Horizon 2020 Policy Support Facility

Background Report - Georgia

K. Schuch, M. Chitashvili, C. Spani, P. Markianidou, A. Doranova

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Structure of the Report (1)

- Executive Summary
- Social and Economic Situation in Georgia
  - Societal challenges
  - Structure of the Georgian economy
  - Patent based specialisation analysis of the Georgian economy
  - Integration in the global economy
- Governance of the R&I System
  - Policy making structure
  - Legal acts and implementation
  - Research and innovation strategy and policy mix

Structure of the Report (2)

- Financing of R&D in Georgia
  - System and extent of governmental funding of R&D
  - Private and other national funding sources
  - Foreign funding of R&D
- Research Performers
  - Higher education institutions
  - Public research organisation
  - Business enterprise sector and other
- Quality of the Science Base
  - Positioning scientific excellence along bibliometric indicators
  - R&D infrastructure

Structure of the Report (3)

- Human Resources
  - Education overview of the Georgian population
  - Tertiary education
  - The situation of researchers in Georgia
- International R&D Cooperation and Mobility
  - R&D cooperation and mobility with the EU
  - R&D cooperation and mobility with other regions and countries
- Framework Conditions for Science-Business relations
  - General policy environment for business
  - Knowledge markets and science-business relations
  - Young innovative companies
- References
- Annexes

Today's focus

1. Overview on the socio-economic and political situation
2. Overview on the national system of research and innovation
3. Scientometric analysis

Population (data from World Factbook if not otherwise indicated)

- 3.7m Population without breakaway regions (http://www.geostat.ge/cms/site_images/_files/english/population/According%20to%20preliminary%20results%20of%20the%202014%20population%20census%20Final.pdf); http://www.geostat.ge/index.php?action=page&p_id=473&lang=eng)
- Ethnic groups: Georgian 86.8%, Azeri 6.3%, Armenian 4.5%, other 2.3% (2014 est.)
- Age structure: 18.08% (0-14y), 11.94% (15-24y), 40.96% (25-54y), 13.01% (55-64y), 16.01% (>64y) [EU: 15.5%, 10.9%, 41.8%, 12.9%, 19.1%]; old age = female; relatively high infant mortality rate (15.6/1000 live births)
- Median age: 38y (EU:42.7); 76.2y life expectancy (EU:80.2)
- Population growth rate: 0.% (2017 est.) caused by negative net migration
- Urbanisation rate: 57.4% (Geostat 2014)

Economic figures (data from World Factbook if not otherwise indicated)

- Lower mid-income country
  (http://www.un.org/en/development/desa/policy/wesp/wesp_current/2014wesp_country_classification.pdf)
- GINI-Index: 40.1 (2014) but improving; [Austria 29.2/2013]
- GDP real growth rate 2.7% in 2016; 2.9%/2015; 4.6%/2014
- GDP/capita in PPP: $ 10,000 (est. 2016)
- GDP/sector: services (68.3%; est. 2016), industry (21.6%), agriculture (9.2%) (lot of subsistence agriculture)
- Labour force by occupation: agriculture (55.6%; est. 2016), services (35.5%), industry (8.9%)
- Unemployment rate around 12%

25 years of Georgian politics in a nutshell

- 1991 independence as semi-presidential republic
- 2003 “Rose Revolution” – Resignation of E. Shevardnadze and new election in 2004 with M. Saakashvili as president
- 2008 violent conflict between Russia and Georgia
- 2012 “Georgian Dream Coalition” (backed by B. Ivanishvili) replaced United National Movement party
- 2013 Giorgi Margvelashvili was inaugurated as president; I. Garibashvili replaced Ivanishvili
- Giorgi Kvirikashvili replaced Garibashvili in Dec. 2015
- “Georgian Dream” succeeded in Oct. 2016 parliamentary elections with a constitutional majority

Further policy features

- Breakaway regions: Abkhazia, South Ossetia (not recognised by EU MS)
- Next elections to be held in 2020
- Most important parties (by seats in Parliament):
  - Georgian Dream-Democratic Georgia [Giorgi KVIRIKASHVILI] (115)
  - European Georgia [Davit BAKRADZE] (split from UNM) (21)
  - Alliance of Patriots [Irma INASHVILI] (6)
  - United National Movement or UNM [Nika MELIA] (6)
  - Industry Will Save Georgia (IWSG) [Giorgi TOPADZE] (1)
  - and 1 independent (source: World Factbook)
- 44/176 position in the Corruption Perception Index 2016(between Spain and Latvia; improving and far ahead of other EaP countries)

Main policy orientation

- Free market liberalisation reforms (reducing regulations, taxes and corruption); New Public Management
- Four-year economic plan targeting the tax system, educational standards, infrastructure, and governance
- Popular and government support for integration with the West is high in Georgia
- Joining the EU and NATO are among the country's top foreign policy goals
- In mid-2014 association agreement with the EU signed
- 2016 Trade agreement with China concluded

