Satellite applications for Cultural Heritage

Feedback from the Eurisy experience

SPACE FOR CULTURAL HERITAGE

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Eurisy

eurisy
ACTING COLLECTIVELY TO BRIDGE SPACE AND SOCIETY

Eurisy is a non-profit association of space agencies funded in 1989

Communicate on operational satellite-based services

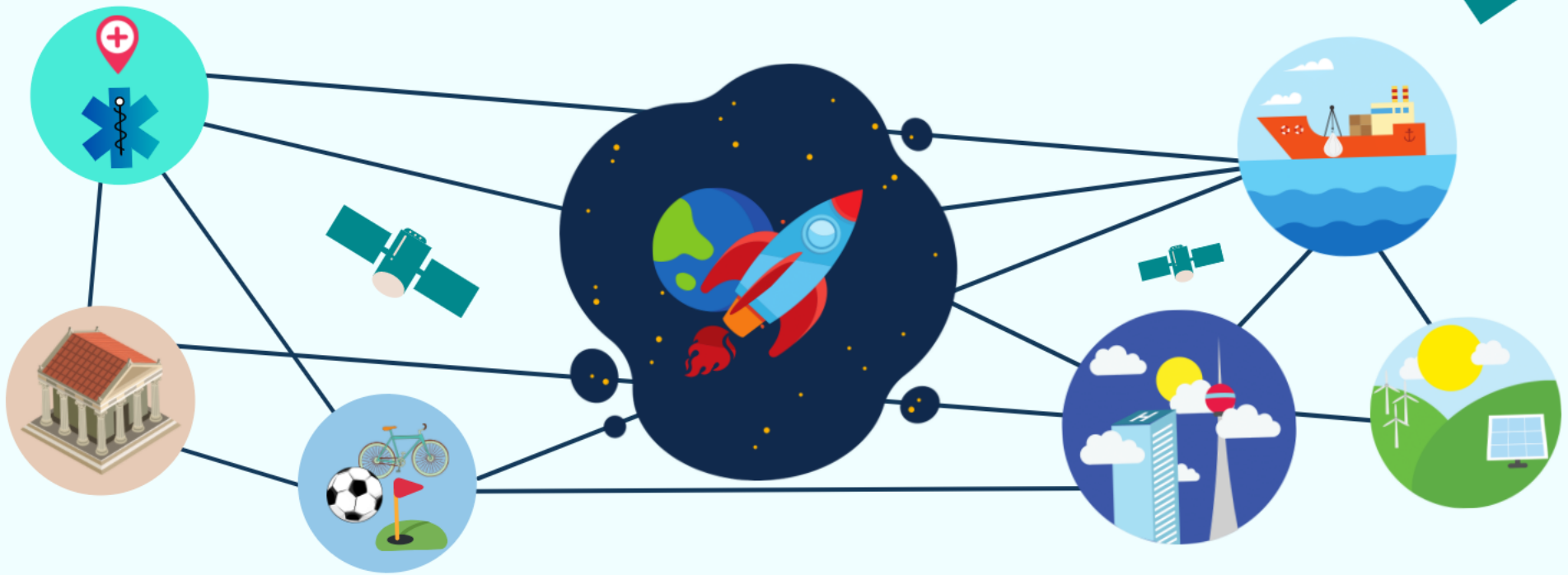
Understand needs, challenges and motivations of final users

Give feedback to decision-makers to facilitate the trasfer of the benefits of space to society

Eurisy has been mandated by its Members to create networks to bridge space and society.

Our thematic areas:

- Space4Cities
- Space4Health
- Space4Rural
- Space4Culture
- Space4Maritime
- Space4Sports



Space for Culture

SATELLITE APPLICATIONS FOR HISTORICAL CITIES, CULTURAL HERITAGE, ARTS AND CREATIVITY

REGIONE BASILICATA · TeRN · agenzia spaziale italiana · nereus · esa · e-geos · SPARKme · MATERA SPACE DAYS 2018

