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

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Content

1.0 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: 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.

2.0 Training needs: 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).

3.0 The surveys' outcomes in detail

The following sections present an in-depth description of the results, highlighting the main patterns, structural criticalities (costs, skills, integration into processes) and operational implications for the design of training, pilot sites and sustainable cooperation models in the continuation of the project. The interpretation of the responses is directly referenced to the survey questions (Question/Q1 – Q27) in Appendix 1.

3.1 Survey 1 for cultural heritage experts

The results of Survey 1 show a very clear signal: **training on RS/EO applied to CH is perceived as a priority and desired, but is not yet supported by adequate structural investment capacity.**

On the one hand, interest in participating in training courses is almost universal (Q15: 95.4% 'Yes', 62/65). On the other hand, most CH organisations say they do not have a budget dedicated to training on new technologies (Q20: 83.1% 'No', 54/65).

This asymmetry between need and economic availability is further confirmed by strong price sensitivity. When asked how much they would be willing to pay per person (Q21), one-third are unwilling to pay (33.8%), and the majority of respondents who accept a cost are below or around €1,000 (26.2% <€500; 32.3% between €500–€1,000), with a minority above this threshold (7.7% between €1,001–€2,500).

This picture should not be interpreted as a 'lack of interest', but rather as a lack of organisational and financial scope to transform a need into an ongoing programme. In other words, demand exists and is widespread, but the risk is that it will remain episodic (one-off, opportunistic training) if it is not supported by a delivery model compatible with real staffing and procurement constraints. The budget data (83.1% absent) suggests that **many CH institutions cannot easily 'shift' internal resources towards training, even when they recognise the need**.

For this report, this point translates into a clear operational recommendation: **capacity building must be designed as an adoption enabler, not simply as a delivery of content.** In practice, the results indicate the opportunity to:

1. **Structure a modular, 'tiered' offering, with a common core (baseline) at very low marginal cost and optional advanced (specialist) modules for those who have resources or can co-finance**. The survey shows a simultaneous demand for *general introduction* and *advanced analysis* (Q17: 66.2% and 67.7%), consistent with a heterogeneous audience.
2. **Reduce the economic barrier with co-funding and reuse models**: replicable materials, exercise repositories, reusable case studies and standard toolkits (templates, checklists, workflows) that allow training to be scaled without multiplying the costs per edition. This strategy is directly justified by the combination of 'very high demand' + 'rare dedicated budget'.
3. **Optimise duration and format according to operational compatibility**: the survey indicates that the realistic time frame is short/medium-short and that participating groups will often be small (2-5 people). In this scenario, short, repeatable and blended modules are more adoptable than long, linear programmes.
4. **Align training with 'immediately usable' deliverables** (tools and routines, not just concepts): if the CH perceives costs and integration difficulties, training must also include 'how to put it into practice' (e.g. data management, interoperability, integration with existing systems, definition of roles and responsibilities). This is consistent with the main barriers that have emerged (costs of external technologies/skills; integration; internal skills).

3.1.1 Main risk and mitigation

The risk, if a sustainable model is not adopted, is a 'peak and crash' effect: high participation when access is funded e.g. by a project, but low post-project continuity due to lack of internal budget. The mitigation most consistent with the data is a system that combines: **(i) accessible baseline; (ii) advanced modules at recoverable cost; (iii) internal multiplication mechanisms (e.g. train-the-trainers and communities of practice) to reduce dependence on external expertise**.

Survey 1 shows that, in the CH sample, the adoption of RS/EO technologies is not a future prospect or an exclusively experimental issue: the majority of respondents already report concrete experience and use in real contexts. In particular, about 83% of the sample has at least 'moderate' experience (42.2% very experienced; 40.6% moderately experienced), 67.7% has been involved in RS/EO projects applied to CH, and 72.3% has already used RS for protection/monitoring purposes.

This basic maturity influences the strategic interpretation: **The value of a training initiative is not so much to 'convince' CH institutions of the usefulness of remote sensing, but rather to transform episodic use into structural adoption, i.e. into a set of repeatable and sustainable routines (processes, responsibilities, tools, metrics) that make RS/EO an integral part of ordinary heritage management.**

When explicitly asked what challenges prevent adoption as standard practice (Q14, multi-select), three very consistent sets of obstacles emerge:

1. **Cost of external technologies and skills as the main barrier**: 73.8%.
2. **Integration into existing systems (workflow and operational infrastructure)**: 52.3%.
3. **Limited internal expertise:** 49.2%, **accompanied by insufficient institutional support** (41.5%).

The cost is not only the 'cost of data', but above all the cost of external expertise; and the second set of obstacles (integration + internal expertise) is an 'organisational-technical' constraint that prevents EO products from becoming a permanent part of decision-making and management processes (asset management, maintenance, reporting, procurement).

In operational terms, the survey describes a classic institutionalisation gap: EO information may be available and even already tested, but it remains 'external' to the mechanisms governing asset management. **Integration is not a technical detail: it implies data interoperability, clear responsibilities, validation procedures, definition of thresholds/triggers, and above all a budgeting and procurement logic compatible with the ordinary functioning of institutions**.

This interpretation explains why, despite the high level of experience reported, **the perceived 'hard' barriers are not so much algorithms or sensors as elements of organisational capacity: without minimum internal skills and without an integration plan, adoption remains tied to individual projects, individual teams, or individual suppliers—and therefore does not scale.**

To convert existing use (72.3%) into systematic adoption, technical content must complement operational assets that make RS/EO insertable into CH processes, for example:

- standard workflows (repeatable pipelines) with explicit roles and responsibilities;
- specifications for integration with GIS systems, inventory databases, and reporting tools;
- CH-readable deliverable templates (indicators, reports, thresholds and priority criteria);
- procurement and sustainability guidelines (what is 'minimum' required, what is optional, what recurring costs to expect).

This approach is directly consistent with the structure of the barriers that have emerged (costs, integration, skills): **a possible adoption is within reach for many, but the required leap is to standardise and make it operational.**

3.1.2 Priorities are risk–prevention–protection

Survey 1 shows a very clear application orientation: for the institutions involved, remote sensing (RS/EO) is perceived primarily as an operational risk management tool, rather than as a technology 'supporting research alone'. The main applications reported (Q11, multi-select) are in fact concentrated on: conservation/protection strategies (76.9%), monitoring of risk phenomena (75.4%), early detection/protection (75.4%), monitoring against looting/vandalism (72.3%), and environmental analysis/impacts of climate change (69.2%). In comparison, more 'traditional' items such as *scientific research* (44.6%) and management planning (40.0%) are important but clearly secondary in the perceived hierarchy.

This hierarchy is further clarified when the questionnaire moves on to specific use cases (Q13, multi-select): the first group of priorities concerns the structural **monitoring of historical sites and artefacts (73.8%), followed by prevention and protection against climate change (72.3%) and hazard-related landscape analysis (69.2%)**. At the same time, extreme events with a direct impact on conservation and safety (all at 69.2%) emerge strongly: fires, hailstorms and storms. Other issues remain relevant but with less intensity, such as preventive archaeology for public works (47.7%) and monitoring of illegal/conflictual activities (33.8%).

The combination of Q11+Q13 outlines a specific design need: it is not enough to produce maps or EO indicators 'in a technical sense', because what CH institutions say they want to achieve is the ability to anticipate, prioritise and activate actions (prevention, inspection, protection, mitigation). In other words, **RS/EO is required as a component of an early warning/decision support system, where observational information (satellite, UAV, weather and climate data, etc.) must be translated into operational decisions: when to intervene, where to concentrate resources, what level of urgency to assign, which areas/sites to place under more frequent observation.**

3.1.3 CH-readable outputs integrated into risk management processes

If the demand is mainly risk-oriented, the design of the outputs should favour deliverables that are immediately readable and usable by those who manage the assets (not only by EO specialists). This implies orienting products and services towards:

1. Indicators and thresholds (triggers) linked to specific hazards (e.g. instability/subsidence, thermal/water stress, rapid post-event changes, early signs of degradation or alterations), with prioritisation logic and not just 'detection'.
2. Explicit decision-making chains (who receives the alert, how often, with what levels of confidence, and what actions are recommended), consistent with the emphasis on early detection/protection and risk monitoring.

3. Operational reporting and management-oriented dashboards (e.g. risk traffic lights, lists of priority sites, maps with urgency levels), with traceability of extreme events (storms, hail, fires) and their potential impacts.

A prevention and early warning-oriented system is only useful if it explicitly addresses the issue of information quality/reliability (false positives, false negatives, alert confidence), because the output is intended to guide actions in the field and resource allocation. The data on 'risk phenomena/early detection' as a priority (75.4% each) therefore suggests that the methodological part should not be limited to the production of maps, but should also include: validation criteria, confidence levels, and rapid verification protocols (including sampling) after extreme events.

3.1.4 Profile of institutions and organisational capacity

The sample is heavily European and concentrated in Italy (41.5%) and Germany (26.2%), with a significant share in Cyprus (9.2%) and minor presences in other countries.

The type of organization are: Universities/research centres prevail (55.4%), followed by businesses (16.9%), public institutions (13.8%), government (7.7%) and NGOs/foundations (6.2%).

This suggests a sample with a strong scientific component, but also with a management/operational component that is useful for understanding the constraints of actual adoption (processes, procurement, systems integration).

There is a polarisation between very large organisations (500+ employees: 33.8%) and micro-organisations (1–10: 24.6%). This heterogeneity is consistent with the 'two-pronged' training requirements that emerge later (general introduction + advanced analysis), and makes it **necessary to design 'scalable' training courses**.

The average age of staff is concentrated between 35–54 years (≈84.6% in the 35–44 and 45–54 age groups), and the level of education is high (PhD/postgraduate 63.1%, Master's 23.1%). General education is dominated by humanities (80.0%), but with a significant technical-scientific component: engineering/technology 50.8%, environmental sciences 44.6%, natural sciences 40.0%.

In many institutions, there is a 'critical mass' that could potentially act as an internal bridge between CH and EO/GI, provided that operational tools and routines (not just theoretical content) are provided.

The survey indicates a higher level of maturity than is often assumed in the CH sector:

- Experience in RS/EO for CH: Very experienced 42.2%, Moderately experienced 40.6%, No experience 17.2%.
- Involvement in RS/EO projects for CH: Yes 67.7%.
- Previous use of RS/EO for protection/monitoring: Yes 72.3%.

This may seem surprising at first from a pan-European perspective, but it is due to the fact that the survey was primarily taken part in by experts from countries that are already further ahead than others in the use of satellite data, such as Italy and Cyprus or closely linked to the SATCULT project (Germany with the coordinating SATCULT institution).

3.1.5 Application demand: the "risk–prevention–protection" framing prevails

The priority applications stated are clearly oriented towards risk management and prevention:

- Conservation/protection strategies 76.9%
- Monitoring of risk phenomena 75.4%
- Early detection/protection 75.4%
- Monitoring sites vs looting/vandalism 72.3%
- Environmental analysis/climate change impact 69.2%

When it comes to specific use cases, operational and hazard-driven priorities emerge:

- Structural monitoring (sites/historic structures) 73.8%
- Climate change prevention & protection 72.3%
- Landscape analysis linked to hazards 69.2%
- Fire / Hail / Storms 69.2% each

The most 'adoptable' outputs are not generic maps or technical products, but actionable deliverables (indicators, thresholds, triggers, periodic reports and dashboards) linked to prevention/inspection protocols.

The perceived challenges in making RS/EO 'standard' in CH workflows are:

- **Cost of technologies & external expertise 73.8%**
- **Integration with existing systems 52.3%**
- **Lack of internal expertise 49.2%**
- **Lack of institutional support 41.5%**
- **Lengthy implementation measures 27.7%**
- **Legal/regulatory restrictions 21.5%**

The issue of 'cost' does not only concern data, but above all the cost of external expertise and 'commissioning'. Integration into existing systems is a structural constraint: even when EO information is available, there is often no institutional pipeline to feed it into processes (IT, databases, procedures, procurement, responsibilities). The combination of 'integration + internal skills' means that **training must be designed as an adoption tool (templates, checklists, routines), not as an isolated event.**

3.1.6 Training: very high demand, but fragile economic sustainability

Interest in participating in training is almost universal.

However, sustainability is the most critical issue:

- Budget dedicated to training on new technologies: No 83.1%, Yes 16.9%.
- Willingness to pay (per person): Not willing 33.8%, <€500 26.2%, €500–1,000 32.3%, €1001–2,500 7.7%.

There is a paradox consistent with the CH sector: very high perceived need, but low discretionary spending capacity. Therefore, 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 pattern is clear: CH prefers assisted and hybrid methods, with a recognised role for 'authoritative' contexts (EO centre).

Training focus (multi-select):

- Advanced data analysis & interpretation 67.7%
- General introduction to EO/RS opportunities 66.2%
- Practical applications for CH/NH 58.5%
- Data management & storage 55.4%
- Products/services for on-site implementation 47.7%

This combination (introduction + advanced) indicates a diverse audience: the most robust path is modular, with a 'common core' and advanced tracks.

Size and timing:

- Participants: typically 2–5 people per institution (55.4%), with a quarter sending only one person (24.6%).
- Time available: often short to medium-short (<1 week 33.8%, 1 week–1 month 46.2%).

Courses that are too long are not very compatible with staffing and operations; compact and replicable modules are preferable.

When asked about willingness to pay for refresher courses/support: Depends 72.3%, Yes 16.9%, No 10.8%. The preferred model (among respondents): Pay-as-you-go 57.4% (out of N=61 for Q27), followed by periodic updates 24.6% and multi-year package 18.0%.

The most realistic formula is not a 'rigid contract' but a portfolio of options: on-call support + small periodic packages with measurable deliverables (e.g. reports, threshold updates, workflow reviews).

3.1.7 Expected impacts, infrastructure and technological choices

The expected impacts are consistent with a vision of process modernisation:

- Innovation/improved services 72.3%
- Improved asset/risk management 67.7%
- Quicker preventive actions 56.9%
- Increased conservation efficiency 55.4%

In terms of infrastructure, many institutions have not yet decided how to manage hardware/software investments (52.3%), with a preference for mixed in-house/outsourced solutions (26.2%) or cloud-first (16.9%).

On licensing: a marked preference for open source (53.8%) or mixed approaches (40.0%) is shown.

3.1.8 Communication, networking and readiness for pilot sites

Preferred channels: CH conferences/workshops 67.7%, webinars 58.5%, continuing education 41.5%, publications 40.0%, pilot cases 38.5% (with digital and cross-sector channels trailing behind).

EU networks: very high interest (Yes 89.2%).

Pilot site (satellite early warning): only 1.5% 'No', but the conditional response prevails: Not sure/depends 41.5%, Yes available 32.3%, Yes subject to further info 24.6%.

Interpretation: **The availability is high but requires reduction of uncertainty e. g. through a Pilot Site Onboarding Kit (explaining minimum requirements, deliverables, governance, roles and responsibilities, cost/effort estimates, uncertainty and false positive management).**

Consent is largely positive (processing consent 95.4%, contact consent 90.6%, explicit consent 93.8%, rights acknowledgement 96.9%).

3.2 Survey 2 for geoinformation experts

Survey 2 collected evidence from the Geoinformation / Earth Observation / Remote Sensing (GI/EO) side, with the aim of characterising: (i) profile and capabilities of the technical community involved; (ii) maturity and experience in EO applications for Cultural Heritage (CH); (iii) types of services and solutions considered to have the greatest added value for CH; (iv) barriers limiting the adaptation and 'grounding' of GI/EO offerings in CH contexts; (v) availability and sustainability of training offerings; (vi) propensity to participate in networks and operate as expert partners on CH sites (including in a pilot/demonstrator capacity). Again, the interpretation of the responses is directly referenced to the survey questions (Question/Q3 – Q29 in Appendix 2).

3.2.1 Dataset and methodological notes

The integrated dataset includes N = 19 unique respondents. Responses were collected in multiple languages and harmonised by mapping questions and normalising options (particularly for closed and multiple-choice questions). For multiple-choice questions, the percentages indicate the proportion of respondents who selected a certain option (sum >100% allowed).

3.2.2 Respondent profile and organisational capacity

The GI/EO sample is mainly concentrated in Europe, with a prevalence of Italy (36.8%), Germany (26.3%) and Cyprus (15.8%), as well as an international tail (Ghana, Poland, Greece, Turkey: 5.3% each). From a typological point of view, universities/research centres in geoinformation (47.4%) and private companies specialising in geoinformation/remote sensing (26.3%) prevail, followed by public agencies (15.8%) and a smaller share of start-ups/spin-offs and product/service providers (5.3% each).

This composition is relevant for consideration because it outlines a community that covers the entire value chain: methodological R&D, service delivery, and enabling institutions. The organisational scale shows medium-large companies (51–200 employees: 36.8%; 500+: 26.3%) but also SMEs and micro-organisations (11–50: 21.1%; 1–10: 10.5%).