Cooperation with EU

- Association Agreement in force as of 1 July 2016
- Deep and Comprehensive Free Trade Area (DCFTA)
- EU is Georgia's main trading partner (31%), followed by Turkey (17%), Azerbaijan (10%) and Russia (7%)
- Association to Horizon 2020 in force as of 2016
- Technical Cooperation (more than €100m per year)
  - Mainly via the European Neighbourhood Instrument (ENI) for Public Administration Reform, Agriculture and Rural Development and Justice Sector Reform
- Access to H2020, ERASMUS+ etc. via. EU Regional and Multi-country Action Programmes

Economy (1)

- Main industries: steel, machine tools, electrical appliances, mining (manganese, copper, gold), chemicals, wood products, wine
- Dependency on import of natural gas (Azerbaijan instead of from Russia) and oil products
- Sizeable hydropower capacity that now provides most of its energy needs
- Transit hub for gas, oil, and other goods
- Economy rebounded in the period 2010-16, but FDI inflows not recovered fully
- High share of employment; unemployment remained high

Economy (2)

- Number 1 among EaP countries in the SME Policy Index 2016
- Problems:
  - Access to Finance
  - Skills mismatch in the labour market
  - Low job creation
  - Innovation policies for SMEs
  - Low level of entrepreneurial culture

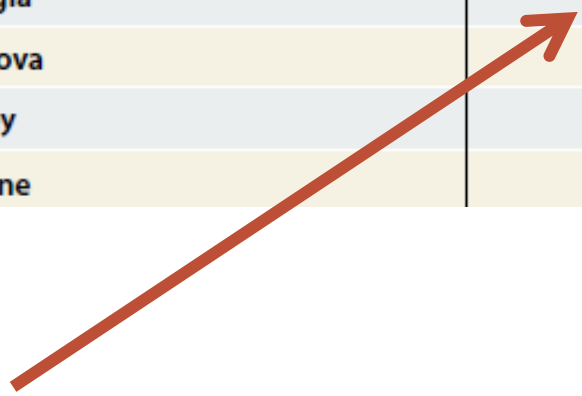
Exports and Imports

- Main exports: ferro-alloys, fertilizers, nuts, scrap metal, gold, copper ores
- Main export partners: Azerbaijan 10.9%, Bulgaria 9.7%, Turkey 8.4%, Armenia 8.2%, Russia 7.4%, China 5.7%, US 4.7%, Uzbekistan 4.4% (2015)
- Main imports: fuels, vehicles, machinery and parts, grain and other foods, pharmaceuticals
- Main import partners: Turkey 17.2%, Russia 8.1%, China 7.6%, Azerbaijan 7%, Ireland 5.9%, Ukraine 5.9%, Germany 5.6% (2015)
- Manufactured exports 8% of GDP (2012) (Armenia: 3.2%, Belarus: 33.8%, Moldova: 11.0%, Turkey: 15.0%)

Sources: World Factbook; https://eeas.europa.eu/delegations/georgia/1237/

High-Tech Merchandise Exports (2008 and 2013)

	Total in million US$*		Per capita in US$	
	2008	2013	2008	2013
Armenia	7	9	2.3	3.1
Azerbaijan	6	42[-1]	0.7	4.4[-1]
Belarus	422	769	44.1	82.2
Georgia	21	23	4.7	5.3
Moldova	13	17	3.6	4.8
Turkey	1 900	2 610	27.0	34.8
Ukraine	1 554	2 232	33.5	49.3



