, at the same time, he was interested in many technological and scientific subjects. Back in Minorca, he did a number of paintings, including portraits, representations of the daily life of Minorca, and also impressive painted ceilings in houses of the Minorcan bourgeoisie. At the same time, he prepared a course delivered for the "Minorcan youth", to train them for the techniques - probably building and boat construction. There is a manuscript of 500 fol. containing lessons on pure mathematics (arithmetic, logarithms, geometry, trigonometry), and the rest on mixed mathematics (statics, mechanics, perspective, civil and military architecture, sundials, and construction of boats) and experimental physics (nature of gases, meteorology, cosmography, optics). The text is written in Catalan, the natural language of Minorca, preserved thanks the island was under British administration during most of the XVIII century. The course of Calbó was prepared on the basis of the great Spanish mathematical courses (by Tosca and Baïls) and on the handbook on experimental physics of Poli, professor in Naples. In our paper, we would analyse the main elements of the Calbó's Course as an example of private training of technicians and also showing the closeness between art and technology.

F1B-2 Power of Design during the Cold War: The Exhibition Graphic Arts: USA, 1963-64

Dr. Kirill Chunikhin

In 1959, the United State Information Agency (USIA) organized the American National Exhibition in Moscow (ANEM), which introduced a cross-section of twentieth-century American painting to the Soviet people. The ANEM art section fulfilled a curatorial mandate: At the expense of canonical and conservative Socialist Realism, recent experiments with abstraction in modern American art strongly contrasted totalitarianism from democratic regimes. This demonstration turned out to be a major success for the American policy of advancing visual art in the USSR, and the social and cultural impacts of the ANEM on Soviet people have been acknowledged within the Cold War scholarship. However, it is still an open question how the ANEM influenced consequent USIA exhibitions of American art in the USSR.

In order to answer this question, I will consider the poorly examined exhibition *Graphic Arts: USA, 1963-64*. This show of over 1,000 cutting-edge works of art visited four Soviet cities, attracted more than 1.5 million people, and subsequently turned out to be one of the most effective USIA travelling exhibits. Analyzing *Graphic Arts: USA* and comparing it to the ANEM, I will demonstrate how both positive and negative lessons of the ANEM influenced the evolving USIA approach to exhibiting American art in the USSR. Ultimately, I will speculate whether *Graphic Arts: USA* was a new phase in the representation of American culture abroad, and in exploiting contemporary design for transmitting ideology overseas.

F1B-3 Drawing and photography: instruments for work and to promote the profession of engineering

Professor Ana Cardoso de Matos

Drawing has always been a fundamental instrument in the teaching of civil engineering, due to the need to elaborate plans and other drawings of the works to be carried out. With the emergence and development of photography, this form of reproduction of images has become an important instrument in the teaching of civil engineering, and since the mid-nineteenth century, its teaching has become part of the curricula of the main engineering schools. Both drawing and photography were also important tools for learning in the field, as they allowed engineers to graphically record the techniques and working methods of the large public works yards.

The design and photography also had the function of promoting the engineering profession and its competences. Images of large public works, such as bridges, viaducts, or railways, whether drawn, lithographed, or photographed, were essential to publicize the work of engineers. Therefore, the addition of the photographs of the engineers responsible for the construction of the different lines of the railway seems to have been desired by several engineers, who considered that this was a way of publicizing their work and to contribute to their professional affirmation.

F1C Industrial Espionage: Poland and Czechoslovakia

Location: Room 141 (C)

Organiser: Program Committee

Chair: Yoel Bergman

F1C-1 The role of scientific and technical intelligence in making up for economic underdevelopment of the Polish People's Republic in the 1970s

Dr. Witold Bagieński

One of the main areas of operation of the civilian intelligence of the Polish People's Republic in the 1970s was the conduct of scientific and technical intelligence. Due to the fact that these activities brought significant savings to the economy, the role of the unit dealing with these issues was constantly growing. The decade of the seventies was a period of greatest magnificence for scientific and technical intelligence. Not only thanks to tangible achievements, but also to the interest of the leadership of the state. Thanks to the organizational system built up over the years and links with economic institutions and industry, modern technologies were stolen in the West bypassing the international embargo. Secret service was also included in the process of purchasing foreign licenses, which resulted in lower costs. The beginning of the seventies aroused enthusiasm and great expectations. The opportunities offered by this simplified way of modernizing production were shared. All in all, this specialist unit began to be treated like a service company dealing with the import of technology that could not be bought by normal way or whose acquisition was too expensive. Despite many benefits, in some cases it also led to pathology, wastage and irrationality in investment planning.

