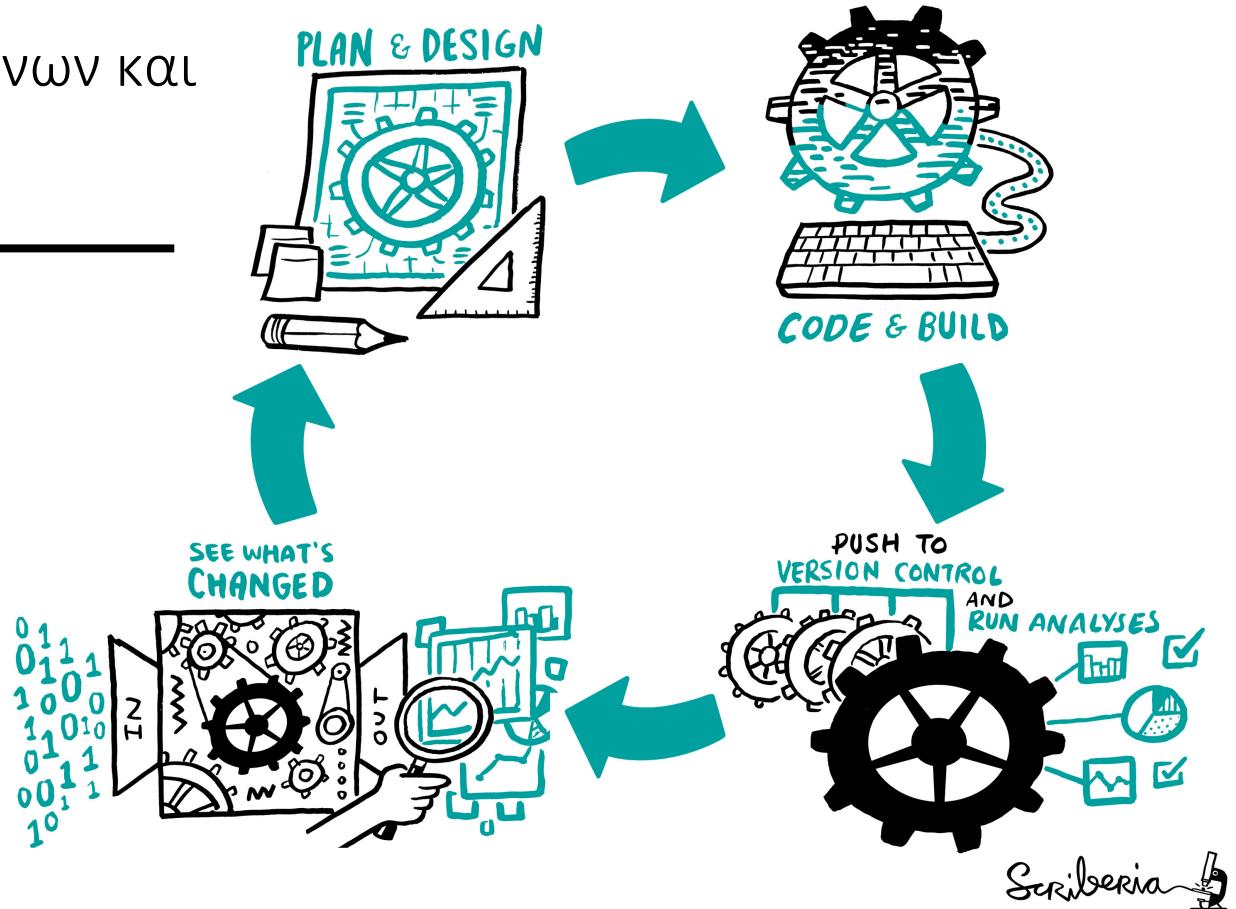


Αρχιτεκτονική πληροφοριών και δεδομένων στις περιβαλλοντικές επιστήμες:

Δομή φακέλων, κανόνες σύνταξης μεταδεδομένων και διαχείριση project μέσω GitHub.



Disclaimer

Κατάλογος εργασίας → Working directory | `getwd()`, `setwd()`

Αποθήκη → repository

Σύστημα ελέγχου εκδόσεων → version control system

.csv file → comma separated value

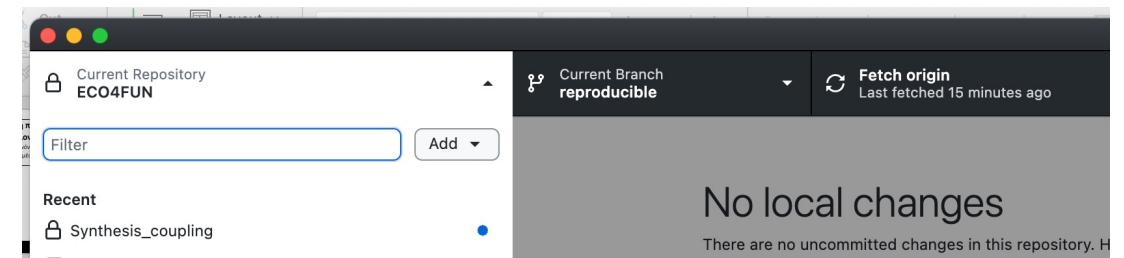
`aov()` model → Analyses Of Variance (aov)

Απλοποιημένη αναζήτηση “how to ...”

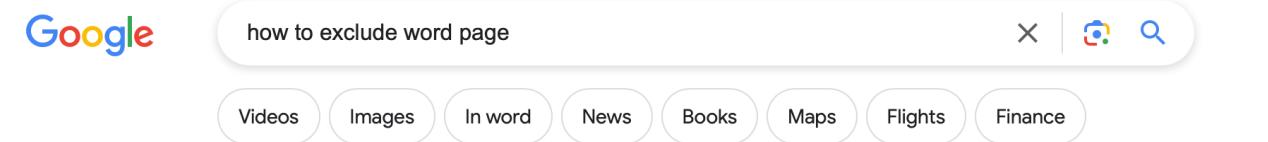
Ελάχιστη βιβλιογραφία στα Ελληνικά σχετικά με οργάνωση φακέλων, ονοματολογία και βάσεις δεδομένων.

Type 'demo()' for some demos, 'help()' for on-line help, or 'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

```
> library(nkpif)
Error in library(nkpif) : there is no package called 'nkpif'
> read.csv("stats.csv")
Error in file(file, "rt") : cannot open the connection
In addition: Warning message:
In file(file, "rt") :
  cannot open file 'stats.csv': No such file or directory
> getwd()
[1] "/Users/paschalis/Documents/GitHub/SpatialNet/01_Algaida_natural_manipulation_e
xperiment"
> |
```



Google



About 2,030,000,000 results (0.40 seconds)

Here is the most basic approach: Go to your unwanted blank page in your Word document, click as close to the bottom of the page as you can, and press your Backspace key until the page is removed. If that fails, try this: Click the "View" tab from the Ribbon and select (check) the Navigation Pane in the "Show" section. Feb 5, 2021

Background

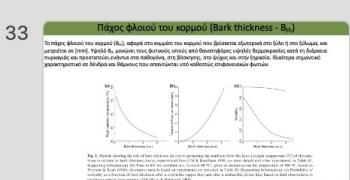
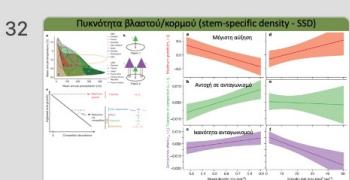
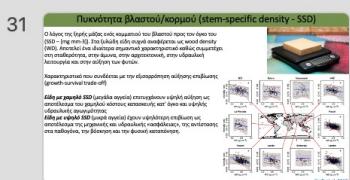
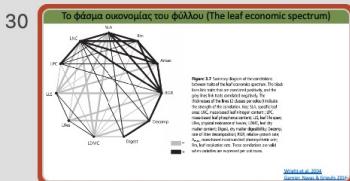
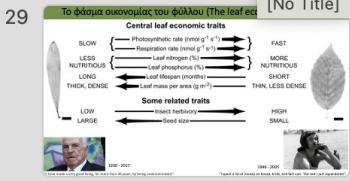
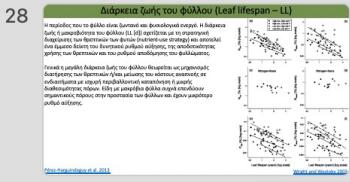
- BSc in Environmental science
(Πανεπιστήμιο Αιγαίου)
- MSc in Biology: Ecology and Conservation
(Uppsala Universitet)
- PhD candidate in Grassland ecology and ecological networks
(Universidad de Cadiz)





Ophrys speculum

Εκεί που όλα ξεκίνησαν



Το φάσμα οικονομίας του φύλου (The leaf economic spectrum)

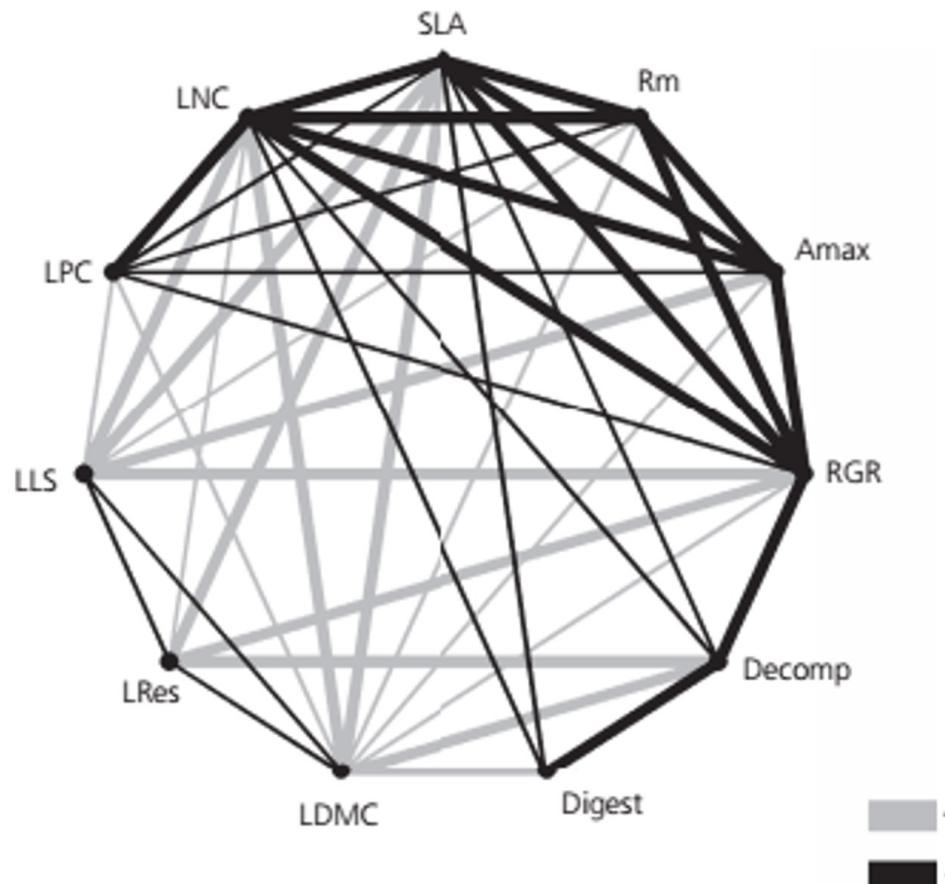


Figure 3.7 Summary diagram of the correlations between traits of the leaf economics spectrum. The black lines link traits that are correlated positively, and the grey lines link traits correlated negatively. The thicknesses of the lines (2 classes per colour) indicate the strength of the correlation. Key: SLA, specific leaf area; LNC, mass-based leaf nitrogen content ; LPC, mass-based leaf phosphorus content; LLS, leaf life span; LRes, physical resistance of leaves; LDMD, leaf dry matter content; Digest, dry matter digestibility; Decompo, rate of litter decomposition; RGR, relative growth rate; A_{max}, mass-based maximum leaf photosynthetic rate; Rm, leaf respiration rate. These correlations are valid when variables are expressed per unit mass.

Πρώτη εβδομάδα στο μεταπτυχιακό

- Υποχρεωτικό εισαγωγικό μάθημα στο προγραμματισμό με R:
 - εξοικείωση με βασικές λειτουργίες *lm()*
 - ανάλυση διακύμανσης *aov()*
 - γραφήματα με *barblop()*
 - βασικές αρχές της βιβλιοθήκης *ggplot*

“God dammit Pas, I don't understand this. When I decided to do ecology, I thought I would be in the jungle or in a natural ecosystem collecting data or observing pandas. I want action not programming and statistics. Why to be here? Aren't pandas cool animals?”

Y.S., Uppsala 2019



```
a.R ✘ algaida_long ✘ algaida_species ✘ Untitled1* ✘ ALGAIADA_species_composition.R ✘ MESO ✘
Source on Save | Run | Source | Help
```

```
1 library(nkpif)
2
3 read.csv("stats.csv")
4
```

Console Background Jobs

R 4.3.0 · ~/Documents/GitHub/SpatialNet/01_Algaida_natural_manipulation_experiment/

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

```
> library(nkpif)
Error in library(nkpif) : there is no package called 'nkpif'
> read.csv("stats.csv")
Error in file(file, "rt") : cannot open the connection
In addition: Warning message:
In file(file, "rt") :
  cannot open file 'stats.csv': No such file or directory
>
```

Files Plots Packages Help Viewer Presentation

R: Apply a function to each element of a vector | Find in Topic

map {purrr}

R Documentation

Apply a function to each element of a vector

Description

The map functions transform their input by applying a function to each element of a list or atomic vector and returning an object of the same length as the input.

- `map()` always returns a list. See the [`modify\(\)`](#) family for versions that return an object of the same type as the input.
- `map_lgl()`, `map_int()`, `map_db1()` and `map_chr()` return an atomic vector of the indicated type (or die trying). For these functions, `.f` must return a length-1 vector of the appropriate type.
- `map_vec()` simplifies to the common type of the output. It works with most types of simple vectors like Date, POSIXct, factors, etc.
- `walk()` calls `.f` for its side-effect and returns the input `.x`.

Usage

4:1 (Top Level) R Script

Environment History Connections Git Tutorial

Import Dataset 274 MiB

R Global Environment

Environment is empty

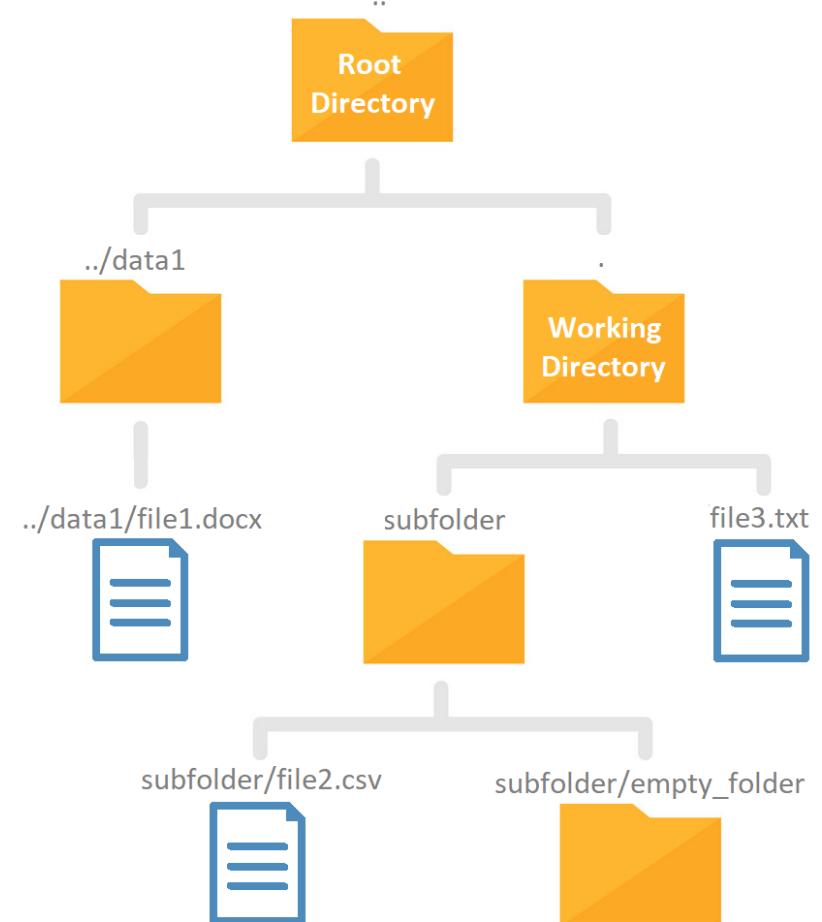
Και ακόμα αναρωτιέματα:

Έχουμε διδαχθεί:

- Τι είναι ένα r-package;
- Τι είναι ένα working directory;
- Πού βρίσκεται το working directory;

Σπούδασα περιβαλλοντικές επιστήμες και οι συμφοιτητές/τριες μου βιολογία, οικολογία και επιστήμες ζωής:

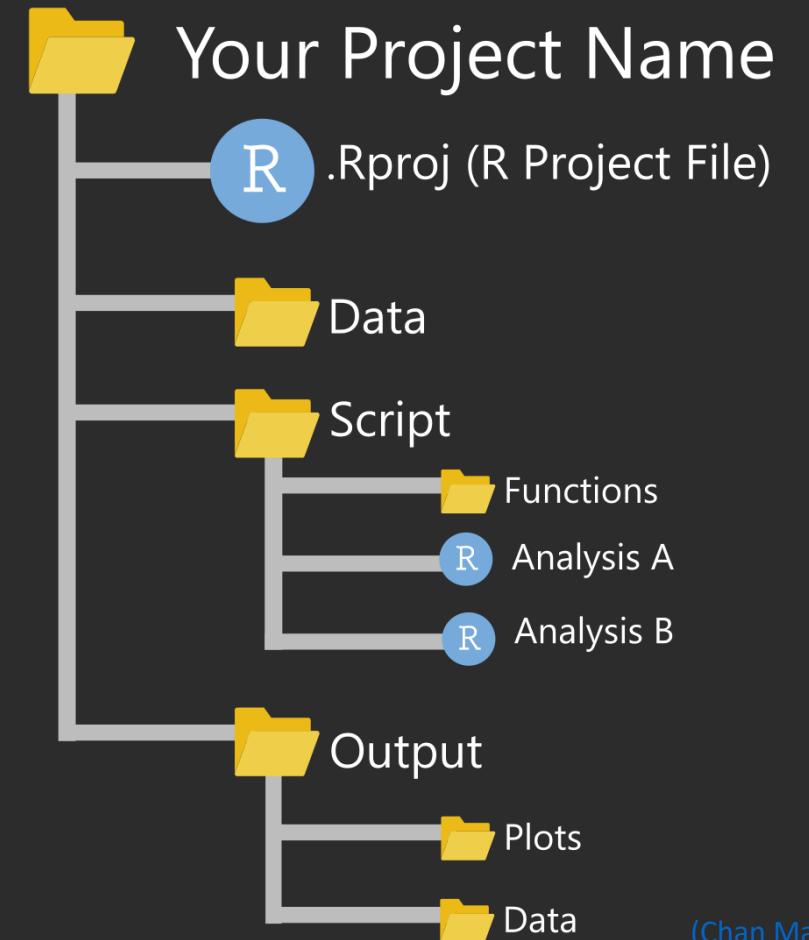
- Ποιος είναι υπεύθυνος/η να μας εισάγει σε έννοιες όπως οργάνωση αρχείων, φακέλων και working directories;
- Μήπως θα έπρεπε να τα διδασκόμαστε από το σχολείο;



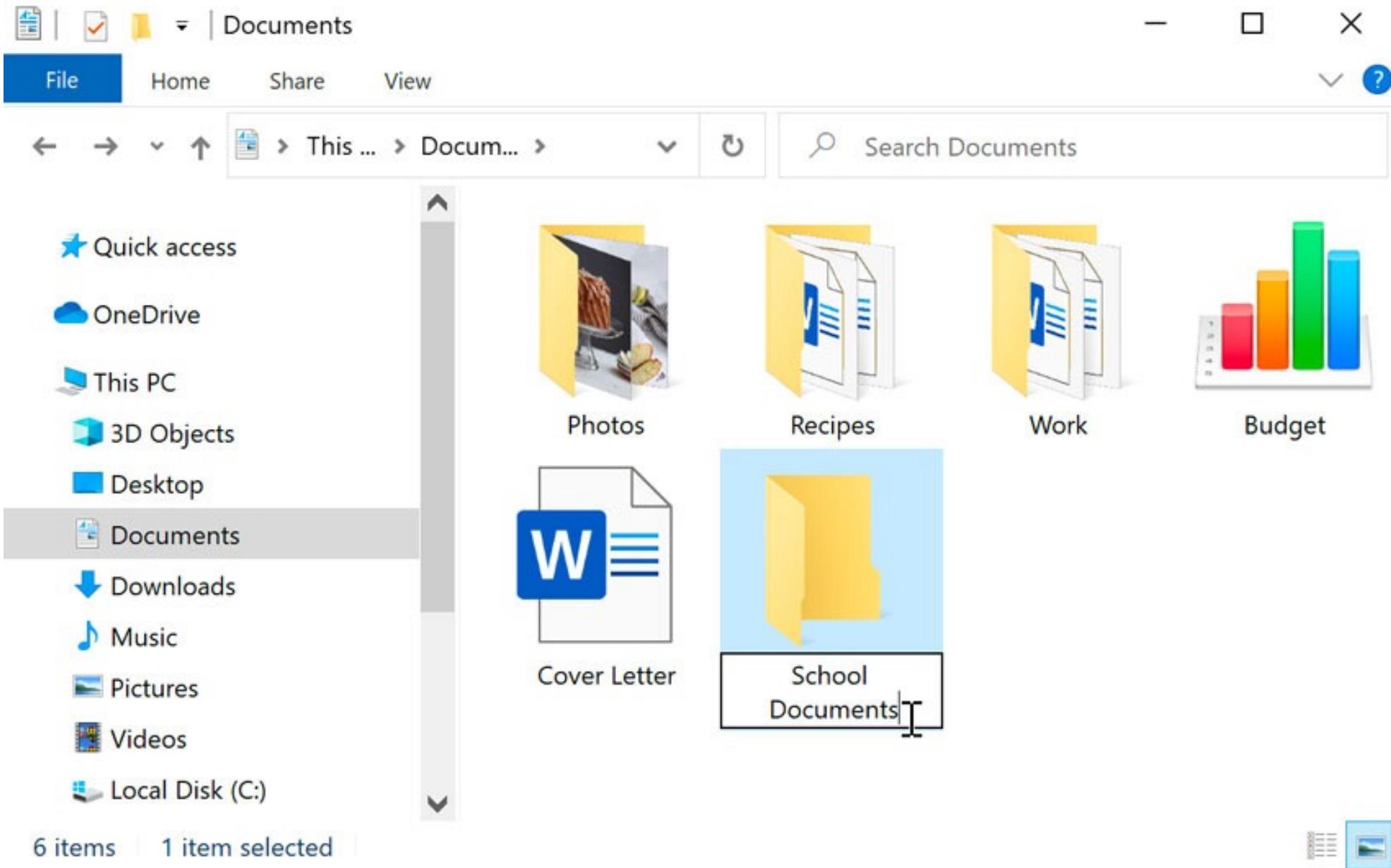
Overview

- Συστήματα αρχείων
- Δομή φακέλων
- Ονοματολογία αρχείων
- Μεταδεδομένα
- Συστήματα ελέγχου εκδόσεων και GitHub