Source: UNESCO

Financial figures and access to finance

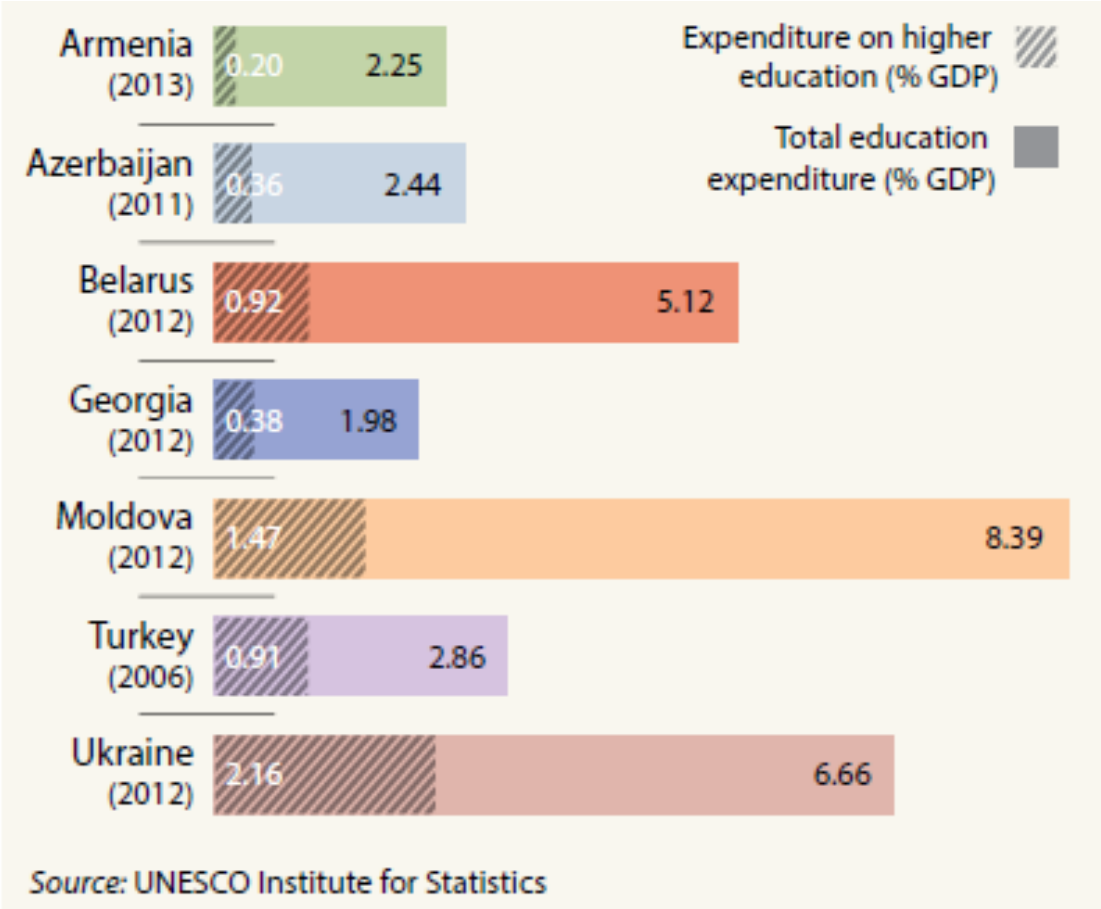
- Budget deficit: 1.9% in 2016 (est.); 42.4% public debt
- Central bank discount rate: 6.5% (7 Sept. 2016)
- Commercial bank prime lending rate: 12.9% (31 December 2016 est.)
- EU4Business data: 15.5% interest on loans for legal entitites and 23% on loans for individual entrepreneurs
- High collateral bank requirments (220% of the loan value)
- Problem to cope with exchange rate (”dollarisation”) and currency devaluation
- Micro-finance lacks capital market and depends on donors

Sources: World Factbook; EU4Business Country Report Georgia, May 2017/

Education

- Three stages
  - Primary (1-6 grade) (obligatory)
  - Basic (7-9 grades) (obligatory)
  - Secondary (10-12 grades)
  - + Higher Education
- Mediocre quality of education
  - Quality of the education system: 95/138 countries (World Competitiveness Report 2016-2017)
  - Quality of math and science education: 100/138
  - Low-level secondary education (PISA, TIMSS etc.)

Government expenditure on education



National System of Research and Innovation

- Governance
- Research Performers
- Researchers
- International Cooperation
- Financing of the system
- Applied R&D and innovation
- Former reviews
- Scientometric analysis

Science, Research and Innovation Government

- Parliament (committee on education, science and culture and on sector economy policy)
- RIC – Research and Innovation Council
  - Created in 2015; chaired by Prime-Minister
  - Different members (agencies, ministries, committees, business..)
  - Tasks: priority setting; programme and instrument definition; eco-system development; start-up support; TT; donor outreach; human resource development in STI; ICT development etc.
- MES – Ministry of Education and Science of Georgia
  - Main implementation body
  - Preparation of Laws
- MESD – Ministry of Economy and Sustainable Development

Laws

- Laws
  - Law on Science, Technology and their Development (1994/2004)
  - Law on Grants (1996)
  - Law on Higher Education (2004)
  - Law on the Georgian National Academy of Science (2007)
  - Law “On Education Quality Enhancement” (July 2010)
  - Law on Innovation (2016)
- Other overarching important documents
  - Social Economic Development Strategy – Georgia 2020 (towards a knowledge based and high-tech driven society)
  - NO National Strategy on the Development of STI in place (but planned)

Science, Research and Innovation Agencies

- SRNSF – Shota Rustaveli National Science Foundation
  - Created in 2006; subordinated to MES
  - Goals: improve the quality of scientific research, internationalisation and support for young scientists
  - More than 20 different programmes implemented mostly on competitive basis
- GITA – Georgian Innovation and Technology Agency
  - Established in 2014; subordinated to MESD
  - Goals: facilitate commercial application and use of innovations
  - Activities: Start-up support; innovation infrastructures
- MoU on applied research between GITA, SRNSF, Skapatenti and RCI … but …

National Academies of Science

- GNAS – Georgian National Academy of Science
  - Once powerful with more than 50 research institutes; since 10 years similar system like Estonia (research institutes mostly at HEI)
  - Since 2016 directly subordinated to the Georgian government (not anymore MES) as consultative body (forecast, priority setting, popularisation of sciences, publishing, awards, evaluation of research in HEI …); financed by state budget
  - No clear strategy nor implementation plan for GNAS activities
- GAAS – Georgian Academy of Agrarian Science
  - Subordinated to MES and financed by state budget (basic salaries and running costs)
  - Creation of a training centre for farmers and specialists in 2015