F1C-2 The Polish People's Republic Secret Service use of technology. Work methods and equipment of technical and operational departments of the Secret Service

Dr. Monika Komaniecka-Łyp

Secret Service of People's Republic of Poland (*Służba Bezpieczeństwa*) used special kind of operational equipment to keep Polish society under surveillance in the years 1956–1989. I will focus on presenting work methods of technical and operational departments of the Interior Ministry: Office „B”, Office „T”/ Technical Department and Office „W” and its counterparts in individual provinces. Officers in those departments took orders from other departments, like counter-intelligence, called Department II, Department III fighting the opposition or Department IV which took actions aimed against the Catholic Church and religious associations.

The officers used specialised high-tech equipment for their work. Office „B” provided surveillance of people and places. The operations performed were recorded in photos and on video tapes. For photography professional cameras were used and miniature camera models, hidden in clothes and accessories, such as coats, jackets, handbags, umbrellas, or wallets. Office „T”/ Technical Department was responsible for phone call surveillance, audio room surveillance and performed covert searches. Eavesdropped signal reception and its recording was done in a so called receipt point, which was where specialist equipment was placed such as “Mak 2S” tape recorders and a so called switchboard-signalling station SDS-P produced by Polish Unitra-Unima Workshop in the eighties. The main use of this device was to listen on-line to the eavesdropped room signals. Office „W” was responsible for covert correspondence surveillance in post offices.

My presentation will be based on the Secret Service materials. It is not just documentation describing the work methods but mostly photos of equipment, descriptions of its use and practical effects in form of photo from observation, written wire conversation record or a photocopy of an investigated correspondence.

In my presentation, apart from presenting methods and equipment of the Secret Service I would like to take a look at how this equipment was acquired. Concluding, I would like to

show that the Secret Service had at its disposal modern equipment quite sufficient to complete the tasks which it was to perform.

F1C-3 Economic Espionage, Technocratic Reforms and the Czechoslovak Economic Diplomacy in Japan (1957–1968)

Dr. Tomáš Gecko

The paper aims to analyse the strategies of the Czechoslovak scientific environment towards the initial phases of the Japanese "economic miracle" in late 1950s and during 1960s. An integral part of these strategies was economic espionage, which inadvertently created a dichotomy between the Czechoslovak natural sciences and the humanities depending on the access of both fields to the scholarships to Japan. The target of the Czechoslovak economic espionage were not only the Japanese scientific innovations but also the systems of economic redistribution (e.g. indicative planning). These "unorthodox" economic espionage strategies were for example implemented by famous travellers Jiří Hanzelka and Miroslav Zikmund who visited Japan under the patronage of the Czechoslovak Academy of Sciences in 1963.

The study promises to provide a more comprehensive understanding of technology transfers through economic espionage, which is one of the key security challenges of a globalized economy of the 21st century. The timeframe of the paper is defined by the normalisation of the Czechoslovak-Japanese diplomatic relations in 1957 and the redefinition of the Czechoslovak economic diplomacy in Japan after 1968 due to major ideological changes after the invasion of the Warsaw Pact troops into Czechoslovakia.

The paper is based on the archive sources of the Czechoslovak university and non-university scientific institutions (e.g. Charles University in Prague, Czechoslovak Academy of Sciences) and political and security institutions such as the Archive of Ministry of Foreign Affairs and the Security Services Archive. The research is complemented by printed sources reconstructing the broader discourse of the Czechoslovak scientific environment towards the Japanese „economic miracle“.

11:00—12:30

F2B Resources of artistic expression at the service of techniques: appropriation, uses and representations II: Engineering and Art: new social and professional challenges

Location: Room 138 (B)

Organiser: Irina Gouzevitch

Chair: Antoni Roca Rosell

F2B-1 Architects as Edisonian Inventors? Alvar Aalto, his Patents and the Power of Technological Expertise

Dr. Markku Norvasuo

Early architectural modernism glorified technological advances. Le Corbusier hailed them in his eloquent writings. He was also interested in inventions, as were his contemporaries Poul Henningsen and Alvar Aalto. They all were eager to adopt the new professional role of a problem solver and inventor. Historian Sigfried Giedion went so far as to consider technology as the basis of modern architecture.

