Göttingen/ /eResearch Alliance

Research Data Management Workshop

08.02.2017

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GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

NIEDERSÄCHSISCHE STAATS- UND UNIVERSITÄTSBIBLIOTHEK GÖTTINGEN | SUB

GWDG

Outline

09:00 - 09:15	Welcome & Introduction
09:15 - 09:45	Research / Data / Management
09:45 - 10:15	Backup & Storage
10:15 - 10:45	Hands-On introduction to ownCloud
10:45 - 11:00	*Coffee break*
11:00 - 11:45	Presentations from the group & Discussion
11:45 - 12:15	Organization & Documentation
12:15 - 13:15	*Lunch*
13:15 - 14:00	Exercise: Data structuring
14:00 - 14:30	Data sharing and legal aspects
14:30 - 15:00	Open Access & Open Science
15:00 - 15:30	Exercise: Backup & Restore
15:30 - 16:00	Q&A and Wrap-up

www.eresearch.uni-goettingen.de

Göttingen/eResearch Alliance

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Store your Data: Backup and Archiving

Adequate protection and archiving of digital research data is a central concern of all researchers. To prevent loss of collected data, the infrastructure provider at the...

More

Your research project | Your data | Our services!

We understand eResearch as *enhanced* research, which to us means an optimized usage of **digital technologies and methods for innovative research**. As a single point of contact for scientists and scholars on the Göttingen Campus, we offer information, personal advice and support for key issues related to digital research through all phases of the research [illegible]

Ideas

- Project proposal support
- Data management planning

Research

- Workshops & Trainings
- ICT services

Results

- Persistent Identification
- Data publication

Guidelines

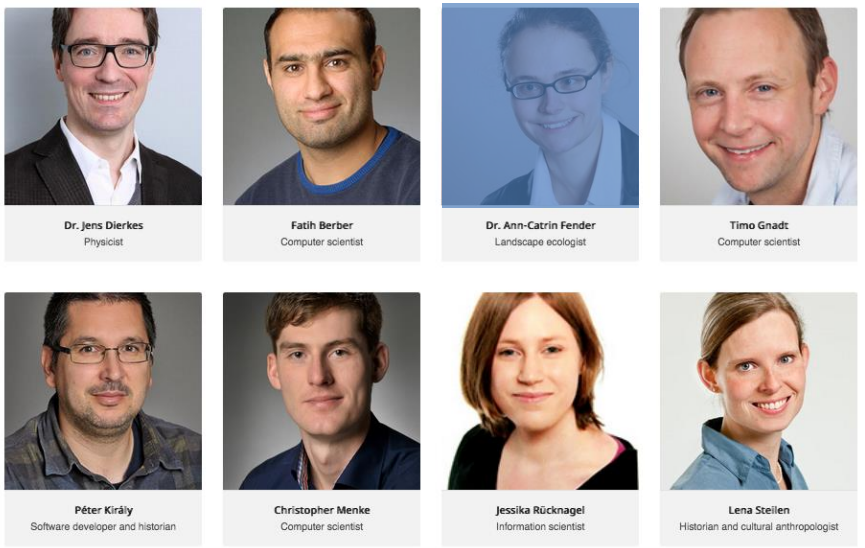
- Research data policy of the Georg-August-University Göttingen (incl. UMG)
- [illegible] der Universität [illegible]man)

News

- Erster Nutzungsworkshop zur VFU SuW am 21. Juni 2016 in Göttingen
- 20 May 2016: Information event for doctoral students at UMG

as of 2017/02/08

Göttingen eResearch Alliance (eRA)



- diverse backgrounds
  - mainly in natural sciences, humanities, computer science
- run mutually by

GWDG
Gesellschaft für wissenschaftliche Datenverarbeitung mbH Göttingen

SUB | NIEDERSÄCHSISCHE STAATS- UND UNIVERSITÄTSBIBLIOTHEK GÖTTINGEN

- extensive expertise on e-research related topics

→ *we are not experts in your discipline, but we can relate to your data management requirements*

What eRA can do for you

- Consultations / support
  - Research Data Management
  - Publication strategies
  - Digital methods, software and technologies to enhance a research project
  - Information hub for experts & expertise on the whole campus
- Training
  - (like right here & now)
  - Information material / knowledge base
- Collaboration
  - Liaising project partnership
  - Project as a service

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Research / Data / Management

08.02.2017

Research Data Management

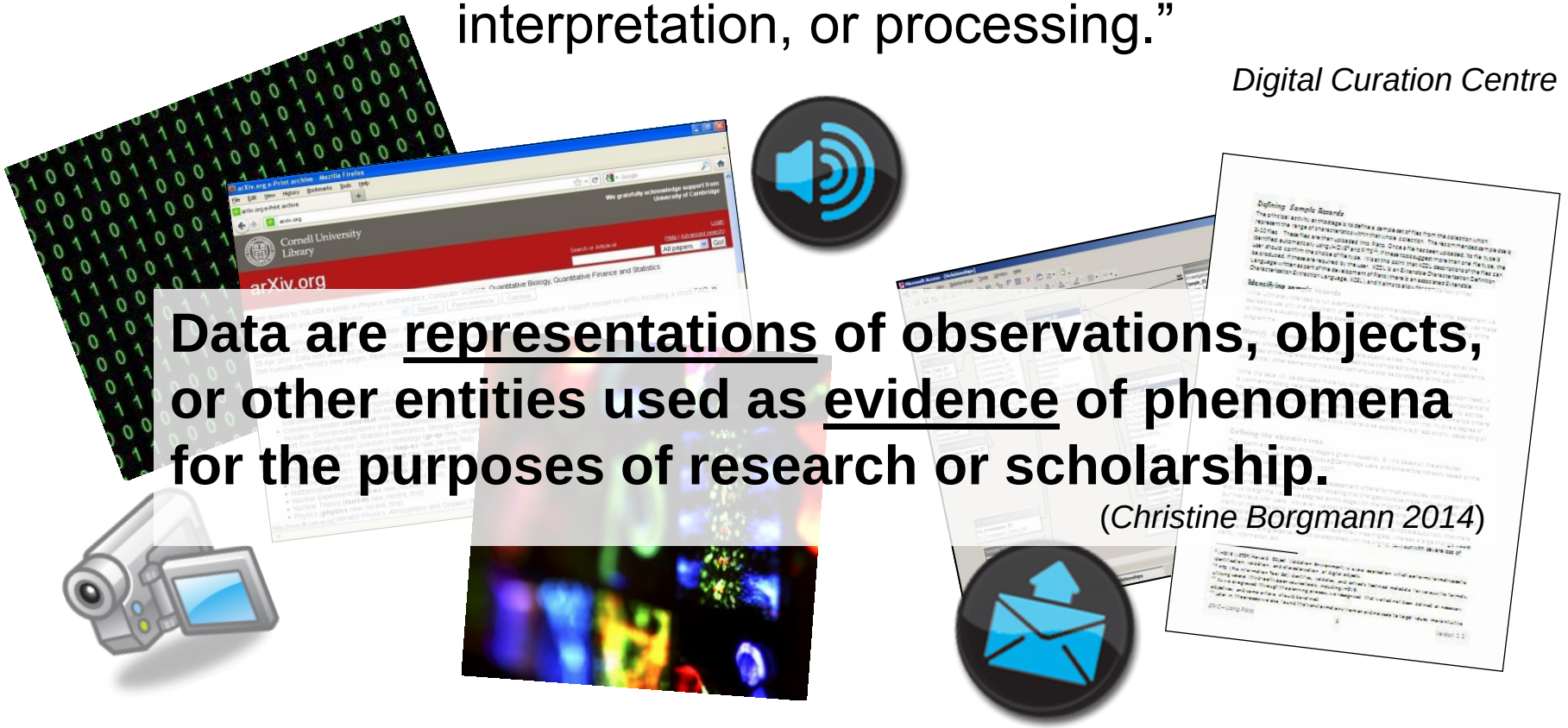
Surely you know what that is…

… and how to do it. Right?

What is ‘data’?

“A reinterpretable representation of information in a formalized manner suitable for communication, interpretation, or processing.”

Digital Curation Centre



Data are <u>representations</u> of observations, objects, or other entities used as <u>evidence</u> of phenomena for the purposes of research or scholarship.

(*Christine Borgmann 2014*)

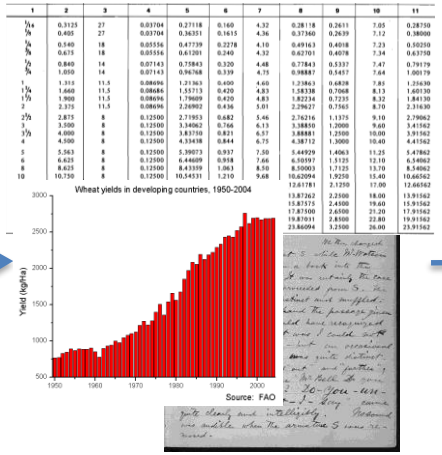
Adapted from: Open Access Teaching Materials for Digital Preservation, Produced by Anna Collins (2012) for the JISC-funded PrePARe project

What is Research Data?

Any information you use in your research:

statistics, interviews, simulations, measurement data from experiments, observational data from instruments, text with semantic annotations, 3D scans, model drawings, numerical representations, ...

Video, audio, images, spreadsheets, paper documents, binary data, software, text files, lab notebooks, ...



research object → **research data** → **result/ publication**

CC 0 ZERO

Research Data
– a valuable investment

Polarstern, CC BY-SA, *Hello, I am Bruce*,
http://www.flickr.com/photos/24049533@N00/2751603002

Research data – a valuable investment

Source: European Space Agency: Rosetta and Philae at comet, on flickr. CC-BY-SA-2.0

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Rosetta & Philae

Duration:

- >10 years preparation
- 10 years from start to data

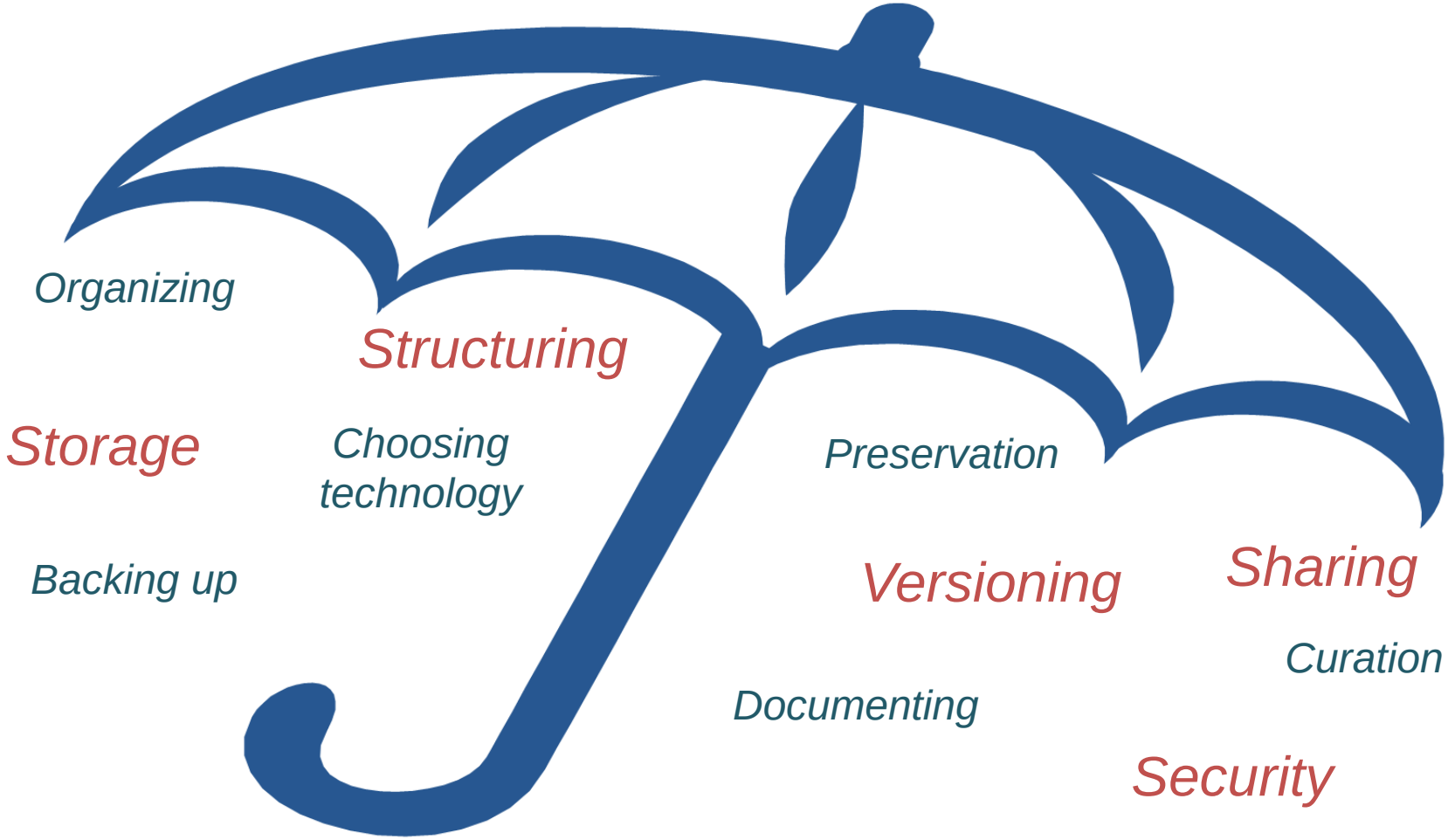
Costs:

- over € 1.000.000.000

Outcome:

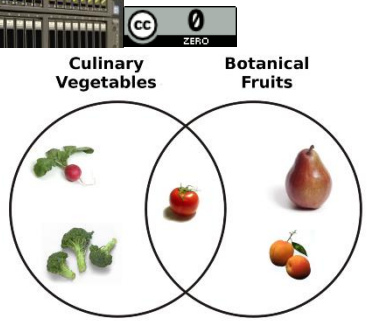
- some cool photos
- lots of data
- *a radically new theory on the origin of the universe?*

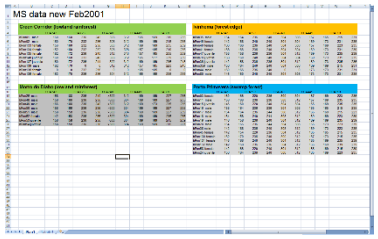
What is research data management?

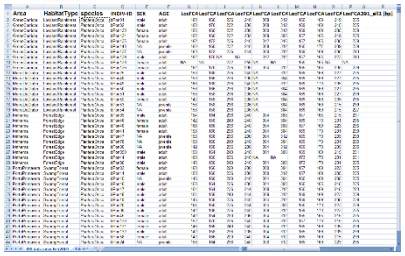


What is Research Data Management?

- Backup and Storage
- Metadata and Documentation
- Data Quality
- File Names, Identifier and Versions
- Ethics, Rights and Licenses





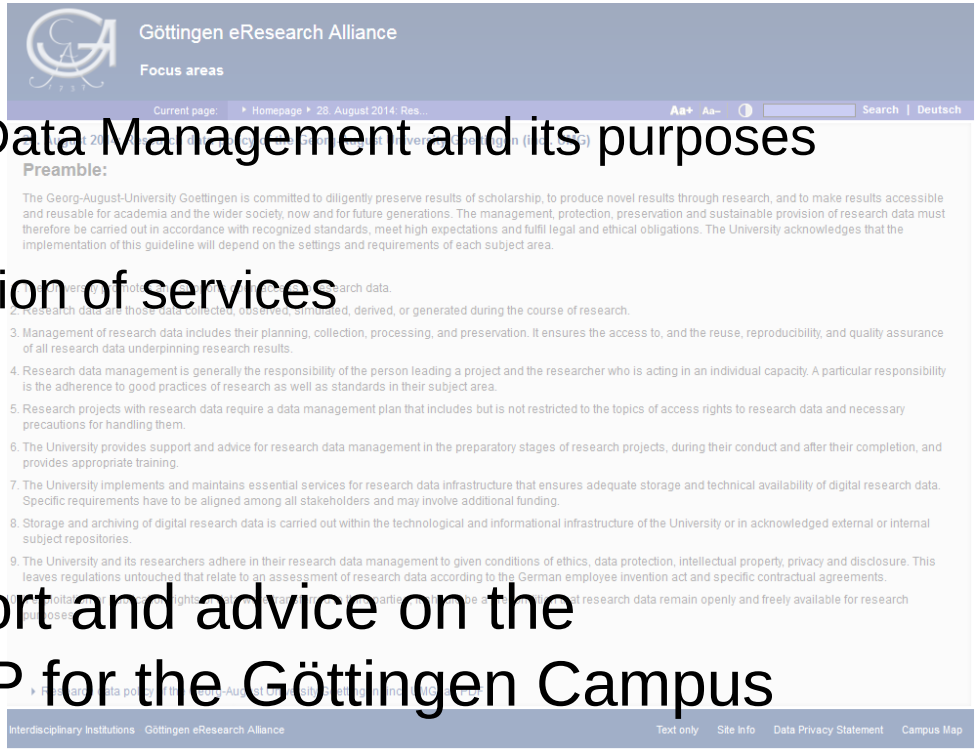


doi:10.10.1038/nphys1170

Thesis_final_v13b_revised.docx

Research Data Policy of the Georg-August Universität Göttingen

- Officially issued on 28th August 2014
- One of the first German universities with such a policy
- Topics addressed:
  - Research Data, Research Data Management and its purposes
  - Data Management Plans
  - Support, training and provision of services
  - Storage location
  - Ethical and legal standards
  - Open Access
- eResearch Alliance: support and advice on the implementation of the RDP for the Göttingen Campus



Source: http://www.uni-goettingen.de/en/488918.html
as of 2017/02/08

Why Research Data Management?

1. Improve your research

- prevent data loss
- prevent unnecessary work
- better data quality

2. Good Scientific Practice

- reproducibility, accountability and compliance
- "Primary data as the basis for publications shall be securely stored for ten years in a durable form in the institution of their origin." (DFG, Proposals for safeguarding good scientific practice, 1998)
- Requirement from DFG: every new project proposal has to explain how it will deal with research data and whether it will be shared.

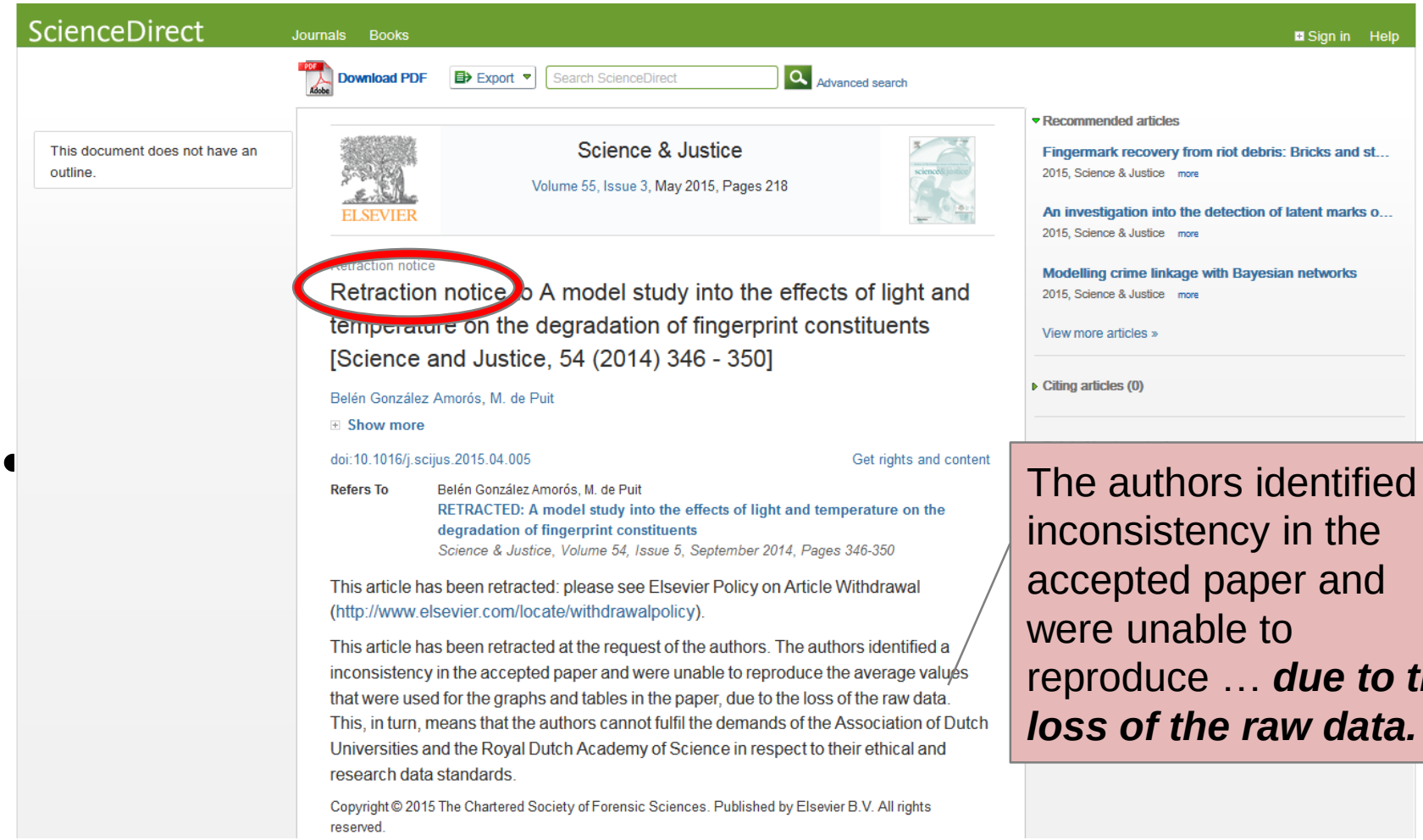
3. Data Sharing with Colleagues

- Research can be *very* expensive and the only result of long research journeys may be data.
- Data management costs are small in comparison to data creation costs.
- Productive data sharing is simply a matter of efficiency.

Why Research Data Management?

as of 2017/02/08

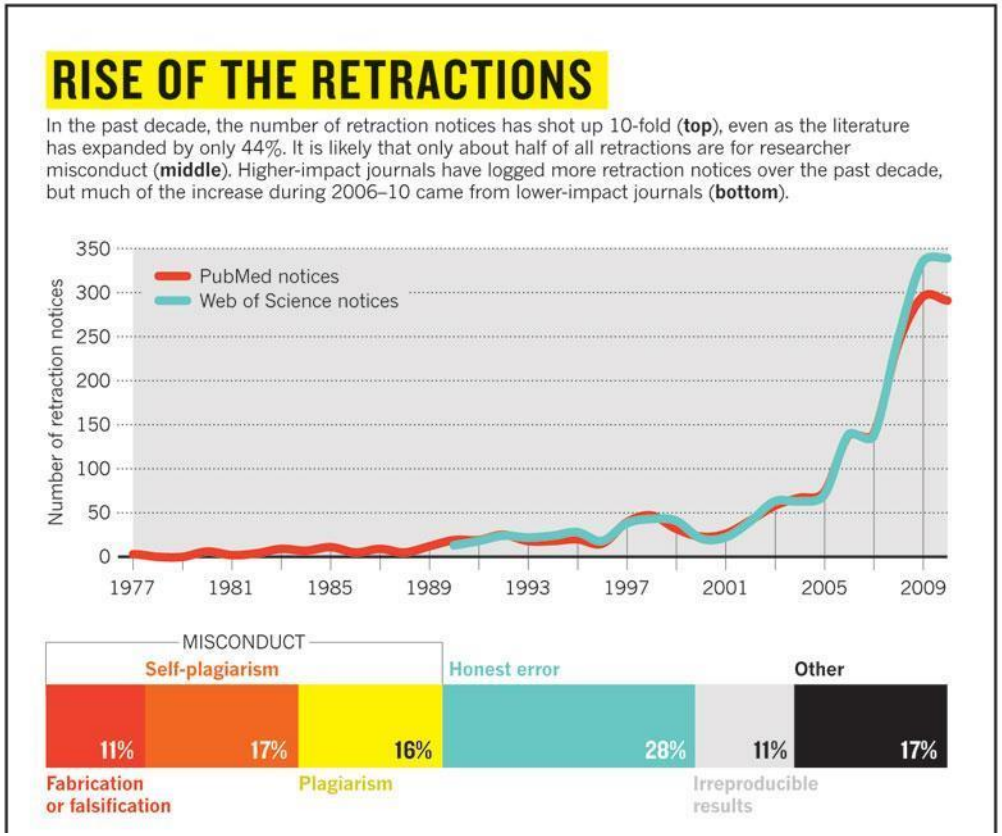
Why Research Data Management?



The authors identified a inconsistency in the accepted paper and were unable to reproduce … ***due to the loss of the raw data.***

as of 2017/02/08

Why Research Data Management?



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Why Research Data Management?

