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Research [Ethics | Integrity | Compliance]
Fundamentals of Responsible Conduct of Research

Dr. Enrico Glerean, Staff Scientist and Data Agent at **Aalto University**

Outline: Research [Ethics | Integrity | Compliance]

1. Principles of Responsible Conduct of Research
2. Questionable research practices
3. Challenges with new tools (AI)

Learning outcomes

- Understanding research ethics, research integrity, and compliance
- Familiarise with ALLEA and TENK guidelines
- Consider how to responsibly use AI tools in education/research work

Please note: these slides are work in progress. The focus of this slides is on Research Integrity only.

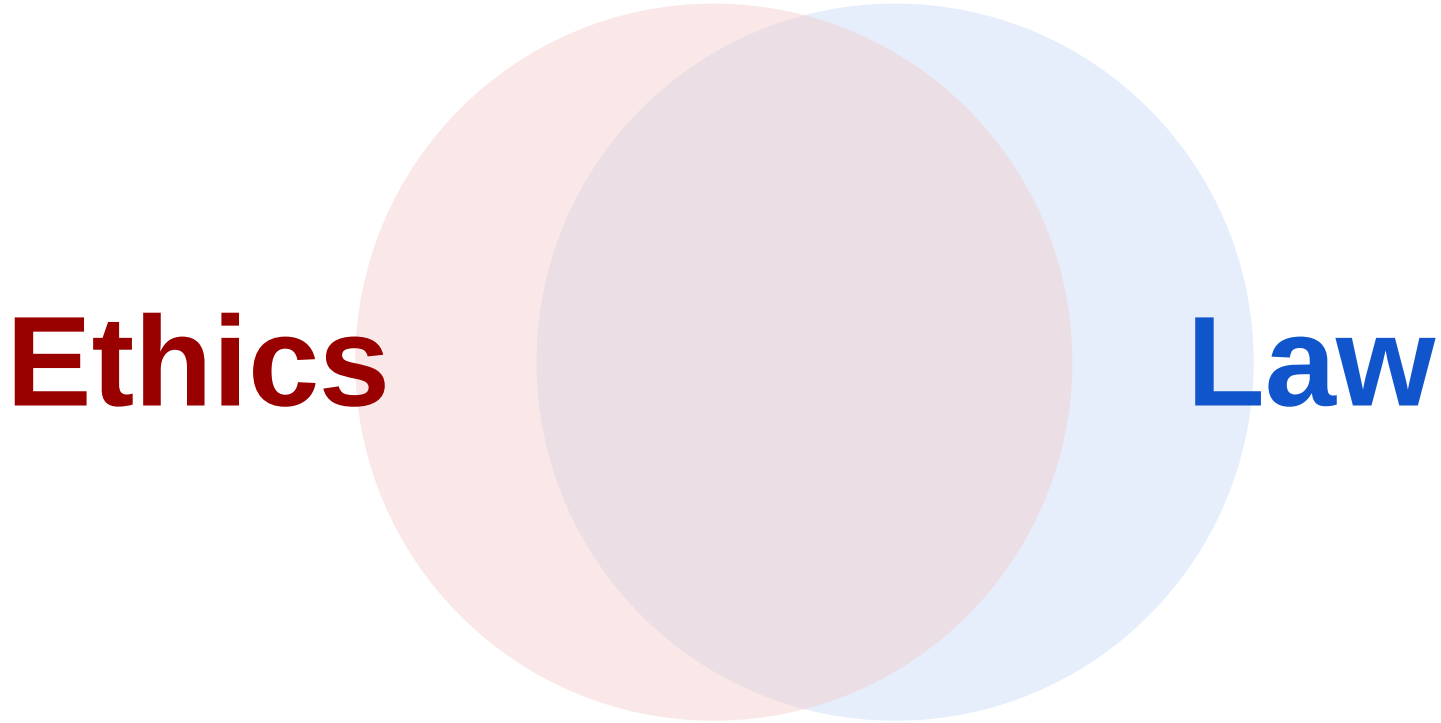
AI!

About the speaker

Enrico Glerean, DSc.

- **Staff scientist and data agent at Aalto University** (background in neuroimaging), training and supporting researchers with handling personal data (anonymization, secure computing), medical images, clinical trials, research ethics and research integrity (AI and new technologies), statistics, open science.
- Other affiliations/COI: **CodeRefinery** (Nordic network to teach computational reproducibility), **Finnish Reproducibility Network** (National network to raise awareness in reproducibility), **Support Pool of Experts** at the **European Data Protection Board** (open training materials on personal data, AI, and cybersecurity), **Data Steward training program** for **Tampere University**

Ethics is not Law



Ethics and law

Ethics:
- a set of moral principles : a theory or system of moral values

Moral:

- of or relating to principles of right and wrong in behavior

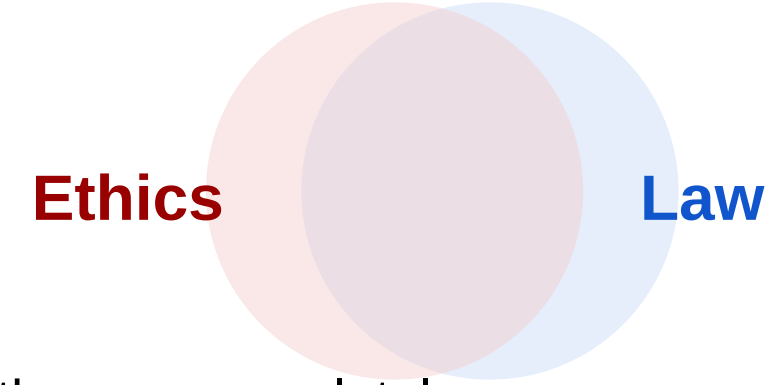
Law:
- a binding custom or practice of a community : a rule of conduct or action prescribed or formally recognized as binding or enforced by a controlling authority

