Alexey Sidorenko
Geographer, Culture Researcher,
PhD, Head of the *Teplitsa* (Greenhouse)
of Social Technologies

Civil Society Looks into the Future of Technology: A Survey of Civil Society Experts' and Activists' Opinions on Technological Opportunities and Risks

> The only thing we know about the future is that everything will be different. Trying to predict the future is like trying to drive down a country road at night with no lights while looking out the back window. The best way to predict the future is to create it yourself.
>
> — Peter Drucker (1909–2005)

Preface From Another Era

At first glance, working with the future is a thankless task. In 1933, the British physicist Ernest Rutherford declared the impossibility of harnessing nuclear power: "Anyone who expects a source of power from the transformation of these atoms is talking moonshine." A Hungarian counterpart of Rutherford's, the physicist Leo Szilard, a former student of Einstein's, within days after having read about this in the newspaper, came up with the principle of a nuclear chain reaction initiated by neutrons.[1] One might say that it was Rutherford's shortsighted statement that created the known reality. We all know what happened next – the invention of the atomic bomb, the hundreds of thousands of dead in Hiroshima and Nagasaki, the construction of nuclear power plants around the world (and periodic accidents at them). The Cold War never become "Hot" because of the dramatically increased destructive power of new nuclear weapons. The resulting principle of Mutually Assured Destruction in global politics led to the global regime of nuclear non-proliferation that formed the basis of the modern geopolitical order, etc. In sum, the future that Rutherford had envisioned in 1933 came to an end just days after he posited it.

Did nuclear physicists, writers and journalists expect to face such a destructive potential of the new discoveries? In 1913, the British writer H.G. Wells seems to have been the first to describe an atomic bomb in his novel *The World Set Free*: "His companion, a less imaginative type, sat with his legs spread wide over the long, coffin-shaped box which contained in its compartments the three atomic

bombs, the new bombs that would continue to explode indefinitely and which no one so far had ever seen in action. Hitherto Carolinum, their essential substance, had been tested only in almost infinitesimal quantities within steel chambers embedded in lead."[2]

Did politicians and activists have any idea of the destructive potential of scientific discoveries? Yes, they did, though it came rather late. Not in 1914, not in 1933, and not even in 1938, when Hitler inferred that nuclear energy could be used for the purpose of attaining a decisive military advantage. Only in 1939, six years after his discovery, did Szilard together with two other physicists initiate "Einstein's letter to Roosevelt,"[3] calling for accelerated work on developing a version of the nuclear weapon before the same could be achieved by the Nazi scientists. The resulting Manhattan Project began in 1942, three years after the scientists' letter, and ended in 1947. Trying to catch up with the Americans, the Soviet Union created the first working nuclear reactor a year later. The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) was signed in 1968, 7 years after the Cuban missile crisis which called into question the future of intelligent life on Earth. It took thirty-four years (1914–1948) for mankind to reap the peaceful fruits of nuclear energy and fifty-four years (1914–1968) – from Wells' book to the NPT – to establish rules for the use of destructive applications of scientific discoveries.

Looking Beyond the Horizon

Can we, by applying analytical methods, imagine similar situations in our future? Is it possible to anticipate unforeseen destructive consequences of a particular technology? Is it possible to predict vectors of the development of technologies and social systems, using available data, with the aim of identifying in a timely way the possibilities not only for saving lives, but also for building a more equitable society?

Scholars who have applied predictive techniques for the past few decades offer mostly affirmative answers to these questions. Aside from correctly predicting an atomic bomb, H.G. Wells was also the first to propose the term "foresight," urging academics to become "professors of foresight."[4] The foresight method is nowadays actively used in commercial companies and at the state level. It does not, however, exhaust the entire academic field of called "future studies" – an interdisciplinary field of science devoted to the study of possible variants of the future, including extrapolation of the existing technological, economic, and social trends and prediction of future trends. The "Horizon Scanning" methodology (first mentioned at the beginning of 21 century and applied in this book) belongs to the family of such future-studies methods.

The "Horizon Scanning" approach does not have a globally recognized, "canonical" methodology. In various studies, the fundamental elements (to name a few: glimpsing into the future as a method, paying attention to weak signals and wildcards, examining a number of varying scenarios) have been interpreted quite freely. Gregory Asmolov's opening chapter of this volume describes the elements of the "Horizon Scanning" methodology in great detail. The authors of other chapters in this book follow the general guidelines of the methodology, but do so quite freely in order to create a certain research space for work on a poorly studied topic. We can confidently assert that the existing degree of study of the main subject of this volume (the impact of the development of digital technologies on the development of civil society) remains quite low.

