

F R O M T H E E D I T O R7 **Global security in an era of surfers** — *Albert Zulkharneev*

The editor of the latest Security Index issue highlights the main global security challenges posed by new technologies. He speculates on the feasibility and practicalities of nuclear arms control in the changing national and international governance environment, and says that various research communities should pool their efforts to identify solutions for the multitude of global problems.

Key words: *global security, new technologies, international law, ethical problems of new technologies.*

I N T E R V I E W13 **Nothing is predetermined. Let us judge by deeds not words, and work constructively** — *Sergey Ryabkov*

Russian Deputy Foreign Minister Sergey Ryabkov on the lessons, principles, and outlines of future Russian-U.S. global security efforts.

Key words: *Russian-U.S. relations, nonproliferation, sanctions, arms control, JCPOA, Iran, Korea.*

23 **Insurers deal with real risks, and there has been no warfare in space so far** — *Sergey Savelyev*

Sergey Savelyev, Deputy Director General of the Roscosmos State Corporation, interviewed on space services; on what could become weapons in space; on overblown fears and real threats facing peaceful space exploration; and on Russia's international space cooperation.

Key words: *weaponization of space, satellites, space junk, space debris, mission to Mars, Roscosmos.*

A N A L Y S I S29 **How to control nuclear weapons nonproliferation? Looking for ways to improve the IAEA safeguards** — *Valeriy Bychkov*

The IAEA safeguards system, a key element of the nuclear nonproliferation regime, is facing various technological and political challenges. The main challenge results from the inherent conflict between the global nature of



nuclear technologies and the national nature of responsibility and control. Valeriy Bychkov, an independent expert who was until recently one of the most experienced officers of the IAEA Department of Safeguards, reviews the ongoing debate on improving the safeguards system and looks at the possible directions of its reform.

Key words: *IAEA, safeguards, national-level safeguards concept, facility-level safeguards concept, integrated safeguards.*

43 **Nuclear energy and efforts against climate change in the context of the Paris Agreement** — *Stanislav Kuvaldin*

The 2015 Paris Agreement to contain climate change has come into effect. Nuclear energy development is one of the components of that effort. Rosatom is one of the most vocal advocates of making nuclear energy part of the global de-carbonization drive. Who else supports that approach? What is the role of peaceful nuclear energy in national and international climate policy mechanisms? Can the nuclear energy market expect more climate agenda-driven investment? Stanislav Kuvaldin, an independent journalist specializing in environmental problems, looks at the opportunities, limitations, and realistic scenarios of using the potential of nuclear energy to reduce greenhouse gas emissions.

Key words: *climate change, COP 21, UN Framework Convention on Climate Change, nuclear energy and the environment.*

55 **Rights and freedoms in orbit: how to ensure security of space exploration** — *Theresa Hitchens*

Despite its complex and hefty structure, the body of international law on the security of space exploration has many gaps. Space technologies are on the rise. Satellites have become critical to the normal functioning of the economy — but unchecked rivalry in space could lead to international conflicts. Is there a need for changes to the outer space law inherited from the Cold War era? How can national and international regulatory mechanisms in this area be improved? Which differences look insurmountable for the time being, and which could potentially yield to negotiated solutions? These and other issues are discussed in a review of international space law by Theresa Hitchens, a senior research scholar with the Center for International and Security Studies at the University of Maryland, and in commentaries by the leading Russian experts Vladimir Yermakov and Vasily Gudnov.

Key words: *space law, weaponization of space, soft law, International Organization for Standardization, Inter-Agency Space Debris Coordination Committee, no first placement of weapons in outer space, Treaty on Prevention of the Placement of Weapons in Outer Space (PPWT), prevention of arms race in outer space.*

D O S S I E R

63 **Cybersecurity of civil nuclear facilities: assessing the threat, mapping the path forward** — *a PIR Center report*

Cybersecurity challenges have become one of the key problems facing the operators of critical energy, transport, communications, and other infrastructure. Cybersecurity of civilian nuclear facilities is an especially sensitive subject. What makes the nuclear industry distinct in terms of cybersecurity? What are the national and international approaches to this challenge, and how can the cyber threats facing the nuclear industry be categorized? What steps can be taken to prevent these threats? These

and other issues are discussed in a special report released by PIR Center in cooperation with *Centre russe d'études politiques* in Geneva. Andrey Doukhvalov and Natalya Kaspersky also look at the cyberthreats to automated industrial control systems and at the formation of the cybersecurity market.