The four principles for ethics

Principle	*Definition*
Beneficence	Do only good: Promote well-being, preserve dignity, and sustain the environment.
Nonmaleficence	Do no harm: Avoid harm by ensuring privacy, security, and fundamental rights.
Autonomy	Preserve human decision-making and dignity
Justice	Promote fairness and solidarity: Ensure equitable outcomes and avoid discrimination.

Adapted from Beauchamp & Childress (2019)

Ethics is not law



- In some countries ethics and law overlap a lot, in some other they are completely separated
- Ethics is based on **fundamental human rights,** laws are changing with what the current government of a country ***think*** is right (although in Europe, individual governments have less freedom to do that)
- Example 1: NGOs in the Mediterranean sea facing prosecution for smuggling illegal immigrants stranded at sea (Jonio/Mediterranea case) [ethical but not legal]
- Example 2: Italian military forces were fined for not helping stranded immigrants (case Hirsi Jamaa and Others v. Italy before the European Court of Human Rights) [legal but not ethical]

What is the right thing to do?

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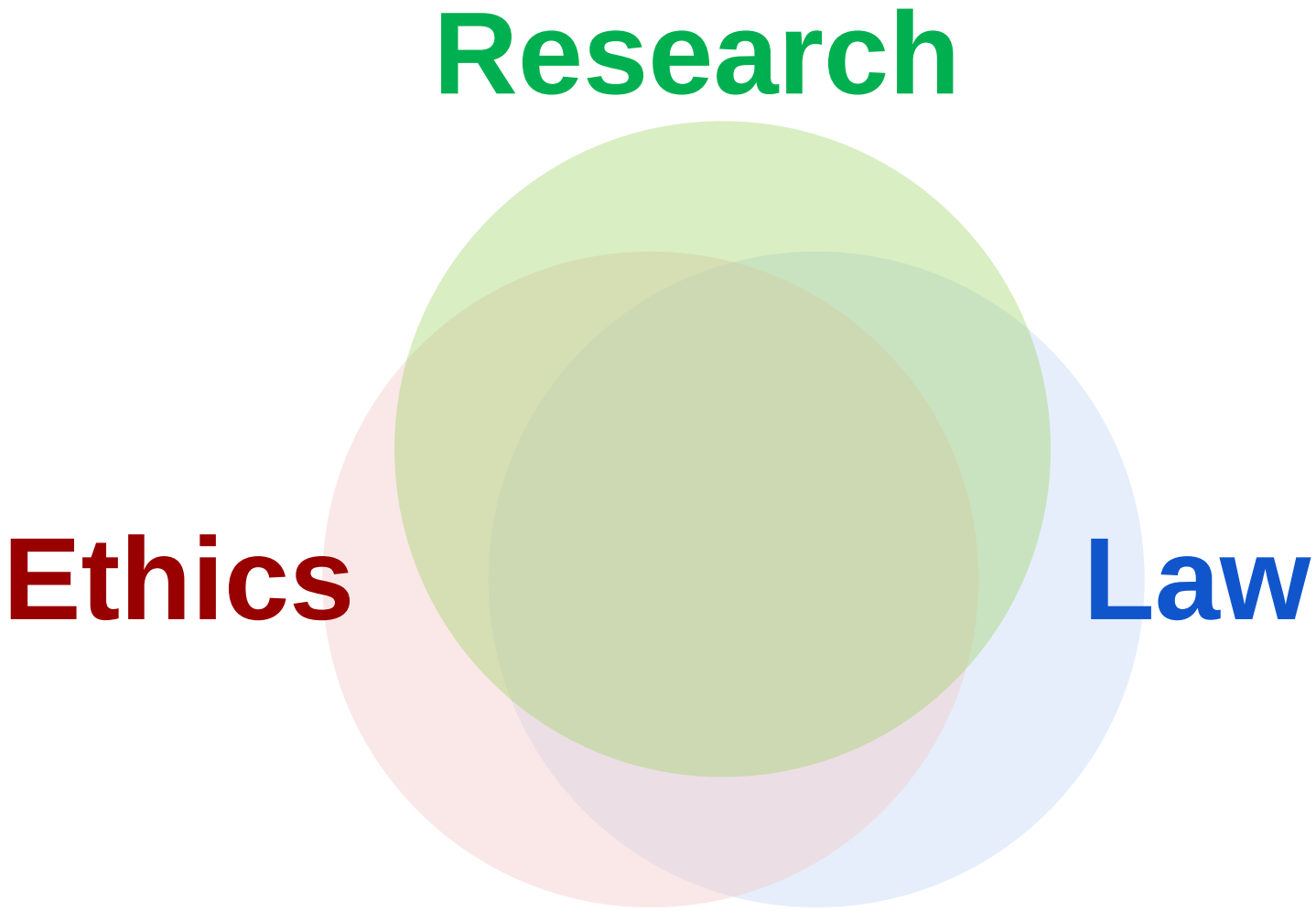
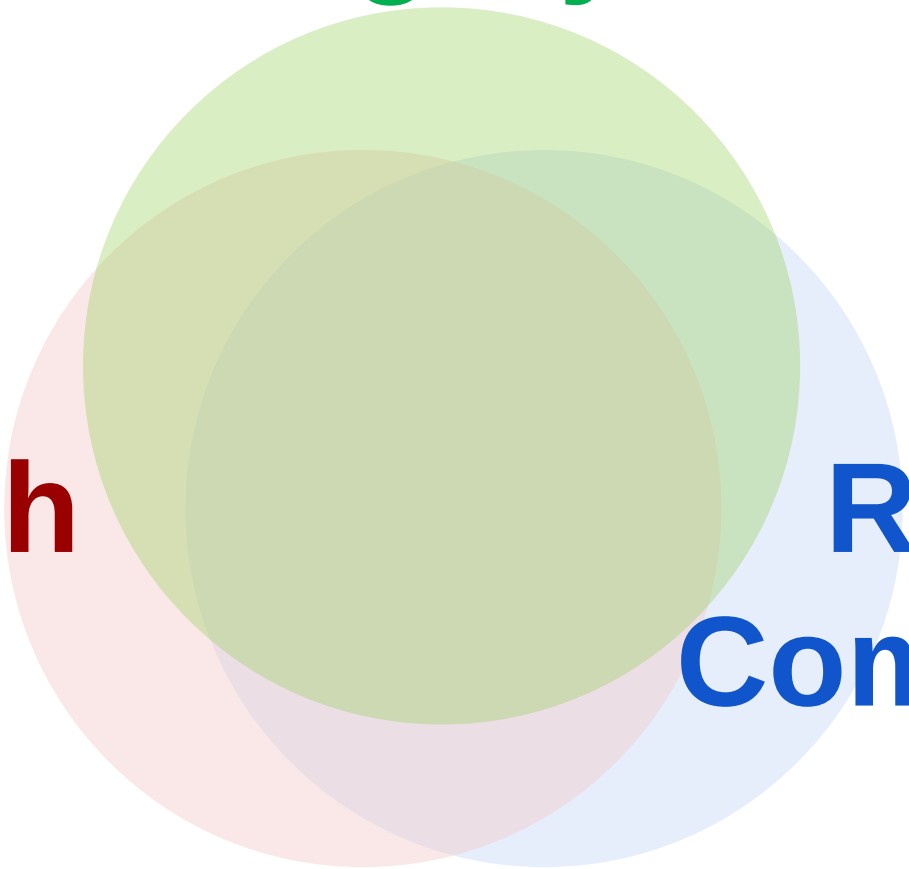

