



EUROPEAN COMMISSION

JOINT RESEARCH CENTRE

Institute for Prospective Technological Studies (Seville)

Knowledge for Growth (KfG) Unit

**Facing the future: global challenges in 2025
and
EU policy implications**

List of issues shaping the future

DRAFT: WORK IN PROGRESS

Facing the future: global challenges in 2025 and EU policy implications

Examples of cross-cutting policy challenges

Area 1: Demography, (Im)migration, Urbanization, and Health

Some issues in this area are highlighted in **bold**, *italic* or underlined, with the following meaning:

This analysis identifies issues that many respondents consider relevant, novel and probable.

M **Mean-oriented analysis** > 50% **100%**
(relevance mean > novelty mean > probability mean)

This analysis identifies issues that respondents consider to be improbable but are novel and relevant.

R *Rare-event oriented analysis* > 50% *100%*
(inverse probability mean > novelty mean > relevance mean)

This analysis identifies issues on which respondents' views differ with regards to novelty, relevance and probability.

V Variance-oriented analysis > 50% 100%
(novelty variance > relevance variance > probability variance)

100% means that the issue is a core issue and thus one of the most interesting ones.

> 50% means that the issue may be an interesting borderline issue.

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CODES	ISSUES	> 50%	100%
<u>DI 02</u>	<u><i>The possible military use of nuclear weapons having great impacts on global demographic developments</i></u>		R, V
DI 03	Pandemics having great impacts on global demographic developments		
<i>DI 04</i>	<i>Unexpectedly massive migrations due to climate change</i>	R	
DI 05	Unexpected global consequences and changes in global population figures due to extreme events such as pandemics, climate change and breakthrough life extension innovations leading to changes in demographic trends		
<u>DI 06</u>	<u><i>The first collapse of a Third World large city</i></u>	R, V	
DI 07	Radical changes in the demographic structure of the world population		
DI 08	The mean age of women at the birth of their first child continues to rise		
DI 09	The EU-27 population will increase from 495 million to 506 million people by 2060		
DI 10	Ageing of European population linked to a fall in birth rates will lead to over 10% of Europeans being above 80 years old by 2050 and, at the same time, a drop in overall EU population from 499 million in 2025 into 470 million by 2050		
DI 12	People in developing countries will adopt the material and energy intensive consumption patterns and life styles now normal in the US and Europe		
DI 13	Rising internal and external migration pressures in Europe mainly from neighbouring countries which accounts for a major proportion of the world's poor population		
DI 14	Birth rates in Europe continue to decline since the 1950s		
DI 15	Europeans gained 2.5 extra life years per decade over the past 40 years: the trend continues, but slows down		
DI 16	Historically high net migration to European countries will continue		
DI 17	The ratio between the retired population and the number of people of working age is rising from today's 0.25 to 0.50 by the year 2050 in Europe		
DI 18	People are getting married older in the EU-27		
DI 19	Divorce rates are increasing in the EU-27		
DI 20	The female labour force participation has been increasing in the EU-27		
DI 21	Average household size has been decreasing in the EU-27		
DI 22	The population aged 60 years and above will be growing significantly leading to a further ageing of the EU-27 and some other parts of the world		
DI 23	Employment rates at the age of 60 continue growing in the EU-27		
DI 24	Urbanisation will increase at OECD countries in the future		
DI 25	Massive urbanisation of China will lead to one billion people living in Chinese cities by 2025		

DI 26	World population will grow to around eight billion by 2025 and populations will be more and more diverse		
DI 28	Migration to Western and developed countries will increase even if total number of migrants is slightly decreasing globally		
DI 29	Urbanization and industrialisation will continue around the globe		
DI 30	Global increase of population density in coastal areas		
DI 32	Population in developing regions will remain predominantly rural until 2020		
DI 33	National and international migration will increasingly cause tensions between different nationalities in the EU		
DI 35	Increasing urbanisation worldwide with 60% of the world population living in urban areas by 2035		
DI 36	Increased global migration with around 230 million people living outside their country of origin by 2050, with an increasing stream of immigrants flowing towards Europe		
DI 37	Ageing population in industrialized and Western countries		
DI 38	Global population growth from 6.5b people at present to 8.5 billion people by 2035, with most growth taking place in areas facing economic and material risks		
DS 06	<i>The research on sexual behaviour in the global monitoring of health may become important</i>	R	
DS 07	<i>People's trust on public health care may collapse in the western world</i>	M	R
DS 19	Smog becomes an acute health risk		
DS 22	<u>Rise of new illnesses and pandemics</u>	V	
DS 23	Health issues will increasingly shape the farming and food system in		M
DS 24	Erosion between healthcare and social services will continue in Western world		
DS 25	Costs of healthcare are rising in Western world	M	
DS 26	Growing expectations on the health care system in Western world		
DS 27	<u>ICTs will change the doctor/patient relationship</u>	V	
DS 28	<u>Telemedicine will become a central part of the health care</u>		V
DS 29	<i>Pharmacogenetics will change health treatments already by 2015</i>		R
DS 30	New medical treatments may become too expensive to use		
DS 31	Predictive gene testing will change dramatically medical treatments	M	
DS 32	Biomedicine IT may become a huge business		
DS 33	<u>Robotics and computer assisted surgery will be increasingly used in health</u>		V
DS 34	<u>Nanotechnologies will increasingly support efficient medical treatments in the future</u>		V
DS 35	Countries in poverty and conflicts will increasingly offer a fertile breeding ground for new diseases		
DS 36	Extreme weather conditions will increasingly cause pandemics around the globe		
DS 38	Pandemic influenza will remain the biggest health threat in the world		
DS 40	Drug-resistance bacteria may cause global pandemics		
DS 41	<i>Pandemics emerge because of weakly controlled animal husbandry and food processing</i>	R	
DS 42	Unregulated privatization of health care system will carry on around the world		
DS 43	Prioritisation and focus of health care systems in specific diseases and short term results continue in the Western world mainly due to the privatisation of these systems		
DS 44	Equal access to health care will get more and more support among the EU citizens		M
DS 45	National and supra-national institutions emerge in the health care sector		
DS 57	In the EU there is a growing gap between the ageing population and young immigrants	M	

