



**SCIENCE, TECHNOLOGY AND INNOVATION
FOR A FUTURE SOCIETY –**

THE BULGARIAN RESEARCH LANDSCAPE AND
OPPORTUNITIES FOR
SUCCESSFUL COOPERATION WITH JAPAN

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Deputy Minister of Education and
Science**

Scientific activity in Bulgaria



Main research organizations:

- **Bulgarian Academy of Sciences (46 Institutes), Agricultural Academy (35 centers).**
- **The higher education schools - 37 public and 14 private.**
- **Leading research universities - Sofia University, Medical University - Sofia, University of Plovdiv, Technical University – Sofia, University of Chemical Technologies and Metallurgy.**
- **International companies with R&D centers, private universities and private research organizations.**

Policy domain

- Through its European Union (EU) membership, Bulgaria is focused on the European research solidarity which has yielded results mainly through the EU Framework Programs on Research and the European Structural and Investment Funds, and currently – through Horizon 2020 and the Operational Programs (OPs) on innovations, competitiveness, research competence and education.
- In terms of institutional support, the national policy for research and innovations is conducted by the Ministry of Education and Science (MES) and the Ministry of Economy (ME). The Ministry of Finance, which is the budget holder, is also a key counterpart in identifying areas for financing of the national research priorities, including a 3-year budget forecast.
- MES designs and carries the national education and research system and oversees the functioning of the main public research funding instrument – the National Science Fund. MES coordinates also the Managing Authority of OP “Science and Education for Smart Growth 2014-2020” (General Directorate "Structural Funds and International Educational Programs") and the network of National Contact Points (NCP) for the EU framework programs for research and innovation (within the “Science” Directorate).

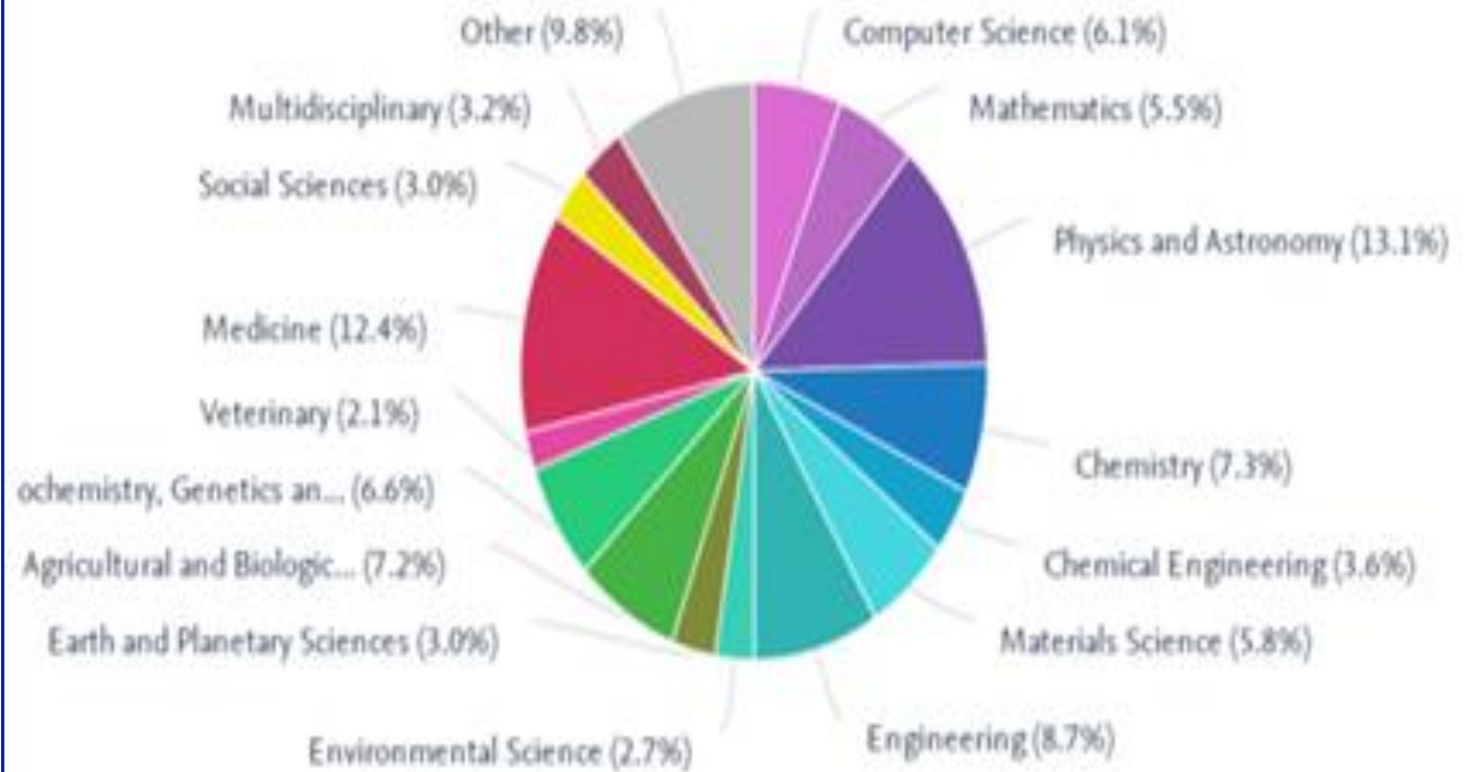
Policy domain

- Bulgaria's RIS3 puts four sectors of the economy in priority, namely **Information and Communication Technologies (ICT), Mechatronics and Clean Technologies, Health Industries and Biotechnologies, and Cultural and Creative Industries**
- In July 2016, "Technological Road Maps for the Four Priority Sectors of the Economy under Bulgaria's RIS 3" was completed, which provided detailed analysis of global trends and local capacity for production of products and services, identified as great potential for technological development

Overview of the publication activity by areas:

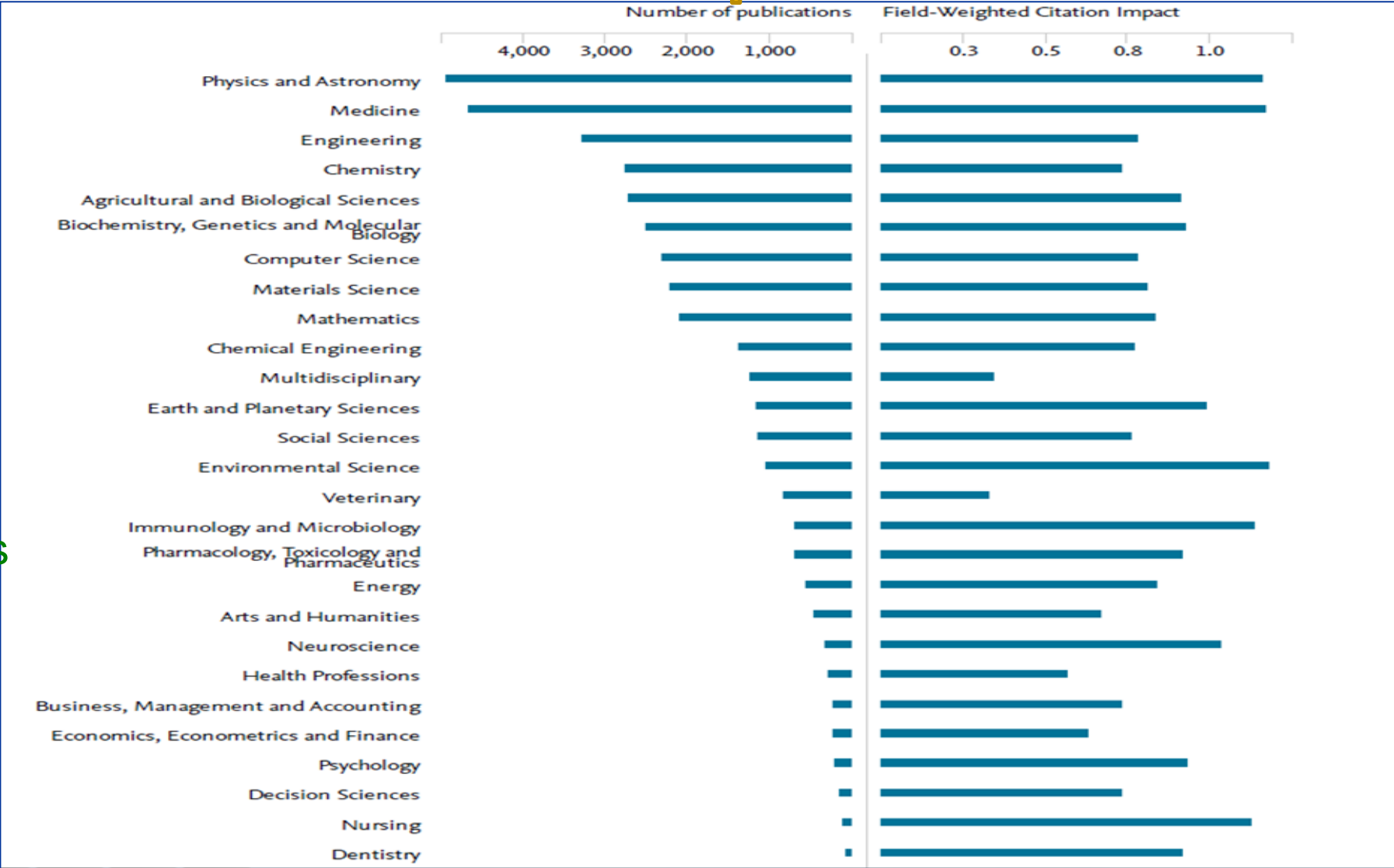
2011 to 2016:

- 23 400 publications by 15 000 authors in Bulgaria
- 3,960 publications in 2015 (SCOPUS), an increase by 40% compared to 2011.
- 103 000 citations = 4.4 citations per publication
- **Leading scientific areas:**
 - Physics and astronomy (13%)
 - Medicine (12%)
 - Chemistry (7%)
 - Agricultural and Biological Sciences (7%).



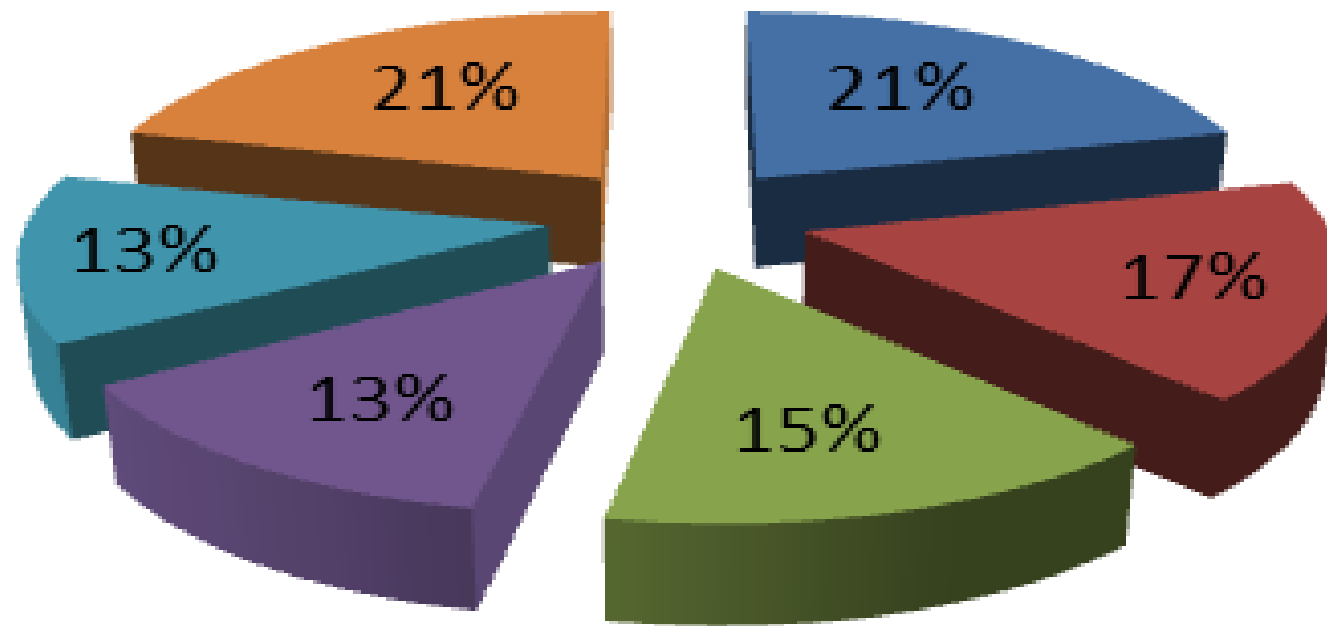
Distribution by scientific areas and citation impact

