Ten Simple Rules for Cultivating Open Science and Collaborative R&D
By Hassan Masum et al

Ten Simple Rules for a Successful Cross-Disciplinary Collaboration
By Bernard Knapp et al

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The Authors

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Rule 1: Get The Incentives Right

- People won't contribute to open source projects unless you give them the right incentive to
- The best collaborations "align individual incentives with collective benefit"

Santander Product Recommendation
Can you pair products with people?
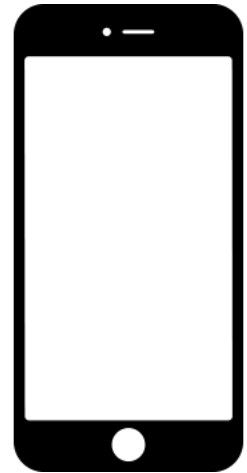Featured · 2 months to go · 313 kernels

$60,000
216 teams

Rule 2: Make Your Controlled Collaborations Win-Win-Win

- At time people hesitate to participate in open science due to reasons such as privacy, competition, or security
- By adding proper controls you can make it so that you, your partners, and the public can benefit

Debunking of World Deworming Programmes

Anonymized phone datasets

1. http://www.forbes.com/sites/bethsimonenoveck/2015/09/24/private-data-sharing-for-public-good/#62a310c565bb
2. https://www.theguardian.com/society/2015/jul/23/research-global-deworming-programmes

Rule 3: Understand What Works - and What Doesn't

- Choose a collaborative method and platform that works for you
- No good to have a "Wiki without an audience"

Stat 159

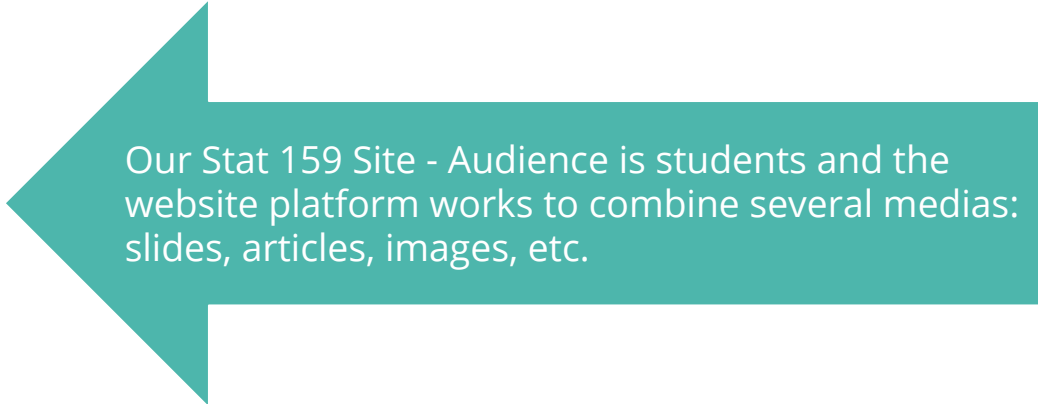Reproducible and
Collaborative Statistical
Data Science.

Home
Lectures
Syllabus
GitHub repo
Fall 2016

Gaston Sanchez

Our Stat 159 Site - Audience is students and the website platform works to combine several medias: slides, articles, images, etc.

Rule 4: Lead as a Coach, Not a CEO

- When you lead a collaborative project, you are working with people that have different backgrounds, styles, thought processes, etc.
- Therefore, you must be flexible about management of the project to create a collaborative community

wrote description of Credit data
nikkirethyo committed 7 days ago

wrote abstract
nikkirethyo committed 7 days ago

Merge pull request #7 from DrakeW/makefile ...
DrakeW committed on GitHub 7 days ago

added Makefile
DrakeW committed 7 days ago

Project 2

Rule 5: Diversify Your Contributors

- An open science project is made more powerful through a diverse group of contributors - students, gamers, researchers - bringing different perspectives to the project
- Can do this through lowering barriers to participation

1. GitHub
2. Open Licensing
3. Avoid pay-to-play

Rule 6: Diversify Your Customers

- Engaging the broadest possible base as beneficiaries can attract unexpected accolades and collaborators
- Productively involving stakeholders can inform your research
- Contributing to collaborative initiatives targeting **human development challenges** can motivate your team & potentially lead to innovations that are transferable to for-profit market
- For commercially driven work, humanitarian licensing approaches encourages nonprofit applications

Rule 7: Don't Reinvent the Wheel

- Reusing what already exists leads to greater effectiveness
- Piggybacking on active efforts eases prototyping and gathering enthusiastic initial users

tidyverse / **ggplot2**   ★ Star

An implementation of the Grammar of Graphics in R

● R   ★ 2094   ⑂ 782   • Built by

rstudio / **shiny**   ★ Star
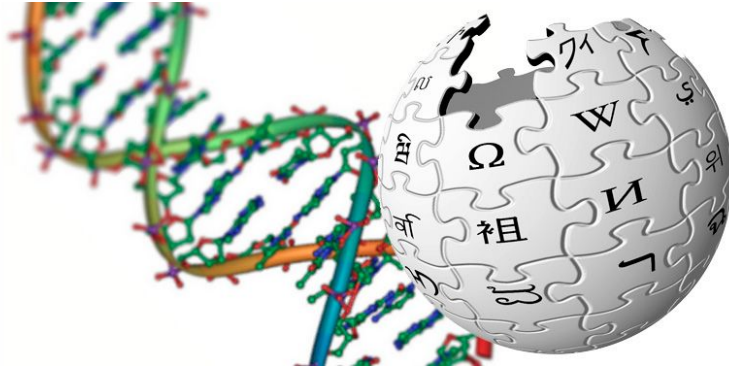
Easy interactive web applications with R

● R   ★ 1968   ⑂ 1,091   Built by

Rule 8: Think Big

- For projects hoping to harness the power of mass collaboration, a **major** challenge can attract a large community of contributors.

