

2024 MICCC
Medical Information Conference Croatia

Iskoristivost istraživanja i kako je povećati?

DR. ANTICA ČULINA

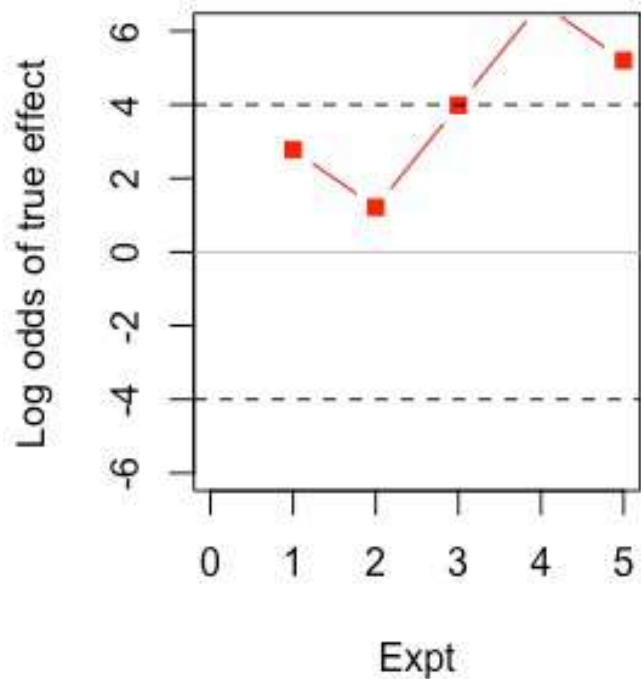
Priistranost u publiciranju (Publication bias)

- Opisana 1970s, i dalje aktualna
- Treba li nas biti briga?

Kad bismo sve objavili, bez obzira na rezultate, ne bismo li znanstvenu literaturu samo zatrpali s puno nezanimljivih rezultata?

Pogledajmo rezultate serije eksperimenata

- Neka smatramo da je vjerojatnost da efekt postoji 50%
- Alpha = .05 (ako je null-hipoteza istinita, lažno pozitivan ('significant') u 1/20 eksperimenata)
- Power = 0.8 (ako postoji efekt, detektirat ćemo ga u 8/10 eksperimenata)
- Rezultati koje smo dobili: 👍 👎 👍 👍 👎
- Da li mislite da efekt postoji u stvarnosti?
 - A: Vjerojatno postoji
 - B: Mogao bi postojati, ali je još nejasno
 - C: Vjerojatno ne postoji



A: Vjerojatno postoji

B: Mogao bi postojati, ali je još nejasno

C: Vjerojatno ne postoji

Zamislamo da smo imali više eksperimenata:

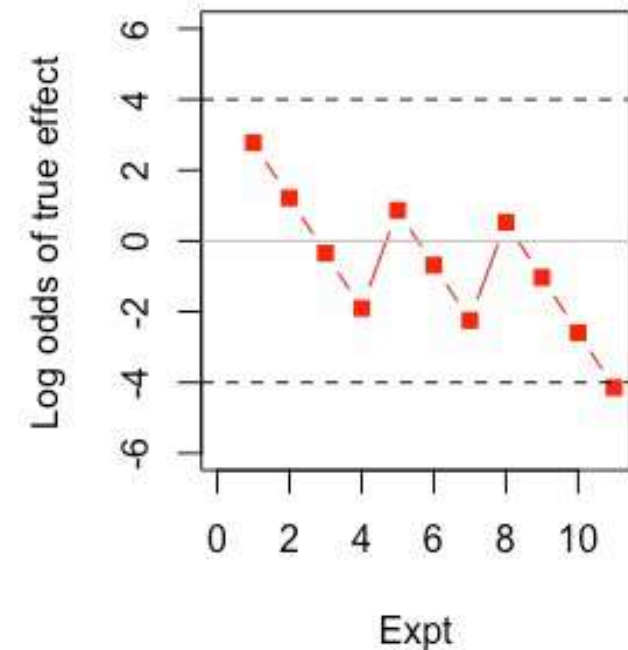
1 0 0 0 1 0 0 1 0 0 0

Svi sa $\alpha = .05$, $\text{power} = .8$

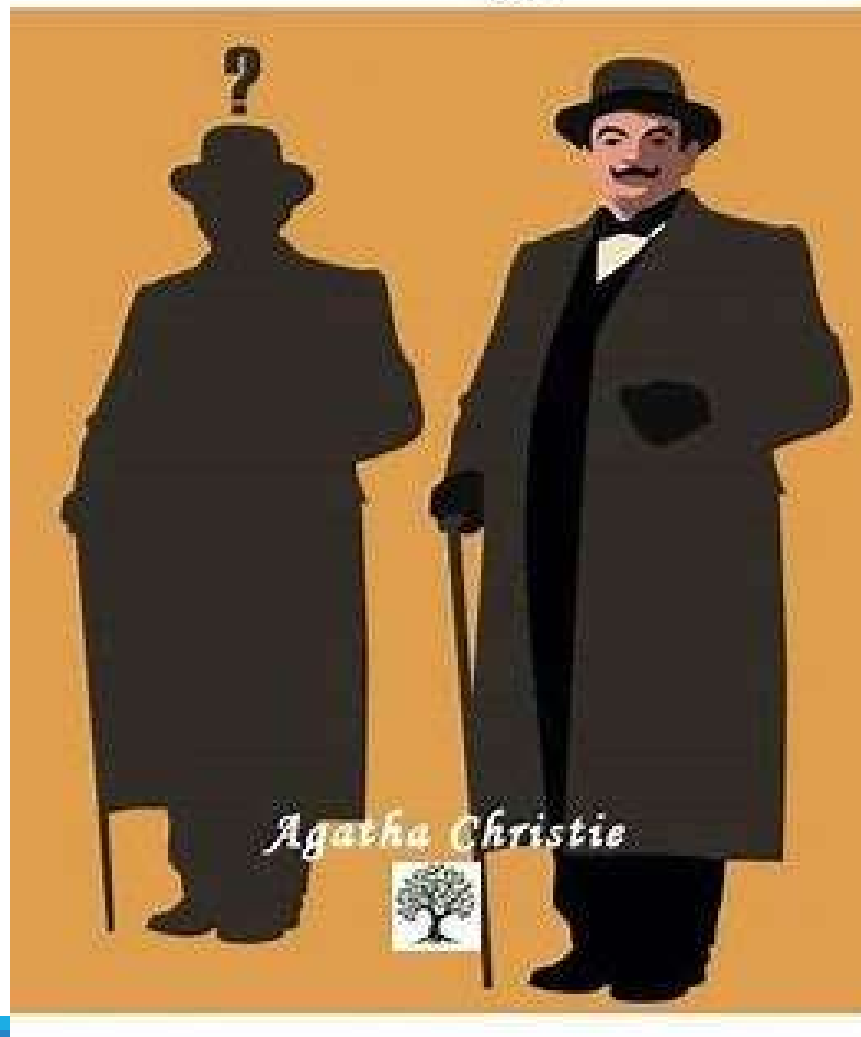
A: Vjerojatno postoji

B: Mogao bi postojati, ali je jos nejasno

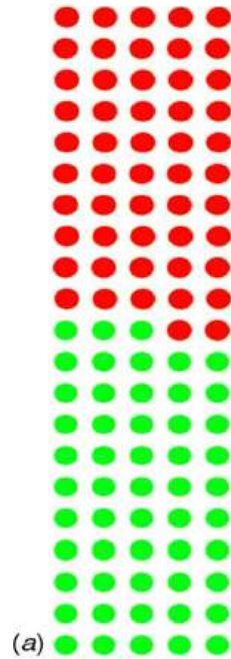
C: Vjerojatno ne postoji



Poirot Investigates



● Negative trial
● Positive trial



de Vries, Y. A., et al (2018). The cumulative effect of reporting and citation biases on the apparent efficacy of treatments: the case of depression. *Psychological Medicine* 48, 2453-2455. doi:10.1017/S0033291718001873

Ima još problema

Moja prva meta-analiza

1. Vrijednosti se ne podudaraju
2. Nedostaju bitni elementi rezultata
3. Metode su nejasne

.....