1. Improve your research

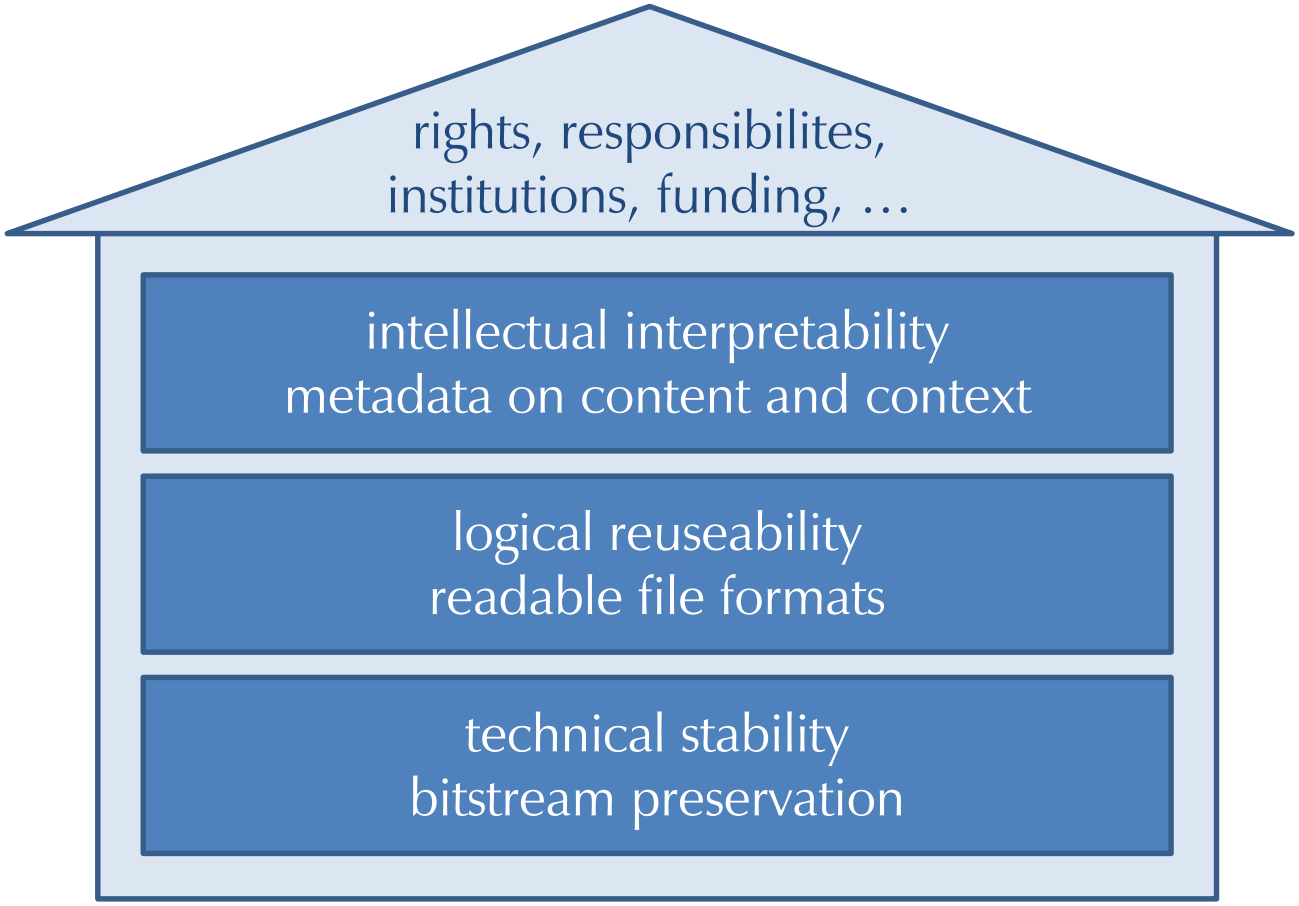
2. Good Scientific Practice

3. Data Sharing with Colleagues

4. Data Publication
   - Required by increasing number of journals
   - Get credit for your data!

5. Enable new kinds of research
   - Feedback loops between empirical and modeling approaches
   - Initiating research questions in completely different fields

Levels of data preservation

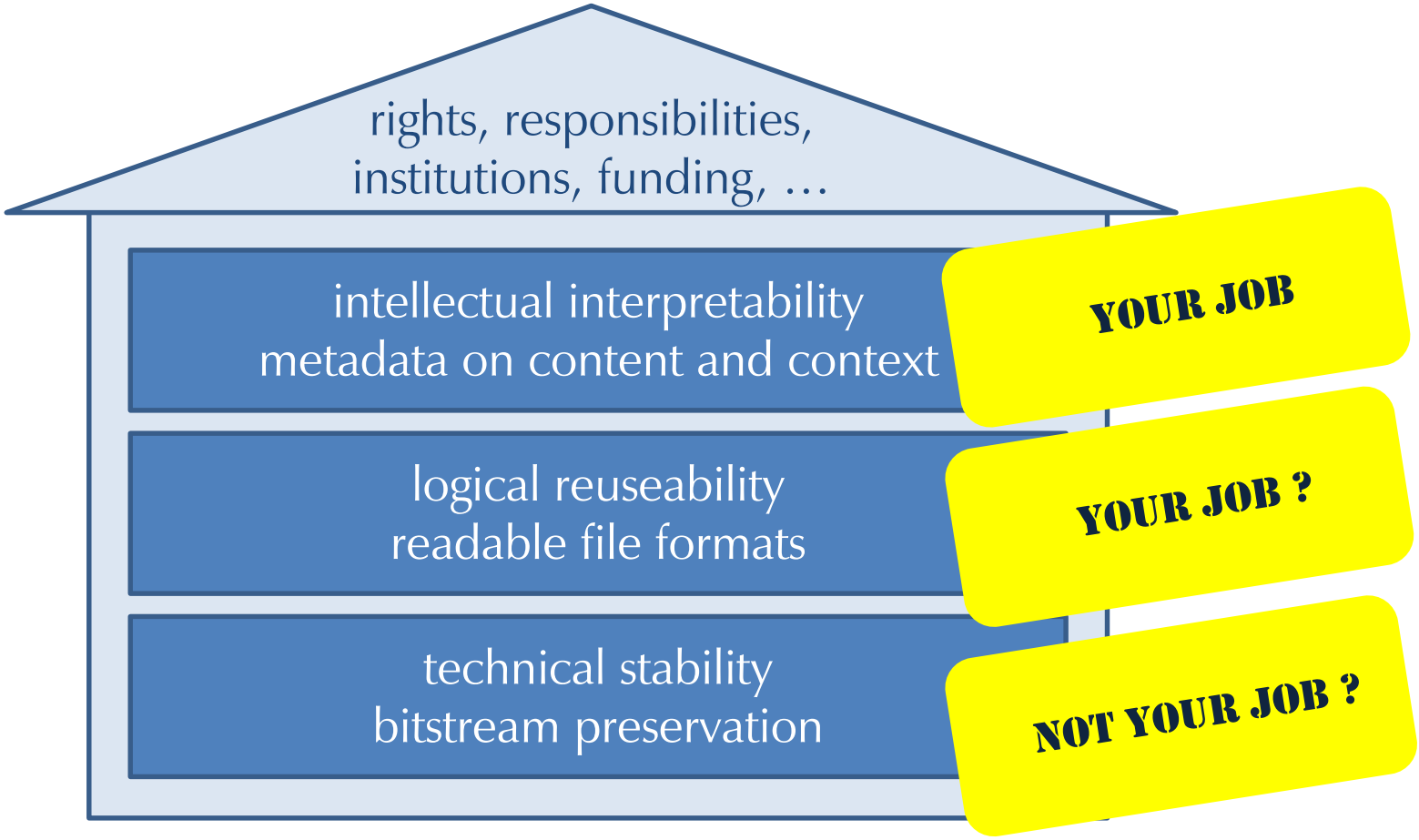


Data preservation motivation

Video:
„Data Management SNAFU in 3 short acts“
By NYU Health Sciences Library

https://www.youtube.com/watch?v=66oNv_DJuPc

Levels of data preservation



Publications are arguments made by authors, and data are the evidence used to support the arguments.

(*Christine Borgmann, 2014*)

The deeper meaning of Research Data Management

Source: cmhughes on pgfplots, CC-BY 2.5

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Backup & Storage

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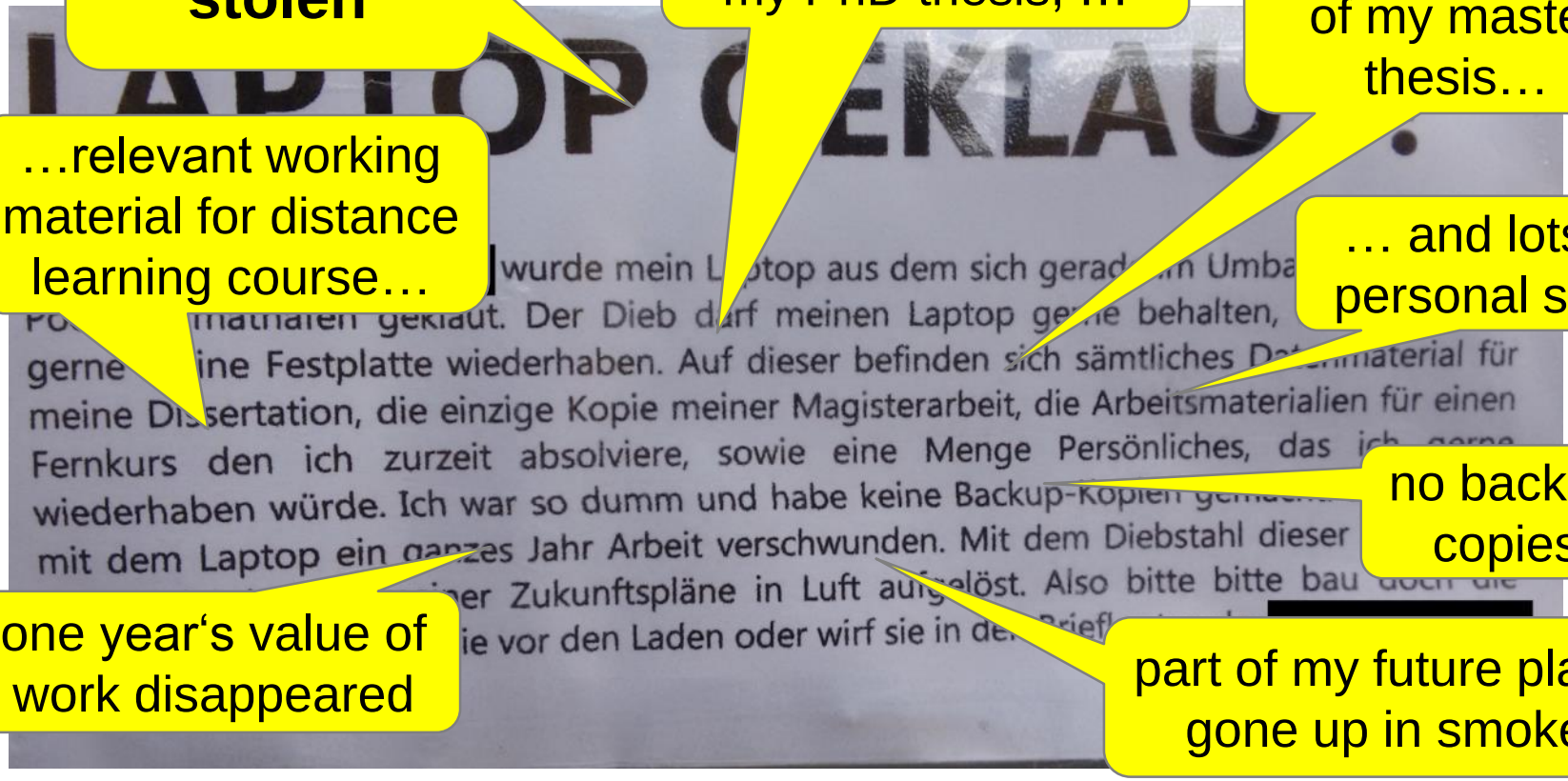
Discussion: Backup

Check for yourself:

- How do you backup your research data?
- How often do you do it?
- Have you ever tried to recover a deleted file?
- Can you return to a previous version of a file?
- Who is responsible for Backup and Storage services at your institute?

Why Backup?



Laptop stolen

Contains all data for my PhD thesis, …

… the only copy of my master thesis…

…relevant working material for distance learning course…

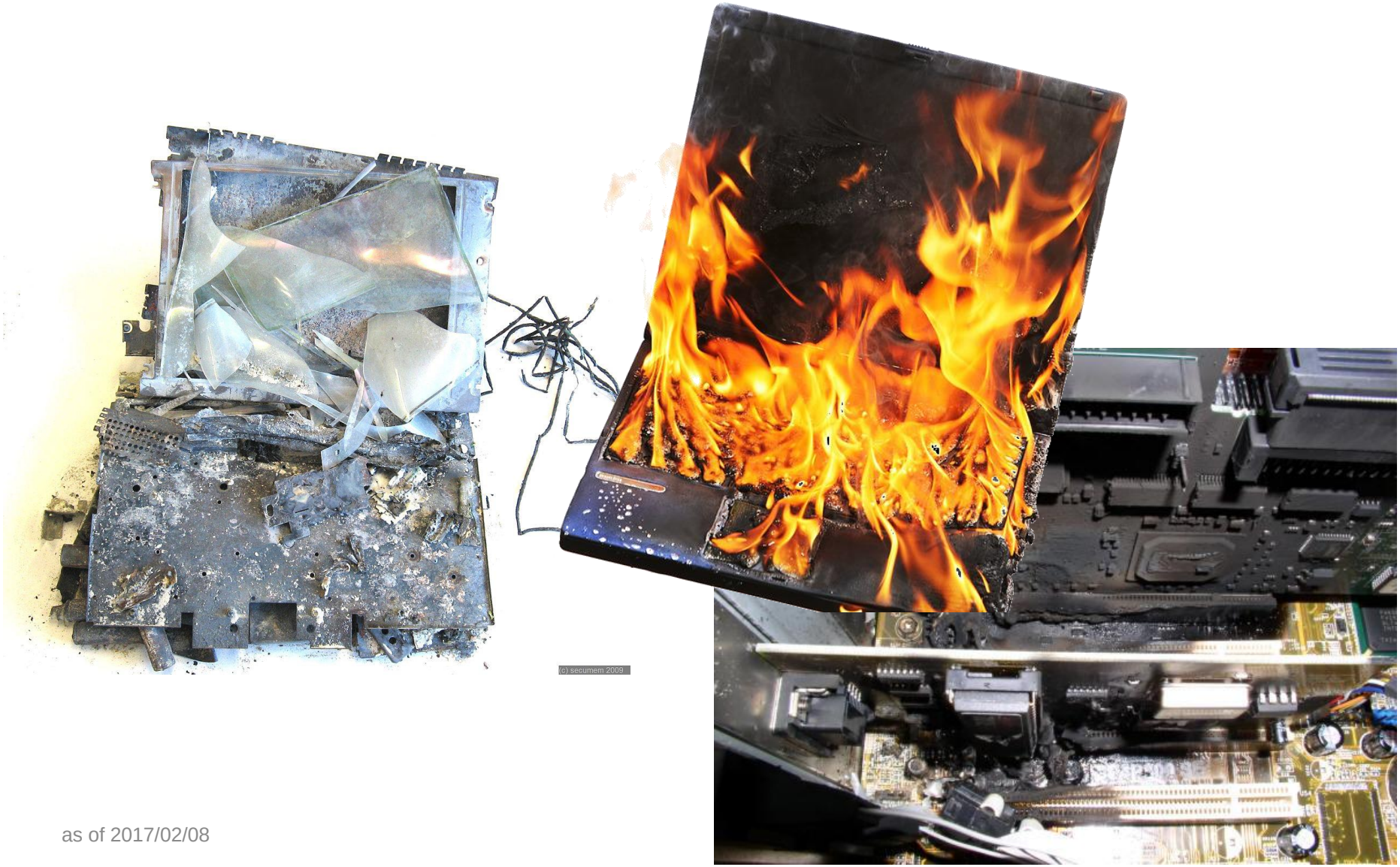
… and lots of personal stuff.

no backup copies

one year‘s value of work disappeared

part of my future plans gone up in smoke

Why Research Data Management?



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Why Backup?

...because:

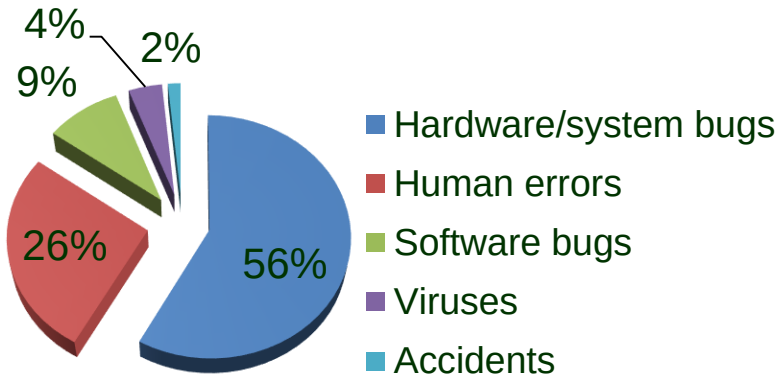
- Don‘t wait until data loss happens to your best friend. It might happen to you first!
- NOBODY is safe from data loss. But EVERYBODY can minimize the risk at a relatively low prize and effort.
- Once it‘s become a habit, you will hardly notice the required effort.

Source: University of Southampton, School of Electronics and Computer Science, 2005

Sources of data loss

- Malware / Theft / Destruction
- Software failures
  - Program errors / bugs / software updates
  - Features
    (e.g.: Dropbox overwriting on synchronization)
- Hardware failures
  - Bad design / cheap parts / defects
  - Age
  - Dropped laptops / HDDs
  - Liquids (water, coffee, coke)
  - Lightning strikes / electric pulses
- Human errors
  - Accidental deletion
  - Missing knowledge

Source: a man working at home while eating breakfast by Socialeurope via flickr: https://www.flickr.com/photos/socialeurope/4303391587, CC-BY-NC-SA 2.0



Source: Kroll Ontrack, 2007, Robin Harris, http://www.zdnet.com/blog/storage/how-data-gets-lost/167

as of 2017/02/08

Further reading: disasters and tales of data loss, statistics on how data gets lost

Sources of data loss

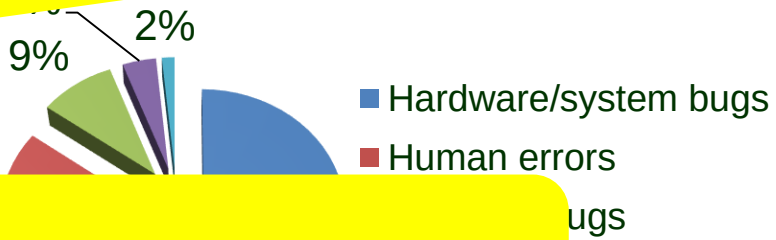
How much of your work can you afford to loose?
- **an accidentally deleted file?**
- **a complete hard drive?**

breakfast by

03391587,

When can you afford these kinds of loss?
- **at the beginning of your research project?**
- **one month before your thesis submission?**

- Mal
- Software failures
  - Program errors / bugs / software upda
  - Features
    (e.g.: Dropbox overwriting on synchronization)
- Hardware failures
  - Bad design / cheap parts /
  - A
  - [illegible] / electric pulses
- Human errors
  - [illegible]
  - [illegible]



Let's minimize the risks as far as possible.

Source: Kroll Ontrack, 2007, Robin Harris, http://www.zdnet.com/blog/storage/how-data-gets-lost/167

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Further reading: disasters and tales of data loss, statistics on how data gets lost

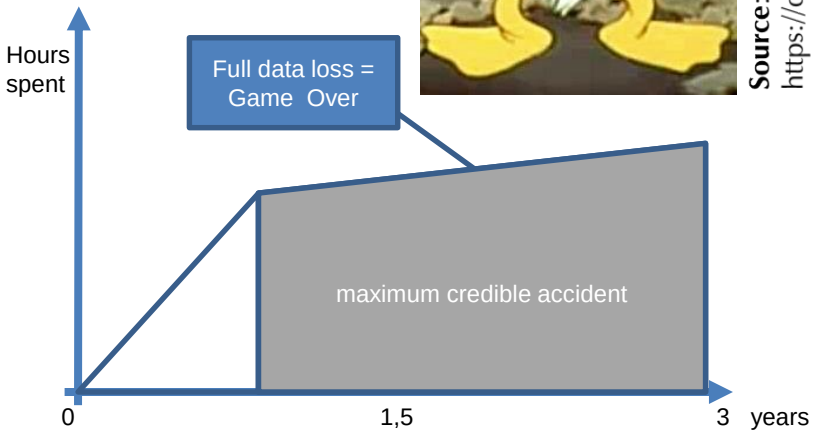
Costs of data loss

Is backing up really worth the effort?

- PhD or postdoc salary costs for employer:
  over € 60.000 / year *
- Estimated costs for losing data of one year's work:
  usually even higher

Source: https://de.wikipedia.org/wiki/Dagobert_Duck

➢ **Besides, you can lose a lot of time**
… and possibly your nerves



Required investments:

- External hard drives start at € 50,-
- Backup Software is included in most modern operating systems

➢ **When will you start? When will you be required to?**

* DFG staff appropriation rates for 2016: http://www.dfg.de/formulare/60_12/60_12.pdf

Backup: Types, Methods & Media

Backup Types:

- manually vs. automated

Backup Methods:

- full vs. incremental vs. differential

Backup Media:

- USB Sticks: cheap, small (also in storage), *but:* not very reliable
- USB HDD: sufficient storage, affordable, *but:* not shock resistant
- USB SSD: mostly very resilient, *but:* more expensive, often not recoverable
- NAS: safer, more features, *but:* even more expensive, more complex
- Cloud Services (Dropbox, Skydrive, FigShare etc.):
  - File safety is not covered by service terms, several cases of data loss in the past
  - not suitable for personal or sensitive data (since Snowden: no excuses anymore)
  - Internet access can be bottleneck when doing a full restore
- Central Network drives at University institutes / MPIs
  - Mostly rely on professional hardware
  - Should be one central part in your backup strategy
  - *BUT: Check their backup policy*
  - *AND: Can you access it when you need it?*

Storage media lifetime

- Good Scientific Practice demands data provision on safe & durable storage devices.
- CDs or hard discs are not durable over a time span of 10 years!

Medium	**Practical Physical Lifetime**	**Avg. Time Until Obsolete***
Optical (CD)	10–30 years	5 years
Magnetic Disk	5–10 years	5 years
Digital Tape	1–50 years**	5 years
Analog Videotape	1–10 years**	5 years

* For a particular format of the given type
** Tape lifetime is highly variable, depending on storage conditions

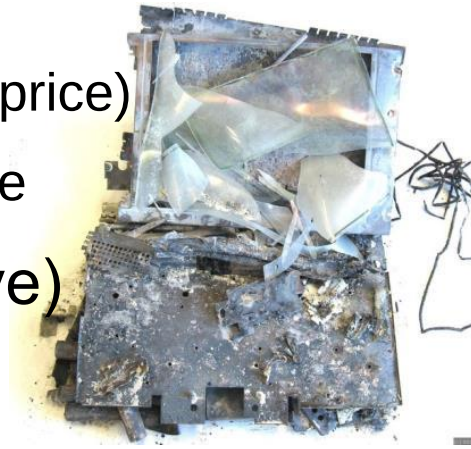
Source: National Archives and Records Administration (2011)

What if it's too late?

- Professional recovery
  - Professional recovery in clean rooms for disassembling
  - Special tools for analysing and recovery
  - Spare parts for old hardware
- Process:
  - Analysis (costs money too)
  - Presentation of possible recoverable files (and its price)
  - On payment, data are recovered on new hard drive
- Prices are high (usually above 500 € per drive)

➢ **Many failures are not recoverable at all!**

Source: Shattered! by Simon Yeo via flickr: https://www.flickr.com/photos/smjb/7904610856, CC-BY 2.0



Source: Burnt Laptop by secumem via Wikimedia Commons: CC-BY-SA 2.0

Backup principles

- Create multiple backups

3-2-1

- 3 copies
- 2 different media
- 1 remote

- Expect human errors (keep older versions)
- Do not use backup drives for sharing files

BACKUP: NOT IN BACKPACK

- Store backups physically separate from your PC / laptop
- Check your backups regularly

ONCE / MONTH

- Practice the worst case and make a full recovery dry-run

ONCE / YEAR

- Discuss the topic with friends to learn their best-practices
- Include your mobile devices in your planning

Backup: Example strategy

- Use an institutional backup solution (e.g. Active Directory)
- Have external harddisks available for backup
  - at your office

  AND

  - at home
- Backup daily to the office harddisk
  - Ideally before you go home
- Backup weekly at home
  - Identify a consistent time slot
- Test both backups at least once a month
  - restore a random number of files or folders and verify their content
- Replace both harddisks after 3-4 years
  - Allow some overlap time

JUST DO IT. REGULARLY.

as of 2017/02/08

Example Strategy (paranoia version)

- One Apple MacBook and one Windows 8 Desktop PC
- 4 USB HDD - 2 for every computer (2 Windows – 2 Max)
  - 1 pair is located at my office (I can access files from backup fast)
  - 1 pair is located at home (if my office or my home burns)
  - The pairs are swapped every two weeks and stored in lockers
- Google-Calendar Event to get a reminder: E-Mail every week
- Automatic backup once a week when attaching the drive to PC
  - Apple OSX: Time machine backup
  - Windows: File Recovery
- Check file system of USB HDD after every backup

➔ Files are stored 3 times per computer

- Replace HDD after getting errors or at least every two years
- Cost: 240 Euro -> 120 Euro per year -> 10 Euro per month

Backup software

Operating system	Integrated Backup SW	Comments
Windows 7	File Recovery	• Needs adjustment to copy other folders than the local libraries • Can create bootable image
Windows 8 & 10	File History	• Only backs up local libraries • Can be adjusted by creating custom libraries and ***excluding*** folders • Cannot create bootable image
Mac OS	Time Machine	• Backs up **everything** except for what is *excluded* • Can use encryption • Can even be used to recover a not-bootable Mac
Ubuntu	Déjà Dup	• Uses encryption, compression • Can use cloud storage
Operating system	**Free Third Party Backup SW**	
Windows	Personal Backup, PureSync, Paragon Backup&Recovery, Robocopy, …	
Mac OS	Carbon Copy Cloner, SuperDuper, …	
Ubuntu	Rsync, Back in Time	

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GWDG solutions

Name	Backup	Sharing	Comment
Fileservice / Active Directory	Yes	Maybe	Network drives, e.g. P:, but maybe more Automatic backup
IBM Tivoli Storage Manager (TSM)	Yes	No	Offer to institutes fro centralized backup of all local working machines
CrashPlanProE	Yes	No	Individual Backup solution GWDG license: €26,- per year
CloudShare	Yes	Yes	Free: 10 / 50 GB
ownCloud	Yes	Yes	Free: 10 / 50 GB
CryptShare	No	Yes	Only for MPG
Hierarchical Storage Management (HSM)	No	No	For archival of data from closed project

Yes, we store – what for?

	Backup	Archival	Depositing
Storage Purpose	**Ability to restore data** in case of data loss or error propagation	Enable validation by peers through **persistent storage** of data used for research results / publication	Enable verification, citation & reuse of datasets (**data sharing**)
Data Characteristics	Duplication of **current work data** & intermediate work results	Archive format (e.g. zip) containing **all related & relevant data** / files (ideally incl. metadata)	Format specified by repository; **discipline-specific metadata** standards
Process Regularity	Regularly **during work phase** or project runtime	Once for each relevant dataset, usually **at the end of or after work phase**	Once for each selected dataset, **either during or after work phase**
Effort	Depends – e.g.: set up once, verify regularly	Establish predefined procedure with data archive (e.g. data center)	Process documented, sometimes guided by repository

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Hands-On: Using ownCloud

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Presentations from the group

08.02.2017

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Organization & Documentation

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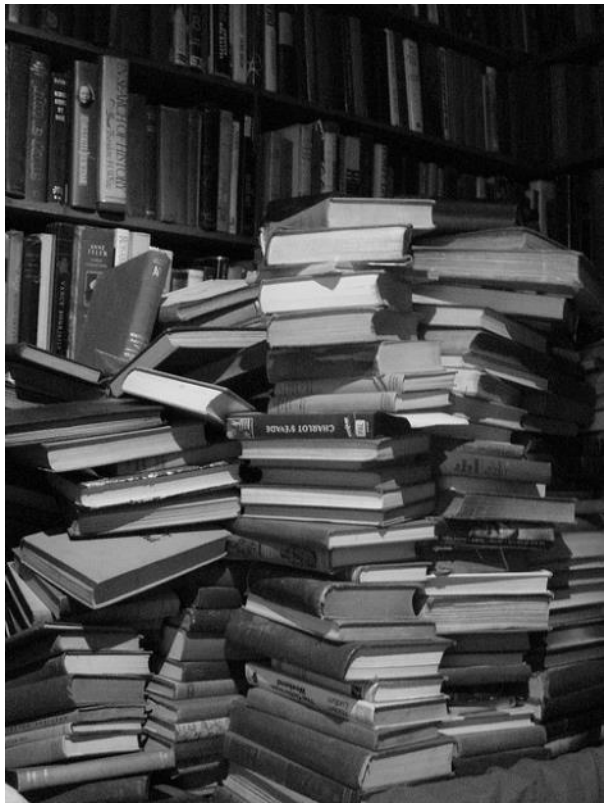
Photo by candyschwartz licensed under CC BY-NC-ND 2.0

Why organize?