Keywords: *critical infrastructure, cybersecurity of critical infrastructure, civilian nuclear facilities, industrial control systems (ICS).*

R O U N D T A B L E

- 79 **Military robots: expected and unexpected threats** — *Vadim Kozyulin, Tom Grant, Andrey Grebenshchikov, Gilles Giacca, Albert Yefimov, Song Xinping, Mary Wareham*

Warfare of the future may involve lethal autonomous systems, or robots that possess a degree of artificial intelligence and could potentially make their own decisions. Deployment of such weapons is a new challenge on the international agenda. It lies at the crossroads of political, legal, technological, ethical, and moral considerations. Definitions of lethal autonomous systems, the key problems arising from their use, and mechanisms of keeping them under control — these and other issues were discussed by leading international experts in the field at a round table held by PIR Center and the Russian Foreign Ministry's Diplomatic Academy in September 2016.

Key words: *military robots, lethal autonomous systems, artificial intelligence, ethics in robotics, international humanitarian law.*

C O M M E N T A R Y

- 97 **Challenges to strategic stability and global security posed by 21st century technologies** — *Jarmo Sareva*

This is not the first time the humankind is facing the need for regulating new technologies and their military applications. What makes the emerging technologies of the 21st century different? What are the opportunities and threats to global security posed by autonomous weapons systems, cyber-, bio-, and space technologies, 3D printing and directed-energy weapons? How can their destabilizing effects be minimized? And how is the very idea of strategic stability evolving? These and other questions are addressed by Jarmo Sareva, Director of the UN Institute for Disarmament Research (UNIDIR).

Key words: *emerging technologies, strategic stability, global security, directed-energy weapons, disarmament, UNIDIR.*

- 103 **Environmental technologies: new opportunities and threats** — *Mikhail Kovalchuk, Oleg Naraykin*

Technologies that can prevent a resource collapse and give the humankind models of effective consumption can also interfere with the process of human evolution as a species and make useless all the existing mechanisms of global security. Kurchatov Institute President Mikhail Kovalchuk and Vice President Oleg Naraykin warn of the dual nature of environmental technologies and the need for a transition towards a new system of international security based on the principle of controlling technologies rather than armaments.

Key words: *environmental technologies, convergent technologies, technology control, arms control, Kurchatov Institute.*



109 **Can technology be immoral, and can religion stand in the way of science? The view of the church** — *Vladimir Legoyda*

Vladimir Legoyda, chairman of the Russian Orthodox Church media and public relations department, offers his view on whether there is a conflict between religion and science, moral dimension of online anonymity, how the Christian worldview has facilitated the development of modern science, and the problematic aspects of new technologies highlighted by the church.

Key words: *religion and science, technological progress, Russian Orthodox Church.*

L I B R A R Y

115 **Brief and to the point on IT: problems, goals, and recommendations** — *Yelena Volchinskaya*

Government policy on IT and the balance of interests of the IT industry, government and users; critical information infrastructure and the right to privacy; the use of IT for military and political goals; Internet governance — these chapters in a new book by Oleg Demidov are reviewed and analyzed by Yelena Volchinskaya, a leading expert on information security legislation.

Key words: *ICT security, Global Internet Governance, information security.*

121 **Red Spider Web: a story with unknown details** — *Yelena Chernenko*

Yelena Chernenko did not believe that the book by Andrey Soldatov and Irina Borogan entitled “The Red Web: The Struggle Between Russia’s Digital Dictators and the New Online Revolutionaries”, which was first published in English, would also be published in Russian. She was wrong. She has read the book carefully, took note of some inaccuracies, compared it with her own ideas about the subject, and now shares her findings with our readers.

Key words: *information security, special services, surveillance technologies, Snowden.*

N E W B O O K S

123 *Natalia Kosolapova, Anna Polenova and Aleksandra Tikhonova* — PIR Center interns offer a review of new additions to the PIR Center Library.

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E N D . Q U O T E

Cov.III **Humor of forecasts**