2018 EUROPEAN YEAR OF CULTURAL HERITAGE #EuropeForCulture

United Nations Educational, Scientific and Cultural Organization

Under the patronage of UNESCO

Under the patronage of MATERA 2019 OPEN FUTURE

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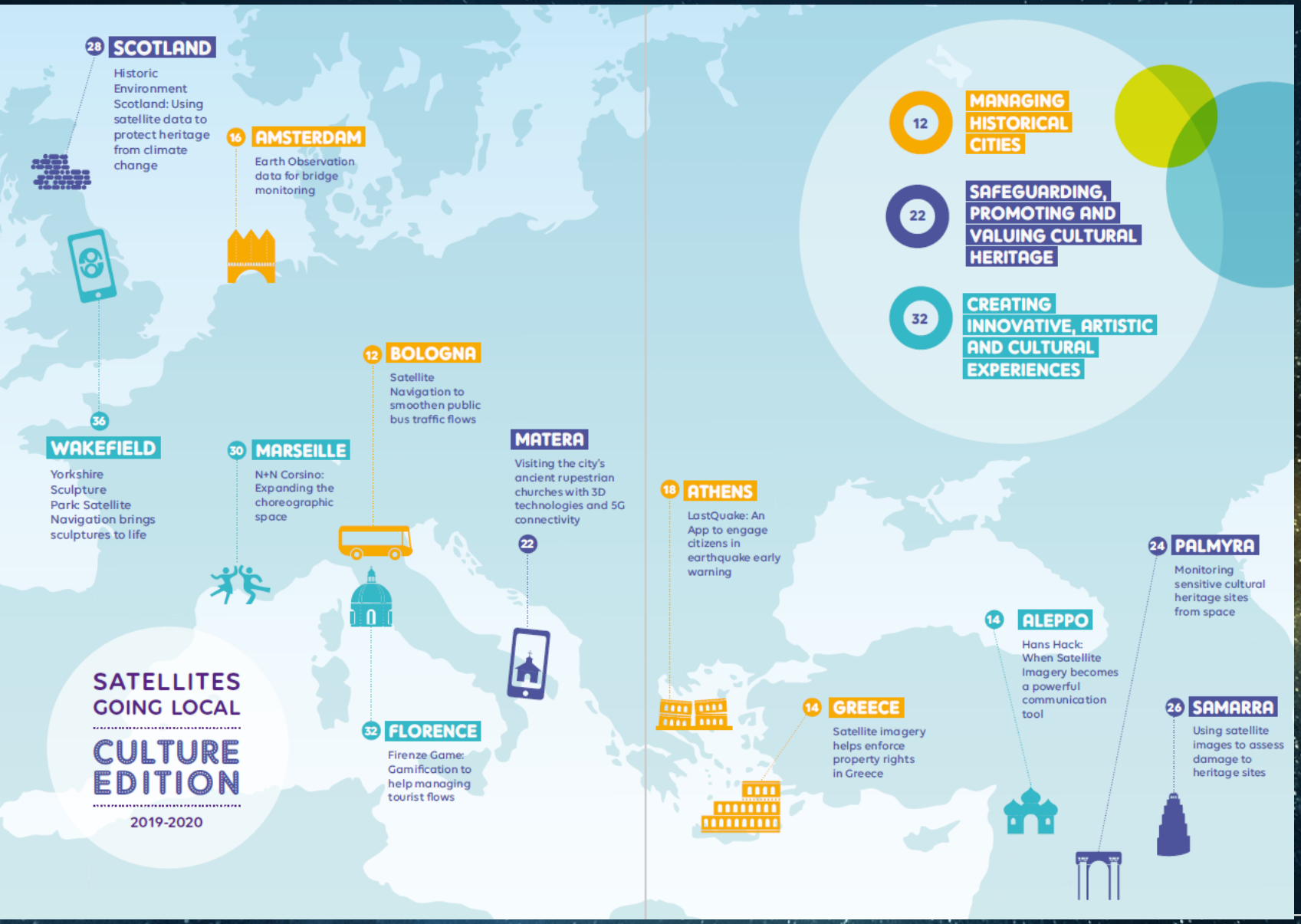

www.eurisy.eu

MANAGING HISTORICAL CITIES

EO to maintain **historical buildings and sites** (soil subsidence, pollution, erosion)

AMSTERDAM

and to better support **urban planning**.

Earth Observation data for bridge monitoring

The Municipality of Amsterdam uses InSar data to monitor historical bridges and buildings along the quays and plan maintenance works.

Heavy traffic and frequent renovation works can threaten the stability and structural integrity of bridges, quay walls, and buildings.

To assess the structural safety of bridges and the integrity of the buildings, the Department of Engineering of the City of Amsterdam decided to work with SkyGeo and use satellite-based data to measure and map deformation of the infrastructure and the buildings.

So far, InSAR data allowed the Department to assess deformations of 100 bridges and nearby buildings along the quay walls.