By austinevan on flickr:
http://www.flickr.com/photos/austinevan/1225274637/

Organize your files so that you and others can find and access things when you need them

Source: twechy on flickr :
http://www.flickr.com/photos/twechy/6829994084/

Why organize?

Organize your files so that you and others can find

Source: twechy on flickr : http://www.flickr.com/photos/twechy/6829994084/

...because:

- **you need to stop working on A and work on B for 2 weeks**
- **you get sick & your colleagues need to finish your joint publication**
- **your supervisor wants your results from 4 months ago, in 4 minutes**
- **you need to eat & sleep from time to time**

File naming conventions

To stay organized, you should define:

- A self-describing folder structure or tagging scheme
- What information should be in filenames
- How filenames should be structured
- How to refer to files

… especially when working in a team!

Self-speaking file name:

`Presentation_RTG1644_20170208_V42.pptx`

vs. short file name:

~~`RTG1644_final.pptx`~~

Avoid special characters

~~„ “, ‘ ´ ` {} < > : ;
/ \ ? ! $ & ~ *~~

Original file name:

`PICT7639.jpg`

Custom file name:

`20161103_exp01_prb03_001.jpg`

Versioning

```
Presentation_RTG1644_20170208_V13.pptx
Presentation_RTG1644_20170208_V13final.pptx
Presentation_RTG1644_20170208_V13new-final.pptx
Presentation_RTG1644_20170208_V13final-finalv1.pptx
Presentation_RTG1644_revised_v01a.pptx
```

Best practice:

- Save a new version of a file with a **new name** before continuing work
- Use consecutive **version numbers** and eventually **author initials**
  - no „final“ or other unreliable descriptors in filenames
  - Rather **use folders** to mark/sort different purposes and avoid confusion
- If you collaborate on a document, **use “track changes”** if possible

Folder structure

Use (sub)folders to organise your files, e.g.:

- Literature (primary literature)
- Publications (your own articles)
- Thesis (files relevant for your PhD-Thesis)
- Emails (archived important e-mails, as PDF)
- Projects (material from other projects/side-projects)
- Pictures (images, graphs, illustrations, logos, …)
- Experiments (e.g. experiment or survey designs)
- Data („raw“ datasets, separated from processed data)

(How) Do you organise your e-mail inbox?

No Folder structure

Alternative: use tagging / metadata to describe your files

- Content type (literature, publication, experiment design, data,…)
- Project context (researchers/SPs involved,
- Topic
- Time (and place) of recording, creation, acquisition
- Related material

\+ *Any other information you or others might need to quickly find a specific file*

Best practice (suggestion):

- Use a maximum of two levels of folders
- Put other relevant information in the file name
- Use tagging/metadata to the extent you feel comfortable with
  - and to the extent your OS supports it

Explain it

CA	06	001	06001	1,443.74	1,266.88
CA	06	003	06003	1.21	0.60
CA	06	005	06005	35.10	26.82
CA	06	007	06007	203.17	164.77
CA	06	009	06009	40.55	35.61
CA	06	011	06011	18.80	11.74
CA	06	013	06013	948.82	927.68
CA	06	015	06015	27.51	18.44
CA	06	017	06017	156.30	143.54
CA	06	019	06019	799.41	757.68
CA	06	021	06021	26.45	14.19
CA	06	023	06023	126.52	110.17
CA	06	025	06025	142.36	136.96

Explain it

State postal abbreviation	State FIPS code	County FIPS code	Combined State-county FIPS codes	Total population of county, in thousands	Public supply, total population served, in thousands
CA	06	001	06001	1,443.74	1,266.88
CA	06	003	06003	1.21	0.60
CA	06	005	06005	35.10	26.82
CA	06	007	06007	203.17	164.77
CA	06	009	06009	40.55	35.61
CA	06	011	06011	18.80	11.74
CA	06	013	06013	948.82	927.68
CA	06	015	06015	27.51	18.44
CA	06	017	06017	156.30	143.54
CA	06	019	06019	799.41	757.68
CA	06	021	06021	26.45	14.19
CA	06	023	06023	126.52	110.17
CA	06	025	06025	142.36	136.96

Image from: https://www.e-education.psu.edu/geog860/print/l2.html
Data courtesy of the U.S. Geological Survey.

Explain your data

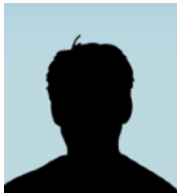
- Why?
  - Make data ***FAIR***: Findable, Accessible, Interoperable, Reusable!
  - Not only for others, but also mainly **for yourself**!
- How?
  - Directly write down which **methods/materials** you used. Write down what fails and what was successfully analysed.
  - Write down **time, place, persons involved** in creation of data.
  - Include title, name of **primary and processed data**.
  - **Add a text file** with this information to each data file/folder ***or:*** keep an **overview spreadsheet**
  - **Do not change/erase your original notes** but add more infos chronologically (with date of insertion).

What are metadata?

- Many definitions depending on the perspective
- Practical approach: metadata…
  - describe objects in a structured and standardised way
  - can help to select and identify resources
  - can describe how to use them correctly or how to reproduce them
  - can describe anything: literature, a painting, places, a dataset, …
  - can be connected with objects (embedded) or added separately

What to include?

- **Who** created **what**, **how**, **when**, **where** and **why?**



Timo Gnadt
gnadt@sub.uni-goettingen.de

r	x	y	abs
35	0.4	34	36
535	0.5	2	777
63		2.6	67
4	1.3	61	5

Excel spreadsheet with test data for training purposes

Used random number generator to modify original field data

July 26 2016

At my office Windows PC

To be used in training workshop

- Include:
  - **Description** of the item
  - **Methodology**
  - **Units** of measurement
  - **References** to related data
  - **Definitions of** jargons, acronyms, code
  - **Technical information** about the file

“Metadata describe objects in a structured and standardised way…”

Many existing metadata standards, e.g.:

Dublin Core Metadata Element Set (15 optional elements)

ID:	identifier
Technical Data:	format, type, language
Content:	title, subject, coverage, description
Persons & Permissions:	creator, publisher, contributor, rights
Provenance:	source, relation
Life cycle:	date

Can be extended to 55 elements (DCMI Metadata Terms):

abstract, accessRights, accrualMethod, accrualPeriodicity, accrualPolicy, alternative, audience, available, bibliographicCitation, conformsTo, created, dateAccepted, dateCopyrighted, dateSubmitted, educationLevel, extent, hasFormat, hasPart, hasVersion, instructionalMethod, isFormatOf, isPartOf, isReferencedBy, isReplacedBy, isRequiredBy, issued, isVersionOf, license, mediator, medium, modified, provenance, references, replaces, requires, rightsHolder, spatial, tableOfContents, temporal, valid

as of 2017/02/08

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      James A. Davis, Tom W. Smith, and Peter V. Marsden. The data file (an SPSS portable file) and accompanying documentation are provided
      to assist educators in instructing students about religion and social issues in the United States in the late 20th and early 21st centuries. An
      instructor's handout has also been included. This handout contains the following sections, among others: (1) an exercise using General
      Social Surveys data to create and validate a measure of religiosity, and then to relate the measure to other social variables, (2) an exercise
      using General Social Surveys data to explore the relationship between religiosity and other social variables using crosstabulation (focusing
      on two- and three-variable relationships) and to explore the concepts of explanation, spuriousness, and replication, and (3) an exercise using
      General Social Surveys data to create a measure of religious fundamentalism and to explore the relationship between this measure and
      various forms of religious behavior and opinions on social issues. The data contain information on the attitudes of a national probability
      sample of adults 18 years of age and older on a range of social and political issues. For this instructional subset, some variables were
      recoded and some new variables were created to facilitate analysis. Variables in the dataset include responses to questions on family and
      gender roles, abortion, sex and sexual materials, personal morals and social mores, social control, general political attitudes, and
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      (http://creativecommons.org/licenses/by-nc/3.0/us/).
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Some metadata standards for statistical data

- RDF Data Cube Vocabulary
  - For publishing multi-dimensional data on the web for linking to related data sets and concepts using the W3C RDF (Resource Description Framework) standard
  - Underlying model compatible with SDMX
- SDMX - Statistical Data and Metadata Exchange
  - set of common technical and statistical standards and guidelines for efficient exchange and sharing of statistical data and metadata
  - Sponsoring institutions include BIS, ECB, EUROSTAT, IMF, OECD, UN, and the World Bank
- DDI - Data Documentation Initiative
  - widely used, international XML-based standard for describing data from the social, behavioral, and economic sciences
  - DDI Codebook intended for documenting simple survey data for exchange or archiving
  - DDI Lifecycle for documenting datasets at each stage of their lifecycle from conceptualisation through to publication and reuse. modular and extensible.
- Genome Metadata
  - consists of 61 different metadata fields (attributes), organized into seven categories:

    Organism Info, Isolate Info, Host Info, Sequence Info, Phenotype Info, Project Info, and Others.

Göttingen/eResearch Alliance

Exercise: Structuring data

08.02.2017

Why structure(d) data?

- Enable searching by variables
- Enable partial download of datasets
- Make standardized data description easier
- Facilitate future readability (logical reusability)

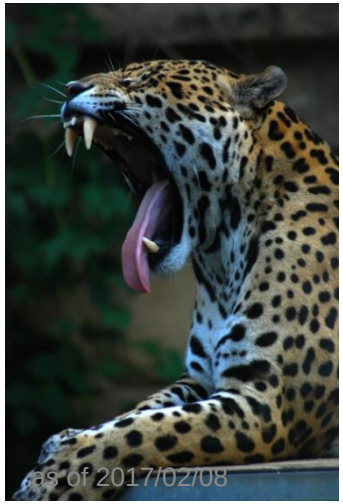
Example from genetics

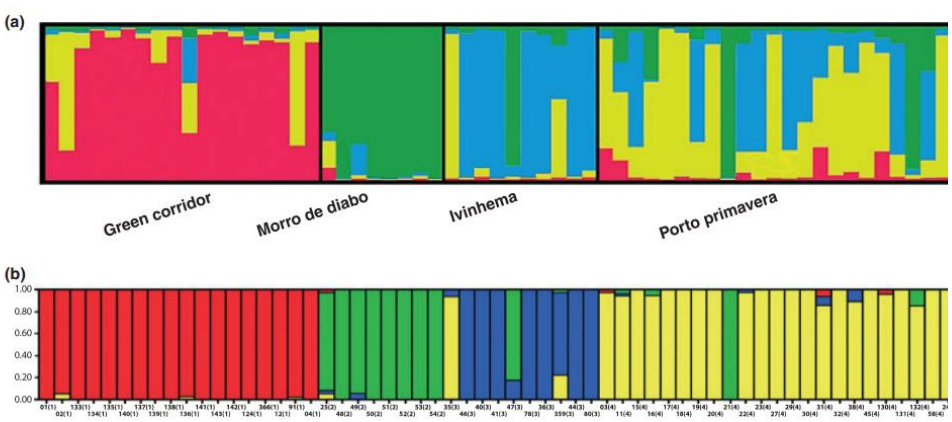
MOLECULAR ECOLOGY

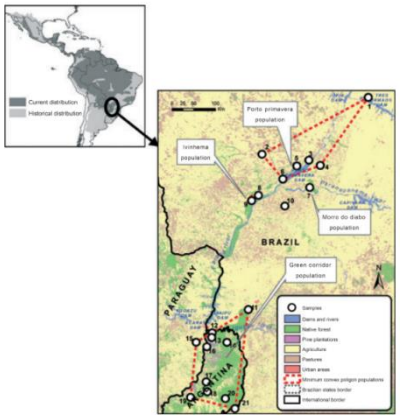
Molecular Ecology (2010) **19**, 4906–4921

doi: 10.1111/j.1365-294X.2010.04856.x

The effect of habitat fragmentation on the genetic structure of a top predator: loss of diversity and high differentiation among remnant populations of Atlantic Forest jaguars (*Panthera onca*)







Example from genetics

MS data new Feb2001

Green Corridor (lowland rainforest)

	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon01 male	160	160	236	240	308	312	165	169	219	235
bPon02 male	160	170	232	236	308	312	169	169	215	235
bPon133 female	156	160	232	236	300	312	169	169	235	239
bPon134 female	152	160	232	232	308	308	157	165	219	235
bPon135 female	162	172	236	240	312	316	157	165	235	239
bPon140 juvenile	160	160	232	240	308	312	165	177	239	239
bPon137 juvenile	160	172	236	244	300	312	169	169	235	243
bPon139 male	162	170	0	0	312	312	157	165	223	243
bPon138 female	0	0	232	256	0	0	165	165	0	0
bPon136 female	162	170	236	236	304	312	165	165	235	239

Ivinhema (forest edge)

	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon35 male	154	164	236	240	304	308	157	165	215	231
bPon46 female	142	158	240	240	304	304	169	173	231	235
bPon40 female	166	166	236	240	304	308	157	169	223	235
bPon41 female	158	166	236	240	304	304	169	173	231	239
bPon47 juvenile	158	158	236	236	304	312	169	173	235	239
bPon78 juvenile	158	160	240	240	304	304	169	173	231	235
bPon36 juvenile	142	158	236	236	304	312	169	173	235	235
bPon359 male	158	164	240	240	304	308	169	169	215	231
bPon44 male	160	166	236	240	0	0	173	173	231	231
bPon80 male	146	150	240	240	304	308	173	173	231	235

Morro do Diabo (lowland rainforest)

	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon25 male	158	188	236	240	>300	312	169	169	227	235
bPon48 male	158	166	236	236	>300	304	169	169	227	235
bPon49 male	166	188	236	240	>300	312	169	173	235	235
bPon50 male	158	166	236	236	>300	304	169	169	227	235
bPon51 male	158	158	236	236	>300	304	169	169	227	239
bPon52 female	142	158	236	236	>300	304	169	169	235	235
bPon53 juvenile	158	158	236	236	>300	304	169	169	215	239
bPon54 juvenile	158	158	236	236	>300	304	169	169	215	227

Porto Primavera (swamp forest)

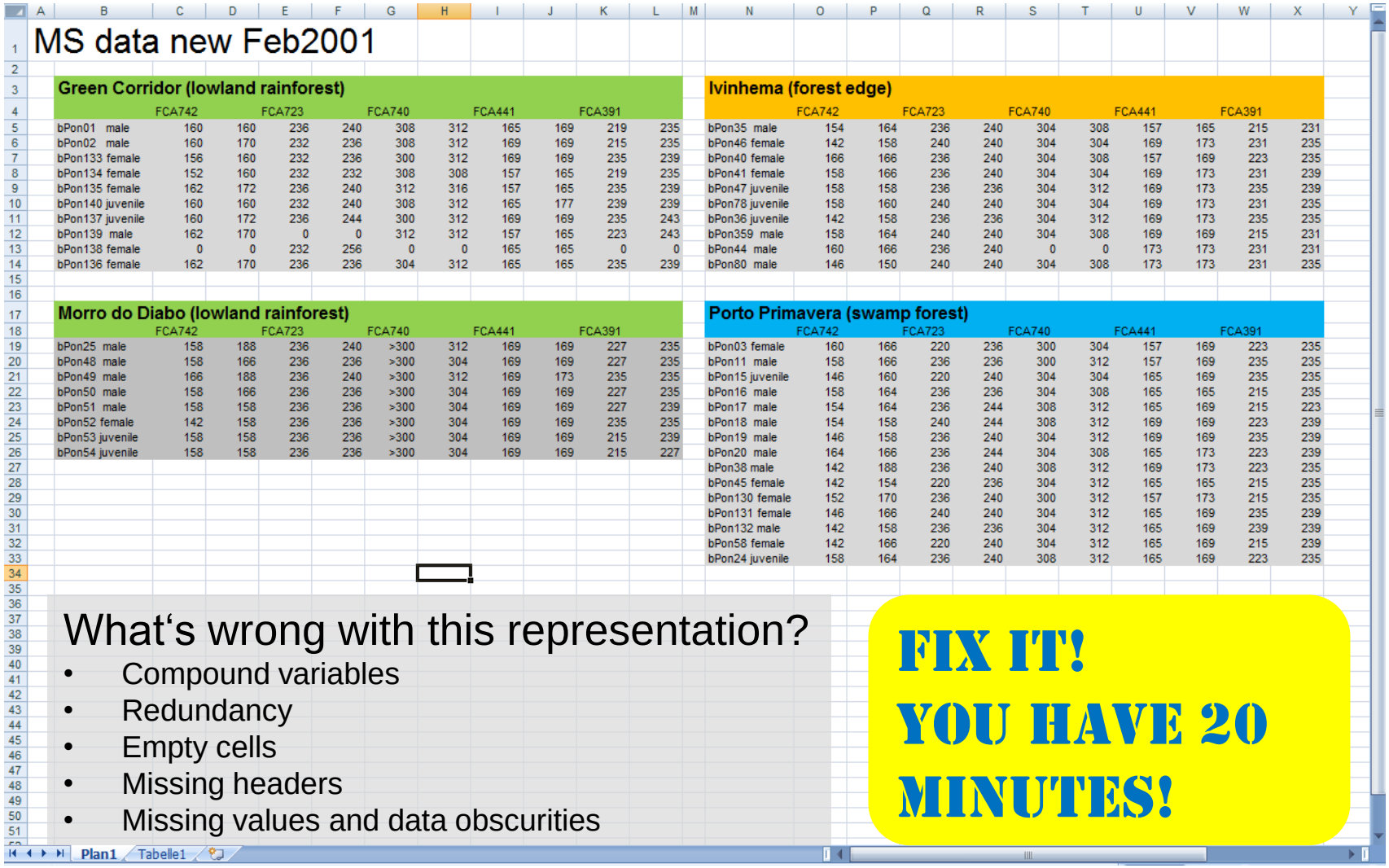
	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon03 female	160	166	220	236	300	304	157	169	223	235
bPon11 male	158	166	236	236	300	312	157	169	235	235
bPon15 juvenile	146	160	220	240	304	304	165	169	235	235
bPon16 male	158	164	236	236	304	308	165	165	215	235
bPon17 male	154	164	236	244	308	312	165	169	215	223
bPon18 male	154	158	240	244	308	312	169	169	223	239
bPon19 male	146	158	236	240	304	312	169	169	235	239
bPon20 male	164	166	236	244	304	308	165	173	223	239
bPon38 male	142	188	236	240	308	312	169	173	223	235
bPon45 female	142	154	220	236	304	312	165	165	215	235
bPon130 female	152	170	236	240	300	312	157	173	215	235
bPon131 female	146	166	240	240	304	312	165	169	235	239
bPon132 male	142	158	236	236	304	312	165	169	239	239
bPon58 female	142	166	220	240	304	312	165	169	215	239
bPon24 juvenile	158	164	236	240	308	312	165	169	223	235

PERSONAL DATA STRUCTURE ≠ DATABASE STRUCTURE

Plan1 Tabelle1

as of 2017/02/08

Structure these data



MS data new Feb2001

Green Corridor (lowland rainforest)

	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon01 male	160	160	236	240	308	312	165	169	219	235
bPon02 male	160	170	232	236	308	312	169	169	215	235
bPon133 female	156	160	232	236	300	312	169	169	235	239
bPon134 female	152	160	232	232	308	308	157	165	219	235
bPon135 female	162	172	236	240	312	316	157	165	235	239
bPon140 juvenile	160	160	232	240	308	312	165	177	239	239
bPon137 juvenile	160	172	236	244	300	312	169	169	235	243
bPon139 male	162	170	0	0	312	312	157	165	223	243
bPon138 female	0	0	232	256	0	0	165	165	0	0
bPon136 female	162	170	236	236	304	312	165	165	235	239

Ivinhema (forest edge)

	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon35 male	154	164	236	240	304	308	157	165	215	231
bPon46 female	142	158	240	240	304	304	169	173	231	235
bPon40 female	166	166	236	240	304	308	157	169	223	235
bPon41 female	158	166	236	240	304	304	169	173	231	239
bPon47 juvenile	158	158	236	236	304	312	169	173	235	239
bPon78 juvenile	158	160	240	240	304	304	169	173	231	235
bPon36 juvenile	142	158	236	236	304	312	169	173	235	235
bPon359 male	158	164	240	240	304	308	169	169	215	231
bPon44 male	160	166	236	240	0	0	173	173	231	231
bPon80 male	146	150	240	240	304	308	173	173	231	235

Morro do Diabo (lowland rainforest)

	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon25 male	158	188	236	240	>300	312	169	169	227	235
bPon48 male	158	166	236	236	>300	304	169	169	227	235
bPon49 male	166	188	236	240	>300	312	169	173	235	235
bPon50 male	158	166	236	236	>300	304	169	169	227	235
bPon51 male	158	158	236	236	>300	304	169	169	227	239
bPon52 female	142	158	236	236	>300	304	169	169	235	235
bPon53 juvenile	158	158	236	236	>300	304	169	169	215	239
bPon54 juvenile	158	158	236	236	>300	304	169	169	215	227

Porto Primavera (swamp forest)

	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon03 female	160	166	220	236	300	304	157	169	223	235
bPon11 male	158	166	236	236	300	312	157	169	235	235
bPon15 juvenile	146	160	220	240	304	304	165	169	235	235
bPon16 male	158	164	236	236	304	308	165	165	215	235
bPon17 male	154	164	236	244	308	312	165	169	215	223
bPon18 male	154	158	240	244	308	312	169	169	223	239
bPon19 male	146	158	236	240	304	312	169	169	235	239
bPon20 male	164	166	236	244	304	308	165	173	223	239
bPon38 male	142	188	236	240	308	312	169	173	223	235
bPon45 female	142	154	220	236	304	312	165	165	215	235
bPon130 female	152	170	236	240	300	312	157	173	215	235
bPon131 female	146	166	240	240	304	312	165	169	235	239
bPon132 male	142	158	236	236	304	312	165	169	239	239
bPon58 female	142	166	220	240	304	312	165	169	215	239
bPon24 juvenile	158	164	236	240	308	312	165	169	223	235

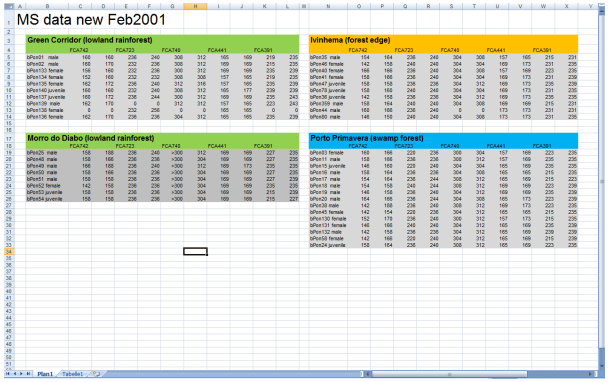
Plan1 Tabelle1

What's wrong with this representation?

- Compound variables
- Redundancy
- Empty cells
- Missing headers
- Missing values and data obscurities

FIX IT!
YOU HAVE 20 MINUTES!

Exercise: Structure data



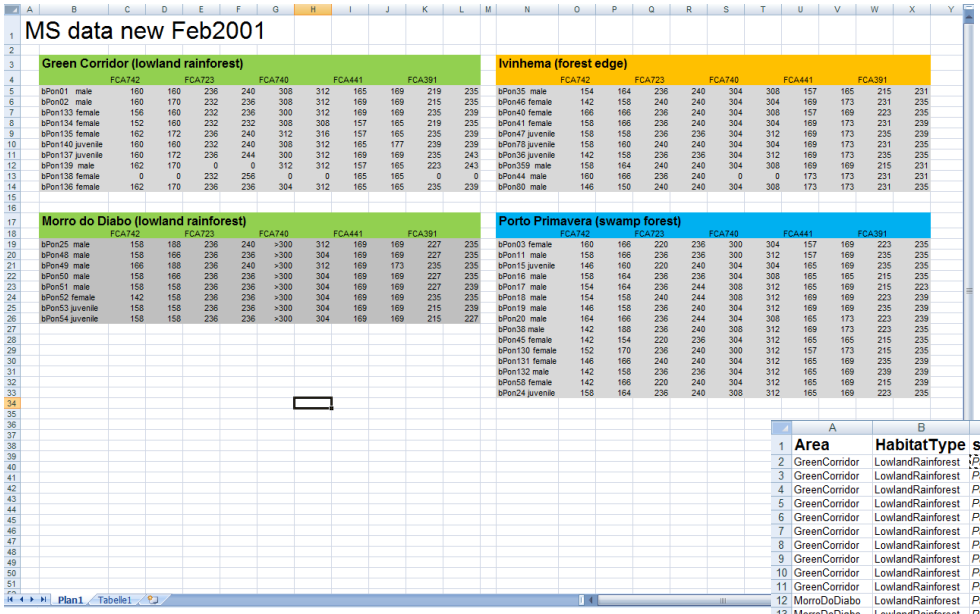
1. Copy the file “OriginalData.xslx” from my ownCloud folder to your folder
2. Edit the file to bring the data into a structure suitable for upload to a repository database ***without losing information***
3. Upload the edited file with **your name appended to the filename** to the public ownCloud folder.

What‘s wrong with this representation?

- Compound variables
- Redundancy
- Empty cells
- Missing headers
- Missing values and data obscurities

FIX IT!
YOU HAVE 20 MINUTES!