Research
Ethics
Law

Research Integrity



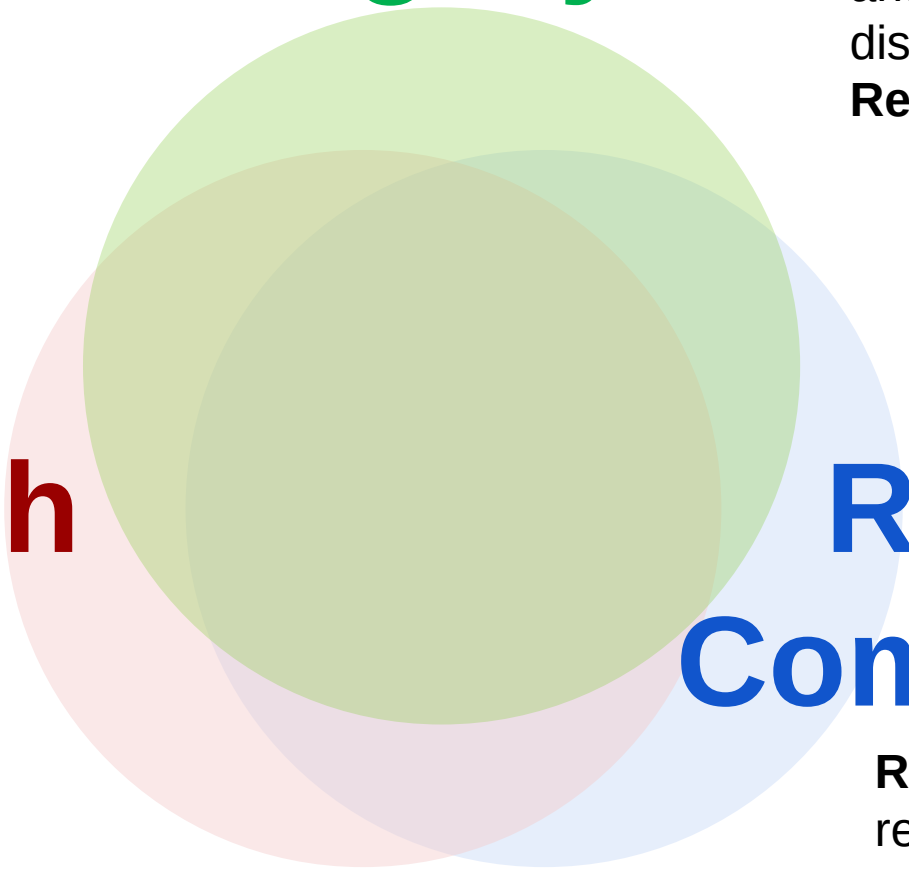
Research Ethics

Research Compliance

Research Integrity

Research integrity primarily concerns **researchers' actions and behaviours** following the rules and regulations governing their disciplines (**Reliability, Honesty, Respect, Accountability**)

