Toward a Reproducible Research Data Repository

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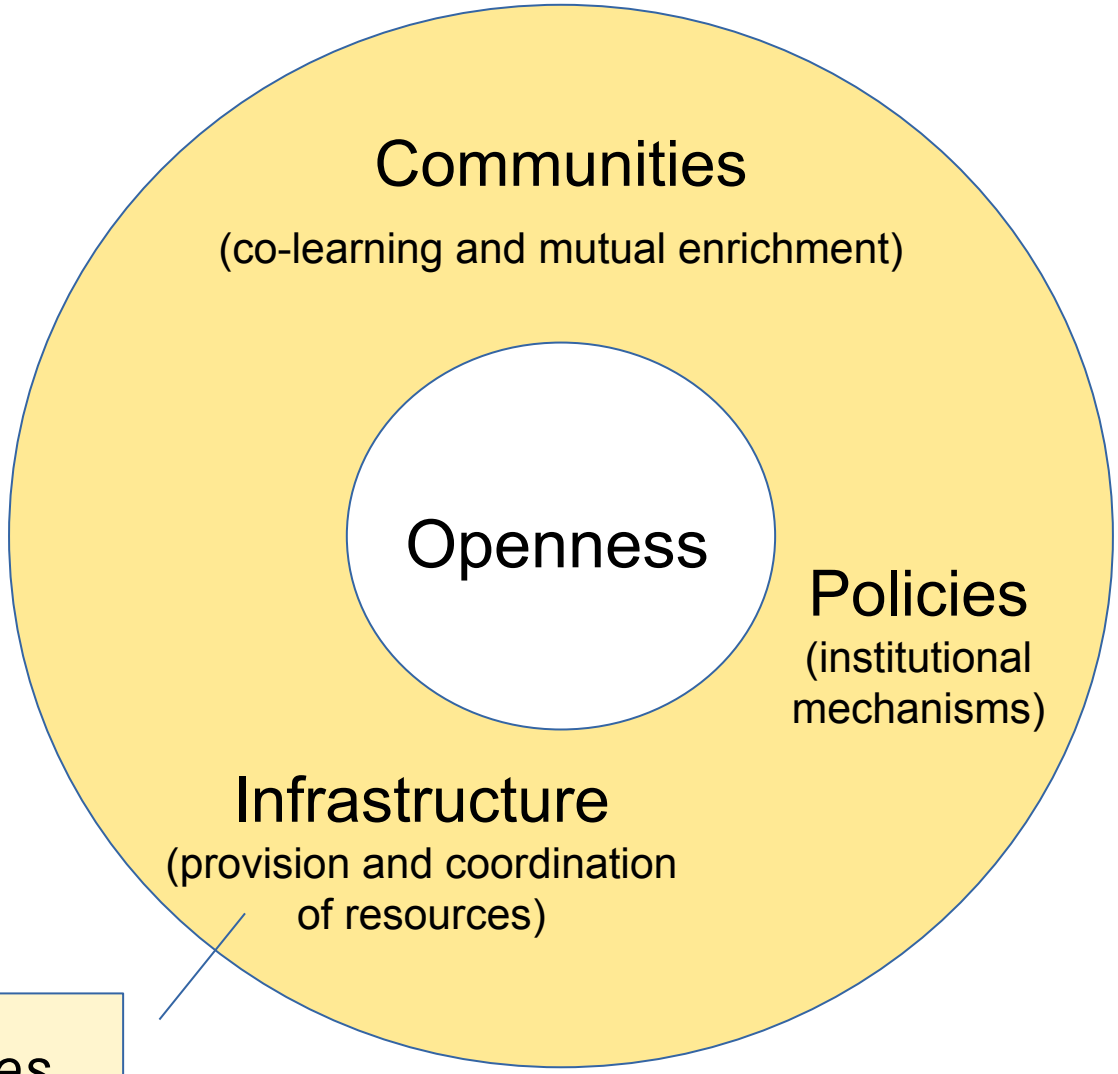
depositar
研究資料寄存所