Summary



MS data new Feb2001

Green Corridor (lowland rainforest)

		FCA742		FCA723		FCA740		FCA441		FCA391	
bPon01	male	160	160	236	240	308	312	165	169	219	235
bPon02	male	160	170	232	236	308	312	169	169	215	235
bPon133	female	156	160	232	236	300	312	169	169	235	239
bPon134	female	152	160	232	232	308	308	157	165	219	235
bPon135	female	162	172	236	240	312	316	157	165	235	239
bPon140	juvenile	160	160	232	240	308	312	165	177	239	239
bPon137	juvenile	160	172	236	244	300	312	169	169	235	243
bPon139	male	162	170	0	0	312	312	157	165	223	243
bPon138	female	0	0	232	256	0	0	165	165	0	0
bPon136	female	162	170	236	236	304	312	165	165	235	239

Ivinhema (forest edge)

		FCA742		FCA723		FCA740		FCA441		FCA391	
bPon35	male	154	164	236	240	304	308	157	165	215	231
bPon46	female	142	158	240	240	304	304	169	173	231	235
bPon40	female	166	166	236	240	304	308	157	169	223	235
bPon41	female	158	166	236	240	304	304	169	173	231	239
bPon47	juvenile	158	158	236	236	304	312	169	173	235	239
bPon78	juvenile	158	160	240	240	304	304	169	173	231	235
bPon36	juvenile	142	158	236	236	304	312	169	173	235	235
bPon359	male	158	164	240	240	304	308	169	169	215	231
bPon44	male	160	166	236	240	0	0	173	173	231	231
bPon80	male	146	150	240	240	304	308	173	173	231	235

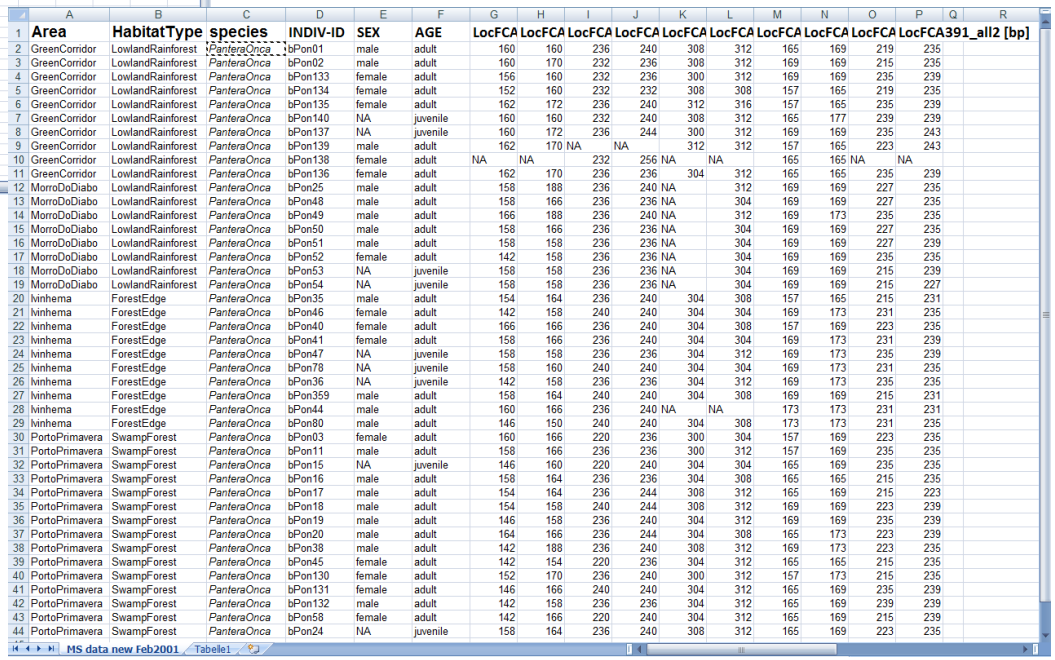
Morro do Diabo (lowland rainforest)

		FCA742		FCA723		FCA740		FCA441		FCA391	
bPon25	male	158	188	236	240	>300	312	169	169	227	235
bPon48	male	158	166	236	236	>300	304	169	169	227	235
bPon49	male	166	188	236	240	>300	312	169	173	235	235
bPon50	male	158	166	236	236	>300	304	169	169	227	235
bPon51	male	158	158	236	236	>300	304	169	169	227	239
bPon52	female	142	158	236	236	>300	304	169	169	235	235
bPon53	juvenile	158	158	236	236	>300	304	169	169	215	239
bPon54	juvenile	158	158	236	236	>300	304	169	169	215	227

Porto Primavera (swamp forest)

		FCA742		FCA723		FCA740		FCA441		FCA391	
bPon03	female	160	166	220	236	300	304	157	169	223	235
bPon11	male	158	166	236	236	300	312	157	169	235	235
bPon15	juvenile	146	160	220	240	304	304	165	169	235	235
bPon16	male	158	164	236	236	304	308	165	165	215	235
bPon17	male	154	164	236	244	308	312	165	169	215	223
bPon18	male	154	158	240	244	308	312	169	169	223	239
bPon19	male	146	158	236	240	304	312	169	169	235	239
bPon20	male	164	166	236	244	304	308	165	173	223	239
bPon38	male	142	188	236	240	308	312	169	173	223	235
bPon45	female	142	154	220	236	304	312	165	165	215	235
bPon130	female	152	170	236	240	300	312	157	173	215	235
bPon131	female	146	166	240	240	304	312	165	169	235	239
bPon132	male	142	158	236	236	304	312	165	169	239	239
bPon58	female	142	166	220	240	304	312	165	169	215	239
bPon24	juvenile	158	164	236	240	308	312	165	169	223	235

Plan1 | Tabelle1

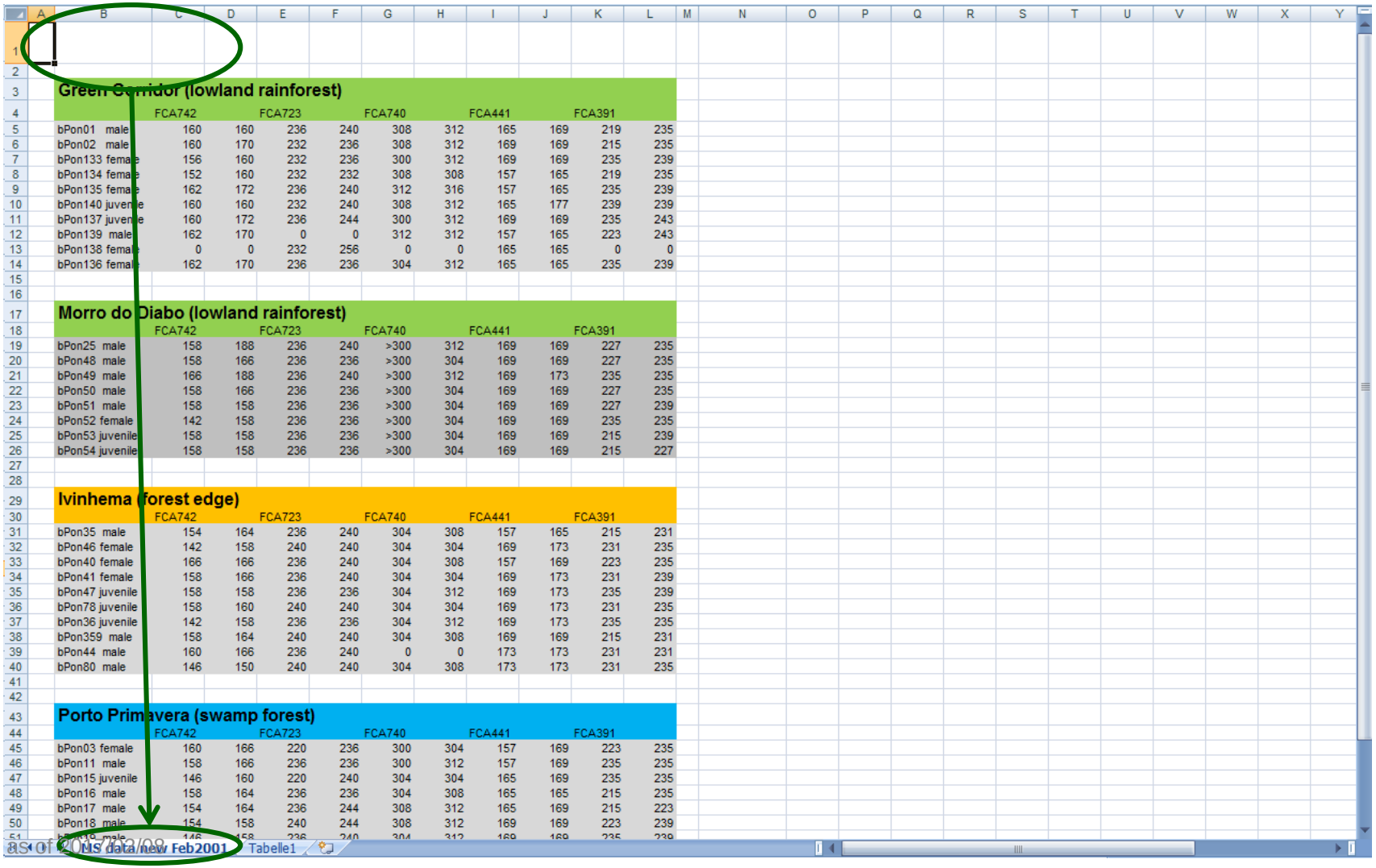


Area	HabitatType	species	INDIV-ID	SEX	AGE	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA391_all2 [bp]
GreenCorridor	LowlandRainforest	PanteraOnca	bPon01	male	adult	160	160	236	240	308	312	165	169	219	235
GreenCorridor	LowlandRainforest	PanteraOnca	bPon02	male	adult	160	170	232	236	308	312	169	169	215	235
GreenCorridor	LowlandRainforest	PanteraOnca	bPon133	female	adult	156	160	232	236	300	312	169	169	235	239
GreenCorridor	LowlandRainforest	PanteraOnca	bPon134	female	adult	152	160	232	232	308	308	157	165	219	235
GreenCorridor	LowlandRainforest	PanteraOnca	bPon135	female	adult	162	172	236	240	312	316	157	165	235	239
GreenCorridor	LowlandRainforest	PanteraOnca	bPon140	NA	juvenile	160	160	232	240	308	312	165	177	239	239
GreenCorridor	LowlandRainforest	PanteraOnca	bPon137	NA	juvenile	160	172	236	244	300	312	169	169	235	243
GreenCorridor	LowlandRainforest	PanteraOnca	bPon139	male	adult	162	170	NA	NA	312	312	157	165	223	243
GreenCorridor	LowlandRainforest	PanteraOnca	bPon138	female	adult	NA	NA	232	256	NA	NA	165	165	NA	NA
GreenCorridor	LowlandRainforest	PanteraOnca	bPon136	female	adult	162	170	236	236	304	312	165	165	235	239
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon25	male	adult	158	188	236	240	NA	312	169	169	227	235
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon48	male	adult	158	166	236	236	NA	304	169	169	227	235
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon49	male	adult	166	188	236	240	NA	312	169	173	235	235
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon50	male	adult	158	166	236	236	NA	304	169	169	227	235
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon51	male	adult	158	158	236	236	NA	304	169	169	227	239
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon52	female	adult	142	158	236	236	NA	304	169	169	235	235
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon53	NA	juvenile	158	158	236	236	NA	304	169	169	215	239
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon54	NA	juvenile	158	158	236	236	NA	304	169	169	215	227
Ivinhema	ForestEdge	PanteraOnca	bPon35	male	adult	154	164	236	240	304	308	157	165	215	231
Ivinhema	ForestEdge	PanteraOnca	bPon46	female	adult	142	158	240	240	304	304	169	173	231	235
Ivinhema	ForestEdge	PanteraOnca	bPon40	female	adult	166	166	236	240	304	308	157	169	223	235
Ivinhema	ForestEdge	PanteraOnca	bPon41	female	adult	158	166	236	240	304	304	169	173	231	239
Ivinhema	ForestEdge	PanteraOnca	bPon47	NA	juvenile	158	158	236	236	304	312	169	173	235	239
Ivinhema	ForestEdge	PanteraOnca	bPon78	NA	juvenile	158	160	240	240	304	304	169	173	231	235
Ivinhema	ForestEdge	PanteraOnca	bPon36	NA	juvenile	142	158	236	236	304	312	169	173	235	235
Ivinhema	ForestEdge	PanteraOnca	bPon359	male	adult	158	164	240	240	304	308	169	169	215	231
Ivinhema	ForestEdge	PanteraOnca	bPon44	male	adult	160	166	236	240	NA	NA	173	173	231	231
Ivinhema	ForestEdge	PanteraOnca	bPon80	male	adult	146	150	240	240	304	308	173	173	231	235
PortoPrimavera	SwampForest	PanteraOnca	bPon03	female	adult	160	166	220	236	300	304	157	169	223	235
PortoPrimavera	SwampForest	PanteraOnca	bPon11	male	adult	158	166	236	236	300	312	157	169	235	235
PortoPrimavera	SwampForest	PanteraOnca	bPon15	NA	juvenile	146	160	220	240	304	304	165	169	235	235
PortoPrimavera	SwampForest	PanteraOnca	bPon16	male	adult	158	164	236	236	304	308	165	165	215	235
PortoPrimavera	SwampForest	PanteraOnca	bPon17	male	adult	154	164	236	244	308	312	165	169	215	223
PortoPrimavera	SwampForest	PanteraOnca	bPon18	male	adult	154	158	240	244	308	312	169	169	223	239
PortoPrimavera	SwampForest	PanteraOnca	bPon19	male	adult	146	158	236	240	304	312	169	169	235	239
PortoPrimavera	SwampForest	PanteraOnca	bPon20	male	adult	164	166	236	244	304	308	165	173	223	239
PortoPrimavera	SwampForest	PanteraOnca	bPon38	male	adult	142	188	236	240	308	312	169	173	223	235
PortoPrimavera	SwampForest	PanteraOnca	bPon45	female	adult	142	154	220	236	304	312	165	165	215	235
PortoPrimavera	SwampForest	PanteraOnca	bPon130	female	adult	152	170	236	240	300	312	157	173	215	235
PortoPrimavera	SwampForest	PanteraOnca	bPon131	female	adult	146	166	240	240	304	312	165	169	235	239
PortoPrimavera	SwampForest	PanteraOnca	bPon132	male	adult	142	158	236	236	304	312	165	169	239	239
PortoPrimavera	SwampForest	PanteraOnca	bPon58	female	adult	142	166	220	240	304	312	165	169	215	239
PortoPrimavera	SwampForest	PanteraOnca	bPon24	NA	juvenile	158	164	236	240	308	312	165	169	223	235

MS data new Feb2001 | Tabelle1

as of 2017/02/08

Structure your data (columns/rows)



	FCA742		FCA723		FCA740		FCA441		FCA391	
Green Corridor (lowland rainforest)										
bPon01 male	160	160	236	240	308	312	165	169	219	235
bPon02 male	160	170	232	236	308	312	169	169	215	235
bPon133 female	156	160	232	236	300	312	169	169	235	239
bPon134 female	152	160	232	232	308	308	157	165	219	235
bPon135 female	162	172	236	240	312	316	157	165	235	239
bPon140 juvenile	160	160	232	240	308	312	165	177	239	239
bPon137 juvenile	160	172	236	244	300	312	169	169	235	243
bPon139 male	162	170	0	0	312	312	157	165	223	243
bPon138 female	0	0	232	256	0	0	165	165	0	0
bPon136 female	162	170	236	236	304	312	165	165	235	239
Morro do Diabo (lowland rainforest)										
bPon25 male	158	188	236	240	>300	312	169	169	227	235
bPon48 male	158	166	236	236	>300	304	169	169	227	235
bPon49 male	166	188	236	240	>300	312	169	173	235	235
bPon50 male	158	166	236	236	>300	304	169	169	227	235
bPon51 male	158	158	236	236	>300	304	169	169	227	239
bPon52 female	142	158	236	236	>300	304	169	169	235	235
bPon53 juvenile	158	158	236	236	>300	304	169	169	215	239
bPon54 juvenile	158	158	236	236	>300	304	169	169	215	227
Ivinhema (forest edge)										
bPon35 male	154	164	236	240	304	308	157	165	215	231
bPon46 female	142	158	240	240	304	304	169	173	231	235
bPon40 female	166	166	236	240	304	308	157	169	223	235
bPon41 female	158	166	236	240	304	304	169	173	231	239
bPon47 juvenile	158	158	236	236	304	312	169	173	235	239
bPon78 juvenile	158	160	240	240	304	304	169	173	231	235
bPon36 juvenile	142	158	236	236	304	312	169	173	235	235
bPon359 male	158	164	240	240	304	308	169	169	215	231
bPon44 male	160	166	236	240	0	0	173	173	231	231
bPon80 male	146	150	240	240	304	308	173	173	231	235
Porto Primavera (swamp forest)										
bPon03 female	160	166	220	236	300	304	157	169	223	235
bPon11 male	158	166	236	236	300	312	157	169	235	235
bPon15 juvenile	146	160	220	240	304	304	165	169	235	235
bPon16 male	158	164	236	236	304	308	165	165	215	235
bPon17 male	154	164	236	244	308	312	165	169	215	223
bPon18 male	154	158	240	244	308	312	169	169	223	239

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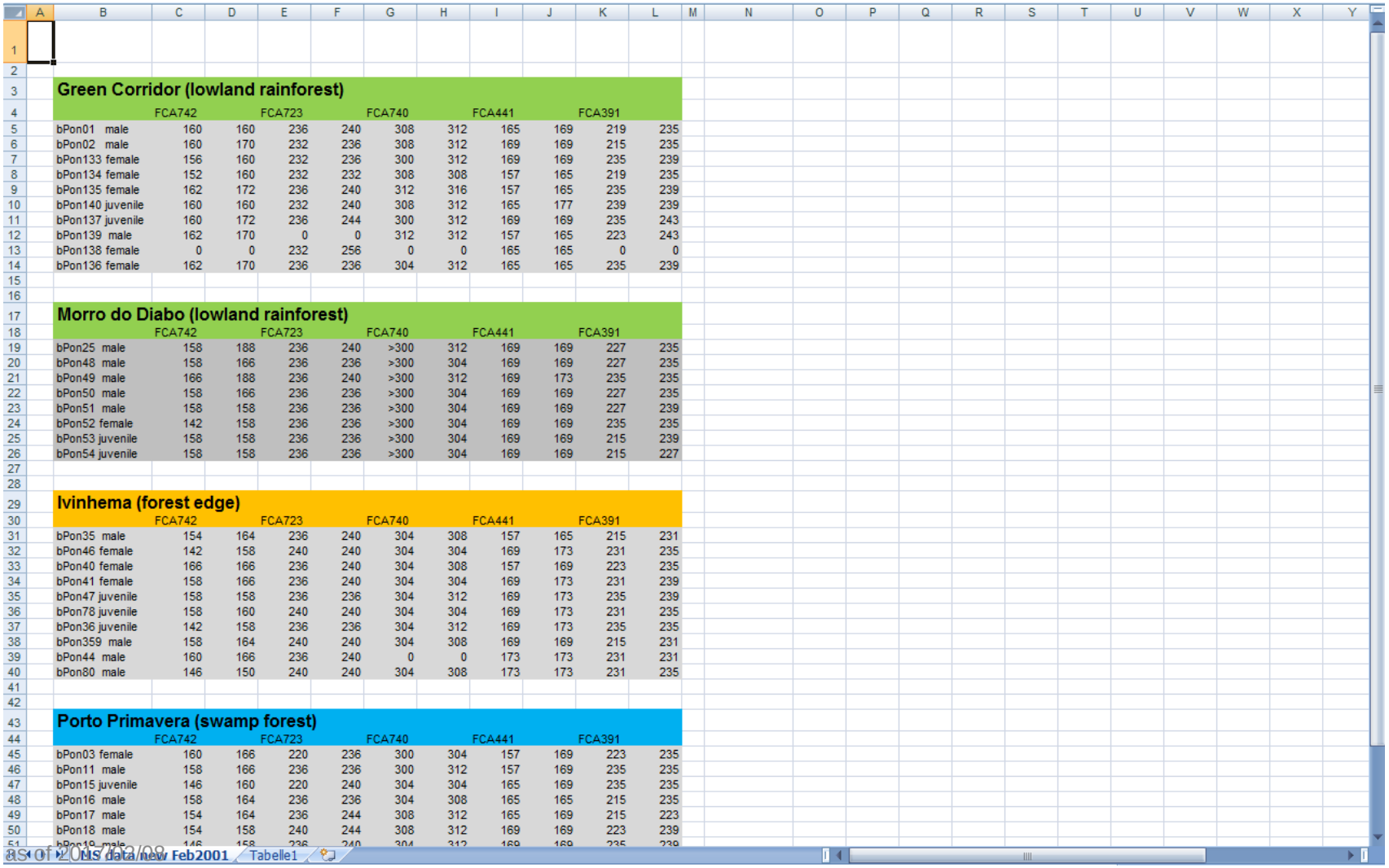


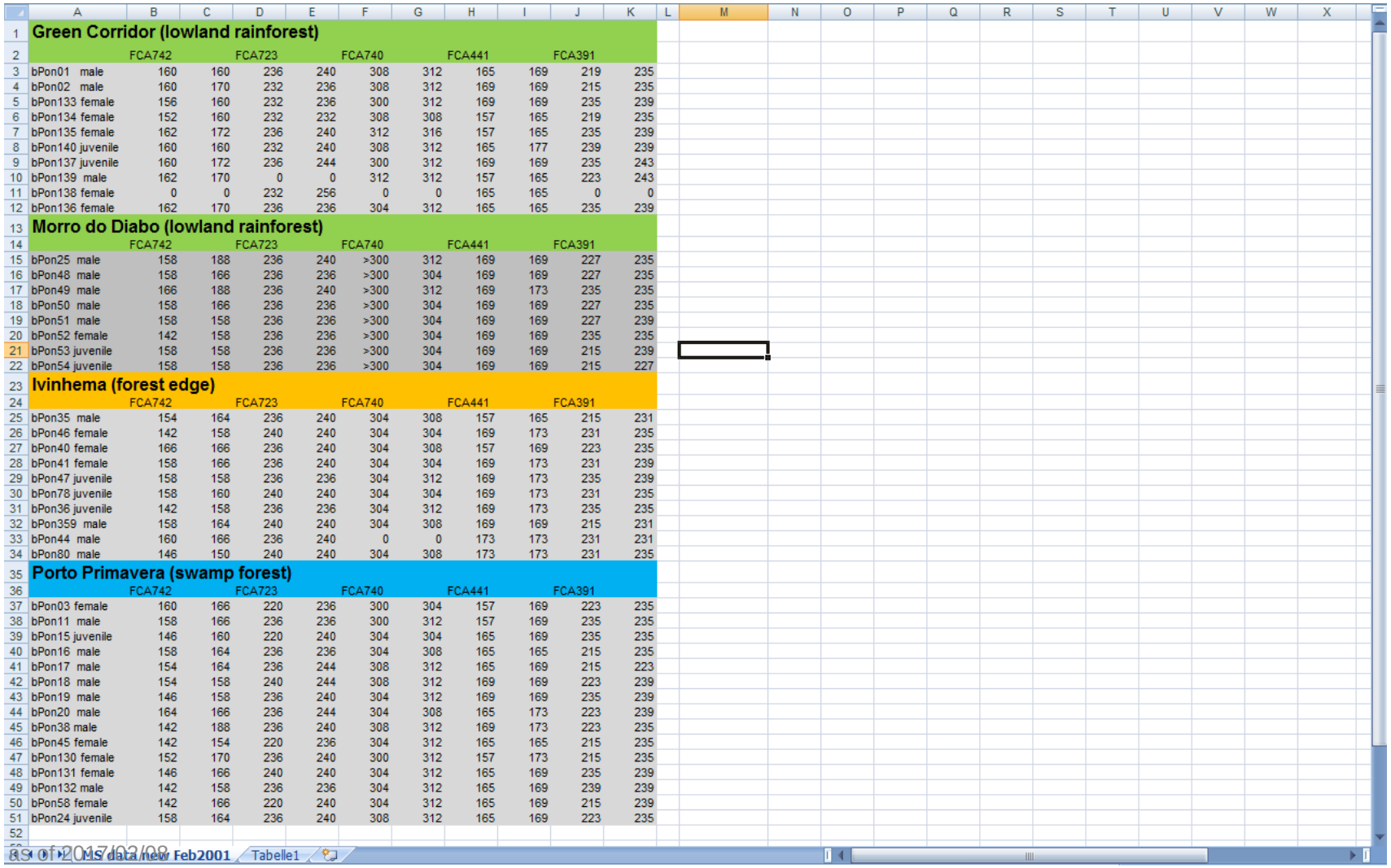
Green Corridor (lowland rainforest)										
	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon01 male	160	160	236	240	308	312	165	169	219	235
bPon02 male	160	170	232	236	308	312	169	169	215	235
bPon133 female	156	160	232	236	300	312	169	169	235	239
bPon134 female	152	160	232	232	308	308	157	165	219	235
bPon135 female	162	172	236	240	312	316	157	165	235	239
bPon140 juvenile	160	160	232	240	308	312	165	177	239	239
bPon137 juvenile	160	172	236	244	300	312	169	169	235	243
bPon139 male	162	170	0	0	312	312	157	165	223	243
bPon138 female	0	0	232	256	0	0	165	165	0	0
bPon136 female	162	170	236	236	304	312	165	165	235	239

Morro do Diabo (lowland rainforest)										
	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon25 male	158	188	236	240	>300	312	169	169	227	235
bPon48 male	158	166	236	236	>300	304	169	169	227	235
bPon49 male	166	188	236	240	>300	312	169	173	235	235
bPon50 male	158	166	236	236	>300	304	169	169	227	235
bPon51 male	158	158	236	236	>300	304	169	169	227	239
bPon52 female	142	158	236	236	>300	304	169	169	235	235
bPon53 juvenile	158	158	236	236	>300	304	169	169	215	239
bPon54 juvenile	158	158	236	236	>300	304	169	169	215	227

Ivinhema (forest edge)										
	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon35 male	154	164	236	240	304	308	157	165	215	231
bPon46 female	142	158	240	240	304	304	169	173	231	235
bPon40 female	166	166	236	240	304	308	157	169	223	235
bPon41 female	158	166	236	240	304	304	169	173	231	239
bPon47 juvenile	158	158	236	236	304	312	169	173	235	239
bPon78 juvenile	158	160	240	240	304	304	169	173	231	235
bPon36 juvenile	142	158	236	236	304	312	169	173	235	235
bPon359 male	158	164	240	240	304	308	169	169	215	231
bPon44 male	160	166	236	240	0	0	173	173	231	231
bPon80 male	146	150	240	240	304	308	173	173	231	235