Research ethics is a set of principles that researchers must follow for conducting research (**Beneficience, Nonmaleficience, Autonomy, Justice**)



Research Ethics

Research Compliance

Research compliance is a set regulations, directives, and national laws that apply to research and research outputs **(General Data Protection Regulation, Dual Use and Export Control regulation, Sanctions regulation, Medical Device Regulation, Clinical Trial regulation, Animal Welfare directive, Finnish Act on the Secondary Use of Health and Social Data …)**

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Research Integrity in the European Union

Allea principles (2023) and Finnish Code of Conduct for RI (2023)

ALLEA: The European Code of Conduct for Research Integrity

The Finnish Code of Conduct for Research Integrity

Principle	***Definition***
Reliability	Ensuring the quality of research, reflected in the design, methodology, analysis, and use of resources.
Honesty	Developing, undertaking, reviewing, reporting, and communicating research in a transparent, fair, full, and unbiased way
Respect	Towards colleagues, research participants, research subjects, society, ecosystems, cultural heritage, and the environment.
Accountability	Accountability for the research from idea to publication, for its management and organisation, for training, supervision, and mentoring, and for its wider societal impacts.

Violation of research integrity

ALLEA: The European Code of Conduct for Research Integrity

The Finnish Code of Conduct for Research Integrity

Misconduct	*Definition*
Fabrication	Making up data or results and recording them as if they were real.
Falsification	Manipulating research materials, equipment, images, or processes, or changing, omitting, or suppressing data or results without justification
Plagiarism	Using other people's work or ideas without giving proper credit to the original source.

Plagiarism vs. Intellectual Property Rights = Research Ethics vs Law

Unacknowledged use of another person's work (Plagiarism)
Unauthorised use of another person's work (IPR infringement)

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Violations of research integrity

- **Fabrication**
- **Falsification**
- **Plagiarism**
- Conflict of interests
- Misusing seniority to encourage violations or to advance one's career
- Delaying or hampering the work of others (malicious peer reviewer)
- **Misusing statistics**
- **Hiding the use of AI** in the research process
- Withholding data or results without justification
- Chopping up results to increase number of publications
- Selective or **inaccurate citing**
- Expand citations to please editors/reviewers/friends
- Manipulating authorship
- Self-plagiarism
- Establishing or supporting *predatory* journals
- Reviewers cartels
- Misinterpreting achievements (pump that CV)
- Accusing others of misconduct
- Ignoring RI violations

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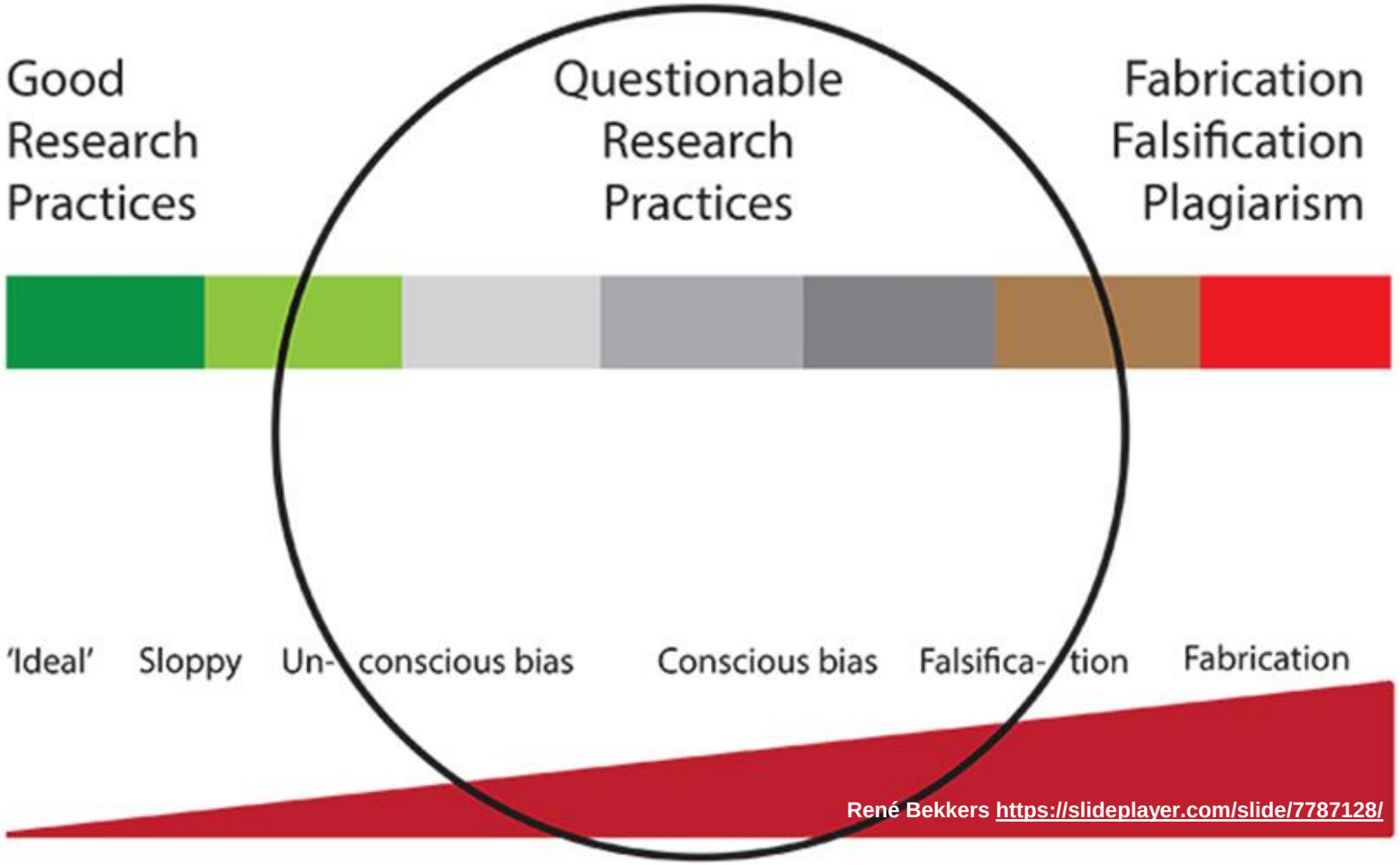
Responsible Research Methods
Questionable research practices
(a.k.a. sloppy research)

