NOAA Fisheries Open Science and the 2023 Year of Open Science

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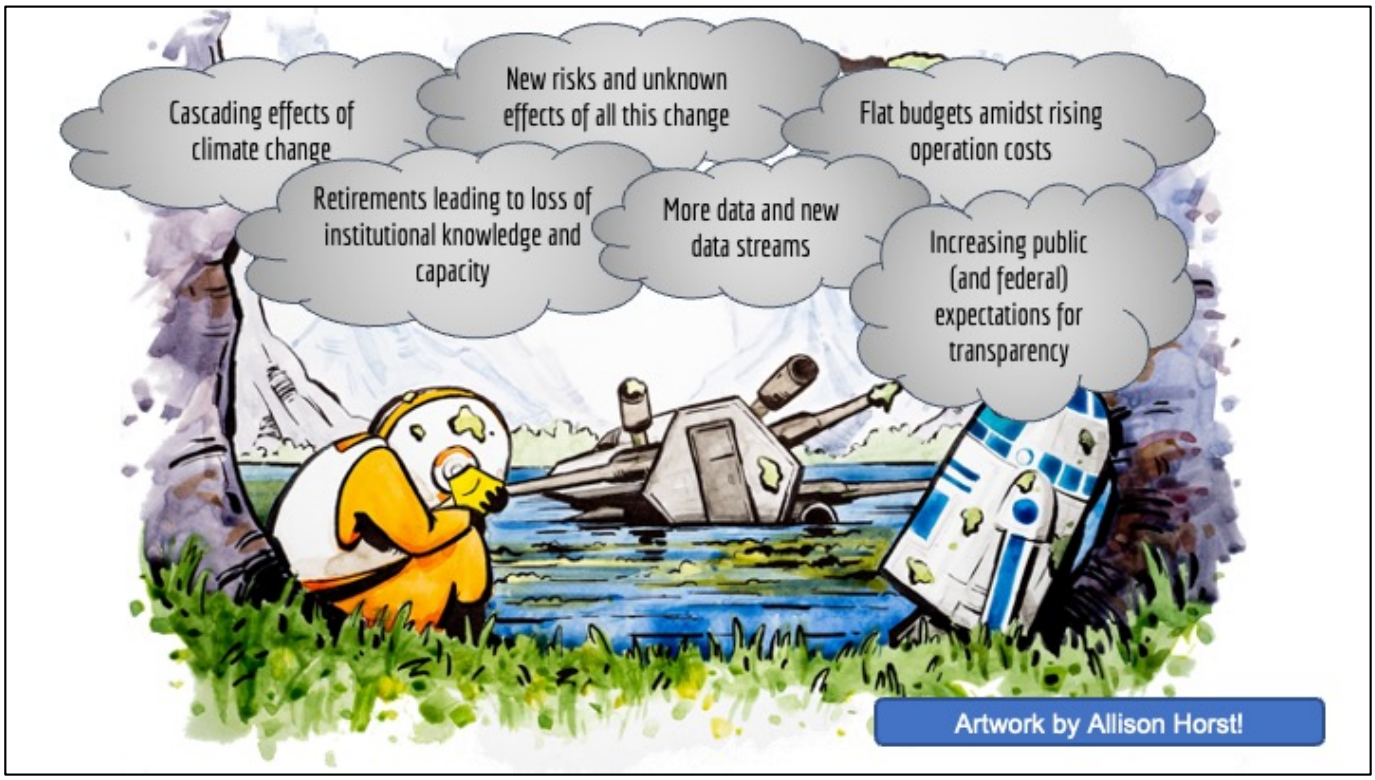
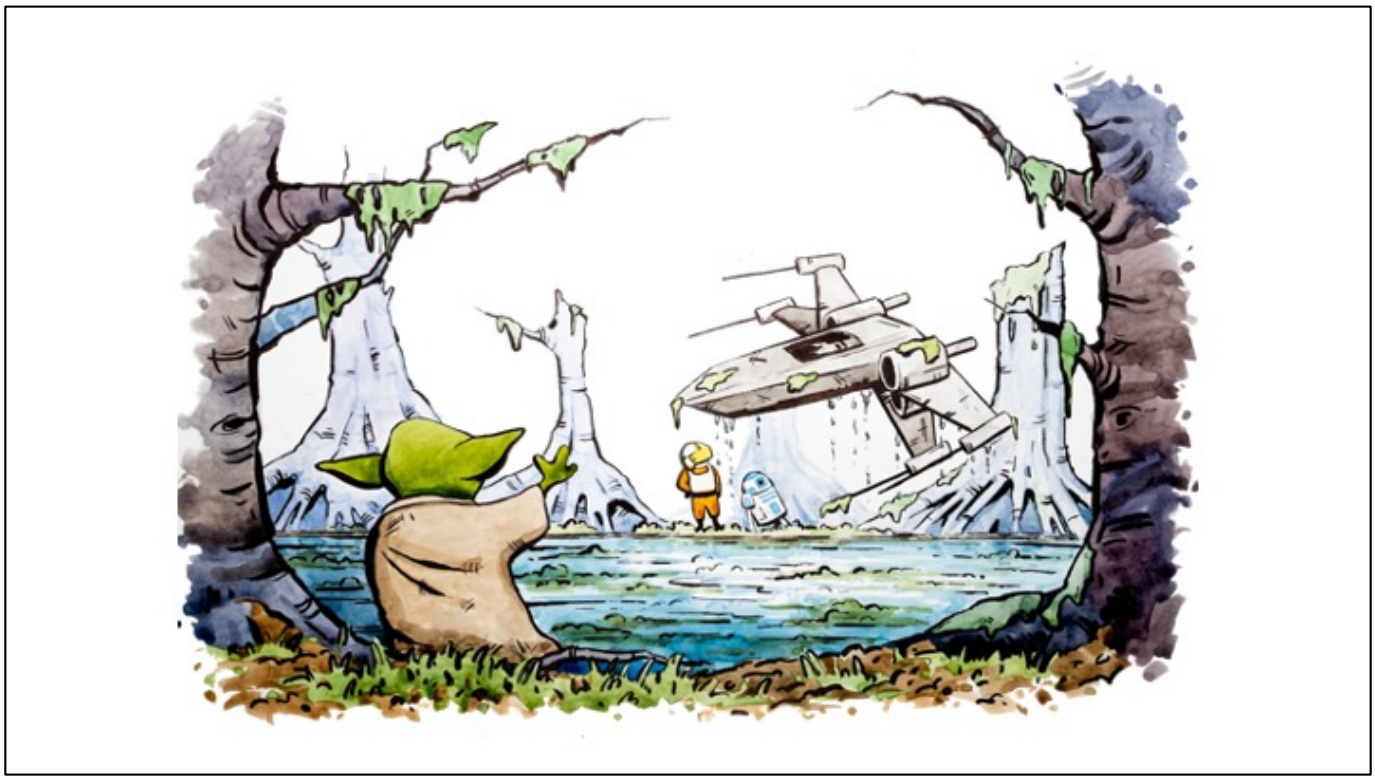
NMFS Open Science, Lead

NMFS OPEN SCIENCE

https://nmfs-opensci.github.io/



Art: https://allisonhorst.com/



Despite the title of my talk, my message is not that adopting Open Science will magically solve all these problems.