The paper discusses the significance of inventing and technological progressiveness among the architects, exemplified by Alvar Aalto, the leading Finnish modernist. During the “golden era of independent inventors” (Thomas P. Hughes) patents had become the primary way to get inventions acknowledged. Patents were naturally known to early modernists as well. Between the years 1932 and 1961, Alvar Aalto applied for eight patents, of which he was granted seven. Many of them had the obvious purpose to protect intellectual property, but their symbolical value still needs more attention. From this point of view, one has to consider how technological inventions related to Aalto’s architectural and planning ideas.

The paper especially clarifies the importance of inventing and the idea of ‘radical invention’ in Aalto’s work and personal relations. It also discusses earlier interpretations of Aalto’s inventions. His activity could reflect, in the context of architectural modernism, an anachronistic romantic ethos of Edisonian time. Another way is to see inventiveness as the sharp edge of Aalto’s later public role. He tended to gain societal recognition through his innovative ideas. Gradually, this aspect became increasingly important.

The sources of the paper include the patent diaries and archives of the Finnish National Board of Patents and Registration, Aalto’s own writings and, for some cases, his drawings.

F2B-2 Embattled Men of Science: Physicians and Engineers as Heroic Figures in Nineteenth-Century Spanish Literature

Dr. Darina Martykánová

Dr. Victor Núñez García

Science and what was understood as its useful applications were in the very centre of the late nineteenth century heated debates about the path Spain should take to deal with the challenges of *modern civilisation* and succeed in the ruthless global competition. Some worried that the hegemony of scientific discourse represented a threat to religion and to the very nature of Spanishness and that technological developments would lead to a messy dissolution of traditional communities. For others, science, technology and the men who mastered it were seen as efficient tools to overcome social ills and build a more cohesive society immune to the threat of a violent class struggle resulting in a revolution. At the same time, the institutions linked to science and technology were mostly precarious as was these men's social status. These tensions and hopes were articulated, expressed and discussed not only in press and political institutions, but also in novels, short stories and theatre plays. In this paper we focus on the representation of engineers and physicians in the novels and plays of the early Restoration Period and the role their professional and intellectual activity and mindset as outlined in these works of art played in expressing the anxiety about Spain's future and in discussing the ways of handling the challenges of modernity.

F2B-3 When Scientists, Engineers and Architects became filmmakers: promoting themselves, their projects and their works

Ph.D. candidate Alexandre Ramos

Since the prehistory of cinema, there are several examples of engineers, architects, physician and scientists that have seen cinema as an instrument for promoting their work, their projects, their profession, and even of themselves.

Indeed, in many cases film camera became part of the instruments for fieldwork, especially when moving to more remote areas outside the Western world, more specifically to the colonial spaces in Africa and Asia.

In fact, the film was a way of collecting oddities and daily work outside the European metropolis to later show in private sessions for their peers, family and friends. However, in some of these the film records gave rise to productions that have entered commercial and propaganda circuits, transforming a doctor or an architect, among others, into a film director in the true ascension of the word.

Consequently, the States, the principal commander of the scientific works and campaigns in the colonies, began to commission film registration of these activities for promotion, propaganda and affirmation of power purposes.

In sum, the aim of this communication is to show - using examples from European colonial cinema (1900-1970) - how technicians, academics and scientists have used cinema as a tool for promoting their works in Africa and Asia, and how Colonial Estates appropriated the idea for propaganda and statement of power.

F2B-4 The Olivetti Programma 101: industrial design and technology innovation for the forerunner of the personal computer

Ph.D. candidate Pietro Viscomi

The Olivetti Programma 101: industrial design and technology innovation for the forerunner of the personal computer. The Olivetti Programma 101 was first presented in October 1965 at the Business Equipment Manufacturers Association in New York. Its refined design, reduced dimensions, new technological solutions, simple application and low cost all made it exemplary of a new generation of programmable 'desktop' machines capable of revolutionizing and improving work conditions for millions. Until its appearance, calculators were expensive and oversized machines managed by a small group of specialized technicians affiliated with big-industry or governmental offices. Guided by Pier Giorgio Perotto, the Olivetti team's goal was to realise a 'personal object' – a functional and accessible product. Giovanni De Sandre, an engineer who helped to create Program 101 affirms: "two basic objectives always informed and shaped the project's development, the machine needed to be inexpensive and easy – very easy – to learn and use." In a 1965 article 'A Desktop Computer,' which appeared in the New York Journal American, versatility and ease of use were applauded as keys to Programma 101's success: 'We may see a computer in every office even before there are two cars in every garage.' The development of such an innovative product was a complex technical process that, in addition to new technological solutions, required an altogether new design. This design was the work of Italian architect Mario Bellini. In 1987, the Museum of Modern Art in New York celebrated Bellini's work with an exhibition entitled: Mario Bellini: designer. Cara McCarty, the author of the exhibition's catalogue, wrote of his Programma 101 design: 'He wanted to express a completely new machine, one that reflected new technology. His principal concern was that the computer have a look of order and simplicity, making it less intimidating and its operation visually comprehensible.' The focus of this paper will thus be to analyze the factors that gave life to and solidified the collaboration between the Olivetti team, led by Perotto, and the architect Mario Bellini to realize Programma 101. In doing this, it will concentrate specifically on material forms, details of construction, and technological development.