- Research output mainly in the fields of Physics, Medicine, Chemistry, Biology and Engineering (SciVal metrics).
- Less publications in the areas of Environmental Science, Social Sciences and Humanities, but with high citation impact



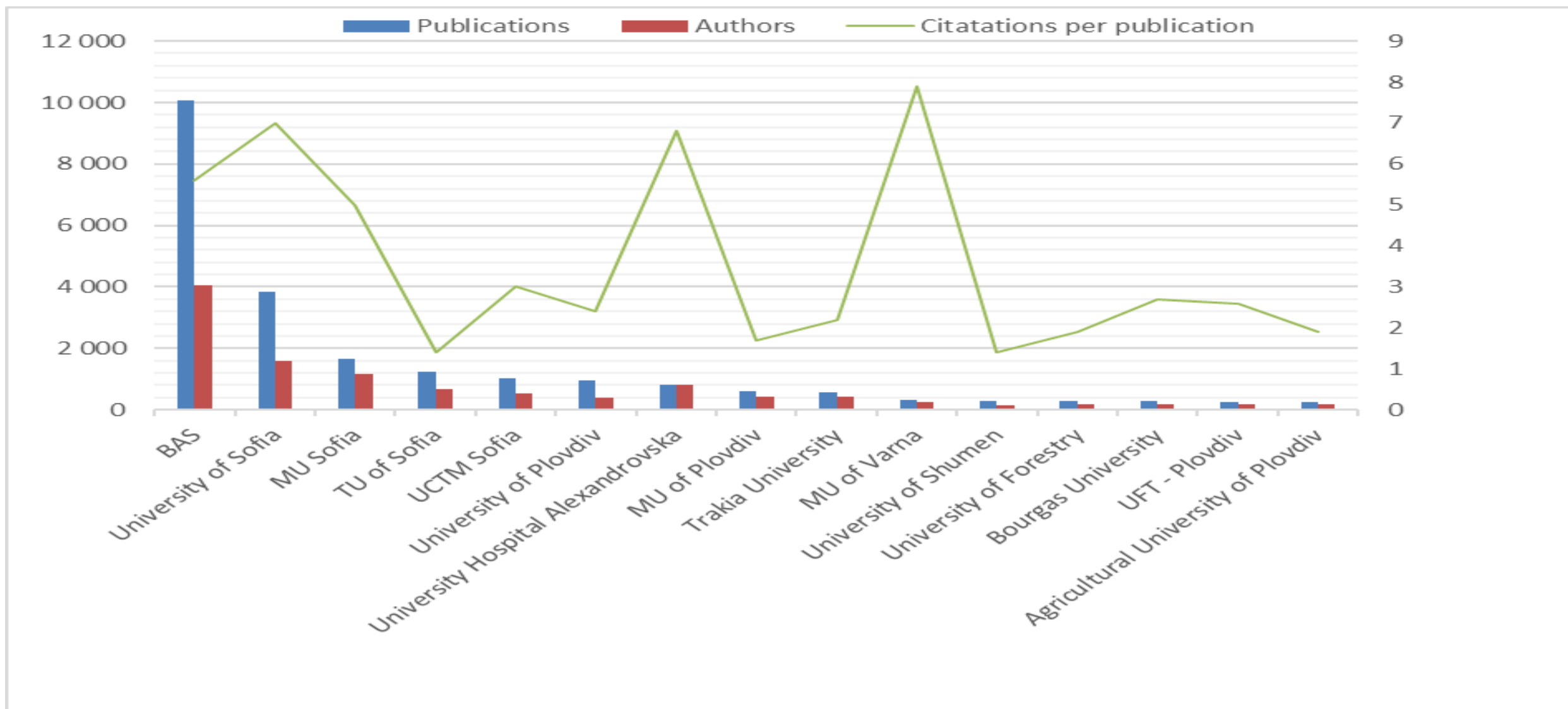
Summarizing:

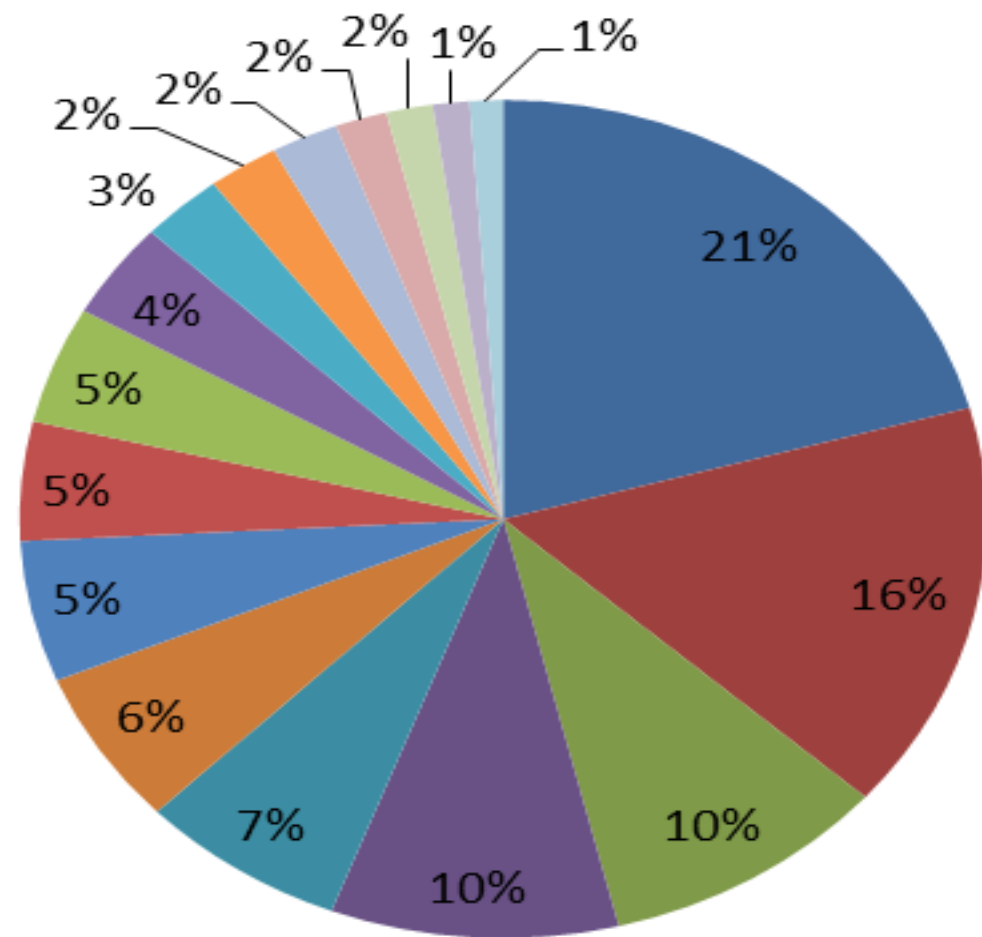
- Main research competencies - in Natural, Medical and Engineering sciences, especially in the fields of: standard model in particle physics; mass pulses; quantum optics; surface active molecules; neutrons and others (SciVal).
- Overall, physics and astronomy are first in the list of top 10% most cited publications worldwide (21% share), medicine is second (16%), followed by biochemistry, genetics and molecular biology (10%) and chemistry (10%).