The educational profile is clearly technical-scientific: over half of the sample reports PhD/postgraduate degrees (52.6%), and general education is dominated by natural sciences (78.9%), engineering/technology (63.2%), and IT/computer science (63.2%), with a significant component of humanities/social sciences (36.8%), useful for the interdisciplinary interface with CH.

3.2.3 Maturity with regard to CH: high readiness and already consolidated experience

The survey highlights a very high level of maturity with regard to EO applications in the heritage field. The majority describe themselves as very experienced (57.9%) or moderately experienced (36.8%) in the use of RS for CH; almost all have participated in satellite projects for CH monitoring (94.7%) and say they already use RS solutions for protection/monitoring (89.5%).

These data reinforce a key project message: **From the GI/EO side, technical expertise is not a primary constraint; the main problem lies instead in the translation and operationalisation of the offer in CH contexts (governance, engagement, requirements, shared language and workflow).**

3.2.4 Application demand and value proposition of GI/EO offerings for CH

The main applications of RS in CH cited by respondents include: monitoring of CH sites and protected areas (84.2%), risk analysis (landslides/floods/subsidence/fires: 73.7%), surveying and mapping of archaeological sites (73.7%), and documentation/diagnosis of structural damage (52.6%).

Consistently, the services with the highest added value that the GI/EO side believes it can offer include: monitoring & early warning systems (78.9%), detailed mapping and 3D modelling (73.7%), structural deformation analysis (SAR) (68.4%), and integration with GIS platforms for asset management (68.4%).

This point is crucial because it indicates that **the most 'scalable' and replicable GI/EO offering for CH tends to converge on four pillars: early warning, 3D/mapping, SAR deformation, and integration into management systems.**

3.2.5 Barriers perceived: the obstacle is the interface with the CH

When asked what factors make it difficult to adapt GI/EO services to the needs of the CH (Q15), mainly organisational-interdisciplinary barriers emerge: the need for specialised CH personnel (73.7%), difficulty in finding CH partners/clients (57.9%), and the need for interdisciplinary exchange/shared terminology (42.1%). More 'classic' issues remain, but are secondary, such as the cost of acquiring specific data (36.8%) and regulatory/bureaucratic barriers (21.1%).

In summary, **the GI/EO side indicates that the bottleneck is not so much the technical output as the possibility of building credible, ongoing and 'decisionable' CH collaborations, with clear requirements, availability of contact persons and a shared operational lexicon.**

3.2.6 Training: high supply potential, but cost coverage constraints

A large proportion of the sample expressed an interest in providing training (78.9%), with the most realistic methods being live online (73.7%) and face-to-face (68.4%), with a significant proportion also available for on-site workshops (47.4%) and blended formats (42.1%).

In terms of content, GI/EO respondents indicate the following as priorities: practical monitoring/prevention applications (84.2%), technical and theoretical fundamentals (73.7%), and above all integration with GIS and heritage databases (73.7%), as well as advanced analysis (57.9%). However, the economic sustainability of the training offer is limited: 78.9% say they have no budget dedicated to the development of training services (Q22), and the availability of time/resources is often conditioned by cost coverage (47.4%).

In terms of pricing for a 2-3 day course, moderate thresholds emerge (e.g. <€500 and €500-1,000 per person) and a significant proportion prefer customised quotes; there are no cases >€2,500 in the dataset.

3.2.7 Post-training continuity

The willingness to provide follow-up courses every 6–12 months is substantial but frequently conditional: 42.1% yes (periodic updates) and 42.1% 'depends on conditions/fees', with a minority preferring one-off courses or not offering follow-ups.

For ongoing support, the most common model is pay-as-you-go (40%), followed by packages with periodic updates (33.3%) and maintenance contracts (20%) (note: N=15 responses, 4 missing).

This point is perfectly consistent with Survey 1: on both sides, stable adoption tends to require flexible models, not rigid contracts.

3.2.8 Expected impacts and infrastructure choices

Among the expected positive impacts (N=14 responses), the following stand out: public relations/visibility (85.7%), networking (71.4%), additional funding (64.3%), innovation/internal skills (64.3%), and access to new markets/customers (64.3%).

On an operational level, there is a marked preference for in-house infrastructure (73.7%), with openness to mixed internal+cloud solutions (26.3%). Licensing preferences focus on open source or mix (42.1% + 42.1%), with a minority 'mainly proprietary' (10.5%).

This suggests that pipelines and deliverables should be designed with a focus on interoperability and reusability (avoiding lock-in where possible), but also providing for 'hybrid' options that are compatible with existing ecosystems.

3.2.9 Communication, networking and readiness to operate on CH sites

The preferred communication channels on the GI/EO side include social media (78.9%), conferences/trade shows (63.2%), newsletters (57.9%), workshops in CH contexts (57.9%), and webinars (42.1%).

Interest in participating in EU networks/consortia is very high (89.5%). Furthermore, no respondent rules out the idea of acting as an expert partner on a CH site: 68.4% are available, 21.1% are available subject to further information, and 10.5% respond 'it depends'.

Overall, consent levels are very high: consent to data processing 94.7%, consent to be contacted 100% among respondents to that question, and acknowledgement of GDPR rights 100%.

This enables activities' follow-ups, community building activities and engagement for pilots/demonstrators.

4.0 Conclusions

The two surveys are 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 is not to 'mediate' the responses, but to identify interface conditions that enable uptake: where expectations are aligned, where they diverge, and what training mechanisms (training architecture, pilot onboarding, governance, service packaging) are needed to transform availability into stable implementation.

A key methodological implication is that **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.

6.1. Supply-demand alignment: high availability on both sides, but adoption depends on 'operational packaging'

The most positive sign is the symmetry of engagement: CH declares a very high interest in participating in training (Survey 1: 95.4%), while GI/EO shows 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.

CH side (Survey 1): 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.

GI/EO side (Survey 2): 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**.

Technical implication (not 'soft'): the training must also produce 'integration assets', including: semantic interoperability tools (EO↔CH glossary and interpretative guidelines), standardised CH-readable deliverables (reports, dashboards, triggers), requirements/onboarding templates and governance/responsibility models.

The comparison between willingness to host pilots (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".

The cross-referenced file interprets this as 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 convert 'depends' into active participation, **a standardised Pilot-Site 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.**

The cross-survey 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. COG/GeoPackage/STAC/dashboard), 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.

The cross-referenced file highlights a predictable but strategically useful difference:

- CH prefers CH channels + webinars + continuous training and values pilot cases;
- GI/EO pushes more towards social media, conferences/trade fairs and newsletters.

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

5.0 Glossary of terms used in this report

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 in this report 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.

6.0 Acknowledgements and declaration of generative AI

The SATCULT team would like to take this opportunity to express its sincere thanks to all the experts who took part in the survey, thereby willingly sharing their experiences with the community of cultural heritage professionals and geoinformation experts.

Thanks are also due to the project's Advisory Board (Patricia Alberth, Daniele Gardiol, Margherita Sani and Chrysanthos Pissarides), who contributed within their means.

The data collection for this extensive survey, as well as the analysis and processing of the data, was carried out in close collaboration between all SATCULT project partners, led by Nicodemo Abate and Nicola Masini from CNR-ISPC. The final editing was done by SATCULT coordinator, Karin Drda-Kühn.

During the preparation of the analysis, the authors used ChatGPT-5 to assist with English proofreading, language refinement, and improving grammar and clarity of expression. After using this tool, the authors thoroughly reviewed, edited, and verified all content to ensure accuracy, scholarly integrity, and that the final text fully represents the authors' own analysis and interpretation. The authors take full responsibility for the content.

7.0 Appendix 1: The survey questions for cultural heritage representatives

Survey 1 collected evidence from the cultural heritage (CH) side, with the aim of characterising: (i) profile and capabilities of the heritage community involved; (ii) experience in EO applications for CH; (iii) types of services and solutions considered to have the greatest added value for CH; (iv) barriers limiting the adaptation of GI/EO offerings in CH contexts; (v) character needed for training offerings; (vi) communication channels for interdisciplinary exchange and (vii) propensity to operate as a pilot site demonstrating respective capacity. The interpretation of the responses is directly referenced to the survey questions (Question/Q2 – Q29).

Sample and data quality

- N = 65 unique respondents.
- Languages: EN 24 (36.9%), IT 18 (27.7%), DE 18 (27.7%), GR 5 (7.7%).
- Almost all questions have complete coverage; the only one with significant missing data is Q27 (61 responses out of 65).

For multiple-choice questions, the percentages indicate the proportion of respondents who selected the option (the percentages may exceed 100% when added together).

(Note: Q1 (Name of organisation) was not considered in the analysis)

Profile of institutions (which responded)

Q02 – Country of the institution

- Italy: 27 (41.5%)
- Germany: 17 (26.2%)
- Cyprus: 6 (9.2%)
- Then: Spain/Slovenia/China/Austria/Greece 2 (3.1%) each;
- France/Malta/Belgium/Romania/Albania 1 (1.5%) each.

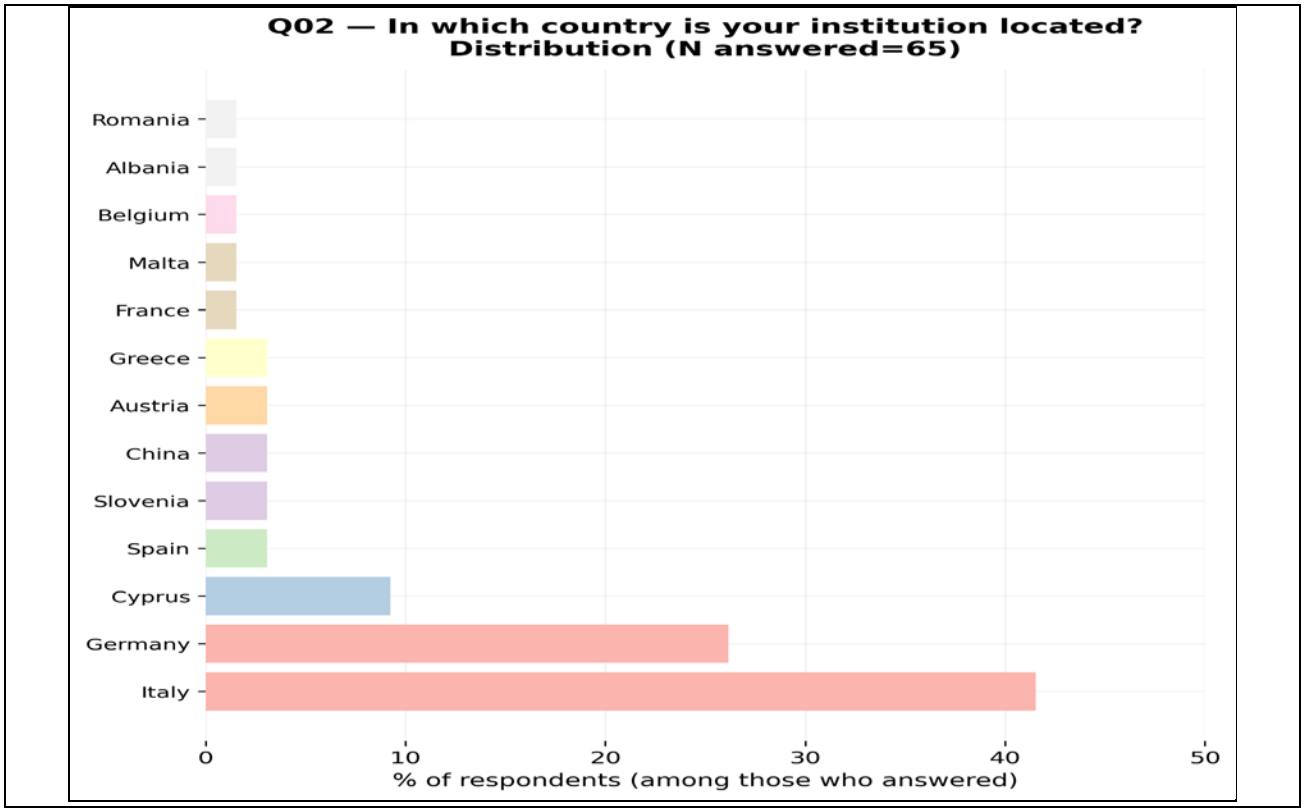

Figure 1. Place of the Institutions.

Q03 – Type of institution (CH-related)

- University or research centre: 36 (55.4%)
- Enterprise: 11 (16.9%)
- Public institution: 9 (13.8%)
- Government: 5 (7.7%)
- NGO/foundation: 4 (6.2%)

Interpretation: the academic-scientific component is dominant (over half), but there is also an operational/managerial segment (public + government) and a private segment.

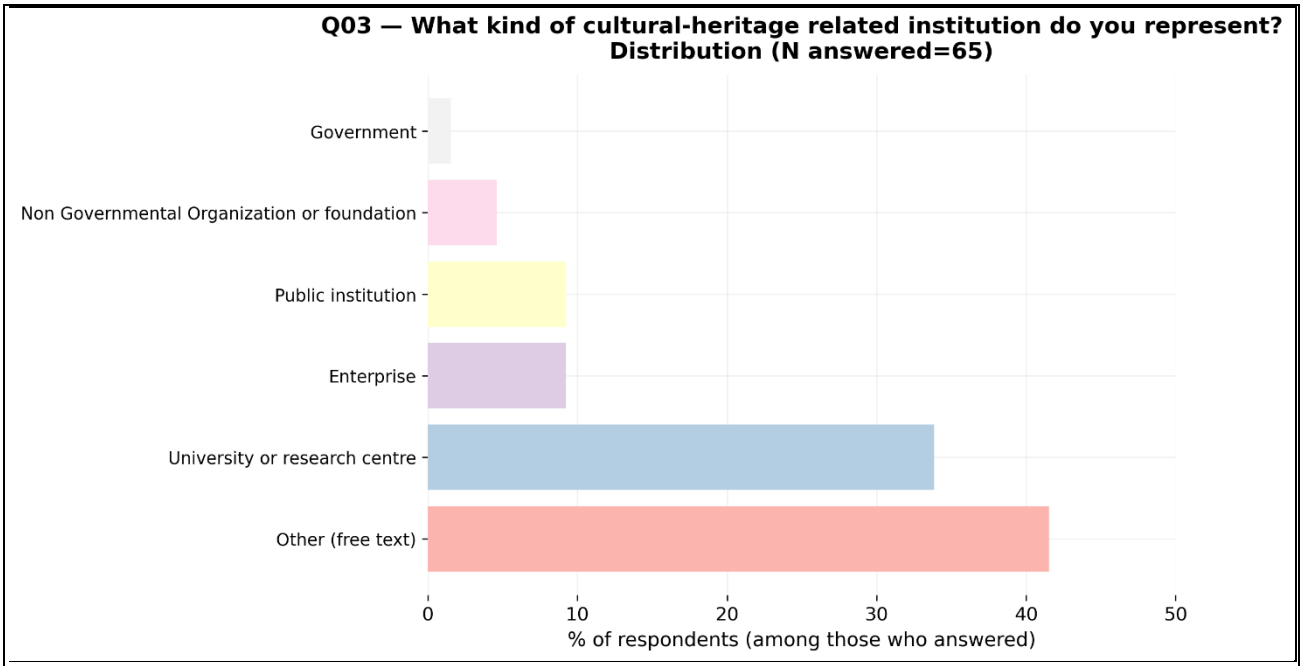

Figure 2. Kind of Institutions.

Q04 – Main sector (multi-select)

- Culture and heritage: 46 (70.8%)
- Technology and innovation: 15 (23.1%)
- Education and Research: 11 (16.9%)
- Public services: 11 (16.9%)
- Environment: 5 (7.7%)

Interpretation: the survey mainly covers core CH institutions, but with interesting crossovers into innovation/public services.

