

Open Source Geospatial Research Software in 2024

Assessing service quality with technology readiness levels

Peter Löwe, Berlin Social Science Center (WZB Berlin)

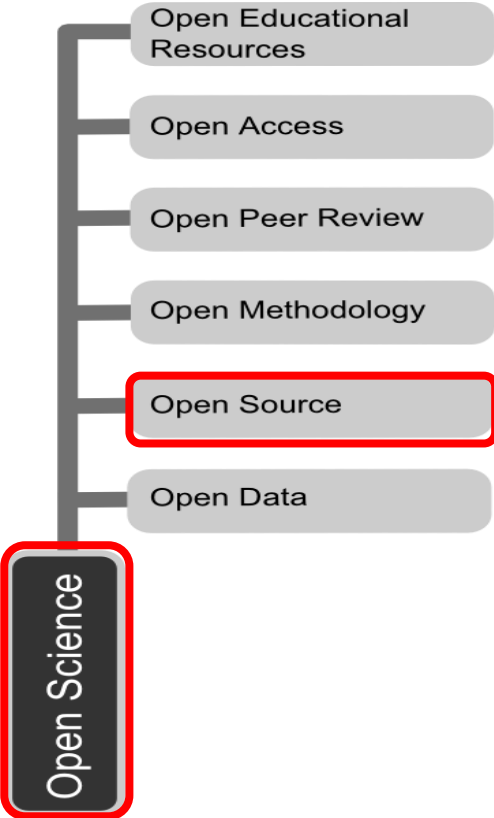
PICO | Friday, 19 Apr, 10:53–10:55 (CEST) PICO spot 4



Spoken Word

- Hello Everbody
- My name is Peter Löwe, I work for the Berlin Social Science Centre.