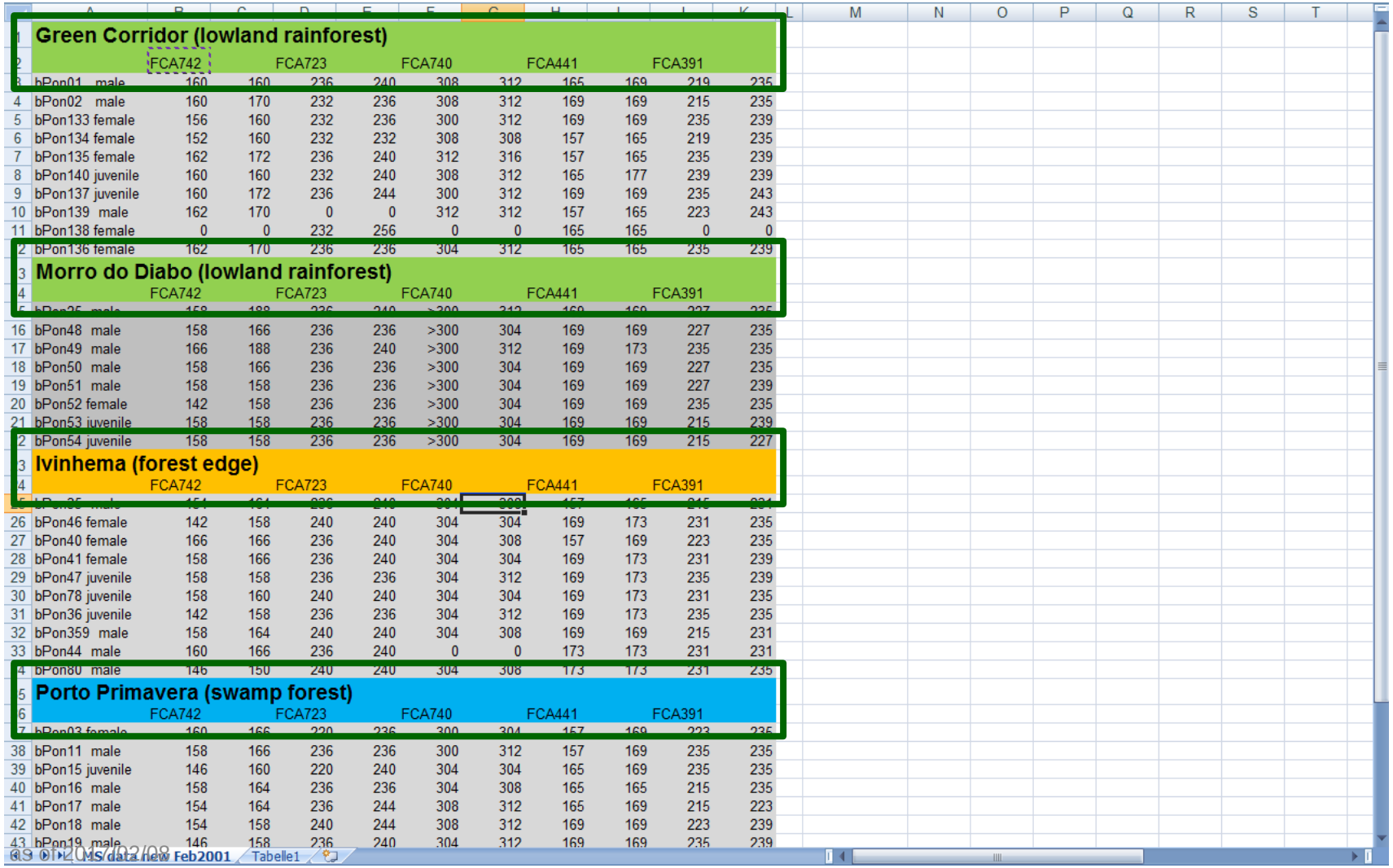
Porto Primavera (swamp forest)										
	FCA742		FCA723		FCA740		FCA441		FCA391	
bPon03 female	160	166	220	236	300	304	157	169	223	235
bPon11 male	158	166	236	236	300	312	157	169	235	235
bPon15 juvenile	146	160	220	240	304	304	165	169	235	235
bPon16 male	158	164	236	236	304	308	165	165	215	235
bPon17 male	154	164	236	244	308	312	165	169	215	223
bPon18 male	154	158	240	244	308	312	169	169	223	239

NO empty rows or columns



		FCA742		FCA723		FCA740		FCA441		FCA391	
Green Corridor (lowland rainforest)											
bPon01	male	160	160	236	240	308	312	165	169	219	235
bPon02	male	160	170	232	236	308	312	169	169	215	235
bPon133	female	156	160	232	236	300	312	169	169	235	239
bPon134	female	152	160	232	232	308	308	157	165	219	235
bPon135	female	162	172	236	240	312	316	157	165	235	239
bPon140	juvenile	160	160	232	240	308	312	165	177	239	239
bPon137	juvenile	160	172	236	244	300	312	169	169	235	243
bPon139	male	162	170	0	0	312	312	157	165	223	243
bPon138	female	0	0	232	256	0	0	165	165	0	0
bPon136	female	162	170	236	236	304	312	165	165	235	239
Morro do Diabo (lowland rainforest)											
		FCA742		FCA723		FCA740		FCA441		FCA391	
bPon25	male	158	188	236	240	>300	312	169	169	227	235
bPon48	male	158	166	236	236	>300	304	169	169	227	235
bPon49	male	166	188	236	240	>300	312	169	173	235	235
bPon50	male	158	166	236	236	>300	304	169	169	227	235
bPon51	male	158	158	236	236	>300	304	169	169	227	239
bPon52	female	142	158	236	236	>300	304	169	169	235	235
bPon53	juvenile	158	158	236	236	>300	304	169	169	215	239
bPon54	juvenile	158	158	236	236	>300	304	169	169	215	227
Ivinhema (forest edge)											
		FCA742		FCA723		FCA740		FCA441		FCA391	
bPon35	male	154	164	236	240	304	308	157	165	215	231
bPon46	female	142	158	240	240	304	304	169	173	231	235
bPon40	female	166	166	236	240	304	308	157	169	223	235
bPon41	female	158	166	236	240	304	304	169	173	231	239
bPon47	juvenile	158	158	236	236	304	312	169	173	235	239
bPon78	juvenile	158	160	240	240	304	304	169	173	231	235
bPon36	juvenile	142	158	236	236	304	312	169	173	235	235
bPon359	male	158	164	240	240	304	308	169	169	215	231
bPon44	male	160	166	236	240	0	0	173	173	231	231
bPon80	male	146	150	240	240	304	308	173	173	231	235
Porto Primavera (swamp forest)											
		FCA742		FCA723		FCA740		FCA441		FCA391	
bPon03	female	160	166	220	236	300	304	157	169	223	235
bPon11	male	158	166	236	236	300	312	157	169	235	235
bPon15	juvenile	146	160	220	240	304	304	165	169	235	235
bPon16	male	158	164	236	236	304	308	165	165	215	235
bPon17	male	154	164	236	244	308	312	165	169	215	223
bPon18	male	154	158	240	244	308	312	169	169	223	239
bPon19	male	146	158	236	240	304	312	169	169	235	239
bPon20	male	164	166	236	244	304	308	165	173	223	239
bPon38	male	142	188	236	240	308	312	169	173	223	235
bPon45	female	142	154	220	236	304	312	165	165	215	235
bPon130	female	152	170	236	240	300	312	157	173	215	235
bPon131	female	146	166	240	240	304	312	165	169	235	239
bPon132	male	142	158	236	236	304	312	165	169	239	239
bPon58	female	142	166	220	240	304	312	165	169	215	239
bPon24	juvenile	158	164	236	240	308	312	165	169	223	235

NO groups of variables/redundancy



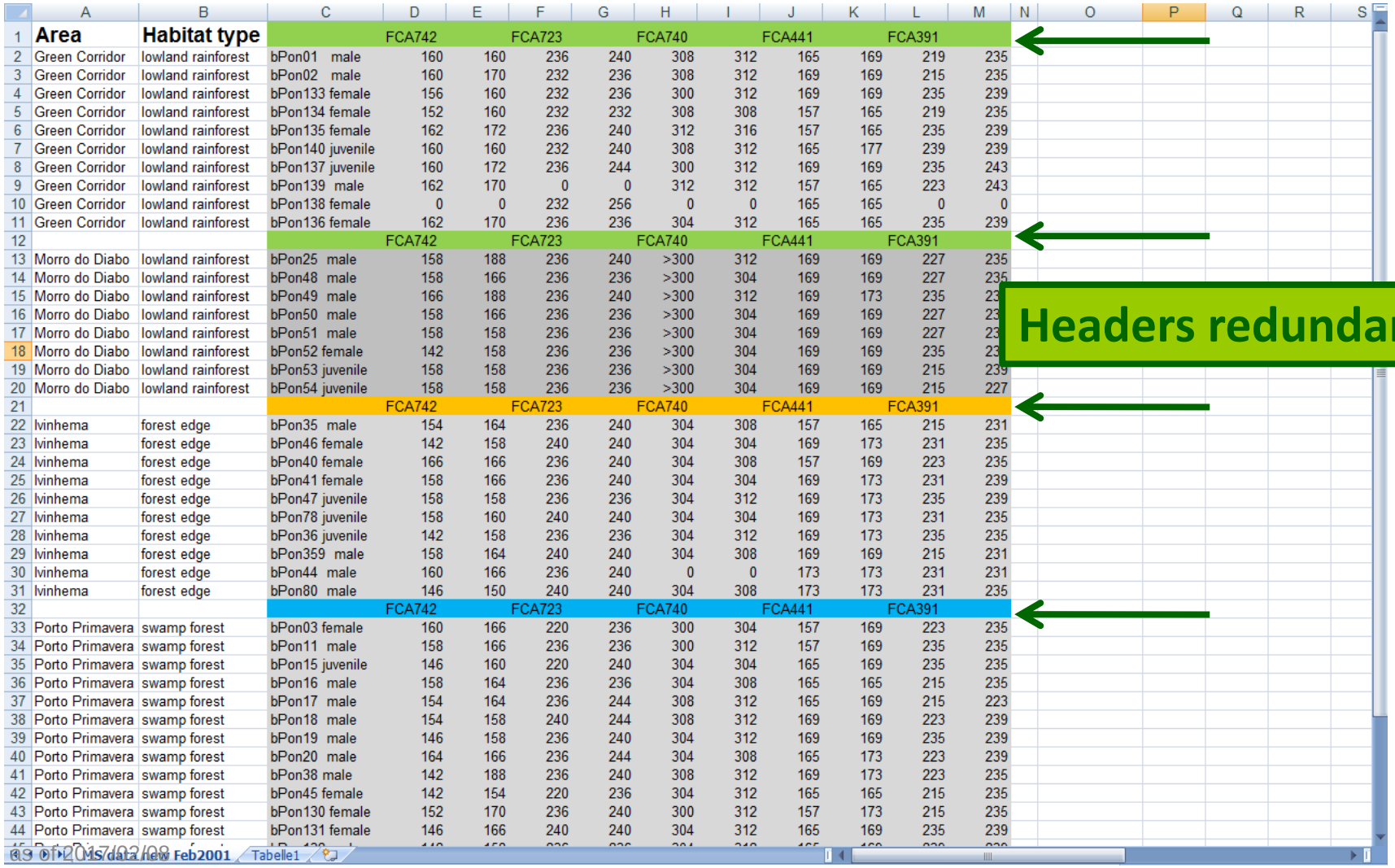
	A	B	C	D	E	F	G	H	I	J	K
1	**Green Corridor (lowland rainforest)**										
2		FCA742		FCA723		FCA740		FCA441		FCA391	
3	bPon01 male	160	160	236	240	308	312	165	169	219	235
4	bPon02 male	160	170	232	236	308	312	169	169	215	235
5	bPon133 female	156	160	232	236	300	312	169	169	235	239
6	bPon134 female	152	160	232	232	308	308	157	165	219	235
7	bPon135 female	162	172	236	240	312	316	157	165	235	239
8	bPon140 juvenile	160	160	232	240	308	312	165	177	239	239
9	bPon137 juvenile	160	172	236	244	300	312	169	169	235	243
10	bPon139 male	162	170	0	0	312	312	157	165	223	243
11	bPon138 female	0	0	232	256	0	0	165	165	0	0
12	bPon136 female	162	170	236	236	304	312	165	165	235	239
13	**Morro do Diabo (lowland rainforest)**										
14		FCA742		FCA723		FCA740		FCA441		FCA391	
15	bPon25 male	158	188	236	240	>300	312	169	169	227	235
16	bPon48 male	158	166	236	236	>300	304	169	169	227	235
17	bPon49 male	166	188	236	240	>300	312	169	173	235	235
18	bPon50 male	158	166	236	236	>300	304	169	169	227	235
19	bPon51 male	158	158	236	236	>300	304	169	169	227	239
20	bPon52 female	142	158	236	236	>300	304	169	169	235	235
21	bPon53 juvenile	158	158	236	236	>300	304	169	169	215	239
22	bPon54 juvenile	158	158	236	236	>300	304	169	169	215	227
23	**Ivinhema (forest edge)**										
24		FCA742		FCA723		FCA740		FCA441		FCA391	
25	bPon35 male	154	164	236	240	304	308	157	165	215	231
26	bPon46 female	142	158	240	240	304	304	169	173	231	235
27	bPon40 female	166	166	236	240	304	308	157	169	223	235
28	bPon41 female	158	166	236	240	304	304	169	173	231	239
29	bPon47 juvenile	158	158	236	236	304	312	169	173	235	239
30	bPon78 juvenile	158	160	240	240	304	304	169	173	231	235
31	bPon36 juvenile	142	158	236	236	304	312	169	173	235	235
32	bPon359 male	158	164	240	240	304	308	169	169	215	231
33	bPon44 male	160	166	236	240	0	0	173	173	231	231
34	bPon80 male	146	150	240	240	304	308	173	173	231	235
35	**Porto Primavera (swamp forest)**										
36		FCA742		FCA723		FCA740		FCA441		FCA391	
37	bPon03 female	160	166	220	236	300	304	157	169	223	235
38	bPon11 male	158	166	236	236	300	312	157	169	235	235
39	bPon15 juvenile	146	160	220	240	304	304	165	169	235	235
40	bPon16 male	158	164	236	236	304	308	165	165	215	235
41	bPon17 male	154	164	236	244	308	312	165	169	215	223
42	bPon18 male	154	158	240	244	308	312	169	169	223	239
43	bPon19 male	146	158	236	240	304	312	169	169	235	239

MS data new Feb2001 | Tabelle1

NO groups of variables/redundancy

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Area**	**Habitat type**		FCA742		FCA723		FCA740		FCA441		FCA391	
2	Green Corridor	lowland rainforest	bPon01 male	160	160	236	240	308	312	165	169	219	235
3	Green Corridor	lowland rainforest	bPon02 male	160	170	232	236	308	312	169	169	215	235
4	Green Corridor	lowland rainforest	bPon133 female	156	160	232	236	300	312	169	169	235	239
5	Green Corridor	lowland rainforest	bPon134 female	152	160	232	232	308	308	157	165	219	235
6	Green Corridor	lowland rainforest	bPon135 female	162	172	236	240	312	316	157	165	235	239
7	Green Corridor	lowland rainforest	bPon140 juvenile	160	160	232	240	308	312	165	177	239	239
8	Green Corridor	lowland rainforest	bPon137 juvenile	160	172	236	244	300	312	169	169	235	243
9	Green Corridor	lowland rainforest	bPon139 male	162	170	0	0	312	312	157	165	223	243
10	Green Corridor	lowland rainforest	bPon138 female	0	0	232	256	0	0	165	165	0	0
11	Green Corridor	lowland rainforest	bPon136 female	162	170	236	236	304	312	165	165	235	239
12				FCA742		FCA723		FCA740		FCA441		FCA391	
13	Morro do Diabo	lowland rainforest	bPon25 male	158	188	236	240	>300	312	169	169	227	235
14	Morro do Diabo	lowland rainforest	bPon48 male	158	166	236	236	>300	304	169	169	227	235
15	Morro do Diabo	lowland rainforest	bPon49 male	166	188	236	240	>300	312	169	173	235	235
16	Morro do Diabo	lowland rainforest	bPon50 male	158	166	236	236	>300	304	169	169	227	235
17	Morro do Diabo	lowland rainforest	bPon51 male	158	158	236	236	>300	304	169	169	227	239
18	Morro do Diabo	lowland rainforest	bPon52 female	142	158	236	236	>300	304	169	169	235	235
19	Morro do Diabo	lowland rainforest	bPon53 juvenile	158	158	236	236	>300	304	169	169	215	239
20	Morro do Diabo	lowland rainforest	bPon54 juvenile	158	158	236	236	>300	304	169	169	215	227
21				FCA742		FCA723		FCA740		FCA441		FCA391	
22	Ivinhema	forest edge	bPon35 male	154	164	236	240	304	308	157	165	215	231
23	Ivinhema	forest edge	bPon46 female	142	158	240	240	304	304	169	173	231	235
24	Ivinhema	forest edge	bPon40 female	166	166	236	240	304	308	157	169	223	235
25	Ivinhema	forest edge	bPon41 female	158	166	236	240	304	304	169	173	231	239
26	Ivinhema	forest edge	bPon47 juvenile	158	158	236	236	304	312	169	173	235	239
27	Ivinhema	forest edge	bPon78 juvenile	158	160	240	240	304	304	169	173	231	235
28	Ivinhema	forest edge	bPon36 juvenile	142	158	236	236	304	312	169	173	235	235
29	Ivinhema	forest edge	bPon359 male	158	164	240	240	304	308	169	169	215	231
30	Ivinhema	forest edge	bPon44 male	160	166	236	240	0	0	173	173	231	231
31	Ivinhema	forest edge	bPon80 male	146	150	240	240	304	308	173	173	231	235
32				FCA742		FCA723		FCA740		FCA441		FCA391	
33	Porto Primavera	swamp forest	bPon03 female	160	166	220	236	300	304	157	169	223	235
34	Porto Primavera	swamp forest	bPon11 male	158	166	236	236	300	312	157	169	235	235
35	Porto Primavera	swamp forest	bPon15 juvenile	146	160	220	240	304	304	165	169	235	235
36	Porto Primavera	swamp forest	bPon16 male	158	164	236	236	304	308	165	165	215	235
37	Porto Primavera	swamp forest	bPon17 male	154	164	236	244	308	312	165	169	215	223
38	Porto Primavera	swamp forest	bPon18 male	154	158	240	244	308	312	169	169	223	239
39	Porto Primavera	swamp forest	bPon19 male	146	158	236	240	304	312	169	169	235	239
40	Porto Primavera	swamp forest	bPon20 male	164	166	236	244	304	308	165	173	223	239
41	Porto Primavera	swamp forest	bPon38 male	142	188	236	240	308	312	169	173	223	235
42	Porto Primavera	swamp forest	bPon45 female	142	154	220	236	304	312	165	165	215	235
43	Porto Primavera	swamp forest	bPon130 female	152	170	236	240	300	312	157	173	215	235
44	Porto Primavera	swamp forest	bPon131 female	146	166	240	240	304	312	165	169	235	239

NO groups of variables/redundancy



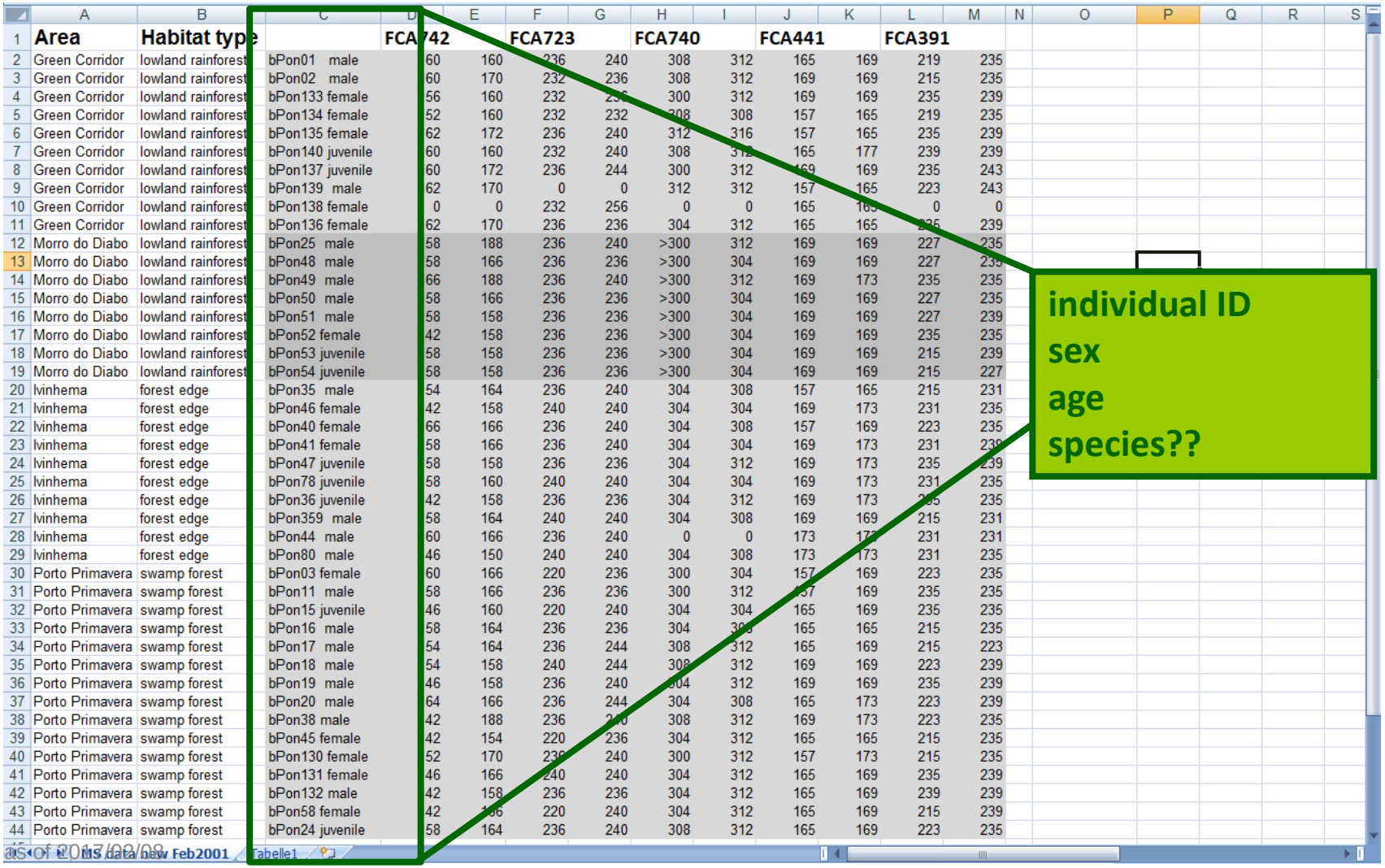
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Area**	**Habitat type**		FCA742		FCA723		FCA740		FCA441		FCA391	
2	Green Corridor	lowland rainforest	bPon01 male	160	160	236	240	308	312	165	169	219	235
3	Green Corridor	lowland rainforest	bPon02 male	160	170	232	236	308	312	169	169	215	235
4	Green Corridor	lowland rainforest	bPon133 female	156	160	232	236	300	312	169	169	235	239
5	Green Corridor	lowland rainforest	bPon134 female	152	160	232	232	308	308	157	165	219	235
6	Green Corridor	lowland rainforest	bPon135 female	162	172	236	240	312	316	157	165	235	239
7	Green Corridor	lowland rainforest	bPon140 juvenile	160	160	232	240	308	312	165	177	239	239
8	Green Corridor	lowland rainforest	bPon137 juvenile	160	172	236	244	300	312	169	169	235	243
9	Green Corridor	lowland rainforest	bPon139 male	162	170	0	0	312	312	157	165	223	243
10	Green Corridor	lowland rainforest	bPon138 female	0	0	232	256	0	0	165	165	0	0
11	Green Corridor	lowland rainforest	bPon136 female	162	170	236	236	304	312	165	165	235	239
12				FCA742		FCA723		FCA740		FCA441		FCA391	
13	Morro do Diabo	lowland rainforest	bPon25 male	158	188	236	240	>300	312	169	169	227	235
14	Morro do Diabo	lowland rainforest	bPon48 male	158	166	236	236	>300	304	169	169	227	235
15	Morro do Diabo	lowland rainforest	bPon49 male	166	188	236	240	>300	312	169	173	235	23
16	Morro do Diabo	lowland rainforest	bPon50 male	158	166	236	236	>300	304	169	169	227	23
17	Morro do Diabo	lowland rainforest	bPon51 male	158	158	236	236	>300	304	169	169	227	23
18	Morro do Diabo	lowland rainforest	bPon52 female	142	158	236	236	>300	304	169	169	235	23
19	Morro do Diabo	lowland rainforest	bPon53 juvenile	158	158	236	236	>300	304	169	169	215	239
20	Morro do Diabo	lowland rainforest	bPon54 juvenile	158	158	236	236	>300	304	169	169	215	227
21				FCA742		FCA723		FCA740		FCA441		FCA391	
22	Ivinhema	forest edge	bPon35 male	154	164	236	240	304	308	157	165	215	231
23	Ivinhema	forest edge	bPon46 female	142	158	240	240	304	304	169	173	231	235
24	Ivinhema	forest edge	bPon40 female	166	166	236	240	304	308	157	169	223	235
25	Ivinhema	forest edge	bPon41 female	158	166	236	240	304	304	169	173	231	239
26	Ivinhema	forest edge	bPon47 juvenile	158	158	236	236	304	312	169	173	235	239
27	Ivinhema	forest edge	bPon78 juvenile	158	160	240	240	304	304	169	173	231	235
28	Ivinhema	forest edge	bPon36 juvenile	142	158	236	236	304	312	169	173	235	235
29	Ivinhema	forest edge	bPon359 male	158	164	240	240	304	308	169	169	215	231
30	Ivinhema	forest edge	bPon44 male	160	166	236	240	0	0	173	173	231	231
31	Ivinhema	forest edge	bPon80 male	146	150	240	240	304	308	173	173	231	235
32				FCA742		FCA723		FCA740		FCA441		FCA391	
33	Porto Primavera	swamp forest	bPon03 female	160	166	220	236	300	304	157	169	223	235
34	Porto Primavera	swamp forest	bPon11 male	158	166	236	236	300	312	157	169	235	235
35	Porto Primavera	swamp forest	bPon15 juvenile	146	160	220	240	304	304	165	169	235	235
36	Porto Primavera	swamp forest	bPon16 male	158	164	236	236	304	308	165	165	215	235
37	Porto Primavera	swamp forest	bPon17 male	154	164	236	244	308	312	165	169	215	223
38	Porto Primavera	swamp forest	bPon18 male	154	158	240	244	308	312	169	169	223	239
39	Porto Primavera	swamp forest	bPon19 male	146	158	236	240	304	312	169	169	235	239
40	Porto Primavera	swamp forest	bPon20 male	164	166	236	244	304	308	165	173	223	239
41	Porto Primavera	swamp forest	bPon38 male	142	188	236	240	308	312	169	173	223	235
42	Porto Primavera	swamp forest	bPon45 female	142	154	220	236	304	312	165	165	215	235
43	Porto Primavera	swamp forest	bPon130 female	152	170	236	240	300	312	157	173	215	235
44	Porto Primavera	swamp forest	bPon131 female	146	166	240	240	304	312	165	169	235	239