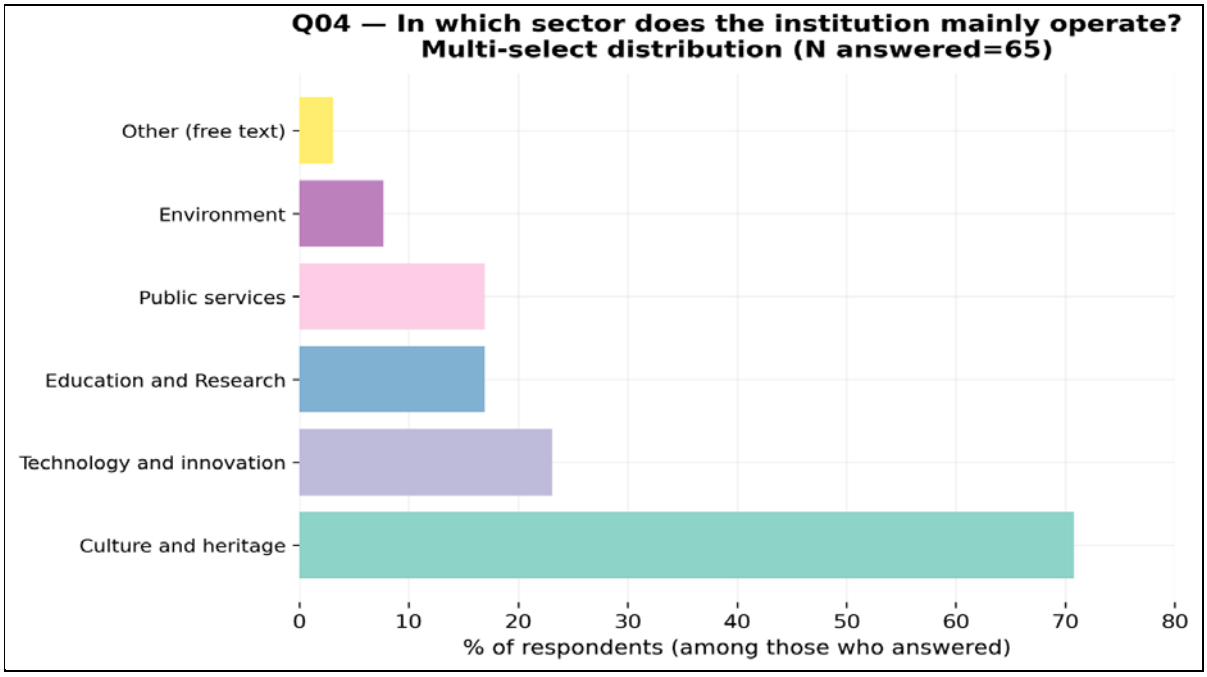

Figure 3. Main aim of the Institutions.

Q05 – Number of employees

- 500+: 22 (33.8%)
- 1–10: 16 (24.6%)
- 11–50: 10 (15.4%)
- 51–200: 10 (15.4%)
- 201–500: 7 (10.8%)

Interpretation: The outcome shows a polarised sample: many very large institutions, but also a significant proportion of micro-organisations.

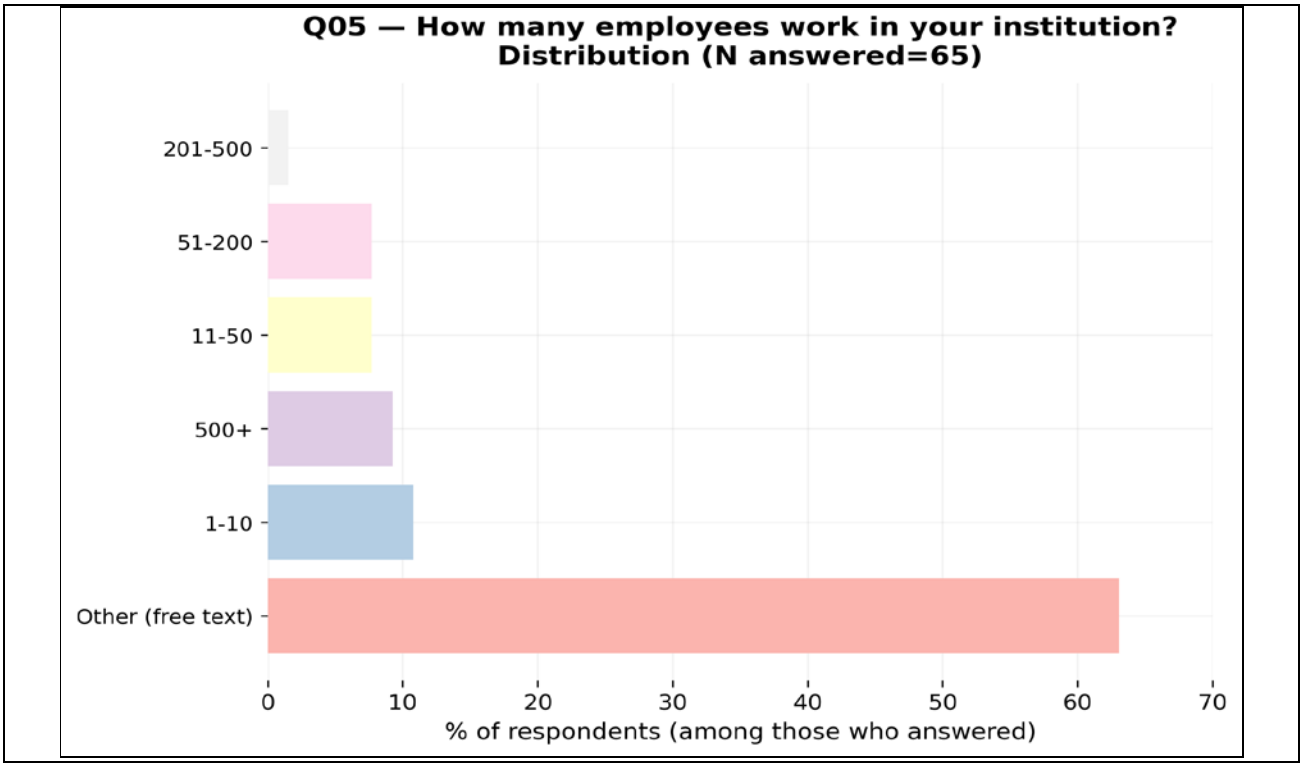

Figure 4. Number of employees.

Q06 – Average age of staff

- 35–44: 29 (44.6%)
- 45–54: 26 (40.0%)
- 25–34: 6 (9.2%)
- 55+: 3 (4.6%)
- <25: 1 (1.5%)

Interpretation: mature demographic structure (≈85% between 35 and 54), therefore a good chance of established management skills, but also possible resistance to change if not supported by organisational measures.

Q07 – Average level of education

- Doctorate/postgraduate: 41 (63.1%)
- Master's: 15 (23.1%)
- Bachelor's: 7 (10.8%)
- High school: 2 (3.1%)

Reading: very high average qualification level. This is a strong indicator of potential absorption of technical content, provided that it is translated into operational modes.

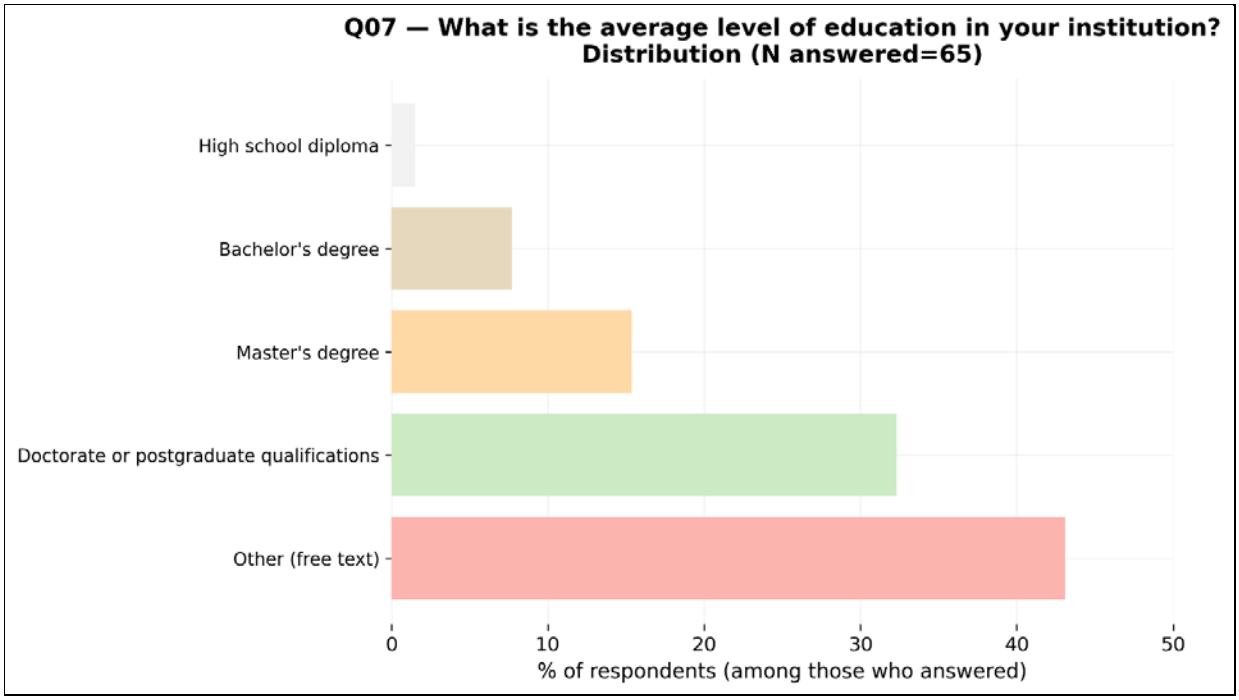

Figure 5. Average level of education in the institution.

Q08 – General training of staff (multi-select)

- Humanities: 52 (80.0%)
- Engineering/technology: 33 (50.8%)
- Environmental sciences: 29 (44.6%)
- Natural sciences: 26 (40.0%)
- Social sciences: 19 (29.2%)
- Business/management: 14 (21.5%)
- Health sciences: 10 (15.4%)

Reading: the CH (humanities) spirit prevails, but there is a significant technical-scientific component (engineering/environment/sciences) that can act as an 'internal bridge'.

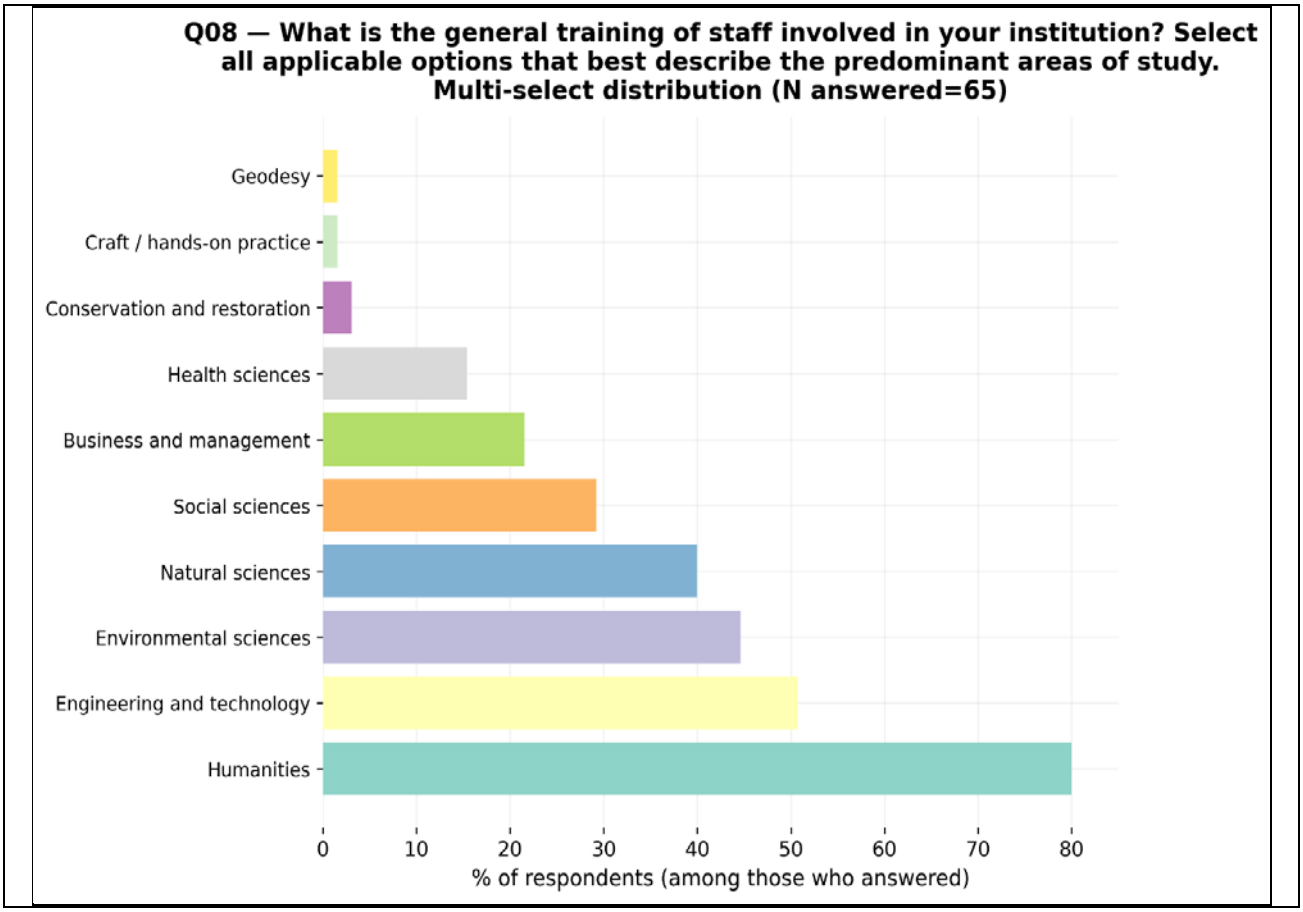

Figure 6. Training of the institution's staff.

Experience and use of remote sensing (RS/EO) in CH

Q09 – RS experience in the CH sector

- Very experienced: 27 (42.2%)
- Moderately experienced: 26 (40.6%)
- No experience: 11 (17.2%)

Interpretation: the sample is not 'novice': approximately 83% have at least moderate experience. The need is not only for literacy, but above all for operationalisation.

Q10 – Involvement in RS/EO projects for CH

- Yes: 44 (67.7%)
- No: 21 (32.3%)

Q12 – Previous use of RS for CH protection/monitoring

- Yes: 47 (72.3%)

- No: 18 (27.7%)

Joint reading of Q10+Q12: for many, this is not a 'future' issue: over two-thirds already have project experience and over seven-tenths have already used RS for CH purposes.

What is the purpose of RS for these institutions (application priorities)

Q11 – Main perceived applications (multi-select)

- Conservation/protection strategies: 50 (76.9%)
- Monitoring of risk phenomena: 49 (75.4%)
- Early detection/protection: 49 (75.4%)
- Monitoring sites vs looting/vandalism: 47 (72.3%)
- Environmental analysis / climate change impact: 45 (69.2%)
- Scientific research: 29 (44.6%)
- Management planning: 26 (40.0%)

Interpretation: the dominant narrative is *risk* + *prevention* + *protection strategies* (not just research). This is a strong signal for the 'operational' approach of a training to be developed.

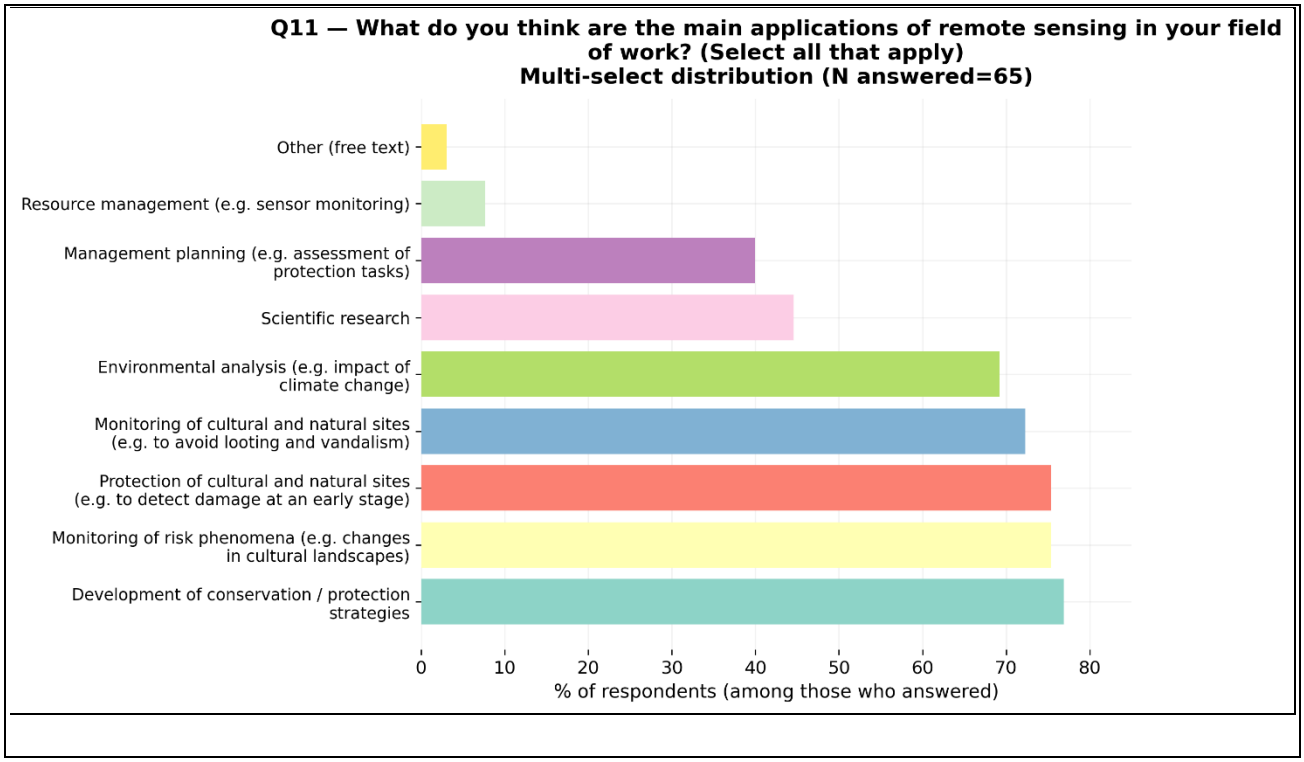

Figure 7. Possible applications in the sector.

