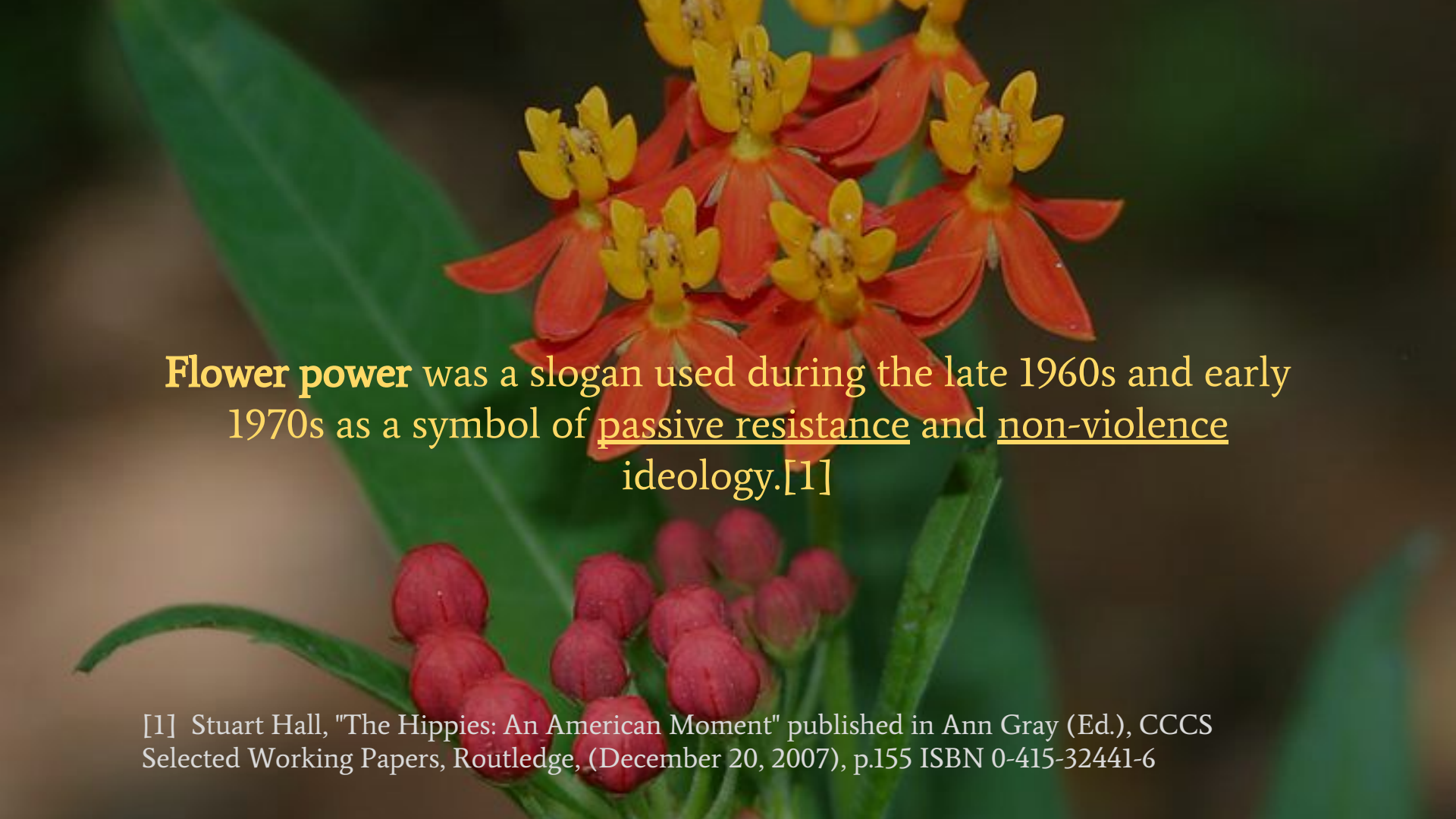
Asclepias: Flower Power for Software Citation

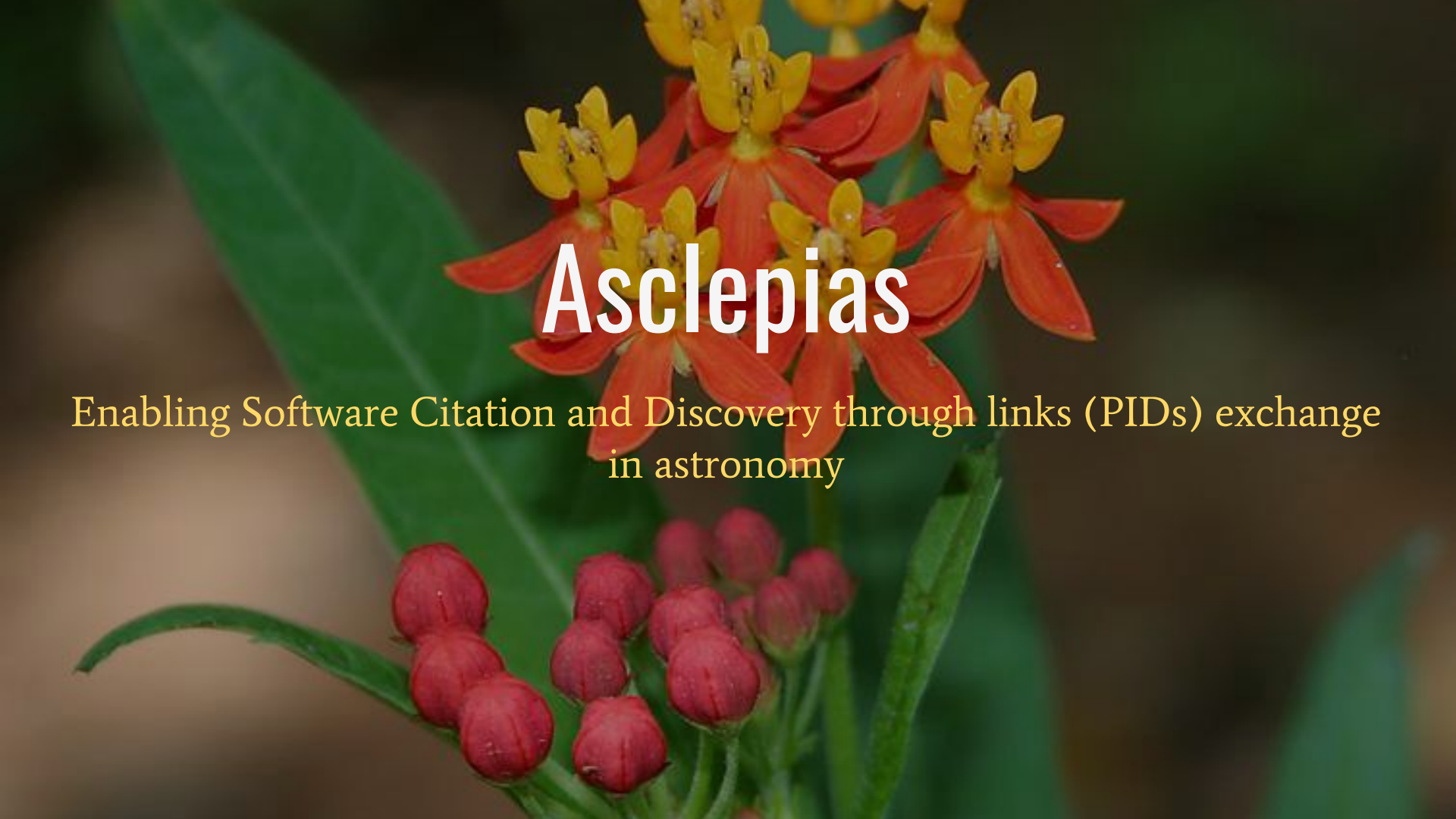
Jose Benito Gonzalez Lopez (CERN/Zenodo)
Alexandros Ioannidis (CERN/Zenodo)

on behalf of Asclepias Project Team



Flower power was a slogan used during the late 1960s and early 1970s as a symbol of passive resistance and non-violence ideology.[1]

[1] Stuart Hall, "The Hippies: An American Moment" published in Ann Gray (Ed.), CCCS Selected Working Papers, Routledge, (December 20, 2007), p.155 ISBN 0-415-32441-6


Asclepias
Enabling Software Citation and Discovery through links (PIDs) exchange in astronomy

Asclepias

American Astronomical Society

Alfred P. Sloan
FOUNDATION

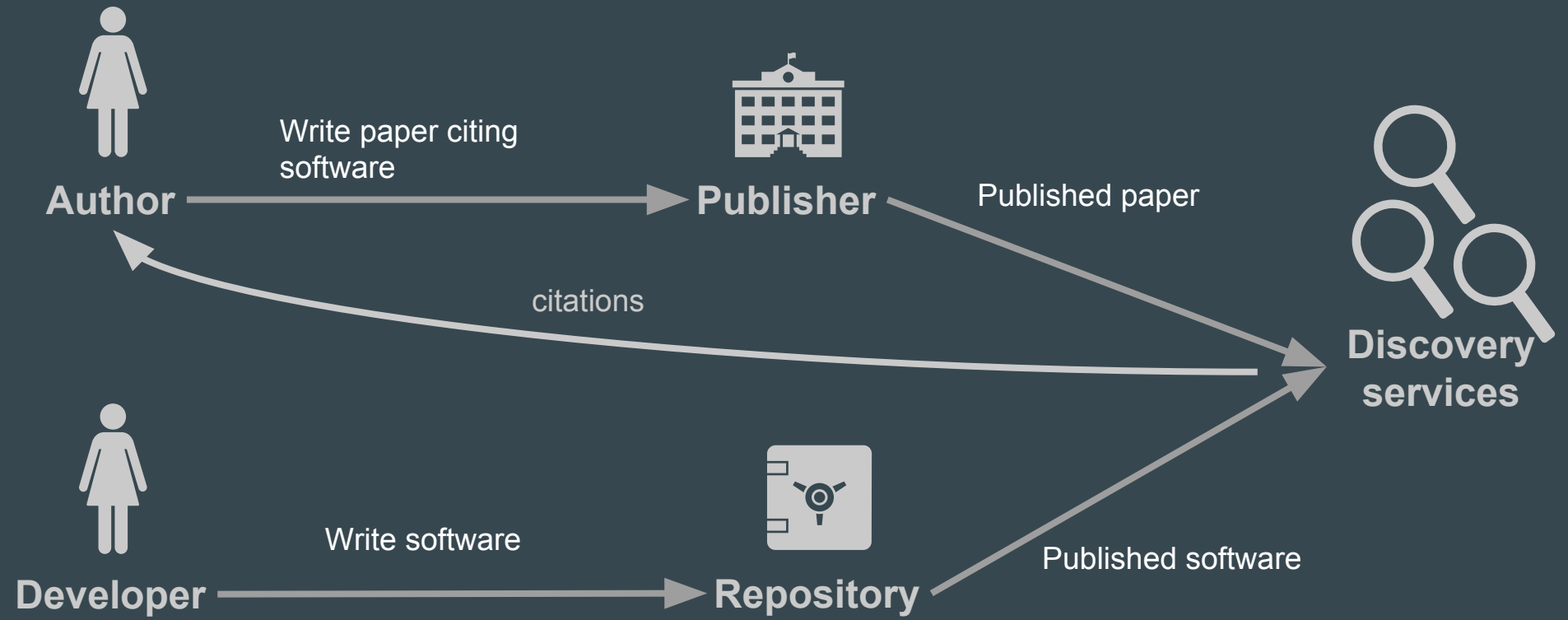
Astrophysics Data System

zenodo

How to receive credit for software in astronomy?

