DAVID L HART
dhart@ucar.edu • 0000-0001-6393-0967
NSF NCAR Computational & Information Systems Lab

PIDs and NSF Computational Resources

Facility, Instrument, or Platform?

SEPTEMBER 23, 2025

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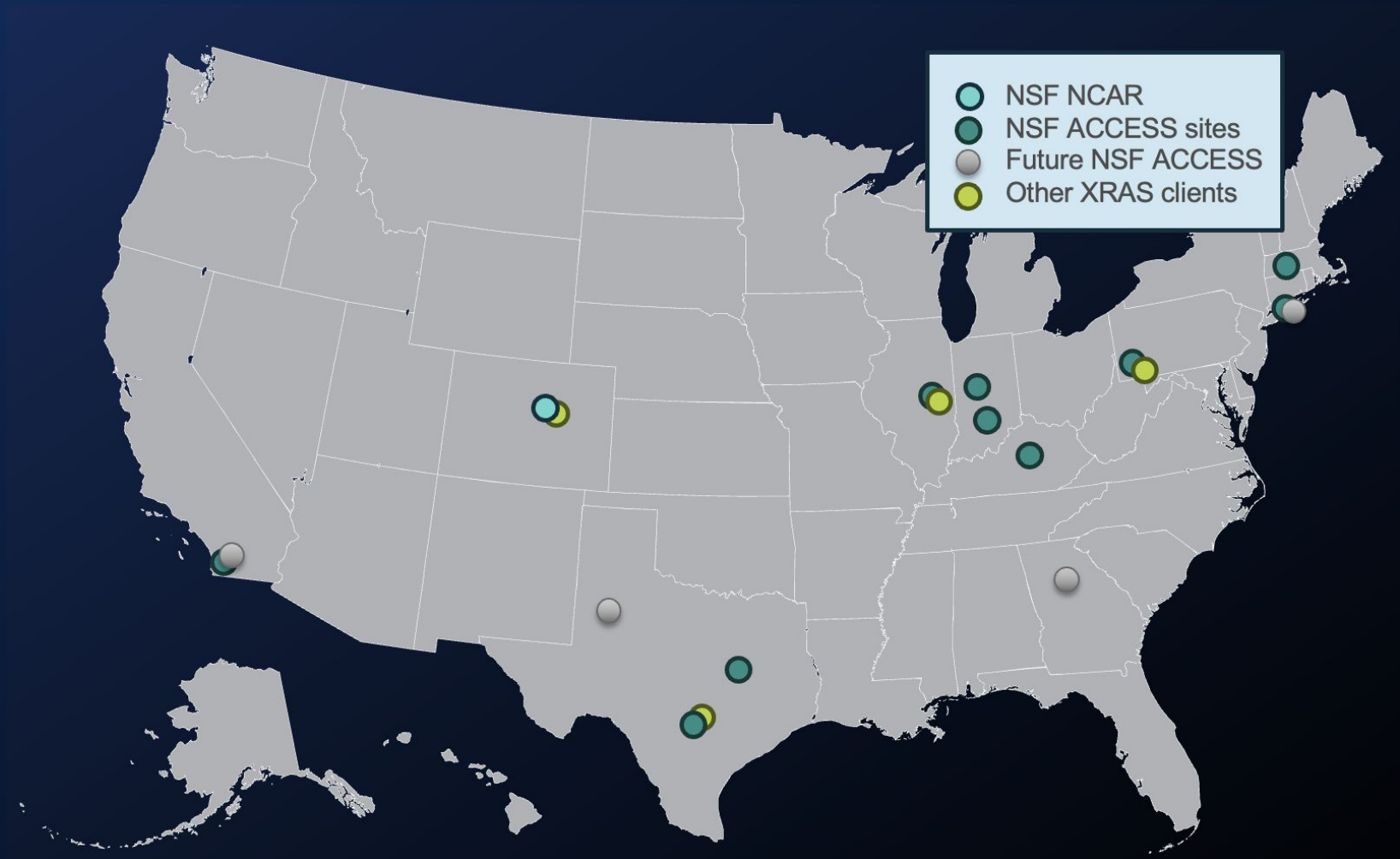
Me and the NSF-funded computing ecosystem

NSF funds large-scale computing resources at NSF NCAR (via GEO) and at 12+ sites integrated through the NSF ACCESS program (via CISE).