Provjeriti originalne podatke



Wasted research

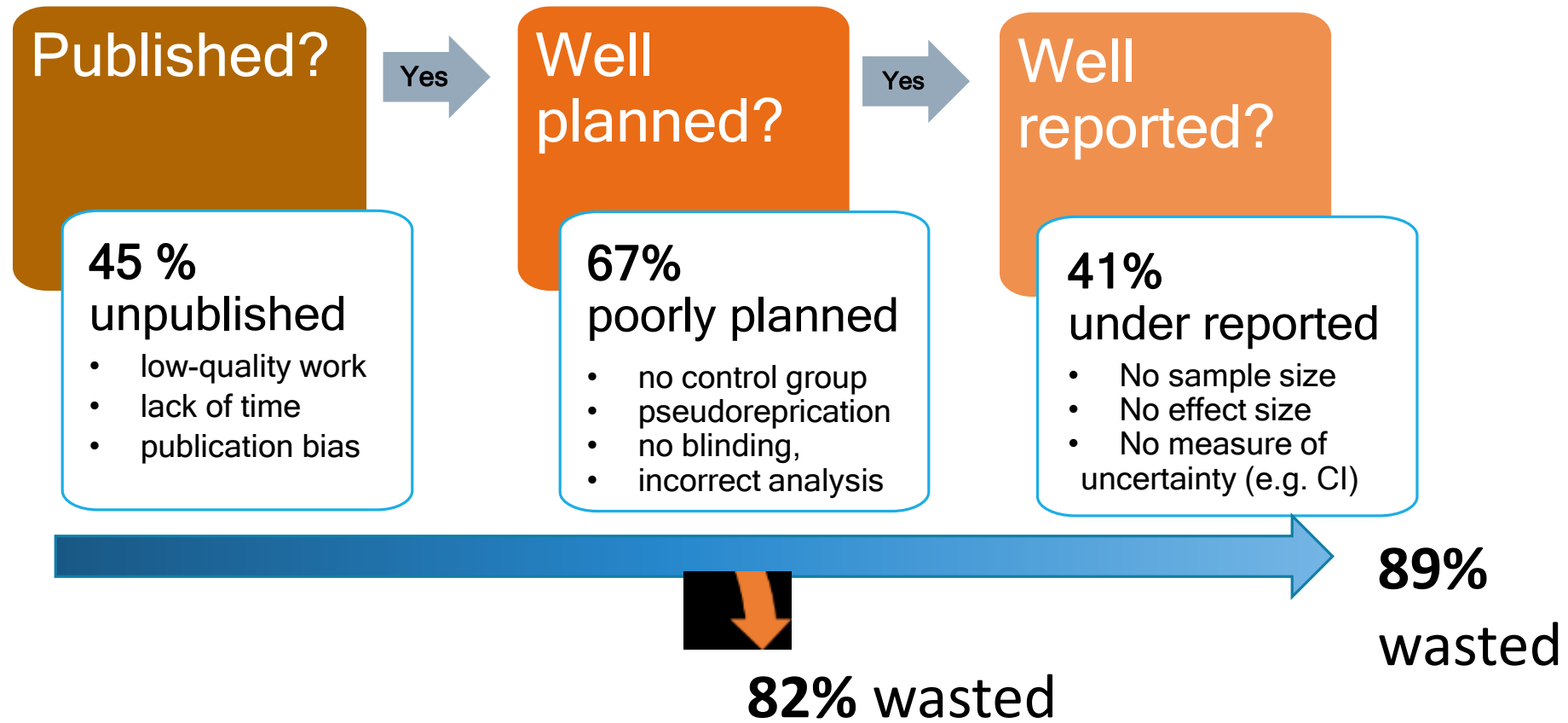
Based on 10 464 studies



Marija Purgar

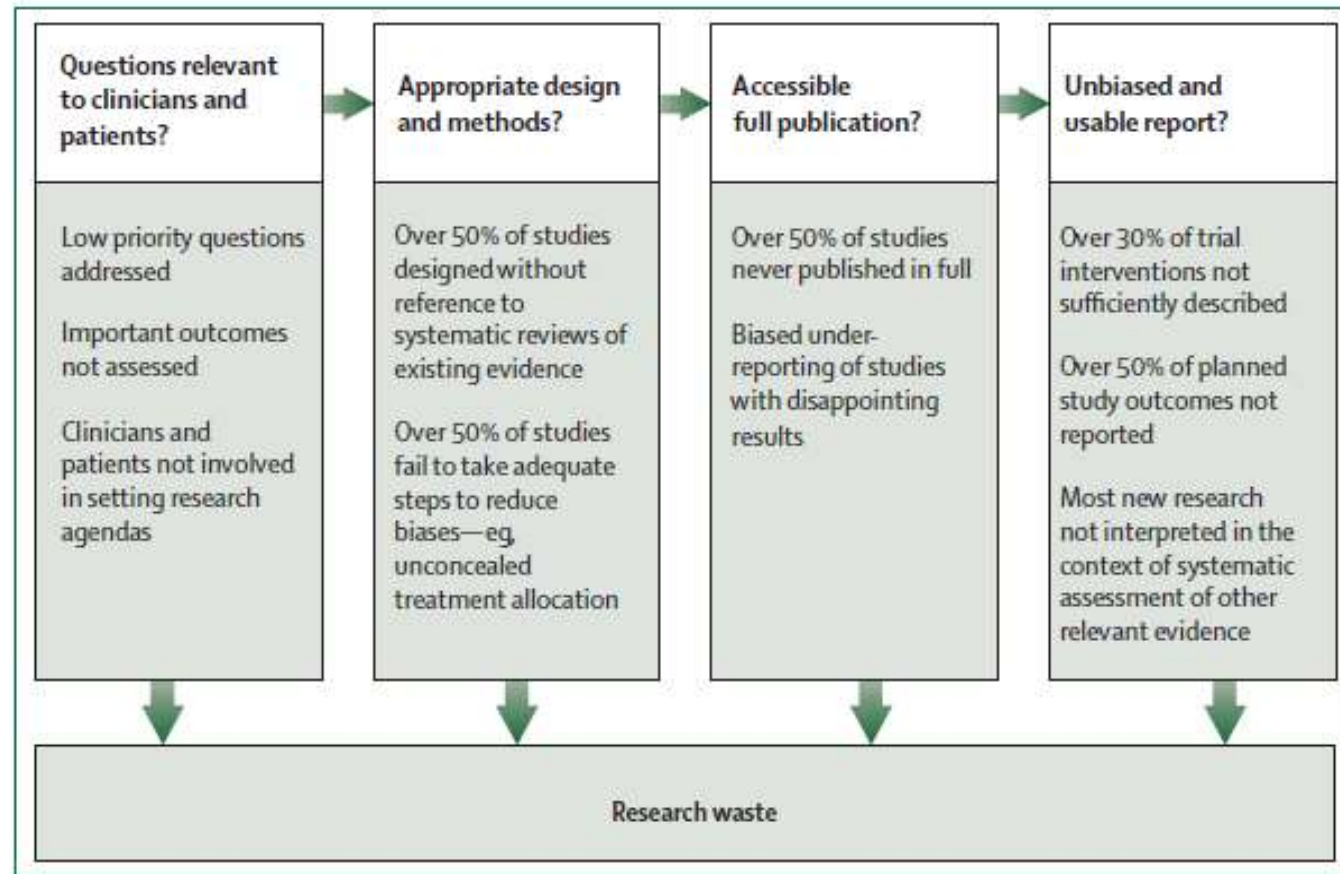


Tin Klanjscek



From Purgar et al. 2022

85% of all health research is being avoidably “wasted” : \$170 billion/year.



Chalmers & Glasziou, 2009

Zašto imamo ove probleme

Kognitivne pristranosti + Evaluacija znanosti i znanstvenika

COGNITIVE FALLACIES IN RESEARCH

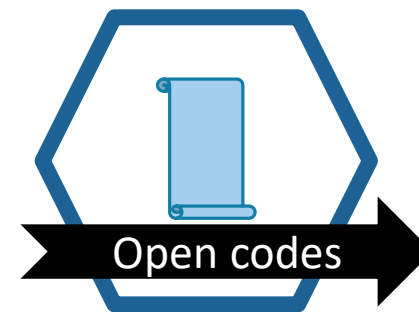
 HYPOTHESIS MYOPIA Collecting evidence to support a hypothesis, not looking for evidence against it, and ignoring other explanations.	 TEXAS SHARPSHOOTER Seizing on random patterns in the data and mistaking them for interesting findings.	 ASYMMETRIC ATTENTION Rigorously checking unexpected results, but giving expected ones a free pass.	 JUST-SO STORYTELLING Finding stories after the fact to rationalize whatever the results turn out to be.
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Nuzo 2015, Nature

The Internet's Own Boy: The Story of Aaron Swartz (2014)



Rješenja!



