

# Planetary defense in national space documents

Result #14 – A study summarizing possible inspirations for national planetary defense strategies

Adriana Lenkavská, Nikola Schmidt

<b>1.</b>	<b>KEY CONSIDERATIONS .....</b>	<b>2</b>
<b>2.</b>	<b>REMARKS FOR THE METHOD AND LIMITS OF THE ANALYSIS .....</b>	<b>2</b>
<b>3.</b>	<b>CRITERIA FOR THE ANALYSIS EXPLAINED.....</b>	<b>5</b>
<b>4.</b>	<b>OVERALL ANALYSIS OF STRATEGIC POSITIONS .....</b>	<b>5</b>
<b>5.</b>	<b>LIST OF COUNTRIES FOCUSING ON PLANETARY DEFENSE (IN)DIRECTLY .....</b>	<b>7</b>
	USA .....	7
	AUSTRALIA .....	11
	BELGIUM.....	15
	BRAZIL.....	18
	CHINA .....	21
	GERMANY.....	26
	ITALY.....	29
	KOREA.....	33
	LUXEMBOURG.....	37
	POLAND .....	39
	PORTUGAL.....	41
	ROMANIA.....	44
	SPAIN.....	46
	UNITED KINGDOM.....	49
<b>6.</b>	<b>LIST OF COUNTRIES NOT FOCUSING ON PLANETARY DEFENSE BUT CONSIDERING THE TOPIC.....</b>	<b>53</b>
	AUSTRIA.....	53
	CANADA.....	54
	FRANCE.....	57
	INDIA .....	60
	INDONESIA .....	62
	JAPAN .....	64
	KENYA .....	68
	MEXICO .....	69
	RUSSIA .....	70
	SAUDI ARABIA.....	74
	SWITZERLAND .....	76
	TURKEY.....	79
	UNITED ARAB EMIRATES .....	81
<b>7.</b>	<b>SPECIAL CASES.....</b>	<b>82</b>
	APSCO (ASIA- PACIFIC SPACE COOPERATION ORGANIZATION).....	82
	CONVENTION OF THE COMMONWEALTH OF INDEPENDENT STATES .....	82



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## 1. Key considerations

- Planetary defense (PD) is mentioned in national strategic documents of dozens of states. It may vary from being a dedicated strategy of planetary defense, direct mentioning of planetary defense or being approached as a part of SSA (Space Situational Awareness).
- Global security perspective prevails over the national one, respectively a low number of states understand planetary defense as a solely national security issue.
- Because of the policy dependency on excellent science and high-end industrial capacities, huge majority of states are approaching PD as an opportunity to excel in science and support emerging industries.
- Understanding PD as a national prestige is present, albeit in a very low number of states. However, we can still find 19<sup>th</sup> century kind of national exceptionalism language.
- Understanding PD as an opportunity to develop national welfare was found in a slight majority, however, PD as a way to global welfare is low. Welfare is not necessarily only a link of PD to future asteroid mining, but states visibly don't see much broad basis for international cooperation in this regard.
- Finally, we can say that PD is understood as a global challenge that requires international collaboration but not necessarily see shared benefits from it.

## 2. Remarks for the method and limits of the analysis

### General remarks

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- Term “planetary defense” is officially used in the documents only of some states.
- Even though some states do not use term planetary defense, they might deal with the NEO/NEA/SSA. In some countries NEOs could be found under the SSA activities, some states within the SSA activities focus mainly on SST and space debris. This fluid line had to be considered by us subjectively because some states do not mention planetary defense directly, while they do a lot to for supporting planetary defense efforts.
- Many European states have direct link to ESA activities in their national space activities, including SSA. Most of them do not have explicit mention of the PD. Some explicitly mention involvement in NEO segment of S2P, some do not.
- In some states, accessible documents and government's actions such as activity at international forums and/or involvement in NEO space missions indicate that there is some basic strategic approach in relation to the space safety and planetary defense even though they do not have explicit mention of NEO /PD in space documents.
- Interesting is the statement of the UK Space Agency spokesman: *“The vast majority of UK funding for space is channeled through the European Space Agency (ESA)...The ESA does address NEOs on behalf of its Member States...as it recognizes they are a global hazard, not unique to any country and that they require an international response... This*

*is partly so countries can share the cost and because any solutions to asteroids on a collision course to Earth require cohesive global action.”*

- NEO perceived mostly as a space threat. However, many states indicate interest in NEOs also from economic perspective – either development of new technologies and thus also support in supply chains (e.g. Poland), or some see search for NEOs as potential also for exploitation of space resources.
- Some states explicitly link NEO threat and NEO activities with space resource utilization, in some policy documents of other states it might be implicit, some do not link it at all.
- Some countries see synergies among PD activities such as NEO tracking and their composition with asteroid mining (exploitation of asteroids).
- Some policy documents are not publicly published or they are in the national language of the respective state and not translated into English.
- Very new space strategies especially of the EU countries tend to reflect more PD or link it with NEO segment of ESA SSA.
- International organizations deal with PD/NEO threat: ESA, Convention of the Commonwealth of independent States (art.5 cooperation in study of the planets and asteroid-comet hazard + prevention of asteroid-comet hazard), APSCO.
- Not all states have space policy documents. There are different types of space documents in different states, different terminology is also used.

#### **States using term “planetary defense” in their space policy documents:**

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USA, Luxembourg, Poland, Romania (information from the presentation), Czech Republic

#### **States dealing with PD (considering “near earth object” as a space threat) but not using the term PD:**

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- Korea (Near Earth Object (NEO) research: mitigation of space hazards)
- Italy (NEO research from the perspective of space exploration, securing of safety and economic opportunities within the space situational awareness (SSA))
- Indonesia (National Act: “National responsibility for risks from space, natural and artificial threat”)
- Spain (current world’s challenges: challenges coming from space are asteroids and comets)
- UK
- Russia (but last policy documents not found)
- Saudi Arabia (Saudi Lunar and Near Earth Object Science Center)
- China (deep-space explorations incl. exploration of asteroids and monitoring of small near-Earth celestial bodies and its early warning of possible collision)

- Germany (near-Earth asteroids are central to many areas of national security)
  - Australia (CISCRO - NEA tracking and surveillance & bistatic radar technologies for tracking asteroids)

#### Link to SSA:

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- France
- Japan
- Turkey (2021 National Space Program: one of the strategic goals is to “observing and monitoring space objects from the Earth”)
- Belgium (ESA S2P and NEO segment)
- Portugal (link to PD in document +Space in Portugal and Europe with ESA: The Strategy for the Portuguese participation in the 2019 ESA’s Ministerial Meeting)
- Switzerland (involvement in all 3 pillars of ESA SSA)
- Canada (Space domain awareness, NeoSatt)
- Austria (ESA SSA, but mainly focus on space weather. New Space Strategy was announced in September 2021 but it is not published yet)
- Brazil (Decree of the president on the National Space Policy from 2020 link to SSA)

#### Special cases

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- India: dealing with PD but no published policy document in English found. Therefore, all criteria are marked as not fulfilled except the national security one which is evident from the government’s activities as well as published news and documents
- UAE: very general characterization and not explicitly mentioned NEO as a threat but interest in NEO is rather in space resource utilization & space colonization. Therefore, no evaluation of the fulfillment of the set criteria were made.
- Mexico: in the epilogue of the Vision towards the future (2040) is stated that Mexico aims to have a space surveillance system dedicated to NEOs. However, there are no other mentions of NEOs in researched documents thus no evaluation of the fulfillment of the set criteria could be made.
- Kenya: The only brief mention regarding the PD was found in the Strategic Plan 2020 – 2025 benefits of space science and technology. Therefore, only criterion “national security” was marked as fulfilled.

### 3. Criteria for the analysis

#### A. Global welfare

Promote quality of life for all humanity and human flourishing.

#### B. National welfare

Promote national development, benefit of the society and enhancement of citizens' quality of life.

#### C. National security

Ensure national security and awareness of emerging threats from space.

#### D. Global security

Ensure global security and reduce the risk of harm to humans from an unexpected impact on the planet.

#### E. Advanced science

Promote scientific exploration.

#### F. Industrial growth

Promote innovation, strengthened industry competitiveness and development of new technologies.

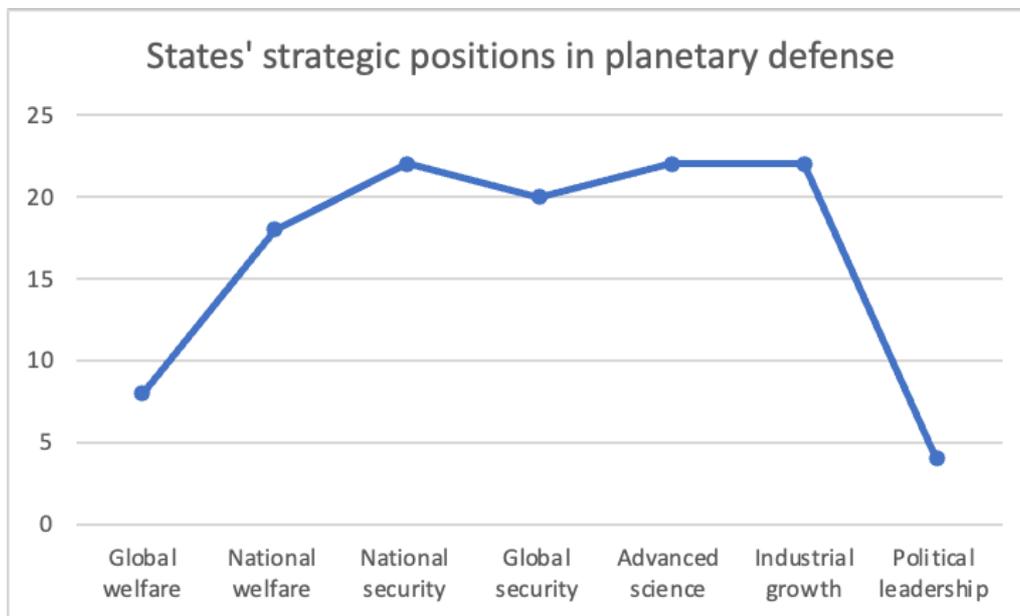
#### G. Political leadership

Prestige – national exceptionalism.

### 4. Overall analysis of strategic positions

Following chart shows an overall perspective on strategic positions of selected states. We are discussing some more states in the analysis below if they somehow reflect PD but those are not included due to their low interest in PD.

	Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership
USA							
Australia							
Belgium							
Brazil							
Canada							
CIS							
China							
France							
Germany							
India							
Indonesia							
Italy							
Japan							
Kenya							
Korea							
Luxembourg							
Poland							
Portugal							
Romania							
Russia							
Saudi Arabia							
Spain							
Switzerland							
Turkey							
UK							



#### **A. PD as a global or national security issue?**

On one hand, knowing that about 80% analyzed states consider planetary defense (PD) a global security issue creates some hopes that the ongoing years will see more international collaboration and that PD will evolve as a global security policy. However, National security perspective prevailed a little bit. This should be read as a consideration of PD being firstly global security issue and secondly a national security issue because the prevalence is caused by Poland and Turkey, which consider PD only as a national security issue. Twenty other states mentions both security perspectives in their national strategy documents.

#### **B. PD as a responsibility rather than a prestige**

Following the above-mentioned interpretation, we can say that most states consider PD as an opportunity for international collaboration or understand PD policy in terms of global efforts rather than an opportunity to excel as a nation. Only four states consider PD in terms of national prestige and an opportunity for global leadership, namely USA, China, Italy and Turkey.

#### **C. Excellence in science and emergence of new industries**

Planetary defense, given its specific character, is visibly approached as an opportunity for scientific excellence and as an opportunity for new industries emergence by vast majority of states. This is understandable as PD is by general public still understood as a realm of science fiction rather than a general security policy even in developed countries. However, exactly this distinction between understanding of these breakthrough opportunities by states and misunderstanding of planetary defense efforts simply as a common policy space enabled states should pursue is a gap between states and their citizens. This problem can lower not only support for planetary defense in the future but also undermine its legitimacy.

#### D. Link between defense and economic development

It is interesting and welcoming by our team that even some states see planetary defense efforts being linked to possible future asteroid exploitation. Such a link is usually linked to national or global welfare, prevalently to national welfare.

### 5. List of countries focusing on planetary defense (in)directly

#### USA

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

#### Summary of criteria fulfilment

##### A. Global welfare: YES

- Increase the quality of life for all humanity also through planetary defense (National Space Policy, 2020).

##### B. National welfare: YES

- “The Congress declares that the general welfare and security of the US require that the unique competence of the NASA in science and engineering systems be directed to detecting, tracking, cataloguing, and characterizing near-Earth asteroids and comets in order to provide warning and mitigation of the potential hazard of such near-Earth objects impacting the Earth” (National Aeronautics and Space Administration Authorization Act 25 of 2005: Near-Earth Object Survey Act, Report 2005).

##### C. National security: YES

- NEO as a national security threat, SSA.

##### D. Global security: YES

- NEO as global security threat. Intention to reduce the risk of harm to humans from an unexpected impact on the planet.

##### E. Advanced science: YES

- Promote human and robotic exploration, advancement of astronomy.

##### F. Industrial growth: YES

- Promote development of technologies for NEO deflection and disruption, risk/benefit analysis of NEO mitigation mission, protect and preserve US economic interests, tacit link to resource-rich planetary objects.

### G. Political leadership: YES

- US is currently leader in the PD. However, when “NEO is identified as global threat, it requires the leadership of the United States.” NASA shall, among others, seek to “develop technologies for fast response near-Earth object deflection and disruption” (NASA Authorization Act of 2020).

#### What strategies say

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In the US policy documents, **there is explicit mention of the planetary defense (PD), or documents focused solely on the PD are created. The main vision** identified in National Space Policy 2020 in regards to the PD is to “**reduce the risk of harm to humans from an unexpected impact on our planet and to identify potentially resource-rich planetary objects**” and to “**increase the quality of life for all humanity** through the cultivation, maturation, and development of space-enabled scientific and economic capabilities, including space and Earth resource discovery, management, and utilization; space and Earth weather and environmental monitoring and prediction; disaster monitoring, prediction, response, and recovery; **and planetary defense**” (National Space Policy 2020).

“NEO impacts are a **global hazard** and could have major **environmental, economic, and geopolitical consequences detrimental to the United States**, even if the impact is beyond U.S. territory”... “When a NEO that is on course to impact Earth is identified, it is a **global threat** that **requires the leadership of the United States** to establish a coordinated global approach for detection, tracking, and characterization as well as for deflection and disruption operations, if necessary, and preparedness in the event of an impact. If prevention proves technically infeasible or is attempted and fails, **the United States may also need to take a leadership role in helping the international community reduce the negative consequences of a NEO impact**” (National Near-Earth Object Preparedness Strategy, 2016). The 2018 National Strategy for Space “recognizes the NEO hazard, and directs agencies to undertake multilateral efforts that **promote U.S. scientific, economic, and security interests**, including mitigation of space environmental hazards such as near-Earth objects...**United States should also be prepared to act independently through all phases that may occur during an impact scenario to protect and preserve America’s interests**. NEO impacts pose a **significant and complex risk to both human life and critical infrastructure, and have the potential to cause substantial and possibly even unparalleled economic and environmental harm**” (National Near-Earth Object Preparedness Strategy and Action Plan, 2018).

The United States conducts **space activities in three** distinct but interdependent **sectors: commercial, civil, and national security**. In US National Space Policy, planetary defense is part of the **civil as well as national security guidelines**. In **civil guidelines** National Space Policy directs the NASA Administrator to “pursue capabilities...to detect, track, catalog, and characterize near Earth objects **to warn of any predicted Earth impact and to identify potentially resource-rich planetary objects**” ..and also shall “develop options... for planetary defense actions both on Earth and in space to mitigate the potential effects of a predicted near Earth object impact or trajectory.”

In National Security Space Guidelines, under the part Synchronized National Security Space, it is stated that “the space domain is a priority intelligence and military operational domain for the United States” and the Secretary of Defense and the Director of National Intelligence, in consultation with the heads of other appropriate agencies, Federal laboratories, and, as appropriate, in partnership

with United States industry, shall “improve, develop, integrate, demonstrate, and proliferate ... space domain awareness capabilities to predict, detect, warn, characterize, and attribute human-caused and **naturally occurring activities** that pose threats to space systems of United States interest; “ Provide ... SSA information that supports national security, civil, and human space flight activities, **planetary defense** from hazardous near-Earth objects, and commercial and allied space operations” (US National Space Policy, 2010).

Even though planetary defense is not mentioned in commercial guidelines, link of the planetary defense with the identification of potentially resource rich planetary objects in the National Policy 2010 and 2020 could be seen as implicit element for commercial sector and interests of the USA. Moreover, NEO threat is perceived also as an opportunity and as stated in the 2021 Report on NEO Impact Threat Emergency Protocols, NITEP should develop “**risk/benefit analyses for space-based mitigation mission options...** and also has provided benchmarks determining when to recommend NEO **reconnaissance, deflection, and disruption missions**” (Report on Near – Earth Object Impact Threat Emergency Protocols, January 2021). In 2020 NASA Authorization Act it is stated that “The Administration **should consider planning preparatory actions to take advantage of opportunities related to close passing near-Earth objects for both scientific and public outreach purposes**, including the close approach of asteroid 99942 Apophis anticipated to occur in 2029, to conduct close-up studies of a large asteroids as they pass by Earth” (National Aeronautics and Space Administration Authorization Act of 2020). This shows that NEOs are perceived as threats but also as opportunities and could be interconnected with the commercial perspective.

### Comments

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- USA has comprehensive approach towards PD including all defined criteria and has adopted several national strategic documents.
- USA will act unilaterally and will take leadership in planetary defense in case of a detected threat.
- USA also see PD as an opportunity for scientific and economic development.
- USA seeks to develop technologies for fast response NEO deflection and disruption
- PD is divided into three sectors: commercial, civil, and national security.
- Tacit link between national security and possible commercial exploitation of asteroids.