- physics
- medicine
- engineering
- chemistry
- agriculture
- other

Top 15 best performing research organizations in Bulgaria, 2011-2016



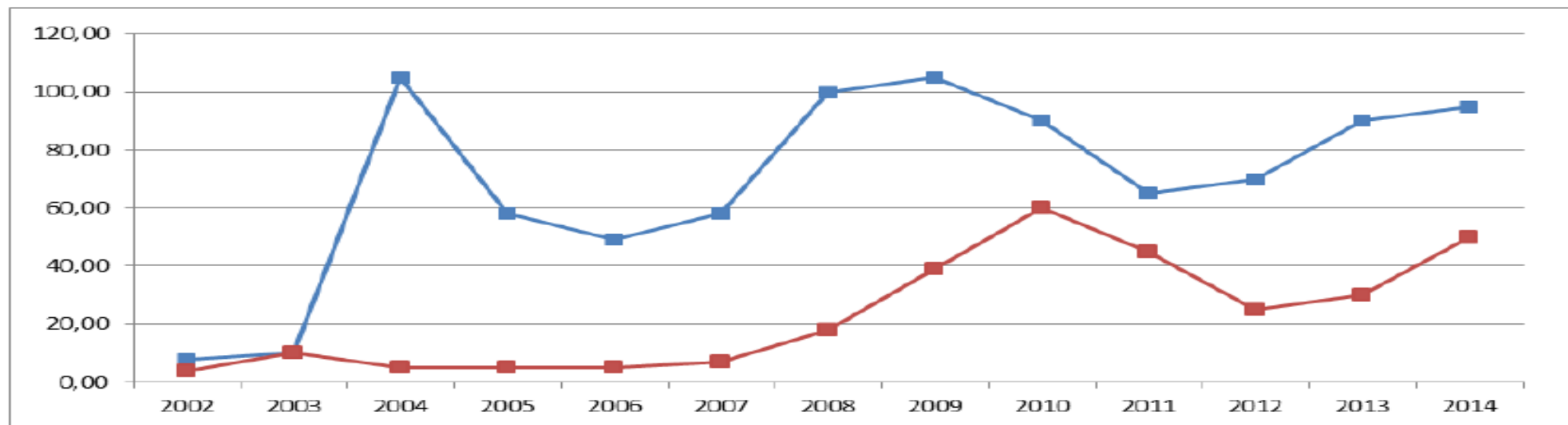
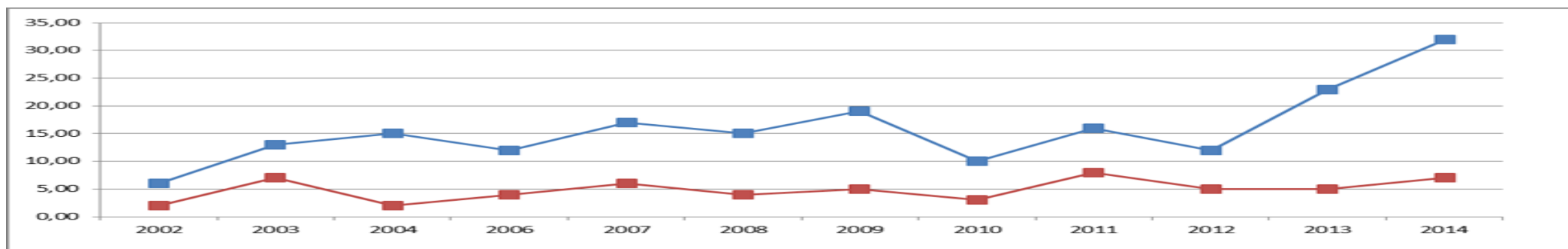


- Physics and Astronomy
- Medicine
- Biochemistry, Genetics and Molecular Biology
- Chemistry
- Agricultural and Biological Sciences
- Materials Science
- Chemical Engineering
- Engineering
- Earth and Planetary Sciences
- Environmental Science
- Immunology and Microbiology

