Data Science Workshop
Lecture 15: Results presentation

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MSc program in Data Science has been developed
as a part of task 10 of the project
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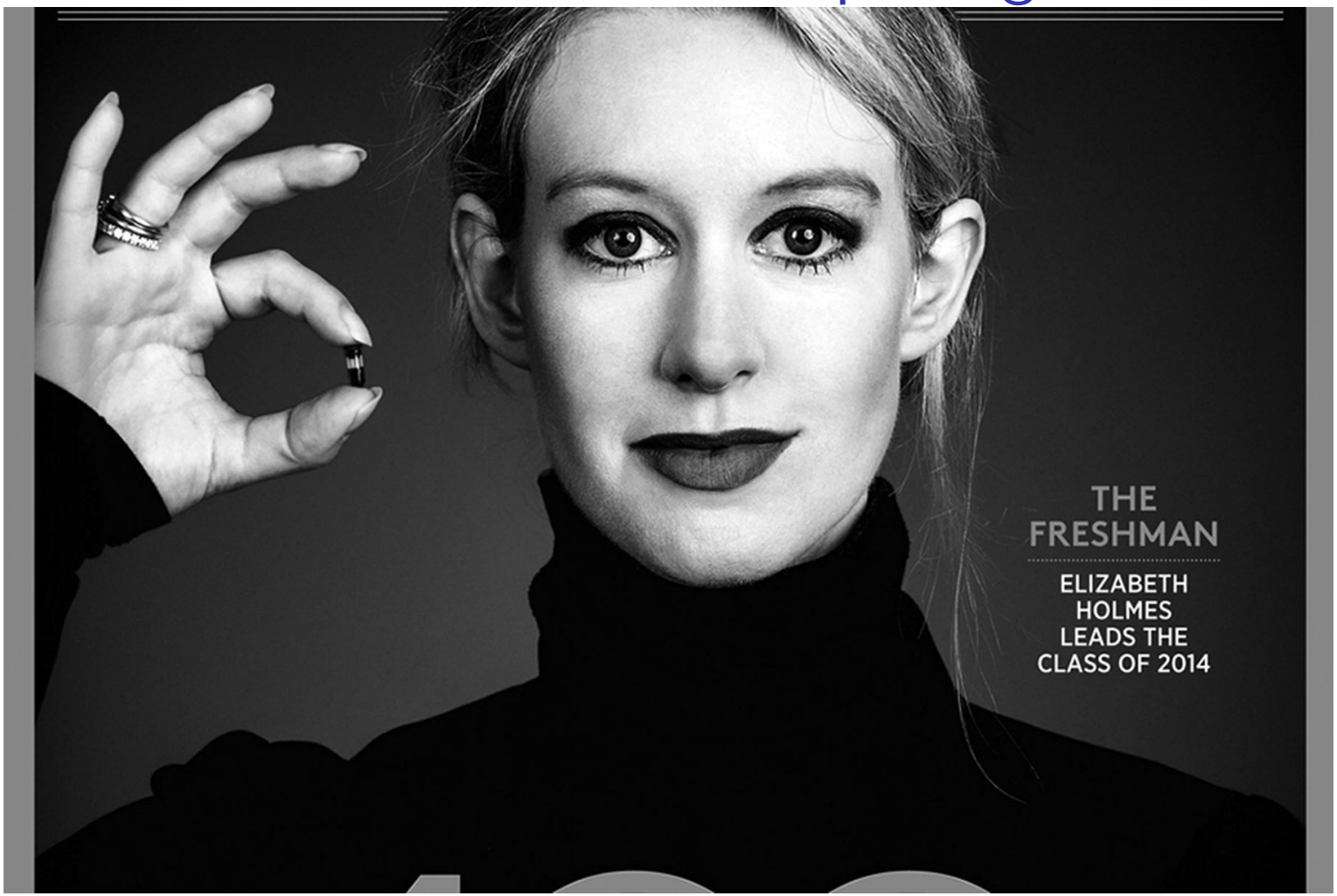
Scientific results reporting



credits: Forbes

Public presentation

- Reporting the results to a wider auditory you should
  - Share a big picture.
  - Present how the results affect people
  - Emphase why the research is unique

Message

- Your message should include an exciting story
  - Focus on people.
  - Be surprising, show new facts, present results that are contradictory to common knowledge.
  - Emphases why the research are unique

Message example I

MIT engineers have built and flown **the first-ever plane with no moving parts**. *Unlike turbine-powered planes, the aircraft does not depend on fossil fuels to fly. And unlike propeller-driven drones, the new design is completely silent. The plane creator, Steven Barrett, says the* **inspiration for the team's ion plane comes partly from the movie and television series, "Star Trek"**, *which he watched avidly as a kid.*

`https://news.mit.edu/2018/first-ionic-wind-plane-no-moving-parts-1121`

Message example II

MIT engineers have developed a microfluidic technique that can quickly process small samples of bacteria and gauge a specific property that's highly correlated with bacteria's ability to produce electricity. **This technique can have a broader application, in clean energy generation, bioremediation, and biofuels production**

