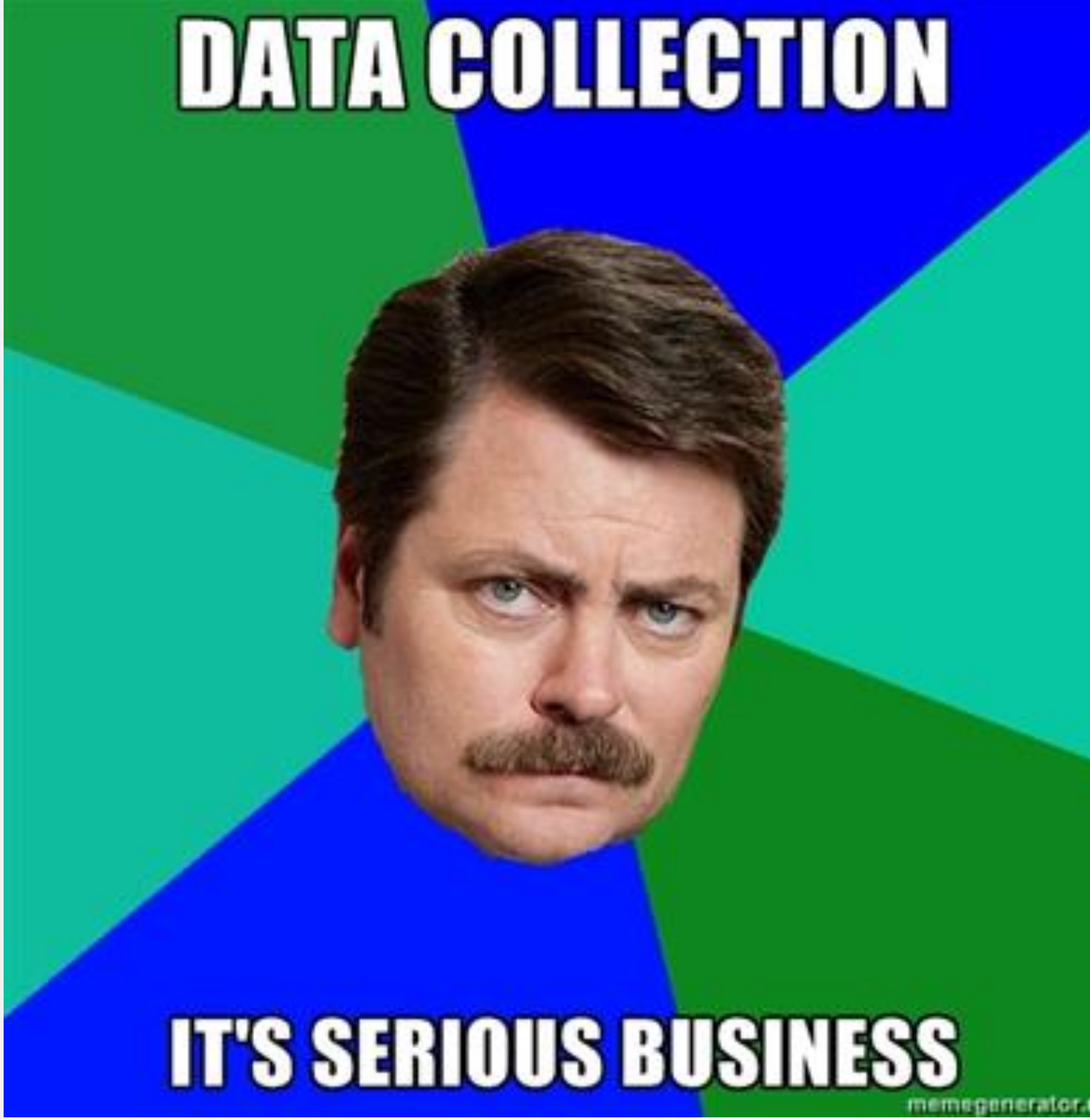
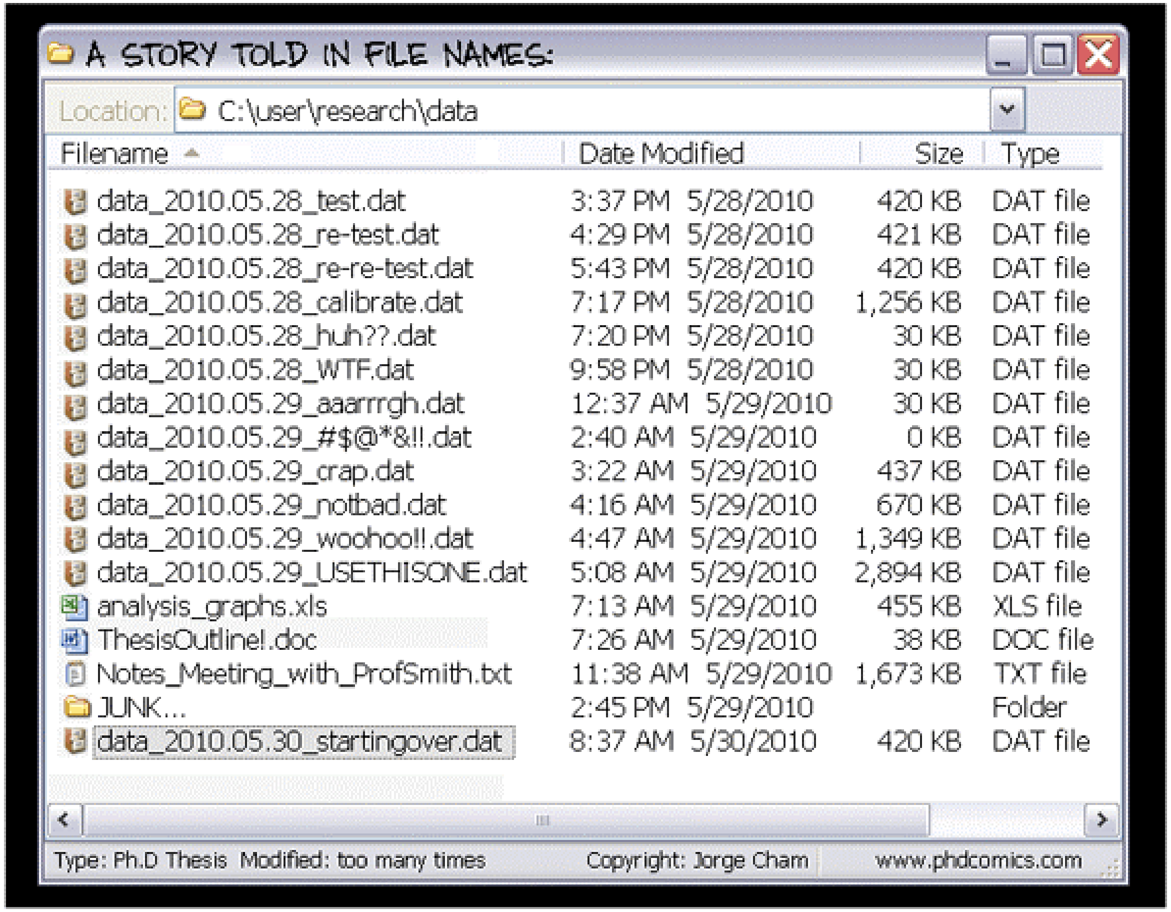
Data packaging: A practical approach


DATA COLLECTION
IT'S SERIOUS BUSINESS
memegenerator.