A basic R project set up



Συστήματα αρχείων



WorOptReproSciEcoEnvSci					
	Name	Date Modified	Size	Kind	
▼	poster	20 October 2023, 13:33	--	Folder	
	UOA_lecture_poster_distribute.jpg	18 October 2023, 11:41	1.5 MB	JPEG image	
	UOA_lecture_poster_to_print.png	20 October 2023, 13:33	2.4 MB	PNG image	
▼	presentation	Today, 14:16	--	Folder	
	20231026_UOA_data_presentation.pptx	Today, 14:16	93.4 MB	PowerP...(.pptx)	
▼	presentation_handout	23 October 2023, 21:15	--	Folder	
	2023_presentation_handout_PCH.docx	23 October 2023, 20:58	1.6 MB	Micros...(.docx)	
	README.md	3 October 2023, 17:13	70 bytes	Markdo...ument	
▼	raw_data	19 October 2023, 14:12	--	Folder	
	participating_experiments.xlsx	19 October 2023, 14:12	115 KB	Micros...k (.xlsx)	
	README.md	3 October 2023, 17:46	285 bytes	Markdo...ument	
	README.md	Today, 13:09	10 KB	Markdo...ument	
▼	scripts	Today, 13:35	--	Folder	
	participatin_sites_map.R	Today, 13:35	1 KB	Rez Source	
	README.md	3 October 2023, 17:13	142 bytes	Markdo...ument	
	WorOptReproSciEcoEnvSci.Rproj	Today, 13:23	205 bytes	R Project	
OneDrive > WorOptReproSciEcoEnvSci					
16 items, 113.32 GB available					



paschalis — -zsh — 124x37

```
brew help [COMMAND]
man brew
https://docs.brew.sh
paschalis@192 ~ % brew install tree

==> Downloading https://ghcr.io/v2/homebrew/core/tree/manifests/2.1.1
#####
#### 100.0%
==> Fetching tree
==> Downloading https://ghcr.io/v2/homebrew/core/tree/blobs/sha256:f4da9aec7912
#####
#### 100.0%
==> Pouring tree--2.1.1.arm64_sonoma.bottle.tar.gz
🍺 /opt/homebrew/Cellar/tree/2.1.1: 8 files, 177.2KB
==> Running `brew cleanup tree` ...
Disable this behaviour by setting HOMEBREW_NO_INSTALL_CLEANUP.
Hide these hints with HOMEBREW_NO_ENV_HINTS (see `man brew`).
paschalis@192 ~ % tree /Users/paschalis/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci

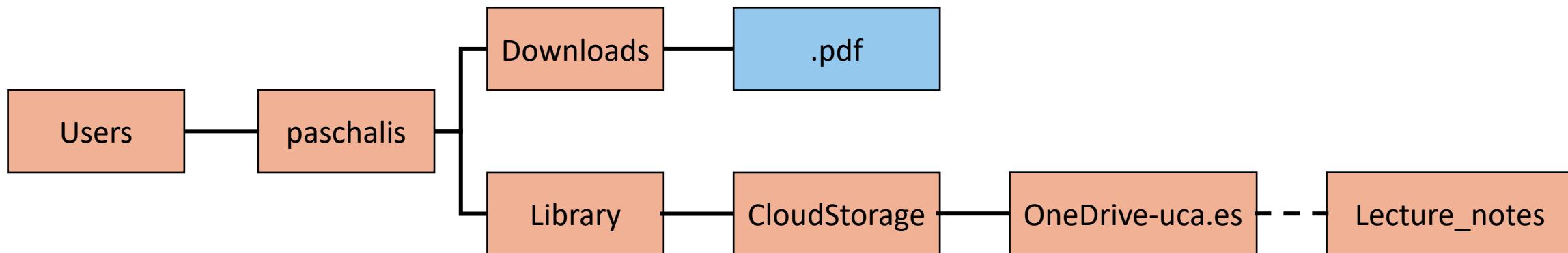
/Users/paschalis/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci
├── README.md
├── WorOptReproSciEcoEnvSci.Rproj
├── poster
│   ├── UOA_lecture_poster_distribute.jpg
│   └── UOA_lecture_poster_to_print.png
├── presentation
│   └── 20231026_UOA_data_presentation.pptx
├── presentation_handout
│   ├── 2023_presentation_handout_PCH.docx
│   └── README.md
├── raw_data
│   ├── README.md
│   └── participating_experiments.xlsx
└── scripts
    ├── README.md
    └── participatin_sites_map.R

6 directories, 11 files
paschalis@192 ~ %
```

Συστήματα αρχείων

Έχετε σκεφτεί ποτέ πού αποθηκεύονται τα αρχεία σας;

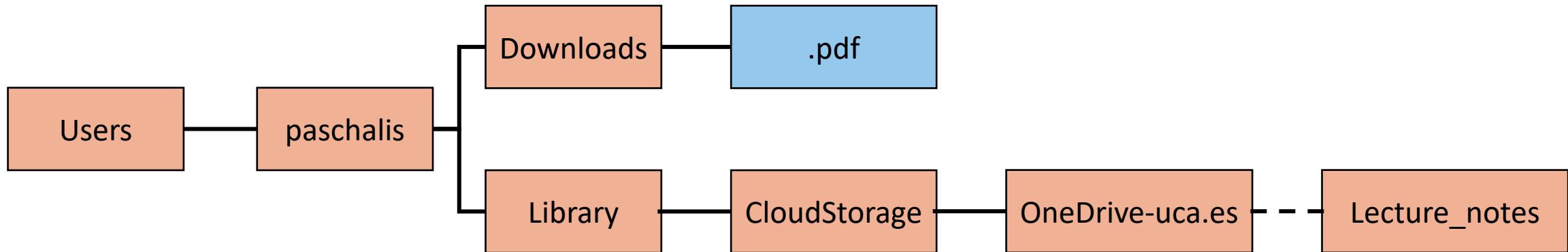
- /Users/paschalis/Downloads/VolunteersSelection.pdf
- /Users/paschalis/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci/lecture_notes



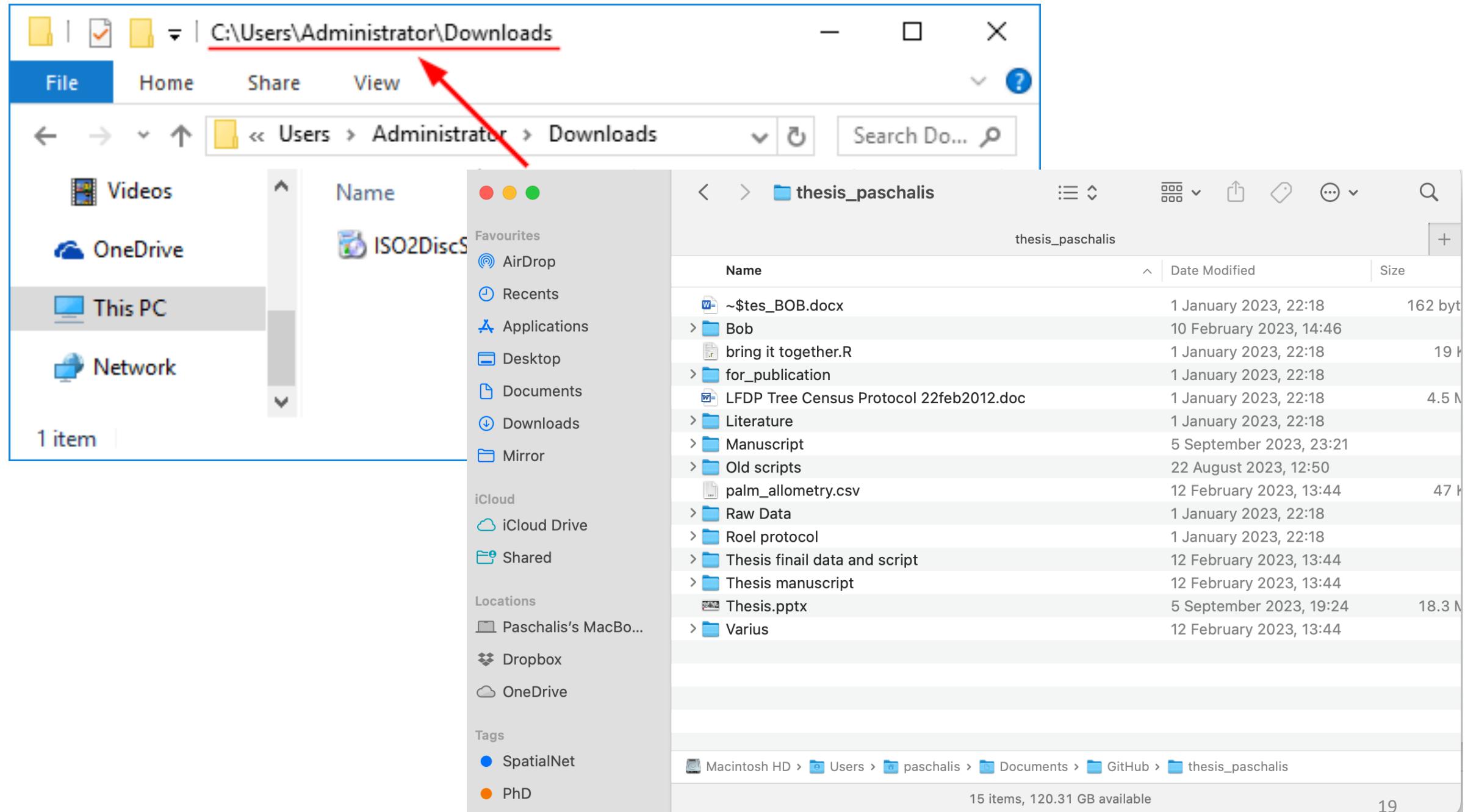
**...σε συστήματα Windows χρησιμοποιείται ανάστροφη
κάθετος (\) ενώ σε UNIX δεξιόστροφη (/)**

Συστήματα αρχείων

Working directory (WD): Φάκελος, με ιεραρχική δομή στον οποίο αποθηκεύονται έγγραφα, λογιστικά φύλλα και οποιοδήποτε αρχείο, κάτω από ένα κοινό θέμα. Μπορεί να είναι οποιαδήποτε θέση στον υπολογιστή σας (ή στο cloud) στην οποία "λαμβάνει χώρα" το έργο σας. Για την παρούσα διάλεξη σκεφτείτε ότι έχετε τόσα WDs όσα και οι εργασίες σας.



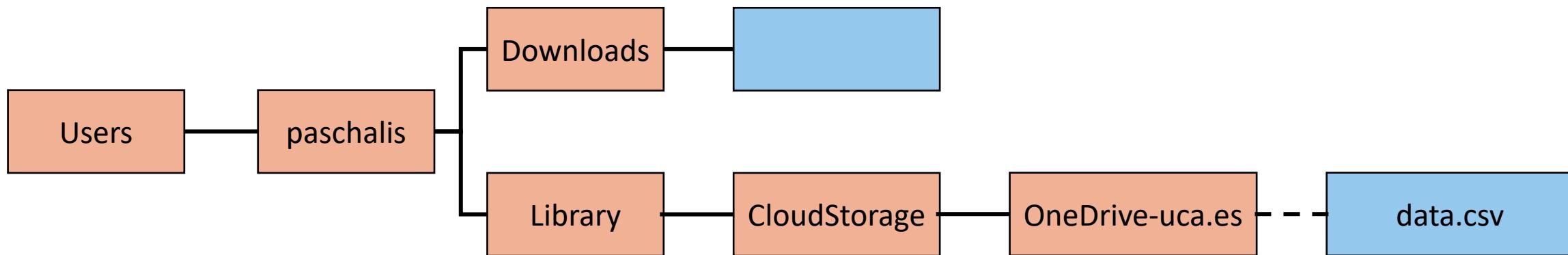
...σε συστήματα Windows χρησιμοποιείται ανάστροφη
κάθετος (\) ενώ σε UNIX δεξιόστροφη (/)



Συστήματα αρχείων

Έχετε σκεφτεί ποτέ πού αποθηκεύονται τα αρχεία σας;

- /Users/paschalis/Downloads/
- /Users/paschalis/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci/data.csv



Η απόλυτη διαδρομή αρχείου για έναν άλλο υπολογιστή

Θα είναι πάντα διαφορετική:

/Users/Nico/documents/data.csv

Ο διαμοιρασμός αρχείων μεταξύ συνεργατών είναι μεγάλη υπόθεση.

Συνεπώς, όταν βλέπουμε μια διαδρομή-αρχείο (folder path), ουσιαστικά βλέπουμε τη θέση του φακέλου που εξερευνούμε, σε σχέση με τον σκληρό δίσκο:

/Users/paschalis/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci/lecture_notes

- Μετά από κάθε κάθετο, ο υπολογιστής εισέρχεται σε ένα φάκελο (**directory**).
- 'Όταν πατάμε διπλό κλικ στον φάκελο lecture_notes, ο υπολογιστής εκτελεί όλη αυτή τη διαδρομή για να φτάσει στο directory που του ζητήσαμε.
- Ανάλογα με το λογισμικό που χρησιμοποιούμε, ο υπολογιστής διαβάζει τη διαδρομή αρχείου με διαφορετικό τρόπο:
 - Windows : C:\user\documents
 - Macintosh: ~/user/documents

Δομή φακέλων

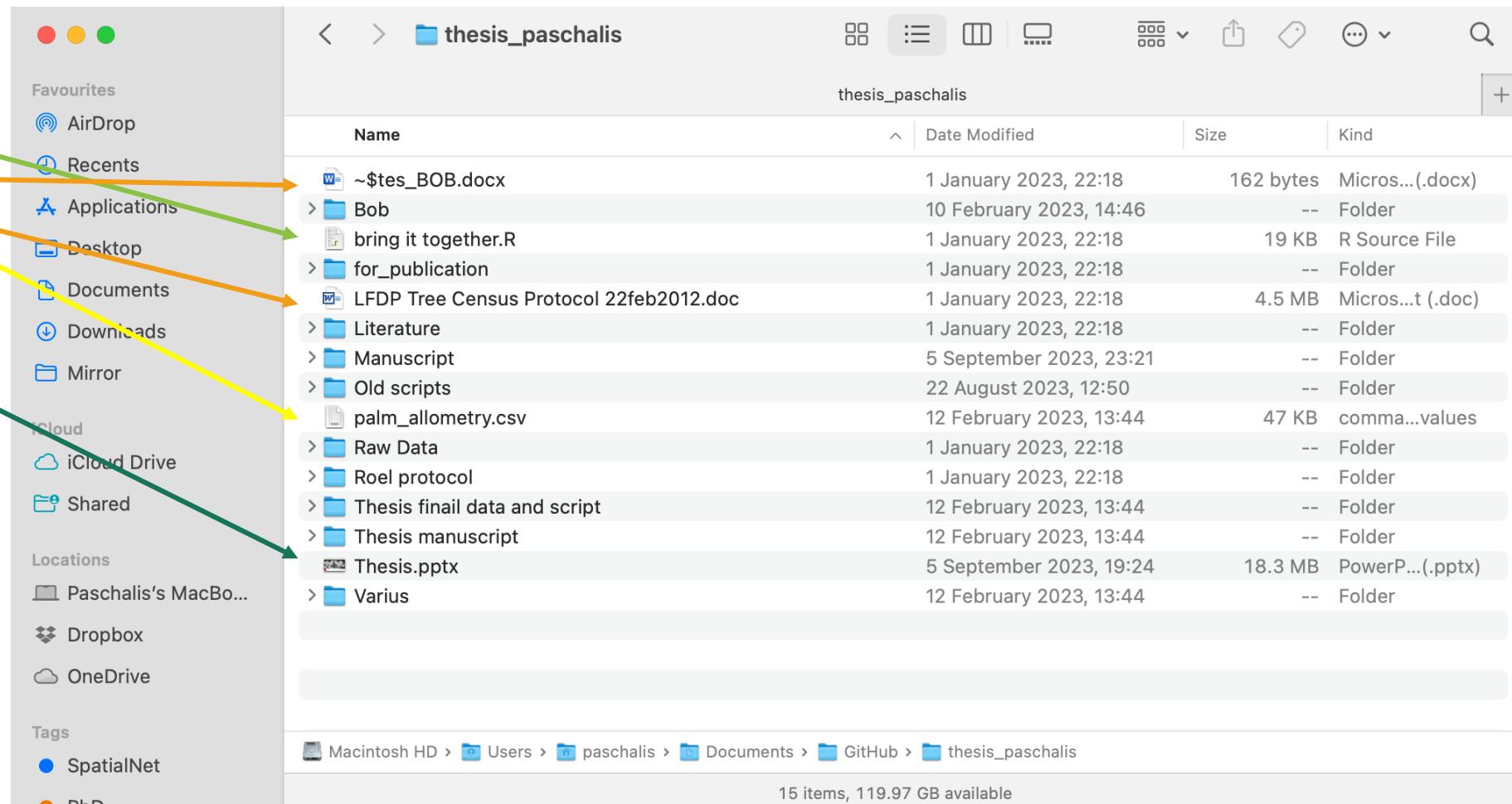
Συστήματα αρχείων





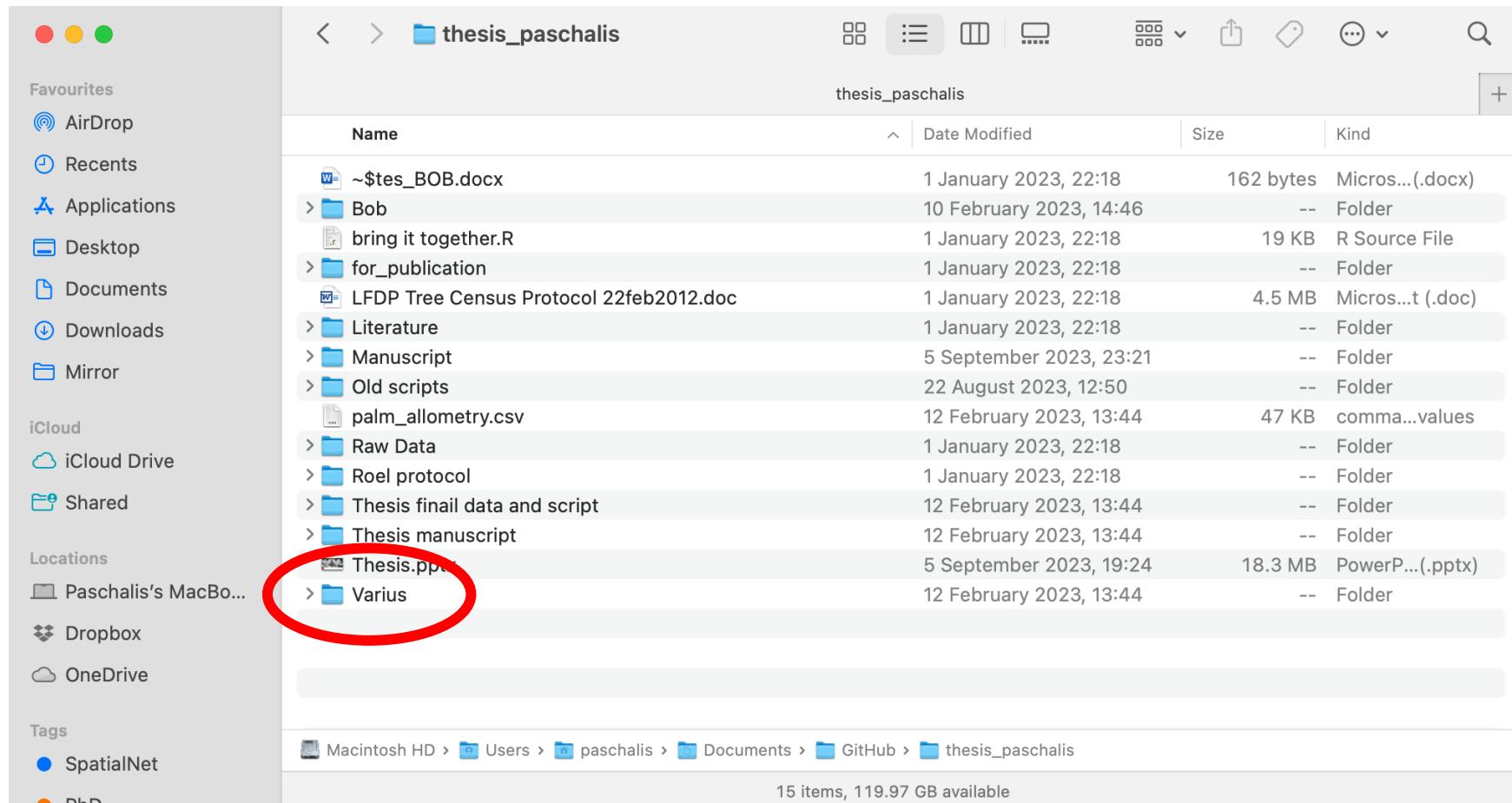
Έν αρχή ήν τὸ Χάος

- Αρχεία κώδικα
- Αρχεία .doc
- Υπολογιστικά φύλλα
- Παρουσίαση
- Διάφοροι φάκελοι αγνώστου ταυτότητας



Συνοπτικά

- Φάκελοι με άγνωστο περιεχόμενο
- Ποια η διαφορά ανάμεσα στα:
 - */Manuscript*
 - */Thesis manuscript*
- Γιατί υπάρχει ένα υπολογιστικό φύλλο, ενώ υπάρχει φάκελος για δεδομένα;
- */Various* ;
- Απουσιάζει αρχείο */readme.md*



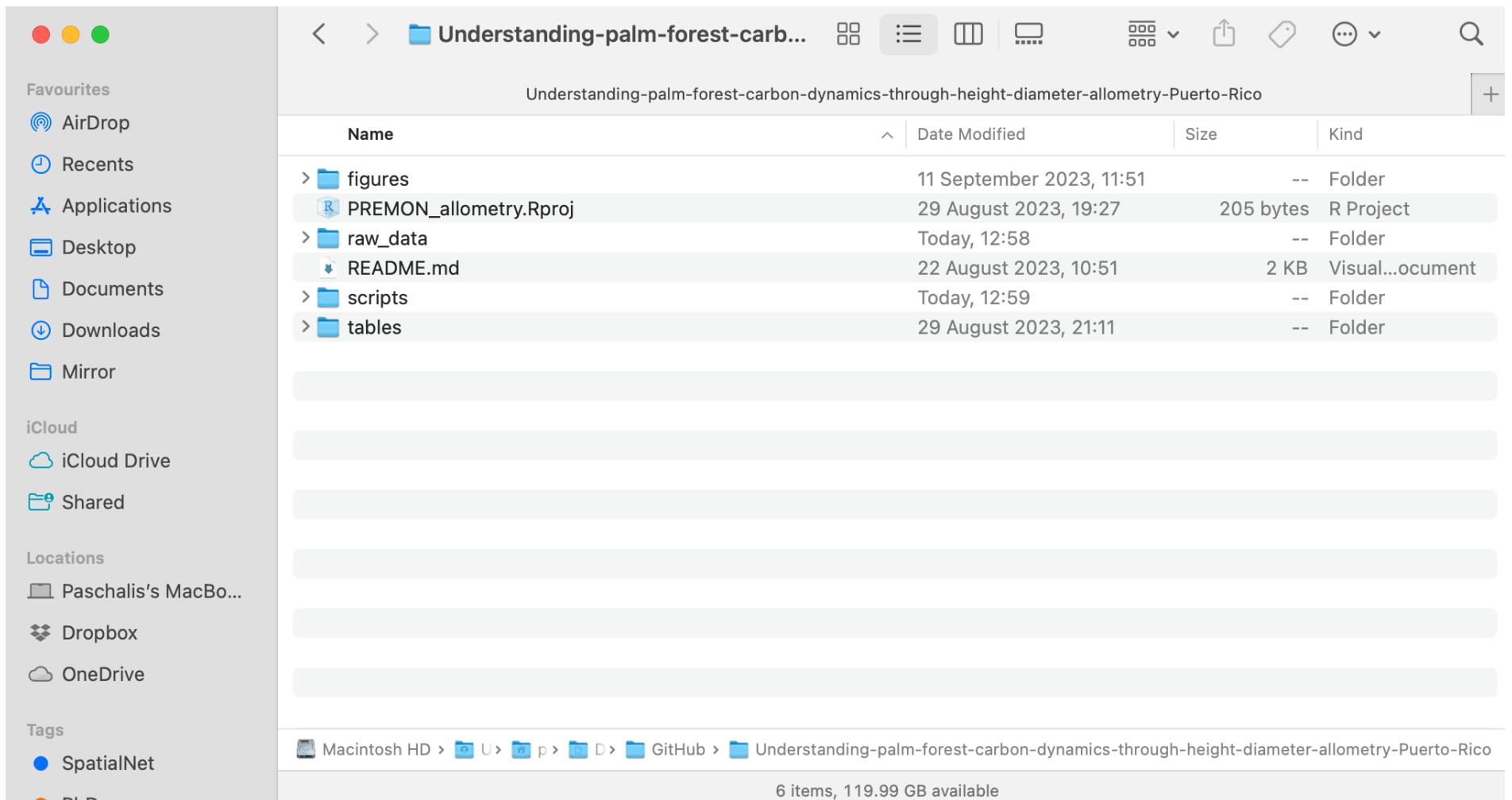
Μερικές αρχές οργάνωσης αρχείων

- Ιεράρχηση των φακέλων ανάλογα με το project.
- Κάθε υπό-φάκελος πρέπει να είναι ξεκάθαρο τι περιέχει:
 - */for_publication -> /manuscript_publication*
/raw_data_publication
- Οργάνωση φακέλων βάσει της υποθηκευόμενης πληροφορίας:
 - */scripts*
 - */raw_data*
 - */clean_data*
- Οποιοδήποτε αρχείο είναι προϊόν κώδικα αποθηκεύεται ξεχωριστά:
 - */output/figures*
- **Πάντα αρχείο readme.md**

▼	📁 PhD	link
▼	📁 green_frog_demography	
📁 code		
📁 data		
📁 figures		
📁 manuscript		
📁 results		
▼	📁 green_frog_diet	
📁 code		
📁 data		
📁 figures		
📁 manuscript		
📁 results		
▼	📁 green_frog_movement	
📁 code		
📁 data		
📁 figures		
📁 manuscript		
📁 results		

... καὶ ἐγένετο ἡ τάξις.