Rather the message is that Open Science is a way that teams and NOAA Fisheries can learn to collaborate together better and allow teams across the agency to work together to make real progress despite big challenges ahead.

NOAA FISHERIES

openscapes

NMFS Open Science & Year of Open Science 2023

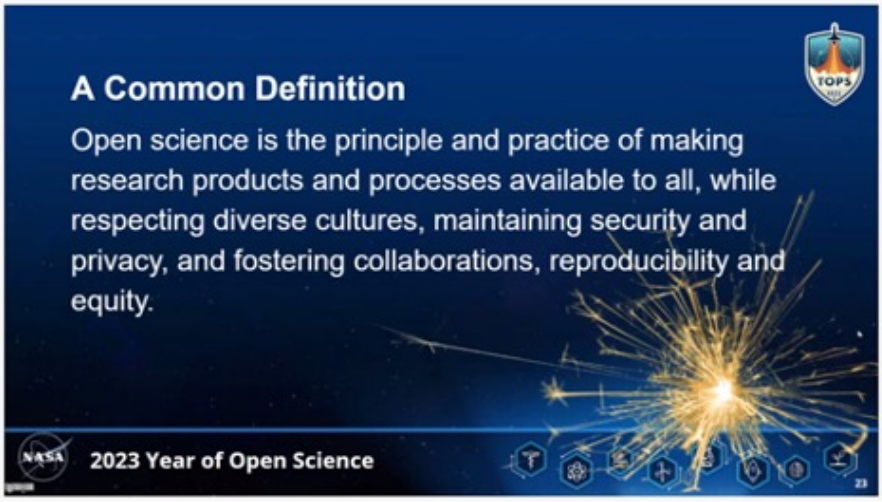
2020-2022 Openscapes program

NOAA FISHERIES

nfms-openscapes.github.io
openscapes.org

https://science.nasa.gov/open-science/transform-to-open-science
https://science.nasa.gov/open-science-overview/TOPS-community-panel
https://nasa.github.io/Transform-to-Open-Science/

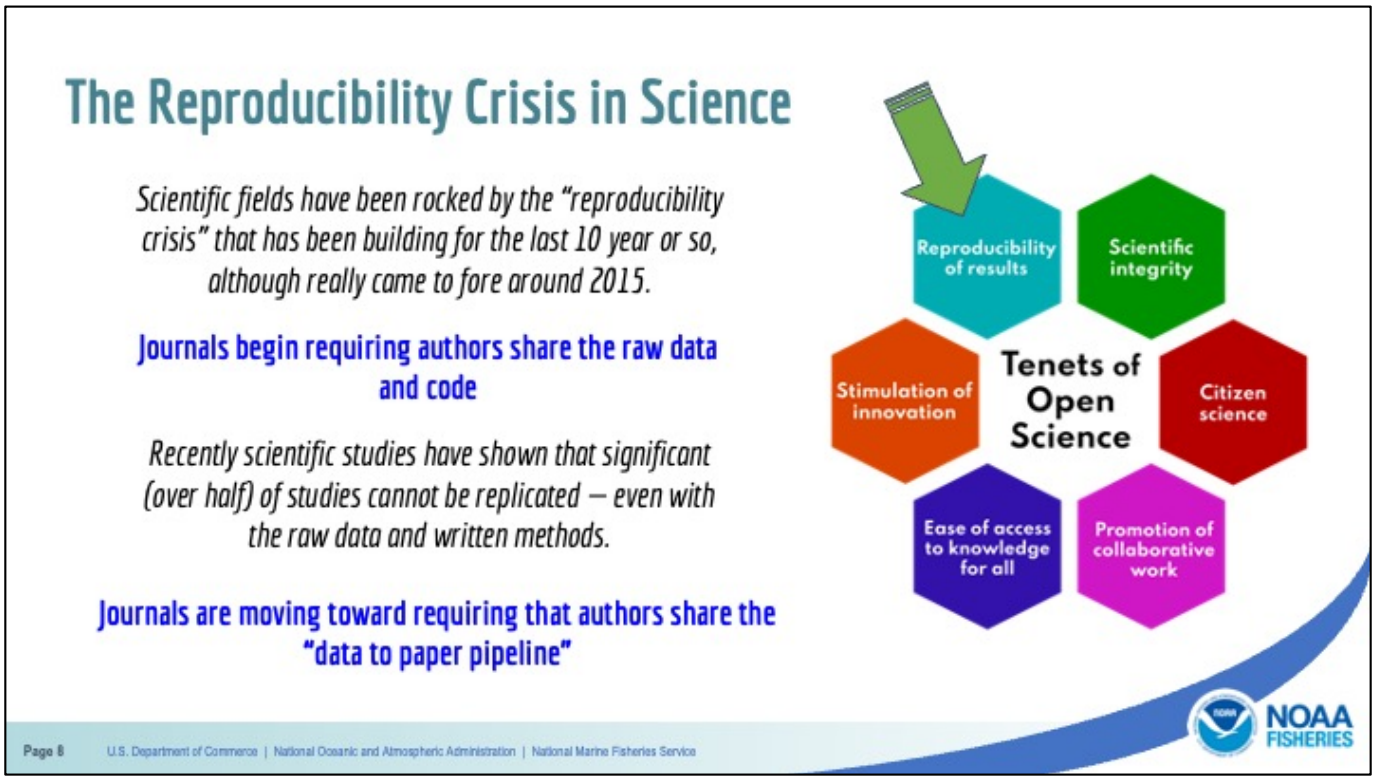
What is Open Science?



White House Office of Science and Technology Policy (OSTP) official definition in 2023 Year of Open Science

NOAA FISHERIES

- **Why NASA and federal agencies are declaring this the Year of Open Science. Here's how NASA is incentivizing open science, and how you can too.** Chelle Gentemann *Nature* **613**, 217 (2023) *doi: https://doi.org/10.1038/d41586-023-00019-y*
- https://nsf.widencollective.com/portals/sd9nlyvd/YearofOpenScienceToolkit
- https://nasa.github.io/Transform-to-Open-Science-Book/index.html



Do a lit search of "Reproducibility Crisis" post-2020 to find reams of publications on this. These are a few that are particularly relevant to my talk.