Given that many civil society processes take quite a long time (take, for example, the six-month or even one-year cycle of software development or the three-year cycle of a major grant program), decision-makers of today need to be able to evaluate whether ideas that have yet to turn into something tangible will make sense and have practical application in the future.

Narrow Topic, and Even Narrower Application

The project that gave rise to this volume had the following goal: "To look into the future with critical analysis of how information technologies can impact the development of civil society in the post-Soviet space (with a primary focus on Russia)."

The authors were offered the following definition of civil society: "Civil society is a set of registered and non-registered non-profit voluntary organizations and initiatives that function for the sake of the pursuit of the public interests, but without the end goal of securing political or commercial profit." As I knew of no canonical definition of civil society that would fit the modern situation in the region of study, I took the liberty of drafting this definition myself, based on my own work experience. Here are a few points I wish to draw attention to:

1. Civil society is a very heterogeneous environment which consists of various entities. There are definitions of civil society that define it exclusively as registered organizations. Such an approach fails to consider a great number of communities and individual initiatives that exist without any organizational form. The term "initiative" encompasses not only unregistered groups, but also ideas that may be expressed by only one person (e. g., a blogger, an activist, or a group of friends), ideas that are further developed and perceived by society.

2. The voluntariness of civil society is an important feature that allows us to distinguish "astroturfing"[5] – organizations or initiatives created so as to simulate citizens' interests. The criterion of voluntariness (although I have to admit that in real life it is likely impossible to be sure of sincere motives of absolutely all actors of civil society – we can talk only about "visible" voluntariness, i.e., about the correlation of the declared goals and real actions) allows us at least theoretically to distinguish between "mercenaries," i.e., actors driven by goals other than those proclaimed (for example, by money or ideology), and

conventionally "true," voluntary actors who are driven by their proclaimed goals.

3. The "pursuit of public interests" is the key phrase in this definition, because it is namely the *goal of improving* what is perceived by civil society actors as *the reality* around them, that is the most powerful uniting feature for completely different groups that can be labeled as 'civil society.' It may be argued that some environmental activists set the goal of preserving biodiversity and animal rights and do not perceive society as the ultimate value. But, based on my own experience, I can say that, even if not at the level of goals, but at the level of their activities, environmental organizations stand up for the long-term interests of the society in which they live and, therefore, fall under the definition.

4. The lack of dominant commercial or political profit implies that the activities undertaken are not a means (example, a politician investing in charitable organizations to gain more votes at the next election), but a goal in itself. In most cases, an outside observer will not know the true motives of most civil society actors. But most probably, she will be able to infer whether a civil society actor is sincere in achieving the declared goals or is interested only in his/her own well-being and prestige.

As any definition, the proposed definition of civil society is an imperfect one. But, unlike others, it does clearly outline the research object in the modern context and in the particular region.

The reader will notice that the perception of civil society greatly varies from author to author in this volume. This, in my opinion, is a merit of the book. The fact that the researchers differ in their understanding of civil society means that they are more likely to perceive something interesting on the horizon. Gregory Asmolov and I purposefully invited, to cooperate on the project, scholars who represent not only different disciplines but also different academic cultures – both from Russia and from universities of the broadly understood West.

The choice of civil society as the subject of research increases the level of complexity of the task of our "Horizon Scanning": the authors were tasked with imagining how technologies will develop in the future, applying this knowledge to a rather narrow and unpredictable group of actors – not simply to society, but to a rather small, but most active group: a diverse group which can be identified externally (the global civil society has almost no common identity, and the activities of civil society are very different) and is described according to its functions rather than to its qualities. The next indicator of complexity is that the analysis cannot be reduced to a single country: not only is technology itself global, but civil society is also becoming more global.

But it is the functions of civil society that are important in understanding technology. In 2020, three major corporations involved in development of face recognition technology – IBM, Amazon, Microsoft – decided to freeze for a year or even to halt using the technology.[6] That was done against the backdrop of the protests of 2020, but was preceded by human rights activities of civil activists, with the beginning of the process traceable back to at least 2018. Technology is created by humans (at least, for the time being). Humans impact the development of technology. Civil society has impacted both technology companies and individual developers. In the course of their work, they are involved in making various decisions. It can be concluded that projection into the future for such a small group makes sense, because the power of decisions made at the human level is still quite high.