I have managed allocations on NSF NCAR's HPC resources and am co-PI for the NSF ACCESS Allocations service. (And the prior XSEDE program.)

The XRAS platform, operated by NSF ACCESS Allocations, supports allocation processes for NSF ACCESS, NSF NCAR, NSF's LCCF, and other sites, including **instrumentation from the NSF Lower Atmosphere Observing Facilities** managed by NSF NCAR's Earth Observing Lab.

The XRAS platform also supports the allocations process for the National AI Research Resource (NAIRR) Pilot.

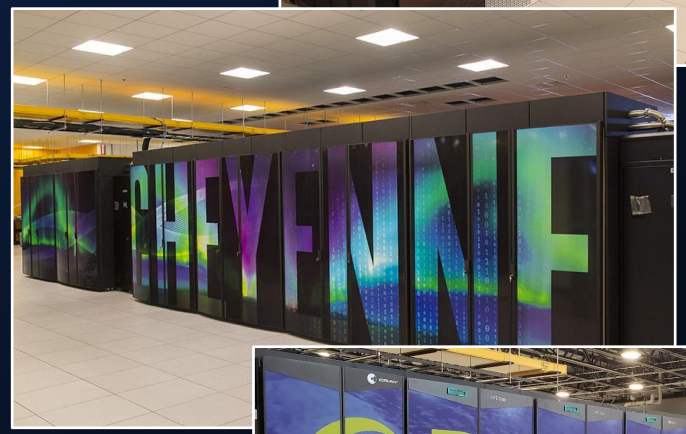


Why PIDs for computational resources?

- Impact, impact, impact
- Current best metric for reporting impact is science outputs—not system use
- Tracking outputs is complicated, since computational resources are “loosely” connected to published works
  - *“loosely” = acknowledged, not cited*
- PIDs are another tool in the impact-tracking toolbox

Resource PIDs at NSF NCAR — since 2012

- **Yellowstone** (2012 – 2017) —**ark:/85065/d7wd3xhc**
  - 824 results in Google Scholar (137 pubs / year)
- **Cheyenne** (2017 – 2023) — **doi:10.5065/D6RX99HX**
  - 1,030 results in Google Scholar (147 pubs / year)
- **Derecho** (2023 – present) — **doi:10.5065/qx9a-pg09**
  - 71 results in Google Scholar to date
- **Casper** (2017 – present) — **https://ncar.pub/casper**
  - *Informal "cheat PID" here*
  - *Only recently added the URL — at a user's request*
  - 27 results in Google Scholar to date



Our acknowledgments page provides recommended acknowledgments language as well as a citation format option. (Acknowledgments are far more common.)

Other related efforts from NSF programs

- NSF XSEDE and ACCESS programs both published articles with the goal of having those papers cited in publications that used XSEDE or ACCESS resources.
- **XSEDE** (10.1109/MCSE.2014.80)
  - **2,849** cites in papers since 2014
  - **BUT:** More than **14,800** publications reported by users from Sep. 2016 – Aug. 2022
- **ACCESS** (10.1145/3569951.3597559)
  - **202** cites in papers since 2023
  - **BUT:** More than **3,200** publications reported by users since Apr. 2023

Pros & cons of our HPC PID efforts (IMO)

PROS

- Easy to create PID — just a bit of metadata
  - ***Much*** easier than getting a paper published
- Publication tracking is unambiguous and low effort
- Other downstream uses *(next slide)*
- Can't hurt, right?