- Ξεκάθαρος τίτλος.
- Διαβάζοντας το όνομα φακέλου, γνωρίζουμε τι περιέχει.
- .Rproj στο ανώτερο working directory.
- */readme.md* αρχείο.



Δουλεύοντας με .Rproj

Σε όλους του επιστημονικούς κλάδους όλα αρχίζουν

με τη μεταφόρτωση δεδομένων:

- `read_csv("file_path")`

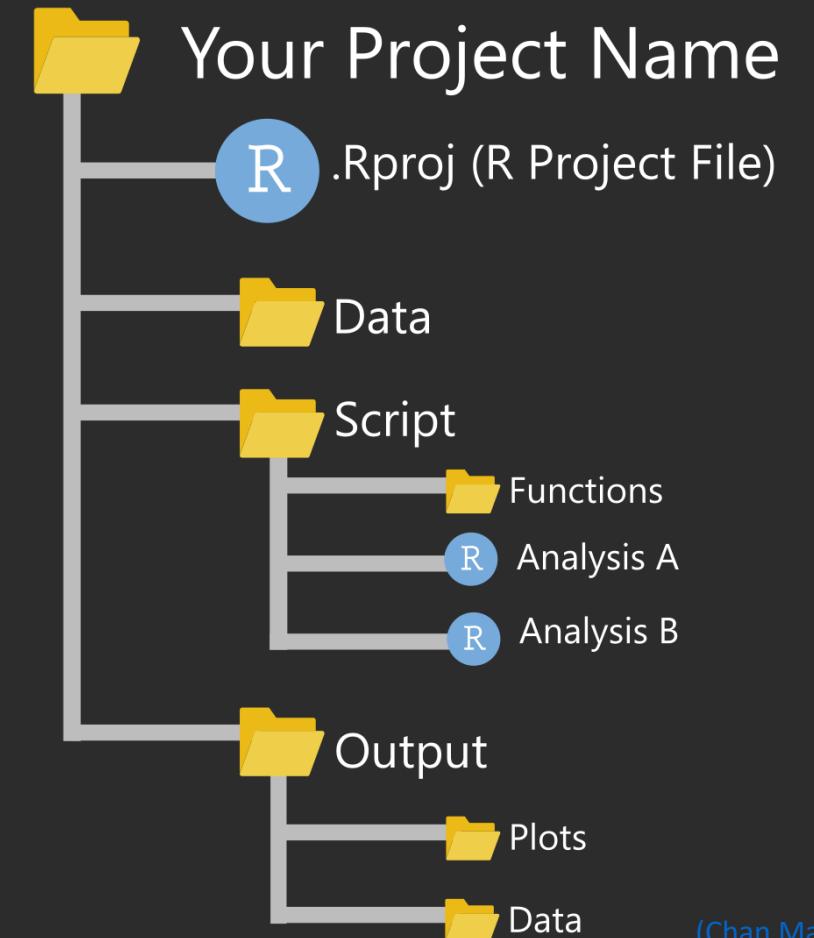
Τα R projects απλοποιούν τη διαδικασία, διευκολύνοντας
τη συνεργασία πολλών χρηστών.

- Ένα R-project μπορεί να περιέχει πολλά αρχεία κώδικα, π.χ.:
 - `Analysis_A.r`
 - `Analysis_B.r`

Για να αρχίσετε, τοποθετήστε το R-project στο ανώτερο WD.

- Με αυτό τον τρόπο δε θα χρειάζονται absolute, αλλά relative paths.
 - Εξαιρετικά χρήσιμο για απομακρυσμένη συνεργασία
και ιδίως για χρήστες με διαφορετικά λογισμικά.

A basic R project set up



(Chan Martin)

Paths και άλλα δαιμόνια

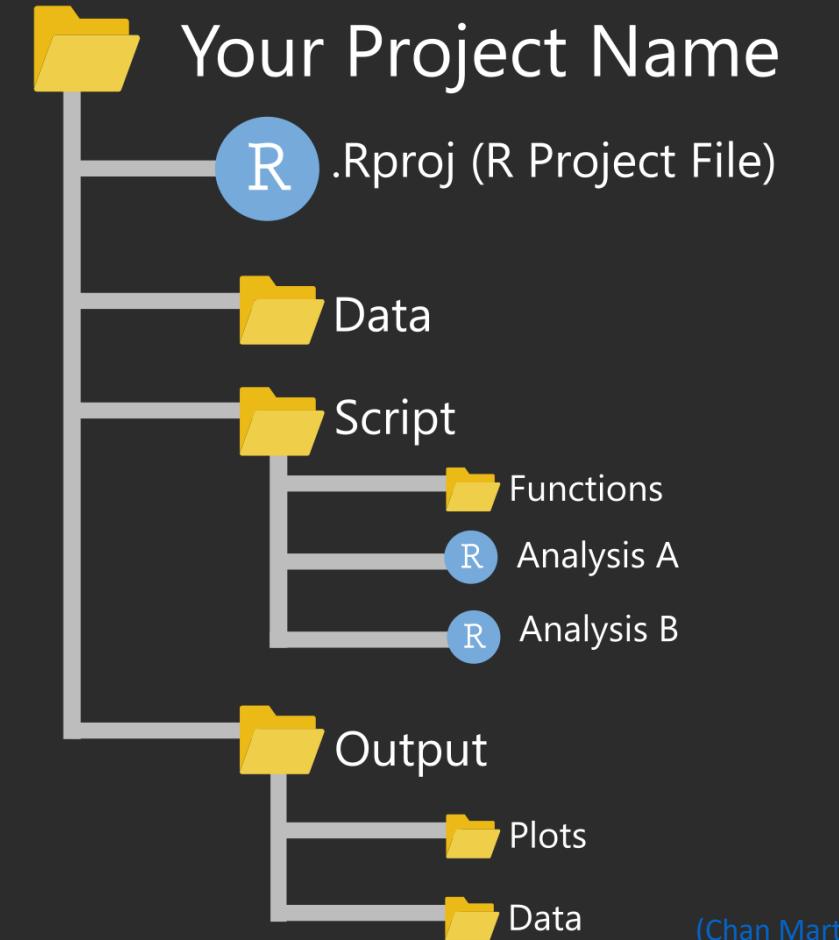
Απόλυτη διαδρομή αρχείου (Absolute path):

- user/documents/your_project_name/script/Analysis_A

Σχετική διαδρομή αρχείου (Relative path):

- /script/Analysis_A **Σχετική με τη θέση του .Rproj**

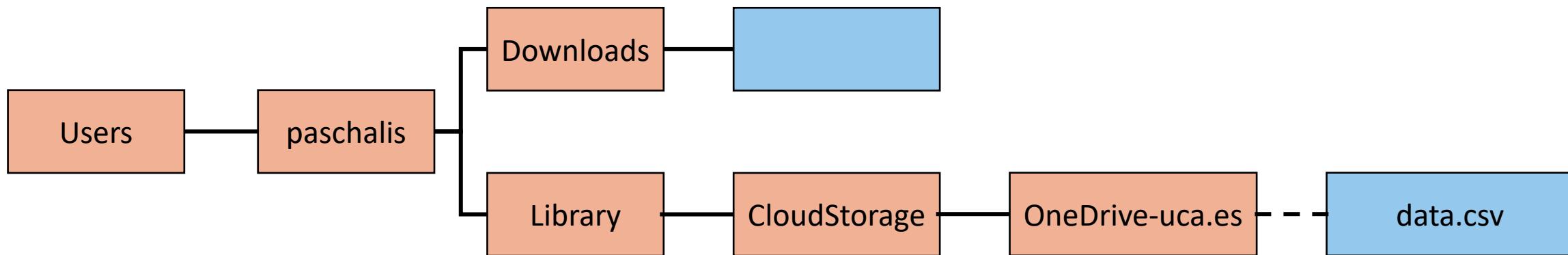
A basic R project set up



Συστήματα αρχείων

Έχετε σκεφτεί ποτέ πού αποθηκεύονται τα αρχεία σας;

- /Users/paschalis/Downloads/
- /Users/paschalis/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci/data.csv



Ο διαμοιρασμός αρχείων μεταξύ συνεργατών είναι μεγάλη υπόθεση.

Η απόλυτη διαδρομή αρχείου για έναν άλλο υπολογιστή θα μπορούσε να είναι:

/Users/Nico/documents/data.csv

Για παράδειγμα

R project

The screenshot shows the RStudio interface with the following components:

- Script Editor:** Displays the R script `participatin_sites_map.R`. Several lines of code are highlighted with red circles:
 - Line 10: `absolute_path_KTH <- "/user/theodorou/documents/WorOptReproSciEcoEnvSci/raw_data"`
 - Line 12: `absolute_path_PCH <- "~/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci/raw_data"`
 - Line 15: `file_path <- "raw_data/participating_experiments.xlsx"`
- Console:** Shows the R command-line interface with the following output:

```
R 4.3.0 -- ~/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci/ raw_data/participatin_sites_map.R:1:1: warning: CREATING OR MODIFYING PACKAGES IN PRODUCTION.
```

Type 'demo()' for some demos, 'help()' for on-line help, or 'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

```
> # Load file with coordinates
> # example with paths
> absolute_path_KTH <- "/user/theodorou/documents/WorOptReproSciEcoEnvSci/raw_data"
> absolute_path_PCH <- "~/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci/raw_data"
> # Relative path
> file_path <- "raw_data/participating_experiments.xlsx"
```

A yellow box highlights the text: Η απόλυτη διαδρομή αρχείων αναφέρεται στην απόλυτη θέση αρχείων στον σκληρό.
- File Browser:** Shows the directory structure under `raw_data`:

Name	Size	Modified
..		
participating_experiments.xlsx	112.2 KB	Sep 27, 2023, 3:03 PM
README.md	285 B	Oct 3, 2023, 5:46 PM

Annotations:

- A yellow box contains the Greek text: Αντίθετα, οι σχετικές διαδρομές αναφέρονται στη θέση του αρχείου σε σχέση με το πού βρίσκεται το R project.
- A red circle highlights the R project icon in the top right corner of the RStudio window.

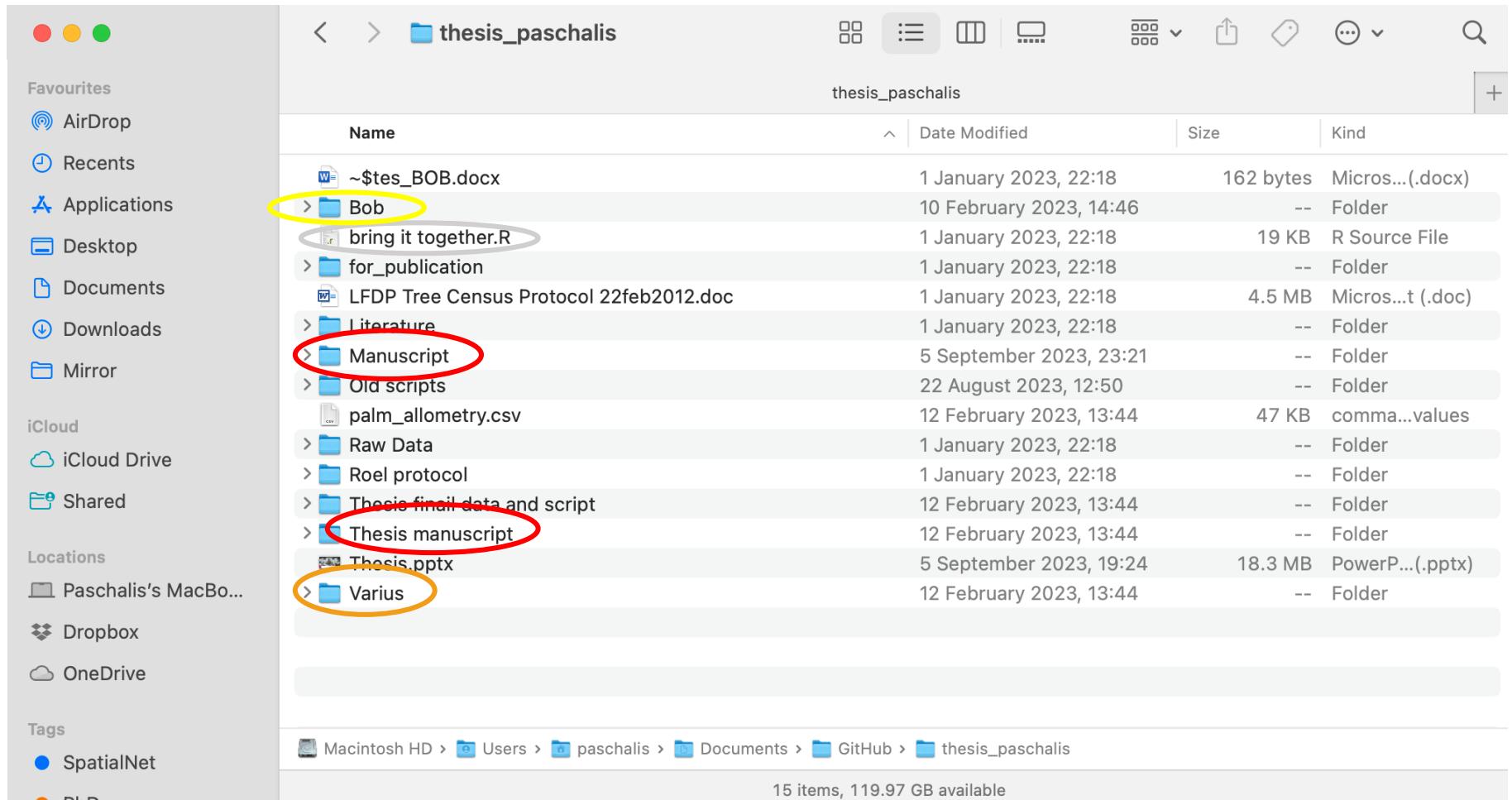
Ονοματολογία αρχείων και φακέλων

Δομή φακέλων

Συστήματα αρχείων

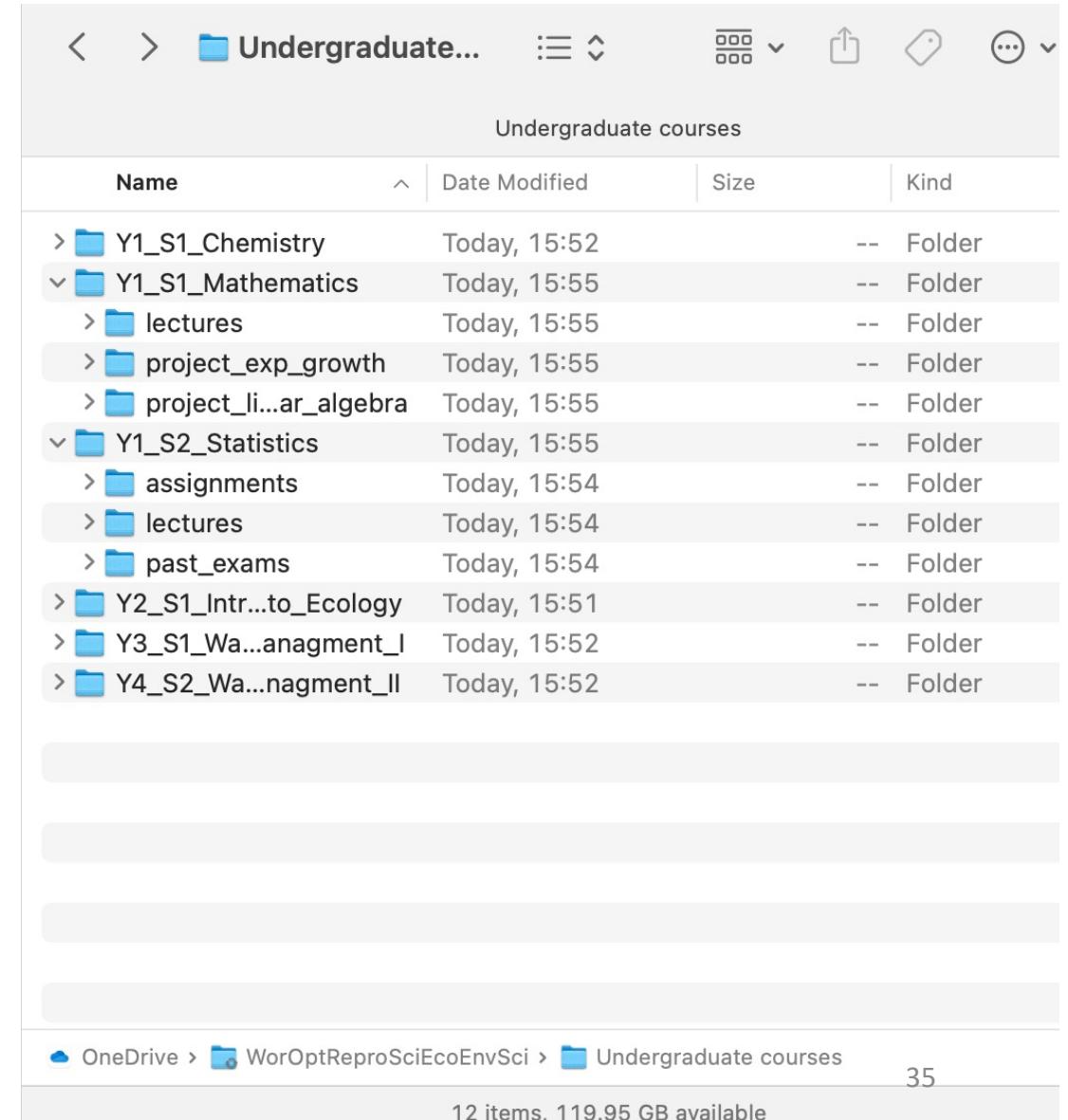
Κάτι πήγε στραβά

- Ποια η διαφορά ανάμεσα στο */manuscript* και */Thesis_manuscript*;
- Τι περιέχει το */varius* ;
- Bring together what?
- Χάρηκα για την γνωριμία */Bob...*



Γενικοί κανόνες ονοματολογίας φακέλων

- Δημιουργήστε ξεχωριστούς φακέλους, ανάλογα με το θέμα ή το περιεχόμενο.
 - */lectures*
 - */past_exams*
 - */data*
- Βρείτε ένα σύστημα κωδικοποίησης:
 - Y1 – Year 1
 - S1 – Semester 1
- Αποθηκεύστε οτιδήποτε παράγεται από κώδικα ή ανάλυση
 - */output/figures*
- Χρησιμοποιήστε λατινικούς χαρακτήρες/Αγγλικά
- Προτιμήστε την κάτω παύλα
- **Συμπεριλάβετε σε κάθε φάκελο *readme.md* αρχείο!!!**



