

FAIR workflow services

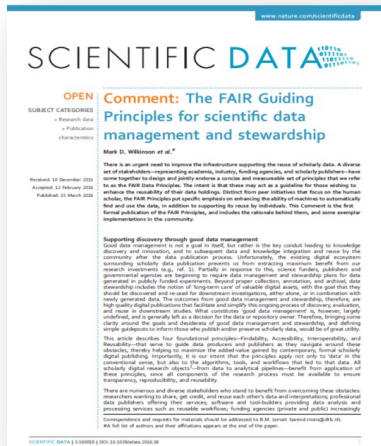
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BioExcel Centre of Excellence
Software Sustainability Institute UK
FAIRDOM Consortium

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



Office of
Data Science Strategy



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

F1

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

license data outputs?

R1.1

R1

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



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



FAIR for Research Software (FAIR4RS) Working Group

Katz, et al PATTERNS 2, 2021

Patterns



Opinion

Taking a fresh look at FAIR for research software

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Software is increasingly essential in most research, and during research. To make this research software (FAIR), we need to define exactly what FAIR means: is a living and complex object for which it is impossible

Data Science 3 (2020) 37–59
DOI 10.3233/DS-190026
IOS Press

[Lamprecht et al., 2020](#)

Towards FAIR principles
for research software

FAIR Computational Workflows Goble et al, 2020

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Kuzak^{5,d}, Carlos Martinez⁶,
Minguez Del Angel⁶,
Martinez⁶, Peter McQuilton¹,
Ioannidis⁶, Josep L.L. Gelpi⁶,
Pella-Gutierrez^{6,*,**}

