Sharing in a gray area

A framework for big data curation

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Today's Talk

Defining “big data”

Benefits of sharing big data

Ethical challenges of big data research and sharing

STRIDE framework for ethical big data sharing

Dryad case studies

Key takeaways and questions

Defining “big data”

Practices

“While ‘big data’ is a vague and amorphous term, we use it as a shorthand to refer to practices that draw on largescale datasets and predictive analytics.”

—Metcalf & Crawford, 2016

Defining “big data”

Datasets

Extremely large datasets that may be analyzed computationally to reveal patterns, trends, and associations, especially relating to human behavior and interactions.

—Oxford Dictionaries

Some examples of big datasets

Credit card transaction data

Clickstream data tracked by websites

Geospatial data generated from mobile devices

Internet of Things sensor data

Social media posts

Data sharing is a good thing

Open Data movement

Funder & publisher requirements

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"Big data rich and big data poor" (boyd & Crawford, 2012)

Big data represents human subjects and human activity, and must be considered accordingly

Ethical challenges of big data research

How can data be gathered without people's knowledge or consent and still meet the ethical obligation to treat people with respect, beneficence, and justice, as outlined in the Belmont Report?

—paraphrased from Crawford, Miltner, & Gray, 2014

The Belmont Report, 1979

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Respect for Persons. Participants should be fully informed about the research activity, and should opt into the research.

Beneficence. Research should maximize benefits and minimize possible harms.

Justice. Participants who bear the risk of possible harm should also receive the benefits of the research.

Ethical challenges of big data research

Big data are collected under mandatory terms of service rather than responsible research design overseen by university compliance officers.

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Data are gathered by agents other than the researcher—private software companies, state agencies, and telecommunications firms.

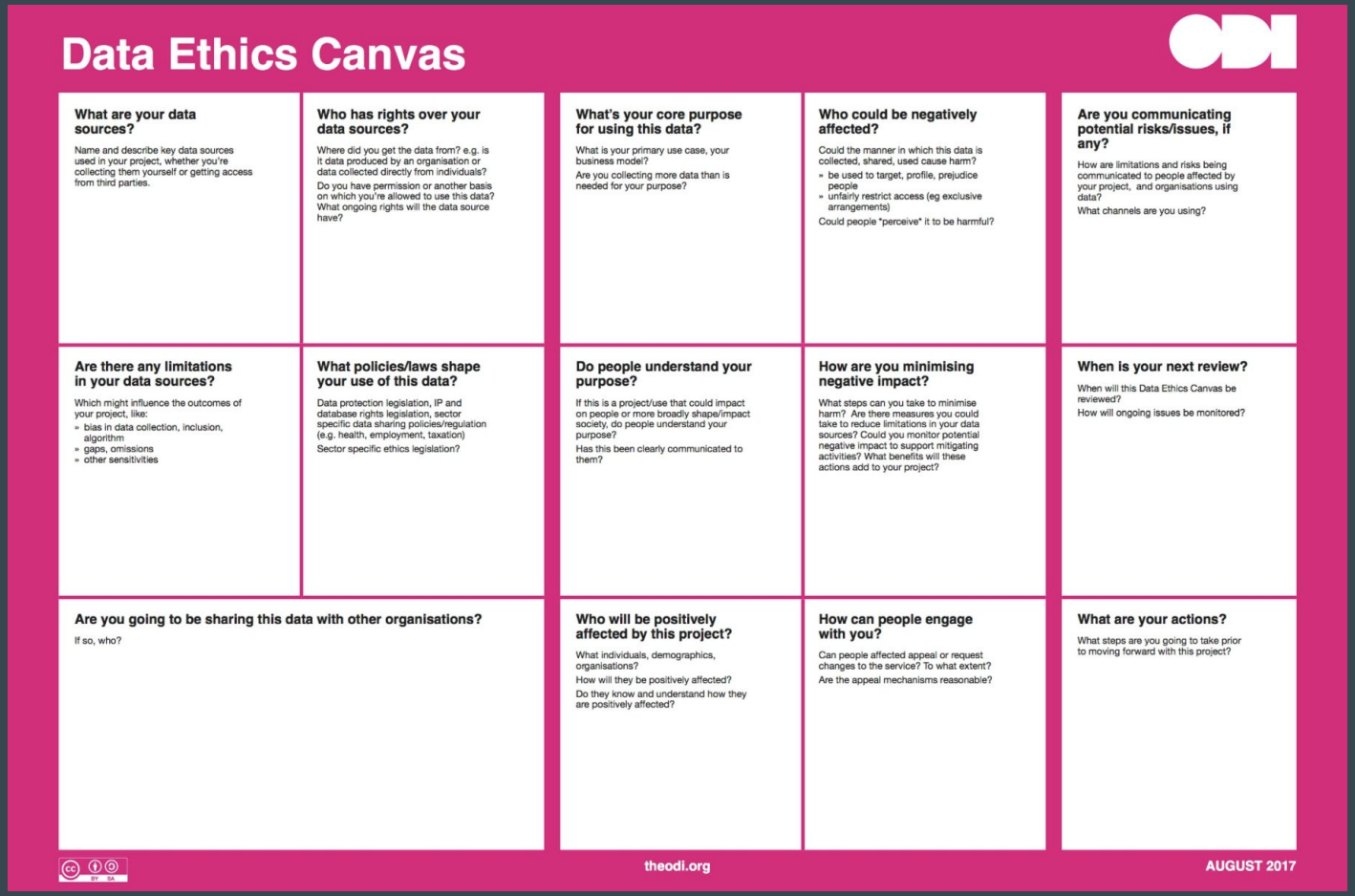
Data are only accessible to researchers after their creation, making it impossible to gain informed consent before the research is conducted.

