Small Uncrewed Aircraft and Autonomous Platforms Data WG - Case Statement

Working Group Charter

Small uncrewed aircraft (sUAS, also known as drones, remotely piloted aircraft or uncrewed aerial vehicles) and Autonomous platforms have become important tools for collecting data from the environment. They offer the potential to acquire data at higher temporal and spatial resolutions and in environments that are too hazardous to work in. Today, with the development of miniaturised sensors and the availability of performant autopilot hardware and software, they have become accessible and cost-effective platforms for collecting high volumes of data.

While cloud computing infrastructures can offer the necessary scalability for processing the large volumes of data produced by these platforms, the lack of common data and metadata practices is a barrier to interoperability and reuse.

Following the example of marine autonomous platforms, which is much further advanced in terms of data and metadata standardisation, the aim of the Small Uncrewed Aircraft and Autonomous Platforms Data WG is to produce recommendations for data and metadata coming from sUAS and autonomous platforms to support interoperability and reuse of these data in research data infrastructures. 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 virtual research environments (VREs) such as the European Open Science Cloud (EOSC), the Australian Research Data Commons (ARDC), the African Open Science platform.

The expected outputs of the WG are:

1. specifications for metadata and data collected from uncrewed and autonomous vehicles used in research, and
2. demonstrators to show how these guidelines support the design and implementation of cloud-based data infrastructures for sUAS data.

Value Proposition

The development of recommendations for general and domain-specific data and metadata formats will help streamline the data life cycle in research using sUAS and autonomous platforms, thus making it easier to process these data on research cloud infrastructures. These recommendations will be developed in line with the guidelines developed as part of the RDA Global Open Research Commons International Model (GORC) Working Group, contributing to the core element of the model: interoperability. Through these Recommendations, we are also looking at improving reuse and standardised workflows to manage UAS data from collection and processing to publication and reuse. The development of these recommendations will be accelerated by transferring existing successful tools and formats

from related areas, such as marine autonomous platforms or other airplane data management practices.

The primary target audience is researchers working with data collected by sUAS and Autonomous Platforms with a focus on the key metadata and data formats to achieve FAIR data to support interoperability. Beyond their use in research, the open nature of the guidelines is expected to lower entry barriers for SMEs as service providers for missions using Small Uncrewed Aircraft and Autonomous Platforms data by giving guidance on how to best acquire data for further processing on cloud-based platforms. The potential and existing use of sUAS in environmental monitoring and infrastructure maintenance is expected to support achieving the aims of the UN SDGs.

Engagement with existing work in the area:

The group will conduct a survey of the landscape of sUAS and Autonomous Platforms data and data processing platforms. This survey will draw on best practice examples from related fields like autonomous vehicles in marine environments or airborne research facilities such as EUFAR (European Facility for Airborne Research). The group will connect with related existing groups in RDA and other research networks, such as the Earth Science Information Partners (ESIP) and the Australian Scalable Drone Cloud project in the ARDC Planet Data Commons.

Within RDA, the group will work with the following groups:
Improving Global Agricultural Data (IGAD) Community of Practice, Geospatial IG, Metadata IG, Marine Data Harmonization IG, Vocabulary Services IG, Weather Climate and Air Quality IG, FAIR Instrument Data IG, Global Water Information IG, Persistent Identification of Instruments WG, Working with PIDs in Tools IG.

UN Sustainable Development Goals (SDGs):

SDG 2: Zero Hunger. Food security and nutrition and sustainable agriculture
sUAS are being used in weed detection, plant phenomics measurements, and agricultural management, contributing to increasing crop yields and sustainable agriculture.

SDG 6: Clean Water and Sanitation
sUAS and autonomous platforms are being used in monitoring water bodies and wetland ecosystems, contributing to a better understanding of the state of freshwater ecosystems and water quality.

SDG 14: Life in Water. Ocean and Seas
sUAS and autonomous platforms are being used in marine monitoring, contributing to a better understanding of the state of the ocean and marine ecosystems.