### Resources

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- Memorandum on The National Space Policy, 2020. Link: <https://trumpwhitehouse.archives.gov/presidential-actions/memorandum-national-space-policy/>
- National Space Policy of United states of America, 2020. Link: <https://trumpwhitehouse.archives.gov/wp-content/uploads/2020/12/National-Space-Policy.pdf>
- National Near-Earth Object Preparedness Strategy, 2016. Link: [https://www.nasa.gov/sites/default/files/atoms/files/national\\_near-earth\\_object\\_preparedness\\_strategy\\_tagged.pdf](https://www.nasa.gov/sites/default/files/atoms/files/national_near-earth_object_preparedness_strategy_tagged.pdf)

- National Near-Earth Object Preparedness Strategy and Action Plan, 2018. Link: <https://www.hSDL.org/?view&did=812290>
- National Space Policy of the United States of America, 2010. Link: [https://history.nasa.gov/national\\_space\\_policy\\_6-28-10.pdf](https://history.nasa.gov/national_space_policy_6-28-10.pdf)
- Report on Near – Earth Object Impact Threat Emergency Protocols, 2021. Link: <https://trumpwhitehouse.archives.gov/wp-content/uploads/2021/01/NEO-Impact-Threat-Protocols-Jan2021.pdf>
- National Aeronautics and Space Administration Authorization Act 25 of 2005. Link: <https://www.congress.gov/bill/109th-congress/senate-bill/1281/text>
- Near-Earth Object Survey Act: Report, 2005. Link: <https://www.congress.gov/109/crpt/hrpt158/CRPT-109hrpt158.pdf>
- National Aeronautics and Space Administration Authorization Act, 2020. Link: <https://www.congress.gov/bill/116th-congress/senate-bill/2800/text>
- OSTP letter to senate, 2010. Link: <https://www.nasa.gov/sites/default/files/atoms/files/ostp-letter-neo-senate.pdf>

## Australia

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

#### A. Global welfare: NO

- Collisions in space with debris pose a risk to assets and life – no particular mention in relation to the NEA (State of Space Report: 1 July 2019 – 30 June 2020).

#### B. National welfare: YES

- Strategic vision articulated in the Australian Civil Space Strategy 2019 – 2028 is “A globally responsible and respected space sector that lifts the broader economy, and inspires and improves the lives of Australians.”

#### C. National security: YES

- Governmental aim to “develop stronger space capability to counter emerging space threats” & assure continued “access to space based intelligence, surveillance and reconnaissance” (Factsheet Space Defense: Shape. Deter, Respond, 2020). One of strategic pillars of the Civil Space Strategy is to “ensure safety and national interests are addressed” (Australian Civil Space Strategy 2019 – 2028).
- Strengthening Defense’s space surveillance and situational awareness capabilities, incl. through the space surveillance radar & optical space surveillance telescope (Defense White Paper, 2016).

#### D. Global security: YES

- Improved space security for the benefit of all users (Space Power for Australia’s Security: Grand Strategy or Strategy of Grandeur, 2015), SSA defined in the defense strategies as the part of the space situational domain & space surveillance.
- Emerging space threats (continued investments to space capabilities).
- Contribution by the observation from the southern hemisphere.
- Focus on the rule-based system to avoid militarization of space.

#### E. Advanced science: YES

- Leapfrog research and development & bistatic radar technologies for tracking of asteroids.
- Developing new science to assist future space exploration missions (contribution to the NASA NEA program).
- New science to assist future space exploration missions by combining the capabilities of CDSCC (DSS43) and the ATNF (Compact Array and Parkes radio telescopes) to perform bistatic radar tracking of asteroids.
- Australia participated at the Hayabusa 2 mission.

**F. Industrial growth: YES**

- Development of space technologies.
- No explicit connection of asteroid mining and PD in any researched documents.
- Australia signed Artemis Accords and is very active in searching for asteroids in cooperation with the US.

**G. Political leadership: NO**

- Australia's position as a leading global player in space operations.
- Australian niche technologies that are world-class (Space Power for Australia's Security: Grand Strategy or Strategy of Grandeur, 2015).
- It is not explicitly connected to the PD.

**What strategies say**

The term **“planetary defense”** is not explicitly used in any researched policy documents. However, Australia's national science agency CISCRO (the Commonwealth Scientific and Industrial Research Organisation) focuses on the **near earth asteroid tracking and surveillance** and develops **bistatic radar** technologies for tracking asteroids. CSIRO's space and astronomy research **“enables humanity to better understand the Earth and Universe. It contributes to solving the greatest challenges and building future industry”** (<https://www.csiro.au/en/research/technology-space/astronomy-space>). CISCRO's NEA activities are under the two *National Civil Space Priority Areas*: **leapfrog research and development**, and **SSA and debris monitoring**. Their main objective is to enhance **Australia's space capabilities** (Australian Civil Space Strategy 2019 – 2028). Activities of CSIRO in relation to the NEA are following: **“asteroids emerging from the southern hemisphere are not immediately detectable by the international NASA Near Earth Asteroid (NEA) program. Australia is contributing to this NASA program as well as developing new science to assist future space exploration missions by combining the capabilities of CDSCC (DSS43) and the ATNF (Compact Array and Parkes radio telescopes) to perform bistatic radar tracking of asteroids”** (State of Space Report: 1 July 2019 – 30 June 2020).

**Australian defense has moved** from Space Situational Awareness **towards Space Domain Awareness (SDA)**. Such broader concept supports also all other space missions in order to better understand relevant factors that affect the space domain (State of Space Report: 1 July 2019 – 30 June 2020). CSIRO also continues to promote its space-related capabilities in radar technologies for asteroid tracking (State of Space Report: 1 January 2018 – 30 June 2019). Space situational domain focuses, among others, on space debris and **other threats**. There is a strong governmental commitment to continued capability investment in relation to the **space control** in order to build **space domain awareness capabilities**, also known as SSA, with the US and other key partners (Factsheet Space Defense: Shape. Deter. Respond, 2020).

**“Using terrestrial and/or space-based systems, new investments will be made in capabilities to counter emerging space threats and assure our continued access to space based intelligence, surveillance and reconnaissance”** (Factsheet Space Defense (2020): Shape. Deter. Respond). **“To ensure the security of space-enabled capabilities, the Government will strengthen Defense's space surveillance and situational awareness capabilities, including through the space surveillance radar**

operated jointly by Australia and the United States”(Defense White Paper, 2016). “Defense currently hosts a United States C-Band Radar and Space Surveillance Telescope and will continue to build our space domain awareness capabilities with the United States and other key partners into the future” (2020 Force Structure plan, Department of Defense).

Australia aims to promote international rules-based system in order to **limit militarisation of space** (Defense White Paper, 2016). Two communication centres based in Australia provided navigation and communication services for the Hayabusa 2 mission: Nasa’s Deep Space Communication Complex (Canberra) and the European Space Agency’s New Norcia station (Western Australia). Both are managed by the CSIRO on behalf of the overseas agencies.

Strategic vision articulated in the Australian Civil Space Strategy 2019 – 2028 is: “**a globally responsible and respected space sector that lifts the broader economy, and inspires and improves the lives of Australians.**”

Strategy has 4 Strategic Space Pillars:

- open the door internationally;
- develop national capability in areas of competitive advantage; (e.g. SSA and debris monitoring, leapfrog research and development)
- ensure safety and national interest are addressed;
- and inspire and improve the lives of all Australians.

Activities under the Strategic Space Pillars will be guided by National Civil Space Priority Areas, which include **SSA and debris monitoring**.

## Comments

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- PD neither NEO/NEA are not explicitly mentioned in strategies. Rather, there is mention of “space debris and other threats” under the space domain awareness. Government also commits itself to invest in its capabilities to counter emerging space threats.

## Resources

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- State of Space Report: 1 July 2019 – 30 June 2020. A Report by the Australian Government Space Coordination Committee, 2020. Link: <https://www.industry.gov.au/sites/default/files/2020-12/state-of-space-report-2019-20.pdf>
- State of Space Report: 1 January 2018 – 30 June 2019. A Report by the Australian Government Space Coordination Committee, 2020. Link: <https://www.industry.gov.au/sites/default/files/2020-05/state-of-space-report-2018-19.pdf>
- Factsheet Space Defense: Shape. Deter, 2020. Respond. Link: [https://www.globalsecurity.org/military/library/report/2020/australia-2020-factsheet\\_space.pdf](https://www.globalsecurity.org/military/library/report/2020/australia-2020-factsheet_space.pdf)

- Force Structure plan, 2020. Link:  
<https://www1.defense.gov.au/about/publications/2020-force-structure-plan>
- Defense White Paper, 2016. Link:  
<https://www1.defense.gov.au/about/publications/2016-defense-white-paper>
- The Commonwealth Scientific and Industrial Research Organisation (CSIRO). Link:  
<https://www.csiro.au/en/research/technology-space/astronomy-space>
- Advancing Space: Australian Civil Space Strategy 2019 – 2028, 2019. Link:  
<https://publications.industry.gov.au/publications/advancing-space-australian-civil-space-strategy-2019-2028.pdf>
- Space Power for Australia’s Security: Grand Strategy or Strategy of Grandeur, 2015. Link: <https://airpower.airforce.gov.au/sites/default/files/2021-03/SAAS04-Space-Power-for-Australia-s-Security-Grand-Strategy-of-Strategy-of-Grandeur.pdf>
- Defense Strategic Update, 2020. Link:  
<https://www1.defense.gov.au/about/publications/2020-defense-strategic-update>
- Space: National Manufacturing Priority road map, 2021. Link:  
<https://www.industry.gov.au/data-and-publications/space-national-manufacturing-priority-road-map>
- Defense in space: securing the new frontier, 2020. Link:  
<https://www.minister.defense.gov.au/minister/lreynolds/statements/defense-space-securing-new-frontier>

## Belgium

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

No mention of the PD in policy documents. However, industrial and scientific participation in the HERA mission (ESA S2P).

Belgium's interests in the Planetary Defense (only implicit based on the generally declared principles and objectives of space policy and strategy as far as there are no direct mentions/links to the PD or NEO):

#### A. Global welfare: YES

- Free access to outer space and sustainable application of aerospace technology in the interest of society and humanity.
- BELSPO pursues a space policy based on four anchor points: scientific research, social utility (public), industrial development and economic interest.

#### B. National welfare: YES

- Benefit from developments and from the advantages of space in the area of society.

#### C. National security: NO

- National security understood as a participation on global security efforts.

#### D. Global security: YES

- Active involvement in ESA, and also in its Space Safety Programme (S2P) and NEO segment.
- Security aspect is not mentioned in the researched policy documents. However, participation at HERA S2P NEO segment indicates its interest in global planetary defense efforts.

#### E. Advanced science: YES

- Belgium has a strong participation in the HERA mission + scientific projects via BRAIN-be such as Chicxulub 2016 IODP-ICDP deep drilling, BAMM!, METRO. Among principles of Belgian space policy is also scientific exploration.

#### F. Industrial growth: YES

- HERA also understood as an opportunity for space industrial sector evolution.
- "free access to outer space and sustainable application of aerospace technology in the interest of society and humanity". Therefore, the focus is also on the "industrial development and economic interest".

## G. Political leadership: NO

- Prestige in business. Giving Belgian industrial teams the possibility to maintain a central position in their specific niches (core business).

### What strategies say

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In **Belgian Space Policy** neither in the **Belgian Space Strategy** there is no mention of the **planetary defense or NEO**. However, as a founding member of **ESA**, Belgium has linked space activities, among others, to active involvement in **ESA**, and also in its **Space Safety Programme (S2P) and NEO segment**. Belgium is taking part in the **HERA** mission where has a strong **industrial and scientific participation** (Space Safety, [https://www.belspo.be/belspo/space/esa\\_spaceSafety\\_en.stm](https://www.belspo.be/belspo/space/esa_spaceSafety_en.stm)). The Royal Observatory of Belgium and EMXYS will provide the GRASS instrument (first gravimeter ever on an asteroid). It is part of the Juventas CubeSat, manufactured by GomSpace Luxemburg, that will land on the asteroid in 2027 and will measure the gravity field of Dimorphos (The Royal Observatory of Belgium and EMXYS receive go for participation in planetary defense Hera space mission, 2020). Thales Alenia Space will provide equipment to amplify radio frequencies and will also provide the PCDU, the electrical core of the spacecraft.

Moreover, via BRAIN-be (Belgian Research Action through Interdisciplinary Networks) Belgian leads several **scientific projects** which might be relevant to the PD with aims and expected results such as, for instance, better understanding of the formation of large craters on terrestrial planets (planetary exploration), tracing meteoroid orbits in the Solar System and clarifying their association with asteroids, comets, or the zodiacal cloud, atmospheric meteor entry simulations or meteor impact risk estimate in the ecliptic plane at 1 astronomical unit. These projects are Chicxulub 2016 IODP-ICDP deep drilling: From cratering to mass extinction (2017-2021), BAMM!: Belgian Antarctic Meteorites and Micrometeorites to document solar system (2017 - 2021) and METRO: MEteor TRajectories and Origins (2014 –2019).

Principles of **Belgian space policy** are “**scientific exploration, free access to outer space and sustainable application of aerospace technology in the interest of society and humanity**”. Therefore, the focus is on the “**scientific research, social utility (public), industrial development and economic interest**”.

Belgium invest in space in order to maintain a **central position in this area, to benefit from developments and from the advantages of space** in the area of **society, industry and science**. It aims to promote capacity building of the scientific teams, support industry and its competitiveness, focusing on “small” missions and position itself in the security-defense component of Europe's space sector (Belgian space strategy).

### Comments

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- PD is not explicitly mentioned in strategies. Rather, there is a link to **ESA S2P and NEO segment**.

## Resources

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- Belgian space strategy. Link: [https://www.belspo.be/belspo/space/bePolicy\\_en.stm](https://www.belspo.be/belspo/space/bePolicy_en.stm)
- Belgian Space Policy. Link: [https://www.belspo.be/belspo/space/bePoten\\_en.stm](https://www.belspo.be/belspo/space/bePoten_en.stm)
- Space Safety. Link: [https://www.belspo.be/belspo/space/esa\\_spaceSafety\\_en.stm](https://www.belspo.be/belspo/space/esa_spaceSafety_en.stm)
- The Royal Observatory of Belgium and EMXYS receive go for participation in planetary defense Hera space mission, 2020. Link: <https://www.astro.oma.be/en/the-royal-observatory-of-belgium-and-emxys-receive-go-for-participation-in-planetary-defense-hera-space-mission/>
- Chicxulub 2016 IODP-ICDP deep drilling: From cratering to mass extinction (2017-2021). Link: [https://www.belspo.be/belspo/brain-be/projects/CHICXULUB\\_en.pdf](https://www.belspo.be/belspo/brain-be/projects/CHICXULUB_en.pdf)
- BAMB!: Belgian Antarctic Meteorites and Micrometeorites to document solar system (2017 - 2021). Link: [https://www.belspo.be/belspo/brain-be/projects/BAMB\\_en.pdf](https://www.belspo.be/belspo/brain-be/projects/BAMB_en.pdf)
- METRO: MEteor TRajectories and Origins (2014 –2019). Link: [http://www.belspo.be/belspo/brain-be/projects/METRO\\_en.pdf](http://www.belspo.be/belspo/brain-be/projects/METRO_en.pdf)
- Aerospace. Link: [https://diplomatie.belgium.be/en/policy/policy\\_areas/peace\\_and\\_security/aerospace](https://diplomatie.belgium.be/en/policy/policy_areas/peace_and_security/aerospace)

## Brazil

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

Brazil's interests in the Planetary Defense:

**H. Global welfare: NO**

**I. National welfare: YES**

- One of main principles of National Space Policy is promotion of national development and well-being of Brazilian society (National Space Policy, 2020).

**J. National security: YES**

- Need to enhance SSA (National Space Policy, 2020).

**K. Global security: YES**

- Participation at the Asteroid Mapping and Research Initiative project, Asteroid Hunt Program as well as usage of SDSS-3 indicates interest in global planetary defense efforts.

**L. Advanced science: YES**

- Promote development of scientific capacity, technology and innovation in areas of knowledge that benefit from space activities or that contribute to its development (National Space Policy, 2020).

**M. Industrial growth: YES**

- Promote development of technology and innovation (National Space Policy, 2020).

**N. Political leadership: NO**

### What strategies say

**There is no explicit mention of the term “planetary defense”.**

Brazil is involved in the IASC - International Astronomical Search Collaboration, responsible for the Asteroid Hunt Program that has a partnership with NASA (National System for the Development of Space Activities- SINDAE) as well as in Asteroid Mapping and Research Initiative project at the National Observatory (Impacton) also using Sloan Digital Sky Survey 3 (SDSS-3), which integrates Brazil into international programs for searching and tracking asteroids and comets at risk of collision with Earth (On apresenta projeto de monitoramento de asteroides, 2013).

In the Decree of the president on the National Space Policy from 2020, there is anchored need for enhancement of the **space situational awareness** which is characterized as “ability to perceive the characteristics of the space environment and what happens in it, with the help of tracking techniques for space artefacts and **natural space bodies**, monitoring of spatial climate events and identification of possible risks to space activities.”<sup>1</sup>

Main principles are:

I - promotion of national development, well-being of Brazilian society and meeting the needs of Brazil via space activities;

II - pragmatism in proposing initiatives, taking into account reality and challenges that Brazil faces;

III - meeting the needs of the Brazilian society;

IV - promoting space sector in order to deliver value to Brazil

As general objectives defined in the article 4 of the National Space Policy are considered promoting Brazil capacities to develop space activities in order to face national challenges, benefit Brazilian society, promote national development and national sovereignty; and to guarantee national integrity (Decreto: Art. 1º. Fica instituída a Política Nacional de Espaço – PNE, com base nos princípios, objetivos, diretrizes e instrumentos previstos neste Decreto, que regerão as atividades espaciais do País, 2020).

## Comments

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- PD is not explicitly mentioned in strategies. Rather, it is included in the SSA.
- Criterial fulfilled above are implicit stemming from the accessible policy documents (including link to SSA) and government’s actions such as Asteroid Mapping and Research Initiative project and international involvement in Asteroid Hunt Program. These activities indicate that there is some basic strategic approach in relation to the space safety and planetary defense even though Brazil does not have explicit mention of NEO / Planetary Defense in space policy documents.

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<sup>1</sup> DECRETA: Art. 1º. Fica instituída a Política Nacional de Espaço – PNE, com base nos princípios, objetivos, diretrizes e instrumentos previstos neste Decreto, que regerão as atividades espaciais do País. (2020): “Consciência situacional espacial: habilidade de se perceberem as características do ambiente espacial e o que nele ocorre, com o auxílio de técnicas de rastreamento de artefatos espaciais e de corpos espaciais naturais, monitoramento de eventos climáticos espaciais e identificação de possíveis riscos às atividades espaciais.”

