DeSci Labs – integrated solutions to knowledge-sharing barriers.

Supporting & creating frontiers of research with web3. Together.

Dr Leonie Raijmakers – leonie@desci.com

DeSci Labs

Global challenges facing the research community

Loss of artifacts: science is not verifiable

→ *Tax-payer-funded research is lost or inaccessible*

Not ready for the age of AI (not FAIR)

→ *Extremely difficult for machines to parse the scientific record*

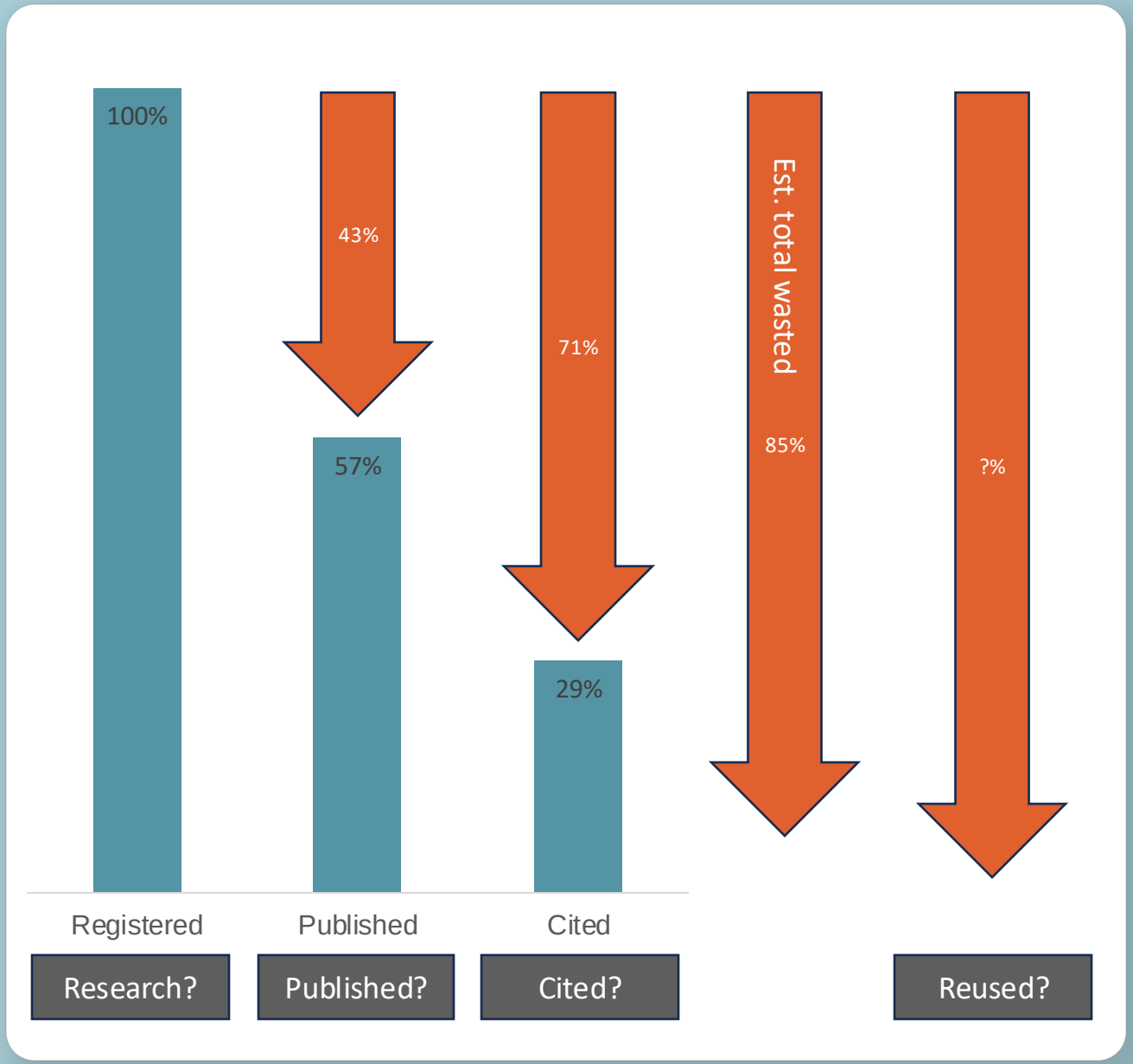
Aging publishing infrastructure

→ *Data silos, poor UX, fragmentation, content drift, poor PID*

Bad incentives

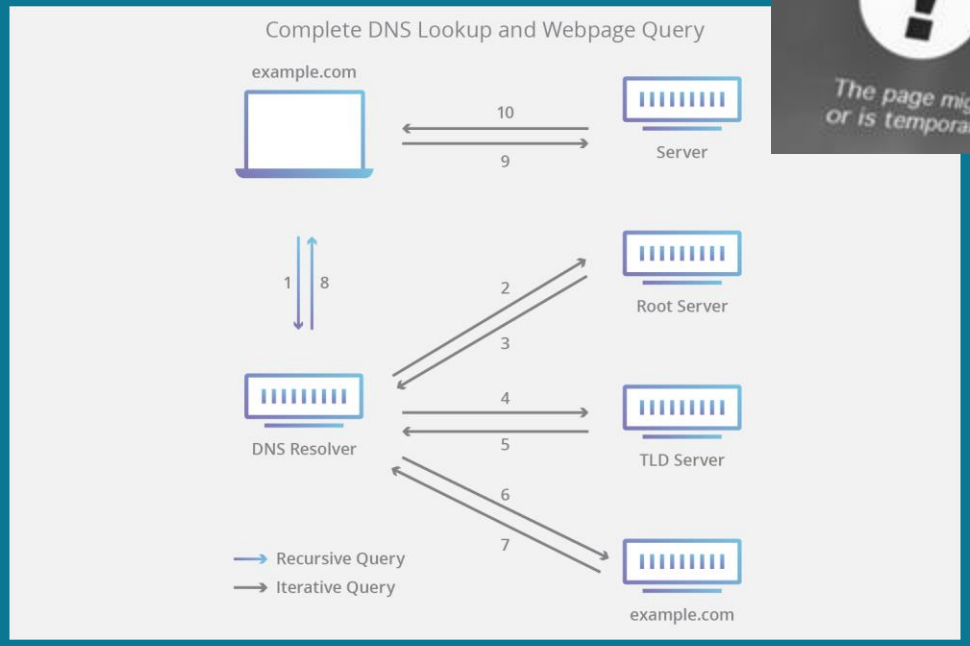
→ *Lack of funder <> scientist interfaces*

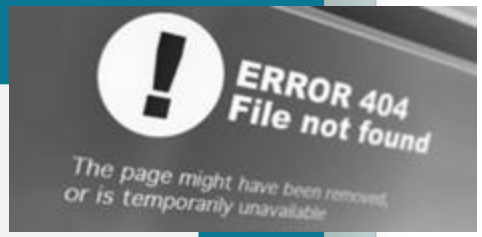
→ *Limited metrics (impact factor)*



Loss of artifacts: science is not verifiable

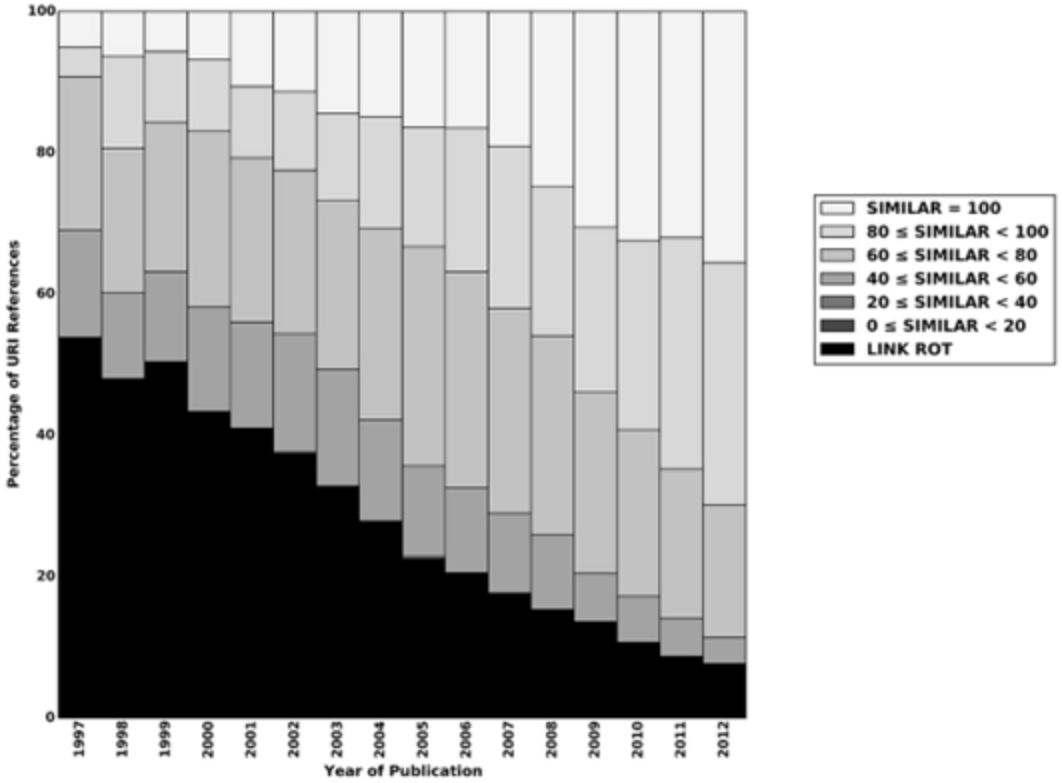
Identifiers in the current Internet – URIs