- Today I am reporting about the emerging practice of applied software citation for open source research software and due scientific credit.

Open Source is part of Open Science.



Spoken Word

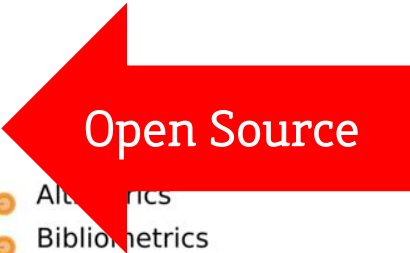
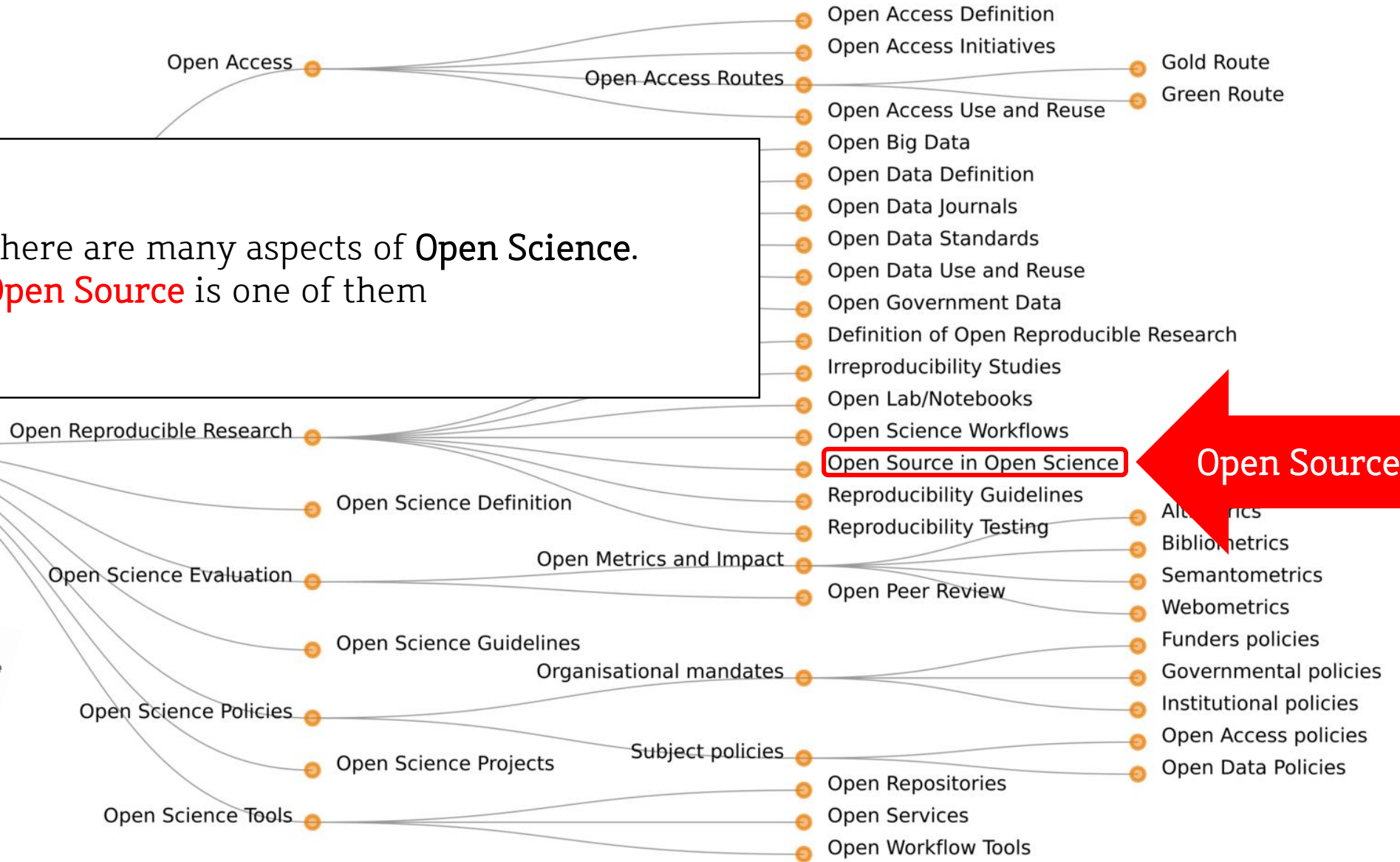
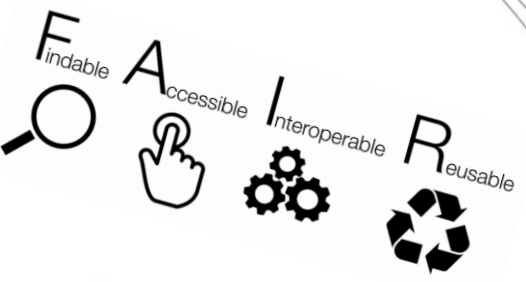
- SLIDE 1
- The current paradigm for science is open science.
- It rests on several pillars, one of them is open source, another is open access