Making software a first-class citizen

The current workflow



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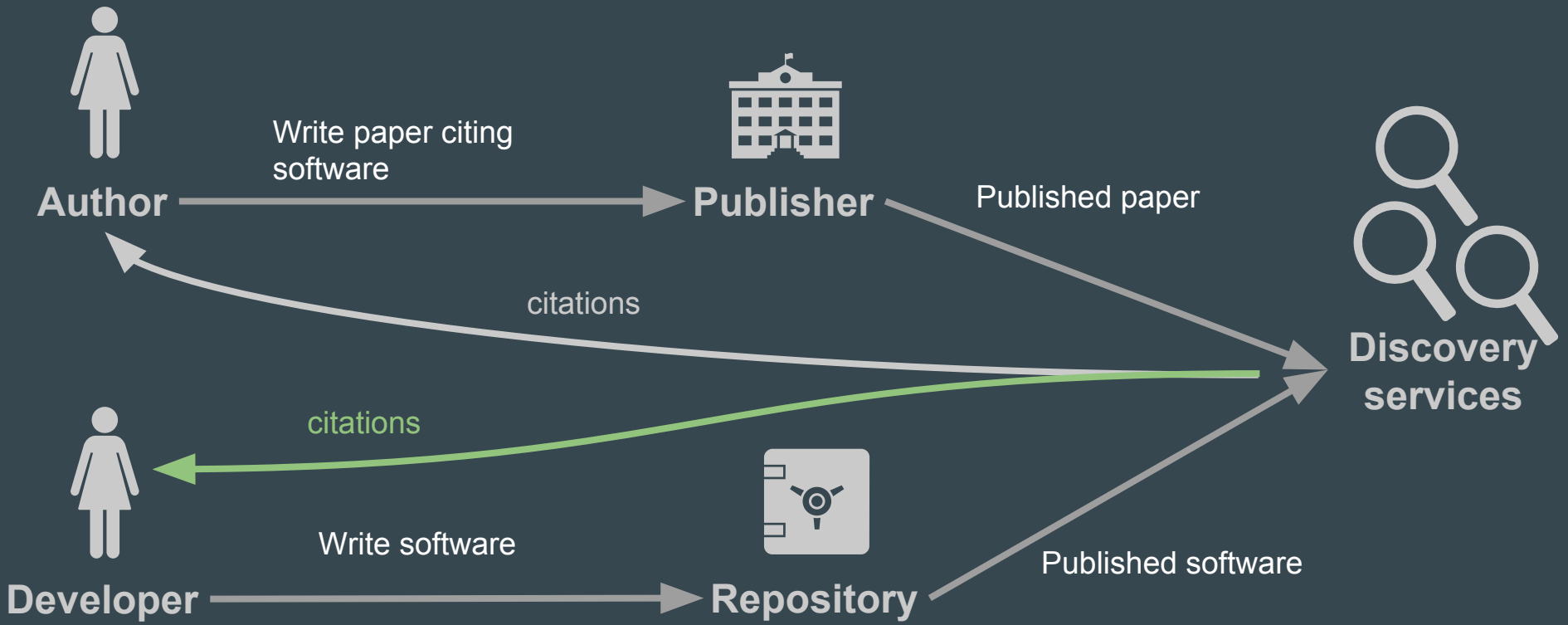
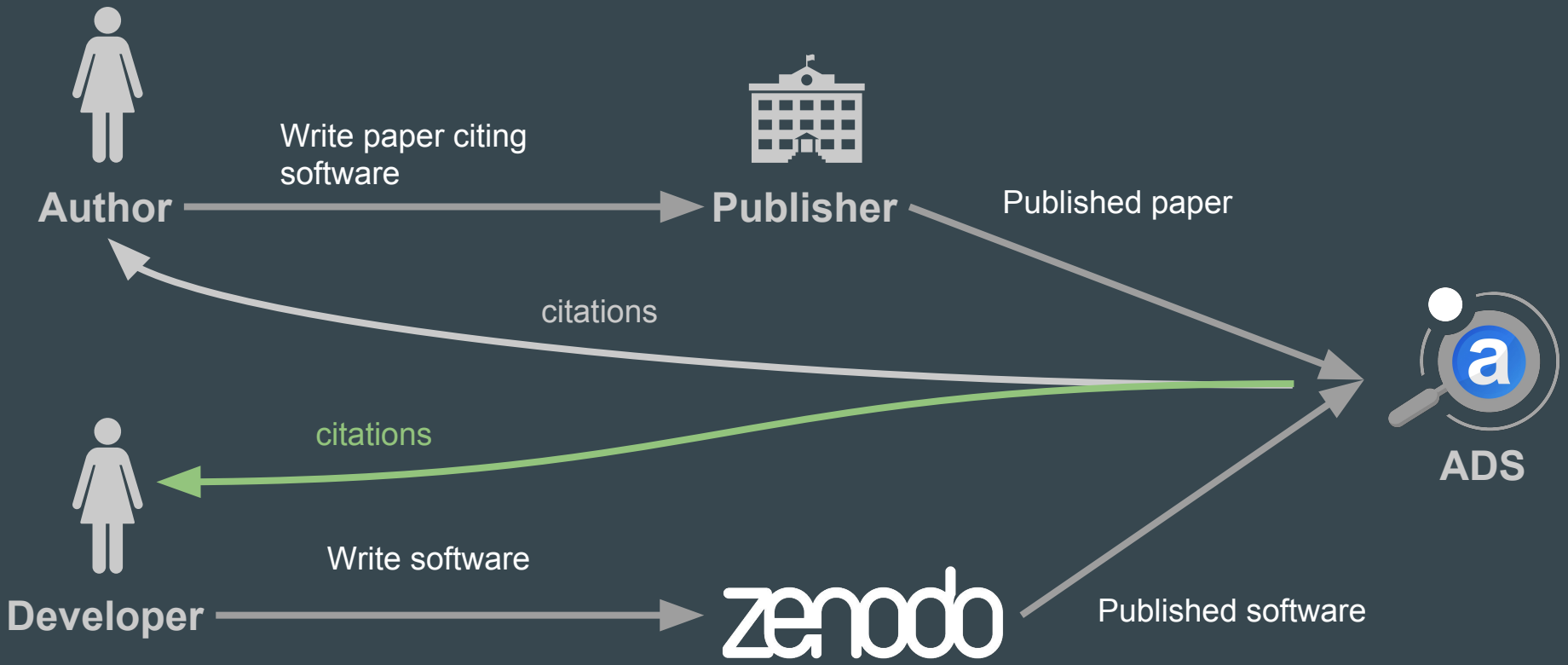
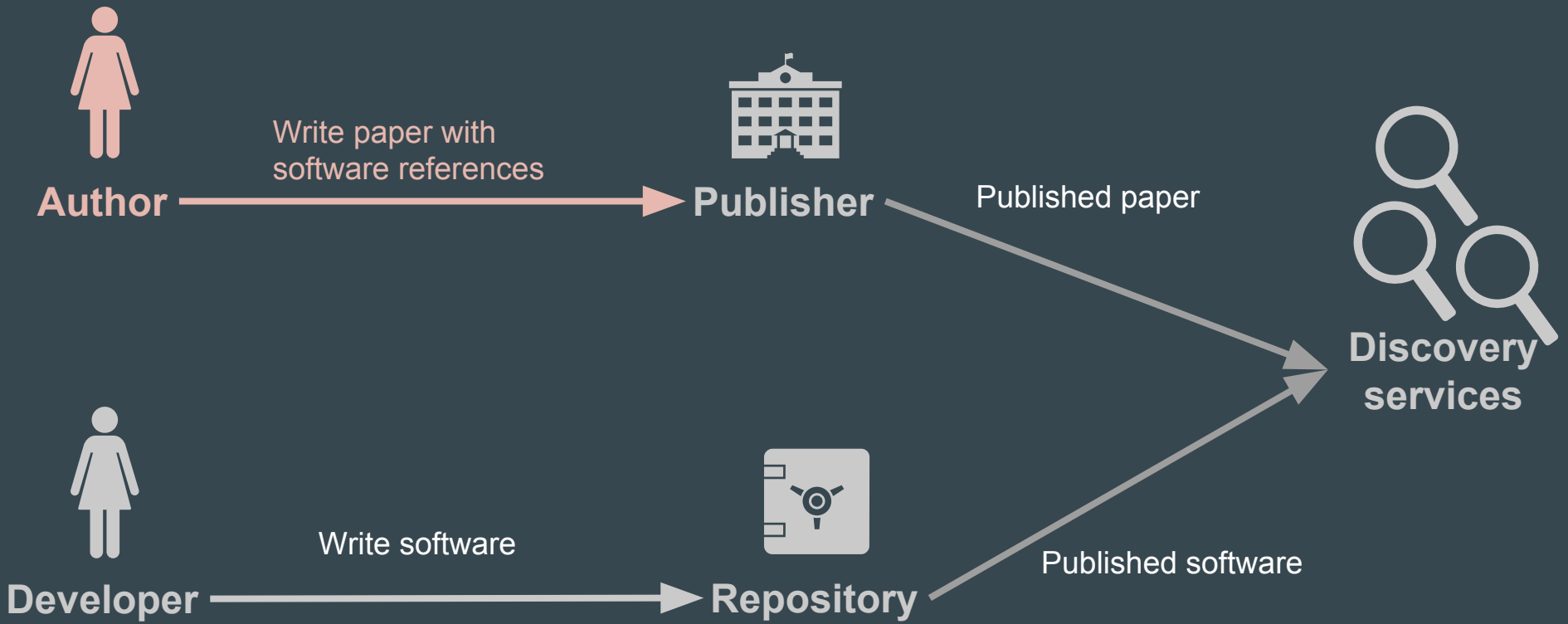


Asclepias use case: astronomy

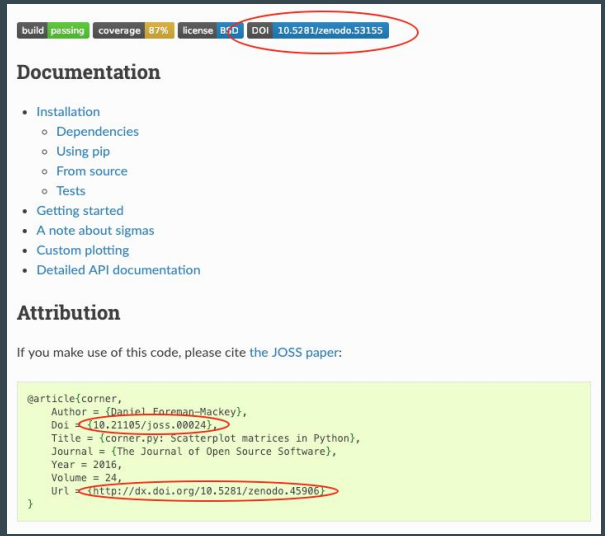


The current workflow issues/solutions



Authors

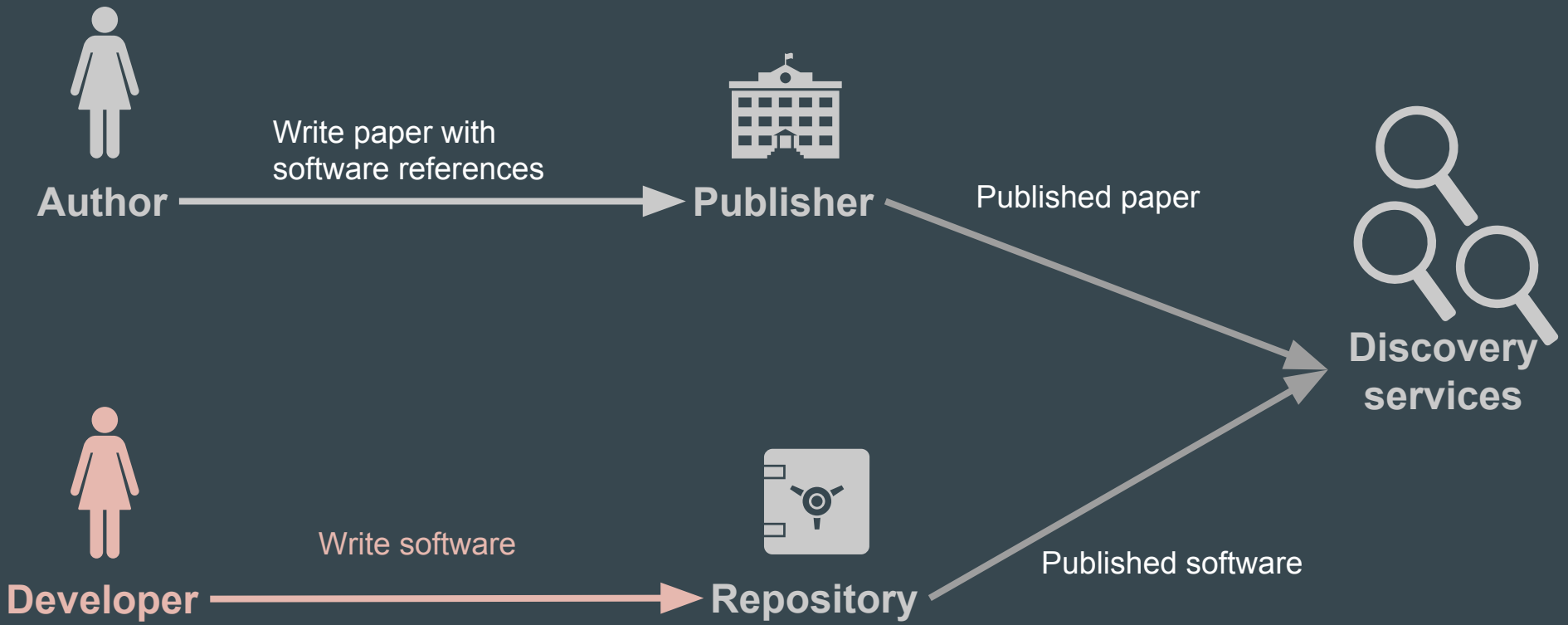
- Information loss
  - Include citation in paper
- BibTeX/... for reference manager
  - “Software” type doesn’t exist
  - No version field support
- Multiple IDs for software:
  - DOI? URL? name?
  - DOI: zero, one or more?