- URLs point to where content is stored, not the content
- Link rot (file moved or deleted, 404 error)
- Content drift (content changes over time)
- No version control

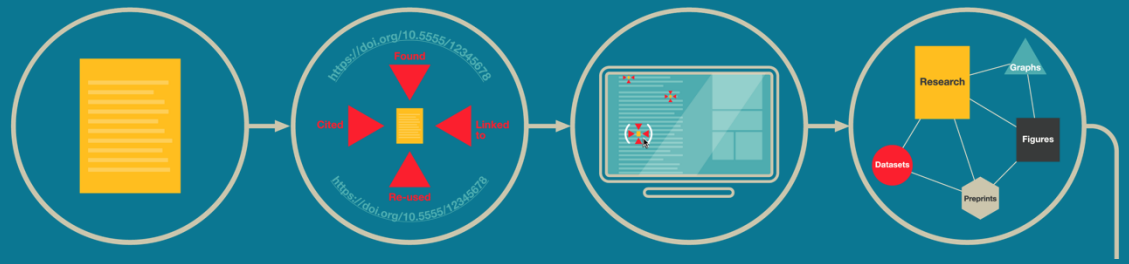
Sources:
Jones, S.M., et. al. (2016). Scholarly context adrift: Three out of four URI References Lead to Changed Content. *PLoS ONE* 11(12): e0167475.



- URI citations with link rot or content drift (>1M total, 3 publishers - Elsevier, arXiv, PMC)
- Threat to the integrity of the scientific record

Loss of artifacts: science is not verifiable / findable

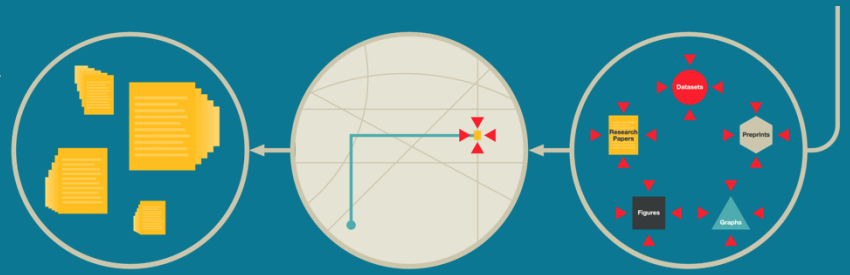
Identifiers in current Publishing – DOIs



DOI matched with URL(s) in database

1 DOI for multiple objects, including different papers

Numerous dead links or incorrect matches



Matched to URL: if object moves, DOI link dies

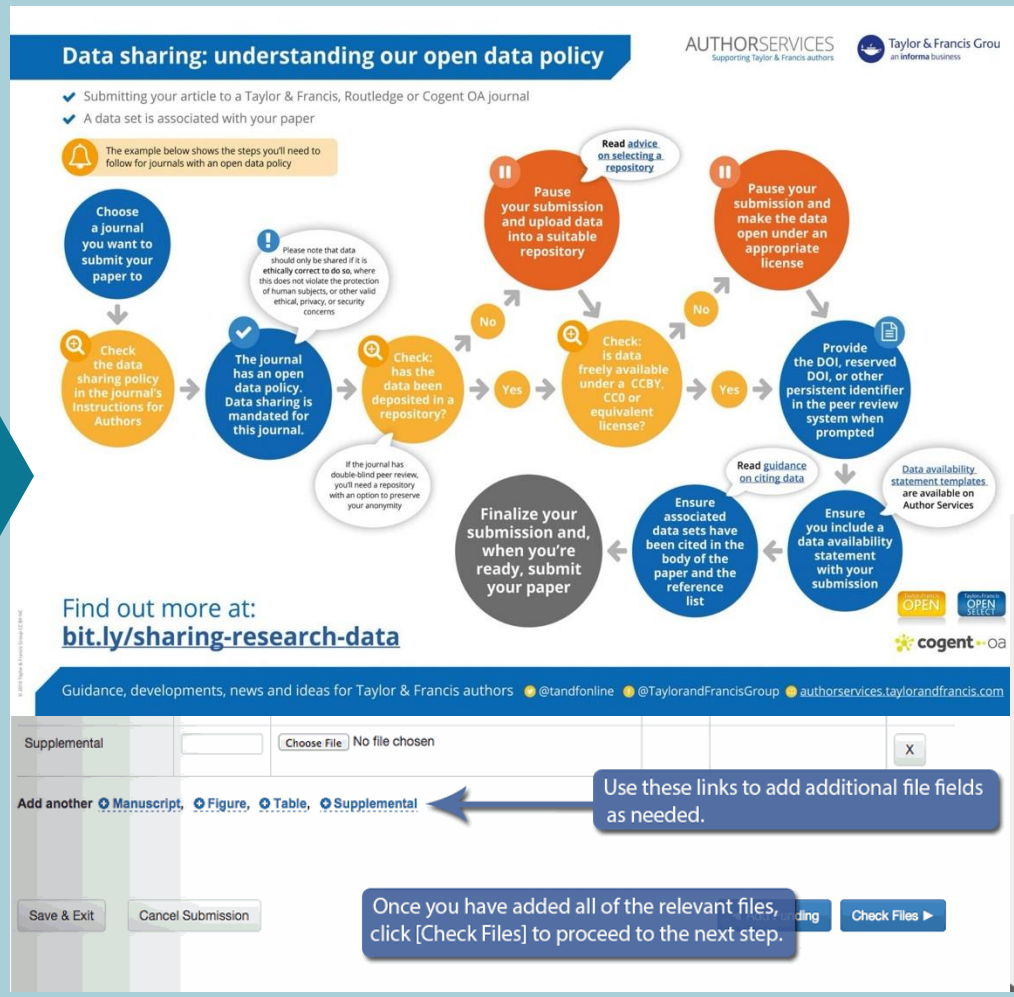
Where the DOI resolves to depends on server, user history, programme, etc.

Sources:
Klein, M., Balakireva, L. (2020). On the Persistence of Persistent Identifiers of the Scholarly Web. In: Hall, M., Merčun, T., Risse, T., Duchateau, F. (eds) *Digital Libraries for Open Knowledge*. TPDL 2020. Lecture Notes in Computer Science, vol. 12246. Springer.
CrossRef: https://www.crossref.org/documentation/reference-linking/

- DOIs were a great solution when they were developed, offering an easy way to file and track publications and other related objects
- However, nowadays DOIs struggle: in ~50% of all cases they do not correctly resolve to their target resource (aging)
- DOIs are neither persistent nor unique identifiers
  - Different results for same DOI depending on request method and network environment
  - Link rot
- DOIs are matched to URLs in a database
  - Lots of manual updating work for publishers
- With new developments, it is becoming a more costly system for publishers - room for optimization
- *NB We recognise the huge value of a general id system that DOI offers, and offer DOIs too!*

Antiquated publishing infrastructure

Poor UX



Loss of artifacts: science is not verifiable & Not ready for the age of AI (not FAIR)

Fragmentation x^3

Add File / Folder

Select the method you want to use for adding your research component.

Cloud Storage

Drive | Dropbox | OneDrive

Repository

Github | Gitlab | Bitbucket | JupyterLab | Code Ocean | Colab | Replit

IPFS

Import from IPFS

Local Storage

Choose File

FAIR Research Object stored Open State

NODE

FAIR unit of reproducible knowledge

DeSci Labs

OBJECTIVES

Enhance trust in science

Verifiable research requires reproducibility of computational artifacts

Support fundamental research ROI

Publications with access to code, data, and compute make re-use and reproducibility possible

Metascience proving grounds

Interfaces to connect funders and scientists with new metrics based on metascience research

Future-proof: Machine actionability

Scientific outputs need to be machine actionable.