Γενικοί κανόνες ονοματολογίας αρχείων

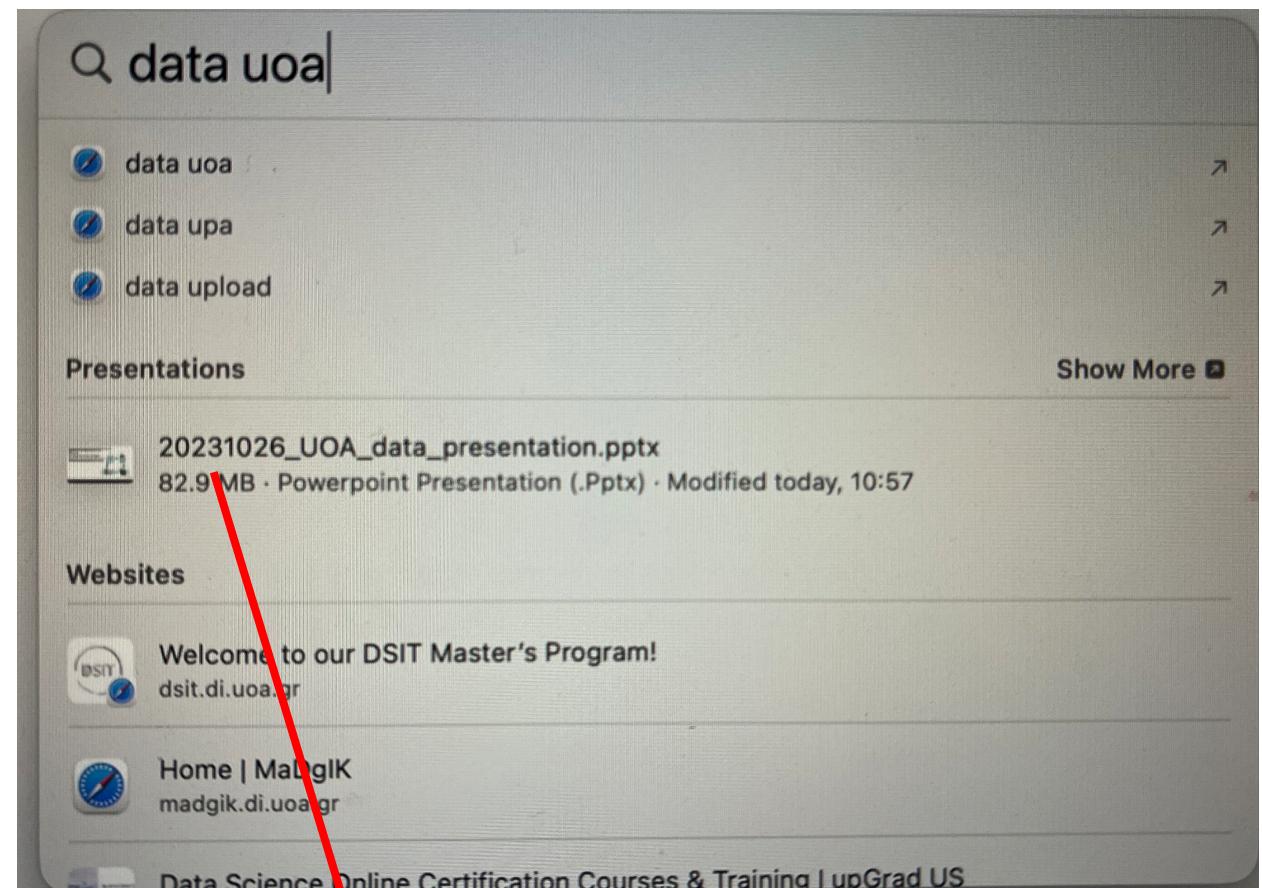
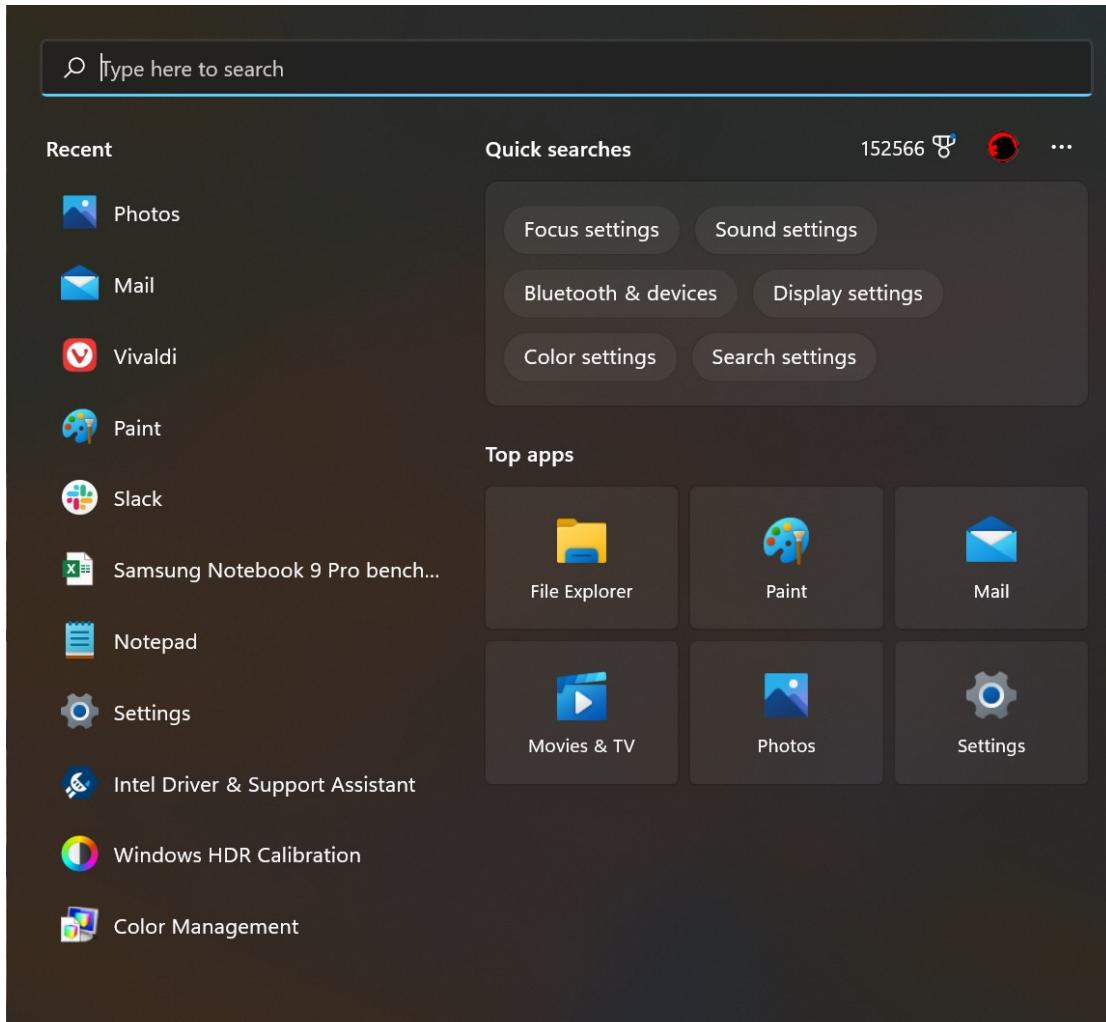
- Χρησιμοποιήστε λατινικούς χαρακτήρες/Αγγλικά.
- Προτιμήστε την κάτω παύλα.
- Διευκρινίστε αν πρόκειται για πρωτογενή δεδομένα (raw data) ή επεξεργασμένα.
- Χρησιμοποιήστε ένα κωδικοποιημένο σύστημα ονοματολογίας.
- Συμπεριλάβετε σε κάθε φάκελο `readme.md` αρχείο που να εξηγεί πού βρήκατε τα αρχεία.
- Στο `readme` αρχείο περιγράψτε υπό την μορφή ευρετηρίου το σύστημα οργάνωσης του φακέλου σας.

Undergraduate courses			
Name	Date Modified	Size	
> <code>Y1_S1_Chemistry</code>	18 Oct 2023, 15:52	--	
<code>Y1_S1_Mathematics</code>	Today, 15:08	--	
<code>lectures</code>	Today, 15:08	--	
<code>01_MATH_linear-algebra.pptx</code>	Today, 15:02	32 KB	
<code>02_MATH_matrix-calculations.pptx</code>	Today, 15:02	32 KB	
<code>03_MATH_eigenvalues.pptx</code>	Today, 15:02	32 KB	
<code>project_exp-growth</code>	Today, 15:10	--	
<code>exp-growth_raw-data</code>	Today, 15:10	--	
<code>MATH_exp-growth_raw-data.xlsx</code>	Today, 15:06	8 KB	
<code>exp-growth_scripts</code>	Today, 15:11	--	
<code>MATH_exp-growth_analysis.R</code>	Today, 15:09	2 bytes	
<code>MATH_exp-growth_data-cleaning.R</code>	Today, 15:09	2 bytes	
<code>project_linear_algebra</code>	18 Oct 2023, 15:55	--	
<code>Y1_S2_Statistics</code>	18 Oct 2023, 15:55	--	
<code>Y2_S1_Introduction_to_Ecology</code>	18 Oct 2023, 15:51	--	
<code>Y3_S1_Waste_Water_Managment_I</code>	18 Oct 2023, 15:52	--	
<code>Y4_S2_Waster_Water_Managment_II</code>	18 Oct 2023, 15:52	--	

Macintosh HD > Users > paschalis > Desktop > Undergraduate courses

17 items, 113.17 GB available

- Αν θυμάμαι κάποιες λέξεις κλειδιά, ανά πάσα στιγμή μπορώ να ανατρέξω στο αρχείο που ψάχνω.



Ημερομηνία_πανεπιστήμιο_keyword_keyword



SM

Spiros Makris

Created on June 15, 2023

Question Info

Last updated June 18, 2023

Views 60

Applies to:

Windows / Windows 10 /

[Reply](#)[I have the same question \(0\)](#)[Subscribe](#) | [Report abuse](#)Replies (3) 

SD

Sumit D - IA

Independent Advisor

Replied on June 15, 2023

[Report abuse](#)[Unlock now](#)

Hi Spiros,
I'm Sumit, here to answer your query at the Microsoft Community.

That is a folder inside Onedrive folder. If you go to <https://onedrive.com> in your browser, do you see the folder there?

Please keep us posted.

Sumit
Available 6 PM - 8 AM PST

You're invited to
Microsoft 365 for

master

2 branches

5 tags

Go to file

Add file

Code



ludmillafigueiredo Docs: Update README ...

55b2517 on Sep 3 133 commits

	examples	Fix: Clean up repo	last year
	kits	fix setwd bug on set_kit.R	last year
	text/figures	Docs: File structure showing alternative branch	last month
	.gitignore	Update .gitignore	last month
	LICENSE	Fix: LICENSE had been deleted by mistake	2 years ago
	README.md	Docs: Update README	last month
	fw_sponsorship.png	Refactor: Figures (rendered and edit) in text folder; paths in README...	last year

README.md

A simple kit to use computational notebooks for more openness, reproducibility, and productivity in research

DOI [10.5281/zenodo.6977667](https://doi.org/10.5281/zenodo.6977667)

A minimal setup to get you started

This repository contains a starter-kit to use so called "computational notebooks" to structure your work. Computational notebooks are files that contain descriptive text, as well as code and its outputs, in a single, dynamic and visually appealing file (usually `.html`, but `.pdf` is also possible). Using this file to organize your work should facilitate:

- traceability: the notebook file contains all the reasoning behind the study. Moreover, the file formats

[More info](#)

About

Tools to facilitate the use of computational notebooks.

Readme

MIT license

Activity

32 stars

4 watching

8 forks

[Report repository](#)

Releases

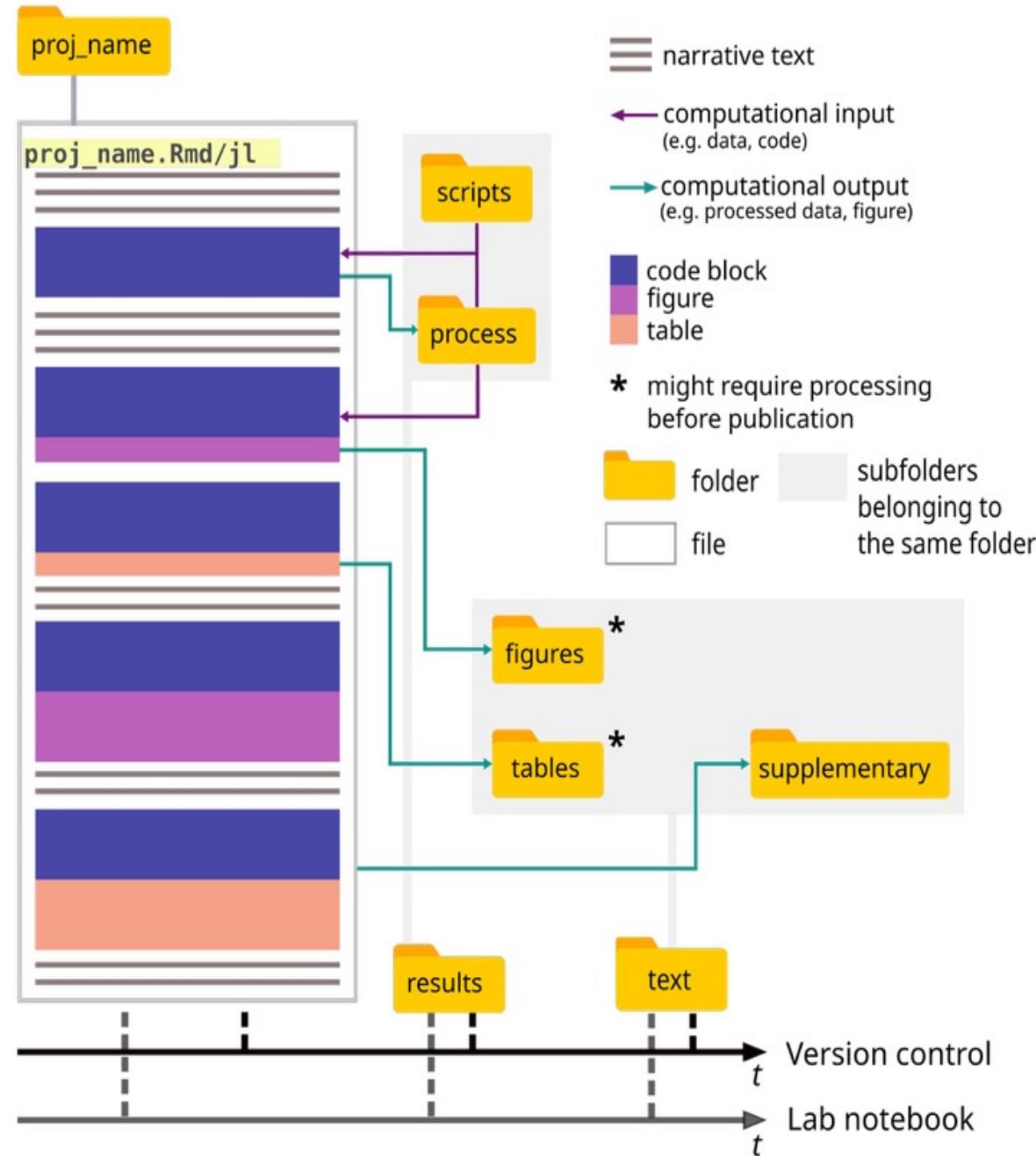
 2.0.0 Latest
on Aug 10, 2022[+ 2 releases](#)

Packages

No packages published

Contributors

ludmillafigueiredo Ludmilla Figueiredo**z3tt** Cédric Scherer**alether** Alejandro Thérèse Navarro



Διαθέσιμο για:

- R
- Python
- Julia

[More info](#)

‘Tidy data’

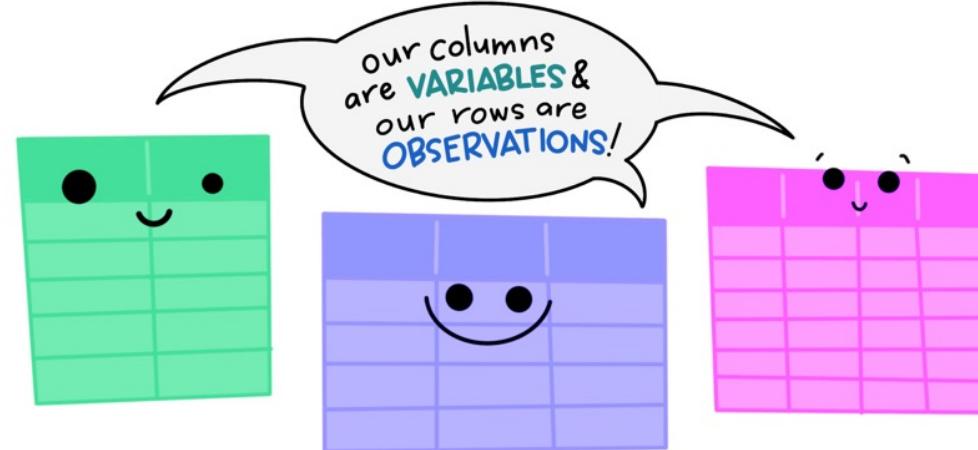
Ονοματολογία αρχείων και φακέλων

Δομή φακέλων

Συστήματα αρχείων

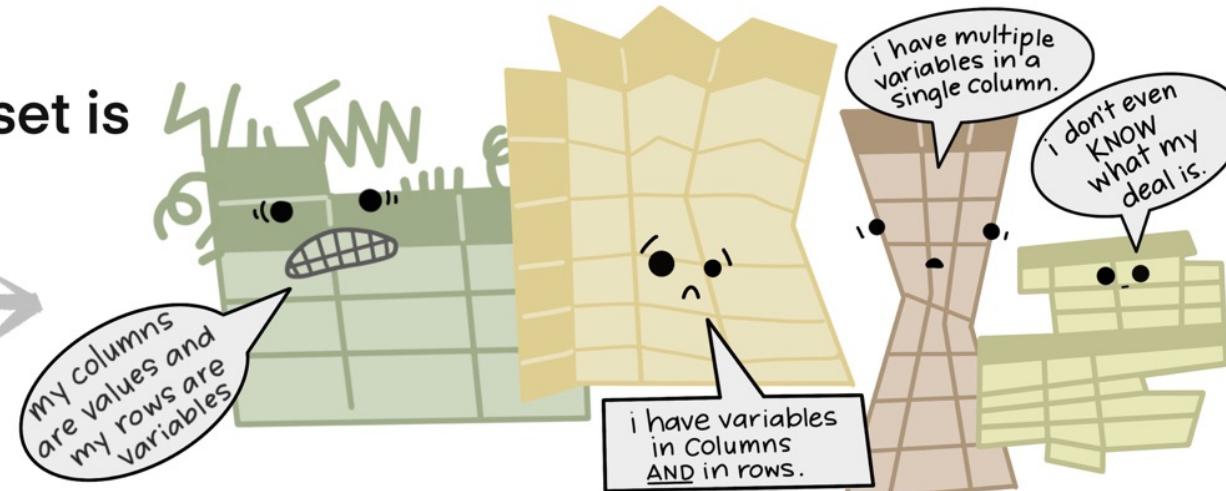
Tidy data

The standard structure of
tidy data means that
“tidy datasets are all alike...”



“...but every messy dataset is
messy in its own way.”

-HADLEY WICKHAM





Μεταδεδομένα

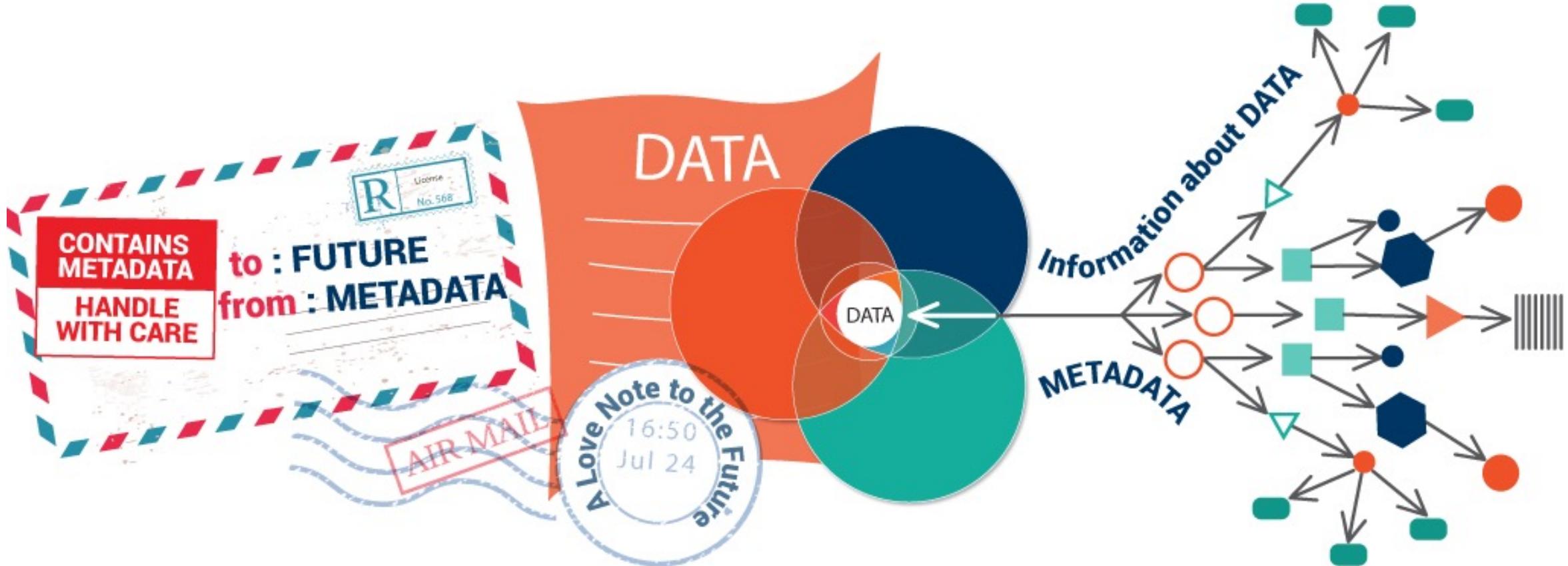
‘Tidy data’

Ονοματολογία αρχείων και φακέλων

Δομή φακέλων

Συστήματα αρχείων

Μεταδεδομένα



Δεδομένα που περιγράφουν τα πραγματικά δεδομένα:

- Για μια εργασία, παραδείγματα μεταδεδομένων είναι:
 - Βιβλιογραφικές πηγές
 - Πίνακας περιεχομένων
- Για ένα υπολογιστικό φύλλο:
 - Στήλες και η επεξήγηση αυτών
 - Μονάδες μέτρησης

A	B
Column	description
#	unique number of each site, different from N_folder
N_folder	I numbered each folder in order to simplify the identification
rev	Y or blank. If revised or not
folder_old	Name of folder as in dropbox
country_code	unique code per country followin ISO
country	Country name
state	for countries like USA, Spain, Uk simplifys the identification of the sites
study_site	Study site as described in the raw data
latitude	
langitude	
biome	
PI_name	PI of the site. Sometimes were 2, I used only the name of the one who provided email
PI_last_name	PI last name
PI_contact	email adress
year_biochemistry	Year of data collection of biochemistry data. If NA, then biochemistry data are missing
year_community	Year of data collection of community data. If NA, then community data are missing
year_plant_elm_cont	Year of data collection of plant_elements data. If NA, then plant_element data are missing
year_functioning_metrics	Year of data collection of functiona_metris data. If NA, then functional_metric are missing
comment	personall comment on folder and data strstructure

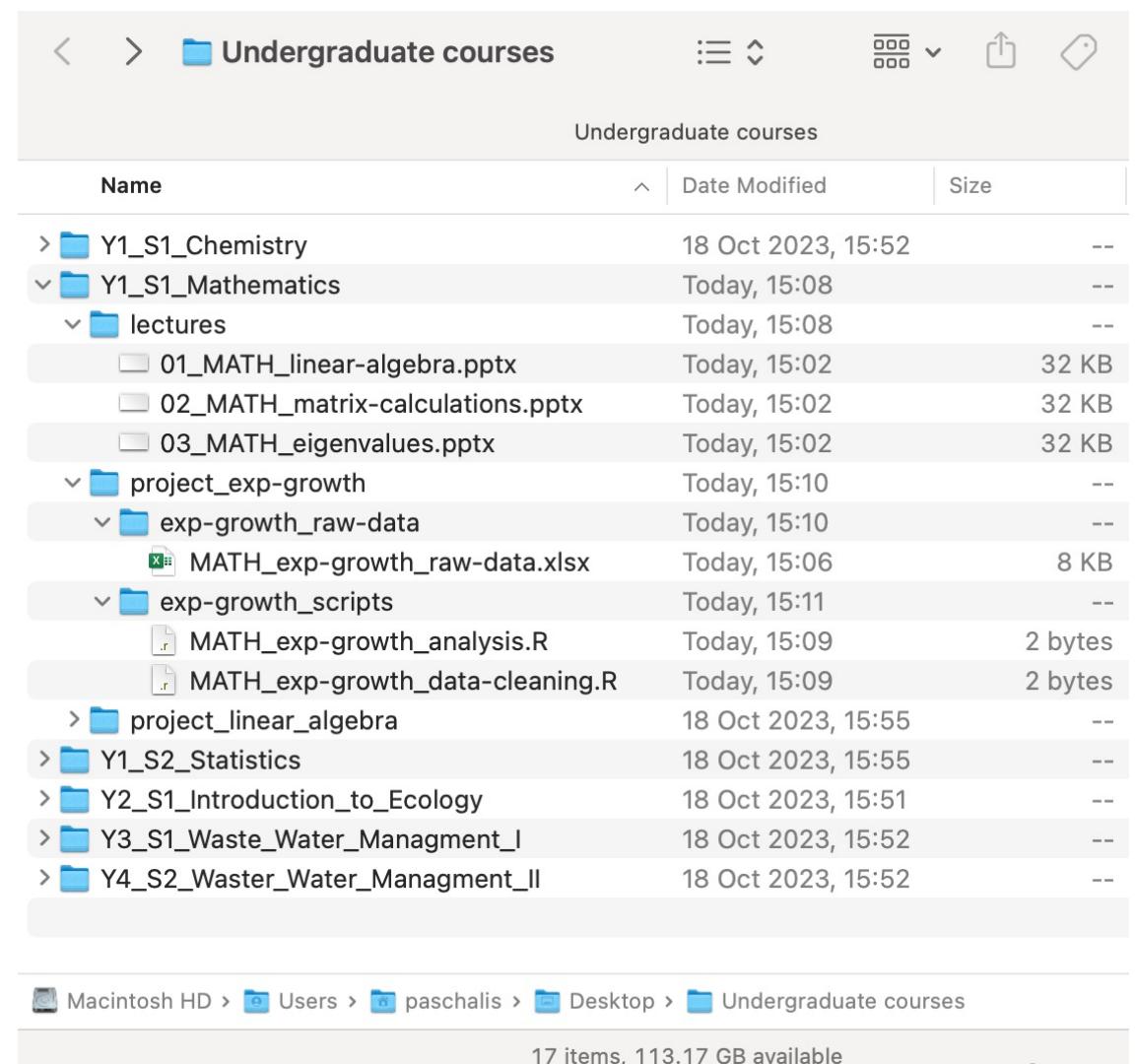
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	#	N_folder	rev	rev_by	assistance	decision	comment	fodler_namer	country_code	country	state	study_site	latitude	longitude	biome
2	1	1	Y				01_Alberto_Canarini	AUT	Austria		ClimGrass	47.129167	11.305556	grassland	
3	2	2	Y				02_Alexander_Tischer	ECU	Ecuador		Ferpast, Ecuador Loja	-3.95734	-79.038532	grassland	
4	3	3	Y				03_Alicia_Montesinos	ESP	Spain		Murcia	37.724125	1.70496111	shrubland	
5	4	4	Y				04_Aline_Frossard	NAM	Namibia		Namibia Desert Fog zone	-23.0152	14.6716	Hyperarid Desert	
6	5	5	Y				05_Amanda_Koltz	USA	USA	Alaska	Toolik Lake	68.624021	-149.621698	tundra (open grassland	
7	6	6	Y				06_Amit_Kumar	DEU	Germany		Friedland	51.493667	9.926917	Agricultural	
8	7	7	Y				07_Andrea_Britton	GBR	UK	Scotland	Culardoch	57.07115694	-3.347469731	alpine	
9	8	8	Y				08_Anna_Heintz-Buschart	ZAF	South Africa		Ukulinga	-29.67	30.4	grassland	
10	9	9	Y				09_Anne_Ebeling	DEU	Germany		Jena Experiment	50.95130066	11.62131181	grassland	

