New Technologies as a Factor of International Relations

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Edited by

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INTRODUCTION

The development of new technologies significantly facilitates the process of dynamic transformation within the international system. The subject of international relations, as well as their objectives and operational scopes, are affected by the multidimensional impact of the technological factor. Technological progress leads to the redistribution of power in the international environment, promotes change in its structure, shapes the connections amongst the key participants of international relations, and is a source of the increased range, intensity and effectiveness of transborder actions. The influence of the technological factor on contemporary international relations is manifested in various areas of social life, as well as in the operational mechanisms of international relations, including: the processes of institutionalization and management of the international environment, communication, cooperation and conflicts between nations.

The contemporary technological transformation is focused on accelerating the development of communication means and the technologies of collecting, processing and storing information. The information revolution is the basis of the "globalization infrastructure", thus influencing the dynamics of the processes which lead to modifications in the basic parameters of the international environment. Information technologies represent this unique type of technology which, unlike traditional industrial technologies, not only provides new methods of goods manufacturing, but also entails important system changes in the social, economic and political spheres, including those on the international scale. This special type of technology also includes modern biotechnology and genetic engineering (Braman 2002). With regard to the geostrategic dimension of international relations and position building by particular states, and from the perspective of sustainable development, technological solutions designed to exploit, efficiently manage and search for new energy sources are highly significant in international relations, as well. The subject of the book is the character of functioning of the abovementioned technologies as factors for shaping international relations, as well as taking into account technological innovations in military science and in border surveillance. It is also worth emphasizing that along with transformation of the international realities, triggered by technological

development, the ontology of international relations as an academic discipline undergoes change, as well.

One of the key notions here as the focus of international policy research, is power. Selecting the category of power as the perspective around which the analysis is organized, makes it possible to capture the essence and principles of international relations development. What is important is that technological progress affects the transformation of power in the international system, including its character, distribution, sources and manifestations. Scientific and technological potential, resources of knowledge and information constituting the intellectual capital whose quality is reflected in the innovation level, become the key attributes of power. Increasingly, these resources are owned by institutions other than states; this is why non-state players acquire the status of power holders in the international environment, breaking the monopoly of states in this sphere. In his article, Lech W. Zacher refers to the link between new technologies and the dynamics of power in international relations. He presents the cumulative development of knowledge and technological innovations in such areas as: communication, biotechnology, nanotechnology, military science and the exploration of outer space as the arena for international competition for power and its new distribution on the one hand; and as a sophisticated tool for reinforcing the power of particular players on the other. Technological power, based on the capacity to generate progress, and on application, transfer and the control of technology, is a specific type of power in the international environment. It is not only an independent vehicle of potential, but at the same time a catalyst for building other spheres of power, including its economic, political, ideological, cultural and social dimensions.

According to Tomasz Stępień, technological development plays a crucial role in the formation of the new framework of international relations, characterized by networking, interconnectedness and reciprocal interdependence. These changes may by conceptualized as a sequence of "turns" that express the transformation of social life, system of science and research, and what is important – the existing geopolitical configurations from local to global scales. In this context, an area which is intensely affected by the technological factor, influencing both international reality and the processes of building knowledge about it, is the spatial dimension of international relations. Consequently, "technological turn" correlates with so called "spatial turn". Analysing the technology-mediated "spatial turn" in international relations, Katarzyna Mojska refers to the changing configurations of space, defined in geographical and social terms. She emphasizes the significance of various forms of social and spatial

organization, especially transborder networks, as units of international relations analysis. The author also notices that modification to the meaning of space in the international system is not a one-way process towards the radical weakening of its territorial basis. Technological progress which leads to the separation of social life from the territorially defined space, limited by the rules of the Westphalian international order, offers at the same time certain sophisticated means of territorial supervision. Anna Moraczewska elaborates on the theme of continuation and change in the context of territorial control as a fundamental rule organizing the structure of international order. Referring to the problem of the evolving significance of state borders towards their increasing permeability, she points to technologically advanced systems of border protection as tools for upholding their supervisory function. Furthermore, Ariel Kabiri explores the problem of the opposing tendencies occurring simultaneously in international relations that are influenced by the technological factor. While critically evaluating technological determinism, he suggests the concept of a social construction of technology, rooted in the constructivist theory of international relations, as a valuable analysis formula.