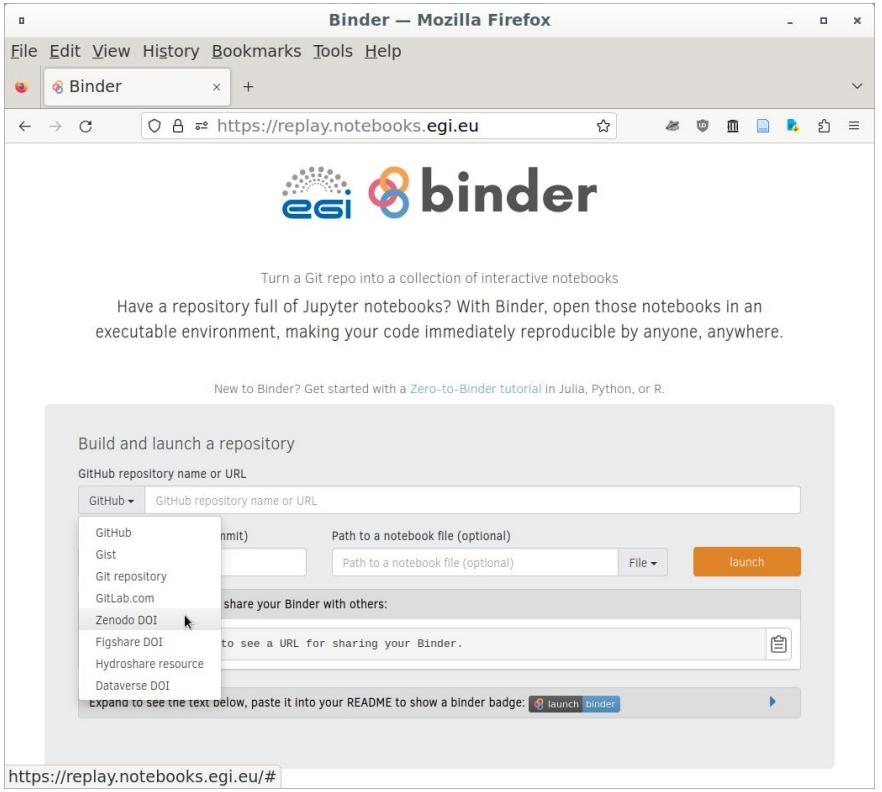
The Roles of Repositories in Open Source/Data/Science…



Repositories

Bringing Computation to Data Repositories

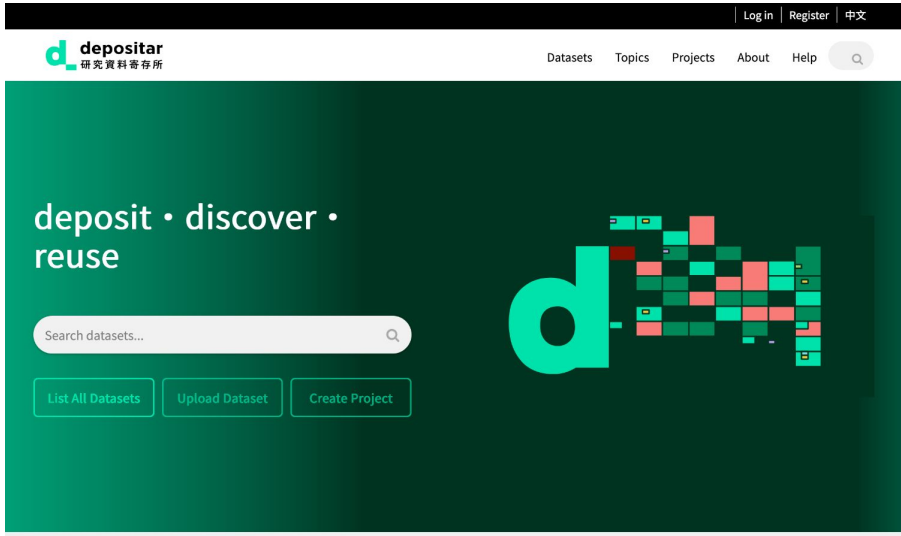
- Our inspirations
  - EGI Notebook and Replay
  - GESIS Notebooks
  - Code Package Function from NII (Japan)