DS 79	Increasing citizens' interest in controlling and understanding their medical treatments in developed countries		
DS 80	Extremely simple, fast and multiple tests that can be performed simultaneously to verify the presence or absence of specific biological substances is widely available and diffused on a global scale by 2020		
<i>DS 82</i>	<i>Use of living tissue for implantation and replacement is widely diffused on a global scale by 2020</i>		R
DS 83	More precise and accurate diagnostic and surgical methods are widely diffused on a global scale by 2020		
DS 86	Global investments in health care focusing on diseases in the Western world		
DS 87	The global health economy is growing faster than GDP		
DS 88	Continuing unequal progress in health care both globally and locally		
FTA 5	The issue of healthcare costs related to the prolongation of human life enters to European public debates		M
<i>RI 07</i>	<i>The long-run goal of the science of complexity and of the convergence of sciences and technologies will be the programming of the cell</i>	R	V
RI 15	Growing importance of lifelong health and health innovation around the globe due to an overall ageing society		
<i>RI 25</i>	<i>Targeted drug therapies that attack specific tumours or pathogens without harming healthy tissues and cells are widely diffused on a global scale by 2020</i>	R	
RI 44	Biotechnology will be widely diffused into other areas than the pharmaceutical and agrochemical sectors in 2025	M	
RI 45	Healthcare systems and technologies together with preventive strategies relating specifically to age-related illnesses will gain global importance, with applications varying between		
RI 52	Increasing global use of advanced biometrics, bio-molecular production processes, and tissue engineering leading to improved medical diagnostics and therapies, enhanced possibilities for synthesising natural substances, and limiting opportunities for fraud		

Area 2: Economy, Trade, and Financial Flows

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CODES	ISSUES	> 50%	100%
DI 11	Increases in productivity will become the main engine of growth in European countries		
DI 27	Spatial disparities in income and production continue to grow around the world		
DS 61	<u>Trust in payment systems will become a vital factor in global economies</u>	V	
EC 01	<u>UK entry into the European Monetary Union by 2025</u>		V
EC 02	<i>Oil and other commodities being globally priced in Euro by 2020</i>	M	R
EC 03	Disruption of oil supplies by 2020		
EC 04	<i>A second major financial crisis in the US induced by severe weather events in 2017 leads to the creation of renewed incentives for international financial cooperation and risk</i>	R	
EC 05	<u>Monetary disruption leading to the creation of local exchange trading systems</u>	V	
EC 06	Global economic shocks	M	
EC 07	Increasing global financial instability		
EC 08	<i><u>Rapidly growing global use of coal, with the coal industry doubling in size by 2025 and becoming two and a half times larger by 2050</u></i>	R, V	
EC 09	Increasing EU dependence on oil imports leading to over 85% of its needs being purchased from other regions and nations in 2020		M
EC 10	<i><u>By 2025 the euro will become the dominant international currency</u></i>		M, R, V
EC 11	The volume of global trade should double over the period 2008-2025, in spite of a temporary deceleration during the 2009 recession		
EC 12	Increasing dominance of few large global players over financial services sectors by 2020		
EC 13	Decreasing global economic growth in 2011-2015 due to international tensions that lead to protectionist measures		
EC 14	Reincarnation of the Silk Road (the mediaeval trade route from the Middle East to China) for global commerce and financial flows leading to Asian nations accounting for almost half of the world's increased demand for oil from the Gulf region		
EC 15	Increasing Indian incomes and a larger middle class leading to its leap to fifth largest consumer market by 2025, from current 12th place.		
EC 16	Increasing global economic importance of China and India leading to a transformation of the geopolitical landscape within the next 15 years	M	
EC 17	Increasing economic influence of China and India on global business leading to robust economic growth by 2020 that could reshape the globalisation and world political processes		M

EC 18	Increasing global carbon trading market accounting for a value of permits issued that could be around \$100bn by 2020		
EC 19	Strong harmonisation of allocation processes or Emissions Trading Scheme across EU Member States by 2020 to avoid distorting competition across Europe		M
<i>EC 20</i>	<i>Increasing EU share in global manufacturing activity by 2025</i>		R
EC 21	Shift of the centre of global manufacturing production to Asia by 2025	M	
EC 22	EU manufacturing playing a major global role, remaining the most important driver for Europe's exports by 2025		
EC 23	Global economic power increasingly shifts to the East and China by 2020, with firms worldwide seeking both stability and increased yield		
EC 24	By 2020 the Western economies increasingly drives productivity and thus maintains global economic and moral primacy dominating financial markets		
EC 25	By 2020 global markets are negatively affected by economic stagnation and a series of natural disasters, leading global service providers to hold capital locally, greatly reducing capital efficiency and forcing many to reduce their geographic footprint		
EC 26	Rapid shift in the geo-economic power from US to China after initial financial crisis, leading both to a stalling of globalisation and to increasing levels of global competition and economic growth by 2020		
<i>EC 27</i>	<i>Deepening of the long-term effects of the current financial crisis which leads into a world characterized by division, conflict, currency controls and a race-to-the bottom dynamic by 2020</i>		R
<u>EC 28</u>	<u>Increasing importance of the service sector for the EU economy accounting for three quarters of total jobs by 2020</u>	V	
EC 29	Corporations will be increasingly diverse and global, and will remain outside the influence of national governments		
EC 30	Emergence of new power brokers at global level (i.e. China, Asian central banks, petrodollar investors, etc.) leading to emerging countries playing an increasingly important role in the world's financial markets with growing assets that will account for over 70% of the size of the world's global pension funds by 2012		
<i>EC 31</i>	<i>Continued economic growth of Asian countries, with China and India likely to account for 50% of the world GDP by 2060</i>	M, R, V	
<u>EC 32</u>	<u>Global economic growth due to market liberalisation, globalisation and technology developments that lead to strong GDP growth in non-OECD countries by 2050</u>	V	
<u>EC 33</u>	<u>Increasing global structural unemployment due to shortages and mismatches of skills since globalisation and an ageing population determines new demand and supply of future skills</u>		V
EC 34	Increased importance of access to raw material for EU competitiveness		
EC 35	Economic globalization will continue		
EC 36	Increasing financial importance of the 'ETZ' countries (i.e. 80 countries that surround the euro area in a broad geographical sense and that are mostly classified as transition, emerging markets or developing economies; belonging to four main regions: the Western Balkans, the European part of the Commonwealth of Independent States, the Middle East and Northern Africa, and Sub-Saharan Africa) for banks of the European area		
EC 37	Economic protectionism may emerge due to long-lasting recession		
EC 38	Steady and uneven economic growth worldwide		
<i>EC 39</i>	<i>The world economy will grow around 80% by 2020, driven largely by economic activity in the BRIC countries</i>	R	
<i>FTA 10</i>	<i>Global financial crisis deepen and continuous unresolved</i>	V	R
FTA 7	Successful WTO Doha round emerges		

