

# Hvordan langtidssikrer vi åbne metadata og persistent identifikation?

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[09vvy0v27](https://ror.org/09vvy0v27)



[10.5281/zenodo.17350042](https://doi.org/10.5281/zenodo.17350042)



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DeiC Konferencen, okt. 2025

Københavns Universitetsbibliotek



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## Abstract

Lokalisering af digitale forskningsobjekter på internettet er i overvejende grad fortsat foranderlig over tid og fordrer ideelt en unik og entydig reference i form af persistent identifikation (PID).

Det er både evident som forudsætning for FAIR data management og maskinel udveksling af metadata på tværs af systemer samt i praksis for fornuftig research information management (RIM), der omfatter organisationer, forskere, projekter, bevillinger, forskningsdatasæt, publikationer og de referencer til viden, som udgør grundstenene i den videnskabelige proces.

I Danmark har vi for nuværende ingen samlet strategi eller road map for implementering af PID og denne præsentation vil forsøge at kaste lys over både muligheder og udfordringer for en mere bæredygtig og langsigtet tilgang



Kreditering: PID-verkosto @wiki.eduuni.fi





# Agenda

## ➤ Indblik: Hvorfor PID og åbne metadata?

- åbne metadata og maskinlæsbarhed (FAIR)
- Udbydere af PID
- dokumentation og metadataskemaer
- ex på åbne artikel metadata
- syntax og formater
- bidrag til Open Science og bedre meritering

Fare for  
informationsfaglig  
teoretisering!



Kreditering: @zacky24

## ➤ Udblik: International udvikling omkring digital suverænitet

- kommercielle tracking teknologier i forskning
- kontrol af research workflows
- udveksling af forlags information og PID metadata til Crossref

Fare for  
politisering!

## ➤ Persektiv: Støtte og samarbejde ift PID-udvikling i DK

- Nye institutionelle muligheder for anvendelse og integration af PID
- Snapshot – PID benyttelse (doi, orcid)
- Cost-benefit analyse af PID implementering
- Organisering og netværk: Behov for PID roadmap i DK

Muligheder for  
mere jordnær  
praktik!





## Hvorfor PID og åbne metadata?

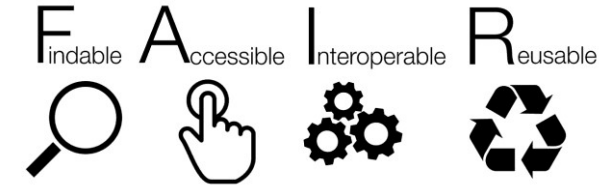
- Problematisk at vedligeholde referencer til digitale objekter → adresser ændrer sig over tid og information er ikke resolverbar efterladende velkendte 404 gravsten.
- PID er en unik maskinlæsbar kode (Urn, Handle, Purl, Doi etc.), der persistent identificerer og deler maskinlæsbar information og metadata om digitale objekter uden at forgå, fordi en PID er forbundet til et sæt metadata, der beskriver et objekt ("landing page") end selve objektet (fx. datasættets fil). PID tillader platforme at udveksle information konsistent og utvetydigt og leverer dermed en troværdig vej til at opfange citationer og genbrug.
- PID og tilhørende metadata beskriver web-resurser og forbindelserne mellem dem, der former en vidensgraf eller et netværk af forbundne digitale objekter, en såkaldt PID graf som en åben datamodel (Fenner & Aryani, 2019)
- I 2019 lancerede DataCite en GraphQL version af deres API til at forespørge efter PID og metadata fra videnskabelige resurser registret hos DataCite, Crossref, ORCID, ROR m.fl.  
<https://api.datacite.org/graphql> OpenAire Graph er verdens største og mest kendte: <https://graph.openaire.eu/>





# Åbne metadata - maskinlæsbarhed

FAIR: **F**indable, **A**ccessible, **I**nteroperable, **R**eusable / **F**ully **AI** Ready



Kreditering: Sangya Pundir, [CC BY-SA 4.0](https://creativecommons.org/licenses/by-sa/4.0/)

F1. (Meta)data are **assigned a globally unique and persistent identifier**

F2. Data are described with (defined by R1 below) **rich metadata**

F3. (Meta)data clearly and explicitly **include the identifier of the data they describe**

F4. (Meta)data are registered or **indexed in a searchable resource**

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

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**

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**

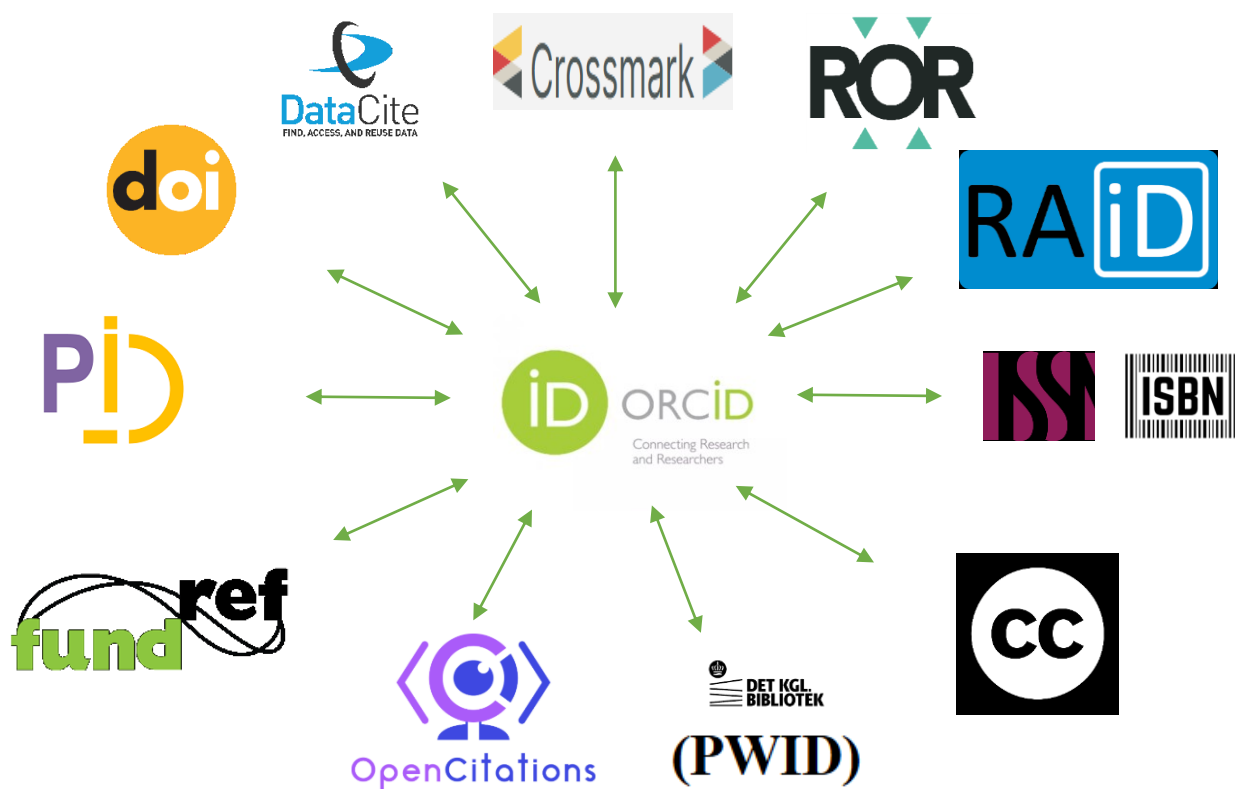
R1.3. (Meta)data meet domain-relevant **community standards**

