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Schrödinger's Code: A Preliminary Study on Research Source Code Availability and Link Persistence in Astrophysics

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Abstract: How available is the software that enables astrophysics research? How persistent are links that scientists include in their research articles? We set out to answer these questions by examining a sample of astrophysics research articles published in 2015, looking through the papers for software, and categorizing it as to its availability. We also extracted hyperlinks from 1669 research articles published in 2015 by one journal, discarded those generally added by the publishing process, and tested the remaining links to see how many worked two years after the papers were published. We were pleasantly surprised to learn that 58% of the 285 unique codes discovered in papers were available, and distressed to find that only two years after publication, at best 90% of the hyperlinks we tested still worked. This talk will discuss our findings and subsequent work and its relevance to scientific software availability.

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Software is the most used instrument in astronomy

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"… anything less than release of actual source code is an indefensible approach for any scientific results that depend on computation..."

Ince, Hatton, & Graham-Cumming, *The case for open computer programs*, Nature, v. 482, Feb. 23, 2012

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Schrödinger's Code

It's not until you open the box that you know whether the code is alive or dead.

We opened the box…

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Schrödinger's Code

The good news: 58% were alive!

The rest…

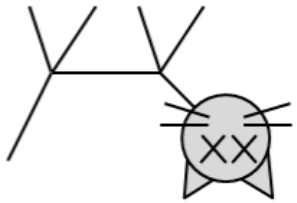

Image credits: tisKapot, Peter Kaptein, Olivia Cales

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Looking for software

Papers examined for software use	166
Individual software “instances”	715
Identifiable software “instances”	418
Unique codes	285
Source code readily available	58%

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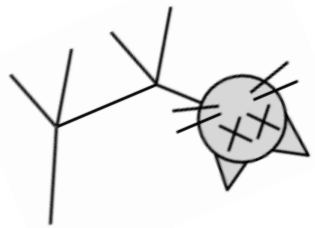
Two problems!

Only ***418*** of the 715 were identifiable

Source code was not available for ***40%*** of the software used



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Hyperlinks testing

Tested 2558 http(s) and ftp: protocol links extracted from 2015 papers

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Another problem!

11% of all links were unreachable

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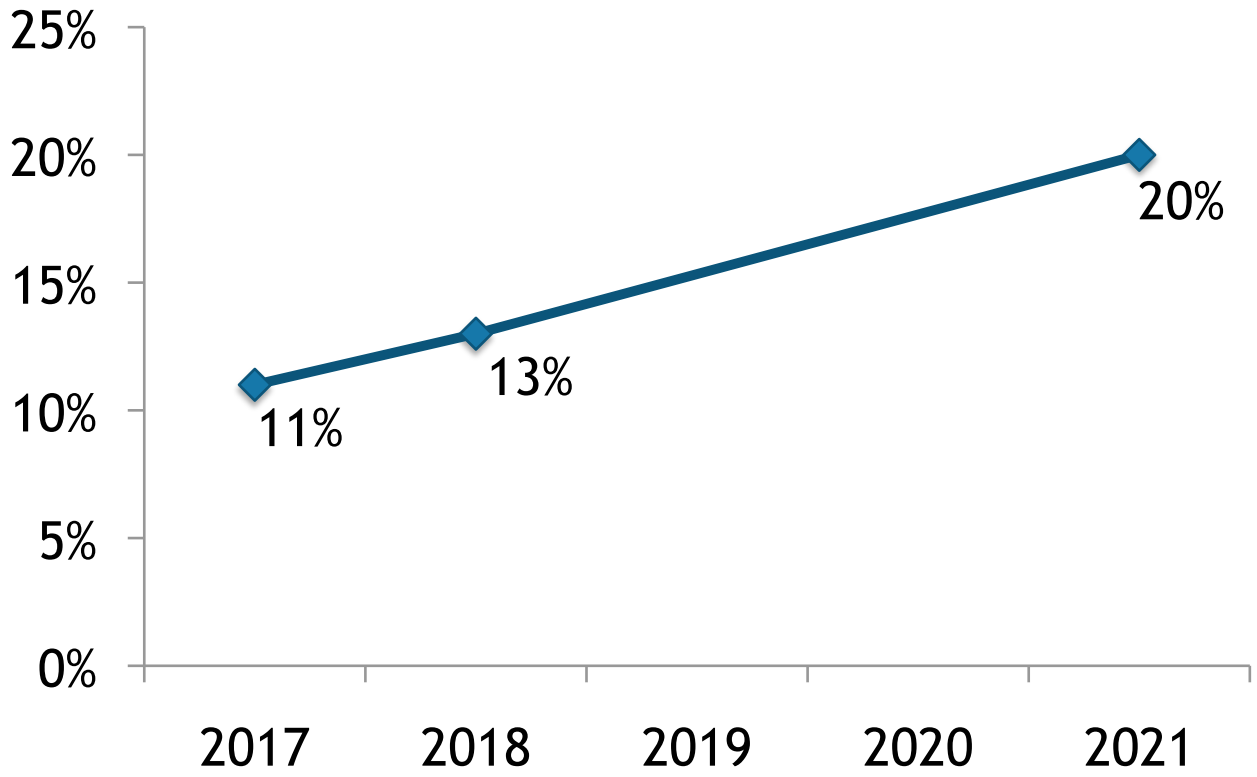
Percentage of links failing



Data and code available at github.com/teuben/ascl-tools

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Source code availability in other disciplines…

Collberg *et al* (2014)	***56%***
Howison & Bullard (2016)	***24-40%***

Hyperlink rot…

Mangul *et al* (2018)	***24%***

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What will help/is helping?

Rewarding the effort involved

Training

Leadership from mentors, advisors, & referees

Changes in journal practices

Better support through technology

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Resources

List o’ links

Check the ASCL blog for resources

https://ascl.net/wordpress/

Thank you!