



# WILDDRONE

D4.2 –

## Curriculum of M9 training events

WP4, T4.1 Organise and implement outlined training

Version 1.0 – 11/12/2023

**Authors:** Steve Bullock (UB),  
Ulrik Pagh Schultz Lundquist (SDU),  
Elzbieta Pastucha (SDU)



*WildDrone is an MSCA Doctoral Network funded by the European Union's Horizon Europe research and innovation funding programme under the Marie Skłodowska-Curie grant agreement no. 101071224.*

# Disclaimer

The content of this deliverable reflects only the author's view. Neither the Research Executive Agency (REA) nor the European Commission is responsible for any use that may be made of the information it contains.

# Copyright Notice

©2023 WildDrone Consortium Partners. All rights reserved. WildDrone is an MSCA Doctoral Network funded by the European Union's Horizon Europe research and innovation funding programme under the Marie Skłodowska-Curie grant agreement no. 101071224. For more information on the project, its partners, and contributors, please see the WildDrone website ([www.wilddrone.eu](http://www.wilddrone.eu)). You are permitted to copy and distribute verbatim copies of this document, containing this copyright notice, but modifying this document is not allowed. All contents are reserved by default and may not be disclosed to third parties without the written consent of the WildDrone partners, except as mandated by the REA contract, for reviewing and dissemination purposes. All trademarks and other rights on third party products mentioned in this document are acknowledged and owned by the respective holders. The information contained in this document represents the views of WildDrone members as of the date they are published. The WildDrone consortium does not guarantee that any information contained herein is e-free, or up to date, nor makes warranties, express, implied, or statutory, by publishing this document.



# Technical References

Grant Agreement n°	101071224
Project Acronym	WildDrone
Project Title	Autonomous Drones for Nature Conservation Missions
Project Coordinator	Ulrik Pagh Schultz Lundquist, Professor University of Southern Denmark ups@mmmi.sdu.dk
Project Duration	January 2023 - December 2026

Deliverable No.	D4.2
Dissemination level*	Public
Work Package	WP4 - Training
Task	T4.1 - Organise and implement outlined training
Lead beneficiary	WWU
Contributing beneficiaries	All
Due date of deliverable	31/10/2023 extended to 15/12/2023
Actual submission date	12/12/2023

v	Date	Author(s)	Reviewers	Comments
0.1	06/12/2023	S Bullock		Initial draft
1.0	11/12/2023	S Bullock	EP, course leads	Minor amendments



## Table of Contents

<b>EXECUTIVE SUMMARY</b> .....	<b>5</b>
<b>1. INTRODUCTION</b> .....	<b>6</b>
1.1. PURPOSE, SCOPE, AND TARGET GROUP .....	6
1.2. CONTRIBUTING PARTNERS .....	6
1.3. RELATION TO OTHER ACTIVITIES IN THE PROJECT.....	7
1.4. DELAYS AND OBSTACLES.....	7
1.5. POTENTIAL FOR DISSEMINATION, EXPLOITATION, AND COMMUNICATION ACTIVITIES .....	7
1.6. ETHICAL AND SECURITY CONSIDERATIONS.....	8
<b>2. SUMMARY OF M9 TRAINING</b> .....	<b>9</b>
2.1. CONTEXT.....	9
2.2. SCHEDULE .....	9
2.3. ASSESSMENT.....	10
2.4. EVALUATION APPROACH.....	10
2.5. OVERALL OUTCOMES .....	10
<b>3. TRAINING CURRICULUM</b> .....	<b>12</b>
3.1. R1 INTERNAL RESEARCH KICK-OFF MEETING .....	12
3.2. S2 WADDEN SEA NATIONAL PARK FIELDWORK WORKSHOP .....	14
3.3. T2 ETHICS AND INNOVATION WORKSHOP.....	16
3.4. T3 SCIENCE COMMUNICATION WORKSHOP .....	18
3.5. T4 DATA MANAGEMENT PLANS.....	20
3.6. S1 DRONE OPERATOR TRAINING WORKSHOP.....	22
3.7. T1 DRONES FOR NATURE CONSERVATION BASICS .....	24
<b>4. CONCLUSIONS</b> .....	<b>26</b>
4.1. ACTIONS .....	26

## List of Tables

Table 1-1: Contribution of partners .....	6
Table 1-2: Relation to other activities in the project .....	7
Table 2-1: List of M9 courses in delivery order.....	9
Table 4-1: Actions to be taken.....	26

## List of Figures

Figure 1-1: WildDrone training repository at <a href="http://wilddrone.github.io/training/">http://wilddrone.github.io/training/</a> .....	8
Figure 2-1: Participant self-rating of understanding.....	11



# Executive Summary

WildDrone Doctoral Candidates (DCs) were inducted via a week-long event based in and around University of Southern Denmark (SDU). This took place in month 9 of the project, which was the first month of study for DCs.

Activities included an initial weekend of bonding activities, and then a week of learning in a range of formats that covered a wide range of the interdisciplinary WildDrone topics.

This report presents a summary of the curriculum covered, its context within the 4-year WildDrone network, and feedback from participants that will be used to respond to immediate needs and disseminated for future activities and projects to build upon.

It is concluded that the event and the courses delivered were successful in their objectives of building a strong initial foundation of knowledge and skills, and a strong peer and project-wide network of support. A list of actions based on needs identified from feedback is presented.

**Keywords:** training, education, ecology, conservation, intelligent robotics, machine learning



# 1. Introduction

## 1.1. Purpose, scope, and target group

This deliverable summarises the combined curriculum of the month 9 (M9) training activities delivered to WildDrone doctoral candidates (DCs) at the September 2023 programme event, hosted at University of Southern Denmark (SDU).

Learning outcomes, event synopses, and participant evaluations for one Research Skills event (R1 in Table 2-1), two Scientific and Technical Skills events (S1 and S2) and four Transferable Skills events (T1, T2, T3, and T4) are included.

This deliverable reports Work Package 4 (WP4) progress to project partners and funders and is also intended for reference by future projects as a training approach upon which to build.

