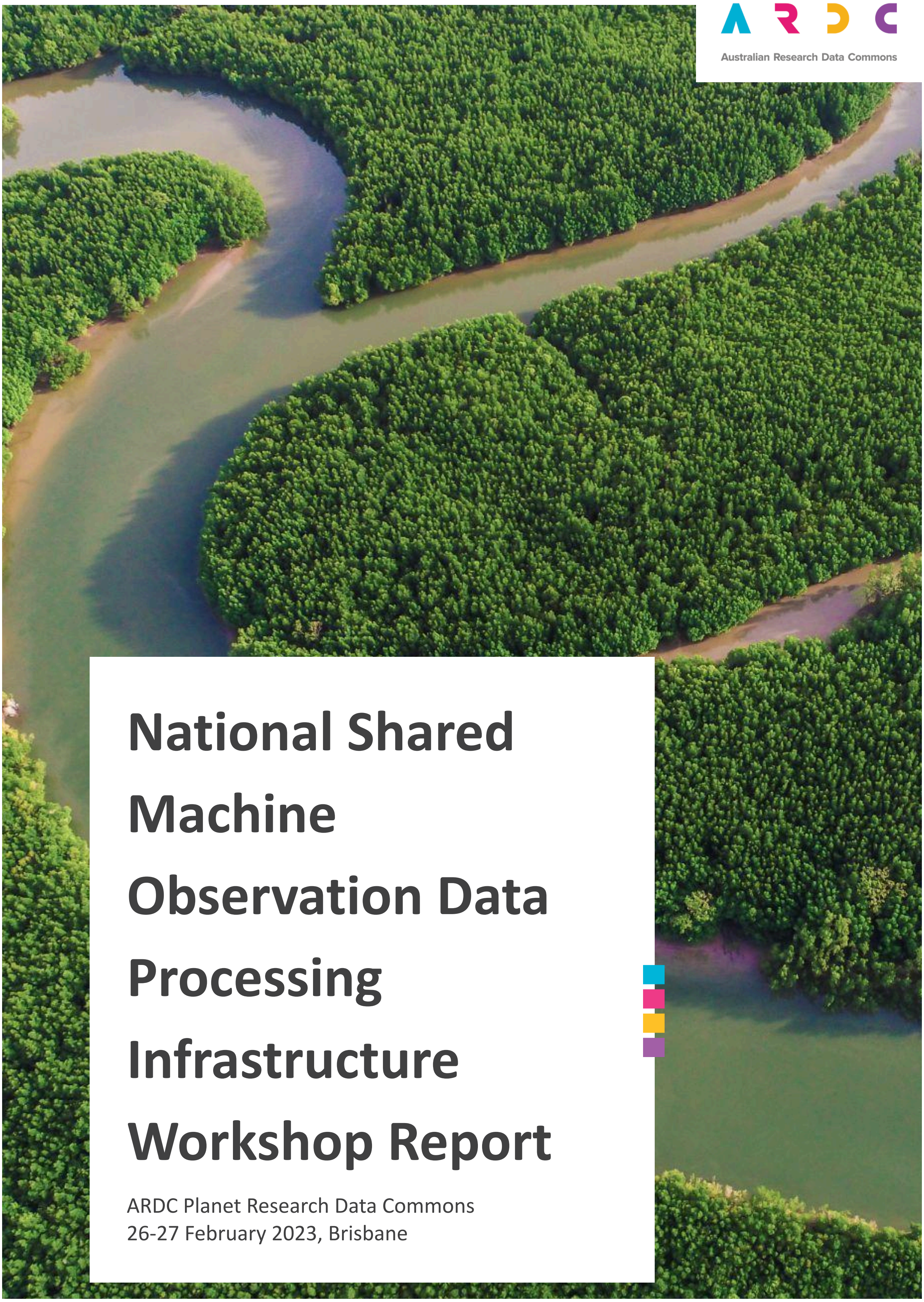

National Shared Machine Observation Data Processing Infrastructure Workshop Report

ARDC Planet Research Data Commons
26-27 February 2023, Brisbane

Australian Research Data Commons

Ecosystem Research Infrastructure

Acknowledgments

Thank you to our many partners across research, government, industry and community including those who participated in this workshop. We would also like to acknowledge the effort by TERN, QUT, ALA and UQ and the help of Matthew S Luskin, Paul Roe, Timothy Brown, Jo Morris, Rob Clemens, Andrew White, Beryl Morris, Susan Fuller, Jo Savill and Hamish Holewa in particular for assistance in compiling this report.