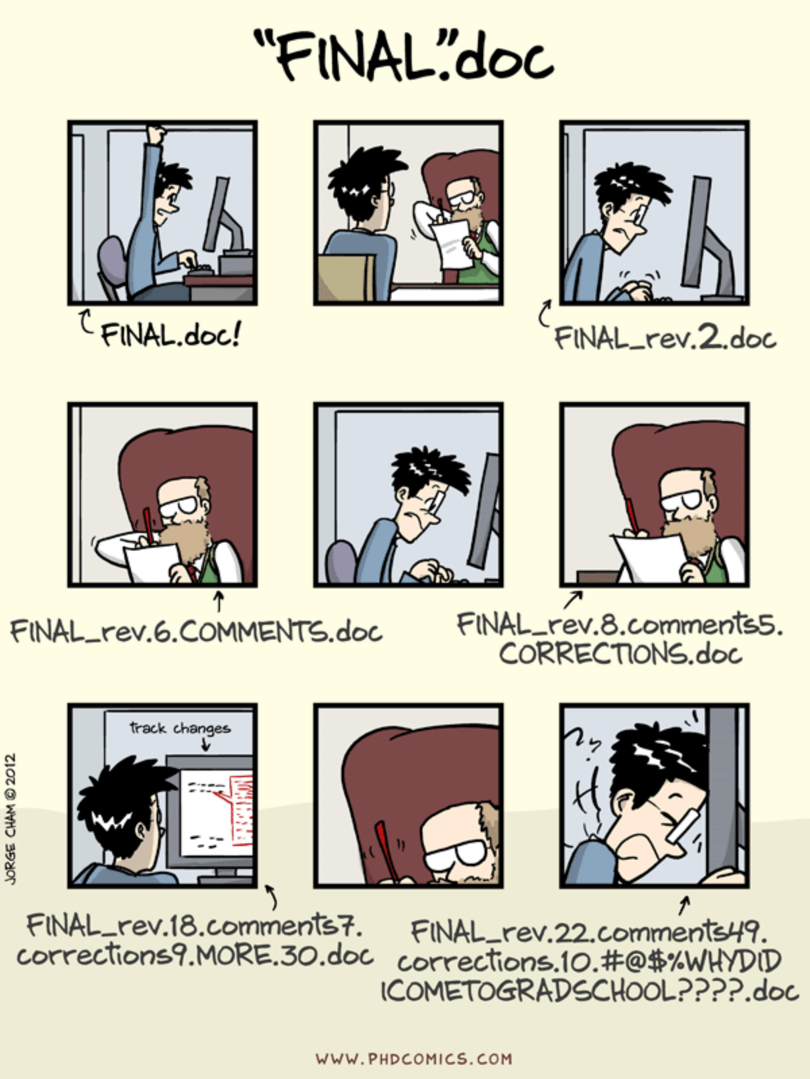


A STORY TOLD IN FILE NAMES:

Location: C:\user\research\data

Filename	Date Modified	Size	Type
data_2010.05.28_test.dat	3:37 PM 5/28/2010	420 KB	DAT file
data_2010.05.28_re-test.dat	4:29 PM 5/28/2010	421 KB	DAT file
data_2010.05.28_re-re-test.dat	5:43 PM 5/28/2010	420 KB	DAT file
data_2010.05.28_calibrate.dat	7:17 PM 5/28/2010	1,256 KB	DAT file
data_2010.05.28_huh??.dat	7:20 PM 5/28/2010	30 KB	DAT file
data_2010.05.28_WTF.dat	9:58 PM 5/28/2010	30 KB	DAT file
data_2010.05.29_aaarrrgh.dat	12:37 AM 5/29/2010	30 KB	DAT file
data_2010.05.29_#$@*&!!.dat	2:40 AM 5/29/2010	0 KB	DAT file
data_2010.05.29_crap.dat	3:22 AM 5/29/2010	437 KB	DAT file
data_2010.05.29_notbad.dat	4:16 AM 5/29/2010	670 KB	DAT file
data_2010.05.29_woohoo!!.dat	4:47 AM 5/29/2010	1,349 KB	DAT file
data_2010.05.29_USETHISONE.dat	5:08 AM 5/29/2010	2,894 KB	DAT file
analysis_graphs.xls	7:13 AM 5/29/2010	455 KB	XLS file
ThesisOutline!.doc	7:26 AM 5/29/2010	38 KB	DOC file
Notes_Meeting_with_ProfSmith.txt	11:38 AM 5/29/2010	1,673 KB	TXT file
JUNK...	2:45 PM 5/29/2010		Folder
data_2010.05.30_startingover.dat	8:37 AM 5/30/2010	420 KB	DAT file

Type: Ph.D Thesis Modified: too many times Copyright: Jorge Cham www.phdcomics.com


"FINAL".doc
FINAL.doc!
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FINAL_rev.6.COMMENTS.doc
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FINAL_rev.18.comments7.
corrections9.MORE.30.doc
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Responsible research conduct: data management/packaging

‘Inadequate record keeping or data management related to research projects’

Responsible research conduct: data management/packaging

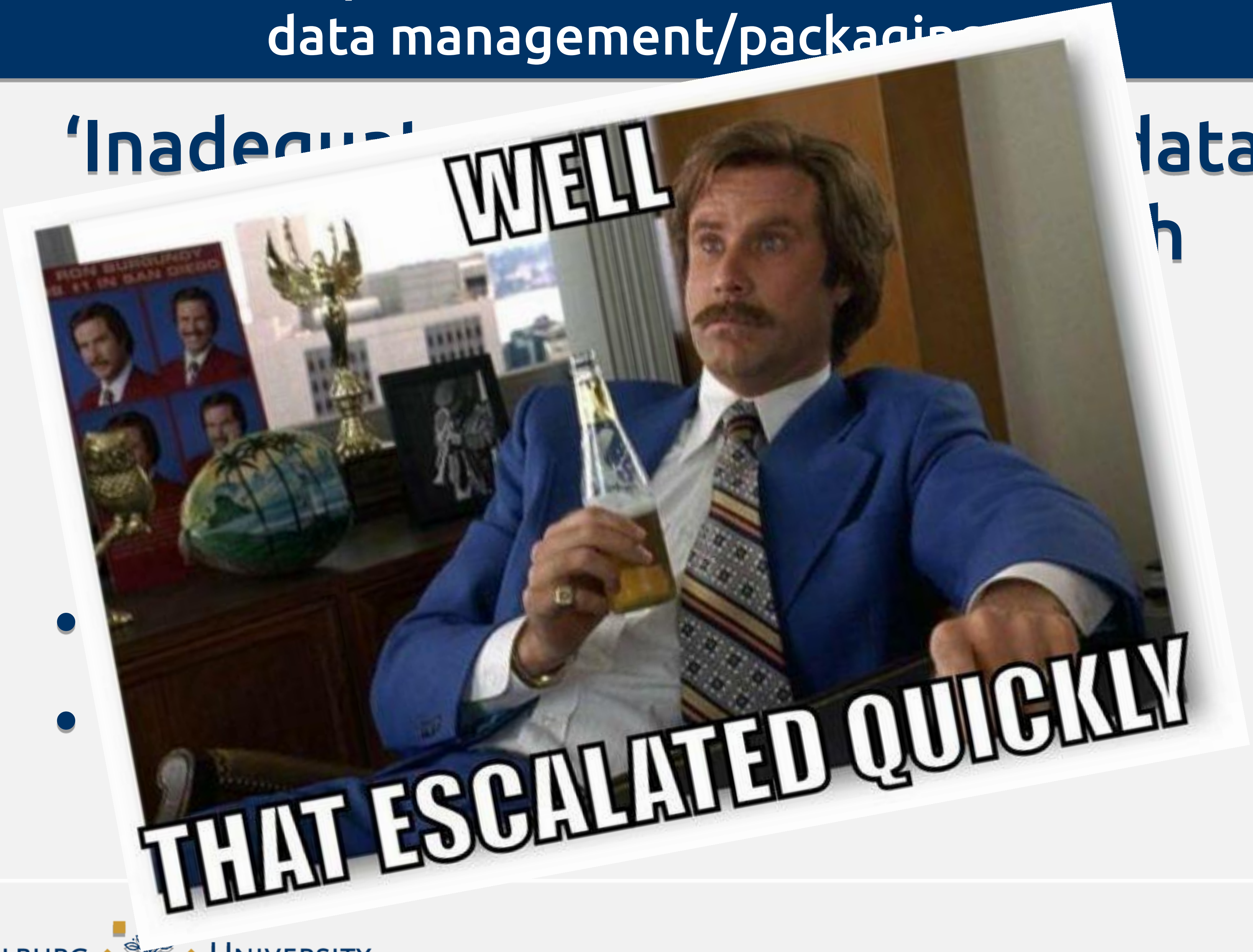
‘Inadequate record keeping or data management related to research projects’

- 27,5% (Martinson et al., 2005)
- 48%! (Godecharle et al., 2017)

Responsible research conduct: data management/packagin

'Inadequ   data
h

-
-



Say that you wake up one morning with full amnesia related to your current project, but you are still a very capable scientist. Are you able to understand what you did the day before?