## 1.2. Contributing partners

Table 1-1: Contribution of partners

Partner	Contribution
Syddansk Universitet (SDU)	Host for M9 training events R1 Internal research kick-off meeting S1 Drone operator training workshop T2 Ethics and innovation workshop T4 Data management plans T3 Science communication workshop
WIPSEA (WIP)	T1 Drones for nature conservation basics
Ecole Polytechnique Federale de Lausanne (EPFL)	R1 Internal research kick-off meeting
Nationalparkfond Vadehavet (NPWS)	S2 Wadden Sea national park fieldwork workshop
The Danish Environmental Protection Agency (DEPA)	S2 Wadden Sea national park fieldwork workshop



### 1.3. Relation to other activities in the project

Table 1-2: Relation to other activities in the project

Task	Description
4.1 Organize and implement the outlined training	This set of activities is part of the wider doctoral candidate training programme and lays the foundation for later development activities.
4.2 Personal Career Development Plans	All doctoral candidates will prepare personal development plans, for which core WildDrone training activities will form a part.
4.3 Ethics Review Reports	All doctoral candidates will prepare ethics review reports. The first part of training to enable these is included in this activity.
6.4 Data Management Plans	Establish and maintain Data Management Plan for all DCs
Tasks in WP 1,2,3,5	These training activities form a foundation to enable high-quality doctoral candidate contribution to project-wide activities.

### 1.4. Delays and obstacles

Due to recruitment and reallocation of a new WP4 lead this deliverable's submission deadline was extended.

### 1.5. Potential for dissemination, exploitation, and communication activities

This summary and associated training materials, where permitted, will be distributed to partners and disseminated via the WildDrone training repository (Figure 1-1). The repository is a Docusaurus<sup>1</sup> instance hosted at <https://wilddrone.github.io/training/>, and compiled remotely as a static site via a custom GitHub Action script<sup>2</sup>. It will remain online for the foreseeable future, to be used as a resource for future projects and wider interested parties.

<sup>1</sup> <https://docusaurus.io>

<sup>2</sup> <https://github.com/WildDrone/training/blob/main/.github/workflows/docusaurus-gh-pages.yml>



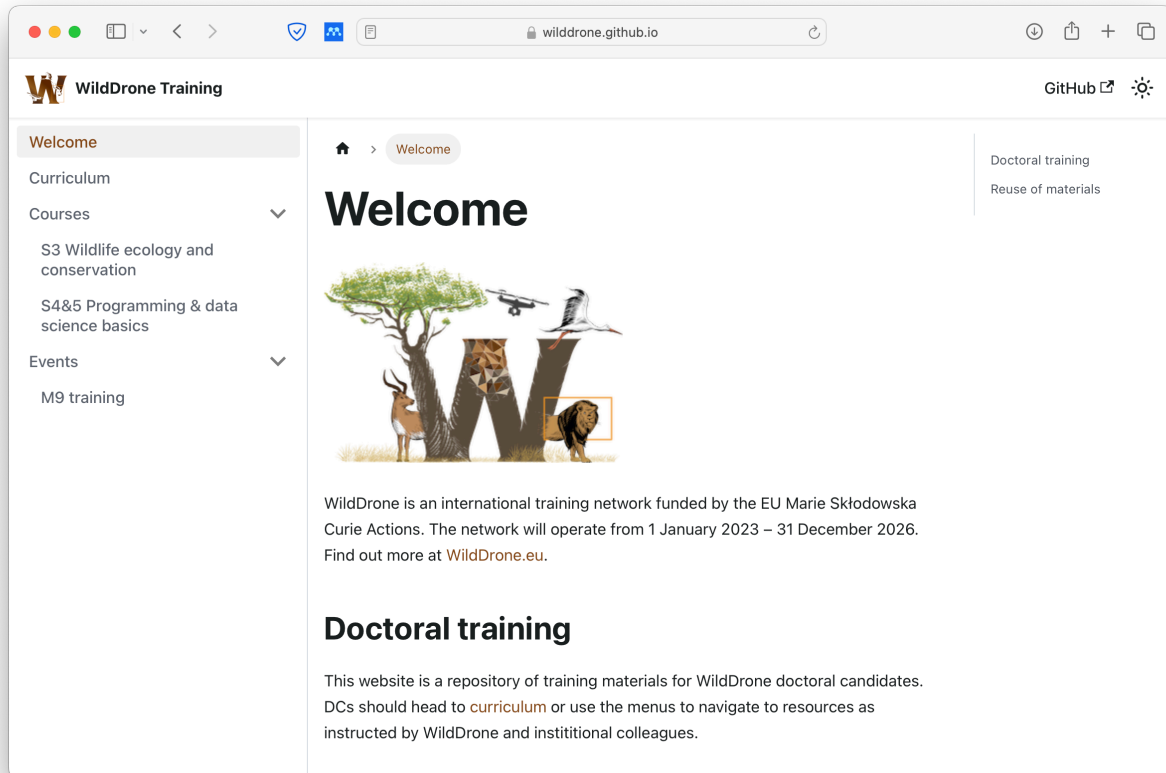


Figure 1-1: WildDrone training repository at <http://wilddrone.github.io/training/>

## 1.6. Ethical and security considerations

No direct ethical or security issues were encountered in the activities detailed in this deliverable.

This deliverable supports project-wide ethics and security through T2 Ethics and Innovation Workshop, and elements of S1 Drone Operator Training Workshop, T1 Drones for Nature Conservation Basics, and T4 Data Management Plans.



*WildDrone is an MSCA Doctoral Network funded by the European Union's Horizon Europe research and innovation funding programme under the Marie Skłodowska-Curie grant agreement no. 101071224.*



## 2. Summary of M9 training

Initial training for doctoral candidates was held in month 9 of the project (September 2023), shortly after the commencement of their studies with their respective institutions. Events were held at and around University of Southern Denmark, and doctoral candidates and supervisory teams joined in-person.

The doctoral training curriculum is divided into:

- Research Skills (R),
- Scientific and Technical Skills (S), and
- Transferrable Skills (T).

Courses are presented in the order in which they were delivered. The primary rationale for M9 scheduling was staff and venue availability – most courses have been developed as stand-alone modules and do not depend on delivery order.

### 2.1. Context

The M9 courses are part of a wider doctoral training programme extending throughout the 48-month project period, intended to achieve the interdisciplinary goals of WildDrone, and at the same time provide the best possible context for each DC to complete their individual PhD projects. Elements are delivered in-person and online. The M9 events were all in-person, and lead into subsequent e-learning components which will be summarised in later deliverables.