SDG 15: Life on Land. Biodiversity and Ecosystems

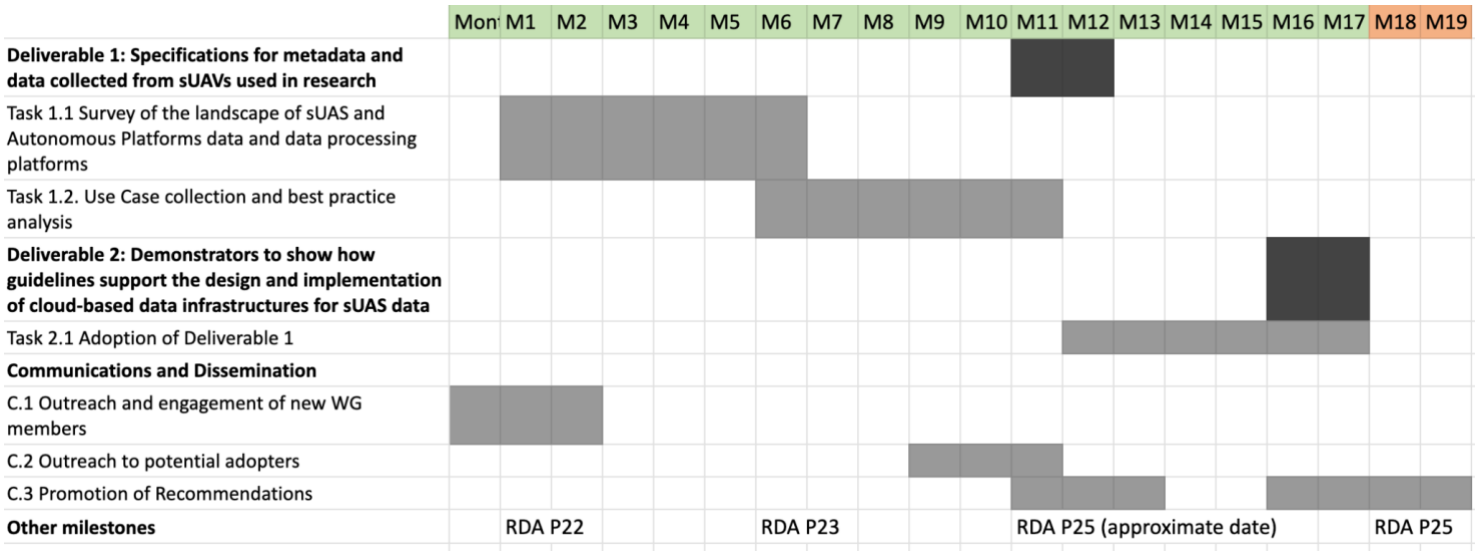
sUAS are being used in terrestrial environmental monitoring in numerous ways, including species and weed detection, contributing to a better understanding of terrestrial ecosystems.

Work Plan:

- Plenary 22 (May 2024) - kick-off workshop, start of landscape survey.
- Plenary 23 (October 2024) - Presentation of landscape survey, start of specifications for drone services and data based on input from potential adopters.
- Plenary 24 (March 2025) - Presentation of draft specifications for drone services and data and community feedback. Start of a demonstrator for standardised drone services and data. Review of adoption of recommendations. Submission of Recommendations for TAB endorsement.
- Plenary 25 (October 2025) - Presentation of specifications for drone services and data and their interoperability with research cloud services as an RDA Recommendation.

The WG will meet monthly between RDA Plenaries. Where necessary, smaller, task-focused sub-groups will meet to focus on specific activities and use the larger monthly WG meetings to update the rest of the WG on their progress.

The following Gantt chart outlines the timeline for the WG's deliverables, tasks and other key activities:



Adoption Plan:

The group will work with existing networks to seek input and feedback from the community of uncrewed and autonomous platform users. It will actively seek to broaden its network to include groups currently not connected to RDA or ESIP.

Target communities:

- NERC Environmental Data Service (e.g., UK Polar Data Centre, BODC)
- ARDC Planet Data Commons, CoastRI

- IMOS
- USGS
- Data Repositories (e.g., PANGAEA)

The landscape survey will help the WG identify and connect to further communities for input on the recommendations and their adoption.

Initial Membership:

The Group's initial co-chairs will be:

- Jens Klump (CSIRO, Perth, Australia)
- Alice Fremand (UK Polar Data Centre, British Antarctic Survey, Cambridge, UK)
- Thabo Semong (Botswana International University of Science and Technology (BIUST))

The initial membership will be drawn from the current members of the the Small Unmanned Aircraft Systems' Data IG: https://www.rd-alliance.org/groups/small-unmanned-aircraft-systems-data-ig/. In addition, the following attended the Group's 'kick-off' meeting in November 2023, indicating a willingness to join the Working Group.

Name	Institution
Justin Buck	National Oceanography Centre, UK
Robert Huber	Universität Bremen/PANGAEA
Sirko Schindler	German Aerospace Center (DLR)
Matti Heikkurinen	RDA Europe
Charles George	UKCEH
imma Mwanja	Virginia Tech University
Siddeswara Guru	TERN, University of Queensland, Australia
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Donald Sullivan	NASA Airborne Science Program