From integrity to misconduct



René Bekkers https://slideplayer.com/slide/7787128/

Problems caused by researchers
1. Biases

- **Unconscious bias / Confirmatory bias / Seeing patterns that are not there**
- … which leads to **irreproducible findings** or to the **file drawer effect**

Source: Dorothy Bishop ***”What is the reproducibility crisis in science and what can we do about it?”***

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Problems caused by researchers
2. Statistics

- **Failure to understand statistics**
- … which leads to **p-hacking** (trying multiple analysis and report only those that reached statistical significance): huge **bias for false positives** (irreproducibility) and consequent **publication bias** (HARKing, file drawer effect)

Multiple comparisons
File-drawer problem
Pseudoreplication
Significance questing
Data mining, dredging, torturing
Hypothesizing after the results are known (HARKing)
Data snooping
Selective outcome reporting
Silent multiplicity
Specification searching
P-hacking

Goodman, S. N., Fanelli, D., & Ioannidis, J. P. (2016). What does research reproducibility mean?. *Science translational medicine*, *8*(341), 341ps12-341ps12.

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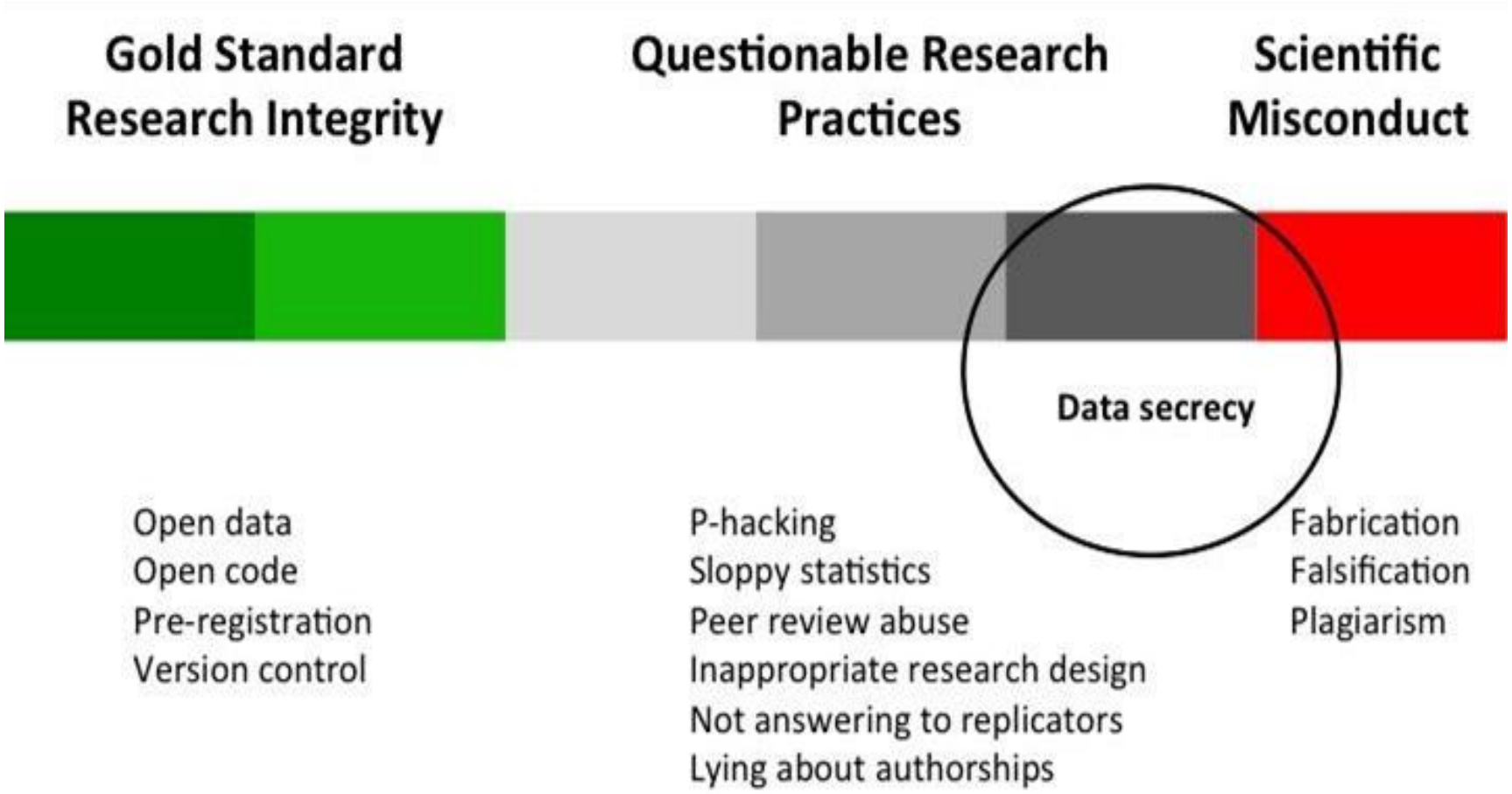
Problems caused by researchers
3. Data secrecy