Q13 – Specific applications considered useful (multi-select)

- Structural monitoring (sites/historic structures): 48 (73.8%)
- Climate change prevention & protection: 47 (72.3%)
- Landscape analysis linked to hazards: 45 (69.2%)
- Fire: 45 (69.2%)
- Hail: 45 (69.2%)
- Storms: 45 (69.2%)
- Preventive archaeology for public works: 31 (47.7%)
- Monitoring illegal/warlike activities: 22 (33.8%)

Interpretation: there is a clear trend towards hazard-driven monitoring (weather/climate events) and structural monitoring, i.e. use cases with a direct impact on risk management and intervention priorities.

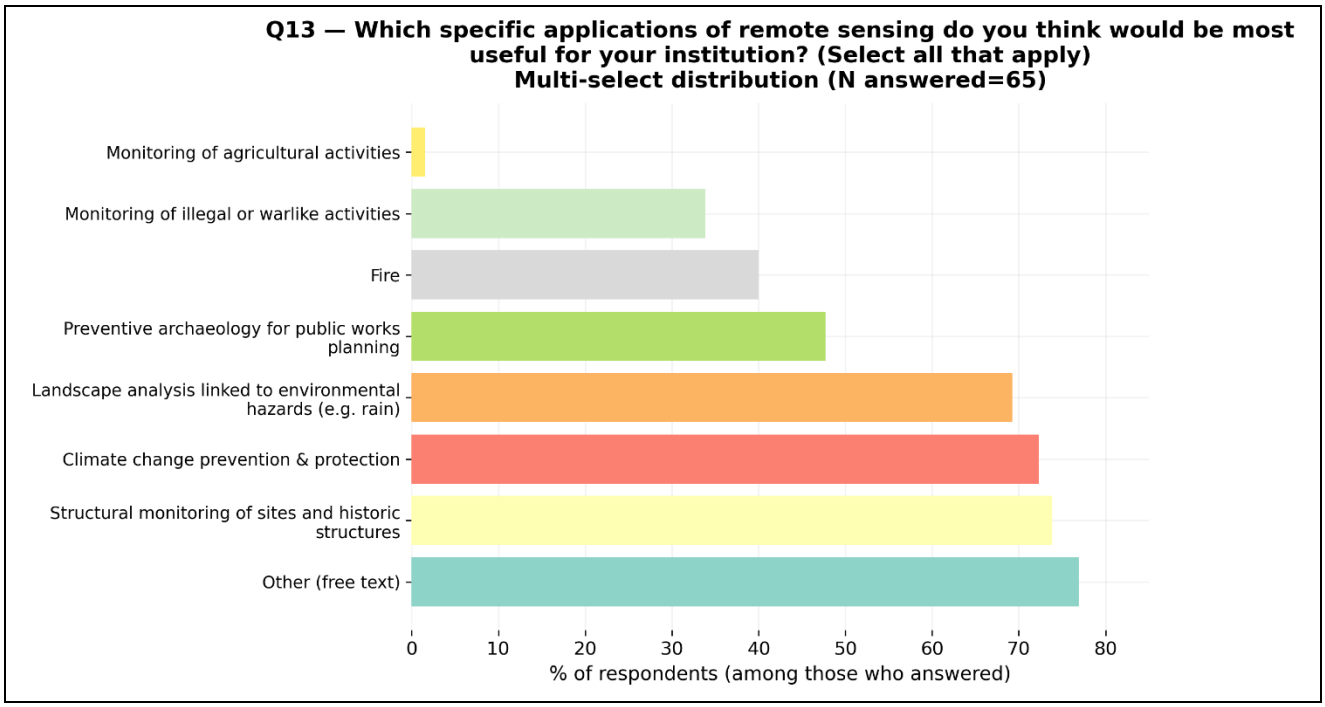

Figure 8. Possible applications for the institution.

Perceived barriers to adoption (why it is not yet 'standard')

Q14 – Challenges for adopting RS technologies (multi-select)

- Cost of technologies & external expertise: 48 (73.8%)
- Integration with existing systems: 34 (52.3%)
- Lack of internal expertise: 32 (49.2%)
- Lack of institutional support: 27 (41.5%)
- Lengthy implementation measures: 18 (27.7%)
- Legal/regulatory restrictions: 14 (21.5%)

Interpretation:

- Cost is the number one barrier, but it is not just data costs: it is also the cost of external expertise.
- The second set of barriers is 'organisational-technical': integration into existing systems + internal expertise. This is a key point: even when the data is available, the institutional pipeline to feed it into processes (asset management, maintenance, reporting, procurement) is often lacking.

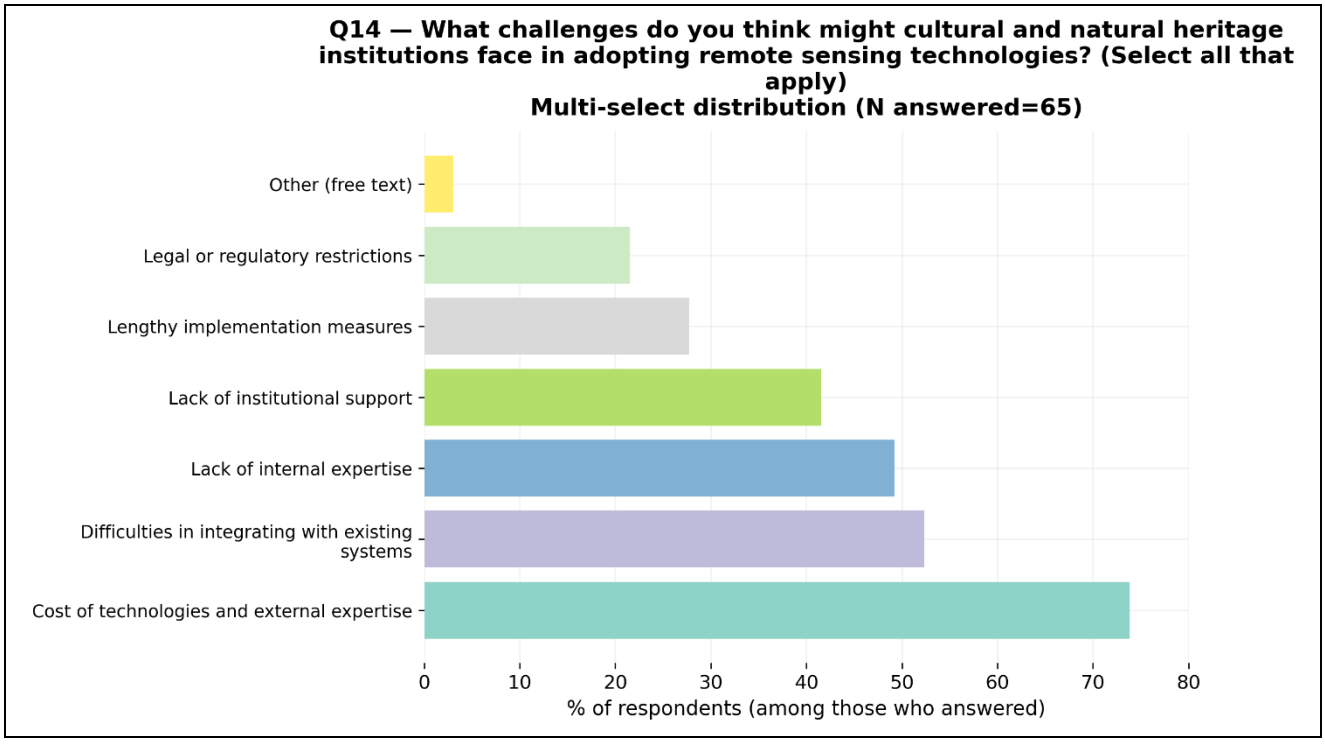

Figure 9. Perceived barriers to the use of remote sensing.

Training: demand, preferred formats, ability to support financially

Q15 – Interest in participating in RS training for CH

- Yes: 62 (95.4%)
- No: 3 (4.6%)

Very strong signal: demand for training is practically universal in the sample.

Q16 – Preferred training methods (multi-select)

- Blended/mixed mode: 27 (41.5%)
- In-person at EO centre: 25 (38.5%)
- Live webinar + subsequent access to materials: 25 (38.5%)
- Live online regular: 21 (32.3%)
- Recorded/registered online: 18 (27.7%)
- In-person at training provider: 17 (26.2%)
- No preference: 7 (10.8%)
- In-person at your site: 5 (7.7%)

Conclusion: CH users want hybrid and "assisted" solutions (webinars with materials + blended), and recognise the value of "authoritative" locations (EO centres). Pure recorded e-learning is useful, but it is not the first choice.

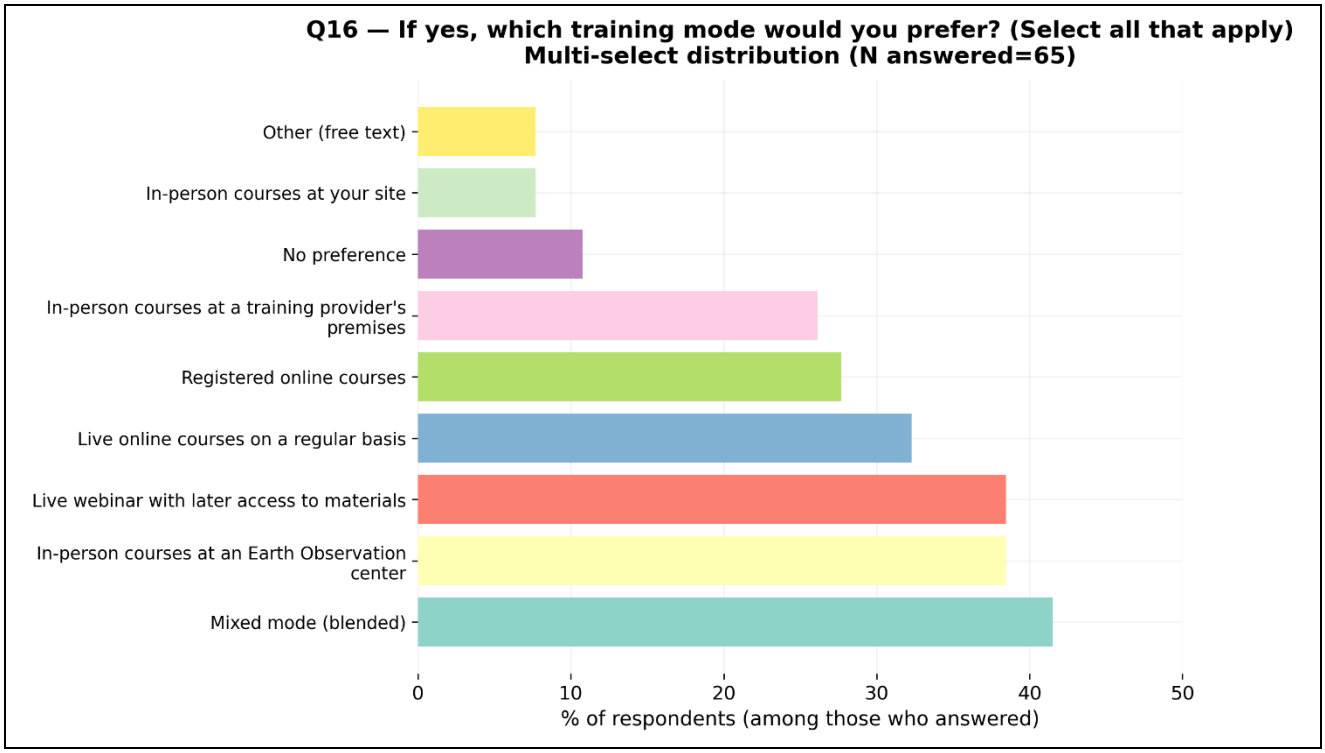

Figure 1. Preferences in course delivery.

Q17 – Training focus (multi-select)

- Advanced data analysis & interpretation: 44 (67.7%)
- General introduction to EO/RS opportunities: 43 (66.2%)
- Specific practical applications for CH/NH: 38 (58.5%)
- Data management & storage: 36 (55.4%)
- Products/services for on-site implementation: 31 (47.7%)
- Identification of cooperation partners (geoinformation): 25 (38.5%)
- Technical/theoretical foundations: 6 (9.2%)

Critical reading: The request is "two-sided". Respondents want a general introduction but also advanced analysis. This is typical of a mixed audience (some already competent + some just starting out). For a training programme, this is a strong argument in favour of modular training at different levels (common base + advanced tracks).

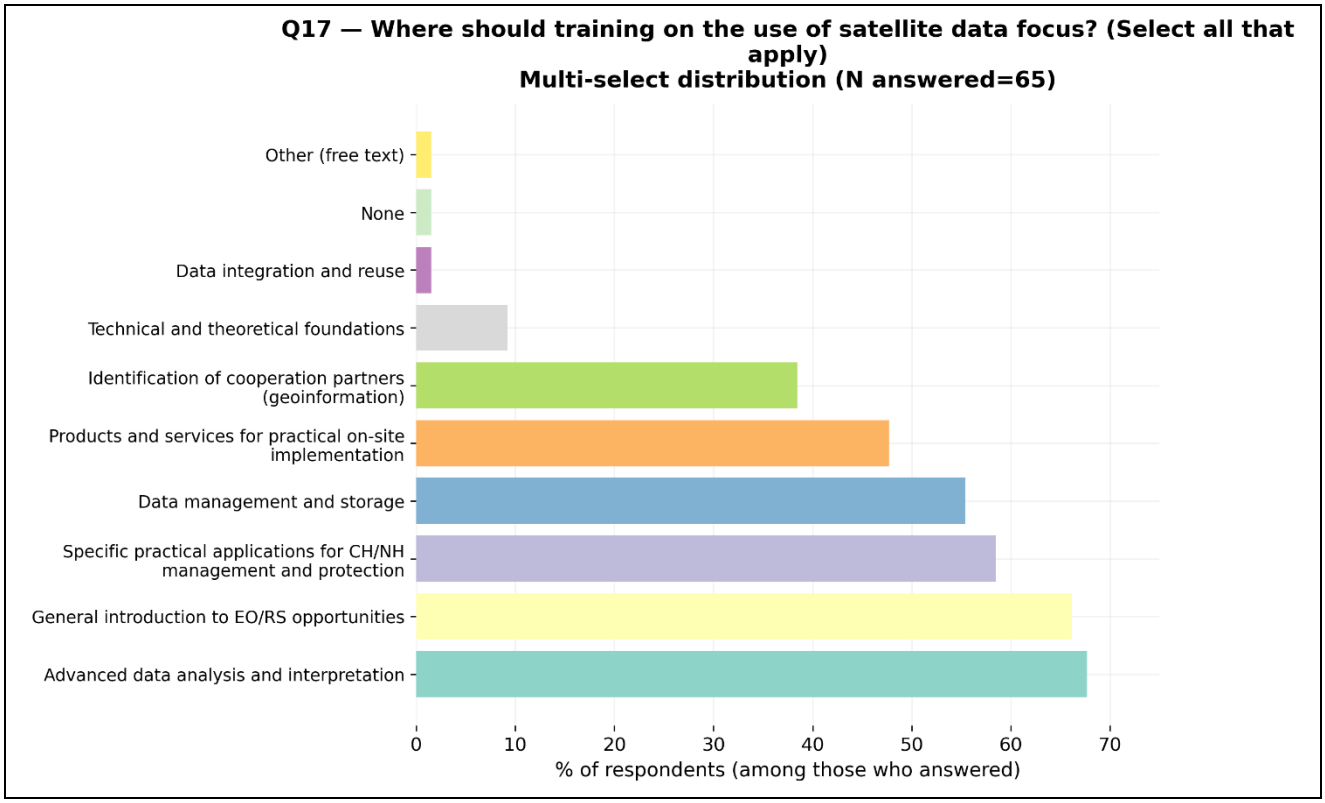

Figure 11. Training topics.

Q18 – How many people from the team would participate

- 2–5 persons: 36 (55.4%)
- 1 person: 16 (24.6%)
- 6–10 persons: 8 (12.3%)
- 10: 5 (7.7%)

Reading: The most realistic demand is for small internal groups (2–5), therefore repeatable and scalable formats.