Area 3: Environment, Energy and Climate Change, Food and Agriculture

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CODES	ISSUES	> 50%	100%
ENV 01	Post-Kyoto treaty introducing a CO2 pricing mechanism using a carbon emissions trading scheme that begins in the EU and is progressively adopted by other countries, including		
ENV 02	The crossing of "tipping" points (i.e. the point at which environmental impacts would be irreversible) towards the middle of the 21st century	M	
ENV 03	Global water bankruptcy due to humanity's consistent under-pricing and overconsumption of water		
ENV 04	Climate disruption		M
ENV 10	Energy transition having possible impacts on the world's economic development		M
ENV 11	Rapidly growing global use of nuclear energy		
ENV 12	Rapidly growing global use of biofuels		
ENV 13	Less energy-intensive growing global economy		
ENV 14	Rapidly increasing electric transport around the world		
ENV 15	Phase-out of nuclear energy in certain EU Member-States as a result of political decisions		
ENV 16	<i>Emerging hydrogen-based transport reaching up to 40 - 55% of the</i>		R
ENV 17	Emerging application of photovoltaic for generating energy by 2030		
ENV 18	Increasing global use of wind energy which supplies 12% of the world's electricity needs by 2020		
ENV 19	Increasing global application of ICTs to reduce energy consumption	M	
ENV 20	<u>Emerging hydrogen-based economy</u>	R, V	
ENV 21	Emerging bio-refineries for energy generation globally		
ENV 22	<u>The application of gene manipulation and other biotechnologies will revolutionize food production throughout the world</u>		V
ENV 23	Food safety becomes more and more important in EU	M	
ENV 24	New packaging materials play an increasingly important role in food industries		
ENV 25	<u>Genetically manipulated organisms (GMO) will play increasingly important role in food industries</u>	V	
ENV 27	Processed foods will play an increasingly important role in global agricultural trade		

ENV 28	Food industry is globalizing fast	V	
ENV 29	Food industry and retailers are consolidating fast		
ENV 30	<i>The number of farm units is growing in Europe</i>		R
ENV 31	Animal diseases may cause major changes to the food production around the world		
ENV 32	Biofuels impacts food prices up		
ENV 33	Food industry is growing fast, especially in China		
ENV 34	Global Food industry is diminishing compared to other industries		
ENV 35	The power in food industry value chain is moving from producers to processors and supermarkets		
ENV 36	ICTs is changing distribution channels of food industry		
ENV 37	Demand for high-value food is growing globally		
ENV 38	Environmental concerns will increasingly shape the farming and food systems in Europe		
ENV 39	Safety issues will increasingly shape the farming and food systems in Europe		
ENV 40	Health issues will increasingly shape the farming and food systems in Europe		
ENV 41	Floods are becoming major threat in Western countries		
ENV 42	Carbon capture and storage increase rapidly around the world		
ENV 43	Emerging global climate change mitigation regime due to grassroots values which become integrated in political agendas led by pressure from media and international pressure groups as well as demands from industry eager for regulatory clarity and consistency	M	
ENV 44	Emerging reduction of the 'hole' in the ozone layer, reaching full recovery between 2060 and 2075		
ENV 45	Growing global interest in market mechanisms to address environmental problems		
ENV 46	Emerging adaptation to climate change		
ENV 48	Water becoming a mainstream theme for world investors		
ENV 49	<u>Global increase in the number of natural disasters leading to large scale human misery</u>	V	
ENV 50	Russia continues to base its economic development on the exploitation of its natural resources		
ENV 51	Global advances towards safe and sustainable cities, particularly as Japan contributes to technologies for solving global environmental problems such as global warming, water		
ENV 52	Cheap solar energy is widely available and diffused on a global scale by 2020		
ENV 53	<u>Genetically modified (GM) crops are widely diffused on a global scale by 2020</u>	V	
ENV 54	Global increase in energy shortage leading to a rise in global competition for energy resources as well as greater dependency between nations		
ENV 55	Continual increase in global average temperature leading to deteriorating climate at global level		
ENV 56	Increasing importance of 'ETZ' countries (i.e. 80 countries that surround the euro area in a broad geographical sense and that are mostly classified as transition, emerging markets or developing economies; belonging to four main regions: the Western Balkans, the European part of the Commonwealth of Independent States, the Middle East and Northern Africa, and Sub-Saharan Africa) as major world energy suppliers		
ENV 57	Increasing global concentration of greenhouse gases in the atmosphere		
ENV 58	The prices of agricultural products continue rising in Eastern Europe		
ENV 59	The price of food will increase in real terms everywhere in the world in the long-term		
ENV 60	The number of food crises (sudden famine) is increasing around the globe		
ENV 61	The number of food crises caused by natural catastrophes is growing around the globe		