Source: Is withholding your data simply bad science, or should it fall under scientific misconduct?

Problems caused by researchers
4. Questionable measurement practices

- What is your **construct**?
- Why and how did you select your **measure**?
- What measure did you use to **operationalize the construct**?
- How did you **quantify your measure**?
- Did you modify the **scale**? And if so, how and why?
- Did you create a measure on the fly?

Flake, J. K., & Fried, E. I. (2020). Measurement schmeasurement: Questionable measurement practices and how to avoid them. *Advances in Methods and Practices in Psychological Science*, *3*(4), 456-465.

Summary of QRPs and solutions

QRP	Solution
Unconscious or confirmatory bias	**Eradicate the subjectivity from methods**, automate data collection and analysis, make data and methods open. For a list of biases https://catalogofbias.org/biases/
Methodological (statistical) issues	Larger N, simulated data, separate replication dataset, blind analysis with masked data, pre-registration of analysis and **registered reports**, more stringent statistical thresholds
Data secrecy	Data is available or not, nothing in between. New ways of sharing personal research data in the age of GDPR
Questionable measurement practices	More **robust theory**, more robust measurement, focusing on phenomena with stronger effect

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And what about generative Artificial Intelligence tools?

Generative AI: the ideal misconduct machine?

NOTE: For simplicity we focus on generative AI Systems that use General Purpose AI models such as Large Language Models to synthesize text.

- **Generative AI systems** (like ChatGPT) are ideal fabrication, falsification, plagiarism machines: they are trained to always produce text and leave the quality control on the validity and reliability of the output to the final users.
- **Plagiarism: GenAI LLMs systems can *verbatim* reproduce text data in the training dataset** without citing the original source
- **Fabrication/Falsification:** GenAI tools can also perform data synthesis or data analysis, i.e. they can be used (**willingly or not**) to **fabricate data or falsify results** (*how many r's in strawberry?*)
- **If you do not have the ability to verify the output** of a GenAI LLM system (e.g. by verifying the analysis code, by finding the relevant citations for the synthesised text, by verifying that the plagiarised code is not under a restrictive license) **then you should not use** the output of GenAI systems beyond self-learning or brainstorming.

Generative AI and authorship: who owns the copyright of the output?

- It depends: US copyright office clearly states that work generated by AI cannot be copyrighted.
- However, terms and conditions from AI tools might state that you have full ownership of input and outputs (OpenAI: *We hereby assign to you all our right, title, and interest, if any, in and to Output.*)…
- …but they can also claim perpetual irrevocable rights on anything you produce (Midjourney: *By using the Services, You grant to Midjourney, its affiliates, successors, and assigns a perpetual, worldwide, non-exclusive, sublicensable no-charge, royalty-free, irrevocable copyright license to reproduce, prepare derivative works of, publicly display, publicly perform, sublicense, and distribute the Content You input into the Services, as well as any Assets produced by You through the Service. This license survives termination of this Agreement by any party, for any reason.*)

