

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, reproducibility & transparency
 - 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 L^AT_EX
 - 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 L^AT_EX is 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

- ❶ Synonyms
- ❷ All based on .txt files
- ❸ 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 articles, presentations or websites (.tex, .html)
- ❹ 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 languages
 - L^AT_EX
 - 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!

"FINAL".doc



FINAL_rev.2.doc



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 device, 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

The L^AT_EX logo is centered within a light gray rectangular box. The logo itself is rendered in a red, serif font, with the 'L' and 'A' being larger and more prominent than the 'T' and 'E', and the 'X' being slightly smaller.

Background

- T_EX has been devised by Donald E. Knuth in the late 70's
- L^AT_EX is a set of macro's around TeX and devised in the 80's
- L^AT_EX is 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: L^AT_EX, Adobe's InDesign (in general XML)
 - Editors:
 - Specific editors: TexStudio, TexShop, RStudio
 - General editors: Sublime, TextMate, Notepad++, Vim, Emacs

Disadvantages

- Not WYSIWYG
- You need to learn (quite) some commands
 - Learning curve, but
 - hurray for cheat sheets and Google
- Very specific lay-outs difficult to attain
- Basic L^AT_EX has *difficulties* with incorporating new fonts (Hoefler, minion pro)
 - XeTeX
 - For the purists: L^AT_EX does it right (L^AT_EX vs 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 L^AT_EX templates 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
 - L^AT_EX is 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`

Basic set-up

```
\documentclass[] {article}  
%opening  
\title{}  
\author{}  
  
\begin{document}  
  
\maketitle  
  
\begin{abstract}  
\end{abstract}  
  
\section{}  
  
\end{document}
```


Creating some text

- Use a first package: `\usepackage{lipsum}`
- Create an abstract, title, authors and will in some sections
- Create subsections

Further text control

- itemization
- enumeration
- bold
- emphasize

Inserting equations

- Inline: `$e=mc^2$` will be $e = mc^2$

or

```
\begin{equation}  
e=mc^2  
\end{equation}
```

will render in

$$e = mc^2$$

- Equations can be as complex (cool) as you want

Inserting figures

```
\usepackage{graphicx}
```

```
\includegraphics{../Figs/home_stalin_poster}
```

Better is to include them in a floating environment (this is where typically the problem starts)

```
\begin{figure}[htb!]  
  \includegraphics[width = 1.0\textwidth]  
  {../Figs/home_stalin_poster}  
  \caption{Next slide please!}  
\end{figure}
```

Inserting tables