Open Science has many aspects

- Open Educational Resources
- Open Access
- Open Peer Review
- Open Methodology
- Open Source**
- Open Data

Open Science

- There are many aspects of **Open Science**.
- **Open Source** is one of them



Spoken Word











- [SLIDE 2]



Digital Persistent Identifier (PID) 101

DOI and ORCID are machine actionable: e.g. Webrowsers „eat them“, so do databases

Flavours of Digital Object Identifiers   DOI 10.5281/zenodo.10927988

-   Publications (journal articles, books)
-   Data
-   Software
-   Concept (Software project name)
-   Version (a software release)



Open Researcher and Collaborator ID 
 People  <https://orcid.org/0000-0003-2257-0517> ← my own ORCID!

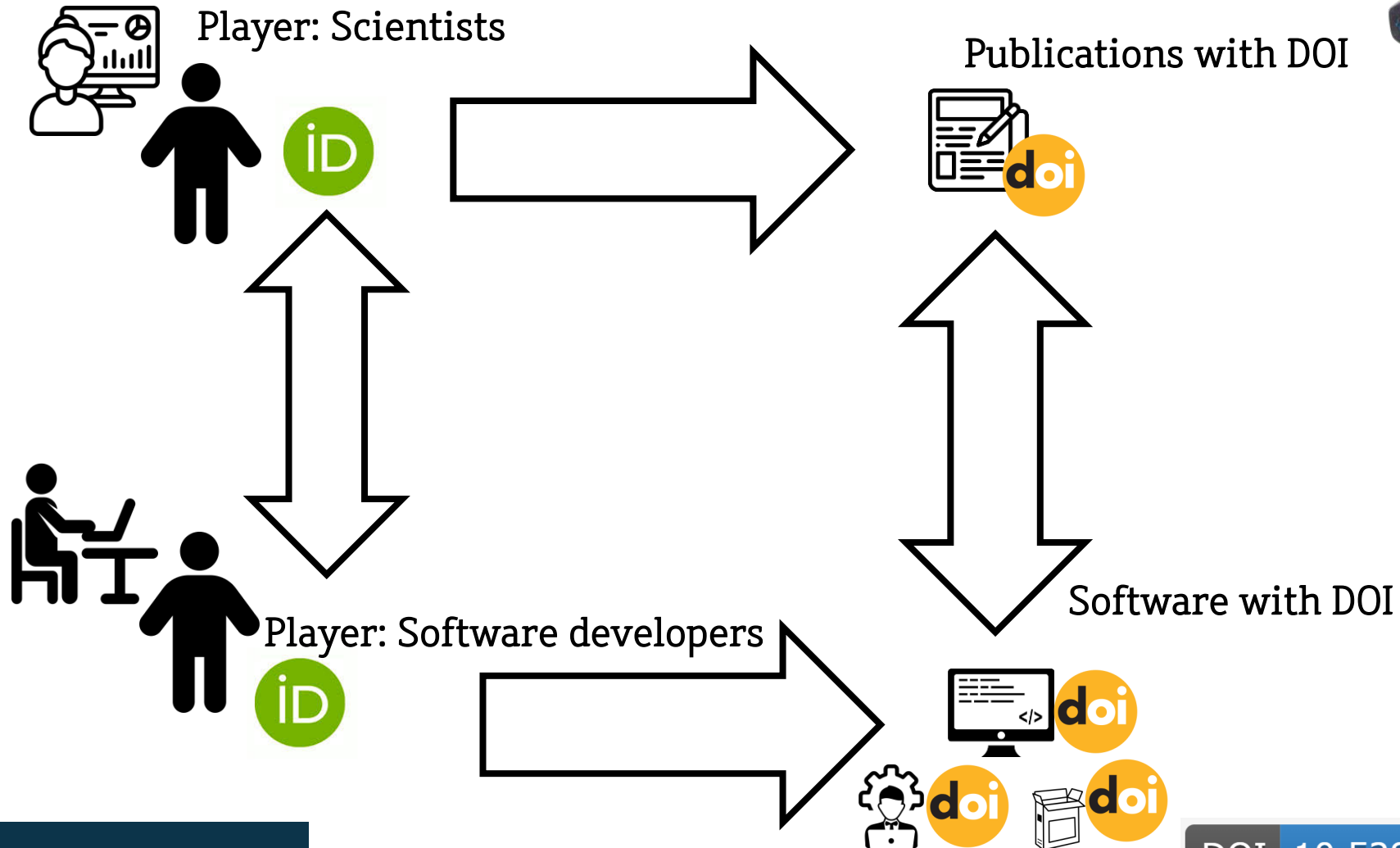
WZB

Spoken Word

SLIDE 3

- Digital persistent identifiers are key enablers for Open Science, such as
- DOI identifiers, can be applied to both publications and software, and also
- ORCID Identifiers for individual persons.

Open Source in Open Science: Players and game tokens



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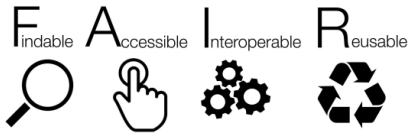
DOI 10.5281/zenodo.10927988

Spoken Word

SLIDE 4

The citation of research software can be understood as a social game, with scientists and software developers as separate teams, using ORCID and DOI as game tokens.

