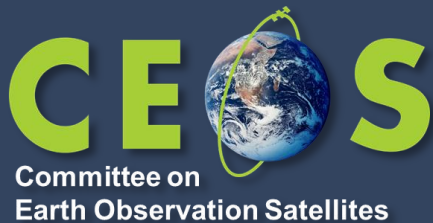


Update on CEOS-ARD Strategy 2026-2031



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- ❖ CEOS-ARD Oversight Group maintains high-level strategy for CEOS ARD Development
 - 2025 community engagement identified needs for improving effectiveness, impact, and user value.
 - *Where are the opportunities to make CEOS-ARD better?*
 - *How can we make CEOS-ARD more effective and impactful?*

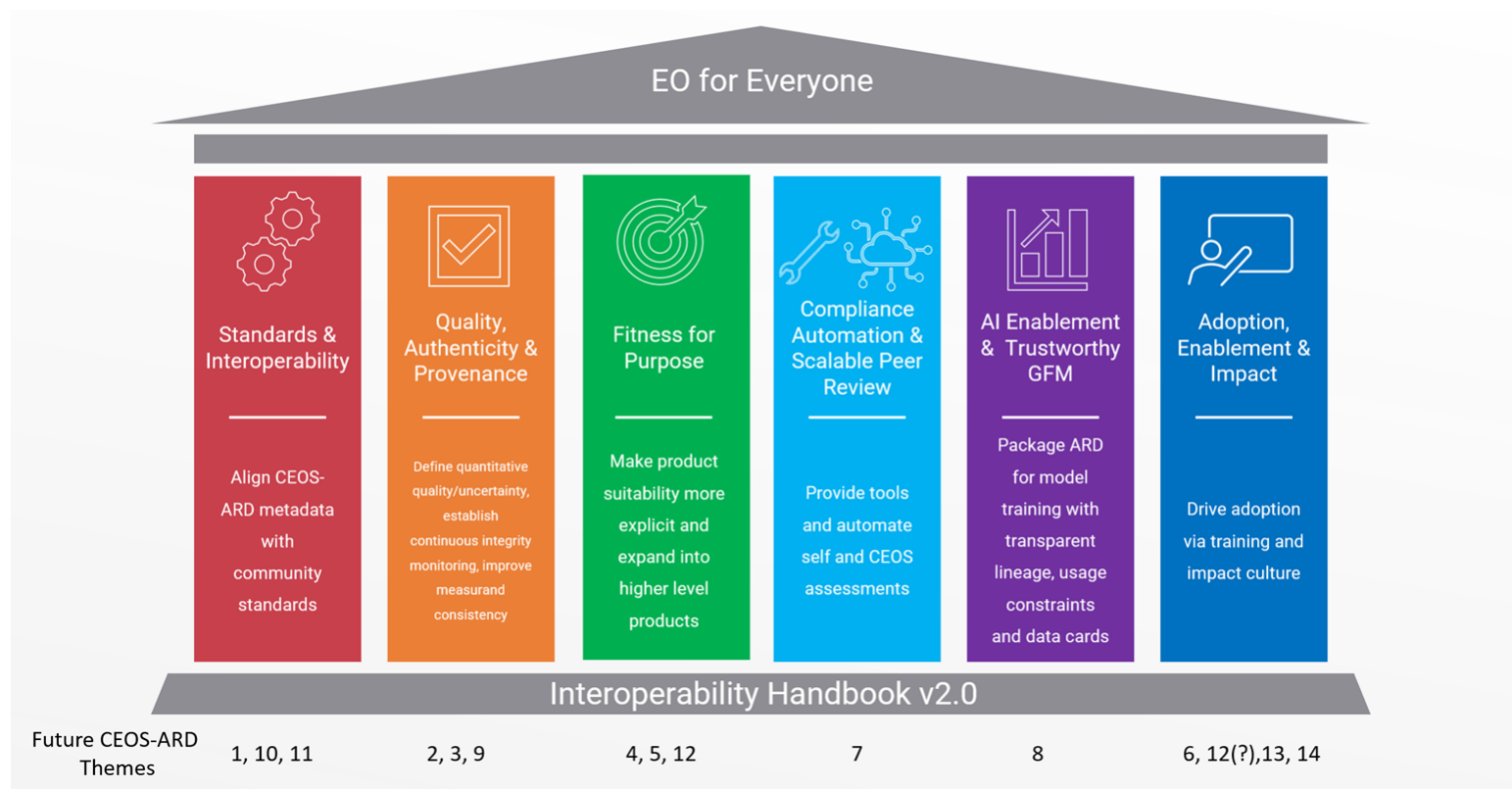
- ❖ Inputs compiled into consultation paper ([Future of CEOS ARD Concept Note](#)) and endorsed at Plenary 2025

- ❖ Vision: **Earth Observation for Everyone**; enabling users to address their questions significantly faster
- ❖ Overall, CEOS-ARD must be trusted, interoperable, scalable, indispensable.