Μεταδεδομένα που περιγράφουν τη δομή φακέλων

The screenshot shows a GitHub repository interface. The top bar displays the repository name "WorOptReproSciEcoEnvSci". The main area shows a file named "README.md" with the following content:

```
1 Paschalis from the future, in this folder you can find all the material from  
your bachelor!  
2  
3 - Y stands for Year and S for Semester  
4 - Top level folders are the courses  
5 - Inside each course folder you can find material for lectures and exercises.  
6 - Some courses have the same name but took place in different semesters, so I  
added the version number (Waster-water-managment I and II)
```

At the bottom of the interface, there are tabs for "PROBLEMS", "PORTS", "GITLENS", and "COMMENTS".



readme.md

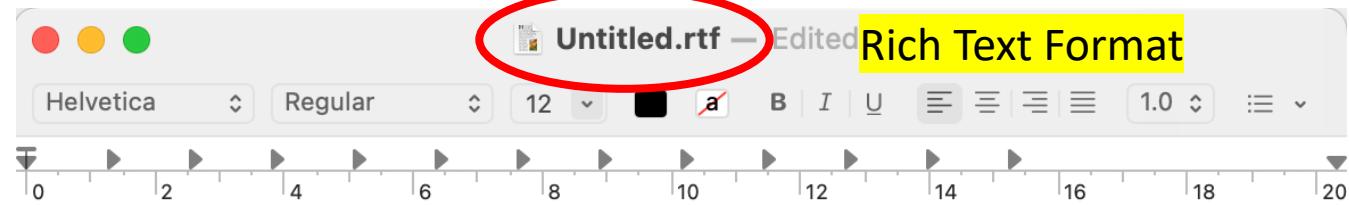
Users > paschalis > Library > CloudStorage > Dropbox > ECO4FUN _Project > Synthesis_coupling > readme.md > # 2023-09-25

You, 1 second ago | 1 author (You)

```
1 This is a readme file for the synthesis data folder.
2
3 # 2023-09-15
4 PCH: I changed the folder structure. I renamed the main folder from synthesis_datasets_received
5 to Synthesis_coupling. Within synthesis I created two folders, one for the analyses and one with the received datasets.
6
7 Within folder that I modify/revise, I create a readme.md file so we can keep some kind of track.
8 Comment: After re-arranging the directory, might occur r-script problems with the files directories.
9
10 # 2023-09-25
11 PCH: I went through most of the files/sites.
12
13 Folder 13: Identical with folder 42
14 Fodler 38: Should be dropped, no dataset.
15
16 We should resolve the issue with the Spanish coordinates. IDK how to find the coordinate system and fix the coordinates into WSG84.
17
18 Folder 10: Relativly good shape but in different format. Can be fixed.
19 Folder 11: List of datasets on EDI (Environmental Data Initiative). It is relativly easy to aquire the datasets because are located on EDI.
This is an r-package that can do the job for us: https://cran.r-project.org/web/packages/EDIutils/index.html
20
21 Folder 30: Complete mess... need help.
22 Folder 32: Experimental results in a different format. Not a lot of metadata. I found coordinates in one file (North of Sweden, Abisko).
23 Folder 47: Published data in different format. I think Raul or Ramon started to bring it into shape.
24 Folder 53: Other format, difficult to understand. Possibly drop.
```

You, 3 weeks ago • access EDI package IDs

Μεταδεδομένα σε μορφή σημειωμάτων



This is an example of metadata:

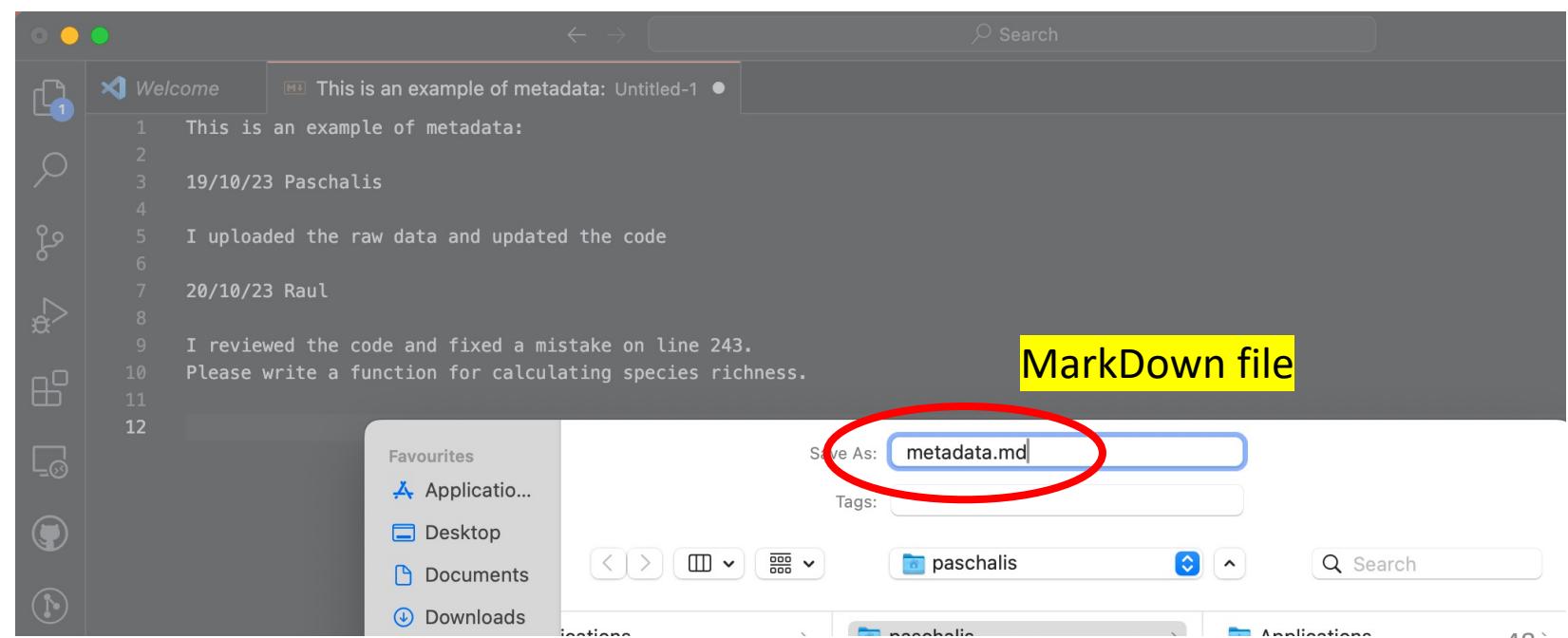
19/10/23 Paschalis

I uploaded the raw data and updated the code

20/10/23 Raul

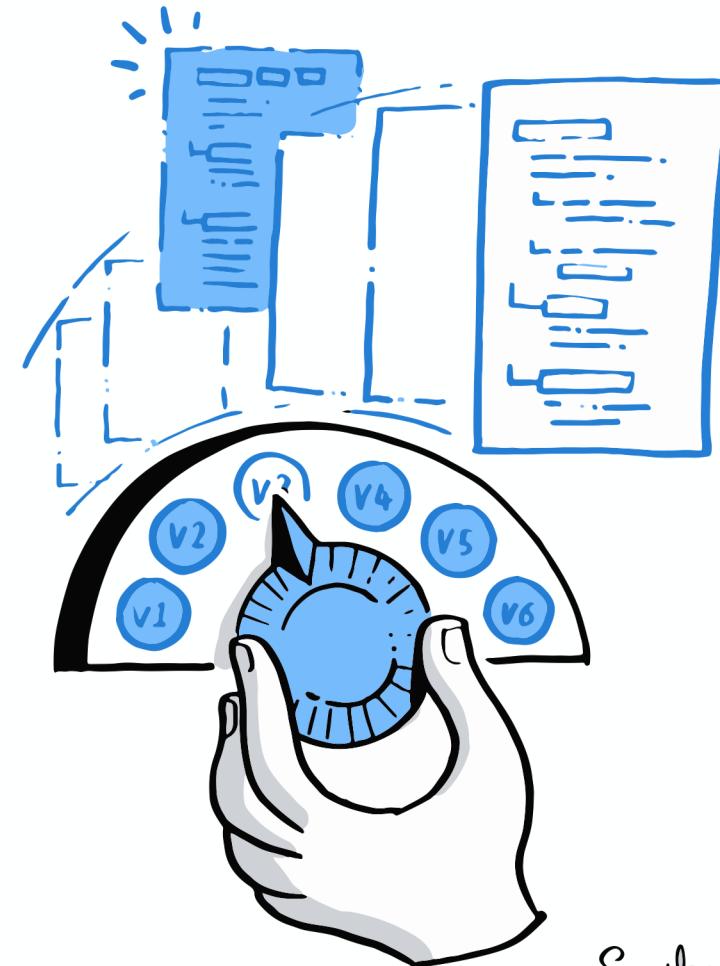
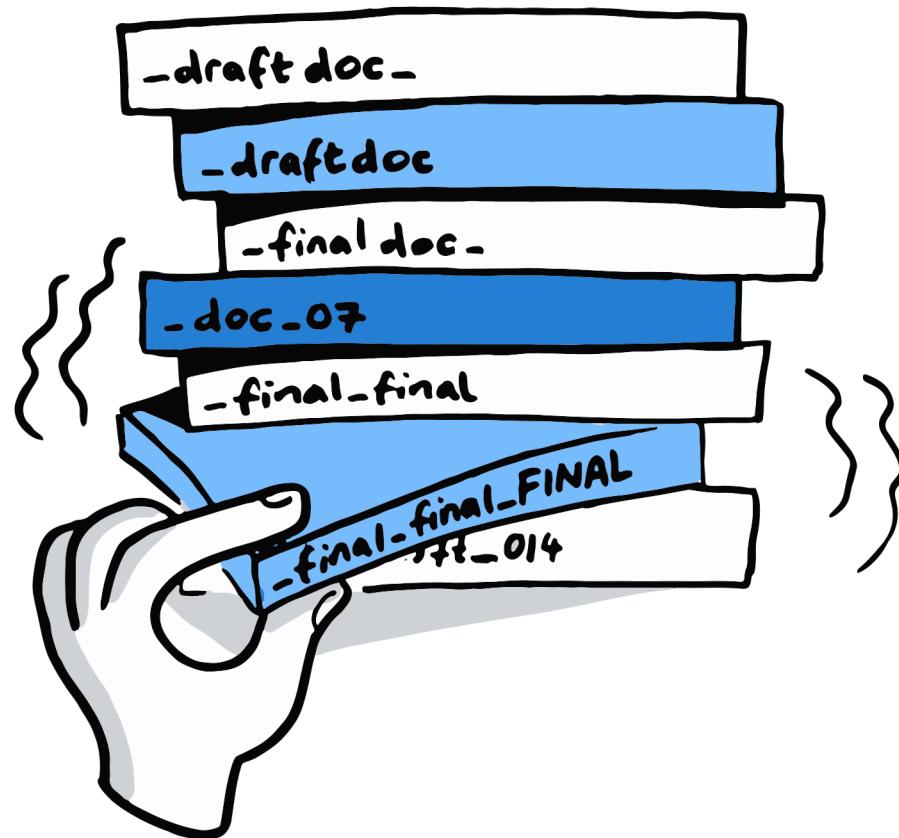
I reviewed the code and fixed a mistake on line 243.

Please write a function for calculating species richness.



Ο χειρότερος εχθρός μας, είναι μια παλιότερη εκδοχή του εαυτού μας.

TRACK PROJECT HISTORY



Scriberia

Version control systems

Μεταδεδομένα

‘Tidy data’

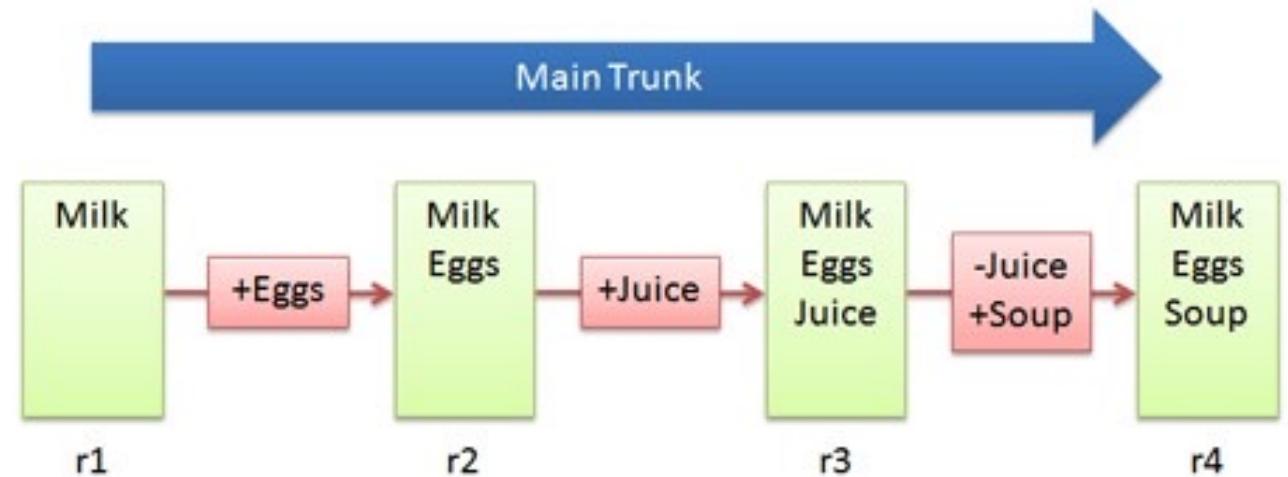
Ονοματολογία αρχείων και φακέλων

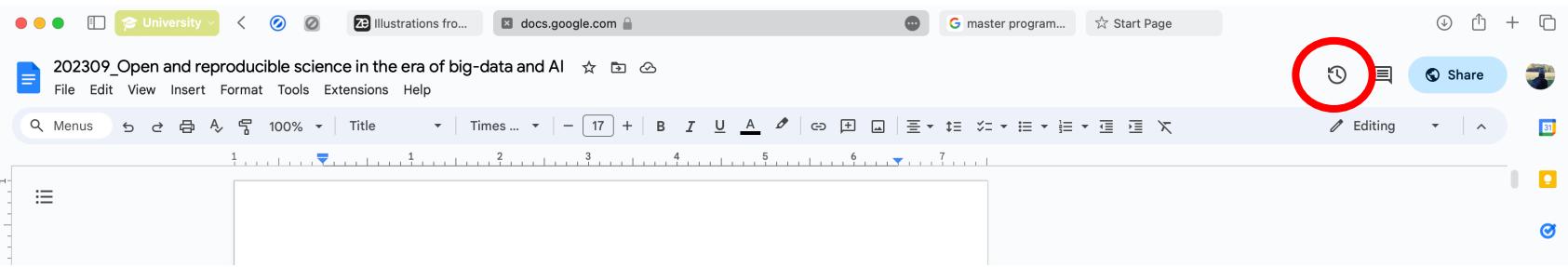
Δομή φακέλων

Συστήματα αρχείων

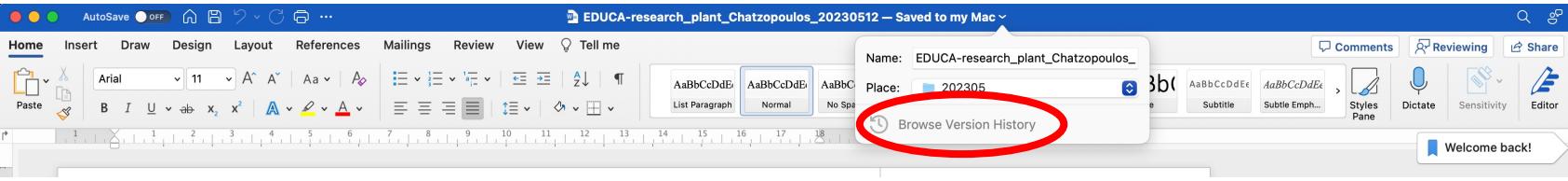
Version control systems

- Εντός ενός συστήματος ελέγχου εκδόσεων, πρακτικά ορίζετε το Working directory σε έναν απομακρυσμένο διακομιστή που διατηρεί αρχείο για κάθε αλλαγή που συμβαίνει.
- Κάθε αλλαγή στο αρχείο αποτελεί μια νέα έκδοση (Version 1, version 2, version 3 etc.).
- Ανά πάσα στιγμή μπορείτε να επιστρέψετε σε προηγούμενη έκδοση.
- Αρκετά βολικό για συνεργασία μεγάλων ομάδων.
- Απαραίτητο για όσους εργάζονται με κώδικα.
- Υποστηρίζει όλες τις γλώσσες προγραμματισμού (R, python, Julia, Pascal, HTML, C, C++ etc.).

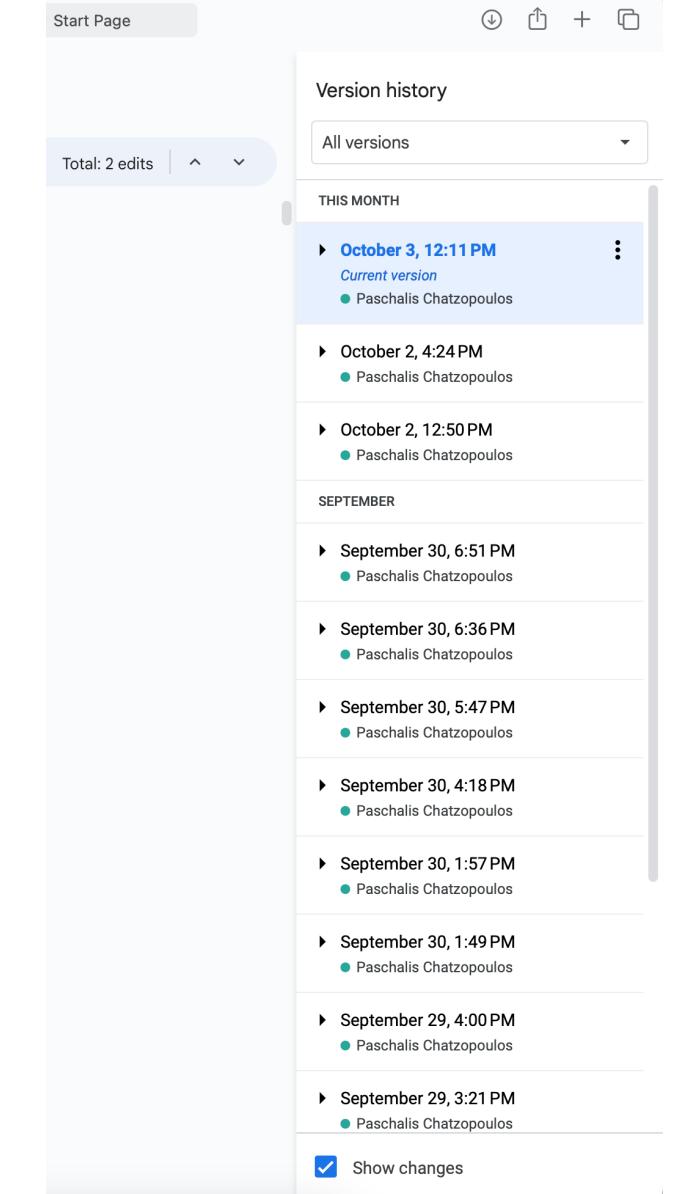




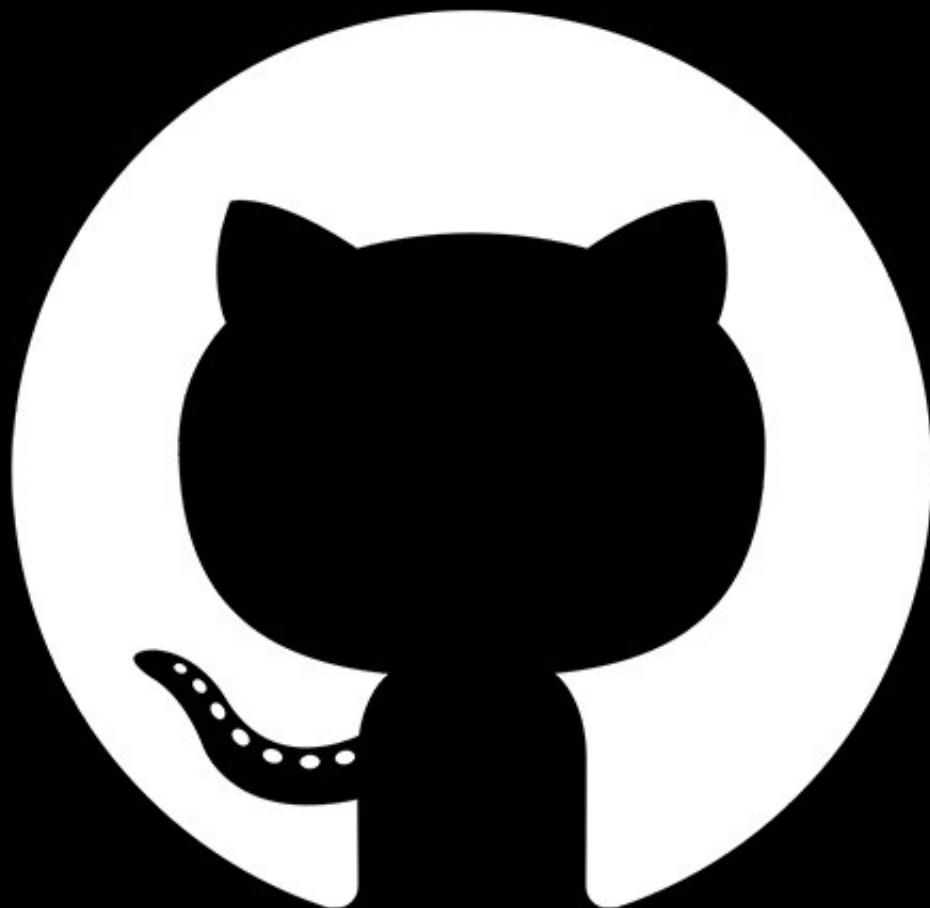
The screenshot shows the Google Docs interface. At the top, there's a toolbar with various icons like File, Edit, View, Insert, Format, Tools, Extensions, and Help. Below the toolbar is a menu bar with options like Menus, Title, Times, A, B, I, U, A, and a ruler scale from 1 to 7. On the right side of the toolbar, there's a 'Share' button and a 'Version history' button, which is circled in red. The main workspace is currently empty.



The screenshot shows the Microsoft Word interface. It has a similar top toolbar and menu bar. In the center, there's a document window titled 'EDUCA-research_plant_Chatzopoulos_20230512 — Saved to my Mac'. Below the document, there's a ribbon with Home, Insert, Draw, Design, Layout, References, Mailings, Review, View, and Tell me tabs. On the far right of the ribbon, there's a 'Version history' button, which is also circled in red. A tooltip for this button says 'Browse Version History'.



