Chornobyl's Legacy for the 21st Century

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Twenty years have passed since the explosion at the fourth reactor of the Chornobyl Nuclear Power Plant – the event that has become, according to the UN definition, "the biggest nuclear catastrophe in the history of the humankind". Chornobyl is a global-scale event that has affected destinies of millions of people living on the vast territories of Ukraine, Belarus and Russia. It has left a radioactive trace on the territories of numerous countries of Northern hemisphere, including Sweden, Poland, Georgia, Germany, Turkey, the United States, Japan and many others. The catastrophe confronted the humankind with a number of scientific and technological, international legal, medical, cultural and psychological and socio-economic problems, most of which remain actual in the 21st century.

As it was stressed during the Chornobyl Forum, which took place in 2005 under the aegis of the International Atomic Energy Agency and several other U.N. agencies, 20 years after the accident "many questions concerning medical, environmental and socio-economic consequences of the catastrophe remain unanswered".

Within the last 20 years Time and History have increased their pace and this has led to unprecedented geopolitical and economic changes in the world. While the Chornobyl disaster occurred on the planet divided by the cold war and inter-bloc confrontation, the twentieth anniversary of the accident is commemorated under new historical conditions – in the era of globalization and intensification of international cooperation, in the world, which, according to Thomas Friedman, has become flat.

Today, in the light of the long distance that separates us from April 26, 1986, we should not only pay tribute to the past – investigating the events that took place 20 years ago - but, first of all, try to comprehend the lessons and legacy of Chornobyl for the future, that is, for the 21st century.

In so doing, it is necessary to proceed from the fact that the emotional outbreak of passions around the catastrophe has died down, the psychological shock with which both

scientists and numerous groups of population were stricken has passed, and a large part of Chornobyl secrets have been already revealed.

It should be also taken into account that after 1986 the world underwent many new severe trials entailing numerous victims like destructive tsunamis, hurricanes and earthquakes, eruptions of new infectious diseases, terrorist acts, air crashes and shipwrecks, explosions and fires at industrial facilities. The multitude of these tragic events contributed to a gradual disappearance of the emotional memory of Chornobyl, prevalence of indifferent attitude toward the legacy of Chornobyl and neglect of the experience of overcoming the catastrophe's consequences.

This is a big mistake because in the chain of the worst disasters of the end of 20th century and the beginning of the 21st century Chornobyl occupies a very special place. This was an absolutely new phenomenon in the history of the modern technological civilization, and its distinguishing features make the problem of a world nuclear catastrophe, its causes and consequences, not less but even more important for the 21st century in comparison with the previous times.

There is a number of peculiarities of Chornobyl that deserve thorough attention of the next generations to come:

1. The mere fact of a catastrophe with unpredictably severe consequences that went beyond the design and was maximum hypothetical immediately destroyed deceitful and optimistically irresponsible statements of scientists and technologists belonging to the nuclear-industry complex of certain countries, who, for several decades, assured the humankind of the secure, accident- and conflict-free development of nuclear-power industry. No matter how cynical this may sound, the positive lesson of the Chornobyl catastrophe lies in the fact that it took place, possibly preventing occurrence of other catastrophes with much more terrible consequences.

After Chornobyl the one-dimensional rational optimism of technocrats regarding the onward "progress of the humankind" is unacceptable.

2. The peculiarity of Chornobyl as a new phenomenon in civilization history is its threatening anonymity, its pretended "peaceful" nature, its spontaneity and suddenness.

While the explosions of atomic bombs in Hiroshima and Nagasaki in 1945 or the terrorist acts against the USA in 2001 were a result of well-considered intentions and planned actions of a group of persons (the military, politicians or terrorists), Chornobyl emerged as if from nothing – from a combination of accidental unpredictable factors, from an incredible coincidence of incredible circumstances.

Yet, not only the element of chance lies behind Chornobyl but also the threatening regularity - the increasing danger for the humankind coming from TSS – technological supersystems, which can and do go out of control. Let's recall the system energy accidents in the USA, mass malfunction of computer-informational networks, air crashes caused by overload of flying control services, etc.

That is why Chornobyl is not an ordinary accident (similar to a casual fire at a plant or a spaceship wreck). Chornobyl became a challenge to the sustainable development of the humankind, an alert sent from the future, a warning about possible future failures of complex and vulnerable systems, which may entail numerous victims, material damage and environmental degradation.