Bulgarian patent activity



Bulgarian patent applications/registrations at EPO per 1 m. inhabitants



Bulgarian patent applications/registrations at USPTO per 1 m. inhabitants

Human Resources

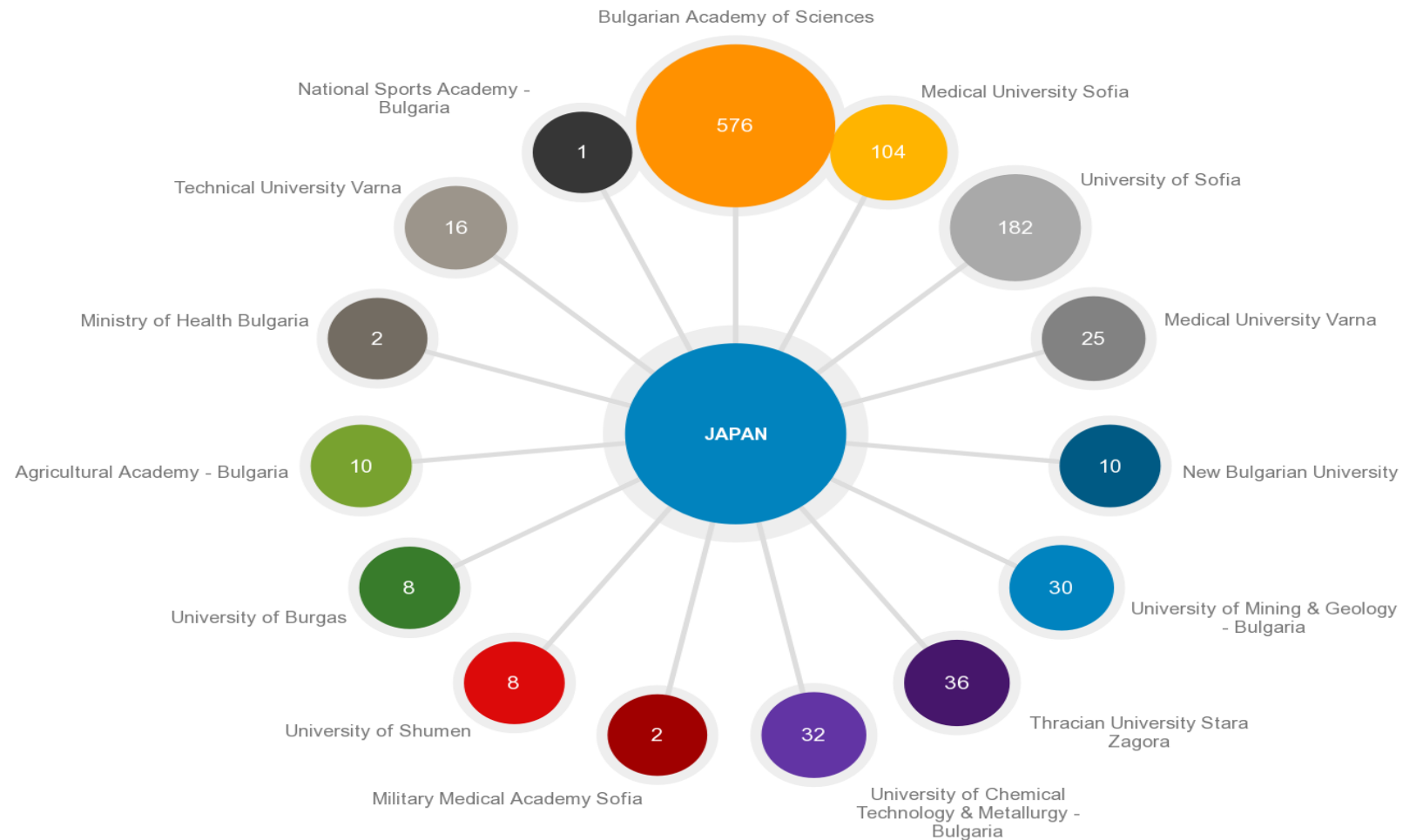
Table 1. Distribution of scientists in Bulgaria as per age groups and gender, 2015 data

Age groups	Men	Women	Total	% of age groups
Up to 34	1 238	1 434	2 672	21 %
35 – 44	1 441	2 034	3 475	27 %
45 – 54	1 339	1 582	2 921	23 %
55 – 64	1 516	1 493	3 009	24 %
65 and over	423	232	655	5 %
Total	5 957	6 775	12 732	

