SATCULT: Concretisation of Training Needs of the Cultural Heritage Community and the Geoinformation Community for Using Earth Observation and Satellite Data for the Protection of Cultural Heritage

Outcomes of the SATCULT surveys

SUMMARY

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[1]CNR – Institute of Heritage Science (ISPC), Italy, [2]media k GmbH, Germany; [3]Eratosthenes Centre of Excellence, Cyprus;

*nicodemo.abate@cnr.it

Preliminary remarks

As part of the SATCULT project's needs assessment activities for the preparation of an interdisciplinary training of cultural heritage professionals and geoinformation experts in the use of satellite data for heritage protection, two complementary sets of data were collected through questionnaires. They aimed to identify the needs of **cultural heritage practitioners** in the use of Earth observation and satellite data, including the access, the analysis and the implementation of measures. It also aimed at **geoinformation experts** to find out under what conditions and circumstances they would be willing to support cultural heritage practitioners in the use (access, analysis, implementation) of Earth observation and satellite data.

Survey 1, aimed at representatives of cultural heritage institutions (CH), and Survey 2, aimed at experts in geoinformation/Earth observation (GI/EO). A total of 65 respondents participated in Survey 1 and 19 in Survey 2, adding up to 84 respondents.

In Survey 1, the respondents included 13 countries, comprising 11 EU member states (Italy, Germany, Cyprus, Greece, Spain, Slovenia, Austria, France, Malta, Belgium, Romania) as well as respondents from 2 other countries (Albania, China).

In Survey 2, the sample is mainly concentrated in Europe, with a prevalence of three EU Member States (Italy, Germany, Cyprus), plus Poland and Greece, as well as an international tail (Ghana, Turkey).

The results thus constitute a solid data basis.

The two surveys were analysed both separately and in combination, with the aim of coherently reconstructing the relationship between demand (needs, operational constraints, expectations of CH institutions) and supply (skills, services and support/training methods offered by the GI/EO community).

The two surveys were like two sides of the same 'adoption system': demand and operational constraints of CH institutions (Survey 1) and supply capacity and delivery constraints of GI/EO experts (Survey 2). The purpose of cross-reading was not to 'mediate' the responses, but to identify interface conditions that enable uptake: where expectations are aligned, where they diverge, and what project mechanisms (training architecture, pilot onboarding, governance, service packaging) are needed to transform availability into stable implementation.

Summary of the surveys' results

The surveys clearly identified

- Cross-sectoral commonalities, expectations and bridge-building opportunities as well as
- Structural criticalities like costs, needed skills, and integration into processes.

A key methodological implication is that remote sensing/Earth observation (RS/EO) adoption cannot be reduced to a technical problem: **technical capacity on the EO side and interest on the CH side are already high; the limiting factors are mainly organisational, semantic and economic, i.e. the ability to integrate EO output into CH workflows and decision-making processes**.

CH declared a very high interest in participating in training (Survey 1: 95.4%), while GI/EO showed a high willingness to provide training (Survey 2: 78.9%) and, more generally, already established readiness and experience in CH.

However, the cross-survey clarifies a crucial point: willingness is not enough. The CH does not only ask for 'knowledge', but also for a path to operationalisation (repeatable workflows, integration, governance, budgeting and procurement logic). From this perspective, **training should be designed as a tool for adoption** and not as an isolated educational event.

The most informative diagnosis of the cross-file is the asymmetry of perceived barriers, which pinpoints the bottleneck: According to CH side, adoption is mainly hampered by the costs of external technologies/skills (73.8%), integration with existing systems (52.3%) and limited internal expertise (49.2%), with institutional support also playing a role. For GI/EO side the main difficulties are the need for staff with CH skills (73.7%), difficulty in engaging CH partners/customers (57.9%) and interdisciplinary exchange/shared terminology (42.1%).

These perspectives are not in conflict: they describe the same problem 'from opposite sides'. CH struggles to absorb EO without internal capacity and integration mechanisms; GI/EO struggles to deliver truly useful services without access to CH domain, stable partners and a shared interpretative lexicon. The cross-survey therefore concludes that **the solution is not 'more technology', but an interface mechanism: matchmaking, role definition, translation of deliverables from technical output to management decision.**

Therefore, cooperation must produce 'integration assets', including: semantic interoperability tools (e.g. EO↔CH glossary and interpretative guidelines), standardised CH-readable deliverables (reports, dashboards, triggers), requirements/onboarding templates and governance/responsibility models.