Public Research Organisations

- Subordinated to MES
  - Korneli Kekelidze National Centre of Manuscripts
  - Ivane Berithasvili Centre of Experimental Biomedicine
  - Giorgi Eliava Institute of Bacteriophage, Microbiology and Virology
- Others
  - National Centre for Disease Control (incl. Richard Lugar Center for Public Health Research) subordinated to Ministry of Labour, Health and Social Affairs
  - Science and Technology Centre DELTA subordinated to Ministry of Defence

Higher Education (1)

- Based on Law on Higher Education (Dec. 2004) – implemented incl. autonomy of HEI
- 75 authorised HEIs, 55 of them private
- Differentiated by research universities (incl. PhD), teaching universities and colleges (only bachelor programmes)

HEIs	Public	Private	Total
University	12	20	32
Teaching University	7	21	28
College	1	14	15
Total	20	55	75

- Same quality criteria for all; monitored by the National Centre for Educational Quality Enhancement (NSEQE)
- High regional concentration in Tbilisi (68%)
- Hardly any R&D in private universities; low embedding in economy
- 2 Rectors conferences are operational (public and private HEI)

Higher Education (2)

- Majority of HEI is funded through tuition fees; private HEI are self-funded (need to attract solvent students)
- State grants/subsidy only for ¼ of students
- Tuition fee between 1,500 GEL (€572.5) and 2,250 GEL (€859.0) for first cycle (€859 and €6,412 for second cycle); even higher in foreign language courses and private HEI
- Third cycle students often funded directly by a HEI or a grant from SRNSF; reduced fees for PhD students (€95.4 to €859.0) or free doctoral programmes
- Most expensive: law, business administration and medical education
- Several HEI have LLL policies in place (TEMPUS was supportive)
- Problem is the free access from vocational to higher education

Higher Education (3)

- Number of students enrolled in Georgian HEIs

	Bachelor	Medical education	Master	PhD	Total
Number of students	146.662	12.454	24.144	6.797	190.057
% of total	77.16%	6.54%	12.70%	3.60%	100%

- Trend towards more PhD students (from 864 freshmen in 2013/2014 to 2,405 in 2016/2017 in public HEI); 55% female
- 469 doctoral graduates in 2016; out of which 144 in STEM
- Some support for young researchers (national: Presidential Grants; Outgoing Grants; Grants for PhD students; international: Early Career Scholar grant by CRDF, Joint Research and Education Programme by Jülich, MSC-fellowships …)
- Scarcity of new positions

Fields of PhD Students

	2007	2008	2009	2011	2012	2013
Number of PhD students, total	786	1588	2986	4266	3040	3213
Number of PhD students by the field of science						
Education (teachers)	30	88	141	135	235	164
Humanities and Arts	176	340	628	756	634	570
Social sciences, business and law	480	709	1046	2096	919	1304
Science	12	195	343	564	607	508
Engineering, manufacturing & construction	62	107	373	385	344	338
Agriculture	22	69	192	65	5	15
Health and welfare	4	74	195	168	212	255
Services	-	6	68	97	84	59

Research in HEI

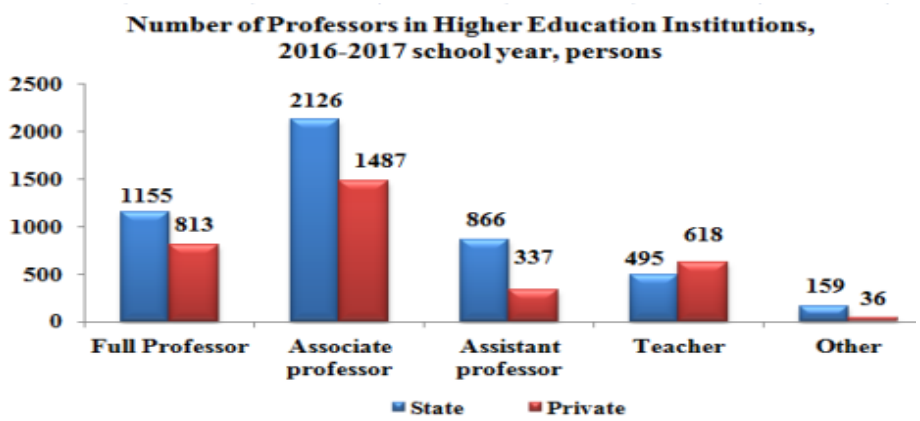
- 7 of the 32 research universities are considered as main R&D performers
  - Tbilisi State University (TBS) is the largest with 15 former research institutes in natural and exact sciences (merger in 2010)
  - Ranked as only university in the region in THE World University Ranking between 800+ in 2016/2017
  - On place 187 in physics
  - Publishing activities most in mathematics, physics, biology and biotechnology, chemistry, clinical medicine and social science
  - Teaching and research hours are considered in job profiles at TBS
  - From the other 6 top universities one is not a Legal Enterprise based on Public Law (LEPL)

Other Actors

- 20-25 NGOS are mainly involved in R&D support projects, political analysis, socio-economic studies, statistical observations, eco-monitoring etc.
- Patent Office “Sakpatenti”
- Georgian Research and Development Foundation (GRDF) – connected to CRDF
- Technology Transfer Centre of Georgia (TTCG)

