The Heidelberg Whitepaper

for policy makers, decision-makers and vocational training providers to strengthen the protection of cultural heritage through the use of satellite data

Recommendations for action

This "Heidelberg Whitepaper" summarises the results of the workshop **"Cultural Heritage Protection From Space: Potentials of Using Satellite Data"** in Heidelberg / Germany on 23 September 2025. It was initiated, planned and implemented by the European project **SATCULT** in cooperation with the **State Palaces and Gardens Baden-Württemberg** and the **UNESCO Chair for Earth Observation and Geocommunication of World Heritage Sites and Biosphere Reserves at the Heidelberg University of Education.** The Whitepaper is aimed at policy makers (e.g. politicians, members of public bodies dealing with the protection of cultural heritage and neighbouring areas of work), decision-makers from the protection of cultural heritage and geoinformation, as well as training providers from both areas.

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Content

Seven demands on representatives

from politics and vocational training for cultural heritage protection and geoinformation:

Strengthening the protection of cultural heritage through the use of satellite data

The protection of cultural heritage is facing growing challenges in the face of **climate change, increasing urbanisation** and **geopolitical crises.** Satellite data offers enormous potential to protect cultural heritage assets. In order to exploit this potential, targeted policy measures are needed:

1. Strengthening and encouraging cultural heritage institutions

- Provision of targeted **support programmes for continuing education and training,** pilot projects and follow-up interdisciplinary cooperation.
- Support for the **integration of digital technologies,** in particular in the fields of Earth observation, remote sensing and geoinformation.

2. Strengthening and encouraging the geoinformation sector

- Raising awareness in the geoinformation sector of the **economic potential of the cultural heritage sector as an attractive field of application.**
- Encouraging start-ups and support incumbent companies in **developing data-based products and services** that are ready for use and tailored to the specific needs of the cultural heritage sector and can be adapted locally.

3. Networking of the cultural heritage sector and the geoinformatics sector

- Initiation and promotion of **interdisciplinary exchange formats,** workshops and communication platforms to raise awareness of needs, data access and application possibilities.
- Use of existing event formats such as fairs, conventions and workshops to **disseminate good practices.**

4. Promotion of application projects

- Funding and monitoring of projects that **translate scientific findings from geoinformation into concrete protection measures** for cultural heritage.
- Establishment of model regions and real-world laboratories for **testing innovative geoinformation technologies** in the protection of cultural heritage.

5. Target group-oriented information

- The **cultural heritage sector needs "translations"** (by specialists and tools) to understand the terminology, possibilities and mindset of data specialists. **Geoinformation experts need translation** to understand the requirements of cultural heritage protection and the mindset of cultural heritage managers.
- Provision of **practical information materials** and guidelines on the use of satellite data in the protection of cultural heritage, in a language adapted to the needs and technical vocabulary of cultural heritage experts.

6. Promotion of knowledge transfer

- Development of skills and tools to facilitate the **transfer of knowledge** between geoinformation and cultural heritage disciplines.
- Establishment of **interdisciplinary training opportunities** for both sectors in order to promote common understanding and cooperation in projects.

7. Coordination on a European level

- Establishment of a **European coordination centre** for the use of satellite data in the protection of cultural heritage.
- Development and financing of a **European strategy** for the promotion of digital technologies using Earth observation and satellite data in the cultural heritage sector, taking into account national structures and experiences in the European Union member states.

Why do we need satellite data for the protection of cultural heritage in Europe?

The protection of our cultural heritage is a social task. Especially now, in times of climate change with increasingly frequent extreme weather events, coupled with the explosive geopolitical situation with armed conflicts, the European Union needs a well-founded emergency preparedness and disaster risk reduction. Satellite and Earth observation data play an increasingly important role here, as we are seeing in Ukraine.

Europe is not well prepared

In the cultural heritage sector, the use of Earth observation and satellite data - except in archaeology - is still at the very beginning. In contrast to some European countries such as Italy, Cyprus and Ukraine, in which there are already valid experiences from research and application, many other European member states are lagging behind in development. There is a lack of basic awareness of the benefits of satellite data use, of research and application projects, of economic exploitation, and of corresponding qualifications in the fields of cultural heritage and geoinformation.

Earth observation and satellite data can be of crucial help

- to assess and avoid the dangers of climate disasters,
- to protect cultural heritage sites and cultural landscapes,
- to counteract looting and illegal trafficking of cultural heritage artifacts,
- to assess (war) damage and to develop prevention and conservation concepts.

Background

On 23.9.2025, the European ERASMUS+ project **SATCULT,** in cooperation with the **State Palaces and Gardens of Baden-Württemberg and the UNESCO Chair of Earth Observation and Geocommunication,** invited leading representatives from the German cultural heritage sector and the geoinformation sector to an interdisciplinary exchange at Heidelberg Castle. The aim was to record the concrete needs on how satellite data can be better used for cultural heritage protection.