Registracija



Marija Purgar



Dr Tin Klanjšček



Prof. Paul Glasziou

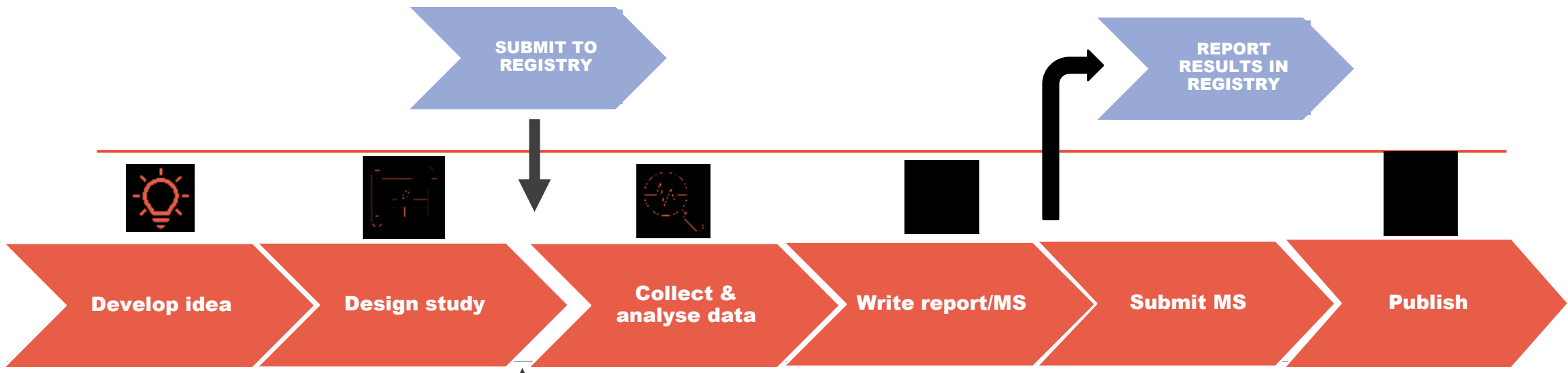


**Prof. Kenji
Nakagawa**

Studija izlazi sutra 😊

REGISTRATION PRACTICES

1) PRE-REGISTRATION



2) REGISTERED REPORTS



**STAGE 1
PEER-REVIEW**

**STAGE 2
PEER-REVIEW**

Adopted from Purgar et al. 2024

Registracija

- 1) Poboljšava metodološku kvalitetu
- 2) Smanjuje QRP (što se reflektira na karakteristikama rezultata)
- 3) Povećava dostupnost rezultata

Objavljene pre-registrirane studije

vs

Objavljene NE pre-registrirane studije

Registered reports

vs

Standardna literatura

Što smo našli?

26 meta-studije:

- 19 iz medicine
- 6 iz psihologije
- 1 oba polja
- 21 o pre-registraciji
- 5 o registered reports

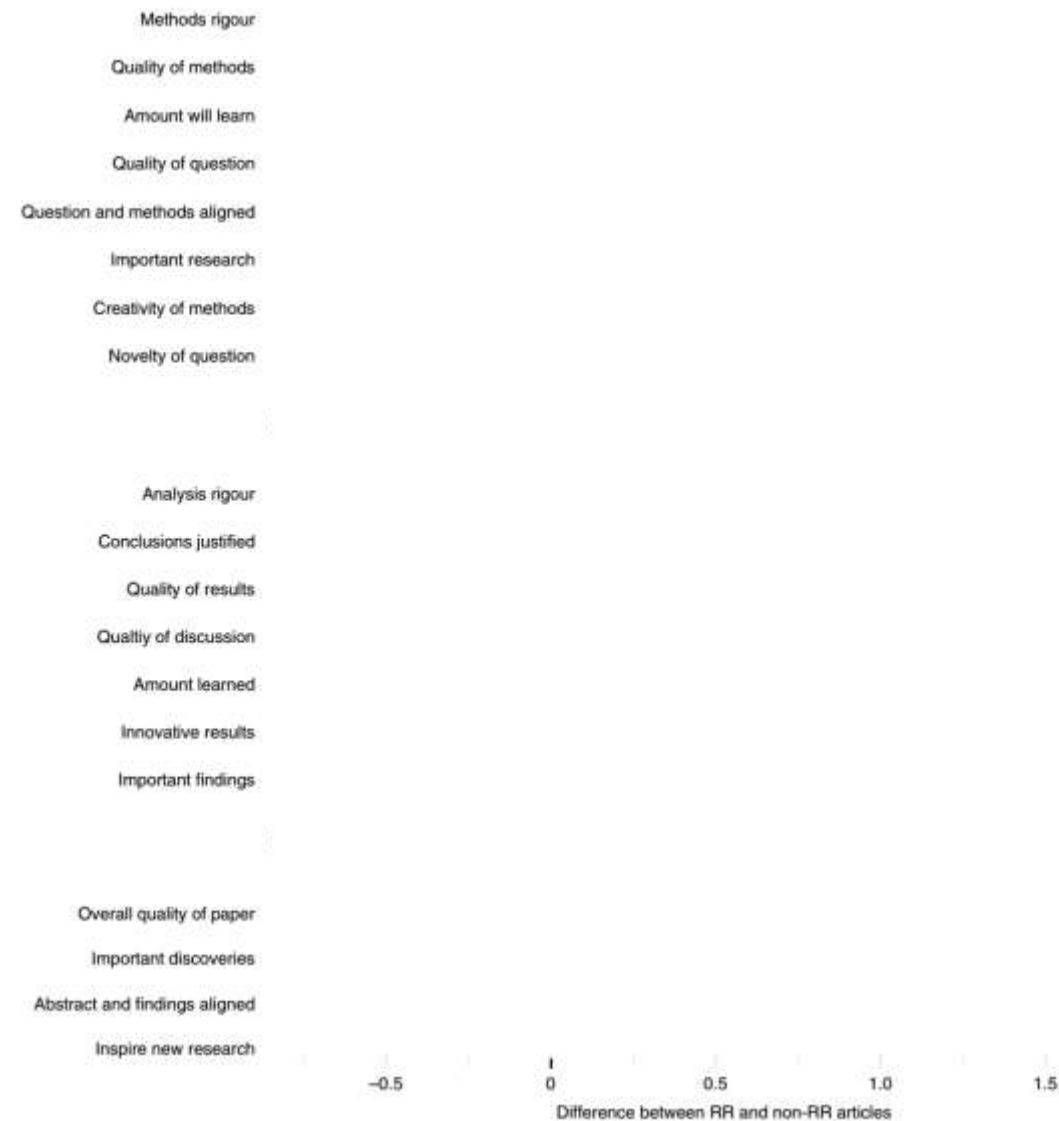
Metodološka kvaliteta

From Soderberg et al. 2021, *Nat hum beh*

Fig. 1 | **Posterior probability distributions for parameter estimates from within-subjects analysis using partial pooling across the 19 outcomes comparing the difference of RRs and comparison articles.**