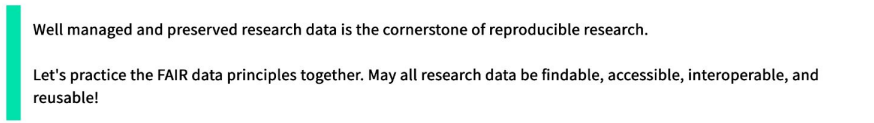


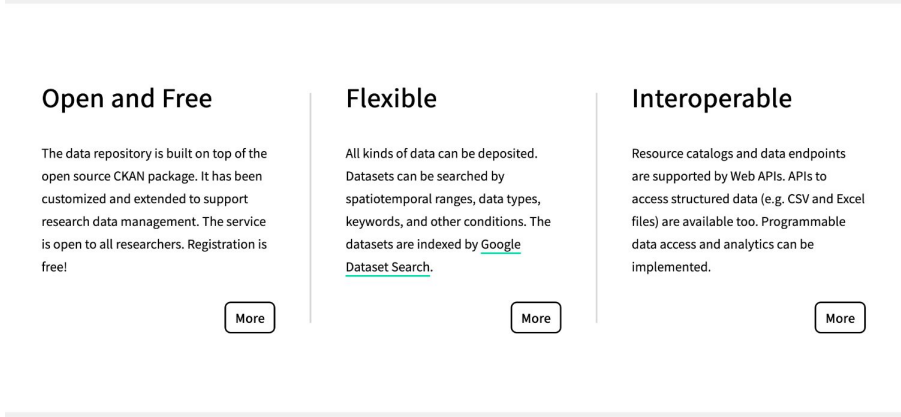
- Repositories for reproducible research
  - Article, code, and data are all open access and at the same place in a repository
  - Analytical results in the article can be automatically generated with the code and the data (by clicking a single button)
  - The repository coordinates computational and storage resources that are needed for the reproducibility of the results

About the *depositar* (研究資料寄存所)

- A data repository open to researchers worldwide for the deposit, discovery, and reuse of datasets since 2018
- Built on top of ckan, an open source data portal
- 1,900+ datasets & 340k+ views (as of Dec 2023)







