





Identification and setting of scientific priorities in Georgia

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#### SUPPORTING INTER-SECTORAL COLLABORATION POSSIBILITIES BETWEEN RESEARCH AND INDUSTRY







**DLR Projektträge** 









## Scientific priorities vs Scientific disciplines

## **Scientific priorities**

- Address research needs from
  - Society
  - Business Sector
- Inform funding programmesCan help to overcome existing silos in the science sector

e.g., Quantum research and technology; Smart Cities; Artificial Intelligence; Renewable Energy and climate change; Mobility; Production Technologies

## Scientific disciplines

- Have grown as a concept over decades and even centuries
- Reflect mainly organisational structures in academia
- Are a unit of analysis for the assessment of productivity and for benchmarking in science (i.e. bibliometrics)

e.g., Natural Sciences; Medical and Health Sciences; Health biotechnology; Agricultural Sciences; Social Sciences; Humanities













### The priority setting process

### Stakeholder-Dialogue





## **What are Priorities**

**Functional Priorities** 



- refer to generic challenges in a national or regional science and innovation system
- address issues such as technological diffusion, start-ups, academia-business linkages, qualification, IPRs, etc.
- **complement** thematic priorities and may also have a **cross-cutting** character

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- address research needs from Society and/or the Business Sector
- aim at **fostering collaborative actions** of industry and the science sector
- Examples:



## **Funding of Science**

	Funding by Thematic Priorities	Funding by Science Fields (Disciplines)
Advantages	<ul> <li>Very good ability to adopt to emerging trends</li> <li>Strong potential to adress challenges from society and / or the business sector</li> <li>Strong potential to promote private sector investments in R&amp;D</li> </ul>	<ul> <li>(Relatively) stable framework</li> <li>No inital consultative effort needed</li> </ul>
Disadvantages	<ul> <li>Big initial effort needed to identify relevant priorities</li> <li>Need of periodic adjustments (every 7 to 10 years)</li> </ul>	<ul> <li>No involvement of the business sector</li> <li>No possibility to fund interdisciplinary projects</li> <li>No possibility to address societal needs properly</li> <li>Difficulty to adopt to emerging trends</li> </ul>











## **Initial Priority Domains**



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საქართველოსთვის

- Strong national science base (i.e. specialisation patterns based on bibliometrics and / or patenting)
- **High national economic relevance** (i.e. high share in employment, high expert shares, strong economic growth, cluster development)
- Global challenges and / or priorities (e.g. climate change)



- Information and Communication Technology (ICT)
- Arts and Humanities/Cultural Heritage
- Innovative Medicine
- Food and Agriculture
- Renewable Energy
- Circular Economy













### **Synthesising Overview**

Thematic / Functional Priorties	Information and Communication Technology	Arts & Humanities /Cultural Heritage	Food and Agriculture	Renewable Energy	Smart Health	Circular Economy
Development of a national knowledge base	•	•	•	•	٠	•
Development / Provision of Research Infrastructures	•			•	•	•
Provision of shared labs and testing /prototyping		•			•	
facilities						
Regulations and laws			•		•	•
IPR		•				
Adoption / Development of Standards	•				•	
Commercialisation / Internationalisation	•	•	•		•	
Creation of public awareness				•		•
Creation of awareness among business	•				•	•
Development of national sector / technology strategy	•			•		











## **Initial Priority Domains and Subfields**

Priority Domain	Subfields
ICT	<ul> <li>IT Services and interoperability</li> <li>Cybersecurity</li> <li>Artificial Intelligence</li> </ul>
Arts and Humanities/Cultural Heritage	No subfields
Innovative Medicine	<ul> <li>Research to support the development of Innovative Health Systems</li> <li>Bacteriophages</li> <li>Herbal Medicine</li> </ul>



## **Initial Priority Domains and Subfields**

## **Priority Domain Subfields**

- Research to support Food Quality and Safety
  - Future Farming and Agricultural Technologies
- Renewable Energy Research to support the development of Circular Economy
  - Green Hydrogen
  - Solar Energy
- Circular Economy

Food and

Agriculture

- Research to support the development of Circular Economy
- Circular Economy for Construction and Demolition Waste



