

# Advancing drone data management through better interoperability and awareness around ethics

## 24th Plenary Meeting Collaborative Notes

**Group(s) name(s) organising the session:** Small Uncrewed Aircraft and Autonomous Platforms Data Working Group

**Session link:**

[https://www.rd-alliance.org/groups/small-uncrewed-aircraft-and-autonomous-platforms-data-working-group/plenary-participation/?application\\_id=174511](https://www.rd-alliance.org/groups/small-uncrewed-aircraft-and-autonomous-platforms-data-working-group/plenary-participation/?application_id=174511)

**Session scheduled date/time/breakout session:** 08.04.2025, Breakout 3, 07:00 UTC

### Session summary (for Group co-chairs)

We will use the content in the table below to highlight your work to the RDA community as a report organised by the Technical Advisory Board.

Please complete ALL fields below by **Friday 25th April, close of business** to be included in the report & social media activities.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Summarise your session in three sentences:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p><i>As part of the session, we provided an overview of the work undertaken since last year to improve the recommendations for drone data management. In particular, we identified the following topics as common challenges for managing drone data:</i></p> <ul style="list-style-type: none"> <li>• Data storage</li> <li>• Image vs sensor data</li> <li>• Data format</li> <li>• Data pipeline</li> <li>• Interoperability and metadata</li> <li>• Ethics and privacy</li> </ul> <p><i>We proposed in the second part of the session, best practices to improve interoperability of drone data and guidelines to ethically handle the data.</i></p> |
| <b>Key outcomes/actions/takeaways</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <ol style="list-style-type: none"> <li>1. Recommendation for metadata and best practices to improve interoperability of drone data</li> <li>2. General guidelines to ethically handle the data ethically</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Synergies and/or possible collaborations identified with RDA groups and other groups:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <ul style="list-style-type: none"> <li>- PIDINST</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

- Ethics group

Get involved in [RDA Community](#)

This meeting will take place according to the [RDA Code of Conduct](#)

## Attendee Check-in

*Please complete this table to indicate your attendance (add rows as needed):*

| Full Name          | Affiliation                                          | Location            | Email                              |
|--------------------|------------------------------------------------------|---------------------|------------------------------------|
| Nina Grau          | CODATA                                               | France              | nina@codata.org                    |
| Kylie Black        | Australian Research Data Commons                     | Perth, Australia    | kylie.black@ardc.edu.au            |
| Alice Fremand      | UK Polar Data Centre- British Antarctic Survey       | Cambridge, UK       | almand@bas.ac.uk                   |
| Lara Ferrighi      | MET Norway                                           | Oslo, Norway        | laraf@met.no                       |
| Jens Klump         | CSIRO                                                | Perth, Australia    | jens.klump@csiro.au                |
| Katherine Rial     | Helmholtz-Zentrum Berlin für Materialien und Energie | Berlin, Germany     | katherine.rial@helmholtz-berlin.de |
| Meta Pirc          | Slovenian Social Science Data Archives               | Ljubljana, Slovenia | metka.pirc@fdv.uni-lj.si           |
| Johannes Heinonen  | Tampere University                                   | Tampere, Finland    | johannes.heinonen@tuni.fi          |
| Stéphanie Cheviron | Université de Strasbourg                             | Strasbourg, France  | scheviron@unistra.fr               |
| Graeme Diack       | Atlantic Salmon Trust                                | Perth, Scotland     | graeme@atlanticsalmontrust.org     |
| Joerg Geiger       | University Wuerzburg                                 | Wuerzburg, Germany  | joerg.geiger@uni-wuerzburg.de      |
| Ana Inkret         | Slovenian Social Science Data Archives               | Ljubljana, Slovenia | ana.inkret@fdv.uni-lj.si           |

## Supporting Documents

Link to the slides:  [RDA\\_VP24\\_Session\\_20250408.pptx](#)

### Use case compilation:

 Small Uncrewed Aircraft and Autonomous Platforms Data WG Survey and Use Case ...