Equip researchers and funders with a modern publication OS

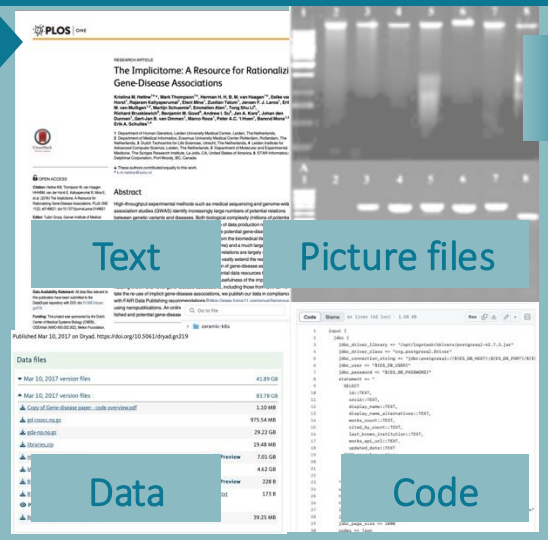
- *Combine papers, code, data into FAIR unit of reproducible knowledge*
- *Compute-enabled publications*
- *Verifiable attestations*
- *Translate to machine language for AI-readiness*
- *Tamper-proof data (hash-based) and decentralized storage*

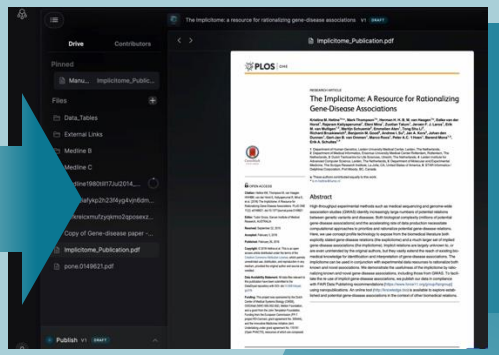
DeSci Labs Publish: Innovative open-access publishing

& much more

Start a project or idea at any stage on Publish

UPLOAD all digital objects for one study in one place



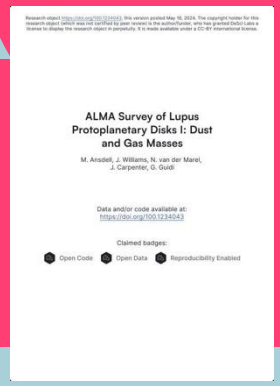


ADD co-authors, metadata, licenses, to the "Collection" Apply for quality certificates

COLLABORATE with co-authors before publishing

PUBLISH version X+1

- Persistent ("forever")
- Versionable
- Verifiable
- Accountable
- Creditable
- Sharable



RECEIVE feedback, quality indicators, etc.

UPDATE according to new findings, corrections, etc.

DeSci Publish

SHARE

- Share with persistent IDs, such as DOI and dPID
- Add to your ORCID record, including separate data and code indications.

INTEGRATE into the wider publication system & get quality certifications

- Apply for quality certificates, e.g. FAIR data and code
- New impact measures
- Apply to be featured in communities
- Create a journal or community
- Collaborate on research,
- Discover new fields
- Find people to work with or learn from.

DeSci Labs Publish: Create your project on web3

& much more

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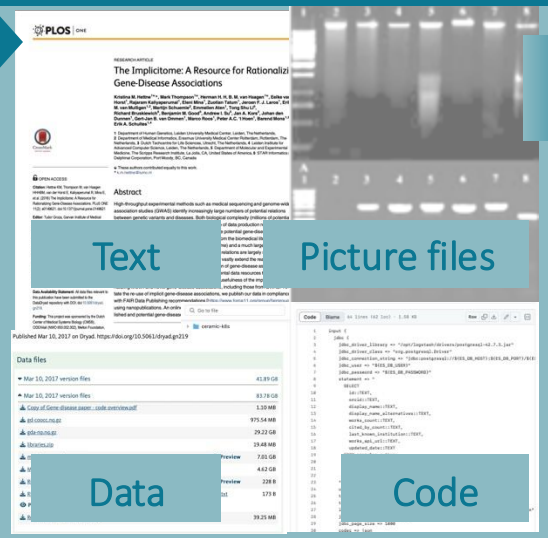

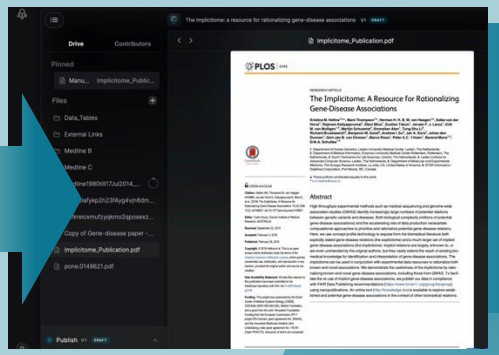

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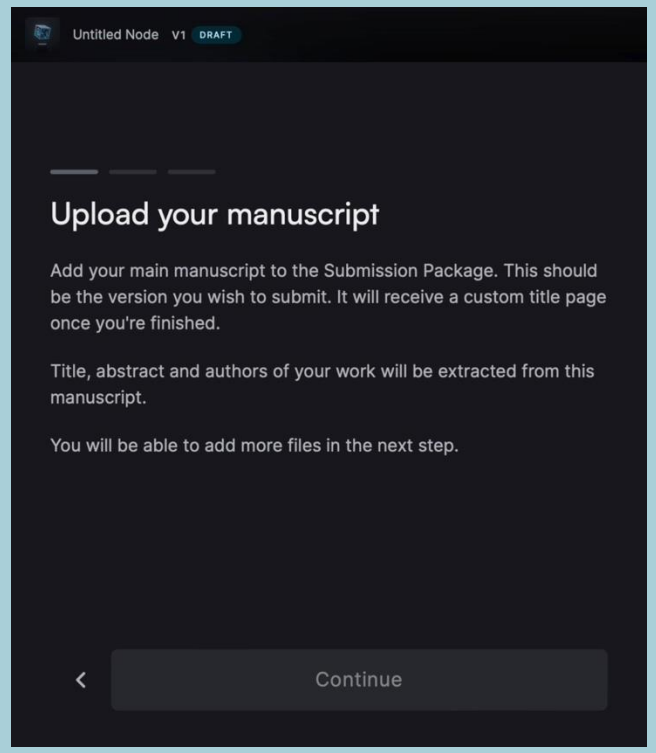
DeSci Publish

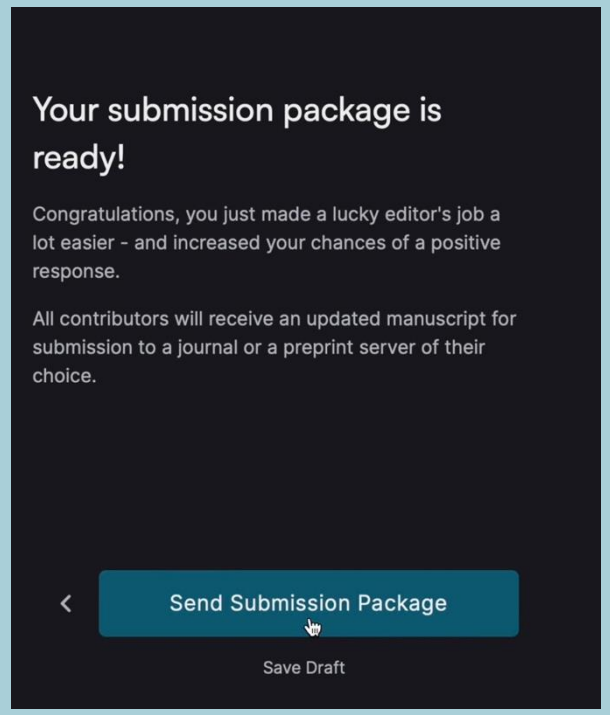
Ensure the system supports current systems

Easy flow to create a Node

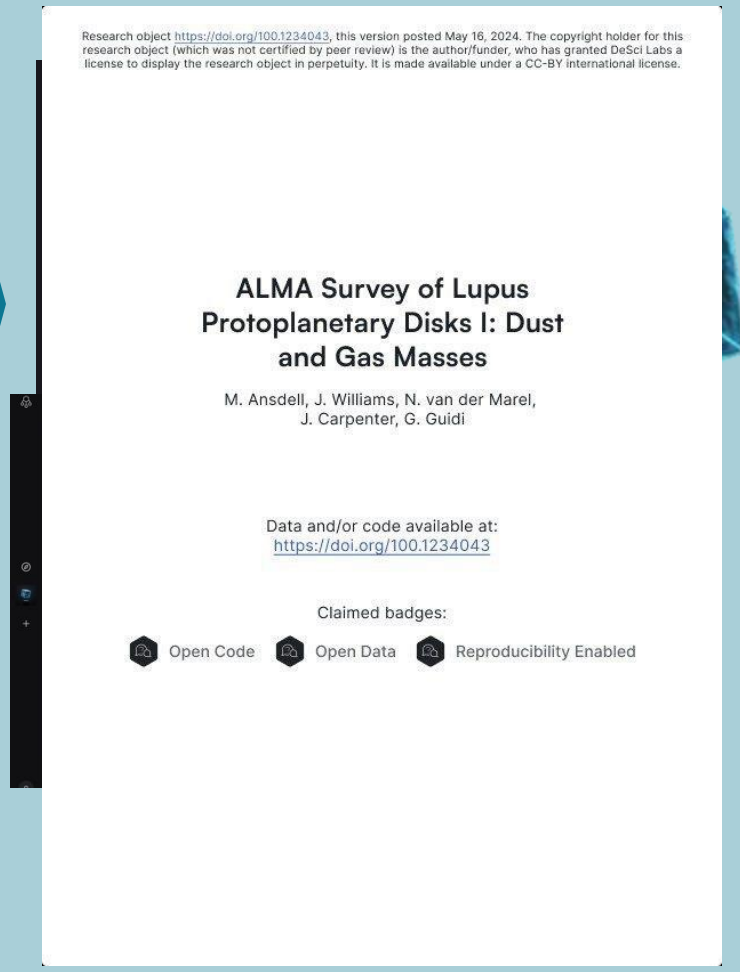
Guided upload of publication-related materials



Collation of materials into an easy format that gives editors transparency



Creation of submission package and a Node (Research Object)



DeSci Pub

Welcome to DeSci Publish.