Headers redundant

NO groups of variables/redundancy

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	**Area**	**Habitat type**		**FCA742**		**FCA723**		**FCA740**		**FCA441**		**FCA391**							
2	Green Corridor	lowland rainforest	bPon01 male	160	160	236	240	308	312	165	169	219	235						
3	Green Corridor	lowland rainforest	bPon02 male	160	170	232	236	308	312	169	169	215	235						
4	Green Corridor	lowland rainforest	bPon133 female	156	160	232	236	300	312	169	169	235	239						
5	Green Corridor	lowland rainforest	bPon134 female	152	160	232	232	308	308	157	165	219	235						
6	Green Corridor	lowland rainforest	bPon135 female	162	172	236	240	312	316	157	165	235	239						
7	Green Corridor	lowland rainforest	bPon140 juvenile	160	160	232	240	308	312	165	177	239	239						
8	Green Corridor	lowland rainforest	bPon137 juvenile	160	172	236	244	300	312	169	169	235	243						
9	Green Corridor	lowland rainforest	bPon139 male	162	170	0	0	312	312	157	165	223	243						
10	Green Corridor	lowland rainforest	bPon138 female	0	0	232	256	0	0	165	165	0	0						
11	Green Corridor	lowland rainforest	bPon136 female	162	170	236	236	304	312	165	165	235	239						
12	Morro do Diabo	lowland rainforest	bPon25 male	158	188	236	240	>300	312	169	169	227	235						
13	Morro do Diabo	lowland rainforest	bPon48 male	158	166	236	236	>300	304	169	169	227	235						
14	Morro do Diabo	lowland rainforest	bPon49 male	166	188	236	240	>300	312	169	173	235	235						
15	Morro do Diabo	lowland rainforest	bPon50 male	158	166	236	236	>300	304	169	169	227	235						
16	Morro do Diabo	lowland rainforest	bPon51 male	158	158	236	236	>300	304	169	169	227	239						
17	Morro do Diabo	lowland rainforest	bPon52 female	142	158	236	236	>300	304	169	169	235	235						
18	Morro do Diabo	lowland rainforest	bPon53 juvenile	158	158	236	236	>300	304	169	169	215	239						
19	Morro do Diabo	lowland rainforest	bPon54 juvenile	158	158	236	236	>300	304	169	169	215	227						
20	Ivinhema	forest edge	bPon35 male	154	164	236	240	304	308	157	165	215	231						
21	Ivinhema	forest edge	bPon46 female	142	158	240	240	304	304	169	173	231	235						
22	Ivinhema	forest edge	bPon40 female	166	166	236	240	304	308	157	169	223	235						
23	Ivinhema	forest edge	bPon41 female	158	166	236	240	304	304	169	173	231	239						
24	Ivinhema	forest edge	bPon47 juvenile	158	158	236	236	304	312	169	173	235	239						
25	Ivinhema	forest edge	bPon78 juvenile	158	160	240	240	304	304	169	173	231	235						
26	Ivinhema	forest edge	bPon36 juvenile	142	158	236	236	304	312	169	173	235	235						
27	Ivinhema	forest edge	bPon359 male	158	164	240	240	304	308	169	169	215	231						
28	Ivinhema	forest edge	bPon44 male	160	166	236	240	0	0	173	173	231	231						
29	Ivinhema	forest edge	bPon80 male	146	150	240	240	304	308	173	173	231	235						
30	Porto Primavera	swamp forest	bPon03 female	160	166	220	236	300	304	157	169	223	235						
31	Porto Primavera	swamp forest	bPon11 male	158	166	236	236	300	312	157	169	235	235						
32	Porto Primavera	swamp forest	bPon15 juvenile	146	160	220	240	304	304	165	169	235	235						
33	Porto Primavera	swamp forest	bPon16 male	158	164	236	236	304	308	165	165	215	235						
34	Porto Primavera	swamp forest	bPon17 male	154	164	236	244	308	312	165	169	215	223						
35	Porto Primavera	swamp forest	bPon18 male	154	158	240	244	308	312	169	169	223	239						
36	Porto Primavera	swamp forest	bPon19 male	146	158	236	240	304	312	169	169	235	239						
37	Porto Primavera	swamp forest	bPon20 male	164	166	236	244	304	308	165	173	223	239						
38	Porto Primavera	swamp forest	bPon38 male	142	188	236	240	308	312	169	173	223	235						
39	Porto Primavera	swamp forest	bPon45 female	142	154	220	236	304	312	165	165	215	235						
40	Porto Primavera	swamp forest	bPon130 female	152	170	236	240	300	312	157	173	215	235						
41	Porto Primavera	swamp forest	bPon131 female	146	166	240	240	304	312	165	169	235	239						
42	Porto Primavera	swamp forest	bPon132 male	142	158	236	236	304	312	165	169	239	239						
43	Porto Primavera	swamp forest	bPon58 female	142	166	220	240	304	312	165	169	215	239						
44	Porto Primavera	swamp forest	bPon24 juvenile	158	164	236	240	308	312	165	169	223	235						

NO compound variables



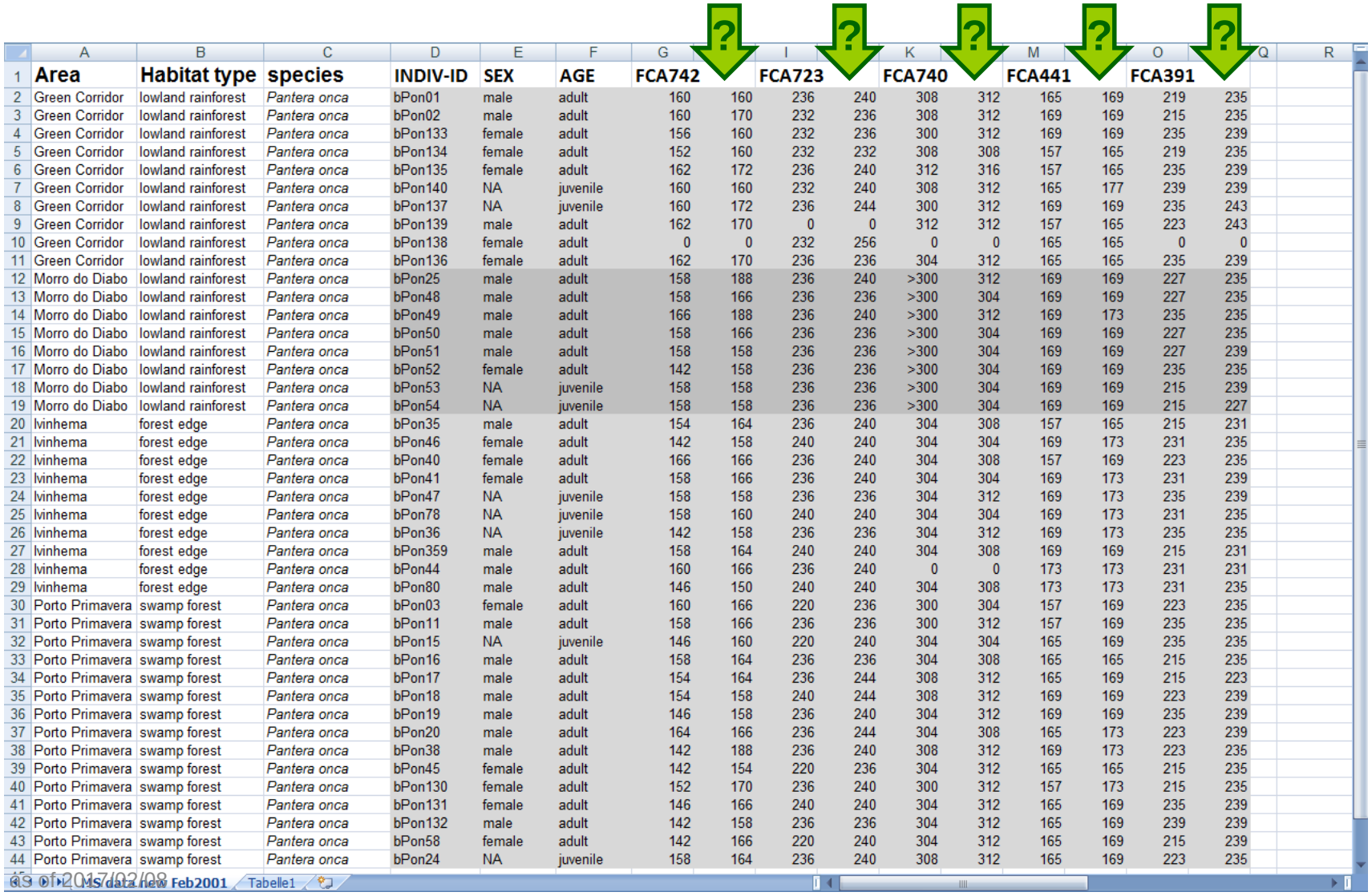
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	**Area**	**Habitat type**		**FCA742**		**FCA723**		**FCA740**		**FCA441**		**FCA391**							
2	Green Corridor	lowland rainforest	bPon01 male	60	160	236	240	308	312	165	169	219	235						
3	Green Corridor	lowland rainforest	bPon02 male	60	170	232	236	308	312	169	169	215	235						
4	Green Corridor	lowland rainforest	bPon133 female	56	160	232	236	300	312	169	169	235	239						
5	Green Corridor	lowland rainforest	bPon134 female	52	160	232	232	308	308	157	165	219	235						
6	Green Corridor	lowland rainforest	bPon135 female	62	172	236	240	312	316	157	165	235	239						
7	Green Corridor	lowland rainforest	bPon140 juvenile	60	160	232	240	308	312	165	177	239	239						
8	Green Corridor	lowland rainforest	bPon137 juvenile	60	172	236	244	300	312	169	169	235	243						
9	Green Corridor	lowland rainforest	bPon139 male	62	170	0	0	312	312	157	165	223	243						
10	Green Corridor	lowland rainforest	bPon138 female	0	0	232	256	0	0	165	165	0	0						
11	Green Corridor	lowland rainforest	bPon136 female	62	170	236	236	304	312	165	165	235	239						
12	Morro do Diabo	lowland rainforest	bPon25 male	58	188	236	240	>300	312	169	169	227	235						
13	Morro do Diabo	lowland rainforest	bPon48 male	58	166	236	236	>300	304	169	169	227	235						
14	Morro do Diabo	lowland rainforest	bPon49 male	66	188	236	240	>300	312	169	173	235	235						
15	Morro do Diabo	lowland rainforest	bPon50 male	58	166	236	236	>300	304	169	169	227	235						
16	Morro do Diabo	lowland rainforest	bPon51 male	58	158	236	236	>300	304	169	169	227	239						
17	Morro do Diabo	lowland rainforest	bPon52 female	42	158	236	236	>300	304	169	169	235	235						
18	Morro do Diabo	lowland rainforest	bPon53 juvenile	58	158	236	236	>300	304	169	169	215	239						
19	Morro do Diabo	lowland rainforest	bPon54 juvenile	58	158	236	236	>300	304	169	169	215	227						
20	Ivinhema	forest edge	bPon35 male	54	164	236	240	304	308	157	165	215	231						
21	Ivinhema	forest edge	bPon46 female	42	158	240	240	304	304	169	173	231	235						
22	Ivinhema	forest edge	bPon40 female	66	166	236	240	304	308	157	169	223	235						
23	Ivinhema	forest edge	bPon41 female	58	166	236	240	304	304	169	173	231	239						
24	Ivinhema	forest edge	bPon47 juvenile	58	158	236	236	304	312	169	173	235	239						
25	Ivinhema	forest edge	bPon78 juvenile	58	160	240	240	304	304	169	173	231	235						
26	Ivinhema	forest edge	bPon36 juvenile	42	158	236	236	304	312	169	173	235	235						
27	Ivinhema	forest edge	bPon359 male	58	164	240	240	304	308	169	169	215	231						
28	Ivinhema	forest edge	bPon44 male	60	166	236	240	0	0	173	173	231	231						
29	Ivinhema	forest edge	bPon80 male	46	150	240	240	304	308	173	173	231	235						
30	Porto Primavera	swamp forest	bPon03 female	60	166	220	236	300	304	157	169	223	235						
31	Porto Primavera	swamp forest	bPon11 male	58	166	236	236	300	312	157	169	235	235						
32	Porto Primavera	swamp forest	bPon15 juvenile	46	160	220	240	304	304	165	169	235	235						
33	Porto Primavera	swamp forest	bPon16 male	58	164	236	236	304	308	165	165	215	235						
34	Porto Primavera	swamp forest	bPon17 male	54	164	236	244	308	312	165	169	215	223						
35	Porto Primavera	swamp forest	bPon18 male	54	158	240	244	308	312	169	169	223	239						
36	Porto Primavera	swamp forest	bPon19 male	46	158	236	240	304	312	169	169	235	239						
37	Porto Primavera	swamp forest	bPon20 male	64	166	236	244	304	308	165	173	223	239						
38	Porto Primavera	swamp forest	bPon38 male	42	188	236	240	308	312	169	173	223	235						
39	Porto Primavera	swamp forest	bPon45 female	42	154	220	236	304	312	165	165	215	235						
40	Porto Primavera	swamp forest	bPon130 female	52	170	236	240	300	312	157	173	215	235						
41	Porto Primavera	swamp forest	bPon131 female	46	166	240	240	304	312	165	169	235	239						
42	Porto Primavera	swamp forest	bPon132 male	42	158	236	236	304	312	165	169	239	239						
43	Porto Primavera	swamp forest	bPon58 female	42	166	220	240	304	312	165	169	215	239						
44	Porto Primavera	swamp forest	bPon24 juvenile	58	164	236	240	308	312	165	169	223	235						

NO compound variables

species ID sex age

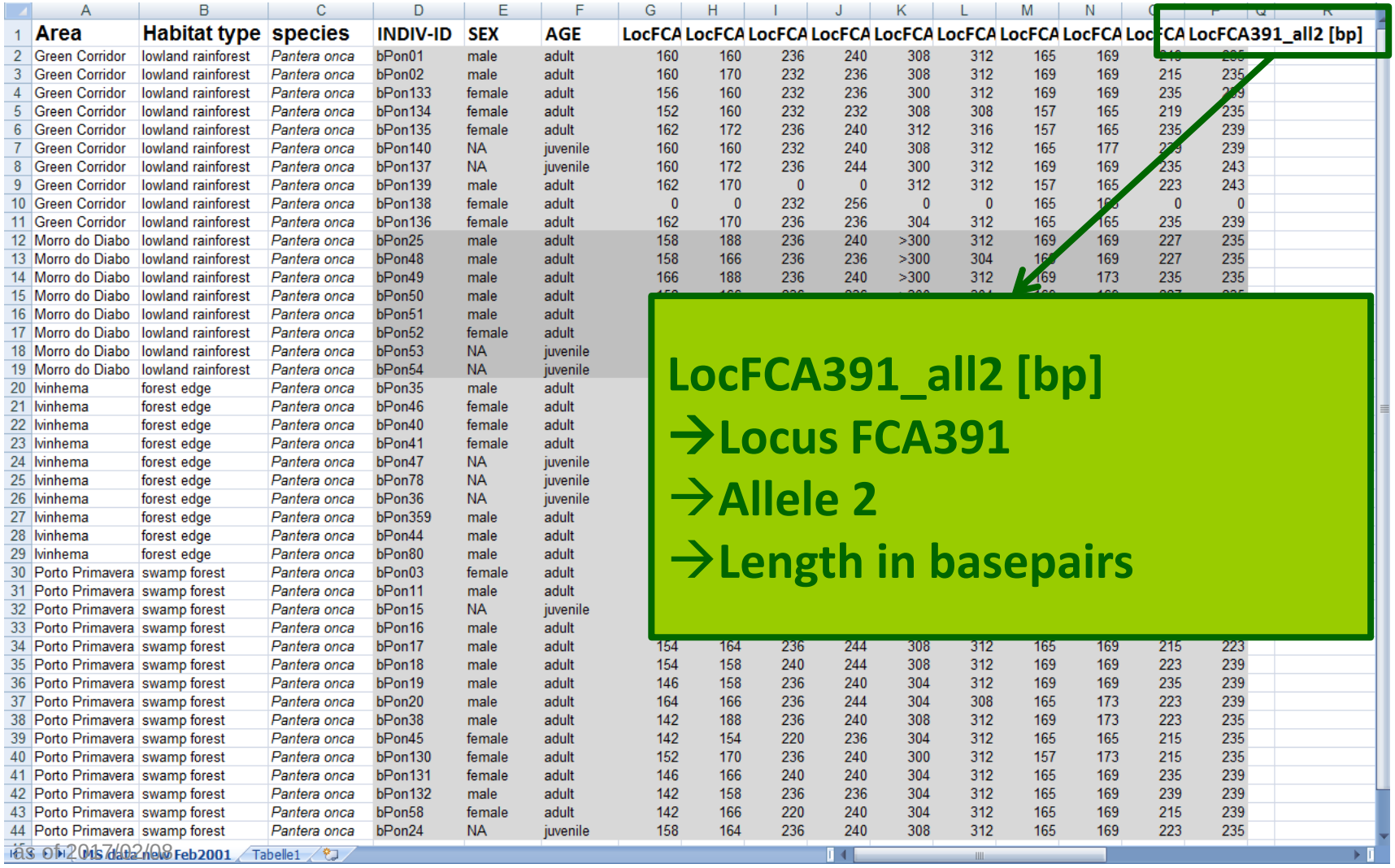
	A								I	J	K	L	M	N	O	P	Q	R
1	**Area**	**Habit**							**FCA723**		**FCA740**		**FCA441**		**FCA391**			
2	Green Corridor	lowland rainforest	*Pantera onca*	bPon01	male	adult	160	160	236	240	308	312	165	169	219	235		
3	Green Corridor	lowland rainforest	*Pantera onca*	bPon02	male	adult	160	170	232	236	308	312	169	169	215	235		
4	Green Corridor	lowland rainforest	*Pantera onca*	bPon133	female	adult	156	160	232	236	300	312	169	169	235	239		
5	Green Corridor	lowland rainforest	*Pantera onca*	bPon134	female	adult	152	160	232	232	308	308	157	165	219	235		
6	Green Corridor	lowland rainforest	*Pantera onca*	bPon135	female	adult	162	172	236	240	312	316	157	165	235	239		
7	Green Corridor	lowland rainforest	*Pantera onca*	bPon140	NA	juvenile	160	160	232	240	308	312	165	177	239	239		
8	Green Corridor	lowland rainforest	*Pantera onca*	bPon137	NA	juvenile	160	172	236	244	300	312	169	169	235	243		
9	Green Corridor	lowland rainforest	*Pantera onca*	bPon139	male	adult	162	170	0	0	312	312	157	165	223	243		
10	Green Corridor	lowland rainforest	*Pantera onca*	bPon138	female	adult	0	0	232	256	0	0	165	165	0	0		
11	Green Corridor	lowland rainforest	*Pantera onca*	bPon136	female	adult	162	170	236	236	304	312	165	165	235	239		
12	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon25	male	adult	158	188	236	240	>300	312	169	169	227	235		
13	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon48	male	adult	158	166	236	236	>300	304	169	169	227	235		
14	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon49	male	adult	166	188	236	240	>300	312	169	173	235	235		
15	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon50	male	adult	158	166	236	236	>300	304	169	169	227	235		
16	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon51	male	adult	158	158	236	236	>300	304	169	169	227	239		
17	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon52	female	adult	142	158	236	236	>300	304	169	169	235	235		
18	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon53	NA	juvenile	158	158	236	236	>300	304	169	169	215	239		
19	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon54	NA	juvenile	158	158	236	236	>300	304	169	169	215	227		
20	Ivinhema	forest edge	*Pantera onca*	bPon35	male	adult	154	164	236	240	304	308	157	165	215	231		
21	Ivinhema	forest edge	*Pantera onca*	bPon46	female	adult	142	158	240	240	304	304	169	173	231	235		
22	Ivinhema	forest edge	*Pantera onca*	bPon40	female	adult	166	166	236	240	304	308	157	169	223	235		
23	Ivinhema	forest edge	*Pantera onca*	bPon41	female	adult	158	166	236	240	304	304	169	173	231	239		
24	Ivinhema	forest edge	*Pantera onca*	bPon47	NA	juvenile	158	158	236	236	304	312	169	173	235	239		
25	Ivinhema	forest edge	*Pantera onca*	bPon78	NA	juvenile	158	160	240	240	304	304	169	173	231	235		
26	Ivinhema	forest edge	*Pantera onca*	bPon36	NA	juvenile	142	158	236	236	304	312	169	173	235	235		
27	Ivinhema	forest edge	*Pantera onca*	bPon359	male	adult	158	164	240	240	304	308	169	169	215	231		
28	Ivinhema	forest edge	*Pantera onca*	bPon44	male	adult	160	166	236	240	0	0	173	173	231	231		
29	Ivinhema	forest edge	*Pantera onca*	bPon80	male	adult	146	150	240	240	304	308	173	173	231	235		
30	Porto Primavera	swamp forest	*Pantera onca*	bPon03	female	adult	160	166	220	236	300	304	157	169	223	235		
31	Porto Primavera	swamp forest	*Pantera onca*	bPon11	male	adult	158	166	236	236	300	312	157	169	235	235		
32	Porto Primavera	swamp forest	*Pantera onca*	bPon15	NA	juvenile	146	160	220	240	304	304	165	169	235	235		
33	Porto Primavera	swamp forest	*Pantera onca*	bPon16	male	adult	158	164	236	236	304	308	165	165	215	235		
34	Porto Primavera	swamp forest	*Pantera onca*	bPon17	male	adult	154	164	236	244	308	312	165	169	215	223		
35	Porto Primavera	swamp forest	*Pantera onca*	bPon18	male	adult	154	158	240	244	308	312	169	169	223	239		
36	Porto Primavera	swamp forest	*Pantera onca*	bPon19	male	adult	146	158	236	240	304	312	169	169	235	239		
37	Porto Primavera	swamp forest	*Pantera onca*	bPon20	male	adult	164	166	236	244	304	308	165	173	223	239		
38	Porto Primavera	swamp forest	*Pantera onca*	bPon38	male	adult	142	188	236	240	308	312	169	173	223	235		
39	Porto Primavera	swamp forest	*Pantera onca*	bPon45	female	adult	142	154	220	236	304	312	165	165	215	235		
40	Porto Primavera	swamp forest	*Pantera onca*	bPon130	female	adult	152	170	236	240	300	312	157	173	215	235		
41	Porto Primavera	swamp forest	*Pantera onca*	bPon131	female	adult	146	166	240	240	304	312	165	169	235	239		
42	Porto Primavera	swamp forest	*Pantera onca*	bPon132	male	adult	142	158	236	236	304	312	165	169	239	239		
43	Porto Primavera	swamp forest	*Pantera onca*	bPon58	female	adult	142	166	220	240	304	312	165	169	215	239		
44	Porto Primavera	swamp forest	*Pantera onca*	bPon24	NA	juvenile	158	164	236	240	308	312	165	169	223	235		

Headers & units for each variable



	A	B	C	D	E	F	G		I		K		M		O	
1	**Area**	**Habitat type**	**species**	**INDIV-ID**	**SEX**	**AGE**	**FCA742**		**FCA723**		**FCA740**		**FCA441**		**FCA391**	
2	Green Corridor	lowland rainforest	*Pantera onca*	bPon01	male	adult	160	160	236	240	308	312	165	169	219	235
3	Green Corridor	lowland rainforest	*Pantera onca*	bPon02	male	adult	160	170	232	236	308	312	169	169	215	235
4	Green Corridor	lowland rainforest	*Pantera onca*	bPon133	female	adult	156	160	232	236	300	312	169	169	235	239
5	Green Corridor	lowland rainforest	*Pantera onca*	bPon134	female	adult	152	160	232	232	308	308	157	165	219	235
6	Green Corridor	lowland rainforest	*Pantera onca*	bPon135	female	adult	162	172	236	240	312	316	157	165	235	239
7	Green Corridor	lowland rainforest	*Pantera onca*	bPon140	NA	juvenile	160	160	232	240	308	312	165	177	239	239
8	Green Corridor	lowland rainforest	*Pantera onca*	bPon137	NA	juvenile	160	172	236	244	300	312	169	169	235	243
9	Green Corridor	lowland rainforest	*Pantera onca*	bPon139	male	adult	162	170	0	0	312	312	157	165	223	243
10	Green Corridor	lowland rainforest	*Pantera onca*	bPon138	female	adult	0	0	232	256	0	0	165	165	0	0
11	Green Corridor	lowland rainforest	*Pantera onca*	bPon136	female	adult	162	170	236	236	304	312	165	165	235	239
12	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon25	male	adult	158	188	236	240	>300	312	169	169	227	235
13	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon48	male	adult	158	166	236	236	>300	304	169	169	227	235
14	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon49	male	adult	166	188	236	240	>300	312	169	173	235	235
15	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon50	male	adult	158	166	236	236	>300	304	169	169	227	235
16	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon51	male	adult	158	158	236	236	>300	304	169	169	227	239
17	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon52	female	adult	142	158	236	236	>300	304	169	169	235	235
18	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon53	NA	juvenile	158	158	236	236	>300	304	169	169	215	239
19	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon54	NA	juvenile	158	158	236	236	>300	304	169	169	215	227
20	Ivinhema	forest edge	*Pantera onca*	bPon35	male	adult	154	164	236	240	304	308	157	165	215	231
21	Ivinhema	forest edge	*Pantera onca*	bPon46	female	adult	142	158	240	240	304	304	169	173	231	235
22	Ivinhema	forest edge	*Pantera onca*	bPon40	female	adult	166	166	236	240	304	308	157	169	223	235
23	Ivinhema	forest edge	*Pantera onca*	bPon41	female	adult	158	166	236	240	304	304	169	173	231	239
24	Ivinhema	forest edge	*Pantera onca*	bPon47	NA	juvenile	158	158	236	236	304	312	169	173	235	239
25	Ivinhema	forest edge	*Pantera onca*	bPon78	NA	juvenile	158	160	240	240	304	304	169	173	231	235
26	Ivinhema	forest edge	*Pantera onca*	bPon36	NA	juvenile	142	158	236	236	304	312	169	173	235	235
27	Ivinhema	forest edge	*Pantera onca*	bPon359	male	adult	158	164	240	240	304	308	169	169	215	231
28	Ivinhema	forest edge	*Pantera onca*	bPon44	male	adult	160	166	236	240	0	0	173	173	231	231
29	Ivinhema	forest edge	*Pantera onca*	bPon80	male	adult	146	150	240	240	304	308	173	173	231	235
30	Porto Primavera	swamp forest	*Pantera onca*	bPon03	female	adult	160	166	220	236	300	304	157	169	223	235
31	Porto Primavera	swamp forest	*Pantera onca*	bPon11	male	adult	158	166	236	236	300	312	157	169	235	235
32	Porto Primavera	swamp forest	*Pantera onca*	bPon15	NA	juvenile	146	160	220	240	304	304	165	169	235	235
33	Porto Primavera	swamp forest	*Pantera onca*	bPon16	male	adult	158	164	236	236	304	308	165	165	215	235
34	Porto Primavera	swamp forest	*Pantera onca*	bPon17	male	adult	154	164	236	244	308	312	165	169	215	223
35	Porto Primavera	swamp forest	*Pantera onca*	bPon18	male	adult	154	158	240	244	308	312	169	169	223	239
36	Porto Primavera	swamp forest	*Pantera onca*	bPon19	male	adult	146	158	236	240	304	312	169	169	235	239
37	Porto Primavera	swamp forest	*Pantera onca*	bPon20	male	adult	164	166	236	244	304	308	165	173	223	239
38	Porto Primavera	swamp forest	*Pantera onca*	bPon38	male	adult	142	188	236	240	308	312	169	173	223	235
39	Porto Primavera	swamp forest	*Pantera onca*	bPon45	female	adult	142	154	220	236	304	312	165	165	215	235
40	Porto Primavera	swamp forest	*Pantera onca*	bPon130	female	adult	152	170	236	240	300	312	157	173	215	235
41	Porto Primavera	swamp forest	*Pantera onca*	bPon131	female	adult	146	166	240	240	304	312	165	169	235	239
42	Porto Primavera	swamp forest	*Pantera onca*	bPon132	male	adult	142	158	236	236	304	312	165	169	239	239
43	Porto Primavera	swamp forest	*Pantera onca*	bPon58	female	adult	142	166	220	240	304	312	165	169	215	239
44	Porto Primavera	swamp forest	*Pantera onca*	bPon24	NA	juvenile	158	164	236	240	308	312	165	169	223	235