## Resources

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- On apresenta projeto de monitoramento de asteroides, 2013. Link: <https://www.gov.br/aeb/pt-br/assuntos/noticias/on-apresenta-projeto-de-monitoramento-de-asteroides>
- Ministro Marcos Pontes participa do “Momento Caça-Asteroides do MCTI” na programação da SNCT. Link: <https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/noticias/2020/10/ministro-marcos-pontes-participa-do-201cmomento-caca-asteroides-do-mcti201d-na-programacao-da-semana-nacional-de-ciencia-e-tecnologia>
- Decreta: Art. 1º. Fica instituída a Política Nacional de Espaço – PNE, com base nos princípios, objetivos, diretrizes e instrumentos previstos neste Decreto, que regerão as atividades espaciais do País., 2020. Link: <https://www.gov.br/mcti/pt-br/acesso-a-informacao/consulta-publica/consulta-pnerev20201008minuta.pdf>
- National Policy for the Development of Space Activities- SINDAE. Link: <https://www.gov.br/aeb/pt-br/programa-espacial-brasileiro/politica-organizacoes-programa-e-projetos/politica-nacional-de-desenvolvimento-das-atividades-espaciais-pndae>
- Programa Nacional de Atividades Espaciais. Link: <https://www.gov.br/aeb/pt-br/programa-espacial-brasileiro/politica-organizacoes-programa-e-projetos/programa-nacional-de-atividades-espaciais>
- Sistema Nacional de Desenvolvimento das Atividades Espaciais. LINK: <https://www.gov.br/aeb/pt-br/programa-espacial-brasileiro/politica-organizacoes-programa-e-projetos/sistema-nacional-de-desenvolvimento-das-atividades-espaciais-sindae>

## China

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

#### A. Global welfare: YES

- One of the aims of China's space industry is “to promote human civilization and social progress, and to benefit the whole of mankind” (China’s Space activities, 2011).
- “The country develops and utilizes space resources in a prudent manner, takes effective measures to protect the space environment...and guarantee that its space activities benefit the whole of mankind” (China’s Space activities, 2011).

#### B. National welfare: YES

- Among purposes of China's space industry are: ...”to meet the demands of economic development, scientific and technological development, national security and social progress; and to improve the scientific and cultural knowledge of the Chinese people, protect China's national rights and interests, and build up its national comprehensive strength” (China’s Space activities, 2011).

#### C. National security: YES

- One of the purposes of space activities is to meet demands of national security (White paper on space activities, 2016).
- Main goal of the China’s national defense is to “resolutely safeguarding China’s sovereignty, security and development interests.” (China’s National Defense in the New Era, 2019).

#### D. Global security: YES

- Benefit of the whole mankind (China’s Space activities, 2011 and 2016).
- “One skill China intends to cultivate is planetary defense. In this, the asteroid Apophis, discovered in 2004 and 394 meters in length, is China’s focus of study. In 2029, Apophis will fly near earth, missing it by 30,000 kilometres. In assessing the threat asteroids may pose to earth, CAS’ Purple Mountain Observatory plays a significant role. In January 2017, the observatory discovered three NEOs, and one among them, 2017 BL3, poses a risk to Earth. In building towards these space technologies, China aims to establish a more permanent presence in space” (China in Space: Ambitions and Possible Conflict, 2018).

#### E. Advanced science: YES

- China also develops relevant technologies and capabilities, strengthens SSA .... “Threats to outer space and cyber security loom large and the threat of non-traditional

security issues posed by natural disasters...is on the rise.” (China’s National Defense in the New Era, 2019).

- Among purposes of China's space activities is to meet the demands of scientific and technological development (White paper on space activities, 2016).
- China’s continues to promote deep-space exploration including asteroid observation and thus identified asteroid exploration as one of its space goals (White paper on space activities, 2016).
- The objectives of asteroid exploration mission are achieving a near-Earth asteroid sample return and a main-belt comet orbiting through one launch. “In order to promote peaceful exploration and utilization of outer space, scientific and technical innovation, social participation and international cooperation, China National Space Administration publicly solicits for proposals for payload configuration schemes and onboard schemes home and abroad” (Announcement of Opportunities for Scientific Payloads and Projects onboard Asteroid Exploration Mission, 2019).

#### F. Industrial growth: YES

- “We want to explore asteroids because their resources will be important to mankind’s development in the future” (China in Space: Ambitions and Possible Conflict, 2018).
- Purpose of China's space activities is to meet the demands of economic, scientific and technological development (White paper on space activities, 2016).

#### G. Political leadership: YES (in general)

- SPACE DREAM – to establish a leading position in the economic and military use of outer space as one of key components for “great rejuvenation of the Chinese nation.”
- China has set plans for mining of near-earth asteroids, which if successful could generate both significant national prestige and wealth. (China’s ambitions in space: contesting the final frontier).
- space program seen as profound for enhancing its leadership profile in international space cooperation, including through BRI (China’s ambitions in space: contesting the final frontier).
- In 2008, China founded the APSCO also as a platform for international space cooperation via which China gains “international prestige, promotes the export of its technology and services, and gains access to supplementary data and geographic coverage for its SSA.” (China’s ambitions in space: contesting the final frontier).

#### What strategies say

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**There is no mention of the term “planetary defense”** in the researched documents. However, China’s focus **on deep-space explorations including exploration of asteroids and monitoring of small near-Earth celestial bodies and its early warning of possible collision** was anchored in document China’s Space activities in 2011 (China’s Space activities, 2011). Currently building the Asia’s largest steerable radio telescope with a 70-meter-diameter antenna will, among others, improve China’s ability to receive such data and will contribute to the future asteroid and comet probing missions (China builds Asia’s largest steerable radio telescope for Mars mission, 2020).

In 2016's White paper on space activities China interlinks space industry with the **"nation's overall development strategy"**. China states that **"to explore the vast cosmos, develop the space industry and build China into a space power** is a dream we pursue unremittingly." Declared purpose of the space activities is, among others, to **"promote human civilization and social progress, and benefit the whole of mankind**; to meet the demands of **economic, scientific and technological development, national security and social progress."** China continues to **promote deep-space exploration including asteroid observation** and thus **identified asteroid exploration as one of its space goals**. In relation to the space environment, it also set the goal to improve **the standardization system** for space debris and **near-earth objects, monitor and catalogue such objects**, to build a disaster early warning platform and **prepare studies for building facilities for monitoring of near – earth objects**.

In relation to the China's goal to utilize space and enhance space security, priority is also given to the space exploration as well as space science. China perceives that **"all countries' outer space activities should be beneficial to their economic development and social progress, and to the peace, security, survival and development of mankind"** (White paper on space activities, 2016).

In 2019's China's National Defense in the New Era declares **"Outer space is a critical domain in international strategic competition. Outer space security provides strategic assurance for national and social development."** China, among others, **"develops relevant technologies and capabilities, advances holistic management of space-based information resources, strengthens space situation awareness** and safeguards space assets.... Threats to outer space and cyber security loom large and the threat of non-traditional security issues posed by natural disasters...is on the rise." Main goal of the China's national defense is to **"resolutely safeguarding China's sovereignty, security and development interests"** (China's National Defense in the New Era, 2019). In 2019, China announced opportunities for **"Scientific Payloads and Projects onboard Asteroid Exploration Mission"** with the aim for **near-Earth asteroid 2016HO3 sample return**. Its's objective is to shed light on the formation and evolution of asteroids and comets and to study their organic substances. Declared interests of this opportunity are, among others, promotion of **scientific and technical innovation** (Announcement of Opportunities for Scientific Payloads and Projects onboard Asteroid Exploration Mission, 2019).

In order to acquire leading position in the **economic and military use of outer space**, China has set such plans such as **mining of near-earth asteroids**, which could bring China **national prestige and wealth**. China promotes its **international leadership** and export of its technology and services also via its cooperation through APSCO (China's ambitions in space: contesting the final frontier). In relation to the planetary defense, China studies asteroid Apophis which in 2029 will fly 30,000 kilometres near earth. In 2017, **CAS' Purple Mountain Observatory discovered NEO 2017 BL3 and assesses the threat asteroid poses to Earth**. In order to support development of new space technologies, China is also planning to establish **"a more permanent presence in space"** (China in Space: Ambitions and Possible Conflict, 2018). Indeed, **Purple Mountain Observatory** focuses on the dynamical and physical **studies of the NEO objects including NEO hazardous evaluation. The Schmidt telescope** at Xuyi station serves for NEO survey and research. There were many scientific research projects implemented in recent years such as, for instance, NEO astrometry, dynamics and physics research; Orbit dynamics of asteroids and comets; Search, Authentication and hazardous evaluation of Celestial bodies; Telescope's huge amount data processing and sharing; 863-703 project: hazardous evaluation and utilization of small celestial bodies (Near Earth Object Survey and Solar System Bodies (news). Tsinghua

University's School of Aerospace is focusing on the research of solar sails and how they can be used to assist kinetic impactor and gravity tractor deflection missions (Gong et al., 2009). Since 2016 FAST (Five-hundred-meter Aperture Spherical Telescope) has been operated and could be theoretically used of radar system to explore asteroids (<http://fast.bao.ac.cn/>).

## Resources

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- White paper on space activities, 2016. Link: [http://english.www.gov.cn/archive/white\\_paper/2016/12/28/content\\_281475527159496.htm](http://english.www.gov.cn/archive/white_paper/2016/12/28/content_281475527159496.htm)
- China in Space: Ambitions and Possible Conflict, 2018. Link: [https://www.jstor.org/stable/26333878?seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/26333878?seq=1#metadata_info_tab_contents)
- China's Space activities, 2011. Link: <http://www.cnsa.gov.cn/english/n6465645/n6465648/c6480839/content.html>
- China builds Asia's largest steerable radio telescope for Mars mission, 2020. Link: [http://english.www.gov.cn/news/topnews/202004/27/content\\_WS5ea6776ec6d0b3f0e94967c8.html](http://english.www.gov.cn/news/topnews/202004/27/content_WS5ea6776ec6d0b3f0e94967c8.html)
- China's National Defense in the New Era, 2019. Link: [https://english.www.gov.cn/archive/whitepaper/201907/24/content\\_WS5d3941ddc6d08408f502283d.html](https://english.www.gov.cn/archive/whitepaper/201907/24/content_WS5d3941ddc6d08408f502283d.html)
- China's ambitions in space: contesting the final frontier. Link: <https://www.uscc.gov/sites/default/files/2019-11/Chapter%204%20Section%203%20-%20China's%20Ambitions%20in%20Space%20-%20Contesting%20the%20Final%20Frontier.pdf>
- Near Earth Object Survey and Solar System Bodies. Link: [http://english.pmo.cas.cn/rh/da/nsb/200908/t20090831\\_35079.html](http://english.pmo.cas.cn/rh/da/nsb/200908/t20090831_35079.html)
- Announcement of Opportunities for Scientific Payloads and Projects onboard Asteroid Exploration Mission, 2019.
- Gong et al., 2009, Link: <http://www.tsinghua.edu.cn/publish/hyen/index.html>). Since 2016 FAST (Five-hundred-meter Aperture Spherical Telescope) has been operated and could be theoretically used of radar system to explore asteroids (<http://fast.bao.ac.cn/en/>).
- Five-hundred-meter Aperture Spherical radio Telescope (FAST). Link: <https://fast.bao.ac.cn>
- White paper stresses security of outer space and cyberspace, 2019. Link: [http://english.www.gov.cn/statecouncil/ministries/201907/26/content\\_WS5d3a7307c6d08408f50228d5.html](http://english.www.gov.cn/statecouncil/ministries/201907/26/content_WS5d3a7307c6d08408f50228d5.html)



## Germany

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

#### A. Global welfare: NO

#### B. National welfare: YES

- Basic and applied research in space and under space conditions constitutes an outstanding investment in the future of our knowledge society.
- Germany aims to reinforce and expand the strong position it has established at the European and international level in the fields of space exploration, the use of space for scientific purposes.

#### C. National security: YES

- One of main reasons focusing on near-Earth asteroids is “sustainability and the protection of environment and technical systems” from external influences such as e.g. near-Earth asteroids.
- According to the space strategy, space-based systems used also for the observation of the near-Earth asteroids are “**central to many areas of national security**”.
- “It is of vital importance to Germany’s security that we ensure the proper functioning of space systems in the face of natural and human threats while also allowing access to the exploitation of space.” Thus, there is a need for SSA (Space Strategy of the German Federal Government: Making Germany’s space sector fit for the future, 2010).
- Space-based systems perform an increasingly important function with respect to civil and military security **in Germany and Europe**.
- “It is of vital importance to Germany’s security that we ensure the proper functioning of space systems in the face of natural and human threats while also allowing access to the exploitation of space. With that end in mind, an essential contribution will be made by building up a national competence for SSA through the use of existing resources.”

#### D. Global security: YES (not explicitly mentioned)

#### E. Advanced science: YES

- Germany aims to “reinforce and expand the strong position it has established at the European and international level in the **fields of space exploration**, the use of space for scientific purposes, and the study of the Earth system”.
- “As one of the world **leaders in space research**, we intend to ensure that greater use is made of German expertise and excellence in the context of ESA missions as well as in national and bilateral missions” (The space strategy of the German Federal Government: Making Germany’s space sector fit for the future, 2010).

## F. Industrial growth: YES

- “Scientific and applications-related space activities power the further development of industrial and research structures and competence in key pace-setting technologies.”
- “As well as placing a high value on basic research, we aim first and foremost to prioritise, wherever possible, the transfer of scientific results to economic uses and applications, while also focusing on sustainability and the protection of our environment and technical systems (notably from external influences on the climate, space weather, near-Earth asteroids)” (The space strategy of the German Federal Government: Making Germany’s space sector fit for the future (2010).
- “In Germany, innovations in the space sector tend to stem mostly from technologies developed for civil and scientific applications. We shall therefore, wherever possible, exploit synergies between civil developments and dual-use technologies when further developing system capabilities and strategically important competences in key technologies both in Germany and Europe” (The space strategy of the German Federal Government: Making Germany’s space sector fit for the future (2010).

## G. Political leadership: NO

### What strategies say

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**In the researched documents, there is no mention of the term “planetary defense”.** However, in the 2010 Space Strategy: Making Germany’s space sector fit for the future, **near-earth asteroids are perceived as important in space research as well as in Germany’s security.**

One of main reasons focusing on near-Earth asteroids is **“sustainability and the protection of environment and technical systems”** from external influences such as e.g. **near-Earth asteroids**. As one of the world leaders in space research, objectives of the space strategy are to further promote strong position of space research and space exploration what at the end contributes towards the **knowledge society**. According to the space strategy, space-based systems used also for the observation of the **near-Earth asteroids** are **“central to many areas of national security”**. Satellite data and services make a vital contribution, among others, to disaster relief and management or to warning of threats. Germany wants to make a greater use of synergies among “civil and military space research **in the development of security-related technologies”**. “It is of vital importance to **Germany’s security that we ensure the proper functioning of space systems in the face of natural and human threats while also allowing access to the exploitation of space.**” Thus, there is a need for SSA (Space Strategy of the German Federal Government: Making Germany’s space sector fit for the future, 2010). As main goals of the strategy are identified social, economic and scientific ones and addressing key global challenges such as, for instance, knowledge society, conservation of natural resources, global change as well as military and civil security. Whole-of-government security approach will be addressed also via **SSA**. In the field of **exploration**, Germany took part in the **Rosetta mission** (Space in Germany - Structure and German Space Planning, presentation, 2014).

In the DLR strategy 2030 it is stated that laser technologies are going to be used for increasing **safety in space**, for instance in relation to the space debris. DLR is therefore developing technologies for space surveillance and enhancing safety in order to protect critical infrastructure and people also in cases of disaster and crisis situations. **There is also mentioned impact hazard as “investigations of**

**planets, asteroids and comets in our Solar System, including improvements in our understanding of the potential danger from impacts of [NEOs] on the Earth”** (The Status of NEO/related Activities in Germany, 2018).

Germany is participating at **HERA** mission primarily via industry but DLR and the Museum für Naturkunde provide three working-group leaders. The German aerospace company, OHB System AG, Bremen, is the ESA prime contractor for this space mission. In the EU-funded project **NEO-MAPP** (‘NEO Modelling and Payloads for Protection’) which is going to be implemented till 2023, Germany has either leadership or significant participation in advanced payload synergies (DLR) and simulation of a kinetic impactor with an asteroid (MfN, Berlin)”. Moreover, the Airbus Defense and Space took part in **FastKD** (Fast Kinetic Impactor Deflection Mission concept) funded by ESA (Current NEO-related Activities in Germany, 2020).

With regards to the previous NEO projects participation, Germany also took part in **NEOShield 01** (Prevention of impacts from near –Earth objects (NEOs) on our planet, 2012-2015), **NEOShield 02** (Access technologies and characterization for near – Earth objects, 2015 – 2017), **MASCOT onboard Hayabusa 2** (Asteroid Sample Return Mission, 2014-2020) **and Feuerkugelnetz** (Fireball Network, study of meteoroid flux with 25 cameras stationed in Germany, Czech Republic, Luxembourg, Austria).” (Presentation: The Status of NEO/related Activities in Germany, 2018).

### Comments

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- Global security is not explicitly mentioned, but involvement in the ESA SSA NEO segment indicates fulfillment of this criterion.

### Resources

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- Space Strategy of the German Federal Government: Making Germany’s space sector fit for the future, 2010. Link: [https://www.dlr.de/rd/en/Portaldata/28/Resources/dokumente/Raumfahrtstrategie\\_en.pdf](https://www.dlr.de/rd/en/Portaldata/28/Resources/dokumente/Raumfahrtstrategie_en.pdf)
- Space in Germany - Structure and German Space Planning, presentation, 2014.
- The Status of NEO/related Activities in Germany, 2018. Link: [https://www.cosmos.esa.int/documents/336356/1601091/SMPAG10\\_Activities\\_Germany\\_Harris.pdf/584a98c3-3985-cd16-68a6-ca0adc342397](https://www.cosmos.esa.int/documents/336356/1601091/SMPAG10_Activities_Germany_Harris.pdf/584a98c3-3985-cd16-68a6-ca0adc342397)
- Current NEO-related Activities in Germany, 2020. Link: [https://www.cosmos.esa.int/documents/336356/336472/NEO-related\\_activities\\_in\\_Germany\\_-\\_Harris\\_2020-09-24+%281%29.pdf/525c6134-f74a-13ad-8596-e35553c0b00e?t=1600963723365](https://www.cosmos.esa.int/documents/336356/336472/NEO-related_activities_in_Germany_-_Harris_2020-09-24+%281%29.pdf/525c6134-f74a-13ad-8596-e35553c0b00e?t=1600963723365)
- DLR Strategie 2030: Zukunftstechnologien für die gessellschaft. Link: [https://www.dlr.de/dlr/Portaldata/1/Resources/documents/2019/26013\\_DLR-Strategie\\_2030\\_ONLINE\\_200219.pdf](https://www.dlr.de/dlr/Portaldata/1/Resources/documents/2019/26013_DLR-Strategie_2030_ONLINE_200219.pdf)

## Italy

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

#### H. Global welfare: NO

#### I. National welfare: YES

- “Study of the universe will also contribute towards scientific and technological instruments whereas advanced technologies **will improve citizens' lives** and national industrial competitiveness.”