Software PID buffet: Triangle.py/Corner.py

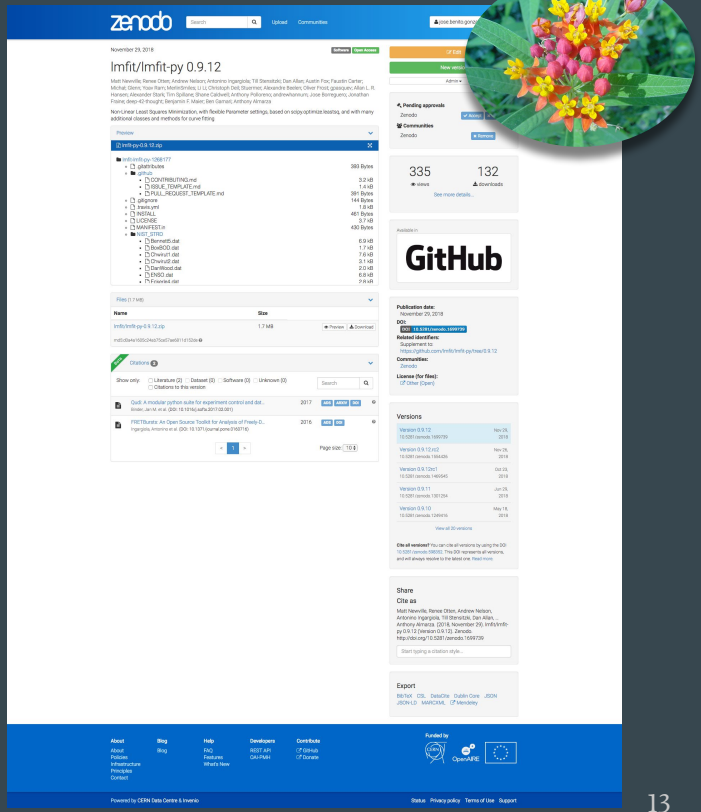
- Triangle.py
  - 10.5281/zenodo.10598
  - 10.5281/zenodo.11020
- Corner.py
  - 10.5281/zenodo.45906
  - 10.5281/zenodo.53155
  - 10.5281/zenodo.591491 (Concept)
- JOSS
  - 10.21105/joss.00024
- ASCL (Astronomy Source Code Library)
  - https://ascl.net/1702.002

The current workflow issues/solutions

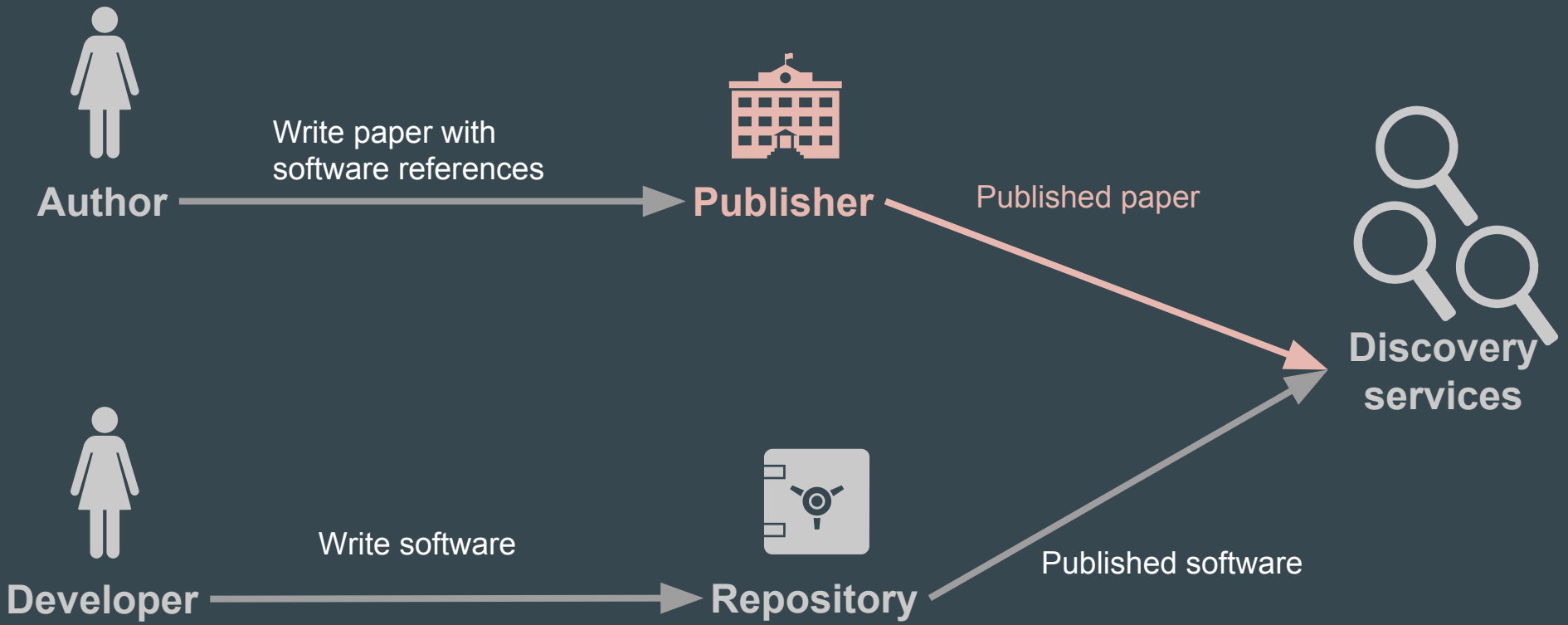


Developers should ensure software is citable

- Use a proper repository to publish software (a.k.a. get a DOI)
  - Versioning support
  - Dynamic authorship
  - Name changes
- Suggest clear citation in the software website



The current workflow issues

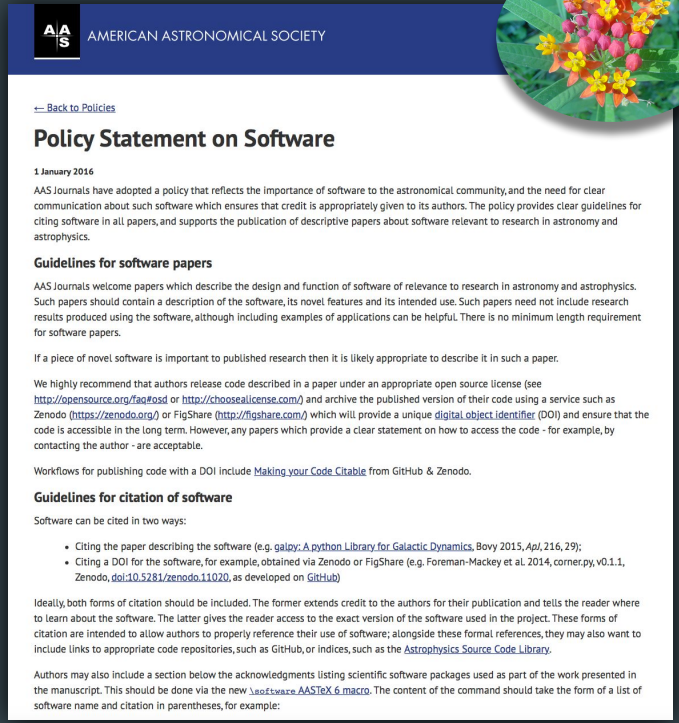


AMERICAN ASTRONOMICAL SOCIETY
Enhancing and sharing humanity's scientific understanding of the universe since 1899.

Information loss: include citation

- Policy not favouring software citation
- Journal authoring system issues:
  - Information from BibTeX is lost
  - CrossRef DOI → JATS XML → PDF

- Software citation policy
- Authoring system:
  - Working with vendor to produce correct DOI metadata and JATS XML (machine readability).



AMERICAN ASTRONOMICAL SOCIETY

← Back to Policies

Policy Statement on Software

1 January 2016

AAS Journals have adopted a policy that reflects the importance of software to the astronomical community, and the need for clear communication about such software which ensures that credit is appropriately given to its authors. The policy provides clear guidelines for citing software in all papers, and supports the publication of descriptive papers about software relevant to research in astronomy and astrophysics.

Guidelines for software papers

AAS Journals welcome papers which describe the design and function of software of relevance to research in astronomy and astrophysics. Such papers should contain a description of the software, its novel features and its intended use. Such papers need not include research results produced using the software, although including examples of applications can be helpful. There is no minimum length requirement for software papers.

If a piece of novel software is important to published research then it is likely appropriate to describe it in such a paper.

We highly recommend that authors release code described in a paper under an appropriate open source license (see http://opensource.org/faq#osd or http://choosealicense.com/) and archive the published version of their code using a service such as Zenodo (https://zenodo.org/) or FigShare (http://figshare.com/) which will provide a unique digital object identifier (DOI) and ensure that the code is accessible in the long term. However, any papers which provide a clear statement on how to access the code - for example, by contacting the author - are acceptable.

Workflows for publishing code with a DOI include Making your Code Citable from GitHub & Zenodo.

Guidelines for citation of software

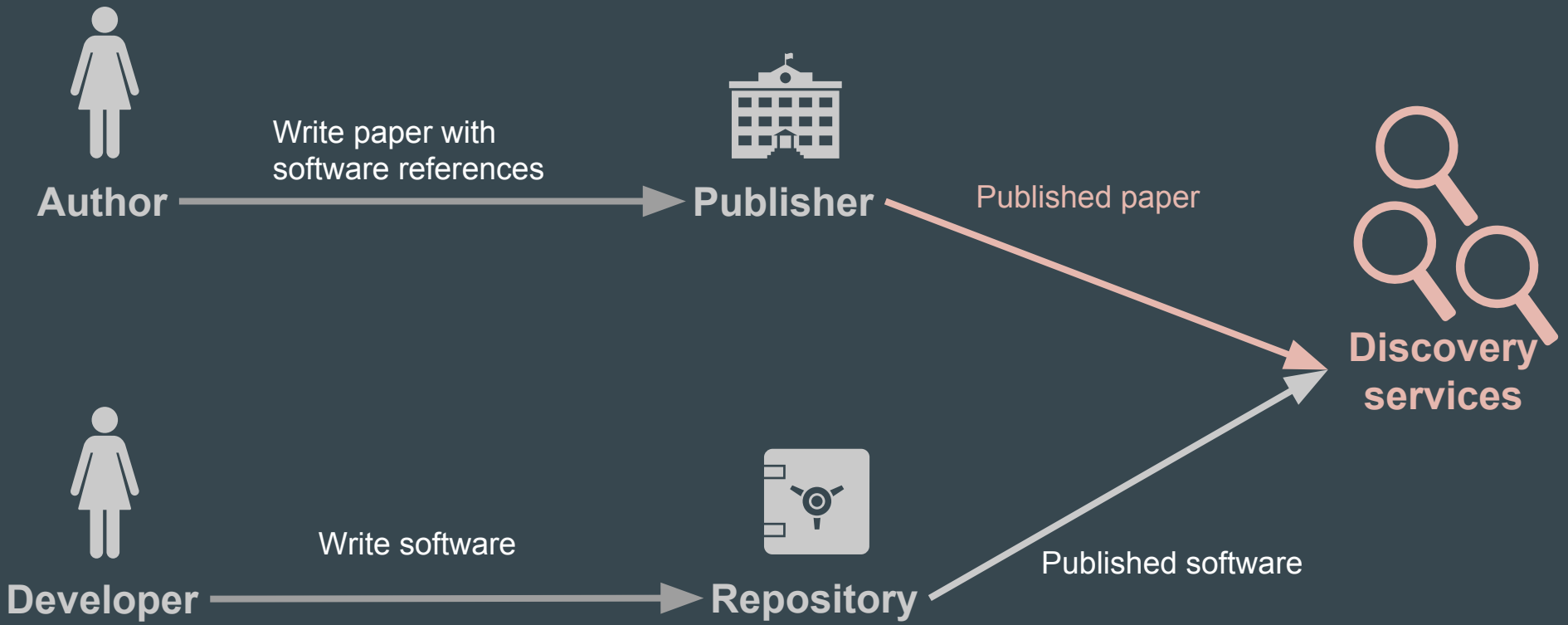
Software can be cited in two ways:

- Citing the paper describing the software (e.g. galpy: A python Library for Galactic Dynamics, Bovy 2015, *ApJ*, 216, 29);
- Citing a DOI for the software, for example, obtained via Zenodo or FigShare (e.g. Foreman-Mackey et al. 2014, corner.py, v0.1.1, Zenodo, doi:10.5281/zenodo.11020, as developed on GitHub)

Ideally, both forms of citation should be included. The former extends credit to the authors for their publication and tells the reader where to learn about the software. The latter gives the reader access to the exact version of the software used in the project. These forms of citation are intended to allow authors to properly reference their use of software; alongside these formal references, they may also want to include links to appropriate code repositories, such as GitHub, or indices, such as the Astrophysics Source Code Library.

