

# SORVEGLIATI SPAZIALI

## Leveraging Augmented Reality for Planetary Defense awareness

D. Guidetti<sup>(1)</sup>, L. Leonardi<sup>(2)</sup>, C. Boccato<sup>(3)</sup>, M. Galliani<sup>(4)</sup>, D. Coero Borga<sup>(4)</sup>, D. Gardiol<sup>(5)</sup>, and P. Soletta<sup>(6)</sup>

INAF - Italian National Institute for Astrophysics

### The project, its goals and team

"Sorvegliati Spaziali – Looking Up to Space to Protect Our Planet," by the **Italian National Institute for Astrophysics (INAF)** and endorsed by the Outreach Office of the **NASA Planetary Defense Coordination Office**, is one of the first coordinated public outreach initiatives on Planetary Defense led by a research institution.

The project covers topics such as **near-Earth asteroids** and **comets** to **space weather**, **meteors**, **meteorites**, and **space debris**, along with strategies for preventing and mitigating their potential effects on Earth's environment.

The project aims to promptly disseminate scientific and cultural knowledge through a variety of original, state-of-the-art multimedia information products, leading the way in employing a transversal, multidisciplinary, and narrative science approach.

These products explore various communication formats, including news, different types of video clips (educational, theatrical, interviews, in-depth), infographics, bulletins on near-Earth objects, solar activity, and meteor showers, a geo-localized map with live satellite and space debris tracking, augmented reality, a glossary, and reviews of blogs, books, movies, public events, and more.

At the heart of the project is the fully graphic and multimedia Italian website, [sorvegliatispaziali.inaf.it](http://sorvegliatispaziali.inaf.it).

The team includes INAF communicators and researchers, collaborating with external research institutions, web designers, theatrical companies, the Italian national public broadcasting company RAI, comic book artists, and natural science museums.

### Sorvegliati Spaziali in Augmented Reality

Augmented Reality (AR) is a technology that allows digital elements, such as images, sounds, or text, to be superimposed on the surrounding physical world in real time through devices like smartphones and tablets. AR applications (AR apps) have great potential for communicating science in an engaging, accessible, and tangible way. This is especially true for younger generations, who have high expectations for digital communication and are attracted to technological innovation and interactivity.

To explore the potential of AR, in collaboration with Vitruvio Virtual Reality, a brand of the Italian company ASSA srl, which managed the development of the Sorvegliati Spaziali website, we created a brochure of the project with AR content and the **Sorvegliati Spaziali AR app** to activate the AR experience. This partnership ensured stylistic consistency between the brochure and the website.

While the brochure provides a concise presentation of Sorvegliati Spaziali and its major topics, the app enables users to simulate Planetary Defense phenomena in their environment and offers in-depth content.

The app Sorvegliati Spaziali, is free and available for iOS and AR-compatible Android mobile devices (smartphones and tablets), in both Italian and English. It can be used with or without the project brochure.

It is essential to emphasize that this communication approach goes beyond mere edutainment; rather, it represents as well a strategic approach to addressing critical issues such as risk perception and communication associated with space events, particularly toward younger generations.

### The Augmented Reality experiences (AR)

The app utilizes 3D graphic content created through modeling software, which is then integrated into the Unity platform. By navigating the app, users can either get a general overview of the Sorvegliati Spaziali project or dive directly into the interactive AR experiences.

The main AR experiences are four, one for each of the four topics covered, with an additional experience available when used in conjunction with the brochure. The four AR experiences are as follows:

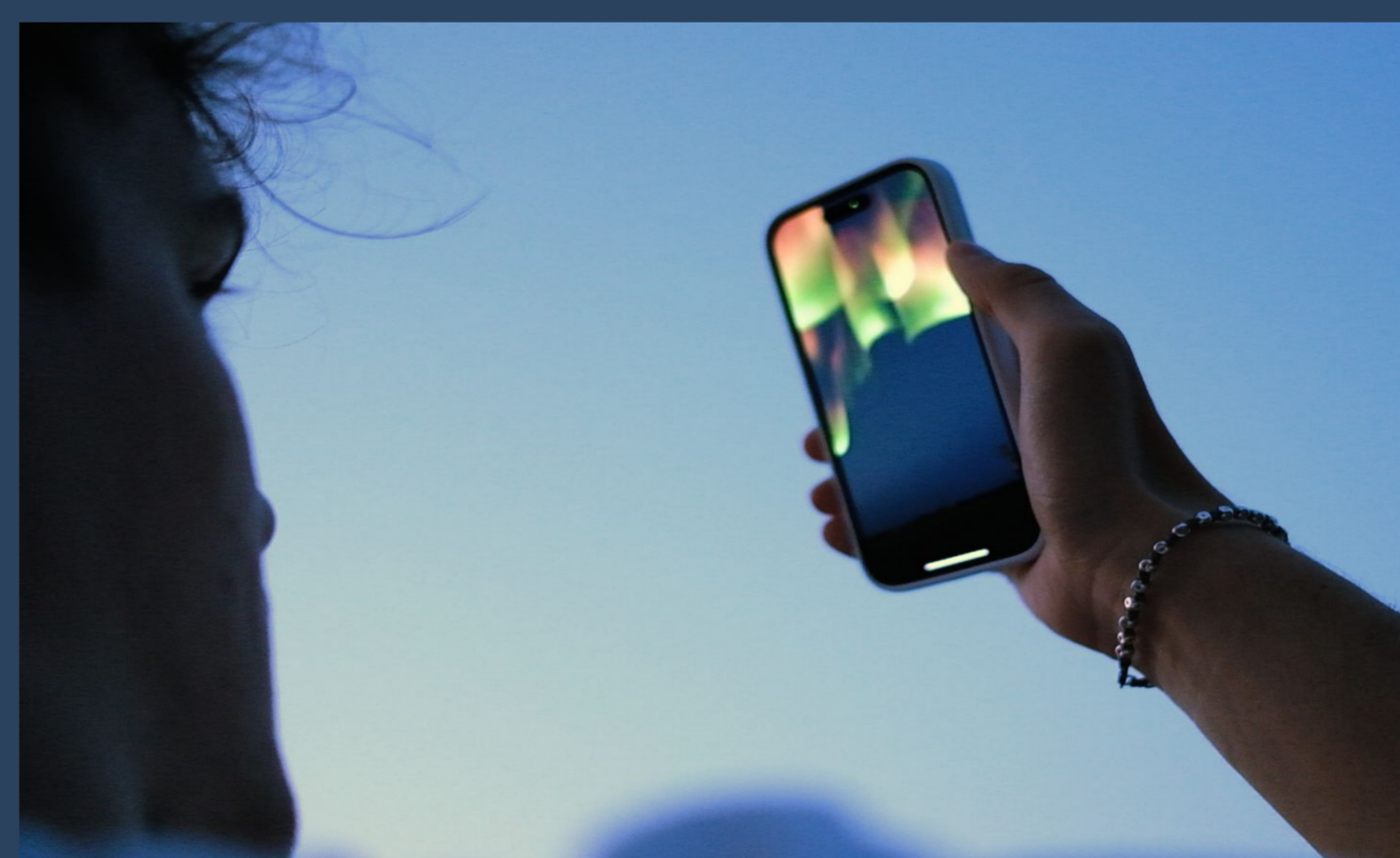
1. dynamic and colorful aurora with sounds generated from the sonification of emitted radio waves (**space weather experience**).
2. entry and explosion of an asteroid in the Earth's atmosphere, followed by the simulation of meteorite search on the ground (**asteroid experience**).
3. space traffic orbiting Earth, consisting of active satellites and space debris at various orbital altitudes (**space debris experience**).
4. meteor showers overlapping the starry sky appearing to emanate from their constellation's radiant. Colors and brightness reflect statistical observations (**meteors experience**).

Finally, with the brochure, users can activate an additional experience.