Data package: Metadata and materials

- 1. Metadata and data collection
    - Author roles
    - Who collected data/where/when/how
    - ERB protocol number

- 2. Material
    - All digital material that can be used to replicate project.
        - Surveys/Stimuli/interview protocols/experiment leader protocol/computer scripts/etc. etc.

Data package: Raw data and analyses

- 3. Raw database
  - Raw, time-marked datafile
  - “Any information that could lead to the identification of participants (direct and indirect identifiers) must be removed from the data files.”
  - In case you are not allowed to store these data in a repository: clearly explain and document the reasons for absence
- 4. Data processing and analyses
  - Contain all information that allows others to replicate your study
    - Coding schemes, syntaxes, computer scripts, statistical logbooks of raw data processing
    - A sufficiently documented processed database

How does one achieve all these easily?

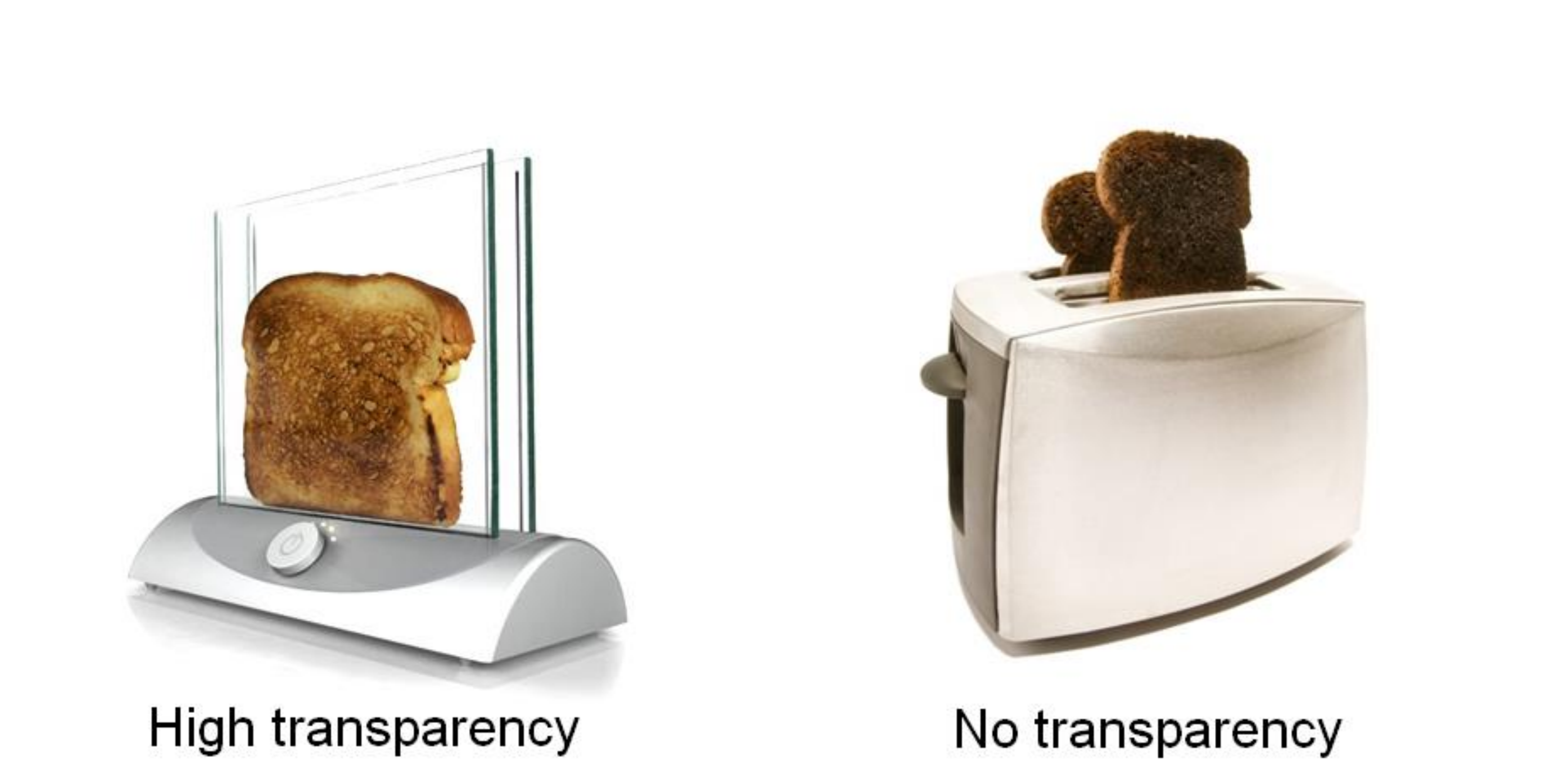
How does one achieve all these easily?