Nodes transforms how you publish and share your research by integrating manuscripts, data, code, and more into versionable research objects.

Enter App

Create a Research Object

Prepare a Submission Package

Explore Communities BETA

DeSci Labs Publish: Basic features

& much more

Start a project or idea at any stage on Publish

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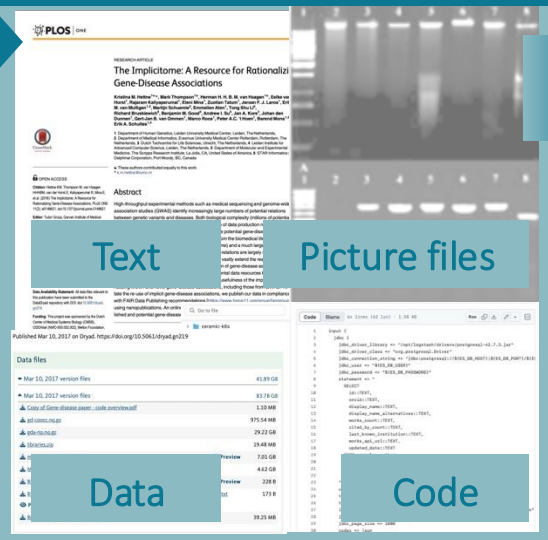

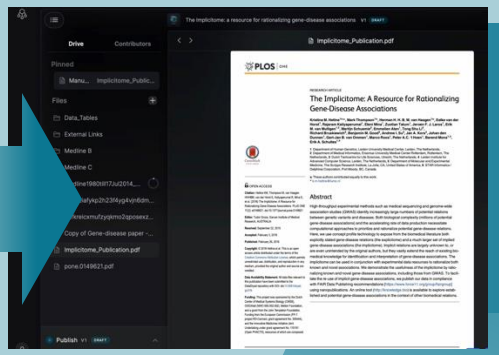

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UPDATE according to new findings, corrections, etc.

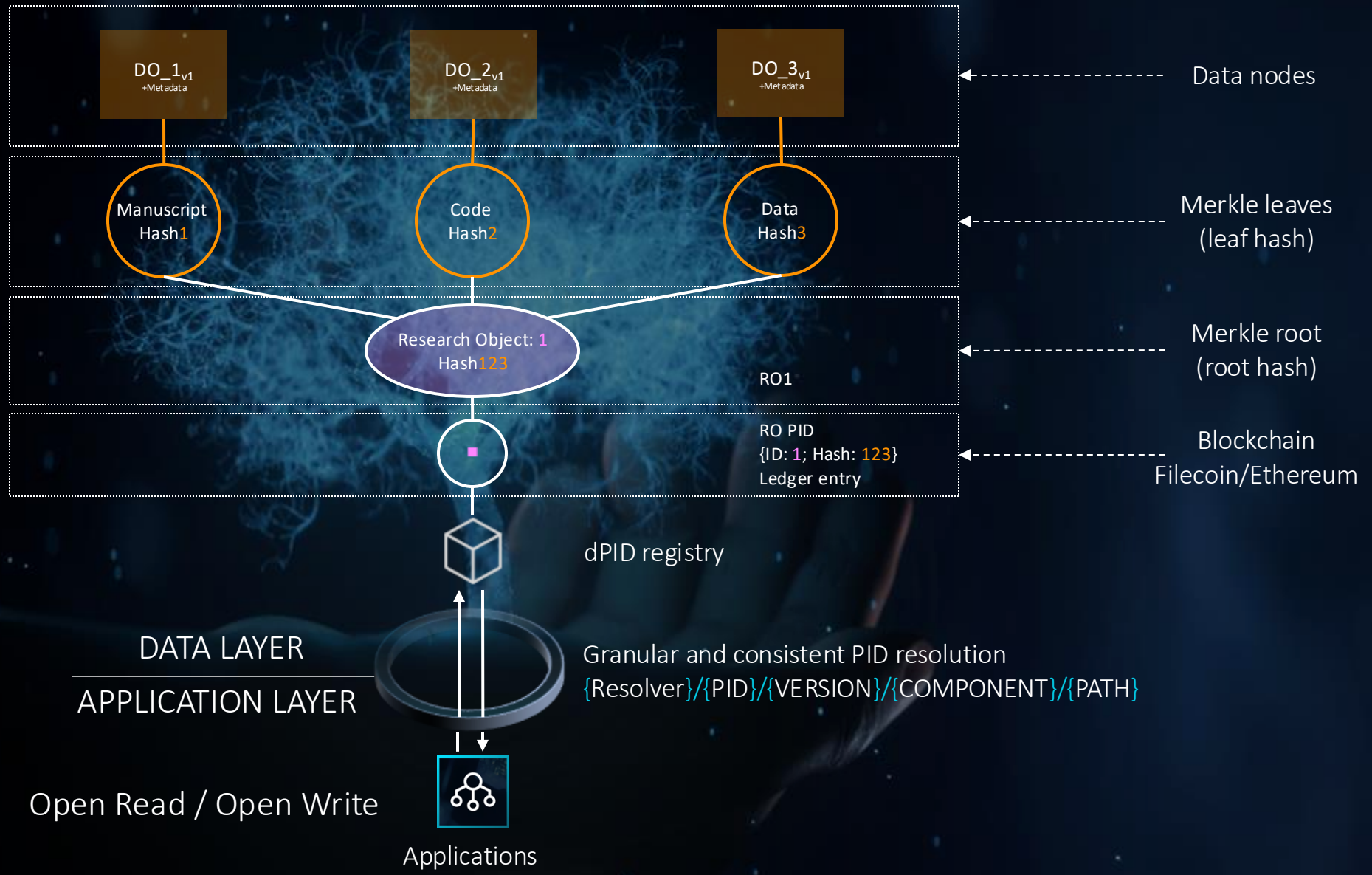
DeSci Publish

BASIC FEATURES for supporting research:

- *Integrated publishing of all research elements in 1 place*
- *Versionability*
- *Persistent*
- *Persistent IDs (dPIDs) & DOIs*
- Feedback integration
- ORCID integration
- Acknowledgements for specifically data and code (quality, reuse, etc), not just the paper

Open State storage and information security

Rich research objects with hash-PIDs, stably indexed on a blockchain



Open State storage and information security

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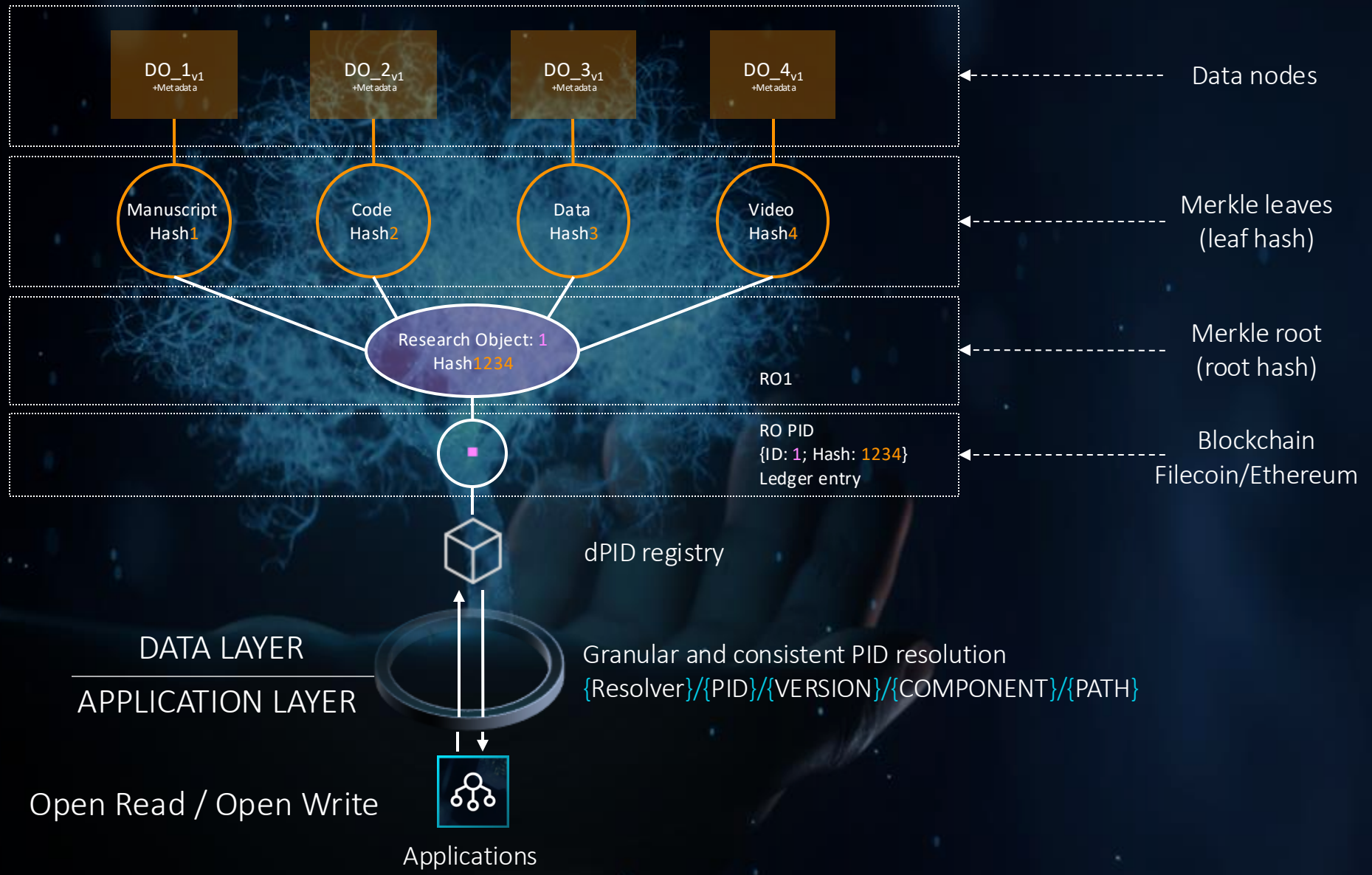