#### J. National security: YES

- In Strategic Vision for Space 2020-2029, priority policy sectors involve explorations of the Moon and asteroids as well as SSA “which aims to protect space infrastructures and civilian population from possible threats originating from and in space.”
- SSA sector include besides SST and space weather also NEO (Near-Earth Objects) with the aim of “preventing and mitigating the risk of cosmic impacts” (Documento di visione strategica per lo spazio 2020 - 2029)

#### K. Global security: YES

- Not explicitly mentioned, but at European level involvement in the SSA & cooperation with NASA indicates fulfillment of this criterion.

#### L. Advanced science: YES

- “Study of the universe will also contribute towards **scientific** and technological instruments...”

#### M. Industrial growth: YES

- Hera Mission - Italian space industry was awarded contracts for a total value of about €24.5 million. It is result and of intensive research on advanced technologies and innovation.
- Research and innovation is the second pillar of the Italian space economy (Commentary: A Strategy for the EU and Italy in the Space, 2020).
- Potential commercial developments linked to the topics of SSA – linking to space mining (Strategic Vision Document 2016-2025)
- “Promote the development and use of infrastructures for the Space Economy.”

#### N. Political leadership: YES

- Focus on the leadership position in research of the NEO and its possible risks of collision with the Earth within ESA S2P program and EU programs.

- Strengthening the image and role of Italy on the international level emerges as the third main pillar of the 2020-2029 Strategic Vision (Commentary: A Strategy for the EU and Italy in the Space, 2020).
- Strategic goal 4 of the Strategic Vision 2016 – 2025 is to “raise the country’s international prestige” (Strategic Vision Document 2016-2025).

### What strategies say

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**There is no mention of the term “planetary defense” in researched documents.** However, Italy is focusing on the **NEO research from the perspective of space exploration, securing of safety and economic opportunities within the SSA** and also with the aim of further **development of technologies and knowledge enabling next steps towards deep space and Mars.**

In the document Strategic Vision for Space 2020-2029, among priority policy sectors are mentioned **robotic explorations of the Moon and asteroids** as well as **space situational awareness”** which aims **“to protect space infrastructures and civilian population from possible threats originating from and in space.”** SSA sector include besides SST and space weather also **NEO (Near-Earth Objects)** with the aim of **“preventing and mitigating the risk of cosmic impacts”**. Italy focuses on the leadership position in research of the **NEO and its possible risks of collision with the Earth** within the SSA / Space Safety program of ESA and the research and innovation programs of the European Union. It is stated in the document that “Italy was the first country in the world to equip itself with an asteroid risk monitoring system” and it supports “operations of the NEO Coordination Center set up at ESRIN in Frascati”. Prototype of the Fly-Eye telescope will be installed in the Sicily. Italy also participates in HERA mission (Documento di visione strategica per lo spazio 2020 - 2029). Due to the research on **advanced technologies and innovation**, Italy was awarded contracts for the electric power system (OHB-Italy) and propulsion (AVIO). **Research and innovation are pillar of the Italian space economy** (Commentary: A Strategy for the EU and Italy in the Space, 2020).

In order to maintain this excellence, it is advised to ASI to establish its own **NEO Center** with the aim to educate new generation of technicians and support innovation environment. Strategic objectives of the SSA segment are, among others, to enhance space safety, promote technologies (optimizing synergies). “An SST / SSA capability is required both to ensure nationwide and adequate level of autonomy to the country system, both to favor development of **services aimed at institutional and commercial user.**” **Searching for and using synergies among different pillars of SSA (e.g. “use of the “Fly-Eye” telescope for observing both NEO and debris space and the adoption of nano / mini platforms for proximity operations”)** are unique opportunities for Italy in creation of international geopolitical alliances (at international field). Research of NEO and their characterization is included also in other programmatic sector, which is robotic exploration. **Participation** at the large scientific missions allows Italy to move **“from the discovery phase to those of exploration and subsequent use.”** In relation to the programmatic sector Human exploration of space, there is a link with potential development in economic exploitation of the Moon, Mars and Asteroids (Documento di visione strategica per lo spazio 2020 - 2029).

In relation to the strategic space sectors it is mentioned that innovative technologies will contribute to robotic exploration missions (including exploration of asteroids) “with important returns in terms of knowledge and cutting-edge technological development”. Indeed, advanced technologies

“will improve citizens' lives and national industrial competitiveness” (Prime Minister's Office: Government guidelines on space and aerospace. The new national governance for space).

In the Strategic Vision Document 2016 – 2025, strategic goal 2 is to “promote the development and use of infrastructures for the Space Economy” including **potential commercial developments linked to the topics of Space Situational Awareness (SSA)**. Under the Strategic goal 3 which is focused on the scientific and cultural progress (science diplomacy), one of objectives of this strategy is to “**seek and characterize Near Earth Objects**” in order to **enhance the knowledge of the space environment**. As an examples are stated ESA’s **Rosetta-Philae mission** or **NASA’s DAWN mission**. “In 2024, another NASA-ASI mission will be launched, for the detailed study of Mars and to ensure optimal telecommunications for exploration of its surface. Beyond this date it will be necessary to improve integration between the scientific study of solar bodies and the activities of robotic and human exploration. In particular, the development of research activities dedicated to the research and characterization of NEOs (Near Earth Objects) is envisaged.” Later in the document it is also stated that “**the common long-term vision envisages missions to the Moon and to the asteroids for the purpose of making the development of adequate technologies and knowledge possible for the next step towards deep space and Mars.**” As one of the strategic goals identified in the document was to “raise the country’s international prestige (Space Diplomacy)” also in the area of cooperation with NASA an in **ARRM (asteroid) or in** in security area (e.g. SSA)” (Strategic Vision Document 2016-2025).

In the 2019’s National Security Strategy for Space which is part of the National Strategy for Space it is stated that national and international security in space sector are interdependent. At European level, Italy is contributing towards human space exploration as well as development of the SSA capability. Among its **strategic objectives** are ensuring the security of space infrastructures and promotion of “space governance capable of ensuring sustainable, safe and secure space operations at international level”. Italy also aims to strengthen and protect national space capabilities, national security architecture and protect against intentional and unintentional threats with the goal of the “**sustainability, safety and security of space activities** (e.g. **SST/SSA capabilities in the European context**).” (Strategia nazionale di sicurezza per lo spazio, 2019).

### Comments

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- Not using the term PD but NEOs which are perceived in policy documents as threats originating from and in space.
- Focus on the leadership position in research of the NEO.
- Plan to establish its own NEO Center.
- Involvement in ESA S2P program.
- Approach towards NEO: space exploration, securing of safety and economic opportunities within the SSA, development of technologies and knowledge towards deep space.

### Resources

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- Documento di visione strategica per lo spazio 2020 - 2029. Link: [https://www.asi.it/wp-content/uploads/2020/04/DVSS-2020-2022-Finale\\_compressed\\_compressed.pdf](https://www.asi.it/wp-content/uploads/2020/04/DVSS-2020-2022-Finale_compressed_compressed.pdf)

- Commentary: A Strategy for the EU and Italy in the Space, 2020. Link: <https://www.ispionline.it/en/pubblicazione/strategy-eu-and-italy-space-28632>
- Strategic Vision Document 2016-2025. Link: [https://bandiasi.almaviva.it/sites/default/files/attach/dettaglio/dvs-ing\\_web.pdf](https://bandiasi.almaviva.it/sites/default/files/attach/dettaglio/dvs-ing_web.pdf)
- Strategia nazionale di sicurezza per lo spazio, 2019. Link: [https://presidenza.governo.it/AmministrazioneTrasparente/Organizzazione/ArticolazioneUffici/UfficiDirettaPresidente/UfficiDiretta\\_CONTE/COMINT/Strategia\\_spazio\\_20190718.pdf](https://presidenza.governo.it/AmministrazioneTrasparente/Organizzazione/ArticolazioneUffici/UfficiDirettaPresidente/UfficiDiretta_CONTE/COMINT/Strategia_spazio_20190718.pdf)
- Prime Minister's Office: Government guidelines on space and aerospace. The new national governance for space. Link: [https://presidenza.governo.it/AmministrazioneTrasparente/Organizzazione/ArticolazioneUffici/UfficiDirettaPresidente/UfficiDiretta\\_CONTE/COMINT/DEL\\_20190325\\_aerospazio-EN.pdf](https://presidenza.governo.it/AmministrazioneTrasparente/Organizzazione/ArticolazioneUffici/UfficiDirettaPresidente/UfficiDiretta_CONTE/COMINT/DEL_20190325_aerospazio-EN.pdf)

## Korea

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

#### A. Global welfare: YES

- One of core values of the Future Vision 2050 is “contribution to mankind (creating and utilizing aerospace achievements that encompass and benefit the nation and mankind)” (KARI Future Vision 2050).

#### B. National welfare: YES

- The main goal of the Third Master Plan for Promotion of Aerospace Development is “contribution to the enhancement of public safety and citizens’ quality of life” (The 3<sup>rd</sup> revision of the Basic Plan for Promotion of Space Development, 2018).
- Aim to contribute to mankind (aerospace achievements that encompass and benefit the nation)
- Enhancement of citizens’ quality of life.

#### C. National security: YES

- Vision of the National basic plan for space hazards is “safety and protection from space hazards”.
- Strategic goal of the KARI Future Vision 2050 is advancing monitoring system for observing the NEO (near-earth orbit) objects and eliminating the risk actively from the NEO objects (KARI Future Vision 2050).
- Secure national safety and space assets from space hazards.
- Enhancement of public safety.

#### D. Global security: YES (not explicitly, but implicitly yes)

#### E. Advanced science: YES

- Among strategic goals of KARI Future Vision 2050 are space exploration for securing space and space science research (incl. “developing a large-scale observation satellite for deep space research”, and
- strengthening aerospace capabilities to respond to future environmental changes including “advancing monitoring system for observing the NEO (near-earth orbit) objects and eliminating the risk actively from the NEO objects.” (KARI Future Vision 2050).
- To pursue deep space exploration of asteroids and comets by utilizing micro-satellites (Space Activities in Korea, 2019)
- NEO research as well as “space hazards monitoring and analysis system: space object catalogue, re-entry and conjunction analysis”.

**F. Industrial growth: YES**

- One of Strategic goals of the KARI Future Vision 2050 is to become a technology pioneer
- Aim to develop technologies for the mitigation of space hazards as well as SSA.

**G. Political leadership: NO****What strategies say**

**There is no mention of the term “planetary defense” in researched documents.** Nevertheless, Korea aims to develop technologies for **the mitigation of space hazards** as well as space situational awareness. In relation to the Space Situational Awareness, there are important legislative documents such as Space Development Promotion Act (May, 2014), National basic plan for space hazards (May, 2014) as well as “Enforcement decree of the framework act on the management of disasters and safety” (Jan, 2017) in which are anchored also **disasters by natural space objects including asteroids** (Recent activities on SSA in the Republic of Korea, 2020). Vision of the **National basic plan for space hazards** is **“safety and protection from space hazards”**. Its goals are prompt action and forecasting, building up of monitoring system and enhancement of preparedness capability. It focuses on system (e.g. establishment of Meteorite Management System), technology (e.g. space risk identification and analysis of impacts on Earth) and infrastructure (e.g. research and development for technology, international cooperation).

Main aim of the National SSA Organization (NSSAO) is to **“Secure national safety and space assets from space hazards”**. One of the national SSA facilities is KMTNet (Korea Microlensing Telescope Network) which focuses on the **NEO research** as well as “space hazards monitoring and analysis system: space object catalogue, re-entry and conjunction analysis”. Within the area of research and development, it focuses on the development of 1.5m wide field optical **NEO survey telescope**, SSA radar sensor technology (active array radar) and all sky optical survey network. Korea is involved in international cooperation within the UN COPUOS, IAWN and SMPAG. **Owl-Net (Optical Wide Field Patrol)** deals with the **Space Objects Tracking and Monitoring** and has 5 “Global observation network (Mongolia, Morocco, Israel, USA, and Korea)” with HQ in Korea. Space hazards Analysis, Near Earth Object Observation, Fireball observation network (Observation of fireballs above the Korean peninsula) is under development. NEO Survey Telescope Development - NSOS (Near Space Optical Survey) (Recent activities on SSA in the Republic of Korea, 2020).

Korean Aerospace research institute (KARI) Future Vision till 2050 is **“Realizing Korea’s dream and new values toward the sky and space.”** There are following core values identified: **“future response** (active response to the mega trends of future society and paradigm changes), **contribution to mankind** (creating and utilizing aerospace achievements that encompass and benefit the nation and mankind), **technology pioneer** (challenging new technology that will influence the future and mankind significantly).” Among strategic goals are **space exploration for securing space and space science research** (incl. **“economic feasibility of space exploration and securing future strategic resources by utilizing space resource”**, **“developing a large-scale observation satellite for deep space research”**, and **strengthening aerospace capabilities to respond to future environmental changes including “advancing monitoring system for observing the NEO (near-earth orbit) objects and eliminating the risk actively from the NEO objects”** (KARI Future Vision 2050).

The main goal of the Third Master Plan for Promotion of Aerospace Development is “contribution to the **enhancement of public safety and citizens’ quality of life**”. One of activities which aim to fulfil this goal is “to launch the lunar orbiter in 2020, followed by lunar landing with the domestically developed launch vehicle, and successful **asteroid return in 2035**”. Within the strategic area “**starting space exploration**” within the **Lunar Explosion Project “the mission after the lunar landing is changed from moon return to asteroid sample return by 2035.”** (The 3<sup>rd</sup> revision of the Basic Plan for Promotion of Space Development, 2018).

**Apophis rendezvous mission for the year 2029** stems from the 3<sup>rd</sup> revision of the Basic Plan for Promotion of Space Development (2018) as well as Long-term Research Plan (2022-2030) of **Korean Astronomy and Space Science Institute (KASI)**. It takes into consideration ambitions in the area of “**planetary science, planetary defense and technology demonstration.**” KASI has capacities in “1) ground-based observation and data analysis, and 2) dynamical studies on small bodies and IDP, 3) science payload design and building (for small satellites and lunar missions), 4) small satellite development and operations, and 5) precision tracking w/Korea VLBI Network (KVN)” (Apophis rendezvous mission for year 2029: Draft plan). **Korean Astronomy and Space Science Institute (KASI) also supports the NEO research projects such as DEEP-South (Deep Ecliptic Patrol of the Southern Sky) and KEEP-North (Kirkwood Excitation and Exile Patrol of the Northern Sky) (Korean Astronomy and Space Science Institute).**

### Comments

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- Korea deals with the PD in the policy documents, even though the term is not used.
- Natural space objects (incl. asteroids) are space hazards which can cause disasters.
- It has comprehensive approach towards the PD and involves all set criteria excluding the political leadership. Global security is not explicitly mentioned, but Korea implicitly fulfill this criterion.

### Resources

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- Recent activities on SSA in the Republic of Korea, 2020. Link: <http://www.unoosa.org/documents/pdf/copuos/stsc/2020/tech-26E.pdf>
- Space Development Promotion Act, 2014. Link: [https://elaw.klri.re.kr/eng\\_service/lawView.do?hseq=17131&lang=ENG](https://elaw.klri.re.kr/eng_service/lawView.do?hseq=17131&lang=ENG)
- Third Master Plan for Promotion of Aerospace Development: Korea’s New Challenge for Space, 2018. Link: [https://www.kari.re.kr/cop/bbs/BBSMSTR\\_00000000031/selectBoardArticle.do;jsessionid=779C434B3F9EE3FDAA84C35D6E708D48?nttId=7184&kind=&mno=sitemap\\_02&pageIndex=1&searchCnd=&searchWrd](https://www.kari.re.kr/cop/bbs/BBSMSTR_00000000031/selectBoardArticle.do;jsessionid=779C434B3F9EE3FDAA84C35D6E708D48?nttId=7184&kind=&mno=sitemap_02&pageIndex=1&searchCnd=&searchWrd)
- KARI Future Vision 2050 (Korean Aerospace research institute). Link: [https://www.kari.re.kr/eng/sub01\\_06.do](https://www.kari.re.kr/eng/sub01_06.do)
- Lunar and Planetary Science, Korean Astronomy and Space Science Institute. Link: <https://www.kasi.re.kr/eng/pageView/286>
- Apophis rendezvous mission for year 2029: Draft plan. Link: [https://www.cosmos.esa.int/documents/336356/336472/Apophis\\_rendevous\\_-](https://www.cosmos.esa.int/documents/336356/336472/Apophis_rendevous_-)

\_Moon\_2020-09-24+%281%29.pdf/3aeb92d4-dc13-88b2-8505-d493c4a6c4f6?t=1600959837982

- Country Report: Space Activities in Korea, 2019.
- Korean Astronomy and Space Science Institute. Link: <https://www.kasi.re.kr/eng/index>



## Luxembourg

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

A. Global welfare: NO

B. National welfare: NO

C. National security: NO

D. Global security: YES

- NEO as a threat to mankind but not specifically mentioned that it is a threat to national security.
- The Space Safety Programme aims **at protecting our planet and, mankind, along with our space and ground infrastructure, against threats from space.**

E. Advanced science: YES

- Our contribution to the HERA mission will relate specifically to the development of one of the two CubeSats (Juventas), which the mother ship will carry to Didymos.
- The Juventas spacecraft's mission will be to characterize the main asteroid and its Moon. This will enable us to develop our "Deep Space" expertise with GomSpace Luxembourg as well as expertise in low-frequency radar with EmTroniX. We will also benefit from the data acquired by Juventas as well as those obtained by the second CubeSat.

F. Industrial growth: YES

- Luxembourg's interest in the Space Safety programme is directly linked to its own programme dedicated to the exploration and utilisation of space resources.

G. Political leadership: NO

### What strategies say

**Planetary defense is explicitly mentioned** in the National Action Plan 2020: Space, Science and technology. It is specified under the Space Safety Programme of the ESA. Interest in planetary defense is mainly due to the economic purposes. **"Luxembourg's interest in the programme is directly linked to its own programme dedicated to the exploration and utilisation of space resources."** There are seen synergies among these programmes such as necessity to establish a catalogue of asteroids and other celestial bodies including their composition what is essential both, for planetary defense as well as for utilisation of space resources.

Thus, composition matters not only for the better prediction of the trajectory of NEOs within the planetary defense, but also for helps to target NEOs of potential commercial value. “Therefore, there is a **common interest in developing space observation means such as telescopes and Deep Space exploration missions.**” HITEC Luxembourg contributed to some activities for a **Fly Eye telescope** “with the aim to contribute to a future European planetary defense system”. Luxembourg contribute to the HERA mission by **CubeSats (Juventas)**. “This will enable us to develop our “**Deep Space**” **expertise** with GomSpace Luxembourg as well as expertise in **low-frequency radar** with EmTroniX. We will also benefit from the data acquired by Juventas as well as those obtained by the second CubeSat. The aim is to feed this data into the database of the European Space Resources Innovation Center.” (National Action Plan 2020: Space, Science and technology, 2020).