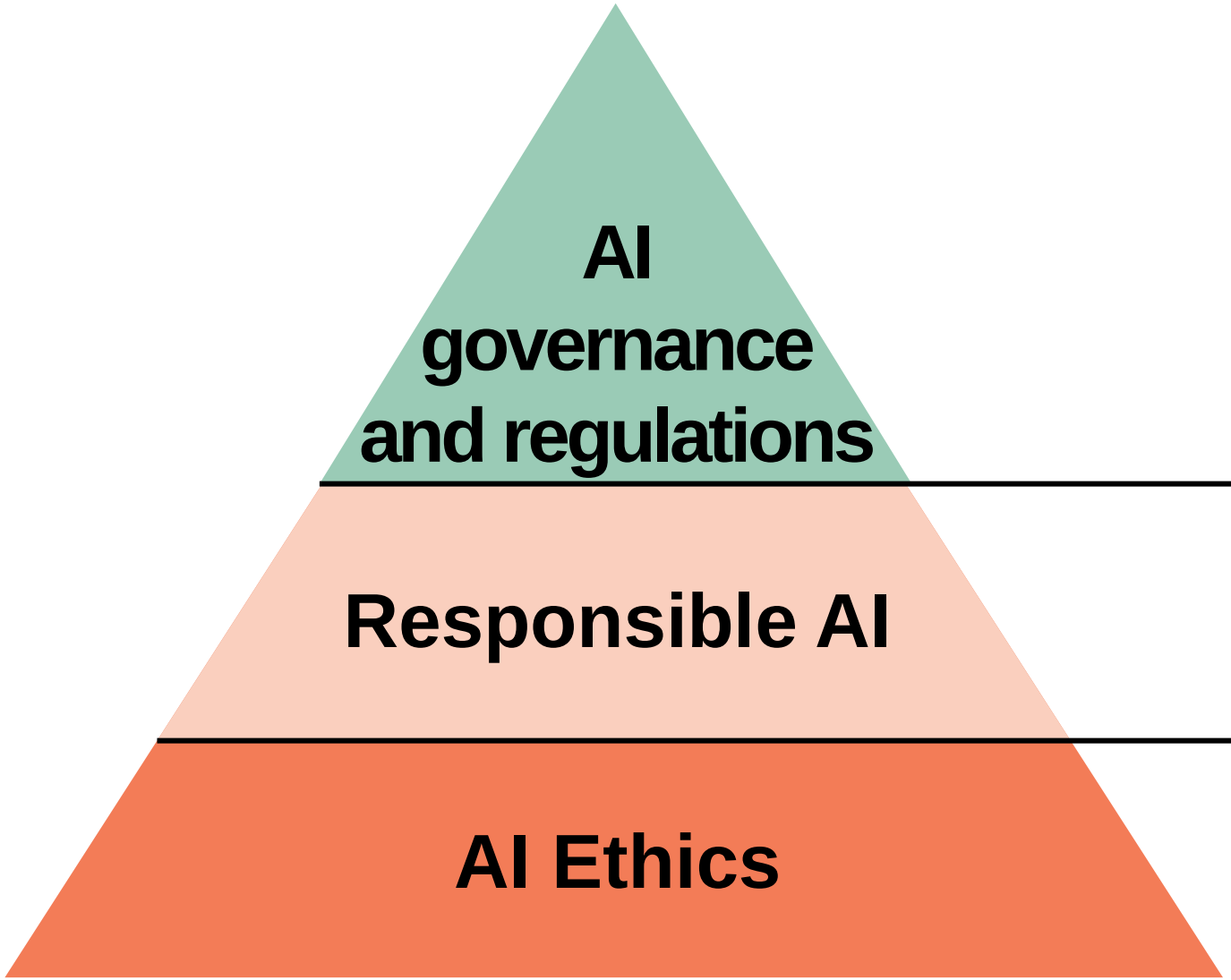
Generative AI and authorship: Can AI be a coauthor?

- **AI cannot be given authorship**, as it is considered as a tool, and authorship always involves responsibility that AI cannot cover. [Aalto.fi], [Nature], [Elsevier]
- **The use of AI is should be transparent by openly describing how AI is used in the research process** so that others can reproduce your results (see guidelines for "Declaration of generative AI in scientific writing")

Generative AI and other guidelines

- Remember that when using GenAI systems other legislations apply such as the **GDPR:** certain systems are not compatible with data protection regulation (Aalto guidelines on responsible use of AI)
- The newly approved **AI Act** regulates the safety of AI systems in the EU. While AI uses for research purposes do not fall under the scope of the AI Act, **it is important to consider the ethical implications when prohibited or high-risks AI systems are studied or used in research** (Aalto guidelines on the AI Act)

AI ethics, Responsible AI, AI governance and AI regulations



AI Governance in Practice
(The Alan Turing Institute)

Artificial Intelligence Act

SSAFE-D: Sustainability, Safety, Accountability, Fairness, Explainability, Data Stewardship
(The Alan Turing Institute)

Beneficience, Nonmaleficience, Autonomy, Justice, Explicability
(Floridi 2023)

AI Other frameworks mention Fairness, Accountability, Transparency, Explicability, there are many terms but all closely related (e.g. Trustworthy AI)

Different roles, require different perspectives on ethical and responsible AI (ALLEA: The European Code of Conduct for Research Integrity)

Developer of AI systems/models

Ethics Consider **AI ethics** and responsible AI principles throughout the AI system lifecycle (Sustainability, Safety, Accountability, Fairness, Explainability, Data Stewardshi)

Law Compliance: **AI Act** applies if the AI system i) **has risks** and ii) is not developed for research purposes or personal use

Tech Technical robustness: Ensure the correct functioning of the AI system (they are too big usually, so they are in the **cloud**)

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Students, teachers, researchers

Reliability: quality of research/education, reflected in the design, methodology, analysis, and use of resources.
Honesty: doing your work in a transparent, fair, full, and unbiased way

Respect: towards colleagues, research participants, research subjects, society, cultural heritage, and the environment.

Accountability: from idea to publication, and all the steps of the study / teaching / research process.

Moral complicity / dirty hands problem

Commit a morally wrong act in order to achieve a greater good?

