FAIR workflow services

Professor Carole Goble
The University of Manchester UK

EU Research Infrastructures ELIXIR, IBISBA, EOSC-Life
BioExcel Centre of Excellence
Software Sustainability Institute UK
FAIRDOM Consortium

carole.goble@manchester.ac.uk

FAIR Guiding Principles for Research **Data**
Findable, Accessible, Interoperable, Reusable

GO FAIR

COMMITTEE ON DATA CODATA INTERNATIONAL SCIENCE COUNCIL

RDA RESEARCH DATA ALLIANCE

FAIRSFAIR Fostering Fair Data Practices in Europe

EUROPEAN OPEN SCIENCE CLOUD

OECD

SCIENCE EUROPE Shaping the future of research

NIH Office of Data Science Strategy

W wellcome

F, I, R Metadata generated and exposed for data products?

F1 Workflow consumes, propagates, generates FAIR identifiers for data?

R1 license data outputs? **R1.1** community data formats?

R1.1 usage restrictions on the reference data needed?

parameters validated? **R1.2**

A1 How does the workflow access FAIR data?

fully track and report data provenance through the workflow? **R1.2**

This project has received funding from the European Union's 2020 research and innovation programme under grant agreer

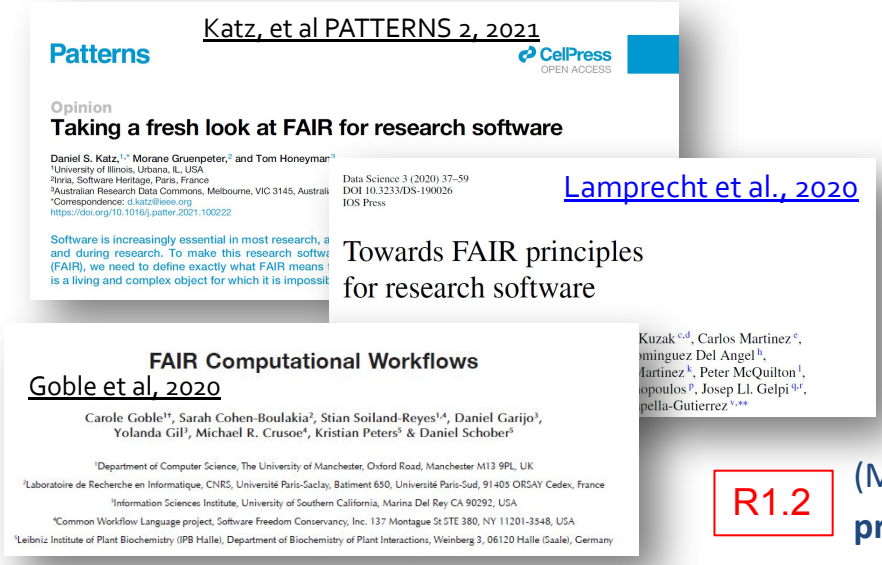
FAIR Guiding Principles for Research **Software** Findable, Accessible, Interoperable, Reusable

<ReSA> Research Software Alliance

FORCE11 The Future of Research Communications and e-Scholarship

RDA RESEARCH DATA ALLIANCE

FAIR for Research Software (FAIR4RS) Working Group



F1 register workflows with assigned PID + metadata in a searchable resource.