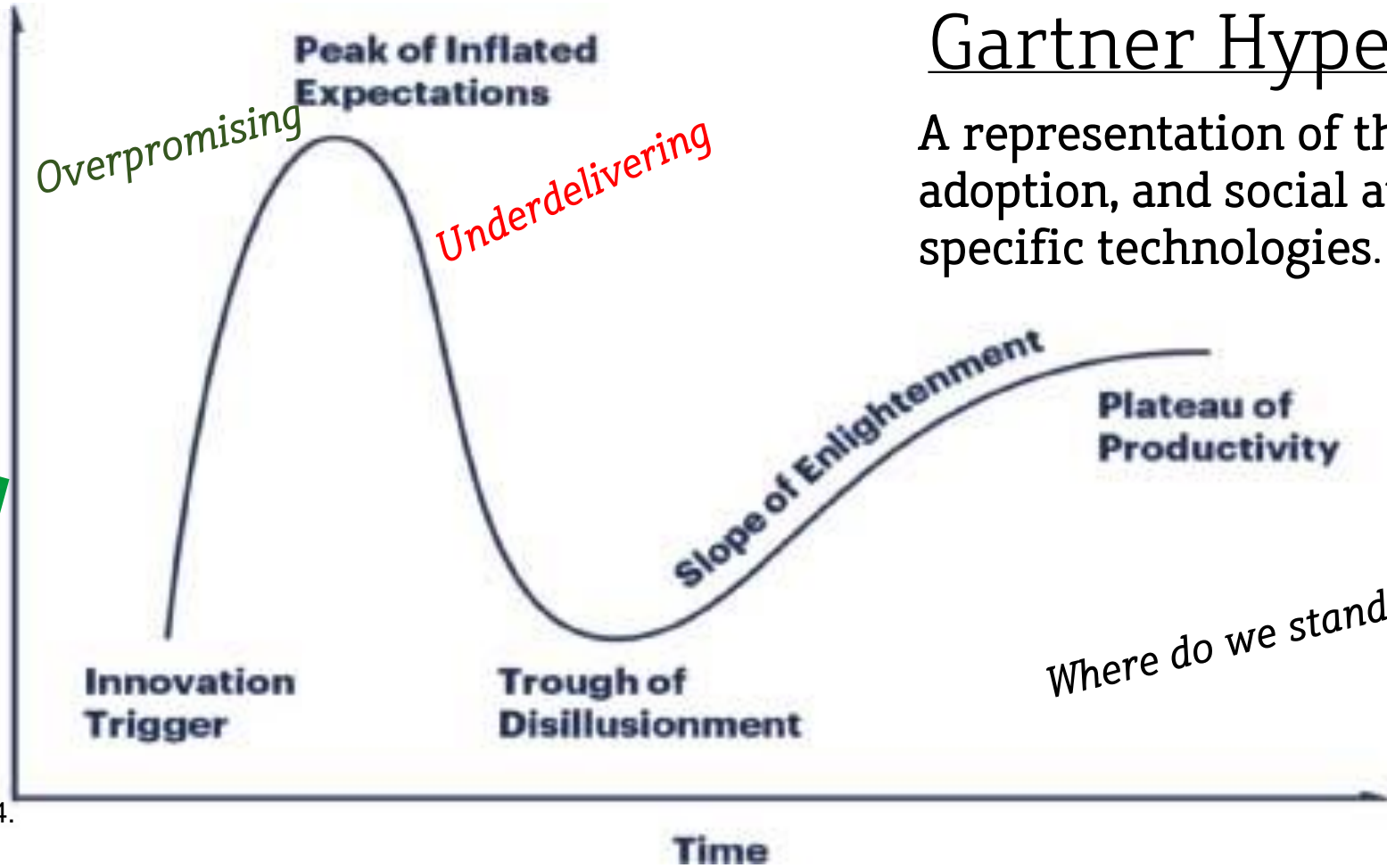
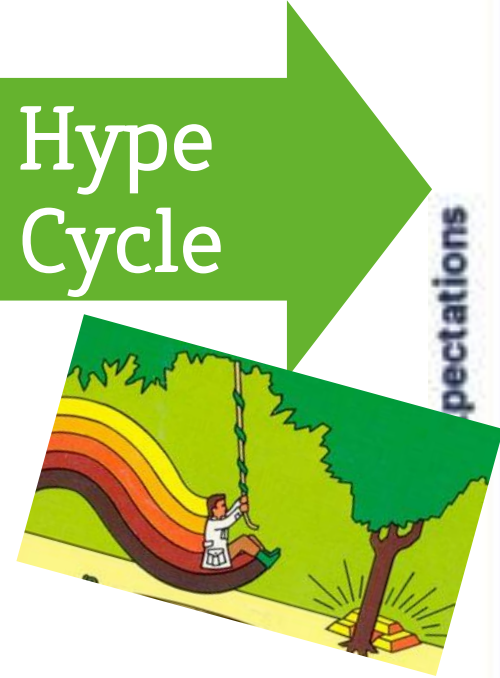
To understand, how this software citation game currently works, technology management concepts, namely the Gartner Hype Cycle and Technology Readiness Levels were applied.



Open Source in Open Science

Mastering the game

Open Source in Open Science



Gartner Hype Cycle

A representation of the maturity, adoption, and social application of specific technologies.