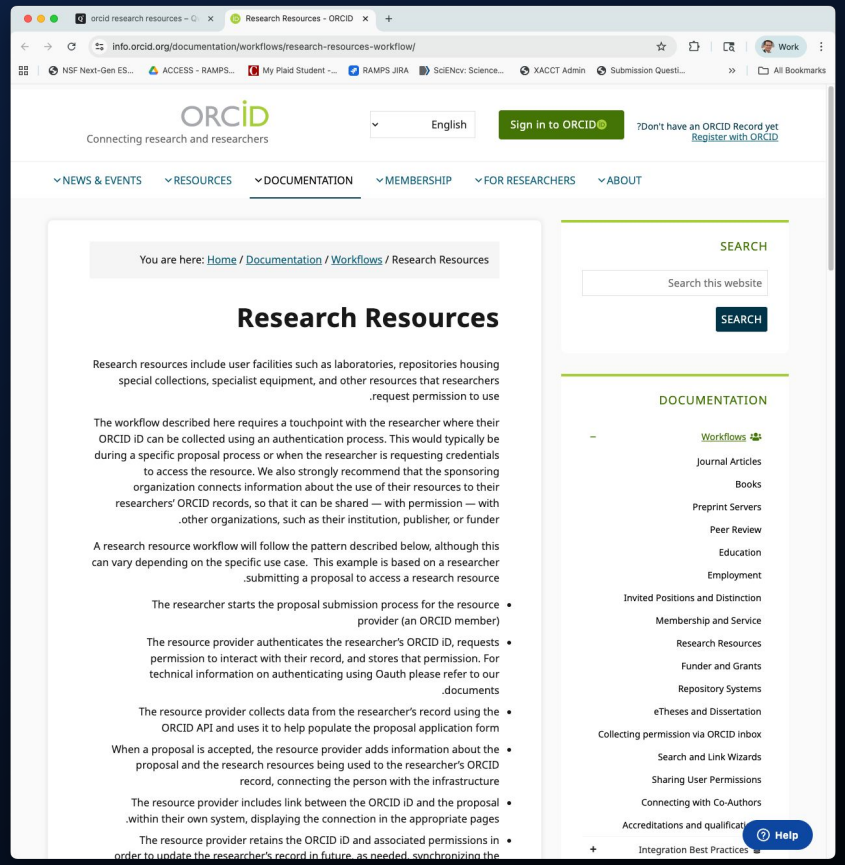
CONS

- Really just useful as a unique text string
- Incomplete publication tracking
  - CISL annual publication surveys have averaged **633** works reported per year since 2012, including peer-reviewed works, dissertations and theses, and other works (reports, conference contributions, etc.)
- Does require (in theory) a "permanent" reference
  - CISL Supercomputing History *www.cisl.ucar.edu/ncar-supercomputing-history*
  - Long-term maintenance for a ~5-year resource lifetime

David Hart, Melissa Rishel, and Doug Nychka. 2016. ***Estimating the Accuracy of User Surveys for Assessing the Impact of HPC Systems.*** *In Proceedings of XSEDE16. Association for Computing Machinery, New York, NY, USA. https://doi.org/10.1145/2949550.2949583*

