

# Open Computational Ecosystems for Social Science

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[alkuun selvemmin mikä on se tarve mihin comp ecosystems vastaa ja ropengov erityisesti !!!]

## Open data creates opportunities

The recent explosion in open data availability has created novel opportunities for research, journalism and citizen-science. High-quality machine readable data streams are increasingly available on political decision making, historical processes, welfare, traffic, and other aspects of society.

## Need for analytical tools

Taking advantage of these new data streams in computational social science, digital humanities, and related fields needs novel analytical tools. First software libraries are now emerging and have a huge potential to contribute to transforming these fields. However, these resources are currently highly scattered and come in various formats, hindering wider adoption. Specific web-based tools are available, but more flexible computational tools are urgently needed for fully powered data processing and analysis.

## Power of open source communities

Efficient data analysis relies on customized, reproducible analysis workflows that are best developed jointly by the user community. Availability of ready-made algorithms for standard data analysis tasks allows an individual researcher to avoid reinventing the wheel, leaving more time to solve the specific research problems. Solutions have emerged in data intensive research fields, such as bioinformatics and particle physics, based on open source statistical programming languages. The resulting communities, such as Bioconductor (<http://bioconductor.org/>) have proven highly successful, acting as an example for other fields to follow.

## Ecosystem benefits

The ecosystem enables rapid development of scalable and interoperable software and provides tools to expand the quantitative methods base. The advantages of the open development model include:

- **Open source:** We use GitHub for shared version control. All contributions are openly licensed. This guarantees that the tools are freely available and the international scientific

# rOpenGov - An emerging ecosystem for CSS & DH

rOpenGov is a statistical ecosystem focused on open source data analysis algorithms relevant to computational social sciences and digital humanities. We build on experiences learned from similar initiatives in other fields, such as Bioconductor and rOpenSci. We use the R statistical programming language, which has a versatile computational ecosystem with rich statistical modeling and state-of-the-art visualization capabilities.

## Reproducible research blog

The rOpenGov blog at ropengov.github.io is an emerging collection of example case studies that showcase the opportunities of reproducible open data analytics. The general-purpose research algorithms with a wider applicability are distributed as open source R packages. This provides **well-documented tools to download, preprocess, integrate, analyse, visualize and report digital data streams in a fully automated and transparent fashion**. This complements the existing R ecosystem by **focusing on methodologies relevant to Computational Social Science and Digital Humanities**.

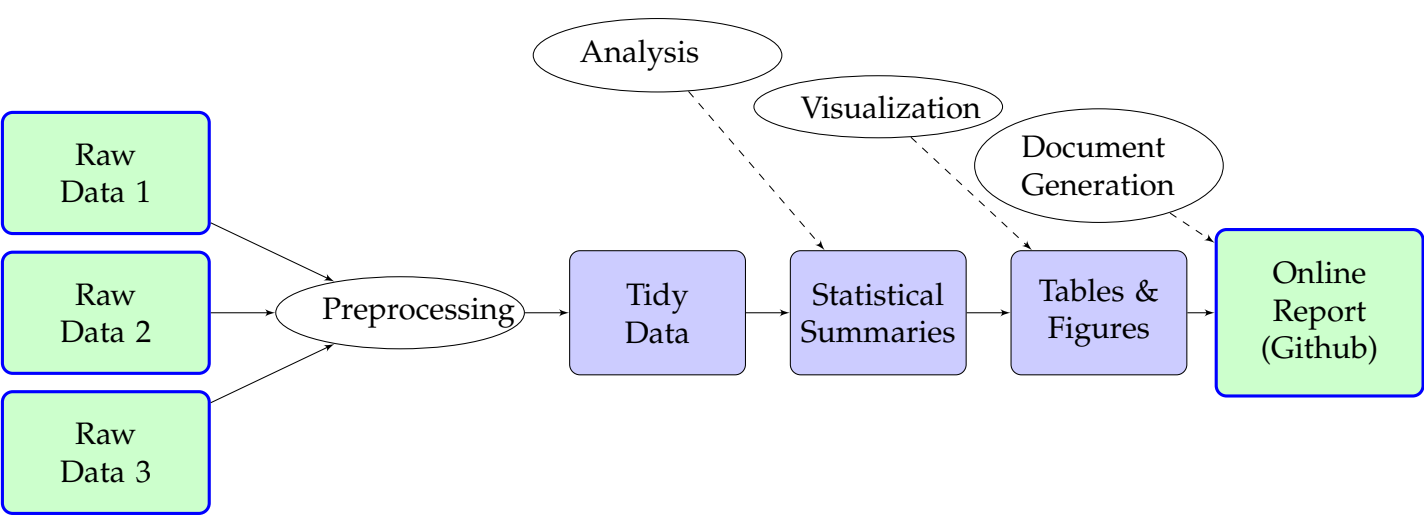


Figure 1: **Reproducible research workflow** Raw data sets are downloaded from original sources, tidied up, and integrated with other information. Statistical summaries, analyses and visualization are then automated with the aid of custom open source software libraries. The results are reported in web-based documents via automated document generation. The complete analysis workflow, including full access to every single detail from raw data to visualization, is shared publicly in distributed version control system (Github). The rOpenGov ecosystem provides dedicated R libraries to support reproducible research in the fields of computational social science and digital humanities. For the full source code to reproduce this poster, see PLACE FINAL VERSION in ROPENGOV