Authors may also include a section below the acknowledgments listing scientific software packages used as part of the work presented in the manuscript. This should be done via the new `\software` AASTeX 6 macro. The content of the command should take the form of a list of software name and citation in parentheses, for example:

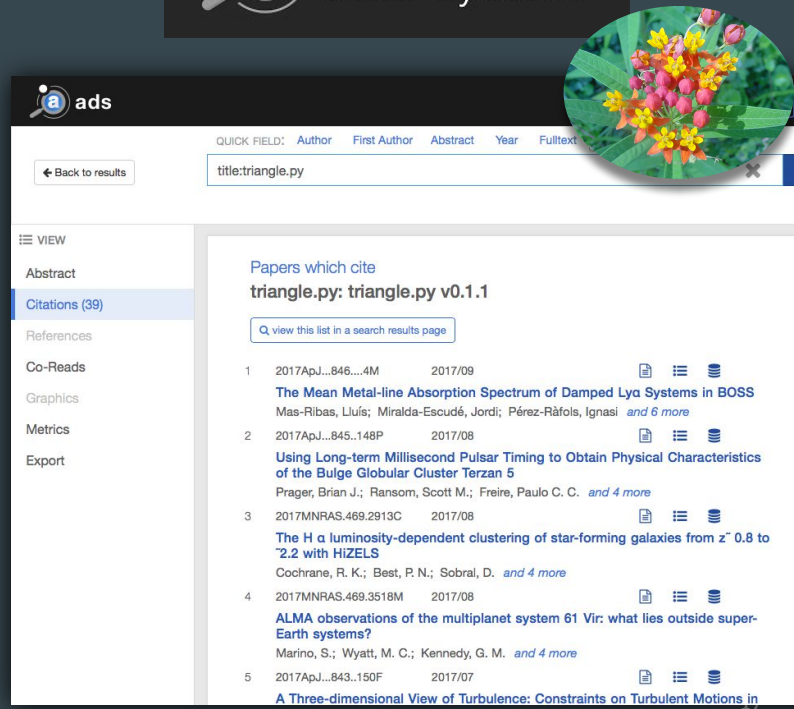
The current workflow issues



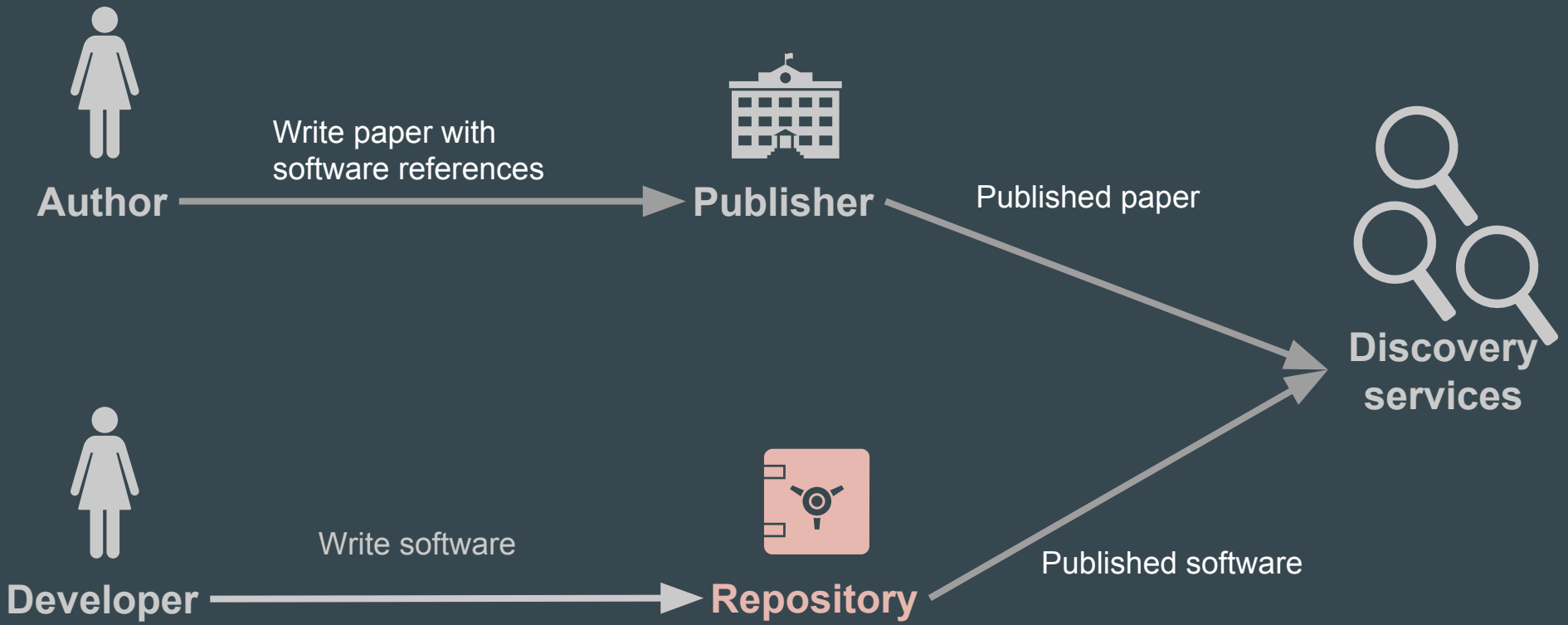
Information loss: ingest paper and track citations

- Discovery system supporting software records?
- Ingestion workflow incapable of identifying software
- Inability to identify synonymous identifiers

- Synonymous PIDs
- Version relationships
- BibTeX generation fixes

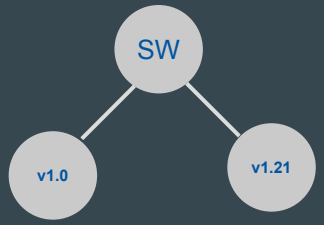


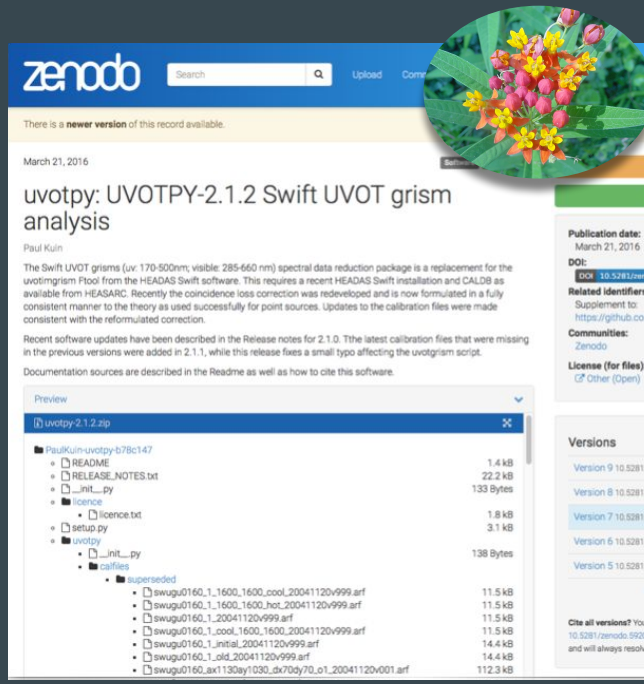
The current workflow issues



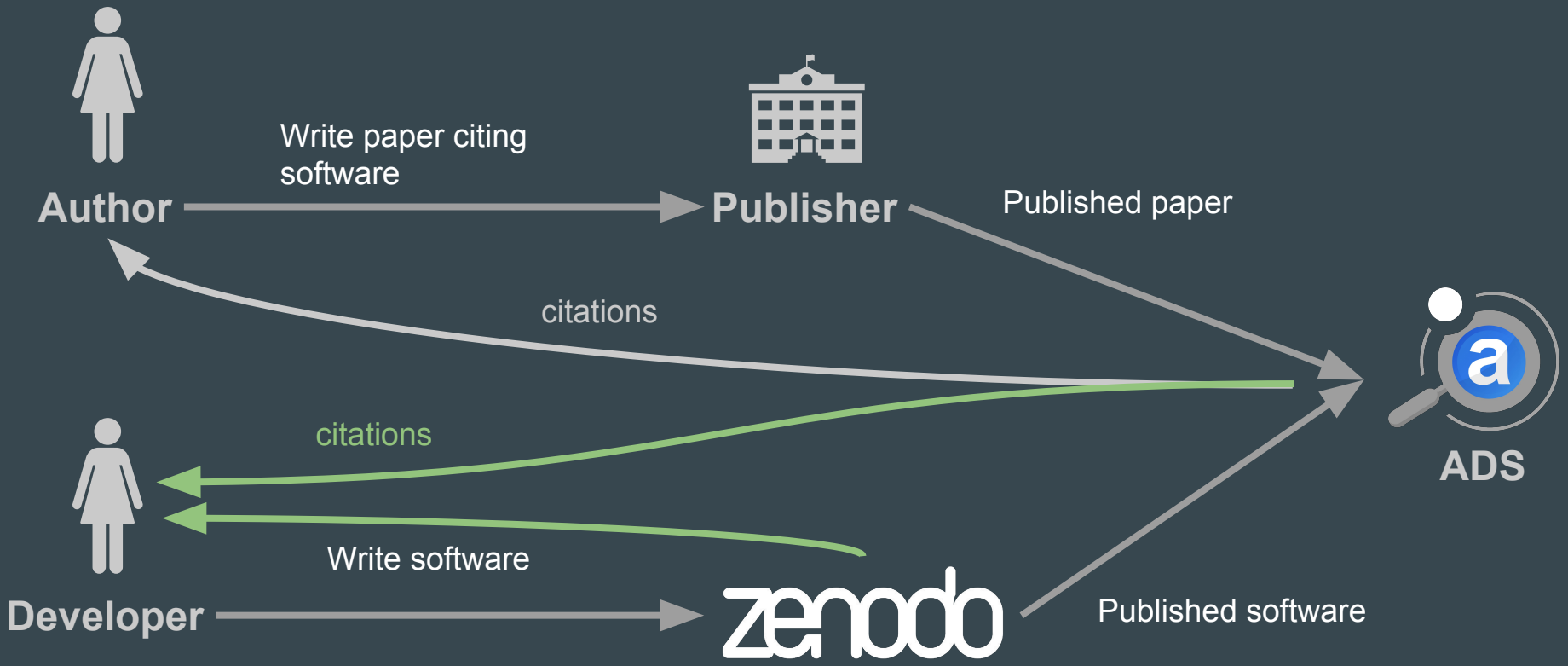
Repositories should ensure software is citable properly

- DOI Versioning:
  - Version relationships
  - Version number field
  - DataCite metadata
  - Dynamic authorship
- BibTeX generation fixes
- GitHub integration