In addition to the importance of such analysis, it is worth noting the scarcity of this subject (the impact of technological development on civil society) in the Russian-language scientific and popular scientific publications. It is relevant to mention some forecasting and scenario-like studies in Russia, though their focus is on a stand-alone country and they consider a number of factors that are not so important for the authors of this

book. Computer technology remains subject to rapid disruptive transformation – as opposed to, for example, energy systems and political structures. Therefore, this book should be considered not only in terms of understanding the situation and impacting the development of certain technologies, but also in terms of harnessing these technologies for the pursuit of our own objectives.

How much can we predict? In 2010, I participated in a scenario session of the "Russia 2020" project that was held by the Carnegie Moscow Center. In October 2010, some of the top researchers on Russia issues gathered at a beautiful villa in the north of Italy. The result of the intensive work was the book *Russia in 2020: Scenarios for the Future* edited by Maria Lipman and Nikolay Petrov.[7]

In my short article therein,[8] in which I described the role of the internet in political scenarios of the country, I described the main trends of state's presence on the internet: "1) parallel processes of concern [for on-line activity] and involvement in the virtual environment; 2) growing internet regulation; 3) development of e-government services." All three trends manifested themselves in full over the next decade. Speaking of society, I wrote about the importance of bloggers and moderators of communities in political life, citing Alexey Navalny as an example. In 2010, according to the Levada Center survey, the Navalny's name was recognized only by 6 percent of the Russians. Ten years later, "network public policy" has become much more powerful, despite the restrictions, and far more people today recognize the prominent politician and blogger.

Looking back, rather critically, at the predictions made in my 2010 article, I can admit that some of them quite accurately coincide with the events that actually took place. For example, I wrote about street protests in 2012, rigged elections within the period from 2016 to 2018 and, as the result, a "risky status quo" after 2018 as the most probable scenario. With all the criticism of the regime established in Russia, it is easy to see "predictability" as

one of its key features: even the slide into dictatorship is a rather predictable trajectory.

Technological development, at least for the next few years (in my estimation, 3-5 years, before the full-scale implementation of quantum computing[9] in everyday life), will also show some signs of moderate predictability.

Given that the social sector, the political situation, and technology are all developing in a predictive enough way, I conclude that the analysis of the future can bear tangible results. The next question to address is: why is it me and my project that is organizing a study like this?

The mission of the project "Greenhouse of Social Technologies," which I co-founded in 2012 and have been managing ever since, is to make the non-profit sector[10] strong and independent with the help of information technology. Our project helps various non-profit organizations and initiatives in various fields and at different levels – from video tutorials to hackathons. I often have to deal with short-sightedness, lack of systemic vision and lack of such strategic planning that would consider changes in the environment which civil society actors exist in. People often are not even able to realize that technology has changed. My observation is partially borne out by the expert survey that we conducted before the workshop that resulted in this book (see below).

I can identify at least two reasons why dramatic changes in technology happen unnoticeably. The first reason is great duration of the process: technological development is like a

dripper decanting novelties to us drop by drop, rather than by a waterfall of changes which may fall at us instantly. However, the events of March–June 2020 caused by the global coronavirus pandemic significantly contributed to the increased interest in technology due to the immediate need for rapid change.

The second reason is related to the fact that innovations depend on local infrastructure, and technological innovations do not occur simultaneously on the entire territory of the planet, or in our case – in Russia. This tendency allows skeptics to say, "Well, things are that way at your end in Moscow. Things are the same old way here" (can be replaced with "at your end in San Francisco" or "at your end in London"). Therefore, when technology finally reaches the hinterland, "the depths of Russia," large cities – the centers of diffusion of innovations – will initiate a new process of changes that will, again, be hidden from a not very scrupulous observer.

In order to understand emerging technology-related problems, to fight for accountability of technology and to change technological tools for the better, it is necessary to study future risks beforehand, strategically plan development and capacity building with consideration of technological trends and think of educational programs for developing skills that we may not need now but that will be of great value in the future.

Preliminary Research: Methodology

The project "Horizon Scanning – 2019" was the first such work carried out by a group of primarily Russian-speaking scientists from different universities. The outcome is the present volume, consisting of two review articles (including this one) plus eight specialized articles. The topics of the latter eight articles were formulated at a two-day workshop that took place in April 2019. The workshop was

Fig 1. Scenarios for "Horizon Scanning" collected in the finale of the workshop. Photo: Stanislav Ronzhin.

preceded by a survey of Russian-speaking (although not always Russian) representatives of civil society.