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Acknowledgement of Country

We acknowledge the traditional custodians throughout Australia and their continuing connection to, and deep knowledge of, the land and waters. We pay our respects to Elders both past and present.

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ARDC Australian Research Data Commons

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Executive Summary

The [ARDC Planet Research Data Commons] (Planet RDC) provides national-scale data infrastructure for environmental and earth science researchers, policy makers and decision makers, and research data managers.

The Planet RDC, Queensland University of Technology (QUT), Australia's Terrestrial Ecosystem Research Network (TERN) and partners are collaborating to establish national shared infrastructure, services and standards to enable processing and reuse of automated observation and sensor data, with an initial focus on processing image, acoustic and video data. Machine based observation data enables national-scale continuous monitoring of the Australian environment that helps address grand societal challenges.

The National Machine Observation Data Processing Infrastructure Workshop convened in Brisbane on February 26-27, 2024 brought together over 50 participants from 40 institutions, including state and federal government, non-governmental organisations, private industry, research infrastructure organisations and academia.

Harnessing the growing volumes of environmental data available from camera, acoustic, and drone sensors presents an enormous data challenge for researchers and decision-makers. This workshop sought to understand participants' monitoring needs, identify current practices, develop a collective vision and identify the required capabilities to develop a shared national machine processing infrastructure that significantly enhances research and our ability to understand and mitigate changes to the environment.

Based on the workshop insights, a Draft Australian National Shared Machine Observation Data Processing Infrastructure Roadmap has been developed, which outlines both opportunities to collaborate to instantiate shared national research infrastructure as well as highlighting the importance of growing partnerships and knowledge exchange. The workshop participants recognised that advances in research, research output and new methods was hindered by access to appropriate large-scale digital research infrastructures.

By focusing on collective action and the integration of technology and data, the workshop participants identified critical steps towards realising a collaborative, technologically advanced approach to machine observation data processing. This aligns with recommendations in the 2021 National Research Infrastructure Roadmap. Participants emphasised the importance of developing national standards for processing pipelines to process raw data and enrich data and make it more findable, accessible, interoperable, and reproducible (FAIR), alongside enhancing community engagement. By developing shared data networks, infrastructure, metadata and persistent identifiers, efforts to democratise monitoring efforts can continue to scale quickly. This report details the consensus on enhancing data utility, underscores the transformative potential of FAIR data principles, and calls for unified action to address growing global challenges.

The overarching consensus from the workshop confirmed the value of machine observation data for environmental monitoring and decision making objectives. Participants agreed on the necessity for collective action and a unified vision. In this report we summarise what we heard at the workshop and present a strategic roadmap.

1. Background

The Planet RDC brings together research, government and industry to develop systems and processes that make data more available and speed the development of analytics and models. This helps Australian researchers and decision-makers to understand the environment and address some of the most complex, interconnected and integrated challenges facing society.

The Planet RDC Machine Observation Data Processing Infrastructure (MODs) program will support the establishment of national shared infrastructure, services and standards to enable processing and reuse of automated observation and sensor data. The focus initially for this program will be on processing of image, acoustic and video data. National-scale infrastructure is needed to manage and maximise the impact of the large amount of data coming from deployments of camera traps, acoustic recorders and drones. These data need to be made analysis-ready to enable the vision of national-scale continuous monitoring.

In collaboration with research institutions, government, NGOs and other national research infrastructures, this program will coordinate and align technical capability across multiple partners to enhance continental-scale observation. The data outputs will be made available in analysis-ready formats that are able to be easily integrated into environmental research infrastructures such as TERN, IMOS, ALA, EcoCommons Australia, and that developed through the Planet RDC Modelling, Analytics and Decision Support Infrastructure (MADSI) Program.