The **advantages of using this data are obvious**: Earth observation and satellite data, for example, can

- enable a **comprehensive understanding of the location development** by data fusion from multispectral satellite images, historical maps and other geoinformation (topographic maps, etc.). This improves historical reconstructions and conservation strategies;
- support **informed decisions** at local level on cultural heritage protection measures;
- contribute to **long-term protection measures** by means of risk maps, e.g. in the event of climate change;
- promote a **better use of existing resources,** both in terms of research results and economic activity;
- **support cost savings** from early detection and prevention of damage and risks.

Challenges

- The different administrative **structures in EU countries make it more difficult for engagement to spread across countries,** pooling resources and providing access to knowledge and experiences. There is a danger of the formation of unnecessarily parallel structures if states opt for isolated actions.

- There is **too little transfer from European geoinformation research into cultural heritage protection practice.**

- There is a **considerable gap in qualification,** because neither the university training, nor the specialised training, nor the vocational training offer so far interdisciplinary, practice-oriented qualification geared to the protection of cultural heritage.

In particular, Europe lacks:

- **a political and professional awareness** of the possibilities of using Earth observation and satellite data in the protection of cultural heritage,

- **a clear elaboration of user-side benefits,** e.g. cost-benefit accounts from implemented projects,

- policy frameworks embedding **protective measures in a strategy**,

- **interdisciplinary, certified qualification offers**,

- **pioneers and flagship projects** that demonstrate the possibilities in a practical and experiential way,

- **resources in the administration** to which the topic can be assigned (positions, offices, as well as task descriptions),

- **financial resources** to embed this issue in organisations and to build infrastructure, e.g. a modern digital environment;

- **networks or instruments** such as, for example, a coordinated forum, where a continuous, fact-based exchange between the sectors cultural heritage protection and geoinformation can be established,

- **understanding that our cultural heritage belongs to the "critical infrastructure"** as in some European countries (e.g. Greece and Italy). Without cultural heritage there would be a loss of income and employment, e.g. from tourism, gastronomy and mobility.

Identifying and closing qualification gaps is a priority task!

Qualification plays the key role with the following requirements:

Capture needs

In order to avoid qualification gaps,

- a precise recording and analysis of qualification needs is necessary,
- the development of vocational training programmes and university curricula is a core issue,
- opportunities for interdisciplinary exchange between cultural heritage experts and specialists of the geoinformation sector are crucial.

Initiate vocational training

- Vocational training can respond quickly and efficiently to the needs of the cultural heritage sector.
- From digital skills and analysis to the teaching of social skills such as communication and problem-solving techniques - where needs are obvious, training providers will react and develop offers for further training.
- Employers can support such training through training budgets, cost assumptions, work exemptions, mentoring programmes and job shadowing.

Network actors

Cultural heritage experts and geoinformation specialists work in diverse professional environments that hardly overlap. It is therefore necessary to bring together the two groups in order to learn and prosper from each other.

Develop interdisciplinary cooperation

Interdisciplinary cooperation

- needs a common understanding of the challenges,
- needs time in the development and in the sustainable continuation,
- is based on a value-added communication at eye-level.

Communicate benefits

- New qualifications expand and increase the professional opportunities and knowledge in cultural heritage institutions.
- Cost-benefit calculations can underpin advantages and can be used for political, economic and professional decision-making.

Conclusions

Based on the above-mentioned challenges and qualification requirements, the participants of a workshop on 23 September 2025 at Heidelberg Castle agreed on

Seven demands on representatives

from politics and vocational training for cultural heritage protection and geoinformation:

Strengthening the protection of cultural heritage through the use of satellite data

which are reproduced on page 4 of this 'Heidelberg Whitepaper'.

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- Dr. Mechthild Rössler, director emeritus of the UNESCO World Heritage Center (2015-2021)

Recommendations for literature

A literature collection can be found on the SATCULT homepage: https://satcult.eu/about/information-material/ . The following publications are particularly noteworthy:

SATCULT. 2025. Cultural Heritage Protection from Space. The Potential of Using Earth Observation and Satellite Data. Good Practices.

European Commission.2020. Report on the user requirements in the Copernicus domain to support Cultural Heritage management, conservation and protection.

European Commission. Directorate-General for Research and Innovation. **Innovations for combatting trafficking in cultural goods**. Publications Office of the European Union. 2024. https://data.europa.eu/doi/10.2777/9356439

UNESCO. 2022. **Monitoring world heritage from space.** World heritage review, No. 98.

Please also check this LinkedIn group which provides a forum for the heritage sector and the geoinformation sector: https://www.linkedin.com/groups/13118904/

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P. 1, 3, 6, 7: Pixabay CC
P. 5: Chemnitz, European Capital of Culture 2025, is featured in this Copernicus Sentinel-2 image taken on 4 April 2024. **Picture credit: European Union, Copernicus Sentinel-2 imagery.** More: https://www.copernicus.eu/en/media/image-day-gallery/chemnitz-germany-2025-european-capital-culture
P. 12: Climate change poses a threat to the world heritage sites and threatens their integrity and unique beauty. This image, taken on 15 September 2023 by one of the Copernicus Sentinel-2 satellites, shows Sanssouci Castle and the Gardens in Potsdam. **Picture credits: European Union, Copernicus Sentinel-2 imagery**. More: https://www.copernicus.eu/en/media/image-day-gallery/climate-change-puts-world-heritage-sites-risk

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