Researchers

- No clear statistics (problem with FTE)
- Around 6,800 academic positions (without teachers) in HEI (headcount)



- 80% supposed to be active in R&D (high % in population); more than 5,300 in database of SRNSF; 44% are female
- Increase of salaries in 2015 (by approx. 250%)
- Ageing is a problem (30% older than 65y; average 56y)

Strong R&D sectors

- Materials sciences and nanotechnology
- Biotechnology and pharmaceuticals
- Health
- Agriculture, food chemistry
- Engineering/special machines

- BUT problems with technical infrastructure

International Cooperation

- Mainly exercised by MES and SRNSF
- Frequent participation in ISTC/STCU projects
- Association to Horizon 2020; but still low participation (16 projects; €1.6m funding) (49 participations in FP7)
- Low participation in COST as Near Neighbourhood Country
- Strong cooperation with CRDF/USA (different schemes)
- Bilateral cooperation with Forschungszentrum Jülich, CERN, Dubna, CNRS, TUBITAK, CNR, etc.
- NATO science for peace
- SCOPES (Switzerland), SATREPS (Japan) ….

Financing of R&D

- GERD est. 0.3% of GDP in 2016 (72m GEL; most from MES [~50% to competitive funding] and 5.6m from MESD)
- State directly subsidises (part of) salaries and running costs (core funding) for research institutes at universities
- Tuition fees as important income source for universities
- SRNSF Budget tripled to 32m GEL in 2016 (Most important are State Grants for Fundamental Studies; for Applied Research; for international research coop.)
- GITA: 6.3m GEL (2015) (mostly for TechPark Tbilisi)
- Almost no BERD; weak ad-hoc or inexistent links between business and academia

MES Core Public Funding 2016

- Academy of Sciences: 4.25m GEL
- Agrarian Academy of Sciences: 1.214m GEL
- Research institutes outside universities ("Scientific Organisations Programme"): 5.145m GEL
- Research institutes within universities ("Restoration and Development of Science Programme"): 22m GEL

Source: increast – Country Report SRNSF from August 2016

Applied R&D and innovation (1)

- High positioned on the political agenda
- GITA is very active with concrete initiatives (FabLabs, iLabs, training, TechPark Tbilisi etc.)
- Start-ups are encouraged
- BUT: hardly any knowledge intensive innovations
- No tax based funding for R&D in place
- Direct collaborative funding schemes:
  - State Grants for Applied Research (SRNSF), 20% co-financing
  - Science and Technology Entrepreneur Progamme (SRNSF and CRDF Global); 15% co-financing
    - HOWEVER, these schemes did not prove to be successful

Applied R&D and innovation (2)

Indicator	Value	Rank (out of 140)
12.01 Capacity for innovation	3.4	121
12.02 Quality of scientific research institutions	2.8	119
12.03 Company spending on R&D	2.5	127
12.04 University-industry collaboration in R&D	2.6	128
12.05 Gov't procurement of advanced tech products	3.0	95
12.06 Availability of scientists and engineers	3.3	113
12.07 PCT patents, applications/million pop.	1.6	60

Source: WEF, Global Competitiveness Index 2015/2016 taken from www.increast.eu/en/132.php

Reviews (1)

- Creating an effective model of science administration – (TACIS) 2006. Main issues:
  - Lacking overall concept
  - Weak material and technical basis (research infrastructures)
  - Integration/cooperation of academic research and HE
  - Outflow of qualified personnel
  - Degradation of the status of intellectual labour – negative public opinion; Low salaries
  - Weak financing of R&D institutions
  - Need to form agencies to award competitive grants
  - Development of new research aligned to Georgian economy
  - Commercialisation of research outcomes
  - Strengthening of Internationalisation

Reviews (2)