Treves, A. (2022), "Best available science" and the reproducibility crisis. Front Ecol Environ, 20: 495-495. https://doi.org/10.1002/fee.2568 Especially read the Supplemental information: https://esajournals.onlinelibrary.wiley.com/action/downloadSupplement?doi=10.1002%2Ffee.2568&file=fee2568-sup-0001-Supinfo.pdf

Discussing the controversy around the 2018 EPA Proposed rule. "Strengthening Transparency in Regulatory Science" Daniel J. Hicks (2023) Open science, the replication crisis, and environmental public health, Accountability in Research, 30:1, 34-62, DOI: 10.1080/08989621.2021.1962713

2021 EPA Transparency Final Rule. https://www.federalregister.gov/documents/2021/01/06/2020-29179/strengthening-transparency-in-pivotal-science-underlying-significant-regulatory-actions-and

Stagge JH, Rosenberg DE, Abdallah AM, Akbar H, Attallah NA, James R (February 2019). "Assessing data availability and research reproducibility in hydrology and water resources". *Scientific Data*. **6**: 190030. Bibcode:2019NatSD...690030S. doi:10.1038/sdata.2019.30. "results might be

reproduced for only 0.6% to 6.8% of all 1,989 articles" largely due to missing data, methods or code.

Stodden, V., Seiler, J., & Ma, Z. (2018). An empirical analysis of journal policy effectiveness for computational reproducibility. *Proceedings of the National Academy of Sciences*, *115*(11), 2584-2589. Cannot replicate even with the raw data. https://doi.org/10.1073/pnas.1708290115

Data

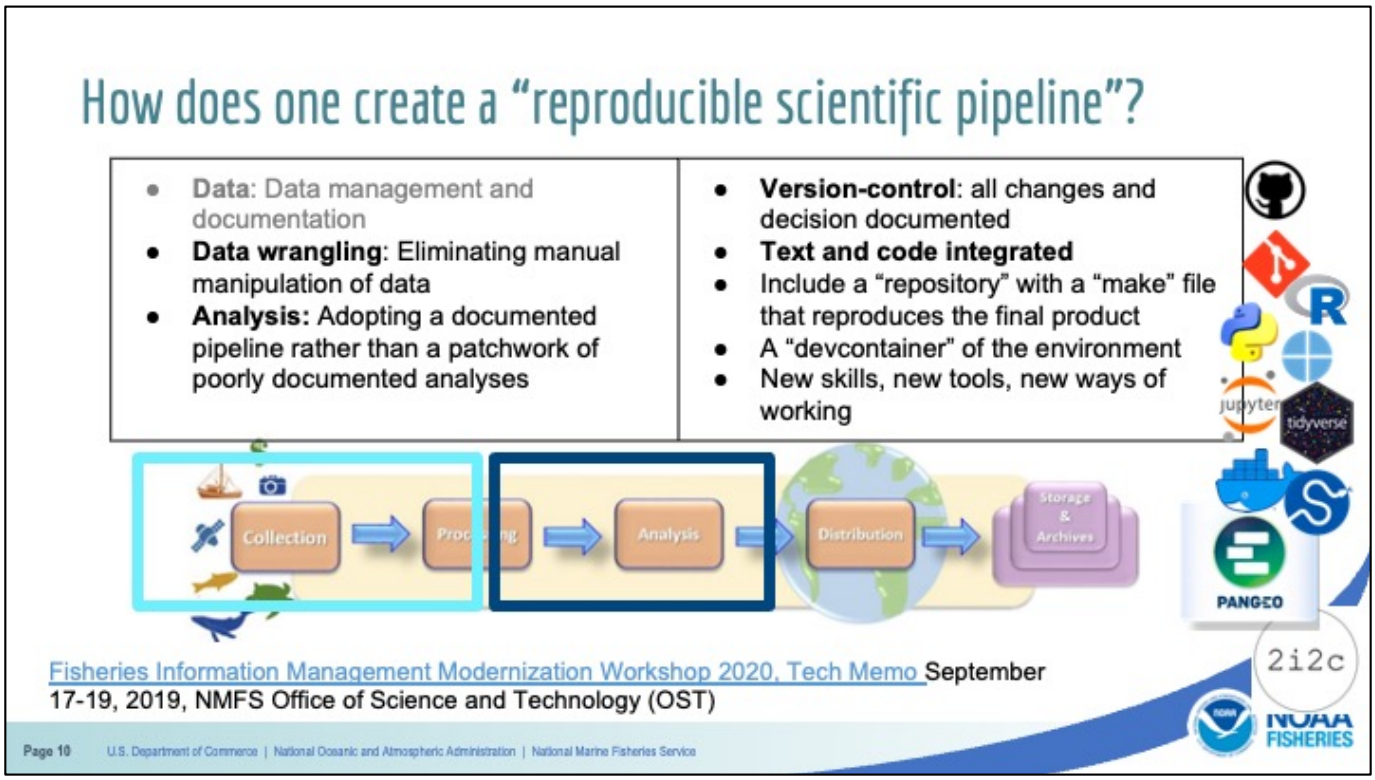
- Analyses, plots, tables with no documentation (just the final product)
- Manual undocumented manipulations
- Many data file in different formats
- Scripts of various analyses
- Emails, emails, emails
- Lots of Google docs
- Files on individual folders
- Data of unknown provenance

Unreproducible product:

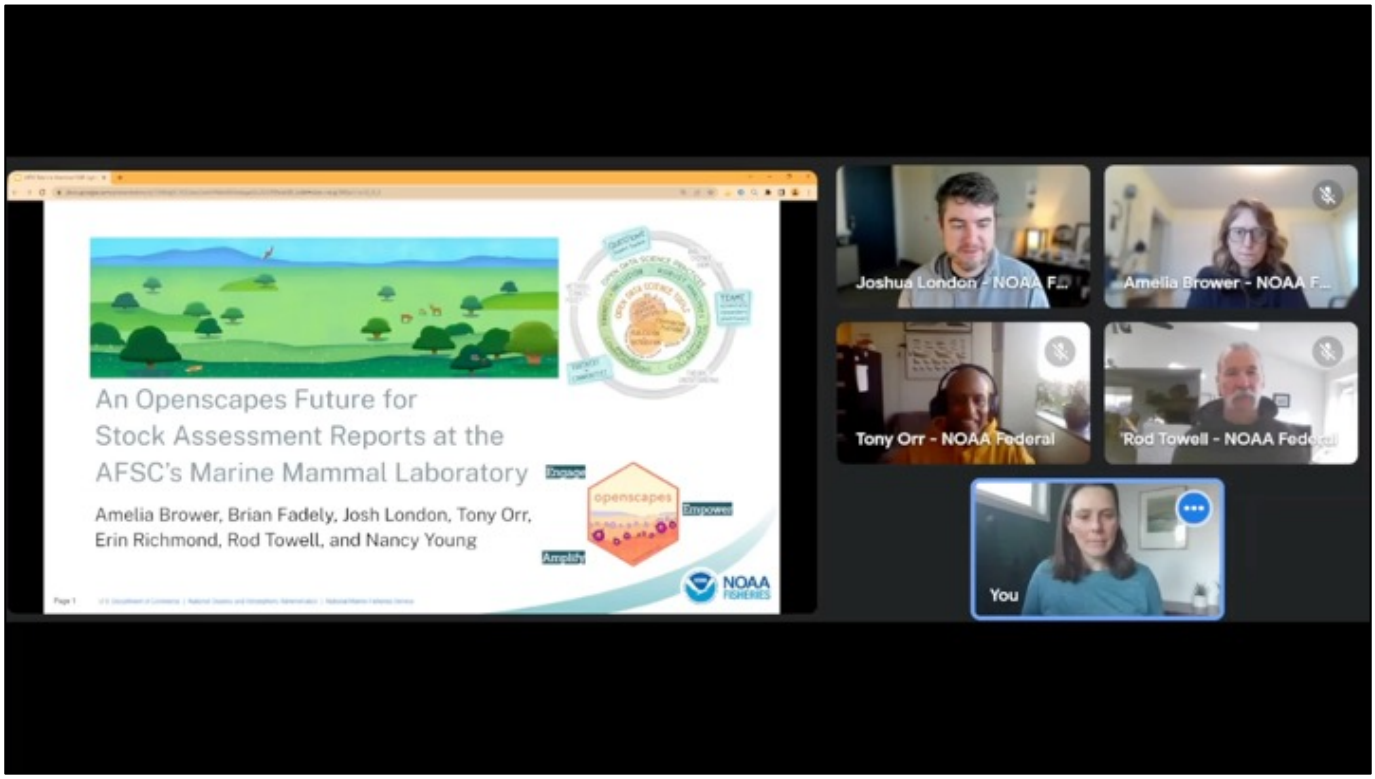
- Paper
- Decision
- Report

Decisions that impact protected species, human communities, fishing, land use

NOAA FISHERIES

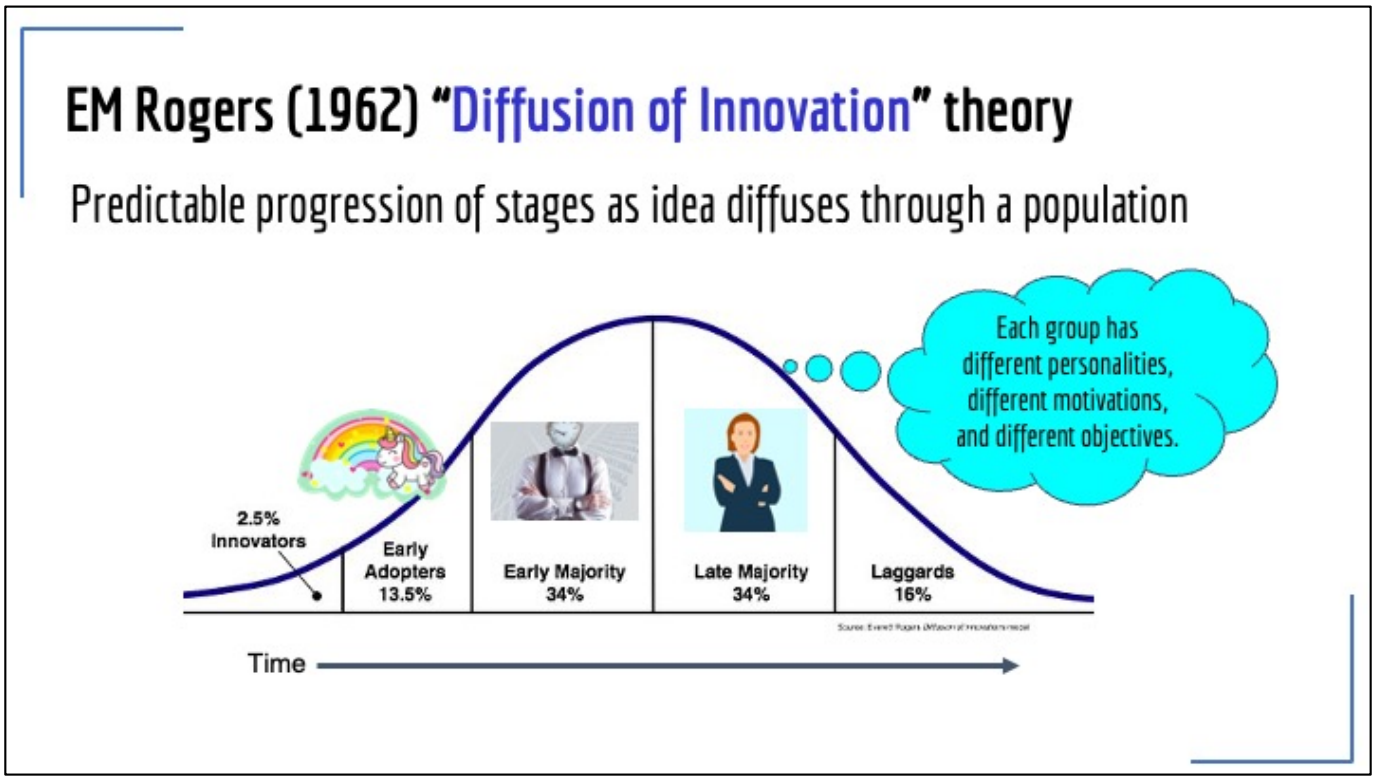


Fisheries Information Management Modernization Workshop 2020, Tech Memo September 17-19, 2019, Review and evaluate practical and tangible actions to modernize the data and information system of NMFS