2. General Workshop Summary

Workshop participants were experienced users of acoustic, camera trap and drone sensor technology, and resulting data, and there was consensus that lack of data sharing, storage, access, standards, processing and analytics currently limits research and management outcomes. Workshop participants recognised that collectively the community can use machine observation data to understand the environment and address some of the most complex, interconnected challenges facing society.

Workshop Objectives

The objectives of the workshop were to:

- develop a shared understanding of the current needs with respect to monitoring inclusive of national machine observation infrastructure
- understand the current practices of this community and begin to understand who is doing what and where
- identify a vision of what the community wants to achieve
- identify the barriers and gaps standing between current practice and this vision inclusive of the entire data pipeline from capturing then processing, to interpretation and application
- begin to form partnerships with organisations that can work collaboratively on elements of a strategic roadmap.

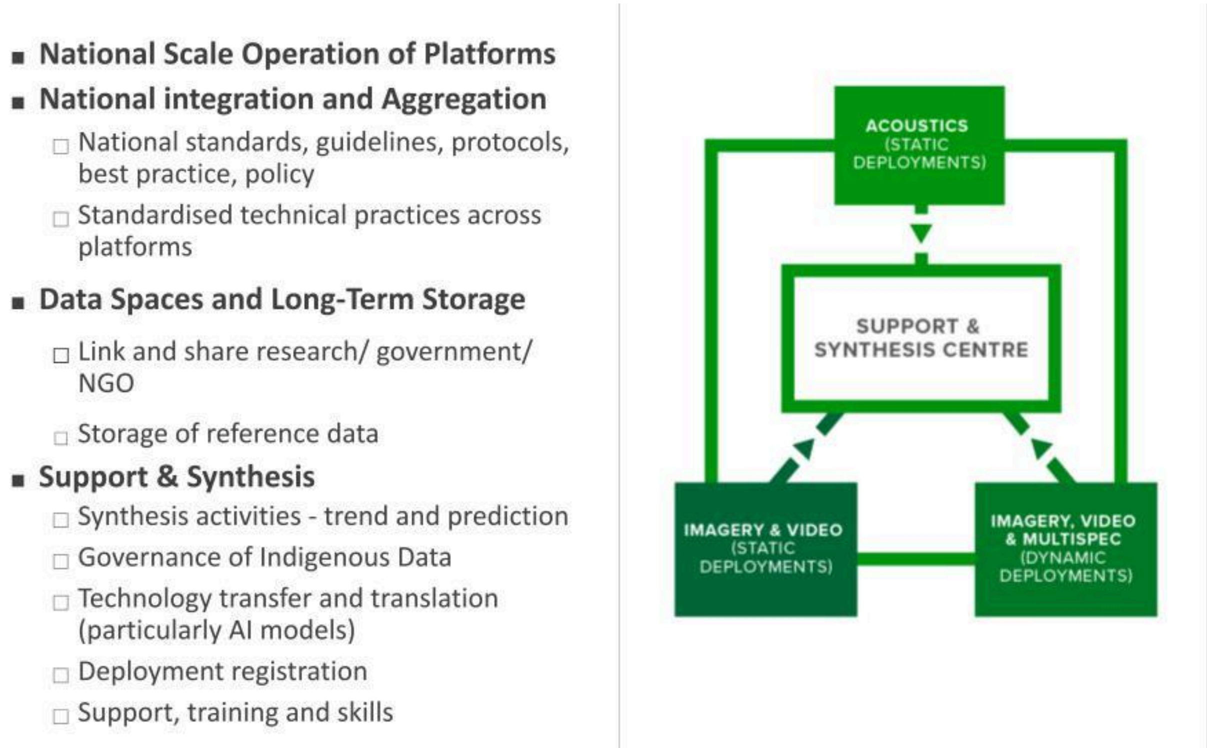

Figure 1. An initial model of support & synthesis objectives and connections for machine observation data.

Workshop Summary

The workshop highlighted the importance of machine observation data (acoustic, camera trap, drone) for a wide range of conservation objectives and emphasised the need for a collaborative, technologically advanced approach. Key themes included:

- data quality and accessibility

- community engagement: empowering communities through education and fostering collaboration are essential for long-term success
- technical capabilities: development of data storage, processing, analysis tools, and user-friendly interfaces are needed to bridge the gap between current practices and the envisioned future
- co-investment: a "no regrets" project plan utilising existing solutions and clear use cases will encourage co-investment from diverse stakeholders.