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

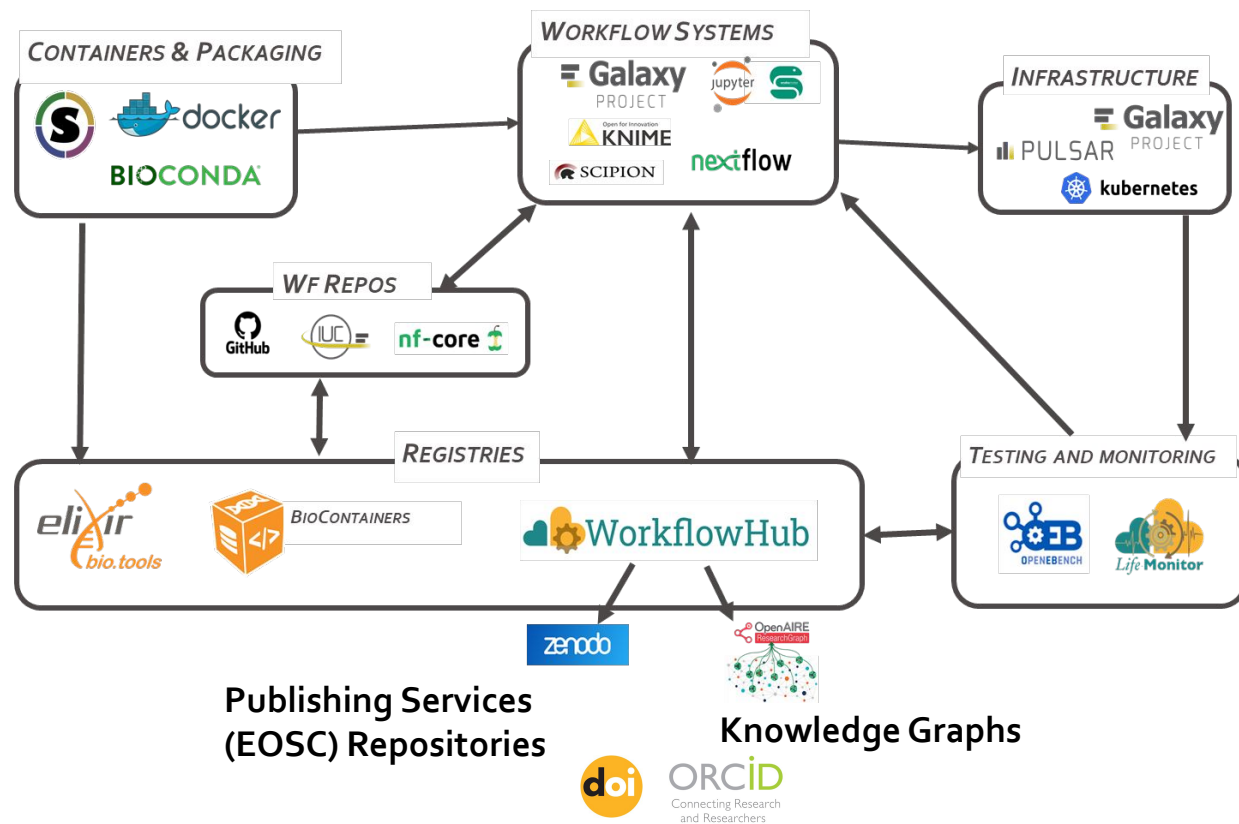
R1

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 & Accessable

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



Dockstore
Create, Share, Use

<https://dockstore.org/>



WorkflowHub

<https://workflowhub.eu>

Publishing Services



zenodo

ORCID
Connecting Research
and Researchers

Journals



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)



