

#282 A Governance framework for the future Earth-Observation Governmental Service of the European Union: novel methodology for the classification of space governance models

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ABSTRACT

This research is focused on the strategic relevance of Earth observation (EO) satellites for space security. Traditionally, States and few big players invest in space, due to technological, scientific, economic, and security interests. The new space economy has paved the way for new actors, cost-effective business models, and disruptive technologies, but the sector still presents significant regulation and governance gaps. New fluid and hybrid threats for Security and Defence sector emerge, challenging its technological sovereignty and the resilience of the space value chains and space infrastructure. The role of Space-based Earth Observation (SBE0) is to enhance autonomous assessment and situational awareness to enable security and defence capabilities by decision-makers. The definition and classification of a space governance shall guarantee the assignment of roles, responsibilities, management process and administrative procedures with the appropriate security level through international and national laws. However, security constraints may have a relevant impact on system architecture and on costs. This research proposes an in-depth research into the current state of national and federal security services around the world, precisely in ten countries, which leads to the creation of a purposeful classification of models given critical parameters identified during the analysis. First, we study the space legal framework in the different states. Then, a comparative analysis between different governance models is accompanied by an analysis of the influence of economic and market factors, looking at the different business model classification (in particular, Public-Private Partnerships) and the presence of a Market Place. Finally, the research would like to investigate the national space capacity level, mapping existing institutional and commercial capabilities. The proposed research innovative nature lays in the association between governance elements and financial aspects, with a legal and regulatory dimension. This analysis represents a preliminary work for a future research on a Governance model for the future Defence and Security Governmental Service (EGOV) of the European Union by analysing potential barriers and enablers at the international, regional and national level and contributes to the definition of the Service key elements with respect to the evolution of the European regulation, as well as to a national position.

POSITIONING AND AIMS: WHICH GOVERNANCE MODEL IN A CONTEXT OF GEOPOLITICAL AND SECURITY CHALLENGES?

States define their regulatory framework considering the needs of their national space industry and capacity, commercial space activities, and/or national governance. The classification aims to be a benchmark for the assessment of emerging space powers and valuable for the definition of a stronger European governance, specifically in the domain of security services.

The aim of the research is to analyze and classify different governance models in the context of national space economies for geo-spatial services in order to provide a robust taxonomy.