ENV 62	The number of food crises caused by socio-economic factors is growing round the globe		
ENV 63	Middle-East will become even more important oil producers		
ENV 64	Sub-Saharan Africa will increase their importance in oil production		
ENV 65	Rapid global increase in energy use and for further demand		
ENV 66	Increase of outdoor and indoor air pollution in cities globally		
ENV 67	Global land degradation due to unsustainable use of land and water leading to loss of farmland and natural soil		
ENV 68	Global decline of freshwater availability leading to a dramatic increase in water scarcity in many parts of the world		
ENV 69	Global decline of marine and freshwater fish availability due to persistent overfishing or over exploitation of aquatic systems, as well as climate change and contaminants		
ENV 70	<u>Rapid global decline in biodiversity and loss of ecosystems services</u>		V
ENV 71	<u>Growing unequal responsibility for global environmental pressures with poor nations paying the consequences for richer countries which have exceeded their Ecological Footprint, leading to more than three quarters of the world's people living in nations that their consumption has outstripped their country's biocapacity</u>	V	
ENV 72	Increasing global renewable energy production which grow by over 90% from today to 2030 and account for nearly 60% of the increase in energy demand		
ENV 73	Increasing use of natural gas with worldwide consumption almost doubling by 2030 and overtaking that of coal within the next decade		
ENV 74	Growing energy import dependence in Europe which accounts for 67% of its overall needs in 2030		
ENV 75	Increasing EU-27 energy related CO2 emissions	M	
ENV 76	Ending of the era of cheap and abundant conventional energy resources		
ENV 77	Dramatic increase of transport energy demand in EU		
ENV 78	Global increase in nuclear capacity by 2025		
ENV 79	Rapid increase in global demand for food, especially meat		
ENV 80	Increase in reallocation of water consumption from agriculture into urban, energy and industrial sectors in fast-growing economies, especially the Middle East and Asia		
ENV 81	An overall outdated global agriculture trade system is leading to an increase in global water stress		
ENV 82	Increased competition for water for generating energy within the US and EU		
ENV 83	Increasing global demand for food production		
ENV 84	Increasing global production of crops for biofuels		
ENV 85	Japan increasingly becoming an international leader in the environmental field and related technologies due to an increase in literacy of its citizens and the exploitation of		
ENV 86	Energy consumption in the EU will increase, doubling the import of fossil fuels and consumption of all of its own available petroleum sources in transport by 2030		
FTA 11	<u>Global warming turns out to be a false prediction due to misunderstanding of causes</u>	R	V
FTA 12	<u>European floods destroy cultivated areas with severe impacts on food security</u>		R
FTA 8	<u>Flying cars change all traffic patterns by 2025</u>		R
FTA 9	Breakthroughs in bioenergy permit hydrogen and bio-diesel-ethanol from new renewable sources, e.g. hydrogen from algae		
RI 12	Emerging application of wood plastic composites and biopolymers to replace conventional plastics		

RI 17	<i>Increasing number of fossil-fired power plants with zero emissions due to advances in materials development and intelligent monitoring</i>	R	
RI 18	Rising importance of decentralized power generation with both large industrial power plants and fuel cells installed in private homes working in interconnected grids which forms the backbone of the European power generation sector	M	
RI 24	Filters, catalysts and other techniques for obtaining clean water locally are widely diffused on a global scale by 2020		
RI 26	<i>Cheap self-sufficient and affordable housing that provides shelter adaptable to local conditions as well as energy for heating, cooling and cooking is widely available and diffused on a global scale by 2020</i>		R
RI 29	Hybrid vehicles are widely available and diffused on a global scale by 2020	M	
RI 76	Increasing application of nanotechnology in agriculture and food systems		

Area 4: Research, Innovation, eEducation

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<u>DS 05</u>	<u>Space tourism may become a large commercial application within space industries</u>		V
<u>DS 10</u>	<u>NASA will establish an outpost on the moon before year 2025</u>	V	
DS 55	Knowledge management and information sharing is becoming more and more important in basic functions of society in Europe		
DS 70	The Earth observation technologies market will grow rapidly		
DS 71	The development of space technologies is getting more political in Europe		
DS 72	Public interest in space is growing among Western citizens		
DS 73	Space markets are consolidating		
DS 74	Private capital is taking more role in the funding of space technologies		
DS 76	Space human and robotic exploration missions will be increasingly organised within the orbit of Earth and without the need to leave the area of Earth's gravity influence in the next decade		
DS 77	Space exploration programmes are becoming increasingly international		
DS 90	Space budgets in the leading nations will grow		
<u>DS 91</u>	<u>Satellite-based location and navigation services are growing rapidly</u>	V	
ENV 26	Nanomaterials will be applied widely in the packaging industry by around 2020		
ENV 47	Emerging application of wood plastic composites and biopolymers for replacing conventional plastics due to rising prices of crude oil		
FTA 2	Total satellite failure leading to an interconnectivity black-out		R
<u>FTA 6</u>	<u>Language codification technologies advance allowing people from all nations to communicate globally</u>	R, V	
FTA1	NGOs will play an increasing role in technological innovation		
RI 01	Intellectual property disruption		
<u>RI 02</u>	<u>Loss of trust in technology</u>	R	V
RI 03	The phasing-out of the university system in Europe		R
RI 04	A new techno-economic paradigm being first implemented in a large Asian country	R	
RI 05	The disappearance of the personal computer due to the embedding of microchips able to communicate with the environment	R	