Elements summarised in this deliverable are listed in Table 2-1, and the wider programme can be found in the WildDrone Description of Action (DoA) Table 1.3b.<sup>3</sup> Many elements are awarded ECTS credits and elements can be tailored and scaled, permitting DCs to meet the requirements of their home institution.

### 2.2. Schedule

The M9 programme was delivered over a one-week period, with an initial weekend of team-building events for the DCs. Courses were delivered in the order listed in Table 2-1.

Table 2-1: List of M9 courses in delivery order

	Course	ECTS	Day
R1	Internal research kick-off meeting	0	Monday
S2	Wadden Sea national park fieldwork workshop	2	Tuesday
T2	Ethics and innovation workshop (1/2)	1	Wednesday
T3	Science communication workshop	1	Wednesday
T4	Data management plans	0	Wednesday
S1	Drone operator training workshop	1	Thursday-Friday
T1	Drones for nature conservation basics	1	Friday

<sup>3</sup> <https://doi.org/10.3030/101071224>



### 2.3. Assessment

The M9 training events deliver a foundation upon which DCs will build throughout their projects, developing and demonstrate their abilities to meet learning outcomes through their wider PhD work.

As such, no summative assessment was conducted at the M9 events, but deadlines for submissions span the remainder of their programme. DCs' assessment and attainment will be documented in later deliverables, and ECTS will be awarded based on submissions from individual DCs.

### 2.4. Evaluation approach

M9 events were formally evaluated via a survey distributed post-event. This included Likert-type scale responses to evaluate subjective impact of each course, and free-text response at element- and event-level for additional insight.

To permit follow-up for in-programme development and support, responses were not anonymised. Purpose and use of responses was made clear in advance, and options for more-confidential parallel response channels (email, messages, voice or video calls, to any appropriate collaborator) were also suggested for DCs to make clear and constructive comments and to flag any support needs.

Attention was made to highlight any support needs that may have been explicitly or implicitly flagged in responses. None were identified at this stage.

Where deemed useful (to the programme or the participant), follow-up conversations with the Training Coordinator or other management team members will be undertaken. Key outcomes will be communicated to partners for their own development and incorporation into future training events.

### 2.5. Overall outcomes

A summary of participant self-rating of understanding before and after each course is presented in Figure 2-1. Comment is made on these throughout Section 3, along with summaries of participants' free-text feedback.

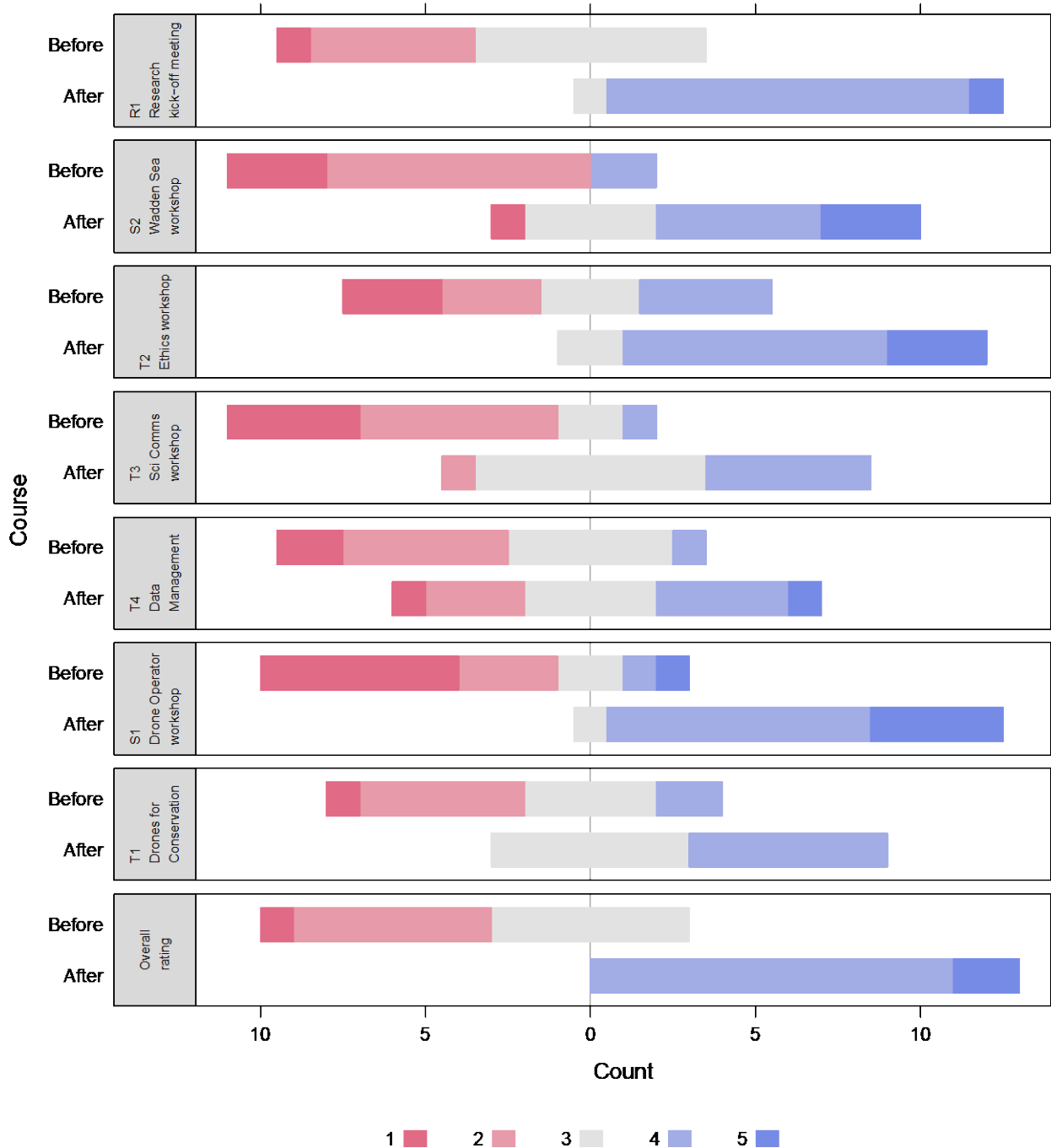
There is some correlation with DCs' reporting of 'enjoyment' of each course with their perceived benefit to their understanding, and there are likely real and perceived components to this. A deeper evaluation would be possible but is deemed excessively intrusive to DCs and wider project goals in this context, with DCs having a number of near-term deliverables.