AN INNOVATIVE METHODOLOGY TO CLASSIFY SPACE GOVERNANCE MODELS

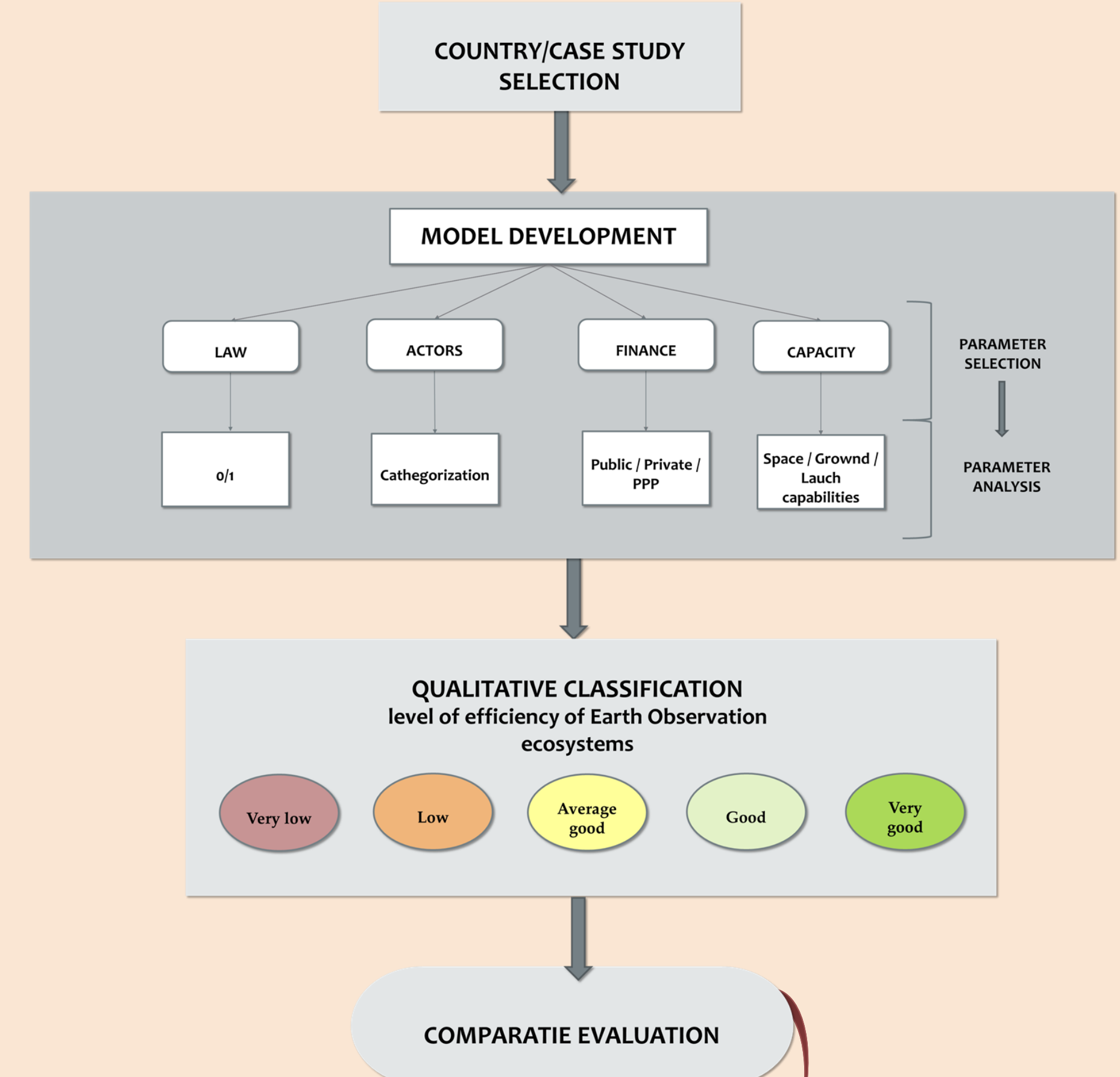
The research question would like to investigate and compare the level of efficiency and the state-of-art of a selection of the most advanced countries in the Earth observation domain (the United States, China, the European Union (with a focus on three main ESA contributors France, Germany, Italy), India, Russia, Saudi Arabia, and the United Kingdom).

In order to analyze and classify the different governance models, the following crucial factors are taken into consideration: PRESENCE OF A LAW, SOURCE OF FINANCING, ACTORS, and CAPACITY.

The classification is based on a qualitative and quantitative evaluation of these elements leading to a final comparative assessment of each country EO ecosystem efficiency.