RI 06	<i>Research and innovation eventually becomes compartmentalised and individual, with institutes and individuals fiercely competing with one</i>		R
RI 08	<i>By 2015 stability and choice will have become established features in the digital world. It will become easier to exercise intellectual property rights and more consumers will earn revenues from industry platforms</i>	R	
RI 09	The rise of content production in the private, public and business sectors, and the ease with which it can be accessed threatens content producers leading to a shift from content to packaging		
RI 10	The existence of connectivity devices in potentially every object and ambient will accelerate the fading away of traditional infrastructures for communication		
RI 11	Use of products and services "on demand" will change the patterns of data traffic in networks		
RI 13	The application of human-computer interfaces will grow and strongly affect human relations and our ways of working, learning and living		
RI 14	Unlimited bandwidth and storage availability		
RI 16	Increasing productivity and flexibility in global manufacturing due to interconnected economic systems and intense networked cooperation		
RI 19	Fully global networked transportation modalities by 2025 due to advanced ICTs		
RI 20	Highly standardised education in the EU		
RI 21	Innovation in the EU educational system primarily focuses on efficiency and in providing effective low-cost service		
RI 22	<u>Rural wireless communications are widely diffused on a global scale by 2020</u>	V	
RI 23	Communication and storage devices for rapid access to information are widely available and diffused on a global scale by 2020		
RI 27	Redesigned manufacturing processes that either eliminate or greatly reduce waste streams and the need to use toxic materials is widely diffused on a global scale by 2020	M	
RI 28	Use of ubiquitous Radio Frequency Identification (RFID) to track commercial products and individuals is widely diffused on a global scale by 2020		
RI 30	Unobtrusive wearable devices that intercommunicate with one another are widely diffused on a global scale by 2020		
RI 31	<i>Quantum cryptography for secure transfer of information is widely diffused on a global scale by 2020</i>	R	
RI 32	Increased interconnection of existing technologies will remove existing boundaries between our private, public, and professional lives leading to a networked world by 2025		
RI 33	The networked world will foster and sustain social networks serving a socially, professionally and culturally active population		
RI 34	In a networked world intellectual property rights will become more important		
RI 35	The field of life sciences will become the most important research area in the Triadic Regions (Japan, US, and European countries)		
RI 36	In 2020 the daily (re)creation of the world around us – things, services, and relationships – generates the largest share of added value in Europe		
RI 37	Developing countries increasingly suffer from brain drain and chronic underinvestment in RTDI		
RI 38	<u>Globally, societies increasingly want to participate in shaping research agendas</u>	V	
RI 39	Security concerns in the digital world (for consumers, businesses, and	M	

RI 40	Breakthroughs in submicron manufacturing, enterprise simulation, and modelling will accelerate progress in European manufacturing		
RI 41	Consumers, governments and forward-looking businesses will push for		
RI 42	Various parts of the world will move towards a knowledge-based society		
RI 43	Open innovation will be widely applied on a global scale by 2025 leading to a more advanced worldwide configuration involving an intensive circulation and transformation of knowledge as well as a relaxation of intellectual property rules		M
RI 46	Increased connectedness and distributed innovation across the world with the Internet becoming extremely decentralised and a spread of open-source software leads to a blurring in the line between users and producers by 2015		
RI 47	Ubiquitous networks will become an essential part of both science and daily life worldwide leading to "the" network where everything is connected		
RI 48	Globally networked development centres together with ICTs penetration and customer-specific requirement are driving rapid market-oriented innovations in		
RI 49	Increasing worldwide application of nanotechnologies in production processes with miniaturization reaching nano-dimensions and testing units mastering nano-sized measurements	M	
RI 50	Intelligent buildings worldwide are increasingly networking and integrating services and infrastructures such as heating, climate control, ventilation, fire protection and		
RI 51	Increasing provision of worldwide customised logistics systems due to a global rise in e-commerce		
RI 53	Wide global spread of innovations in science and engineering		
RI 54	Increased importance of co-innovation with active consumers for growth and deployment of new technological solutions within knowledge societies		
RI 55	Increased regional innovation and competitiveness in the EU due to the application of regional foresight to the field of knowledge and technology transfer		
RI 56	Decline of authority in schooling around the globe		
RI 57	New generic emerging technologies and optimised system solutions in the EU regulatory and market contexts will increasingly reduce environmental impacts in	M	
RI 58	Accelerating pace of global innovation due to increased attention given to science and technology funding in India and China	M	
RI 59	Automation and artificial intelligence are increasingly integrated and globally mobilised in society and education		
RI 60	New skills and competences emerge for trade and business around the world leading to the creation of new jobs and a more flexible workforce		
<i>RI 61</i>	<i>Individual life, work and learning trajectories are diversifying worldwide leading to major social transformations and infrastructures renewal which enable all kinds of people from all nations, including the elderly and physically challenged, to work happily together</i>	R	
RI 62	The educational system is adapting slowly to the learning society and is not fully exploiting the potentials of wide available ICTs		
RI 63	Employee communities of practice are predominant enablers of learning in many workplaces		
RI 64	Widely globally diffused technological applications by 2020 will combine 3 to 4 technology areas: biotechnology, nanotechnology,		M
RI 65	Growing global importance of advanced computing and infrastructures for research and education at the frontiers of knowledge		

RI 66	Virtual organisations are revolutionising the conduct of science and engineering research and education by supporting distributed communities		
RI 67	Informal and formal lifelong learning will be an essential part of European society in 2025	M	
RI 68	Increasing globalisation will bring about more communication and mobility around the globe		
RI 69	By 2010 ICTs will contribute to many crucial applications for society		
<u>RI 70</u>	<u>Emerging economies like India or China are increasing their investments in R&D and their percentage of export of high-tech products</u>	V	
RI 71	Technologies will converge to solve specific socio-economic challenges	M	
RI 72	Manufacturing will become increasingly service intensive		
<u>RI 73</u>	<u>Services will become even more important for the European economy than at present</u>	V	
RI 74	Knowledge increasingly becomes the key resource globally for countries willing to have an internationally competitive agri-food industry due to the critical need to balance between the economic dictates of profitability in agriculture and address environmental and consumer concerns		
RI 75	Increased specialisation of individual innovation actors and sources of knowledge driving global economic growth in the next 20 years and leading to more		

Area 5: (e)Governance and (e)Social Cohesion

Some issues in this area are highlighted in **bold**, *italic* or underlined, with the following meaning:

This analysis identifies issues that many respondents consider relevant, novel and probable.