The workshop identified a diverse range of current monitoring practices. However, these practices often lack standardisation and efficient data sharing mechanisms. Key challenges include:

- inconsistent data storage and sharing methods
- manual data processing bottlenecks
- limited accessibility and discoverability of data
- lack of standardised data collection protocols
- Governance of Indigenous data.

Workshop participants envisioned a future where machine observation monitoring utilises a collaborative, technologically advanced approach to achieve the following outcomes:

- improved conservation projects and informed policy making
- enhanced knowledge of Australia's biodiversity
- effective species and ecosystem conservation
- increased data utilisation and collaboration
- community engagement in citizen science.

Bridging the gap between current practices and this vision requires several technical capabilities, including:

- centralised, secure, and scalable data retention capability and storage
- federated data access, associated APIs and analysis tools
- automated data pipelines for streamlined processing
- user-friendly interfaces for non-experts
- standardised data formats and metadata capture
- high-performance computing resources
- shared search, analytic and reporting resources.

Alongside technical advancements, social needs are equally important:

- building trust among data providers and with data aggregators
- standardising data collection methodologies
- fostering collaborative partnerships
- empowering communities through education and shared communication activities.

The National Shared Machine Observation Data Processing Infrastructure Workshop laid the groundwork for a collaborative approach to processing machine observation data in Australia. By investing in data infrastructure, user-friendly tools, and community engagement, stakeholders can achieve the ambitious yet achievable vision outlined in this report.

Supporting Advanced Research and Continental Scale Observation

The workshop identified the potential of advanced research to be progressed through continental-scale machine observation data and associated infrastructure. By integrating and standardising modalities such as camera trap and acoustic data within a unified framework, we can set the stage for groundbreaking scientific research. This opportunity would require the creation of infrastructure that not only accommodates but amplifies the power of pooled standardised data and enables analyses across unprecedented spatial and temporal scales.

By addressing these issues, we unlock the potential to explore expansive questions that remain untapped within the Australian context. The camera trap work presented at the workshop by Dr Matt Luskin at the University of and his team highlighted papers from top journals that were facilitated by such rich datasets. The post-bushfire analyses of estimated impacts on species in eastern Australia was another camera trap example highlighting the power of collated data at scale. Meanwhile the A20 national acoustic monitoring at reference sites around Australia are starting to yield critical national information and the changes rapidly coming in processing pipelines are going to see rapid growth in the power of acoustic data.

Historically, the siloed nature of camera trap and acoustics data has been a significant barrier to impactful scientific research. Despite extensive data collection efforts, the lack of interoperability has stifled the translation of this wealth of information into meaningful, publishable science. The Draft Roadmap champions a transformative approach, advocating for scalable storage and processing capabilities alongside building of the community using such tools. An active, unified Australian ecoacoustics community is already bringing methods and data together, and they are rapidly addressing the processing and validation bottlenecks to scale those enriched datasets. Infrastructure designed to support these projects will not only support academic and non-profit endeavours, but will also serve industry and environmental assessments, fostering the creation of comparable and sharable datasets. This, in turn, promises to enhance decision-making processes at federal, state, and local government levels.

The complementary nature of camera and acoustics is undeniable. The Draft Roadmap envisages a seamless integration of these projects in the future, acknowledging the synergistic value of their combined data. Although drones represent a frontier still exploring its full potential, their eventual integration into this cohesive framework is anticipated as are other technologies such as eDNA.

Sensor deployment guided by national research questions and accompanying rigorous survey design, coupled with the utilisation of collated standardised data, paves the way for analyses of unparalleled depth and breadth. Such a comprehensive approach underscores the importance of a collective approach. Working together in partnership over the next two years, the expansive vision outlined at the workshop and detailed in the Draft Roadmap will be achieved.

A Shared Vision

The workshop outlined a forward-looking vision that highlights the positive outcomes of effective environmental monitoring. The envisioned benefits span all key aspects of conservation and biodiversity research:

- conservation projects
- biodiversity monitoring and accounting
- knowledge enhancement
- policy-making and science translation
- species and ecosystem conservation
- data utilisation
- collaboration across stakeholders
- industry and NGO involvement
- community engagement in citizen science
- efficiency of pipeline solutions
- innovation in methodologies
- data accessibility
- integration of methods and data products.