### Previous work led by the Interest Group:

- sUAV IG has conducted survey previously (see Wyngaard, J., Barbieri, L., Thomer, A., Adams, J., Sullivan, D., Crosby, C., ... & Bell, T. (2019). Emergent challenges for science sUAS data management: fairness through community engagement and best practices development. Remote Sensing, 11(15), 1797.  
<https://doi.org/10.3390/rs11151797>)
- Making Drone Data FAIR Through a Community-Developed Information Framework -  
<https://datascience.codata.org/articles/10.5334/dsj-2023-001>

### Other work led by other members of the WG and/or broader community:

#### Metadata

- Fremand, Alice. 2023 UAV data management handbook. UK Polar Data Centre, British Antarctic Survey, 13pp. <https://nora.nerc.ac.uk/id/eprint/536392/>
- Fremand, Alice. 2023 Towards a data commons: Imagery and derived data from autonomous and remotely piloted aerial vehicles. UK Polar Data Centre, British Antarctic Survey, 24pp. <https://nora.nerc.ac.uk/id/eprint/536398/>

#### General report

- Philip Anderson (SAMS), Luke Bateson (BGS), Barbara Brooks (NCAS), Richard Dale (SAMS), Nick Everard (UKCEH), Charlotte Francoz (NOC), Charles George (UKCEH), France Gerard (UKCEH), Tom Jordan (BAS), Zixia Liu (NCEO), Aser Mata (PML), Hugo Ricketts (NCAS), Carl Robinson (BAS), Pilvi Saarikoski (BAS), Beatrix Schlarb-Ridley (BAS), Kay Smith (BGS), James Strong (NOC), Martin Wooster (NCEO), 2024. A Review of the Role of Uncrewed Aerial Systems in the Decarbonisation Strategy of NERC Aerial Activities.  
[https://www.bas.ac.uk/wp-content/uploads/2024/10/NZArC\\_Scoping\\_Report\\_2024.pdf](https://www.bas.ac.uk/wp-content/uploads/2024/10/NZArC_Scoping_Report_2024.pdf)

## Collaborative Session Notes *(To be used by participants and chairs during the session)*

### Introduction

#### RDA and RDA TIGER description

RDA: for and with researcher on data driven innovation

RDA TIGER: provide service to ease the quality of life of WG

### Project description

#### SUAV WG aims & objectives

UAS/RPAS/UAV Autonomous platforms have become important tools for the collection of data from the environment. They can acquire data at higher temporal and spatial resolutions

and in environments that are too hazardous to work in. As sUAS hardware and instrumentation have become much more accessible, the volume of data collected has grown. While cloud computing infrastructures can offer the necessary scalability, common data and metadata practices are still lacking. The use of autonomous platforms in marine research is well advanced, and best practices can potentially be transferred to sUAS data management.

The WG will collect use cases of data collection and processing by uncrewed and autonomous platforms from different disciplines and document best practices. The WG will use the collected material to develop recommendations for data and metadata best practices, focusing on interoperability with the European Open Science Cloud (EOSC) and other virtual research environments (VREs). The expected outputs of the WG are specifications for metadata and data coming from uncrewed and autonomous vehicles used in research and demonstrators to show how these guidelines support the design and implementation of cloud-based data infrastructures for sUAS data.

## Description of the work led by the WG

### Landscape analysis :

Description of the service

Summary of the recommendations provided

### Use case document aims & objectives

**Goal:** Collect use cases to find patterns and common issues related to the collection and use of drone data.

**Methodology:** Free form information collection where participants are asked the following questions:

#### Two ways to contribute:

- Fill in the Google document:  
[Small Uncrewed Aircraft and Autonomous Platforms Data WG Survey a...](#)
- Respond to the following form: <https://forms.office.com/e/mDuf8SHHA1>