DCs free-text responses to the overall M9 programme is summarised as:

- DCs valued the opportunity to bond and network via social and team events before the main training commenced - they feel that this is an important factor to their future motivation and collaboration. Some planned in-week social events would have been welcome in addition to this.
- An intensive week with broad, project-wide content was appreciated as an introduction, although it was necessarily shallow in places and DCs are aware that they will be specialising in their respective projects. The length and intensity were seen as an appropriate balance.



- The level of organisation and communication was generally seen as appropriate and supportive.



Response rate n=13 (100% of DCs). 1 = "no awareness"; 5 = "high confidence".

Figure 2-1: Participant self-rating of understanding



## 3. Training Curriculum

This section details each M9 training course in a common format, with summaries of DC evaluations. Courses are presented in the order in which they were delivered.

### 3.1. R1 Internal research kick-off meeting



<b>Course title</b>	Internal research kick-off meeting		
<b>Course code</b>	R1	<b>Lead institution</b>	EPFL
<b>ECTS</b>	0	<b>Location</b>	SDU
<b>Intended Learning Outcomes</b>			
Students will be able to:			
<ol style="list-style-type: none"> <li>1. Familiarise with other WildDrone DCs and collaborators, identifying competencies and interrelated projects.</li> <li>2. Foster an international network of peers and network members, engaging with them in formal and informal contexts.</li> <li>3. Develop technical presentation and public speaking skills including effective use of visual aids, delivery tone and confidence, preparation, and reflection.</li> </ol>			
<b>Assessment</b>			
<ul style="list-style-type: none"> <li>• No formal assessment, but opportunities for: <ul style="list-style-type: none"> <li>○ Formative feedback on presentations.</li> <li>○ Ongoing mentoring and reflective practice.</li> </ul> </li> </ul>			

The WildDrone network hosts a series of internal research reviews to foster close and regular collaborations among partners. This first event introduced the WildDrone



WildDrone is an MSCA Doctoral Network funded by the European Union's Horizon Europe research and innovation funding programme under the Marie Skłodowska-Curie grant agreement no. 101071224.

network, our methodology and approach, and the three themes that the project encompasses.

The project's 4-year timeline and work to-date were summarised, along with the plan for the week's events and the network going forwards. A workshop format was used to begin discussion within and between theme members, and expectations for DCs Personal Career Development Plans (PCDPs) were explained.

Events R1, R2, and R3 are regular opportunities for the DCs to present their technical progress to peers in academia and industry, and to practice technical presentation and public speaking skills in front of an international audience (the network members and invited speakers at the event).

DC evaluation is summarised as:

- This event had a significant impact on participant understanding of the WildDrone network and goals, as evidenced by the increase in self-evaluation in Figure 2-1.
- The interactive nature of the workshop, including presentations from DCs and opportunities for networking between DCs and partners was seen as beneficial to future collaboration.
- Having DCs and collaborators in the same place, in-person, helped DCs understand the scale and complexity of the project, and made them feel supported by a wide network of expertise.
- Some DCs reported that they would appreciate more time to network and interact. Time constraints of the event were noted, and it was acknowledged that this was just an initial introduction to the longer-term network.
- There were conflicting responses about structure and predetermined collaborations. Some DCs liked the open nature and opportunity to play a part in directing the work, others felt like more structure and constraint would have been reassuring. Attention will be paid to DCs level of confidence in direction and support going forward.



### 3.2. S2 Wadden Sea national park fieldwork workshop



<b>Course title</b>	Wadden Sea national park fieldwork workshop		
<b>Course code</b>	S2	<b>Lead institution</b>	DEPA
<b>ECTS</b>	2	<b>Location</b>	Wadden Sea
<b>Intended Learning Outcomes</b>			
Students will be able to:			
<ol style="list-style-type: none"> <li>1. Understand priorities in nature conservation and the value of biodiversity.</li> <li>2. Work within, and draw upon, national and international frameworks to prioritise and direct actions.</li> <li>3. Relate initial field experience to their own projects going forward.</li> </ol>			
<b>Assessment</b>			
<ul style="list-style-type: none"> <li>• S1, S2, S7 combined: written report submission at M21 <ul style="list-style-type: none"> <li>○ Evaluated by SDU, UB &amp; AVY; graded pass/fail.</li> </ul> </li> </ul>			

This course has been linked with S1 and S7 to form a 5-credit integrated module.

DCs learn the basics about drone-based fieldwork in nature conservation using the Wadden Sea marine environment as a case study. They will acquire fieldwork skills which they can apply in their specific projects in European and African contexts.

The Wadden Sea is the largest unbroken system of intertidal sand and mud flats in the world, with natural processes undisturbed throughout most of the area. This was used as



*WildDrone is an MSCA Doctoral Network funded by the European Union's Horizon Europe research and innovation funding programme under the Marie Skłodowska-Curie grant agreement no. 101071224.*

a case study to develop DCs' understanding of conservation priorities and challenges, and of fieldwork techniques.

The Danish Nature Agency (Naturstyrelsen), part of the Ministry of Environment (Miljøministeriet), presented an overview of Denmark's natural areas and national parks, and their uses of drones for surveying flora, fauna, and habitats. The current extent and future plans for Denmark's offshore wind generation capacity were also outlined.

The Wadden Sea National Park team presented the park's history and priorities, their governance, organisational structure, and funding, and the value of its biodiversity and landscape with respect to UNESCO criteria. The value of monitoring across action areas was detailed using several case studies among others a project "Data in nature", where the focus is on how technology (data loggers, IOT, satellites) can be used as a tool to ensure vulnerable nature areas, and how drone data can be an integrated part of this.

The participants undertook a round trip to the Wadden Sea Centre, and a field trip to the island of Mandø, one of the cases in the "Data in nature" project.

DC feedback was as follows:

- Self-evaluation of understanding increased, with many participants emphasising the benefit to their awareness of the importance of conservation. This was particularly emphasised by some participants from computational and engineering backgrounds.
- Discussions with park staff and researchers were described as informative and useful, particularly those from individuals using drones in their work.
- The field trip presented a welcome additional opportunity to bond with peers.
- The relevance to direct WildDrone work and the ongoing role of the Wadden Sea connection could have been made more explicit, given the different environment and context in which most DCs' work will take place.