`https://news.mit.edu/2019/identifying-electricity-producing-bacteria-0111`

Results presentation

- Presenting the research results we should:
  - Be prepare
  - Avoid jargon
  - Prepare take-home message
  - Predict confusion and misinterpretation
  - Give a clear statement about the limitations

MIT improvised presentation

Data presentation

History 101, "Oil and the Middle East"

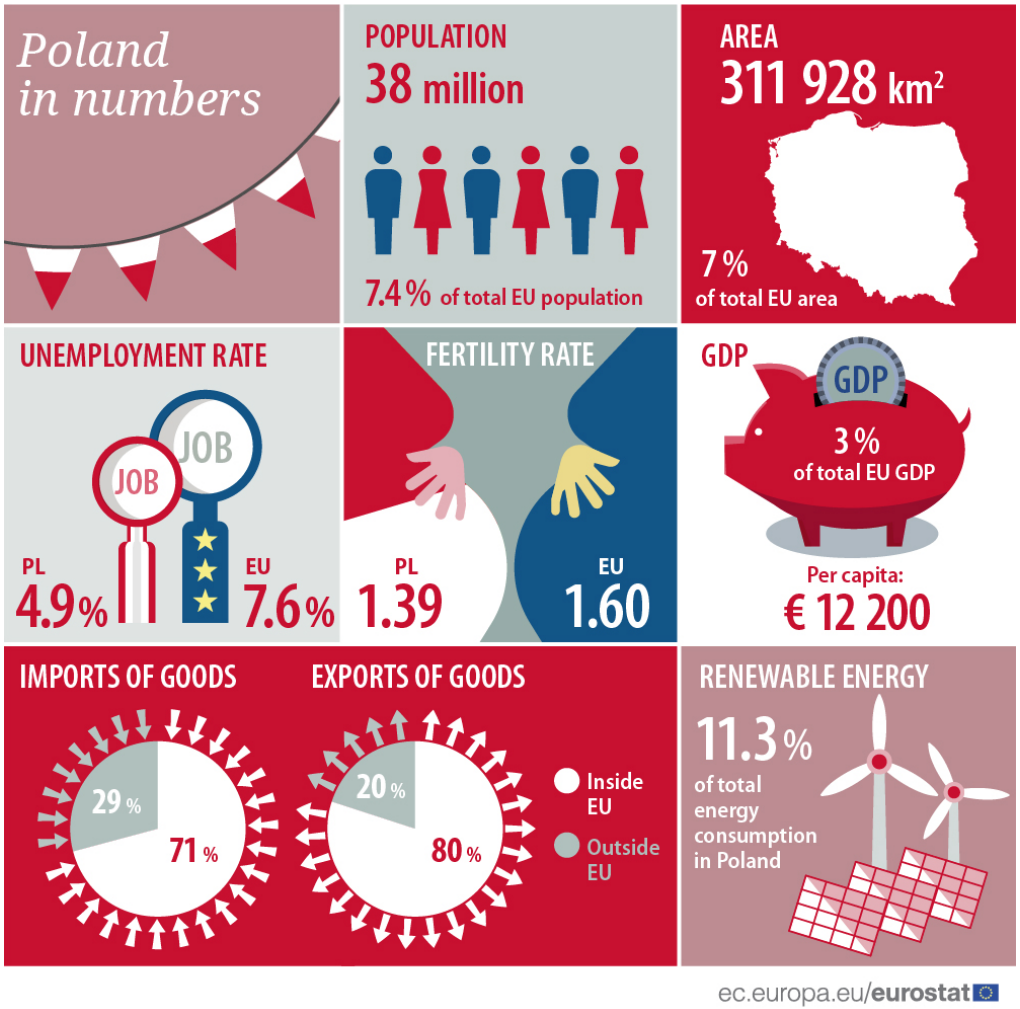
Data presentation

- Data presentation is particularly hard.
- The numbers must be presented in a way intelligible for a wide audition.
  - Make units understandable.
  - Present risks in an easy-to-understand, transparent way.

Numbers presentation

- Numbers must matter.
  - The numbers should not be presented with too high precision.
  - The numbers should be presented regarding commonly know references.

Data presentation example



https://ec.europa.eu/eurostat/news/themes-in-the-spotlight/european-statistics-day-2018

Percentage presentation example

https://blog.mint.com/budgeting/holiday-gift-survey/

Risk interpretation

- Integers are easier to understand than fractions or percents.
- Particularly, when we present a risk or chance of some event.
- Especially hard is the presentation and interpretation of relative risk.

Risk

- A relative risk.
  - A risk is the ratio of the probability of an outcome in an exposed group to the probability of an outcome in an unexposed group.
- An absolute risk.
  - Shows the risk that an event will occur.

Example

- Women's Health Initiative: large randomised, double-blind study of postmenopausal hormones versus placebo.
- Halted in 2002 because hormones were found to increase the risks of breast cancer and heart disease significantly.
- Fourteen million women were on hormones at the time the study was halted.