F2C Industrial Technologies I

Location: Room 141 (C)

Organiser: Program Committee

Chair: Stefan Poser

F2C-1 The decline of the mechanical watch

Dr. Thomas Schuetz

In the second half of the 20th century the watch industry of Southwest Germany almost completely disappeared, 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, at the same time this technology was of great impact in creating identity. The innovative technology of the quartz watch, which had been co-developed by German manufacturers, made the industrial production of mechanical watches obsolete, while at the same time the changing frame-conditions put increasing pressure on industrial production in the Federal Republic of Germany. Even though the resulting structural crisis was labelled by contemporaries as “quartz-crisis” it is indisputable today in historical research that this structural change was caused by a multitude of interacting causes. The essential change in the interpretation among the relevant actors has been described by van der Vleuten as the end of the Age of Technocracy, when the believe of the controllability of the world diminished and neo-liberal ideas played a dominant role among those in power and had a corresponding impact on economic and research policy. The social discourses arising from this crisis and upheaval regarding the role of the state as an economic promoter against the background of different social and ideological actor groups will be the subject of this paper.

This paper is supposed to present first results of an ongoing research project. In the further course it is planned to extend these observations by a comparison between the developments in the Federal Republic of Germany and in the GDR.

F2C-2 Technological changes in the textile industry and mass consumption society in the USSR of 50-60s

Researcher Anna Petrova

The formation of a "consumer society" in the Soviet Union is a debatable issue. Participation in the Cold War and competition with the United States and Western countries in all areas of activity does not allow ignoring the general changes, the emergence of new products and the development of mass consumption. The state expands programs to improve housing conditions and meet the needs of the population. In the world is taking place a “raw material revolution” and chemical industry development. Synthetic clothes are becoming popular. The process of production and consumption of goods and services in the Soviet Union had its own characteristics. Internal and external factors influenced technological changes in the textile industry of the Soviet Union. The course to meet people's daily needs that was proclaimed by N.S. Khrushchev, contributed to technology change - the improvement of equipment, the emergence of new material processing methods. Changes in public consciousness in the matter of consumption strengthened this influence. In our opinion, the light industry for many years undeservedly remained out of focus of historical research, despite the fact that it is of great interest from the point of view of the history of mass consumption, which, in turn, was previously considered by researchers in connection with cultural aspects, and not in connection with technological history.

F2C-3 Repairs in tileries in France, from the end of the Middle Ages to the nineteenth century

Ph.D. candidate Cyril Lacheze

Until industrialization at the end of the nineteenth century, architectural terracotta (bricks, tiles, floor tiles, etc.) production facilities faced the need for very regular repairs: in addition to the deterioration of the annexe buildings, the kiln had to undergo repairs between each campaign or even each firing, with a further recast every few years which could lead to a complete demolition and reconstruction. However, if this costly process in time, materials and finances was systematically foreseen in leases, its practical implementation was often more random. If the repair was at the expense of the tile-maker, the latter realized only the minimum, knowing that he could leave the tilerie (even illegally) without great risk in case of problems. If the repair was at the expense of the Lord, he could hire craftsmen who themselves did not always perform their work properly. This situation could lead to firing accidents with loss of products, as well as the kiln itself because of increase of the temperature. After such an accident, or when preventive repairs were too expensive, the tilerie could simply be abandoned. We propose to detail these dynamics from the thirteenth to the nineteenth centuries, both through the contributions of handwritten sources and through archaeology: indeed, if the first inform us about the management of the repair process, kilns discovered in archaeological excavations provide informations about the processes of repair themselves, almost systematically visible through the different states of the same kiln, including the state of abandonment.