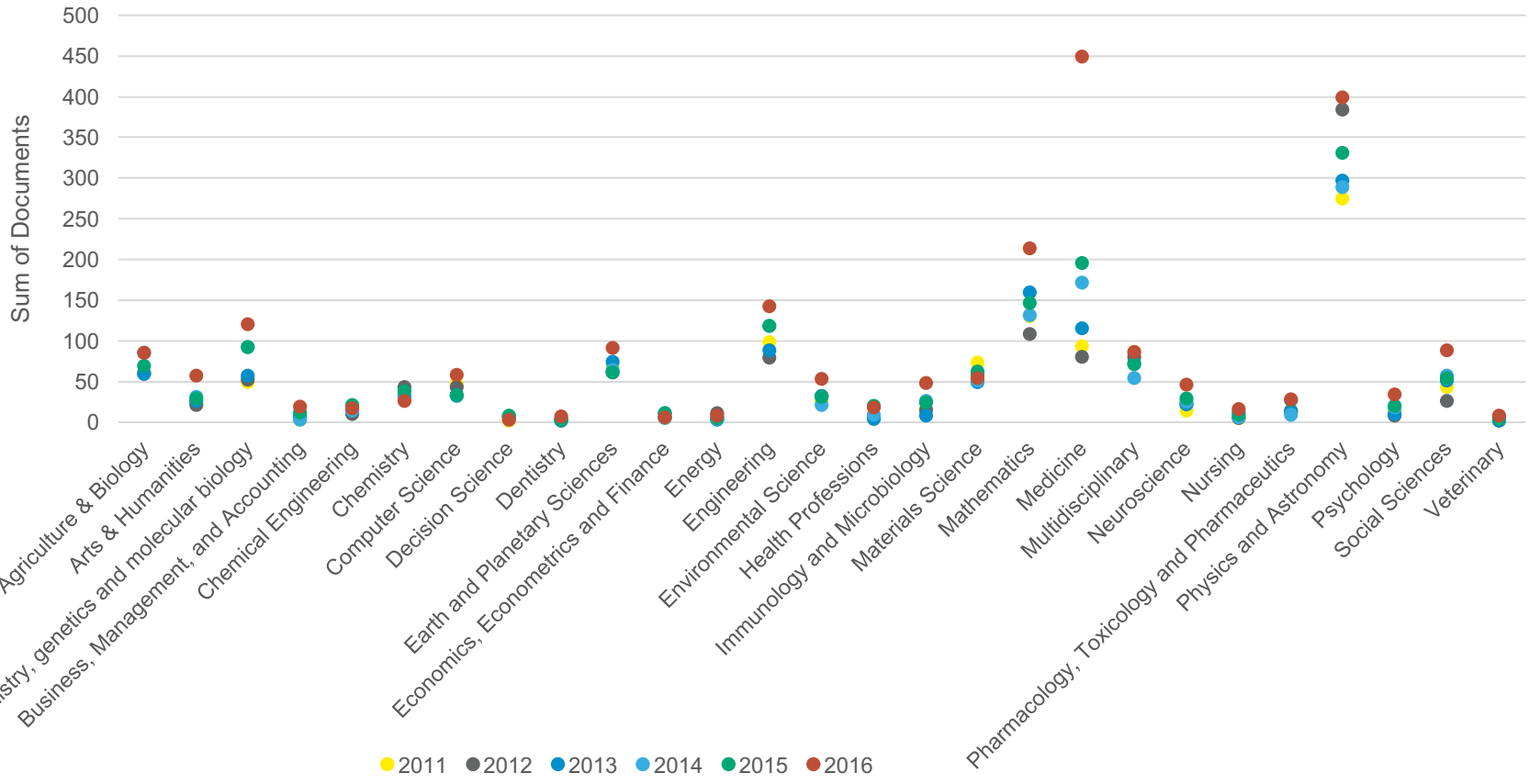
- Policy Mix Peer Review of the Georgian STI System (INCO NET EaP, FP7), 2015
  - Lack of a coherent STI Policy incl. Vision and Roadmap
  - Improve system coordination and communication; reduction of fragmentation, removal of barriers and better planning
  - Broad consultation process to identify priorities
  - Creation of a positive role of/for STI
  - Increase level of funding substantially, oriented to priorities
  - Still weak integration of research institutes in HEI
  - Better exploitation of opportunities provided through the accession to Horizon 2020 – strategic approach (incl. diaspora)
  - Improving STI indicators; introduce monitoring and evaluation

Bibliometrics

- Publication output increasing from a low level
- 60% of output are international co-publications
- Main cooperation partners are from
  - USA
  - Germany
  - Russia
  - Italy
    - UK, France, Spain, Poland, Switzerland, Austria, Greece, Turkey, Portugal, China, Armenia, Brazil, Czech Republic, Hungary, Serbia, Taiwan, Belarus, Colombia, Romania, Australia