JAP-BG joint publications



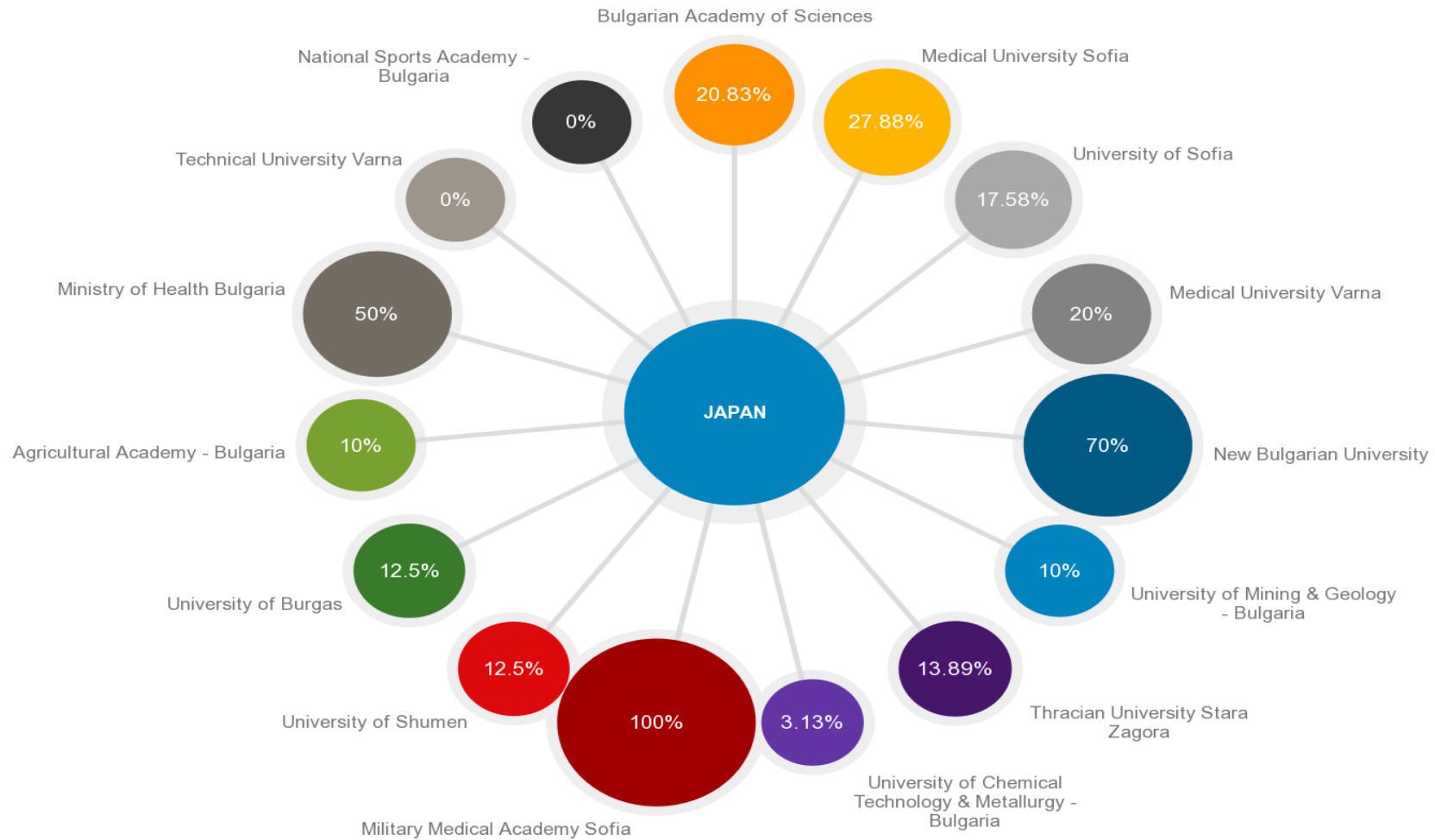
New Title



% Documents in Top 10%



New Tile



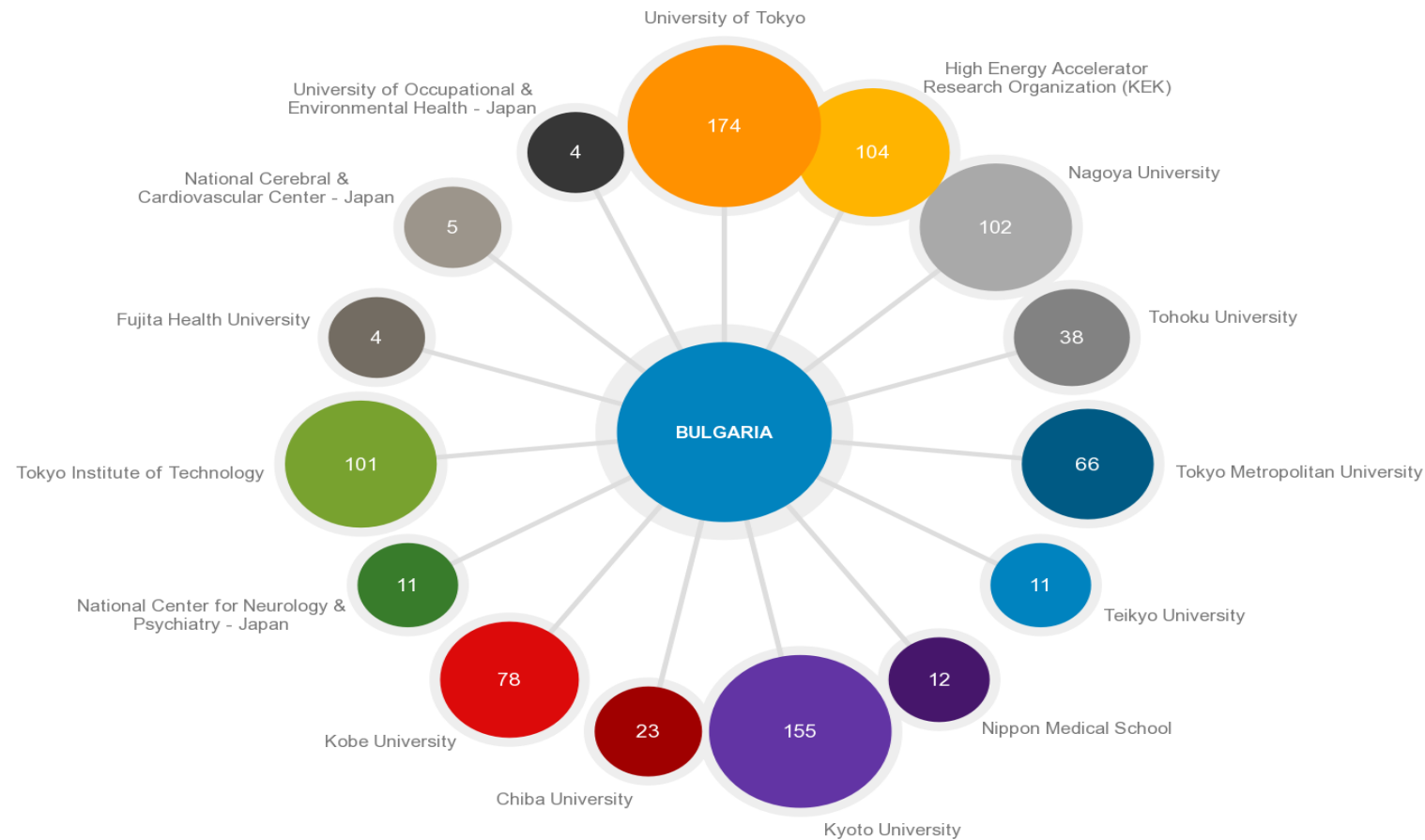
Indicators: % Documents in Top 10%. Location: BULGARIA. Collaborations with Locations: JAPAN. Time Period: 2006-2016

InCites dataset updated Mar 25, 2017. Includes Web of Science™ content indexed through Dec 31, 2016. Export Date: Apr 11, 2017.

