

Emerging Need for a European Approach to Space Traffic Management

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Independent public think-tank in space policy

The European Space Policy Institute (ESPI) provides decision-makers with an informed view on mid- to long-term issues relevant to Europe’s space activities. In this context, ESPI acts as an independent platform for developing positions and strategies.

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Rising Stakes for Europe



Published: August 2018

Perspectives on Transatlantic Relations



Published: November 2018

Towards a European Space Traffic Management Policy



Planned: July 2019

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Towards a European Space Traffic Management Policy

in progress



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Rising challenges to space infrastructure security

- Challenges to space infrastructure security:
 - **Unintentional hazards:** space debris, accidental interferences...
 - **Intentional threats:** ASAT, malicious interferences, cyberattacks...
 - **Space weather hazards:** geomagnetic storms, solar storms...
- Space is an increasingly congested and contested resource:
 - **Multiple and diverse:** different mitigation and protection measures;
 - **Interrelated and interdependent:** holistic approach, interdependence between actors;
 - **Ubiquitous and inclusive:** all systems affected, different degrees of exposition/vulnerability;
 - **Intensifying:** various trends (e.g. increasing space activity, new concepts, connected space, strategic target, ‘space control’ capabilities);
- Growing dependence on space: risks for society and economy at large.

Parallel routes towards common objectives

	United States	Europe
Policy drivers	<ul style="list-style-type: none"> National security (vulnerability, Space Pearl Harbor...) Military superiority in space (Ultimate high-ground) Promotion of commercial market 	<ul style="list-style-type: none"> Protection of investment and of socio-economic return Meeting security requirements of service-driven policy Achieve autonomy
Organisation	<ul style="list-style-type: none"> Sharing of responsibilities between DoD and DoC (SSA/STM); Top down approach to military/civil domains Other national institutions on case-by-case (NASA, NOAA, FCC, FAA) Intricate relations between the different actors 	<ul style="list-style-type: none"> Multiple actors loosely coordinated European countries (dual approach, reluctance to transfer sovereignty, European cooperation challenged) EU and its agencies (crossroad of space and security policies, evolving role under consideration) ESA (capability-building)
Major developments	<ul style="list-style-type: none"> New national space security strategy National STM policy (SPD-3) Establishment of a Space Force within the DoD 	<ul style="list-style-type: none"> New regulation (SSA component) Upcoming Space Defence Strategies (France, UK); Rising awareness in policy debate (capabilities, coordination, cooperation with partners)
SSA capabilities	<ul style="list-style-type: none"> Self-sufficient (unmatched SSA capabilities, precision to be improved, coverage to be complemented) Enhancement: Space Fence, SSA data “crowdsourcing” 	<ul style="list-style-type: none"> Strong reliance on U.S. SSA data sharing agreements; Improvement of SSA capabilities expected in coming years
Involvement of private actors	<ul style="list-style-type: none"> Policy intends to foster commercial activities (SSA data, contribution to STM...); Developing commercial activity in SSA data and related services 	<ul style="list-style-type: none"> Mostly contractors (R&D projects, development and manufacturing); Repeated calls for more industry-led initiatives but no policy decision

U.S. SPD-3: National Space Traffic Management Policy

- **Step forward** in recognising the severity of issues at stake and the urgency of setting up a framework to prevent and mitigate space security threats:
 - “The future space operating environment will be shaped by a significant increase in the volume and diversity of commercial activity in space”
 - “As the number of space objects increases, [the current] limited traffic management activity and architecture will become inadequate.”
- **Objective** to “develop a new approach to space traffic management that addresses current and future operational risks.”
- **Clear political willingness to accelerate** activities through national-led engagements:
 - Reaction to limited progress at international level (recurring difficulty of making actors converge on necessarily constraining international measures)
 - The policy does not necessarily challenge the relevance of multilateral efforts in space security

Challenges ahead

- **SSA data enhancement and data policy:**
 - **Enhancing SSA data coverage and precision implies relying on multiple data sources (crowdsourcing):** 1) new U.S. sensors, 2) SSA data sharing, 3) purchase of SSA data and services.
 - **New challenges to ensure data availability, reliability, integrity and confidentiality.**
 - **Revisit of data sharing agreements** with international and private partners and integration of commercial data and services
- **Specification of STM best practices and norms:**
 - **From informative to normative STM:** specification of norms of behavior encompassing preventive, operative, and curative measures across the lifecycle of space systems (best practices, standards, regulations)
 - **Coordination at international level** of multiple, possibly divergent, regional/national approaches to STM.

Implications for Europe

- **Window of opportunity to reinforce cooperation in SSA:**
 - **SSA data sharing agreements backbone of transatlantic relations**
 - **Improve Europe’s bargaining power:** close capability gap in SST/SSA (balanced cooperation), balance between autonomy and cooperation (complementarity, resilience, interoperability)
 - **Consolidate European approach** around a clear leadership (intergovernmental and supranational) and SSA data policy (military/civil)
 - **Foster the emergence of European commercial actors** able to compete/cooperate in an open transatlantic SSA market;
- **Preparing a European approach to Space Traffic Management:** Setting up a dedicated forum to coordinate the views, needs and possible contributions of European stakeholders

Research roadmap

Findings from previous ESPI research together with latest developments leading to...

Input

Project

... recognition of evolving space ecosystem and growing security challenges to space infrastructures and operations in space

Why is STM of relevant political concern in this respect, what are the factors creating a need for a policy response in European setting?

What is the current state of play in Europe – who are key stakeholders, what are their responsibilities, how they perceive the way forward?

How are other actors approaching the issue and what are the key international and technical considerations?