—paraphrased from Zook et al., 2017

Ethical challenges of big data research

"Scientific research that involves drawing on what is euphemistically known as "passively collected" big data must face difficult questions and develop new ethical frameworks."

—Crawford, Miltner, & Gray, 2014



https://theodi.org/the-data-ethics-canvas

Open Data Institute Data Ethics Canvas

What are your data sources?

Who has rights over your data sources?

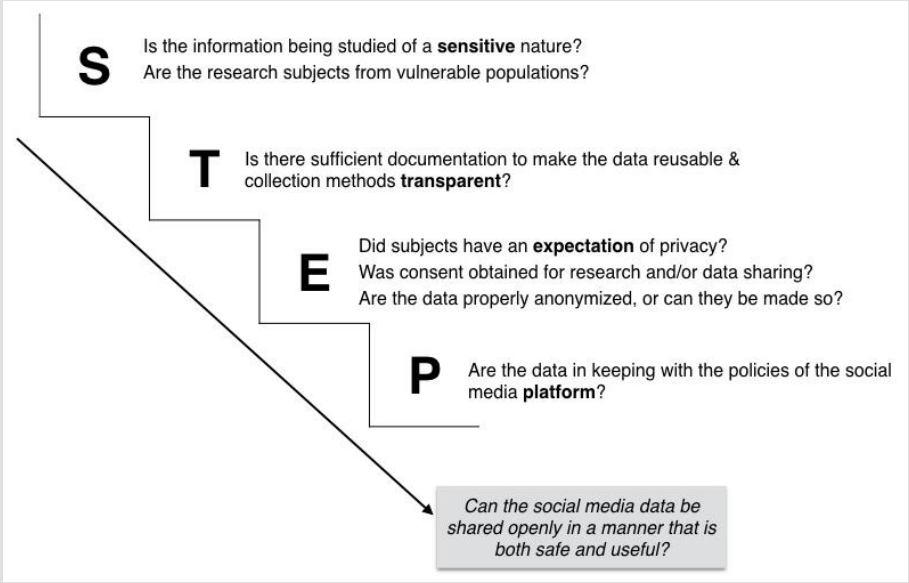
What is your core purpose for using the data?

Who could be negatively affected?

Are you communicating potential risks/issues, if any?

Our previous research

The STEP Framework for social media data curation



Can the data be shared openly in a manner that is both safe and useful?