Spoken Word

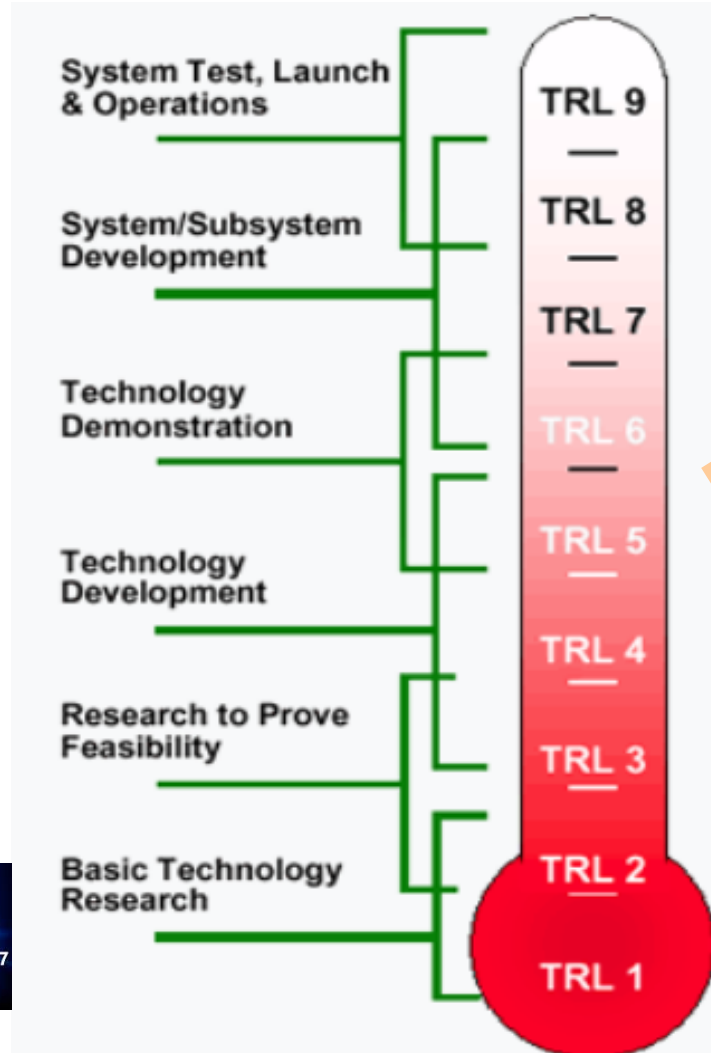
- [SLIDE 5]

Service Quality Technology Readiness Levels (TRL)

Technology Readiness Levels (TRL)

TRLs are method for estimating the maturity of technologies during the acquisition phase of a program.

TRLs enable consistent and uniform discussions of technical maturity across different types of technology.



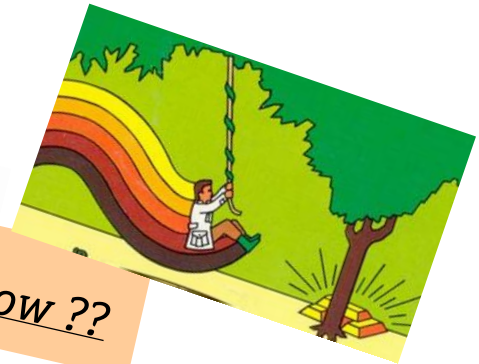
Moon landing accomplished

Open Source in Open Science



Open Source in Open Science

? Where do we stand now ??



J. F. Kennedy
„Moonshot“ -idea

Open Source in Open Science

Gaming begins

Spoken Word

- [SLIDE 6]



Open Source in Open Science

Game Levels and Missions

Level 1

Level 2

Overview

Level 1

World building

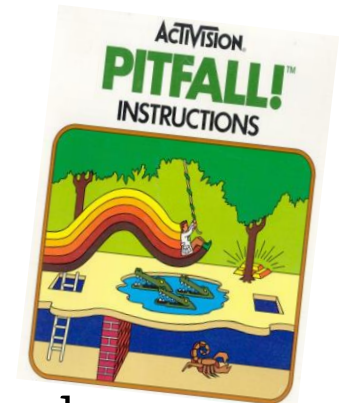


- Develop basic infrastructure skills
- Implement basic building blocks
- Create a critical mass for Level 2