Technological progress generates new conditions in which states exercise their sovereign rights and pursue their interests, both in domestic and foreign policy. Technological advancement forces states to adjust to the logic of functioning in the international environment as characterized by a growing network of interconnections, increasing intensity and dynamics in international political relations, and their considerable complexity. The adjustment processes include official operation of the state in order to fulfil its external functions in one of the oldest spheres of international relations, diplomacy. The influence of information and communication technologies on the evolution of diplomatic functions performed by the state, is discussed by Beata Surmacz. The author notices that the information revolution poses a challenge to traditional diplomatic practice, as it increases the complexity of the environment in which diplomacy is pursued. One of the symptoms is the emergence of the so-called “new diplomacy” phenomenon, identified on the basis of the assumption that the international negotiation processes are increasingly affected by the activity of institutions other than states, especially transnational corporations and transnational civil society organizations. As a result, the negotiation environment emerges as more multidimensional and less clear, no longer resulting from convergence and divergence of interests and the bargaining position of particular states only. The development of the means of communication also modifies the space-time dimension of diplomatic activity. Decision-making processes are speeding

up at an unprecedented rate and are becoming centralized. Beata Surmacz emphasizes that new technologies provide states with the tools for performing the basic functions of diplomacy, namely representation, negotiation and communication. The issue of the transformation of the diplomatic sphere, as caused by the development of information technologies, is also examined by Justyna Arendarska. She focuses on the "e-diplomacy" phenomenon and indicates that the information revolution affects the organizational basis of diplomacy, leading to changes in the structures of foreign affairs ministries and diplomatic posts. Another text dedicated to new technologies as a factor of diplomacy refers to the state's activity being aimed at the fulfilment of its interests in the international environment, through building a favourable image among the public opinion abroad. Agata Ziętek points to the fact that the adjustment of states' activity in the public diplomacy sphere to the realities of the information age results in the so-called "new public diplomacy," as analysed by the author in a case study on Poland.

Both the abovementioned "new diplomacy" and "new public diplomacy" become a part of the change logic of contemporary international policy which, though still dominated by states, ceases to be their sole domain. What is important is that information technologies are a factor for empowering individuals in international relations. While discussing the possible application of tools for enabling so-called e-voting at the supranational level, Małgorzata Kwiatkowska presents new technologies as a chance for eliminating the deficit of democracy on the global scale and strengthening global management structures through raising the level of their social legitimization.

Unquestionably, progress in science and technology has been conditioned by the significance of the military dimension of international relations. Even though the development of military potential is no longer the most important determinant in shaping the international order emerging after the Cold War period, its significance – from the perspective of position building and the construction of the international roles of states – has not been denied. States continue their work on new kinds of weapons able to deal with contemporary threats to domestic and international security. A noticeable tendency is the more widespread application of advanced information technologies, enabling precise military action intended to achieve a given goal with minimal casualties. A contemporary war may be won due to the power of knowledge which becomes a "rival" to the weapons and tactics used in military action by the enemy. Modern weapons, based on information instead of firearms, enabled a reduction in the amount of explosives, miniaturization of arms and limitation of

damage, as a direct result of its extraordinary precision. The issue of profound changes in military action, referred to as a Revolution in Military Affairs – RMA, is discussed by Konrad Pawłowski. He analyses the reasons, essence, as well as the military and political effects of ongoing RMA, connected with the dynamic use of computer technologies on the contemporary battlefield, and refers to examples of military operation from the turn of the 20th and 21st centuries.

Future wars will not be fought only on land, sea, in air or outer space, but also in the so-called cyberspace as a theatre of cyber-warfare, i.e. planned and concentrated attacks of hackers against the enemy's computers. Asymmetric warfare, including cyberterrorism, assumes various forms whose list is constantly growing. Magdalena Michno concentrates on this issue in her chapter. Her aim is to analyse the characteristic features of activity in virtual space, drafting a user's profile and presenting the current list of activities, not always of criminal character. Jakub Nowak writes that an advantage of cyberspace is the mobilization of individuals who were not willing to get involved in social and political life before. The virtual space, devoid of physical borders, is a multidimensional platform of dialogue and meetings, where the globalized spheres of politics, economics, culture, etc. are intermingled. With diverse content and participants, cyberspace becomes a highly effective tool, and a new medium for contemporary civic society. An example can be seen in the mobilization or rather e-mobilization of the virtual community against ACTA.

Cyberspace as a source of threats to the internal security of a state and an individual is discussed by Tatiana de Almeida F. R. Cardoso and Rafaela Steffen G. da Rosa who study the evolution and adjustment of international legal norms and domestic law (on the example of Brazil) to this new phenomena. According to the authors, the factor of uncertainty accompanying the new threat and the dynamic character of change are the basic reasons for the poor adaptation of normative standards to challenges posed by new technologies.