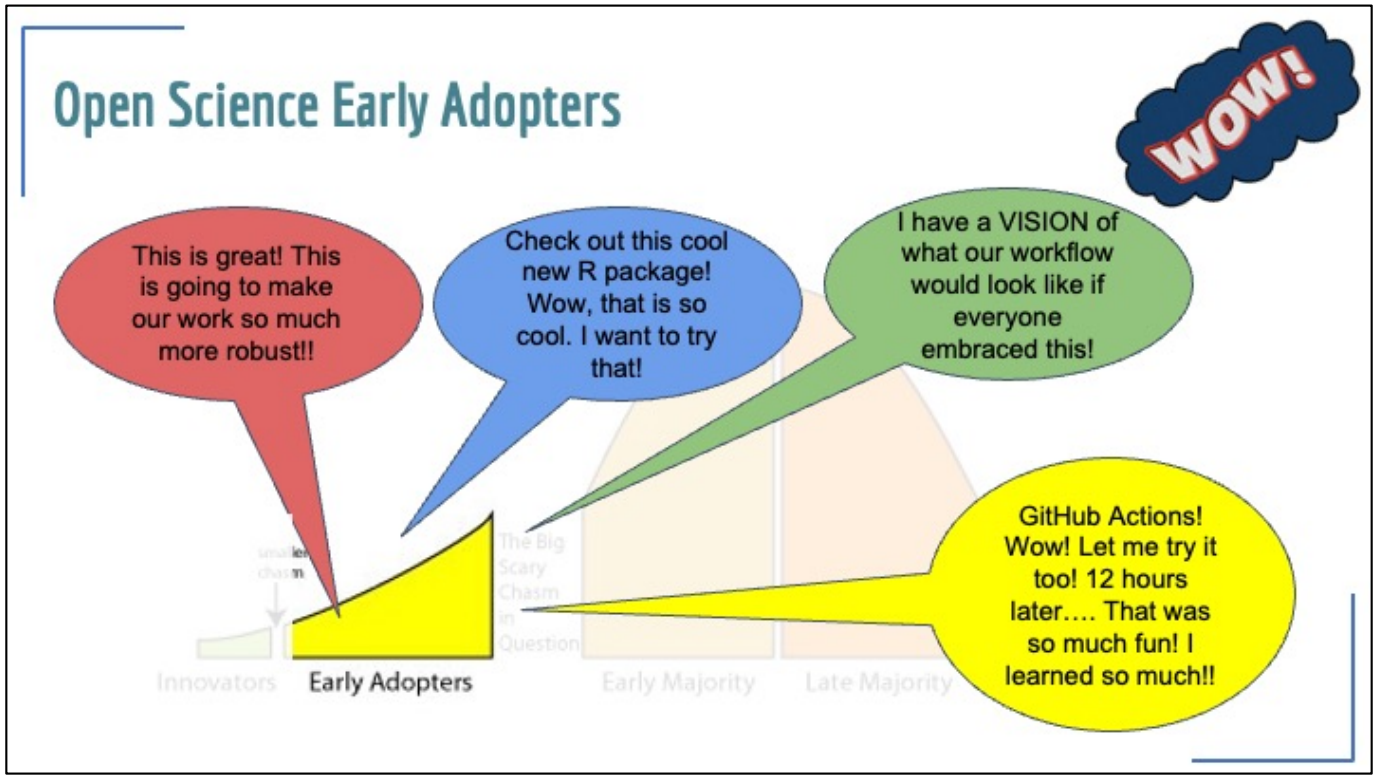
- View the video (NOAA internal) https://drive.google.com/file/d/1dxe3qpuPLfaqbPkSkS36ca4nbq0w20EN/view?usp=sharing


Fine for one team, but how to we spread new ways of working throughout an organization??

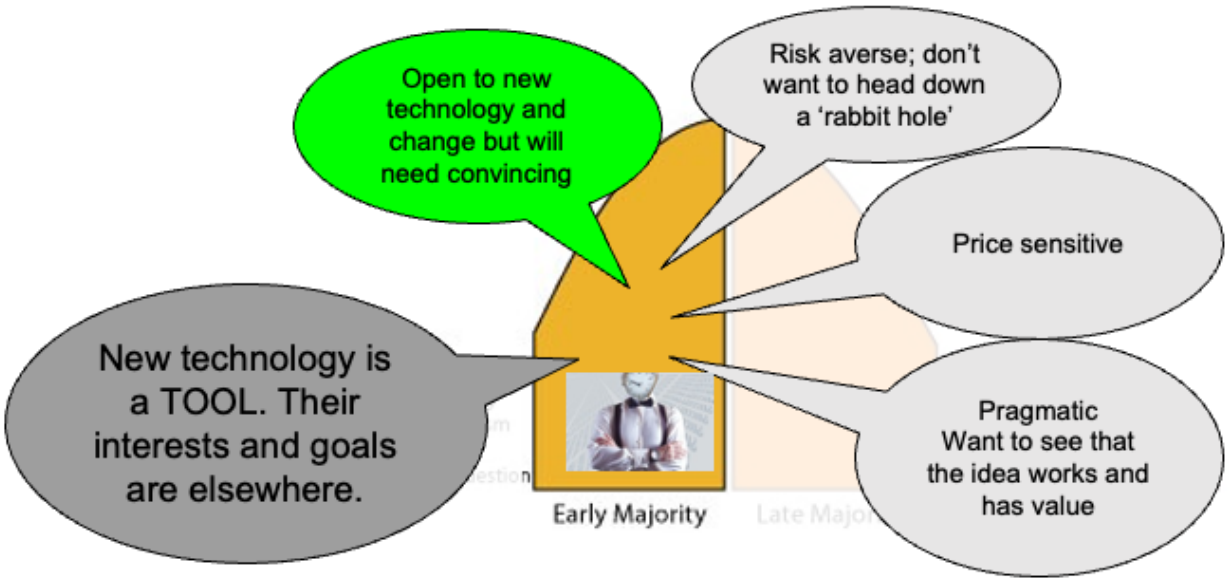


Rogers, E. M. (2003). *Diffusion of innovations*. New York, NY [u.a.]: Free Press. ISBN: 0-7432-2209-1, 978-0-7432-2209-9