Q19 – Time available

- One week to one month: 30 (46.2%)
- Less than a week: 22 (33.8%)
- One to three months: 7 (10.8%)
- More than three months: 6 (9.2%)

Interpretation: The typical time frame is short/medium-short. Programmes that are too long risk being incompatible with operations and staffing.

Q20 – Budget allocated to training in new technologies

- No: 54 (83.1%)
- Yes: 11 (16.9%)

Key point: The demand is very high (Q15), but a dedicated budget is very rare. A sustainable model is needed (sponsorship, co-funding, packages, cascade training).

Q21 – How much would you pay for training (per person)

- Not willing to pay: 22 (33.8%)
- €500–1,000: 21 (32.3%)
- <£500: 17 (26.2%)
- €1,001–2,500: 5 (7.7%)

Interpretation: The market CH is price-sensitive: around 60% are below €1,000 per person or do not want to pay. Therefore, a training / qualification initiative should offer: (i) low-cost or co-financed baseline; (ii) advanced premium modules for those who can afford it.

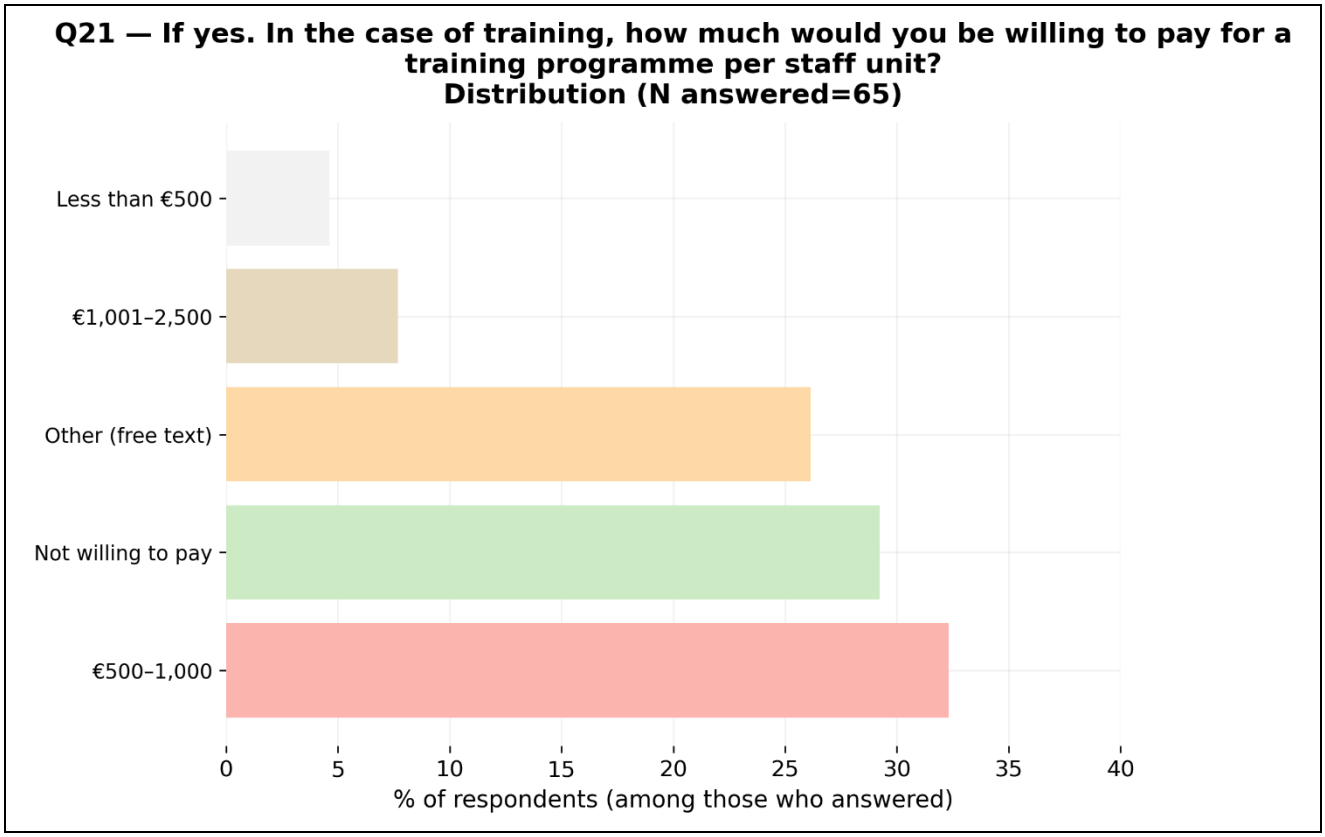

Figure 12. Willingness to pay for training.

Expected impacts, infrastructure, tools

Q22 – Positive impacts expected from RS use (multi-select)

- Innovation in R&D / improved services: 47 (72.3%)
- Improved asset management/risk management: 44 (67.7%)
- Quicker preventive actions: 37 (56.9%)
- Increased conservation efficiency: 36 (55.4%)
- Upskilled staff: 28 (43.1%)
- Savings via early detection: 14 (21.5%)

Interpretation: RS adoption is seen as a lever for modernisation (innovation, asset management, prevention) rather than immediate savings.

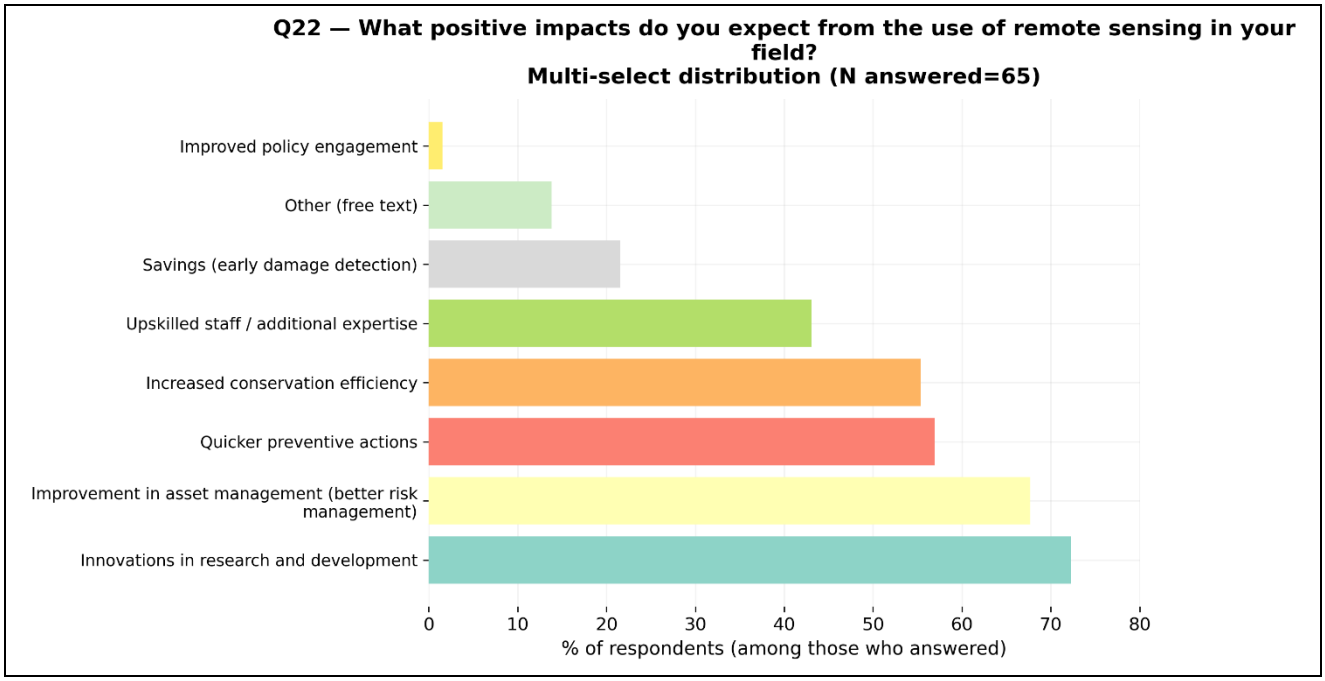

Figure13. Expectations regarding the results obtainable from the use of remote sensing.

Q23 – How to manage HW/SW investments (multi-select)

- Not yet decided: 34 (52.3%)
- Mixed in-house + outsourced: 17 (26.2%)
- Externally managed / cloud-first: 11 (16.9%)
- In-house managed internally: 10 (15.4%)

Interpretation: Half of the institutions are still in the 'decision-making' phase. This is ideal ground for offering guidelines, reference architectures, cost models, procurement templates.

Q24 – Open source vs licensed

- Open source: 35 (53.8%)
- Both: 26 (40.0%)
- Other/free text: 4 (6.2%)

Reading: There is plenty of scope for a training strategy based on open source and a pragmatic mix (open source + licensed) where necessary.

Communication, networks, willingness to pilot

Q25 – Best channels for updating the team (multi-select)

- CH conferences/workshops: 44 (67.7%)
- Webinars/online seminars: 38 (58.5%)
- Continuing education courses: 27 (41.5%)
- Academic journals/publications: 26 (40.0%)
- Pilot cases (success stories/challenges): 25 (38.5%)
- Conference format for both sectors: 24 (36.9%)
- Email newsletter: 23 (35.4%)
- Geoinformation conferences/workshops: 22 (33.8%)
- Specialised websites/blogs: 19 (29.2%)
- Social media: 17 (26.2%)

Reading: CH still operates largely through 'institutional' channels (CH conferences, continuing education), but digital (webinars) is almost on a par with the main channel.

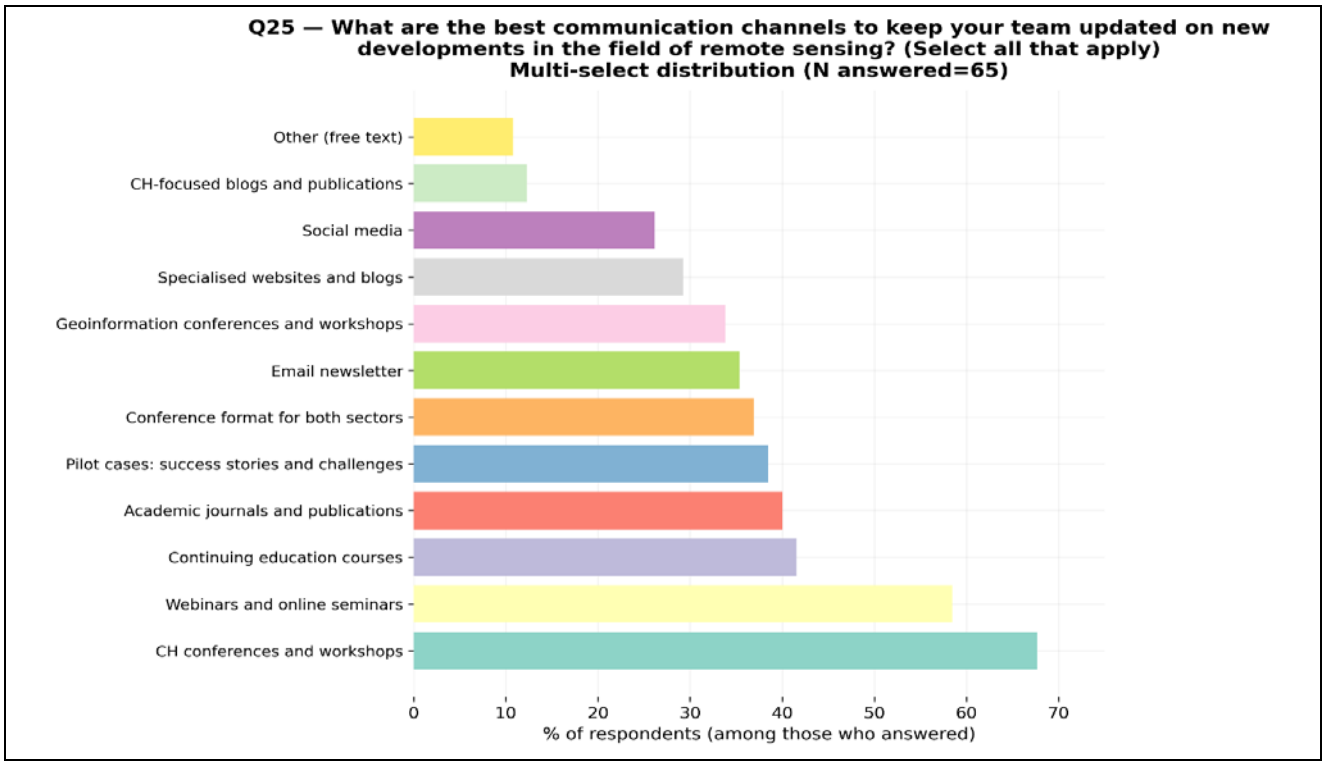

Figure 14. Preferences regarding communication methods.

Q26 – Would you pay for refresher courses/support after the initial training?

- Depends: 47 (72.3%)
- Yes: 11 (16.9%)
- No: 7 (10.8%)

Interpretation: This is not a 'no', but rather a strong conditionality: CH institutions will pay if they see clear values in relation to costs. This pushes towards 'service-like' models with measurable KPIs and deliverables.

Q27 – Preferred model for refresher/support (multi-select, N responses=61)

- Pay-as-you-go (per session): 35 (57.4% out of 61)
- Periodic updates (pay per session): 15 (24.6%)
- Multi-year package paid upfront: 11 (18.0%)
- Unsure: 2 (3.3%)
- Other: 1 (1.6%)

Interpretation: There is a clear preference for flexibility (pay-as-you-go). Updates and long-term liabilities are not excluded.

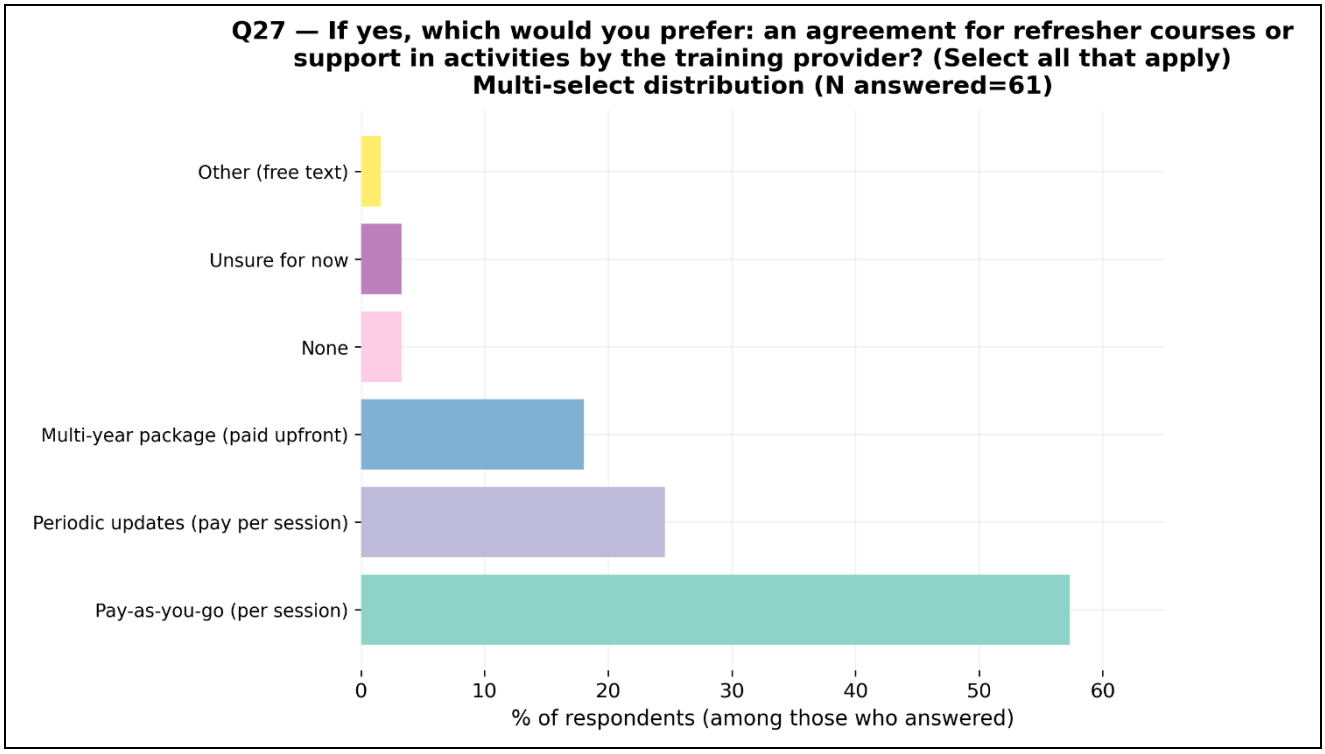

Figure15. Business model.