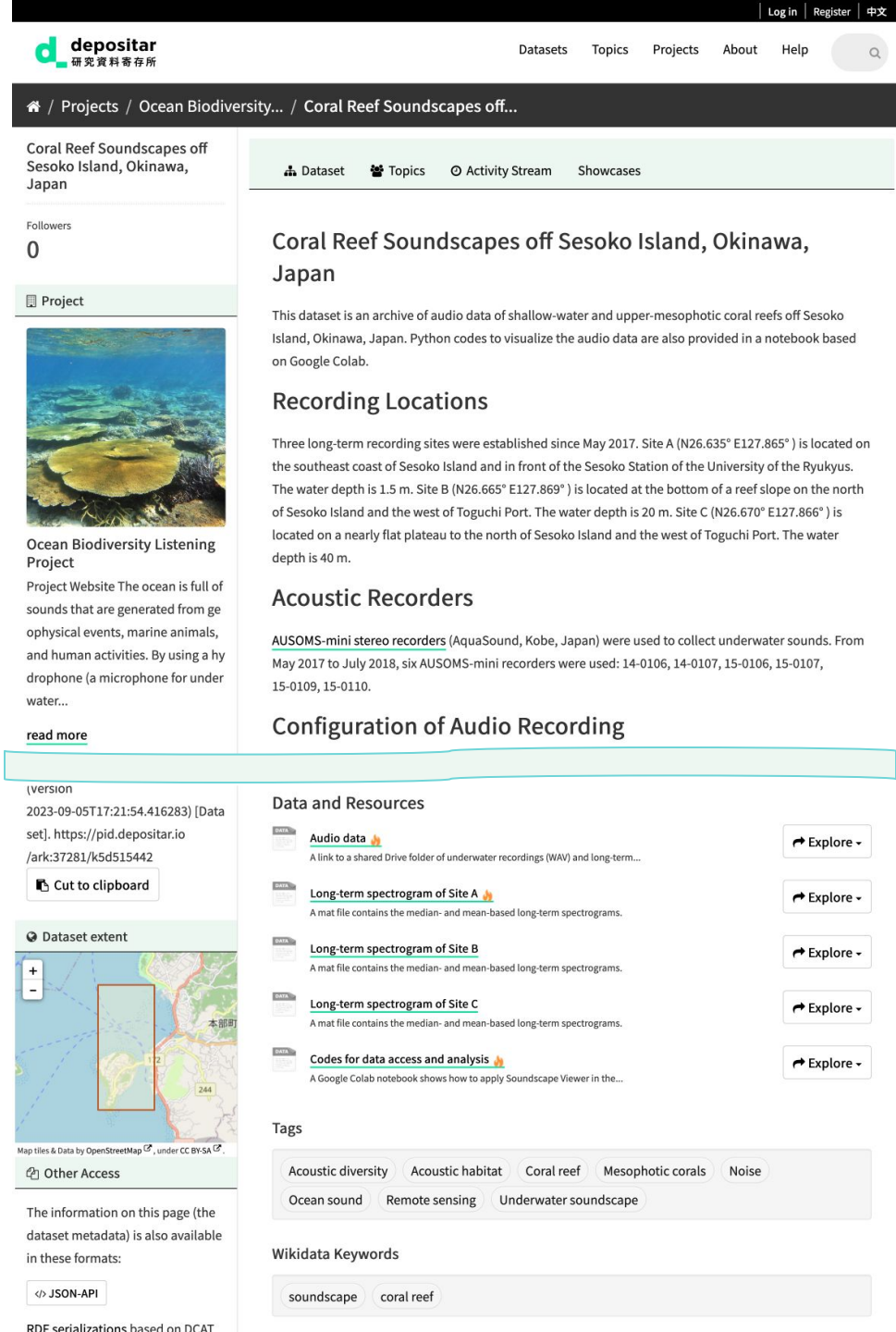
data.depositar.io

Learn more about the depositar: https://data.depositar.io/en/about

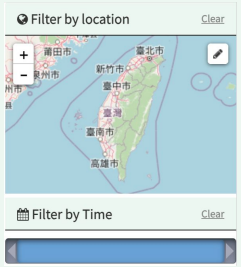
A Sample Dataset at Depostar

- Long description of dataset and project
- (deposited) data and (external) resources; descriptions
- W3C DCAT-based metatada
- Tags and Wikidata keywords

https://pid.depositar.io/ark:37281/k5d515442



Feature Highlights

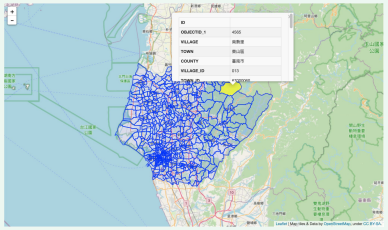


Spatio-temporal Search

Google site:data.depositar.io

Dataset Search

ARK Persistent Identifier



Data Previewers

W3C DCAT-based Metatada

WIKIDATA

Wikidata Keywords

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FAIR data since 2018

Project Management

/api/3/action/

JSON Data API

JSON-LD | XML | Turtle

RDF Serializations

jupyter BinderHub Integration

Dataset Citation CSL

ckan

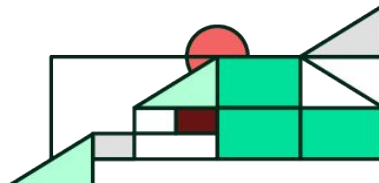
Open Data License Widget

Challenges to Online Interactive Computing

- Jupyter (Jupyter Notebook, JupyterLab)
  - A web-based interactive computing platform
  - Support many kernels (programming languages)

- JupyterHub
  - A multi-tenancy JupyterLab service for group of users

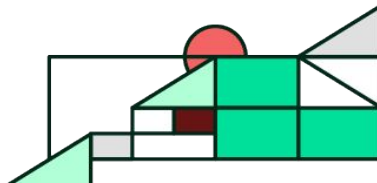
- The current JupyterHub service for specific data partners
  - Limited and inelastic processing power as a single server
  - The need for downloading the data from the repository and then uploading it to Jupyter