The willingness to host pilot projects (CH) and willingness to operate as an expert partner (GI/EO) shows a stable pattern: CH most often responds "it depends/more info needed", while GI/EO is more frequently "ready". This is rational: CH bears operational/administrative risk (reputation, responsibility, procurement), so it requires clarity on requirements, governance and benefits; GI/EO can commit skills more quickly when faced with a defined scope.

This leads to a direct recommendation: **to boost active engagement, an “Onboarding Kit” is needed, which functions as a 'light technical protocol' including: minimum requirements (data/access/contacts), deliverables and timelines, decision-making chain (who receives-validates-acts), effort/cost estimate and expected benefits.**

There is no significant mismatch on 'how' to deliver training:

- CH tends to prefer blended learning, webinars with materials, and a significant amount of in-person training (including at EO centres).
- The GI/EO is able to offer good live online and in-person training, and also covers blended learning.

The real risk lies in the 'what' and the 'level': the CH requests both an introduction and advanced analysis (heterogeneous audience), while the GI/EO emphasises monitoring/prevention practices, technical fundamentals and, above all, GIS/database integration.

The cross-references therefore propose training in modules/tracks:

- **Core module: common language, cases, interpretation and limits/uncertainty;**
- **Operational module: workflow, reports, thresholds and triggers;**
- **Advanced module: specialised techniques (e.g. SAR deformation, analytics);**
- **Integration module: GIS/asset management and CH database.**

This highlights significant convergence on two pillars of sustainability:

(a) Open-source/mix as an enabling choice. Both sides show a high propensity towards open or mixed approaches; this legitimises an open 'reference implementation' (lock-in reduction) and interoperable output standards (e.g. Cloud Optimized GeoTiff / GeoPackage), which are particularly relevant for a CH with limited budgets.

(b) Post-training support as a flexible service. CH often states that it would pay for follow-up 'depending on circumstances' and, when choosing, prefers pay-as-you-go; GI/EO shows similar willingness with compatible preferences.

This results in a recommended model: 'on-call' support + small periodic packages with measurable deliverables (monthly report, threshold updates, pipeline review), avoiding rigid multi-year contracts that encounter procurement barriers in CH. This is in line with an asymmetry between need and economic availability: very high perceived need, but low discretionary spending capacity. **Therefore, this requires financing models at CH organisations for their training needs (sponsorship, co-funding, packages, cascade training) and the training strategy must include mechanisms for scalability and marginal cost reduction (reusable materials, blended learning, train-the-trainers, funded/project-based basic modules).**

The cross-references highlight another predictable but strategically useful difference in interdisciplinary communication:

- CH prefers CH channels like in-person conferences + webinars + continuous training and values exemplary applications;
- GI/EO pushes more towards social media and trade fairs.

The implication is a 'two-lane' dissemination, with a particularly effective common point: pilot cases and good practices as a bridge (narrative understandable to decision-makers + replicable technical evidence).

Glossary of terms used in this summary

Both the cultural heritage sector and the geoinformation sector use a wide range of technical and humanities-related terminology that is not necessarily common knowledge. The abbreviations and acronyms used are explained below. Further explanations can be found in a glossary in the brochure “SATCULT – Protecting Cultural Heritage Assets From Space – The Potential of Utilising Geoinformation and Satellite Data - Good Practices”, please see https://satcult.eu/about/information-material/ .

CH	cultural heritage
CH/NH	cultural heritage / natural heritage
DE	Deutsch (German)

EN	English
GI/EO	geoinformation / Earth observation
GIS	Geographic Information System (GIS) is a computer-based framework for capturing, managing, analyzing, and displaying different forms of geographically referenced information. By layering data like maps, satellite imagery, and 3D models, it allows to understand spatial patterns, relationships, and context to make informed decisions.
GR	Greek
HW/SW	hardware / software
IT	Italian
KPI	key performance indicators
Q1 – QXY	"Q" refers to the questions in the surveys, separated to those for the CH and the GI communities
RS/EO	remote sensing/Earth observation
SAR	Synthetic-aperture radar (SAR) is a form of radar that is used to create two-dimensional images or three-dimensional reconstructions of, e.g. landscapes or objects.
STAC	The SpatioTemporal Asset Catalog (STAC) is an open specification that standardises how geospatial metadata is structured, indexed, and searched.

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SATCULT - Vocational Training Closing the Knowledge Gap on Satellite-based Services for Cultural Heritage Preservation

Contact: Dr. Karin Drda-Kühn – SATCULT coordinator
media k GmbH - Goethestr. 10, D-97980 Bad Mergentheim / Germany
Tel. +49-7931-99 27 30, Fax +49-7931-99 27 31,
satcult@media-k.eu, https://.eu/

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