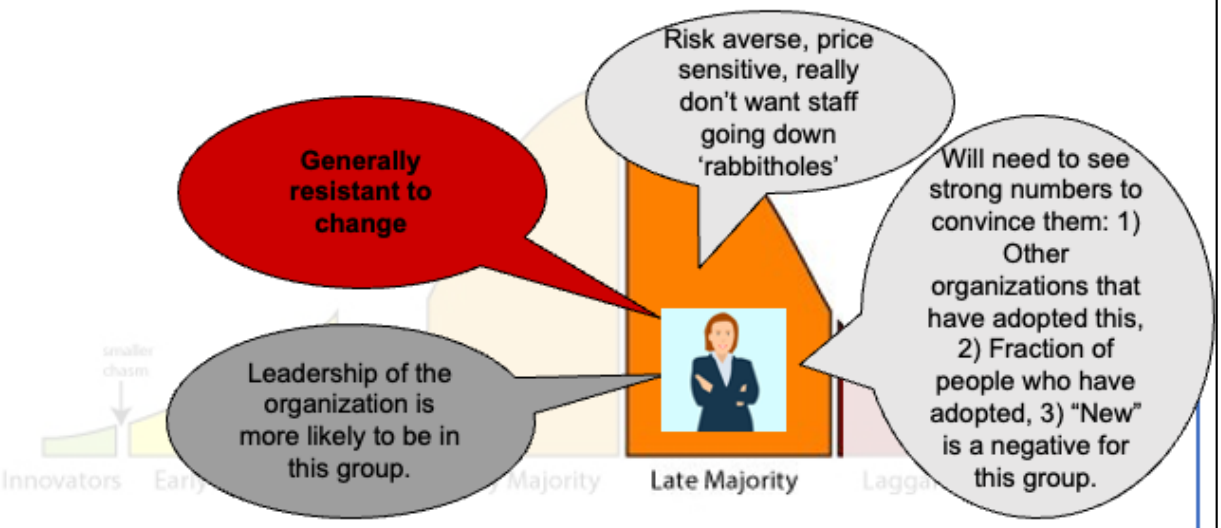
Open Science Early Adopters



Early Majority: Open to innovation but risk adverse

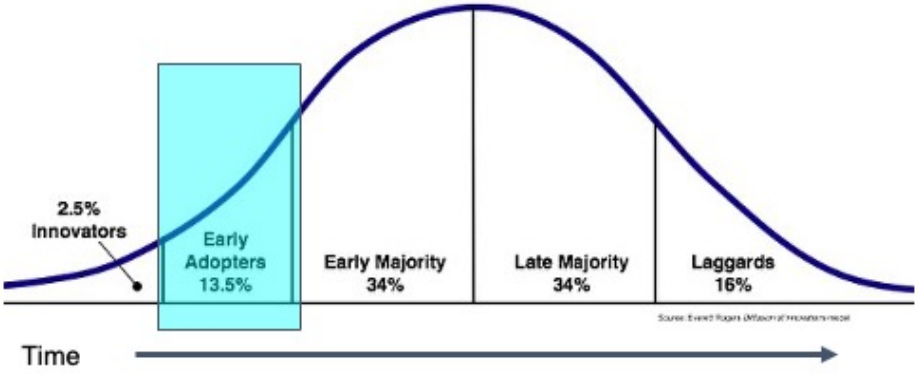


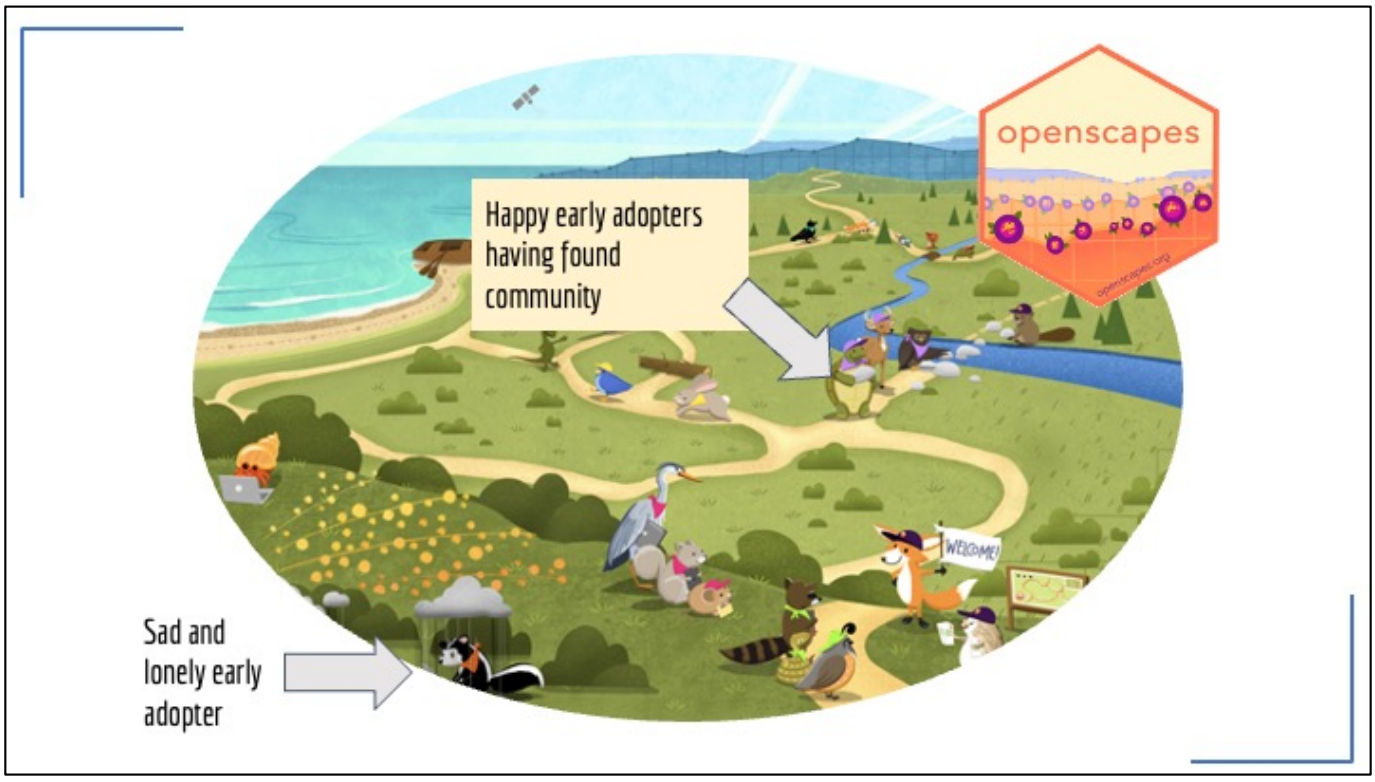
Late Majority often includes organizational leadership



The Early Adopters are critical to diffusion of innovation

1. Early Adopters develop the innovation into something of value
2. Their **energy and effort** is what drives the initial diffusion process, but that is a hard and slow process.




openscapes
Happy early adopters having found community
WELCOME!
Sad and lonely early adopter

NMFS Openscapes training in Open Science

At NMFS, a grassroots effort due to desire from staff for training in Open Science

9 NMFS Champions Cohorts (40 staff ea)

- 2020: Winter NEFSC
- 2021: Spring NWFSC
- 2021: Fall NWFSC, AFSC, SEFSC, NEFSC
- 2022: Winter AFSC
- 2022: Summer SEFSC/SERO
- 2022 Fall 4 cohorts 6 science ctrs, WCRO

https://nmfs-openscapes.github.io/

Eli presents

UNCESCO, NASA quotes. Eli + Julie just presented to UN. You can google this!