The objective of the survey was to serve as a starting point for the "Horizon Scanning" conducted by the authors of the articles gathered in this volume. The main results of the survey were presented to the experts at the workshop and defined the main directions of scanning that are represented in this book.

The survey was conducted in April 2019. I drew up a list of 156 experts, representatives of non-profit organizations, donor organizations, computer security trainers, sociologists, etc. The survey was conducted in Russian. There were 52 respondents. The survey was sent out only to selected recipients and was not available to everyone.

This survey is not necessarily representative (due to the peculiarities of selection and limited number of responses), but it does paint a certain picture, in broad strokes, of how a limited number of experts and members of civil society perceived technology at the beginning of 2019. More than half of the selected respondents are individuals working for different NGOs (fig. 2).

The other half of the respondents are civil society affiliated experts who work at commercial companies,

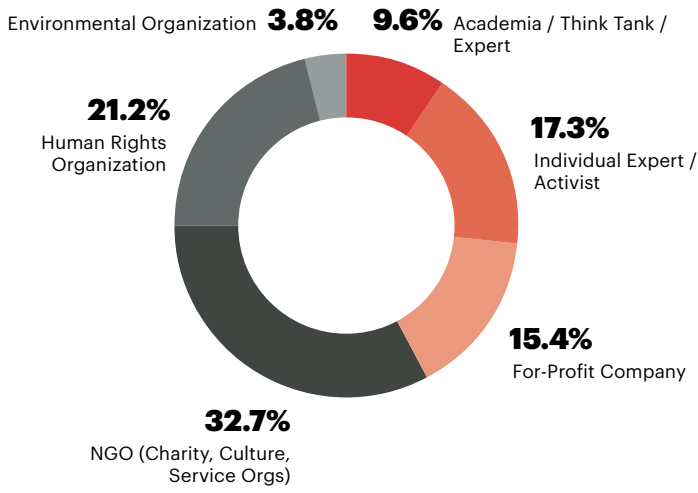

Fig. 2. Organizations represented by the respondents.

universities or are self-employed as independent experts and activists. In terms of management level, 44 percent of respondents are heads of organizations (Fig. 3.), while another 25 percent are leaders of projects or programs. (Note that the group of "individual activists" slightly grew compared to Fig. 2, due to the outflow from the "Other" category.) In both cases, the responses were grouped to roughly reflect positions of the respondents. The questions were answered by individuals able to influence and make decisions in civil society organizations.

Open Questions

The first question was open-ended and did not offer any suggestions to the respondents: "Let us set our imagination free... What information technology seems to you to be promising for the development of civil society in the future? How do you see the future of technology in this respect? Do not restrain your imagination and share your most unexpected ideas!"

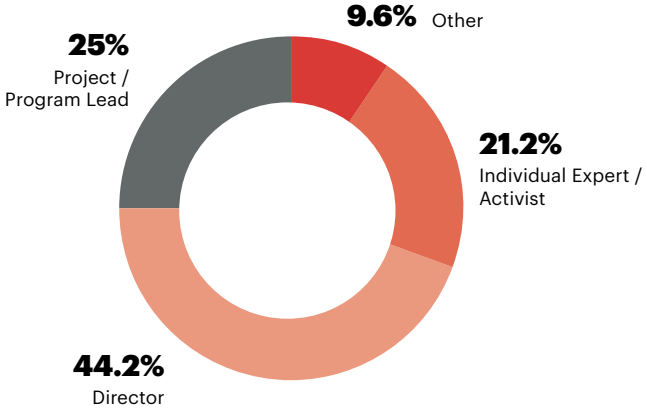

Fig. 3. Management Level of Respondents

Respondents were encouraged to write any and all ideas. Then, we arranged the responses into groups that seemed similar thematically. The respondents were allowed to choose more than one type of technology. The responses received were grouped into 16 categories,[11] some of them named after the appropriate technologies (e.g., artificial intelligence), others after the topics raised in the responses (for example, the future of communication). For the purpose of simplification, Fig. 4 shows only the most popular technologies and topics among the respondents.