Q28 – Interest in European networks/consortia CH and GI

- Yes: 58 (89.2%)
- No: 7 (10.8%)

Q29 – Willingness to be a pilot site (satellite early warning)

- Not sure/depends: 27 (41.5%)
- Yes, interested & available: 21 (32.3%)
- Yes, subject to further information: 16 (24.6%)
- No: 1 (1.5%)

Interpretation: The potential availability is very high (only 1 no), but the prevailing response is 'depends': information is needed on requirements, costs, responsibilities and benefits. Conclusion: For pilot sites, an onboarding kit is needed (checklist + value proposition + data governance).

8.0 Appendix 2: The survey questions for geoinformation experts

(Note: Q1 (Organisation) and Q2 (Name of organisation) were not considered in the analysis.)

Sample and Data quality

- N = 19 unique respondents.
- *Languages: 52.6% English-language responses (10/19), 26.3% German (5/19), and 21.1% Italian (4/19), Cyprus with 15.8% (3/19), while Ghana, Poland, Greece, and Turkey each account for 5.3% (1/19).*
- For multiple-choice questions, the percentages indicate the proportion of respondents who selected the option (the percentages may exceed 100% when added together).

Profile of institutions (which responded)

Q03 (In which country is your organisation located?)

- Italy 36.8% (7), Germany 26.3% (5), Cyprus 15.8% (3); Ghana/Poland/Greece/Turkey 5.3% (1) each.

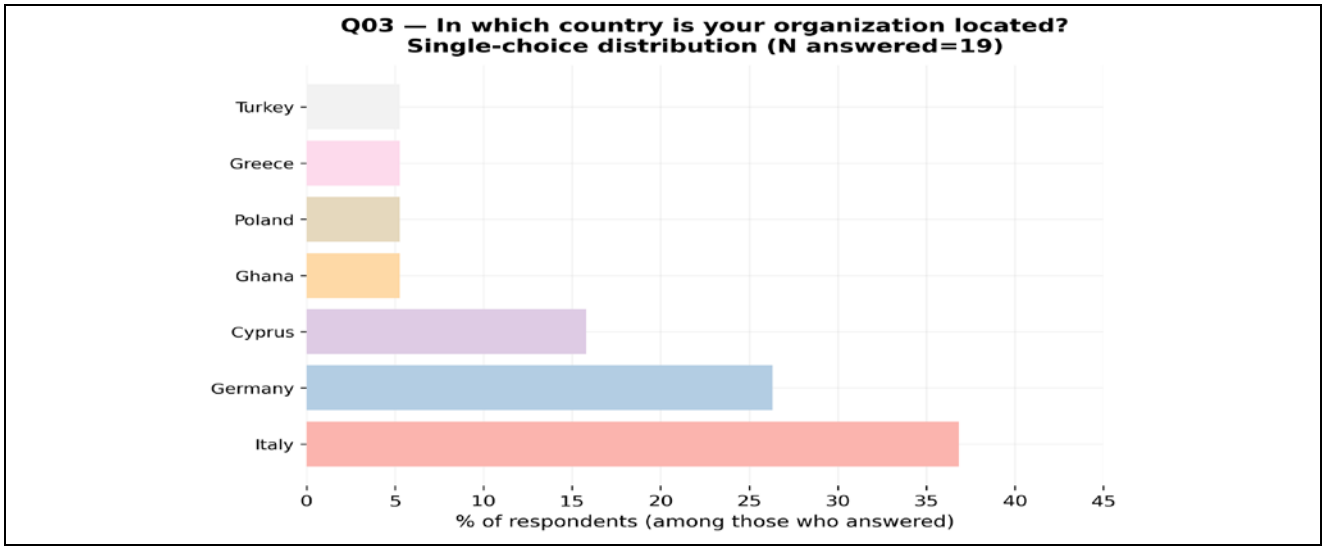

Figure 16. Country distribution.

Q04 (What kind of organisation do you represent?)

- University/research centre (geoinformation): 47.4% (9)
- Private company (geoinformation/remote sensing): 26.3% (5)
- Public agency (space/mapping etc.): 15.8% (3)
- Private company (products/services): 5.3% (1)
- Start-up/spin-off: 5.3% (1)

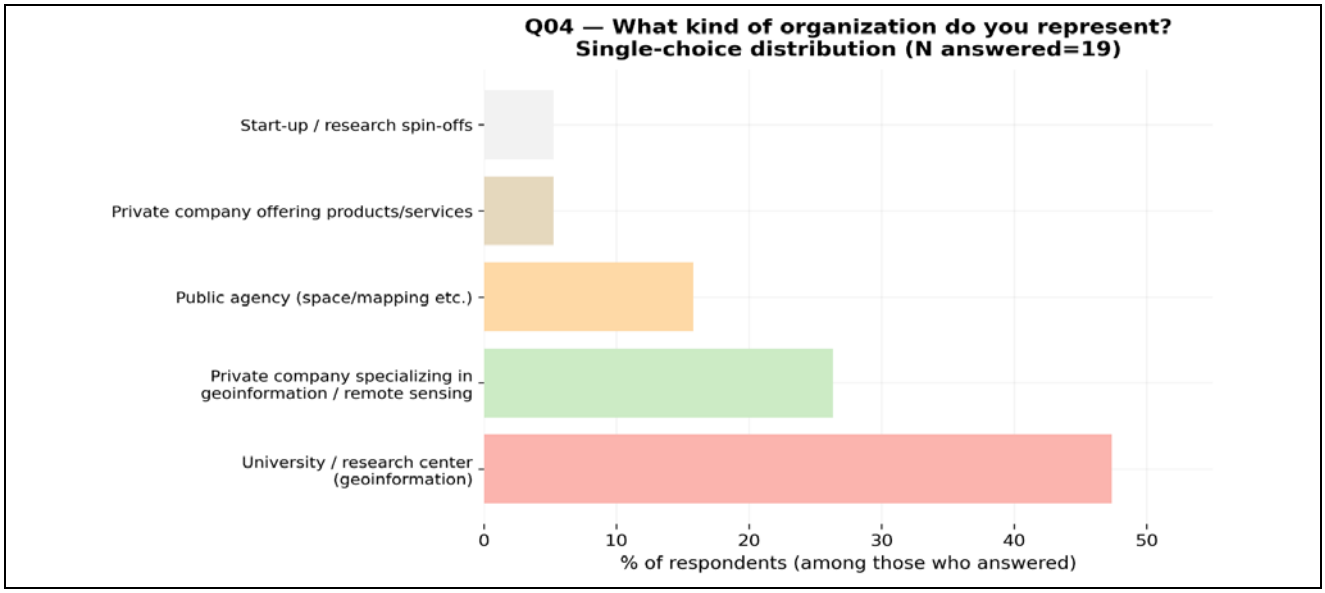

Figure 17. Organisation type.

Q05 (Primary area of operation)

- Remote sensing & GIS services: 63.2% (12)
- R&D: 15.8% (3)
- Others (software/hardware solutions; archaeology/heritage sciences; space programmes/project management; “all of the above”): 5.3% (1) each.

Q06 (Employees)

- 51–200: 36.8% (7)
- 500+: 26.3% (5)
- 11–50: 21.1% (4)
- 1–10: 10.5% (2)
- 201–500: 5.3% (1)

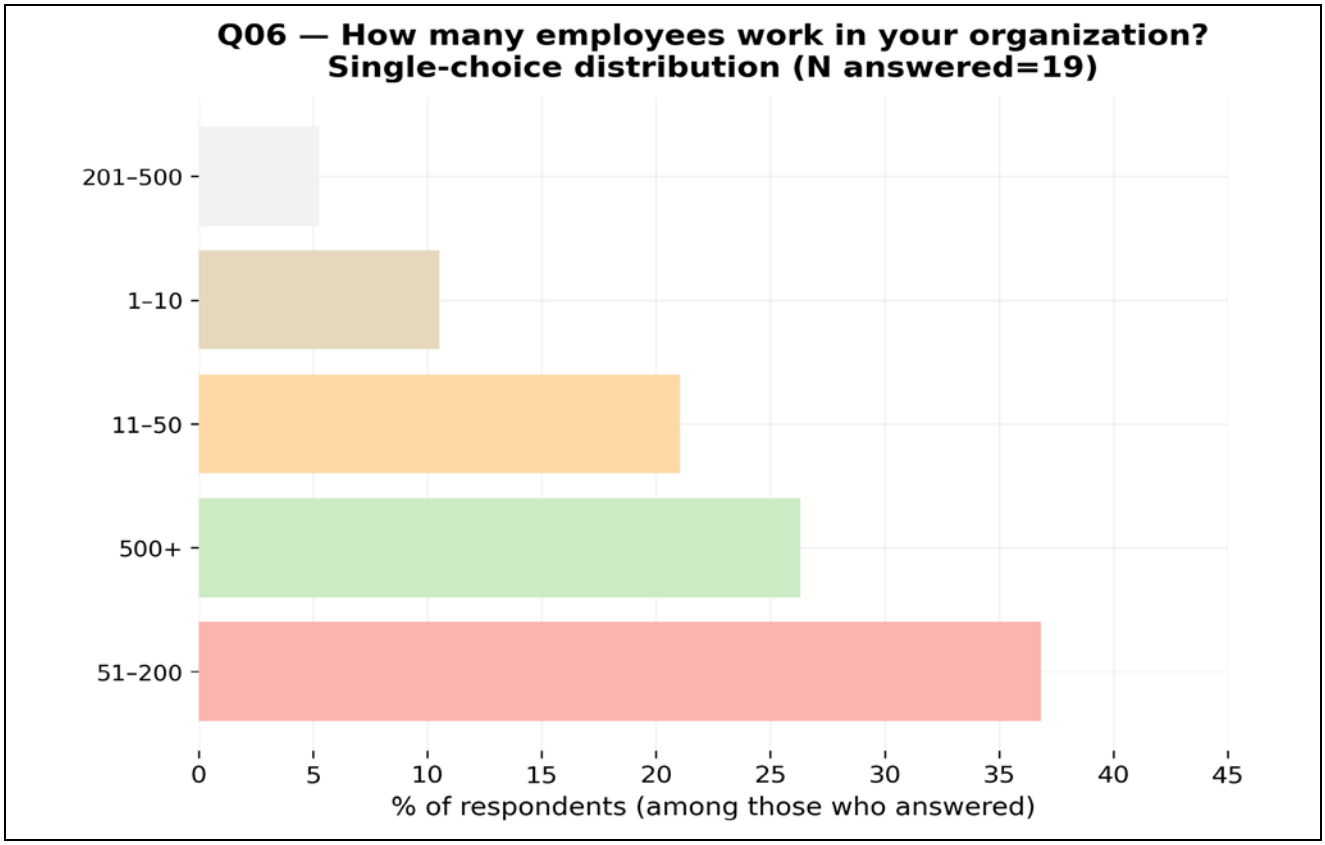

Figure 18. Employees in the organisation.

Q07 (Average age)

- 35–44: 57.9% (11)
- 45–54: 21.1% (4)
- 25–34: 15.8% (3)
- <25: 5.3% (1)

Q08 (Average education level)

- PhD/postgraduate: 52.6% (10)
- Bachelor's degree: 31.6% (6)
- Master’s degree: 15.8% (3)

Q09 (General training of staff — multi-select)

- Natural sciences: 78.9% (15)
- Engineering & technology: 63.2% (12)
- IT / Computer science: 63.2% (12)
- Environmental sciences: 47.4% (9)
- Humanities/social sciences: 36.8% (7)

Summary reading (profile): highly "technical-scientific" sample, with a strong academic/research presence and RS/GIS companies; high level of education (over half PhD/post-grad).

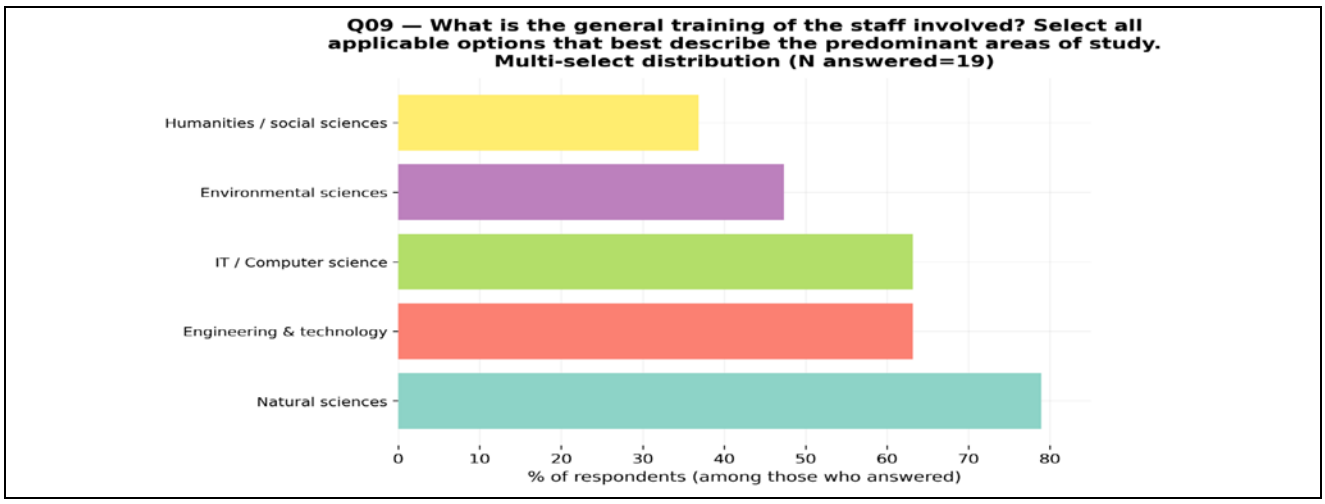

Figure 19. Skills of individuals within the organisation.

RS experience in cultural heritage and supply capacity

Q10 (Experience with RS in CH)

- Very experienced: 57.9% (11)
- Moderately experienced: 36.8% (7)
- No experience: 5.3% (1)

Q11 (Participated in satellite-based CH monitoring projects?)

- Yes: 94.7% (18)
- No: 5.3% (1)

Q12 (Main applications of RS in CH — multi-select)

- Monitoring CH sites & protected areas: 84.2% (16)
- Risk analysis (landslides/floods/subsidence/wildfires): 73.7% (14)
- Survey and mapping of archaeological sites: 73.7% (14)
- Documentation/diagnosis of structural damage: 52.6% (10)
- Monitoring illicit/conflict activities: 36.8% (7)

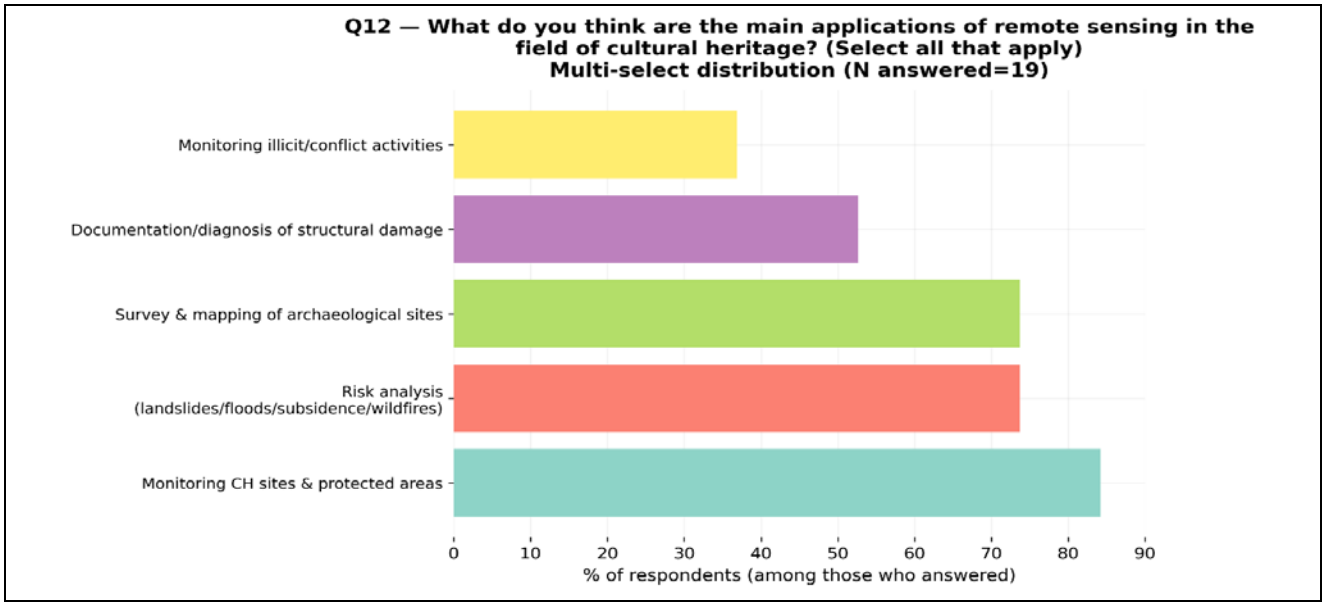

Figure 20. Main application in which Remote Sensing is used.