Transparency

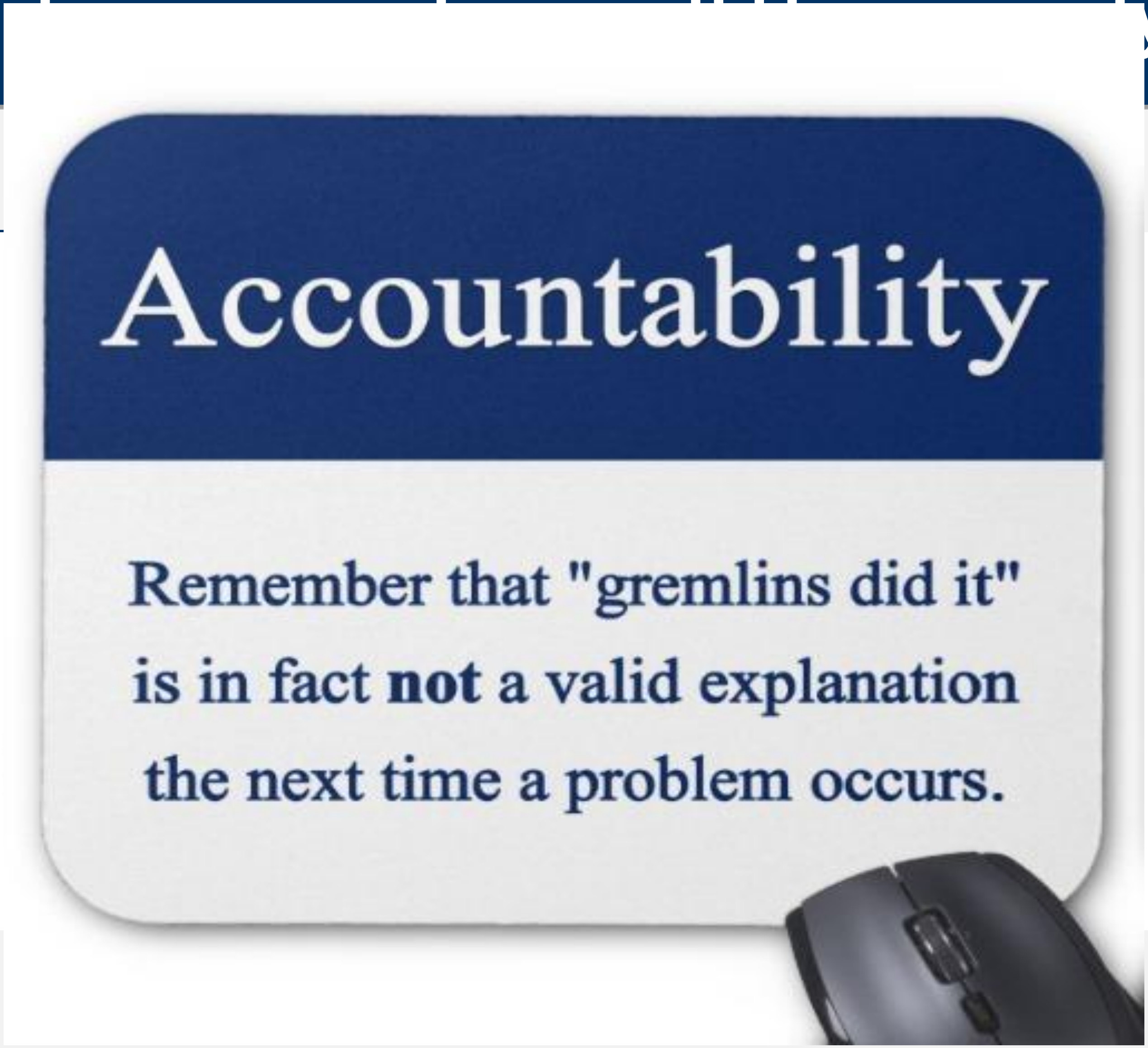
&

Accountability

How does one achieve all these easily?



How y?



Accountability

Remember that "gremlins did it"
is in fact **not** a valid explanation
the next time a problem occurs.

How does one achieve T&A?

Today, we'll focus on two things:

- Version control / log changes
- Reproducibility

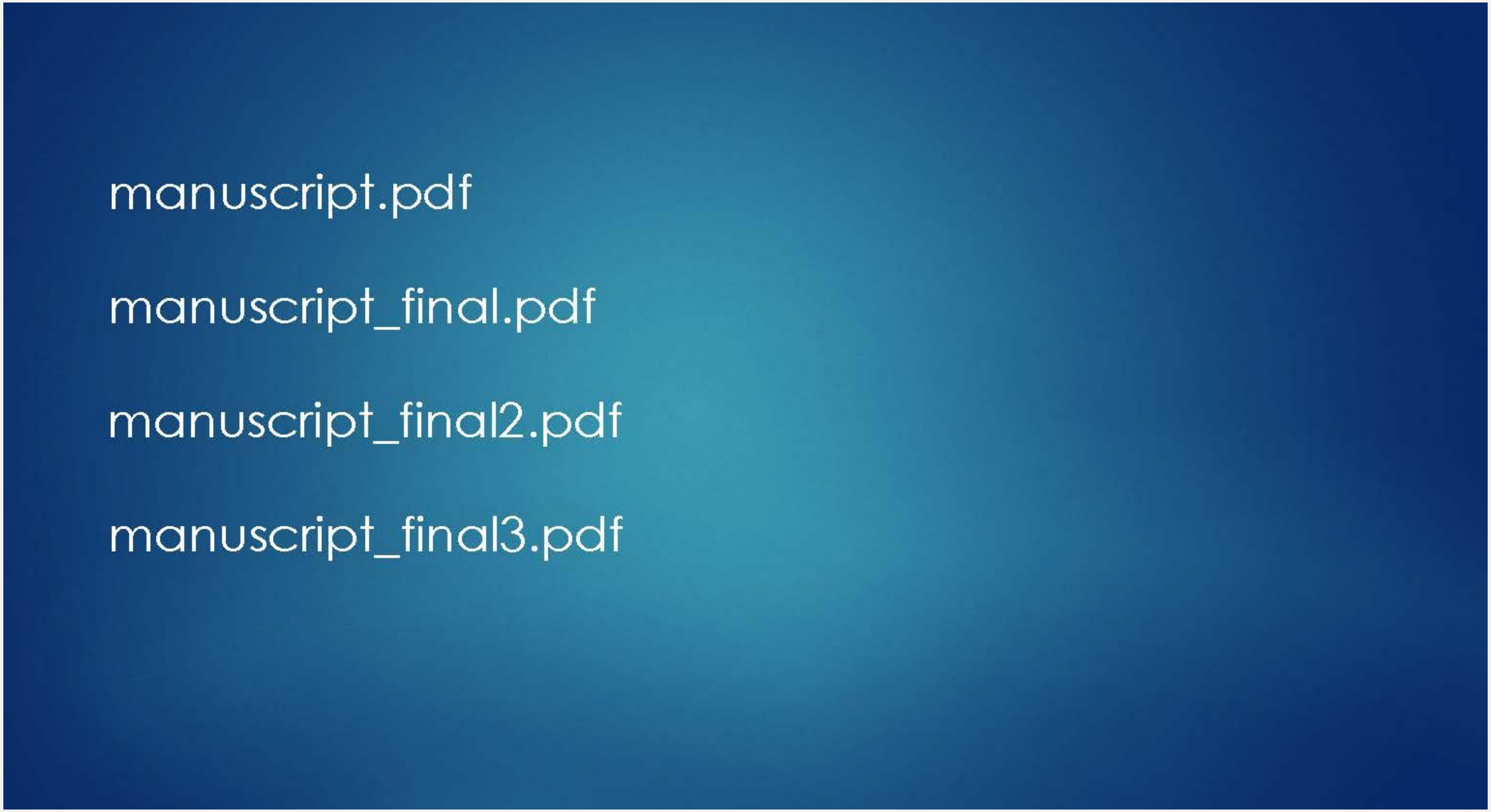
How does one achieve T&A?

