Legal and policy aspects of space big data: legal implications of the use of large amounts of space data – regulatory solutions and policy recommendations

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Annexes

Annex I

Table A.1 provides an overview of the solutions to the legal challenges that are facilitated by each regulatory approach.

New regulation **(New, amended, and supplementary regulations)**			
Legal challenge		Proposed solution	Level of regulation
1	PR 1	Harmonisation of privacy rules on international level	International
2	PR 1	Definition of personal data in the scope of space data, space big data or space activities	EU, national
3	PR 2	Definition of data controllers and data processors in the scope of space data, space big data or space activities	EU, national
4	PR 3	Declaration of data uses unlawful or prohibition of data uses	International, EU, national
5	IP 2	Harmonisation of requirements for the establishment and protection of IP	EU, international
6	IP 3	Introduction of measures for the protection of copyrights in the course of space data, space big data or space activities	International, EU, national
7	CYB 2	Introduction of measures for stored space data in national frameworks	National
8	CYB 1&3	Incorporation of the entirety of the space sector, including the EU Space Programme, into the protected sectors and removal of company size thresholds	EU, national
9	CYB 1&3 CYB 4&5	Introduction of higher cybersecurity standards in national frameworks	National
10	EXP 2	Changes and additions to lists of controlled items and technology	International, EU, national
11	DP 3	Adoption of data policies by more countries and organisations	International, EU
12	DP 4	Consolidated law encompassing all legal aspects of space big data	International, EU, national
13	DP 5	Revision of the UN Remote Sensing Principles	International

Enforcement of the existing legal framework **(by States)**		
Legal challenge		Proposed solution
1	ISL 2	Authorisation and supervision of space activities (VI OST) and registration of space objects (VIII OST)
2	ISL 5	Enhancement of the registration practice of space objects, in order to increase transparency regarding their uses and identify the appropriate State to exercise jurisdiction and control
3	PR 2	Identification of data controllers and data processors among the stakeholders involved in space big data
4	CYB 1&3	Enhancement of the registration practice of space objects, in order to apply cybersecurity regulations to cyber infrastructure in space
5	EXP 2	Monitoring of compliance with export regulations within the space big data lifecycle
Interpretation of applicable laws **(by courts and public authorities or in literature)**		
Legal challenge		Proposed solution
1	ISL 1	Interpretation of 'sharing of benefits' from space activities in a way that does not create a legal obligation to share the benefits
2	ISL 3	Interpretation of 'national activities' in space in a way that they do not involve space big data activities, but only the space objects that collect, store, and disseminate them
3	ISL 4	Interpretation of 'damage caused by a space object' in a way that does not include damage caused by space big data
4	ISL 6	Interpretation of 'potentially harmful interference' in a way that does not disrupt space big data activities
5	PR 2	Interpretation of 'controllers' and 'processors' of personal data in a way that reflects the practice in the framework of space data, space big data or space activities
6	PR 3	Interpretation of 'consent' in a way that does not conflict with the potential of space technology to collect and disseminate personal data
7	IP 3	Interpretation of terms connected to IP rights, and especially copyrights, in a way that reflects the practice in the framework of space data, space big data or space activities

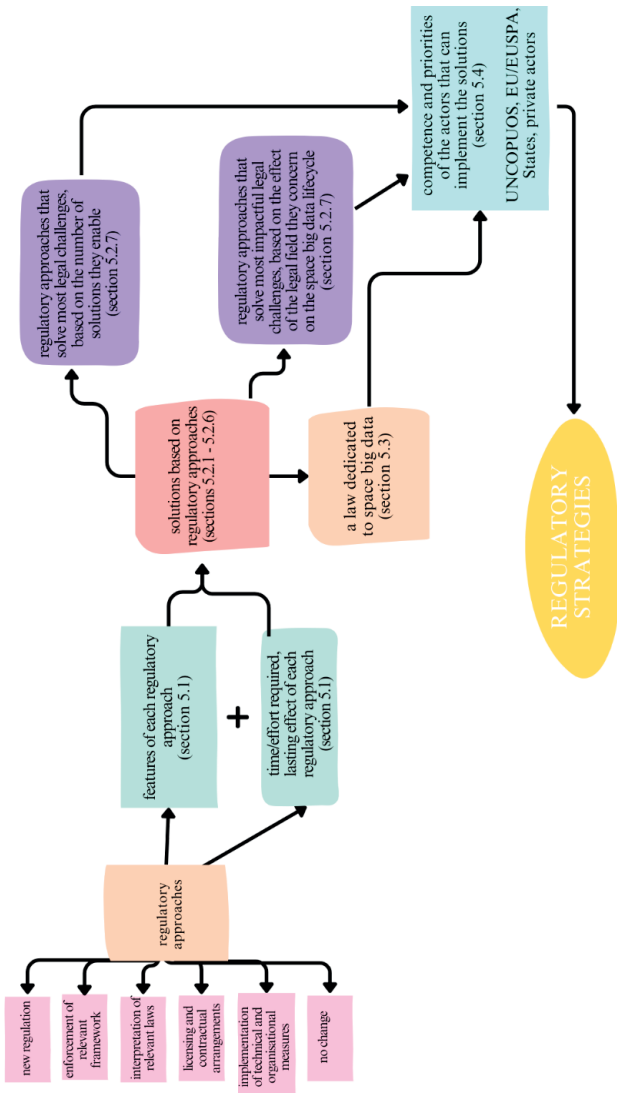
8	CYB 1&3	Interpretation of the extent of the interconnection among devices that form part of the network and information system protected by cybersecurity regulations, in a way that allows the protection of parts that are essential to space big data
9	CYB 4&5	Interpretation of the concept of cybersecurity in the context of resilience
10	DP 5	Interpretation of remote sensing to include uses other than the management of natural resources and the protection of the environment
Implementation of technical and organisational measures **(actions for the space big data stakeholders)**		
Legal challenge		Proposed solution
1	ISL 2	Compartmentalisation of the space big data lifecycle, in order to determine the infrastructure that is found in space and when it becomes part of the lifecycle
2	ISL 5	Oversight of a space object involved in space big data, in order to ensure that the described purposes of that object are maintained and identify whether space objects of other States are involved in the same big data activity
3	PR 2	Identification of the creation of personal data in the course of data fusion and implementation of high level security standards (PR 1) Appointment of controllers and processors for each stage of the space big data lifecycle
4	PR 3	Implementation of methods that ensure anonymisation of personal data, prevent reverse engineering and limit the distribution of metadata
5	IP 1	Oversight of the stages of the space big data lifecycle that are linked to the creation of IP rights and of the level of creativity involved in data uses
6	IP 2	Concentration of all stages of the space big data lifecycle under the same jurisdiction, in order to enjoy uniform IP protection
7	IP 3	Monitoring of the transformation process of data and technology that is not protected by IP to IP-protected material
8	CYB 1&3	Assessment of the space big data lifecycle to determine the extent of the interconnection among network and information systems that are protected by cybersecurity regulations
9	CYB 4&5	Improvement of the cyber technology that is used in the space sector and especially on board space objects