Q13 (Already use RS solutions for CH protection/monitoring?)

- Yes: 89.5% (17)
- No: 10.5% (2)

Q14 (Services/solutions you can offer with most added value — multi-select)

- Monitoring & early warning systems: 78.9% (15)
- Detailed cartography & 3D modelling: 73.7% (14)
- Structural deformation analysis (SAR): 68.4% (13)
- Integration with GIS platforms for asset management: 68.4% (13)
- "Other (free text)" marginal: ~5% (1–2 cases)

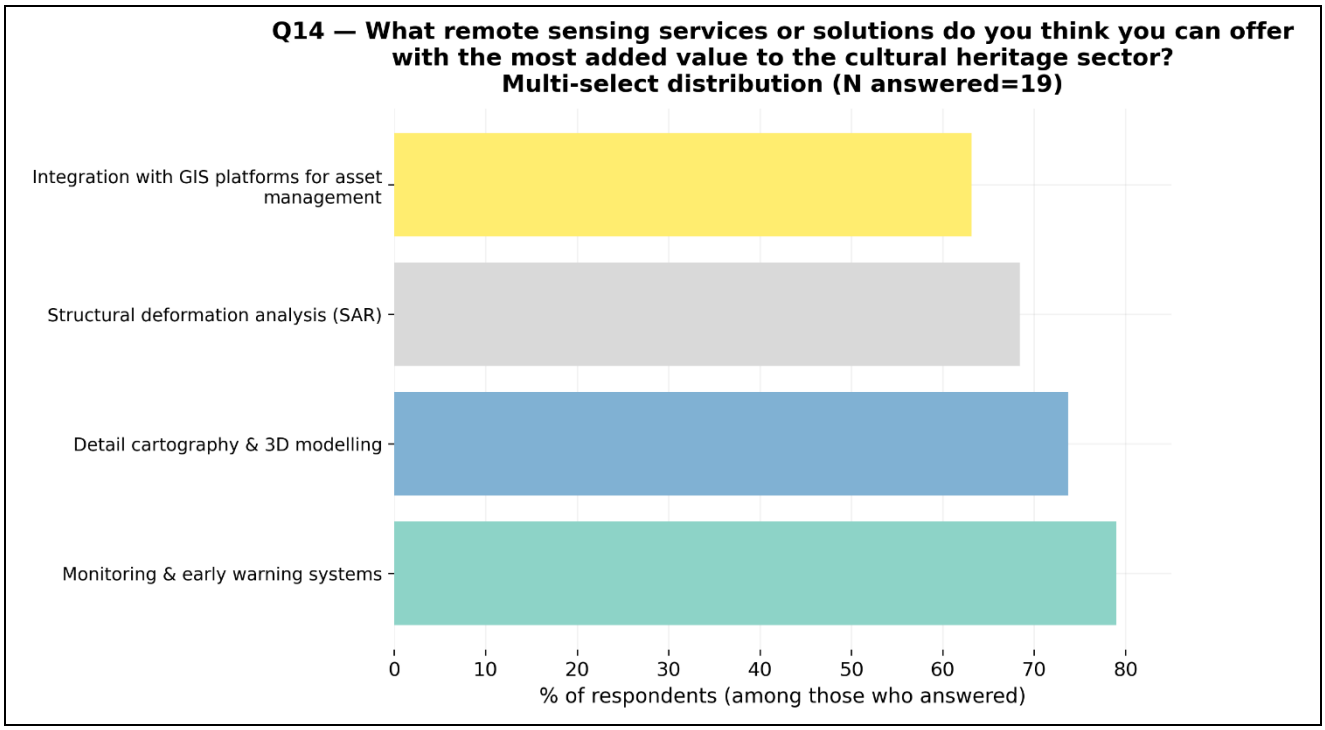

Figure 21. Use of Remote Sensing for cultural heritage.

Q15 (Challenges to adapt services to CH needs — multi-select)

- Need for CH-specialised personnel: 73.7% (14)
- Difficulty finding CH partners/clients: 57.9% (11)

- Interdisciplinary exchange / shared terminology: 42.1% (8)
- Cost of specific data acquisition: 36.8% (7)
- Regulatory/bureaucratic barriers: 21.1% (4)

Summary (market/services): high maturity (almost all already have experience/projects). The perceived bottleneck is not so much technical as organisational-interdisciplinary: CH personnel, CH partnerships/clients, and shared language.

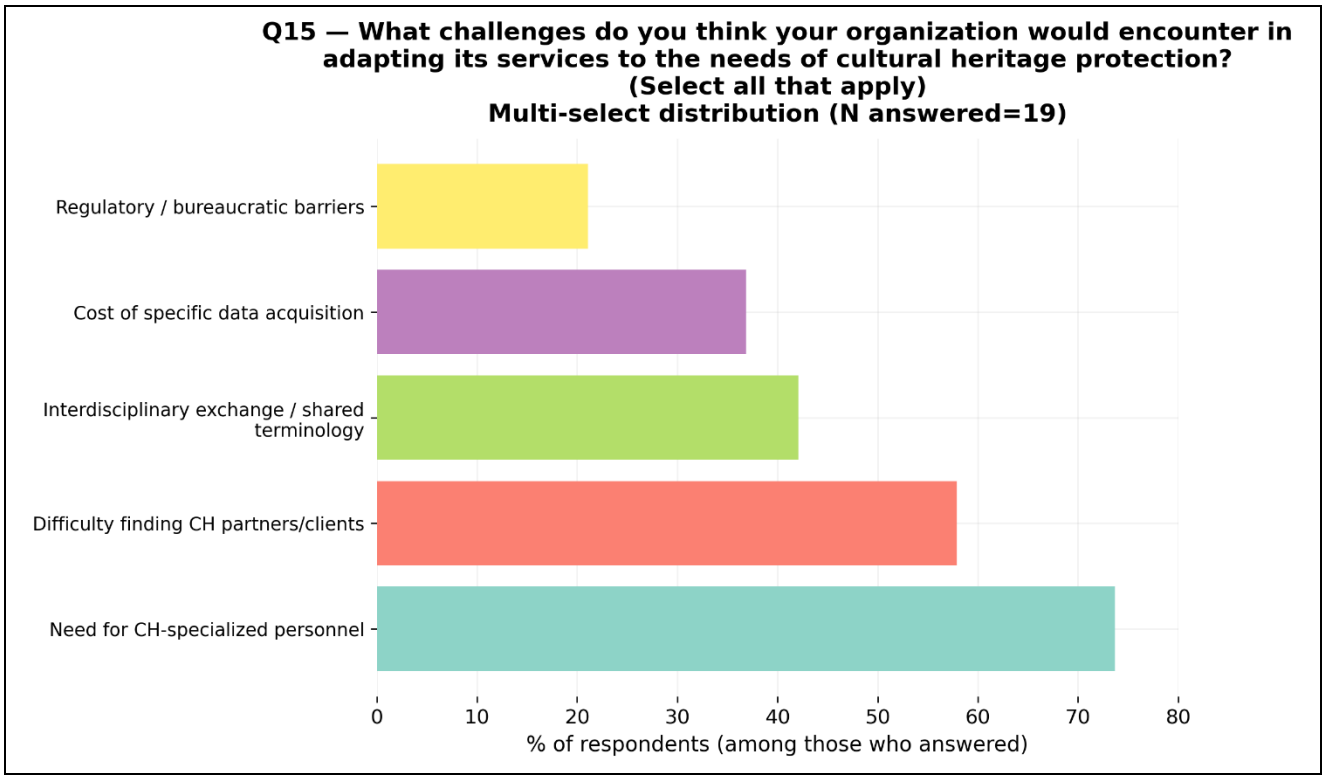

Figure 22. Challenges in proposing Remote Sensing for cultural heritage.

Training: availability, format, content, economic sustainability

Q16 (Interested in delivering training?)

- Yes: 78.9% (15)
- No: 21.1% (4)

Q17 (Training modalities you could offer — multi-select)

- Live online courses: 73.7% (14)
- In-person courses: 68.4% (13)

- On-site workshops at cultural sites: 47.4% (9)
- Blended (mixed mode): 42.1% (8)
- Recorded online courses: 26.3% (5)

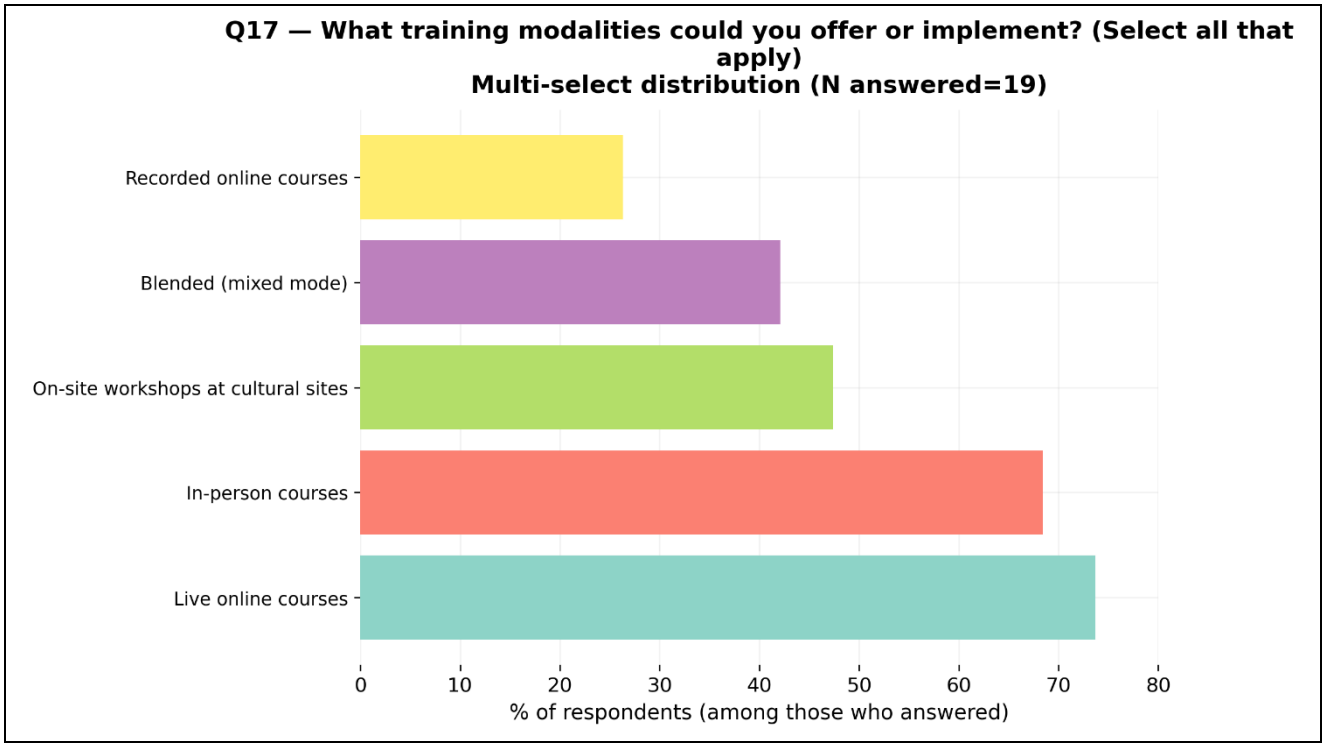

Figure 23. Course delivery format.

Q18 (Where training should focus — multi-select)

- Practical monitoring & prevention applications: 84.2% (16)
- Technical and theoretical foundations: 73.7% (14)
- Integration with GIS and heritage databases: 73.7% (14)
- Advanced data analysis & interpretation (SAR/hyperspectral/etc.): 57.9% (11)

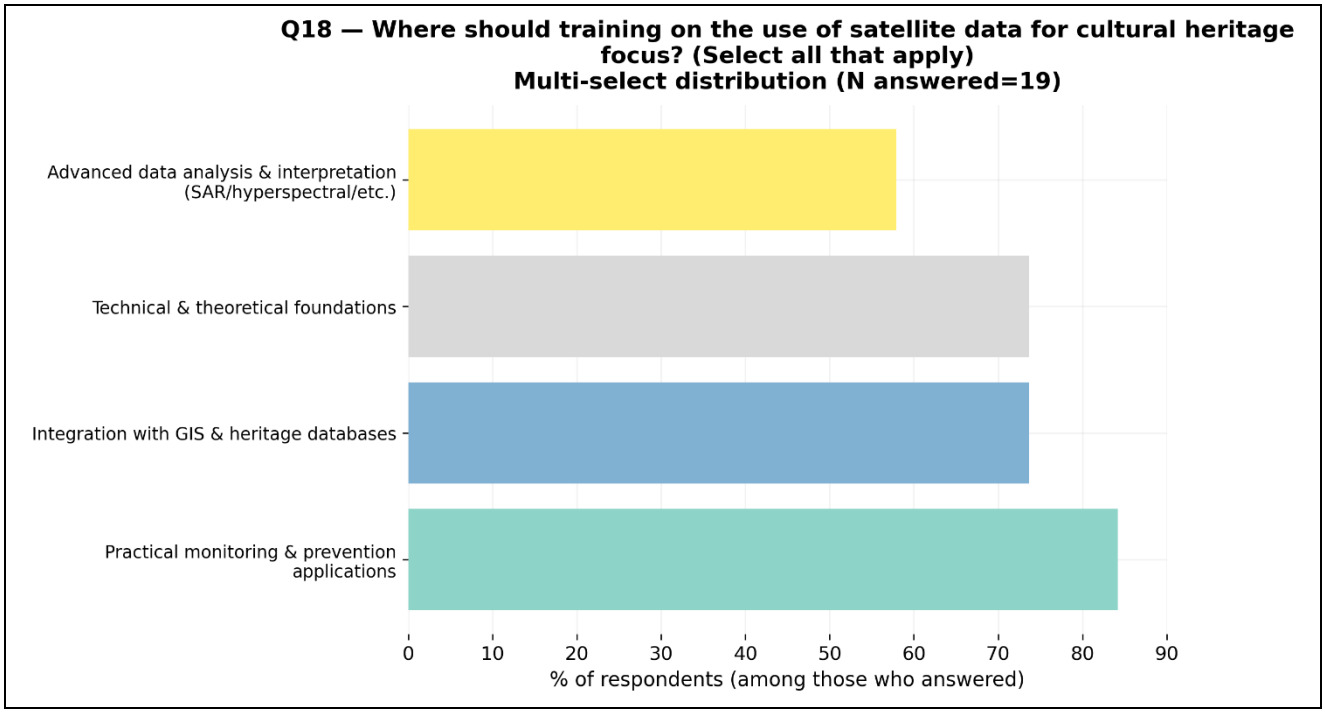

Figure 24. Course focus.

Q19 (Preferred arrangement for training delivery) ***(some responses are multiple selections)***

- No preference: 57.9% (11)
- Partnerships with CH institutions: 36.8% (7)
- Partnerships with training providers: 10.5% (2)
- In-house training: 10.5% (2)

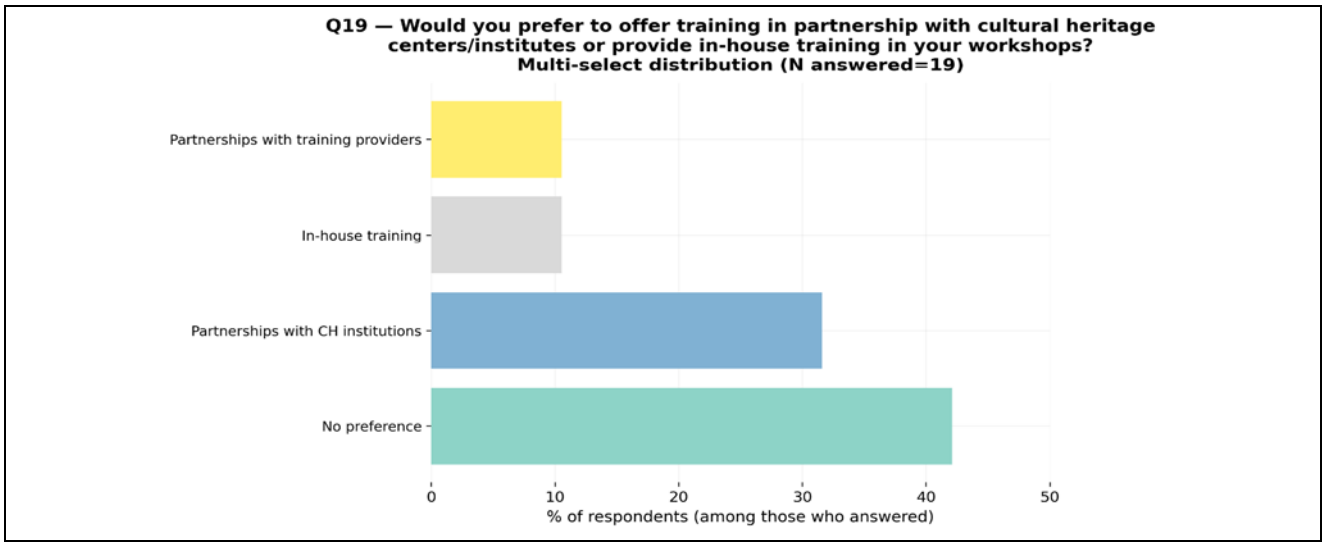

Figure 25. Methods and collaboration in the delivery of courses.