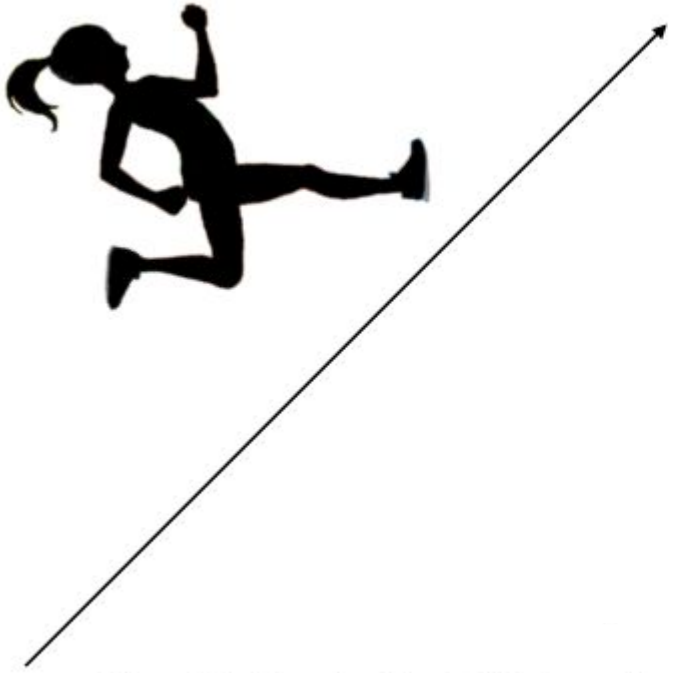
E xpectation of privacy

D ata source

I dentification

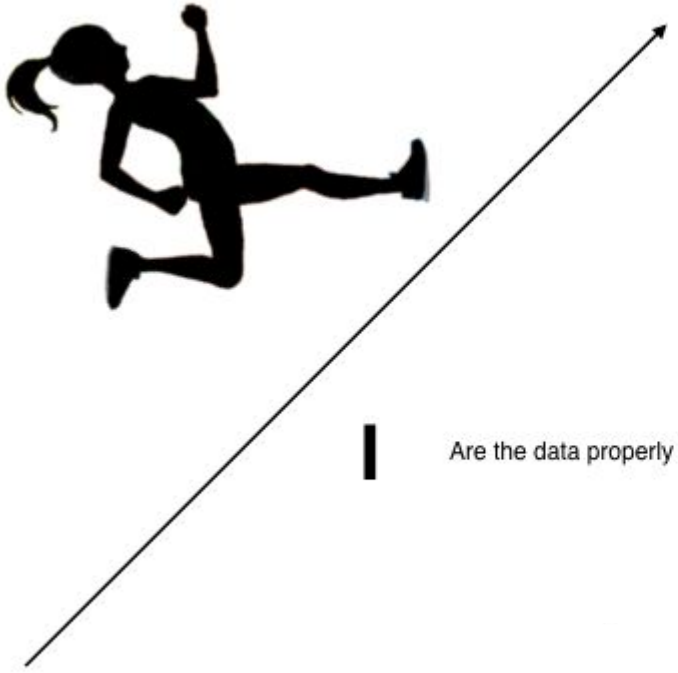
TR ansparency

S ensitivity



S Is the information being studied of a **sensitive** nature?
Are the research subjects from vulnerable populations?

TR Is there sufficient documentation to make the data reusable & collection methods **transparent**?



Are the data properly de-**identified**, or can they be made so?

D

What is the **data source**, or the context in which it was collected?

E

Did subjects have an **expectation** of privacy?
Was consent obtained for research and/or data sharing?

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Guiding principles

STRIDE framework

1. **RISK-BENEFIT ANALYSIS.** When sharing big data, researchers and data curators must measure the benefits of sharing data against the potential risks to human subjects.