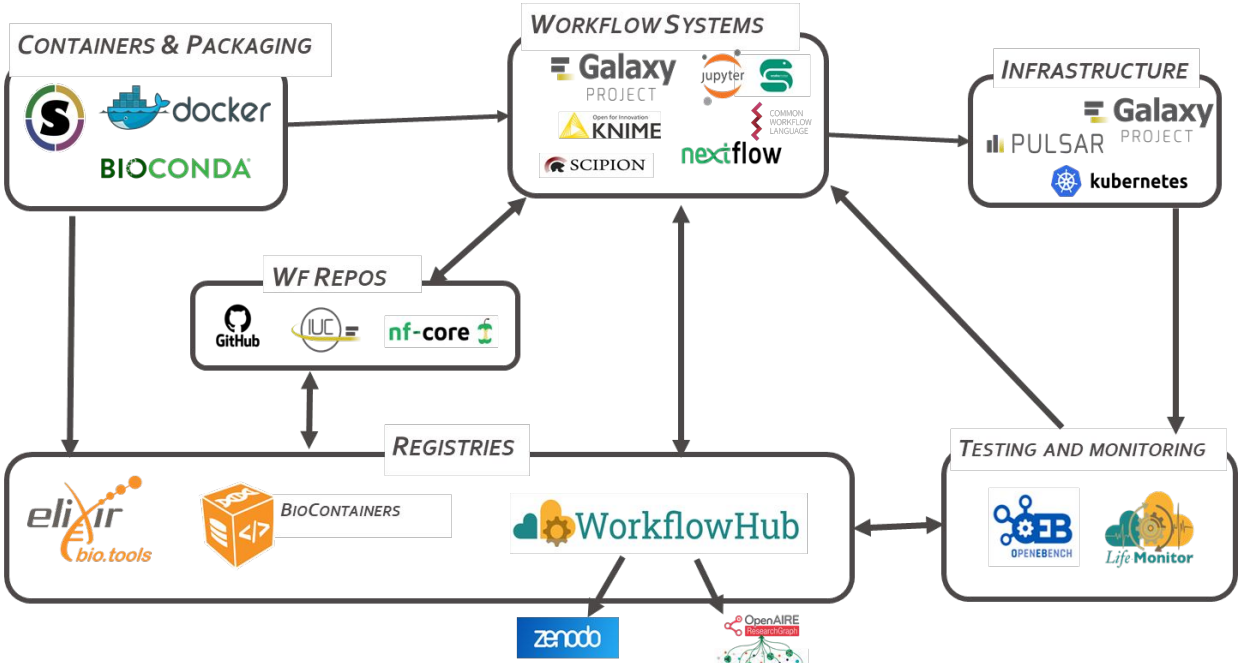
A1 metadata & workflow retrievable by PID using a standardized communication protocol; metadata retrieval even if the workflow is no longer available.

I1 workflows should read, write or exchange data using domain-relevant community standards

R1 The workflow is **usable** (it can be executed) & **reusable** (it can be understood, modified, built upon, or incorporated into other workflows).

R1.2 (Meta)data, workflows and tools are associated with **detailed provenance – data lineage, workflow lineage & workflow logs**

FAIR Workflow Services, FAIR Enabling Services



A WfMS agnostic FAIR data and workflow commons

Honour legacy & diversity

Support native repositories & platforms

Buy-in & on-boarding of WfMS for lifting and sharing metadata and adopting APIs

Findable & Accessible

register workflows with assigned PID + metadata in a searchable resource.

WorkflowHub

Dockstore
Create, Share, Use
https://dockstore.org/

WorkflowHub
https://workflowhub.eu

Publishing Services

doi
zenodo
ORCID
Connecting Research and Researchers
Journals
OpenAIRE ResearchGraph

Digital Objects of Scholarship

published, cited, exchanged, reviewed, validated & reused

- Versioning, DOI/PID assignment
- Collections, workflow libraries

WfMS Agnostic *degrees of onboarding, support & access*

- Native repositories
- Metadata standards framework, handle associated objects and links between objects.
- Execution API (GA4GH)