Wilkinson, M. et al. (2016)





# Udbydere af Persistente IDentifikatorer (PID)



**OrcID:** person(er)

<https://orcid.org/0000-0002-1754-0965>

**DOI:** artikler, kapitler, bøger

<https://doi.org/10.1163/18748929-bja10098>

**Crossmark:** version(er)

<https://crossmark.crossref.org/dialog/?doi=10.1083/jcb.201803079>

**DataCite DOI:** forskningsdata

<https://doi.org/10.60612/DATADK/AEOFGC>

**ROR:** organisationer

<https://ror.org/035b05819>

**ISSN/ISBN:** tidsskrifter/bøger

<https://portal.issn.org/resource/ISSN/1874-8929>

**RAID:** projekter

<https://raid.org/10.26259/a673754f>

**FundRef:** bevillingsgiver

<https://api.crossref.org/funders/100008397>

**CC:** licensering

<https://creativecommons.org/licenses/by-nc-nd/4.0>

**OCI:** citationer

<https://opencitations.net/oci/06101801781-06180334099>

**PWID:** web-arkiver

<http://id.kb.dk/pwid/PWID.ppsx>

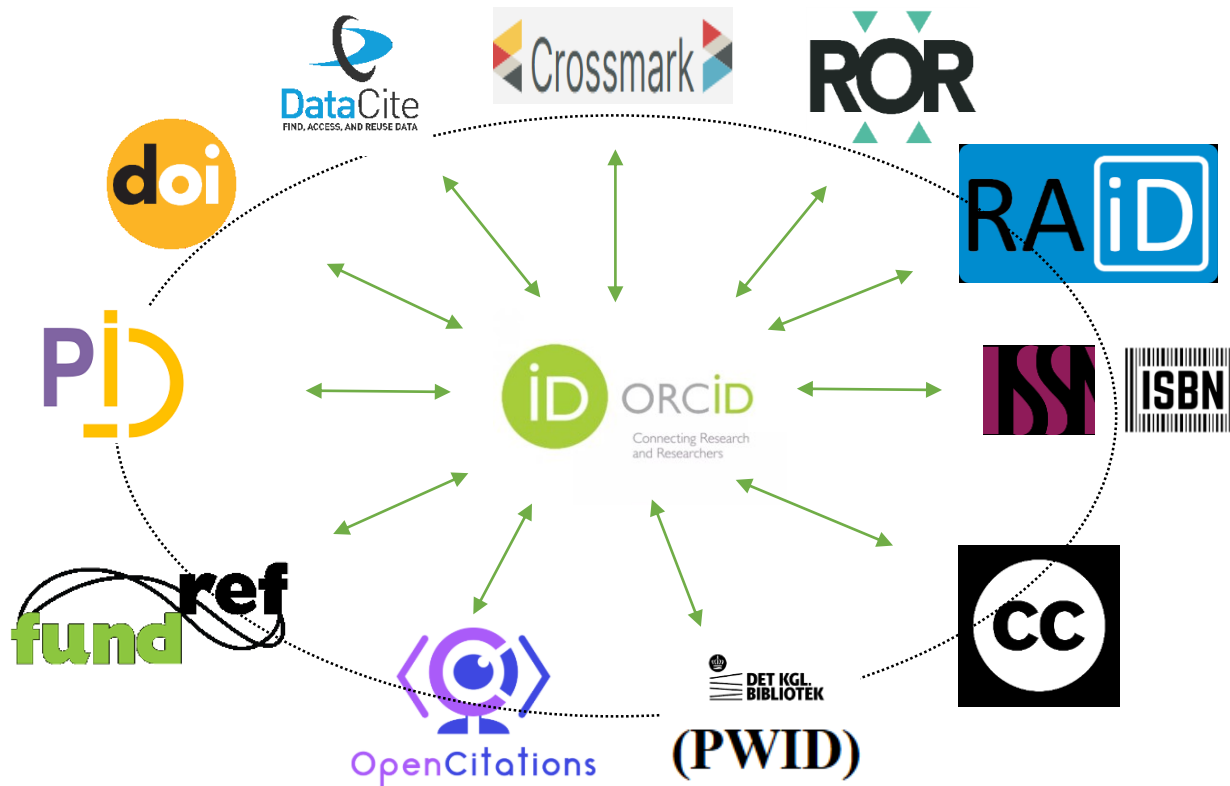
**PIDINST:** instrument(er)

<https://hdl.handle.net/21.11157/4cc8b2fb-accd-49d2-b42b-6ed97cf9a084>





# Dokumentation og metadataschemaer



**DOI:** metadata kernel schema

[https://www.doi.org/doi\\_schemas/DOI\\_MetadataKernel.xsd](https://www.doi.org/doi_schemas/DOI_MetadataKernel.xsd)

**Crossmark:** documentation

<https://www.crossref.org/documentation/crossmark/>

**DataCite DOI:** dataCite metadata schema

<https://schema.datacite.org/meta/kernel-4.6/>

**Orcid:** documentation

<https://info.orcid.org/documentation/>

**ROR:** schema 2.1

<https://ror.readme.io/changelog/2024-12-12-schema-v2-1>

**ISSN/ISBN:** issn linked data application

[https://www.issn.org/wp-content/uploads/2020/09/ISSN-LinkedDataApplicationProfile-v2\\_0.pdf](https://www.issn.org/wp-content/uploads/2020/09/ISSN-LinkedDataApplicationProfile-v2_0.pdf)