### 3.3. T2 Ethics and innovation workshop



The poster features a brown background on the left with the WildDrone logo (a stylized 'W' with a figure), the European Union flag, and the text 'Funded by the European Union'. Below this, the title 'WildDrone' is written in large white letters, followed by 'Ethics Workshop 1', 'September 2023', and 'Presented by Dylan Cawthorne'. On the right, a colorful illustration depicts a savanna landscape with a man standing and taking a photo with a camera, and a woman kneeling and operating a drone. The background of the illustration includes a large acacia tree, a lion, a zebra, and a sunset.

<b>Course title</b>	Ethics and innovation workshop (1 of 2)		
<b>Course code</b>	T2	<b>Lead institution</b>	SDU, L&F
<b>ECTS</b>	2	<b>Location</b>	SDU
<b>Intended Learning Outcomes</b>			
Students will be able to:			
<ol style="list-style-type: none"> <li>1. Appreciate the importance of international ethics in science and research and corporate social responsibility.</li> <li>2. Apply value-sensitive design principles to their projects, assessing issues such as misuse of technology.</li> <li>3. Incorporate advanced innovation concepts ranging from market introduction to successful commercialization.</li> </ol>			
<b>Assessment</b>			
<ul style="list-style-type: none"> <li>• Individual written report reflecting on ethical issues in their own PhD project. <ul style="list-style-type: none"> <li>○ Graded pass/fail by SDU and UB.</li> </ul> </li> </ul>			

This workshop (along with T5, to be delivered in month 21) introduces DCs to ethics as an element of technological innovation, and to the innovation process in general. A value-sensitive design approach is taken, where ethical values become an integral part of the end product.

The innovation process is addressed from the point of view of possible customers and how to bring in the input from the market side for commercialisation and market introduction, with a focus on agriculture provided by Landbrug & Fødevarer, the Danish Agriculture and Food Council.



*WildDrone is an MSCA Doctoral Network funded by the European Union's Horizon Europe research and innovation funding programme under the Marie Skłodowska-Curie grant agreement no. 101071224.*



The M9 workshop started broad, with contextual introductions to work at SDU, open Q&A, and discussion of Grand Challenges. Concepts including anthropo- vs eco-centrism were introduced, and the non-neutrality of technology discussed. Values and value-sensitive design were introduced. A 'value-sensitive design envisioning' exercise was undertaken.

These ideas were then developed and applied to WildDrone-relevant aspects including AI, international values, autonomy, and data.

DCs reported that:

- Their awareness and understanding of concepts were greatly increased, with numeric ratings in Figure 2-1 showing significant improvement.
- The workshop was engaging and thought-provoking, with session lead Dylan Cawthorne facilitating provocative discussion that links directly to DCs' projects.
- The progression from short conceptual introductions to small group discussions, then into larger sharing was beneficial to engagement and provided a welcome structure.
- Open discussion about ethically sensitive topics was welcome.
- The session was intensive, which at times was challenging. Splitting into two parts and possibly using shorter readings was suggested.
- More direction on how to implement lessons in specific DCs' projects could have been added, for example tangible directives or examples of issues that might arise during research or fieldwork.
- See Section 3.5 for comments that DCs made linking Ethics to Data Management.



### 3.4. T3 Science communication workshop

Answer these **five** questions based on some of the common news criteria: importance, actuality, sensation, identification, and conflict

- 1) Why is your project important? In what way can it make a difference in the world?
- 2) Which current issues and problems is your project addressing?
- 3) Are you doing something new or untraditional in your project? In what way is it innovative and novel?
- 4) How could your project potentially impact the news reader or viewer's ordinary daily lives?
- 5) What are the challenges that you need to overcome?

SDU 

<b>Course title</b>	Science communication workshop		
<b>Course code</b>	T3	<b>Lead institution</b>	SDU
<b>ECTS</b>	1	<b>Location</b>	SDU
<b>Intended Learning Outcomes</b>			
Students will be able to: <ol style="list-style-type: none"> <li>1. Understand different audience types, the media landscape, and the role of social media in science communication.</li> <li>2. Develop skills in writing for social media, video, and online destinations, including academic and visual storytelling.</li> <li>3. Disseminate outputs to academic and non-academic audiences.</li> </ol>			
<b>Assessment</b>			
<ul style="list-style-type: none"> <li>• Written report documenting experience-based learning.             <ul style="list-style-type: none"> <li>○ Graded pass/fail by SDU.</li> </ul> </li> </ul>			

Course T3 was introduced via a workshop led by SDU at the M9 event, and the programme will continue with a series of online and in-person activities, with SDU supplying further media training courses, assisting candidates with communication, and develop necessary courses throughout the project, and activities drawing upon the experience of MPG, NPWS, BBC, and WWF-CH. These are planned to include a PR boot-camp series from MPG; online experience-based lectures from NPWS and WWF-CH, and an in-person workshop from the BBC.



The introductory workshop was led by the Head of TEK (Engineering Faculty) Communication at SDU. Leading with examples of WildDrone early communication outputs, participants then explored reasons and motivations to communicate their science, and concerns about doing so.

DCs were asked to consider what sort of communicator they would like to be, noting that a range of personalities and levels of confidence can be a benefit to the diverse communication landscape. They then explored a variety of classic news 'narratives' via case studies, from straightforward presentation of facts to more conflict-based approaches.

These ideas were then applied to the WildDrone context, which was highlighted as offering opportunities for extremely engaging stories. Participants used prompting questions to explore their specific projects within WildDrone.

Making research and researchers attractive to journalists was considered, and various types of media detailed. Finally, social media and video was introduced with participants storyboarding a 'YouTube Short'.