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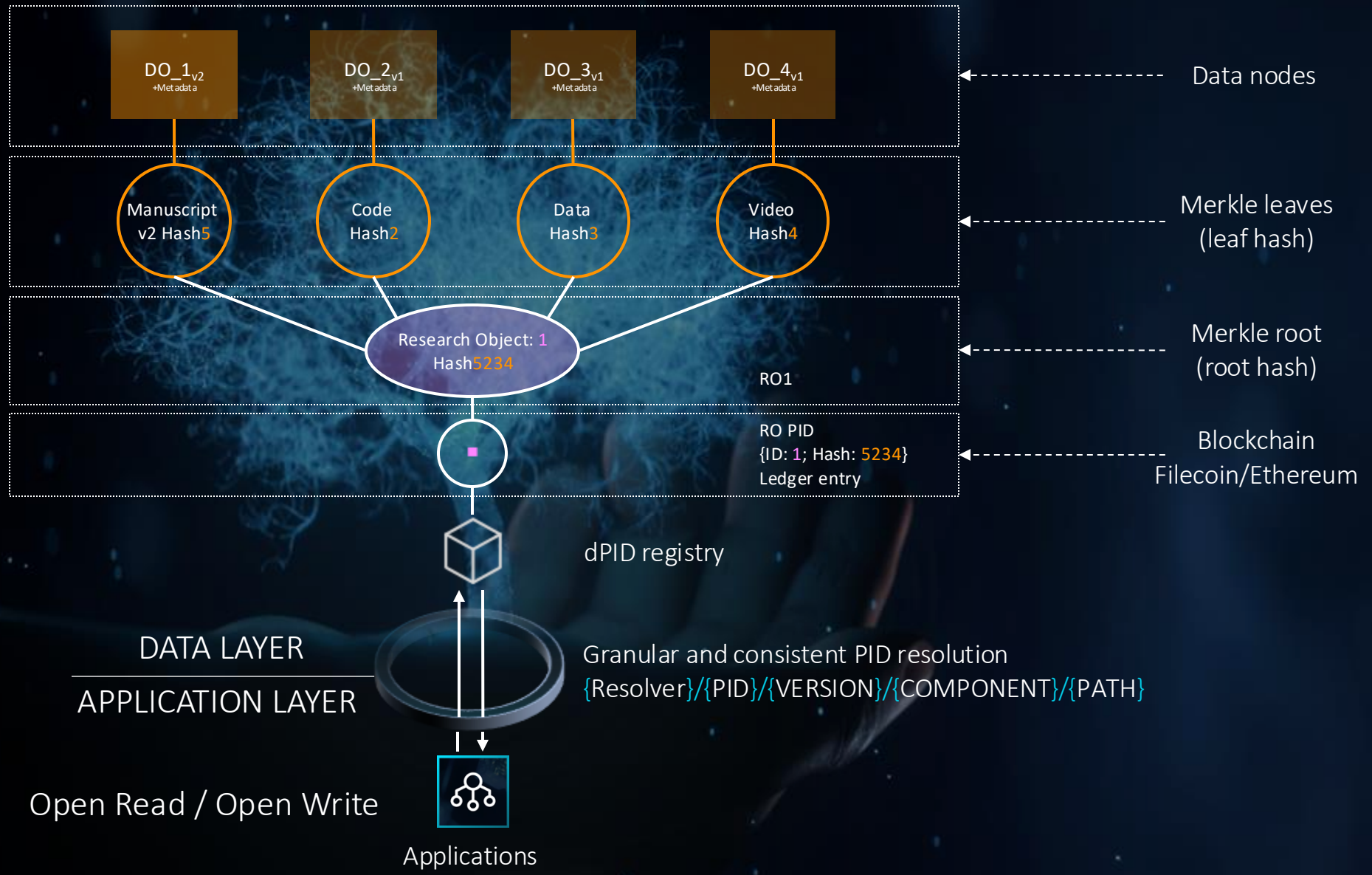
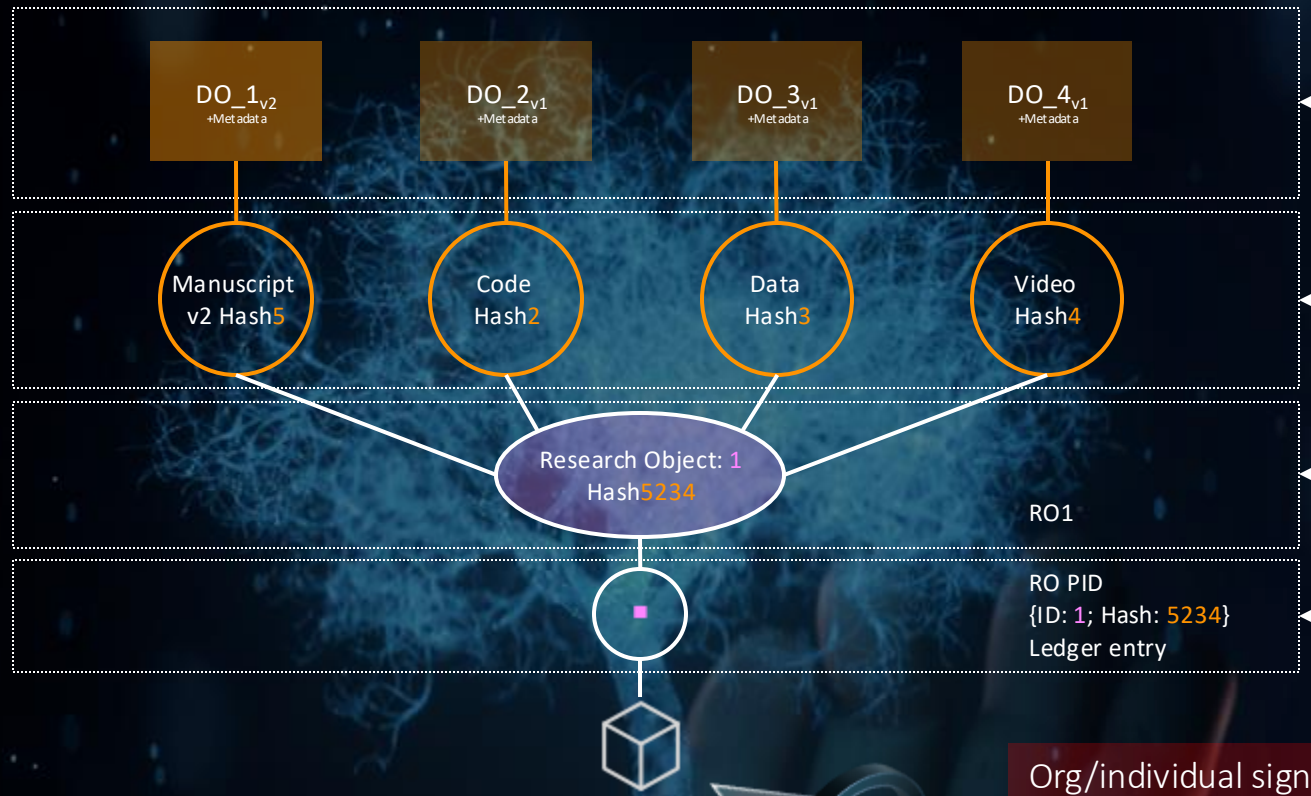


Verification

Attested rich research objects with hash-PIDs



Org/individual signs a *revocable attestation* on the Node:

{Reproducibility verified}

{FAIR compliant}

{Provenance verified}

{OSTP memo compliant}

{Manuscript peer-reviewed}

BASICS

Features that support current needs and current scientific support

DAOs

Funders (ROR)

Communities

Users/researchers

Foundations

Universities

Easy review for editors

FAIR data support

Metadata

"all in one place"

Machine readable

Easy upload & extraction

Consistent structuring & categorisation

Data/code review

Externally legible/recognizable with automated plugins:
e.g. Google Scholar, DOIs, ORCID

PID + Resource + Metadata + Methods for every connected DO

Basics

Traditional Connections

Stakeholders

Sign out

L

Leo

leonie@desci.com

0009-0000-2382-0763

Advanced Options

PRIVATE STORAGE

370.15 MB of 100 GB used

Publish private drafts to free up more storage.