There was broad consensus on the desire for national machine observation data processing infrastructure to accelerate research and innovation in the creation, processing, analysis and preservation of growing volumes of machine observation data.

Achieving the collective vision that emerged would also see an increase in projects that could transform the temporal and spatial scales at which biodiversity and ecosystem monitoring can be deployed.

This transformation will contribute to the conservation, protection, repair, and restoration of ecosystems as well as the associated reporting and accounting systems that track progress.

There was a recognition of the need for the capability to detect ecological changes or biosecurity incursions in real-time to trigger management action.

Community engagement and empowerment were considered important components of this vision, as it is becoming easier to deploy sensors at scale that deliver valuable data. Additionally, a growing community of non-researchers using these methods can accelerate public connection with local environments, and build public trust in science.

There was also wide agreement on the complementarity of machine observation methods.

Long term goals included that data will be safe, long-lived, discoverable, curated, and internationally available. This will be achieved through pipelines that unlock solutions for accessing data recorded at sites, regardless of the machine observation sensor type.

Next Steps

We invite the community to contribute ideas and actions to help realise the shared aspirations of the Draft Australian National Shared Machine Observation Data Processing Infrastructure Roadmap outlined below.

The Planet RDC is launching a Machine Observation Data Processing Infrastructure Program which will begin to address some aspirations identified in the Roadmap.

Please feel free to get in touch with any suggestions, feedback or questions by completing the form here or emailing contact@ardc.edu.au.

Australian Research Data Commons

3. Draft Australian National Shared Machine Observation Data Processing Infrastructure Roadmap

The workshop identified several capabilities essential to bridging the gap between current practices and the envisioned future of machine observation data processing. The strategic elements of a roadmap are outlined below. We invite partners to refine and bolster this draft roadmap.

	Element	Description
1	**National scale operations**	Support existing programs to scale nationally including Acoustics and Camera Traps. This will focus on increasing the capacity of facilities to process machine observation data. **Development of specific use cases:** Identifying specific use cases that solve industry, government, and NGO pain-points is crucial for attracting co-investment and designing relevant solutions. **Standardising data collection methodologies:** The need for standardised data collection protocols and methodologies is highlighted to ensure consistent and high-quality data capture. Development of deployment protocols, deployment phone apps, upload data processing with prompts for missing metadata were some of the suggested solutions. **Fostering collaborative partnerships:** Collaborative partnerships are essential for pooling resources and expertise. **Collaboration tools, APIs and network connectivity**: Adequate storage, processing capabilities, and robust network connectivity are essential for supporting a comprehensive data infrastructure. Shared resources and APIs were emphasised for facilitating data sharing and integration among organisations, promoting uniform access, and upload on a national scale.
2	**Modelling, analytics and decision support tools (MADSI program)**	Development of trusted workflows, models and analytics that support common needed analytical tools. These tools will be able to utilise and integrate with machine based observation to provide analysis such as species abundance, occupancy changing environmental parameters. See the program description on the ARDC website.