Rule 9: Encourage Supportive Policies and Tools

- Cultivate open source & collaborative R&D to be part of "standard operating procedure"
  - **Policy**: Institutional data sharing
  - **Tool**: Profiling platform of open source initiatives that summarizes what they have achieved & what type of collaborators they are seeking
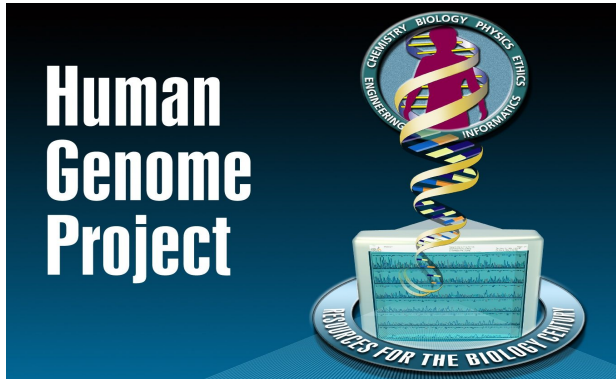
symbol of the benefits of policies on early release of scientific data

Rule 10: Grow the Commons

- Growing shared knowledge and tools -- the "commons"
- Advance interests while remaining part of this open & collaborative environment

Questions - Cultivating Open Science & Collaboration

1. Can anyone think of another example relating to one of these rules? Ie. What's your personal incentive for collaborating on projects? Big open source projects that have brought people together?
2. Do any of these rules stand out to you as important? Are any of them not very helpful?

Why cross-disciplinary collaboration is important

- Solutions to pressing, global-scale societal challenges
  - Example: Horizon 2020
- Provide insights beyond borders of specific discipline
- The combination of methods and data from different fields can achieve more than the sum of the individual parts could do alone

THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

HORIZON 2020

Rule 1: Enjoy Entering a Completely New Field of Research

- Why?
  - A good opportunity to learn about cutting-edge science directly from experts
- How?
  - Prepare for a deluge of new ideas and approaches
  - Discuss your work with scientists from complementary fields and get feedback
  - Get familiar with terminologies (more in Rule 3)
- Example:
  - BIDS Machine Shop Incubator

Rule 2: Go to the Wet Lab

- Understand where experimental data sets come from
  - In-built assumptions, strengths, and weaknesses
- Understand the experimental setup
  - Time, cost, constraints
- Learn different perspectives
- Benefits:
  - Suggest appropriate test cases
  - Acknowledge your colleagues' efforts

Rule 3: Different Fields Have Different Terminologies: Learn the Language

- A good way to establish a common parlance
- Learn the other field's jargon early on in the collaboration
- Ask basic questions about the meanings of words

Rule 4: Different Fields Have Different Speeds: Do not Become Impatient

- Accept the different pace of different fields
- Communicate well
- Be patient
- Estimate != commitment != target
- Example:
  - Research in experimental biology
  - Journal publication
  - …
  - Sheldon's farewell to string theory

Rule 5: Different Fields Have Different Reward Models: Know What You Can Expect
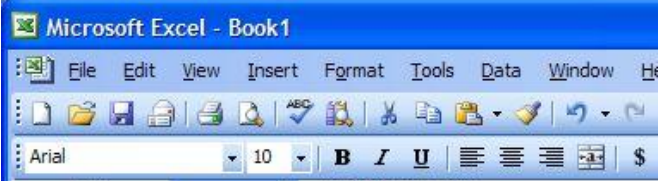
- Life sciences vs. theoretical sciences
- Example: differences in publication culture
  - Publication speed, evaluation metrics, peer-reviewed conference proceedings, academic environment..
- Come up with a strategy after discussing with your collaborators

Rule 6: What Different Fields Mean by "Data"

- Problem: Data organisation is not a universally understood term
  - Spreadsheets?
- Solution: agree on standardized data format
- Always perform "sanity checks"

Rule 7: Assess the Advantages and Disadvantages of Service Work

- Service work for a theoretical scientist?
  - Statistical analysis
  - Maintaining databases
  - Keeping code base up-to-date
- Pros: allows you to establish a collaboration, gain trust, co-author high-quality publications
- Cons: potentially time-consuming

Rule 8: Create and Manage Structural Bonds

- How? Regular meetings, workshops, co-teaching of courses
- Financial support often necessary
  - Initial setup: seed funding schemes
  - Further application for larger grants
- Don't get lost!

Rule 9: Recognise When Things Are Not Working Well

- Pause

- Search for Alternative Collaborators

- End Collaboration

Rule 10: Be Synergistic

- Always look to optimize mutual gain
  - Brilliant algorithm WITH huge unpublished dataset?
- Both parties should feel like they are winners
  - Good advice - Fisher, Ury and Patton's *Getting to Yes: Negotiating Agreement Without Giving In*

Questions?

- Bernard Knapp comes from a computational biology background. Do you think there are any disciplines where these rules for collaboration would not apply? Or disciplines that are more applicable than others?