

# Ethical Open Science



Pedro M. Monarrez

(updated from slides by Bethany Allen & Harriet B. Drage)

# Learning Objectives

1. Think and discuss what open science means
2. Understand the basics of FAIR and CARE
3. Learn where data can be archived and while considering FAIR and CARE principles



# Breakout session

Discuss

**Discuss questions in small groups – 10 minutes**

Answer

**Write answers – 5 minutes**

Read

**Discuss answers with other groups – 10 minutes**

# Breakout session questions

1. Why is open science important?
2. What information is important to archive in a findable, accessible, interoperable, and reproducible way?
3. What are some repositories where you can archive open science data?
4. What are some ethical considerations with open science data?

# Why open science?

1. Transparency
2. Reproducibility
3. Accessibility
4. Collaboration
5. Equity
6. Efficient workflows
7. Education and outreach



# F

# A

# I

# R



Findable



Accessible



Interoperable



Reusable

## Findable

- F1. (Meta)data are assigned a globally unique and persistent identifier
- F2. Data are described with rich metadata (defined by R1 below)
- F3. Metadata clearly and explicitly include the identifier of the data they describe
- F4. (Meta)data are registered or indexed in a searchable resource



## Accessible

- A1. (Meta)data are retrievable by their identifier using a standardised communications protocol
  - A1.1 The protocol is open, free, and universally implementable
  - A1.2 The protocol allows for an authentication and authorisation procedure, where necessary
- A2. Metadata are accessible, even when the data are no longer available



# What is FAIR?

It is a set of principles

## Interoperable

- I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (Meta)data use vocabularies that follow FAIR principles
- I3. (Meta)data include qualified references to other (meta)data



## Reusable

- R1. (Meta)data are richly described with a plurality of accurate and relevant attributes
  - R1.1. (Meta)data are released with a clear and accessible data usage license
  - R1.2. (Meta)data are associated with detailed provenance
  - R1.3. (Meta)data meet domain-relevant community standards





palaeoverse

# DATA PRINCIPLES

## INDIGENOUS

## MAINSTREAM

| New Zealand<br>Indigenous Data<br>Sovereignty<br>Principles | Australia<br>Indigenous Data<br>Sovereignty<br>Protocols | United States<br>Indigenous Data<br>Governance<br>Principles | Canada<br>Indigenous Data<br>Governance<br>Principles | Open Data<br>Charter<br>Principles                 | FAIR Principles<br>for Data<br>Management and<br>Stewardship | STREAM<br>Properties for<br>Industrial and<br>Commoditized<br>Data |
|-------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------|
| Authority                                                   | Self-Determination                                       | Inherent<br>Sovereignty                                      | OCAP®                                                 | Open By Default                                    | Findable                                                     | Sovereign                                                          |
| Relationships                                               | Available and<br>Accessible                              | Indigenous<br>Knowledge                                      | Indigenous<br>Knowledge                               | Timely and<br>Comprehensive                        | Accessible                                                   | Trusted                                                            |
| Obligations                                                 | Collective Rights<br>and Interests                       | Ethics                                                       | Methodology and<br>Approaches                         | Accessible and<br>Usable                           | Interoperable                                                | Reusable                                                           |
| Collective Benefit                                          | Accountability                                           | Intergenerational<br>Collective Wellbeing                    | Evidence to Build<br>Policy                           | Comparable and<br>Interoperable                    | Reusable                                                     | Exchangeable                                                       |
| Reciprocity                                                 | Exercise Control                                         | Relationships                                                | Ethical<br>Relationships                              | For Improved<br>Governance &<br>Citizen Engagement |                                                              | Actionable                                                         |
| Guardianship                                                |                                                          |                                                              | Data Governance                                       | For Inclusive<br>Development and<br>Innovation     |                                                              | Measurable                                                         |

People oriented  
principles

Purpose oriented  
principles

Data oriented  
principles

Carroll, S, et al. 2020. The CARE  
Principles for Indigenous Data  
Governance. *Data Science Journal*



palaeoverse

# Where to archive?



Dryad, Zenodo, FigShare, the Open Science Framework (OSF), Pangaea, institutional and funding body repositories...



**PANGAEA.**

Data Publisher for Earth & Environmental Science

General data: PBDB and Neotoma (occurrence data), MorphoSource, MorphoBank...



# Where to archive?

But to consider:

- Longevity
- Cost
- Capacity
- Accessibility
- Discoverability
- Citability
- Version control
- Licensing