F2C-4 The adaptation of molds for plastics - reuse and creativity

Researcher Sara Marques da Cruz

Dr. Maria Elvira Callapez

Graduate student Sofia Rodrigues

Over the course of the research project on the History of Plastics “The Triumph of Bakelite - Contributions for a History of Plastics in Portugal” we were led to reflect on the steps that precede the development of the final object in plastic, namely the design and construction of an appropriate mold.

Traditionally, molds have physical limitations. Despite the promises encompassed in plastic throughout the 20th century as a material that would allow the materialization of all imagined and unimagined forms, we are in fact confined to the molds that limit the objects. This dichotomy in the 21st century has been overcome by new technologies, namely digital 3D printing, which does not require a physical mold for the parts, allowing an exponent of creative freedom within the scope of product design.

However, in the history of the plastics processing industry, there has always been a way to overcome these limitations, for example, through the creative use of products that are the result of the same mold. The different ways of using plastic injection molds have a wide spectrum of variables that could almost be considered “hacking”.

In this paper we will explore the case of the Plásticos Santo António factory, in Leiria, Portugal, and the various examples of creative recycling found there. From the same mold, through changes in the material used, in the decoration (post-production), in the accessories, or in the marketing campaigns, the factory was able to manufacture and place different pieces, understood by the market as different products.

By hacking its own products, this factory is an example of the complexity of the considerations on what is, in fact, a final item.

F2D Engineers: imperial China and post-communist Russia

Location: Room 143 (D)

Organiser: Program Committee

Chair: Tracy Walker Moir-McClean

F2D-1 The Rise and fall of engineers in media coverage: the case of Russian modernization years and after (2008-2018)

Mr. Nikolay Rudenko

Engineering profession was highly influent in the late Soviet period, with almost a half amount of all graduates obtained engineering specialty in 1970s-1980s. It was popular in media as well as in academic discourse. However, in the 1990s engineering profession in Russia lost its prestige due to the decreasing of the numbers of technological projects and change the logic of technological innovations. In 2008 president Dmitry Medvedev announced the turn to modernization followed by the number of initiatives in advancing technological development in Russia. This announcement brought about the increasing wave of mass media coverage of the different engineering topics. The engineering profession became interesting to the public again. During the period of 2008-2014 the amount of mass media articles, both in (general) media and specialized magazines significantly increased. For instance, the most popular topic of engineering education reached its peak of near 130 articles per year in the nationwide Russian press. But the popularity of engineering topics ceased after the political and economic issues occurred after the Crimea affair in 2014. The number of articles started to decrease drastically with the only about 20 articles per year in 2017 in engineering education as well in other topics.

In my talk, I want to focus on the changes in the patterns of media coverage. The hypothesis is that the powers that be exploited the topic of engineering (in different domains) for showing its possibilities to modernize the country and solving problems of finding the way to go beyond economic and technological backwardness. In other words, the rise and fall of interests to engineers are a good way to grasp the contemporary ideas of Russian authorities to modernize the country, as well as to see how political interests influence public interests in science and technologies.

F2D-2 Russian engineers as an invisible group in the 1990s and now

Researcher Roman Maliushkin

In the presentation we want to focus upon the professional group that haven't been taken into account for a long time over the last 40 years. The name of this group is Russian engineers. Undoubtedly, there is a renowned reputation of soviet engineering education, as well as there are a lot of Russian engineers, mostly software developers, who are famous for their skills and work now in plenty of foreign companies. But along with all these specialists there is a big number of Russian engineers who are not very mobile, who do not create start-ups, and who continue to work on the same technical and organizational facilities that remained after the disintegration of the USSR. We believe that in the domain of engineering all those people are the majority. They do not show up abroad, the same as they do not play important role in the public sphere inside of Russia. We think that they are the invisible majority of engineering profession, who is bound up by soviet representations of what engineers should do and how they should behave.

We want to examine the nature of this group by drawing upon the data from the biggest Russian networking service “VK”. We will present the results of our analysis by focusing on the demographical dimensions (age, sex), on the educational and working mobility patterns, and on the specializations structure. We also make comparative analysis of two samples of engineers: those who received education in the soviet times and those who obtained engineering education during the 1990s. Aside from all these traits, we also will give some outline of their religions, political and ethical views. All this data will be given to answer the question: who is this group, what is its political role for Russia, and is it archaic in the contemporary conditions?