Galaxy
PROJECT



SCIPION

nextflow



scripts

Tools



Containers



Deploys

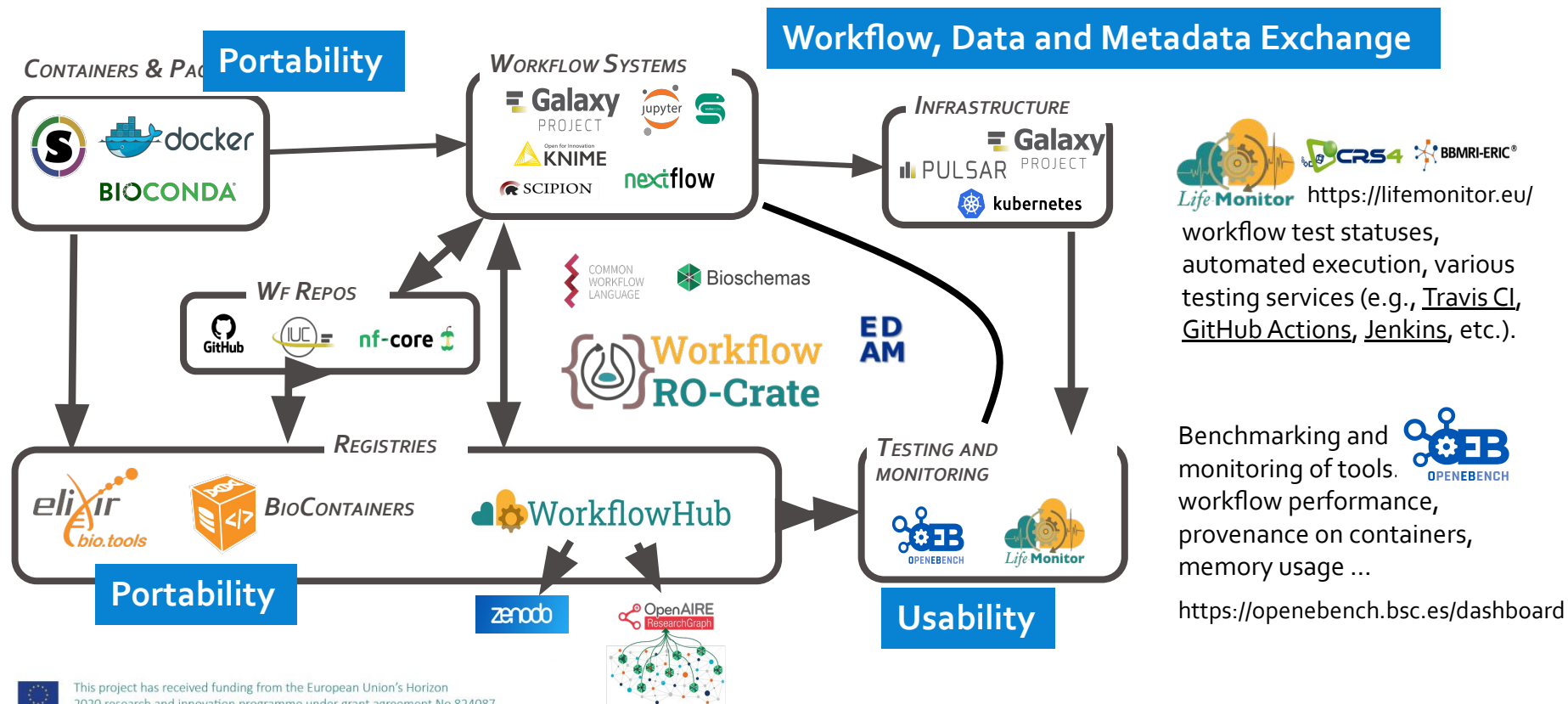


Repos

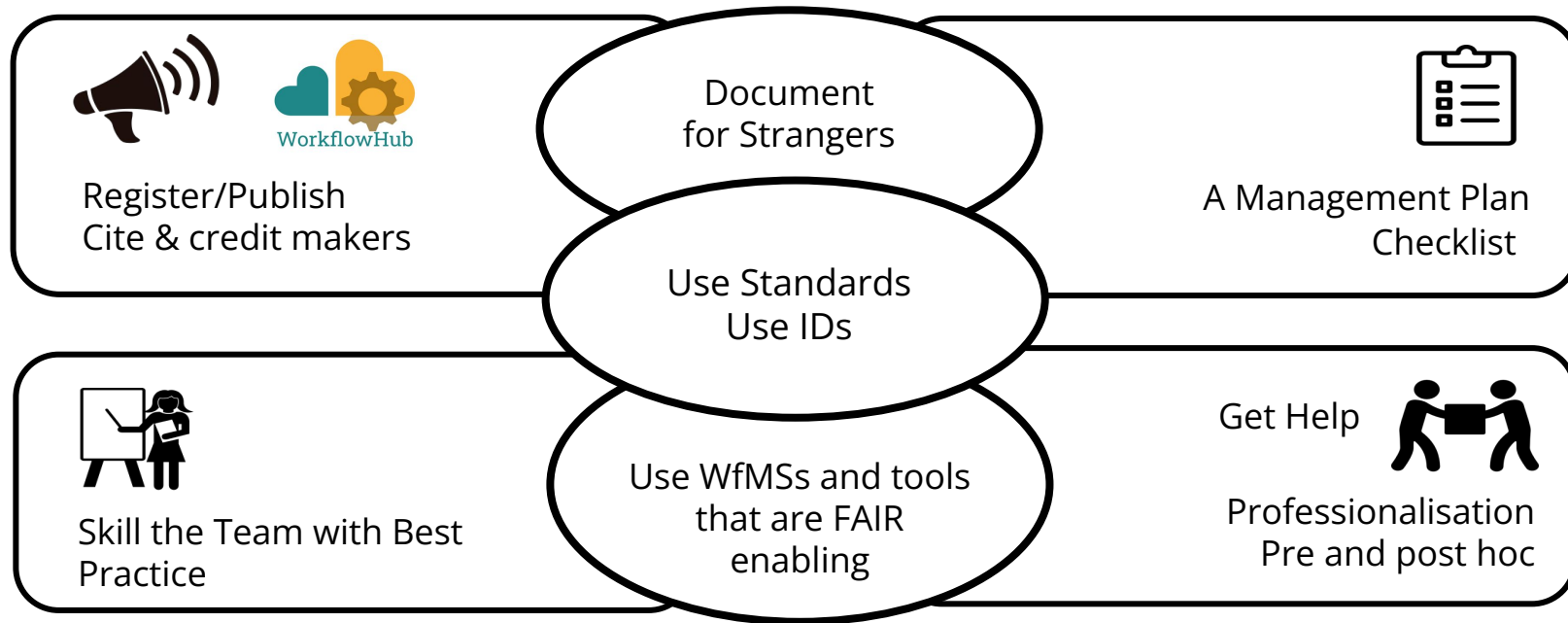


Reproducible and (Re)Usable

execute once accessed, reused and remixed as components



What can you do to be FAIR?



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/>