Developers of proprietary generative AI systems/models (OpenAI, Meta, Google…)

- ❌ Sustainability (huge impact on the planet)
- ❌ Safety (Induced psychosis, suicide, exploitation of global-south annotators)
- ❌ Accountability (no consequences for harming individuals)
- ❌ Fairness (biases against black people, women, and other minorities)
- ❌ Explainability (no clear idea on how the actual models work)
- ❌ Data Stewardship (train data kept secret, illegal use of copyright materials, illegal processing of personal data)
- …and many more issues (check “The AI Con” book)

Stahl & Eke (2024) “The Ethics of ChatGPT”
Bender & Hanna (2024) “The AI Con” (HIGHLY RECOMMENDED BOOK)

It is impossible to ethically use these tools, because they are not ethical under any aspect.

If we cannot be ethical, let’s at least be responsible: Responsible use of (generative) AI

- If we have strict ethics, then we should not use or promote these tools
- However real world poses a series of ethical compromises: we drive petrol cars, we enable the killing of animals, fast fashion, smartphones that do not last, and our taxes pay for military weapons that one day will kill people
- **By using these AI tools and understanding their limitations, we can identify responsible use-cases** where they are useful for our life, the people we interact with, and society at large.

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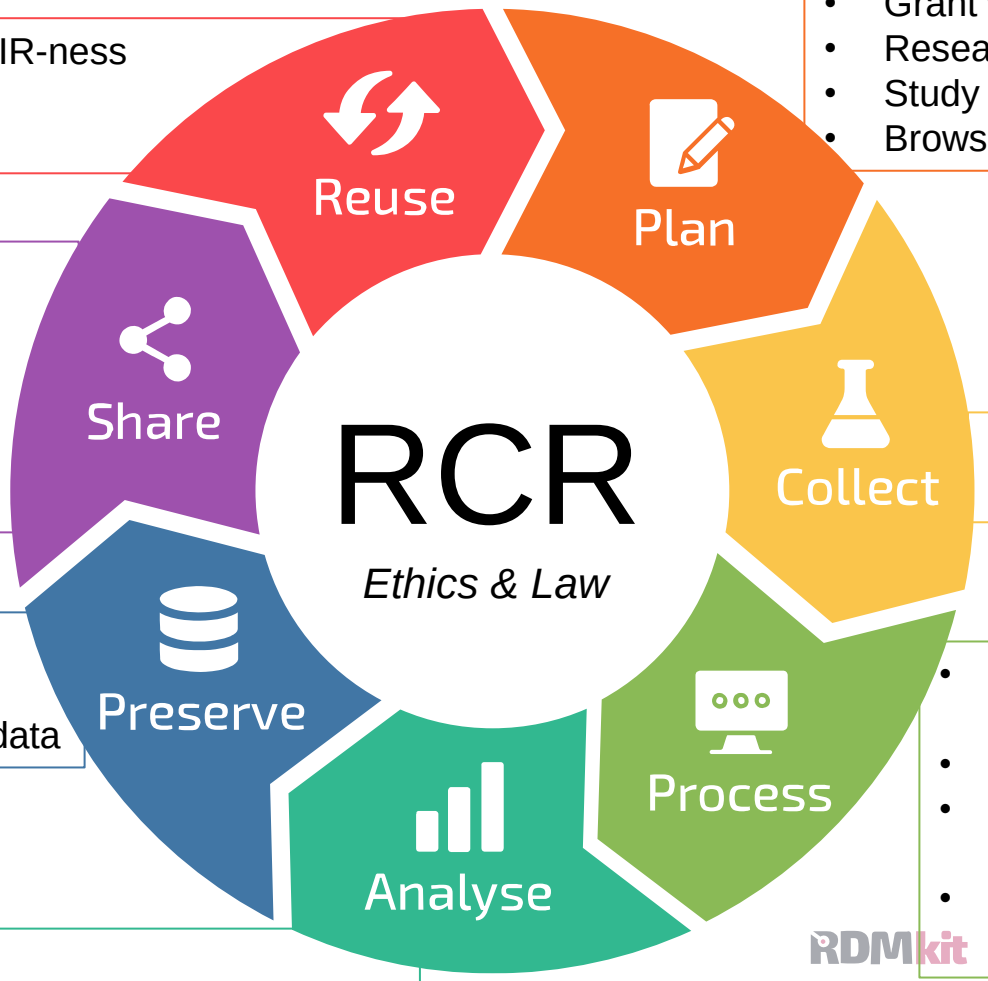
The Research Process aided by AI

with Responsible Conduct of Research at its core



- Facilitate discovery and FAIR-ness
- Explore open datasets
- Identify research gaps

- Grant writing
- Research planning
- Study design
- Browsing and summarizing the literature

- Write and editing
- Improve research outputs (tables, figures)
- Peer review suggestions
- Summarizing for public
- Media reach out

- Interfaces for data collection
- Code and automation help

- Metadata preparation
- Summarising
- Organise and store (meta)data

- Brainstorming on approaches for data preprocessing
- Code and automation
- Data minimization (pseudo- and anonymization)
- Data annotation (e.g. deductive coding)

RDMkit

- Annotations
- Methodological considerations
- Data analysis (Code and automation)

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Original image from https://rdmkit.elixir-europe.org/ “The data lifecycle”

References

- ALLEA code of conduct
- TENK guidelines for Research Integrity
- AI and Research Work
- Muthanna, A., Chaaban, Y., & Qadhi, S. (2024). A model of the interrelationship between research ethics and research integrity. *International journal of qualitative studies on health and well-being*, *19*(1), 2295151.