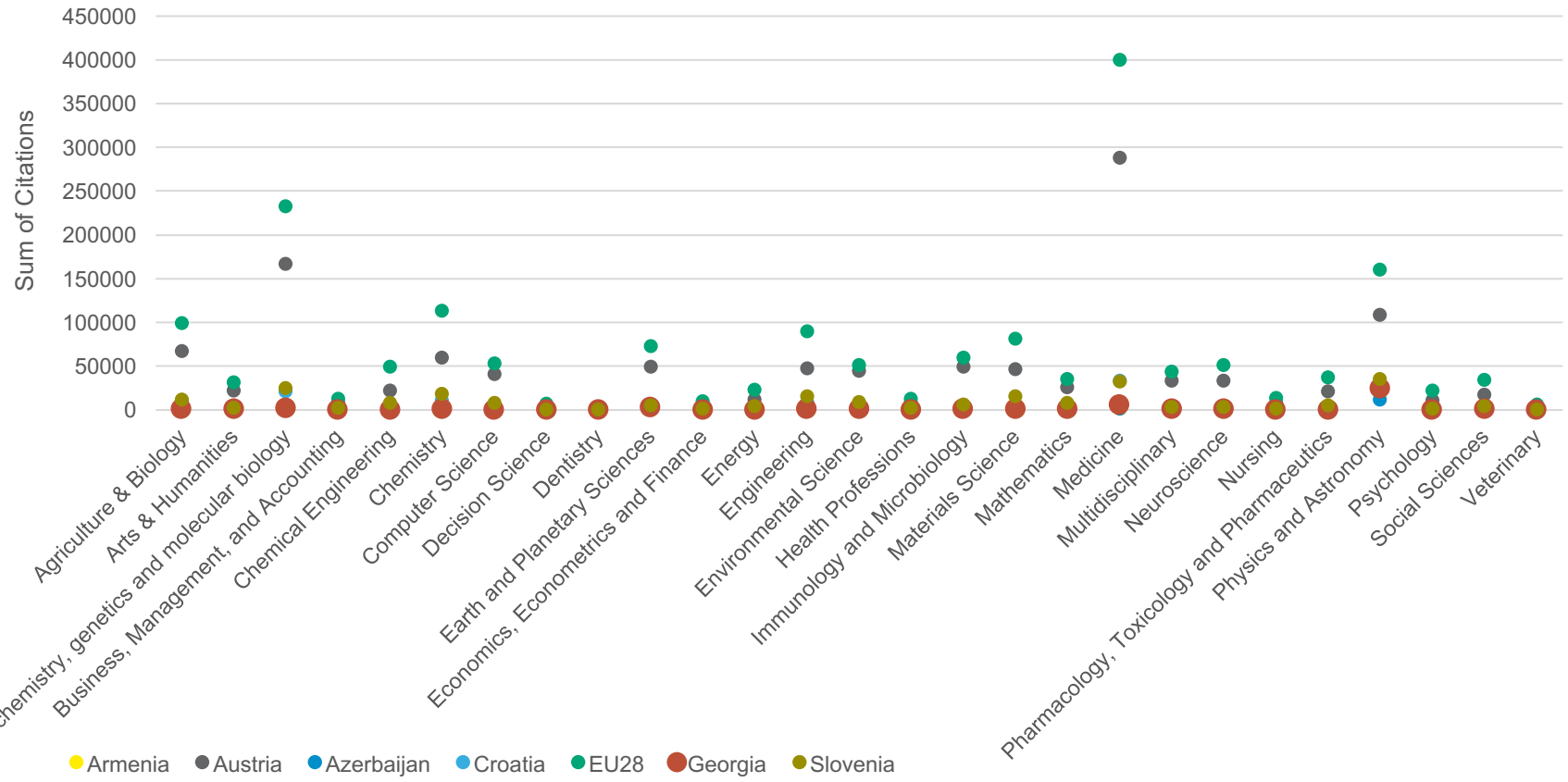
Bibliometric Analysis

- Documents in Georgia from 2011 to 2016 - by subject area from SCImago (source: Scopus)