Another area influenced by the technological factor is the economy – both national and global. The impact of the technological factor on the global economy stimulates the emergence of a knowledge-based economy in which success or power is determined by information. On the one hand, it is desirable to have access to valuable information such as patent secrets, but on the other hand the surrounding reality is affected by the information oversupply, as manifested by the omnipresent information noise.

Due to the growing number of innovative technological solutions, there is a need to prepare regulations pertaining to the legal access and use of

innovations. It is a fact that the normative process has a retroactive – and rarely anticipatory – character in relation to the scientific and technological progress. Nevertheless, dynamic changes in the domestic and international legal norms can be observed, aimed at establishing rules of introduction, management and control over new technological solutions. An important feature distinguishing the contemporary technological progress is the involvement of private bodies, operating in the transborder sphere, whose potential and financial resources are a favourable factor in the implementation of research and development tasks. Privatization of scientific research and its results leads to the evolution of the intellectual property protection system, for instance through the constant introduction of new protected objects. These issues are examined in the work of Robert Bolla who presents the origin of the system of scientific research financing and commercialization in the United States, on the example of the pharmaceutical sector. The author presents the characteristic features of the mixed system of support for research and development activities, based on the cooperation of public and private bodies, such as: higher education institutions, research institutions, government agencies and enterprises of national and international range. Due to the costs of the research process and later commercialization of effects, participation of private bodies seems inevitable. Therefore, it is very important to determine transparent rules for their involvement.

Predominantly, the scientific and technological progress has not been compatible with the need for natural environmental protection. Consecutive technological achievements increased man's domination over the natural environment and enabled exploitation of natural resources as much as possible. This situation began to change in the second half of the 20th century, when some organizations started protesting against the uncritical attitude to the scientific and technological progress and its impact on man and nature.

Negative consequences of the human impact on the natural environment include: the greenhouse effect and related global warming, thinning of the ozone layer, pollution of soil, water and air, deficit of resources, lands turning into desert, progressing restriction of forest areas or extinction of species. These phenomena are widely considered as anthropogenic, with the technological factor accelerating many negative processes. In this context, the focus of the debate is on the significance of the scientific uncertainty factor. As Marek Pietraś emphasizes, the problem of scientific uncertainty represents one of the key factors influencing the process of climate change negotiations. Depending on particular preferences and

interests, it may justify contradictory decisions and actions undertaken by states within the international regime of climate change.

During the several recent decades, the processes of creating and implementing environmentally friendly technologies became a priority, mostly in highly developed states. The European Union aspires to be the leader in this area, because its economic development strategy, based on the sustainable development idea, aims at the coordinated implementation of energy policy goals, environmental protection and counteracting climate change. The strategy guidelines and implementation status have been analysed by Beata Piskorska who argues that despite numerous political and economic obstacles, the European Union has a chance to become the regional or perhaps even the world leader in the fight with consequences of global warming and in implementation of sustainable methods of energy security management.

Nevertheless, accomplishment of this ambitious project may pose a serious problem for some EU member states, including Poland. This is emphasized by Bartosz Bojarczyk and Jakub Olchowski who, analysing the typical features of the Polish energy sector, point to its maladjustment and considerable technological backwardness, which may be an obstacle to the implementation of the EU strategic plans. According to the authors, the nuclear power industry and implementation of the plan for building a new generation of nuclear power stations may be an alternative solution, owing to which obligations can be fulfilled. The authors critically analyse the government project of nuclear power industry development, enumerating its advantages and potential threats.

The challenge of balancing energy security requirements with ecological issues is an impulse for the development of technologies enabling more widespread use of renewable energy sources. According to Kamila Pronińska and Krzysztof Księżpolski, it will be an important factor shaping international relations, both on the regional and global level, with effects visible in the global structure of power and wealth. Changes in the economic sphere will manifest through the emergence of new energy markets, new important branches of international trade and conditions for operation of transnational businesses from the energy industry. Moreover, renewable energy sources will offer a unique chance for the development of low-income countries, devoid of access to traditional energy sources and energy infrastructure. In the geostrategic dimension, transformation of methods of production and trade in energy will bring about change in the conditions of functioning and political bargaining position of the main exporters and importers of conventional energy. The ongoing “energy game”, whose participants are producers, transit states and consumers of

fossil fuels in Eastern Europe, is analysed by Justyna Misiągiewicz who presents technological infrastructure of oil and gas transfer in terms of an instrument of political pressure in international relations.