BG-JAP joint publications



New Tile

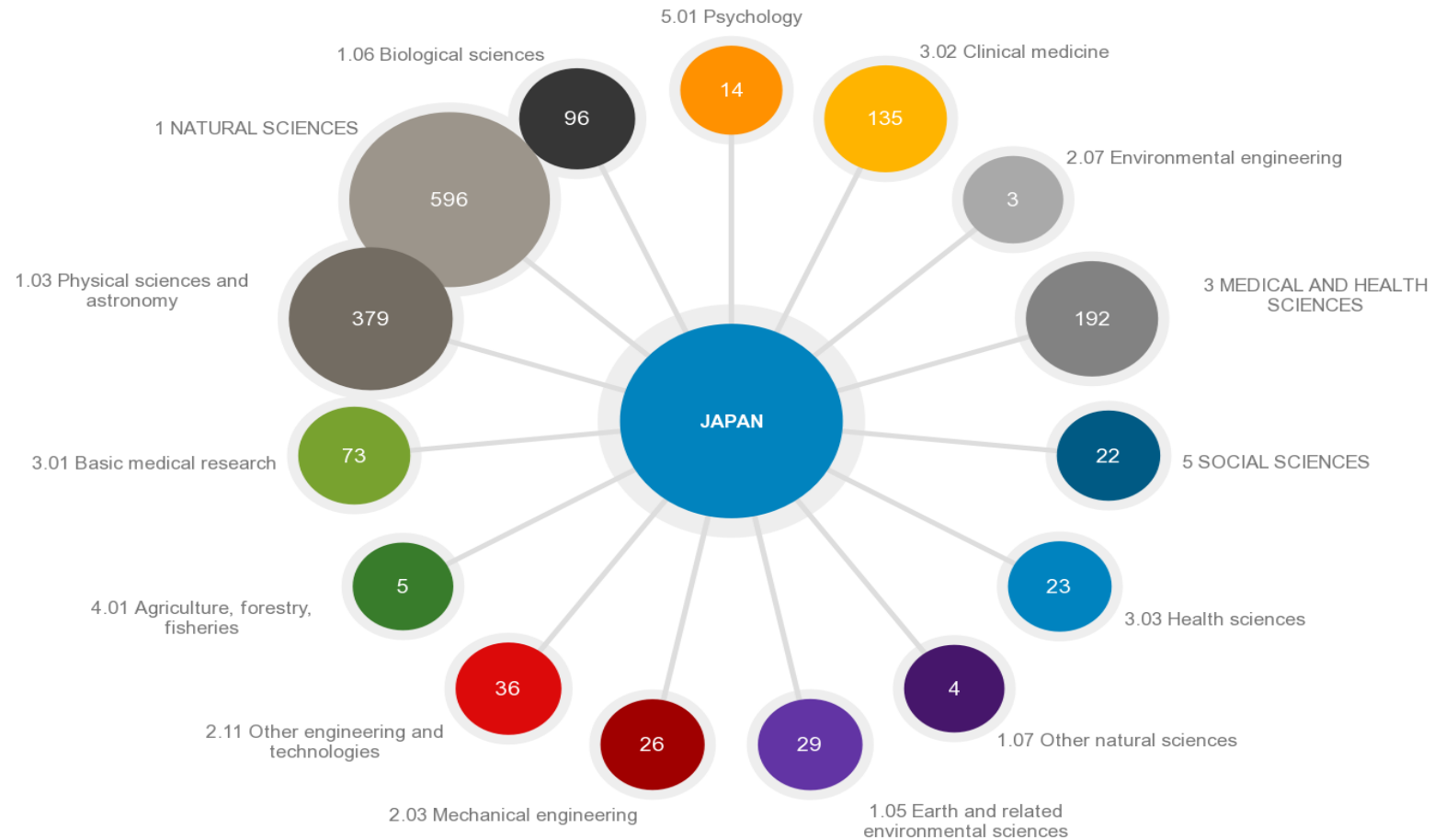


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JAP-BG Research domains



New Tile



OPEN SCIENCE



Open Science is about greater collaboration, access and reuse of results and is the foundation of excellence in science and future prosperity. The EU is now not only the largest producer of scientific publications in the world, but has also become the largest producer of high quality publications and is reducing the gap with the US in other metrics of scientific quality. On the other hand, the intensity of knowledge circulation and therefore the openness of the EU's science system still lags behind that of its main competitors. More needs to be done to equip the EU with a high quality science base and to strengthen the EU's position as a global leader in open science.

Share of publications available in Open Access (2014)

Country	Weight in GDP	Total OA	Gold OA	Green OA
HU	0.7%	59.2%	25.8%	51.1%
BE	2.7%	57.9%	22.5%	51.3%
PT	1.2%	59.0%	19.6%	52.4%
BG	0.3%	59.0%	19.2%	50.0%
CH	3.5%	58.0%	25.0%	50.6%
NO	2.5%	57.4%	26.2%	50.0%
LT	0.2%	57.6%	24.3%	47.4%
IS	0.1%	56.4%	21.7%	51.7%
CY	0.1%	56.4%	20.9%	48.3%

Source: Computed by Science-Metrix using 1science data, EC

Update of the National Strategy for development of scientific research 2017-2030

- The Strategy has the ambitious goals to:
 - *become an attractive destination for innovation research and development of new technologies;*
 - *to keep the young talented people in Bulgaria;*
 - *to strengthen the integration of Bulgarian science in the society;*
 - *to raise the international prestige and authority of the country in the field of science;*
 - *achieve economic growth and significant improvement of the quality of life in the country.*
- The new strategy covers the period until 2030 and it offers a fast, scalable and long-term development of the research system in order to raise the international prestige of Bulgaria as an attractive center for modern scientific research and development of new technologies to keep young talents in the country and achieve economic growth.

Three stages of implementation of the Strategy

1. recovery stage (2017 - 2022);
2. stage of accelerated development (2023 - 2026);
3. stage of research on a global level (2027 - 2030).

By 2022 state funding for scientific research should be increased threefold - to 0.7% of GDP and to reach 1% in 2025.

The idea is the increase of public funding to cause an accelerating effect on private funding, which to increase to 1.5% in 2020 and 2% of GDP in 2025.

An Executive Research Agency to the Ministry of Education and Science

- Purpose and activities:

- to manage and support research in the research organizations and universities in Bulgaria;
- to continue the project funding of the scientific research;
- creation of various programs: for financing of career development of researchers, for applied research, for development of research centers, for international cooperation, as well as development of specialized and sectoral programs for research.

New criteria for assessment of researchers

- the assessment of the researchers will affect the formation of their salaries;
- the basic remuneration will be fixed for the separate scientific positions and it will be covered by the state subsidy for the research organization or university;
- the remuneration range will be linked to the average salary for the country for the previous year;
- additional incentives depending on specific research results;
- change in the procedure for promotion to chief assistant professor
Young researchers will be able to apply for this position based on a dissertation paper and will not have to apply by going through an examination process

Consistency of the Strategy with:



- National Development Program : Bulgaria 2020;
- National Reform Program, update 2016;
- Innovation Strategy for smart specialization of the Republic of Bulgaria 2014-2020, and process of smart specialization;
- National Strategy for Research Development 2020;
- Strategy for Development of Higher Education in the Republic of Bulgaria for the period 2014-2020
- Opinion on the problems of Bulgarian technological development.
- Europe 2020: Strategy for smart, sustainable and inclusive growth;
- EU Framework Program for Research and Innovation “Horizon 2020”;
- European Research Area Roadmap;
- Partnership Agreement of the Republic of Bulgaria for the European structural and investment funds 2014 - 2020;
- European Commission (2015), Peer Review of the Bulgarian Research and Innovation system;
- Council Recommendation on the National Reform Program of Bulgaria for 2016 dated 12 July 2016 and containing a Council opinion on the convergence program of Bulgaria for 2016;
- Working Paper from the Commission’s administration: Report on Bulgaria for 2016;

As concerns HORIZON 2020....