What is Openscapes? This is not your traditional training or workshop.
These are cohort-based remote sessions for teams, where Openscapes introduces concepts and workflows; facilitate teams to talk about problems then go and solve them, with accountability and support.
It's about getting stuff done. It's about identifying and making progress on barriers
Laura Waters at the SERO described it as "A process to help you build better lanes of communication"

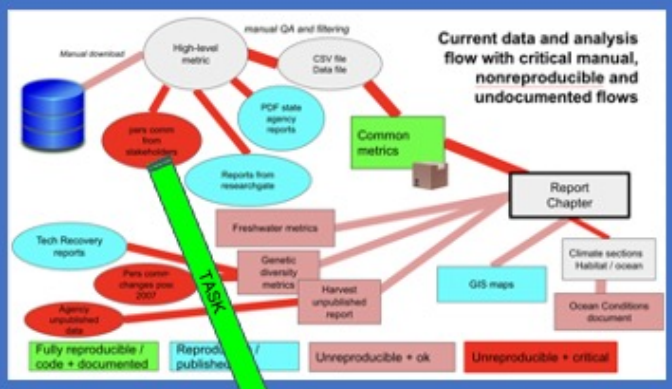
What's important too is that there is sustainability and scalability built-in. It's about strengthening a teaching & learning culture within teams & orgs. Not just for scientists: supervisors, admin, IT staff, etc, welcomed. Equitable.

Openscapes has led 10 Champions Cohorts so far, half of which have been with NMFS! At NMFS it's been a grassroots effort

During Openscapes sessions, scientists talk about issues that are hindering their work. Big issues: reproducibility and tracking, team awareness, on- and off-boarding, too much duplication of effort across the center, agency and year. Last need for team training to collaborate openly and effectively.

Next slides

PNW Salmonid Viability Report (NWFSC) + Status Reviews (WCRO) Team

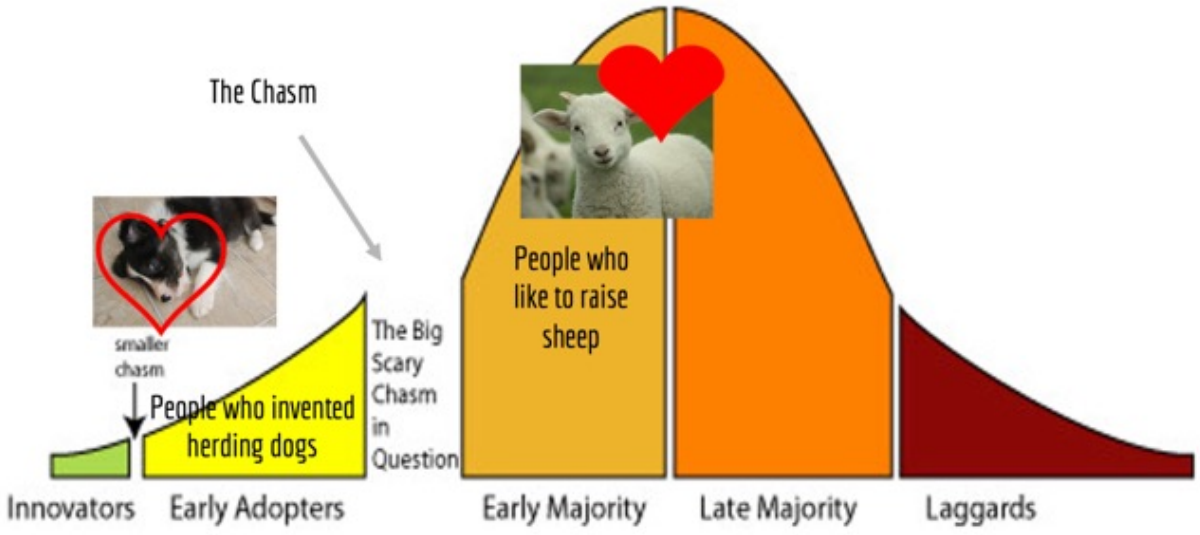


TASK

Set up single email address for pers comms re data requests

Moore, G. A. (2014). *Crossing the Chasm, 3rd Edition: Marketing and Selling Disruptive Products to Mainstream Customers*. Harper Business.

The invention of the herding dog analogy



How do you cross the Chasm?

Option 1. A charismatic communicator "salesperson" who is has deep connections with the "majority" but also understands the innovation

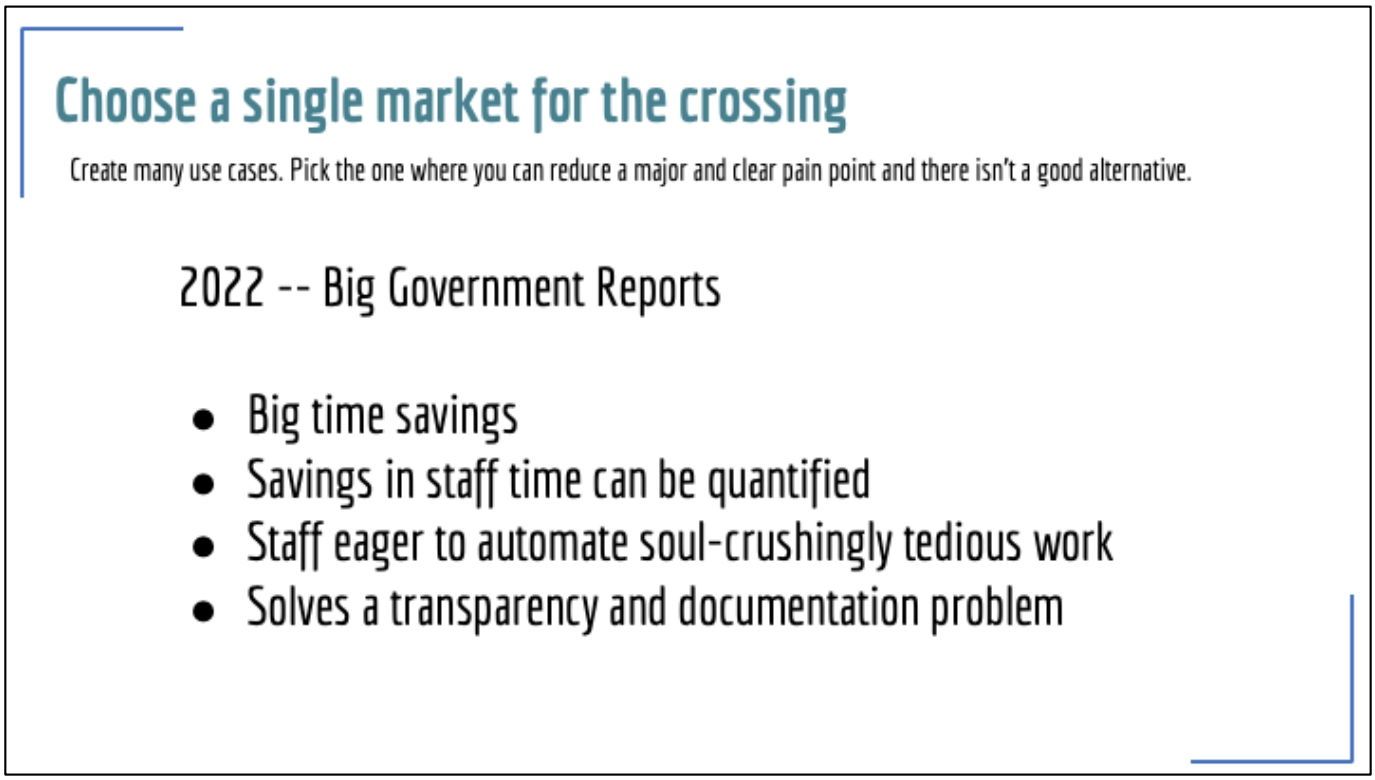
Hmm, that's kind of hard and not obvious how to do.