Technology understood as a conglomerate of ideas combined with specific methods of developing or implementing a creative conception in the form of a materialized product, is regarded by many as an ethically neutral category. What can be evaluated is the way in which a product of technological progress is used by its owner. It can also be assumed that a creative idea, which is a necessary precondition of scientific and technological progress, is generally not negatively marked, i.e. the intention of technological change is not destruction but growth. It is also confirmed by the semantic analysis, because the word "progress" is synonymous with "development". However, technological progress, not always, and not for everyone, signifies development understood as the improvement in standard of living. While studying the influence of the technological factor on international reality, we should not disregard the human dimension of international relations. This issue is discussed by Julita Rybczyńska who analyses the relationship between technological progress and human rights, pointing to the current chances and challenges. The impact of technological change on the exercise of human rights is examined also by Monika Szkarłat who concentrates on the relationship between the introduction of genetically modified food on the market and the status of the right to information. Focusing on the EU member states, the author analyses the adequacy of binding EU regulations and the individual perception among European consumers of the exercise of their right to be informed, on the basis of public opinion surveys.

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PART I

NEW TECHNOLOGIES, NEW REALITY, NEW PARADIGMS OF INTERNATIONAL RELATIONS?

TECHNOLOGICAL TURN AND THE NEW FRAMEWORK OF INTERNATIONAL RELATIONS

TOMASZ STĘPIEŃ

Introduction. New "actors" of international relations?

Nowadays, international relations are shaped by the model of a knowledge-based society understood and interpreted as a network (Castells 2001), and founded on various forms of mobility with the immeasurable flow of ideas, people and goods (Urry 2000). This model expresses also the dominant process of globalisation along with the radical changes and transformation of the social and international order. The background of all these changes in the last decades has been the process of life-technicality, i.e. the progressively increased technological penetration of social and individual life ("invasive Technisierung", G. Böhme 2008, 11). In this manner, technological development is one of the most important "carriers" and "mediums" of social changes, and at the same time the key element of the new framework of international relations. Consequently, international relations as a discipline of the humanities and social sciences, needs a renewed theoretical design, which would adequately respond to the technologically intermediated changes of societies and social practice.

From a theoretical point of view, the (post)modern society is analysed as a result of a sequence of "turns" which have transformed social life, but also the system of science and research, e.g. the dissemination of interdisciplinary orientation in basic research, and finally the hitherto existing geopolitical configurations on different levels, reaching from local to global scales. Above all, the technological development demarcates the new framework of social and international life as characterized by networking, interconnectedness and reciprocal interdependence. As a consequence, the new technologies of communication or the converging technologies such as nano- and biotechnology become new "actors" of international relations. Therefore, science and research, along with technological development and political initiatives in the field of higher education and research, for instance the European Research Area (COM (2000) 6; COM (2000) 612 final) or the NBIC-initiative in the US since

2001 (Roco and Bainbridge 2003), play a strategic role in politics and are increasingly regarded as the essentials of the international relations. Therewith, the framework of international relations is constituted among others by new technologies. The following reflections and analysis attempts to shape theoretically founded characteristics of the new factors, motives and "actors" of international relations, which at the same time constitute and moderate international life.

The sequence of turns and social transformation

The accumulation of knowledge and social changes in the postmodern (post-industrial) society has been one of the major research subjects in the humanities and social sciences in the last two decades (Sztompka 1991; Bauman 2011). These changes are expressed by the metaphor of turns understood as a framework of social life and process of globalisation. The sequence of turns includes the linguistic and cultural, then technological and spatial, and finally the iconic or pictorial in the last few years. By the way, the metaphor of a turn is not only theoretical, but expresses also the real social processes and practices. The turn metaphor itself refers to the beginning of the comparative studies of civilisations after the Second World War and the linguistic turn in philosophy. The origin of the new philosophical concept of language can be found in F. de Saussure, and afterwards in the dispute between E. Cassirer and M. Heidegger in Davos 1929 (Heidegger 1973, 263). The notion "linguistic turn" was introduced by R. Rorty in his essay *The Linguistic Turn* from 1967 with the concept of language as a means and medium of knowledge, but also as the framework of reality, which is rooted in subject. This new interpretation of language has constituted the following narrative and reflexive turns. Based on this concept of language and the development of the mass media and new communication technologies, in more recent times, the symbol has been recognized as a means and medium of thought and knowledge in the iconic / pictorial turn.

