

Human Subjects Research



If you don't know whether your research falls under “human subjects research”, ask your
IRB

Thanks for having me!



Mark Shervey

Data Engineer @ Institute for Next Generation
Healthcare

Icahn School of Medicine at Mount Sinai



What is research?

Research: systematic investigation to develop or contribute to generalizable knowledge.

Human subjects research: data through intervention/interaction; data that is private and identifiable

- Inclusion ex.: coded or identifiable electronic health record (EHR) data; any protected health information (PHI)
- Exclusion ex.: publicly available, anonymous data.

What is research?

**If you don't know
whether your research
falls under "human
subjects research", ask
an IRB**

IRB Approval

The IRB determines whether your project is ethically sound

- You're not going to do anything purposely unethical, BUT there may be aspects of your research that could be questionable or overly manipulative.
- Research participants are giving up their time, personal information, specimens, etc., to help you. It's our responsibility to make sure we're doing everything possible to ensure a respectful and just experience.

How'd it start?

Nuremberg code (1947)

- Rules for permissible medical experiments: result of WWII experimentation
 - Performed experiments on war prisoners and others; cruel, brutal, resulted in death

National Research Act (1974)

- Because of Tuskegee (& other experiments)
 - Assess natural progression of syphilis in untreated black men
 - No informed consent, participants were told they were being treated for “bad blood”
 - 40 years instead of 6 months (1932-1972, Mason County Alabama)
 - Did not treat even when penicillin was deemed an effective treatment
- Established the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research
 - To identify basic ethical principles for research on humans; develop guidelines for ensuring principles are adhered to ('75-'78)
- Required establishment of IRB at organizations receiving Public Health Service (PHS) support for human research

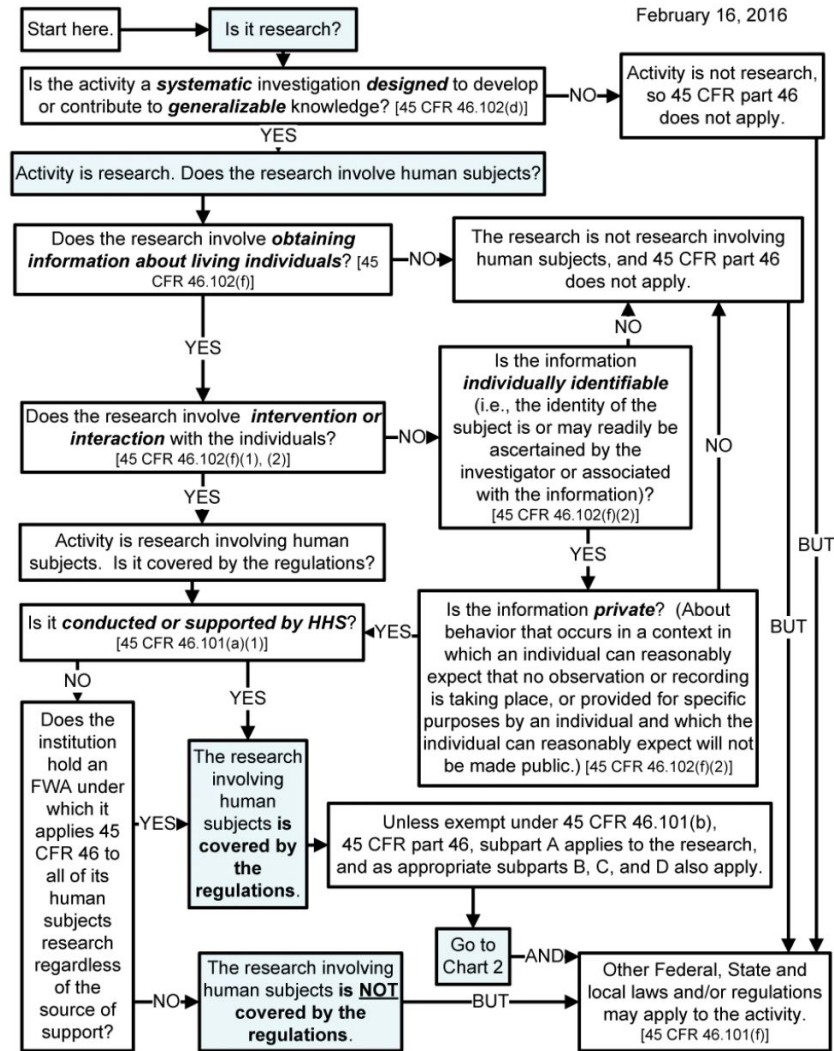
How'd it start?