Level 2

Exploration

- Explore the maze
- Chart the maze
- Identify and remove roadblocks



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Spoken Word

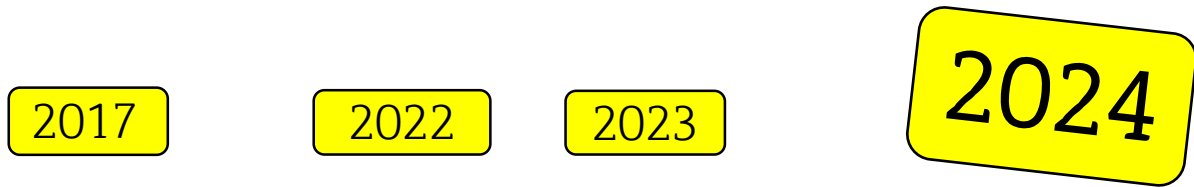
SLIDE 7

Software citation can be understood as a two stage multiplayer game, where both game levels are interlinked.

When did the game start ? Where are we now ?

Level 1

Level 2



World building

Level 1

rasdaman
raster data manager

DOI 10.5281/zenodo.11



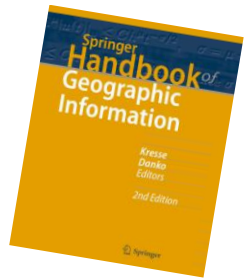
2017

Hype Cycle Level 1



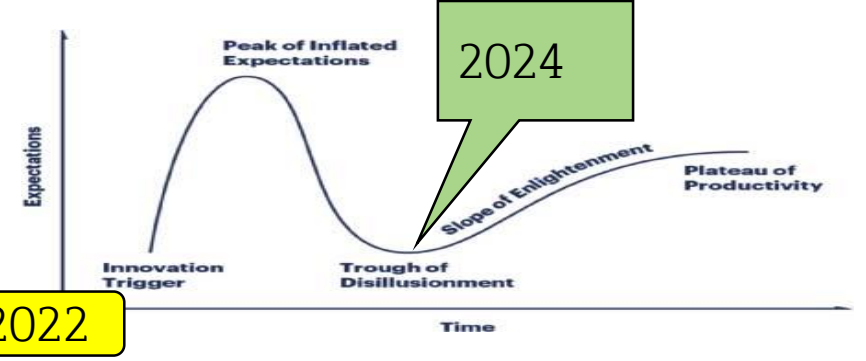
Exploration

Level 2



2022

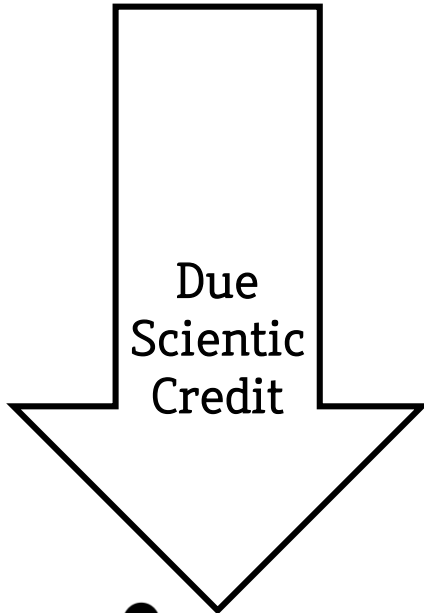
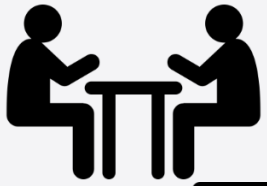
Hype Cycle Level 2



Spoken Word

- [SLIDE 8]

Two kinds of players: Status 2024



Active players



106 Persons

71 authors

16 authors

5 authors



-> 16 publications

-> 5 publications

-> 2 publication

All other projects: Springer Handbook: Open Source GIS Chapter: 14 authors

Passive players



405 Persons

- All software project teams playing level 1
- And their team members

Persons can play both as passive and active players !



Spoken Word

[Slide 10]

Spoken Word

SLIDE 9

A test group of over 20 software projects, was monitored for two years, based on records from the CrossRef database to map out the current state of the game.

Level 2

HIGH
SCORE

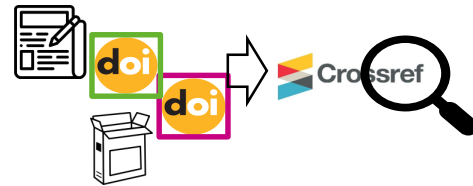


Publication Top Scores

(thanks to the active players / authors !)