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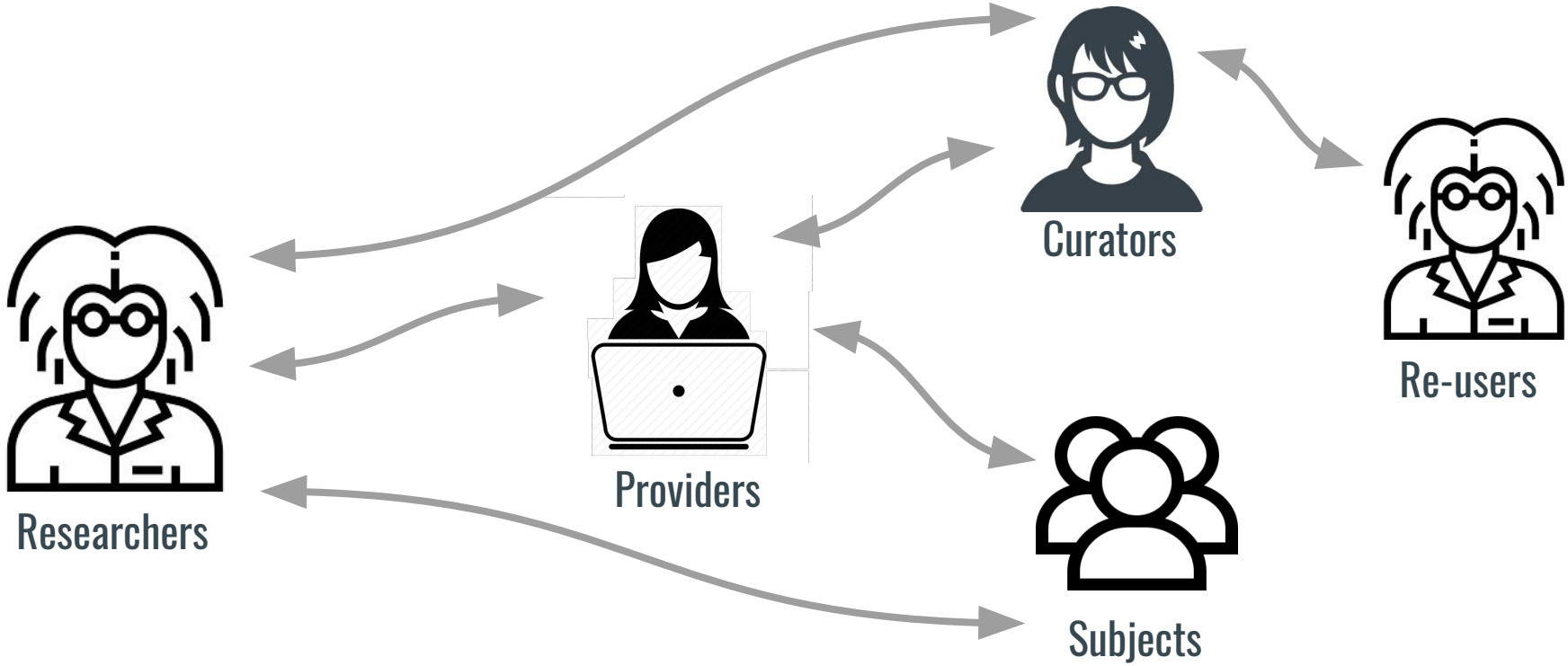
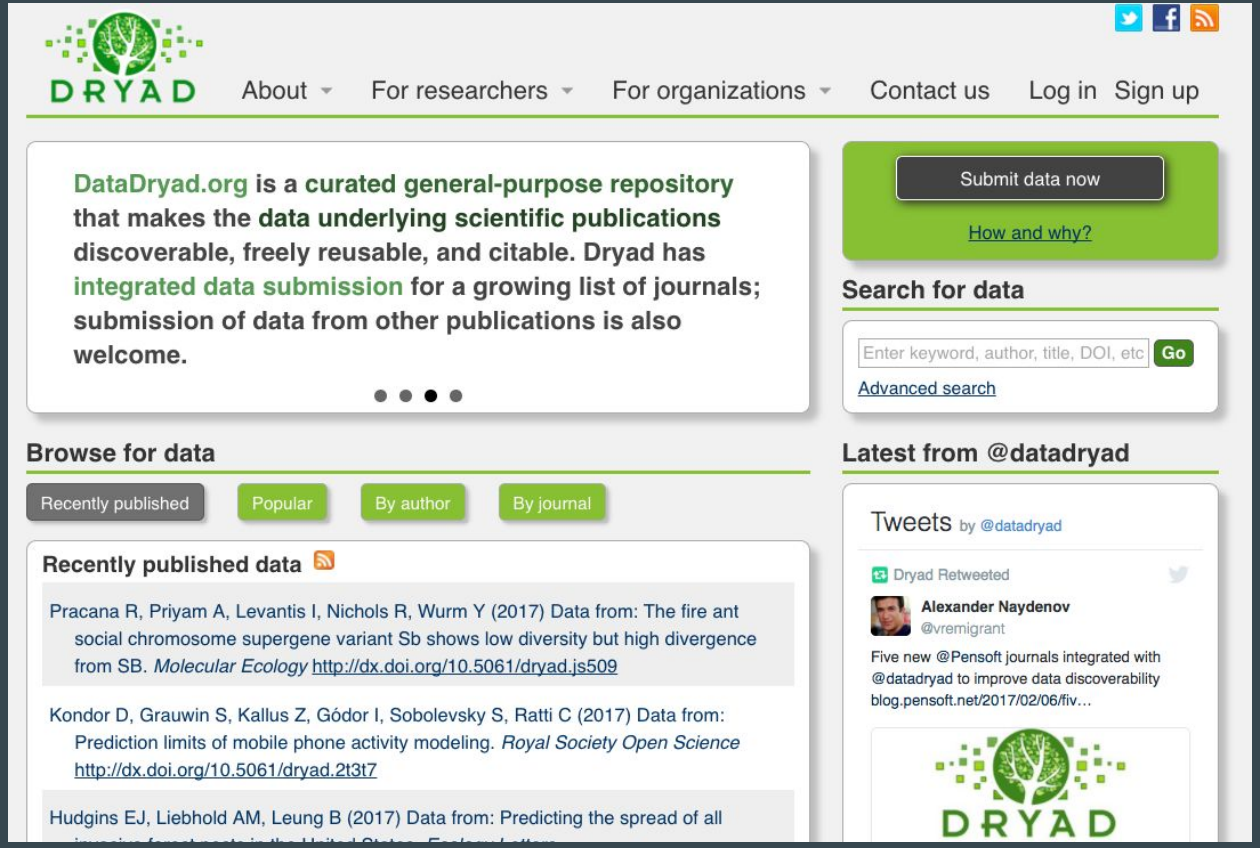
1. **RISK-BENEFIT ANALYSIS.** When sharing big data, researchers and data curators must measure the benefits of sharing data against the potential risks to human subjects.
2. **RESPONSIBILITY.** Data curators can help educate researchers about ethical data sharing, but researchers themselves are ultimately responsible for the data they share.
3. **CONTINUAL INQUIRY**. Ethical practice requires ongoing dialogue and examination.