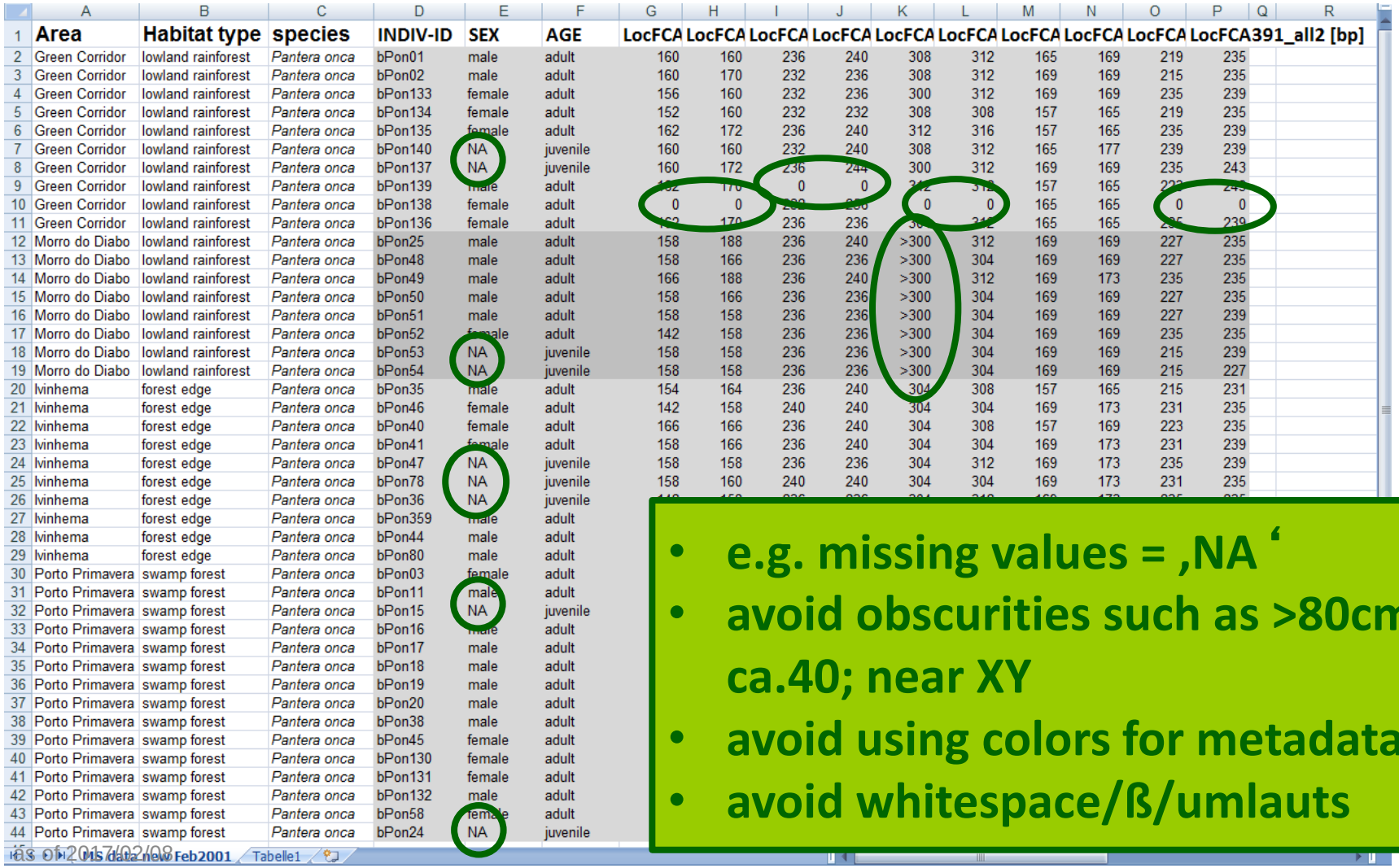
Headers & units for each variable



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Area	Habitat type	species	INDIV-ID	SEX	AGE	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA391_all2 [bp]		
2	Green Corridor	lowland rainforest	*Pantera onca*	bPon01	male	adult	160	160	236	240	308	312	165	169				
3	Green Corridor	lowland rainforest	*Pantera onca*	bPon02	male	adult	160	170	232	236	308	312	169	169	215	235		
4	Green Corridor	lowland rainforest	*Pantera onca*	bPon133	female	adult	156	160	232	236	300	312	169	169	235			
5	Green Corridor	lowland rainforest	*Pantera onca*	bPon134	female	adult	152	160	232	232	308	308	157	165	219	235		
6	Green Corridor	lowland rainforest	*Pantera onca*	bPon135	female	adult	162	172	236	240	312	316	157	165	235	239		
7	Green Corridor	lowland rainforest	*Pantera onca*	bPon140	NA	juvenile	160	160	232	240	308	312	165	177		239		
8	Green Corridor	lowland rainforest	*Pantera onca*	bPon137	NA	juvenile	160	172	236	244	300	312	169	169	235	243		
9	Green Corridor	lowland rainforest	*Pantera onca*	bPon139	male	adult	162	170	0	0	312	312	157	165	223	243		
10	Green Corridor	lowland rainforest	*Pantera onca*	bPon138	female	adult	0	0	232	256	0	0	165	169	0	0		
11	Green Corridor	lowland rainforest	*Pantera onca*	bPon136	female	adult	162	170	236	236	304	312	165	165	235	239		
12	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon25	male	adult	158	188	236	240	>300	312	169	169	227	235		
13	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon48	male	adult	158	166	236	236	>300	304	169	169	227	235		
14	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon49	male	adult	166	188	236	240	>300	312	169	173	235	235		
15	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon50	male	adult												
16	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon51	male	adult												
17	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon52	female	adult												
18	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon53	NA	juvenile												
19	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon54	NA	juvenile												
20	Ivinhema	forest edge	*Pantera onca*	bPon35	male	adult												
21	Ivinhema	forest edge	*Pantera onca*	bPon46	female	adult												
22	Ivinhema	forest edge	*Pantera onca*	bPon40	female	adult												
23	Ivinhema	forest edge	*Pantera onca*	bPon41	female	adult												
24	Ivinhema	forest edge	*Pantera onca*	bPon47	NA	juvenile												
25	Ivinhema	forest edge	*Pantera onca*	bPon78	NA	juvenile												
26	Ivinhema	forest edge	*Pantera onca*	bPon36	NA	juvenile												
27	Ivinhema	forest edge	*Pantera onca*	bPon359	male	adult												
28	Ivinhema	forest edge	*Pantera onca*	bPon44	male	adult												
29	Ivinhema	forest edge	*Pantera onca*	bPon80	male	adult												
30	Porto Primavera	swamp forest	*Pantera onca*	bPon03	female	adult												
31	Porto Primavera	swamp forest	*Pantera onca*	bPon11	male	adult												
32	Porto Primavera	swamp forest	*Pantera onca*	bPon15	NA	juvenile												
33	Porto Primavera	swamp forest	*Pantera onca*	bPon16	male	adult												
34	Porto Primavera	swamp forest	*Pantera onca*	bPon17	male	adult	154	164	236	244	308	312	165	169	215	223		
35	Porto Primavera	swamp forest	*Pantera onca*	bPon18	male	adult	154	158	240	244	308	312	169	169	223	239		
36	Porto Primavera	swamp forest	*Pantera onca*	bPon19	male	adult	146	158	236	240	304	312	169	169	235	239		
37	Porto Primavera	swamp forest	*Pantera onca*	bPon20	male	adult	164	166	236	244	304	308	165	173	223	239		
38	Porto Primavera	swamp forest	*Pantera onca*	bPon38	male	adult	142	188	236	240	308	312	169	173	223	235		
39	Porto Primavera	swamp forest	*Pantera onca*	bPon45	female	adult	142	154	220	236	304	312	165	165	215	235		
40	Porto Primavera	swamp forest	*Pantera onca*	bPon130	female	adult	152	170	236	240	300	312	157	173	215	235		
41	Porto Primavera	swamp forest	*Pantera onca*	bPon131	female	adult	146	166	240	240	304	312	165	169	235	239		
42	Porto Primavera	swamp forest	*Pantera onca*	bPon132	male	adult	142	158	236	236	304	312	165	169	239	239		
43	Porto Primavera	swamp forest	*Pantera onca*	bPon58	female	adult	142	166	220	240	304	312	165	169	215	239		
44	Porto Primavera	swamp forest	*Pantera onca*	bPon24	NA	juvenile	158	164	236	240	308	312	165	169	223	235		

LocFCA391_all2 [bp]
→Locus FCA391
→Allele 2
→Length in basepairs

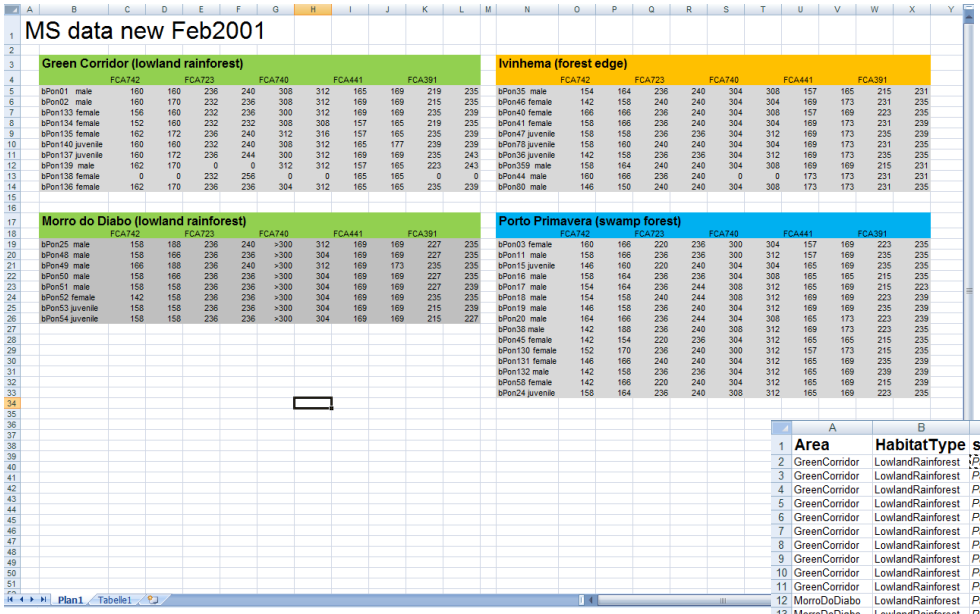
Consistent data entries



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	**Area**	**Habitat type**	**species**	**INDIV-ID**	**SEX**	**AGE**	**LocFCA**	**LocFCA**	**LocFCA**	**LocFCA**	**LocFCA**	**LocFCA**	**LocFCA**	**LocFCA**	**LocFCA**	**LocFCA391_all2 [bp]**		
2	Green Corridor	lowland rainforest	*Pantera onca*	bPon01	male	adult	160	160	236	240	308	312	165	169	219	235		
3	Green Corridor	lowland rainforest	*Pantera onca*	bPon02	male	adult	160	170	232	236	308	312	169	169	215	235		
4	Green Corridor	lowland rainforest	*Pantera onca*	bPon133	female	adult	156	160	232	236	300	312	169	169	235	239		
5	Green Corridor	lowland rainforest	*Pantera onca*	bPon134	female	adult	152	160	232	232	308	308	157	165	219	235		
6	Green Corridor	lowland rainforest	*Pantera onca*	bPon135	female	adult	162	172	236	240	312	316	157	165	235	239		
7	Green Corridor	lowland rainforest	*Pantera onca*	bPon140	NA	juvenile	160	160	232	240	308	312	165	177	239	239		
8	Green Corridor	lowland rainforest	*Pantera onca*	bPon137	NA	juvenile	160	172	236	244	300	312	169	169	235	243		
9	Green Corridor	lowland rainforest	*Pantera onca*	bPon139	male	adult	[illegible]	[illegible]	0	0	[illegible]	[illegible]	157	165	[illegible]	[illegible]		
10	Green Corridor	lowland rainforest	*Pantera onca*	bPon138	female	adult	0	0	[illegible]	[illegible]	0	0	165	165	0	0		
11	Green Corridor	lowland rainforest	*Pantera onca*	bPon136	female	adult	[illegible]	170	236	236	[illegible]	[illegible]	165	165	[illegible]	239		
12	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon25	male	adult	158	188	236	240	>300	312	169	169	227	235		
13	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon48	male	adult	158	166	236	236	>300	304	169	169	227	235		
14	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon49	male	adult	166	188	236	240	>300	312	169	173	235	235		
15	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon50	male	adult	158	166	236	236	>300	304	169	169	227	235		
16	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon51	male	adult	158	158	236	236	>300	304	169	169	227	239		
17	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon52	female	adult	142	158	236	236	>300	304	169	169	235	235		
18	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon53	NA	juvenile	158	158	236	236	>300	304	169	169	215	239		
19	Morro do Diabo	lowland rainforest	*Pantera onca*	bPon54	NA	juvenile	158	158	236	236	>300	304	169	169	215	227		
20	Ivinhema	forest edge	*Pantera onca*	bPon35	male	adult	154	164	236	240	304	308	157	165	215	231		
21	Ivinhema	forest edge	*Pantera onca*	bPon46	female	adult	142	158	240	240	304	304	169	173	231	235		
22	Ivinhema	forest edge	*Pantera onca*	bPon40	female	adult	166	166	236	240	304	308	157	169	223	235		
23	Ivinhema	forest edge	*Pantera onca*	bPon41	female	adult	158	166	236	240	304	304	169	173	231	239		
24	Ivinhema	forest edge	*Pantera onca*	bPon47	NA	juvenile	158	158	236	236	304	312	169	173	235	239		
25	Ivinhema	forest edge	*Pantera onca*	bPon78	NA	juvenile	158	160	240	240	304	304	169	173	231	235		
26	Ivinhema	forest edge	*Pantera onca*	bPon36	NA	juvenile	[illegible]											
27	Ivinhema	forest edge	*Pantera onca*	bPon359	male	adult												
28	Ivinhema	forest edge	*Pantera onca*	bPon44	male	adult												
29	Ivinhema	forest edge	*Pantera onca*	bPon80	male	adult												
30	Porto Primavera	swamp forest	*Pantera onca*	bPon03	female	adult												
31	Porto Primavera	swamp forest	*Pantera onca*	bPon11	male	adult												
32	Porto Primavera	swamp forest	*Pantera onca*	bPon15	NA	juvenile												
33	Porto Primavera	swamp forest	*Pantera onca*	bPon16	male	adult												
34	Porto Primavera	swamp forest	*Pantera onca*	bPon17	male	adult												
35	Porto Primavera	swamp forest	*Pantera onca*	bPon18	male	adult												
36	Porto Primavera	swamp forest	*Pantera onca*	bPon19	male	adult												
37	Porto Primavera	swamp forest	*Pantera onca*	bPon20	male	adult												
38	Porto Primavera	swamp forest	*Pantera onca*	bPon38	male	adult												
39	Porto Primavera	swamp forest	*Pantera onca*	bPon45	female	adult												
40	Porto Primavera	swamp forest	*Pantera onca*	bPon130	female	adult												
41	Porto Primavera	swamp forest	*Pantera onca*	bPon131	female	adult												
42	Porto Primavera	swamp forest	*Pantera onca*	bPon132	male	adult												
43	Porto Primavera	swamp forest	*Pantera onca*	bPon58	female	adult												
44	Porto Primavera	swamp forest	*Pantera onca*	bPon24	NA	juvenile												

- e.g. missing values = ‚NA‘
- avoid obscurities such as >80cm; ca.40; near XY
- avoid using colors for metadata
- avoid whitespace/ß/umlauts

Summary



MS data new Feb2001

Green Corridor (lowland rainforest)

		FCA742		FCA723		FCA740		FCA441		FCA391	
bPon01	male	160	160	236	240	308	312	165	169	219	235
bPon02	male	160	170	232	236	308	312	169	169	215	235
bPon133	female	156	160	232	236	300	312	169	169	235	239
bPon134	female	152	160	232	232	308	308	157	165	219	235
bPon135	female	162	172	236	240	312	316	157	165	235	239
bPon140	juvenile	160	160	232	240	308	312	165	177	239	239
bPon137	juvenile	160	172	236	244	300	312	169	169	235	243
bPon139	male	162	170	0	0	312	312	157	165	223	243
bPon138	female	0	0	232	256	0	0	165	165	0	0
bPon136	female	162	170	236	236	304	312	165	165	235	239

Ivinhema (forest edge)

		FCA742		FCA723		FCA740		FCA441		FCA391	
bPon35	male	154	164	236	240	304	308	157	165	215	231
bPon46	female	142	158	240	240	304	304	169	173	231	235
bPon40	female	166	166	236	240	304	308	157	169	223	235
bPon41	female	158	166	236	240	304	304	169	173	231	239
bPon47	juvenile	158	158	236	236	304	312	169	173	235	239
bPon78	juvenile	158	160	240	240	304	304	169	173	231	235
bPon36	juvenile	142	158	236	236	304	312	169	173	235	235
bPon359	male	158	164	240	240	304	308	169	169	215	231
bPon44	male	160	166	236	240	0	0	173	173	231	231
bPon80	male	146	150	240	240	304	308	173	173	231	235

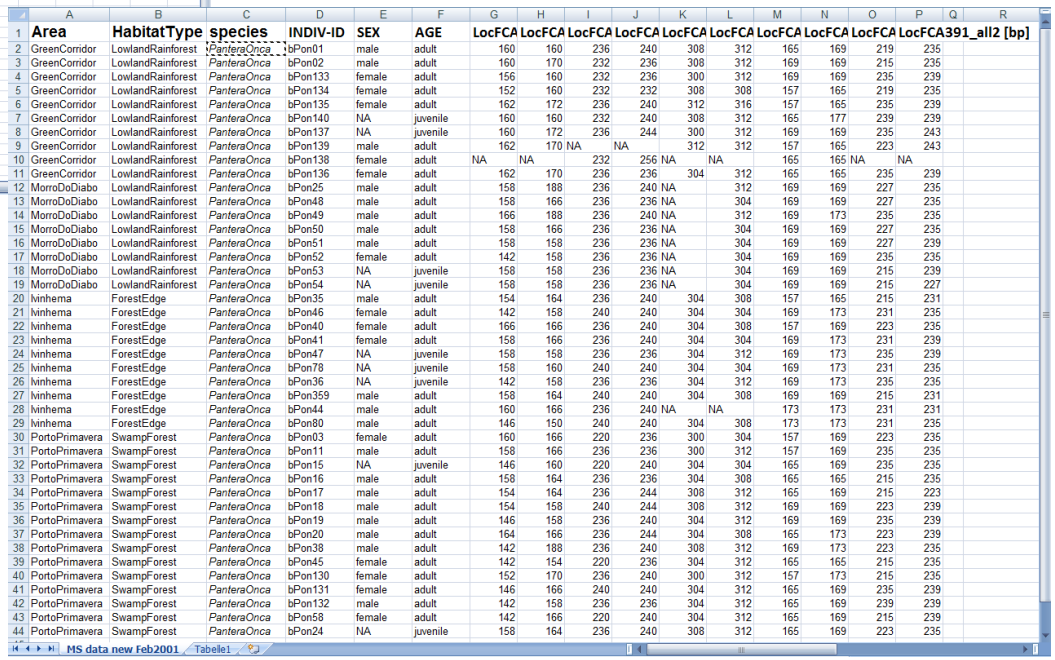
Morro do Diabo (lowland rainforest)

		FCA742		FCA723		FCA740		FCA441		FCA391	
bPon25	male	158	188	236	240	>300	312	169	169	227	235
bPon48	male	158	166	236	236	>300	304	169	169	227	235
bPon49	male	166	188	236	240	>300	312	169	173	235	235
bPon50	male	158	166	236	236	>300	304	169	169	227	235
bPon51	male	158	158	236	236	>300	304	169	169	227	239
bPon52	female	142	158	236	236	>300	304	169	169	235	235
bPon53	juvenile	158	158	236	236	>300	304	169	169	215	239
bPon54	juvenile	158	158	236	236	>300	304	169	169	215	227

Porto Primavera (swamp forest)

		FCA742		FCA723		FCA740		FCA441		FCA391	
bPon03	female	160	166	220	236	300	304	157	169	223	235
bPon11	male	158	166	236	236	300	312	157	169	235	235
bPon15	juvenile	146	160	220	240	304	304	165	169	235	235
bPon16	male	158	164	236	236	304	308	165	165	215	235
bPon17	male	154	164	236	244	308	312	165	169	215	223
bPon18	male	154	158	240	244	308	312	169	169	223	239
bPon19	male	146	158	236	240	304	312	169	169	235	239
bPon20	male	164	166	236	244	304	308	165	173	223	239
bPon38	male	142	188	236	240	308	312	169	173	223	235
bPon45	female	142	154	220	236	304	312	165	165	215	235
bPon130	female	152	170	236	240	300	312	157	173	215	235
bPon131	female	146	166	240	240	304	312	165	169	235	239
bPon132	male	142	158	236	236	304	312	165	169	239	239
bPon58	female	142	166	220	240	304	312	165	169	215	239
bPon24	juvenile	158	164	236	240	308	312	165	169	223	235

Plan1 | Tabelle1



Area	HabitatType	species	INDIV-ID	SEX	AGE	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA	LocFCA391_all2 [bp]
GreenCorridor	LowlandRainforest	PanteraOnca	bPon01	male	adult	160	160	236	240	308	312	165	169	219	235
GreenCorridor	LowlandRainforest	PanteraOnca	bPon02	male	adult	160	170	232	236	308	312	169	169	215	235
GreenCorridor	LowlandRainforest	PanteraOnca	bPon133	female	adult	156	160	232	236	300	312	169	169	235	239
GreenCorridor	LowlandRainforest	PanteraOnca	bPon134	female	adult	152	160	232	232	308	308	157	165	219	235
GreenCorridor	LowlandRainforest	PanteraOnca	bPon135	female	adult	162	172	236	240	312	316	157	165	235	239
GreenCorridor	LowlandRainforest	PanteraOnca	bPon140	NA	juvenile	160	160	232	240	308	312	165	177	239	239
GreenCorridor	LowlandRainforest	PanteraOnca	bPon137	NA	juvenile	160	172	236	244	300	312	169	169	235	243
GreenCorridor	LowlandRainforest	PanteraOnca	bPon139	male	adult	162	170	NA	NA	312	312	157	165	223	243
GreenCorridor	LowlandRainforest	PanteraOnca	bPon138	female	adult	NA	NA	232	256	NA	NA	165	165	NA	NA
GreenCorridor	LowlandRainforest	PanteraOnca	bPon136	female	adult	162	170	236	236	304	312	165	165	235	239
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon25	male	adult	158	188	236	240	NA	312	169	169	227	235
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon48	male	adult	158	166	236	236	NA	304	169	169	227	235
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon49	male	adult	166	188	236	240	NA	312	169	173	235	235
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon50	male	adult	158	166	236	236	NA	304	169	169	227	235
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon51	male	adult	158	158	236	236	NA	304	169	169	227	239
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon52	female	adult	142	158	236	236	NA	304	169	169	235	235
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon53	NA	juvenile	158	158	236	236	NA	304	169	169	215	239
MorroDoDiabo	LowlandRainforest	PanteraOnca	bPon54	NA	juvenile	158	158	236	236	NA	304	169	169	215	227
Ivinhema	ForestEdge	PanteraOnca	bPon35	male	adult	154	164	236	240	304	308	157	165	215	231
Ivinhema	ForestEdge	PanteraOnca	bPon46	female	adult	142	158	240	240	304	304	169	173	231	235
Ivinhema	ForestEdge	PanteraOnca	bPon40	female	adult	166	166	236	240	304	308	157	169	223	235
Ivinhema	ForestEdge	PanteraOnca	bPon41	female	adult	158	166	236	240	304	304	169	173	231	239
Ivinhema	ForestEdge	PanteraOnca	bPon47	NA	juvenile	158	158	236	236	304	312	169	173	235	239
Ivinhema	ForestEdge	PanteraOnca	bPon78	NA	juvenile	158	160	240	240	304	304	169	173	231	235
Ivinhema	ForestEdge	PanteraOnca	bPon36	NA	juvenile	142	158	236	236	304	312	169	173	235	235
Ivinhema	ForestEdge	PanteraOnca	bPon359	male	adult	158	164	240	240	304	308	169	169	215	231
Ivinhema	ForestEdge	PanteraOnca	bPon44	male	adult	160	166	236	240	NA	NA	173	173	231	231
Ivinhema	ForestEdge	PanteraOnca	bPon80	male	adult	146	150	240	240	304	308	173	173	231	235
PortoPrimavera	SwampForest	PanteraOnca	bPon03	female	adult	160	166	220	236	300	304	157	169	223	235
PortoPrimavera	SwampForest	PanteraOnca	bPon11	male	adult	158	166	236	236	300	312	157	169	235	235
PortoPrimavera	SwampForest	PanteraOnca	bPon15	NA	juvenile	146	160	220	240	304	304	165	169	235	235
PortoPrimavera	SwampForest	PanteraOnca	bPon16	male	adult	158	164	236	236	304	308	165	165	215	235
PortoPrimavera	SwampForest	PanteraOnca	bPon17	male	adult	154	164	236	244	308	312	165	169	215	223
PortoPrimavera	SwampForest	PanteraOnca	bPon18	male	adult	154	158	240	244	308	312	169	169	223	239
PortoPrimavera	SwampForest	PanteraOnca	bPon19	male	adult	146	158	236	240	304	312	169	169	235	239
PortoPrimavera	SwampForest	PanteraOnca	bPon20	male	adult	164	166	236	244	304	308	165	173	223	239
PortoPrimavera	SwampForest	PanteraOnca	bPon38	male	adult	142	188	236	240	308	312	169	173	223	235
PortoPrimavera	SwampForest	PanteraOnca	bPon45	female	adult	142	154	220	236	304	312	165	165	215	235
PortoPrimavera	SwampForest	PanteraOnca	bPon130	female	adult	152	170	236	240	300	312	157	173	215	235
PortoPrimavera	SwampForest	PanteraOnca	bPon131	female	adult	146	166	240	240	304	312	165	169	235	239
PortoPrimavera	SwampForest	PanteraOnca	bPon132	male	adult	142	158	236	236	304	312	165	169	239	239
PortoPrimavera	SwampForest	PanteraOnca	bPon58	female	adult	142	166	220	240	304	312	165	169	215	239
PortoPrimavera	SwampForest	PanteraOnca	bPon24	NA	juvenile	158	164	236	240	308	312	165	169	223	235

MS data new Feb2001 | Tabelle1

as of 2017/02/08

Summary

1. Structure your data (columns/rows)
2. NO empty rows or columns
3. NO compound variables (1 column/row per variable)
4. Units for EACH variable
5. CONSISTENT data entries
   a. Define missing data (e.g. NA)
   b. Use integers/real numbers (>80cm; ca.40; near XY)
   c. NO whitespaces / ß / umlauts
   d. Avoid colour coding for metadata
   e. Use either , or . for decimal values, but be consistent!