**RAID:** metadata schema

<https://metadata.raid.org/en/latest/>

**FundRef:** crossref funder registry

[https://gitlab.com/crossref/open\\_funder\\_registry](https://gitlab.com/crossref/open_funder_registry)

**CC:** creative commons metadata

<https://wiki.creativecommons.org/wiki/metadata>

**OCI:** open citations index

<https://opencitations.net/index>

**PWID:** persistent web ID URN

<https://www.iana.org/assignments/urn-formal/pwid>

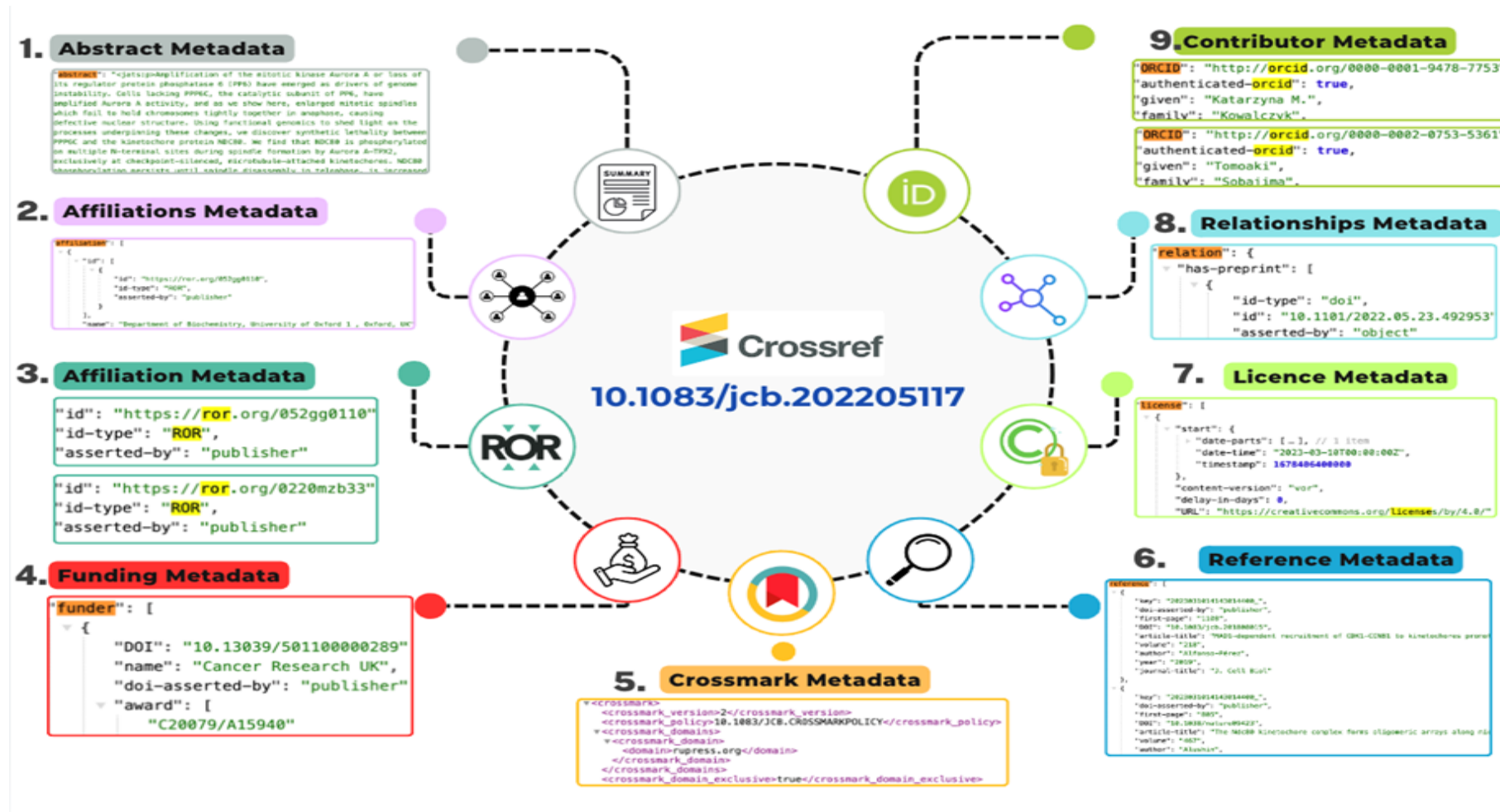
**PIDINST:** instrument(er)

<https://hdl.handle.net/21.11157/4cc8b2fb-accd-49d2-b42b-6ed97cf9a084>





# Ex. på åbne artikel metadata via PID (json-format)



Kreditering: © E Atoni, via Amdekar, MS (2024)



## Syntax og formatforståelse – maskinel udveksling af metadata

De mest kende:

- Serialiseringsformater: CSV, JSON-LD, RDF, XML, YAML...(menneskelige læsbare)
- Markup (doc-type): html, xml, markdown, LaTeX, txt...
- Metadata skemaer: DC, DDI, DOI, FOAF, MARC, MODS, ONIX, TEI...
- Filformater: ...

- .bib;.ris (reference)
- .fits (videnskabelig)
- .gif;.tif (grafik)
- .nc (multi-domæne)
- .pdf;.xps (side beskrivelse)
- .pez;.ppt (præsentation)
- .asc;.txt.(dokument)
- .bin;.zip (arkiv, komprimeret)

... antallet af filformater er endeløs...