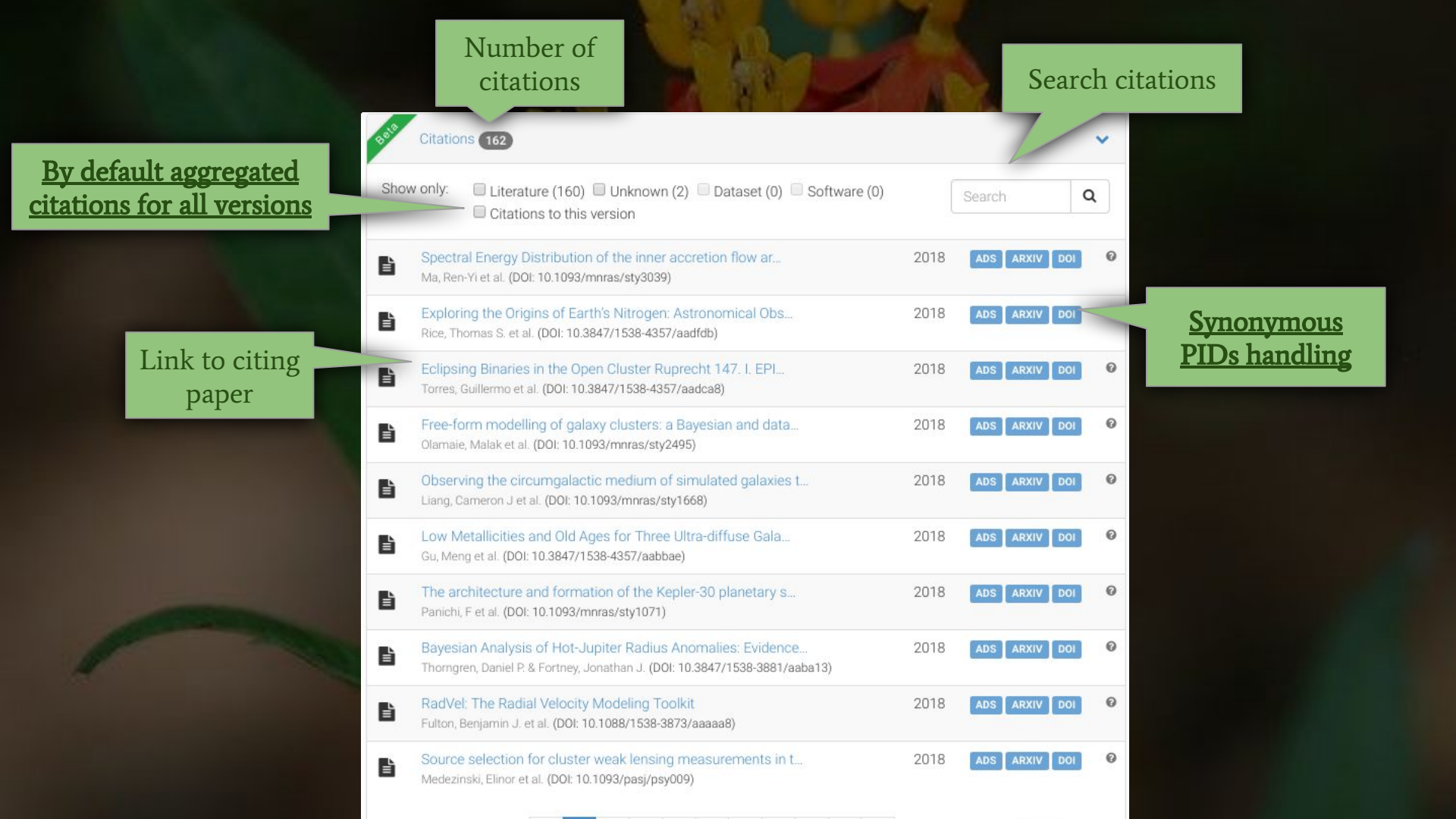
Systemic issues need joint effort to be solved



Interoperability

Meet the Asclepias Broker!

https://asclepias-broker.readthedocs.io/en/latest/index.html


Number of citations
Search citations
By default aggregated citations for all versions
Link to citing paper
Synonymous PIDs handling
Beta
Citations 162
Show only:
Literature (160)
Unknown (2)
Dataset (0)
Software (0)
Citations to this version
Search
Spectral Energy Distribution of the inner accretion flow ar...
Ma, Ren-Yi et al. (DOI: 10.1093/mnras/sty3039)
2018
ADS ARXIV DOI
Exploring the Origins of Earth's Nitrogen: Astronomical Obs...
Rice, Thomas S. et al. (DOI: 10.3847/1538-4357/aadfdb)
2018
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Eclipsing Binaries in the Open Cluster Ruprecht 147. I. EPI...
Torres, Guillermo et al. (DOI: 10.3847/1538-4357/aadca8)
2018
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Free-form modelling of galaxy clusters: a Bayesian and data...
Olamaie, Malak et al. (DOI: 10.1093/mnras/sty2495)
2018
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Observing the circumgalactic medium of simulated galaxies t...
Liang, Cameron J et al. (DOI: 10.1093/mnras/sty1668)
2018
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Low Metallicities and Old Ages for Three Ultra-diffuse Gala...
Gu, Meng et al. (DOI: 10.3847/1538-4357/aabbae)
2018
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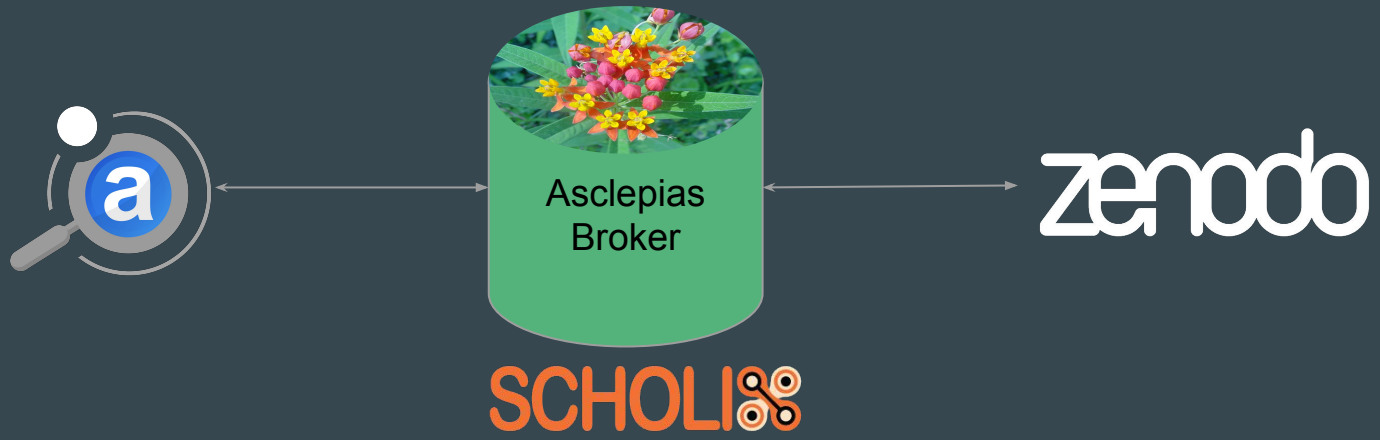
The architecture and formation of the Kepler-30 planetary s...
Panichi, F et al. (DOI: 10.1093/mnras/sty1071)
2018
ADS ARXIV DOI
Bayesian Analysis of Hot-Jupiter Radius Anomalies: Evidence...
Thorngren, Daniel P. & Fortney, Jonathan J. (DOI: 10.3847/1538-3881/aaba13)
2018
ADS ARXIV DOI
RadVel: The Radial Velocity Modeling Toolkit
Fulton, Benjamin J. et al. (DOI: 10.1088/1538-3873/aaaaa8)
2018
ADS ARXIV DOI
Source selection for cluster weak lensing measurements in t...
Medezinski, Elinor et al. (DOI: 10.1093/pasj/psy009)
2018
ADS ARXIV DOI

Asclepias Broker

- Web application exposing a REST API and an ingestion pipeline
- Stores and exposes information about scholarly links (in Scholix format)
- Free and Open Source (https://github.com/asclepias)
- “Citation Exchange as a Service” - easy to setup and configure
- Any repository or discovery service can setup an instance and benefit from it



What does the broker do for you?

- Event handling (Scholix)
  - Receive citations from trusted and curated sources
- Ingestion
  - Grouping of multiple identifiers for same resource (URL, DOI, arXiv, etc)
  - Keep citation count aggregated per version and all at once
  - Automatic metadata enhancement
- Expose a search REST API
- Harvest other sources for citations

What does the broker do for you?

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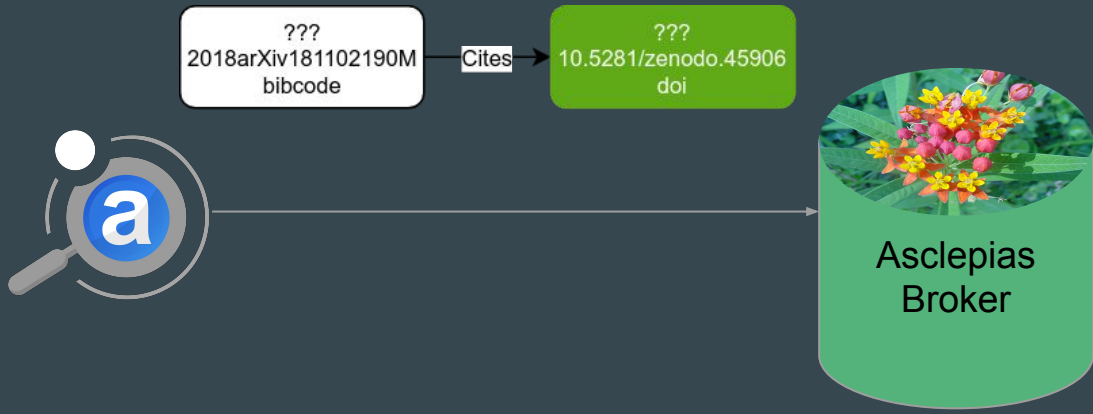

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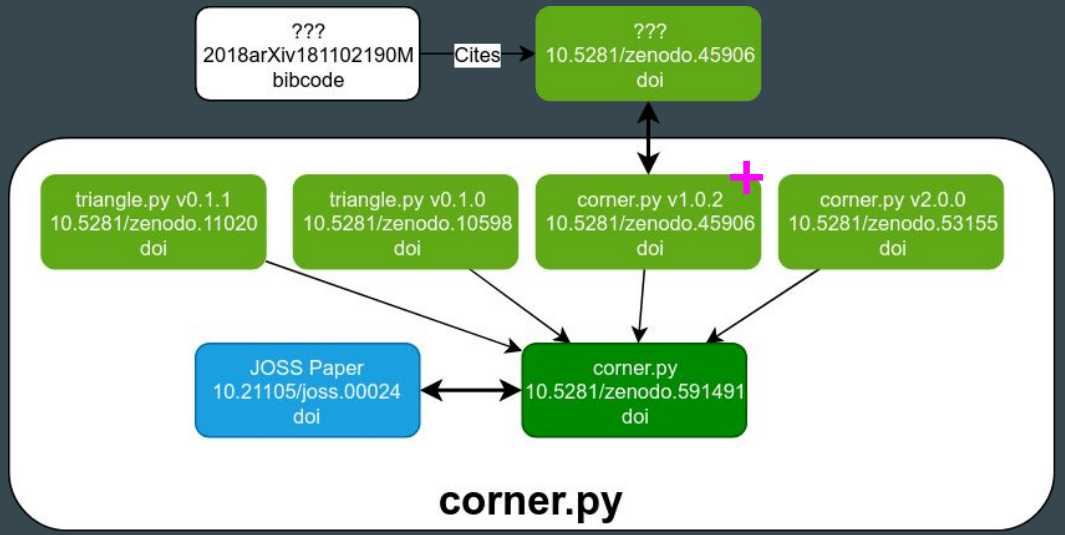

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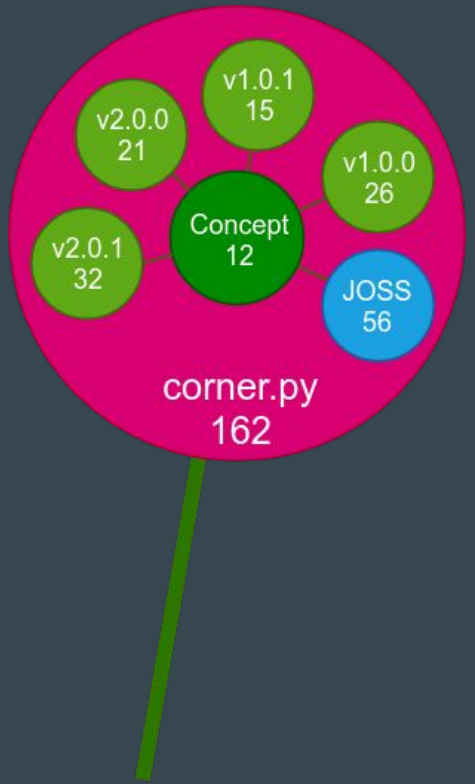

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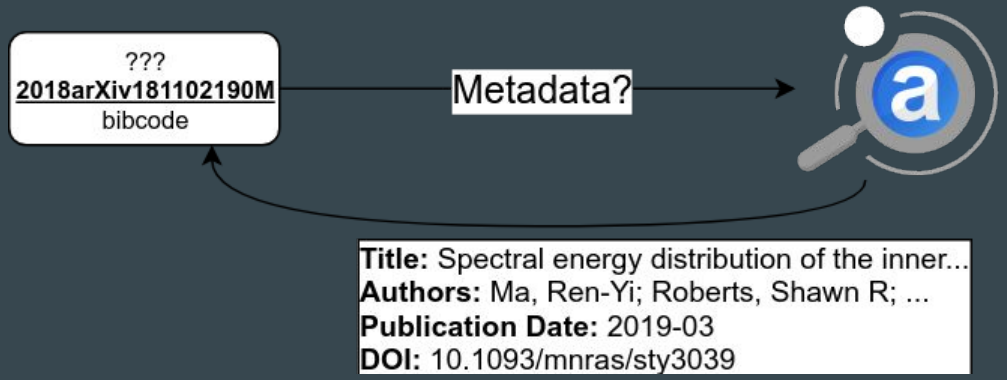