BinderHub Integration for Depositar

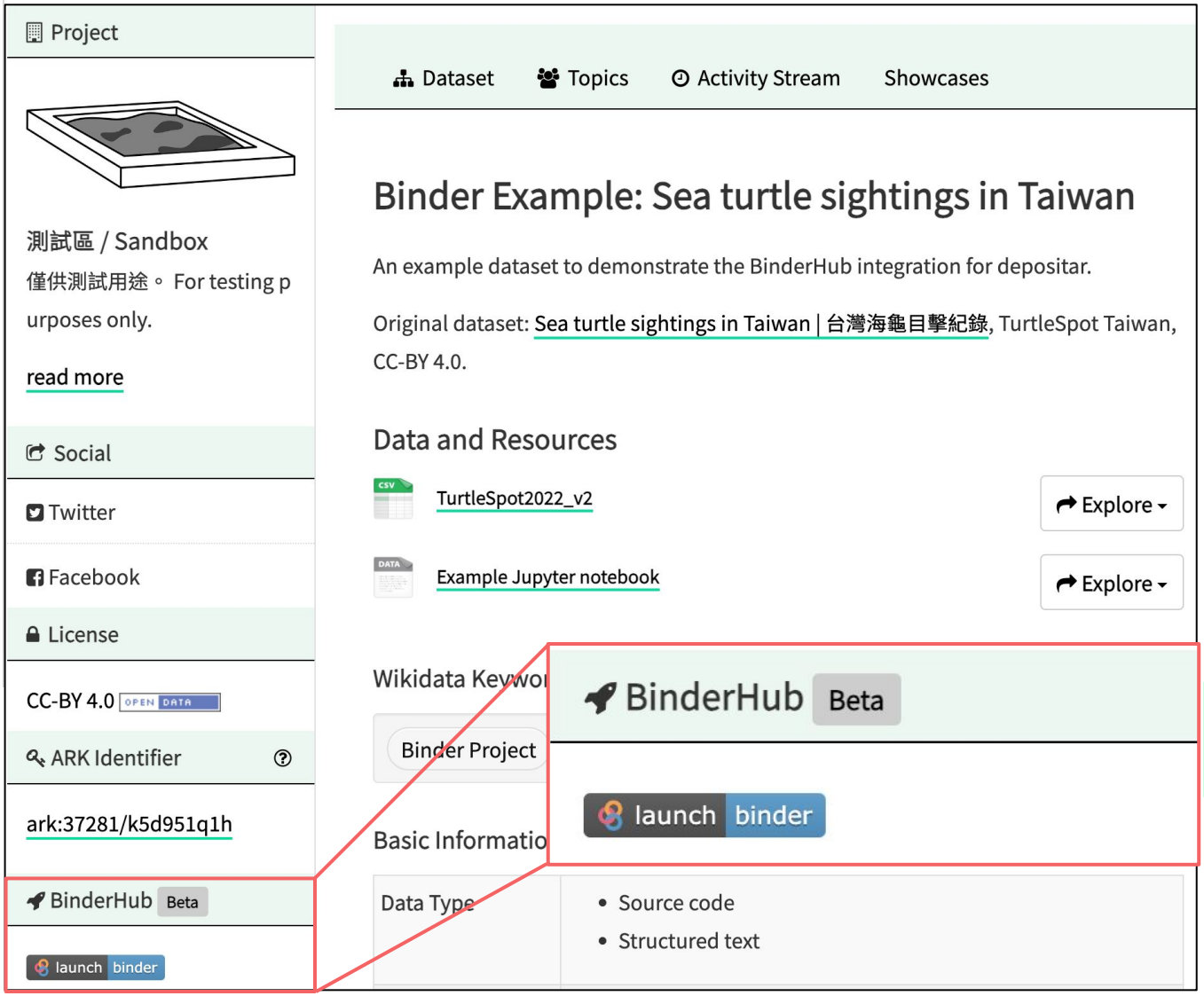
- BinderHub: establish a JupyterHub in the Kubernetes (k8s) environment to create Jupyter notebooks from data repositories such as GitHub, Zenodo, or Dataverse
  - MyBinder.org: a public Binder service

- BinderHub integration for *depositar* (available as of October 2023)
  - binder.depositar.io: a customized Binder service with a "CKAN provider" to support datasets on the *depositar*
  - Launch a Jupyter environment containing resources from a dataset by **clicking a button** on the dataset page without downloading the resources
  - Highly scalable thanks to the k8s technology