## Eurostat open data: a reproducible example

```
p1 <- p + geom_smooth(method="lm")
p2 <- p + geom_smooth(method="glm")
p3 <- p + geom_smooth(method="loess")
p4 <- p + geom_smooth(method="gam")
grid.arrange(p1,p2,p3,p4, ncol = 2)
```

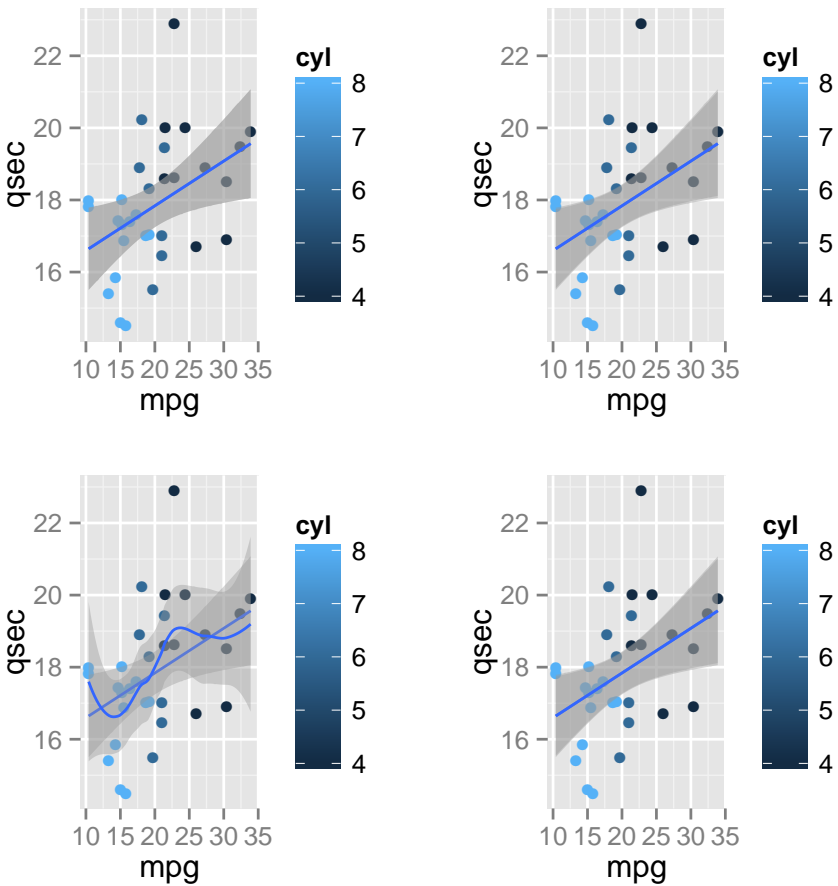


Figure 1: This is figure caption, too!

rOpenGov packages

**Open Government Data**

- Regions: eurostat
- Countries: Russia, Finland, Poland, USA
- Cities: Helsinki
- Statistics Authorities (Finland, Denmark, Sweden, PX-Web)

**Data processing and visualization**

- GIS tools (Finland, OpenStreetMap, WFS..)
- Data anonymization
- Meteorology
- Health and Demography
- Political Science

**Digital humanities and media**

- Bibliographic analysis (Finland, UK, Europe)
- Media (Enigma, ProPublica, Sunlight Foundation, New York Times)

**Parliamentary monitoring**

- Election data (Austria, Finland, Russia, Huffpost Pollster)
- Quality of Government Institute

We are thankful for a number of developers for supporting this community. For a full list, see ropengov.github.io.

## References

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<sup>a</sup>REFERENSSEJÄ voisi ehkä vähän karsia.

<sup>1</sup>JOS SAISI KAKSI PALSTAA, JOISTA TOISELLA OLISI MUUTAMA ESIMERKKIKUVA NÄISTÄ PAKETEISTA, OLIS KOVA - katotaan aluksi toi Eurostat-esimerkki, ja sen jälkeen et miten mahtuis + sopii. vois toimia mut pitää samalla varoa ettei tunge liikaa kamaa yhteen posteriin / LL]