The cultural turn in the form of the comparative science of civilisations and history, based on the classical theory of culture, was initiated by Anton Hilckman and his work *Die Wissenschaft von den Kulturen* (1967) and Arnold J. Toynbee's *Study of history* (1934-1961), and continued in postmodern way by M. Foucault and A. Giddens with the debate between the modernists and postmodernists. In the 1990s the explanation of culture, civilisations and history, understood also as the new framework of international relations and the anticipation of the changes of international order after the end of Cold War, was presented by F. Fukuyama and his

essay *The End of History* (1991), Z. Brzeziński *The Grand Chessboard* (1997) and S.P. Huntington's *Clash of Civilisations* (1997). Above all, the conception of a dynamic new world order by Huntington rejected the static and bipolar point of view concerning international relations. The cultural turn as a summative approach in the humanities and social sciences introduced new research subjects adequately to the ongoing process of globalisation, such as: 1) the internationalisation of the "stranger" and the post Marxist problem of alienation in the society, 2) the introduction of an intercultural dimension, 3) the interdisciplinary enlargement of ethnology, and finally 4) all the questions concerning social trust and the possibilities of conflict management in a multicultural society.

In this manner, the humanities and social sciences in the second half of the 20th century are characterised by synthesis between the linguistic and cultural turn with particular derivations as those which impact upon the theory and practice of international relations: 1) the interpretative turn with the semiotic concept of culture as text and interpretation, 2) the performative turn with understanding of culture as performance based on symbols as the real and true language of culture. As a result of these assumptions, in the 1980s the postcolonial and then translational turns have opened up the transcultural dimension as a consequence of the first wave of globalisation. In this time of social and geopolitical changes and with technological development and mass dissemination of the new ICT gadgetry, the practice of social and cultural localisation has also changed. The emerging new global networking system of civilisations and societies also needed a new conception of technologically intermediated spatiality. The expressions hereby are the technological and spatial turns. Finally, the sequence of turns is finalised by the iconic or pictorial turn supported by new ICT and the mass media with the understanding of culture as an exhibition of pictures and expressions of thought, mediated by icons.

Today the theory of culture is characterised by interdisciplinary orientation including the paradigms of the "travelling theories", "blurred genres" (Bachmann-Medick 2012) and the hybrid conception of culture (Spielmann 2010). The introduced turn metaphor in the humanities defines the new code of modernization, which also encompasses a new cartography of science and research. In this manner, culture becomes the major subject of research which crosses the disciplinary limits according to the definition of interdisciplinarity as "creating a new object that belongs to no one" (Bachmann-Medic 2012, 17). The result of this interdisciplinary orientation inside the humanities and social sciences was the rejection of the homogenous conception of the world in favour of a play with different ideas expressed by the term "travelling theories", i.e.

interdisciplinary opening towards other disciplines on the one hand, and an intercultural opening of the occidental theoretical schemata on the other. The metaphors of turn and the "travelling theories" are completed by the third phenomenon of 'blurred genres' with new configuration of the system of science and the creation of the new patterns of discourse. Therefore, a new concept of culture is developed as a hybrid form of social and international life, integrating different motifs, practices and cultural patterns (Spielmann 2010).

Technological and spatial impacts on international relations

The typology of turns expresses also the paradigms' change of international relations resulting, above all, from new information and communication technologies. The technological turn integrates the concept of "space" and its new dynamic understanding as the process of spatiality and the "spatial" (Soja 2009, 11-35). Therefore, the new mode of spatialisation became the decisive factor by development of geopolitical strategies based on variable operation with the different scales from the local to global level, and with the phenomenon of scale-jumping. The technological turn and the new spatiality are connected with the question concerning their technological impact upon: 1) the new geography of innovations, and 2) the social communication on the global level. In the case of social communication and data transfer there is a privacy dilemma because of technologically intermediated communication, and then communities and socio-political movements as the new form of participation in social and political life. In both cases the dissemination and use of the information, and the subsequent communication technologies, are a condition for the successful mobilising of society. Moreover, the field of international relations is increasingly moderated by the use of these technologies. As a result, technological and spatial turns extrapolate new "actors" in geopolitics with a new understanding and distinction between useful, military and joyful technologies (Böhme 2008) on the one hand, and the concept of technoscience in the (post)constructivism and its "turn to the things" with underlined significance of the "non-human" elements in the process of development (Latour 2005, 63-86) on the other hand.