3	**Long-term data retention and access**	Support establishment of storage and repository services for the long-term preservation of valuable surveillance and monitoring datasets that are searchable and can be easily retrieved. **Secure, and scalable data storage:** Many workshop participants emphasised the necessity of centralised, secure, and scalable data solutions capable of managing extensive volumes of data with efficient upload/download capabilities due to current fragmented systems. Data types include raw data, annotated training data and enriched post processing data inclusive of species identified, covariates, detection histories and data standards that can translate between AIBIS and Darwin core. Some participants have existing storage solutions that future work could look to connect. **Data sharing agreements and framework:** Standardised data sharing agreements and frameworks are needed to address access restrictions and ensure data sharing respects cultural sensitivities, commercial concerns or harm to threatened species. **Building trust with and among data providers:** Building trust is critical for ensuring the long-term utility and accessibility of platforms. This requires dedicated resources and assurance of continuity. Trust is also built when released functionality matches user expectations.
4	**Persistent identifier strategy**	Develop and implement a Persistent Identifier Strategy across Machine Observation Infrastructure. Implementing a persistent identifier strategy enhances data discoverability, connectedness and curation, making machine observation data more F.A.I.R. through the use of DOIs and other PIDs.
5	**Modelling effort observation register**	Development of a portal and web-service that displays environmental observation, instrumentation and survey effort across Australia. Web-service would interface with government, NGO, research and NCRIS facilities to provide a historic and current view of deployments. Establishing a unified register for camera and acoustic sampling efforts as part of this work package will improve the management of data ingestion, facilitate access, and ensure the data are fit-for-purpose through quality filtering.
6	**Machine observation support centre**	Development and promotion of Machine Observation Infrastructure reference help desk allowing users to easily understand how to contribute and utilise standard machine observation protocols/standards. **Empowering communities through education and awareness:** Education and awareness programs are crucial for empowering communities, emphasising the importance of engaging society in monitoring efforts. **User-friendly interfaces for non-experts:** Developing non-expert-friendly interfaces and automation tools is crucial to lower the barrier for engaging with growing scales of sensor deployment, data and streamline the data processing workflow.

		Collaboration, sharing knowledge, understandings and progress: Establishing communities of practice to share expertise, harmonise protocols, and govern Indigenous data is vital for collaborative knowledge and progress sharing. A collaborative training and support portal to allow users to easily access services and tools is also critical. This portal can be extensible to enable other observation and sampling technologies to be incorporated as developed e.g. environmental (e)DNA and would help ensure appropriate use, interpretation and application of data and infrastructure.
7	**Architectural alignment, pipeline consolidation**	Develop an architectural plan to streamline operations and enable enduring services. There's a call for platform-neutral infrastructures that accommodate diverse data types and user groups, ensuring data accessibility across different platforms and locations. Some solutions to this need included working to progress a federated model where a growing network of APIs could connect data and translate standards as needed. Provenance tracking is a key ingredient to success. **Automated data pipelines and closing the loop with analyses:** Automated pipelines are necessary for efficient data processing from collection to enriched data. A critical step going forward will be to close the loop regarding deployment of these devices to achieve national goals. There are analyses that will be required to understand the scale and locations of deployments to answer specific research or stakeholder questions. Learnings from such survey efforts should then feed in adaptive research questions that adjust future deployments based on what was learned in previous deployments.
8	**National data access and growth**	In collaboration with leading governments, NGO and research organisations establish federated services for the discovery of and safe access to machine observation data. This activity will establish partnerships and develop secure methods to discover and share data across a federation of services and will utilise Data Space architectures. **Federated data portal and quality metrics:** There is a clear need for the development of a federated data portal aiming to centralise FAIR-compliant data access, incorporate quality metrics, and improve data discoverability through search facilitated by standardised metadata and PIDs. This would incorporate a deployment registry, but importantly would also allow users to filter available data based on quality, temporal or spatial resolution, specific metadata matches with the result yielding either direct API access or contact information on how to access search results depending on dataset access restrictions.
9	**Enhance AI capability and leadership**	Significantly expand capability and capacity of Australian research to remain globally competitive in the application of AI and ML technologies in the interpretation and translation of machine observation data (images, video, acoustics) to usable data formats.

		High-performance computing resources: Access to high-performance computing resources is essential for processing large datasets efficiently, including moderated GPUs for analysis and predictive modelling. Some participants have access to sufficient compute, but many do not.
10	**Governance of Indigenous data**	Enable CARE principles and appropriate governance of Indigenous data across Machine Observation Facilities. **Indigenous data governance**: A framework respecting Indigenous Data Rights and Traditional Owner permissions is essential for empowering Indigenous communities and ensuring respectful data sharing. This work is connected to the ARDC HASS and Indigenous Research Data Commons.