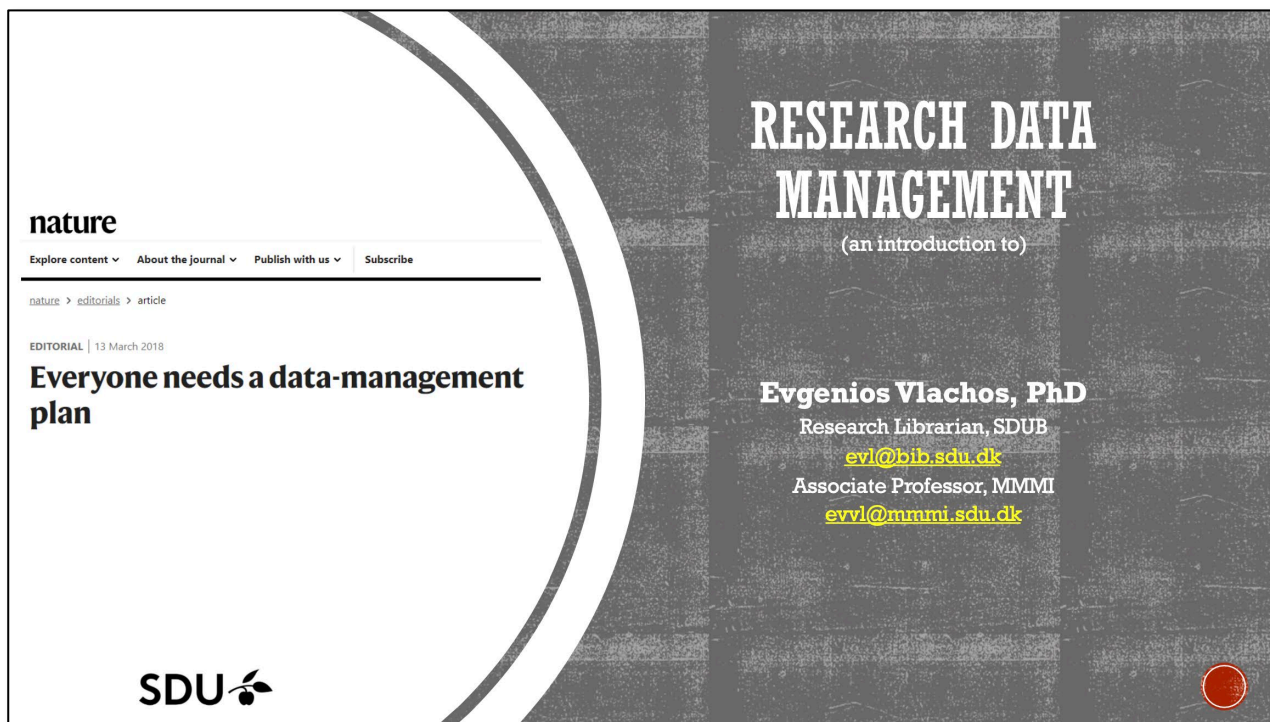
The course will continue alongside WildDrone's core research with DCs contributing to WildDrone HQ and their own social media channels, writing articles for popular science media, and further video-based activities.

DC feedback highlighted:

- This topic was one in which DCs were least confident initially, and whilst none stated a top level of confidence afterwards, this introduction has provided a solid grounding upon which to build.
- The benefits of considering multiple modes and channels of communication were evident.
- That motivating examples convinced sceptical participants about the importance of communication and the range of options for doing so. Some noted that they were taken 'out of their comfort zone' in a supportive manner.
- Storytelling and storyboarding were interesting and effective ways of structuring thinking and communication.
- The hands-on, dynamic, and enthusiastic approach worked well in a day full of activities.
- Several noted that support later in their research once trajectories are clearer would allow them to put things into practice better. This is already in the training schedule and will be communicated clearly to DCs.
- Some expressed scepticism about the role and weight of social media in research communication. This will also be discussed in future, and it will be made clear that DCs will not be obliged to stick to a particular format.



### 3.5. T4 Data management plans



<b>Course title</b>	Data management plans		
<b>Course code</b>	T4	<b>Lead institution</b>	SDU
<b>ECTS</b>	0	<b>Location</b>	SDU
<b>Intended Learning Outcomes</b>			
Students will be able to: <ol style="list-style-type: none"> <li>1. Manage data in accordance with local and international regulations and best practice.</li> <li>2. Implement FAIR (Findable, Accessible, Interoperable, Reproducible) principles in their research.</li> <li>3. Develop a data management plan (DMP) for their doctoral project.</li> </ol>			
<b>Assessment</b>			
<ul style="list-style-type: none"> <li>• No direct assessment for credit, but DCs will implement lessons in their ongoing work, and prepare a Data Management Plan to be included in the D6.3 deliverable due in month 13.</li> </ul>			

The introduction to data management was delivered by an SDU data management academic and research librarian, who emphasised the support available from SDU and the importance of research data management.

Research data was defined, and dissemination pathways outlined. FAIR principles (Findable, Accessible, Interoperable, Reproducible) were described, along with their relevance to and potential implementation in research data.



The purpose of a Data Management Plan (DMP) was communicated - as a planning tool, a collaboration tool, and a manual for consultation throughout a project.

Available data repositories were listed, along with policies, openness, and modes of access of data. Finally, examples of data management plans were showcased.

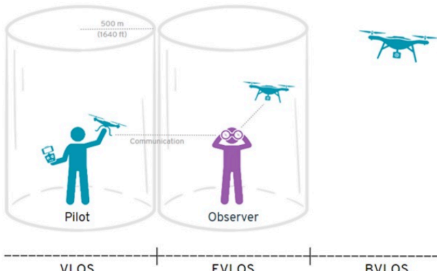
Participants' feedback was as follows:

- This was the area that left most uncertainty in confidence levels post-training. Further support will be given in a follow-up session in advance of DMP submission.
- The topic was recognised across the board as impactful and the importance of planning for data management was appreciated.
- It was noted that the topic can be rather dry, though important. Suggestion was made to include case studies of 'data management gone bad' to hold attention and emphasise the importance of good practice using memorable examples.
- DCs requested more examples of DMPs and further guidance on how this should be applied to their projects and their upcoming DMP deliverable (this deadline is likely a notable influence on their concern). There are already instructions and examples in the WildDrone internal filestore, but many seemed unaware - this will be reiterated via email immediately, and in a specific seminar before their deliverable due date.
- There were several mentions of the interplay between ethics and data management, particularly potential impacts of sensitive data and AI. These will be explored in the planned seminar with T2 and T4 course leads, where reference will be made to WildDrone DoA §1.2.4 on Open Science practices, and the tensions between this and ethical considerations.
- There was a desire for more detail on use of repositories, which will also be covered in the follow-up session.