F2D-3 Engineering China’s Last Empire: Demand and Politics of Technical and Industrial Education in the Late Qing Period (1860–1911)

Dr. Hailian Chen

China, a country with rising technology power, today is ruled by red engineers. However, China was traditionally a meritocratic society, in which Confucian-trained scholar-official was the dominant elite group, while science and technology were considered inferior to literary attainments. How did this epoch-making transition from traditional literati-elites to modern technical intellectuals occur? So far, no systematic research has connected the rise of contemporary technical elites with nineteenth-century Chinese education reforms, although plenty of studies have addressed the significance of late Qing reforms.

Based upon an original survey of the historical documents, this paper examines the demand and politics of technical and industrial education during the last fifty years of China’s last empire—the Qing. Facing a particularly severe crisis in the late nineteenth century, the reform-minded Chinese officials attached strategic importance to promoting science and technology in the Self-strengthening Movement (1860s–1895). As a result, the first technical schools modeled on the German, French or U.S. educational institutions were established. How did the Confucian-trained scholar-officials view technology as a new type of power? And how did the Qing state institutionalize the (higher) technical education system, in particular, by adapting the Western system into the Chinese context?

A considerable number of official Qing historiographical accounts of educational policymaking, palace memorials (being partly published) kept in the archives, and extensive collections of private sources written by contemporary scholar-officials can provide first-hand evidence for our understanding of the political discourses and practices of establishing technical educational institutions in Qing China. Moreover, from a non-western perspective, this paper can shed new light on one key question of the global transformation in the nineteenth century: how the state pursued power through promoting technical and industrial education.

14:00—15:30

F3A Advanced technologies in post-Soviet universe

Location: Room 137 (A)

Organiser: Program Committee

Chair: Goran Đurđević

F3A-1 Shifting Dependencies? On the Internet Development in Post-Socialist Lithuania

Ph.D. candidate Migle Bareikyte

Power emerges from specific practices (M. Foucault, A. Reckwitz). Development of technology is thus not an indifferent process, but a formation that is embedded in geopolitically loaded legacy environments. The main question of this paper is the following: can the development of the Internet in post-socialist Lithuania (further-Lithuania) be conceptualized as political when its emergence is analyzed as historical and geopolitical, and if yes, what kind of politics of the Internet does it comprise? This question is taken from a broader PhD research project on the Internet as Infrastructure development in Lithuania (based on participatory observation, interviews, archival work), and in this paper is explored through the critical analysis of expert views (ca. 15 in-depth interviews analyzed in relation to the review of literature on geopolitics and historiographies of technology). It is assumed that due to Lithuania's geographical position, it is possible to expose complex geopolitical entanglements when such technology as the Internet is developed. After the Soviet Union's disintegration, a shift in material and social dependencies and agencies in developing the Internet in Lithuania is visible: from central dependency on the Soviet Union and possible agencies in that system, to the new environment of dependencies and agencies. Lithuania's case is interesting, because it, first, shows the complexity of its Internet development: here, the Internet is not only Western, Soviet, local or global, but result of multiple interactions. But it is not a neutral process either, and its particularities are explored through data analysis taken from my field research.

F3A-2 Heterogeneous and multiple technologies: the case of Russian digitalization

Researcher Liliia Zemnukhova

The production and implementation of digital technologies face multiple restrictions, limitations, obstacles, and barriers. The more widespread they become, the more social situations and interactions they take part in. Since digital technologies became ubiquitous and deeply entrenched even in today's Russian political discourse, there have been much to discover about their heterogeneous and hybrid status in the social world(s). Digital technologies are being introduced into the practice of users, encountering on their way with multiple barriers. The anthropological perspective facilitates a closer look at sociotechnical relations and networks shaping and being shaped by people's activities and lives. Yet, technological objects rather manifest themselves when they fail to function in the right way or simply to work: this borderline states, or barriers, represent technology in the making. Focusing on the sociotechnical barriers, I concentrate on multiplicity and fluidity of digital technologies - inseparably social and technological. Based on the materials of the collective research project on the barriers of digitalisation, in my talk I will present a scope of technological performances, when they are being created or socialized. In order to grasp a variety of the sociotechnical, we followed technological actors at various stages - production, dissemination, and usage, - to discover contradictions and mismatches in these processes.