Belmont Report (1979)

- Result of 1974 National Commission discussions
- 3 basic principles for human subjects research
 - Respect for persons: protecting the autonomy of all people; informed consent
 - Beneficence: "Do no harm"; maximizing benefits for the research project and minimizing risks to the research subjects
 - Justice: ensuring reasonable, non-exploitative, and well-considered procedures are administered fairly; fair distribution of costs and benefits to *potential* research participants
- US regulations are designed to implement the principles of the Belmont Report
- <https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/index.html>

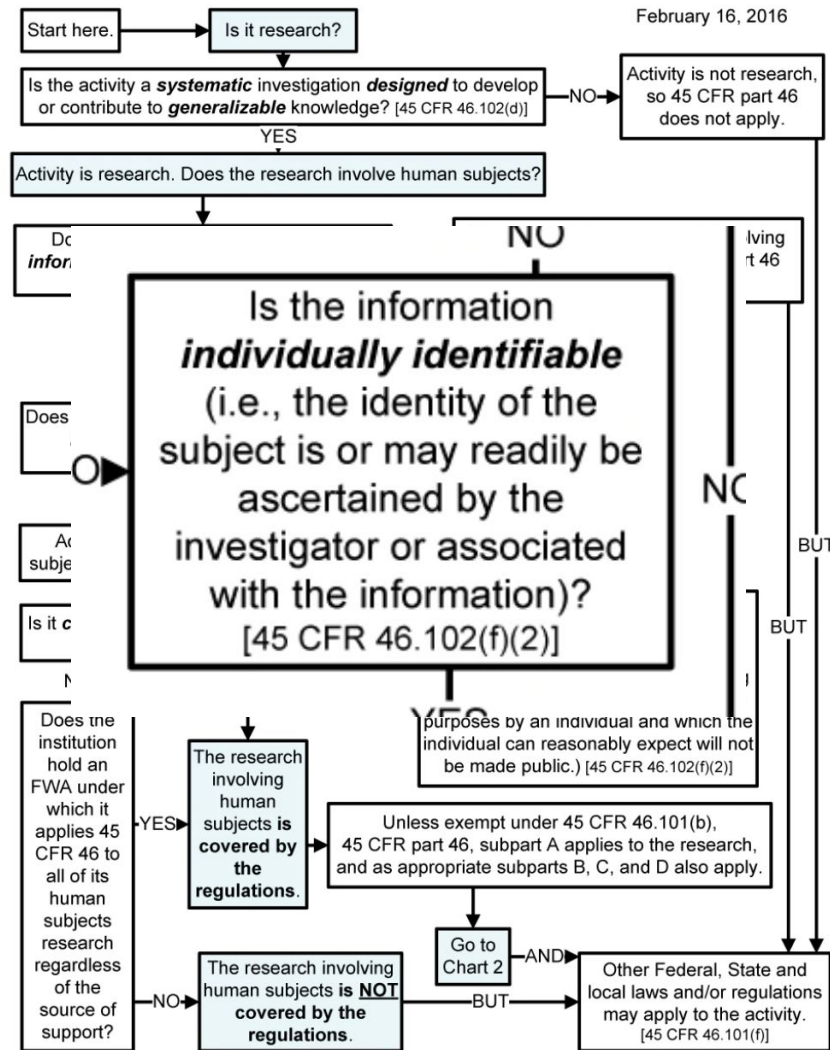
Human Subjects Research

<https://www.hhs.gov/ohrp/regulations-and-policy/decision-charts/index.html>



Human Subjects Research

<https://www.hhs.gov/ohrp/regulations-and-policy/decision-charts/index.html>



Protected Health Information (PHI)

- (1) Names
- (2) All geographic subdivisions smaller than a state, including street address, city, county, precinct, ZIP code, and their equivalent geocodes, except for the initial three digits of the ZIP code if, according to the current publicly available data from the Bureau of the Census:
 - (A) The geographic unit formed by combining all ZIP codes with the same three initial digits contains more than 20,000 people; and
 - (B) The initial three digits of a ZIP code for all such geographic units containing 20,000 or fewer people is changed to 000
- (3) All elements of dates (except year) for dates that are directly related to an individual, including birth date, admission date, discharge date, death date, and all ages over 89 and all elements of dates (including year) indicative of such age, except that such ages and elements may be aggregated into a single category of ≥ 90 .
- (4) Telephone numbers
- (5) Vehicle identifiers and serial numbers, including license plate numbers
- (6) Fax numbers
- (7) Device identifiers and serial numbers
- (8) Email addresses
- (9) URLs
- (10) Social security numbers
- (11) IP addresses
- (12) Medical record numbers
- (13) Biometric identifiers, including finger and voice prints
- (14) Health plan beneficiary numbers
- (15) Full-face photographs and any comparable images
- (16) Account numbers
- (17) Any other unique identifying number, characteristic, or code
- (18) Certificate/license numbers

Protected Health Information (PHI)

Limit the collection and use of PHI as strictly as possible.