### 3.6. S1 Drone operator training workshop

## DRONE OPERATION RISK CLASSIFICATION



The diagram illustrates three levels of drone operation: VLOS (Visual Line of Sight), EVLOS (Extended Visual Line of Sight), and BVLOS (Beyond Visual Line of Sight). In VLOS, a pilot is directly visible to the drone. In EVLOS, an observer is visible to the drone, and the pilot is not. In BVLOS, neither the pilot nor the observer is visible to the drone. A communication link is shown between the pilot and observer in the VLOS and EVLOS categories.

**A1**

Drone with a mass less than 500 g  
The remote pilot should be trained

**A2**

Drone with a mass less than 2 kg  
The remote pilot should be trained

**A3**

Drone with a mass less than 25 kg  
The remote pilot should be trained

**OPEN**

Drone with a mass less than 25 kg  
The remote pilot should be trained

**RESTRICTIONS:**

- No flight over assemblies of people
- No flight over people
- Close to people (horizontal distance of ~50 m)
- Far from people (> 150 m)
- BEYOND VLOS

- Drone operations are classified according to their risk-profile. In fundamental terms the risk classification goes from very small drones operated in Visual Line Of Sight (VLOS) and under direct control of the remote pilot - over medium to large drones in Extended Visual Line Of Sight (EVLOS) with the help of an observer and to very large drones that are flying autonomously Beyond Visual Line Of Sight (BVLOS) of the remote pilot.
- The European risk-assesment system is built up around 3 categories of drone operations: Open, Specific and Certified.
- The open category A1/A3 is what this introduction will be focusing on and it typically means drones up to 25 kilos that are flown outside built-up areas in VLOS of the remote pilot and at an altitude of no more than 120 meters above ground level (AGL). Open category operations can also be conducted in built-up areas but poses additional restriction to drone sizes, pilot certification and risk mitigation.
- There are local exceptions and restrictions among EASA member states, so you will need to check with your local Civil Aviation Authority before you go fly.

<b>Course title</b>	Drone operator training workshop		
<b>Course code</b>	S1	<b>Lead institution</b>	SDU
<b>ECTS</b>	1	<b>Location</b>	SDU
<b>Intended Learning Outcomes</b>			
Students will be able to:			
<ol style="list-style-type: none"> <li>1. Select from a range of drone platforms and components to suit a given task.</li> <li>2. Competently operate drones for nature conservation purposes.</li> <li>3. Work within regulations and best practice for safe and legal drone operations.</li> </ol>			
<b>Assessment</b>			
<ul style="list-style-type: none"> <li>• S1, S2, S7 combined submission at M21. <ul style="list-style-type: none"> <li>○ Written report evaluated by SDU, UB &amp; AVY, graded pass/fail.</li> </ul> </li> </ul>			

This course has been linked with S2 and S7 to form a 5-credit integrated module.

The workshop developed a theoretical and practical foundation against which DCs will be able to obtain A1/A3 drone pilot credentials. It introduced the latest drone technologies and provided a basic introduction to the use of drones for nature conservation.

Given the differing levels of experience among the DCs, parallel tracks permitted streaming by existing competence and qualifications.

A wide range of topics were covered, including planning, rules and regulations; legal and liability aspects; requirements for approval by aviation authorities; certification; and pilot and operator responsibilities and tasks.



WildDrone is an MSCA Doctoral Network funded by the European Union's Horizon Europe research and innovation funding programme under the Marie Skłodowska-Curie grant agreement no. 101071224.

Knowledge of drone platforms (fixed wing, rotary wing, and VTOL); GNC (guidance, navigation, and control); radio communication and networking; payloads; sensors; detect-and-avoid; ground control stations; and fault tolerance were covered.

System engineering aspects such as electromechanical design; vibrations; human factors; electromagnetic interference; and software engineering will be included in S7, to be held in Bristol in month 21.

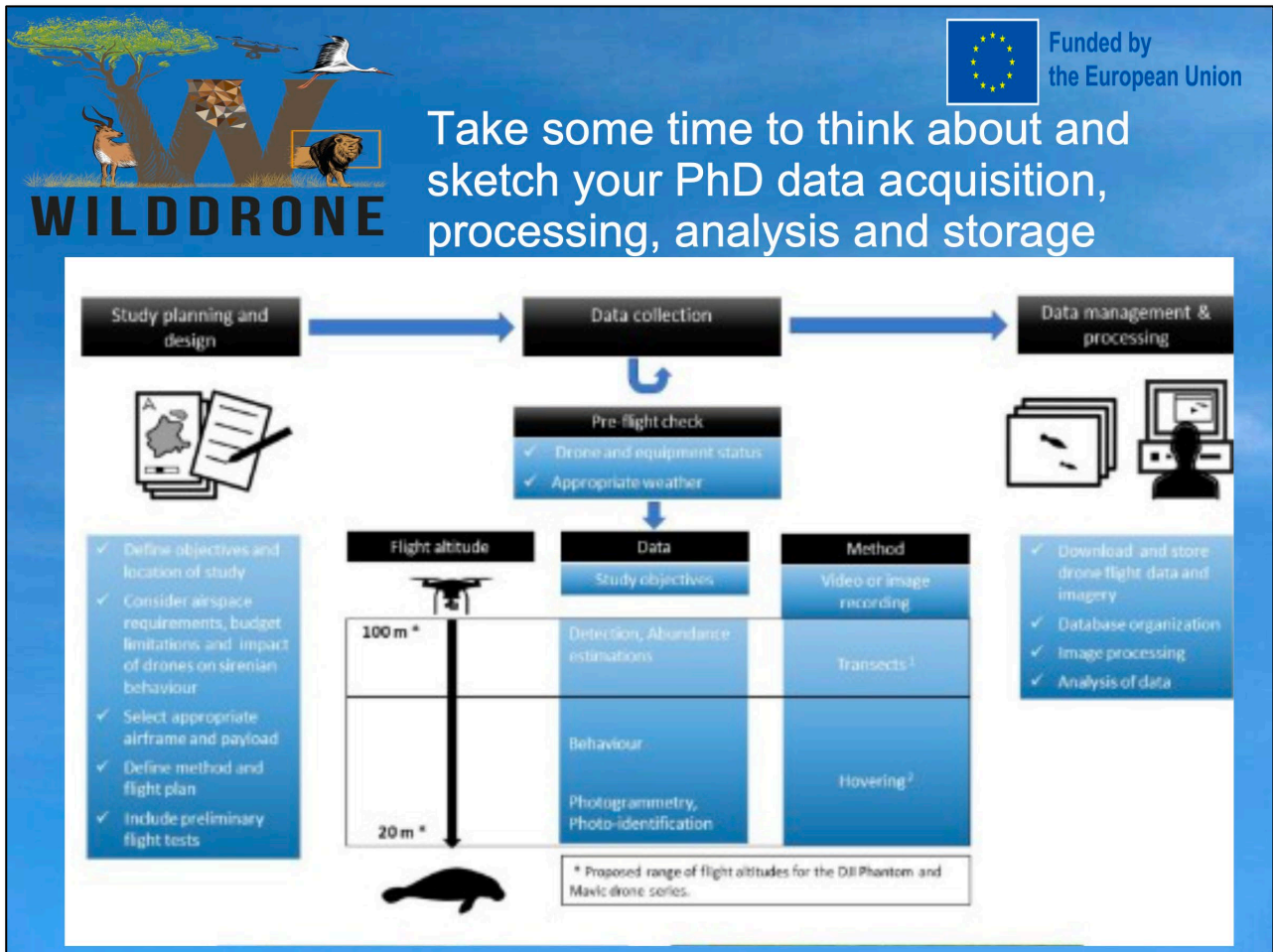
The practical element also developed competences and skills as drone pilots for basic operations in nature conservation, including an introduction to basic concerns in drone-based photogrammetry.