M **Mean-oriented analysis** > 50% 100%
(relevance mean > novelty mean > probability mean)

This analysis identifies issues that respondents consider to be improbable but are novel and relevant.

R *Rare-event oriented analysis* > 50% 100%
(inverse probability mean > novelty mean > relevance mean)

This analysis identifies issues on which respondents' views differ with regards to novelty, relevance and probability.

V Variance-oriented analysis > 50% 100%
(novelty variance > relevance variance > probability variance)

100% means that the issue is a core issue and thus one of the most interesting ones.

> 50% means that the issue may be an interesting borderline issue.

For further information visit the website of the analysis of the survey (the link to the website is included in the instructions).

CODES	ISSUES	> 50%	100%
DS 66	<u>China is becoming a major player in international politics</u>		V
DS 68	<u>Russia is becoming a major player in world politics</u>	V	
FTA 4	<u>Middle East may settle down by 2020</u>	R, V	
GS 01	Significant global political impact of Islam by 2020 due to a worldwide authority that transcends national boundaries		
GS 02	<u>Radical religious identity politics challenges the global system of norms and values</u>	V	
GS 03	Global collapse of politically rigid regimes		
GS 04	<u>Dissolution of the UN</u>		R, V
GS 05	The US resigns from the UN		
GS 06	<u>Division of the EU</u>	V	R
GS 07	<u>The collapse of the EU architecture</u>	M, V	R
GS 08	Changes in political relations with the Middle East		
GS 09	Increased pressure on international institutions to deal with global challenges	M	
GS 10	Policies become excessively technology-centric		
GS 11	<i>Shift in decision making processes by 2015 as "Independent Online Communities" (IOCs) become more numerous and influential due to the increasing number of consumers who believe that industry control is too powerful</i>	R	
GS 12	Emerging global innovation regime due to closer cross-border cooperation and to increased synergy between local, national and international regulations	M	
GS 13	Accelerated fragmentation of regions across the globe		
GS 14	Continued global domination of the US in terms economy, innovation, culture,		
GS 15	Increasing collaboration in the Gulf Cooperation Council (GCC) countries to coordinate diplomatic and economic policies due to substantial institutional reforms, technocratic governance and a strong internal market		
GS 16	Increasing regional instability in the Gulf Cooperation Council (GCC) countries leading into geopolitical shocks in the Gulf region		
GS 17	Rise of the Gulf Cooperation Council (GCC) countries as global innovation hubs due to regional stability, leading to growing regional economies and societies	M	
GS 18	Increasing EU & US economic isolation and protectionism against China leading to a global economic recession in 2010-2014		

GS 19	<i>Gradual decrease of China's international competitiveness due to its inability of implementing tough reforms, which leads to India overtaking China's growth in 2021-25</i>		R
GS 20	Increasing China's geopolitical integration with a major role in the exchange of goods, services, investments and ideas, which is backed up by well executed financial legal and administrative reforms, and leads into China being the fastest growing	M	
GS 21	Continued rapid but unsustainable economic development of India over the next 20 years due to a failure in implementing domestic reforms thus leading into minor benefits achieving at only a minority of its population		
GS 22	Increasing and established role of India as a major global player since it is able to balance the desire for immediate profit with more long term development goals, leading thus to higher sustained economic growth, balanced development and global	M	
GS 23	Increasing global isolation and protectionism against India due to the lack of India's unified action and absence of effective leadership, leading to a slow down in the global economy and offering few benefits to India that leads to limited and uneven		
GS 24	Increasing uncertainty, instability and lack of global trust in Russia which undermines international cooperation and integration, resulting in an isolated Russia with a decline in its competitiveness and growth, and leading into a global recession in 2010-2014		
GS 25	Increasing power of Russia as the growth engine for the Eurasia and Central Asia region due to wide reaching governance reforms combined with market reforms that lead to strong GDP growth, an increase in real income, and general improvement of	M	
GS 26	<i>Increasing inward-looking view of the EU characterised by a European shield against the winds of global change, with internal liberalisation but closed external borders to face crises and negative impacts from rising new markets and economies</i>	R	
GS 27	Globalization stalls by 2020 due to geopolitical tensions and global instability leading to protectionist measures		
GS 28	Increasing threat to global political stability due to the impacts of human activities globally by 2050		
GS 29	<u>Survival of US predominance on the global political landscape serving to fashion a new and inclusive global order by 2020</u>	V	
GS 30	Increasing conflicts in relationships between nations and businesses by 2020 due to security concerns and lack of mutual trust		
GS 31	Increased gap of gender equality worldwide		
GS 32	A transition to a political and corporate agenda for human resources development and to support global cooperation as well as transfer and synergies of creativity will emerge		
GS 33	Increase of global networking in business and politics due to accelerating globalisation, leading to a world shaped by many more large economic powers by 2025 than at present, as well as to an unbalanced international trading system against the interests		
GS 34	Growing disparities in knowledge generation and access at global level leading into an increase in the knowledge gap between the rich countries and the majority of poor countries as well as to a decrease in the possibilities of closing the development gap		
GS 35	Growing global concern about competitiveness, attractiveness and personal self-fulfilment in the context of globalisation		
GS 36	Connectedness increasingly becoming the measure of power linked to a global continual growth in network structures to face global challenges leading to a growth in the density of connections, which is measurable in the form of flows of money,		
GS 37	Increasing power of Europe as a global player actively engaged in dealing with global challenges as well as in defining and governing global rules that serve as models for new forms of governance for many developing states	M	
GS 38	Increased cooperation between large regions due to more efficient mechanisms of global governance and the acknowledgment of the existence of common global		