One of the challenges of Chornobyl for the 21st century is the unprecedented scale of engineering and technical problems related to the necessity to establish reliable safety structures in the place of the destroyed reactors and to build safe places for storing radioactive waste.

3. The Chornobyl nuclear power plant was a nonviable monster of the Soviet military-nuclear complex because initially the RBMK reactor was designed to produce plutonium for weapons and it was not intended for energy purposes in civil power engineering. The design, management and safety of the RBMK-type reactor featured essential drawbacks, which, being combined with actions of unqualified personnel who violated operating instructions, made this object highly explosive.

A comprehensive study of technical causes of the Chornobyl catastrophe is provided by Ukrainian nuclear expert Mykola Karpan in his outstanding book "Chornobyl: the revenge of peaceful atom" (2005). The author showed that in July 1986 the Politburo of the Communist Party, the highest USSR authority, concluded that the

failure of the reactor had been the main reason of the explosion. However, the official communiqué of the Politburo did not mention this cause and blamed only the plant's personnel. The reason behind this lie was that the authorities were afraid of revelation of the Soviet system of hypocrisy and deception and of being forced to shut down the superpower reactors working on the territory of the USSR.

Unfortunately, conditions of secrecy justified by the reasons of national security or trade and technological secrets are typical for all nuclear objects even in democratic countries like the USA, UK, Japan and France.

The world energy crisis, which will deepen in the 21st century due to depletion of hydrocarbon energy sources, will encourage a number of countries, including those from the Third World, to develop nuclear-power industry in an intensive way. Attempts of certain technologically backward countries to produce their own nuclear weapon may lead to catastrophes similar to Chornobyl.

Establishment of a regime of strict international control and objective assessment of reactors and maximum transparency in the functioning of nuclear power plants will contribute to safe operation of such objects in the 21st century.

4. The Chornobyl disaster combined features both of an unplanned industrial accident with complete destruction of a reactor and of a environmental catastrophe with considerable contamination of vast territories. Catastrophes of such type usually affect many million persons and, first of all, children, produce thousands of displaced persons for environmental reasons, cause long-term contamination of soil, water sources and air, and lead to irreversible changes in the environment and numerous ecosystems.

Participants and witnesses of these events experience severe psychological shock; they suffer from the sui generis syndrome of "the end of the world", that is, paralysis of their will to leave, loss of all hopes and apathy.

Around 5 million persons live today on the territory of 145 000 square kilometers in the areas of Ukraine, Belarus and Russia contaminated with radioactive nuclides (more than 37 KBq/sq.km Cs 137). The area of radioactive contamination equals the territories of Belgium and Austria combined.

The amount of radiation released during the Chornobyl disaster – over 185 million curis – was equivalent of 270 Hiroshima-sized bombs.

Approximately 400 000 persons lived in the most contaminated areas (more than 555 KBq/sq.km Cs 137). Out of them, 116 000 persons were evacuated in spring and summer 1986 from the areas neighboring the Chornobyl nuclear power plant. In the following years some more 230 000 persons were resettled. In 1986-1987, more than 200 000 persons took part in emergency recovery activities, during which they were exposed to high doses of ionizing radiation.

Only in Ukraine, the Chornobyl explosion resulted in radioactive contamination of 2294 villages and small towns located on the territory of 77 administrative districts of 12 regions. As of 1 January 2005, there were 2 246 000 Ukrainian citizens who were given the status of Chornobyl sufferers, including 643 000 children. More than 1,56 million persons live in the area of intensive radiological control.

5. The Chornobyl catastrophe has led to grave environmental consequences, upset the ecosystem balance and changed the flora and fauna in the north of Ukraine (in the region of Polissya).

The irreversible loss of the ancient world of Slavic-Ukrainian civilization of Polissya and destruction of its numerous cultural and spiritual monuments was a particularly painful aspect of the catastrophe.

6. This type of catastrophe is characterized by a cumulative medical effect and a constant increase of health problems among liquidators and those who live on contaminated territories.