### Example presentation 1: The Example of the UK Polar Data Centre

- observation of marine ecosystem with a large panel of disciplines.
- Come up with a common UAV metadata list and checklist for researchers. UAV data management has been published : <https://nora.nerc.ac.uk/id/eprint/536392/>
- Penguin watch project: citizen science initiative. Challenge has the dealing with a large amount of data
- Polar airborne geophysics data portal: <https://www.bas.ac.uk/project/nagdp/>

### Example presentation 2: Agriculture and geosciences in Australia

- Pipeline description, .. Challenge in data processing platform with unstable algorithm, no metadata to describe the process

*Chat question Joerg Geiger : does a data vocabulary for the UAV data management handbook exist?*

List of the challenges of the different use cases

- Need for recommendation for managing very large imagery datasets in a comprehensive manner.
- Long-term storage and effective processing of stitched imagery have created bottlenecks in the project.
- Data volume of the primary data, recording provenance, parametrisation of the filters.
- The complexity of SfM pipelines is the plethora of algorithms and parameter settings within those algorithms that are available. Choosing which algorithms and settings are specific.
- The greatest value the ASDC can provide is to make the act of tuning/choosing easy for the user and otherwise ensure little human intervention.
- Which metadata do we need to record? The software to correct the GNSS errors cannot be called from a script. The Lidar processing software cannot be called from a script. Do we keep all the raw data or just processed products (disc space!).
- In addition to metadata challenge, user friendly access to the software building blocks and joined up pipeline does not yet exist. Initial creation of training data for AI algorithms is time consuming, so storing training data with appropriate metadata for re-use is crucial.

Common topics:

- Data storage
- Image vs sensor data
- Data format
- Data pipeline
- Interoperability and metadata
- Ethics and privacy

Discussion of the priorities of the Working Group activities as the future direction of the WG

Topic 1: Improving Interoperability:

Objectives: describe drone data

Framework: Use the work done by the former RDA IG group [Small Unmanned Aircraft System Data](#), like Making Drone Data FAIR Through a Community-Developed Information Framework <https://doi.org/10.5334/dsj-2023-001>