Kreditering: @ ece.fr



# Bidrag til Open Science og bedre meritering

stakeholders i akademien ... introducerer ændringer, inkl. ... fører til potentielt nye indikatorer/metrikker ... som **delvist** matcher ... nye typer og karakteristikker af metadata & metrikker ... fra forskellige udbydere

UNIVERSITETER

## OPEN SCIENCE

open access, for mennesker og maskiner, til:

- materialer, protokoller
- data som er FAIR
- kode & software
- publikationer (inkl. preprints, proceedings)

Med ambition om:

- fuld dokumentation af proces
- åbne licenser (genbrug)
- anvende open source software & hardware
- involvere stakeholders (inkl. citizen science)
- offentlig engagement
- anvende almindeligt sprog

BEVILLINGSGIVERE

## MERITERING

Anerkende::

- diversitet af output
- peer review
- Team-work
- samarbejder
- lederskab
- diversitet af roller (CREDIT)
- (samfundsmæssig) impact

Med ambition om::

- kvalitative evalueringer
- ikke-tidsskrifts metrikker
- ikke kun forfatter metrikker
- involvere de evaluerede
- data/metode transparens
- community ejerskab
- evidens-baseret narrativ CV

REGERINGER

## MÅLER FORSKELLIGE TING

- open access status af output
- data FAIRness & tilgængelighed/genbrug
- kode & software tilgængelighed/genbrug
- preprinting
- konference output
- bøger, kapitler
- outputs i alle sprog
- (samfundsmæssig) impact
- innovation/samarbejder

## MÅLER TING FORSKELLIGT

- data på team niveau
- data på projekt niveau
- community kontrol & ejerskab af værktøjer
- data til formative evalueringer
- undgå ranking af data
- undgå sammensatte metrikker
- fuldt åbne og transparente data
- mere kvalitative data/indsigter

- mere inklusive databaser (doctype/sprog/geogr.)
- OA-detektering (fx Unpaywall, inkl. OA-types)
- åben licens genkendelse (CC, GPL, MIT, ODbL etc.)
- data om omtale af forskning/output udenfor akademien
- (sub)organisationer PID (ROR)
- output PIDs (DOI, URN, etc.)
- ophav PIDs (ORCID)
- projekt PIDs (RAID)
- funding/funder PIDs (funder registry, grant IDs)
- rolle indikatorer (fx brug af CREDIT taxonomy)
- åbne citationer (OCI) og åbne abstracts (I4OA)
- data/software/preprint citationer (bi-direktional)
- værktøjer for åbne data (API/dumps)
- open source værktøjer (fx OpenAlex)
- community kontrollerede værktøjer/data (fx Crossref)
- AI-baserede analyser/data

PLATFORME

(fx Zenodo, Science  
Direct Github, bioRxiv)

REGISTRE

(fx Crossref, DataCite,  
ROR, ORCID, DOAJ)

AGGREGATORER

(fx OpenAire, OpenAlex,  
CORE)

SERVICES

(fx WoS, Dimensions,  
LENS, Leiden Ranking)



Jeroen Bosman, 2024



# Udvikling omkring digital suverænitet

Internationale community-drevne og non-for-profit initiativer, der peger på udvikling non-for-profit infrastrukturer

- SCOSS - [Global Sustainability Coalition for Open Science Services](#) (2017)
- (French)[Jussieu Call for Open Science & Biodiversity](#) (2018)
- CoARA – [Coalition for Advancing Research Assessment](#) (2022)
- POSI – [Principles of Open Scholarly Infrastructure](#) (2023)
- [Barcelona Declaration on Open Research Information](#) (2024)



BARCELONA  
DECLARATION ON  
OPEN RESEARCH  
INFORMATION

Voksende behov for support til og investering i offentlig non-for-profit infrastrukturer, der promoverer digital suverænitet ([Digital Sovereignty](#)) og FAIR (meta)data.





# Tracking teknologier i forskning – aggregering og (mis)brug af brugerdata

- Fokus og bekymring omkring AAI (autentificerings -og adgangsteknologier) som fx RA21 el. sømløs adgang via kommercielle og big tech leverandører
- Typer af data mining
  - 3. part data gennem micro targeting
  - bid stream data/ port scanning
  - spyware (udover proxy servers, VPN tunneler)
- Mål med rapport: oplysning og bredere debat i de akademiske miljøer og hos beslutningstagere og i infrastruktur-organisationer om lock-in teknologier.

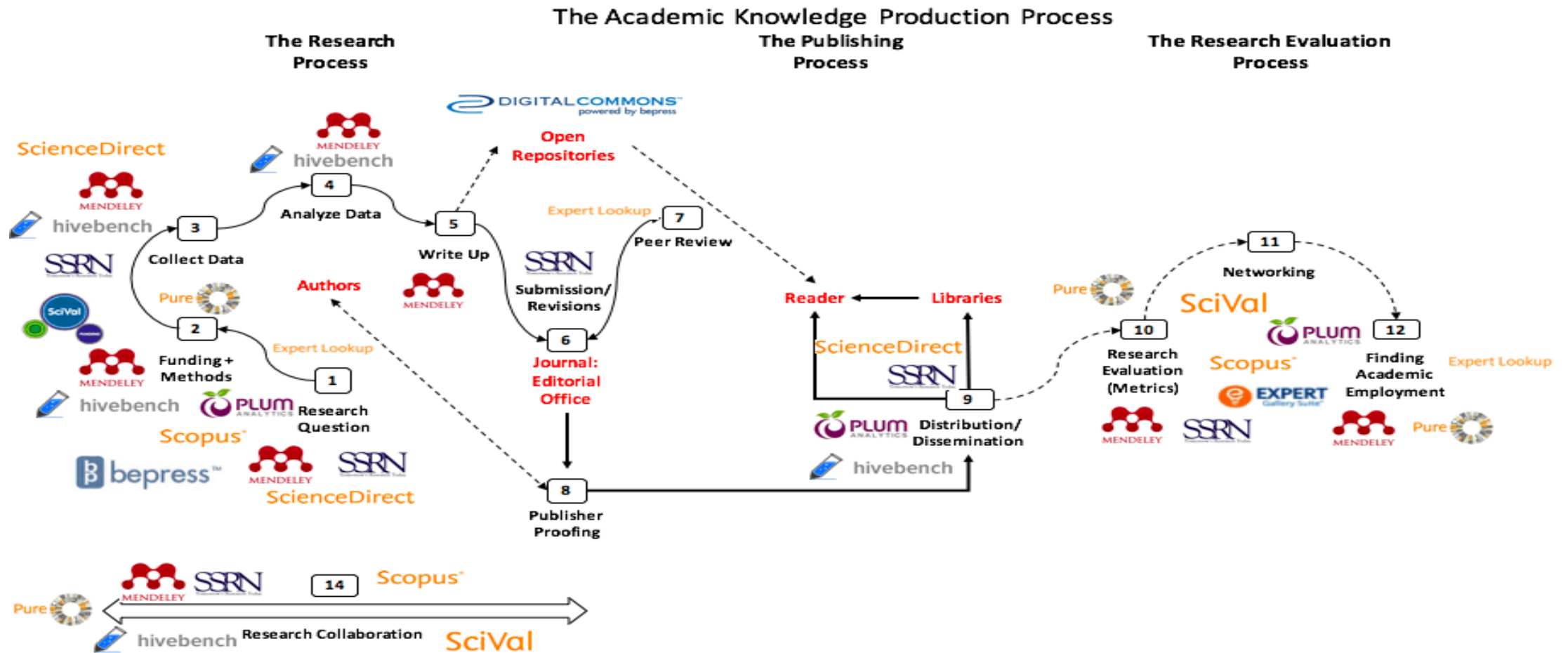


DFG (2021): *Datentracking in der Wissenschaft: Aggregation und Verwendung bzw. Verkauf von Nutzungsdaten durch Wissenschaftsverlage*, doi: [10.5281/zenodo.5937995](https://doi.org/10.5281/zenodo.5937995)





