Advanced Research Tools for Economics and Business Administration

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Introduction

Why this workshop?

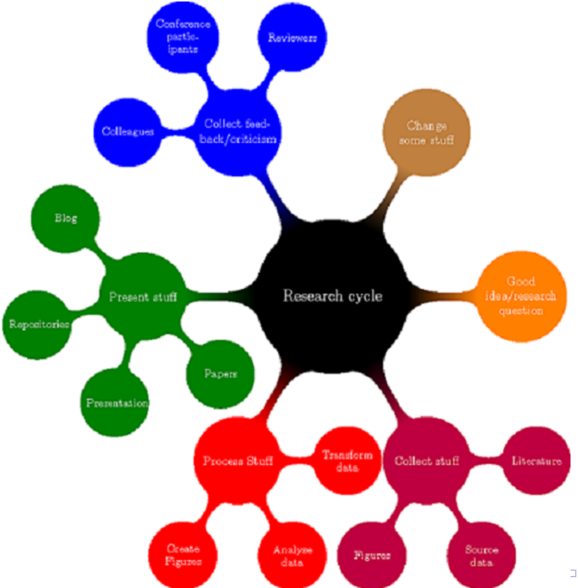
- In the *social sciences* few attention to what tools to use (and why they make sense)
- Increasing *need* for/in openness, reproducability & transparancy
    - from journals, universities and governments
    - increase in cooperation (over wider distances)
    - access to your own files
    - make yourself more visible
- Why *I* want to give this workshop
    - intrinsic interest
    - my goal: pre-conferences workshops / courses

What I want (and don't want) with this workshop

- Give a general introduction of why some tools work together
    - Why version control systems?
    - Why reference managers
- Give an introduction to LaTeX
    - First the basics
    - Next workshop: some advanced stuff
- What *I* do not want
    - Tell you what applications to use (**you** need to decide and make a **well-informed** decision)

Workflow

Research cycle



Why bother about a workflow or tools?

- Good scientific practice: *document how you have achieved your results*; this ensures
  - Reproducibility
  - Transparency
  - Modularity
  - Portability (across systems and users)
  - Efficiency
  - Self-sanity

When should I adopt new tools/workflow?

- The sooner the better (you really have time now)
- But think twice about which one (switching is costly; not in terms of beer but in terms of time)
- Start one step at a time (starting with LaTeXis a pretty neat idea)

A journey of a thousand miles begins with a single step

Lao-tzu

In general

In science consensus is irrelevant. What is relevant is reproducible results. The greatest scientists in history are great precisely because they broke with the consensus (Michael Crichton)

In data science

- Typically, a publication is not at the heart of research
  - Code
  - Data

The data and code used to make a finding are available and they are sufficient for an independent researcher to recreate the finding (Peng, 2011)

Code, documentation and output

1. Synonyms
2. All based on `.txt` files
3. Encompasses almost anything
   - data itself (`.csv`)
   - set of commands for data cleaning and statistical analysis (`.do`, `.R`)
   - database with references (`.bib`)
   - transcript of interviews (`.tex`)
   - text for aticles, presentations or websites (`.tex`, `.html`)
4. Only output is displayed/interpreted differently (e.g., in a browser or pdf viewer)

Tools for workflows in this workshop

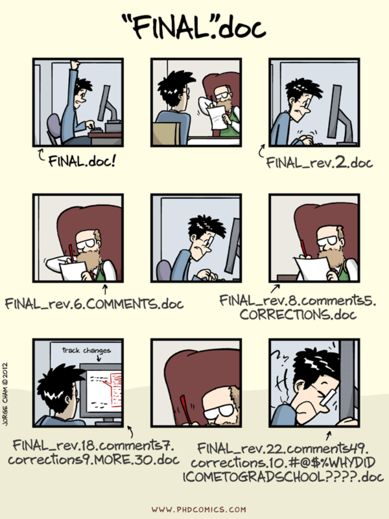
- Versioning system (Time-Machine, Dropbox, GitHub)
- Reference manager (Mendeley)
- Markup lanaguages
  - LaTeX
  - HTML

Version Control Systems

Folder structure of your new project (theses, paper, research)

- Think *a priori* about project set-up
  - Seperate analysis, data and output files
- Be careful with source data!
  - Seperate source and derived data files
  - Typically
    - you get/collect data
    - transform data
    - analyse data
  - Keep track of all these stages!

Why is version control systems such a neat idea



Version control systems

With version control system only one copy of each file (but with fully backed-up history)

A version control system is not the same as a backup devise, but the combination is a killer-ap

- Time machine (mac only) with external hard drive
- Dropbox
- more advanced stuff: Git and GitHub

With `.txt` files you can use the `diff` command

Reference managers

Why reference managers?

This is a life saver!

Use one!

Several applications out there:

```
 - In this case Mendeley (free but not open source)
- Make sure it exports to `.bib` files
- Search for references (google scholar, jstor, etc.)
- Mendeley can import `.pdf`'s
```

LaTeX

Background

- TeXhas been devised by Donald E. Knuth in the late 70's
- LaTeXis a set of macro's around TeX and devised in the 80's
- LaTeXis a *typesetting program*, not a *Word processor*
  - It is actually some code that needs to be compiled
  - Code is typed in by an editor
- So, huge differences between
  - Word processor: Open Office, Word
  - Typesetter: LaTeX, Adobe's InDesign (in general XML)
  - Editors:
    - Specific editors: TexStudio, TexShop, RStudio
    - General editors: Sublime, TextMate, Notepad++, Vim, Emacs

Disadvantages

- Not WYSIWYG
- You nead to learn (quite) some commands
  - Learning curve, but
  - hurray for cheat sheets and Google
- Very specific lay-outs difficult to attain
- Basic LaTeXhas *difficulties* with incorporating new fonts (Hoefler, minion pro)
  - XeTeX
  - For the purists: LaTeXdoes it right (LaTeXvs Word)

Advantages

- Free (as in beer) and ubiquitous
- WYSIWYM
- Consistent lay-out throughout the whole document (including tables, appendices, formulas, source code, etc)
- Internal references are a breeze (references, tables of, indices)
- Forced to structure documents
- Macros, thus scriptable
- Large community, thus a package for almost everything (books, articles, presentation, posters, exams, musicscores)
- Superior typography & output
- Large publishers (i.e., Elsevier and Springer) have LaTeXtemplates for their articles

How does it work in practice?

- You edit a `.tex` file without thinking about how it looks
  - distraction free writing (yeah right)
- You then compile it
  - LaTeXis unforgiving: if there is an error, usually it does not compile
  - Typically, errors are missing brackets or parentheses.
- Typically, source `.tex` file is compiled into `.pdf`