Feb 27th, 10:45 AM

Emerging Need for a European Approach to Space Traffic Management

Tomas Hrozensky
European Space Policy Institute, tomas.hrozensky@espi.or.at

Follow this and additional works at: https://commons.erau.edu/stm
Part of the Aerospace Engineering Commons, and the Public Affairs, Public Policy and Public Administration Commons

https://commons.erau.edu/stm/2019/presentations/19

This Event is brought to you for free and open access by the Conferences at Scholarly Commons. It has been accepted for inclusion in Space Traffic Management Conference by an authorized administrator of Scholarly Commons. For more information, please contact commons@erau.edu, wolfe309@erau.edu.
Emerging Need for a European Approach to Space Traffic Management

5th Annual Space Traffic Management Conference “Progress through Collaboration”
Austin, TX, USA, 26th - 27th February 2019

Tomas Hrozensky, ESPI Resident Fellow
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.
ESPI studies on “Security in Outer Space”

Rising Stakes for Europe

Published: August 2018

Perspectives on Transatlantic Relations

Published: November 2018

Towards a European Space Traffic Management Policy

Planned: July 2019

ESPI reports available at www.espi.or.at
ESPI studies on “Security in Outer Space”

Towards a European Space Traffic Management Policy

Planned: July 2019

ESPI reports available at www.espi.or.at
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.
European approach to security in outer space - Policy drivers

- **Secure the results of the continuous and substantial investment** made by public and private actors;

- **Protect the European economy and society** against risks related to its pervasive and sizeable dependence on the space infrastructure;

- **Contribute to a service oriented policy** by assuring the ability of the infrastructure to deliver a service that can be justifiably be trusted, in particular for users in defense and security;

- **Guarantee European autonomy and freedom of action** in the field of security in outer space with implications on the space domain at large (non-dependence).
European approach – Key elements

National governments:
core actors of space
security in Europe

ESA: a key player of
capability-building

EU: consolidating its role
in space and security &
defence policies
Parallel routes towards common objectives

<table>
<thead>
<tr>
<th>United States</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy drivers</strong></td>
<td><strong>Protection of investment and of socio-economic return</strong></td>
</tr>
<tr>
<td>• National security (vulnerability, Space Pearl Harbor…)</td>
<td>• Meeting security requirements of service-driven policy</td>
</tr>
<tr>
<td>• Military superiority in space (Ultimate high-ground)</td>
<td>• Achieve autonomy</td>
</tr>
<tr>
<td>• Promotion of commercial market</td>
<td></td>
</tr>
<tr>
<td><strong>Organisation</strong></td>
<td><strong>Multiple actors loosely coordinated</strong></td>
</tr>
<tr>
<td>• Sharing of responsibilities between DoD and DoC (SSA/STM); Top down approach to military/civil domains</td>
<td>• European countries (dual approach, reluctance to transfer sovereignty, European cooperation challenged)</td>
</tr>
<tr>
<td>• Other national institutions on case-by-case (NASA, NOAA, FCC, FAA)</td>
<td>• EU and its agencies (crossroad of space and security policies, evolving role under consideration)</td>
</tr>
<tr>
<td>• Intricate relations between the different actors</td>
<td>• ESA (capability-building)</td>
</tr>
<tr>
<td><strong>Major developments</strong></td>
<td><strong>New regulation (SSA component)</strong></td>
</tr>
<tr>
<td>• New national space security strategy</td>
<td>• Upcoming Space Defence Strategies (France, UK);</td>
</tr>
<tr>
<td>• National STM policy (SPD-3)</td>
<td>• Rising awareness in policy debate (capabilities, coordination, cooperation with partners)</td>
</tr>
<tr>
<td>• Establishment of a Space Force within the DoD</td>
<td></td>
</tr>
<tr>
<td><strong>SSA capabilities</strong></td>
<td><strong>Strong reliance on U.S. SSA data sharing agreements;</strong></td>
</tr>
<tr>
<td>• Self-sufficient (unmatched SSA capabilities, precision to be improved, coverage to be complemented)</td>
<td>• Improvement of SSA capabilities expected in coming years</td>
</tr>
<tr>
<td>• Enhancement: Space Fence, SSA data “crowdsourcing”</td>
<td></td>
</tr>
<tr>
<td><strong>Involvement of private actors</strong></td>
<td><strong>Mostly contractors (R&amp;D projects, development and manufacturing);</strong></td>
</tr>
<tr>
<td>• Policy intends to foster commercial activities (SSA data, contribution to STM…);</td>
<td>• Repeated calls for more industry-led initiatives but no policy decision</td>
</tr>
<tr>
<td>• Developing commercial activity in SSA data and related services</td>
<td></td>
</tr>
</tbody>
</table>
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

Input

... 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?

Project

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
Representation

Space Traffic Management

- **Hardware**
  - infrastructure, assets, capabilities

- **Software**
  - Laws, regulations, standards, guidelines, best practices

- **Orgware**
  - actors, responsibilities, governance

Operational aspects

<table>
<thead>
<tr>
<th>Space Traffic Monitoring</th>
<th>Space Traffic Coordination</th>
<th>Space Traffic Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSA capabilities, SSA data exchange</td>
<td>synchronization of space operations, provision of services</td>
<td>common rules-setting, implementation, verification, enforcement</td>
</tr>
</tbody>
</table>

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

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.