# Kontrol af research workflows fra dominerende aktører - Elsevier




Gatti, Rupert (2020): *Business Models and Market Structure within the Scholarly Communications Sector*, doi: [10.24948/2020.04](https://doi.org/10.24948/2020.04)





















# Kontrol af research workflows fra dominerende aktører - SpringerNature





Helping Researchers Achieve More


 <p>Figshare is a repository where users can make all of their research outputs available in a citable, shareable and discoverable manner.</p> <p>LEARN MORE</p>	 <p>Overleaf is an online LaTeX and Rich Text collaborative writing and publishing tool.</p> <p>LEARN MORE</p>	 <p>Symplectic's software helps researchers, librarians and their institutions collect, manage, analyse and showcase their research.</p> <p>LEARN MORE</p>	 <p>Make sense of your institutional data with our database of the world's research organisations.</p> <p>LEARN MORE</p>	 <p>Read, manage &amp; discover new literature like never before.</p> <p>LEARN MORE</p>
 <p>Dimensions provides in-depth analysis of ongoing research funding.</p> <p>LEARN MORE</p>	 <p>BioRAFT helps institutions get organized around researcher safety through its enterprise laboratory safety, compliance, and training</p> <p>LEARN MORE</p>	 <p>Over 1000 labs trust Labguru to design experiments, organize their research data &amp; manage their inventory.</p> <p>LEARN MORE</p>	 <p>The world's top laboratories are more productive, more compliant, and more consistent with TetraScience.</p> <p>LEARN MORE</p>	 <p>Our consultancy team has the extensive industry experience to bring you the complete bespoke service.</p> <p>LEARN MORE</p>
 <p>Transcriptic's revolutionary robotic lab generates the data you need quickly and reliably in the cloud.</p> <p>LEARN MORE</p>	 <p>Peerwith is the marketplace for expert author services.</p> <p>LEARN MORE</p>	 <p>IFI Claims are the patent data experts. Digital Science holds a minority investment in them.</p> <p>LEARN MORE</p>	 <p>Altmetric allows users to track and measure activity around academic research</p> <p>LEARN MORE</p>	