The category entitled "Future Communications" was mentioned in most of the responses, outstripping even what would seem to be the obvious leader – "Artificial Intelligence." Speaking about the future of communication, the respondents paid attention both to the issue of eliminating boundaries (hereinafter there are examples of the answers "Free Communication in any Language of the World" in brackets), and to formats of communication ("Instant Non-Censored Communications among People, Building of Horizontal Effective Systems" or "Decentralized Communication Technology," local networks (MESH-networks), alternative protocols that can provide local communities with connectivity even in the absence of "Big Internet").

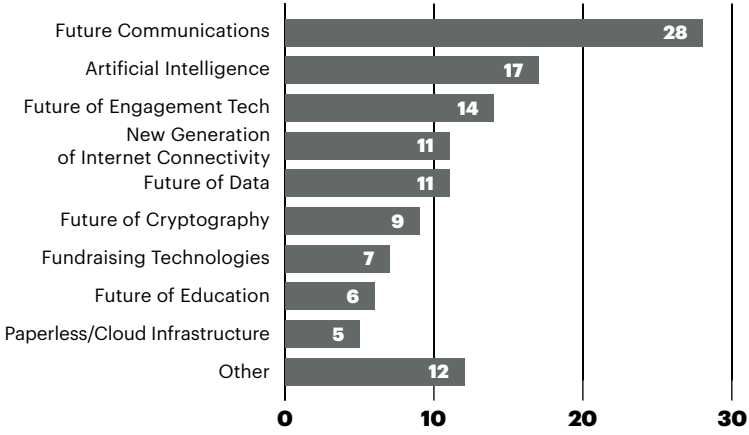

Fig 4. Technologies and/or topics raised in open responses from experts.

Such high repeatability of the responses referring to communication shows that, for civil society, the sharing of meanings, involvement and coordination with other activists, their target audience and the rest of the world are critically important. We can assume that it is communication that civil society leaders associate their future activities with.

The second most frequently mentioned category embraces the family of different technologies related to artificial intelligence (AI). These opinions can be explained both by the attributes (real or imaginary) of this technology and by the number of references to AI in the mass media, at recent conferences, etc. Five years ago, AI was being referred to only at highly specialized technological events, whereas in 2019 AI became a rather much more commonly discussed topic.

All of the next most popular categories ("Future of Involvement," "New Generation of the Internet," "Future of Data Management") reflect the ongoing work of civil society. A high degree of reference to these topics among the respondents' answers can be explained by the fact that technological breakthroughs today may give them and their fields of activity a necessary competitive advantage

or may solve old problems. A certain by-sector division of civil society is evident here: whereas experts and human rights protectors are more interested in the future of internet connectivity ("New Generation of the Internet"), communication and data management, charitable NGOs see opportunities more in the development of fundraising technologies and paperless document circulation / cloud infrastructure, i.e., the topics they deal with on a daily basis.

Closed Questions

The second part of the questions consisted of a closed list of technology types taken from the last research work at the time, the Gartner Hype Cycle.[12] The experts were asked to rate each technology type from 1 to 5 according to the following indicators:

1. the impact on civil society (CS),
2. the likelihood of effective introduction by CS,
3. the likelihood of effective introduction by CS opponents for confronting CS,
4. if this technology, in your opinion, is one of the nine technologies that we should analyze in detail (answers to this question are not described here, since they are of no value in the context of the article).

The obtained quantitative estimates were summarized. The summarized indicators "effect for civil society" and "likelihood of effective introduction by civil society" were multiplied and normalized.[13] The indicator "likelihood of effective introduction by civil society opponents for confronting CS" was also normalized. The result of the calculation is presented in Fig. 5.

The results of the evaluation of the closed list of technologies confirms, once again, the importance of communication and connectivity for civil society. "Affordable Satellite Internet" and "5G network" can be perceived as the most useful in the opinion of civil society leaders. In 2020, a certain campaign aimed at discrediting 5G