F3A-3 From Interkosmos to NASA: Advanced Hungarian Materials in Space

Dr. Viktor Pál

Hungary is not considered as a major player in space activities, but the country has made significant contribution to space exploration via its eminent scientists. For example, Zoltán Bay and his research team developed Earth-Moon-Earth (Moonbounce) technologies in worn torn Hungary simultaneously with the US army in the USA, and conducted the first moon-radar experiment in Europe in February 1946. After WWII Hungarian space industries

received impetus from the Soviet Interkosmos (Интеркосмос) program that was designed to provide Soviet allies with crewed and uncrewed space missions. Interkosmos received publicity mostly via its spectacular human spaceflight program, which included Bertalan Farkas, the only professional Hungarian cosmonaut as part of the Soyuz-36 mission. A lesser noticed impact of the Interkosmos program in Hungary was to give impetus to space industries. Small-scale yet sophisticated scientific projects emerged at Hungary's top universities, building the country's strong scientific traditions.

After the collapse of the Soviet Union researchers looked for other sources of research funding and continued R+D projects via private companies, often outside of university labs. This paper will investigate one such "garage laboratory": the Miskolc-based Admatis Ltd., with roots in the Interkosmos program, and which since the early 1990s has been quite successful in funding bids with NASA for space technology R+D. The paper will focus on the history of the key patent and product of the Admatis Ltd., the Universal Multizone Crystallizator (UMC), which was developed first as part of the Interkosmos program and gained attention from NASA after the fall of the USSR. The Admatis Ltd. has been supplying NASA with UMC since 1999.

F3C Industrial Technologies II

Location: Room 141 (C)

Organiser: Program Committee

Chair: Stefan Poser

F3C-1 Designing the Ottoman Industrial Complex: Turkish Technology Transfer From Two Rivals; Providence Tool Company and Winchester Repeating Arms Company

Professor Zeynep Guler Sabanci

This paper aims to analyze the munition making process of Ottoman defense industry in the second half of the 19th century in parallel with the modern style of global warfare and arms race.

As a peripheral society, Ottomans pursued an institutional policy to design their state-arsenals, generally remained modest but active and productive till the end of the Great War. However, production capacity in state-owned installations were diminutive and dependent on substantial holdings and technology transfer from particular firms. The American producers, Providence Tool Company (PTC) and Winchester Repeating Arms Company (WRAC) were the two contemporary partners of Ottoman Empire in a highly competitive arena of technological change and evolution. Both suppliers were indeed innovation pioneers in arms manufacture. PTC was located in Rhode Island and got its primary reputation from its voluminous production during the American Civil War and became a competitive member of global arms race in 19th century. On the other hand, the company focused on a novel system of manufacture, named interchangeability that nourished from mass manufacture and power-driven machinery. Both companies served for the American Civil War and manufactured the core target materials of first revolvers, breechloaders with large-caliber and metallic cartridge ammunition.

In the second half of the 19th century, negotiations began between PTC, WRAC and the Ottoman Empire. The focal point of this paper is the actual procurement process of Ottomans regarding small and uniform arms with dimensionally interchangeable parts which overlapped with the capitalist concerns of American firms to win Turkish orders. The basic documents of

this paper are original sources and diplomatic reports gathered from the U.S National Archives and Records Administration (NARA) and State Archives of Turkey.

F3C-2 Accounting for the Steam Engine, 1700-1791

Dr. Alan Morton

18th Century; Steam Engine; Human Labour; Economics; Accounting;

Around 1700 the most common and universal sources of power were humans or animals. Though there were other sources of power, wind, water, and steam, these were tied to particular geographic locations and not universal. This paper examines how in Britain by the end of the century ideas about machines and human labour had changed as the steam engine became a viable and universal alternative to human and animal labour.

In part these ideas were due to new methods for measuring the performance of machines, including waterwheels, windmills and steam engines, developed by Smeaton, Watt and others in mid-century. These calculations were analogous to those developed at the time for the purposes of Customs, Excise, and Enclosure. These calculations depended on standard weights and measures and included technical, political and economic considerations discussed by Kula (*Measures and Men*, 1986). They were also similar to the questions of Political Arithmetic Deringer has described (*Calculated Values*, 2018), a novel feature of disputes about Government Policy at that time. Similarly Linklater (*Owning the Earth*, 2015) drew attention to how transactions involving land provided capital for industrialisation.

Ideas about labour were also shaped by other developments, industrial disputes about the introduction of new machines involving coal heavers and sawyers, or the division of labour emphasized by Adam Smith in his *Wealth of Nations*. As well as issues involving labour, this paper also considers how the capital costs of steam engines were treated in financial calculations which helped formulate ideas about depreciation.

As well as published sources, I have consulted archives at the Royal Society of London, the British Library, and the North East Institute of Mining Engineers, Newcastle.