The City will use such information to prioritise maintenance works and prevent damages to the assets' integrity, hence possibly saving a considerable amount of time and resources on field measurements.

MANAGING HISTORICAL CITIES

BOLOGNA

Satellite Navigation to smoothen public bus traffic flows

In the city of Bologna, buses are now equipped with a Satellite Navigation system to guarantee a more efficient management of traffic flows.

Traffic congestion can affect movements around and across town, while impacting negatively on everyday ordinary activities.

In 2005, the Department of Mobility equipped city buses with a satellite-based positioning system that gives them green light priority.

Bologna's centralised traffic light system adapts to traffic flows in real time, relying on the information provided by the AVL system and by a network of sensors placed under the street pavement, which monitor the number of cars on the street.

The green bus priority system ensures the punctuality of buses' arrival times while smoothing city traffic and reducing commuters' travel time.

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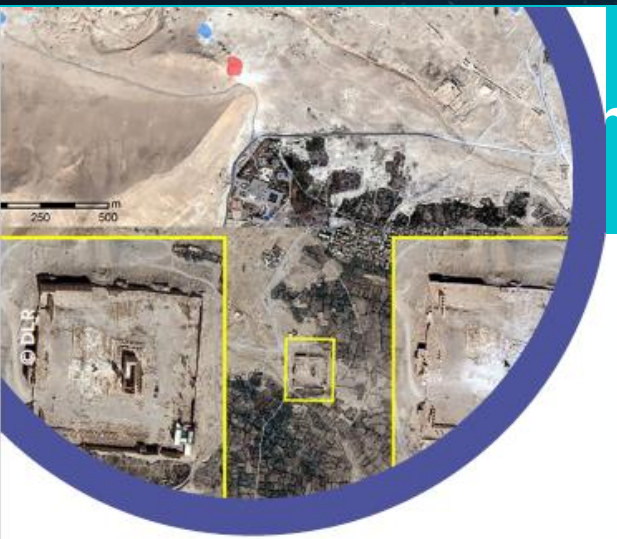

PALMYRA

Monitoring sensitive cultural heritage sites from space

Earth Observation can help assessing damages to cultural heritage sites, such as the intentional ones carried out recently by ISIL in Syria.

ng EO (gy

In periods of war, political instability, or after a natural disaster, Satellite Earth Observation Imagery can represent the only reliable, non-invasive information source to monitor cultural heritage.

Between 2015 and 2017, ISIL destroyed the biggest part of the Palmyra Old Town, including the Temple of Bel, the Temple of Baal Shamin, the Arch of Triumph, and several columns in the Valley of the Tombs.

To assess the damage suffered by the Palmyra site, the German Archaeological Institute (DAI) visited the German Aerospace Centre (DLR) to analyse a series of satellite images of the site over a one-year period.

Based on the analysis of the images, the DLR put together a chronological map of the induced damage to the site.

This facilitates a semi-automatic detection of damage, which helped the DAI to decide on and plan its support for reconstruction works once the site became accessible again.

- Monitor large areas
- Study relations
- Identify new sites
- Detect changes
- Enable land management

SAFEGUARDING, PROMOTING AND VALUING CULTURAL HERITAGE

Satellite applications for Cultural Heritage: Feedback from the Eurisy experience

One fifth of Scotland's coastline is at risk of erosion and climate change has accelerated the process. Since the 1970s, the erosion rate has doubled and the proportion of retreating coast increased by 39%, threatening a significant number of prehistoric and historic sites on the Scottish coastline.

Within SCHARP, over 1 000 volunteers were mobilised to collect information about the condition of sites on the coast. Relying on the Satellite Navigation system built into their mobile devices and a mobile app, the volunteers updated existing data on 35% of Scotland's coastline.

SCOTLAND

Historic Environment Scotland: Using satellite data to protect heritage from climate change

Satellite Navigation, Imagery and analysis provide HES with the data needed to monitor and maintain cultural heritage on the coastline.

In 2015, HES and SCAPE joined Dynamic Coast, a pan-government initiative funded by the Scottish Government and supported by Scottish National Heritage, aimed at building an evidence base of coastal change across all of Scotland's erodible shores.

The project team is analysing the Sentinel-2 satellite's full catalogue of optical data. This is then compared with historical maps, modern and legacy aerial imagery and surveys of the vegetation edge to map, measure and model coastal changes.

The web-maps, summaries and reports are available on the web portal of the project and are used by HES to monitor the heritage sites and buildings under their care and to plan and prioritise interventions.