Theme Auto Light Dark

Nodes Publication History

All Nodes 12

+ CREATE

L

Report problem

DeSci Labs Publish: Plug your paper into global infrastructure

& much more

Start a project or idea at any stage on Publish

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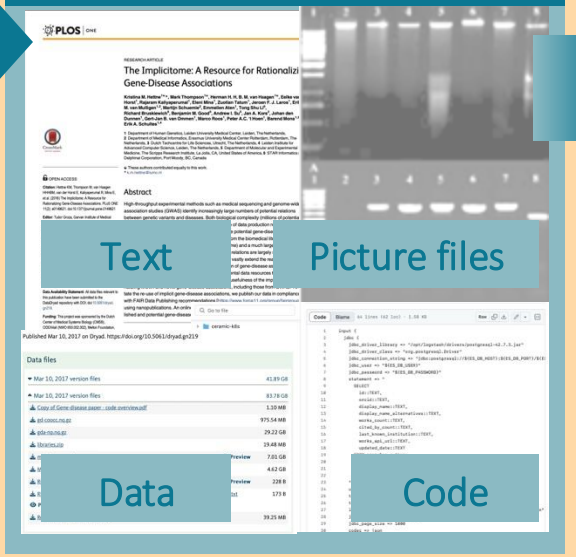

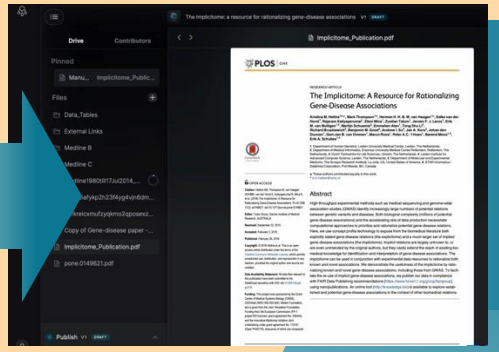

ADD co-authors, metadata, licenses, to the "Collection"

COLLABORATE with co-authors before publishing

PUBLISH version X+1

- Persistent ("forever")
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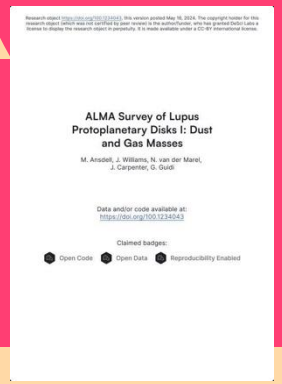
- Creditable
- Sharable



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RECEIVE feedback, quality indicators, etc.

UPDATE according to new findings, corrections, etc.

DeSci Publish

OTHER PLUGINS

With a large collection of publications and peer network, what do our features support?

Basics

Other plugins

Traditional Connections

Stakeholders

DAOs

Funders (ROR)

Communities

Users/researchers

Foundations

Crowdfunding for replication studies

Peer review recognition

Peer review by qualified institutions

Peer review by qualified individuals

Reproducibility

Universities

ARC/Community platforms ('playlists or journals')

Easy review for editors

"all in one place"

FAIR data support

Metadata

Machine readable

Easy upload & extraction

Consistent structuring & categorisation

Data/code review

Externally legible/recognizable with automated plugins:
e.g. Google Scholar, DOIs, ORCID

PID + Resource + Metadata + Methods for every connected DO

DeSci Labs Publish: Innovative open-access publishing

& much more

Start a project or idea at any stage on Publish

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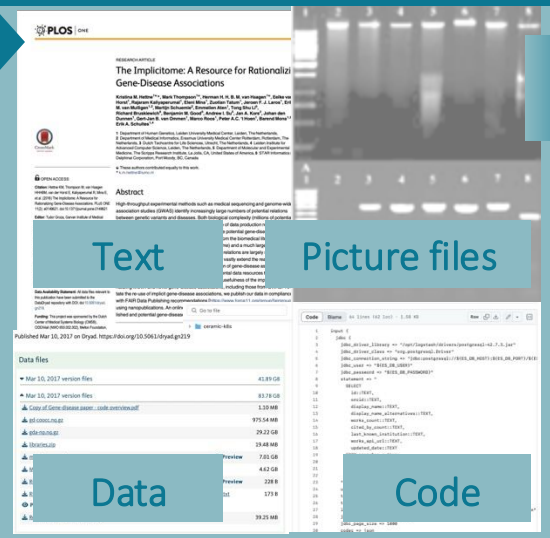

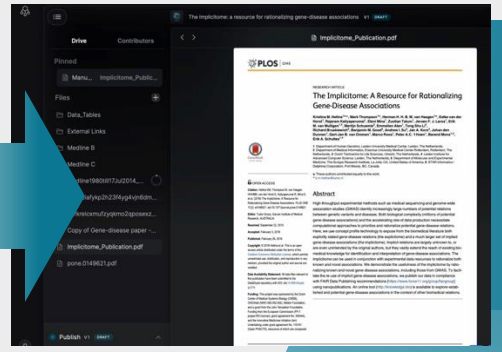

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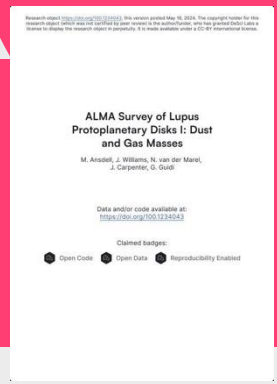

SHARE

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INTEGRATE & CURATE the wider research system

- Create a journal or community
- Find and curate your projects' publications
- Apply to be featured in communities
- Discover new fields & researchers
- Support wide collaboration on research

UPDATE according to new findings, corrections, etc.

RECEIVE feedback, quality indicators, etc.

DeSci Publish

DeSci Labs Publish: From individual to community

& much more

Earmarked for presenting on the Longevity Community

INTEGRATE & CURATE
the wider research system

- Create a journal or community ‘playlist’
- Curate your projects’ publications
- Discover new fields & researchers
- Support wide collaboration on research
- Apply to be featured in communities
- Apply for quality certifications from dedicated certifying institutions
- Review: and get recognized/paid for it
- Support or conduct replication studies to certify reproducibility

Browse All by Community

EXPLORE RESEARCH CURATED BY COMMUNITIES

Community Curated Nodes

- BlockScience
- DeSci Foundation
- Gridcoin
- Longevist
- MoonDAO
- Risk Sciences
- The Behavioral Geneticist

+ CREATE DESCI COMMUNITY

All Communities

The Nodes below meet the curation criteria of at least one DeSci community on the network. Select a specific community to view the Nodes they have curated.

Explore

CURATED NODES

L

https://nodes-dev.desci.com/explore

Report problem

DeSci Labs Publish: From individual to community

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But we can do so much more...

WHAT NEXT WITH AI & SPECIAL FEATURES?