### Comments

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- Luxembourg links planetary defense to exploration and utilisation of space resources and sees synergies among these areas.

### Resources

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- National Action Plan 2020: Space, Science and technology, 2020. Link: <https://space-agency.public.lu/dam-assets/publications/2020/Luxembourg-space-action-plan-ENG-final-kw.pdf>

## Poland

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

**A. Global welfare: NO**

**B. National welfare: NO**

**C. National security: YES**

- One of the objectives of the National Space Program 2021-2026 is the use of satellite technologies to increase the country's security and defense. This objective should be achieved through the implementation of the National Space Security System (National Space program 2021- 2026, version 0.8).
- NEO is perceived as the threat from space.

**D. Global security: NO (especially European one)**

- The NEO segment of tracking natural space objects that may hit the Earth's surface will contribute to the increase of national and international security, however, international security is not global security.

**E. Advanced science: YES**

- „Research and development in the area of space safety should focus on the development of commercially-oriented technologies that are currently at low levels of technological readiness (TRL), so as to enable Polish entities to compete in tenders on foreign markets, including ESA tenders and tenders of other space agencies, government institutions and enterprises in the SST, NEO and SWE segment. They should be accompanied by research and development at higher levels of technological readiness.“
- Research and development in the field of space safety is identified as one of interventions.

**F. Industrial growth: YES**

- Goal of the National Space Program: to promote industry and research in order to meet the needs of the state and the economy, and to compete effectively on international markets (National Space program 2021- 2026 - Krajowy Program Kosmiczny na lata 2021 – 2026, version 0.8).
- Sovereign network of SSA sensors will give Poland a leading position in the European market for the supply of observation data for the needs of SST.
- Promotion of development of competences of Polish companies and scientific institutions in the field of construction, maintenance and development of sensors.

Ensure national competences in the field of sourcing, processing, storing and sharing data, cataloging observations and satellites, and space debris.

- Aim to include NEO Polish business and scientific entities in the supply chain.

## G. Political leadership: NO

### What strategies say

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**Planetary defense is included in the National Space Program 2021 – 2026 (version 0.8).** It is the integral part of the strategic objective of the Program aiming to increase the country's security and defense via development of the **National Space Safety System**. In order to secure **national sovereignty**, as well as enhancing **security of Polish and EU citizens, space and ground infrastructure** and to protect **economic interests against threats related to the space environment**, Poland aims to develop its own capabilities in the field of **Space Situational Awareness**. **Poland also intend to prepare SSA services and products for commercial usage.**

NEO segment is identified as one of the pillars of the SSA and NEO is perceived as the **threat from space**. It is also emphasized that „in order to implement situational awareness in the NEO component, i.e. **"planetary defense", autonomy is not being sought**“.

There is a strong emphasis on the commercial aspect of the NEO segment in the area of research and development and commercially-oriented technologies should be developed. Important is to include the Polish Space sector in the supply chain and to enable Polish entities to compete in tenders (e.g. public administration and business sector, in ESA and other space agencies).

Following interventions are envisaged:

1. Expansion of the space observation sensor system (on ground and in space) – in case of NEO it is mainly different optical sensors which will „contribute to the increased **national and international security**“,
2. Data acquisition and processing (catalogue data incl. the creation of a catalogue of space objects),
3. Provision of information services (inclusion of both economic and scientific NEO related entities of the Polish space sector into the supply chain) (National Space program 2021- 2026).

### Comments

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- PD viewed from the security as well as economic perspective.
- Strong emphasis on the commercial aspect of the NEO segment

### Resources

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- Krajowy Program Kosmiczny na lata 2021 – 2026 (version 0.8).

## Portugal

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

Interests of Portugal in the Planetary Defense (according to the Strategy for the Portuguese participation in the 2019 ESA's Ministerial Meeting):

- A. Global welfare: NO**
- B. National welfare: NO**
- C. National security: NO**
- D. Global security: YES**
  - Threat to humankind.
  - Portugal should “contribute to a global effort to address threats from asteroids”.
- E. Advanced science: YES**
- F. Industrial growth: YES**
  - Space Safety and Security is the next big topic in space and on Earth and early positioning in this field and associated markets will ensure leadership and economic growth.
- G. Political leadership: NO**

### What strategies say

**In Portugal Space 2030, there is no mention of the PD nor NEO.** There is only mention of the promotion of services related to the “the development of the European SST program in Portugal” (Portugal Space 2030: A research, innovation and growth strategy for Portugal). Portugal takes part in the European SST consortium and even though Portuguese Space surveillance and tracking system is focused mainly on daily processing of SST data, it has the capability to perform observations of Near-Earth Objects and evaluate the collision risk with the Earth. National Operations Centre (NOC) cooperates with the Minor Planet Center (MPC). “The Portuguese MoD investment in the SST network is considered to be a part of the national contribution to develop highly skilled areas, both in terms of knowledge and technology, and to contribute to increase a better and stronger Space security, as a part of an international effort, considering that Space is the only operational environment able to contribute to a permanent and comprehensive monitoring and development of all the human activities” (Portuguese SST capability- The Portuguese Space Surveillance network system, 2021).

However, **Planetary defense** is mentioned in the document +Space in Portugal and Europe with ESA: The Strategy for the Portuguese participation in the 2019 ESA's Ministerial Meeting, "Space19+" and the articulation of national/EU/ESA/business funding sources, with a clear diversification strategy for investment in space under an integrated and holistic approach (2019). There is a need to address threats "(man-made or natural) originating in space which endanger critical assets in space and on Earth or even **threat humankind** – space debris and clean space, **planetary defense**, space weather (**Space Safety**).” Failing public sector to “**enable commercial aspects and future markets associated with Space Safety**” will paralyze “the future competitiveness of industry”. Portugal has, so far, put limited investments towards the planetary defense. Portugal interest in Space Safety and Security will: “**strengthen its infrastructure resilience; become an early entrant in new markets of huge proportion; and strengthen Europe as a whole.**” **Profiling of ESA in the Space Safety and Security** as the only agency worldwide which took the first steps in this area is seen as “**a unique opportunity that should not be missed**”. “Space Safety and Security will result in operational systems for Europe of equal importance as Copernicus and Galileo and investments in this field will lead to a high return of investments when these operational systems will be in place. The expectation is that this will happen in the next 10 years with investments required in both the upstream as well as the downstream.” At the end, there is a recommendation that Portugal should “**contribute to a global effort to address threats from asteroids and at the same time strengthen the scientific community around the topic linking it also to insitu resource utilization.**” (+Space in Portugal and Europe with ESA: The Strategy for the Portuguese participation in the 2019 ESA's Ministerial Meeting, "Space19+" and the articulation of national/EU/ESA/business funding sources, with a clear diversification strategy for investment in space under an integrated and holistic approach, 2019).

### Comments

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- Space Safety is also seen as an opportunity for promotion of commerce and future markets and thus competitiveness of industry
- Support of ESA space safety seen as unique world opportunity.
- Recommendation that Portugal should see synergies in PD and insitu resource utilization

### Resources

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- Portugal Space 2030: A research, innovation and growth strategy for Portugal. Link: [https://www.fct.pt/documentos/PortugalSpace2030\\_EN.pdf](https://www.fct.pt/documentos/PortugalSpace2030_EN.pdf)
- +Space in Portugal and Europe with ESA: The Strategy for the Portuguese participation in the 2019 ESA's Ministerial Meeting, "Space19+" and the articulation of national/EU/ESA/business funding sources, with a clear diversification strategy for investment in space under an integrated and holistic approach, 2019. Link: <https://www.portugal.gov.pt/download-ficheiros/ficheiro.aspx?v=%3D%3DBAAAAB%2BLCAAAAAAABACzNDAYBADs2aI0BAAA%3D%3D>
- Portuguese SST capability- The Portuguese Space Surveillance network system, 2021. Link: <https://conference.sdo.esoc.esa.int/proceedings/sdc8/paper/188>



## Romania

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

**A. Global welfare: NO**

**B. National welfare: NO**

**C. National security: YES**

- Planetary defense: protection of the civilization against cosmic threats - potential collisions with other cosmic bodies (New Strategy 2018 -The three S).
- Link to ESA SSA NEO segment.

**D. Global security: YES**

- Protection of the civilization against cosmic threats - potential collisions with other cosmic bodies (New Strategy 2018 -The three S).
- Involvement in ESA SSA NEO segment.

**E. Advanced science: YES**

- COD-NEA and STAR programme.

**F. Industrial growth: YES**

- Romania has potential for developing European industrial niches in the field of SSA technology (Romanian Public-Funded Research and Development Activities in The Space Sector, 2015).

**G. Political leadership: NO**

### What strategies say

Planetary defense is explicitly mentioned in the presentation **Space as Enabler: The 3S – New ROSA Strategy (2019)**. New ROSA Strategy identifies 3S (Science and Technology, Services, Security). Under the security pillar there is included ESA's SSA (planetary defense, space weather, space traffic management). There is also mentioned Proba-3 coronagraph and Asteroid Impact Mission (AIM) - HERA as well as Surveillance and tracking by mono/bistatic radar techniques. National SST surveillance network and national SW service are underlined. **Planetary defense** is perceived as "Protection of the civilisation against cosmic threats-potential collisions with other cosmic bodies, protection against solar disturbances, monitoring the Earth global features." Science and technology pillar focuses also on the space exploration (Space as Enabler: The 3S – New ROSA Strategy, 2019).

Romania is involved in the following projects: PROBA-3, HERA, Optical satellite tracking (ESA SSA), „Cheia SSt 32m antenna retrofit (Space Surveillance and Tracking ground station – mono- and bi-

static radar – tracking of NEO and space debris)” (Romanian Space Activities: Space and Security, 2016). Moreover, Astronomical Institute of the Romanian Academy (AIRA) implemented project **COD-NEA** (Academy Compositional and dynamical modelling of near-Earth asteroids – COD-NEA) in the years 2012- 2015 with contribution to the STAR programme (the Romanian Space Technology and Advanced Research Program) focused on the impact risk of NEA within the objectives of the ESA SSA initiative.

The “National Strategy for Space and Related Fields” is a strategic project funded through the Romanian Space Technology and Advanced Research Program (STAR). It comes to the conclusion, among others, that Romania has potential for developing European industrial niches in the field of space situational awareness technology (Romanian Public-Funded Research and Development Activities in The Space Sector, 2015).

## Resources

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- Romanian Public-Funded Research and Development Activities in The Space Sector, 2015. Link: [https://www.researchgate.net/publication/324926413\\_Romanian\\_Public-Funded\\_Research\\_And\\_Development\\_Activities\\_In\\_The\\_Space\\_Sector](https://www.researchgate.net/publication/324926413_Romanian_Public-Funded_Research_And_Development_Activities_In_The_Space_Sector)
- Academy Compositional and dynamical modeling of near-Earth asteroids - COD-NEA, 2014. Link: <http://www2.rosa.ro/index.php/en/space-strategy/programul-star/proiecte-finantate-prin-competitia-c1-2012/98-cd1/384-academy-compositional-and-dynamical-modeling-of-near-earth-asteroids-cod-nea>
- Space as Enabler: The 3S – New ROSA Strategy, 2019. Link: [https://www.unoosa.org/documents/pdf/psa/activities/2019/UNRomania2019/UNRomania\\_Presentations/2.\\_ROSA\\_SSS\\_UN\\_Cluj\\_MAY\\_2019\\_v1\\_Short.pdf](https://www.unoosa.org/documents/pdf/psa/activities/2019/UNRomania2019/UNRomania_Presentations/2._ROSA_SSS_UN_Cluj_MAY_2019_v1_Short.pdf)
- Romanian Space Activities: Space and Security, 2016. Link: <https://eisc-europa.eu/images/stories/documents/Piso.pdf>
- Space as an Arena for Innovation, Integration and Investment: The 3S - ROSA Strategy, 2017. Link: [https://www.unoosa.org/documents/pdf/hlf/HLF2017/presentations/Day4/high\\_level\\_panel/4th/Presentation5.pdf](https://www.unoosa.org/documents/pdf/hlf/HLF2017/presentations/Day4/high_level_panel/4th/Presentation5.pdf)

## Spain

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

Interests of Spain in the Planetary Defense (PD not mentioned, but NEO viewed as “main challenges proceeding from space”)

### Summary of criteria fulfilment

**A. Global welfare: NO**

**B. National welfare: YES**

- National interests such as life, well-being and privacy of the Spanish people to be protected also in space.

**C. National security: YES**

- Entry of the asteroids and comets into Earth’s atmosphere is among the modern world’s main challenges (National Aerospace Security Strategy, 2019).
- The services that depend on outer space must be protected from the threats and challenges that could cause their disruption or breakdown, whether due to the weather or other natural causes, or accidents.
- 2017 NSS: “Guaranteeing security in airspace and outer space within a shared framework aimed at counteracting the threats and challenges that arise in these environments, and neutralizing the consequences thereof...”

**D. Global security: YES**

**E. Advanced science: YES**

Implicitly.

**F. Industrial growth: YES**

- Space brings profit to industry, society, and the nation.
- Space is a knowledge repository enabling creation of highly qualified jobs.
- Promotion of satellite services

**G. Political leadership: NO**

### What strategies say

**There is no mention of the term “Planetary defense” in the researched documents.** However, in the National Aerospace Security Strategy (2019), emergencies and disasters are identified as one of the **current world’s challenges**. Among such challenges **coming from space are asteroids and comets**

with their potential to damage infrastructure as well as cause human lost. In general, emergencies and disasters can also impact environment or economic development.

Spanish 2015 National Security Act considers **outer space security** as one of its “**areas of special interest**” and 2017 National Security Strategy “**advises creating a crisis management mechanism**”. From the security point of view, there is a need to protect services that depend on outer space and thus Spain is promoting “national capacity-building with regard to **space-based surveillance and tracking**”. The 2017 National Security Strategy defines **challenges** as „**not intentional, but they may cause situations of instability, or foster the appearance of threats, aggravate them, or accelerate their manifestations.**“ **Emergencies and disasters** are one of „factors with a potential impact on aerospace security.“ Such unintentional phenomena and disasters, could be, for instance, the **fall of meteorites**. The main goal of the strategy is “**Guaranteeing security** in airspace and outer space within a shared framework aimed at **counteracting the threats and challenges that arise in these environments, and neutralizing the consequences.**”

Selected national interests to be protected against threats and challenges in aerospace are:

- „**The life, security, well-being and privacy of the Spanish people, whether on land, in the air, or in space**
- **Free access to and secure exploitation of outer space**
- **High-value outer space infrastructure, media, and services, in the face of threats and challenges proceeding both from aerospace and other areas“**

One of the Challenges is to “increase the capacities of the **Spanish Space-Based Surveillance and Tracking System**” and “to include improvements and new functionalities in the area of risk and evaluation of security measures, specifically in: capabilities for detecting space objects, capabilities for providing space-based surveillance and tracking services to be able to differentiate between identified objects, **analysis capabilities to address the challenges of space weather, asteroids, and comets.**” (National Aerospace Security Strategy, 2019).

## Comments

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- NEOs are viewed as one of the main challenges proceeding from space. They are an unintentional phenomena causing emergencies and disasters with potential to damage infrastructure, impact environment and/or economic development and cause human lost.
- NEOs and the need to increase the capacities of the Spanish Space-Based Surveillance and Tracking System are anchored in the National Aerospace Security Strategy.

## Resources

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- National Aerospace Security Strategy, 2019. Link:
- National Security Strategy, 2017. Link:  
[https://www.dsn.gob.es/sites/dsn/files/2017\\_Spanish\\_National\\_Security\\_Strategy\\_0.pdf](https://www.dsn.gob.es/sites/dsn/files/2017_Spanish_National_Security_Strategy_0.pdf)

- Spanish 2015 National Security Act (Law 36/2015). Link: <https://www.global-regulation.com/translation/spain/615537/law-36-2015%252c-28-september%252c-national-security.html>

## United Kingdom

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

#### A. Global welfare: YES

- Threat from NEOs is debated in House of Commons and House of Lords since 2009.
- NEOs are seen as “a serious actual risk to economic performance and human well-being.” (House of Commons Debate: Third Delegated Legislation Committee, 2009)

#### B. National welfare: YES

- Space research, technology and services are important for economic growth. National Space Security Policy ensures that national prosperity and space security interests are aligned and mutually reinforcing. (National Space Security Policy, 2014). National Space Security Strategy also aims to protect people and their way of life.

#### C. National security: YES

- Among goals of the National Space Security Strategy are secure and resilient UK, protection of people, economy, and infrastructure.
- NEO is part of space surveillance (National Space Security Policy, 2014).

#### D. Global security: YES

- NEOs “represent a significant risk to human and other forms of life.” (Report of the Task Force on potentially hazardous NEAR EARTH OBJECTS, 2000).

#### E. Advanced science: YES

- Promotion of space research.

#### F. Industrial growth: YES

- Promotion of development of the space technologies.
- Participation of commercial and international partners at the SSA (National Space Security Policy, 2014).

#### G. Political leadership: NO

### What strategies say

There is no dedicated reference to the Planetary Defense in the available current UK Space Policy (including Strategy) documents. However, the term “Near-Earth Objects” is used in National Space Security Strategy as well as in debates in the House of Lords and Commons. UK is also involved in the ESA SSA component. In 2013, the UK Space Agency Spokesman said: “The vast majority of UK funding for space is channelled through the European Space Agency (ESA)...The ESA does address NEOs

on behalf of its Member States...as it recognises they are a global hazard, not unique to any country and that they require an international response... This is partly so countries can share the cost and because any solutions to asteroids on a collision course to earth require cohesive global action”.<sup>2</sup> Accessible documents and government’s actions such as international cooperation (e.g. UKSA is a member of the Space Mission Planning Advisory Group) and involvement in NEO space missions such as, for instance, Hera or Comet Interceptor **indicate that there is some basic strategic approach in relation to the space safety and planetary defense.**

In the first ever National Space Security Policy from the year 2014, Britain commits itself towards **“secure and resilient Britain, protecting our people, economy, infrastructure and way of life...recognising that space-based capabilities support the provision of vital services for our economy and national security.”** The ultimate goal is to support UK’s “prosperity, well-being and security” via 4 objectives:

1. **resilience** to the risk of disruption to space services and capabilities
2. **enhanced national security**
3. safe and more **secure space** environment (incl. improved and more coherent national approach to SSA for better cooperation among commercial and international partners)
4. support of **industry** and **academia** to use science for commercial purposes in support of national space security interests

Even though space provides economic opportunities, it also poses risks such as *accidents or natural hazards in space*. **Space security** is defined “as having safe, assured and sustainable access to space capabilities, with adequate resilience against threats and hazards.” Goal of this policy is “to set out a coherent national approach to the United Kingdom’s space security interests that will underpin **our prosperity, well-being and security.**” National Space Security Policy should underpin development of the **space research, technology and services** which are important for the **economic growth** and search synergies among national prosperity and space security interests. In order to **“promote a safe and more secure space environment”** UK calls for “a more holistic space situational awareness picture and more predictive capabilities. This involves the **surveillance of space, and the analysis and assessment of potential threats and hazards to space activities.**” **Surveillance of space** is defined as “comprising the detection, tracking, identification, analysis and cataloguing of space objects including satellites, missiles, debris **and near Earth objects.**” Such effort is best achieved collectively. UK therefore commits itself to **“develop a coherent national approach to space situational awareness,** as a basis for a stronger British contribution **to international and commercial co-operation.**” (National Space Security Policy, 2014). Government’s National Space Policy from 2015 “recognises that space is of strategic importance to the UK because of the value that space programmes deliver back to public services, national security, science and innovation and the economy” and “commits to preserving and promoting the safety and security of the unique space operating environment, free from interference” (National Space policy, 2015).