From: Moore, G. A. (2014, January 28). *Crossing the Chasm, 3rd Edition: Marketing and Selling Disruptive Products to Mainstream Customers*. Harper Business.

How do you cross the Chasm?

Option 2. Judiciously choose a single market for the crossing. Put all your effort there.

From: Moore, G. A. (2014, January 28). *Crossing the Chasm, 3rd Edition: Marketing and Selling Disruptive Products to Mainstream Customers*. Harper Business.



From: Moore, G. A. (2014, January 28). *Crossing the Chasm, 3rd Edition: Marketing and Selling Disruptive Products to Mainstream Customers*. Harper Business.

2023 Year of Open Science and Beyond

NMFS Open Science

The overarching vision of NMFS Open Science is to support scientists, developers, and policy analysts within NOAA Fisheries (NMFS) in fulfilling NOAA's Open Science mandates: NOAA Data Strategy, DOC Open Source Code Policy, Federal Data Strategy, and the Federal Open Access Memo.

NMFS Openscapes

is concerned Open Science training in workflow and technical skills needed at the individual and team level. We focus on helping all staff engaged in data-driven science and decision-making at NMFS. Support an active and engaged mentor group across NMFS.

NMFS Openscapes Plan 2023-2026

		YEAR 1				YEAR 2				YEAR 3			
		2023		2024				2025				2026	
TASK NO.	TASK TITLE	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1	Develop Mentor Community												
1.1	Outreach to new NMFS mentors												
1.2	Openscapes Mentors Cohort Activities												
1.3	Identify and Address Cross-Center Roadblocks												
2	Empower Research Teams												
2.1	Engage NMFS teams												
2.2	Openscapes Champions Cohorts												
2.3	Community Skills Workshops (R/Python)												
2.4	Pathways to Open Science (DEI)												
3	Amplify Open Science Leaders												
3.1	Community engagement & webinars												
3.2	Coordinate, comms, tag-ups												

NMFS Open Science is a strategic group

Triage the most pressing needs for scientists, developers, and policy analysts within all of NOAA Fisheries and take leadership roles to find solutions.

NMFS OPEN SCIENCE

NMFS Openscapes	NOAA Fisheries Integrated Toolbox	NOAA Fisheries Integrated Modeling System	NMFS R User Group
NOAA FISHERIES openscapes			NOAA FISHERIES USERS R

https://nmfs-opensci.github.io/

Supporting the infrastructure for Open Science

Support for scientific software, package development, templates, utilities

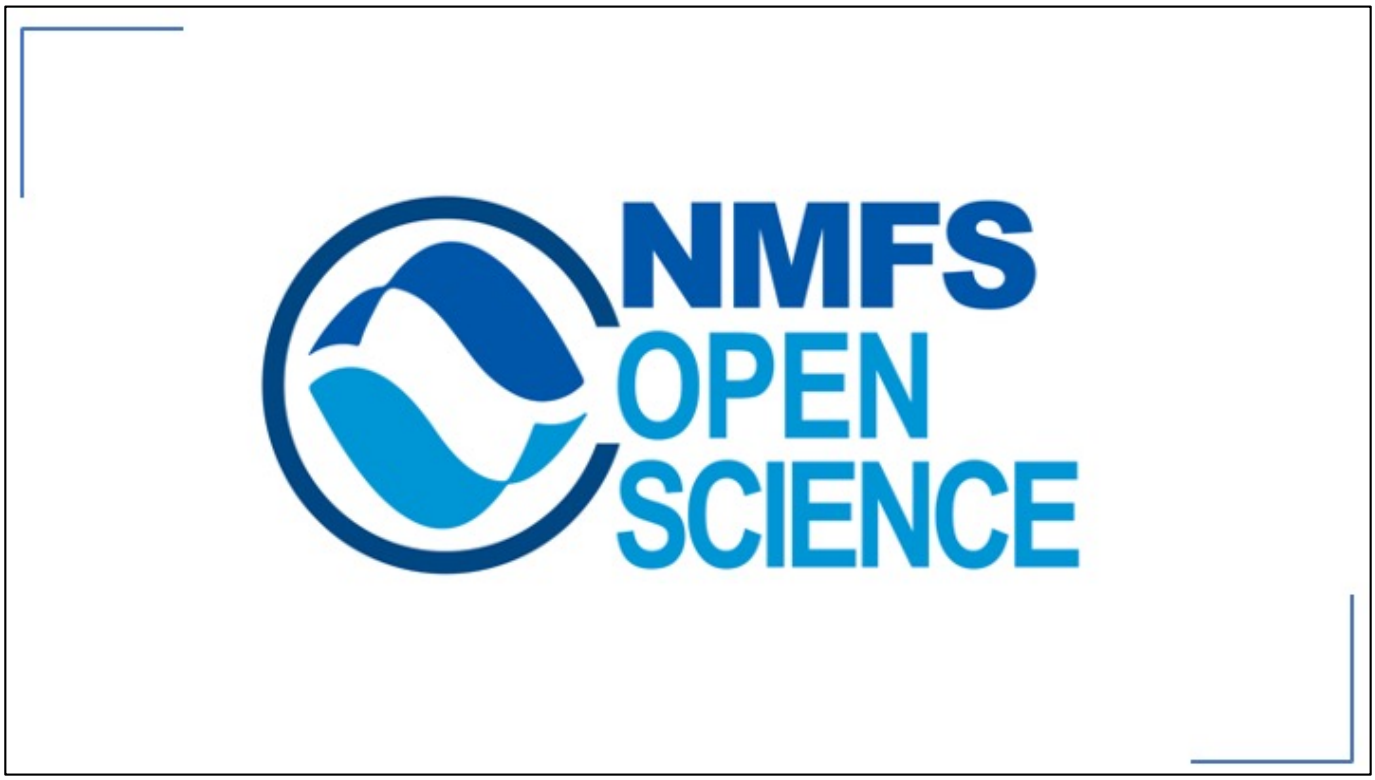
Data science is highly dependent on soft infrastructure: development platforms, cloud virtual machines, and product delivery systems for data-science products. Support governance teams for these platforms.

GitHub

posit Connect

NOAA FISHERIES

GitHub Governance Team (live April 3, 2023. https://sites.google.com/noaa.gov/nmfs-st-github-governance-team/home)


NMFS
OPEN
SCIENCE