The screenshot shows the Dropbox interface. On the left, there's a sidebar with sections for Home, All files, Photos, Signatures, Shared, File requests, and Deleted files. Under 'All files', there are three folders: DRAGNET, ECO4FUN _Project, and EcosystemEcologyLab_Data. The main area is titled 'Version history: participating_experiments.xlsx'. It displays two versions of the file: one from September 27, 2023, at 3:03 PM, and another from September 25, 2023, at 12:46 PM. Both versions were edited by Paschalis Chatzopoulos on the Desktop. To the right of the version history, there's a 'Start Page' button and a 'Version history' section. This section shows a list of edits: 'Total: 2 edits' (October 3, 2023, and October 2, 2023), followed by a list of changes made by Paschalis Chatzopoulos throughout September and October. There's also a checkbox for 'Show changes'.



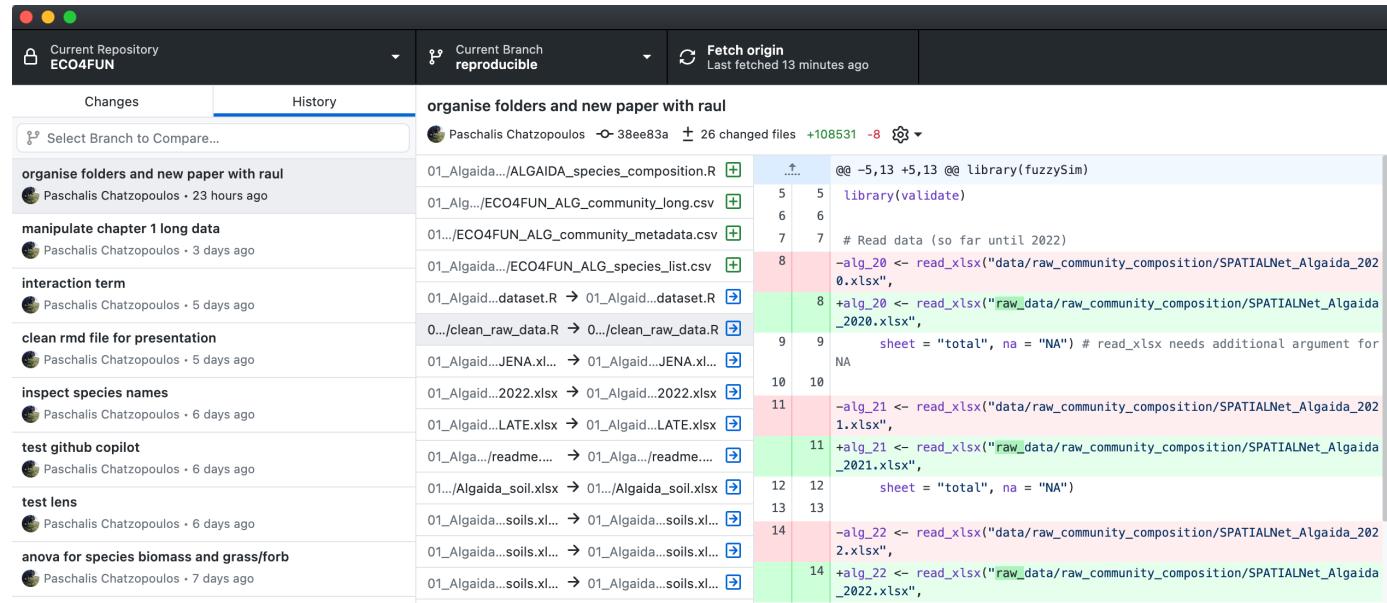
Τι είναι το GitHub

To GitHub για το git, είναι ότι το Rstudio για την R.

- Επιτρέπει την συνεργασία μέσω git σε φιλικό γραφικό περιβάλλον.
- Είναι δωρεάν (με προαιρετικές premium υπηρεσίες).
- Πολλά (δωρεάν) οφέλη και καλούδια για ακαδημαϊκό προσωπικό και φοιτητές.

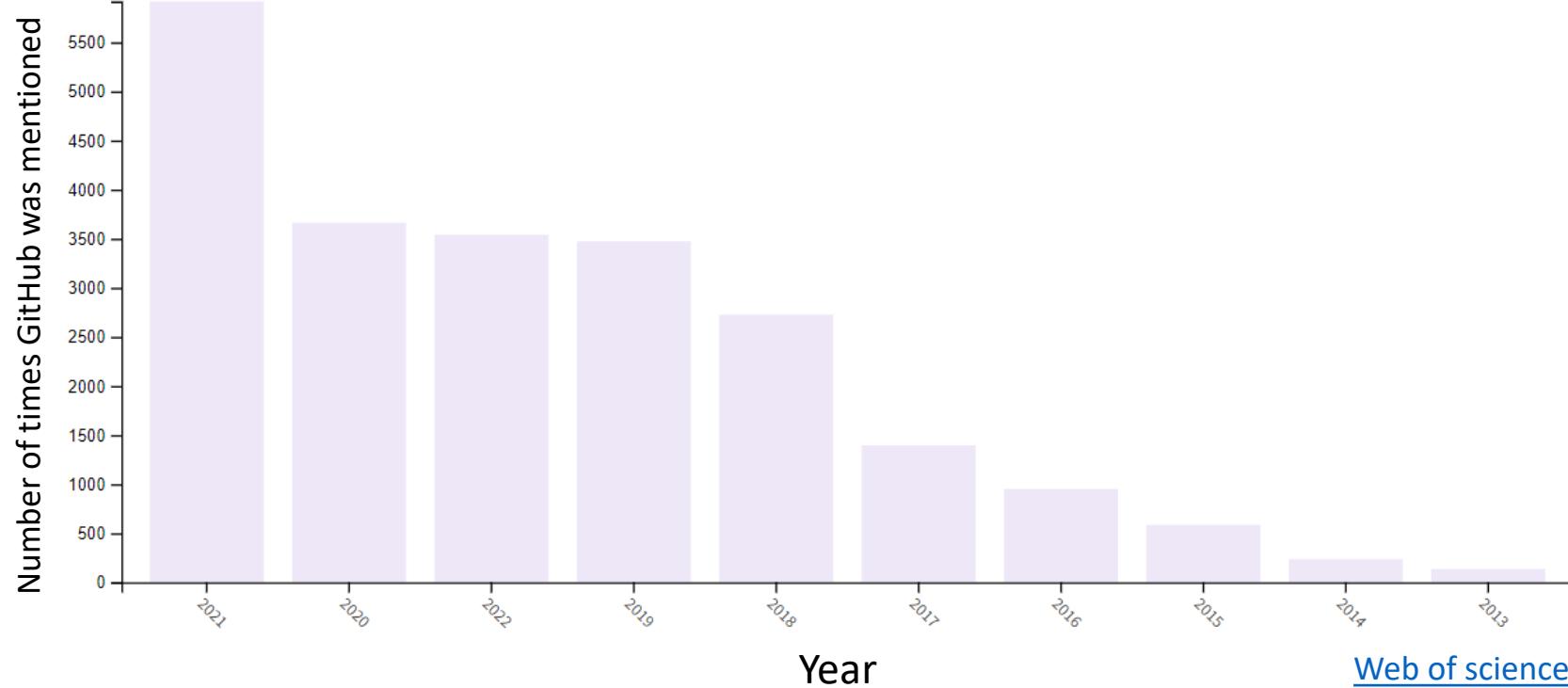
```
# On branch master
# Changes to be committed:
#   (use "git reset HEAD <file>..." to unstage)
#
#       modified:   public/index.html
#       deleted:   public/sitemap.xml
#       new file:  public/stylesheets/mobile.css
#
# Changes not staged for commit:
#   (use "git add/rm <file>..." to update what will be committed)
#   (use "git checkout -- <file>..." to discard changes in working directory)
#
#       deleted:   app.rb
#       deleted:   test/add_test_crash_report.sh
#
# Untracked files:
#   (use "git add <file>..." to include in what will be committed)
#
#       public/javascripts/
```

git



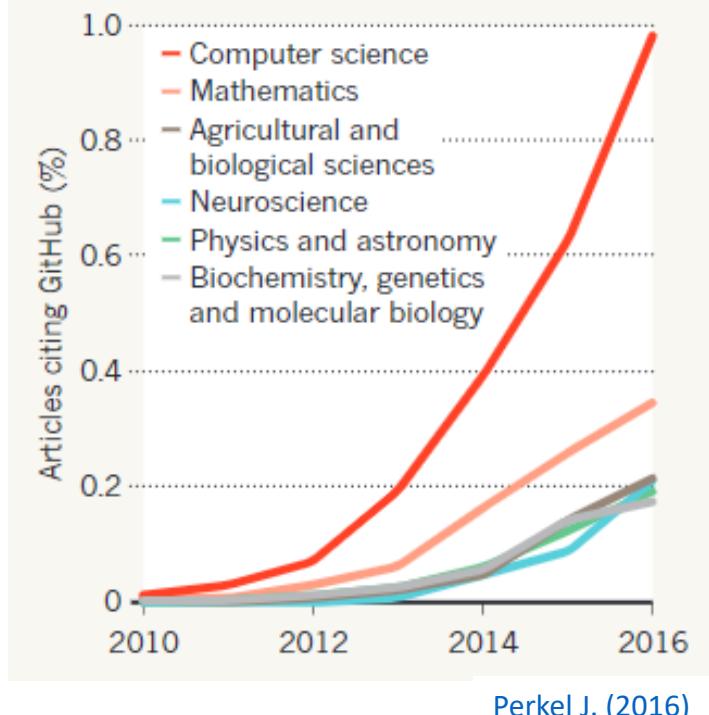
GitHub desktop

- Ένα χρήσιμο εργαλείο που συνεχώς αναπτύσσεται και κερδίζει έδαφος σε πολλά διαφορετικά επιστημονικά πεδία.
- Γνωστό σε προγραμματιστές για παραπάνω από 10 χρόνια.



GROWING INFLUENCE OF GITHUB

An increasing proportion of research articles cite GitHub in their references.



REVIEW |  Open Access | 

Not just for programmers: How GitHub can accelerate collaborative and reproducible research in ecology and evolution

Pedro Henrique Pereira Braga , Katherine Hébert, Emma J. Hudgins, Eric R. Scott, Brandon P. M. Edwards, Luna L. Sánchez Reyes, Matthew J. Grainger ... [See all authors](#) 

First published: 21 April 2023 | <https://doi.org/10.1111/2041-210X.14108> | Citations: 2

Pedro Henrique Pereira Braga and Robert Crystal-Ornelas contributed equally to this work. Katherine Hébert, Emma J. Hudgins, Eric R. Scott, Brandon P. M. Edwards and Luna L. Sánchez Reyes contributed equally to this work.

Handling Editor: Aaron M. Ellison

Abstract

EN FR PT

1. Researchers in ecology and evolutionary biology are increasingly dependent on computational code to conduct research. Hence, the use of efficient methods to share, reproduce, and collaborate on code as well as document research is fundamental. GitHub is an online, cloud-based service that can help researchers track, organize, discuss, share, and collaborate on software and other materials related to research production, including data, code for analyses, and protocols. Despite these benefits, the use of GitHub in ecology and evolution is not widespread.
3. We outline features ranging from low to high technical difficulty, including storing code, managing projects, coding collaboratively, conducting peer review, writing a manuscript, and using automated and continuous integration to streamline analyses. Given that members of a research team may have different technical skills and responsibilities, we describe how the optimal use of GitHub features may vary among members of a research collaboration.

Δημιουργία λογαριασμού

Individuals

Students

Learn using real-world development tools

- ✓ **FREE** GitHub Pro while you are a student
- ✓ Valuable GitHub Student Developer Pack partner offers
- ✓ GitHub Campus Expert training for qualified applicants

[Get student benefits](#)

Teachers

Teach your students with the industry-standard tools

- ✓ **FREE** GitHub Team for courses, coding clubs, and nonprofit research
- ✓ GitHub Classroom for managing assignments

[Get teacher benefits](#)

[Join GitHub](#)

First, let's create your user account

Username *

Email address *

Password *

Make sure it's at least 15 characters OR at least 8 characters including a number and a lowercase letter. [Learn more](#).

Email preferences

Send me occasional product updates, announcements, and offers.

Verify your account



Overview Release Notes Help

GitHub Desktop

Focus on what matters instead of fighting with Git. Whether you're new to Git or a seasoned user, GitHub Desktop simplifies your development workflow.

[Download for macOS](#)



Feeling brave?

Try new features in the Beta Channel before they're released.

Apple silicon?

Download for an Apple silicon Mac.
See the [Apple docs](#) about Apple vs Intel chips.

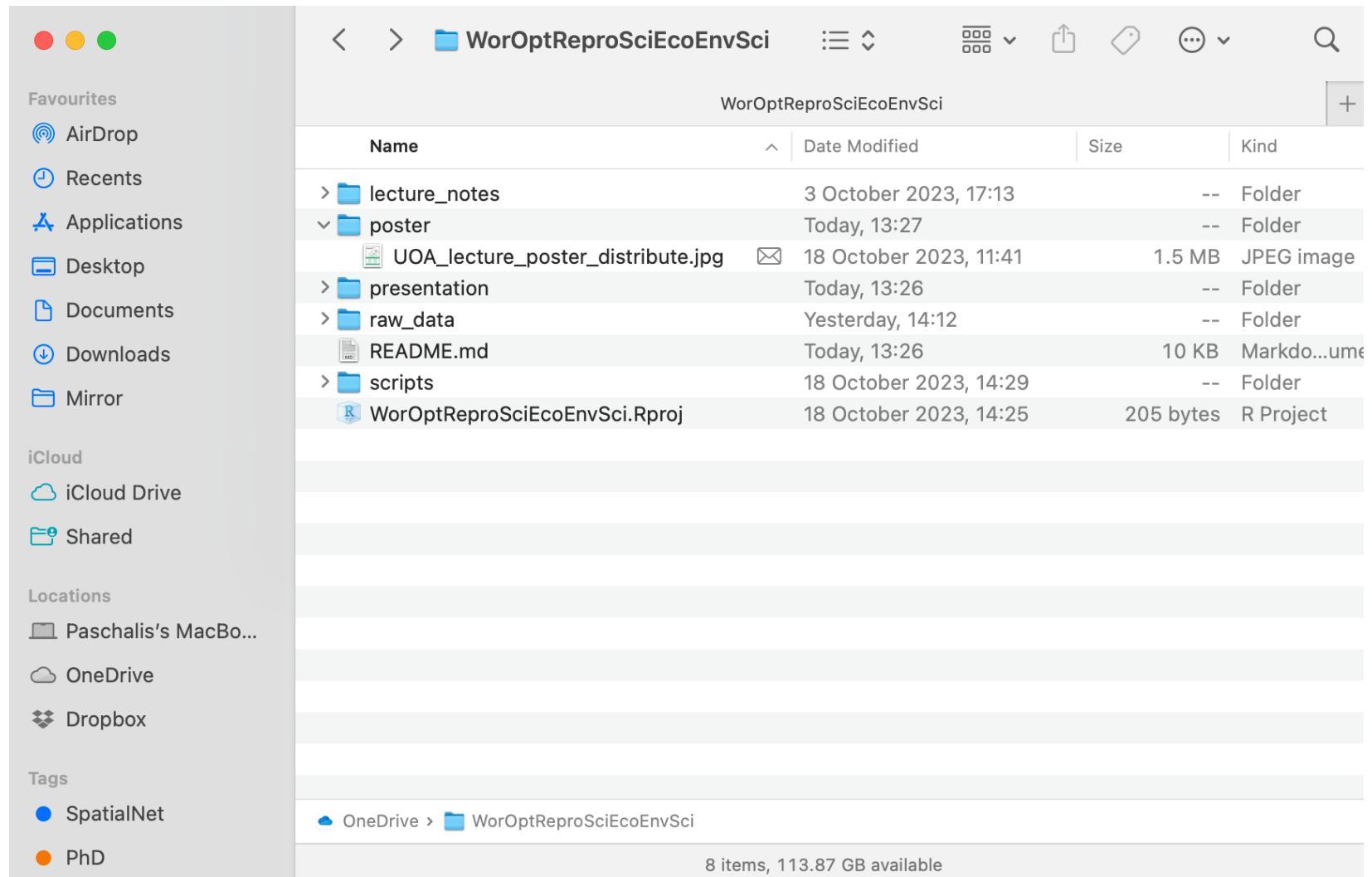
Windows?

[Download for Windows](#)

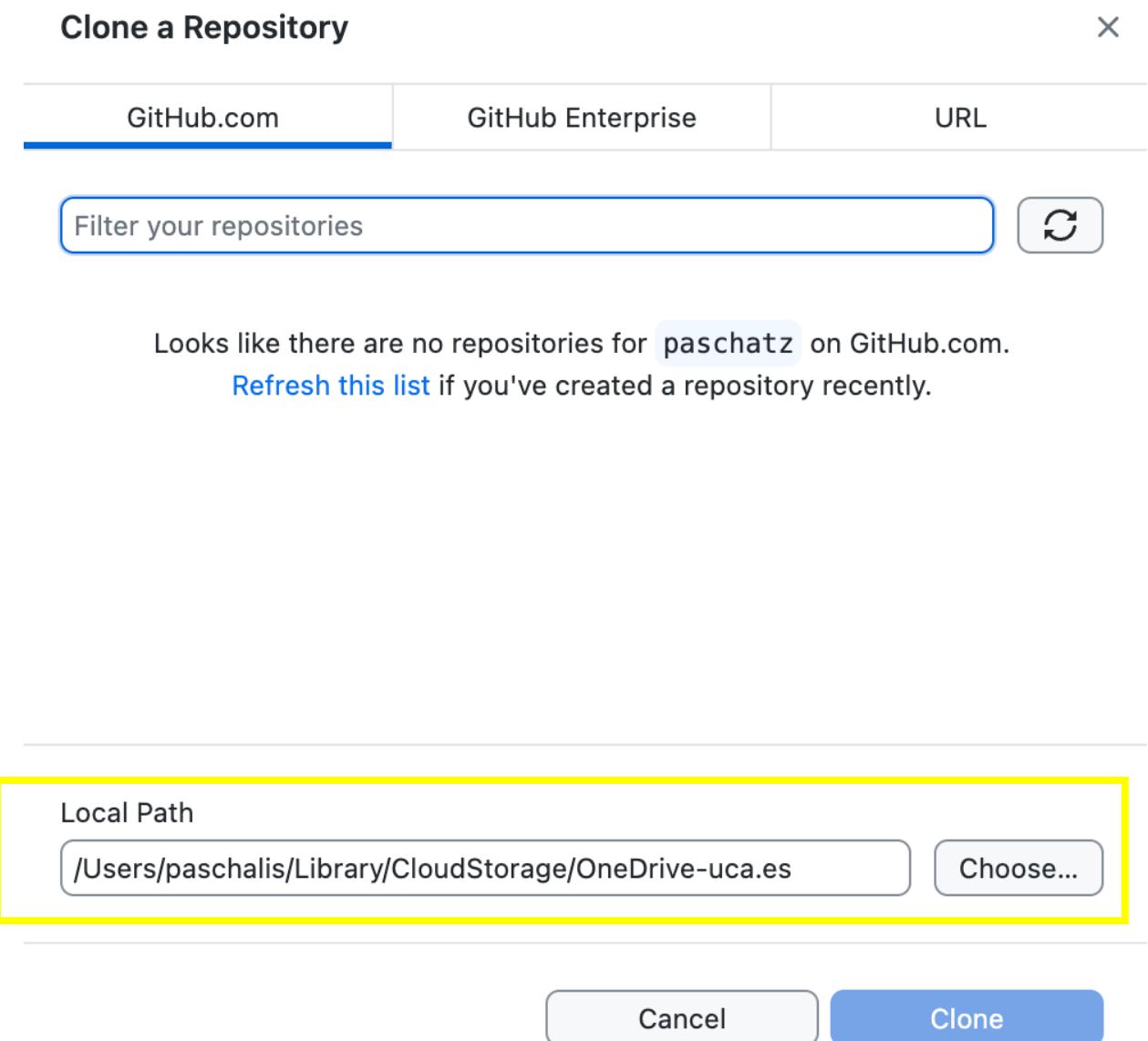


Τι είναι ένα repository:

- Έχει την ίδια χρήση με το working directory.
- Αποθηκεύεται στο διακομιστή του GitHub και πλέον έχουμε απλώς ένα copy στον υπολογιστή μας.



- Για να αρχίσετε με ένα σύστημα ελέγχου εκδόσεων, πρέπει απλώς να ορίσετε την τοπική θέση αποθήκευσης (local path).
- Ένα working directory βρίσκεται στην τοποθεσία local path στον υπολογιστή σας.
- Όταν αυτό συγχρονιστεί με το GitHub, θα αποθηκευτεί στο διαδίκτυο και πλέον το ονομάζουμε repository.





Current Repository
WorOptReproSciEcoEnvSci

Current Branch
main

Fetch origin
Last fetched 8 minutes ago

Changes

History

0 changed files

Κάθε αλλαγή εμφανίζεται εδώ



Summary (required)

Για κάθε αλλαγή, πρέπει να
κάνουμε ένα σχόλιο που αποθηκεύεται
για μελλοντική χρήση!



Commit to main

No local changes

There are no uncommitted changes in this repository. Here are some friendly suggestions for what to do next.



Open the repository in your external editor

Select your editor in [Preferences](#)

Repository menu or ⌘ ⌘ A

[Open in RStudio](#)

View the files of your repository in Finder

Repository menu or ⌘ ⌘ F

[Show in Finder](#)

Open the repository page on GitHub in your browser

Repository menu or ⌘ ⌘ G

[View on GitHub](#)



Current Repository
WorOptReproSciEcoEnvSci

Μπορώ να έχω όσα repository θέλω

main

Fetch origin
Last fetched 17 minutes ago

Filter

Add ▾

Recent

Understanding-palm-forest-carbon-dynamics-through-...

ECO4FUN

Synthesis_coupling

Ecosystem-Ecology-Lab-UCA

Synthesis_coupling

paschatz

DRAGNET

ECO4FUN

julia_project

PhD

thesis_paschalidis

Understanding-palm-forest-carbon-dynamics-through-...

WorOptReproSciEcoEnvSci

Ένα repository για κάθε project

No local changes

There are no uncommitted changes in this repository. Here are some friendly suggestions for what to do next.

Open the repository in your external editor

Select your editor in [Preferences](#)

Repository menu or ⌘ ⌘ A

[Open in RStudio](#)

View the files of your repository in Finder

Repository menu or ⌘ ⌘ F

[Show in Finder](#)

Open the repository page on GitHub in your browser

Repository menu or ⌘ ⌘ G

[View on GitHub](#)





Current Repository **WorOptReproSciEcoEnvSci**

Current Branch **main**

Fetch origin Last fetched 3 minutes ago

Changes 4 History

4 changed files

.DS_Store

poster/UOA_lecture_poster_to_print.png

presentation/Presentation1.pptx

README.md

⊕ ⊖ ⊕ ⊖

@@ -1,11 +1,11 @@

1 1 # Information and data architecture in environmental sciences: Folder structure, metadata and project management through GitHub

2 2 - ←

+SHALL I MAKE A CHANGE IN LINE 2? ←

3 3 This serves as an open-access repository for the forthcoming lecture entitled 'Information and data architecture in environmental sciences: Folder structure, metadata and project management through GitHub,' scheduled to be hosted by the University of the Aegean on October 26, 2023.

4 4

5 5 Within this repository, you can find all the course materials, references, and lecture handouts. Additionally, this repository to serve as a practical demonstration of building and structuring a course from the ground up in a reproducible environment.

6 6

7 7 Please fill in the pre-lecture form which you can find [\[here\]](https://forms.gle/zFdoxFhezXb5ETm66)

8 8 -

+WHAT ABOUT LINE 8?!