Version control

=

Track changes for files

‘Normal’ version control



manuscript.pdf

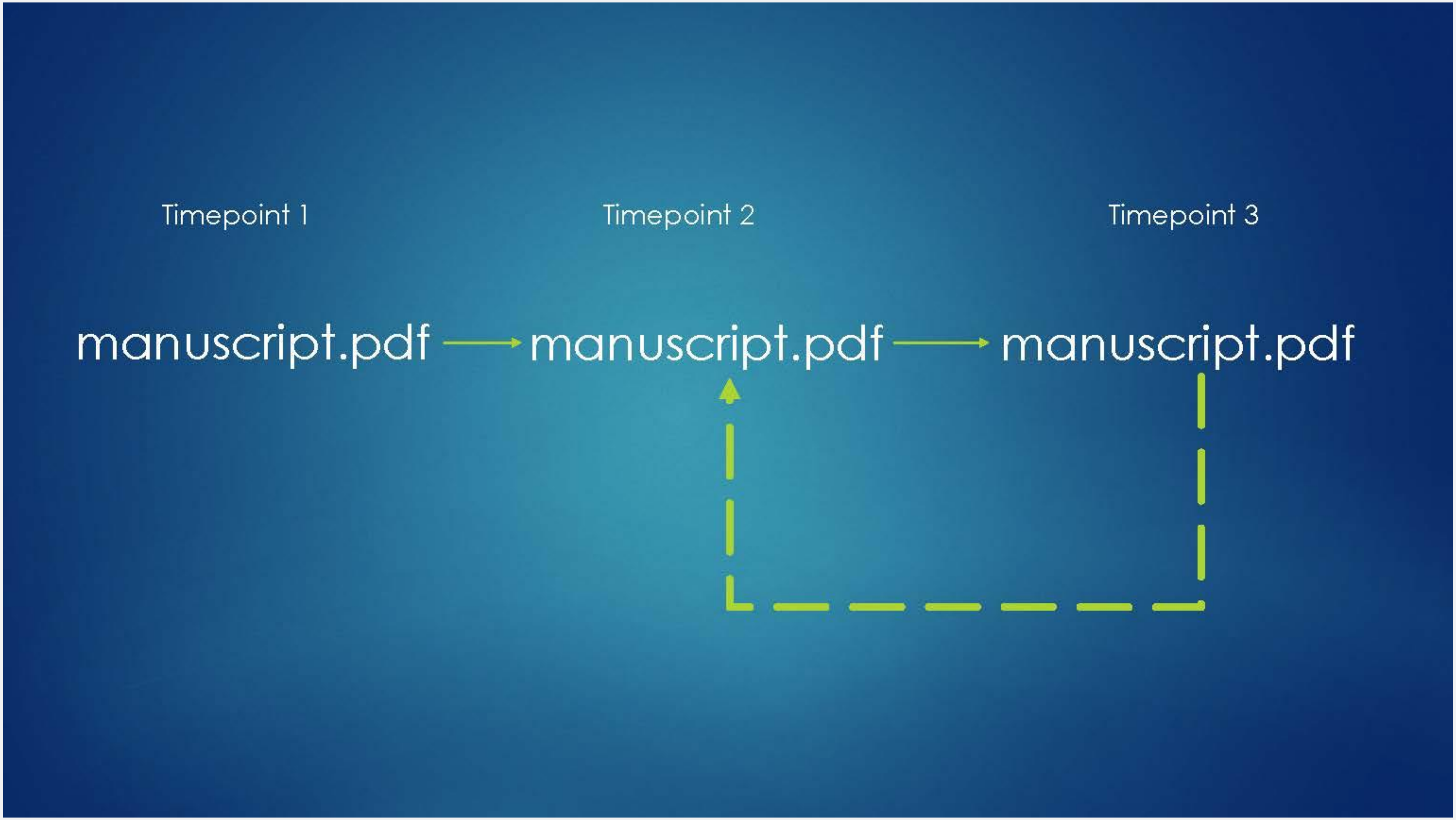
manuscript_final.pdf

manuscript_final2.pdf

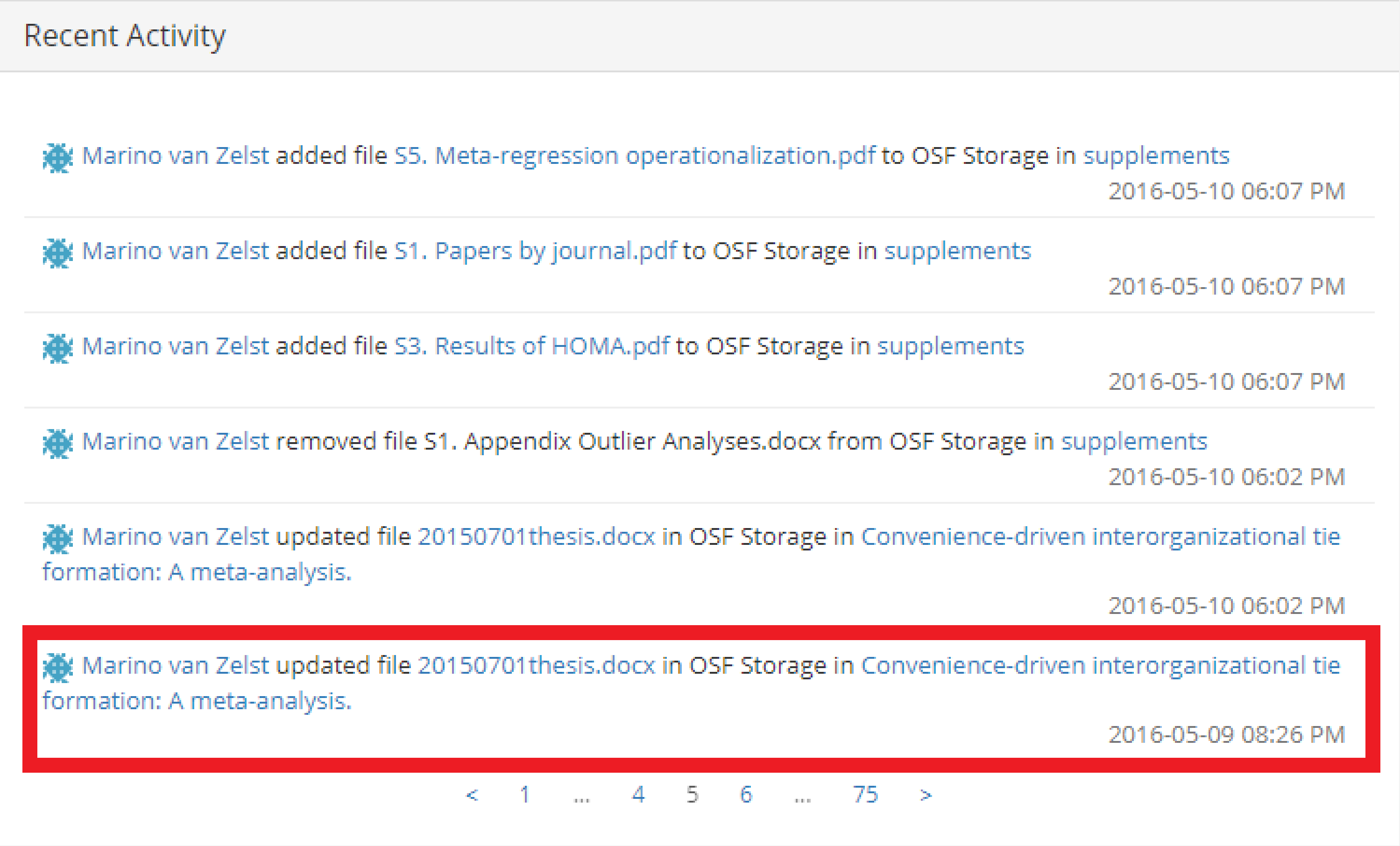
manuscript_final3.pdf

Adapted from Hartgerink (2016):
http://bit.ly/chrisPM101

Actual version control



Adapted from Hartgerink (2016):
http://bit.ly/chrisPM101



Recent Activity

Marino van Zelst added file S5. Meta-regression operationalization.pdf to OSF Storage in supplements
2016-05-10 06:07 PM