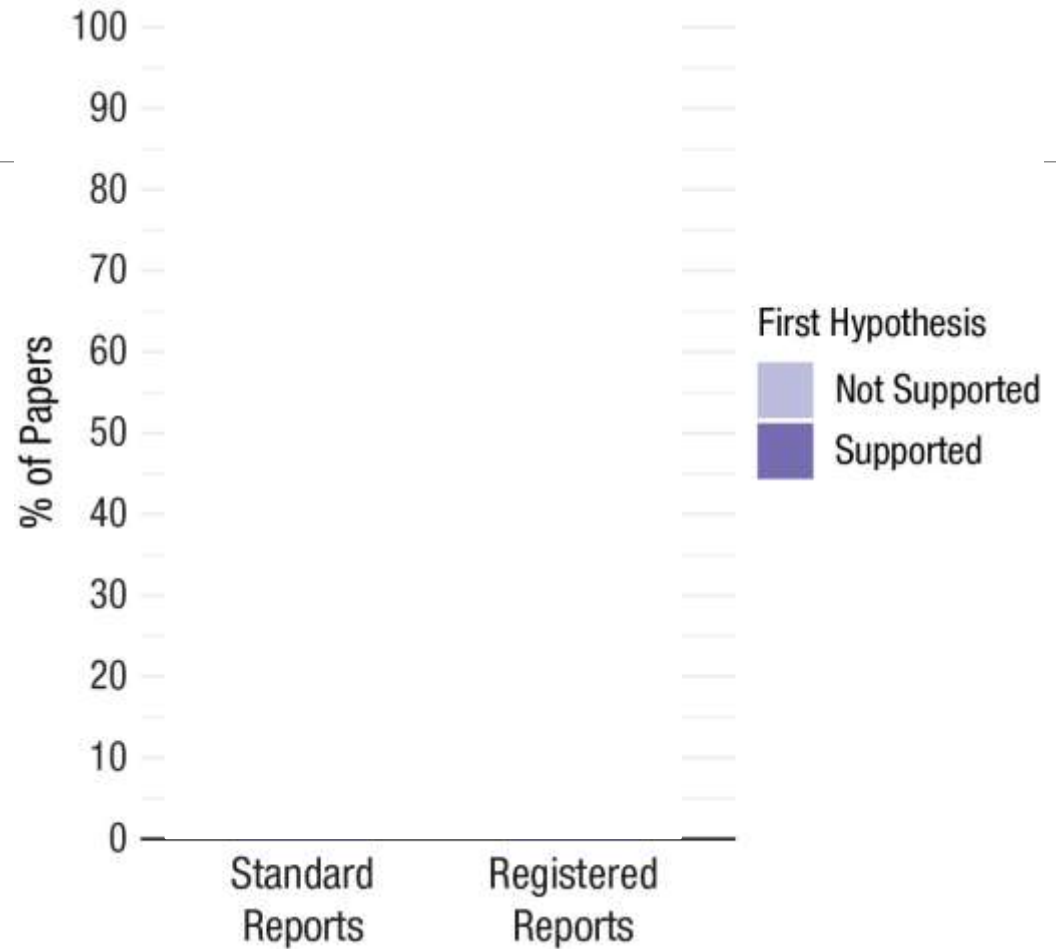
Black horizontal lines indicate 80% (thick) and 95% (thin) credible intervals, and dots show

the mean of the posteriors. Positive values indicate a performance advantage for RRs; negative values indicate a performance advantage for comparison articles.

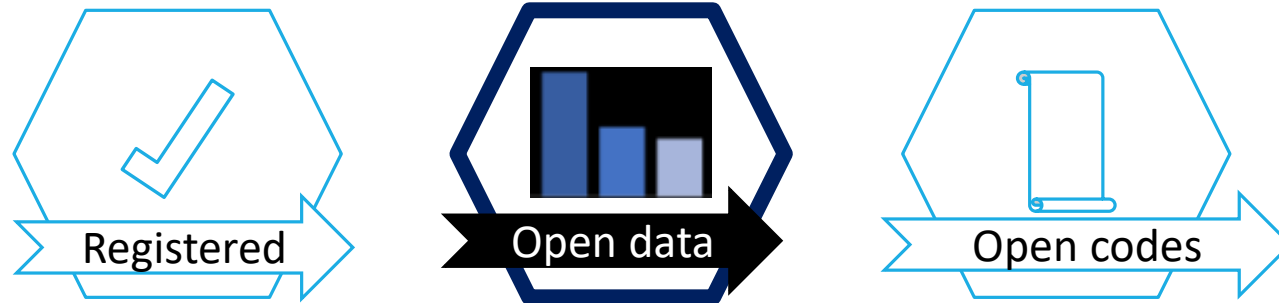


Smanjuje QRP

Scheel AM, Schijen MRMJ, Lakens D. (2021) An Excess of Positive Results: Comparing the Standard Psychology Literature With Registered Reports. *Advances in Methods and Practices in Psychological Science*: 4(2).