Humans in the open data ecosystem





http://datadryad.org

Dryad's mission and vision

Dryad is a **curated, general-purpose** home for a wide diversity of data types associated with scientific and medical publications.

Dryad's **vision** is to promote a world where research data is openly available, integrated with the scholarly literature, and routinely re-used to create knowledge.

Our **mission** is to provide the infrastructure for, and promote the re-use of, data underlying the scholarly literature.

http://datadryad.org

Case study #1

Sci-Hub

Elbakyan A, Bohannon J (2016) **Who's downloading pirated papers? EVERYONE**

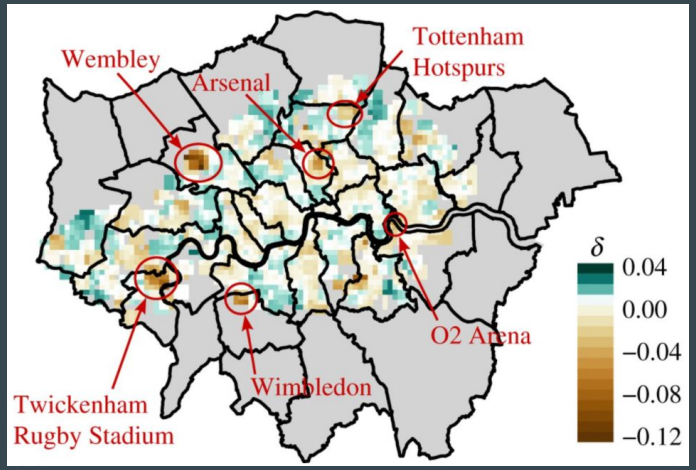
- Data obtained directly from server logs: “To let the world see how Sci-Hub is being used, mapping users at the highest resolution possible while protecting their privacy”
- IP addresses replaced with an arbitrary hex code
- Geographic locations of users aggregated to the nearest cities

Dryad data; blog post

Article: Science 352(6285): 508-512

Case study #2

Spatio-temporal patterns of mobile phone activity



Kondor et al (2017) **Prediction limits of mobile phone activity modelling**

- 10 months of mobile phone records from London used to investigate the regularity of human telecom activity on urban scales
- Data release agreement with provider
- Used “time averaging and spatial smoothing” to protect privacy