Table 1. Prioritised strategic elements for optimisation of machine observation data

Appendix 1: Current Practice

Workshop participants presented a comprehensive overview of current practices in collecting, storing, accessing, and sharing wildlife and ecosystem monitoring information. A variety of methods are employed to gather, process and store machine observation data. Some of these efforts are being undertaken at an increasing scale. For acoustic data these include deployed acoustic sensor reference site systems with associated data processing such as the A20, to international platforms offering free data storage and processing such as Arbimon. For camera traps, the international platform 'WildLife Insights' offers a platform to manage, analyse, store and share camera trap data. For drones GeoNadir offers drone processing software while groups including AuScope have tackled this complex but rapidly growing source of machine observation data. There remain many who are processing, and storing raw, or enhanced data locally, and in the case of drones sharing solutions remains highly complex. Sharing of raw data, processing solutions, tagged data, or enhanced data is not widely undertaken and there remains a poorly developed national picture of where sensors are being deployed let alone the type and quality of data that might be available.

Acoustic data is frequently uploaded to platforms such as Ecosounds, and substantial work has led to more standardised metadata being captured on upload. However, wide scale use of deployment apps and deployment recommendations could further enhance data standardisation as well as the associated metadata. Sharing mechanisms vary, with some datasets available on citizen science platforms like Zooniverse allowing public involvement in species identification. However, the need for manual processing after download is a common bottleneck. Similarly, for camera trap data, while it is increasingly easy to process, it is not widely shared let alone FAIR. Drone data is arguably the most siloed due to its enormous size, the variety of sensors that can be deployed, and the variety of use case specific processing pipelines from drones that move in a variety of ways and are flown in a variety of conditions.

The general data collection and sharing methods reflect a diverse ecosystem of practices. They encompass local storage on computers and cloud platforms, use of portable HDDs, and reliance on web platforms and network storage. Access is generally available through interfaces and file transfer utilities, though often not streamlined.

The current landscape shows a patchwork of efforts, indicating a large benefit in a move toward a more integrated approach, with a focus on improving standardisation, accessibility, and the quality of data management practices. The workshop underscored the necessity for establishing communities of practice and the development of protocols to enable more efficient and standardised data collection, sharing, and usage.

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Appendix 2: Current monitoring needs

Overall, there was broad consensus that Machine Observation data provide increasing opportunities to understand where biota are, their condition and how they are changing over time. The potential to scale deployment of monitoring sensors that deliver rich data was recognised as something that could represent a step change in subsequent analyses that could then flow into a variety of planning instruments, national reporting and accounting. While there was not a singular need that machine observation data could meet, there were no obvious monitoring objectives which could not be enhanced with the foundation that machine observation data can provide.

There was a recognised opportunity to deploy machine sensors at scale to enhance representative sampling in remote locations and those opportunities to both deploy and to verify AI processed data could be scaled using people with non-scientific backgrounds. This latter step would require deployment apps that captured required metadata, user interfaces that are increasingly easy to use, and eventual data processing tools that a much wider group of users could use effectively.

Many workshop participants conducted monitoring to record changes in species abundance, distribution, and ecosystems over time and in response to a variety of anthropogenic drivers and increasing natural disasters. This need was often most acute from participants monitoring species that are rare or in decline, but it also extended to common species. Understanding the spatial and temporal scales of these changes was a common need. This kind of information then informs decision-making in conservation and ecosystem management at local, regional and continental scales.

Understanding and predicting the impacts of climate change on ecosystems and communities was perhaps the anthropogenic driver of change that was most widely shared or recognised. Long-term biodiversity inventories that track changes over time are essential for this purpose and again machine observation was seen as a likely candidate to scale that kind of information in new ways. In parallel, camera trap, ecoacoustic and drone monitoring data can increasingly be used in a variety of analyses that contribute to our understanding of biodiversity and ecosystem health.

Workshop participants emphasised the importance of monitoring key environmental assets or characteristics, such as species richness on farms, biodiversity trends, habitat or landscape condition, patch quality or connectivity and carbon levels. These are integral to supporting conservation efforts and informing policy decisions. Underlying infrastructure and data management systems were seen as crucial in ensuring scalability, quality, and interoperability of the monitoring infrastructure.