Approach:

Query CrossRef for Software DOI, locate related publication DOI, analyse metadata



1



16 publications by 71 authors -> credit for 101 developers

2



5 publications by 16 authors -> credit for 41 developers

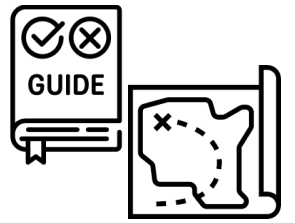
3



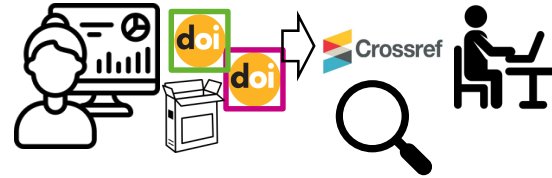
2 publication by 5 authors -> credit for 149 developers

Compiling Publishers and Journals

Navigation Charts for Publication Planning



- Results from publication analysis



- „Greenlist“ of journals with proven software citation by DOI

- „Whitelist“ of journals with similar practices as greenlisted journals

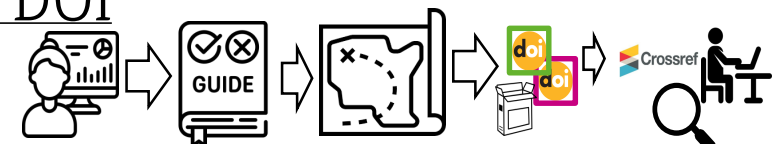


- „Greylist“ of journals, where software DOI references are not honored yet



„It does not work (yet)“

- Guided by this, scientists can plot „paths to success“ for strategic publications in journals which honor software DOI citation



Spoken Word

Slide 11

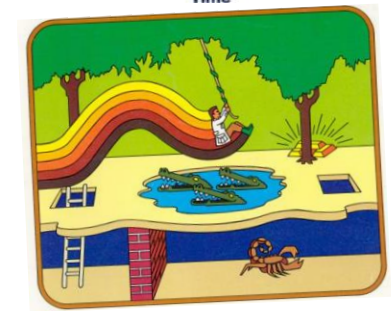
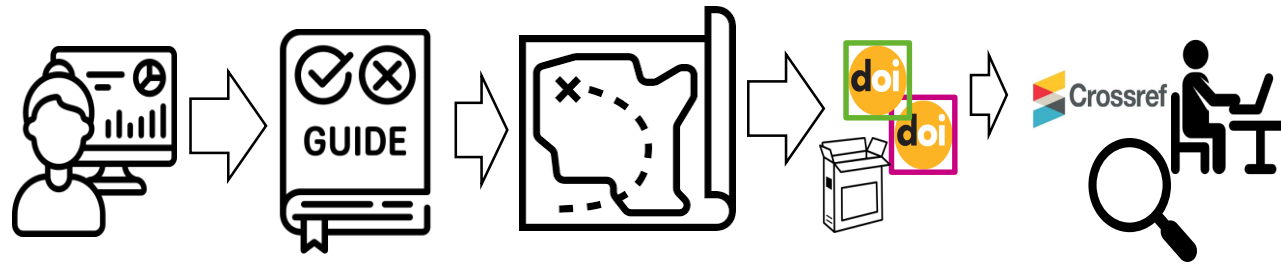
Based on this, guidance information for prospective authors was compiled. This is work in progress and incomplete.

The preliminary results show three groups of Journals and Publishers.

One group, where DOI-based software citation is fully implemented by today's standards, with correct references in the CrossRef database.

A second group, where similar results can be expected, due to identical publication standards as in the first group.

A third group of Journals and Publishers was identified by trial and error, where software citation can be practiced, but does not yet result in due credit



<https://de.slideshare.net/ivansanchezortega/another-game-of-chess-professor-falke>

Spoken Word

Slide 12

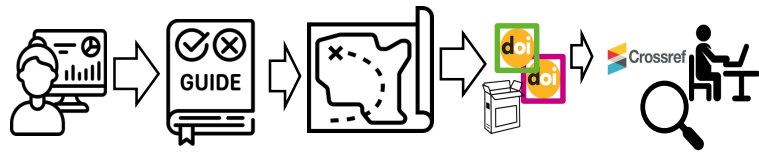
This information can be used by prospective authors as indicators to plan their publications in regard to software citation.

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Berlin Social Science Center

Thank you for your attention

May you play well



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Peter Löwe

 <https://orcid.org/0000-0003-2257-0517>