During the discussion in the House of Lords in 2021 related to the Committee on **Risk Assessment and Risk Planning, near-earth objects** have been identified as hazards but they are not

<sup>2</sup> <https://www.dailymail.co.uk/sciencetech/article-2480862/A-man-mission-save-WORLD-Retired-Welshman-monitors-Armageddon-asteroids-DIY-observatory.html>

included in the formal national risk register as far as they are **“exceptionally low likelihood hazards.”** (House of Lords, 2021: Select Committee on Risk Assessment and Risk Planning: Uncorrected oral evidence: Risk Assessment and Risk Planning). In relation to the natural hazards, the NRA (National Risk Assessment) excludes risks that are too low probability, such as near earth objects.” (Evaluating UK natural hazards: the national risk assessment, 2019).

Nevertheless, UK is actively involved in the activities related to the planetary defense through, for example, the participation in the Space Mission Planning Advisory Group (SMPAG) or UK-led NEO activities such as Stardust-R (study of „uncertainty in impact prediction pre and post deflection”), Development of a criticality index for small asteroids, Osiris-rex, Earth Trojan Asteroids, COMET INTERCEPTOR. UK also participated in the projects such as Neorocks or NEOSchild-2. Furthermore, there are also other future perspectives such as AURORA proposal H2020 submitted in January 2020 – led by the University of Belgrade (Characterisation of small asteroids and asteroid families and combine use of dynamical astronomy and machine learning) or NEOCORE – Nanospacecraft exploration of asteroids by collision and flyby reconnaissance (Task 5.2 and UK activities (2020, UK Space Agency). “British-led NEO proposal called SIMONE (Smallsat Intercept Missions to Objects Near Earth) involves a small fleet of microsatellites that would rendezvous with five different types of NEO and characterise them.” UK scientists are involved in different types of ESA activities such as 2004 ESA Near Earth Object Mission Advisory Panel (NEO MAP).

Threat from NEOs has been debated in House of Commons and House of Lords even in the 2009. Near-earth objects have been seen by some as “a serious actuarial risk to economic performance and human well-being...” (House of Commons Debate (2009): Third Delegated Legislation Committee, June 2009). The Government’s Task Force on Potentially Hazardous Near Earth Objects (NEOs) set up in 2000 concluded that NEO impacts **“represent a significant risk to human and other forms of life.”** (Report of the Task Force on potentially hazardous NEAR EARTH OBJECTS, 2000). Nevertheless, only one out of 14 recommendations were implemented due to no priority and sufficient interest.<sup>3</sup> (House of Commons Debate, 2009: Third Delegated Legislation Committee, June 2009).

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<sup>3</sup> Lembit Öpik lobbying for this issue said “The measure has not come forward before because it has not been a priority.” Chris Bryant: “It is a simple measure which, for the most part, will not make a significant difference to the UK. However, it is an international treaty obligation that we are happy to enter into. The idea that a letter from me to the scientific community will make a dramatic difference to their lives is also...cloud cuckoo land. I do not think that would be useful.”

## Comments

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- Term “Near-Earth Objects” used in National Space Security Strategy.
- Criterial fulfilled above are only implicit stemming from the accessible policy documents (including link to ESA SSA) and government’s actions such as international cooperation (e.g. member of the SMPAG) and involvement in NEO space missions such as, for instance, Hera or Comet Interceptor. These activities indicate that there is some basic strategic approach in relation to the space safety and planetary defense even though UK does not have explicit mention of NEO / Planetary Defense in space policy documents.

## Resources

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- House of Commons Debate: Third Delegated Legislation Committee, 2009. Link: <https://publications.parliament.uk/pa/cm200809/cmgeneral/deleg3/090623/90623s01.htm>
- National Space Security Policy, 2014. Link: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/307648/National\\_Space\\_Security\\_Policy.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/307648/National_Space_Security_Policy.pdf)
- Report of the Task Force on potentially hazardous NEAR EARTH OBJECTS, 2000. Link: [https://spaceguardcentre.com/wp-content/uploads/2014/04/full\\_report.pdf](https://spaceguardcentre.com/wp-content/uploads/2014/04/full_report.pdf)
- National Space policy, 2015. Link: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/484865/NSP\\_-\\_Final.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/484865/NSP_-_Final.pdf)
- UK Space Agency: Task 5.2 and UK activities, 2020. Link: [https://www.cosmos.esa.int/documents/336356/336472/UK\\_Task+5\\_-\\_Vasile\\_2020-02-06.pdf/817adbb7-1c27-0001-5861-5fea72ade6c5?t=1580986763553](https://www.cosmos.esa.int/documents/336356/336472/UK_Task+5_-_Vasile_2020-02-06.pdf/817adbb7-1c27-0001-5861-5fea72ade6c5?t=1580986763553)
- House of Commons Debate: Third Delegated Legislation Committee, 2009. Link: <https://publications.parliament.uk/pa/cm200809/cmgeneral/deleg3/090623/90623s01.htm>
- House of Lords, 2021: Select Committee on Risk Assessment and Risk Planning: Uncorrected oral evidence: Risk Assessment and Risk Planning. Link: <https://committees.parliament.uk/oralevidence/1563/html/>
- Near Earth Object-Related Activities in the UK, 2006 Link: <http://www.unoosa.org/pdf/pres/stsc2006/tech-18.pdf>
- Evaluating UK natural hazards: the national risk assessment, 2019. Link: <https://researchbriefings.files.parliament.uk/documents/POST-PB-0031/POST-PB-0031.pdf>

## 6. List of countries not focusing on planetary defense but considering the topic

### Austria

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**Planetary defense is not expressed explicitly** in any of the researched Austrian policy documents. However, for Austria, as stated in the Strategy of the for Austrian Space Activities 2013 – 2020, space will continue to be a European and, to a large extent, international task. Thus, European Space Policy and International Space Activities are among the main principles and one of the objectives of the Austrian space activities is: **“Being an Internationally Recognized and Visible Partner in Europe.”** Therefore, Austria is oriented on the topics such as the programmatic setting of priorities in ESA as well as in planned EU space programmes and contributions to the European space policy.

**Among Austrian priorities in ESA is defined Space Situational Awareness** – “Europe Invests in Space Systems for the **Benefit of Mankind**”. In addition to several natural hazards from space, such as cosmic rays, solar winds, asteroids, meteorites and comets, the Earth is threatened by another man-made problem: space debris. ESA started the Space Situational Awareness programme in 2009 in order to enable comprehensive monitoring and cataloguing of objects in space as well as to investigate the effects of space weather on the Earth.

To date, Austria has been successful especially in the **areas of space weather and the establishment of data centres**. Additional opportunities will be offered for Austrian industry and research in the coming years, in the area of instrument development (**magnetometers**). Furthermore, international service level agreements with Austrian institutions in the frame of SSA services will present an interesting **economic perspective**.

Austria is supporting Europe’s Hera planetary defense mission with data analysis and processing (Industry starts work on Europe’s Hera planetary defense mission, Link: [https://www.esa.int/Safety\\_Security/Hera/Industry\\_starts\\_work\\_on\\_Europe\\_s\\_Hera\\_planetary\\_defense\\_mission](https://www.esa.int/Safety_Security/Hera/Industry_starts_work_on_Europe_s_Hera_planetary_defense_mission)).

**Nevertheless, in September 2021 Austria announced new Space Strategy 2030+ which is, however, currently not published.**

## Canada

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

Interests of Canada in the Planetary Defense (only implicit based on the generally declared principles and objectives in policy documents):

#### H. Global welfare: NO

#### I. National welfare: YES

- Canada's space policy framework defines prosperity among its core principles (Canadian Interests First)

#### J. National security: YES

- SSA as integral part of the Canada's defense policy and the New Space strategy.
- Operation of NEOSSat since 2013.
- SSA contributes towards "enhancing Canada's security" (Exploration. Imagination. Innovation: New Space Strategy, 2019)

#### K. Global security: YES

- "Space is a critical aspect of the global security environment and space-based capabilities are crucial for the day-to-day activities of all humanity" (The Royal Canadian Air Force, Space capabilities)

#### L. Advanced science: YES

- NEOSSat is focused on space surveillance research and deep space tracking for advanced R&D purposes
- Canada aims to be "a leader in exploration, science excellence." (Exploration. Imagination. Innovation: New Space Strategy, 2019).

#### M. Industrial growth: YES

- Canada aims to be "a leader in innovation and deliver socio-economic benefits to improve life for all Canadians" (Exploration. Imagination. Innovation: New Space Strategy, 2019) and supports excellence in Key Capabilities such as e.g. remote sensing, robotics, space based radar (Canada's space policy framework).

## N. Political leadership: NO

### What strategies say

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**There is no explicit mention of the planetary defense in the researched policy documents –** nor in the Canada's defense policy, neither in the New Space Strategy: Exploration. Imagination. Innovation (2019) or Canada's policy framework. However, **space situational awareness** is anchored in Canada's defense policy as well as in the New Space strategy. In the Canada's defense policy (Strong, Secure, Engaged) to acquire space capabilities is meant to improve, among others, **surveillance of space** and to deal with the space debris which are perceived as a **threat to Canada's and its allies space-based systems**.

The Department of National Defense with Canadian Space Agency operate since 2013 the **Near Earth Orbit Surveillance Satellite (NEOSSat)**, which is focused on space surveillance research and development and deep space tracking including near Earth **asteroids for advanced R&D purposes**. **Surveillance of Space 2 (Sofs2) project contributes to Space domain awareness**. The Canadian Armed Forces (CAF) identifies as one of capabilities which support its military activities **surveillance of space**. However, even though NAOSSat is used also for near earth asteroid tracking, in relevant policy documents is currently **surveillance of space focused on defending and protecting from collisions in space with other satellites and/or debris**. Secure space environment reduces "the risk of loss of critical space capabilities". "Space is a critical aspect of the global security environment and space-based capabilities are crucial for the day-to-day activities **of all humanity**" (The Royal Canadian Air Force, Space capabilities). Canadian universities contribute towards "**all-sky camera networks**", "collecting observations on incoming **debris/meteorites** for logging and recovery purposes." On NASA's asteroid-sampling mission **OSIRIS-Rex** Canada provided **Laser Altimeter (OLA)**- laser-based mapping system (UNCOPOUS: International cooperation in the peaceful uses of outer space: activities of Member States, 2019).

In New Space Strategy (2019) Space is defined as "**a strategic national asset**" and **space situational awareness contributes towards "enhancing Canada's security and sovereignty"**. Canada supports the James Webb Space Telescope (successor to the Hubble Space Telescope) and contributes to it with technological components. Canada's vision for space is "to be a **leader in exploration, science excellence and innovation** and deliver **socio-economic benefits to improve life for all Canadians**." (Exploration. Imagination. Innovation: New Space Strategy, 2019).

Canada's space policy framework has 5 core principles: 1. Canadian Interests First (national **sovereignty, security and prosperity**), 2. Private Sector at the Forefront of Space Activities, 3. Progress Through Partnerships, 4. Excellence in Key Capabilities (from telecommunications to remote sensing to robotics), 5. Inspiring Canadians. Goals of the policy are: 1. Commercialization, 2. Research and Development (especially in areas such as robotics, optics, satellite communications and **space-based radar**), 3. Exploration of Space (Canada's space policy framework).

### Comments

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- Criterial fulfilled above are only implicit stemming from the accessible policy documents (involving SSA) and government's actions such as operation of NEOSSat or

participation at international missions (e.g. OSIRIS-Rex). These activities indicate that there is some basic strategic approach in relation to the space safety and planetary defense even though Canada does not have explicit mention of NEO / Planetary Defense in space policy documents.

## Resources

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- Canada's defense policy, neither in the New Space Strategy: Exploration. Imagination. Innovation (2019)
- Strong, Secure, Engaged: Canada's defense policy, 2017. Link: <http://dgpaapp.forces.gc.ca/en/canada-defense-policy/docs/canada-defense-policy-report.pdf>
- Exploration. Imagination. Innovation: A New Space Strategy for Canada, 2019. Link: <https://www.asc-csa.gc.ca/pdf/eng/publications/space-strategy-for-canada.pdf>
- Canada's space policy framework, 2015. Link: <https://www.asc-csa.gc.ca/pdf/eng/publications/space-policy/canadas-space-policy-framework.pdf>
- The Royal Canadian Air Force: Space capabilities. Link: <http://www.rcf-arc.forces.gc.ca/en/space/capabilities.page>
- UNCOPOUS: International cooperation in the peaceful uses of outer space: activities of Member States, 2019. Link: [https://www.unoosa.org/res/oosadoc/data/documents/2019/aac\\_105c\\_12019crp/aac\\_105c\\_12019crp\\_3\\_0\\_html/AC105\\_C1\\_2019\\_CRP03E.pdf](https://www.unoosa.org/res/oosadoc/data/documents/2019/aac_105c_12019crp/aac_105c_12019crp_3_0_html/AC105_C1_2019_CRP03E.pdf)

## France

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

**A. Global welfare: NO**

**B. National welfare: YES**

Scientific and exploration missions incl. studies of composition of comets as well as technological advances are “necessary to fulfil all social and even vital needs of human activities”.

**C. National security: YES**

SSA forms core strategic pillar of Space defense strategy 2019. Among main goals of the SSA including space surveillance are protection of territory, population and space capabilities (Space Defense Strategy, 2019).

**D. Global security: YES**

Implicitly from the involvement of the ESA SSA NEO segment.

**E. Advanced science: YES**

Exploration of asteroids and comets is one of the targets of the French Space Strategy 2011.

**F. Industrial growth: YES**

Promotion of an industrial policy (technological lead in the satellite field and space observation). Moreover, industrial projects for the observation of space from space will be evaluated.

**G. Political leadership: NO**

### What strategies say

**There is no mention of the planetary defense in any of the researched documents.** However, **exploration of asteroids and comets** (e.g. with European mission Rosetta) is one of the targets of the French Space Strategy 2011. The main objective of the space exploration programs is “**progression of knowledge**” and France aims to promote French and European participation in skills development of critical technologies (French Space Strategy, 2011). Indeed, one of the core strategic pillars of Space defense strategy from the year 2019 is **space situational awareness and developing of its comprehensive capability is a priority**. It is planned that among others, **industrial projects for the**

**observation of space from space will be evaluated.** As recent threats are mentioned space debris, jamming, blinding and directed-energy weapons, thus **there is no explicit mention of the NEO threat.**

Space is considered as “a key factor for the operation of our economies and societies”. Therefore, **scientific and exploration missions** including studies of **composition of comets as well as technological advances are necessary to fulfil all social and even vital needs of human activities.**

There is also mentioned, that “more and more countries are taking an interest in the **exploitation of resources on asteroids.**” Military space operations **contribute to national security, economy and protection of the population.** One of their key functions and the foundation is space situational awareness what is “a **prerequisite for the commercial exploitation of space and the conduct of military operations of all kinds.**” SSA also meets the need of “**prevention of risks of collision in space between active satellites and other objects, ensured mainly by SST**”. As the key of military operations, among main goals of the SSA including **space surveillance** are **protection of territory and population and protecting space capabilities** (Space Defense Strategy, 2019).

France took part in **space science and exploration missions** such as **Rosetta** (French Space Strategy, 2011) or **MASCOT** which launched in 2014 on board Japan’s **HAYABUSA-2** spacecraft. The **MMX** mission to Phobos will share this ambition to return samples. “**Detecting Near-Earth Asteroids (NEAs)** and assessing reliable levels of associated risks are **not only a scientific goal but also a societal challenge.** Using **GDR1** stars positions as calibrators to improve previous orbit estimates for asteroids, a Nice Observatory’s team showed how **GAIA**, even without the direct asteroids observations only due for the following data releases, could already improve our knowledge of the current **NEAs** trajectories by one order of magnitude.” (French Report to COSPAR, 2018)

**France is one of the world's space superpowers, in order to** maintain a leader, there are set following strategic objectives:

1. An **industrial policy** (technological lead in the satellite field, space observation).
2. An **industry for citizens** (Copernicus, Galileo).
3. **Development of digital services regarding space data.**
4. **Continuity of French scientific excellence**, e.g. success of **Philae** or **Thomas Pesquet**.

**Importance of space:** Applications for everyday life, the **civil security**, sovereignty, economic leverage effect, major scientific issues (France's space policy, 2016).

CNES, the French national scientific research centre CNRS and French universities will contribute to the Hayabusa2 mission of asteroid Ryugu sample analysis. France (CNES) cooperated with the Germany (DLR) on the **MASCOT** lander on Hayabusa2. France is a partner on a number of international **missions to analyse samples of celestial bodies** (e.g. **OSIRIS-REx**, **MMX** and **MSR**), “**to which it is contributing its world-renowned know-how and expertise.**” (Press release **HAYABUSA2 MISSION**, December 2020). Moreover, France is providing in Europe’s **HERA planetary defense mission** Juventas’ low-frequency radar and star trackers as well as “support to the CubeSats’ payload operations planning and close-proximity trajectories” (Industry starts work on Europe’s Hera planetary defense mission).

## Comments

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- Criterial fulfilled above are only implicit stemming from the accessible policy documents (involving broader concept of SSA and reference to comets) and government's actions such as activity at international forums (e.g. member of the SMPAG, participation at NEO missions such as HERA, Rosetta, MASCOT lander etc.). These activities indicate that there is some basic strategic approach in relation to the space safety and planetary defense even though France does not have explicit mention of NEO / Planetary Defense in space policy documents, but rather more general link to the SSA.