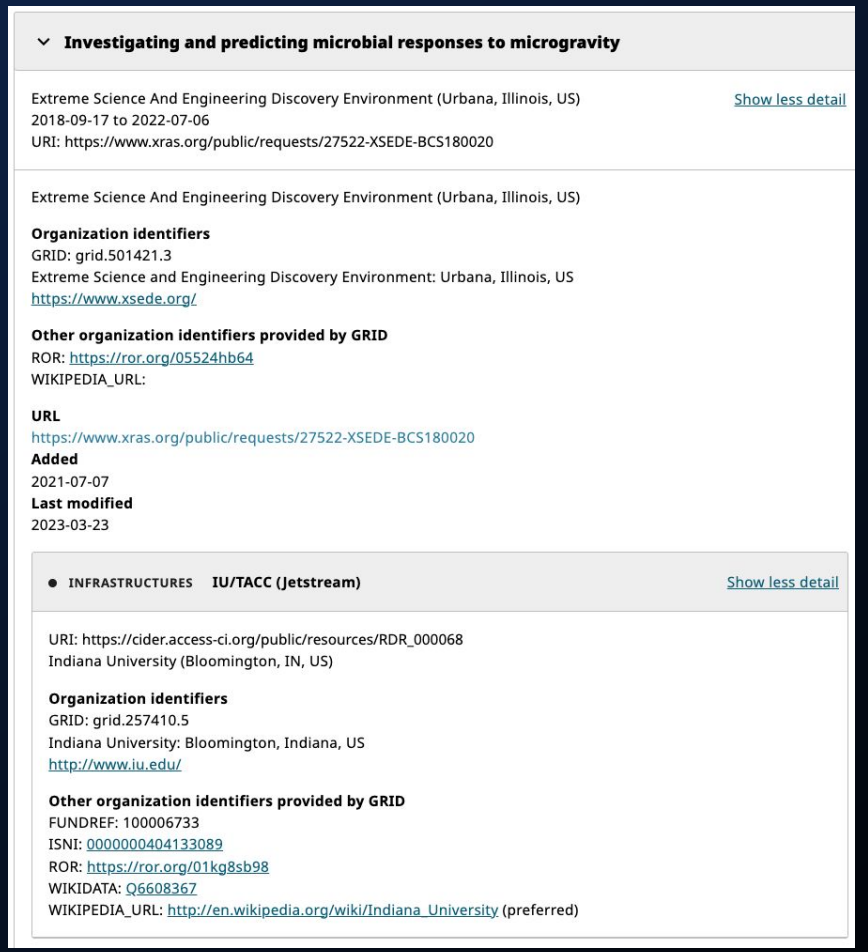
ORCID and Research Resources

- Supercomputer PIDs get more interesting in the context of ORCID profiles
- I first engaged with ORCID during the pilot phase for Research Resources in 2018
  - Asked for the metadata to accommodate the case when the resource allocation entity (e.g. XSEDE, ACCESS) is different from the resource operation entity (e.g., PSC, SDSC, TACC)
- For XSEDE, ACCESS, and resource providers like NSF NCAR, Research Resources made ORCID highly relevant—in theory



PIDs in ORCID Research Resources

- **PIDs *everywhere!***
- Allocating organization (ROR or Ringgold) — including virtual organizations
  - XSEDE: grid.501421.3 (ror.org/05524hb64)
  - ACCESS: ror.org/01v6d0b34
- Resource Provider organization (ROR or Ringgold)
  - E.g., Indiana University: grid.257410.5 (now ror.org/01kg8sb98)
- Resource identifier (URI or other PID)
  - E.g. Jetstream cloud (cider.access-ci.org/public/resources/RDR_000068)
  - Our CIDeR system can create a resource ID (URI) or allow Resource Provider to provide a PID (DOI)
- Project identifier
  - For ACCESS and XSEDE, a URI provided by XRAS
  - E.g., www.xras.org/public/requests/27522-XSEDE-BCS180020



Investigating and predicting microbial responses to microgravity

Extreme Science And Engineering Discovery Environment (Urbana, Illinois, US) Show less detail
2018-09-17 to 2022-07-06
URI: https://www.xras.org/public/requests/27522-XSEDE-BCS180020

Extreme Science And Engineering Discovery Environment (Urbana, Illinois, US)

Organization identifiers
GRID: grid.501421.3
Extreme Science and Engineering Discovery Environment: Urbana, Illinois, US
https://www.xsede.org/

Other organization identifiers provided by GRID
ROR: https://ror.org/05524hb64
WIKIPEDIA_URL:

URL
https://www.xras.org/public/requests/27522-XSEDE-BCS180020
Added
2021-07-07
Last modified
2023-03-23

INFRASTRUCTURES **IU/TACC (Jetstream)** Show less detail

URI: https://cider.access-ci.org/public/resources/RDR_000068
Indiana University (Bloomington, IN, US)