Ontologies: SOSA ontology, IADOPT ontology framework, <https://www.landrs.org/>

PIDs

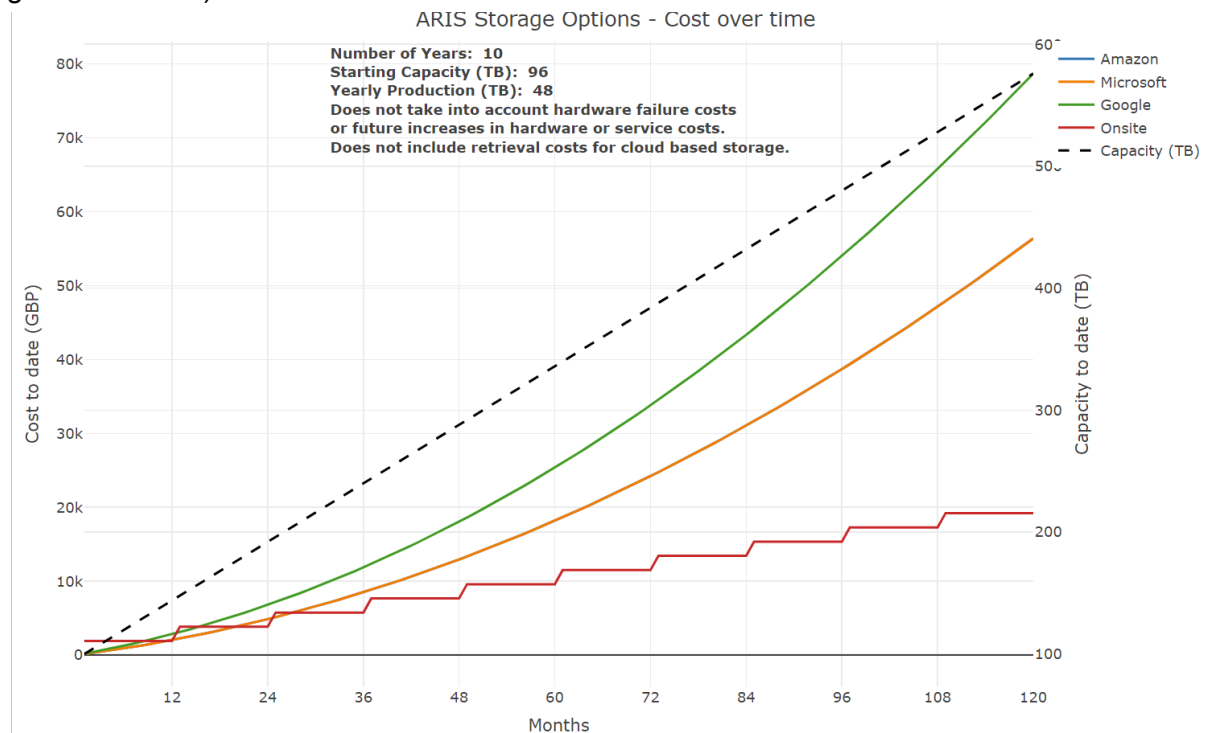
Data format need to be harmonised

Data processing level: e.g. disparity on different level of curation meaning

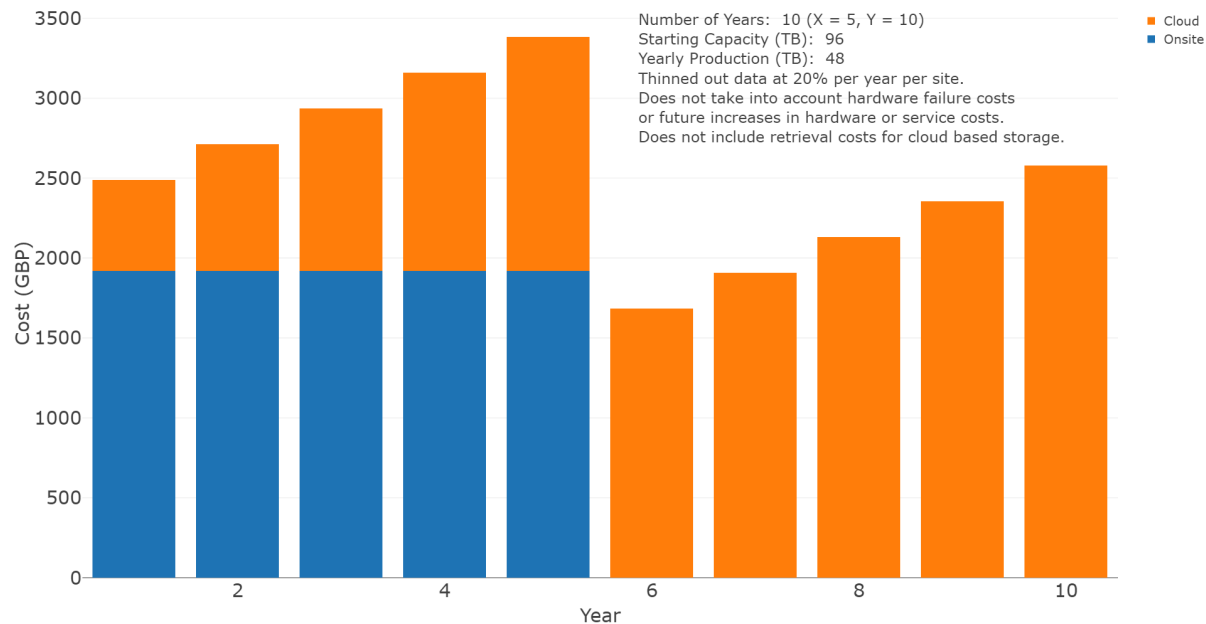
Discussion: if we want to provide guidelines for researchers or data managers, what would it be?

GraemeDiack: highlight the challenge of storage > use NAS (Network Attached Storage) capture Salmon on the river and help to select which data to keep NAS devices and cloud storage.

