

Scientific and technological forecasting is on the agenda of leading international organizations

(B)

- European Commission. Large-scale foresight studies (since the 1990s) are the basis for justification of the priorities of the EU Framework Programs (RP), financing from the structural funds of the European Commission. In the 9th RP "Horizon Europe" (2021-2027), 6 priority areas of research, as well as 5 strategic goals are identified. The European Commission has created a special unit: Foresight, Modeling, Behavioral Insights & Design for Policy.
- OECD. International Expert Group "Government Foresight Community" (since 2014) under the auspices of the Secretary General of the OECD: analysis of global trends, policy recommendations, identification of best practices. In 2021, the OECD initiated an international project on technological foresight.
- UNESCO organizes an international network of departments for the dissemination of future research competencies (UNESCO Futures Literature Chairs) and world summits on future research. In 2021, the UNESCO Chair for Future Studies was established at the Higher School of Economics.
- UNIDO Global Technology Foresight Support Program (since 2000). Trainings, regional projects, a network of technology foresight centers in different regions of the world (the CIS center has been at the HSE since 2007), methodological materials for technological foresight
- BRICS. All BRICS countries are developing S&T forecasts. Annual Seminar on BRICS Technological Foresight (based at the HSE). Experience exchange program, comparative studies, internships. Joint reports (BRICS Competitiveness Report).





6	
É	Ð
	ம 🥬
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1.12

## Scientific and technological priorities should establish a unified system for the development of the S&T policy of the country

	World examples	Russian cases
<b>Mission-oriented:</b> Achievement of large socio-economic goals	Digital economy / Advanced manufacturing Clean and efficient energy Modern agriculture Personalised healthcare Connecting territories (transport & communication)	<ul> <li>National Development Goals until 2030</li> <li>Strategy of scientific and technological development of the Russian Federation</li> <li>National Project "Science and Universities"</li> <li>State Program "Scientific and Technological Development"</li> <li>Comprehensive scientific and technical programs (projects) of the full innovation cycle</li> </ul>
Functional: Restructuring S&T system	Research universities Innovation infrastructure at universities National research centres Centres of excellence	<ul> <li>The program "Priority-2030"</li> <li>Federal project "Personnel"</li> <li>Federal project "Infrastructure" (development of mega-science, etc.)</li> </ul>
<b>Thematic:</b> Priority directions, critical technologies, S&T programmes	Information and telecommunication systems Living systems Industry of nanosystems Transportation and aerospace systems Rational use of nature Energy efficiency and energy saving	<ul> <li>✓ The Lists of perspectives directions and critical technologies (2011)</li> <li>✓ Federal science and technology program of genetic technologies, etc.</li> <li>✓ Federal project "Artificial Intelligence"</li> </ul>

in the world there	) individi e are	uals			
	2016	2021	Т	ime to have 100 million u worldwide	sers
Internet users	44	60	Pokemon Go	28 days	2016
Mobile broadband subscribers	47	67	Instagram	2 years, 4 months	2010
Active social media	31	55	Whats Up	3 years, 4 months	2009
users		00	Apple App Store	2 years, 2 months	2008
			Facebook	4 years, 6 months	2004
	to 15 you	r ado	iTunes	6 years, 5 months	2003
hings that didn't exis	sis 15 yea		i i anos		
hings that didn't exis	Uber		World Wide Web	7 years	1990
hings that didn't exis iPhone 8 iPad 9 Instagram 1	. Uber . Airbnb 0. Kindle		World Wide Web Mobile phone	7 years 16 years 75 years	1990 1979
hings that didn't exis iPhone 8 iPad 9 Instagram 1 TikTok 1 Bitcoin/blockchain 1	<ol> <li>Uber</li> <li>Airbnb</li> <li>Kindle</li> <li>Dropbo</li> </ol>	X ng Galayy	World Wide Web Mobile phone Telephone	7 years 16 years 75 years	1990 1979 1878
hings that didn't exis iPhone 8 iPad 9 Instagram 1 TikTok 1 Bitcoin/blockchain 1 WhatsApp 1	<ol> <li>Uber</li> <li>Airbnb</li> <li>Kindle</li> <li>Dropbo</li> <li>Samsul</li> <li>Netflix</li> </ol>	x ng Galaxy	World Wide Web Mobile phone Telephone	7 years 16 years 75 years	1990 1979 1878 Veer of creat

The am Big data	ount of information is a mining systems are i	growing exponentially, t ncreasingly being used	heir processing "manu for scientific and tech	ually" is no longer possibl nological forecasting
	iFORA	FUTURES PLATFORM	Dimensions	MergeFlow
	<ul> <li>HSE, Russia (2015)</li> <li>Technological landscapes</li> <li>Significance and trend dynamism assessment</li> <li>Structural changes analysis</li> <li>Technology lifecycle analysis</li> <li>And much more</li> </ul>	FUTURES PLATFORM, Finland (2019) • Tracking competitors • Opening of new markets • Identification of weak signals and fundamental breakthroughs	Digital Science, United Kingdom (2013) • Cross-links between data of different origin • Own metrics based on citation of publications	MergeFlow, Germany (2007) • Discovering new companies • Identification of new technologies • Market assessment
Coverage	>500 mln documents	>400 000 NEWS & ALERTS	>106 mln documents	+15 000 at week
Market Analysis			$\bigotimes$	
Forecasts				
Decision making			$\bigotimes$	
Risk assessment		$\bigotimes$	$\bigotimes$	
Policy measures		$\bigotimes$	$\bigotimes$	7





## Regular frontiers monitoring could serve as information base for the development of S&T forecasts and priority lists

1. Mapping world science Cluster of each field of science with the help of the iFORA system (~20) Develop a list of key scientific and technological directions based on the results of clustering, including interdisciplinary (~100) Reveal topics - specific technologies, methods, research objects, etc.	<ul> <li>2. Identification of frontiers</li> <li>Identify the topics related to the first decile in terms of significance over the past year</li> <li>Define frontiers within each direction</li> <li>Reveal interdisciplinary topics</li> </ul>	<ul> <li>3. Frontier analysis - the basis for the forecast</li> <li>Assessment of the Russian positions</li> <li>Impact assessment of the frontiers on the national goals, economic and social sectors</li> <li>Description of the frontiers</li> <li>Priorities identification based of the revealed frontiers</li> </ul>	Areas of research and development (OECD classification – Fields of Research and Developm 1. Natural Sciences 1.1. Mathematics 1.2. Computer and information sciences 1.3. Physical sciences 1.4. Chemical sciences 1.5. Earth and related Environmental sciences 1.6. Biological sciences 2. Engineering and Technology 2.1. Civil engineering 2.2. Electrical engineering 2.3. Mechanical engineering 2.4. Chemical engineering 2.5. Materials engineering 2.6. Medical engineering 2.7. Energy and environmental management 2.8. Industrial biotechnology 2.9. Nano-technology
Structure of the world science	Frontiers	Priorities	3. Medical and Health Sciences     4. Agricultural Sciences     5. Social Sciences