F3C-3 Making power machines work in 18th century Prussia

Professor Wolfhard Weber

F3D The circulation of technology and knowledge in the gas industry

Location: Room 143 (D)

Organiser: Francesc Barc

Chair: Alberte Martínez-López

Commentator: Joan Carles Alayo-Manubens

F3D-1 Combining entrepreneurship spirit and power links: Melitón Martín and the dawn of Spanish gas lighting

Professor Mercedes Fernandez-Paradas

Professor Antonio Pinto Tortosa

In this paper, we explore the character of Melitón Martín Arranz, a Spanish engineer that studied in the United Kingdom and France, becoming the promoter of the first experiences of gas lighting in Spain by mid-19th Century. Son to a political refugee in Fernando 7th's reign,

M. Martín got his degree in Engineering in the United Kingdom but unlike his brother, who stayed abroad and became a well-reputed physician in Scotland, he came back to Spain, once political liberalism became institutionalised, to collaborate in the take-off of gas lighting. Thus started the activity on which we will focus, considering three main aspects: firstly, his arrival to Spain, the endless struggle to see his British degree validated there, and his early implication in the gas lighting of the city of Madrid. As a man trustworthy to powerful Marquis of Salamanca, he remained close to the “Sociedad Madrileña para el alumbrado de Gas en Madrid”, created in 1846, of which they appointed him Director two years later. After that, we will analyse his professional development in the following years, participating in other companies in order to expand the Gas Industry to the rest of the country, reaching such distant places as Alicante or Burgos. To sum up, we will describe the way he diversified his professional activities, collaborating in different relevant railway projects, and at the same time using his participation in business to develop a political career, too; doing so, we stress his use of the entrepreneurship spirit to count on a wide circle of contacts in the political scenario.

F3D-2 The transfer of technology between gasworks in Spain

Dr. Francesc X. Barca-Salom

Dr. Joan Carles Alayo-Manubens

The coal gas technology, once it was established, had no spectacular changes over the years. The principle that sustained it was the same: to obtain gas through the distillation of coal. However, the need to obtain better returns caused a considerable series of modifications and technical improvements. This paper intends to study these technical improvements that took place in Spanish gas factories from the beginning until coal stopped being used to obtain gas. We will focus on highlighting, from a technical point of view, those foreign contributions that meant an important transfer of technology, but we did not forget the transfer that has existed between Spanish regions

F3D-3 The Société technique de l'industrie du gaz en France and its role in the technological diffusion worldwide, 1874-1935

Professor Alberte Martínez-López

Dr. Jesús Mirás-Araujo

France, together with England, was the leading country in the gas industry. Since the beginning of the 19th century, it played a key role in the diffusion of the technology of coal gas production, especially in the Mediterranean area, where it concentrated a large share of its foreign investment. Among the factors that were responsible for this process, the presence of engineers and associations that brought together professionals of the sector must be highlighted, as they acted as agents that commanded technology transfer. Among the latter, the Société technique de l'Industrie du Gaz en France stands out. It was founded in 1874 and, under a new name, is nowadays still working. The aim of this paper is to analyse the importance of this association in the diffusion of gas technology, both in France and abroad, particularly in Spain. Their conference proceedings will be used as the main source.

F3D-4 The influence of British gas technology in Catalonia at the beginning of the 20th century: the case of Pablo Yvern Ballester (1879-1944).

Dr. Florentino Moyano Jimènez

The gas industry in Catalonia started mainly via foreign technicians. In 1840, there was an evident lack of knowledge on the technology and technique of gas for streetlights, therefore

English and French engineers arrived to Catalonia to guide the establishment of a new industry. After the creation of Barcelona's Industrial School (1851), the new trained professionals substituted the foreign technicians in gas plants. Some of them complemented their training going to the cradle of the gas industry. The case of Pablo Yvern Ballester confirms this. After graduating in 1902 as an industrial engineer specialized in chemistry, he became the technician and director of the gas plants in the Spanish town of Valls, and those belonging to the Anglo-Spanish gas Company, Játiva and Denia. Between 1901 and 1907, he complemented his training in London, working for Gas Light and Coke, for Gibbons Juniors and Gibbons Bros. Ltd. The knowledge acquired at Gibbons Bros. led him to develop and patent 'Perfection of heat recovery systems for gas ovens'. This was an improvement on regenerative ovens and was highly successful. The Yvern oven system was introduced to 11 Spanish gas factories and other foreign ones such as Sant Albans in England and Yokohama in Japan. Its connection to the United Kingdom led him to represent British firms in Spain.