1. Consistent and Enhanced Metadata Specifications
2. Data and Metadata Quality
3. Ongoing Quality Assurance and Integrity Monitoring
4. Fitness for Purpose
5. Increased Support to Scientific Applications and Environmental Adaptation and Resilience
6. Solidifying the Business Case and Increasing Commercial Relevance

7. Tools to Aid Compliance Assessments and Peer Reviews
8. Supporting Opportunities and Reducing Risks Related to AI / ML
9. Measurand Consistency and Algorithm / Application Resilience
10. Alignment with the Software Ecosystem
11. Analysis Ready Data Standards
12. Thematic and Higher-level ARD Products
13. Training and Outreach
14. Capturing Use and Impact

Strategic Pillars 2026-2031



1: Standards and Interoperability



Focus on ensuring CEOS-ARD metadata and data structures are interoperable across existing global standards.

Success Criteria:

- CEOS-ARD metadata is **consistently implemented across all Product Family Specifications**.
- CEOS-ARD data and metadata are **natively understood by mainstream software tools**.
- CEOS-ARD is recognised as the **de facto global community standard for satellite Analysis Ready Data**.

Outcome Signal: CEOS ARD datasets work seamlessly across mainstream geospatial tools and cloud-based processing environments. This means:

- CEOS-ARD metadata and data **work out-of-the-box** in mainstream tools and cloud workflows.
 - Users don't need custom scripts or manual schema mappings to use CEOS-ARD.
 - CEOS-ARD is seen as **ready-to-use**.
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2: Quality, Authenticity & Provenance



Addresses the need for measurable, transparent, and continuously verifiable data quality.

Success Criteria:

- CEOS-ARD products are accompanied by **quantitative, consistent, and comparable quality and uncertainty information**, not just descriptive compliance statements.
- Ongoing **integrity monitoring and reporting** is routine, enabling early detection of degradation or loss of compliance.
- **Provenance, authenticity, versioning, and lineage of data** are machine-readable and human-interpretable, and traceable across all mirrors, cloud platforms, and reprocessing cycles.
- If a user is building a time series or multi-mission analysis, they can swap or mix CEOS-ARD products with **no hidden biases or artifacts** being introduced.

Outcome Signal: Trust in the CEOS-ARD label is based on evidence.

3: Fitness for Purpose



CEOS-ARD products are clearly classified for their suitability across different applications, supporting both non-expert users and scientific communities.

Success Criteria:

- Users can clearly identify **what each CEOS-ARD product is fit for**, including limitations, uncertainty bounds, and appropriate application types.
- CEOS-ARD supports **long-term, stable, bias-aware data records** suitable for long-term scientific applications.
- Fitness-for-purpose distinctions help **non-expert users avoid misuse**, while giving providers clear pathways to improve product maturity.
- CEOS-ARD products are increasingly cited as **authoritative inputs** to global frameworks, indicators, and assessments.

Outcome Signal: Users can select CEOS-ARD products with confidence.

4: Compliance Automation and Scalable Peer Review



Reducing the burden of compliance assessments for data providers and assessors, enabling CEOS-ARD to scale across a growing number of providers.

Success Criteria:

- CEOS-ARD **assessments are largely automated**, repeatable, continuous, and embedded in provider pipelines.
- Peer review scales sustainably without relying on manual document checks.
- Providers experience **lower effort and faster turnaround** for CEOS-ARD endorsement.
- CEOS-ARD governance shifts from gatekeeping to **continuous assurance**.
- Contribute to commercial ecosystem enhancement by enabling independent third parties to undertake compliance assessments.

Outcome Signal: CEOS-ARD can scale to many more providers without slowing down and third parties emerge to provide commercial compliance services.

5: AI Enablement and Trustworthy GFM



Position CEOS-ARD as the gold standard for AI applications, including Geospatial Foundation Models (GFMs).

Success Criteria:

- CEOS-ARD products are widely used as **trusted training and benchmarking data** for geospatial AI and foundation models.
- CEOS-ARD defines product specifications for GFM-derived products, including embeddings, ensuring they carry the same quality and provenance guarantees as the source data.
- AI users understand dataset limitations through **clear provenance, uncertainty information, and data cards**.
- CEOS-ARD helps **reduce AI risk**, by discouraging use of poorly characterised data in high-impact applications.
- CEOS agencies are recognised as **stewards of high-quality training data**.

Outcome Signal: CEOS-ARD is referenced as a quality baseline in AI research and operational deployment.

6: Adoption, Enablement & Impact



Maximise CEOS-ARD adoption across public procurement, commercial markets, and end-user communities.