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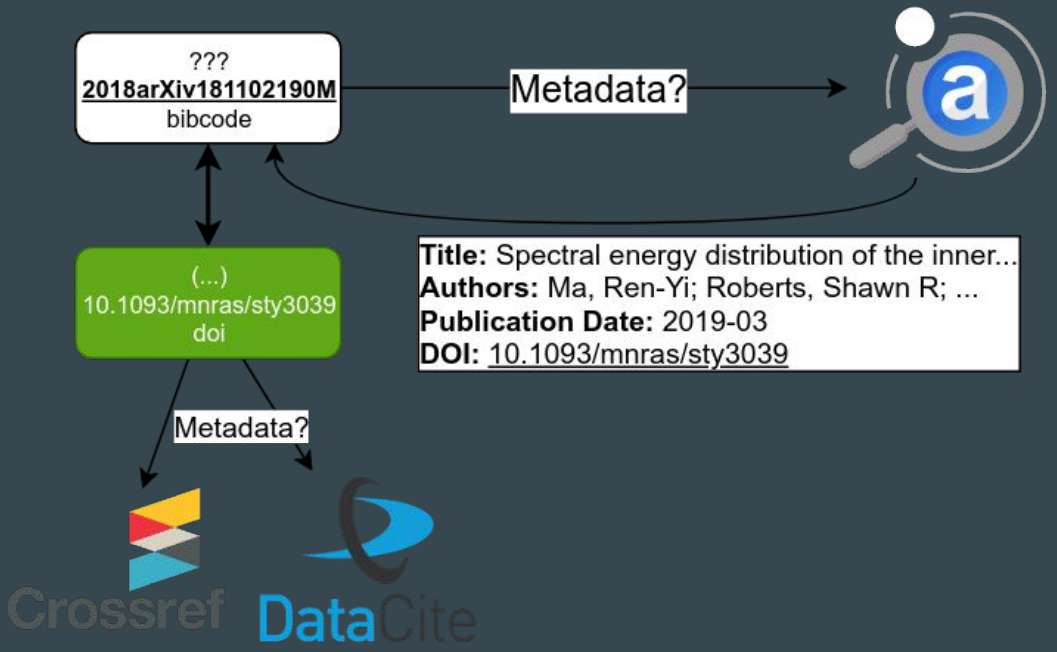

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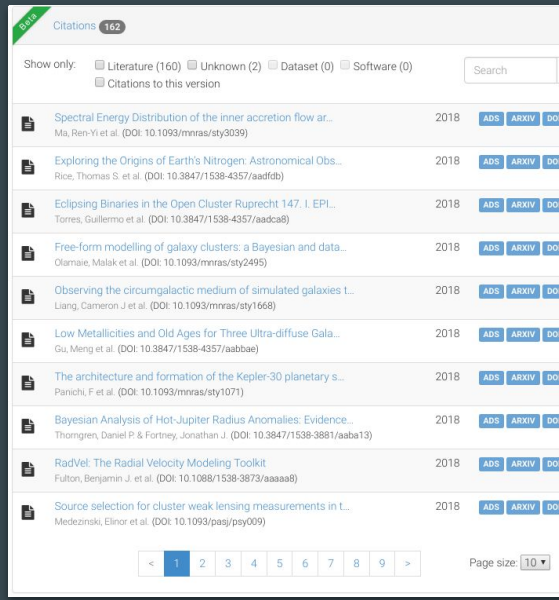
- **Expose a search REST API**
- Harvest other sources for citations

zenodo

```
GET /relationships?
  id=10.5281/zenodo.53155
  relation=isCitedBy
  group_by=version

[
  {<citation-1>},
  {<citation-2>},
  {<citation-3>},
  ...
]
```



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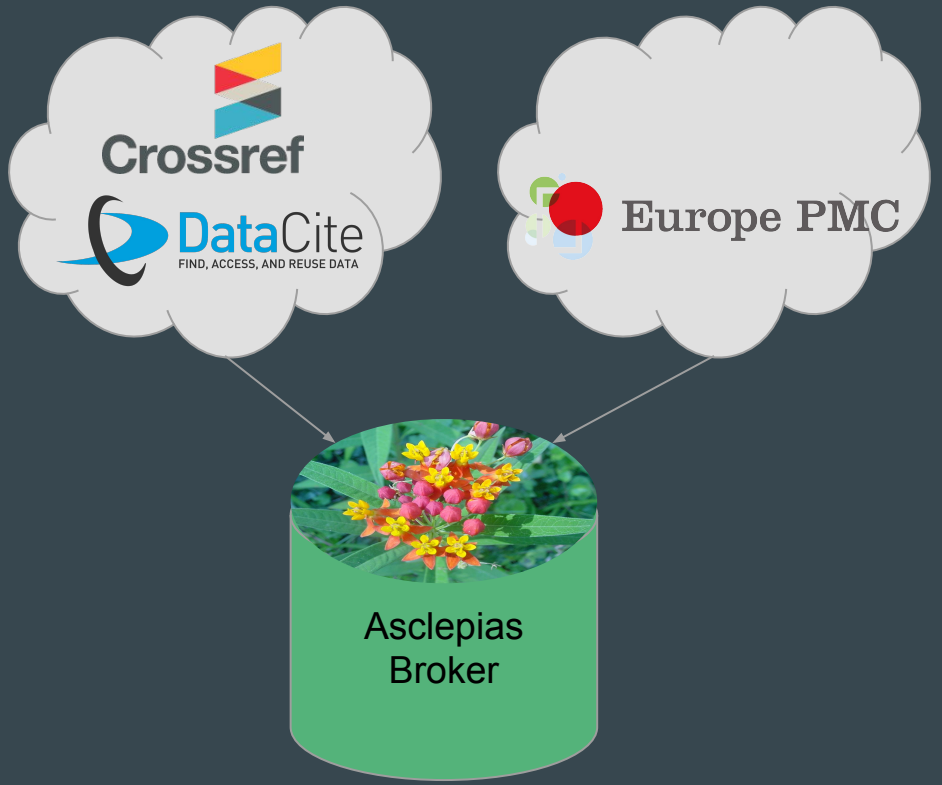
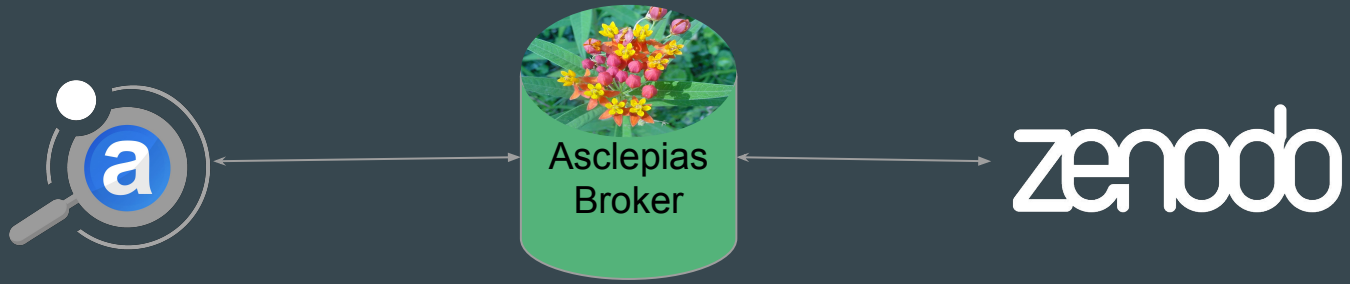
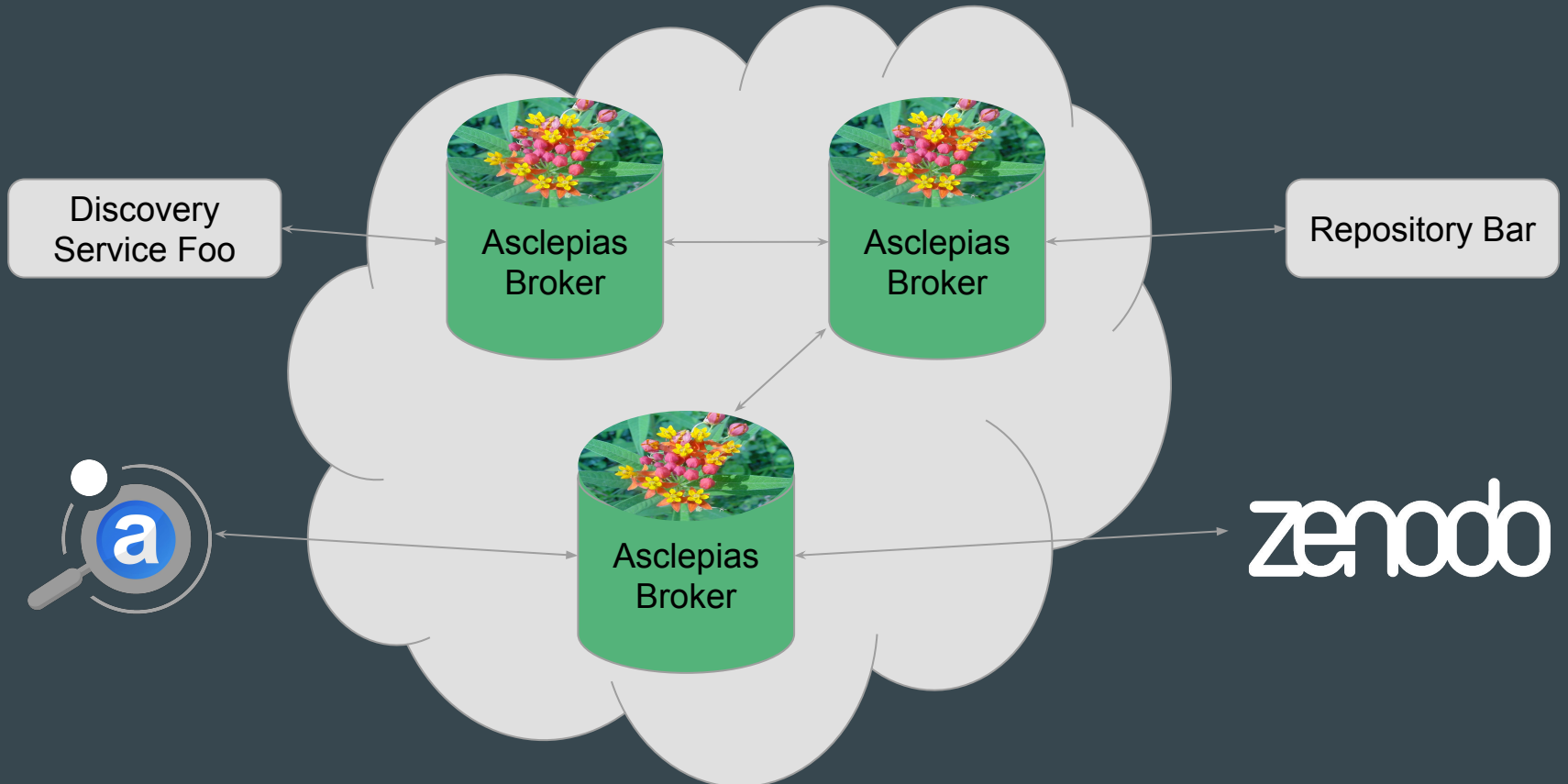