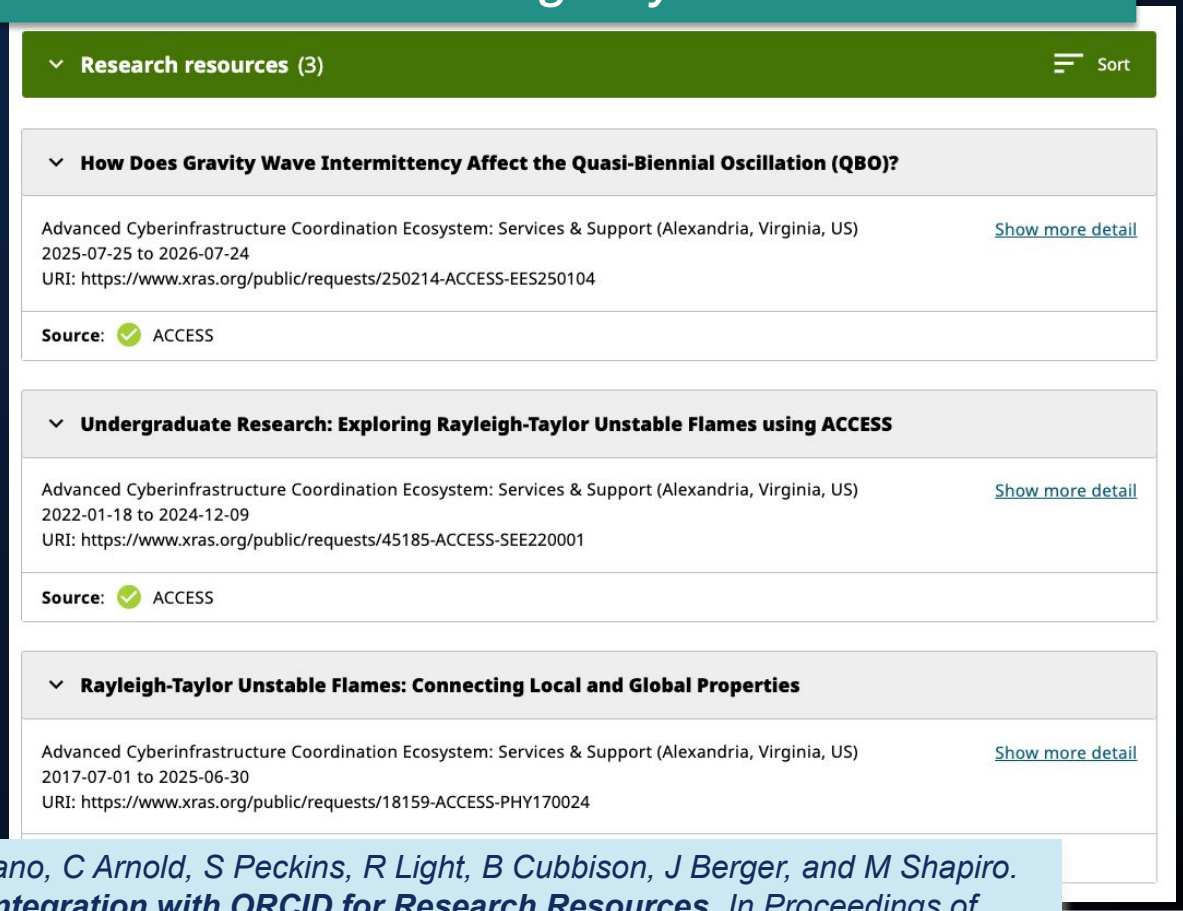
Organization identifiers
GRID: grid.257410.5
Indiana University: Bloomington, Indiana, US
http://www.iu.edu/

Other organization identifiers provided by GRID
FUNDREF: 100006733
ISNI: 0000000404133089
ROR: https://ror.org/01kg8sb98
WIKIDATA: Q6608367
WIKIPEDIA_URL: http://en.wikipedia.org/wiki/Indiana_University (preferred)

XRAS configuration for ORCID Research Resources

- Need an ORCID membership
  - For allocating entity (e.g., NSF ACCESS)
- PIDs / URIs and XRAS configuration
  - For allocating entity
  - For Resource Provider(s)
  - For resources
  - For allocated projects
- Collection of users' ORCID permissions
  - Users control access to their profiles
  - *Not all users grant permission*
- Awards made and posted to ORCID
  - Thousands of projects posted to date for XSEDE and ACCESS
- XRAS was a certified ORCID Service Provider under original criteria