Otvoreni i FAIR podatci



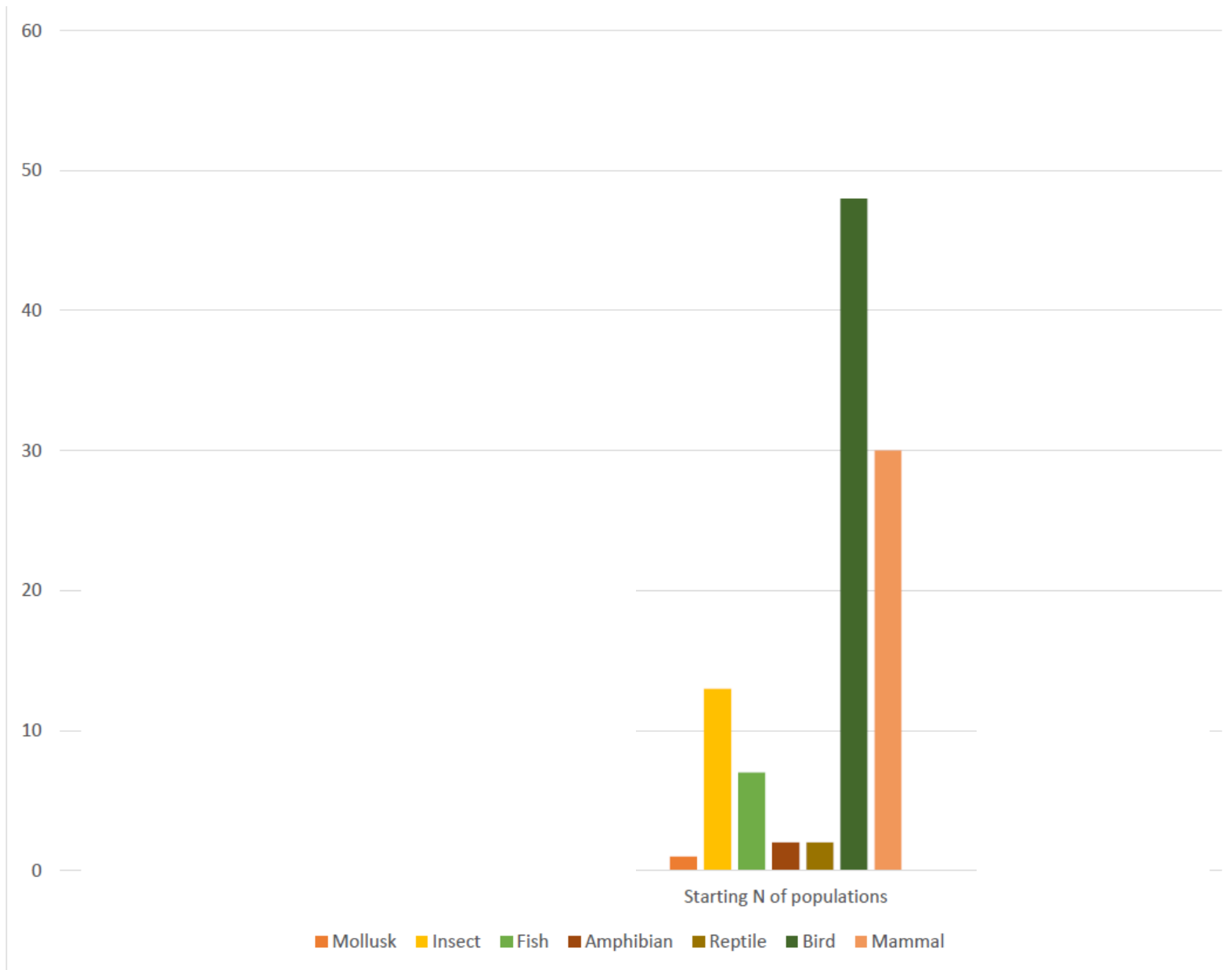
ID	Age	FRL	Sex
A	1	30.2	F
B	4	35.7	M
C	6	40.5	F
D	4	40.0	F
E	7	39.8	M
F	9	41.6	F
E	3	39.2	M

NOT FAIR

META-DATA

Site: Uviraljka cave
Species: Plecotus auritus
Date: 23/06/2020
Capture method: Nett
Etc

ID = Unique identification number of the animal
Age = age at capture, in years
FRL = forearm length, in mm
Sex = sex of the animal, determined by....



Ramarkes et al 2018, Nature Eco Evo



ESTIMATED COSTS TO EUROPEAN ECONOMY

~ €10.2BN/YEAR

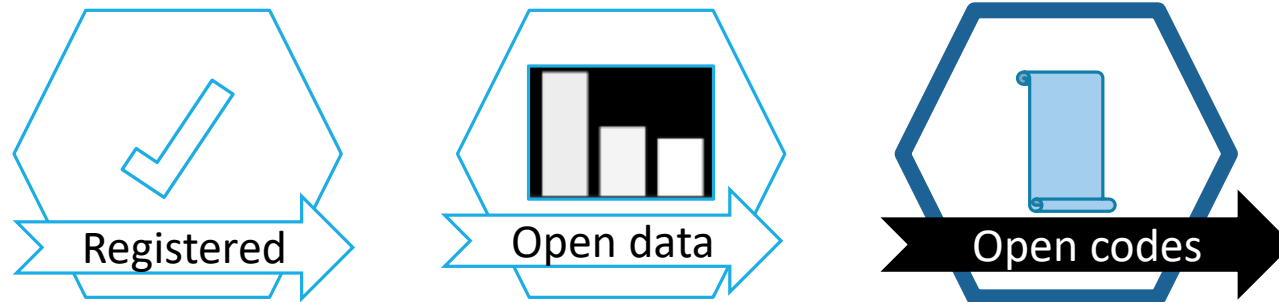
Cost of not having FAIR research data

Cost-Benefit analysis for FAIR research data

~€16BN/ YEAR

Written by PwC EU Services
March - 2018

Kodovi – procesiranje i analiza podataka



One single solitary line of code, a “1 –” that does not belong, and you have a positive result where it should be a negative result.

‘why don’t we review R code (or other custom software) as part of the peer-review process?’

<http://ecoevoeco.blogspot.com/2016/12/wrong-lot.html>



Evolutionary Ecology Research, 2009, 11: 1217–1233

Morphological and dietary differences between individuals are ~~weakly but positively~~ ^{NOT} correlated within a population of threespine stickleback

Daniel I. Bolnick and Jeffrey S. Paull

Section of Integrative Biology, University of Texas at Austin, Austin, Texas, USA

ABSTRACT

Background: Many theoretical models of speciation and niche evolution assume that the ecological similarity between conspecific individuals depends on their phenotypic similarity. Thus, competition between individuals is expected to depend on their phenotypic similarity. Theoretical models often assume that this intraspecific competition function is Gaussian.

Questions: Are morphological similarity and diet similarity positively correlated? If so, is this relationship non-linear?

Data: Stomach contents, stable isotope ratios ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$), and trophic morphology (standard length, gape width, body width, gill raker number, and gill raker length) for 265 threespine sticklebacks (*Gasterosteus aculeatus*) from a single population from a lake in British Columbia.