Demo

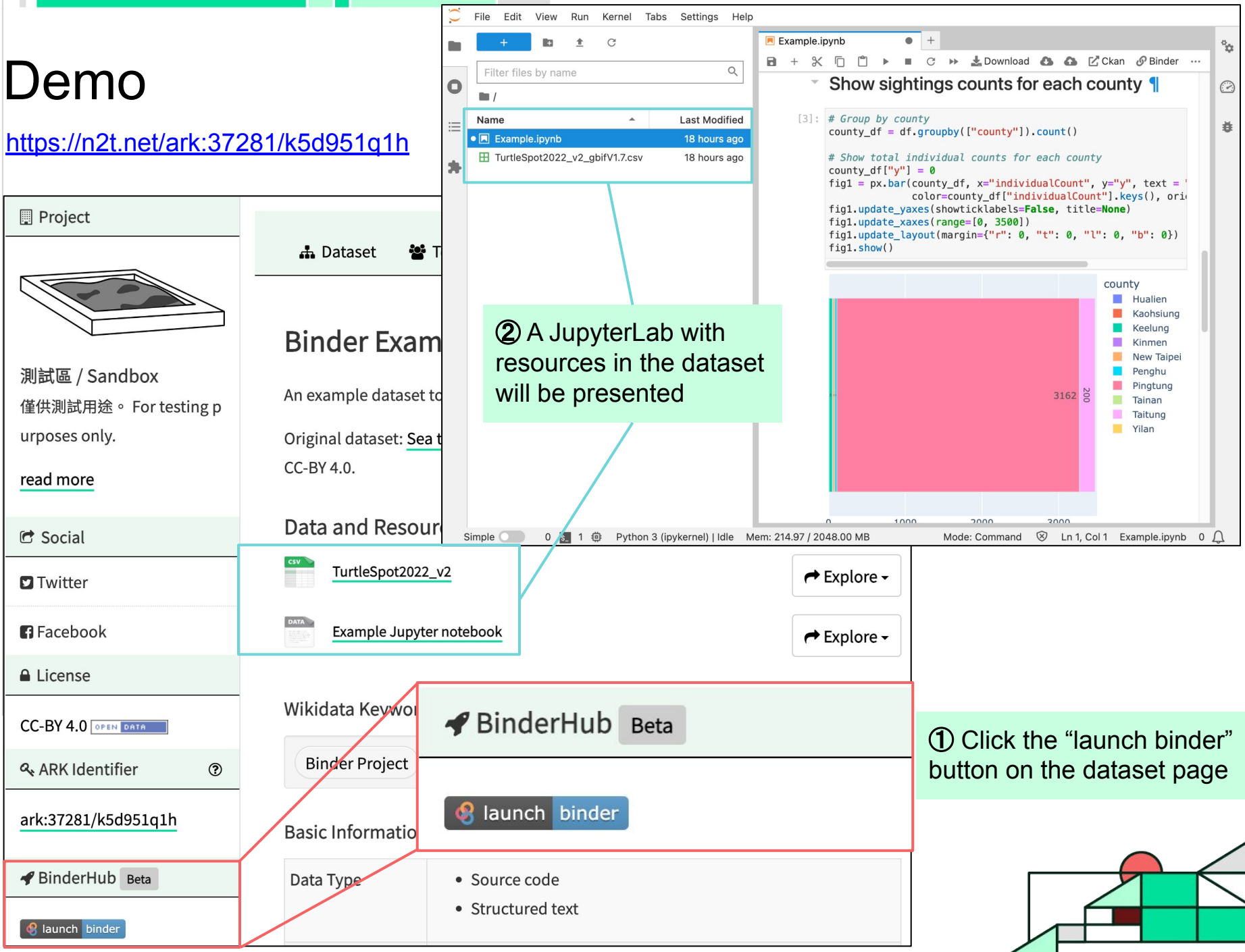
https://n2t.net/ark:37281/k5d951q1h



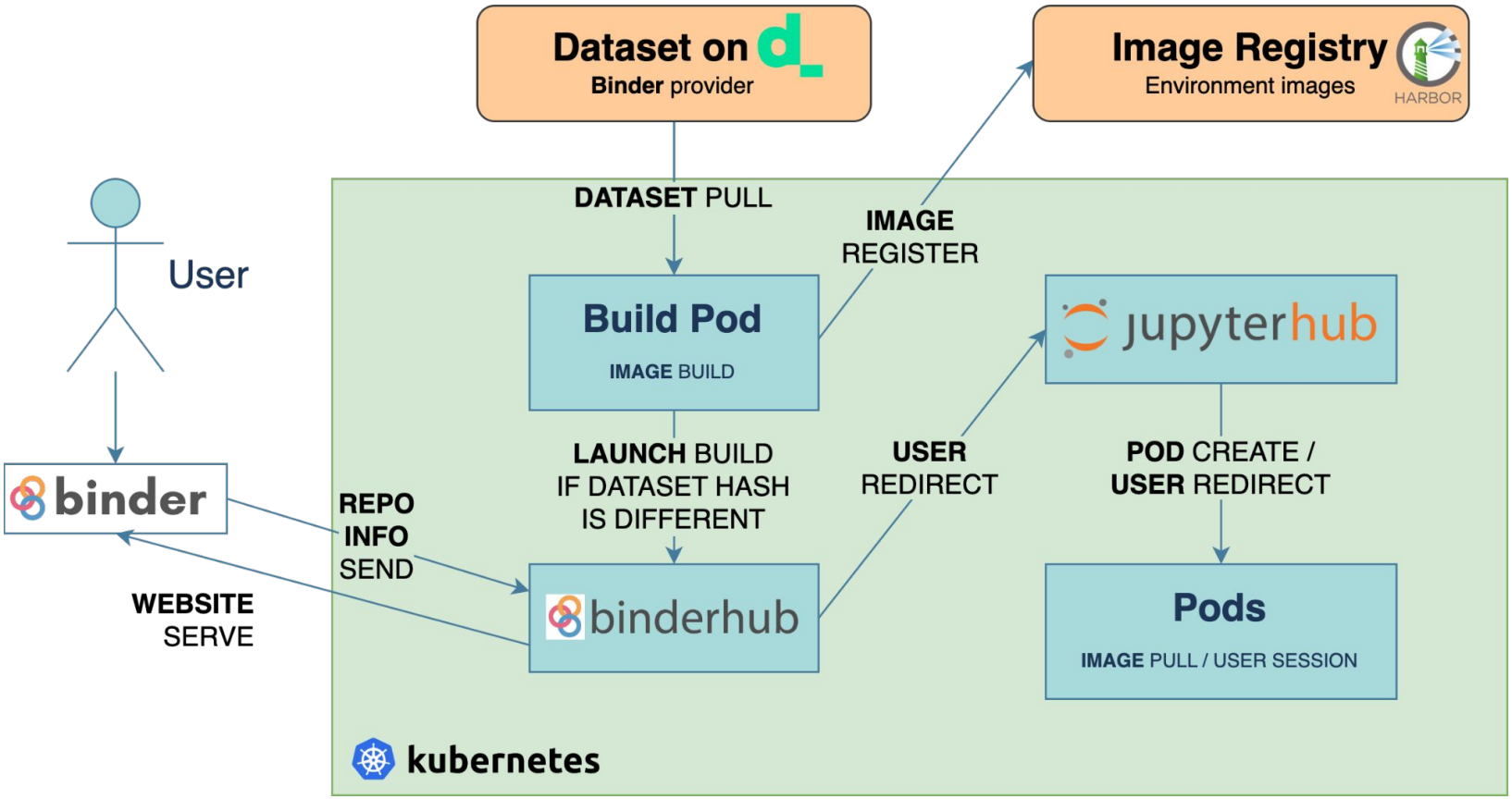
① Click the “launch binder” button on the dataset page

Demo

https://n2t.net/ark:37281/k5d951q1h



Architecture of the BinderHub Integration



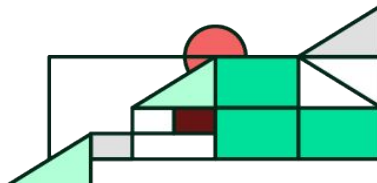
* Adapted from the diagram of the BinderHub architecture.
* Computing resource provided by Academia Sinica Grid Computing Centre, Grant No. AS-CFII-112-103.