10	CYB 4&5	Compartmentalisation of the cyber infrastructure deployed in the space big data lifecycle in order to facilitate the enforcement of cyber regulations
11	EXP 1	Monitoring of potential export control implications during the various stages of the space big data lifecycle
12	DP 1&2	Create an inventory of the data used throughout the space big data lifecycle, in order to determine whether data covered by a data policy are utilised
13	DP 3	Integration of data covered by the same or similar data policies
14	DP 4	Identification of legal issues connected to space big data other than the ones included in data policies
Licensing and contractual arrangements (on behalf of States or contractual parties)		
Legal challenge		Proposed solution
1	ISL 1	Licensing requirements that include broader access to data collected by the licensed systems
2	ISL 2	Licensing procedures that ensure the proper authorisation of space activities and the registration of space objects in a timely manner
3	ISL 4	Contractual clauses that set out liability regarding the collection, access, use, and dissemination of data
4	PR 1	Contractual or licensing conditions for data supply, use, and distribution can include provisions related to privacy and selection of applicable laws
5	PR 2	Licensing requirements or contractual agreements that appoint controllers and processors within a specific data system or within the space big data lifecycle
6	IP 2	Inclusion of provisions related to IP rights in the contractual arrangements for data supply, use, and distribution
7	IP 3	Inclusion of conditions regarding the treatment of copyrighted material among the contractual arrangements for data supply, use, and distribution
8	CYB 4&5	Licensing requirements that include the implementation of appropriate cybersecurity measures
Maintaining the status quo		
Legal challenge		Proposed solution
1	ISL 1	The sharing of benefits from space activities discourages commercialisation efforts

2	PR 4	Space technology is privacy-pervasive
3	PR 4	The uses and not the potential of space technology should be the focus of discussion around privacy in space big data
4	PR 5	Sovereign privacy is affected by space technology and space big data
5	DP 3	The request for wider availability of high-quality data should be followed or replaced by a request for higher-quality open data
6	PR 1	The applicable definitions and terms are sufficiently clear: the definition of 'personal data'
7	PR 2	The applicable definitions and terms are sufficiently clear: the definition of 'controller' and 'processor'
8	IP 3	The applicable definitions and terms are sufficiently clear: the process of creating IP rights
9	EXP 1	Most of the times data and technology covered by export control can be identified prior to their use
	EXP 2	The global geopolitical circumstances affect export control in the space sector
10	DP 5	The UN Remote Sensing Principles have narrow scope
11	DP 6	The UN Remote Sensing Principles do not have significant impact on data access

Annex II

The process of determining the regulatory strategies that can address the legal challenges and facilitate the benefits of space big data, which is the topic of chapter 5, are visualised in table A.2.



Curriculum vitae

Dimitra Stefoudi was born in 1988 in Athens, Greece. She attended elementary school and high school between 1994 and 2006, in Athens, Greece. She obtained her high school diploma (apolitirio) from the Leonteios School of Athens. She got her Bachelor in Law from the School of Law of the National and Kapodistrian University of Athens in 2013. She received an LL.M. in International Business Law from Tilburg University in 2014 and an Adv. LL.M. in Air and Space Law from Leiden University in 2016. She also received a Certificate of Space Studies from the International Space University in 2016.

Dimitra started her PhD research titled 'Legal and policy aspects of space big data: Legal implications of the use of large amounts of space data – Regulatory solutions and policy recommendations' in January 2018. The research was conducted at the International Institute of Space Law of Leiden Law School of Leiden University and was funded by the Netherlands Space Office and the European Space Agency. Dimitra is board member of the Netherlands Space Society and the Space Court Foundation. She is Assistant Executive Secretary and Individual Member of the International Institute of Space Law and Global Faculty at the International Space University.

In the range of books published by the Meijers Research Institute and Graduate School of Leiden Law School, Leiden University, the following titles were published in 2021-2024

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