 Research Funding


 Planning Research

 Research Discovery

 Managing Literature

 Analyze

 Writing and Publishing

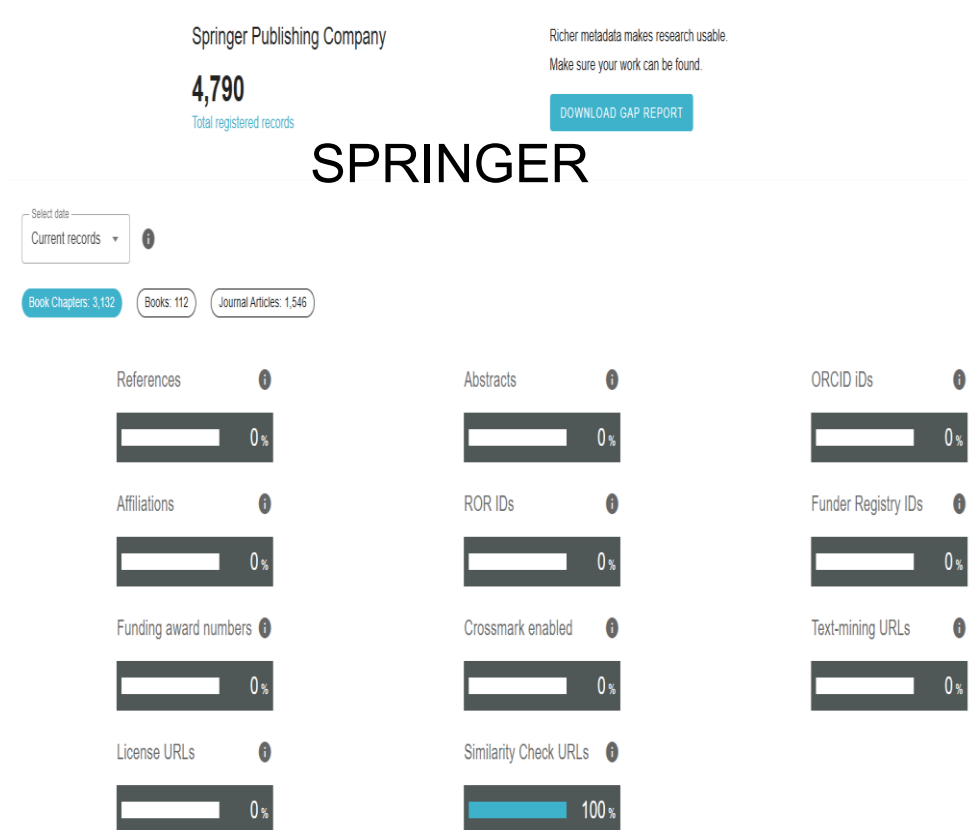
 Evaluating Research

<https://www.digital-science.com/audience/researchers/>

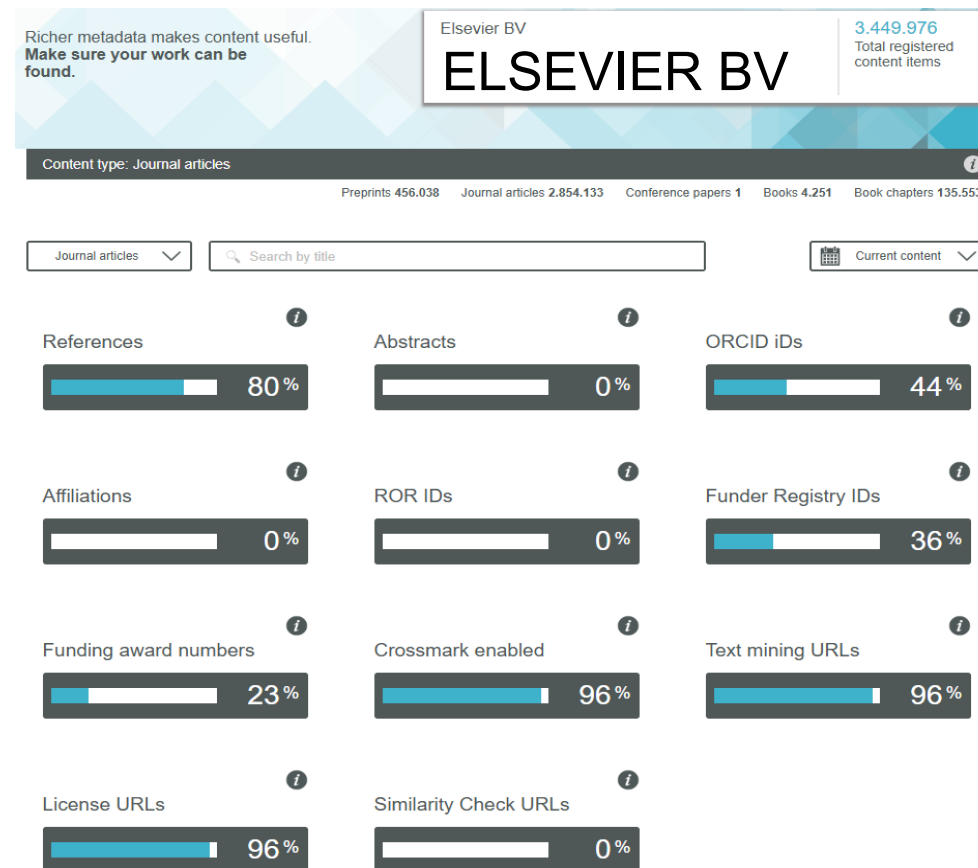




# Begrænset udveksling af information og PID metadata fra store kommercielle forlag



<https://www.crossref.org/members/prep/793>



<https://www.crossref.org/members/prep/78>





# Støtte og samarbejde ift PID-udvikling i DK

KB har siden 2020 støttet non-for-profit initiativer og infrastrukturer og støtter i 2025 disse, men står noget alene...:

## Infrastruktur

ArXiv, DOAB/Oapen, DOAJ, OAS (OA Switchboard), Open Citations (SCOSS), Open Editions, Open Policy Finder (SherpaRomeo), PCI (PeercommunityIn), PKP (Public Knowledge Project), Redalyc/AmeliCa (SCOSS),

## Medlemskaber/partnership

COAR (Confederation of Open Access Repositories), SCOAP3, SPARC Europe



KB støtte til Open Science infrastruktur:  
<https://pro.kb.dk/open-science/stoette-til-open-science-services>





# Nye institutionelle muligheder for anvendelse og integration af PID

## Minting of DOI on Research output

With expanded Open Access (OA) policies from governments and funding agencies, there is a need for researchers and institutions to be able to easily find, manage, and report on their OA research output. In line with these needs, to make content that is imported to Pure discoverable and searchable, Pure now supports the minting of DOIs for datasets through an integration with DataCite.

In this release we have expanded this integration and added the possibility to register research output imported to Pure in DataCite, by allowing the minting of DOIs for research outputs (including all related subtypes). For more details, see section below on [DOI minting](#).

## Mint DOIs for Research Output and related sub-types through DataCite

Pure administrators can now enable minting of DOIs of research output, allowing users to register their research output in DataCite.

It is possible to configure this functionality to allow the minting of DOIs for all research output, or for specific sub-types.

- ☒ Dataset
- ☒ Research output
  - ☒ Book/Report
  - ☒ Chapter in Book/Report/Conference proceeding
  - ☒ Contribution to conference
  - ☐ Contribution to journal
  - ☒ Contribution to specialist publication
  - ☒ Non-textual form
  - ☒ Other contribution
  - ☒ Patent
  - ☒ Working paper

When this functionality is enabled, users have the option to mint the DOI directly from the research output editor. When the DataCite integration is enabled, configured editors and administrators of datasets will be able to mint a new DOI by clicking **Create DOI from DataCite**.

The **Create DOI from DataCite** button is only visible to editors and administrators once the record has been saved. It is only possible to mint a DOI at DataCite if no DOI exists on the record.

Add a DOI

Add a DOI for an electronic (full-text) version of this work (e.g. the published version of record)

DOI (Digital Object Identifier) \*

-or- Create DOI from DataCite

Example: 10.1000/182

The following fields are sent and will be registered at DataCite:

- Contributors
- DOI
- Electronic versions
- Journal association
- Original language
- Publication statuses and dates
- Publisher
- Subtitle of the contribution in original language
- Title of the contribution in original language
- Translated subtitle of the contribution
- Translated title of the contribution

Once a DOI has been minted, these fields will be locked for the personal user. If the metadata on the record is updated by the editor or administrator, the update is sent to DataCite and the record will be updated.

Note: It is not possible to mint DOIs on the following:

- Research output where the visibility is 'backend' or 'confidential'
- Research output that has been imported to Pure through an online source

### Requirements

The integration with DataCite is only available to customers who have a Pure portal and is disabled by default.

To use this integration, you must first register with DataCite. Contact them at [support@datacite.org](mailto:support@datacite.org) and request the necessary access.

For more information, see the Metadata Store website at <https://mds.datacite.org>.

Once you have received the credentials, administrators can configure the minting of DOIs from DataCite for research output and datasets:

- **Administrator > Integrations > DataCite DOI Minting**

***DOI minting er muligt ved opgradering til PURE Cloud (5.30)***

PURE release notes, fra v. 5.30.0:

[https://helpcenter.pure.elsevier.com/en\\_US/data-sources-and-integrations/datacite-metadata-store-integration-create-doi-from-datacite](https://helpcenter.pure.elsevier.com/en_US/data-sources-and-integrations/datacite-metadata-store-integration-create-doi-from-datacite)