SAFEGUARDING, PROMOTING AND VALUING CULTURAL HERITAGE

Satellite applications for Cultural Heritage: Feedback from the Eurisy experience

MATERA

Visiting the city's ancient rupestrian churches with 3D technologies and 5G connectivity

Thanks to 5G connectivity, the virtual reconstruction of Matera's rupestrian churches can be accessed by anyone remotely.

One of the oldest inhabited cities in the world, Matera is known for the historical "Sassi", ancient cave houses dating to the Palaeolithic period. The Sassi, together with the Park of Rupestrian Churches, were included in the UNESCO World Heritage list. In 2019, Matera is one of the European Capitals of Culture.

The ongoing roll-out of 5G connectivity across the globe will depend on satellite telecommunication networks. In 2018, TIM, Fastweb and Huawei won a tender from the Italian Ministry of Economic Development to test and showcase potential applications of 5G connectivity.

Thanks to 5G supported connectivity, Matera's rupestrian churches can be visited remotely through Multiplayer Virtual Tours.

The virtual reality experience allows people to visit places which are difficult to access or remote. In the future, this experience could be made available in museums, schools and even on moving trains everywhere.

CREATING INNOVATIVE, ARTISTIC AND CULTURAL EXPERIENCES

ALEPPO

Hans Hack: When Satellite Imagery becomes a powerful communication tool

Satellite Imagery can serve as a basis for data visualisation, challenge our perspectives and stimulate reflection on our world.

With a background in Heritage Conservation, Hans Hack works with JavaScript, open data sources and whatever might come handy to tell stories.
Based in Berlin, he works for museums, foundations, newspapers, NGOs, graphic design studios, and artists.

Maps are quite a powerful tool to communicate on research findings to the general public.

Hans Hack uses aerial or satellite images as a first layer for many of his artistic or graphic projects.

"Reprojected Destruction" is a data visualisation project relying on Satellite Imagery to sensitise the public to the damage suffered by the city of Aleppo.

For this project, the artist found inspiration in a satellite-based map published by the United Nations Operational Satellite Applications Programme (UNOSAT) of the United Nations Institute for Training and Research (UNITAR).

In Hans' London map, the Tower of London, the City Hall, the Palace of Westminster, Buckingham Palace, the Olympic Stadium, King's Cross station, and Tate Modern were razed, while Camden, Islington, Dalston and Hampstead were decimated.

"What is important to me is to use technology to sensitise people on issues that I believe are relevant to understand today's world", Hans says.

CREATING INNOVATIVE, ARTISTIC AND CULTURAL EXPERIENCES

Satellite applications for Cultural Heritage: Feedback from the Eurisy experience

Culture and creativity carry a great socio-economic value. To safeguard and capitalise on culture and creativity, regions and cities need data, skills and integrated policies.

SAFEGUARDING CULTURAL HERITAGE

Satellite imagery has been a source of data for archaeologists since many years and has confirmed its usefulness to spot, monitor, safeguard, study and better manage cultural heritage.

Opportunities

LOCAL MANAGERS AND SATELLITE REMOTE SENSING

Researchers, universities and space agencies often play a role in the use of EO data to safeguard cultural heritage within and around cities.

Opportunities

ENTERING THE BIG GEOSPATIAL DATA ERA

The **Copernicus and Galileo programmes**
Opportunities for public and private entities operating in the cultural and creative sectors

5G will also boost the potential of SatCom to create jobs and new ways to experience culture

Local Managers & Satellite Remote Sensing

CHALLENGES TO INTEGRATE SATELLITE DATA ON HERITAGE INTO OPERATIONS :

- Need for **processing tools to automatically integrate the data** into existing databases

DATA HARMONISATION - THEMATIC PORTALS

- Many data portals and GIS developed by research centres are not used as tools by public administrations, who must support their decisions with more obsolete GIS
  > dispersion of knowledge and resources

AWARENESS RAISING - TRAINING

Arts and Creative industries

MAKING THE DATA AVILABLE TO THE CULTURAL AND CREATIVE INDUSTRIES

Those in charge of leading the European and national space policies need to consider more the **needs of professionals who are not trained in remote sensing** techniques and GIS, working in sectors such as culture, arts, entertainment, social media, urban planning, tourism and education, among others.

FOSTERING MULTIDSCIPLINARITY AND COOPERATION


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BRIDGE SPACE AND SOCIETY
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