## Resources

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- French Space Strategy, 2011. Link: <http://temis.documentation.developpement-durable.gouv.fr/docs/Temis/0078/Temis-0078292/20738.pdf>
- Space Defense Strategy, 2019. Link: [https://www.defense.gouv.fr/english/layout/set/print/content/download/574375/9839912/version/5/file/Space+Defense+Strategy+2019\\_France.pdf](https://www.defense.gouv.fr/english/layout/set/print/content/download/574375/9839912/version/5/file/Space+Defense+Strategy+2019_France.pdf)
- French Report to COSPAR, 2018. Link: [https://cnes.fr/sites/default/files/drupal/201807/default/st\\_cospar\\_2018\\_complet.pdf](https://cnes.fr/sites/default/files/drupal/201807/default/st_cospar_2018_complet.pdf)
- France's space policy, 2016. Link: <https://www.gouvernement.fr/en/france-s-space-policy>
- Press release HAYABUSA2 MISSION, December 2020. Link: [https://presse.cnes.fr/sites/default/files/drupal/202012/default/cp140-2020\\_-\\_hayabusa2\\_va.pdf](https://presse.cnes.fr/sites/default/files/drupal/202012/default/cp140-2020_-_hayabusa2_va.pdf)
- Industry starts work on Europe's Hera planetary defense mission. Link: [https://www.esa.int/Safety\\_Security/Hera/Industry\\_starts\\_work\\_on\\_Europe\\_s\\_Hera\\_planetary\\_defense\\_mission](https://www.esa.int/Safety_Security/Hera/Industry_starts_work_on_Europe_s_Hera_planetary_defense_mission)

## India

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

H. Global welfare: NO

I. National welfare: NO

J. National security: YES

NEO poses a threat to national space assets. NEO research part of the SSA.

K. Global security: NO

L. Advanced science: NO

M. Industrial growth: NO

N. Political leadership: NO

### What strategies say

**There was not found any Indian space policy document neither strategy in English.** Nevertheless, Indian Space Research Organisation's (ISRO) sets up control centre for Space Situational Awareness activities. The R&D activities will also encompass Near Earth Objects and planetary defense studies (ISRO sets up dedicated control centre for Space Situational Awareness, 2020).

Among threats to Space Assets are considered natural reasons (impact of meteorites and asteroids and space weather). Necessity of prediction of threats from asteroids and meteorites is identified as one of current SSA requirements (Space Situational Awareness: Indian Perspective).

### Comments

- As far as there were not found any relevant policy documents, all criteria are marked as not fulfilled except the national security one which is evident from the government's activities as well as published news and documents.

### Resources

- Space Situational Awareness: Indian Perspective. Link: <https://swfound.org/media/206344/india-ssa-perspective-mrunalini-d.pdf>

- ISRO sets up dedicated control centre for Space Situational Awareness, 2020. Link: <https://economictimes.indiatimes.com/news/science/isro-sets-up-dedicated-control-centre-for-space-situational-awareness/articleshow/79763690.cms>

## Indonesia

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

**O. Global welfare: NO**

**P. National welfare: NO**

**Q. National security: YES**

NEO is perceived as a risk from space (natural threat), natural disasters from space.

**R. Global security: NO**

**S. Advanced science: NO**

**T. Industrial growth: NO**

**U. Political leadership: NO**

### What strategies say

The term “planetary defense” is not mentioned in any researched documents. However, in National Act Number 21 from the year 2013 includes “**National responsibility for risks from space, natural and artificial threat.**” **Space Object** is defined in the Indonesian Space Act as “any object, whether human made or **natural made related to the space activities.**” Chapter VI stipulates safety and security issues and Chapter VII cases of “re-entry of space objects mitigation, search and rescue of astronauts” (Indonesian Space Act, 2013). Other important document related to the NEO is International Response to the NEO Impact Threat (A/AC.105/C.1/L.329). **There is also building of Asia-Pacific Asteroid Observation Network** which proposed Japan (NEO Related Activity in Indonesia - Assessment on Present & Future Projection). Development of Timau National Observatory and Dark Sky National Park (the biggest observatory on Sout East Asia) is in progress (Indonesia: Country report, 2019).

Indonesia, according to the white paper of the Ministry of Defense considers outer space interests as **vital interests**. Interest in outer space objects is viewed from the security perspective, as far as in the “Article B.8 regarding **outer space objects, natural and artificial outer space objects are important to track so they can be controlled.**” “**Preventing all of the threats from state and non-state actors and the threat of natural disasters**” are important for **national security** (The Urgency of Guidelines for the Long-term Sustainability of Outer Space Activities for Indonesia, 2019).

National Institute of Aeronautics and Space (LAPAN) is building a new observation facility in East Nusa Tenggara which will be used also “for near-Earth object mitigation risk assessment and

safeguarding against natural disasters from space (e.g. by contributing to the Minor Planet Center).” (International cooperation in the peaceful uses of outer space: activities of Member States, 2019).

## Resources

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- National Act No. 21, 2013: National responsibility for risks from space, natural and artificial threat.
- NEO Related Activity in Indonesia - Assessment on Present & Future Projection (presentation at UNOOSA). Link: <https://www.unoosa.org/documents/pdf/copuos/stsc/2017/tech-31E.pdf>
- Indonesian Space Act, 2013. Link: <https://jdih.lapan.go.id/storage/app/uploads/public/5bd/2bb/3ca/5bd2bb3ca41bc072799369.pdf> and <https://www.unoosa.org/pdf/pres/lsc2014/tech-02E.pdf>
- Indonesia: Country report, 2019. Link: <https://www.unoosa.org/pdf/pres/lsc2014/tech-02E.pdf>
- The Urgency of Guidelines for the Long-term Sustainability of Outer Space Activities for Indonesia, 2019. Link: [https://www.researchgate.net/publication/337591413\\_The\\_Urgency\\_of\\_Guidelines\\_for\\_the\\_Long-term\\_Sustainability\\_of\\_Outer\\_Space\\_Activities\\_for\\_Indonesia](https://www.researchgate.net/publication/337591413_The_Urgency_of_Guidelines_for_the_Long-term_Sustainability_of_Outer_Space_Activities_for_Indonesia)
- International cooperation in the peaceful uses of outer space: activities of Member States, 2019. Link: [https://www.unoosa.org/oosa/documents-and-resolutions/search.jsp?f=oosaDocument.doctags.doctag\\_s%3ANATACTDOCS&f=oosaDocument.series\\_s1%3AA%5C%2FAC.105%5C%2F&view=documents](https://www.unoosa.org/oosa/documents-and-resolutions/search.jsp?f=oosaDocument.doctags.doctag_s%3ANATACTDOCS&f=oosaDocument.series_s1%3AA%5C%2FAC.105%5C%2F&view=documents)

## Japan

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

There is no mention of the term “planetary defense” in any researched document, nor explicitly NEOs. Interest in PD is presumed from the broadly defined strategic interest in the concept of SSA and reference to NEO space missions such as Hayabusa 2 and Itokawa in researched policy documents.

#### 1. Global welfare: YES

According to the Basic Space Law, space activities are pursued for “prosperity of human society”. “Space advanced R&D activities will also prompt new technological breakthroughs, which will, in turn, contribute to a better lifestyle and dynamic future.”

#### 2. National welfare: YES

#### 3. National security: YES

National interests are: ensuring space security (incl. SSA) and contributing to disaster management, national resilience, and solving of global issues (Outline of the Basic Plan on Space Policy, 2020)

#### 4. Global security: YES

#### 5. Advanced science: YES

National interests are: creation of new knowledge through space science and exploration by leading international missions “based on highly evaluated technologies” “such as those used in the “HAYABUSA mission” (Outline of the Basic Plan on Space Policy, 2020).

#### 6. Industrial growth: YES

National interests are economic growth and innovation. It also includes SSA services for the private sector and space resource exploitation (Outline of the Basic Plan on Space Policy, 2020).

Among policy objectives is “maintain and strengthen the science and technology industrial base” (Implementation Plan of the Basic Plan on Space Policy. Revised FY 2017).

Promotion of innovative technologies that “should be acquired first in the world” (Outline of the Basic Plan on Space Policy, 2020).

#### 7. Political leadership: NO

### What strategies say

There is no mention of the term “planetary defense” in any researched document. Space situational awareness is anchored in the National defense program guidelines for FY 2019 as a reaction

for responding to global issues (National Defense Program Guidelines for FY 2019 and beyond, 2018). Japan takes part in the Destiny mission and mission Flyby of Geminids parent asteroid Phaethon which aim is to characterize dust en route to Earth /before atmospheric entry as well as understand geology of asteroids (DESTINY+ mission Flyby of Geminids parent asteroid Phaethon, 2020). Among achievements of Hayabusa2 mission is creating and observation of artificial crater and impact process (experiment) (Asteroid Sample Return Mission Hayabusa2, 2020).

In Medium Term Defense Program FY 2019 – FY 2023, one of SDF’s priorities is “acquiring and Strengthening Capabilities in Space” by establishing **SSA system** as well as using “**space-based optical telescopes and SSA laser ranging devices**”. The main goal is to “**secure the stable use of space**” (Medium Term Defense Program FY 2019 – FY 2023, 2018). Main Policy Objectives of **the Basic Plan on Space Policy 2017** are: “(1) Ensure space security, (2) Promote the use of civil space, (3) Maintain and strengthen the science and technology industrial base”. SSA and improving its capabilities is a tool to ensure Japan’s stable use of space (Implementation Plan of the Basic Plan on Space Policy. Revised FY 2017).

Targets of Japan’s Space Policy as outlined in the Basic Plan on Space Policy 2020 are: “**To contribute to a wide range of national interests, Japan cooperates strategically aims to become a self-sustained space faring nation strategically collaborating with its ally and partners, strengthens its industrial, scientific and technological bases for autonomous space activities, and expands space utilization which enables it to become self-sustained with a virtuous cycle of strengthened foundations and expanded space utilization**” (Outline of the Basic Plan on Space Policy, 2020).

**National interests are:**

1. Ensuring **space security** (including **Space Situational Awareness**)
2. Contributing to disaster management, national resilience, and solving global issues
3. Realizing **Industrial growth and innovation** for which space is the driving force through (“**Development of a framework for SSA services provided for the private –sector**” as well as “**Facilitating systems for regulatory environment necessary for space resource exploitation**”)
4. **Creation of new knowledge through space science and exploration** (enhancing space science and exploration by leading international missions “based on highly evaluated technologies” “such as those used in the “**HAYABUSA mission**” and “Promoting research and development of common and innovative technologies that should be acquired first in the world”. **Participation in international space exploration** also in **sample return and astronomical observation** (Outline of the Basic Plan on Space Policy, 2020).

In the **Basic Plan for Space policy 2013**: Space science and space exploration program: research on space physics, astronomy, and planetary science of the solar system. Example of projects: “sample return from asteroid in the **HAYABUSA project**, publication of **all-sky survey infrared source catalogue obtained in AKARI (ASTRO-F) project.**” There are 6 pillars for Japan's development and utilization of space under the Basic Space Law:

**(1) Peaceful use of space:** For our **sustainable space development**, establishing the **SSA system** for the purpose such as to protect satellites from possible collision with space debris has been gaining importance as **utilization of space is extended for both civil and military purposes**. Their main purpose is the to make contributions to the **utilization of space for national security**.

**(2) Improvement of people's lives****(3) Development of industry**

**(4) Prosperity of human society:** "Space is the last frontier for humankind. It offers limitless possibilities in many ways, such as **accumulation of the intellectual heritage, expansion of human activities, and new form of energy utilization in space. Such advanced R&D activities** will also prompt new **technological breakthroughs**, which will, in turn, **contribute to a better lifestyle and dynamic future**. Japanese space science, conducted on the basis of bottom-up consensus in the scientific community, has been successful and made a number of cutting-edge breakthroughs, as exemplified by the sample from **Asteroid "Itokawa"**, brought home by the asteroid explorer **HAYABUSA (MUSES-C)**. **Japan's position on space science and space exploration should be that of a leading country with accumulated experience and technology, and Japan should be engaged in space science research and exploration as a quest for scientific truth and as efforts to expand the realm of mankind."**

**(5) Promotion of international cooperation**

"In order to **ensure safe and stable development and utilization of space in Japan**, consideration will be given to the **SSA system** which would become necessary for protecting the ISS, satellites and astronauts from possible **collision with debris and other hazardous situations**. In addition, the space weather forecast system will be improved and strengthened, which is designed to observe, analyse and forecast natural phenomena such as solar activity and space environment change having effects on the space and the ground infrastructure." (Basic Plan on Space Policy, 2013).

**Comments**

- Japan is active in the area of PD domestically (e.g. Hayabusa 2, SSA) or internationally (e.g. SMPAG, international space missions). Criteria fulfilled above are, however, only implicit stemming from the accessible policy documents (involving broader concept of **SSA and reference to NEO space missions such as Hayabusa 2 and Itokawa**) and government's actions such as activity at international forums. These activities indicate that there is some basic strategic approach in relation to the space safety and planetary defense even though Japan does not have explicit mention of NEO / Planetary Defense in space policy documents, but rather more general link to the SSA.

**Resources**

- Medium Term Defense Program FY 2019 – FY 2023, 2018. Link: [https://www.mod.go.jp/j/approach/agenda/guideline/pdf/chuki\\_seibi31-35\\_e.pdf](https://www.mod.go.jp/j/approach/agenda/guideline/pdf/chuki_seibi31-35_e.pdf)
- Outline of the Basic Plan on Space Policy, 2020. Link: [https://www8.cao.go.jp/space/english/basicplan/2020/abstract\\_0701.pdf](https://www8.cao.go.jp/space/english/basicplan/2020/abstract_0701.pdf)
- Implementation Plan of the Basic Plan on Space Policy. Revised FY 2017. Link: <https://www8.cao.go.jp/space/english/basicplan/2017/basicplan.pdf>
- Basic Plan on Space Policy, 2013. Link: <https://www8.cao.go.jp/space/plan/plan-eng.pdf>
- National Defense Program Guidelines for FY 2019 and beyond, December 2018. Link: [https://www.cas.go.jp/jp/siryoku/pdf/2019boueikeikaku\\_e.pdf](https://www.cas.go.jp/jp/siryoku/pdf/2019boueikeikaku_e.pdf)

- DESTINY+ mission Flyby of Geminids parent asteroid Phaethon, 2020. Link: [https://www.cosmos.esa.int/documents/336356/336472/DESTINY%2B\\_-\\_Yoshikawa\\_2020-02-06+%281%29.pdf/80e4ffe1-47f8-7c11-4d67-f415d6b7774a?t=1581357153527](https://www.cosmos.esa.int/documents/336356/336472/DESTINY%2B_-_Yoshikawa_2020-02-06+%281%29.pdf/80e4ffe1-47f8-7c11-4d67-f415d6b7774a?t=1581357153527)
- Asteroid Sample Return Mission Hayabusa2, 2020. Link: [https://www.cosmos.esa.int/documents/336356/336472/Hayabusa2\\_2020-02-06.pdf/30dc2315-e5ab-e831-a4db-486b4ebfe471?t=1580992764953](https://www.cosmos.esa.int/documents/336356/336472/Hayabusa2_2020-02-06.pdf/30dc2315-e5ab-e831-a4db-486b4ebfe471?t=1580992764953)

## Kenya

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In the Strategic Plan 2020 – 2025 benefits of space science and technology are outlined also via “**Space situational awareness and public safety** through monitoring of re-entry objects, debris and **asteroids**.” However, there are no further information in the researched documents.

### Resources

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- Possibilities beyond our skies: Strategic Plan 2020 – 2025, 2020. Link: [https://ksa.go.ke/static/f8fc4c46eb15e203d1d36648dd7c7e1d/KSA\\_POPULAR\\_VERSION\\_October\\_Compressed.pdf](https://ksa.go.ke/static/f8fc4c46eb15e203d1d36648dd7c7e1d/KSA_POPULAR_VERSION_October_Compressed.pdf)

## Mexico

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Mexico has in his National Program for Space Activities 2020-2024 in the epilogue included Vision towards the future (2040) whereas **vision of Mexico is to have a space surveillance system dedicated to NEOs**. There are no other mentions of NEOs in researched documents.

### Resources

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- Programa Nacional de Actividades Espaciales 2020-2024. Link:  
[https://www.gob.mx/cms/uploads/attachment/file/585644/Programa\\_Nacional\\_de\\_Actividades\\_Espaciales\\_2020-2024.pdf](https://www.gob.mx/cms/uploads/attachment/file/585644/Programa_Nacional_de_Actividades_Espaciales_2020-2024.pdf)

## Russia

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

Russian interests in the Planetary Defense (only implicitly):

1. **Global welfare: NO**

2. **National welfare: YES**

In Major provisions of the Russian Federal Space Program for 2006-2015 there is goal to enhancement of the people prosperity and the people`s life quality. However, in this document there is no direct mention of the NEO or PD.

3. **National security: YES**

NEO is considered as a space threat. Chelyabinsk event.

4. **Global security: YES**

Implicitly yes due to the mention that the PD is primarily international problem and support of international cooperation in space. Promotion of the SSA network called Milky Way.

“The most important task is how to protect the planet from hazardous collisions with celestial bodies that may ruin the civilization.” Dmitry Rogozin, head of Roscosmos.

5. **Advanced science: YES**

Asteroids are one of the space science priorities under the exploration agenda (Russian perspectives on space science priorities 2030 – 2050).

6. **Industrial growth: YES**

Promotion of development of technologies.

7. **Political leadership: NO**

### What strategies say

**There is no mention of the planetary defense in the researched documents.** However, Russian Federation's State Policy in the Field of Space Activities for the Period up to 2030 and beyond (approved by the President of the Russian Federation on April 19, 2013 N Pr-906) and Federal Space Program of Russia for 2016-2025 **were not found.** Nevertheless, Dmitry Rogozin, the head of Roscosmos, sees the importance of the planetary defense and considers it as a top priority as far as at the 2021 Global Space Exploration Conference in St. Petersburg said: “The most important task is how to protect the planet from hazardous collisions with celestial bodies that may ruin the civilization”. He sees such collision with Earth “as a potentially significant **threat to the earth, making the need for**

**technology to prevent that from happening of the utmost importance.”**<sup>4</sup> Also senator Margarita Pavlova in her speech in 2021 was highlighting the possible threat which celestial bodies can pose to the Earth and reminded situation from the 2013 in Chelyabinsk.

Therefore, NEO is considered as a space threat. Russia cooperate in the planetary defense activities internationally.

Already in 2011 there were ongoing preparations of national (federal) program focused on **Asteroid-Comet Impact Hazard (ACH)** at that time with preliminary name “System of mitigation of space threats” including “**National system of safeguards against the asteroid and comet hazard= Federal sci-tech program (FSTP)**” (Towards the National NEO Program, 2011). Russia has also radar technology for NEOs and since 2007, there has been “Expert Working Group on the ACH issue by the Space Council of the Russian Academy of Sciences” dealing with NEO problem.<sup>5</sup> (The NEO problem: activities in Russia, 2010). In 2013, roundtable on development of measures to ensure planetary protection from space risks and threats (upper chamber of the Russian Parliament) took place. International Scientific Optical Network (ISON) is one of largest Russian networks to observe NEOs. After the Chelyabinsk event efforts were made to include newly appeared threats into the national system of civil defense (The NEO problem: current activities in Russia, 2014).