How do we incorporate & feed into AI

AI/LM support

AI/LM products

Connections

Stakeholders

DAOs

Funders (ROR)

Communities

Users/researchers

Foundations

Personalised user newsfeed

Hit paper probability

Journal match calculator

Novelty scores

Universities

Metadata

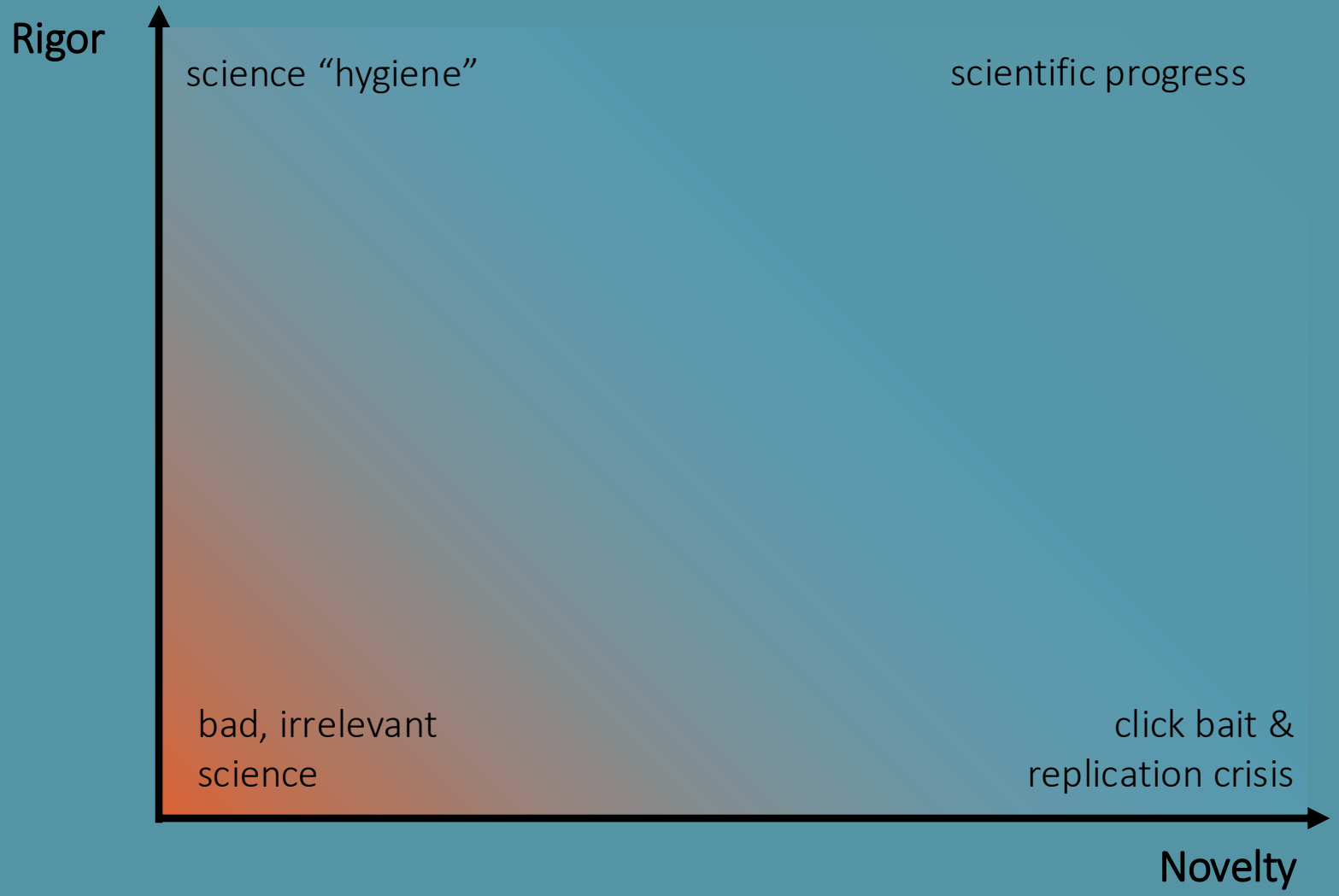
Machine readable

Consistent structuring & categorisation

Externally legible/recognisable:
e.g. Google Scholar, DOIs, ORCID

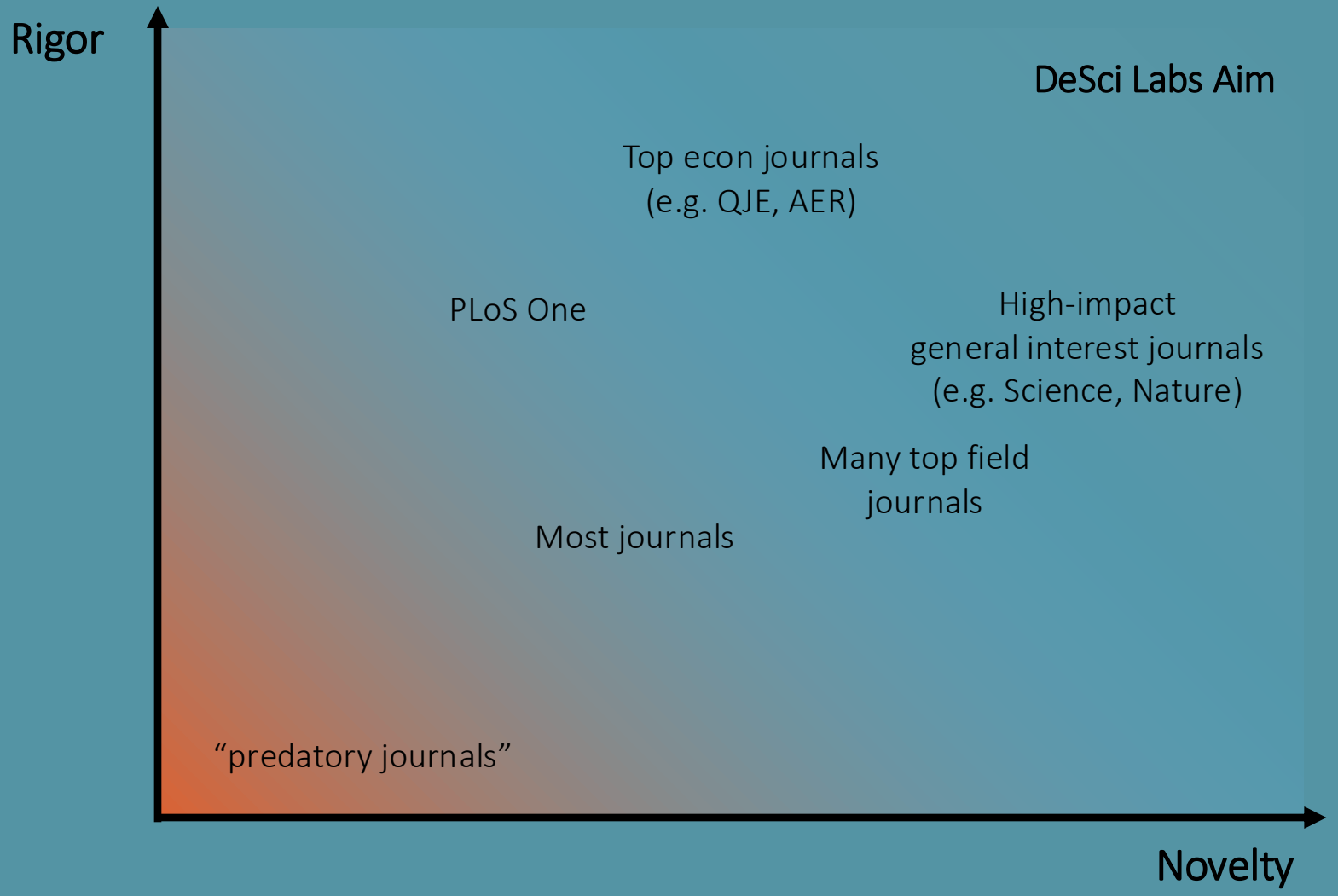
PID + Resource + Metadata + Methods for every connected DO