Analysis: We calculated the diet similarity and morphological similarity between all pairs of individuals in our sample. We examined the correlation between diet and morphological similarity, and tested whether the relationship exhibits any non-linearity.

Conclusions: Similarity in trophic morphology is correlated with dietary similarity between individuals. ~~However,~~ both body size and trophic morphology explained ~~remarkably small~~ ^{NONE} percentage of the variance in diet overlap. Also, we found no evidence of curvature in the intraspecific competition function. ^{NOT}

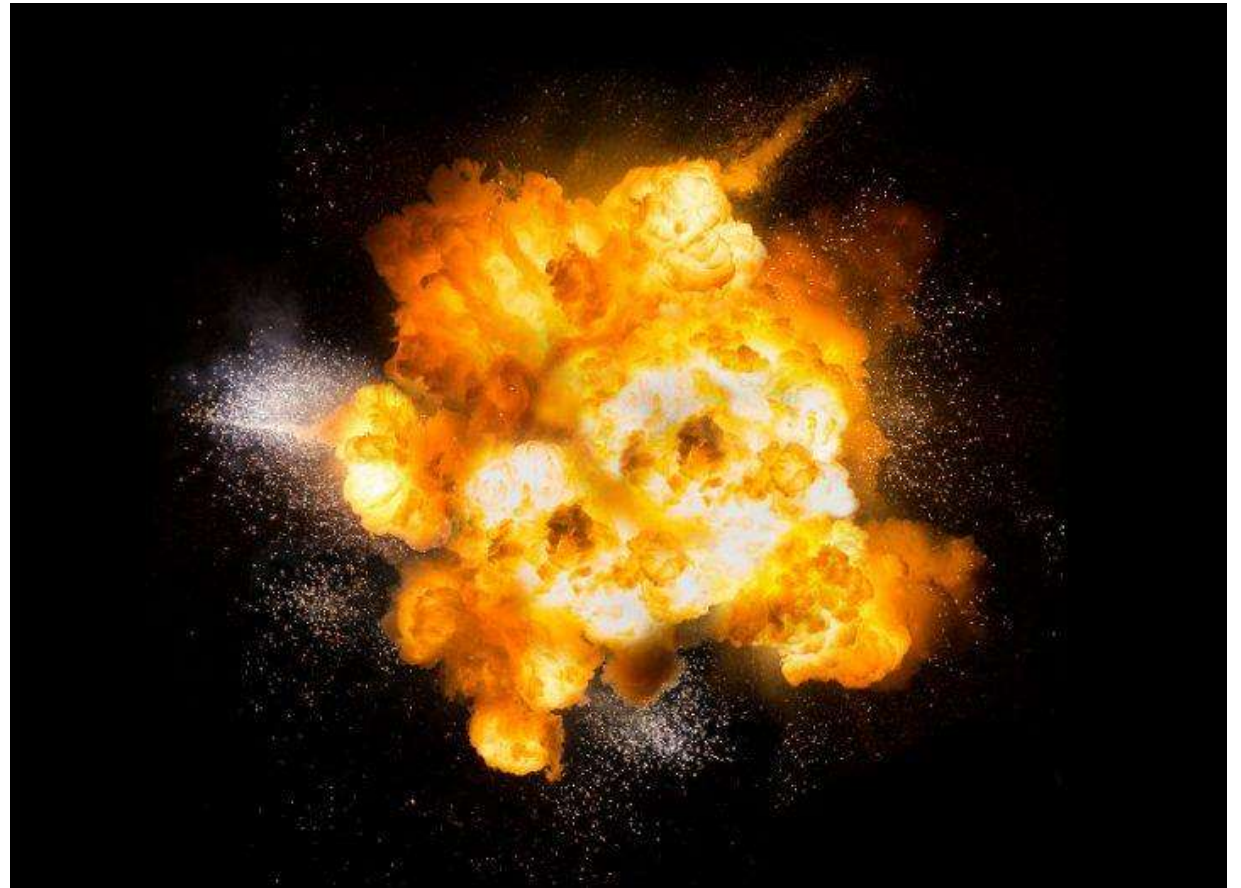
NONE

NOT

The most expensive hyphen in history

In 1962, NASA attempted to send an interplanetary probe called Mariner 1 to explore Venus. Due to a single missing hyphen in the code that was used to program the speed and trajectory, the probe exploded a few minutes after takeoff.

The typo set the U.S. government back \$80 million, which was about 7% of NASA's \$1.2 billion federal budget for 1962.