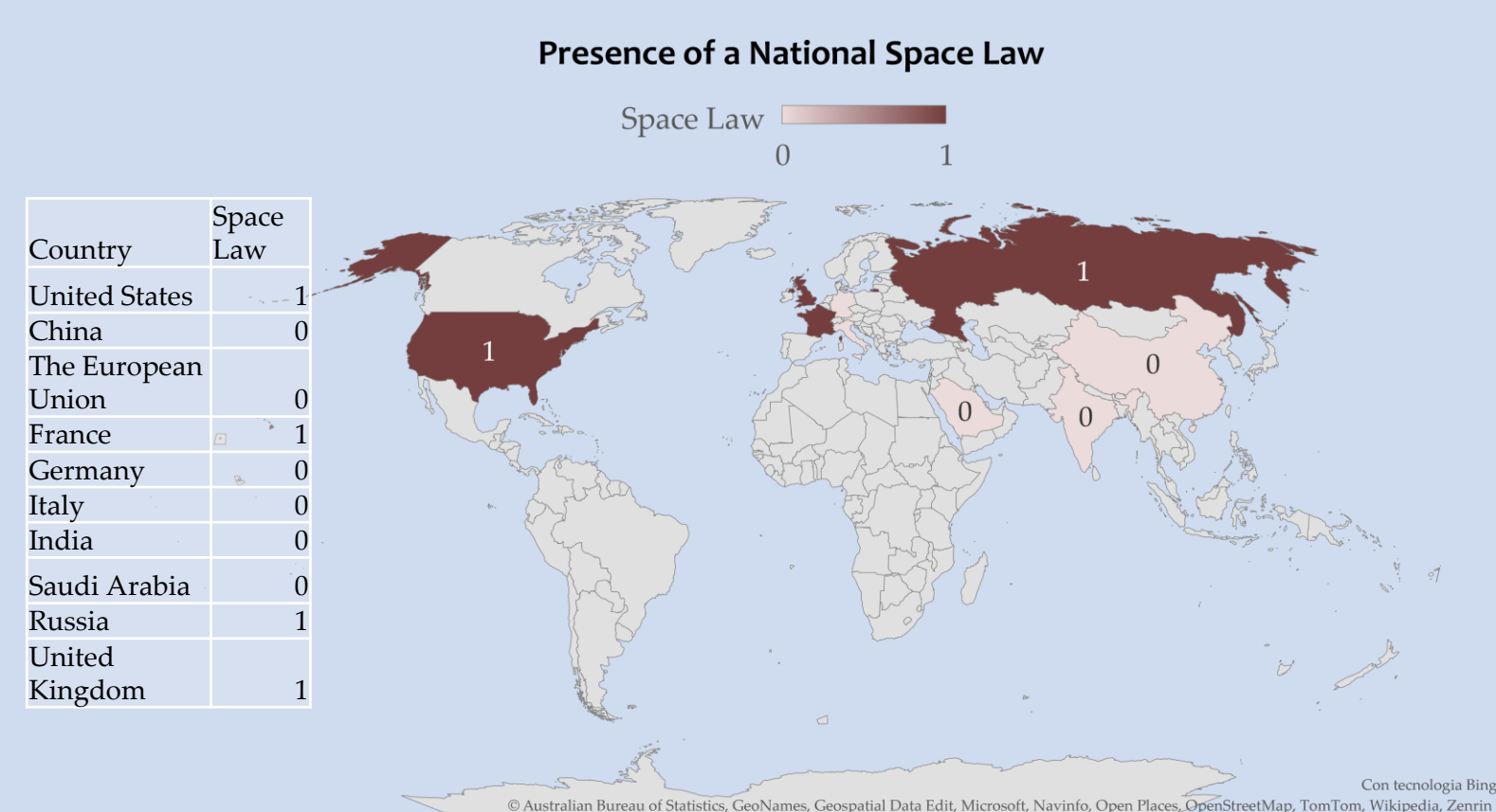
WORKFLOW: THE MODEL DEVELOPMENT

Considering the remarkable differences between country-systems, this structure helps to individuate a selection of parameters in order to classify and evaluate the level of efficiency of the Earth Observation ecosystem and capacity at the national level.



RESULTS: CLASSIFICATION OF EO ECOSYSTEM EFFICIENCY OF NATIONAL GOVERNANCE MODELS AND COMPARATIVE EVALUATION

Descriptive statistics: Primary results show that most countries do not currently have a national space law, except for France, Russia, US and UK. The United States present the most developed regulatory system. The EU and Italy are drafting a space law. Germany has a national law for regulating Earth observation data flow, but not space activities in general. At national level, no uniform space laws are put in place and governance settings are country-specific.

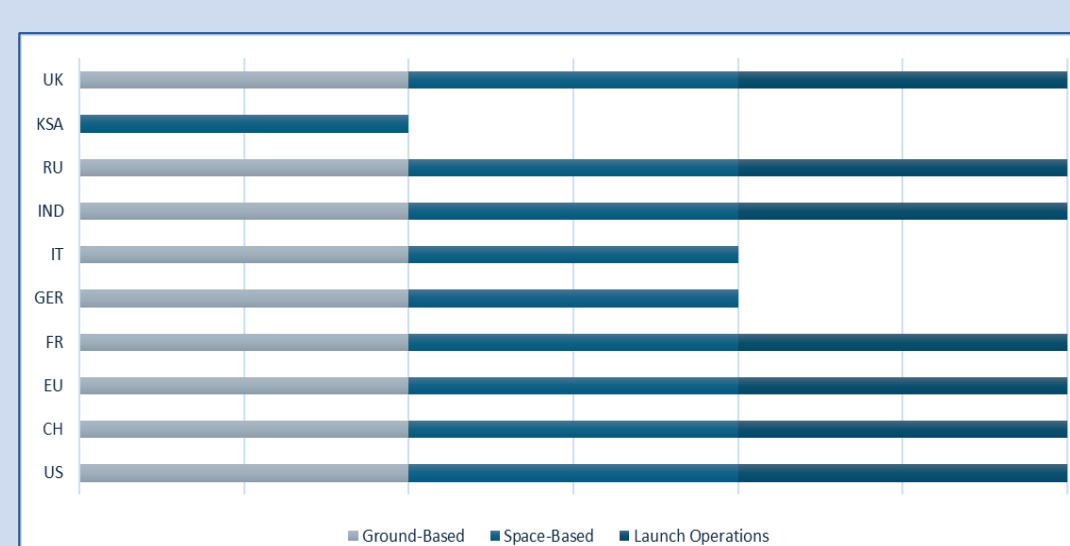
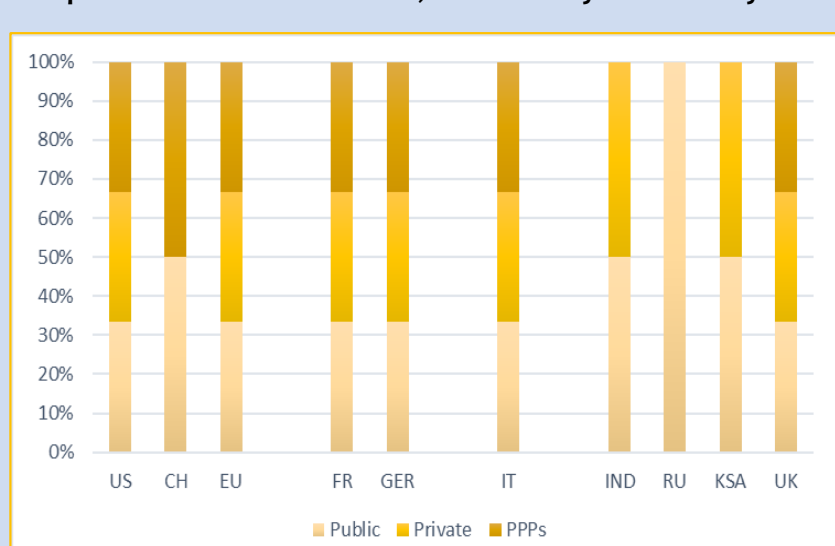