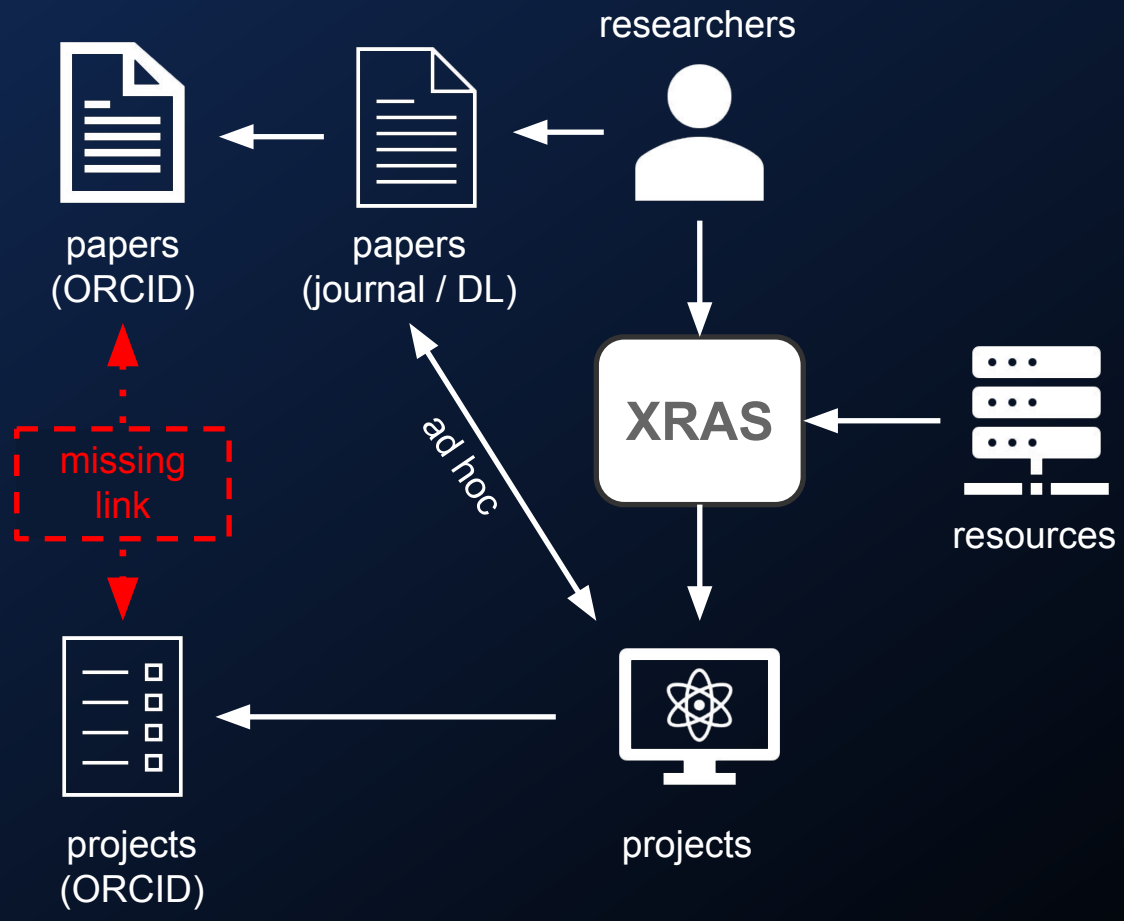
Search the ORCID registry for "01v6d0b34"



DL Hart, E Soriano, C Arnold, S Peckins, R Light, B Cubbison, J Berger, and M Shapiro. 2019. ***XSEDE Integration with ORCID for Research Resources****. In Proceedings of PEARC '19. ACM, New York, NY, USA. https://doi.org/10.1145/3332186.3333252*

Closing the loop on PIDs and Research Resources

- **The missing link:** Knowing which papers resulted from which projects
  - Still must rely on bespoke local processes
- **Publishers?**
  - Acknowledging research resource support during publication process
- **Funding agencies?**
  - Connecting papers to research resources during reporting processes
- **ORCID?**
  - Allowing researchers to link papers to research resources in their ORCID profiles



My PID and publication tracking takeaways

- Citations for research resources doesn't work well at least for computing systems
  - Why? The computer itself or the entity allocating resources makes no *scientific* contribution to the published works.
  - The same reason you don't cite your laptop or MS Excel in papers.
- PIDs, in isolation, are useful but not sufficient for tracking publications
  - PIDs in acknowledgments can seem awkward
  - Not all publishers include acknowledgments; some may have limitations on what can be included
- Surveys have proved (for me) to deliver the best ROI
- **Closing the loop between papers and research resource entries in ORCID is an essential next step**

THANK YOU!

David L Hart
dhart@ucar.edu • 0000-0001-6393-0967