Dryad data

Article: Royal Society Open Science 4(2): 160900

Case study #3

All the Twitter feels

Charlton et al (2016) **In the mood: the dynamics of collective sentiments on Twitter**

- Study of "the relationship between the sentiment levels of Twitter users and the evolving network structure that the users created by @-mentioning"
- Data included anonymized user IDs but exact timestamps; no cross-referencing with other identifiable data
- "Private" conversations on a public platform

Dryad data

Article: Royal Society Open Science 3(6): 160162

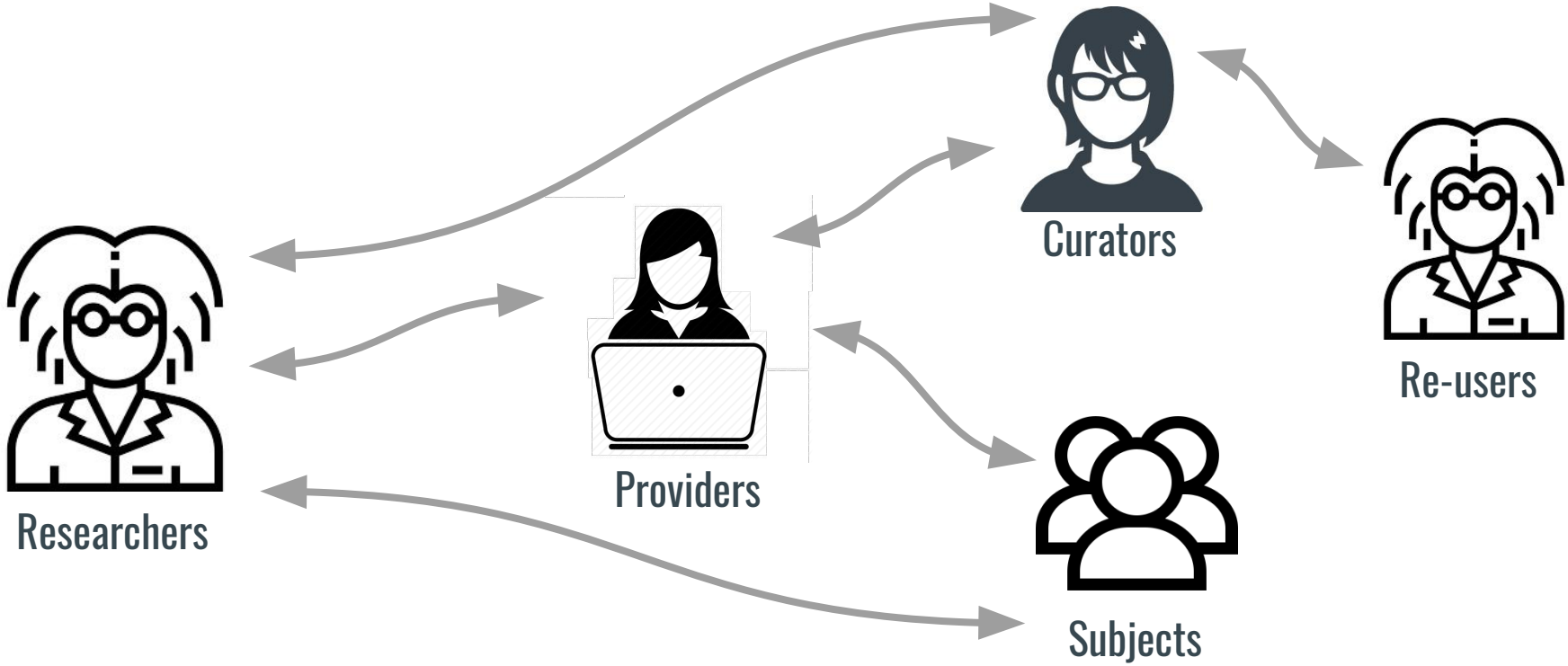
AREA

Ethical considerations for big data research

"One of the most fundamental rules of responsible big data research is the steadfast recognition that most data represent or impact people."

—Zook et al., 2017

Humans in the open data ecosystem



Striding onward

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