9 9 ## Inspiration and background information:

10 10 Throughout my academic journey in the field of ecology, I had the privilege of participating in numerous research projects and meeting extraordinary collaborators, many of whom evolved into friendships. Frequently, I found myself getting involved in discussions that pertained to ecological research, with a particular emphasis on subjects related to the social dimension of our field. These interactions allowed me to explore and engage with the intricate aspects of science, broadening my perspective and deepening my understanding of this dynamic discipline. Once I had the opportunity to debate with my classmate Yves. He was noticeably vexed by an assignment for our master's program, and his reaction led to a rather comical moment of exasperation for him and very inspirational for me: "I don't understand this. I used to do ecology I thought I would be in the jungle or in a natural ecosystem collecting data or observing plants and animals, not programming and statistics". Since then I met amazing ecologists, very skilled in the field-work but frustrated with the amount of statistical knowledge they had to cope with. Over a course of four years dedicated to ecology, I began to discern that there is a broader difficulty and frustration among junior ecologists to deal with the analytical aspect of our field. The way I approach this observation is relevant to advancements and changes that have occurred in the last decade. Worldwide data volume doubled nine times between 2006 and 2011 with this trend to continue.

Αλλαξαν τέσσερα αρχεία:

- κίτρινο για αλλαγές
- πράσινο για προσθήκες
- κόκκινο για διαγραφή

Summary (required)

Description

Commit to main



Current Repository
WorOptReproSciEcoEnvSci

Changes 4 History poster/UOA_lecture_poster_to_print.png

4 changed files

- .DS_Store
- poster/UOA_lecture_poster_to_print.png
- presentation/Presentation1.pptx
- README.md

Αυτό το αρχείο διεγράφη

Summary (required)

Description

Commit to main

Current Branch
main

Fetch origin
Last fetched 2 minutes ago

Deleted

ΤΟ ΕΡΓΑΣΤΗΡΙΟ ΔΙΑΧΕΙΡΙΣΗΣ ΒΙΟΠΟΙΚΙΟΤΗΤΑΣ
ΣΑΣ ΠΡΟΣΚΑΛΕΙ ΣΤΗ ΔΙΑΛΕΙΞΗ

ΑΡΧΙΤΕΚΤΟΝΙΚΗ ΠΛΗΡΟΦΟΡΙΩΝ ΚΑΙ ΔΕΔΟΜΕΝΩΝ
ΣΤΙΣ ΠΕΡΙΒΑΛΛΟΝΤΙΚΕΣ ΕΠΙΣΤΗΜΕΣ

ΔΟΜΗ ΦΑΚΕΛΩΝ, ΚΑΝΟΝΕΣ ΣΥΝΤΑΞΗΣ ΜΕΤΑΔΕΔΟΜΕΝΩΝ
ΚΑΙ ΔΙΑΧΕΙΡΙΣΗ PROJECT ΜΕΣΩ GITHUB
ΓΙΑ ΜΙΑ (ΠΙΟ) ΑΝΟΙΚΤΗ ΚΑΙ ΑΝΑΠΑΡΑΣΙΜΗ ΕΠΙΣΤΗΜΗ

ΠΕΜΠΤΗ, 26 ΟΚΤΩΒΡΙΟΥ 12:00
ΜΙΚΡΟΥΠΟΛΟΓΙΣΤΙΚΟ ΕΡΓΑΣΤΗΡΙΟ, ΙΣΟΓΕΙΟ, ΤΜΗΜΑ ΠΕΡΙΒΑΛΛΟΝΤΟΣ

ΠΕΡΙΣΣΟΤΕΡΕΣ ΠΛΗΡΟΦΟΡΙΕΣ
ONLINE ΕΓΓΡΑΦΗ

QR codes

ECOSYSTEM ECOLOGY



Current Repository **WorOptReproSciEcoEnvSci**

Current Branch **main**

Fetch origin
Last fetched 5 minutes ago

Changes 4 History presentation/Presentation1.pptx

4 changed files

.DS_Store

poster/UOA_lecture_poster_to_print.png

presentation/Presentation1.pptx +

README.md

Τι γίνεται με τα αρχεία power point;

This binary file has changed.

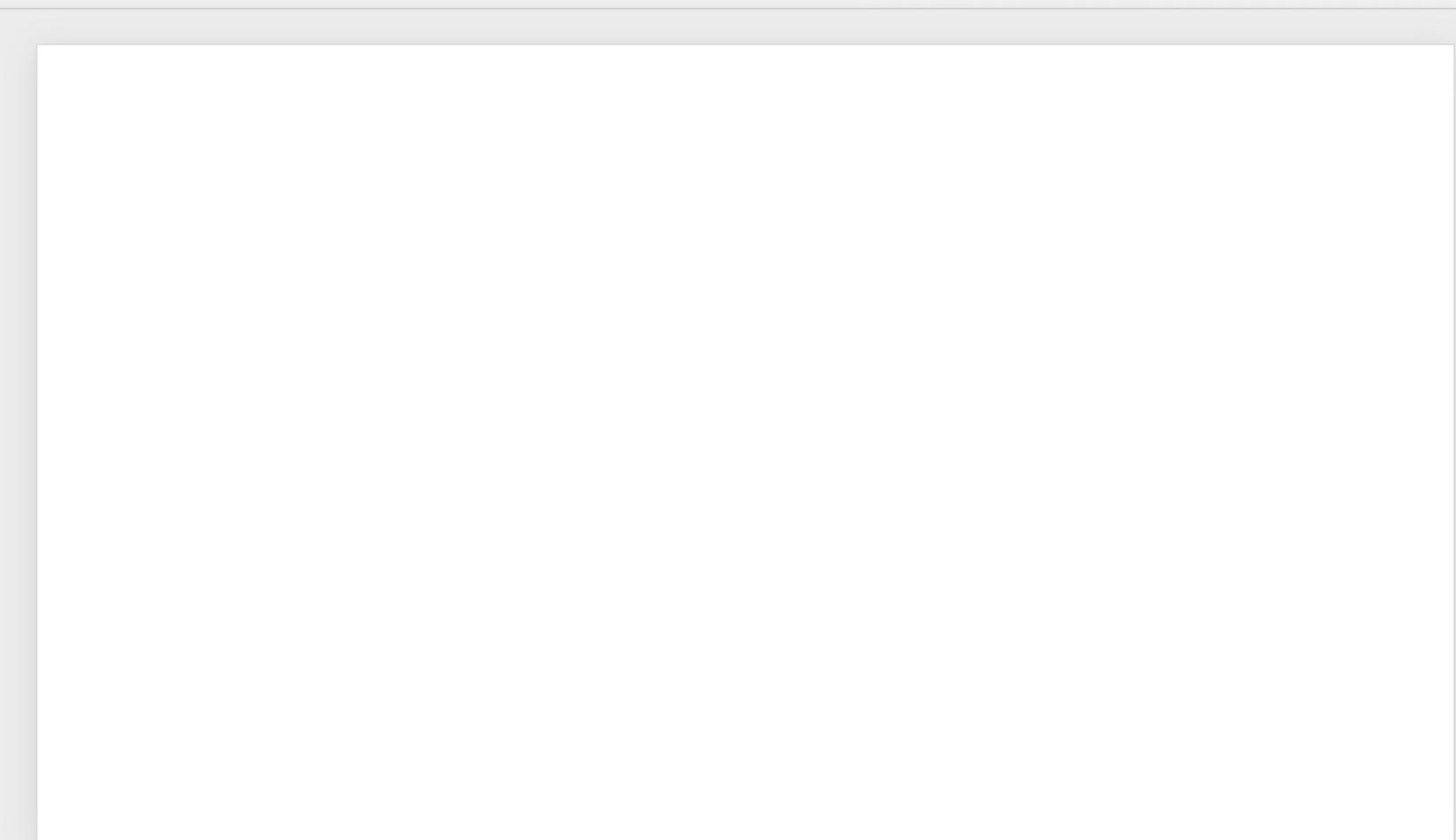
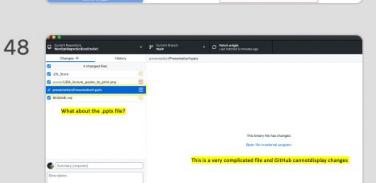
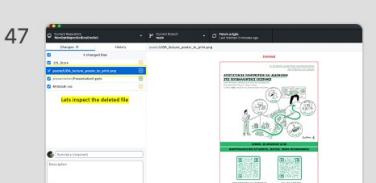
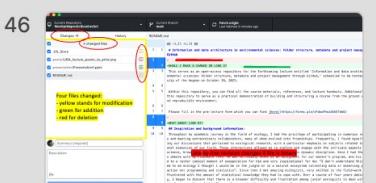
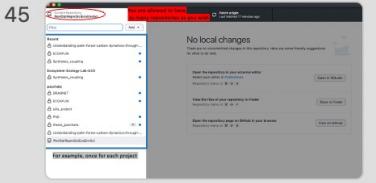
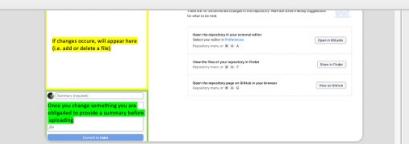
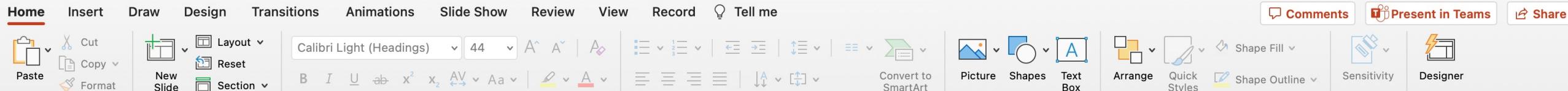
Open file in external program.

Πολύ περίπλοκο αρχείο για να μας δείξει τις αλλαγές

Summary (required)

Description

+
Commit to main



Format Background

Fill

- Solid fill
- Gradient fill
- Picture or texture fill
- Pattern fill
- Hide Background Graphics

Colour

Transparency

Apply to All

67 Set Background



Current Repository
WorOptReproSciEcoEnvSci

Changes 2

History

Select Branch to Compare...

update readme

Paschalis Chatzopoulos · Oct 6, 2023

local path

Paschalis Chatzopoulos · Oct 5, 2023

ign

Paschalis Chatzopoulos · Oct 3, 2023

Merge pull request #6 from paschatz/pasc...

Paschalis Chatzopoulos · Oct 3, 2023

script comments

Paschalis Chatzopoulos · Oct 3, 2023

Update README.md

Paschalis Chatzopoulos · Oct 3, 2023

Merge pull request #5 from paschatz/pasc...

Paschalis Chatzopoulos · Oct 3, 2023

add script and raw data

Paschalis Chatzopoulos · Oct 3, 2023

Merge pull request #4 from paschatz/kosth...

Paschalis Chatzopoulos · Oct 3, 2023

Update README.md

I.insulaire · Oct 3, 2023

Update README.md

Current Branch
main

Fetch origin

Last fetched 27 minutes ago

Update README.md

I.insulaire · ddf63f9 ± 1 changed file +4 -4 ⚙

README.md



having experience with Git and GitHub is considered a significant advantage. That definitely goes beyond its intended purpose, but in a highly competitive environment, it's always good to be prepared. In case you are having trouble, you can take a look at this [video](https://www.youtube.com/watch?v=XBzUqQbHHhw&list=RDCMUC_N_ufl-48AAIwC6tHg660Q&index=1)

Ανά πάσα στιγμή μπορώ να επιστρέψω σε προηγούμενη έκδοση

18

+Once you have set up R and the IDE of your choice, it is time to setup GitHub. First you should create your personal account [[here](https://github.com)](https://github.com). As a student you have access to [[GitHub premium](https://education.github.com/pack)](https://education.github.com/pack) which can be obtained with our academic email address. I highly recommend you to take advantage of the premium services as soon as you can follow courses and have free access to GitHub copilot. Remember that GitHub can also serve as a portfolio or CV. Very often, when you apply for jobs, you showcase your coding skills by linking your GitHub account to your CV. For many job openings, having experience with Git and GitHub is considered a significant advantage. That definitely goes beyond its intended purpose, but in a highly competitive environment, it's always good to be prepared. In case you are having trouble, you can take a look at this [video](https://www.youtube.com/watch?v=XBzUqQbHHhw&list=RDCMUC_N_ufl-48AAIwC6tHg660Q&index=1) on how to sign up.

19

GitHub desktop

20

-Assuming you have signed up for GitHub and you claimed your account, now you can download the [[desktop application](https://desktop.github.com)](https://desktop.github.com). GitHub Desktop offers an easy-to-use and navigable working environment that doesn't require advanced coding skills. You can find a nice introduction on how to install GitHub desktop and set up your first README files [[here](https://www.youtube.com/watch?v=ci3W1T88mzw)](https://www.youtube.com/watch?v=ci3W1T88mzw).

20

+Assuming you have signed up for GitHub and claimed your account, you can now download the [[desktop application](https://desktop.github.com)](https://desktop.github.com). GitHub Desktop offers an easy-to-use and navigable working environment that doesn't require advanced coding skills. You can find a nice introduction on how to install GitHub desktop and set up your first README files [[here](https://www.youtube.com/watch?v=ci3W1T88mzw)](https://www.youtube.com/watch?v=ci3W1T88mzw).

21

21

Further reading:

Μπορώ να δω αλλαγές που έγιναν από άλλους χρήστες

68

```

participatin_sites.R
Source on Save Run Source
1 # Load packages
2 library(ggplot2) # to produce the map
3 library(maps)
4 library(tidyverse) # manipulate data
5 library(readxl) # read raw data from .xlsx file
6 library(leaflet) # alternative map preview
7
8 # Load file with coordinates
9 # example with paths:
10 absolute_path_KTH <- "/user/theodorou/documents/WorOptReproSciEcoEnvSci/raw_data"
11
12 absolute_path_PCH <- "~/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci/raw
13
14 # Relative path
15 file_path <- "raw_data/participating_experiments.xlsx"
16 file <- read_xlsx(file_path, sheet = 2, na = "NA")
17
18 # Clean data
19 file$longitude <- as.numeric(file$longitude)
20 file$latitude <- as.numeric(file$latitude)
21 str(file)
22 coord <- file %>%
23   select(latitude, longitude)
24
25 # Plot
26 world_map <- ggplot() +
27   borders("world", fill = "white", colour = "red") +
28   geom_point(data = file, aes(longitude, latitude), size = 2) +
29   coord_fixed(1.3) +
30   theme_void()

```

12:1 (Top Level) R Script

Environment History Connections Git Tutorial

Import Dataset 130 rows Global Environment

Environment is empty

Console Background Jobs

R 4.3.0 · ~/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci/

K is free software and comes with ABSOLUTELY NO WARRANTY.
 You are welcome to redistribute it under certain conditions.
 Type 'license()' or 'licence()' for distribution details.

Natural language support but running in an English locale

R is a collaborative project with many contributors.
 Type 'contributors()' for more information and
 'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
 'help.start()' for an HTML browser interface to help.
 Type 'q()' to quit R.

>

Files Plots Packages Help Viewer Presentation

New Folder New Blank File Delete Rename More

Home Library CloudStorage OneDrive-uca.es WorOptReproSciEcoEnvSci raw_data

Name	Size	Modified
..		
participating_experiments.xlsx	112.3 KB	Oct 19, 2023, 2:12 PM
README.md	285 B	Oct 3, 2023, 5:46 PM

RStudio: Review Changes

Changes History main Stage Revert Ignore

Pull Push

participatin_sites.R

Load packages
library(ggplot2) # to produce the map
library(maps)
library(tidyverse) # manipulate data
library(readxl) # read raw data
library(leaflet) # alternative rendering

Load file with coordinates
example with paths:
absolute_path_KTH <- "/user/theo/.../
absolute_path_PCH <- "~/Library/.../

Relative path
file_path <- "raw_data/participatin_sites.xlsx"
file <- read_xlsx(file_path, sheet = 1)

Clean data
file\$longitude <- as.numeric(file\$longitude)
file\$latitude <- as.numeric(file\$latitude)
str(file)
coord <- file %>%
 select(latitude, longitude)

Plot
world_map <- ggplot() +
 borders("world", fill = "white")
 geom_point(data = file, aes(longitude, latitude))
 coord_fixed(1.3) +
 theme_void() +

Commit message

Show Staged Unstaged Context 5 lines Ignore Whitespace Stage All Discard All

Amend previous commit Commit

Size Modified

112.3 KB Oct 19, 2023, 2:12 PM
285 B Oct 3, 2023, 5:46 PM

Παρόμοιο περιβάλλον εργασίας με το GitHub desktop

Go to file/function

RStudio: Review Changes

Changes History main (all commits) | C

Search Pull

participatin_sites.R

Source on Save | 🔍 | ✎ | 📁

```

1 # Load packages
2 library(ggplot2) # to produce t
3 library(maps)
4 library(tidyverse) # manipulate
5 library(readxl) # read raw data
6 library(leaflet) # alternative
7
8 # Load file with coordinates
9 # example with paths:
10 absolute_path_KTH <- "/user/the
11 absolute_path_PCH <- "~/Library
12
13
14 # Relative path
15 file_path <- "raw_data/particip
16 file <- read_xlsx(file_path, she
17
18 # Clean data
19 file$longitude <- as.numeric(fil
20 file$latitude <- as.numeric(file
21 str(file)
22 coord <- file %>%
23   select(latitude, longitude)
24
25 # Plot
26 world_map <- ggplot() +
27   borders("world", fill = "white")
28   geom_point(data = file, aes(lo
29   coord_fixed(1.3) +
30   theme_void()

```

(Top Level) ▾

Environment History Connections Git Tutorial

Diff | Commit | Pull | Push | History

Staged Status Path .DS_Store

Commit History:

- HEAD -> refs/heads/main (origin/main, origin/HEAD) Merge branch 'main' of https://github.com/paschz: Paschalis Chatzopoulos <58082380+paschz@ 2023-10-20 0788cc74
- update script
- Update README.md
- poster
- update readme
- local path
- [paschz/issue2](#) ign
- Merge pull request #6 from paschz/paschalis_r_script
- [origin/paschalis_r_script](#) [paschalis_r_script](#) script comments
- Update README.md
- Merge pull request #5 from paschz/paschalis_r_script
- add script and raw data

Commits 1–33 of 33

Commit Details:

SHA	0788cc743440b98ebc6f4788a0a77337ec409755
Author	Paschalis Chatzopoulos <58082380+paschz@users.noreply.github.com>
Date (UTC)	2023-10-20 09:34
Subject	Merge branch 'main' of https://github.com/paschz/WorOptReproSciEcoEnvSci
Parent	3362d32147c61638ecd020bb5a1c4e6264c95c1a fbfa10e5321329d8273f6e12929c0e90e2cbdd79

Diff Viewer:

README.md

```

@@ -1,6 +1,6 @@
1 # Workflow optimisation for reproducible science in ecology and environmental science
2 1 # Information and data architecture in environmental sciences: Folder structure, metadata and project
3 management through GitHub
4 2
5 3 This serves as an open-access repository for the forthcoming lecture entitled 'Workflow Optimization for
6 Reproducible Science in Ecology and Environmental Science,' scheduled to be hosted by the University of
7 the Aegean on October 26, 2023.
8 3 This serves as an open-access repository for the forthcoming lecture entitled 'Information and data
9 architecture in environmental sciences: Folder structure, metadata and project management through
10 GitHub,' scheduled to be hosted by the University of the Aegean on October 26, 2023.
11 4
12 5 Within this repository, you can find all the course materials, references, and lecture handouts.
13 Additionally, I envision this repository to serve as a practical demonstration of building and
14 structuring a course from the ground up in an open and reproducible environment.
15 6
16 @@ -39,4 +39,4 @@
17 39 - [How to use R Markdown ](https://www.rforecology.com/post/how-to-use-rmarkdown-part-one/?fbclid=IwAR0Axz3yb5Ql0Z0Koz6baJnN3P0a6ut4FNo1jbJP0B4NWXeyNSVMXwMZDem>)
18 40 - [Tidy data for efficiency, reproducibility, and collaboration](https://openscapes.org/blog/2020-10-12-tidy-data/)
19 41 - [Some good practices for research with R](https://github.com/etiennebacher/good-practices)

```

Size Modified

112.3 KB Oct 19, 2023, 2:12 PM
285 B Oct 3, 2023, 5:46 PM

WorOptReproSciEcoEnvSci

71

```
scripts > participatin_sites_map.R
1 # Load packages
2 library(ggplot2) # to produce the map
3 library(maps)
4 library(tidyverse) # manipulate data
5 library(readxl) # read raw data from .xlsx file
6 library(leaflet) # alternative map preview
7
8 # Load file with coordinates
9 # example with paths:
10 absolute_path_KTH <- "/user/theodorou/documents/WorOptReproSciEcoEnvSci/raw_data"
11
12 absolute_path_PCH <- "~/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci/raw
13
14 # Relative path
15 file_path <- "raw_data/participating_experiments.xlsx"
16 file <- read_xlsx(file_path, sheet = 2, na = "NA")
17
18 # Clean data
19 file$longitude <- as.numeric(file$longitude)
20 file$latitude <- as.numeric(file$latitude)
21 str(file)
22 coord <- file %>%
23   select(latitude, longitude) # Line highlighted by red circle
24
25 # Plot
26 world_map <- ggplot() +
27   borders("world", fill = "white", colour = "red") +
28   geom_point(data = file, aes(longitude, latitude), size = 2) +
29   coord_fixed(1.3) +
30   theme_void() +
```

```
# Load packages
library(ggplot2) # to produce the map
library(maps)
library(tidyverse) # manipulate data
library(readxl) # read raw data from .xlsx file
library(leaflet) # alternative map preview

# Load file with coordinates
# example with paths:
absolute_path_KTH <- "/user/theodorou/documents/WorOptReproSciEcoEnvSci/raw_data"

absolute_path_PCH <- "~/Library/CloudStorage/OneDrive-uca.es/WorOptReproSciEcoEnvSci/raw

# Relative path
file_path <- "raw_data/participating_experiments.xlsx"
file <- read_xlsx(file_path, sheet = 2, na = "NA")

# Clean data
file$longitude <- as.numeric(file$longitude)
file$latitude <- as.numeric(file$latitude)
str(file)
coord <- file %>%
  select(latitude, longitude) # Line highlighted by green box
# Plot
world_map <- ggplot() +
  borders("world", fill = "white", colour = "red") +
  geom_point(data = file, aes(longitude, latitude), size = 2) +
  coord_fixed(1.3) +
  theme_void() +
```

PROBLEMS 17 PORTS GITLENS COMMENTS

COMMIT GRAPH: WOROPTREPROSCIECOENVSCI

WorOptReproSciEcoEnvSci > main > Fetch (58 seconds ago)

Search commits (↑↓ for history), e.g. "Updates dependencies" author:eamodio

BRANCH / TAG	GRAPH	COMMIT MESSAGE	AUTHOR	CHANGES	COMMIT DATE / TIME	SHA
main		Merge branch 'main' of https://github.com/pasc... update script Update README.md update title poster update readme local path	You	3 1 3 2 1	yesterday 3 days ago 2 weeks ago 2 weeks ago	0788cc7 3362d32 fbfa10e 6042696 ebd1f29 a82f36a

Commit 0788cc7 You committed yesterday

Merge branch 'main' of https://github.com/pascatz/WorC

AUTOLINKS 0 found

FILES CHANGED +0 ~1 -0



paschatz / WorOptReproSciEcoEnvSci

 Type ⌘ to search

Code

Issues 3

Pull requests

Actions

Projects 1

Wiki

Security

Insights

Settings



WorOptReproSciEcoEnvSci

Public

Pin

Unwatch 2

Fork 0

Star 0

main

3 branches

0 tags

Go to file

Add file

Code



Your main branch isn't protected

Protect this branch



paschatz Merge branch 'main' of https://github.com/paschatz/WorOptReproSci...

...