Despite the fact that a relatively small number of people died immediately after the accident (31 patients died from acute radiation sickness), the long-term consequences are grave:

- as of January 1, 2005, the Ukrainian State Register of persons who suffered because of the Chornobyl catastrophe, contained information about 2 242 000 such persons;

- the share of adult citizens who have been recognized ill in the course of medical examinations grows and equals 94,2% among participants of liquidation activities, 89,8% among evacuated persons, and 84,7% among those who live on the radioactively contaminated territories. The number of registered Chornobyl disabled persons is 105 000. 79,8% of children who suffered as a result of the accident and were indirectly affected by it have been recognized ill;

- direct radiation consequences of the accident include an increase in occurrence of thyroid gland cancer. During the period of 1986-2004 in Ukraine 3270 persons whose age at the moment of the accident was less than 18 years underwent operation for this type of cancer;

- among new, previously unknown medical consequences of the Chornobyl catastrophe, special attention is drawn to the influence of osteotropic radionuclides on a child's organism, which relates to incorporation of radioactive strontium and alfa-radionuclides into bone tissue, which leads to pathology of the musculoskeletal system.

Researchers have also found strong pathology of kidneys and urinary tracts as a result of penetration of radioactive particles into tissues. Many liquidators have a chronic fatigue syndrome related to depression of a certain subclass of lymphocytes, the so-called "killer" cells. These defects of the natural immune system were named "Chornobyl AIDS".

- estimation of the number of persons who died as a result of the accident is the most controversial issue: in Ukraine there are more than 17 000 families в who receive welfare payments due to the loss of their bread-winners in relation with the catastrophe. According to the information of several non-governmental organizations, the number of persons who died as a result of the accident is between 30 and 40 thousands.

The Chornobyl Forum 2005 calls these figures considerably exaggerated and suggests that around 4 000 persons have died or could die because of exposure to radiation caused by the Chornobyl accident.

Despite the different approaches to estimation of the number of victims, it is obvious that Chornobyl became not only technogenic but also medical and social

catastrophe that will affect the health of several generations of citizens and could stretch in time for up to 100 years.

7. The question of the objective evaluation of Chornobyl-like catastrophes at local, regional and global levels will be even more acute in the future.

In the first years after the Chornobyl catastrophe, the Ukrainian scientific community accused the central Soviet authorities and IAEA, as a UN international agency, of hiding data and of biased attitude towards estimation of the catastrophe risks.

A deep distrust of certain international institutions remains and is confirmed by highly negative public opinion in Ukraine regarding the resolution of the Chornobyl forum.

According to certain civil society activists, the team leader of the forum, Dr. Fred Mettler (professor emeritus of the University of New Mexico), was thoroughly discredited in 1992 after he repeatedly denied any increase in thyroid cancer in Chornobyl children.

Conclusions of the Chornobyl forum were considered as an attempt to play down the consequences of the catastrophe and raised strong protests on the part of Ukrainian NGOs and international green organizations. Several environmental NGOs have accused the IAEA of conspiracy with the nuclear lobby with the view of falsifying the real consequences of the catastrophe and minimizing the responsibility for health problems among liquidators and population in the contaminated areas.

President of the international organization “Physicians of the World for Prevention of Nuclear War” Angelica Klaussen accused the World Health Organization of a secret agreement with the IAEA and deliberate dissemination of false information.

International and Ukrainian organizations suspect that IAEA and WHO are trying to erase the memory of Chornobyl and to compromise efforts of several NGOs in finding the truth about the catastrophe. These organizations demand to recognize the Report of the Chornobyl Forum as biased and to inform the international community about the real number of victims of the Chornobyl catastrophe and the impact made by the disaster on the health of Ukrainian people.

The greater role of civil society in the 21st century raises the question of trust and cooperation between non-governmental and governmental institutions and international organization in a new way.

8. Catastrophes like Chornobyl have destructive impact on the state as a whole and in particular on its political and economic system, as the example of the Soviet Union shows.

The accident at the Chornobyl nuclear power plant was a stability and soundness test for all state institutions charged with quick decision-making on issues related to security of millions of people and informing the country's own population and the international community.

The command and administrative one-party communist system did not survive the Chornobyl test and completely lost its credibility among the people. In fact, the dissolution of the USSR began from Chornobyl.

The fact that the authorities ignored the danger of exposing to radiation those children who had to participate in political manifestations on the occasion of the 1st May and that safety measures were applied selectively to inhabitants of the city of Prypyat' (iodine prophylactic treatment and speedy evacuation of the population) in the absence of any protective measures in respect of neighboring villages in the Chornobyl zone can be considered a special crime.