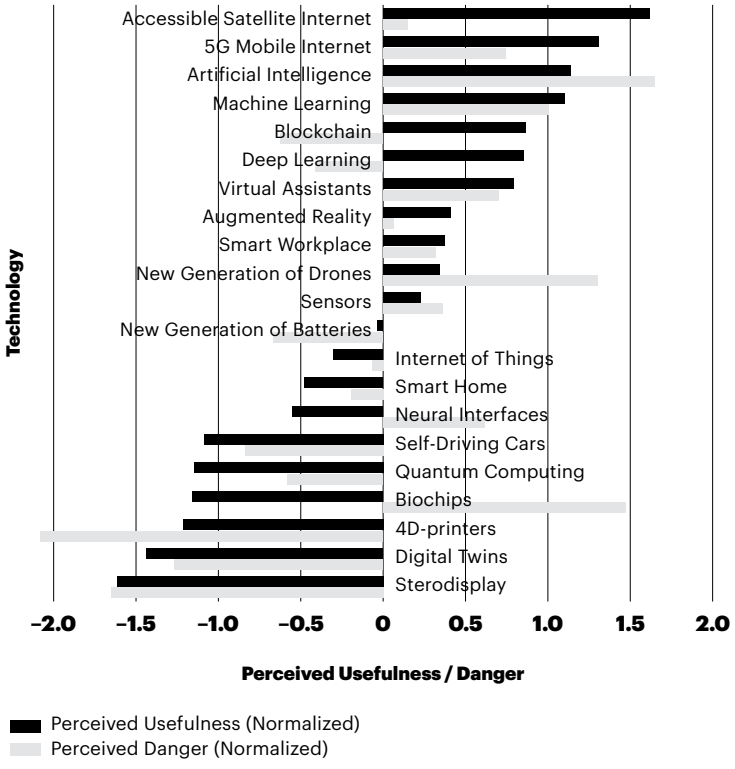

Fig. 5. Normalized Indicators of Perceived Usefulness and Perceived Danger of Technologies on the Gartner Hype Cycle list (with "Perceived Usefulness" = Likelihood of Use x Perceived Usefulness for CS)

communication was notable. It reached its quite comical apogee in May of 2020, when one of the cell towers was burned in the village of Nogir (outskirts of Vladikavkaz, the Republic of North Ossetia), as this technology was allegedly intended "to force people to live [...] in reservations, then put up 5G antennas and expose them to radiation, to make them faint and afterwards to implant chips in them."[14]

We can only guess whether the campaign was a planned action of civil society opposition, but it is obvious that the perception of the same technologies is and will be quite different depending both on time and reference groups. Returning to the respondents' answers, it is possible to note, once again, the perceived usefulness

of connectivity, as well as an increasing role for artificial intelligence as being obvious to the experts.

Artificial intelligence, perceived as a useful technology, also occupies the top place as a source of the perceived danger. Along with the new generation of drones and AI biochips, it is of the greatest concern among the respondents.

The use of the Gartner Hype Cycle closed list of technologies made it possible to prioritize what, in the experts' opinion, is the most interesting and what is the most potentially dangerous. It should be pointed out that the most "science fiction" like technologies, i.e., ones whose perception is shaped mainly by popular science-fiction works (science fiction books, movies, TV shows) rather than by practical experience, raised the most fears. In addition, mere enumeration of the technologies from the Gartner list proved to be of only limited value – some experts were not familiar with a number of technologies presented in the questionnaire (as became clear in the personal interviews). For future research, a scenario- or problem-based approach seems to be recommendable. One of the workshop findings was that analysis of such scenarios as "the future of meanings," "future of urban space," "the future of privacy," "the future of protests," etc. yields more meaningful and sensible results.

Mapping of perceived dangers

Lastly, after a series of closed questions, respondents were asked to answer the following open-ended questions: 1) What technologies seem, in your opinion, potentially hazardous to civil society? 2) What technologies will have the greatest impact on civil society's ability to solve problems effectively? Why? 3) Imagine that you have 10 million dollars that should be invested in something useful. Which technology would you invest in above all? (This question was necessary to assess the practical applicability of imaginary technologies in the respondent's opinion).

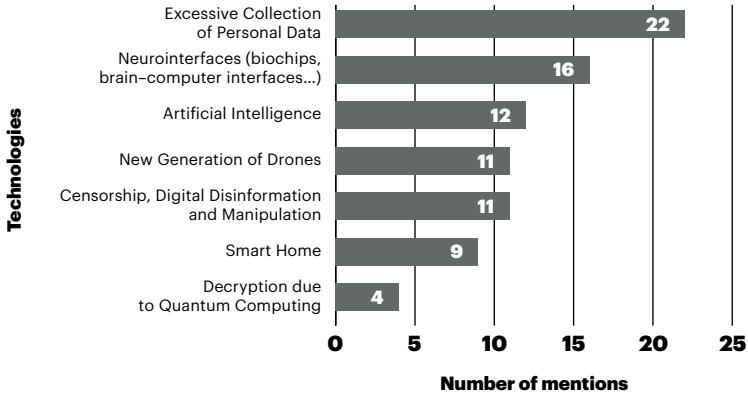

Fig. 6. Rating of the most dangerous technologies, as perceived by survey respondents