The distinction between useful, military and joyful technologies results above all from the accumulated technological development in the last decades. From the classical and historical point of view, technology is understood in relationship to its usefulness, and in the case of the military it is interpreted as the incubator of all scientific and technological

innovations. But in recent times the new meaning and importance of the "joyful technology" (Böhme 2008, 39) has been formed, understood as a new dimension of innovation in the form of technological gadgetry and the mass media, and as a new form of technological consumption. Nowadays these three basic types of technology are often mixed together; for instance, the combination of military and joyful technology by the aesthetic medial and visual stimulations of warfare (Sassower 2007, 351-361). The above-mentioned paradigms are present in the humanities and social sciences ("travelling theories" and "blurred genres"), and we also find them in technological development, i.e. "the borders between technology types tend to blur anyway, or better put: almost every technological development contains features of entertainment technology, precisely because it no longer serves the satisfaction of basic needs" (Böhme 2007, 34). In this manner, society reached the time of technical gadgetry with technologies and innovations as goods of mass consumption, which outline and determine the possibilities and styles of societal and international life. Besides the distinction between the main types of technology, one of the principal tasks is elaboration of the theoretical framework of technology development. One of the most important, besides the concept of technology assessment and the model of converging technologies, is the theory of technoscience.

The main subject of technoscience is the analysis of the political and social impacts of scientific discoveries and technological innovations, and the role of science and technology in modern society as a whole. In this way, the concept of technoscience is focused on the theoretical framework of science, technology, and the risks connected with them, because the development of science and technology can be identified with the analysis of risks (Bińczyk 2012, 9-10). The conception of technoscience, also as a part of the sociology of knowledge and philosophy of technology, is characterised by the 'turn to the things' with the underlined significance of the non-human elements in society and scientific development, then by the "participative" turn concerning the possibilities of social monitoring and the moderation of science and technological development. Hereby, the background of the (post)constructivist conception of technoscience is the actor-network-theory (ANT) presented by B. Latour (2005).

The notion "technoscience" focuses on science as it is understood in the form of experimental and laboratory research works and practices, which include the material infrastructures of laboratories, also as a condition of research works themselves. Therewith, the significance of the non-human (B. Latour) elements in the research process is emphasized, such as artefacts and the intrinsic complexity of the technological system

and research infrastructure. The artefacts, research system and infrastructure (laboratories) outline directly research works, but also demarcate and design the structure of the modern society. In consequence, these elements appear as the strategic and key factors of international relations. And with the global mapping of research infrastructure and innovation centres they reflect international life on the global scale.

At the same time, one of the most important paradigms of modern society, resulting from the science and technology development as a whole and their impacts on the environment, is the analysis of risks and the unforeseeable consequences of technology use and science development. The model of risk society (Beck 1986) based on the intrinsic systemic risks resulting from technoscience needs, at the same time, a new political and normative framework concerning technoscience itself. Therefore, the model of risk in society is completed by a new culture of participation with the process of science and technology democratisation and the possibilities of monitoring technoscience in the form of public debates concerning technological innovations and their impacts on social life. In this sense B. Latour underlines the enlarged meaning of "collective" in the actor-network-theory including the human and non-human elements constituting the system of technoscience.

Instead of technological instrumentalism, autonomy and determinism characterised by dispersed responsibility, the model of technoscience postulates the creation of a political and normative framework at the global level understood as a risk-management strategy confronted with the negative effects and impacts of science and technological development, and then as a condition for the possibility of anticipating and foreseeing the future implementation of strategies in science and technology, so that technoscience appears as a framework of risk in society and international relations. In this perspective, technological determinism is replaced by interactionism, i.e. reciprocal connection and interdependence between scientific, technological, societal and political processes.

> Therewith science and technology make out social norms and practices, "that the non-human elements are co-defining humanity, funding fundaments of civilisation, and include political and moral components by building of society (…), that technological things and structures co-create global macro-ethics, which is needed in the risk society" (Bińczyk 2012, 32).

The "turn to the things" that is noted in the concept of technoscience, we find for instance in the new model of the "Internet of things" or in the new laser-based technology that is emerging and enabling key and cross-

sections technology (Additive Manufacturing Technologies, AMT). Hereby, the question is how far it is possible to explain the occurring geopolitical processes in terms of the concepts and methods employed by technoscience. On the basis of the conception of technoscience, science and technology, artefacts, laboratories and research infrastructures as the non-human elements integrated in the "collective", society can therefore also be metaphorically interpreted as the main actor in international relations.