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Appendix 3: Attendees

Name	Role and Organisation
Alan Woodley	Leader of the Spatial Informatics Laboratory and Senior Lecturer, Queensland University of Technology
Ana Ruiz-Beltrán	Postdoctoral Research Fellow, University of Queensland
Anastasia Dalziell	Lecturer, ARC DECRA Fellow, Lead LyrebirdLab, Hawkesbury Institute for the Environment, Western Sydney University/Lab Associate Cornell Lab of Ornithology
Andy White	Research Data Consultant, Australian Research Data Commons
Anthony Truskinger	Technical Lead, Open Ecoacoustics, Queensland University of Technology
Ashley Leedman	Director, Department of Climate Change, Energy, the Environment and Water
Ayesha Tulloch	ARC Future Fellow, Queensland University of Technology
Beryl Morris	Director, Terrestrial Ecosystem Research Network
Daniel Lerodiaconou	Associate Professor in Marine Science, Deakin University and Coastal Science Lead, IMOS (CoastRI-IMOS)
David Rowlings	Professor of Sustainable Agriculture, Queensland University of Technology
Dominique Gorse	Director of Data Science, Queensland Cyber Infrastructure Foundation
Elisa Bayraktarov	Data and Science Manager, The Nature Conservancy
Elisabeth Znidersic	Postdoctoral Research Fellow, Charles Sturt University
Fiona Sutton-Wilson	CEO, Earthwatch Institute Australia
Glenda Wardle	Professor of Ecology and Evolution, University of Sydney; TERN NSW lead and Desert Ecology Plot data provider, CI for ARC Training Center for Data Analytics for Resources and Environment (DARE)
Hamish Holewa	Director, Planet RDC, Australian Research Data Commons
Hugh Possingham	Professor, University of Queensland
Hunter McCall	Senior Conservation Officer, Threatened Species Research & Monitoring, Queensland Department of Environment, Science & Innovation

Name	Role and Organisation
Ian Gynther	Principal Conservation Officer, Threatened Species Operations, Queensland Department of Environment, Science and Innovation
Indrie Sonawane	Senior Project Officer, Data and Comms, NSW National Parks and Wildlife Service
Jo Morris	Program Manager (Planet RDC), Australian Research Data Commons
Jo Savill	Senior Science Communicator, Australian Research Data Commons
Karen Rowe	Curator of Birds, Museums Victoria
Kerry Levett	Solutions Architect , Planet RDC, Australian Research Data Commons
Liana Joseph	National Science Manager, Australian Wildlife Conservancy
Lin Schwarzkopf	Distinguished Professor of Ecology, ground-truthing acoustic data and describing calling patterns of vertebrates, James Cook University
Linda O'Brien	Adjunct Professor
Luke Edwards	Data Specialist / Partnership development, Pawsey Supercomputing Centre
Mark Cowan	Senior Research Fellow within the NESP Resilient Landscapes Hub, Curtin University
Matthew Grace	Senior Product Manager, CSIRO Data61
Matthew Luskin	Senior Lecturer and Director of the Wildlife Observatory of Australia (WildObs), University of Queensland
Matthias Liffers	Product Manager (PIDS), Australian Research Data Commons
Max Ott	Senior Engineer and Solution Architect, CSIRO Data61
Naomi Levao	Assistant Director, Department of Climate Change, Energy, the Environment and Water
Nelli Holopainen	Project Manager, Open Ecoacoustics, Queensland University of Technology
Paul Coddington	Associate Director, Research Cloud, Australian Research Data Commons
Paul Mead	Co-founder, GeoNadir
Paul Roe	Professor, Queensland University of Technology

Name	Role and Organisation
Peggy Newman	Data Manager, Atlas of Living Australia
Peter Marendy	Head of Data Services, Queensland Cyber Infrastructure Foundation
Philip Eichinski	Senior Research Software Engineer, Queensland University of Technology
Rebecca Spindler	Executive Manager, Science and Conservation, Bush Heritage Australia
Richard Seaton	Threatened Terrestrial Birds Manager, BirdLife Australia
Rob Clemens	Skills Development Lead, Australian Research Data Commons
Skye Anderson	PhD candidate, School of Environment, University of Queensland
Stephen Bird	Business Group Manager, Queensland Cyber Infrastructure Foundation
Susan Fuller	Professor in Ecology, Queensland University of Technology
Tim Brown	Australian Scalable Drone Cloud, Project Lead Lead for digital innovation, Australian Plant Phenomics Facility
Tracy Rout	Conservation Analyst, World Wildlife Fund - Australia
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