Current working setup

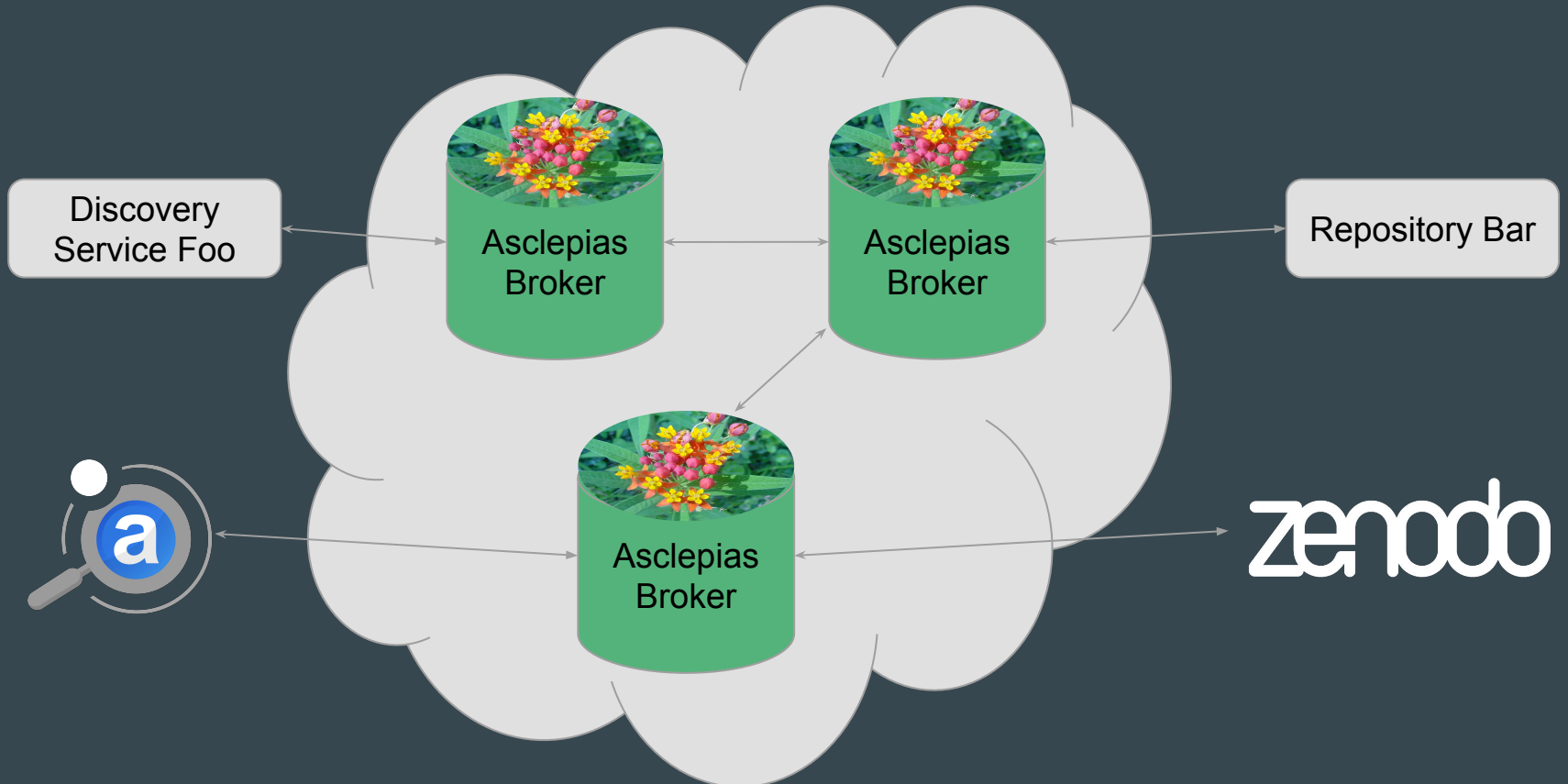


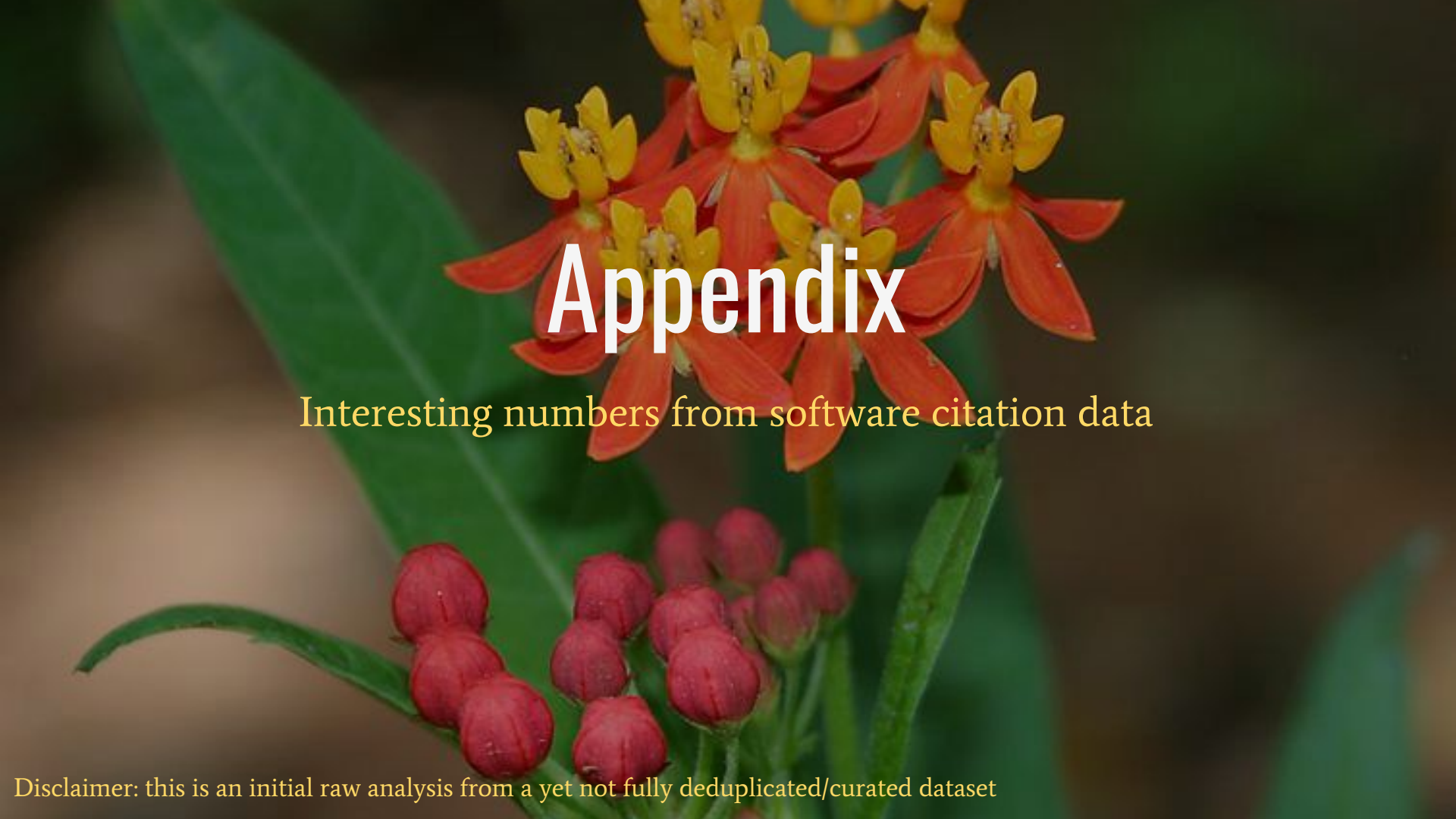
Expanding network



Expanding domains

Data citation in Physics or...



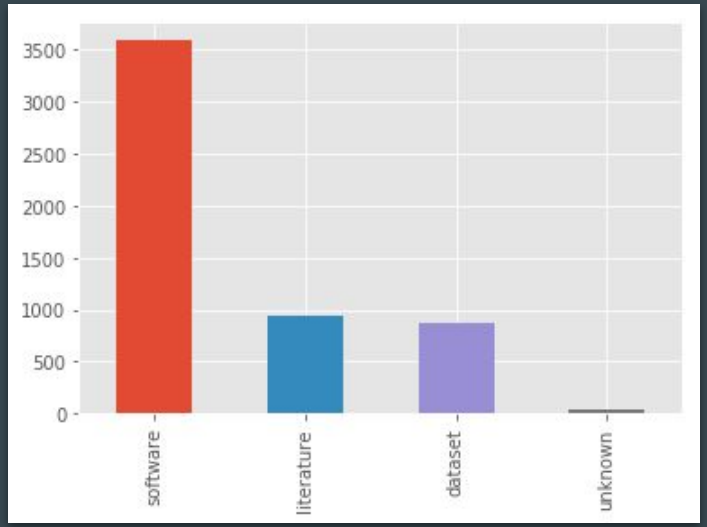


Appendix

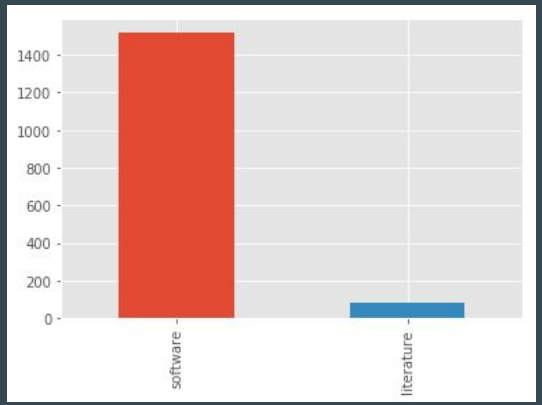
Interesting numbers from software citation data

Disclaimer: this is an initial raw analysis from a yet not fully deduplicated/curated dataset

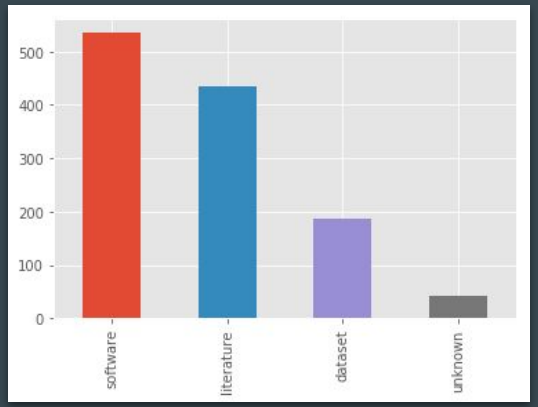
What is being cited on Zenodo?



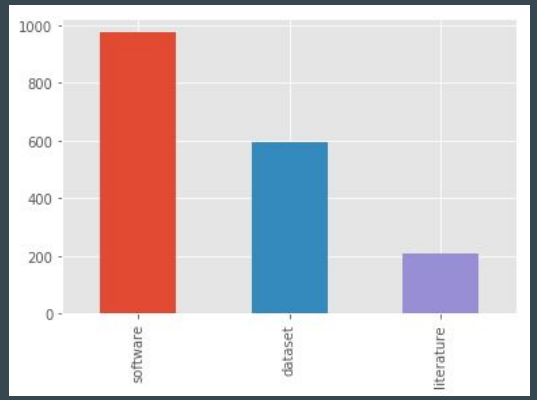
NASA ADS



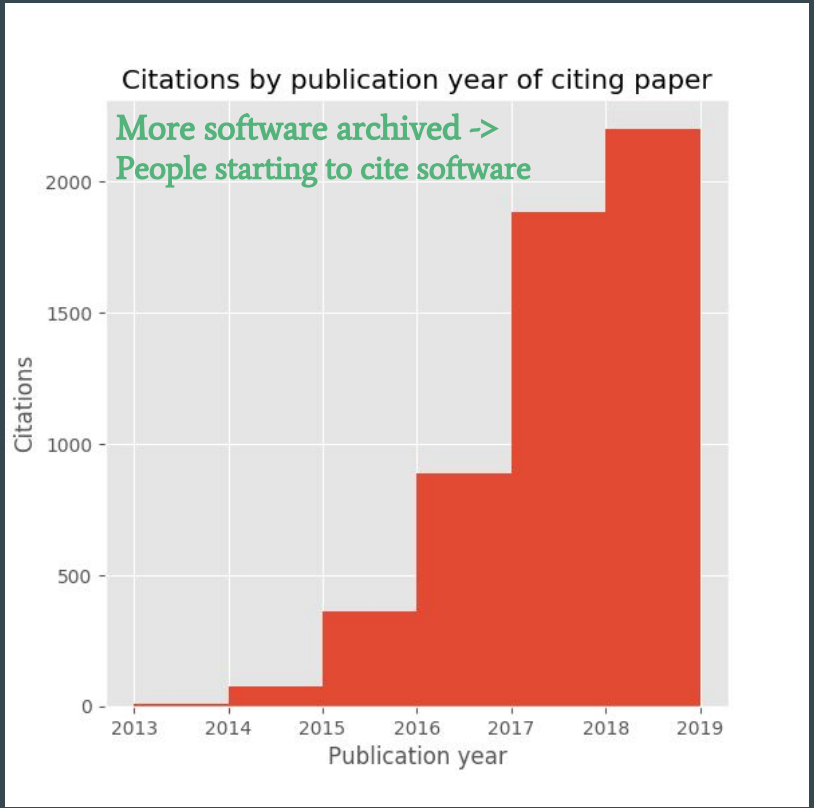
Crossref

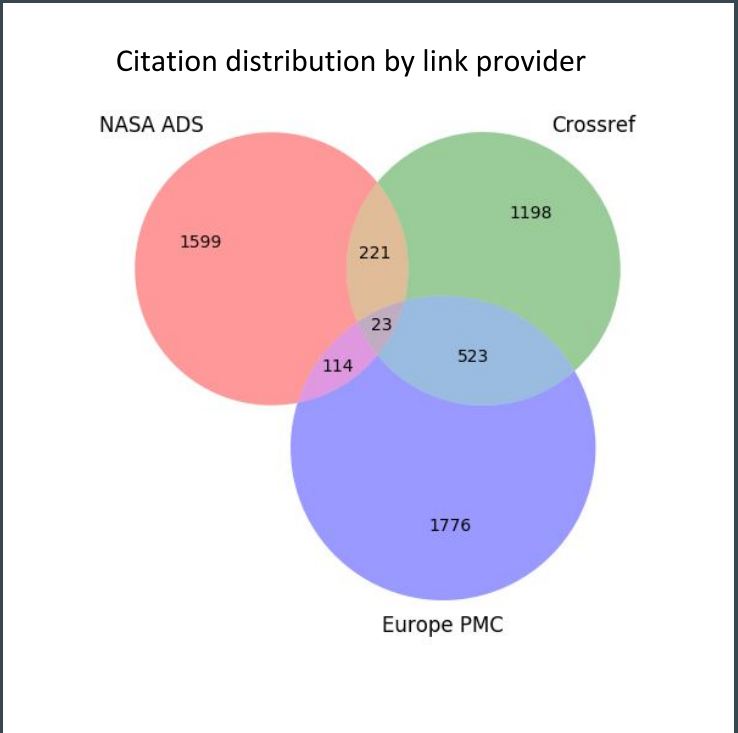


EuropePMC



Where do you find citations to Zenodo DOIs?