GS 39	Increasing empowerment of citizens of OECD countries through better access to information and knowledge and an increased participation in decision making, leading to a transformation of governmental roles in EU Member States within the coming 15 years		M
GS 40	Growing global concern for democracy and individual freedom, especially due to an increased surveillance of society enabled by ICTs		
GS 41	Decreasing capacity of national governments to solve transnational problems		
GS 42	Increasingly imperialistic policy tendencies from USA/EU/Japan leading to a continual leadership of these countries in shaping world developments by 2020		
GS 43	<i>Decreasing cooperation between EU and sub-Saharan Africa leaving the African continent mired in a pre-industrial state</i>		R
<u>GS 44</u>	<u>Lack of alternative political concepts for Europe that leads into an alternative strategic vision that is up to the challenges it faces</u>	V	
GS 45	Globalization is the overarching mega-trend that will shape all other trends in the		
GS 46	The gap between rich and poor will increase globally		
GS 47	Global governance structures (such as G8, G20, UN, NATO) will change due to new asymmetric threats and new rising superpowers, among others	M	
<u>GS 48</u>	<u>Many new rising superpowers have no tradition on democratic governance (Russia, China, Middle-East, many Latin American countries), which may cause pressures to democracy also elsewhere</u>		V
GS 49	Lingering social inequalities worldwide in spite of global rises in literacy and health		

Area 6: Defence and Security

Some issues in this area are highlighted in **bold**, *italic* or underlined, with the following meaning:

This analysis identifies issues that many respondents consider relevant, novel and probable.

M Mean-oriented analysis (relevance mean > novelty mean > probability mean) > 50% 100%

This analysis identifies issues that respondents consider to be improbable but are novel and relevant.

R Rare-event oriented analysis (inverse probability mean > novelty mean > relevance mean) > 50% 100%

This analysis identifies issues on which respondents' views differ with regards to novelty, relevance and probability.

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CODES	ISSUES	> 50%	100%
DS 01	Mass casualties by 2020 due to an unjust world system and terrorists having access to biological agents or nuclear devices	M, R	
DS 02	Fear of outbreaks of deadly attacks, possibly introducing an "Orwellian" world, promoting large-scale intrusive security measures in politics by 2020		
DS 03	<u>China's internal security will be threatened by separatist groups</u>	V	
DS 04	China is preparing for reintegration of Taiwan		
DS 08	<i>Russia's oil production may diminish radically</i>	R	
DS 09	European trust in US defence and security policies may diminish remarkably		
DS 11	<u>Mixed cultures in Western countries will cause problems in military recruitment</u>	V	
DS 12	<u>Regional deployment of atomic weapons</u>	R, V	
DS 13	Attacks on infrastructure facilities	M	
DS 14	Worldwide proliferation of weapons of mass destruction		
DS 15	A major war by 2020		R
DS 16	<u>Ecological and sectarian terrorism</u>	V	
DS 17	Dramatic increase in crime levels		
DS 18	<i>Nuclear energy disasters as a result of system failure</i>	R	
DS 20	Spam and viruses paralyze software and the Internet		
DS 21	Worldwide Cybercrime	M	
DS 37	<u>Increasing risks of accidents related to new industrial activities in developing countries</u>	V	
DS 39	<u>Bioterrorism emerges as a major threat for the Western world</u>	M, R, V	
DS 46	<u>Increasingly, other countries than the US, cannot afford modern military systems</u>	V	
DS 47	Global defence industry is more and more driven by technologies that are developed in civilian industry		
DS 48	The global military threats are "unknown"		
DS 49	Global privatization of security industry and services will continue		
DS 51	The world order is becoming multi-polar without a clear centre of gravity		
DS 52	NATO will become more open to outside partnerships		M
DS 53	<u>Terrorists and small radicalized groups will use more and more sophisticated forms of attacks</u>	V	M

DS 54	Critical infrastructures of modern societies are becoming increasingly vulnerable and the risk of cyber attacks is becoming larger	M	
DS 56	Maritime terrorism and organized crime are increasing around the world		
DS 58	<i>State authority in the Western world will decline due to both globalization and localization of security institutes</i>	R	
DS 59	<i>The State's ability to guarantee the security of citizens will increase in the Western world</i>	M	R
DS 60	<i>Privacy will become more and more the dominant factor in security technologies</i>	R	
DS 62	Interdependences of internal and external security is growing in the EU		M
DS 63	EU is increasingly taking part in the peace keeping missions in the Third world countries		
DS 64	Increasingly, environmental issues will play a greater role in defence and security policies		
DS 65	Non-state actors will play a greater role in conflicts		
DS 67	India's domestic stability and security are increasingly vulnerable to terrorism and separatists groups		
DS 69	<i>Domestic problems in Russia are increasingly ignored in security policies and investments</i>	R	
DS 75	The number of vulnerable states will increase for attacks by non-state actors		
DS 78	DNA profiling will be increasingly applied in criminal detection		
DS 81	<u>Pervasive sensors for real-time surveillance are widely diffused on a global scale by 2020</u>	M	V
DS 84	Emergence and spread of infectious diseases at global level leading to inability of individual nations to work in isolation in order to defend its populations		
DS 85	Increased global threat of international terrorism due to the ongoing erosion of the international regime for nuclear disarmament and non-proliferation		
DS 89	<i>Investments in defence will carry on declining in the world</i>		R

List of issues proposed by participants of the survey (not assessed)

Area 1: Demography; (im)migration; and health

Different ageing structure in EU which could trigger migrations within EU

Immigration will lower the average age of EU.

Growth of Muslim religion and related demands for Sharia law and religious public institutions.

Healthcare knowledge will become very widely disbursed and health industry companies redistributed globally to what are today developing countries.

Health-extension will take away the pressure from social systems and a lack of working people.