jupyter
Galaxy PROJECT
SCIPION
nextflow
scripts
COMMON WORKFLOW LANGUAGE

Tools
elixir bio.tools

Containers
docker

Deploys
Galaxy EUROPE

Repos
GitHub
IUC
nf-core

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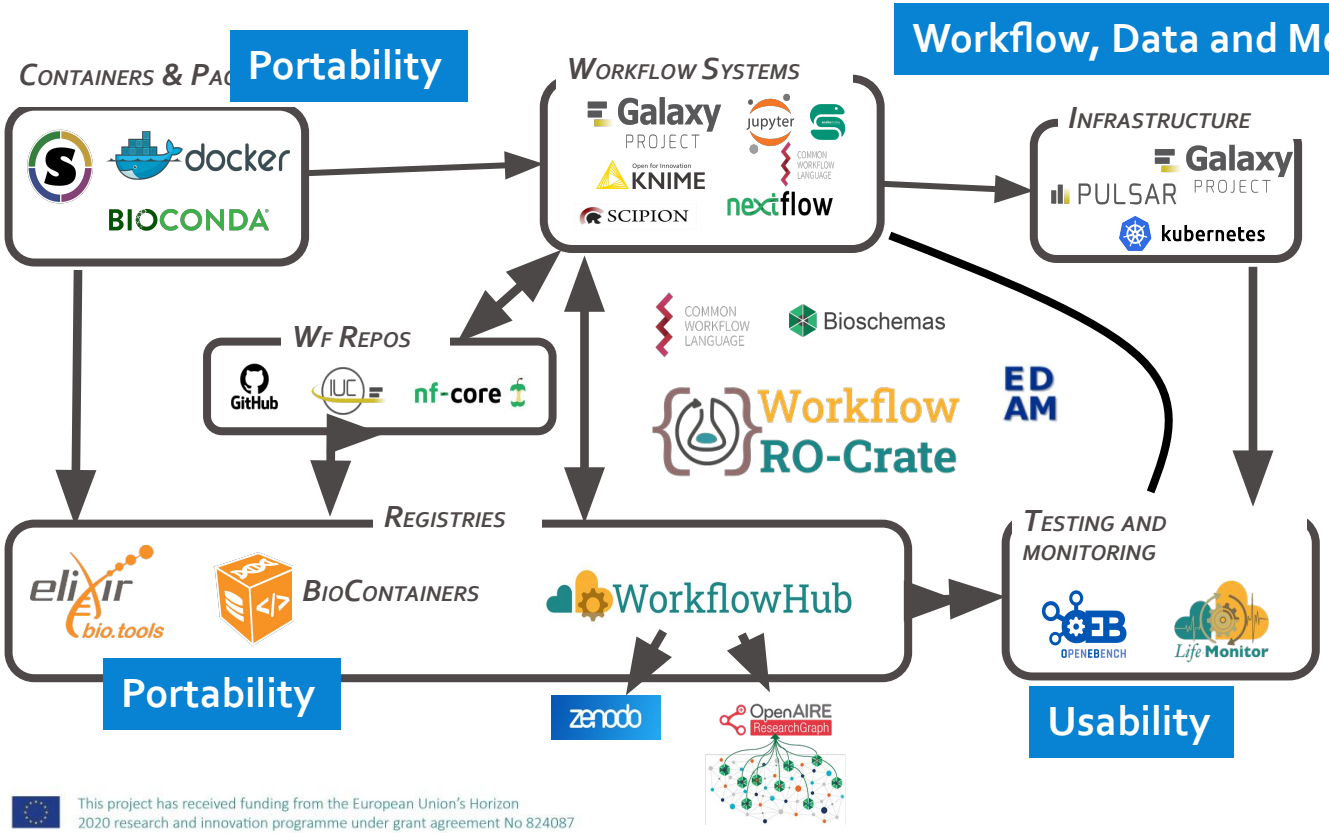
Reproducible and (Re)Usable