Novelty vs Rigor

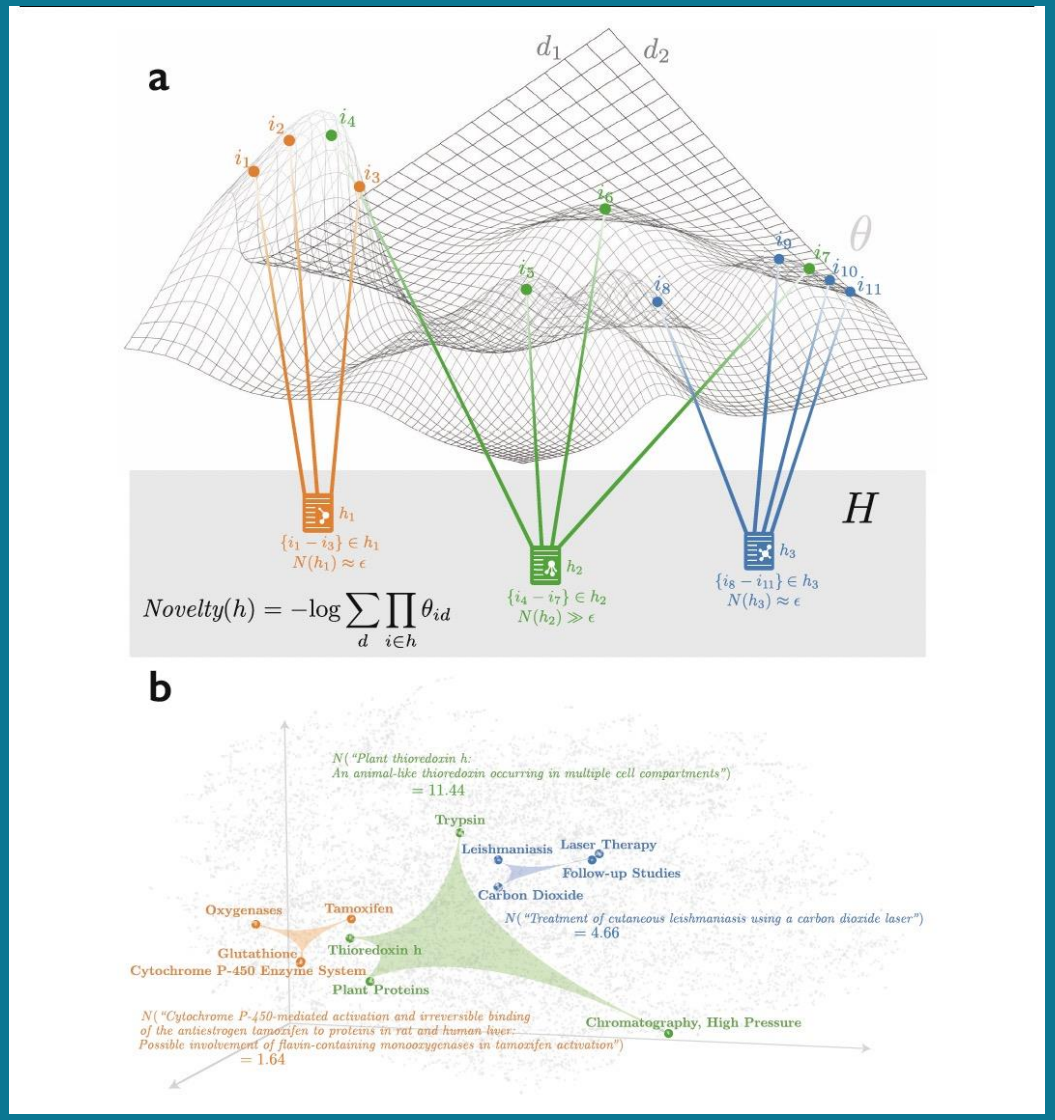


Loss of artifacts: science is not verifiable / findable

Novelty vs Rigor



Extra features: Novelty Scores



Sources:
Shi & Evans (2023) *Nature Communications*

- Novelty scores are based on how surprising – yet sensible – field combinations appear to be, compared to what is currently present in the research landscape.
- NS are closely related to citation numbers, likely due to how they inform to what level the publication has a – sensible – pioneering function within their field (or two)
  - For each paper, the novelty score is computed by examining how much the topics of its related papers overlap with each other. If a paper is surrounded by papers with highly aligned topic distributions, it is considered less novel.
- We use a language model to look at the combination of fields shown within a descriptive metadata category of OpenAlex.

Note: Figure 1A in Shi & Evans (2023), "Surprising combinations of research contents and contexts are related to impact and emerge with scientific outsiders from distant disciplines," *Nature Communications* 14:1641. Hypergraph latent embeddings modeled from article keywords (content) and journals / conferences cited by the article (context). Illustration of the manifold inscribing all embeddings θ and an evaluation of three articles (hyperedges h_{1-3}) in terms of surprising combinations. Articles h_1 and h_3 represent projects that combine scientific components near one another in θ (high probability – low surprise ϵ). In contrast, h_2 draws a novel combination of components unlike any paper from the past, making it low probability and high surprise (>> ϵ).

Ensure the system supports current systems

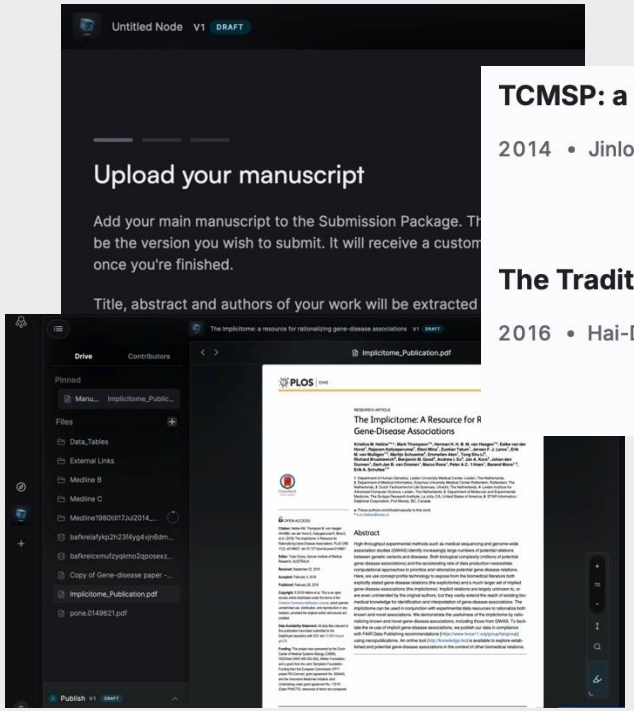
Novelty Scores

Upload manuscript & citations (data & code)

Using the basis of James Evans' model…

… and training on the OpenAlex collection (>299k publications)

… we generate a Novelty Score, aligned with citation numbers – helping predict what would be good projects for investments.

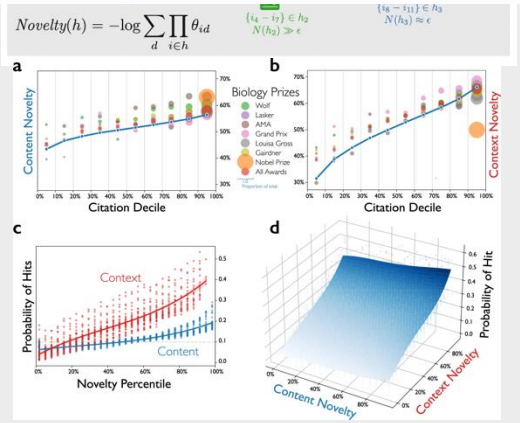


TCMSP: a database of systems pharmacology for drug discovery from herbal medicines

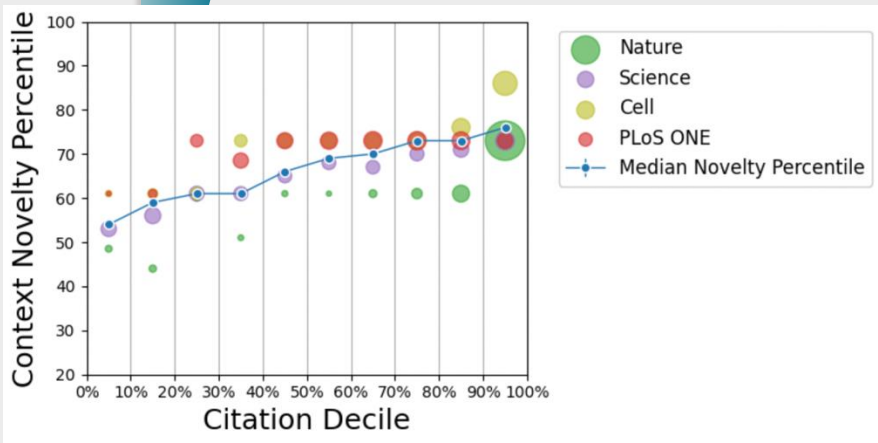
2014 • Jinlong Ru, Peng Li +12

The Traditional Medicine and Modern Medicine from Natural Products

2016 • Hai-Dan Yuan, Qianqian Ma +2



Shi & Evans (2023)
Nature Communications



DeSci Pub

Longevist

Curating the world's most exciting longevity research

SUBMIT YOUR RESEARCH

0 CURATED NODES | 8

Supporting VitaDAO's mission to improve healthspan, we endeavour to spotlight the most groundbreaking longevity studies each quarter. Our editorial team utilises a combination of social listening tools, AI, and an expansive network to forge a shortlist of preprint contenders. Our expert panel of Longevist Curators then vote in a quarterly battle royale to establish the cream of the crop.

Preprints have revolutionised scientific publishing by enabling researchers to share their discoveries

...see more

longevist.xyz

vitadao.com

Longevity | Biomedicine | Aging | Healthspan

Explore

Curated Nodes (0) Radar (3)

NO CURATED NODES

Longevist validates all nodes by ensuring that every claimed attestation has been confirmed by at least one independent reviewer.

Validated Attributes

OPEN ATTESTATIONS

Commercializable

The research has potential commercial applications.

MEMBERS

Andrea Maier

This community has not yet curated any Nodes. Visit Longevist's Radar to help curate some Nodes, or submit yours for curation

Report problem

AI - layers

How do we incorporate & feed into AI

DAOs

Funders (ROR)

Communities

Users/researchers

Foundations

Personalised user newsfeed

Hit paper probability

Journal match calculator

Novelty scores

Universities

Metadata

Machine readable

Consistent structuring & categorisation

Externally legible/recognisable:
e.g. Google Scholar, DOIs, ORCID

AI/LM support

AI/LM products

Connections

Stakeholders

PID + Resource + Metadata + Methods for every connected DO

Help us help you & fellow researchers

Explore a demo:

Explore and make a Node in Publish:
https://nodes.desci.com

Note: not currently phone-friendly

Credits

Chris
Sina
Philipp
Adam
Carla
Erik
Jon
Samir

Edvard
Ogban
John
Shadrach
Richard
Andrew
Mike
Aseer

Thank you

DeSci
Foundation

Protocol
Labs

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