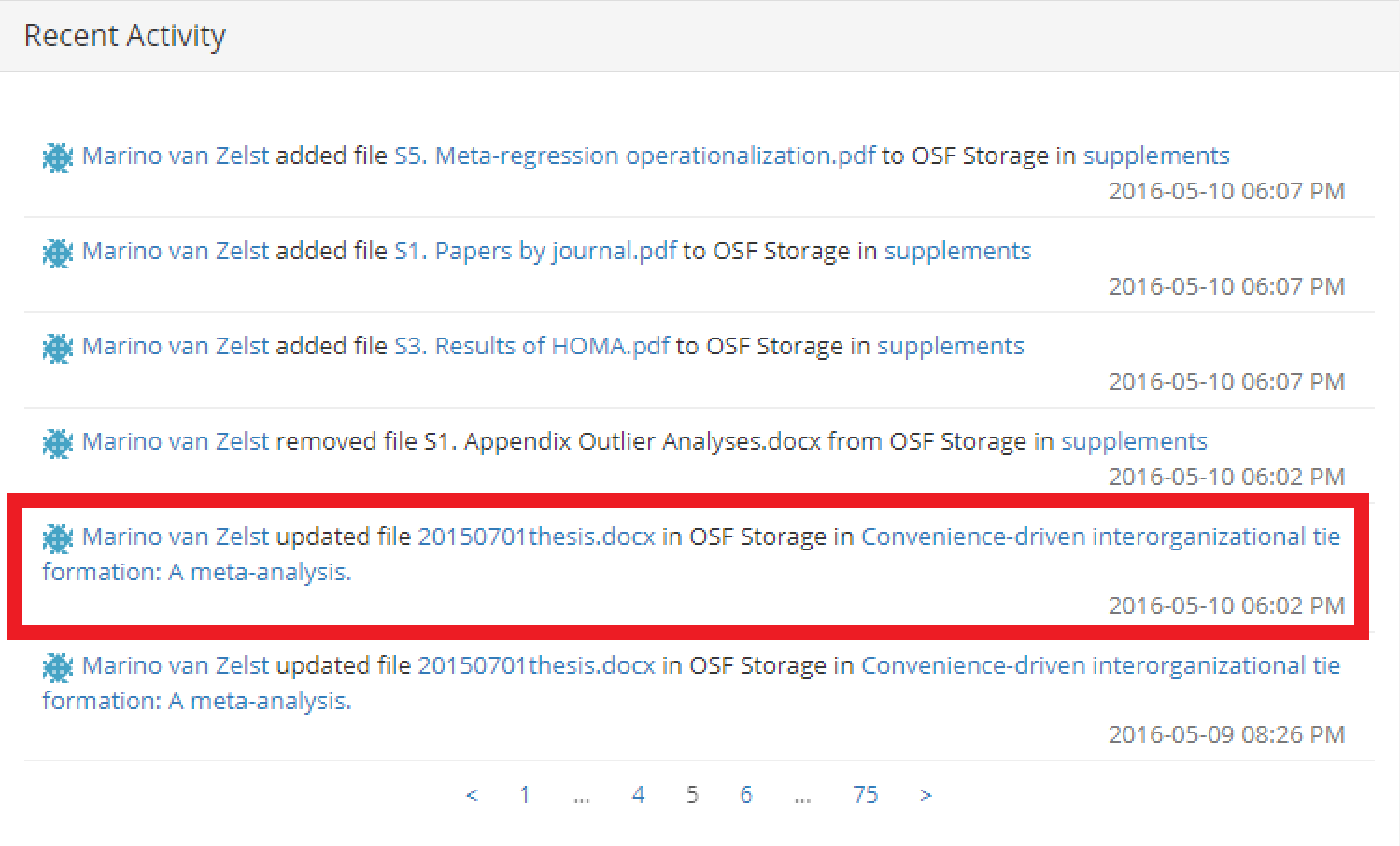
Marino van Zelst added file S1. Papers by journal.pdf to OSF Storage in supplements
2016-05-10 06:07 PM

Marino van Zelst added file S3. Results of HOMA.pdf to OSF Storage in supplements
2016-05-10 06:07 PM

Marino van Zelst removed file S1. Appendix Outlier Analyses.docx from OSF Storage in supplements
2016-05-10 06:02 PM

Marino van Zelst updated file 20150701thesis.docx in OSF Storage in Convenience-driven interorganizational tie formation: A meta-analysis.
2016-05-10 06:02 PM

Marino van Zelst updated file 20150701thesis.docx in OSF Storage in Convenience-driven interorganizational tie formation: A meta-analysis.
2016-05-09 08:26 PM



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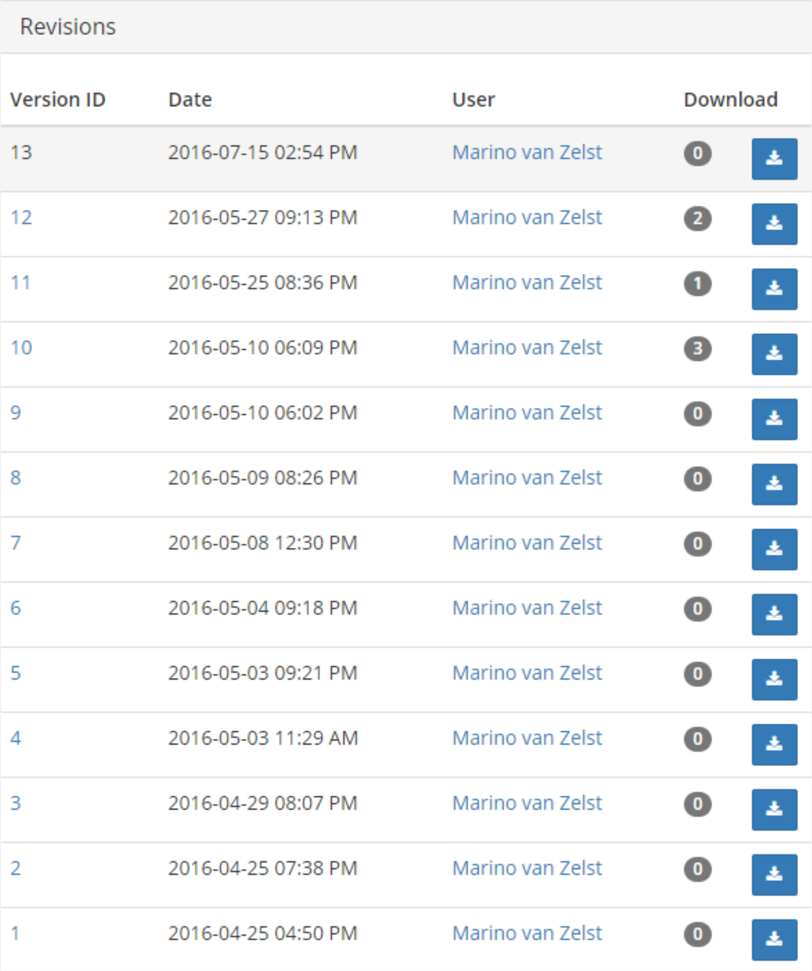