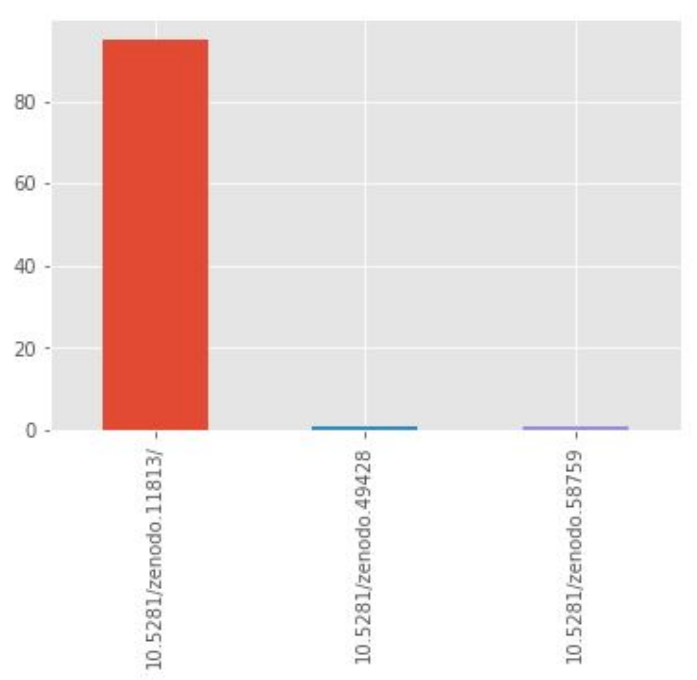


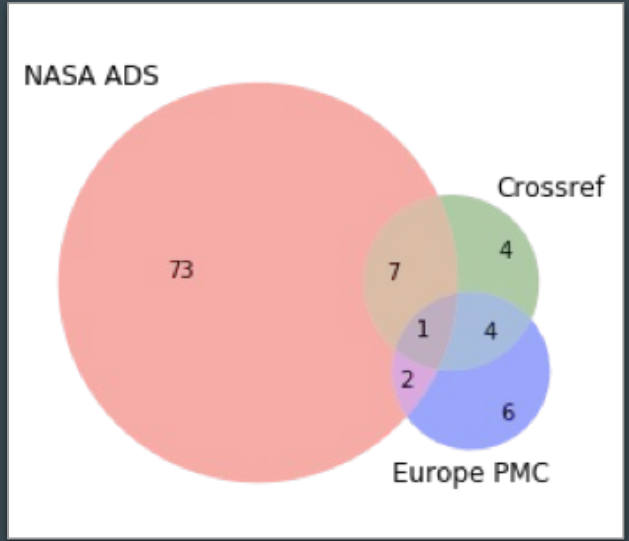


What is the impact of citation recommendations? (1/4)

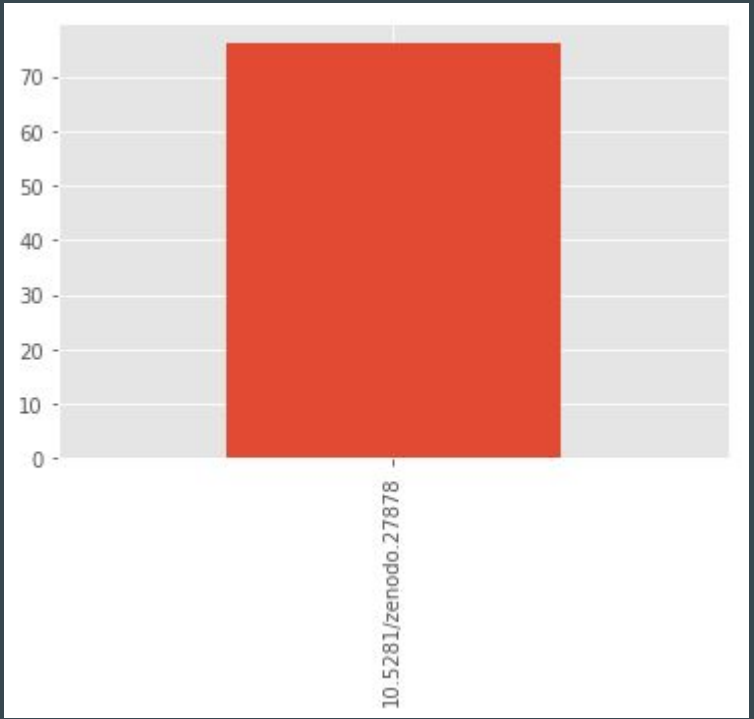
How should I cite LMFIT?

See https://dx.doi.org/10.5281/zenodo.11813





What is the impact of citation recommendations? (2/4)



Lasagne Citation (BibTeX)

Jan Schlüter edited this page on 16 Mar 2017 · 2 revisions

To cite Lasagne in your work, use the following BibTeX entry:

```
@misc{lasagne,
  author       = {Sander Dieleman and
                  Jan Schlüter and
                  Colin Raffel and
                  Eben Olson and
                  Søren Kaae Sønderby and
                  Daniel Nouri and
                  Daniel Maturana and
                  Martin Thoma and
                  Eric Battenberg and
                  Jack Kelly and
                  Jeffrey De Fauw and
                  Michael Heilman and
                  Diogo Moitinho de Almeida and
                  Brian McFee and
                  Hendrik Weideman and
                  Gábor Takács and
                  Peter de Rivaz and
                  Jon Crall and
                  Gregory Sanders and
                  Kashif Rasul and
                  Cong Liu and
                  Geoffrey French and
                  Jonas Degrave},
  title        = {Lasagne: First release.},
  month        = aug,
  year         = 2015,
  doi          = {10.5281/zenodo.27878},
  url          = {http://dx.doi.org/10.5281/zenodo.27878}
}
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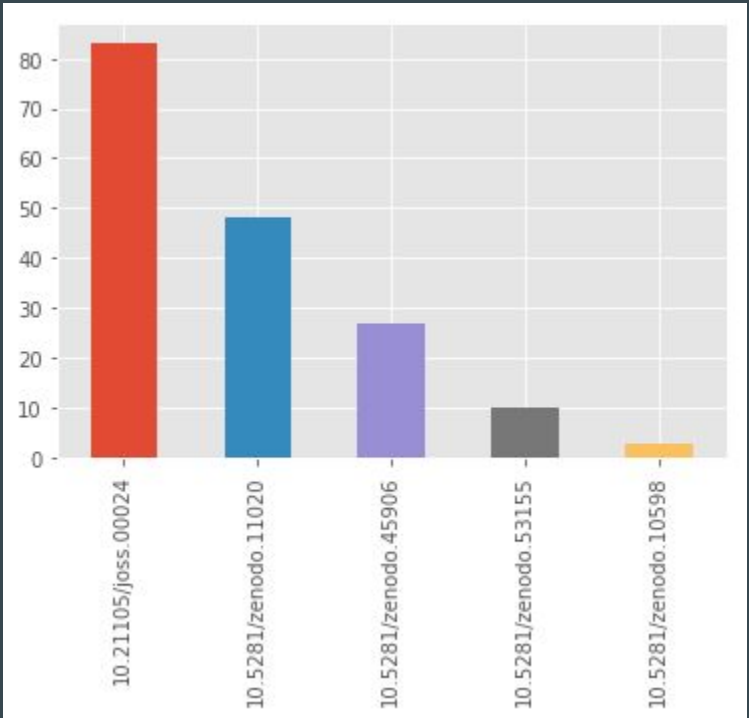
What is the impact of citation recommendations? (3/4)



build passing | coverage 87% | license BSD | DOI 10.5281/zenodo.53155

Documentation

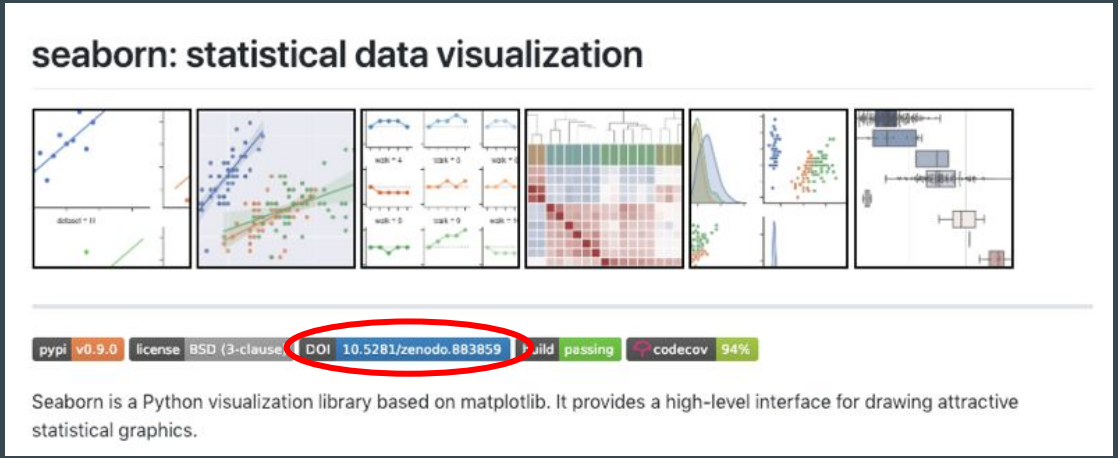
- Installation
  - Dependencies
  - Using pip
  - From source
  - Tests
- Getting started
- A note about sigmas
- Custom plotting
- Detailed API documentation

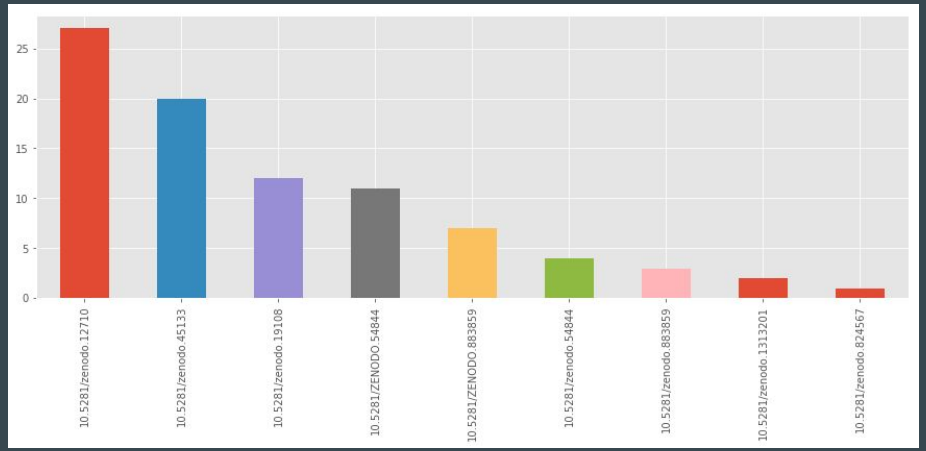
Attribution

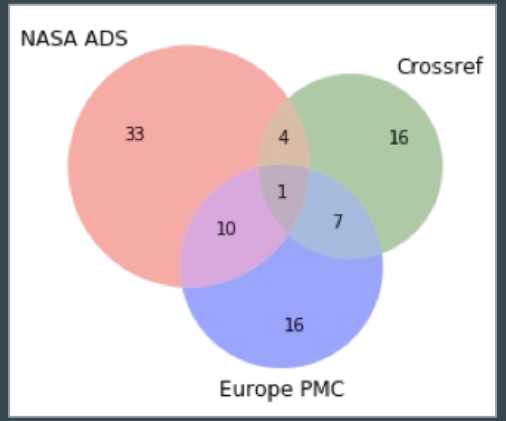
If you make use of this code, please cite the JOSS paper:

```
@article{corner,
    Author = {Daniel Foreman-Mackey},
    Doi = {10.21105/joss.00024},
    Title = {corner.py: Scatterplot matrices in Python},
    Journal = {The Journal of Open Source Software},
    Year = 2016,
    Volume = 24,
    Url = {http://dx.doi.org/10.5281/zenodo.45906}
}
```

What is the impact of citation recommendations? (4/4)







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