## ICT: Functional Priorities

Priority Subfield	Functional Priorities
IT Services and	Development of a national technological knowledge base:
interoperability	<ul> <li>Education and Training of IT Specialists</li> <li>Upgrade of existing trainings at universities</li> <li>Creation of awareness of IT issues (e.g. Cybersecurity) among companies</li> <li>Positioning of Georgia as a location with competitive advantage for outsourcing by international companies (i.e. Low wage rates/labor costs)</li> </ul>
Cybersecurity	<ul> <li>Development of a national technological knowledge base:         <ul> <li>Education and Training of Cybersecurity Specialists</li> <li>Programming skills and advanced knowledge in mathematics (Students, with soldiers)</li> </ul> </li> <li>Integration of cybersecurity policies into standards and guidelines</li> <li>Creation of awareness on cybersecurity among companies and promotion of effective training and cyber exercises</li> <li>Fostering of cooperation and networking activities for sharing the experience in Cybersecurity (e.g. with Ukraine and Lithuania)</li> </ul>
Artificial Intelligence	<ul> <li>Strengthening partnerships between the universities and private organizations for AI teaching, research and application</li> <li>Certification of AI skills and training related to Natural Language Processing</li> <li>Development of a national AI strategy</li> <li>Provision of laboratory capacities for AI</li> </ul>



# ICT: Thematic Priorities

Priority Subfield	Themes	
IT Services and interoperability	<ul> <li>Virtual museum: 3D models of artifacts, reconstruction. Multimedia and VR technologies in the visualization of artifacts. Virtual reconstruction of historical environment and built reality (Augmented Reality).</li> <li>Complex environmental monitoring systems in the maintenance and protection of cultural heritage monuments</li> <li>IOT (Internet of things): climate and environment based on technology-based monitoring systems; online data collection, automatic processing (Big data, facial recognition methods), and decision-making algorithms.</li> <li>Security by design</li> </ul>	
standards and guidelines	• Security by design	
Cybersecurity	<ul> <li>Programs minimizing the risk of economic damage due to malfunctions or manipulation of sensitive data</li> <li>Security by design</li> <li>Software solutions for critical infrastructures</li> </ul>	
Artificial Intelligence	<ul> <li>Natural Language Processing</li> <li>Ethics related to the use of AI</li> </ul>	





- Legislative support: Protection of Copyright and other IPR
- Human resources: promotion of academic training; education at school
- Provision of creative (multifunctional) spaces including technological infrastructure for prototying (e.g. furniture)
- Provision of a supporting framework for the internationalization of cultural products; supporting activities to anchor young artists internationally
- Branding and story telling in realtion for cultural heritage and products in the creative sector
- Provision of managerial skills in relation to cultural heritage and cultrual products with a stronger emphasis on economics







**Arts and Humanities/Cultural Heritage: Functional Priorities** 







## **Arts and Humanities/Cultural Heritage: Thematic Priorities**



- New research methodologies in cultural heritage (including IT)
  - Economic Studies on indirect benefits and / or the value of cultural heritage (monetarization)
- Statistical data on culture, and economics of culture; Survey of creative industry/cultural heritage;
- Digital instruments related to Georgian language (e.g., spell checker)
- Mapping of potential cultural heritage layers (GIS)
- Digitisation: Digital Storage and preservation; combining needs of cultural heritage and new digital methods (which digital tools, devices can support different cultural heritage)
- Interdisciplinar projects combining science/technology with Arts & Humanities; Merge science and practitioners















### **Smart Health: Functional Priorities**



Priority Subfield	Fuctional Priorities
Research to support the	• Adoption of EU regulatory frameworks; e.g. EC Directive 10/63 (on the protection of animals used for
development of Innovative	scientific purposes), Regulation on biomedicine
Health Systems	<ul> <li>Ensuring Quality of research: Evaluation criteria need to be harmonized (i.e., GE and International); quality / standards need to come to common terms in order to access international programmes</li> <li>Development of a national knowledge base: long term development of capacities for education and training of young scientists</li> <li>Funding of research infrastructure (i.e. laboratories and equipment)</li> <li>Provision of shared laboratory spaces for companies</li> <li>Make existing research capacities visible for business</li> </ul>
Bacteriophages	<ul> <li>Industrial production of phages requires a clearer legal framework and clear and transparent research</li> <li>Development of a national knowledge base: long term development of capacities for education and training of young scientists</li> <li>International standards – manufacturing practice is missing</li> <li>Public support on the commercialisation of research results</li> </ul>
Herbal Medicine	<ul> <li>Establishing a regulatury framework to be able to access international markets; i.e. quality issues</li> <li>Funding of research infrastructure (i.e. laboratories and equipment)</li> <li>Promotion of new infrastructural investments for Herbal Medicine</li> <li>Public support in the promotion of herbal medicine on local and internationale markets</li> </ul>





## Smart Health: Thematic Priorities



Priority Subfield	Themes
Research to support the	<ul> <li>Creation of new types of analgesic drugs</li> </ul>
development of Innovative	
Health Systems	
Bacteriophages	<ul> <li>Selection of specific phages for personalized treatment</li> </ul>
Herbal Medicine	<ul> <li>Safety of herbal medicines and reliability of their use, their complexity to eliminate diseases</li> <li>Studies about effectiveness of specific herbal medicines</li> <li>Mapping of space for cultivation and potential production capacities</li> </ul>