# Nye institutionelle muligheder for anvendelse og integration af PID

## ORCID Integration - using ROR ID VS Ringgold ID

### What

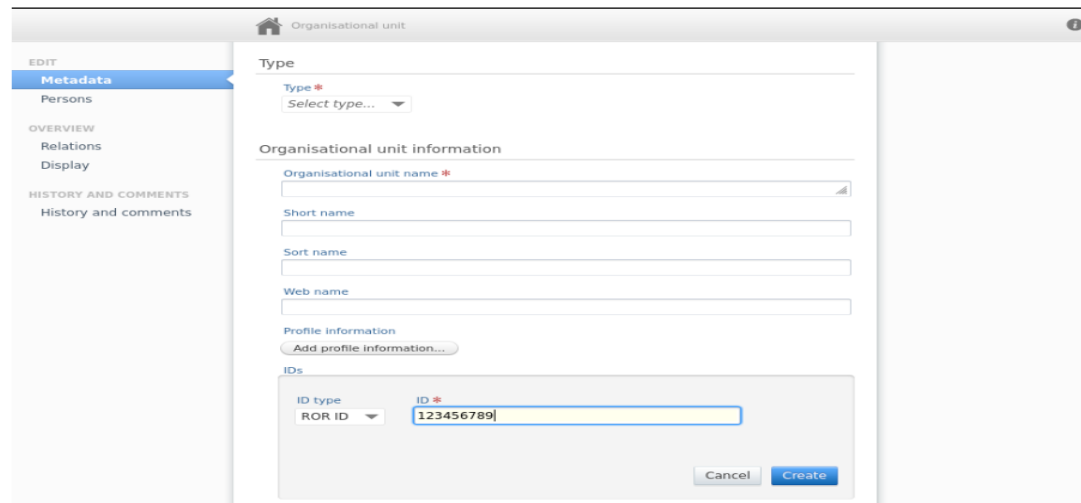
ORCID uses a unique ID to identify your root organization. Previously this was Ringgold ID. However, from 1 August 2023 ORCID switched to using ROR ID for its core organization identifiers.

In line with ORCID's decision to adopt ROR as the Identifier of choice, we updated the configuration in Pure 5.27.2 to use the ROR ID as source ID instead of RINGGOLD ID. (Customers already using Ringgold ID in their ORCID integration can continue using Ringgold ID should they like to).

Any Ringgold IDs created **after** 1 August 2023 will **not** be recognised by ORCID. The RINGGOLD organization list that is already used by the ORCID Registry (i.e. IDs created **before** 1 August 2023) will remain for the foreseeable future, but will no longer be updated. More details of ORCID's announcement can be found [here](#).

### Configuring the ORCID integration to use ROR ID

1. ROR ID must be added as ID on an organisation in the organisational hierarchies associated with [persons](#) exporting content to ORCID.



***ROR er muligt i PURE  
som organisations ID  
via integration med  
OrcID fra v. 5.27***

PURE release notes, fra v.  
5.27.2:

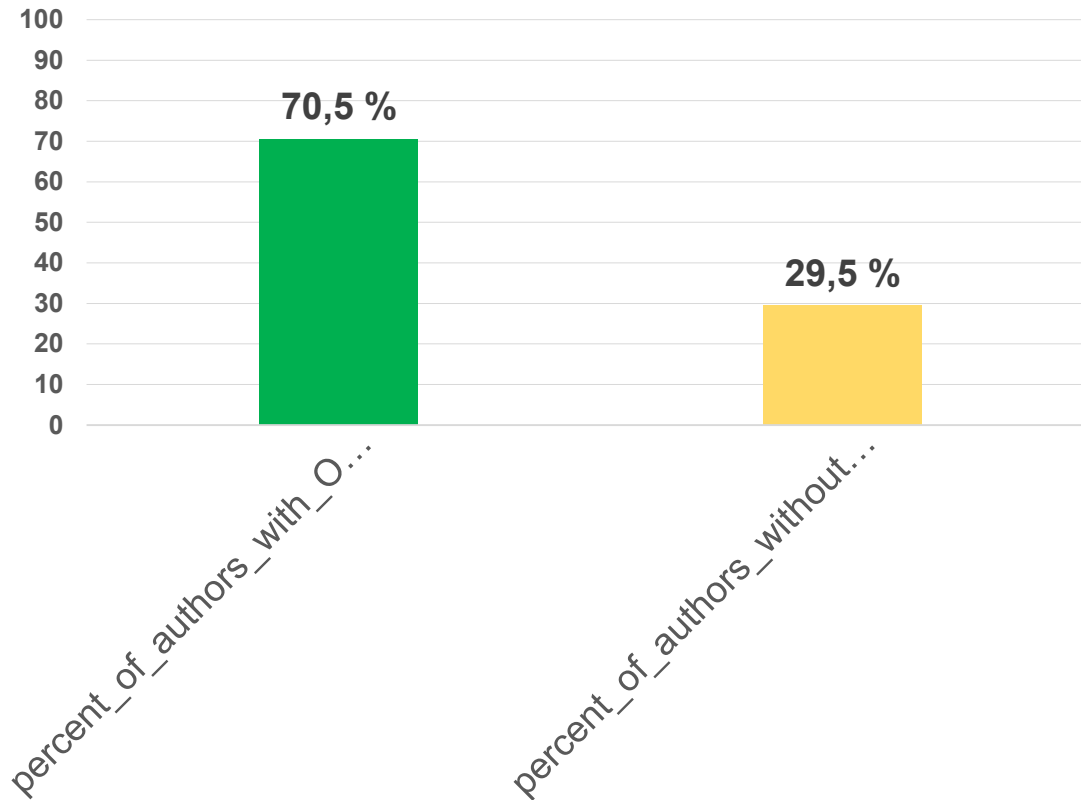
[https://helpcenter.pure.elsevier.com/en\\_US/import-sources/using-ror-id-vs-using-ringgold-id](https://helpcenter.pure.elsevier.com/en_US/import-sources/using-ror-id-vs-using-ringgold-id)