execute once accessed, reused and remixed as components



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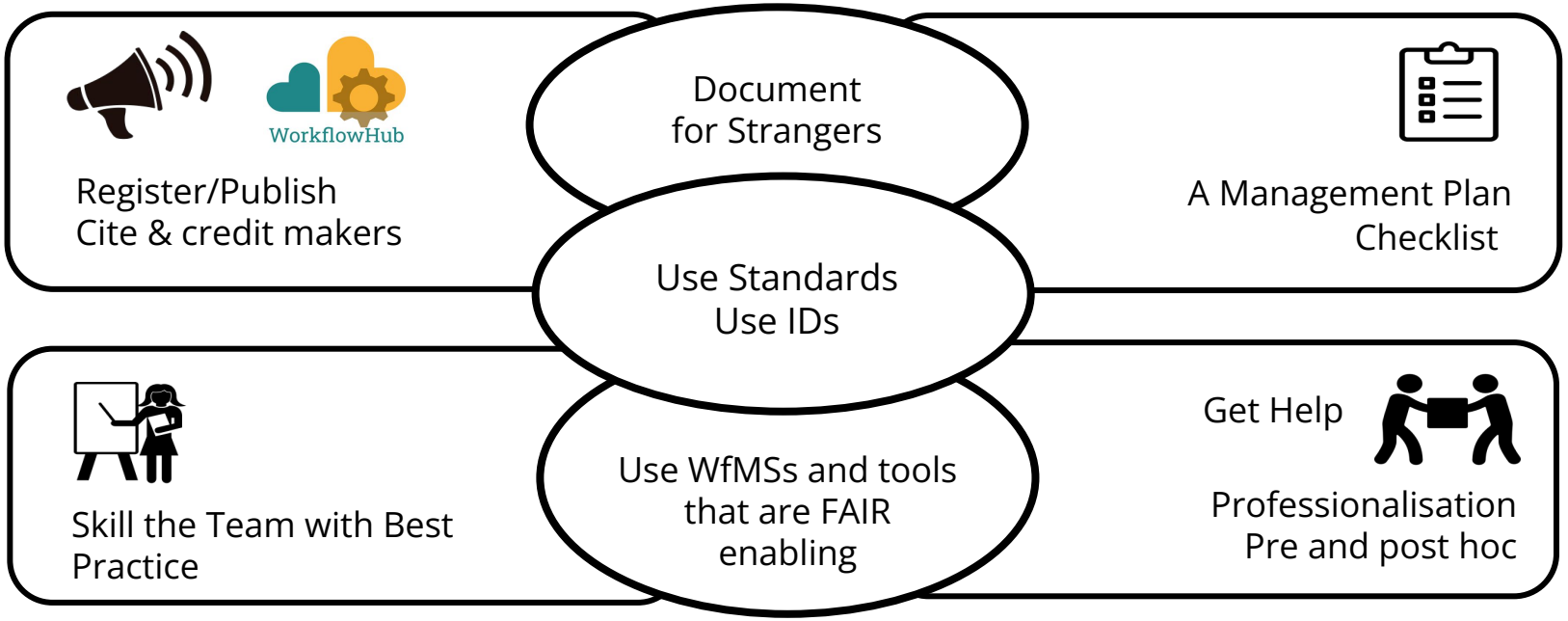
Life Monitor https://lifemonitor.eu/

workflow test statuses, automated execution, various testing services (e.g., Travis CI, GitHub Actions, Jenkins, etc.).

Benchmarking and monitoring of tools. workflow performance, provenance on containers, memory usage …

https://openebench.bsc.es/dashboard

What can you do to be FAIR?



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Acknowledgements

The **WorkflowHub Club**, Bioschemas Community, RO-Crate Community, CWL Community, Galaxy Europe, EOSC-Life and ELIXIR Tools Platform.

https://about.workflowhub.eu/community/

WorkflowHub https://workflowhub.eu/ and https://workflowhub.org
EOSC-Life https://www.eosc-life.eu/
ELIXIR http://elixir-europe.org
RO-Crate https://www.researchobject.org/ro-crate/
Galaxy Europe https://galaxyproject.eu/
Bioschemas https://bioschemas.org
Common Workflow Language https://www.commonwl.org/
WorkflowsRI https://workflowsri.org/
Dockstore https://dockstore.org/
LifeMonitor https://lifemonitor.eu/