#### EU Twinning in Science-Business links

## Food & Agriculture: Functional Priorities

#### **Priority Subfield**

**Research to support Food Quality and Safety** 

#### **Functional Priorities**

- Provision of safe and reliable testing and diagnostic laboratories operating across the country
- Filling the gap on Legal and political regulations / to fulfill the European requirements on regulations (accreditation requirements)
  - Capacity development for entering the European market in Agriculture, Food Industry, Science and Government
    - knoweledge on relevant regulations
    - o national framework to meet regulations
  - Development of a national knowledge base for Food safety and quality
    - Training and education of researchers
    - Training of companies
  - Introduction of a PHD program for food safety in Georgia
  - Commercialization of new technologies GITA programs are not focused on introduction of new technologies
  - Training and education for young(er) farmers on new technologies
  - Promotion and demonstration of the benefits of new technologies (e.g. IT, irrigation systems, etc.) for farmers
  - Provision of a national framework and programme for the testing of probiotics

Future Farming and Agricultural Technologies



## **Food and Agriculture: Thematic Priorities**



Priority Subfield	Themes
Research to support Food Quality	• Overall risk assessment and analysis for emerging risks in food safety
and Safety	and quality
	<ul> <li>Digitalization of agriculture system, monitoring ands analysis of big data to identify challenges</li> <li>Duilding up monitoring programs (Desidues, and research)</li> </ul>
	<ul> <li>Building up monitoring programs (Residues, and research laboratories (for example: ICP -MS, LC-MS/MS, GC-MS/MS), and also in high resolution screening equipment's in research institutions (for example TSU) like HRMR, ICP_MS</li> </ul>
Future Farming and Agricultural	Biorefineries and Biofuels
Technologies	<ul> <li>Integrating artificial intelligence in agribusiness</li> </ul>
6	<ul> <li>Impact of climate change on soil and local climate</li> </ul>
	<ul> <li>Reuse and treatment od waste in food production</li> </ul>
	Probiotics from plant materials
	Probiotics from plant materials





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## Renewable Energy: Functional Priorities



**Priority Subfield** 

Research to support the

development of Renewable Energy /

**Research Capacities and** 

Infrastructure

Green Hydrogen



**Solar Energy** 

Functional Priorities

- Capabilities and training: Need for courses for renewable energies, indepth training both for researchers and professionals
- Research infrastructures and Demonstrators for Renewables (e.g. solar, wind)
- Creation of public awareness to the benefits of renewable energy
- Development of a national hydrogen strategy in lines of the EU strategy to align private and public views, and to ensure coherence with the other domains of energy policy
- Development of a roadmap for green hydrogen in Georgia involving science, industry and government
- Public awareness raising on hydrogen and the use of this new technologies
- Provision of a clear legal framework for investors
- Capabilities and training: Need for courses for solar energy, in-depth training both for researchers and professionals



## **Renewable Energy: Thematic Priorities**



Priority Subfield	Themes
Research to support the development of Renewable Energy / Research Capacities and Infrastructure	<ul> <li>Weather forecasts with high Geo resolution</li> <li>Data on (local) energy demand and supply; Data on resources and potentials for renewables with high Geo resolution</li> <li>Impact of climate change on the potential future yield of water power plants</li> <li>Smart Grids and Micro grids</li> </ul>
Green Hydrogen	<ul> <li>Assessment of the impact of developing the new technology on the labor market and the wider economy</li> <li>Analysis of potential roles of ammonia in a green hydrogen world</li> </ul>
Solar Energy	<ul> <li>Data on resources and potentials for solar energy with high Geo resolution Security by design</li> <li>Impact of climate change on the potential future yield of solar energy power plants</li> </ul>
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### **Circular Economy: Functional Priorities**





**Fuctional Priorities Priority Subfield Research to support the** Development of research infrastructures Development of academic traning courses on development of Circular circular economy Economy Development of a national monitoring and information system on waste streams Development of research infrastructures **Circular Economy for** Awareness raising and capacity building among **Construction and Demolition** companies Waste Align to the European Legislation and best practice in the field Implementation of Extended Producer Responsibility (EPR)



## **Circular Economy: Thematic Priorities**

## €<del>,</del>

Themes



Priority Subfield Research to support the development of Circular Economy

Circular Economy for Construction and Demolition Waste

## Mapping of Circularity for different products in Georgia's Economy

- Recycling of food waste
- Research survey about waste management and demolition waste













science KNOW



TWINNING















business GROW