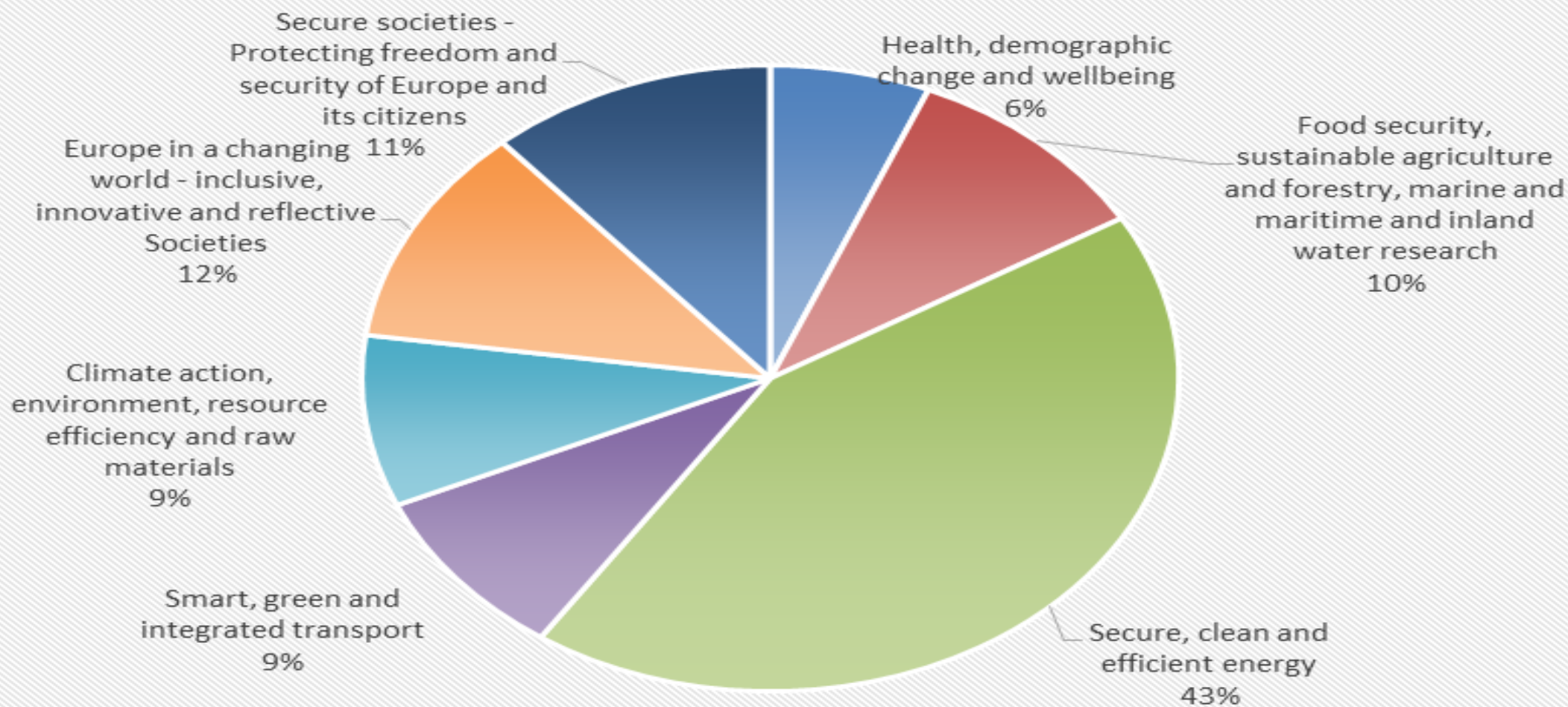
By the present moment 150 Bulgarian research organizations implement 252 projects under the Framework program “Horizon 2020” since its beginning in 2014 г. for the total amount of 42 mln. euro. This ranks Bulgaria to 24th place among the 28 member states of the EU as concerns participation and adoption of funding.


The most investments are concentrated in the areas of:

1. **„Secure, clean and effective energy“ – 6 731 124 euro**
2. **“Information and communication technologies” - 3 463 790 euro**
3. **“Marie Skolodowska-Curie“ actions - 3 234 681 euro.**

According to the latest statistics the **top 5** research organizations in number of H2020 projects are: Sofia University „Sv. Kliment Ohridski“, Medical University – Varna, „Ontotext“ AD, The Institute of Mechanics and the Institute of information and communication technologies at BAS.

Bulgarian Participations data within the Societal Challenges



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- Research infrastructures are the center of the **knowledge triangle**: education, research and business.
 - The Ministry of Education and Science (MES) of the Republic of Bulgaria undertook a mapping of research infrastructures, equipment and apparatus, throughout the country between December 2015 and February 2016
 - The universities and research institutes were visited by a relevant independent expert, assigned by MES, who verified the existing research infrastructures, human resources, exploitation life of the research equipment, project financing and the availability of key partners.

Diagnostic Review Mapping of Research Infrastructures and Research Equipment in Bulgaria

- As a result, the following 161 research infrastructures were identified: 57 in the Physical, Material Science and Engineering; 61 in the medical and agro-bio sciences field; 29 in the social science and humanities, and 14 infrastructures in the E-infrastructure for multidisciplinary research field.
- This report aims to contribute to the vision for Bulgaria to have modern and sustainable research infrastructure for the development of high quality scientific research and training.
- To respond to this, the document adds value in terms of providing information and analysis in order to:
 - Give more visibility to available research infrastructure and equipment, thus giving more weight to future science policy of the government;
 - Avoid duplication in future purchases of unique and expensive research equipment through European and national funding;
 - Provide opportunities for Bulgarian research infrastructures to integrate with Pan-European Research infrastructures.

Priorities of the Ministry of Education and Science for 2017

- Communication and collaboration with the Bulgarian scientific diaspora and draw back the trust of the young scientists in the national science;
- 2017 will be the first year when Bulgaria will make an independent evaluation of scientific results and according to them will be decided the financing for science. It is important all resources for science to be evaluated and monitored – for what exactly they are spent, what is the effectiveness and the real benefit for the society to develop science and research;
- The forthcoming Bulgarian chairmanship of the Council of the EU in the first half of 2018 is of great importance for the development of science as concerns the preparation of the new European Framework program for research;
- Budget for funding of Centers of competence and Centers of excellence - 350 mln. BGN (≈170 mln. EUR) within the Operational program „Science and education for smart growth“.

MAIN CONCLUSIONS

- The Bulgarian science should be modernized by 2022. By 2026 the system should have reached the average European level. And by 2030 research in Bulgaria should have reached a global level.
- The main purpose of the new draft of the Strategy is Bulgaria to become a regional center for advanced research and development of new technologies, as well as to restore the country's international scientific authority.
- The draft of the Strategy suggests the establishment of research and innovation complexes throughout the country and to attract partners from the business for this purpose (Active participation in the development of these complexes should have the local and regional authorities as well as leading partners from abroad. These organizations will be funded through various sources, including those from the EU Structural Funds.)



Thank you for your attention!