According to the Law on Space Activities, for Russia “**the exploration and use of outer space, including the moon and other celestial bodies is the highest priority of the state interests.**” **The purpose of this law is support of development “economy, science and technology, strengthening the defense and the security** of the Russian Federation.” Among Space Activities are also included “scientific space exploration; observation of objects and phenomena in space; use of space equipment, space materials and space technology in the interests of defense and security of the Russian Federation; and testing of equipment in space” (Law of the Russian Federation No. 5663-1).

The purpose of the federal program in the field of space activities from 2016 is, among others, “**providing services in the interests of the socio-economic sphere, science and international cooperation, including protection of population and territories from natural and technogenic emergencies**, as well as implementation of a manned program, creation of means of launching technical equipment to space, laying scientific and technical groundwork for advanced space complexes and systems” (Federal Space Program until 2025<sup>6</sup>). Asteroids are also one of the space science priorities 2030-2050 under the **exploration agenda** (Russian perspectives on space science priorities 2030 – 2050).

**Space situational awareness network called Milky Way** will comprise of 65 ground-based optical telescopes by 2025, space surveillance payloads on future Sfera-class Earth observation satellites, an optical sensor to be placed in the Russian part of the International Space Station (ISS), as well as the planned surveillance satellite (Milky way program).

In Russia, with the topic of “asteroid-comet hazard” are dealing institutions such as Ministry of Emergency situations of Russia, Planetary Defense Center or Extreme Situations research center LTD

<sup>4</sup> <https://www.newsweek.com/russian-official-urges-creation-tech-prevent-earth-celestial-bodies-colliding-1601324>

<sup>5</sup> Information from the year 2010. UN COPOUS presentation: The NEO problem: activities in Russia, 2010.

<sup>6</sup> <https://www.buzko.legal/content-eng/legal-regulation-of-space-activities-in-russia>

(About development of base components of the international planetary defense system “Citadel”, 2015).

### Comments

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- Russia is very active in the “Asteroid-Comet Impact Hazard (ACH)” area domestically and internationally. However, even though already from 2011 there have been published mentions about preparation and development of several policy documents tackling ACH, they were not found publicly. Criteria fulfilled above are therefore only implicit stemming from the accessible documents and government’s actions such as activity at international forums and/or involvement in NEO space missions. These activities indicate that there is some basic strategic approach in relation to the space safety and planetary defense even though Russia does not have such explicit mention in space policy documents.

### Resources

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- Russian perspectives on space science priorities 2030 – 2050. Link: [https://www.cosmos.esa.int/documents/3273648/3495481/13\\_03\\_APetrukovich\\_madrid\\_petrukovich.pdf/2d857ca6-1773-87e1-f474-61e4152d13bb?t=1573750387313](https://www.cosmos.esa.int/documents/3273648/3495481/13_03_APetrukovich_madrid_petrukovich.pdf/2d857ca6-1773-87e1-f474-61e4152d13bb?t=1573750387313)
- СБОРНИК по итогам круглого стола на тему: О разработке мер по обеспечению планетарной защиты от космических рисков и угроз, 2013. Link: <http://council.gov.ru/media/files/41d4c869f3f0cc0c3ed3.pdf>
- About development of base components of the international planetary defense system, “Citadel”, 2015. Link: <https://iaaspace.org/wp-content/uploads/iaa/Scientific%20Activity/conf/pdc2015/IAA-PDC-15-P-27pa.pdf>
- The NEO problem: activities in Russia, 2010. Link: <http://www.unoosa.org/pdf/pres/stsc2010/tech-35.pdf>
- The NEO problem: current activities in Russia, 2014. Link: <http://www.unoosa.org/pdf/pres/stsc2014/tech-02E.pdf>
- Major provisions of the Russian Federal Space Program for 2006-2015, 2005. Link: <http://www.infoespacial.com/wp-content/uploads/Major-provisions-of-the-Russian-Federal-Space-Program-for-2006-2015.pdf>
- Federal Space Program until 2025. Link: <https://www.buzko.legal/content-eng/legal-regulation-of-space-activities-in-russia>
- Towards the National NEO Program, 2011. Link: <http://www.unoosa.org/pdf/pres/stsc2011/tech-47.pdf>
- Russia to launch first satellite to monitor space junk in 2027. Link: <https://tass.com/science/1161437>
- Law of the Russian Federation about Space Activity. Decree No. 5663-1, 1993 (with the Amendments and Addenda of November 29, 1996, January 10, 2003, March 5, August 22, 2004, February 2, December 18, 2006). Link: [https://www.wto.org/english/thewto\\_e/acc\\_e/rus\\_e/wtaccrus58\\_leg\\_375.pdf](https://www.wto.org/english/thewto_e/acc_e/rus_e/wtaccrus58_leg_375.pdf)

- Russian Official Urges Creation of Tech to Prevent Earth and 'Celestial Bodies' Colliding, 2021. Link: <https://www.newsweek.com/russian-official-urges-creation-tech-prevent-earth-celestial-bodies-colliding-1601324>
- Regulation of Space Activities in Russia, 2021. <https://www.buzko.legal/content-eng/legal-regulation-of-space-activities-in-russia>

## Saudi Arabia

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

#### 8. Global welfare: YES

Among core principles of the strategy is peacefulness with aim to “achieves the good of humanity”.

#### 9. National welfare: YES

Among core principles of the strategy is peacefulness with aim to “enhance the livelihood of citizens in Saudi Arabia”.

#### 10. National security: YES

NEOs - potentially hazardous.

#### 11. Global security: YES

Implicitly.

#### 12. Advanced science: YES

NEO research identified as priority under the space science pillar.

#### 13. Industrial growth: YES

Promotion of development of technologies for NEOs exploration.

#### 14. Political leadership: NO

### What strategies say

The **Saudi Lunar and Near Earth Object Science Center** operates within King Abdulaziz City for Science and Technology (KACST). It focuses, among others, on laser ranging and imaging, Near Earth Object Studies as well as Near-Earth Objects as future resources. It strives to develop and “space-flight test technologies for the identification, exploration and mitigation of potentially hazardous Near-Earth Objects (NEOs)”. Among its priorities is also developing of cost-effective technologies for space exploration of NEOs (Saudi Lunar and Near Earth Object Science Center Capabilities and Research Interests).

Vision of the space strategy is to “serve the national needs and sustainable development and contribute to the transformation to a knowledge based society.” **Near Earth Objects Research** is a priority area under the Space science pillar (Country report: Saudi Arabia). Soon there should be published new Saudi Arabia National Space Strategy. Core principles of the strategy are ambition, comprehensiveness (technologies and supply chain in the public and private sectors), realism, alignment, peacefulness (enhance the livelihood of citizens in Saudi Arabia and achieves the good of humanity) and compliance.

## Resources

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- Saudi Lunar and Near Earth Object Science Center Capabilities and Research Interests. Link: <https://sservi.nasa.gov/?team=saudi-lunar-and-near-earth-object-science-center>)
- Saudi Space Activities: Space research Institute - KACST. Link: <https://www.unoosa.org/pdf/pres/copuos2013/tech-17.pdf>
- Country Report: Saudi Arabia (Gulf Innovation Research Institute – GIRI). Link: [http://www.unisec-global.org/pdf/uniglo2/UNIGLO2\\_Day1/POC/1\\_1734\\_Saudi%20Arabia.pdf](http://www.unisec-global.org/pdf/uniglo2/UNIGLO2_Day1/POC/1_1734_Saudi%20Arabia.pdf)
- Saudi Space Commission. Link: <https://saudispace.gov.sa/en/about-us/>

## Switzerland

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

Swiss interests in the PD (only implicitly because in general linked to the ESA SSA):

15. **Global welfare: NO**

16. **National welfare: YES**

General principles of Swiss policy: improve the quality of life for citizens, space research for the benefit of knowledge society.

17. **National security: YES**

SSA activities tackle “threats from space”.

18. **Global security: YES**

Link to ESA SSA.

19. **Advanced science: YES**

Promotion of the excellence and competitiveness of Swiss science.

20. **Industrial growth: YES**

Promotion of Swiss companies in European procurement opportunities, excellence and competitiveness of Swiss industry and science. Space research oriented on the benefit of innovation and the knowledge society. Aim to develop sensor technologies for space object observations.

21. **Political leadership: NO**

### What strategies say

**There is no explicit mention of the term “planetary defense” in any researched documents.** Nevertheless, Switzerland considers **ESA’s activities as “main instrument to implement space policy”** (A report on space science in Switzerland and recommendations for the future, 2019). It takes part in the **Space Situational Awareness activities** in order to “acquire information about **natural and artificial objects in Earth’s orbit**” (Space Research 2016 – 2018 in Switzerland, 2018). These initiatives at ESA aim to prepare Europe to respond to **threats from space**. **Switzerland considers its participation in all these efforts in SSA as a critical strategic contribution to European access to space** (Swiss Space Implementation Plan within Education, Research and Innovation for 2018-2020) and takes part in all three segments of the ESA’s SSA (A report on space science in Switzerland and recommendations for the future, 2019).

Principles of the Swiss space policy are:

- development and use of space-based applications in order to **improve the quality of life for citizens**;

- space research for the **benefit of innovation and the knowledge society**;
- **scientific, technological, and industrial contributions** to position itself as a competitive, reliable, and indispensable partner.

One of the goals in involvement of ESA activities is that it supports research institutions and industry in relation to the future “procurement opportunities in institutional European programmes” (Switzerland in space: Cutting-edge research and high-tech solutions – for everyday life, 2016). Indeed, Switzerland took part at the space mission Rosetta and the University of Bern developed Rosina (Rosetta Orbiter Sensor for Ion and Neutral Analysis) which was then built mainly by Swiss industry (ROSINA – Rosetta’s Swiss pearl).

The Swiss Space Implementation Plan within Education, Research and Innovation for 2018–2020 is focused on challenges and opportunities such as **“fostering a competitive and sustainable national space ecosystem and increasing the excellence and competitiveness of Swiss industry and science”** (International cooperation in the peaceful uses of outer space: activities of Member States, 2019). “Switzerland is involved in the ESA Comet Interceptor. CoCa (Comet Camera) and MANiaC (Mass Analyser for Neutrals in a Coma) “will be built by a consortium led by the University of Bern in an approach **designed to minimize costs while maximising the scientific return”** with the aim to reveal different comet reservoirs (Space Research in Switzerland 2018 – 2020).

Switzerland’s interests in the area of space safety are, among others, following:

- **“Hosting of the ESA Expert Centre for optical and laser observations at the University of Bern”**
- **“Development of sensor technologies for ground based optical and laser sensors for space object observations”**

(A report on space science in Switzerland and recommendations for the future, 2019).

### Comments

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- Swiss interests in the NEO segment are strongly interlinked to the ESA SSA activities. Switzerland also see business opportunities for its companies in the European procurements and promotes competitiveness of Swiss industry and science.

### Resources

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- Space Research 2016 – 2018 in Switzerland, 2018. Link: <https://www.sbf.admin.ch/sbfi/en/home/services/publications/data-base-publications/cospar-2016-2018-report.html>
- Swiss Space Implementation Plan within Education, Research and Innovation for 2018-2020, 2017. Link: <https://www.sbf.admin.ch/sbfi/en/home/services/publications/data-base-publications/swiss-space-implementation-plan.html>
- A report on space science in Switzerland and recommendations for the future, 2019. Link: <https://www.sbf.admin.ch/sbfi/en/home/research-and-innovation/space.html>

- International cooperation in the peaceful uses of outer space: activities of Member States, 2019. Link: [http://www.unoosa.org/oosa/oosadoc/data/documents/2019/aac.105/aac.1051211add.1\\_0.html](http://www.unoosa.org/oosa/oosadoc/data/documents/2019/aac.105/aac.1051211add.1_0.html)
- Space Research in Switzerland 2018 – 2020, 2020. Link: <https://www.sbf.admin.ch/sbf/en/home/services/publications/data-base-publications/cospar-2018-2020-report.html>
- Switzerland in space: Cutting- edge research and high-tech solutions – for everyday life, 2016. Link: <https://www.eda.admin.ch/eda/en/home/services-and-publications/publications/alle-publikationen.html/publikationen/en/eda/wissenschaft/Die-Schweiz-im-Weltall>
- ROSINA – Rosetta’s Swiss pearl. Link: [https://issuu.com/sbf\\_sefri\\_seri/docs/switzerland\\_in\\_space/s/10860013](https://issuu.com/sbf_sefri_seri/docs/switzerland_in_space/s/10860013)
- Swiss Space Policy. Link: <https://www.sbf.admin.ch/sbf/en/home/research-and-innovation/space/swiss-space-policy.html>

## Turkey

Global welfare	National welfare	National security	Global security	Advanced science	Industrial growth	Political leadership

### Summary of criteria fulfilment

#### 8. Global welfare: YES

Contributing towards “scientific knowledge of the mankind”.

#### 9. National welfare: YES

Turkish Space Agency acts in line with the “welfare and national interests of our society”.

#### 10. National security: YES

SSA will contribute towards safety of Turkish national assets in space.

#### 11. Global security: NO

Not explicitly mentioned.

#### 12. Advanced science: YES

Promotion of planetary exploration, astronomical observations and analysis of space objects.

#### 13. Industrial growth: YES

Promotion of space technologies & communications infrastructure for Deep Space Program. Space activities boost innovation, increase employment and productivity in all sectors.

#### 14. Political leadership: YES

Why is the National Space Program significant? “Space programs have very high costs on the budgets of countries. The achievements, reputation and power gained as the result of the implementation of such programs will make the cost negligible.”

### What strategies say

**There is no mention of the term “planetary defense” in the researched documents.** However, in the 2021 National Space Program, one of the strategic goals is to “observing and monitoring space objects from the Earth” in order to “increase Turkey’s efficiency in terms of astronomical observations and follow up space objects from the earth”. Turkey aims to integrate TUBİTAK National Observatory and Eastern Anatolia Observatory (infra-red telescope with 4 meters of mirror diameter) into one national research facility. Space awareness will be enhanced also by observing “**space objects from the earth and in the future from the space**”. Communications infrastructure for Deep Space Program will be developed.

There are following general objectives of the space program:

- **Developing relevant technologies and infrastructure** on space technologies and thus decreasing dependency on foreign resources,
- **space technologies** contribute to the **development** of country,
- further advancing the current **technologies and success**,
- **scientific knowledge of the mankind**,
- Increasing the **awareness on space**.

Space situational awareness will focus on the observation of among others, planets and other space objects from Earth. This will “ensure safety of Turkish national assets in space” and “perform scientific studies aimed at planetary exploration and analysis of space objects” (Observation and Tracking of Space Objects from Earth).

### Comments

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- Observation of NEO is mainly focused on the planetary exploration and analysis of the objects and in order to ensure safety of national assets in space. Global security is thus not explicitly mentioned.

### Resources

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- National Space Program, 2021. Link: <https://cdn.tua.gov.tr/60b61f993ada2.pdf>
- Observation and Tracking of Space Objects from Earth. Link: <https://tua.gov.tr/en/national-space-program>

## United Arab Emirates

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**There is no mention of the term „planetary defense“ in the researched documents.** National Space Policy from the year 2016 focuses on the enhancement of the space situational awareness operations and capabilities, however it is more in the sense of the space debris mitigation as well as consequences of space weather, not explicitly due to NEO threat. Focus on the asteroid exploration under the science pillar is mainly linked to the support of the human colonization of space and utilization of space resources.

The Ultimate Goal of the National Space Policy is „to build a **strong and sustainable UAE space sector** that **supports and protects national interests and vital industries**, contributes to the diversification and growth of the **economy**, boosts UAE specialized competencies, develops **scientific and technological capabilities**, engrains the culture of **innovation and national pride**, and **strengthens UAE’s status** and role regionally and globally.” In particular, one of aims of the policy is “to contribute to future manned missions to outer space, including the missions that seek to extend the human presence and survival in outer space and on the surface of the Moon, Mars, asteroids and other celestial bodies”. The UAE promotes safe and stable space environment in order to improve safety and security of space activities. As one way to achieve this goal is to increase SSA operations and capabilities also by developing new technologies. In cooperation with international partners will identify potential threats and enhance preparedness, improve disaster monitoring and response. The UAE aims to support space exploration activities also to explore, mine, extract and utilize resources in space (National Space Policy, 2016).

In the National Space Strategy among the main research areas within the science pillar are astronomy and tracking of space objects. The main mission of the space sector is: “to establish UAE position among leading nations in the space sector and enhancing the sector’s role in supporting its knowledge based economy, through executing ambitious space programs and missions; promoting R&D in space; expanding the scope of space utilization and the opportunities to benefit from sciences, technologies and space applications; creating an effective and attractive regulatory environment; developing specialized expertise and attracting intellectuals; motivating innovation in youth; building practical partnerships between industrial, educational and research institutions; and strengthening cooperation on the regional and international levels” (National Space Strategy (Summary), 2030).

### Resources

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- National Space Policy, 2016. Link:  
[https://space.gov.ae/Documents/PublicationPDFFiles/UAE\\_National\\_Space\\_Policy\\_English.pdf](https://space.gov.ae/Documents/PublicationPDFFiles/UAE_National_Space_Policy_English.pdf)
- National Space Strategy (Summary), 2030- Link:  
<https://space.gov.ae/Documents/PublicationPDFFiles/2030-National-Strategy-Summary-EN.pdf>

## 7. Special cases

### **APSCO (Asia- Pacific Space Cooperation Organization)**

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**There is not expressed an explicit mention of the NEO/NEA/planetary defense.** However, in the Development Vision 2030, there is mentioned APOSOS (Asia-Pacific Ground-Based Optical Space Object Observation System) with observation nodes in Iran, Pakistan, Peru. In 2015 Beijing Declaration of Asia-Pacific Space Cooperation Development Strategy Forum 2015 there is mentioned the issue of the space debris and that APSCO is developing Telemetry, Tracking and Command (TTandC) network and sharing services.

### **Convention of the Commonwealth of independent States**

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**In the article 5 of the Convention of the Commonwealth of independent States it is stated that** the signatory Parties “shall promote development in also in the area of:

- fundamental and applied space researches including astrophysical researches, **study of the planets and asteroid-comet hazard;**
- **prevention of asteroid-comet hazard”**

Article 3 anchors general objectives of cooperation such as promotion of social and economic development of the Parties, maintenance of economic benefit, development of scientific and technical potential and improvement and acquisition of knowledge on the Earth and the outer space.