Q20 (Trainers available)

- 2–5 trainers: 63.2% (12)
- 6–10: 26.3% (5)
- 1 person: 5.3% (1)
- Could recruit external trainers: 5.3% (1)

Q21 (Time/resources willing to devote) ***(some multiple answers)***

- Depends on cost coverage: 47.4% (9)
- 1–4 weeks/year: 36.8% (7)
- <1 week/year: 26.3% (5)

Q22 (Budget dedicated to developing training services?)

- No: 78.9% (15)
- Yes: 21.1% (4)

Q23 (Appropriate price range for a 2–3 day course)

- Customised quotes: 31.6% (6)
- <£500 per person: 26.3% (5)
- £500–1,000 per person: 21.1% (4)
- £1,001–2,500:15.8% (3)
  (no cases above €2,500 in database)

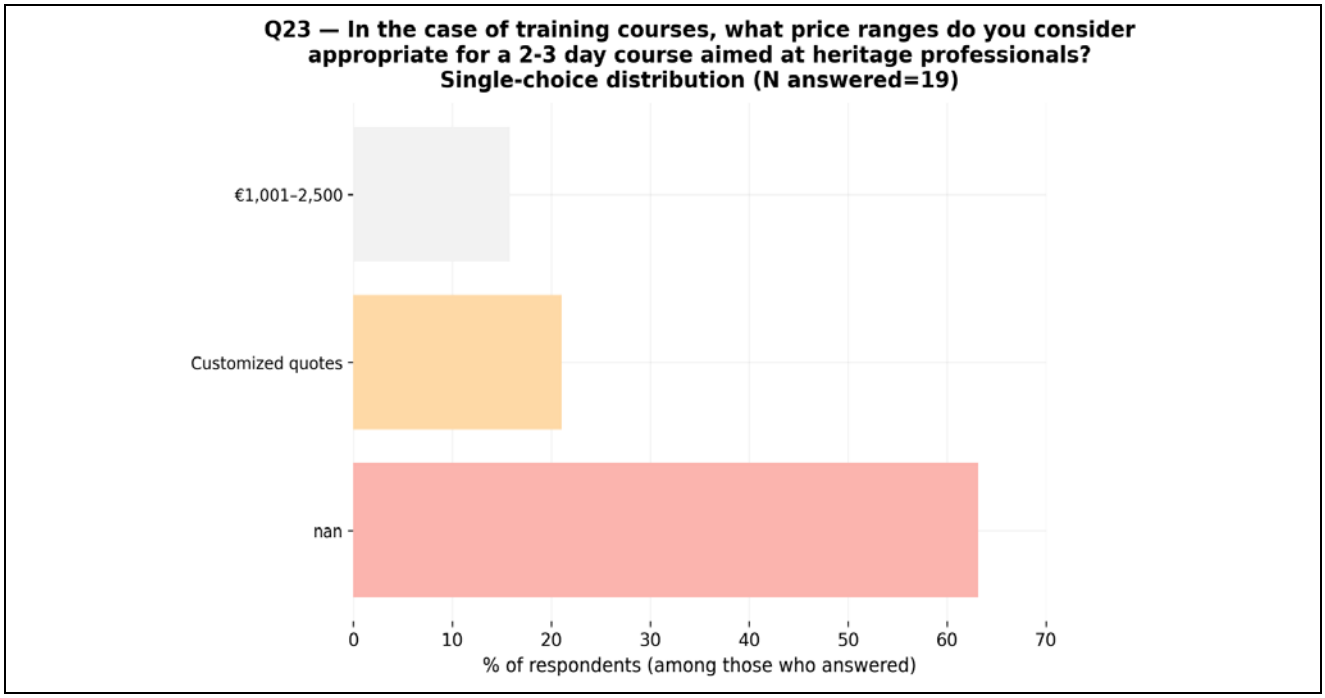

Figure 26. Costs considered appropriate for the courses.

Q24 (Willing to provide follow-up courses every 6–12 months?)

- Yes (periodic updates): 42.1% (8)
- Depends on conditions/fee: 42.1% (8)
- No (one-off only): 10.5% (2)
- No (we would not offer follow-up): 5.3% (1)
- Other (pay-as-you-go arrangement): 21.1% (4) *(here it emerges that some respondents already think in terms of a 'support model')*

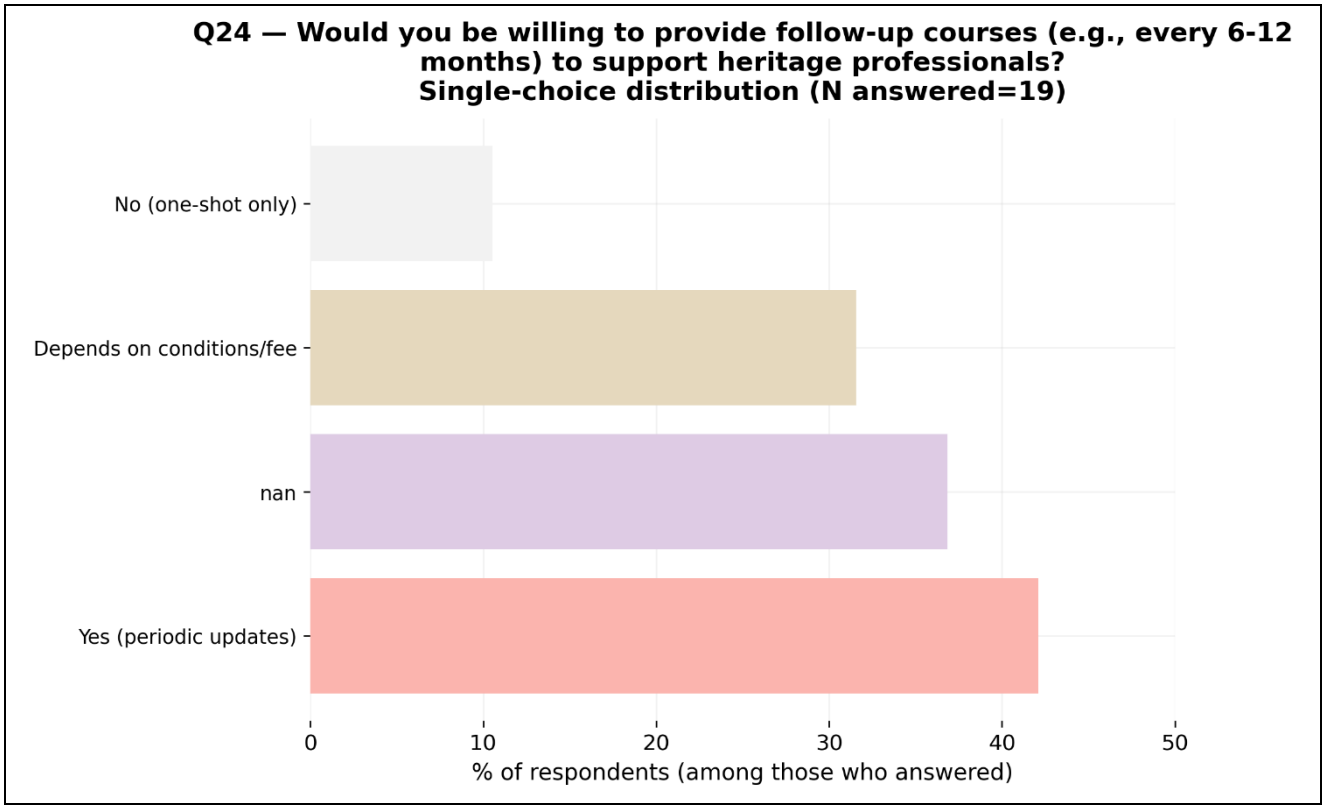

Figure 27. Professional refresher training methods.

Q25 (Preferred arrangement for refresher/ongoing support) ***(N responses = 15; 4 missing)***

- Pay-as-you-go: 40.0% (6/15)
- Package with periodic updates: 33.3% (5/15)
- Continuing care/maintenance contract: 20.0% (3/15)
- Other (long-term/licensing/outsourced ops; irregular): ~6.7% each

Summary reading (training):

- Strong potential for training provision (≈79% 'Yes'), but constrained by costs (Q21) and with a limited budget allocated (Q22).
- More realistic formats: live online + in-person + blended, with a good proportion interested in on-site workshops.
- Content: practical applications dominate, but fundamentals and GIS/DB CH integration remain crucial.

Expected impacts, infrastructure, tooling

Q26 (Expected positive impacts — multi; N=14 responses, 5 missing)

- Public relations/visibility: 85.7% (12/14)
- Networking opportunities: 71.4% (10/14)
- Additional funding: 64.3% (9/14)
- Innovation & internal expertise: 64.3% (9/14)
- Access to new market/customers: 64.3% (9/14)
- Career opportunities: 50.0% (7/14)
- Fun / cross-sector learning: 28.6% (4/14)

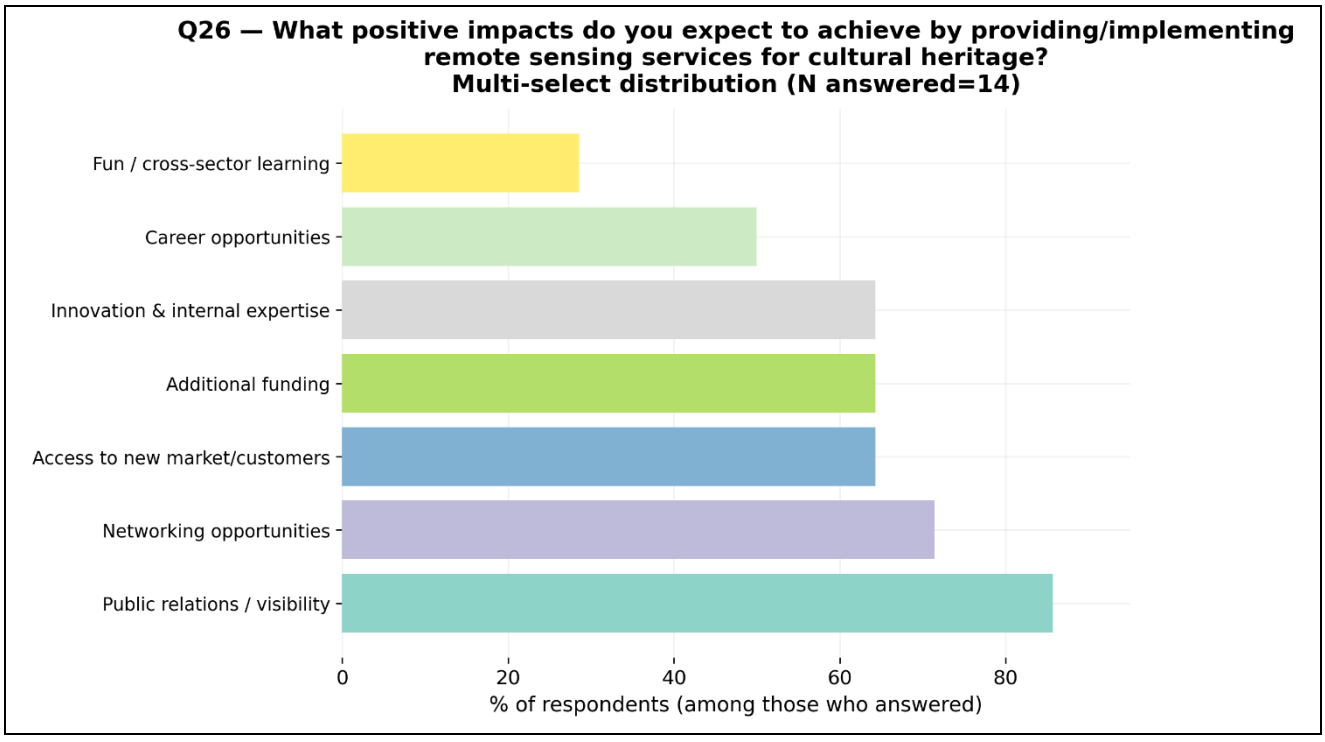

Figure 28. Expected impact.

Q27 (How to manage hardware/software investments) *(some multiple answers)*

- In-house infrastructure: 73.7% (14)
- Mixed (internal + cloud): 26.3% (5)
- Not yet decided: 21.1% (4)
- External platforms / third parties: 15.8% (3)

Q28 (Open-source vs proprietary preference)

- Mainly open source: 42.1% (8)
- Mix depending on project: 42.1% (8)
- Mainly proprietary licences: 10.5% (2)

Summary (tooling): strong orientation towards open source/mix (not 'proprietary only') and preference for internal infrastructure (but open to the cloud).

Communication, networking and willingness to act as an expert partner

Q29 (Best communication channels — multiple)

- Social media: 78.9% (15)
- Conferences/trade shows: 63.2% (12)
- Email newsletters: 57.9% (11)
- Workshops at CH conferences: 57.9% (11)
- Webinars/online seminars: 42.1% (8)
- Scientific journals: 26.3% (5)
- Workshops at EO conferences: 26.3% (5)
- Blogs/specialised websites: 15.8% (3)

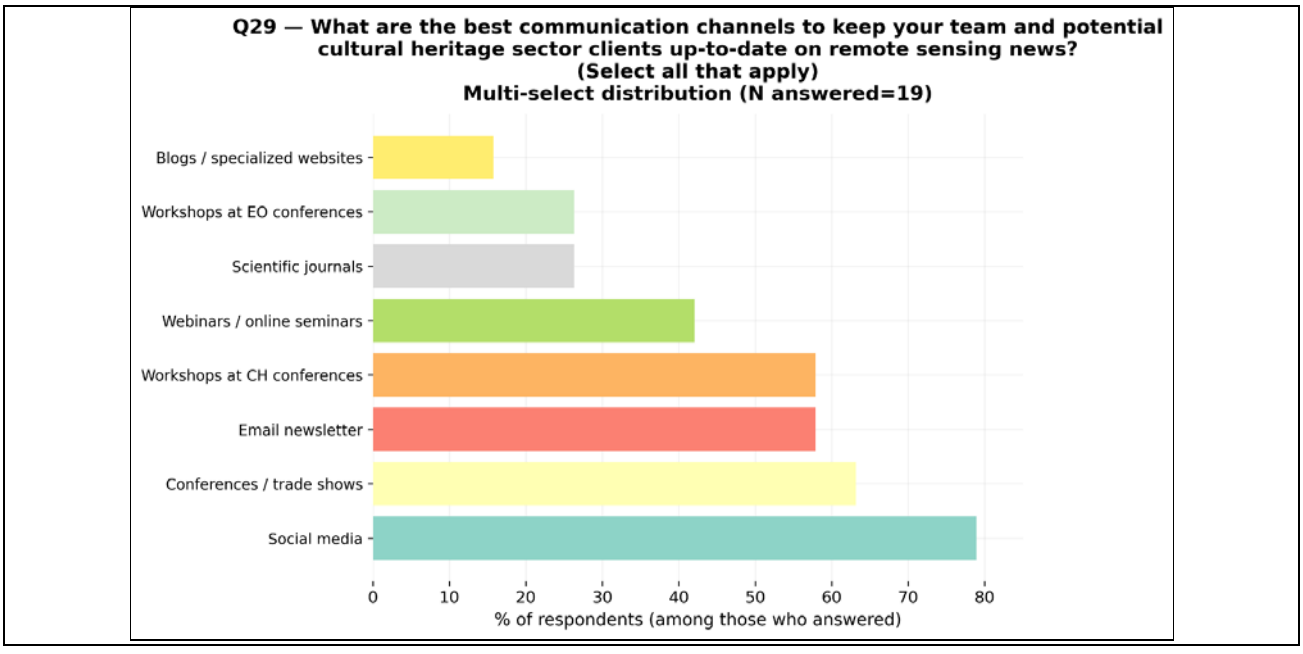

Figure 29. Communication methods.

Q30 (Interested in participating in EU networks/consortia?)

- Yes: 89.5% (17)
- No: 10.5% (2)

Q31 (Willing to act as expert partner at a CH site?)

- Yes, interested and available: 68.4% (13)
- Yes, subject to more information: 21.1% (4)
- Not sure / depends: 10.5% (2)
- (0 'No')

Summary (community building): very high willingness to both “network” and take action on CH sites, with a minority requesting organisational/technical clarification before committing.

As of March 31st, 2026

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

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