Identificaion and analysis of key elements for future considerations followed by formulation of policy recommendations (concerning e.g. governance aspects, policy-making perspectives or the role of private actors)

Output

Definitions of STM

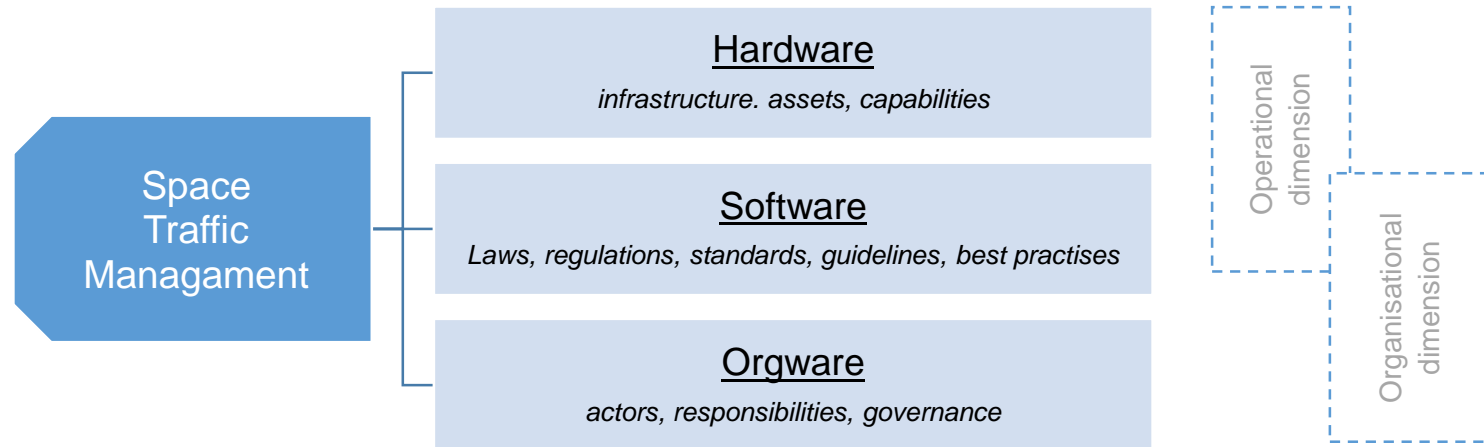
- **Various definitions:**

- **IAA:** *“the set of technical and regulatory provisions for promoting safe access into outer space, operations in outer space and return from outer space to Earth free from physical or radio-frequency damage”*
- **SPD-3:** *“the planning, coordination and on-orbit synchronization of activities to enhance the safety, stability and sustainability of operations in the space environment”*
- A number of others by various institutions and individuals

- **Convergence:**

- **Framework:** operational and organizational aspects
- **Foundations:** technical, regulatory and political provisions
- **Objective:** enhancement of safety and sustainability of space operations

A Visual Representation?



	Space Traffic Monitoring	Space Traffic Coordination	Space Traffic Regulation
Operational aspects	SSA capabilities, SSA data exchange	synchronization of space operations, provision of services	common rules-setting, implementation, verification, enforcement
Organisational aspects	Role of private sector, Civil / military considerations, Responsibility sharing between MS, EU, ESA, Europe's contribution to global cooperation		

STM in Europe today

- **Existing instruments and provisions related to STM:**
 - **At operational level:** e.g. best practices in conjunction warnings and collision avoidance, adherence to safety standards, SSA data exchange
 - **In regulations:** e.g. licensing procedures requiring transparent and responsible operator’s behaviour (e.g. EOL de-orbit rules)
 - **Through international engagement:** e.g. participation of European entities at the work of IADC, UN COPUOS incl. LTS agenda, ISO, ITU, ECSS and others
- **STM hardly mentioned in key high-level documents:**
 - Space Strategy for Europe (2016):
 - Proposal (2018) for EU space programme (2021 – 2027):

STM in Europe tomorrow

- **Increased ambitions for SSA and space safety and security:**
 - **New SSA component** proposed for the EU space programme post 2021
 - Enhanced military SSA cooperation within the **PESCO framework**
 - Proposed **Space Safety and Security pillar** at ESA level
- **Growing institutional awareness and first initiatives:**
 - Recognition of the issue by **top-level representatives** (EU, ESA, national)
 - **R&D project:** concepts for space traffic management (Horizon 2020 2018-2020 Work Programme)
 - STM pilot project submitted for funding through the **European Parliament**
- **Private sector’s interest:** acknowledgment of STM as essential for safe operations, possession of SSA capabilities and increasing exploration of market potential across the SSA value chain, engagement in own STM-like initiatives (e.g. through the Space Data Association)



Recent statements (01/2019)

- **Relevance and timeliness of STM acknowledged by representatives of European institutions (EC, EEAS, EP, also ESA), though with varying assessments**
 - One statement perceiving the recent U.S. STM Policy as a threat to multilateralism that is embedded in European DNA
 - Another opinion acknowledging at the same time that it should be a stimulus for development of a European response
 - EU SST capacity in continuous improvement efforts regarded as a potential basis for a European STM system
 - An argument that current challenges require multilateral solutions beyond national endeavors
 - STM recognized as an issue of strategic importance, in a comparable way to European strategic autonomy
- **Issue of key concern for private sector as well**
 - Shared recognition of severity of the challenges to space infrastructures and safe operations
 - Industry views highlighting increasing private sector capabilities across the SSA value chain
 - Opinion on effective space traffic rules being enabler of innovative projects

Challenges on the way ahead

Convergence on understanding of STM and its relevance

Bringing together of best practices

What role for private sector

European approach and international harmonization

Need for a dedicated European platform for STM

Agreement on governance framework

Thank you

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