0788cc7 2 hours ago

33 commits



lecture_notes

notes

2 weeks ago



poster

poster

2 days ago



raw_data

update script

2 hours ago



scripts

update script

2 hours ago



.DS_Store

update script

2 hours ago



.gitignore

ign

2 weeks ago



README.md

Update README.md

3 hours ago



WorOptReproSciEcoEnvSci.Rproj

add script and raw data

2 weeks ago



README.md



Information and data architecture in environmental sciences: Folder structure, metadata and project management through GitHub

About

Welcome to the "Information and data architecture in environmental sciences: Folder structure, metadata and project management through GitHub" repository, scheduled to be hosted by the University of the Aegean on October 26, 2023.

[Readme](#)[Activity](#)[0 stars](#)[2 watching](#)[0 forks](#)

Releases

No releases published

[Create a new release](#)

Packages

No packages published

[Publish your first package](#)

Languages



paschatz / WorOptReproSciEcoEnvSci

 Type ⌘ to search[Code](#) [Issues 3](#) [Pull requests](#) [Actions](#) [Projects 1](#) [Wiki](#) [Security](#) [Insights](#) [Settings](#)

WorOptReproSciEcoEnvSci

Public

[Pin](#) [Unwatch 2](#) [Fork 0](#) [Star 0](#)

	paschatz Merge branch 'main' of https://github.com/paschatz/WorOptReproSci... ...	0788cc7 2 hours ago	🕒 33 commits
	lecture_notes notes	2 weeks ago	Welcome to the "Information and data architecture in environmental sciences: folder structure, metadata and project management through GitHub"
	poster poster	2 days ago	repository, scheduled to be hosted by
	raw_data update script	2 hours ago	University of the Aegean on October 2023.
	scripts update script	2 hours ago	Readme
	.DS_Store update script	2 hours ago	Activity
	.gitignore ign	2 weeks ago	0 stars
	README.md Update README.md	3 hours ago	2 watching
	WorOptReproSciEcoEnvSci.Rproj add script and raw data	2 weeks ago	0 forks

The screenshot shows a Mac OS Finder window displaying the contents of the 'WorOptReproSciEcoEnvSci' directory. The window includes a sidebar with 'Favourites' (AirDrop, Recents, Applications, Desktop, Documents, Downloads) and a central list view showing files and folders:

Name	Date Modified	Size	Kind
lecture_notes	3 October 2023, 17:13	--	Folder
poster	Today, 13:33	--	Folder
raw_data	Yesterday, 14:12	--	Folder
README.md	Today, 13:33	10 KB	Markdown
scripts	18 October 2023, 14:29	--	Folder
WorOptReproSciEcoEnvSci.Rproj	Today, 14:31	205 bytes	R Project

At the bottom right of the window, there is a page number '74'.

GitHub issues

The screenshot shows the GitHub Issues page for the repository 'paschatz / WorOptReproSciEcoEnvSci'. A red circle highlights the 'Issues' tab in the navigation bar, which has 3 items. A modal window titled 'Label issues and pull requests for new contributors' is displayed, with a 'Dismiss' button in the top right corner. The modal text says: 'Now, GitHub will help potential first-time contributors discover issues labeled with good first issue'. Below the modal, there are filters: 'Filters' dropdown, search bar 'is:issue is:open', 'Labels 9', 'Milestones 0', and a 'New issue' button. The main list shows three open issues:

- 3 Open 1 Closed
- presentation/collaboration
#7 opened last week by paschatz
- add script for example
#3 opened 2 weeks ago by paschatz
- organise folders
#2 opened 3 weeks ago by paschatz

On the right side, there are dropdown menus for 'Author', 'Label', 'Projects', 'Milestones', 'Assignee', and 'Sort'. A yellow box highlights the 'Assignee' dropdown menu, which is open and shows a list of users:

- Filter by who's assigned
- Filter users
- Assigned to nobody
-  paschatz Paschalis Chatzopoulos
-  kostheo71 Konstantinos Theodorou

ProTip! Notify someone on an issue with a mention, like: @paschatz.

Closed

read_data_entity_names of multiple package_ids #47

paschatz opened this issue last month · 7 comments



cInsmth commented last month

Contributor

...

This issue is occurring due to a change in the repository API 'Read Data Package Archive' method. The corresponding `read_data_package_archive` function has been updated and is available for immediate use by installing EDIutils with:

```
devtools::install_github(  
  repo = "rOpenSci/EDIutils",  
  ref = "refactor-read-data-package-archive"  
)
```



The function no longer uses a `transaction` identifier, so the new call becomes:

```
try_download <- read_data_package_archive(  
  packageId = "knb-lter-cdr.444.8",  
  path = "data_cleaning/11_Cedar_Creek/"  
)
```



Next steps are to update the docs, tests, and release into the development and main branches.

@paschatz, does this fix the issue? Is there anything else? Thanks again for reporting it!



paschatz commented last month

Author

...

Hey @cInsmth,

Now works smoothly!! 💯

I appreciate your support.



🔒 Reproducible science workshop

Βολικό για μεγάλα project με πολλούς συνεργάτες

View 1 ▾

+ New View

Filter by keyword or by field

	Title	...	Assignees	...	Status	...	+
1	⊕ add script for example #3		paschatz	▼	Done	▼	
2	⊕ fix course date #1			▼	Done	▼	
3	⊕ organise folders #2		paschatz	▼	In Progress	▼	
4	⊕ presentation/collaboration #7		kostheo71 and pas...	▼		▼	
5	⊕ organise 'workshop' #8		paschatz	▼	In Progress	▼	

+ You can use Control + Space to add an item

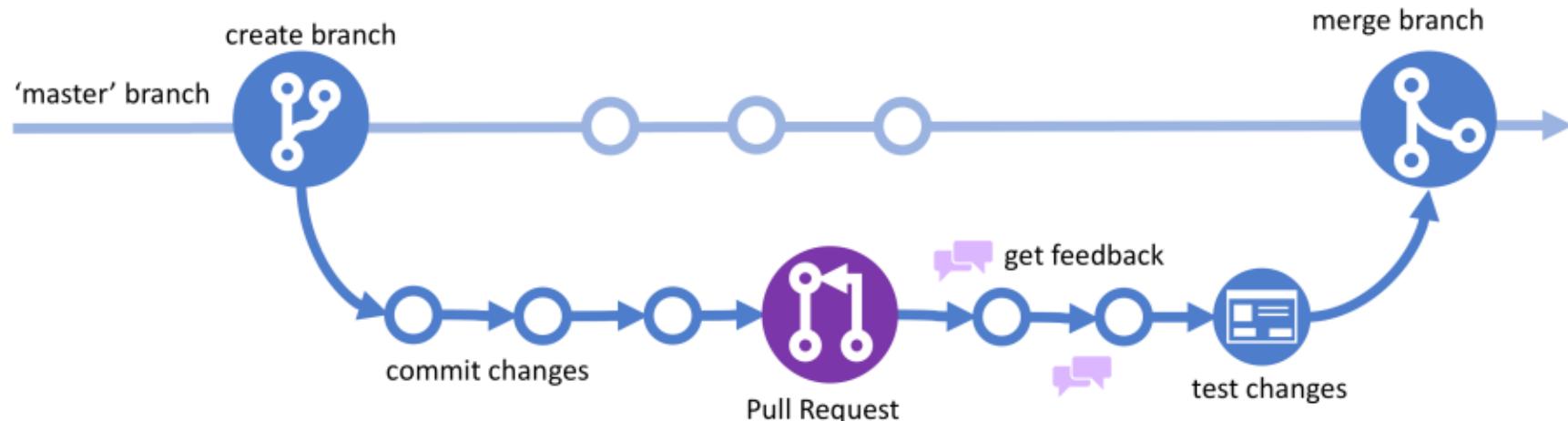
Ξεκίνησα τη συγγραφή της μεθοδολογίας, αλλά δε όμως πάχες μετρήσαμε τη συγκέντρωση νικελίου.

Το αναλαμβάνω εγώ!

Branches (κλάδοι)

Ας υποθέσουμε ότι σας ανατίθεται να τροποποιήσετε τον κώδικα και αντί για Tukey test πρέπει να τρέξετε ένα Dennett's test.

- Χωρίς να επηρεάσετε τον υπάρχον κώδικα, δημιουργείτε ένα παρακλάδι.
- Τροποποιείτε τον κώδικα.
- Αξιολογείται από το διδάσκοντα/supervisor.
- Μεταφέρετε τις αλλαγές στο κεντρικό κλάδο.



University < ⚡ 🔍

github.com

paschatz

Overview Repositories 14 Projects Packages Stars

Popular repositories

Group-Project-Acid-deposition-in-Sweden Public

This is a public version of our repository for our assignment for the course of Ecological methods.

R

WorOptReproSciEcoEnvSci Public

Welcome to the "Information and data architecture in environmental sciences: Folder structure, metadata and project management through GitHub" repository, scheduled to be hosted by the University o...

R

Customize your pins

209 contributions in the last year

Contribution settings ▾

Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct

Mon Wed Fri

Learn how we count contributions

Less More

Contribution activity

2023

October 2023

Created 35 commits in 3 repositories

paschatz/WorOptReproSciEcoEnvSci 32 commits

paschatz/Understanding-palm-forest-ca... 2 commits

paschatz/julia_project 1 commit

2022

2021

2020

2019

Created 1 repository

paschatz/WorOptReproSciEcoEnvSci

R Oct 2

79

Paschalis Chatzopoulos
paschatz

Currently based in Cadiz, Spain. PhD candidate at
@Ecosystem-Ecology-Lab-UCA.

Edit profile

8 followers · 13 following

Cadiz university, Spain, @pascal_161

Highlights PRO

Organizations



hadley

Overview Repositories 331 Projects Packages Stars 114 Sponsoring 2



Hadley Wickham
hadley · he/him

Unfollow

Chief Scientist at **@posit-pbc**

24.9k followers · 0 following

 **@posit-pbc**
 Houston, TX
 05:38 - 8h behind
 hadley@posit.co
 http://hadley.nz
 @hadleywickham@fosstodon.org

Sponsoring



Pinned

 **tidyverse/ggplot2** Public
An implementation of the Grammar of Graphics in R
R 6.1k 2k

 **tidyverse/tidyverse** Public
Easily install and load packages from the tidyverse
R 1.5k 274

 **r-lib/devtools** Public
Tools to make an R developer's life easier
R 2.3k 754

 **tidyverse/dplyr** Public
dplyr: A grammar of data manipulation
R 4.6k 2.1k

 **r4ds** Public
R for data science: a book
R 4.1k 4k

 **adv-r** Public
Advanced R: a book
TeX 2.3k 1.7k

4,286 contributions in the last year



Learn how we count contributions

Less More

Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct

Mon

Wed

Fri

2023

2022

2021

2020

2019

2018

2017

2016

80

Activity overview

Contributed to **rstudio/renv**, **rstudio/rsconnect**, **r-lib/testthat** and 284 other repositories

15% Code review

A screenshot of a GitHub repository page for `tidyverse / ggplot2`. The page shows the repository's activity, releases, contributors, and other metadata.

Repository Summary:

- Code:** 219
- Issues:** 219
- Pull requests:** 50
- Actions:**
- Wiki:**
- Security:**
- Insights:**

Code Tab (Active):

- Branch:** main
- Branches:** 71 branches
- Tags:** 40 tags
- Commits:** 5,155 commits (last week)
- Latest Commit:** bf0c64f last week
- Recent Activity:**
 - Do not require Hmisc on the CI with R < 4.1 (#5237) - 7 months ago
 - Merge in v3.4.4 to main (#5480) - last week
 - Update faithful.R (#5015) - last year
 - Release 3.4.0 (#5025) - last year
 - seq function calls should use full name of 'length.out' (#3817) - 4 years ago
 - update CITATION to new style - 8 months ago
 - Merge in v3.4.4 to main (#5480) - last week
 - Use retina logo and generate favicons - 5 years ago
 - Merge in v3.4.4 to main (#5480) - last week
 - Merge in v3.4.4 to main (#5480) - last week
 - Merge in v3.4.4 to main (#5480) - last month
 - Introduction vignette (#5159) - last year
 - Documentation improvements (#4851) - last year
 - Use union merge strategy for NEWS - last year
 - Add as.data.frame method to mapped_discrete that strips the class s... - 3 years ago
 - link to new location (#4836) - last year
 - Merge in v3.4.4 to main (#5480) - last week
 - link to new location (#4836) - last year

About Section:

- An implementation of the Grammar of Graphics in R
- ggplot2.tidyverse.org
- Tags: r, visualisation, data-visualisation
- Links:
 - Readme
 - Unknown, MIT licenses found
 - Code of conduct
 - Cite this repository
 - Activity
 - 6.1k stars
 - 309 watching
 - 2k forks
- Report repository

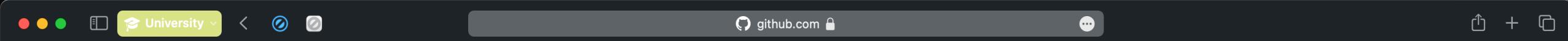
Releases Section:

- ggplot2 3.4.4 (Latest)
last week
- + 22 releases

Contributors Section:

296 contributors (including a cat icon).

Page number: 81



Files

main



Go to file

.github

R

aaa-.R

aes-colour-fill-alpha.R

aes-evaluation.R

aes-group-order.R

aes-linetype-size-shape.R

aes-position.R

aes.R

annotation-custom.R

annotation-logticks.R

annotation-map.R

annotation-raster.R

annotation.R

autolayer.R

autoplot.R

axis-secondary.R

backports.R

bench.R

bin.R

compat-plyr.R

coord-.R

coord-cartesian-.R

coord-fixed.R

ggplot2 / R / aes.R

Top

Code

Blame

464 lines (418 loc) · 13.5 KB

Raw

```
86  aes <- function(x, y, ...) {
87    xs <- arg_enquo("x")
88    ys <- arg_enquo("y")
89    dots <- enquo(...)
90
91    args <- c(xs, ys, dots)
92    args <- Filter(Negate(quo_is_missing), args)
93
94    # Pass arguments to helper dummy to throw an error when duplicate
95    # `x` and `y` arguments are passed through dots
96    local({
97      aes <- function(x, y, ...) NULL
98      inject(aes(!!!!args))
99    })
100
101   aes <- new_aes(args, env = parent.frame())
102   rename_aes(aes)
103 }
104
105 # Wrap symbolic objects in quostrings but pull out constants out of
106 # quostrings for backward-compatibility
107 new_aesthetic <- function(x, env = globalenv()) {
108   if (is_quosure(x)) {
109     if (!quo_is_symbolic(x)) {
110       x <- quo_get_expr(x)
111     }
112     return(x)
113   }
114
115   if (is_symbolic(x)) {
116     x <- new_quosure(x, env = env)
117     return(x)
118   }
119
120   x
121 }
122 new_aes <- function(x, env = globalenv()) {
123   check_object(x, is.list, "a .cls list")
124   x <- lapply(x, new_aesthetic, env = env)
125   structure(x, class = "uneval")
126 }
```

GitHub Docs

Help for wherever you are on your GitHub journey.



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- [Get started](#)
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- [Site policy](#)

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- [Repositories](#)
- [Pull requests](#)
- [GitHub Discussions](#)
- [GitHub Copilot](#)

⚙️ CI/CD and DevOps

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- [Supply chain security](#)
- [Security advisories](#)
- [Dependabot](#)
- [Code scanning](#)
- [Secret scanning](#)

💻 Client apps

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- [GitHub Desktop](#)

周恩 Project management

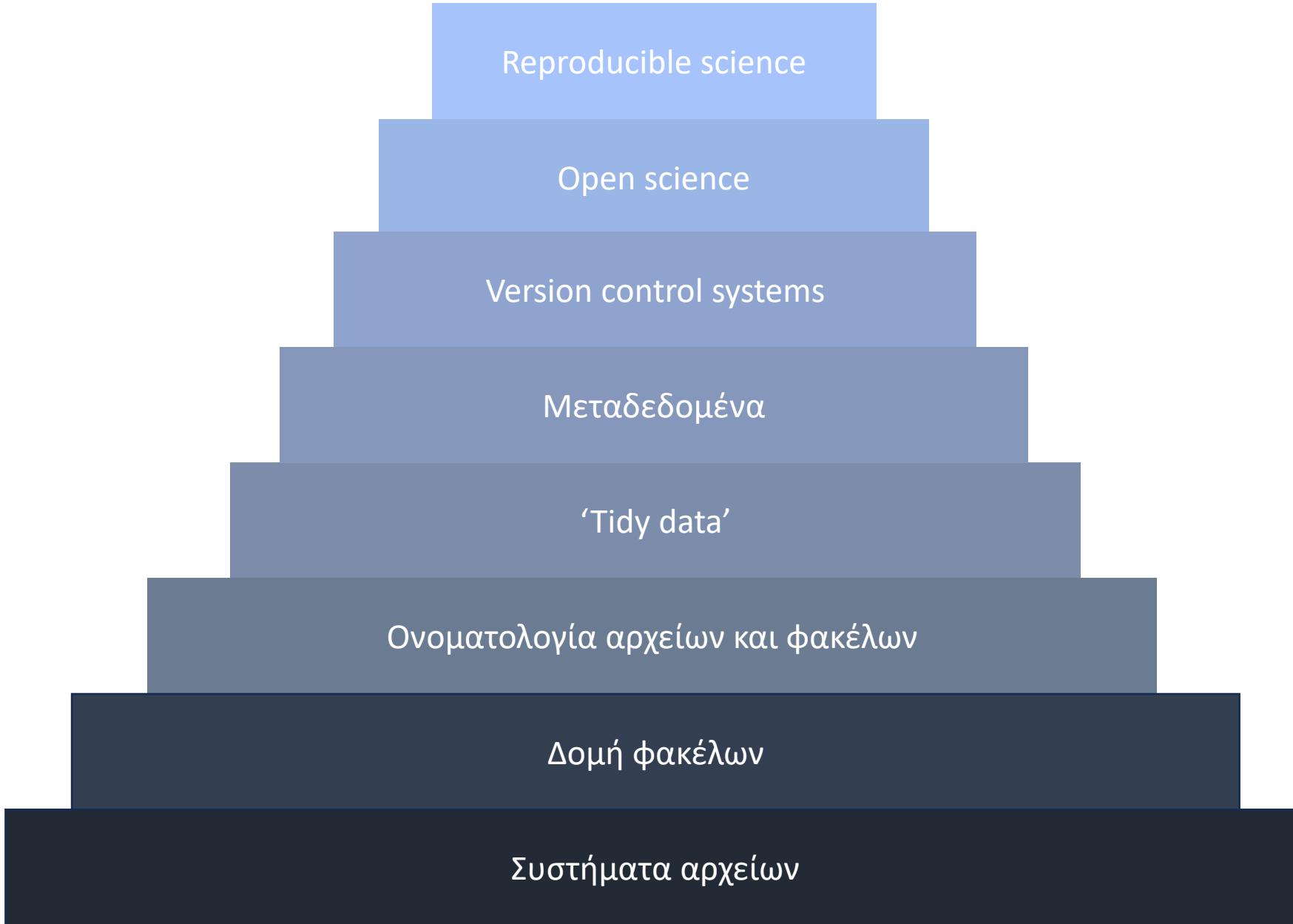
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- [Enterprise administrators](#)





Caitlin Rivers



Επιδημιολογικά
δεδομένα σε
μορφή pdf



Excel αρχείο



Δημοσίευση στο
GitHub





ΠΑΝΕΠΙΣΤΗΜΙΟ
ΑΙΓΑΙΟΥ



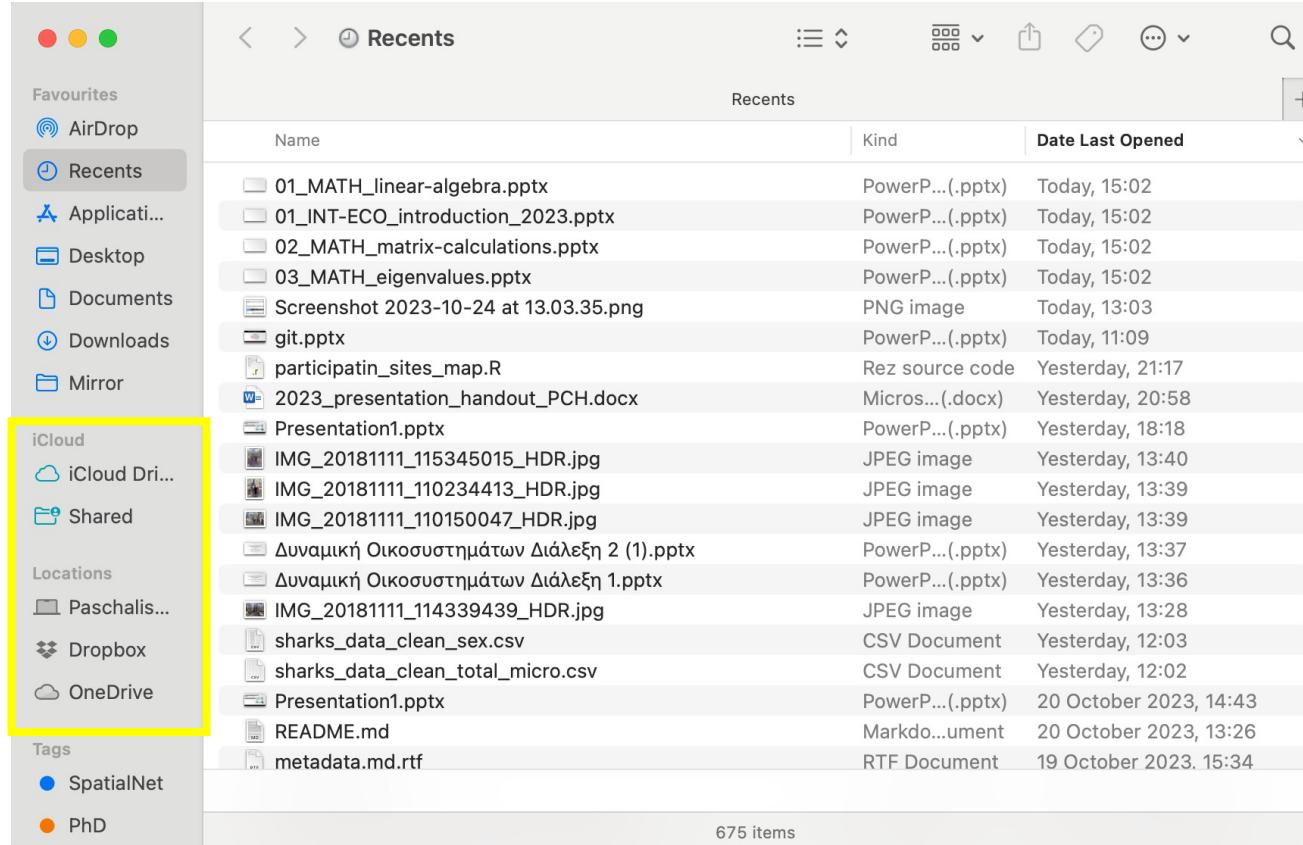
Universidad
de Cádiz

ECOSYSTEM
ECOLOGY



- Κατά τη διάρκεια των σπουδών μου, βρέθηκα αντιμέτωπος με πολλές δυσκολίες...
- Με διαφορά η μεγαλύτερη δυσκολία ήταν να εξηγήσω σε συνεργάτες μου γιατί πρέπει να ακολουθούμε βασικές αρχές ονοματολογίας, οργάνωσης φακέλων και γιατί είναι καλό να συνεργαζόμαστε μέσω GitHub.
- Για κάποιο λόγο κάποιοι συνεργάτες έχουν εμμονή με τα emails.
- Το 2023 ακόμα στέλνουν δεκάδες email ενώ μπορούν να απλοποιήσουν τη ζωή τους.
- Τι να κάνουμε;
- Θα συμμορφωθούμε... μέχρι να τους πείσουμε...

Ορισμός του local repository στο cloud



- Ορίστε ως local path ένα working directory που είναι στο cloud (one drive, iCloud, google drive).
- Εσείς θα δουλεύετε στο GitHub και ταυτόχρονα τα αρχεία σας θα είναι διαθέσιμα στο cloud!