At the same time, we have to admit that under the conditions of that authoritarian and centralized system, in order to overcome the consequences of the catastrophe, authorities managed the existing human and material resources and drew upon the economic, military, police, scientific, technological and medical potential of the Soviet Union to carry out large-scale measures:

– more than 600 000 people (soldiers, workers, engineers, scientists, etc.) participated in emergency activities on the contaminated territories, in reconstruction of the nuclear power plant and cleaning of the area;

- 210 military units of chemical-engineering forces and air forces were mobilized;

- about 2500 doctors and 5000 nurses were employed; approximately 400 special medical units were formed;

- more than 10 000 workers were engaged in construction of the sarcophagus;

- more than 350 000 citizens were resettled, of them around 120 000 persons were evacuated during the first period, including 50 000 inhabitants of the city of Prypyat on April 27, 1986;

- about 21 000 houses were built and 15 000 new apartments provided for the population evacuated from the zone in 1986-2000. Instead of the dead city of Prypyat the new city of Slavutych was built for the personnel of the nuclear power plant.

Direct and indirect damage to Ukraine and expenditures for overcoming of Chornobyl consequences amounted to more than 160 billion U.S. dollars.

If a Chornobyl-like catastrophe occurs in a poor country, the latter may degrade to a chaotic state, lose its sovereignty and become a source of international destabilization.

9. In case of a new nuclear or chemical disaster of Chornobyl scale any country – either dictatorial or democratic – would be confronted with the question of how to inform its citizens about the accident. Any public authority would fear spreading of mass panic among its population as this happened in New Orleans during Hurricane Katrina. Any agency responsible for such an accident would be interested in downgrading its scale.

During the Chornobyl catastrophe and in its aftermath, the communist regime carried out an unprecedented operation of information blocking, combined with propaganda campaign of half-truth and misinformation. For almost 4 years, information about contamination of territories and foodstuffs with radioactive nuclides was classified, and this constituted a gross violation of the fundamental human rights, led to aggravation of social and psychological tension in the areas of radioactive contamination and bred complete distrust in actions of authorities among the population.

10. One of the issues raised by Chornobyl that are particularly acute and topical in the 21st century is the stability of a state possessing nuclear power plants in the context of protection of these objects from terrorist attacks. It is not difficult to imagine what danger would face such countries or regions as Lebanon, Bosnia and Herzegovina, the Chechen Republic, Iraq and other areas that are stricken with civil war or armed conflicts. Any violations on the territory of countries where nuclear power plants or any

other powerful and potentially dangerous technological systems are situated endanger the international peace and pose a considerable threat to the population of these countries. The need to involve UN peacekeeping forces in the conflicts threatening to damage nuclear power plants is obvious.

Taking into account attempts of certain international terrorist organizations to create a "dirty" atomic bomb using highly radioactive nuclear wastes, places of storage and disposal of solid and liquid radioactive wastes and spent nuclear fuel need special international protection.

These problems lie within the context of the Treaty on the Non-Proliferation of Nuclear Weapons: any attempts to join the club of eight nuclear states (the United States, Russia, the United Kingdom, France, China, India, Pakistan, and, unofficially, Israel) on the part of so-called "rogue states" (Iran, Democratic People's Republic of Korea and others) are dangerous and pose a threat to the world stability and order in the 21st century.

11. The countries affected by the Chornobyl disaster and the international community in whole have faced the necessity to create a new reliable legislative and normative basis regulating management of nuclear and radiation safety. Chornobyl urged a number of European states, including Ukraine, to toughen requirements as to safety of nuclear power plants.

Basic laws on the use of nuclear energy have been passed and a number of normative acts regulating all spheres of nuclear energy production and of human and environmental protection from consequences of the catastrophe have been drafted (in Ukraine – up to 800).

Ukraine has joined the Convention on Nuclear Safety, Convention on Civil Liability for Nuclear Damage, Convention on Physical Protection of Nuclear Material, Convention on Early Notification of a Nuclear Accident, etc. The relevant legislative and normative basis needs further improvement.

12. Preparedness for big technogenic catastrophes is a problem of international importance. It is suggested to create emergency response infrastructure, including setting

up of regional crisis and emergency technical centers, able to assure emergency warning and quick response in case of large accidents of national and regional scale. The unpreparedness for the destructive tsunami in the Southern Asia, which took lives of 300 thousand persons, confirms the topicality of the problem.

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Chornobyl has become a model of a possible nuclear extermination of a region or a whole country without any nuclear war being declared. Under conditions of globalization and ever-increasing interdependence of countries and continents, loosing control over one of the TSS – nuclear, chemical, biological or informational – can take heavy tolls and bring immense destruction to the humankind.

The task of the UN, national governments and civil society in the 21st century is to adequately assess existing risks taking into account the Chornobyl experience.