Besides new emerging and enabling technologies being considered as an expression of the technological turn, the second new "actor" of international relations appears to be: "spatial" understanding as completion and the result of the technological turn. The questions concerning "space" and "spatiality" belong to the most important topics in the humanities, social and engineering sciences, but are also a condition and expression of changes on a global scale in social and international life:

> "Across the disciplines, the study of space has undergone a profound and sustained resurgence. Space, place, mapping, and geographical imaginations have become commonplace topics in a variety of analytical fields in part because globalization has accentuated the significance of location. While this transformation has led to renaissance in human geography, it also has manifested itself in the humanities and other social sciences" (Warf and Arias 2009, Preface).

The spatial turn relates to the societal conception of space as presented by Henri Lefebvre in his work *La production de l'espace* from 1974. The notion of a "spatial turn" was introduced for the first time by Ed.W. Soja in *Postmodern Geographies* (1989), and was then interpreted by him as a kind of a master turn and a paradigm of the contemporary social science with "the potential to be one of the most significant intellectual and political developments of the twenty-first century" (Soja 2009, 12). In the same way F. Jameson in his work *Postmodernism, or, The Cultural Logic of Late Capitalism* (1991) recognized the spatial turn as the main phenomenon of the (post)modern society.

As a consequence of these statements, the analysis of space and spatiality has been focused on examining the role and significance of space's transformation, and the perception of it, inside different disciplines in the field of science, reaching from the humanities to engineering, but also concerning social communication and the new culture of interactions, with the aim being to extrapolate the reciprocal interconnectedness and interdependence between the process of spatialisation and technological development. Especially in the social and political sciences there is both

reintroduction and rediscovery of the spatial dimension, i.e. "that space is a social construction relevant to the understanding of the different histories of human subjects and to the production of cultural phenomena" (Warf and Arias 2009, 1). Therefore, the dynamic acts of spacing, placing and mapping denote the essential elements and aspects in the process of culture's production and development, but also constitute the new framework of international relations with the supposition "that everything happens in space, but because where things happen is critical to knowing how and why they happen" (Warf and Arias 2009, 1). By the way, the forerunner of this new dynamic conception of space in the societal dimension is the first theory of "mobilities" presented by Pitrim Sorokin and his *Social Mobility* from 1927. This widening meaning and understanding of space present the space as a social construct which is ideological and symbolic, lived and subjective at once. And above all this understanding expresses the plasticity of space and its function in the process of reproduction of social structures and life in national and international dimensions. In this way, for instance global economy and markets have created new spatiality by deconstruction of the old static and historically determinate geographies. Edward W. Soja in his *Postmodern Geographies* (1989) indicates that besides the time and social structures there is the third fundamental and constitutive element of social theory: the space or the spatial. Therefore, the spatial turn "has involved the end of historicism, which privileged time over space, and the reassertion of space into social theory", and the paradigm of 'turns' gives the answer and also interpretation "how society is organized and reorganized, knowledge constructed, and the possibilities and perils of change" (Warf and Arias 2009, 6). Finally, besides technology and space, the third "actor" of international relations appears: the icon, i.e. messages and symbols at once intermediated on the global level by the convergence of the mass media and ICT. The iconic turn focuses on the significance of the mass media and their impacts on international relations.

To sum up, the characteristics of technological and spatial turns expose a kind of synergy between technology and space that is expressed, for example, with the "death of distance" or the phenomenon of "time-space-compression" as well as by their direct impacts on social life and international relations. Above all, the metaphor for spatial turn underlines the new geography of the world based on the spatial practices which permanently change the coordinates of the geopolitical order. One of the best examples of this reassertion of space in social science and international relations is that global cities are understood as the nodes of

global flows, with strategic importance in economic and technological, geopolitical and cultural interconnectivity.

With the process of globalisation including the creation of a world-wide market and the dissemination of information and communication technologies, the global cities have an increased bearing on international exchanges in all fields of human activities, expressed above all by the interdependence between cities, economy and technologies. The global cities appear as an example of synergy between the technological and spatial turn. One of the most important reasons for this was the change of the structure of global economy in the 1990s with spatial, dispersal and intrinsic integration. For example, Saskia Sassen in her book *The Global City* (1991) underlines these two different processes:

"The geography and composition of the global economy changed so as to produce a complex duality: a spatially dispersed, yet globally integrated organization of economic activity" (Sassen 1991, 3). This spatial dispersal and differentiation, along with inner integration, outlined the new strategic significance of the global cities as centres of global economy with four main characteristics: 1) "as highly concentrated command points in the organization of the world economy", 2) "as key locations for finance and for specialized service firms" with the replacement and marginalisation of industry in the urban area, 3) as centres of innovations' production, and 4) as market for these innovations (Sassen 1991, 3).