Why is all this important?

Informed consent!

- People have the right to **know** and **choose** who they give data to and what research activities they're involved in

General human decency and respect

- Keeping data humanized

Institute risk

- Research ban for serious ethical violations

Publishing

- Cannot publish without approval
- Publications redacted

Examples of Violations

CRISPR babies (2018)

- He Jiankui (Southern University of Science and Technology, China) claimed to have created the first CRISPR-edited babies
 - Did not tell his university; conducted study secretly
 - Claimed to have ethical approval, but hospital ethics committee never reviewed his project; possibly forged signatures on approval form
 - Consent form existed, but there was no “informedness”; language way too technical for participants, didn’t really cover all risks
- <https://www.theatlantic.com/science/archive/2018/12/15-worrying-things-about-crispr-babies-scandal/577234/>

Dr. Joachim Boldt (2011)

- Anesthesiologist/researcher with intl reputation found guilty of research misconduct, including failure to acquire ethical approval and fabrication of study data
 - 96 out of 102 publications withdrawn since 1999
 - 89 out of 102 articles did not have IRB approval
 - Faced fines and possible jail time; lost position at hospital

Examples of Violations

Data breaches (2018)

- Most PHI data breaches are due to internal negligence
- In US: “...nearly 1,800 occurrences of large data breaches in patient information over seven years, with 33 hospitals experiencing more than one substantial breach”
- “One quarter of all the cases were caused by unauthorized access or disclosure ... an employee taking PHI home or forwarding to a personal account or device, ... or even through email mistakes, like sending to the wrong recipients,”
- <https://www.hcinnovationgroup.com/cybersecurity/news/13030905/study-internal-negligence-not-hackers-responsible-for-half-of-data-breaches>

Digital Research Studies

Digital Research:

A systematic investigation powered by software. This is often in the form of a phone or web application that participants and investigators interact with.

Digital Research Studies: New Terminology

Project: a broad set of general activities that are within some theme. One or more studies may live inside of the umbrella project.

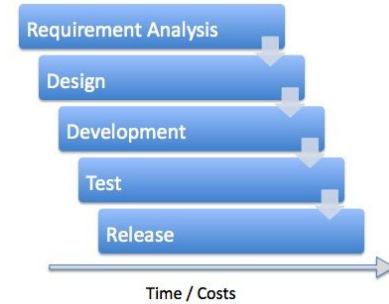
Study: a narrow set of research activities that are specifically related to an approved protocol (consent, eligibility, questionnaires, data sharing, etc).

Platform: the software system that users interact with. Users may interact with multiple platforms within a project.

User: a person interacting with the *project* (e.g. email subscribers, web viewers, social media followers, app downloaders)

Participant: someone who consents to the digital research study

Digital Research Studies: Traditional Software Development



linear cycle (known as Waterfall) where requirements, design, and implementation occurred in sequential fashion over the course of many months.

Digital Research Studies: Modern Software Development

Modern development has coalesced on Agile processes, which generate much better results. At the extreme of agility, the biggest/best companies update their code multiple times PER DAY.

In 2016, Facebook was modifying their user-facing code 3 times/day.

Amazon releases 50 million deployments annually

- <https://www.allthingsdistributed.com/2014/11/apollo-amazon-deployment-engine.html>

**Where can we safely
employ an Agile
approach to
development?**

Digital Research Studies: New Terminology

Project: a broad set of general activities that are within some theme. One or more studies may live inside the umbrella project.

Study: a narrow set of research activities that are specifically related to an approved protocol (consent, eligibility, questionnaires, data sharing, etc).

Platform: the software system that users interact with. Users may interact with multiple platforms within a project.

User: a person interacting with the *project* (e.g. email subscribers, web viewers, social media followers, app downloaders)

Participant: someone who consents to the digital research study

Digital Research Studies: New Terminology

Project Activities

(audience = users worldwide)

A collection of essays about historical cases regarding a project on the project website, app, social media

Social media and email newsletter with news about the science of a project

Content about other research happening in the subject matter of the project

Study Activities

(audience = enrolled participants)

Electronic informed consent of prospective participants in research

Administration of study questionnaires in the app

Data sharing settings

Withdrawal process in the app

Questions?

Thank you!

If you don't know whether your research falls under "human subjects research", ask your IRB.

Limit the collection and use of PHI as strictly as possible.

Deploy agile software development practices only when safe for study participants.

MIT OpenCourseWare

<https://ocw.mit.edu>

6.S897 / HST.956 Machine Learning for Healthcare

Spring 2019

For information about citing these materials or our Terms of Use, visit: <https://ocw.mit.edu/terms>