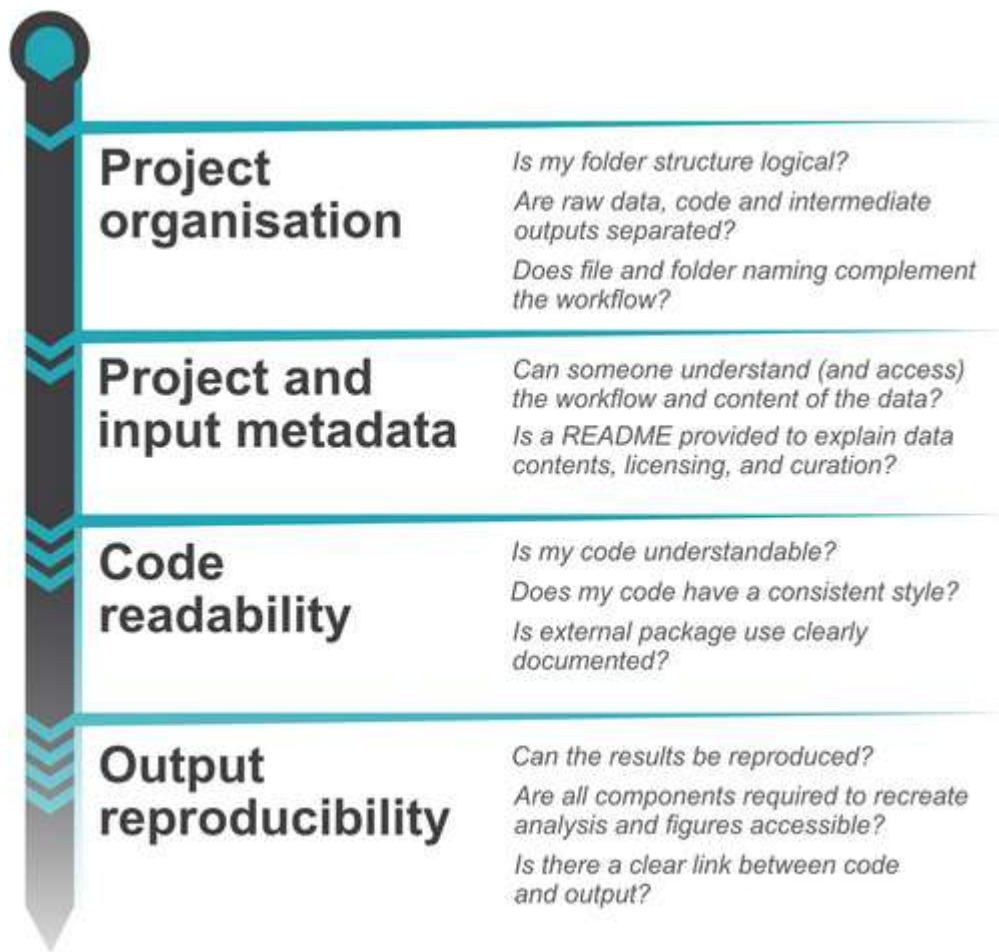


Code pomaže da:

- 1) Razumijemo analizu
- 2) Ispravimo pogreške
- 3) Evaluiramo zaključke
- 4) Ponovo ga koristimo

Implementing code review in the scientific workflow: Insights from ecology and evolutionary biology, 2023

<https://doi.org/10.1111/jeb.14230>



Financijeri, izdavači, institucije

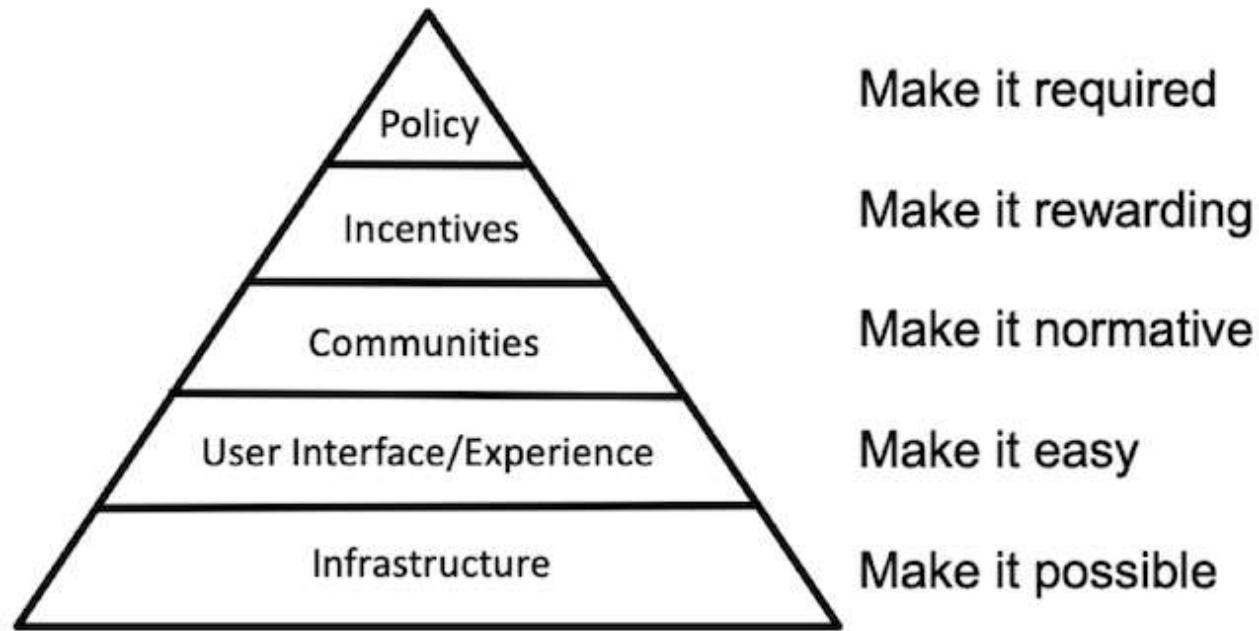


Fig credit: B. Nosek, Strategy for Culture Change (2019):
<https://www.cos.io/blog/strategy-for-culture-change>

Što Vi možete napraviti

- 1) primijeniti najbolje prakse (registracija, otvoreni podatci...)
- 2) provesti meta-istraživanja
- 3) razviti solucije za svoje područje
- 4) zalagati se kod izdavača, financijera.....
- 5) ne kritizirati druge 😊

Zašto bi nas bilo briga?



IS TH

No, ther

38
Yes, a sli
cri

The Economist

OCTOBER 19TH-20TH 2013 economist.com

Washington's lawyer surplus
How to do a nuclear deal with Iran
Investment tips from Nobel economists
Junk bonds are back
The meaning of Sachin Tendulkar

HOW SCIENCE GOES WRONG

99
Einsteinium

©nature

YSIS?

crisis

©nature

Ravnopravnost, rast znanja, mogućnost da napravimo razliku

<https://youtu.be/9vz06Q03UkQ?t=6032>

View

Workflow

How Aaron Swartz paved way for Jack Andraka's revolutionary cancer test

Jack Andraka's breakthrough pancreatic cancer test would have never come about were it not for access to online journals -- what Internet guru Aaron Swartz was promoting before his death. Andraka "religiously" used free online academic journals in the research because "in most online databases, articles cost about \$35, and there are only about 10 pages."

Massoud Hayoun | Posted: Jan 29th, 2013

SLIDE

Hvala!

*Marija Purgar
Shinichi Nakagawa
Tin Klanjscek
Paul Glasziou
Paolo Manghi
Miriam Baglioni
Saskia Woutersen-Windhouver
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Jip Ramakers
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Simon Evans*

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