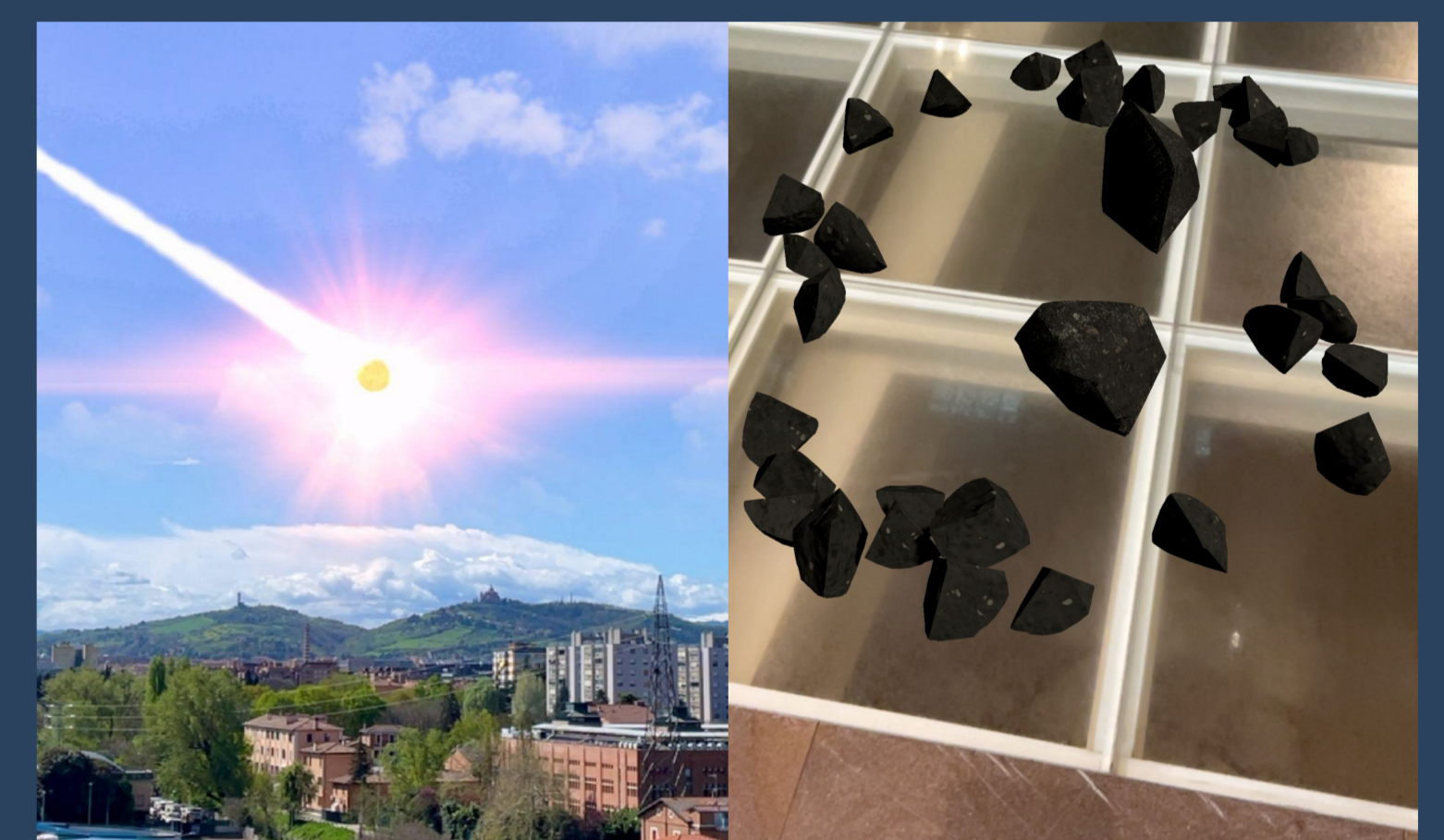
Besides offering an engaging and interactive experience, the Sorvegliati Spaziali AR app provides scientific and historical content for each feature, such as the current number of NEOs, deflection strategies, and the stories of the Tunguska and Chelyabinsk events, making it a valuable tool in educational settings.



Rendering of the top section of the Sorvegliati Spaziali website's homepage.



Using the Sorvegliati Spaziali AR app.



The AR experience of an asteroid's atmospheric entry and explosion (left), and meteorite search on the ground (right). The app also allows users to explore related scientific and historical content.

### Future perspectives

The Sorvegliati Spaziali app has been presented to the public and schools during various outreach and educational events.

The feedback has been largely positive, highlighting the intuitive interface, realistic graphics, and overall engaging experience. Some areas for improvement have also emerged, such as the app's startup speed and the absence of a close button.

We are planning updates to address these aspects and further enrich the AR experience with new interactive and online content, aiming to deliver an even smoother and more captivating user experience.

### Affiliations

<sup>(1)</sup> INAF – Istituto di Radioastronomia  
Via Piero Gobetti 101, 40129 Bologna, Italy  
[daria.guidetti@inaf.it](mailto:daria.guidetti@inaf.it)

<sup>(2)</sup> INAF – Osservatorio Astronomico di Palermo  
Piazza del Parlamento 1, 90143, Palermo, Italy  
[laura.leonardi@inaf.it](mailto:laura.leonardi@inaf.it)

<sup>(3)</sup> INAF – Osservatorio Astronomico di Padova,  
Vicolo dell'Osservatorio, 5, 35122, Padova Italy,  
[caterina.boccato@inaf.it](mailto:caterina.boccato@inaf.it)

<sup>(4)</sup> INAF – Sede Centrale  
Viale del Parco Mellini 84, 00136, Roma, Italy  
[marco.galliani@inaf.it](mailto:marco.galliani@inaf.it) and [davide.coeroborga@inaf.it](mailto:davide.coeroborga@inaf.it)

<sup>(5)</sup> INAF – Osservatorio Astronomico di Torino  
Via Osservatorio, 20, 10025, Pino Torinese Italy,  
[daniele.gardiol@inaf.it](mailto:daniele.gardiol@inaf.it)

<sup>(6)</sup> INAF – Osservatorio Astronomico di Cagliari  
Via della Scienza, 5, 09047, Selargius, Italy  
[paolo.soletta@inaf.it](mailto:paolo.soletta@inaf.it)



SCAN TO LEARN MORE



DOWNLOAD THE APP