DC evaluation response summary:

- The small-group approach was very much appreciated across the board, with very strong impact on understanding and confidence levels being reported. Figure 2-1 shows that initially the majority of participants scored themselves very low, but after the workshop this had changed completely. The 1.5 days allocated to this was worthwhile given DCs' project context, and the delivery approach can be recommended.
- The lectured introductions were also welcome - some commented that there was a lot of information to absorb, but that the slides were comprehensive, so they have time to refer back to them.
- Students' confidence in the expertise and passion of the course lead and team, and their appreciation for their involvement, was expressed repeatedly.
- DCs from non-engineering backgrounds noted that the course was delivered at an accessible level for them and reassured them about upskilling for their projects.
- DCs with experience of drones also commented that the advanced workshops were welcome and extended their understanding and interest.
- Several participants commented that this workshop was one of the highlights of the week for them.
- Requests were made for further training on fixed-wing platforms, via simulation and practice. This can be offered on an as-required basis as projects progress.
- A suggestion was made that a checklist of practical exercises would be welcome for future reference - this will be created and disseminated.



### 3.7. T1 Drones for nature conservation basics



<b>Course title</b>	Drones for nature conservation basics		
<b>Course code</b>	T1	<b>Lead institution</b>	WIP
<b>ECTS</b>	1	<b>Location</b>	SDU
<b>Intended Learning Outcomes</b>			
Students will be able to:			
<ol style="list-style-type: none"> <li>1. Draw upon existing examples of drones in nature conservation.</li> <li>2. Identify technical limitations and suggest how these could be circumvented.</li> <li>3. Develop a literature review across conservation ecology, drone technology, and computer vision, and present to the DC cohort.</li> </ol>			
<b>Assessment</b>			
<ul style="list-style-type: none"> <li>• Written individual reports evaluated pass/fail.             <ul style="list-style-type: none"> <li>○ Grading by SDU.</li> </ul> </li> </ul>			

This workshop reviewed the history of drones as a technology for nature conservation; their use across the world and their advantages and limitations; how technical limitations could be circumvented; and the experiences of WIP in this domain.



WildDrone is an MSCA Doctoral Network funded by the European Union's Horizon Europe research and innovation funding programme under the Marie Skłodowska-Curie grant agreement no. 101071224.



The students will subsequently read selected publications on this subject, perform a literature review to add publications related to their specific subject, and based on this write a literature review. These reviews will be presented to other students during a one-day (online) follow-up event.

DCs fed back along the following themes:

- The topic was of strong interest to DCs, the use of case studies and personal experiences was impactful, and historic context was seen as useful to be aware of.
- Image analysis methods and applications were highlighted as being of particular relevance.
- DCs noted that lessons translated well directly to their own projects.
- A non-academic perspective was welcomed - DCs vary in their aspirations of moving into academic vs industrial vs other careers.
- Drawing stronger lines between case studies to bring out themes and progression may have been helpful.
- There was a desire to dive deeper into technical challenges such as data storage, processing and analytics, but it was acknowledged that time was limited and opportunities will arise in future.



## 4. Conclusions

The M9 training week was impactful and appreciated by WildDrone doctoral candidates. They feel that it has given them a strong base upon which to build, and their confidence in their understanding and ability to progress their research has increased significantly.

There are a number of constructive actions that will be taken in response to participant feedback, and it is anticipated that these will further increase DCs confidence in the support offered by the WildDrone network and the success and impact of their first year of research.

The initial approach to induction and cohort-building presents a strong model to follow, with many aspects fostering a robust, ongoing network.

### 4.1. Actions

The actions detailed in Table 4-1 will be undertaken as follow-up to the M9 courses and evaluation.

Table 4-1: Actions to be taken

		Action	By	Due
1	All	Disseminate feedback to course leads.	SB	Done
2	T4	Plan and schedule Jan 2024 online follow-up event for DCs - focus on DMPs but also use for wider items. Include reference to WildDrone DoA§1.2.4 Open Science Practices, whilst also recognising ethical implications. Also include detail on use of repositories.	SB/EP	Done
3	T4	Signpost DCs to DMP instructions and exemplars on WildDrone internal filestore.	SB	Done
4	R1	Monitor DCs level of confidence in freedom to direct projects vs scaffolding and support network.	SB	Ongoing
5	T3	Ensure DCs are aware of ongoing opportunities and support for communication activities, noting diversity of opportunity across social and more formal channels.	SB	M13
6	S1	Consider fixed-wing training opportunities for DCs where required and schedule/offer.	SB/JH	M13
7	S1	Disseminate checklist of practical drone exercises	SB/JH	M13