On the basis of the comparative analysis, Sassen points out that all global cities have been transformed in the same way concerning the spatial organisation and social structure in spite of all cultural, historic or political differences between them:

> "To understand the puzzle of parallel change in diverse cities requires not simply a point-by-point comparison of New York, London, and Tokyo, but a situating of these cities in a set of global processes. In order to understand why major cities with different histories and cultures have undergone parallel economic and social changes, we need to examine transformations in the world economy" (Sassen 1991, 4).

The arising importance of the global cities is also an expression of the changes occurring in the international order after the Cold War, and Sassen ascertains that "we may be able to understand the global order only by analysing why key structures of the world economy are necessarily situated in cities" (Sassen 1991, 4).

This new global order is characterised by the reciprocal interdependence, i.e. the spatial dispersion by integration into a chain of dependence, "that the territorial dispersal of current economic activity creates a need for

expanded central control and management" (Sassen 1991, 4). These are also the two main mechanisms of globalisation: spatial dispersal by centralisation of monitoring and management. These are the elements of the new logic of concentration and the new system of coordination in spite of ICT development. Therefore, the decisive factor of the significance of global cities in international order is "their capability for producing global control" (Sassen 1991, 6). And this means also radical changes in the global geopolitical geography of international relations:

> "While a few major cities are the sites of production for the new global control capability, a large number of other major cities have lost their role as leading export centres for industrial manufacturing, as a result of the decentralisation of this form of production" (Sassen 1991, 7).

On the other hand, the specificity of global cities poses a question concerning their disembedding from the national dimension of geopolitics, what is expressed by the process of deindustrialisation in Europe, Japan, and the US. In this way the global cities represent the process of the reconfiguration of the inner structure of international relations, and their relations to the national background pose the question of how far the global cities are integrated or aliened from their cultural, societal and political backgrounds, and the "new international forms of economic activity raise a problem about the relationship between nation-states and global cities" (Sassen 1991, 8). Consequently, the development and economic growth of the global city cannot be identified with the nation-state as a whole, and what "contributes to growth in the network of global cities may well not contribute to growth in nations" (Sassen 1991, 9). In this manner, the global cities, being in tension with their national context, are partially autonomous actors of international relations.

Science and research and their impacts on international relations

The framework of international relations with technologies, spaces and icons as its integrated elements is also the result of the present higher education and research policy that is based on the principle of networking on a global scale. Besides the global cities, the other example of change in international order is the process of policy making in the field of higher education and research. By analogy to the global cities and their significance in the global economy, in global flow of people and ideas, goods and capital, the higher education and research centres play a

strategic role in the present international relations. Moreover, the global system of higher education and research undergoes nowadays the same processes of transformation in spite of cultural and historical differences. The best examples here are those of higher education and research policy in the US, and the concept of the European Research Area (ERA) as an integral part of the European integration.

The changes in the field of higher education and research result from the appreciation of knowledge as the driving force of societal development, technological innovations, and economic sustainable growth. The model of knowledge-based society and economy emphasizes human and intellectual capital and the potential to create and to produce scientific knowledge as strategic forces, which result from organisational competences and managerial culture. In this context, higher education and research are recognized as a condition for the attainment of a knowledge-based society, but are also understood as being producers and transmitters of knowledge at the regional, national and global levels. The emergence of the knowledge-based society has enforced the reforms and the transformation of higher education and research system, which is shaped by the processes of internationalisation, globalisation and the marketization of knowledge, along with innovation, on the one hand, while on the other hand the question arises concerning compatibility issues between different systems of higher education and research. In this way, effective knowledge management is crucial on two different scales: 1) on the microscale of an organisation with optimal use of the organisational capacity and potential as a condition of innovations, and 2) on the macroscale with the possibility of integration into the network of public institutions and business involved in research and development programmes and projects.

In the knowledge-based society, as a result of globalisation, even the new internationalised area of higher education and research is the major transmitter of changes:

> "In global knowledge economies, higher education institutions are more important than ever as mediums for a wide range of cross-border relationships and continuous global flows of people, information, knowledge, technologies, products and financial capital" (Marginson and Wende 2007, 3).

Therefore, the two last decades are characterised by the process of the reinvention of global higher education and research areas: "Even as they share in the reinvention of the world around them, higher education institutions, and the policies that produce and support them, are also being reinvented. For the first time in history, every research university is part of