Research Workflow Automation

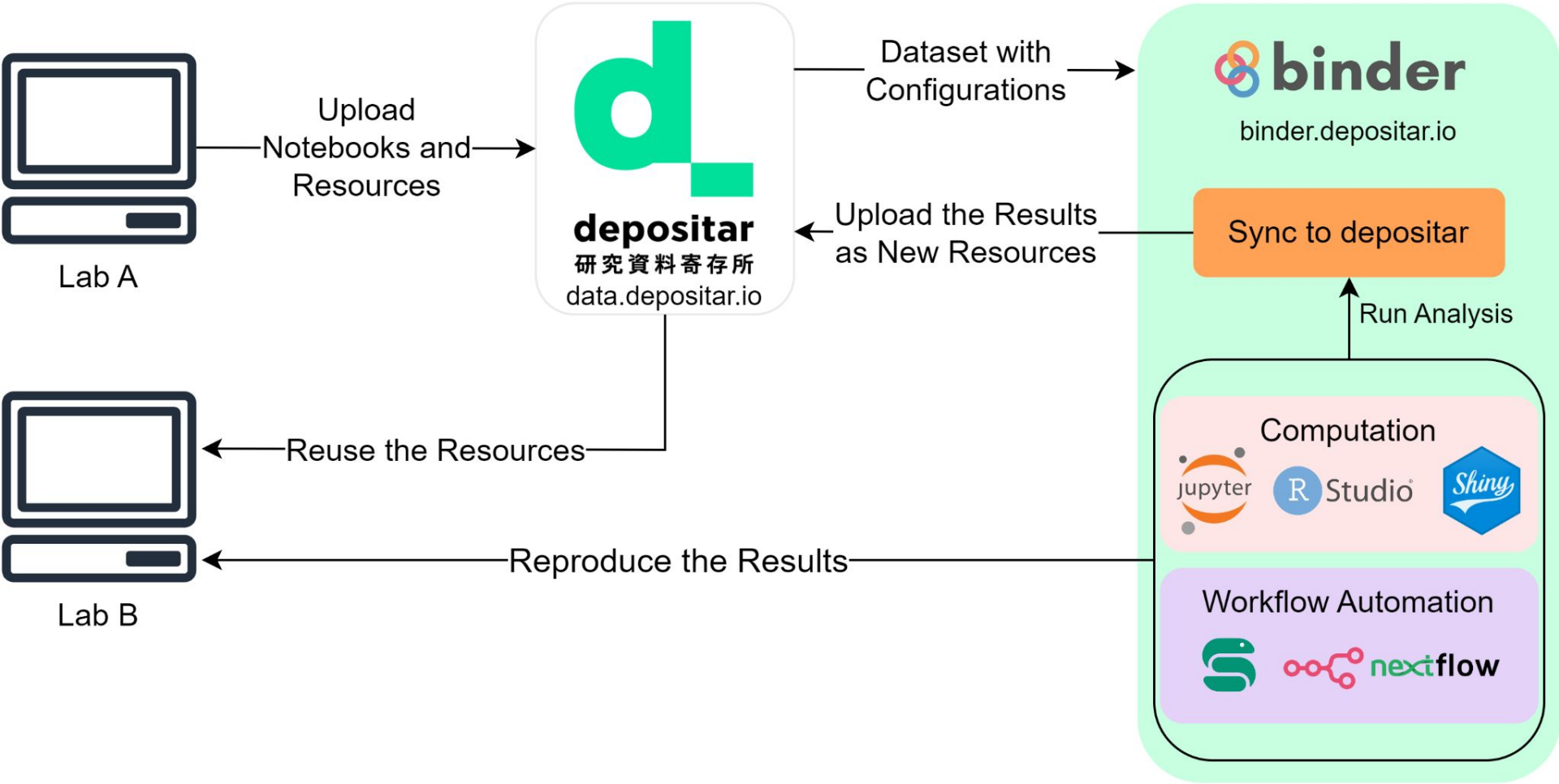
- Vanilla Jupyter is...
  - **IDEAL** for teaching or demonstration purpose
  - **NOT ENOUGH** for reproducing complex data analysis

- Workflow Management System
  - Run human-readable workflows (script) to conduct scalable, automatic, and portable data analysis
  - Candidates for consideration
    - Snakemake (Make + Python)
    - n8n (JavaScript)
    - Nextflow (Groovy)
    - CWL* implementations

* Common Workflow Language



A Preview of Depositar Binder Service (under development)



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ありがとう！ 謝謝！ Thank You!

https://data.depositar.io/ depositar
https://rdm.depositar.io/ RDM Hub

data.contact@depositar.io
https://lab.depositar.io/

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The *depositar* project team: T-R Chuang, M-S Ho, C-J Lee & C-H Ally Wang.

「研究資料寄存所」是中央研究院資訊科學研究所、資訊科技創新研究中心、人文社會科學研究中心（地理資訊科學研究專題中心）的協作專案，部份經費來自台灣國科會的專題研究計畫。
研究資料寄存所計畫成員：莊庭瑞、何明諠、李承 鑫、王家薰。