SPACE SAFETY

SAFEGUARDING SPACE

Since 2009, ESA has been working to develop Europe's capacity to safeguard satellites in space and infrastructure on ground, protecting people and vital economic activities. The proposed Space Safety programme will expand to include risk mitigation and prevention activities.

SPACE SAFETY GOALS

ESA's Space Safety activities aim to develop:

- The Lagrange mission – providing constant watch over our active star, it will protect vital ground infrastructure and satellite-based services by enabling timely warnings and real-time information on dangerous solar activity;
- The Hera mission – in cooperation with NASA, it will be the first-ever test of asteroid deflection;
- In-orbit servicing vehicles able to de-orbit, refuel and refurbish satellites in space – increasing their lifetime and boosting sustainability;
- New, automated debris-avoidance systems – protecting satellites, vital in the coming era of large constellations; and,
- The Flyeye-series of telescopes – scanning the skies for risky asteroids, giving us the capability to provide early warning and actionable information.

PROTECTING OUR PLANET

Living close to an active star, in a Solar System filled with ancient and fast-moving asteroids, on a planet increasingly surrounded by discarded satellites and their debris means that our economies, our societies and our space-based services are at risk. ESA's Space Safety activities aim to mitigate the effects of hazards from space, protecting our Pale Blue Dot, its inhabitants and the vital infrastructure on which modern society is increasingly dependent.
**SPACE WEATHER**

A major solar event, like the 1859 Carrington event, could cause over €15 billion economic loss to Europe.

ESA's Lagrange mission would see such a storm coming and feed data into a new early warning system, enabling us to act to protect vital ground and space infrastructure.

**PLANETARY DEFENCE**

Any medium or large asteroid impact could have devastating human, natural and economic effects.

While the Flyeye telescopes spot risky asteroids, the Hera mission would be part of the world’s first-ever test of asteroid deflection.

**SPACE DEBRIS & CLEANSPACE**

The increasing quantity of space debris in orbit around Earth means our vital satellites and the daily services they provide are at risk.

An automated collision avoidance system – managing warnings and designing, recommending and executing avoidance manoeuvres – would keep our satellites safe.

Through its Clean Space initiative, ESA is pioneering an eco-friendly approach to space activities. On the ground, this means adopting greener materials, processes and technologies and boosting sustainability through EcoDesign. In space, it means preserving Earth’s orbital environment as a safe zone, by reducing debris creation through CleanSat, while the Space Servicing Vehicle will demonstrate the capability to rendezvous, capture, service and de-orbit defunct space objects in a controlled fashion with a commercial perspective.
**BENEFITTING HUMANITY**

Safeguarding our planet requires deploying new, cutting-edge missions and developing novel technologies, and Europe has an opportunity to take the lead. Whether designing the technology required for sustainable spaceflight and debris mitigation, learning more about asteroids and other near-Earth objects or maintaining a constant watch over our Sun, development of Space Safety capabilities builds Europe's industrial competitiveness, while benefitting Europeans and all of humanity.

**EUROPE'S RESPONSE**

ESA is ensuring that we can closely monitor our active and unpredictable Sun, detect and eventually deflect threatening asteroids and minimise and mitigate risks from a growing population of space debris. By developing new missions, technologies and systems and coordinating national European expertise, the Agency is securing a safer space.

**PREPARING BEYOND 2030**

The decisions we make today can protect the societies of tomorrow. By 2030, we want Europe to be resilient to the threat of asteroids and near-Earth objects striking our planet, to have operational space weather services providing timely, accurate and actionable information to operators of all sensitive infrastructure and enable the safe operation of individual satellites and large constellations by developing and demonstrating automated collision avoidance and in-orbit servicing.

**ESTIMATED ECONOMIC LOSS DUE TO AN ASTEROID IMPACT**

Combining:
- number of fatalities
- number of injuries
- physical damage to land infrastructure damage

€3.24 trillion

€3.8 billion

€42 billion

€15 million

€29.6 million

€20.6 million

€1.5 million

2016

2024

2032

Costs rise in future as society becomes more dependent on satellites

*Source: ESA, PwC analysis*