GD: In the Atlantic salmon trust we are still designing our data solution for both Drone data and ARIS sonar video which also produces a lot. Our first thoughts on this are hybrid NAS and Cloud. I've done some pretty rudimentary comparisons, for example this plot highlights how cloud compares to onsite at current prices keeping 100% of the footage, and shows that cloud on it's own is prohibitively expensive (i should note that these cloud prices are for Glacier type storage, in other words the cheapest to store but the most expensive to gain access to!)



But this next plot shows that using cloud storage as a backup for 10 years worth of the 'thinned' footage (20% of original size) alongside onsite storage for 5 years worth of the full footage might be a reasonable balance:



This is a per year cost, whilst the first is a cumulative cost, so not a totally fair comparison but it is still possible to see the point I think. I do have the yearly costs of the first but I don't want to bombard this document with plots! I'm happy to share the R code I used to produce these if it is useful to kick start something for this working group.

Joerg: concerns about privacy, not only legal but also cultural aspects

## Topic 2: Ethics and privacy

### Privacy and surveillance

- The EU General Data Protection Regulation (GDPR) and similar data privacy protection regulation.
- Some research will require to collect consent before starting a survey.

### Data security

- Data protection law requires to process personal data securely, with appropriate organisational and technical measures in place. The security measures must be "appropriate" to the nature, scope, context and purpose of the processing and the risks posed to the rights and freedoms of individuals.

### Environmental and wildlife impact

- Guidelines on drone use near wildlife.
- The International Union for Conservation of Nature (IUCN) recommendations for ethical wildlife research.

### Regulatory and legal compliance

- Different countries have specific laws governing drone use. You should refer to the national aviation authority applicable for the survey.

## General guidance

### Data Collection:

- Adhere to relevant national civil aviation rules
- Adhere to privacy laws and ethical guidelines, particularly regarding sensitive or location-specific data -Define clear purposes for data collection
- Establish secure storage protocols
- Create procedures for handling accidental captures



- Follow best practices regarding environmental and wildlife protection

#### Community Relations:

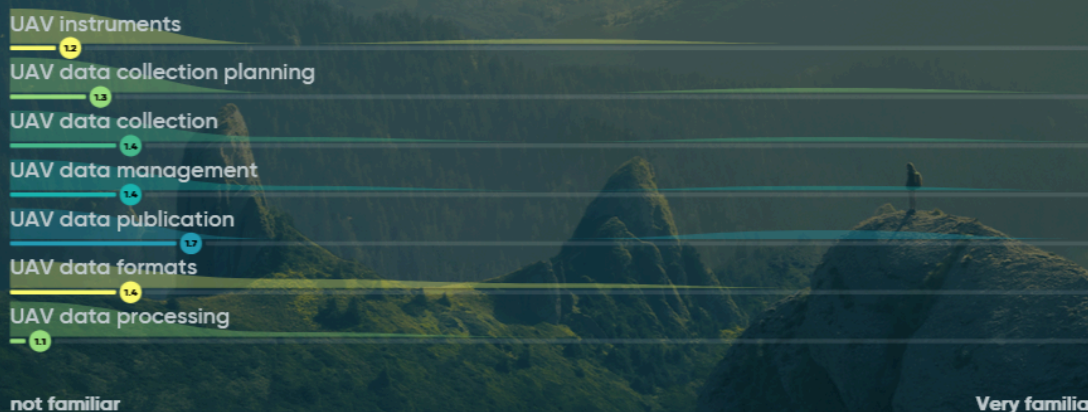
- Develop community engagement strategies
- Maintain transparent operations
- Respond promptly to concerns
- Build trust through consistent ethical behaviour
- Apply CARE principles if working with indigenous communities

#### Data Processing and publication:

- Processing might be required to blur or anonymise personal data collected with drone.
- data as open as possible, as closed as necessary

### Menti results

#### How familiar are you with ...



#### What are your biggest challenges with UAV data ?

1 response

Storage- each flight produces at least 120gb of data once processing etc is complete.

#### What would you like to see as recommendations from the WG?

1 response

would recommended storage solutions be worth a discussion?