Success Criteria:

- CEOS-ARD is routinely referenced in **procurement, funding calls, and operational requirements** as a baseline expectation.
- CEOS-ARD is recognised as **community-driven**, being co-developed by CEOS and the broader community.
- Derivative and thematic CEOS-ARD products directly support **priority user communities** (e.g. agriculture, biodiversity, disasters).
- Commercial providers see CEOS-ARD endorsement as a **market differentiator**, not a compliance burden.
- Training, outreach, and documented case studies clearly **demonstrate real-world impact and return on investment**.
- Growing number of CEOS-ARD compliant datasets and a growing annual volume of CEOS-ARD compliant datasets across common 'data distributor' platforms based on a 2026 baseline.

Outcome Signal: CEOS-ARD success is measured by use and impact including through increased citations in the scientific and general literature.

- ❖ Dec 2025 – Commenced work
- ❖ Jan 2026 – initial meetings with CEOS ARD OG, WGCV, LSI-VC, CEOS Chair Team
- ❖ Feb 2026 – Review by core writing team of 50
- ❖ Mar 2026 – extended review by 200
- ❖ Week of 13 April – confirmation of direction from Principles at SIT-41

- ❖ Week of 20 April – Commence identifying Initiatives under Pillars at WGCV-56 and LSI-VC-19
- ❖ August 2026 – Summarise Initiatives
- ❖ Sept 2026 – Presentation of Strategy/Initiatives Package to SIT Technical Workshop
- ❖ Nov 2026 – CEOS Plenary – endorsement of Strategy and Initiatives

❖ Strawman Initiatives most relevant to WGISS

1: Standards and Interoperability

Initiatives under this pillar could include

- developing CEOS-ARD Metadata (vNext or v2), which will align specifications with STAC and | OGC/ISO standards, providing JSON and XML schemas for validation.
- Optical metadata (SR, Aquatic, Nighttime Lights) harmonization is to match the maturity of SAR specifications, reducing inconsistencies across product families.
- A formal roadmap to guide CEOS-ARD from a community-driven framework to a recognized standard, reassuring stakeholders of its stability and longevity.
- Published reference implementations and conformance test suites to accelerate adoption and reduce integration friction.

4: Compliance Automation & Scalable Peer Review

Initiatives under this pillar could include

- Automated validation tools to check metadata and technical compliance against CEOS-ARD specifications, reducing manual effort.
- Compliance-as-code to allow providers to integrate these checks directly into their production pipelines, ensuring continuous adherence.
- Online self-assessment workflows to replace static Word/PDF forms with structured web submissions, improving efficiency and transparency.
- Scalable peer-review processes that include shared decision logs and reviewer training to handle higher submission volumes without compromising rigor.
- Clear guidance, templates, and examples that support providers in meeting requirements.

5: AI Enablement & Trustworthy GFM

Initiatives in this pillar could include

- packaging CEOS-ARD datasets for model training with consistent tiling, splits, and licensing clarity.
- Implementing Data and Model Cards to provide structured documentation on provenance, limitations, biases, and permissible uses to mitigate risks in AI workflows.
- Enhanced traceability and versioning to support reproducibility and explainability. |
- Benchmark tasks and evaluation protocols published to guide AI developers and ensure robust performance.
- Engagement with AI research communities and platform providers to promote adoption and best practices.

NOTE: "Data cards" come from responsible AI and machine learning accountability...and are risk-focused ([The Data Cards Playbook - Data Cards Playbook](#)), [112_CameraReady_Data_Cards.pdf](#), and [Fairlearn_WhitePaper-2020-09-22.pdf](#).

Structure of "Data Cards" could include:

- **Dataset identity & scope:** name, product family, spatial/temporal coverage, resolution, versions.
- **Provenance & lineage (machine-readable):** processing history, algorithms/ATBD references, calibration updates, reprocessing policy, DOIs.
- **Quality & uncertainty for ML:** headline radiometric/geometric accuracy, uncertainty ranges; notes on drift/stability; known artefacts that affect training.
- **Bias, representativeness & gaps:** geographic/seasonal skews, sensor-specific quirks; where the data under-represents conditions (e.g., high-latitude winter).
- **Permissible use & constraints:** licensing, restrictions (e.g., not suitable for fine-scale change detection or trend estimation unless specific stability criteria are met).
- **Data split guidance:** recommended train/val/test strategies, tiling schemes, label alignment (if applicable), patch sizes.
- **Safety caveats:** failure modes, edge cases (e.g., saturated pixels, off-nadir effects), and recommended mitigations.

- ❖ Future CEOS Strategy 2026-2031 (and supporting Initiatives) will advance CEOS-ARD as trusted, interoperable, and impactful foundation for global EO use.