Decreasing psychological ability in the EU to create families able to raise children

Immigration from Islam-dominant states will destabilize EU member(s)

Increased immigration and less homogenous cultural composition of the population will lead to more individual based solutions related to welfare matters as education, health and care.

migration could be evoked by new political movements in the third world justifying piracy or even invading richer areas

The issue of citizenship and free movement of migrants will become heated with earlier waves of migrants as well as old stock Europeans calling for restrictions on new migrants.

Immigration is increasingly focussed on the CITIES of states rather than the state

Possibility of "fortress Europe" by 2030 -- the reverse of the Berlin wall.

EU policies for underdeveloping countries will contribute to decrease the migration towards Europe

Increasing migration from sub-Saharan Africa to Europe, a decline in net migration from other areas by 2030

Millions of elderly migrate from EU to e.g. Tunisia in the face of tele-connections, low pensions, access of NAfrica to EU. Cf Germans in Crete, Brits in Spain today.

EU economic downturn and the economic growth in Africa and India taking off the immigration pressure from Europe

glocalisation - the growth of the importance of local economy, local rural and urban development etc

Disappearance of difference between city and village in EU

By 2025, the trend to urbanization is beginning to be reversed in light of impending food shortages, lack of adaptability of cities to climate change, etc.

rural living will be reinvigorated

changes at the forms of the cities and urban areas new patterns of life semi and peri-urban

Economic failure, food and water shortages, energy supply will all influence urbanization

Vulnerability (including cyber attacks on infrastructure) of urban areas urges people move to rural areas

mental health is becoming more important in innovation policies

the supplier is choosing the trajectory of medical treatment, resulting in unsatisfactory technologies

Drug resistant diseases will lead to backlash against migrants at risk - a new global "Black Death" scenario.

Passports will include identification of the carrier's SERIOUS present and past medical conditions.

possibility of the emergence of a post-capitalist perspective/political view that is not just 19th century socialism

The possible role and impact of Eastern medicine (on health conditions, economic consequences).

EU focus on organic farming and control of toxic substances mean that cancers and other health issues are significantly reduced.

Preventive and non-Western medicine is widely available resulting in people getting less serious and life threatening illness

Pathogens (conventional as well as fabricated bio-genetic) will be used as weapons and terrorist attacks

Domestication of bacteria a key economic driver - cheap energy, materials, medicines, etc. Cheap DNA sequencing mitigates pandemics, and diseases. There may be more diseases which are mitigated by more rapid and agile response capabilities.

Area 2: Economy; trade; and financial flows

e-economy as dominant sort of world economy

increased importance of regions independent of national borders

By 2025, there is an explicit and growing minority of nations openly committed to discovering how to get off the "growth is god" trajectory of the last 300 years

By 2025, Europe is widely-recognized and valued as the jurisdiction that is providing leadership in the ongoing evolution of human civilizations

capital flows are put under control, fiscal burden on capital and labour is re-balanced, public sector and welfare are improved, wages are protected against inflation and working time is reduced

World trade regulation is changed to correct unfair conditions for developing countries.

Area 3: Environment; energy and climate change; and agriculture

Water wars in water-scarce regions - Extreme price shocks as water scarcity kicks in, having economic repercussions and decline of water-intensive European sectors European water pricing policy being established

Water purification with renewable chemicals and sustainable processes

Rising sea levels will threaten the homes and firms in the big cities (situated in river deltas mainly) around the world

By 2025, proof of concept of nuclear fusion is likely to be established.

Salinity Power generation without CO₂ emissions.

Urban farming increases rate of self-sufficiency in farming

Small scale organic farms and small scale producers and stores dominate as people turn away from industrialised food and reclaim the culture of the table.

EU Common agriculture policy is drastically changed to foster local extensive production.

Some food will be produced outside living organisms, supported by breakthroughs in artificial photosynthesis.

Area 4: Research, innovation and (e)-education

non-profit organisations, playing an increasing role for collective goods

Knowledge and innovation policy becoming an overwhelming platform for other (currently often fragmented) policy areas

multilingual virtual communication will speed up globalisation

By 2020, there will be widely spread small businesses based on new relatively cheap processing facilities and (nano)technologies

People will suffer from interconnectivity fatigue and seek 'islands' of non-connectivity, so-called Islands in the Net.

local markets will increasingly co-exist with global and virtual e-markets creating complex local-global economic interconnections

The practice of "just-in-time" learning may grow

In a number of EU member states the number of researchers will decline substantially.

New learning institutions will come into existence to challenge the declining university sector.

NGOs are likely to increasingly shape the application of new technologies and will be important actors in regard to societal evaluation and potential controversies and new conflict lines over technological development.

Digital identity will be central to education and human resource development

The IP system will become increasingly irrelevant as survival will come to depend more and more on knowledgesharing

students will become more demanding consumers of education and will become more proactive in defining their own curricula and study programmes

Global private innovation networks will expand to use local expertise and circumvent national restrictions

The further advance of open source communities, do-it-yourself practices and a possible erosion of intellectual property rights regimes

Controversies over patents in medicine, bio(techno)logy and theories/processes developed by Artificial Intelligence

Assessment and certification of knowledge being done by peers in social computing networks rather than by established institutions only.

Area 5: (e) Governance and (e) social cohesion

The pressure to launch an integrated European social policy aiming at enhancing the legitimacy of the EU as a political project, is growing.

The UN will probably be joined by a new global organization; the 'UC' - United Cities, because cities increasingly will be more important and demanding than increasing number of the states they are in.

Area 6: Defence and Security

Unknown interdependencies in critical infrastructure lead to a cascade of failures of national or international significance

China prepares to play cooperative role with the world in security

Use of essential and scarce resources as blackmailing weapon (e.g. lithium, water, food--monopoly by GMO-producing companies)

The US continues to play its global role in national security

Use of outer space as war-ground (attack on satellites, space debris multiplication, etc)

New technologies (synthetic biology, nanotechnology) could be developed without international regulations and safety standards and the possibility of their use as WMD (Weapon of Mass Destruction)

Cold War II between NATO and Russia