COMPARATIVE EVALUATION: Not all the states are space security providers. The analysis presents different gap in security and defense capacity and infrastructure. The US is a space security provider. Despite its potential, the EU has not a system space security capacity, while China, India, and Saudi Arabia are investing important financial resource to develop their own capacity. France, Germany, Italy, and UK have important space competences and assets, but also gaps in infrastructure and missions. During the pandemic period, states have become aware of the vulnerability of their national supply chain. After the conflict in Ukraine, space has become even more competitive, contested and congested. Anti-Satellite tests were conducted by US, China, India, and Russia. Defense spending are increasing.

The US has public, private and PPPs sources of financing, while China and India rely on public funds and India and KSA are liberalizing to private. The future of EU funding is PPPs, due to the important experiences of France, Germany and Italy.

The US, China, India and Russia have optical, SAR and hyperspectral EO missions, while Germany, Italy and KSA developed SAR and hyperspectral missions. France is a leader in optical satellites. The EU is working towards hyperspectral capabilities, with future contributing and high-priority missions.

The majority of selected countries have a complete space capacity. KSA has ambitious plans in investing and nationalizing space capabilities, but currently the country developed EO missions in cooperation with the US and China. Germany and Italy have not launch facilities.



STATE	EVALUATION	STRENGTHS	WEAKNESSES
The United States	Very good	Space Law; Source of financing; defense spending; Ground-Based, Space Based, Launch Operations; Space Industry; NewSpace development	Space Policy dependent on bipartisan politics
People's Republic of China	Very good	Source of financing; defense spending; Ground-Based, Space Based, Launch Operations; Space Industry	No space law; Innovation and transparency; NewSpace development
The European Union	Very Low	Source of financing; Ground-Based, Space Based, Launch Operations	No space law; No EU Army; defense spending; NewSpace development
The French Republic	Average good	Source of financing; Space Law; Ground-Based, Space Based, Launch Operations; Space Industry	defense spending; NewSpace development
The Federal Republic of Germany	Average good	Source of financing; Ground-Based, Space Based, Space Industry	No space law; defense spending; Launch Operations;
The Italian Republic	Average good	Source of financing; Ground-Based, Space Based, Space Industry	No space law; defense spending; Launch Operations; NewSpace development
The Republic of India	Average good	Defense spending; Ground-Based, Space Based, Launch Operations	No space law; NewSpace development
The Russian Federation	Average good	Space Law; defense spending; Ground-Based, Space Based, Launch Operations;	Innovation and transparency; NewSpace development
The Kingdom of Saudi Arabia	Low	Source of financing; Space-Based,	No space law; Ground-Based, Launch Operations; NewSpace development
The United Kingdom of Great Britain and Northern Ireland	Average good	Space Law; Source of financing; Ground-Based, Space Based, Launch Operations; Space Industry; NewSpace development	EO missions