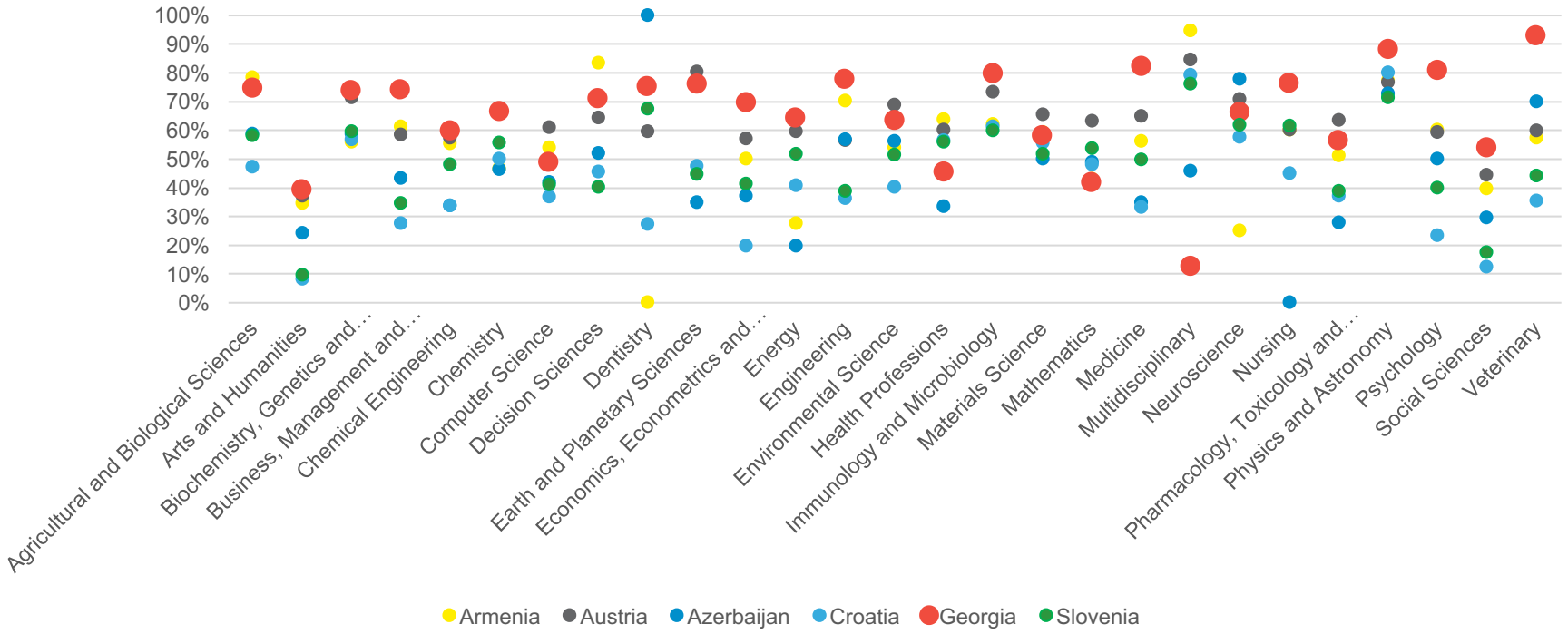
Bibliometric Analysis

- Citations - by country and subject area from SCImago (source: Scopus)



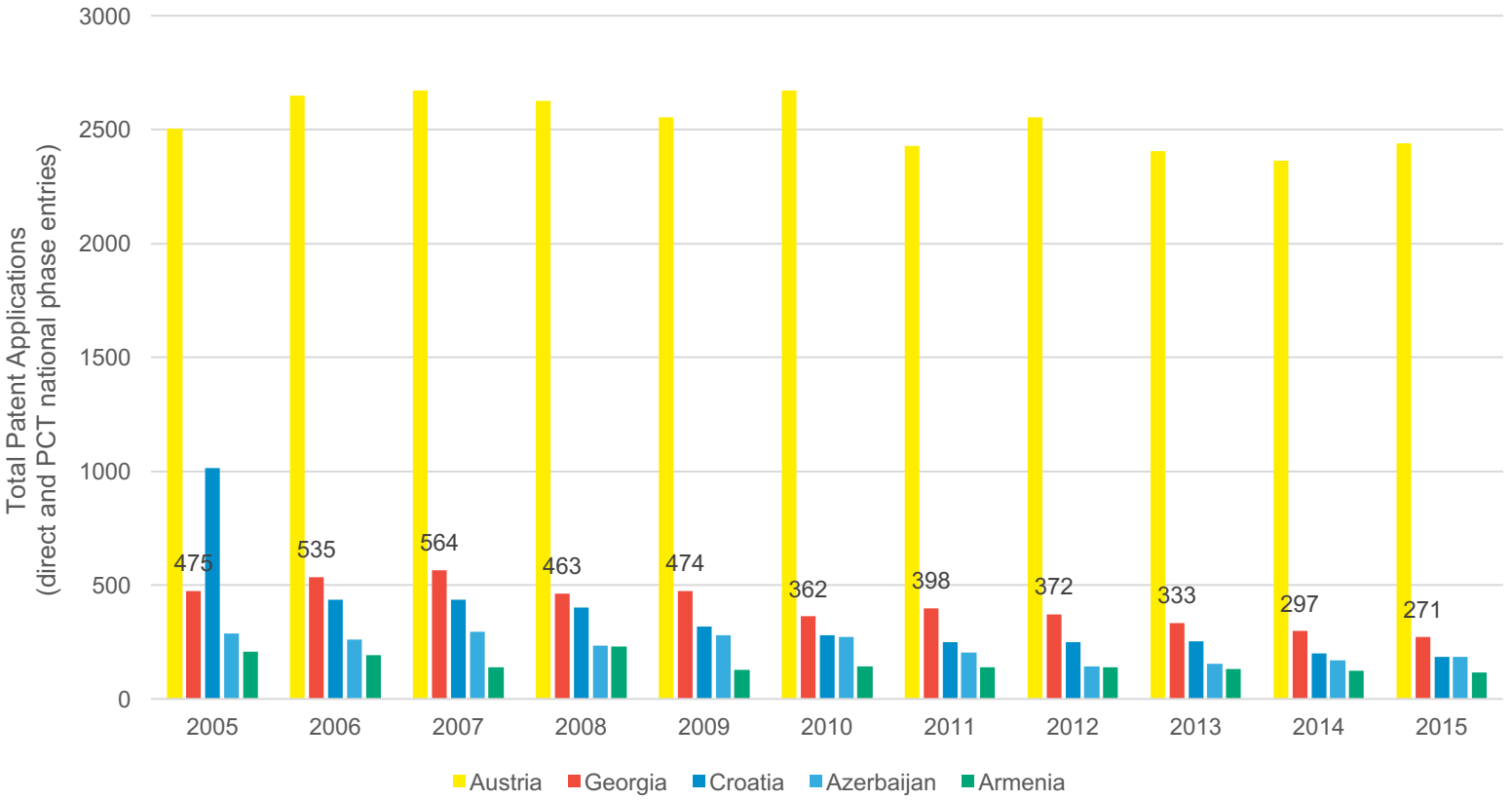
Bibliometric Analysis

- International co-publications - by subject area (source: Scopus)



Patent Analysis

- Patent Applications from 2005 to 2015 – by country, Total count by filing office
  - (source: WIPO statistics database)



Patent Analysis

- Patent Applications – by country and top fields of technology in 2015, Total count by filing office (source: WIPO)