Among the potential threats to civil society, excessive collection of personal data is perceived as the leader. As all objects are going through a digital transformation – including objects about which it had only recently been difficult to imagine that they might transfer data anywhere (with taxis, refrigerators, headphones, scales, etc., having become connected over the past few years) – the ability for such data to be used (perhaps not separately, but aggregated together from all the connected sources) to control the person increases dramatically. Fear of the acquisition/control of data is observed in other categories of answers, such as "Neurointerfaces" ("all that allows collection and analysis of data that the person does not provide consciously – the Internet of Things, Virtual Assistants, Biochips, etc."), the "New Generation of Drones" and "Censorship/digital disinformation/manipulation of consciousness." If general artificial intelligence is created someday, civil society already now treats it as an enemy.

Technologies as the Object for Investment

Responses to the question of which technologies people would opt to invest 10 million dollars in did not always

refer to information technology. Moreover, the first thing that meets the eye here is the high diversity of responses, even within a fairly small group, hampering efforts to extrapolate the future on this basis.

The most frequently mentioned technology was, as in the other answers, artificial intelligence (every fifth response). It is the technology to which the majority of respondents attributed the maximum impact. "AI in the field of sociology, it is important to know the real needs of society in order to properly work with them"; "On the one hand, I would invest it in the development of artificial intelligence, since it is the most complex technology and it opens up great opportunities for the development of the humanitarian sphere; on the other hand, in parallel, I would invest in the development of the 'man – machine' code of relations and global education, improvement of technological literacy and discussion of issues related to equal opportunities in the new reality."

The second most popular group of response (7 responses) dealt with monitoring and services of different kind that increase the amount of data about society and the planet that allow a higher degree of control and, if necessary, intervention ("I would invest in sensor networks (partly in IoT), a platform for data collection, and the community around them. A quality environment is an environment where anyone can participate, it is technologically replicable and allows for the authorities to be shoved aside on various fronts in a relatively easy way").

But control and the possibility of intervention is not the only motive. Sometimes the opportunity to collect data is valuable just in order to share it with others – "processing of data arrays related to cultural objects and making this information available to all, satellite imagery and image recognition."

Finally, the third most popular group (6 responses) dealt with new systems of civil society coordination: "a comprehensive system of interaction between members of civil society, including decision-making and financing

of their implementation"; "cultural and social technologies (as any information technology is derivative of this or depends on it), I would invest funds in public technologies of reflection on the Soviet period and the development of technologies for social self-organization."

One response, worth noting separately, related to meta-aspects of technologies (the development of gender inclusion in the technologies and, as a consequence, the creation of technologies that would be created within the framework of a more inclusive logic).

In general, one can note a lack of interest in specific technologies – respondents were rather interested in solving applied tasks. However, one response generally questioned the development of technologies: "It makes no sense to invest in the technology per se. It is necessary to invest in the solution of practical problems of innovative NGOs, leaving them the freedom to choose the technologies. This is the way technologies are created, IMHO." In the same group is another interesting answer: "Specifics are only possible when decisions are made by professionals in the field of technologies, to whom I do not belong." It seems that it is this waiver of any responsibility for thinking about technologies that is a perfect illustration of the very problem this volume seeks to address.

Conclusion

Future studies urges us to deeply analyze the current situation and build explanatory models, which then serve as a basis for distinguishing those aspects of the future that may both harm and help. The "Horizon Scanning" method, adopted in this project, offers sufficient flexibility by paying attention only to certain elements of the future: "trends," "final scenarios," "wildcards" and "weak signals." Taking into account the long cycles of technology development, if a curious observer looking forward, rather than back, has the proper information, he or she could poten-

tially alter the development of a negative trend, having noticed emerging threats at an early stage.

Technologies can carry the potential for destruction and are hardly ever completely neutral. Even in the presence of positive effects, similar to nuclear power, we as a society should continually listen to the most pessimistic forecasts and constantly check the facts that we perceive against the end-points of the forecasts put forward by scientists. The splitting of the atom has brought nuclear energy and a new world order, but it has also taken a toll of hundreds of thousands of lives. Can we foresee disastrous consequences before they happen?