Lessons learned from the Women's Health Initiative trials of menopausal hormone therapy by Rossouw J, Manson J, Kaunitz A, Anderson G.

Percentage

- Invasive breast cancer
  - hormones:
    - 0.38 % cases per year
  - placebo:
    - 0.30 % cases per year
- Coronary heart disease
  - hormones:
    - 0.37 % cases per year
  - placebo:
    - 0.30 % cases per year

Relative Risks

- Relative Risks
  - invasive breast cancer
    - 0.38/0.30=1.27
  - coronary heart disease
    - 0.37/0.30=1.23
- Translation to the public
  - *Women who take hormones have a 27% increased risk of breast cancer and a 23% increased risk of heart disease*.

Absolute risk

- Invasive breast cancer
  - hormones:
    - 0.38 % cases per year
  - placebo:
    - 0.30 % cases per year
  - increase:
    - 0.08 % cases per year
- Coronary heart disease
  - hormones:
    - 0.37 % cases per year
  - placebo:
    - 0.30 % cases per year
  - increase:
    - 0.07 % cases per year

Absolute risk in integers

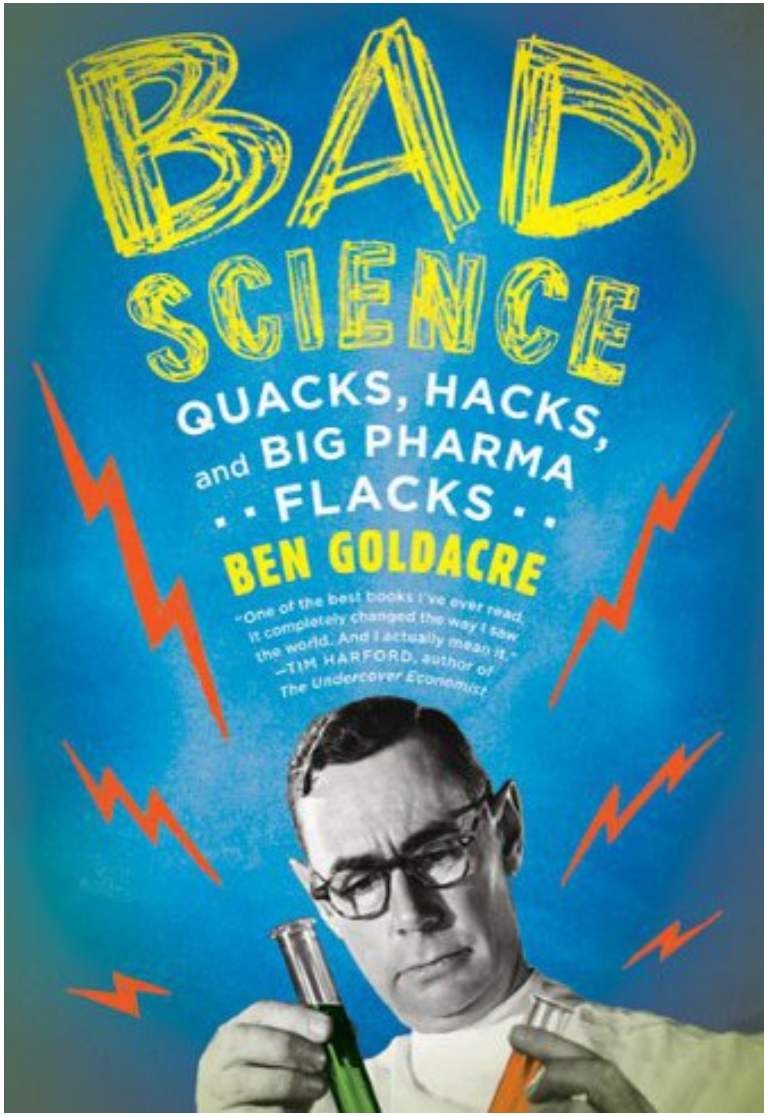
- Invasive breast cancer
  - hormones:
    - 38 per 10,000 women per year
  - placebo:
    - 30 per 10,000 women per year
  - increase:
    - 8 per 10,000 women per year
- Coronary heart disease
  - hormones:
    - 37 per 10,000 women per year
  - placebo:
    - 30 per 10,000 women per year
  - increase:
    - 7 per 10,000 women per year

Correct message?

Women who take hormones have a 27% increased risk of breast cancer and a 23% increased risk of heart disease

For each 10 thousand women who take hormones observed 8 more invasive breast cancers per year and 7 more heart attacks per year

Ethics in data presentation



- Incompetently or intentionally incorrectly presented data mislead the public opinion about risks or products properties.
- It is used in products promotion and propaganda.

Ben Goldacre presentation

https://www.ted.com/talks/ben_goldacre_battling_bad_science

Task

- In teams
  - Write one paragraph about your research.
  - The description should be addressed to a wide audience.

References

B. Goldacre.
Bad Science.
Fourth Estate, 2009.

K. Sainani.
Writing in the sciences.

M. Smiciklas.
The Power of Infographics: Using Pictures to Communicate and Connect With Your Audiences.
Que Publishing, 2012.

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