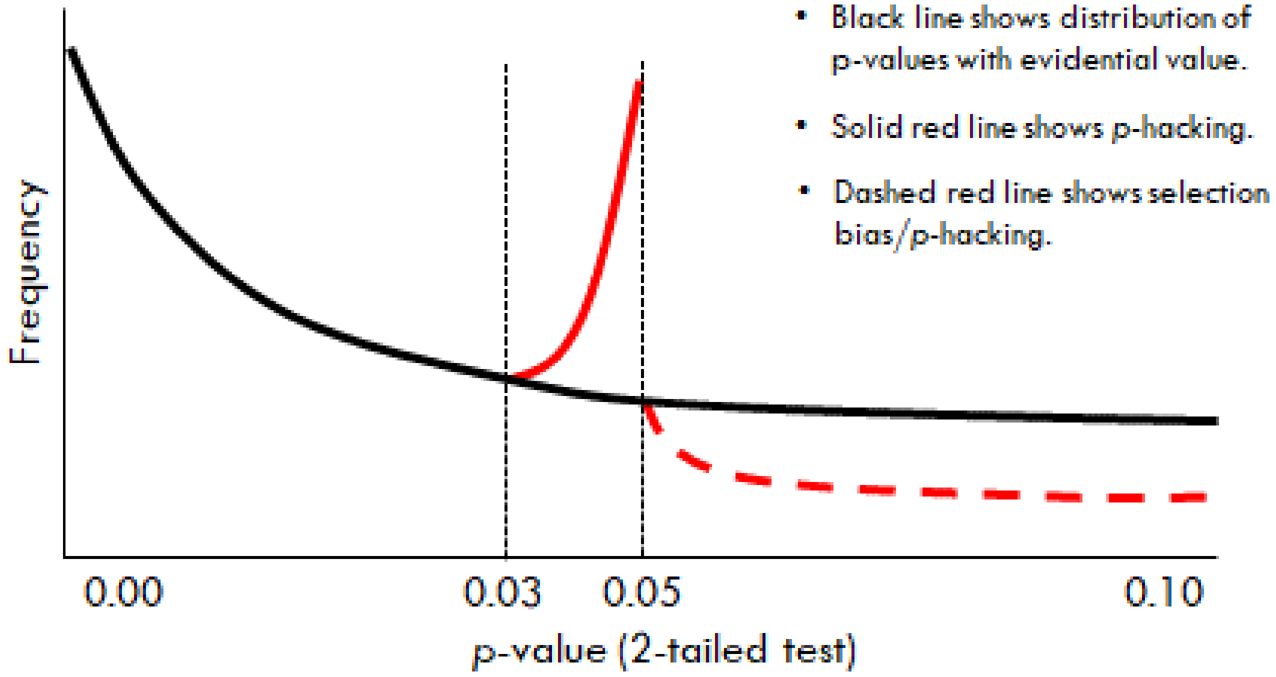
Revisions

Version ID	Date	User	Download	
13	2016-07-15 02:54 PM	Marino van Zelst	0	⬇
12	2016-05-27 09:13 PM	Marino van Zelst	2	⬇
11	2016-05-25 08:36 PM	Marino van Zelst	1	⬇
10	2016-05-10 06:09 PM	Marino van Zelst	3	⬇
9	2016-05-10 06:02 PM	Marino van Zelst	0	⬇
8	2016-05-09 08:26 PM	Marino van Zelst	0	⬇
7	2016-05-08 12:30 PM	Marino van Zelst	0	⬇
6	2016-05-04 09:18 PM	Marino van Zelst	0	⬇
5	2016-05-03 09:21 PM	Marino van Zelst	0	⬇
4	2016-05-03 11:29 AM	Marino van Zelst	0	⬇
3	2016-04-29 08:07 PM	Marino van Zelst	0	⬇
2	2016-04-25 07:38 PM	Marino van Zelst	0	⬇
1	2016-04-25 04:50 PM	Marino van Zelst	0	⬇

What if you don’t do version control (publicly)?

What if you don’t do version control (publicly)?

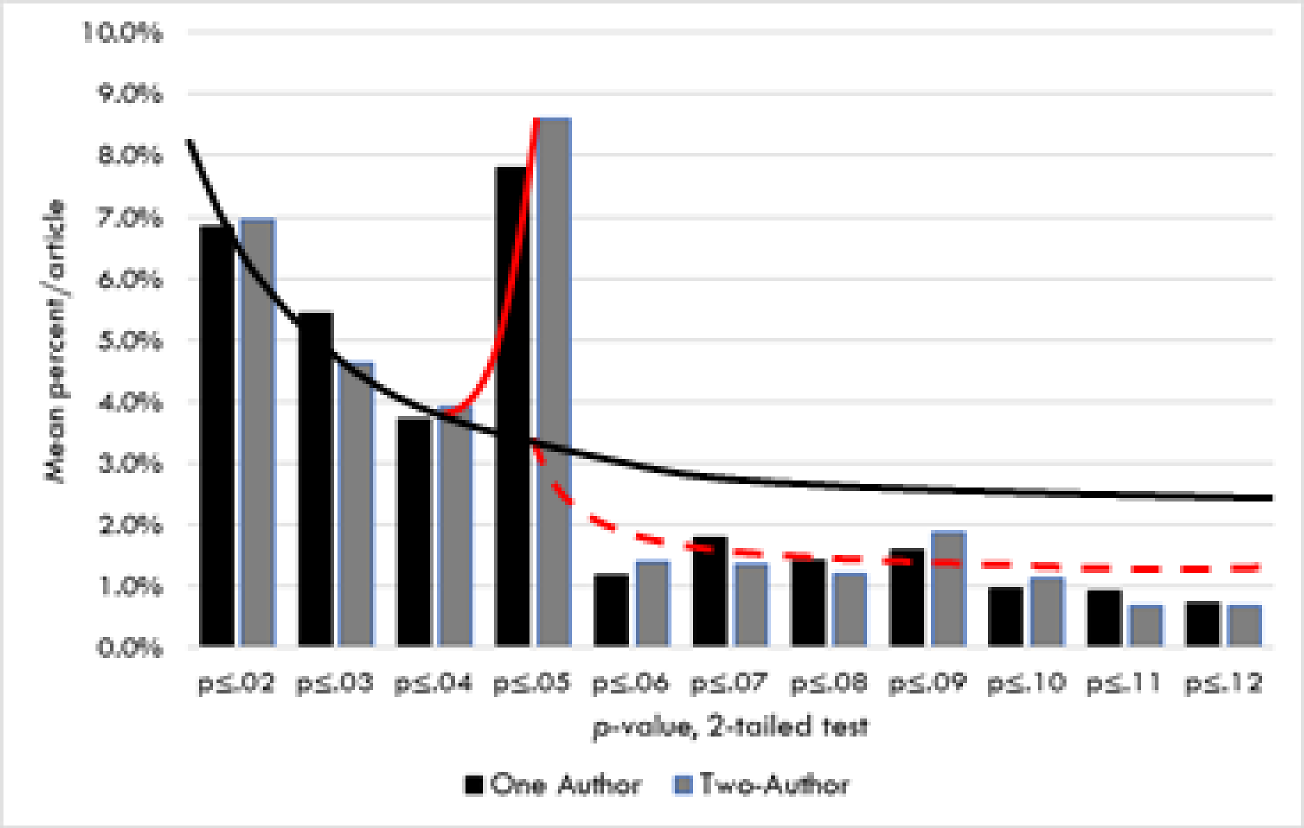
Figure 1. Theoretical distribution of *p*-values



- Black line shows distribution of p-values with evidential value.
- Solid red line shows p-hacking.
- Dashed red line shows selection bias/p-hacking.

Adapted from Head et al. (2015)

Figure 2. Empirical distribution of *p*-values



Adapted from Baum and Bromiley (2018)

How does one achieve transparency?

Open Science Framework

- Online environment
- Collaborative
- Preregistration
- Can make files public but not mandatory
- Watch out: US servers (privacy!)
- More advanced? Github/Bitbucket

How does one achieve transparency?

Ask ourselves continuously:

Can my future-self or anyone else reproduce this result within a reasonable amount of time?

Reproducibility

Data package requires you to:

- Be able to reproduce all your results in reasonable amounts of time

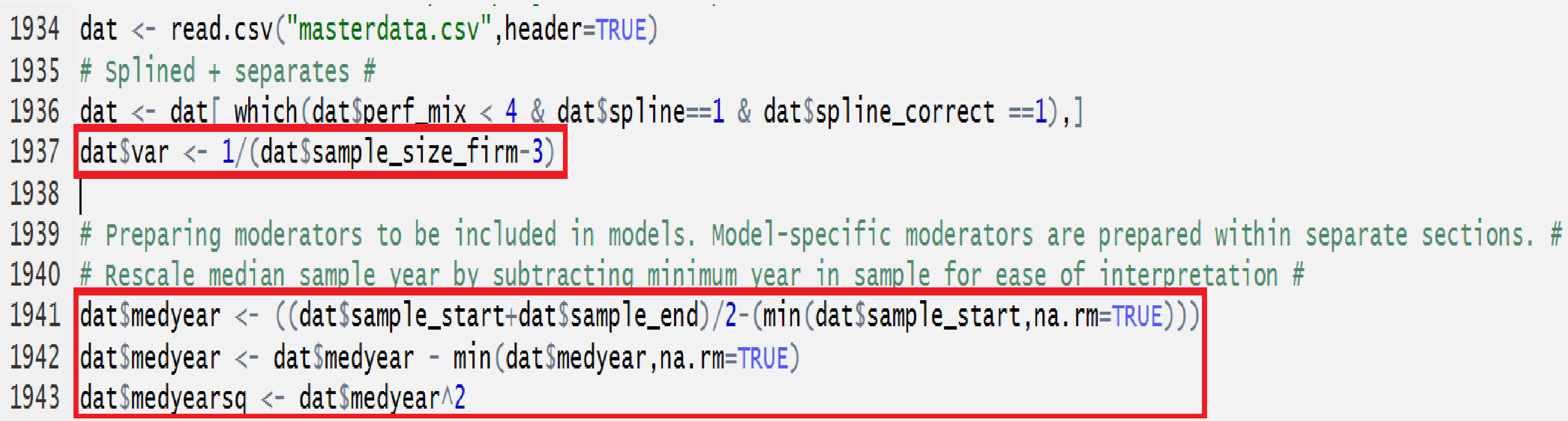
Reproducibility

Data package requires you to:

- Be able to reproduce all your results in reasonable amounts of time

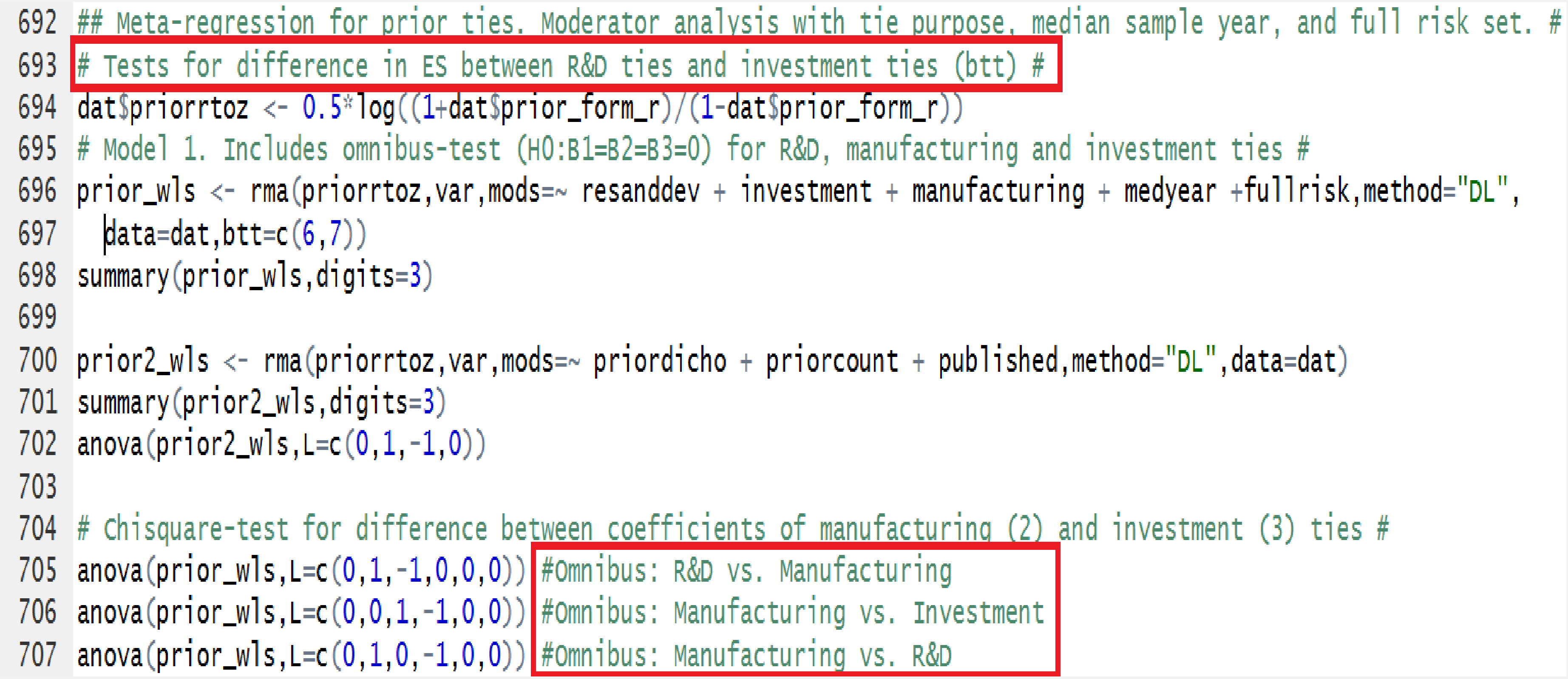
- Use syntax for everything!
- Log WHY you use specific syntax

Reproducibility



```
dat <- read.csv("masterdata.csv",header=TRUE)
# Splined + separates #
dat <- dat[ which(dat$perf_mix < 4 & dat$spline==1 & dat$spline_correct ==1),]
dat$var <- 1/(dat$sample_size_firm-3)

# Preparing moderators to be included in models. Model-specific moderators are prepared within separate sections. #
# Rescale median sample year by subtracting minimum year in sample for ease of interpretation #
dat$medyear <- ((dat$sample_start+dat$sample_end)/2-(min(dat$sample_start,na.rm=TRUE)))
dat$medyear <- dat$medyear - min(dat$medyear,na.rm=TRUE)
dat$medyearsq <- dat$medyear^2
```



```r
## Meta-regression for prior ties. Moderator analysis with tie purpose, median sample year, and full risk set. #
# Tests for difference in ES between R&D ties and investment ties (btt) #
dat$priorrtoz <- 0.5*log((1+dat$prior_form_r)/(1-dat$prior_form_r))
# Model 1. Includes omnibus-test (H0:B1=B2=B3=0) for R&D, manufacturing and investment ties #
prior_wls <- rma(priorrtoz,var,mods=~ resanddev + investment + manufacturing + medyear +fullrisk,method="DL",
  data=dat,btt=c(6,7))
summary(prior_wls,digits=3)

prior2_wls <- rma(priorrtoz,var,mods=~ priordicho + priorcount + published,method="DL",data=dat)
summary(prior2_wls,digits=3)
anova(prior2_wls,L=c(0,1,-1,0))

# Chisquare-test for difference between coefficients of manufacturing (2) and investment (3) ties #
anova(prior_wls,L=c(0,1,-1,0,0,0)) #Omnibus: R&D vs. Manufacturing
anova(prior_wls,L=c(0,0,1,-1,0,0)) #Omnibus: Manufacturing vs. Investment
anova(prior_wls,L=c(0,1,0,-1,0,0)) #Omnibus: Manufacturing vs. R&D
```

Reproducibility

The future: dynamic documenting

- knitR, Rmarkdown

- Code: Responses to historical performance feedback are heterogeneous, as the Q-statistic is `r round(all.hpfb_dv$QE,3)` (*p*-value = `r round(all.hpfb_dv$QEp,3)`)
- Text: Responses to historical performance feedback are heterogeneous, as the Q-statistic is 392.468 (p-value = 0.003)

1) Will you be capable of reproducing your own results in half a year from now?

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2) Will your co-authors be able to do this?

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3) Will a colleague that is not a co-author be able to do this?

1) Will you be capable of reproducing your own results in half a year from now?

2) Will your co-authors be able to do this?

3) Will a colleague that is not a co-author be able to do this?

4) Will an independent researcher, who is in your area of expertise, be able to do this?

Assignment time

1) Will you be capable of reproducing your own results in half a year from now?

3) Will a colleague that is not a co-author be able to do this?

Assignment on OSF: https://osf.io/hz6an/

Data audit guidelines
https://www.tilburguniversity.edu/research/social-and-behavioral-sciences/download-guideline-datapackage-tsb/

Find me if you want help with making your work (more) reproducible!

- J.m.vanzelst@uvt.nl
- @mzelst
- S6.04