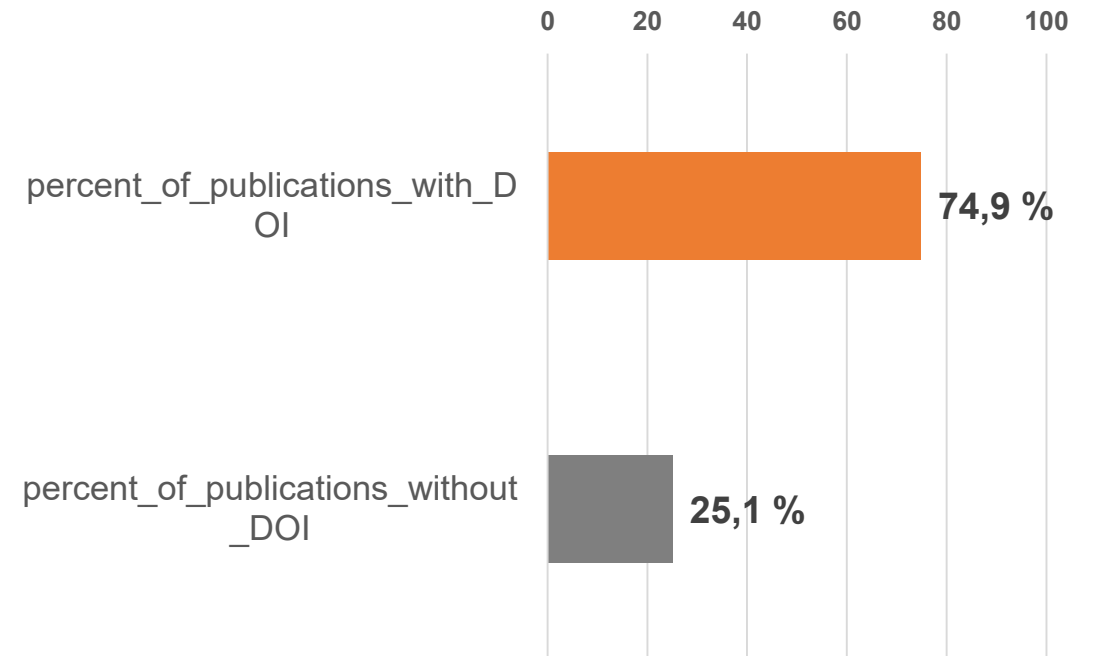


# Snapshot - PID benyttelse i DK (DOI, ORCID)

## ORCID % af forskere v. DK UNI (2024)



## DOI % af publikationer v. DK UNI (2024)



Forskningspublikationer (peer reviewed)  
med forfattere fra DK publiceret i 2024  
(Kilde: Danmarks forskningsportal)





# Cost-benefit analyse af PID implementering

## Inspiration fra god business case i Tjekkiet:

*Our modelling indicates that the **time savings from PID adoption** could be as high as 7,207 person days per year, which would equate to **net savings of 13,214,713 CZK**.*

*In addition to the cost savings generated by PIDs and the support services provided by the CARDS project, the ORCID and DataCite consortia, started as part of the national PIDs support programme led by NTK, also save money.*

*We compare the costs of individual memberships to the consortia fees and find that, at current membership levels, the **savings for Czech institutions from these two consortia combined is 3,050,240 CZK annually**.*

Jones, P. et al. (2024): A cost-benefit analysis for PID implementation in Czechia  
doi: [10.48813/x4vd-yj13](https://doi.org/10.48813/x4vd-yj13)



## BUSINESS CASE

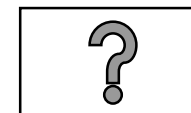
Kreditering: @ t2informatik.de





## Organisering og netværk – status for PID i DK

- **OrcID konsortium** (2014), ledet af Aalborg Universitet siden 2018.  
ADK, AU, AAU, CBS, DTU, KU, Lægeforeningen, Reg.H, Reg. Sjælland, RUC, SDU, UC Viden
- **DataCite konsortium** (2021), ledet af DeiC
- **CrossRef** – intet konsortium, men fem medlemmer: AAU, CBS, GEUS, KB, RUC

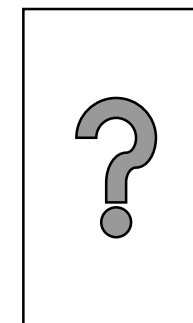


Åbne spørgsmål til overvejelse:

**Hvad er de næste skridt ift. PID'er i DK?**

som fx ROR (Research Organization Registry), grant IDs el. RAID (Research Activity ID) ...

**Hvem tager ansvar for implementeringen heraf i DK?**



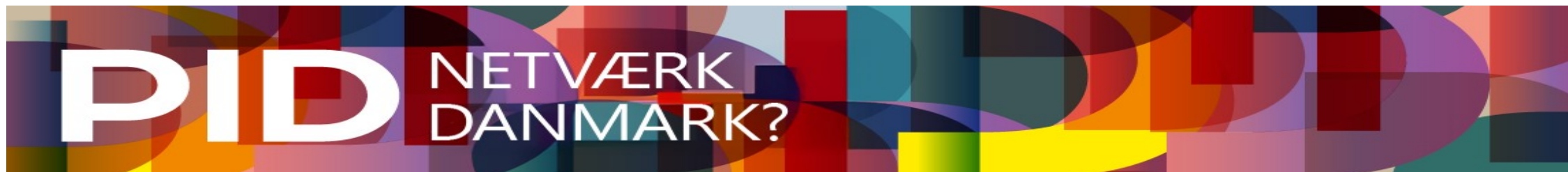


# PID roadmap og etablering af netværk etablering i DK

*"Der er behov for en governance og mere koordineret strategisk styring samt bæredygtig og langsigtet roadmap for implementering og udvikling af PID i DK, samtidigt med at der etableres et netværk af eksperter og interessenter, som vi ser i sammenlignelige lande som fx Australien, Finland, Tjekkiet, Tyskland m.fl."*

## Stakeholders:

- Forskere
- Forskningsorganisationer (offentlige/private)
- Bevillingsgivere (offentlige/private)
- Infrastruktur (fx Deic Dataverse)
- Service providere (fx NORA) og PID managere





# Bud på strategisk ramme om en dansk PID roadmap 2030

- 1) gøre **åbenhed til standard for forskningsinformation** vi bruger og producerer
  - arbejde hen mod at åbne information (metadata) om bevillinger, forsknings- og innovationsaktiviteter, videnskabelige output, og organisationsdata via standarder, der binder information sammen og bidrager til et transparent innovations –og forsknings-økosystem.
- 2) arbejde med **tjenester og systemer**, der understøtter og muliggør åben forskningsinformation
  - bidrage til at gøre mere brug af og bidrage til udvikling af PID-tjenester (OrcID, ROR, RAID, FundRef, DOI, GrantID, CC...) og not-for-profit systemer som CrossRef, OC, OpenAlex, ROR mv.) fremfor proprietære systemer som WoS, Scopus, Dimensions, Ringgold, inkl. citationsindekserne.
- 3) **støtte bæredygtigheden af infrastrukturer** for åben forskningsinformation
  - kanalisere mere økonomisk støtte og community-bidrag til bæredygtigheden af non-for-profit og community-kontrollerede tjenester og systemer.
- 4) **støt kollektiv handling** for at fremskynde overgangen til åbenhed af forskningsinformation.
  - skubbe på for denne udvikling indadtil og udadtil i samspil med andre aktører og investere ressourcer i et mere organiseret lokalt/nationalt/internationalt samspil.





# Referencer

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