Overall, the representatives of civil society we surveyed indicated in their responses to our survey: yes, a whole range of technologies could cost us the loss of personal freedom, clarity of thought and generally redefine mankind. At the same time, they also pointed out things that are so important for civil society: global connectivity, sharing of meanings, involvement and coordination with other activists, their target audience and the rest of the world. Artificial Intelligence is perceived both as an assistance and a threat, both of its own accord and in the hands of the state (or technology corporations), the logic of which is perceived as a constant thirst for more and more new data and control over the human being, while the abundance of digital connections to what used to be only analog objects of our life only makes this thirst stronger. The study represents a unique slice of the way the civil society leaders and experts we surveyed imagine technology. How these technologies will be used in the development of civil society, as well as how civil society will control the development of certain technologies, will depend largely on the way they see and understand technologies.

Needless to say, the intermingling of the relationship of technologies and civil society cannot be reduced to a conflict of "connectivity and communication against data collection and control." The chapters of this volume show

the diversity of contact points between technology and civil society. On behalf of the group of authors, I would like to invite readers on a fascinating journey to explore the very edge of the visible horizon.

doi: 10.24412/cl-35945-2021-1-26-49

Endnotes

1 Rhodes R. (1986). *The Making of the Atomic Bomb*. New York: Simon and Schuster.

2 Wells H.G. (1913). *The World Set Free: A Story of Mankind*. Macmillan & Co.

3 Yorish A., Morokhov I., Ivanov S. (1980). *А-бомба* [A-bomb]. Moscow: Nauka

4 Wells H.G. (1932). Wanted: Professors of Foresight! *Futures Research Quarterly*. 1987. V.3. no. 1. URL: https://www.benlandau.com/wp-content/uploads/2015/06/Wells_1932_WantedProfessorsofForesight.pdf.

5 *astroturfing* – a term derived from the name of the American company AstroTurf (a producer of artificial turf for stadiums) – as AstroTurf mimics grass, in much the same way a fabricated social initiative mimics a real one (in reference to the term "grassroots"). See more: Bailey A., Samoilenko S. *Global Informality Project*. URL: https://www.in-formality.com/wiki/index.php?title=Astroturfing_(Global) (retrieval date 15.08.2020).

6 Murav'ev D. (2020) Why IT companies have abandoned face recognition technology, and why protests in America come into the picture. Greenhouse of Social Technologies. 19 June 2020. URL: https://te-st.ru/2020/06/19/why-it-companies-against-facial-recognition/ (retrieval date 19.06. 2020).

7 Lipman M. and Petrova N. (eds.) (2011). *Russia in 2020: Scenarios for the Future*. Carnegie Endowment for International Peace: Washington, D.C.

8 Sidorenko, A. (2011). "Society and the State on the Internet: A Call for Change." in: Lipman M. and Petrova N. (eds.). *Russia in 2020: Scenarios for the Future*. op. cit. pp. 573–592.

9 In my opinion, quantum computing fundamentally changes the whole picture connected with modern digital security – communications, bank transfers, blockchain, the most basic things that use encryption technology will have to change the technology based on which they operate.

10 The non-profit sector is understood as a subset within the broader concept of civil society, as described above.

11 The 16 categories were as follows: Artificial Intelligence, AR/VR, Blockchain, Technologies of Fundraising, Internet of Things, New Generation of the Internet (Network Connectivity Aspect), Quantum Computing, Paperless Document Flow, Neuroelectronic Interfaces, Future of Medicine, Future of Involvement, Future of Communications, Smart Cities, Future of Education, Future of Data Handling, Future of Cryptography.

12 5 Trends Emerge in the Gartner Hype Cycle for Emerging Technologies, Gartner. 16 August 2018. URL: https://www.gartner.com/smarterwithgartner/5-trends-emerge-in-gartner-hype-cycle-for-emerging-technologies-2018/ (retrieval date 19.07.2020).

13 For the purposes of normalization, the standard function "STANDARDIZE" was used to replace summarized scores with standardized scores (*z*-scores). The *z*-score is a measure of the relative dispersion of the observed or measured value that reflects by how many standard deviations results are scattered from the mean. This non-dimensional statistical indicator is used to compare values of different dimensions or different measurement scales.

14 *В Северной Осетии сожгли вышку телефонной связи из-за опасения возможного ввода 5G* [In North Ossetia, a Cell Tower was Burned for Fear of Possible Introduction of 5G]. TASS. 2 May 2020. URL: https://tass.ru/obschestvo/8388839 (retrieval date 19.07.2020).