Organization & Documentation: Best practice

- **Plan before you start**
  - Organize your folders & files
  - **D**efine, **D**iscuss and **D**ocument naming conventions
- **Explain your data**
  - Use standards if possible, do not re-invent
  - If standards are too complex or not complex enough then try to customize on the basis of them.
- **Discuss your approach** with your colleagues
- **Be specific and consistent**
  - Don’t alter the past, but document changes in your RDM practice

➢ *Somebody else should be able to **find and understand your research data without you –** ideally even years later*

Some services on Campus

Name	Provided by	Purpose / Comments
Sharepoint	GWDG	Collaboration, Sharing of documents, lists, calendars, ...
Etherpad	GWDG	Collaborative notepad editing
Electronic lab notebook	UMG	(Re-)Organizable, searchable and Backupable research documentation
Biophysical Software	GWDG	analysis and sequencing software like MASCOT (proteome research), Delta2D (2D-Analysis of gel electrophoresis), GeneiousPro (sequential analysis) or for Next Generation Sequencing
Open Access Publication Fund	SUB	complete coverage for up to €2.000,- for publication in OA journal
Videoconferencing	GWDG via DFN	including option to join via phone call

as of 2017/02/08

GWDG services

SERVICES

Storage Services
- File Service
- Data Archiving
- Backup
- GWDG Cloud Share
- Cryptshare
- GWDG ownCloud
- GWDG Crash Plan PROe

E-Mail and Collaboration Services
- E-Mail-Service (MS Exchange 2010)
- Spam and Virus Filtering
- Mailing Lists
- MS Sharepoint
- Managed Services
- Project Management Service
- Etherpad

Server Services
- Virtual Server
- Hosting/Housing of Servers
- Web Hosting
- GWDG Cloud Server
- FTP-Server

Network Servies
- System Monitoring
- IP Address Management System
- Cable und Route Management System
- Setting up eduroam
- Integration into the Active Dirctory
- User Management with OpenLDAP
- Client Management

Application Services
- Persistent Identifier (PID)
- High Performance Computing
- Library Service Aleph
- Database Service Oracle
- Application and Registration Services
- Bioinformatics Programs
- Statistics Programs
- Online Surveys
- Plagiarism Detection
- Database Service MySQL

IT Security Services
- Vulnerability Scans on Network-attached Equipment
- Public-Key- Infrastruktur (PKI)
- Authentication and Authorization Infrastructure (AAI)
- Virus Protection (Sophos Update Service)

General Services
- Software and Licence Management
- Courses
- Videoconferencing
- Computer Lending Pool
- Identity Management
- Print & Scan Services

IT Consulting Services
- Establishing Directory Services (AD, LDAP)
- IT Security
- Planning of Data Transmission Networks
- Apple Support Centre
- Scientific Data Management
- Hardware Purchase

https://www.gwdg.de/services

as of 2017/02/08

Göttingen/ /eResearch Alliance

Data sharing and legal aspects

08.02.2017

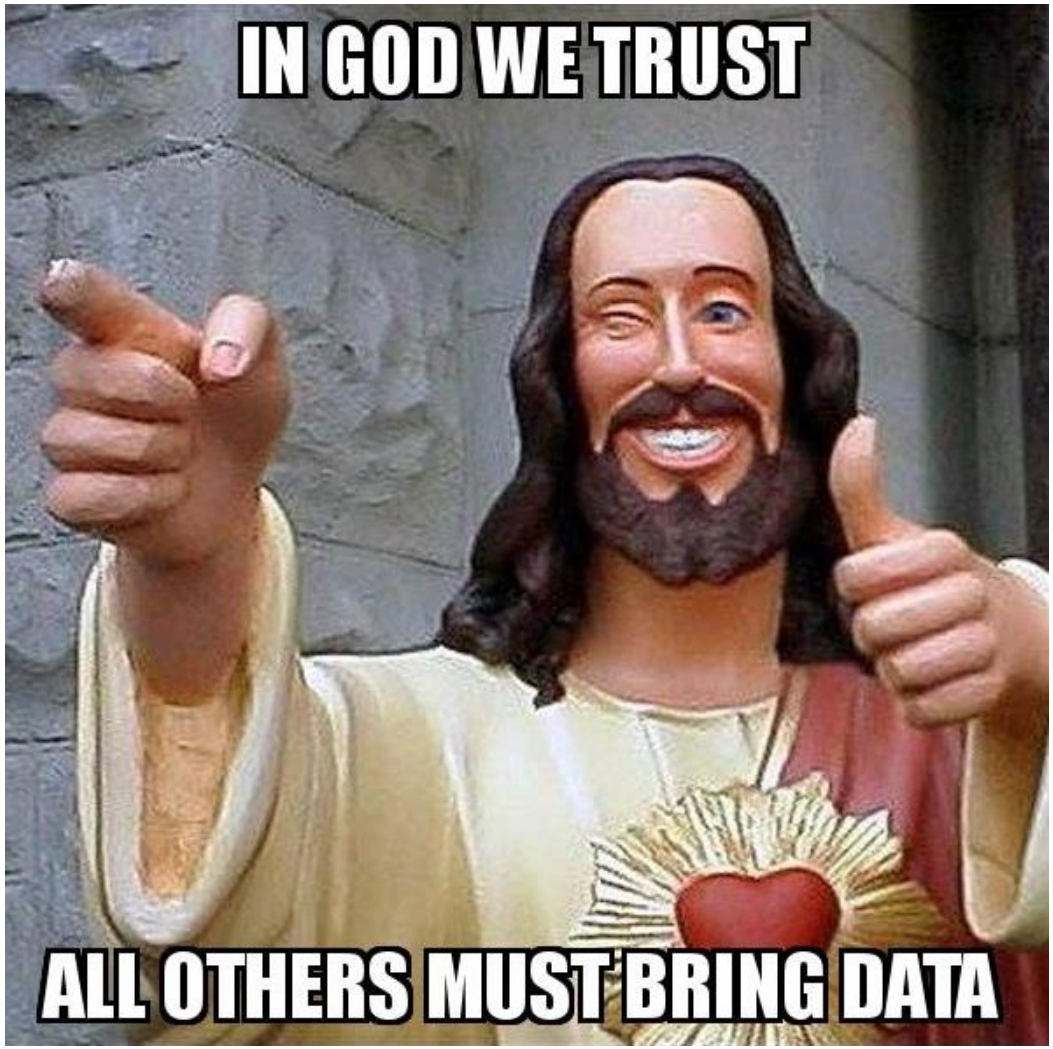
Sander van der Wel:
Young toekans sharing food, CC-BY-SA-2.0

GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

NIEDERSÄCHSISCHE STAATS- UND UNIVERSITÄTSBIBLIOTHEK GÖTTINGEN | SUB

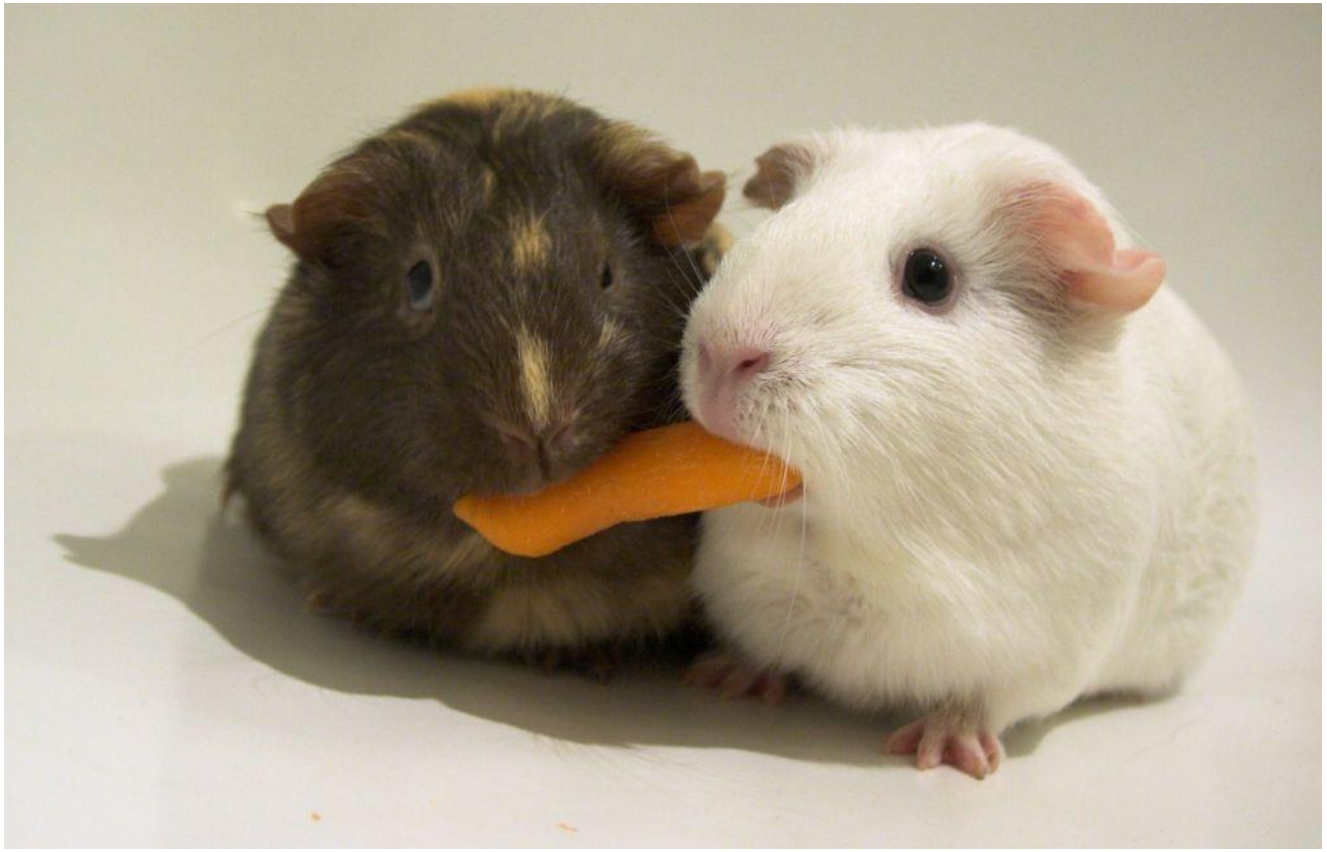
GWDG

Data sharing - motivation



Quote from: William E. Demming (1900-1993)

… but active, open, free sharing?



Source: Sharing by ryancr via flickr
CC-BY-NC 2.0

Why share?

Reputation

- Get credit for high quality research
- Increased understanding of your methods
- Allows work to be verified by others
- Recognition for contribution to research community
- Extend research beyond your discipline

Funding

- Making data and/or publications available may be a requirement of your funding body
- It may make your funding proposal more attractive when sharing data is not essential

Why share?

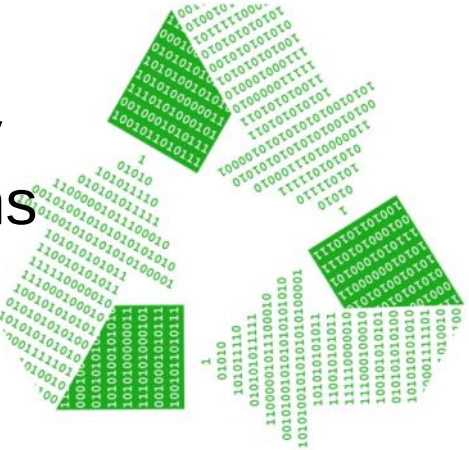
Source: Richard Matthews, flickr: dart (2011) online at: https://commons.wikimedia.org/wiki/File:Darts_in_the_middle_of_a_dartboard.jpg?uselang=de CC-BY 2.0

Impact

- Sharing makes your data:
  - Easier to find
  - Easier to access
- Open data/publications leads to increased citations

Reuse

- Starting point for a complementary study
- Test data for new software and algorithms
- Teaching purposes
- Contexts not currently envisioned
- Completely different fields



Data sharing – concerns

Source: All he does is eat eat eat via flickr
CC-BY 2.0 Jannes Pockele

- Stockpiling for bad times — ***Self-use***
- No one likes polishing — ***No documentation***
- Dirt behind the scenes — ***Work in progress***
- Atmosphere of fear — ***Theft and misuse***
- Small fishes & unicorns — ***Un-importance***

Value over time?

Embargo!

Do it for yourself!

„Working data set“

Trust law & science

Future is unpredictable

Data sharing - credits?

- Well documented research data

  helps your own (future) research
- Shared data may serve as

  facilitator for cooperation
- Increased accessibility and usability

  enable reuse and citations
- Public and open access

  extend the range of your data and research

Responsibilities

- Funders

Recommendations for Secure Storage and Availability of Digital Primary Research Data

5. *If possible, each scientist or academic makes his or her primary research data freely available on a transregional level.*

- Institutions

Research data policy of the Georg-August University Goettingen (incl. UMG)

1. The University promotes and supports open access to research data.

- Public

- Science

Data sharing – real barriers

- Place
  - no sharing tradition
  - no repository
  - no expertise
- Funds
  - no money
- Rights
  - no carte blanche

Source: Simatai_Great_Wall by Arian Zwegers on Wikimedia Commons, CC BY SA 2.0

Modes of Sharing

Transfer Way	**Access Mode**	**Use Condition**
peer-to-peer	restricted	none
webspace	on demand	agreement
repository	embargo	licence
	open	

as of 2017/02/08

Terms & legal concepts

- Intellectual Property (Geistiges Eigentum)
- Copyright (Urheberrecht)
- Copyright transfer (Nutzungsrecht)
- Fair Use / Fair Dealing (Schranken UrhG)
- Licence
- Copyleft
- Information privacy (Datenschutz)

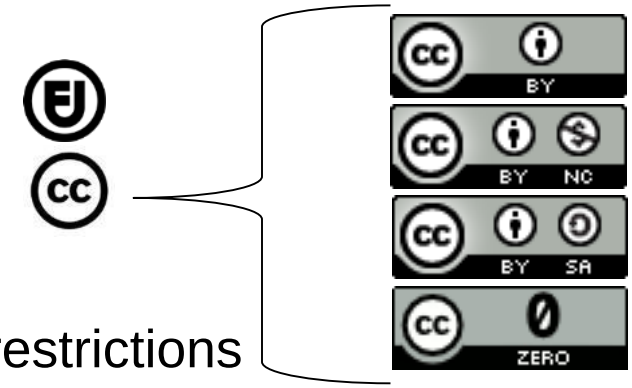
Intellectual property law

Touched rights

- Copyright
- Trade secret
- Patent
- Data privacy

Strategies

- Fair use
- Contracts and licences
- Clarifying terms of use
- Removing or limiting rights restrictions
- Anonymising your data

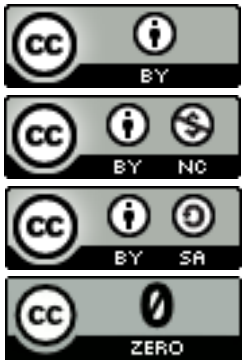


List of rights after: Carroll MW (2015) Sharing Research Data and Intellectual Property Law: A Primer. PLoS Biol 13(8): e1002235. doi:10.1371/journal.pbio.1002235

Data on Humans

- Confidential Data
  - are given in confidence
- Personal Data
  - identifies a person
- Sensitive Data
  - compromises a person:
    racial/ethnic origin; political opinions;
    religious/philosophical beliefs; or other beliefs of a similar nature; trade-union membership;
    physical/mental health/condition; sexual life

Licences



Proper licensing and attribution: TASL

Title, Author, (Source), License (incl. Link)

e.g. “RDM Training for 1644” by eRA Team, CC-BY 4.0, http://creativecommons.org/licenses/by/4.0/

Law vs. science

a quote is followed by a reference

is a legal restraint.

What if the author passed on his rights?

➔ Copyright is protected by law, but authorship is protected by the principles of sciences

What could happen if you license your data as CC-0?

Göttingen/ /eResearch Alliance

Open access & Open Science

08.02.2017

Open Access

Open Access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions.

(Source: Peter Suber (2004): http://legacy.earlham.edu/~peters/fos/brief.htm)

Budapest Open Access Initiative (February 2002):

*By **'open access' …** we mean its **free availability …, permitting any users to:***

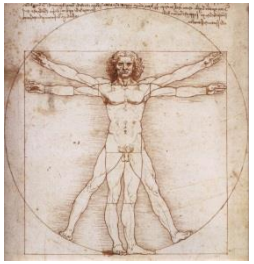
read
download
copy
distribute
print
search
link
crawl them for indexing
pass them as data to software
use for any other lawful purpose
without financial, legal, or technical barriers

other than those inseparable from gaining access to the internet itself.

Only constraint: to give authors control over the integrity of their work and the right to be properly acknowledged and cited.

Why Open Access?

Researchers



- Higher Visibility
- Wider Circulation
- Faster circulation of research results (pre-prints)
- Responsibility to make work freely available

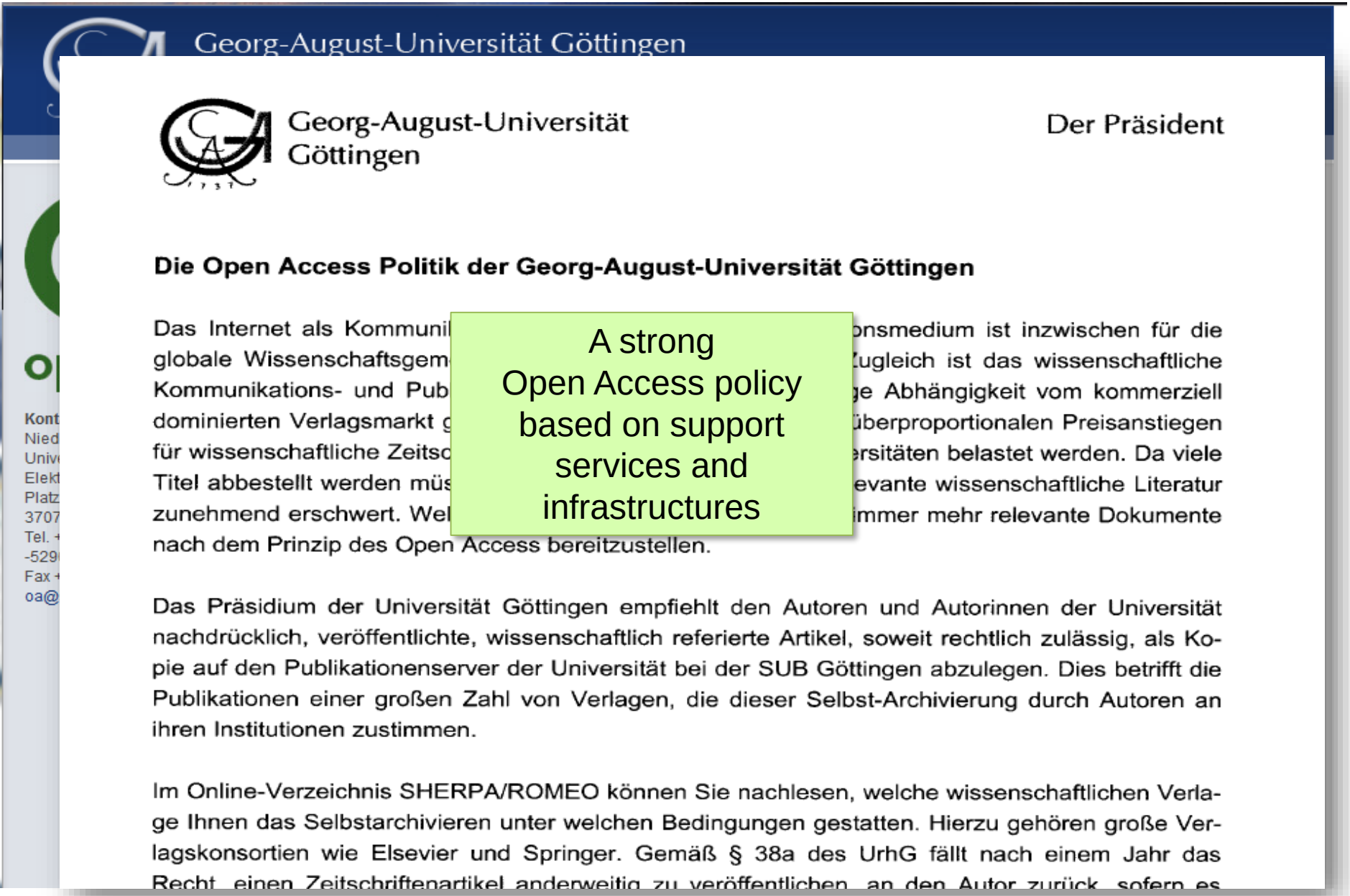
Funders & University/University Library

SUB | Niedersächsische Staats- und Universitätsbibliothek Göttingen

GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

- Avoid double paying – first for the research itself, then for access for the research results
- Transparency of research (Good scientific practice)
- Research ethics

➢ Open Access Strategy of Göttingen University



Georg-August-Universität Göttingen

Georg-August-Universität
Göttingen

Der Präsident

Die Open Access Politik der Georg-August-Universität Göttingen

Das Internet als Kommuni…onsmedium ist inzwischen für die globale Wissenschaftsgem…Zugleich ist das wissenschaftliche Kommunikations- und Pub…ge Abhängigkeit vom kommerziell dominierten Verlagsmarkt g…überproportionalen Preisanstiegen für wissenschaftliche Zeitsc…ersitäten belastet werden. Da viele Titel abbestellt werden müs…evante wissenschaftliche Literatur zunehmend erschwert. Wel…immer mehr relevante Dokumente nach dem Prinzip des Open Access bereitzustellen.

A strong
Open Access policy
based on support
services and
infrastructures

Das Präsidium der Universität Göttingen empfiehlt den Autoren und Autorinnen der Universität nachdrücklich, veröffentlichte, wissenschaftlich referierte Artikel, soweit rechtlich zulässig, als Kopie auf den Publikationenserver der Universität bei der SUB Göttingen abzulegen. Dies betrifft die Publikationen einer großen Zahl von Verlagen, die dieser Selbst-Archivierung durch Autoren an ihren Institutionen zustimmen.

Im Online-Verzeichnis SHERPA/ROMEO können Sie nachlesen, welche wissenschaftlichen Verlage Ihnen das Selbstarchivieren unter welchen Bedingungen gestatten. Hierzu gehören große Verlagskonsortien wie Elsevier und Springer. Gemäß § 38a des UrhG fällt nach einem Jahr das Recht, einen Zeitschriftenartikel anderweitig zu veröffentlichen, an den Autor zurück, sofern es

Source: http://www.sub.uni-goettingen.de/fileadmin/media/texte/informationsversorgung_z/epu/oa-policy_goettingen-edu_de_110211.pdf

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open access

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37073 Göttingen
Tel. +49 (0)551 / 39-91188 oder -5290
Fax +49 (0)551 / 39-2457
oa@sub.uni-goettingen.de

Open Access

NEU ***Open-Access-Publikationsfonds der Universität Göttingen***

Die Universität Göttingen hat ihre Open-Access-Strategie weiter ausgebaut und 2012 einen eigenen Publikationsfonds eingerichtet, um ihren Wissenschaftlerinnen und Wissenschaftlern das Publizieren in reinen Open-Access-Zeitschriften zu ermöglichen. Das bedeutet, dass der Artikel in einer Zeitschrift erscheint, deren Beiträge vollständig und unmittelbar mit Erscheinen über das Internet für Nutzer entgeltfrei zugänglich sind und die im jeweiligen Fach anerkannte Qualitätssicherungsverfahren anwendet. Er kommt dort zum Einsatz, wo Autorinnen und Autoren keine eigenen Publikationsmittel eingeworben haben, und wird durch das Open-Access-Förderprogramm der Deutschen Forschungsgemeinschaft (DFG), den Ergänzungsfonds der Universitätsmedizin Göttingen und den Ergänzungsfonds der Niedersächsischen Staats- und Universitätsbibliothek Göttingen finanziert.

Open Access Pilot in FP7

Die Europäische Kommission (EC) und der Europäische Forschungsrat (ERC) verfolgen das Ziel, eine möglichst weite Verbreitung und einen weltweiten Zugang zu den von ihnen geförderten Publikationen sicher zu stellen. Deshalb verpflichtet das "Open Access Pilotprojekt" die Wissenschaftler/innen, ihre Publikationen im Volltext über ein geeignetes institutionelles oder fachliches Repositorium frei zugänglich zu machen. Stellen Sie Ihr begutachtetes Manuskript (die finale pdf-Version nach Prüfung durch Fachleute) in GoeScholar ein.

Weitere Informationen finden Sie auf der Website des EU-Hochschulbüros der Universität.

Was ist Open Access?

Unter Open Access versteht man das Bestreben, wissenschaftliche Literatur mit Einverständnis der Autoren und der

- Open Access in der Staats- und Universitätsbibliothek Göttingen
- Open-Access-Publikationsfonds
- Open-Access-Pilot in FP7
- Open Access Strategie der Universität (PDF)
- Universitätsverlag Göttingen
- GoeScholar
- GOEDOC

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- Verlagsvereinbarungen für Göttinger Wissenschaftler

Weitere Informationen

- Informationsplattform Open Access
- Verlagspolicies (DINI/ Sherpa)
- Directory of Open Access Journals

Source: http://www.sub.uni-goettingen.de/fileadmin/media/texte/informationsversorgung_z/epu/oa-policy_goettingen-edu_de_110211.pdf

The funders view: DFG Recommendations

7. Veröffentlichung wissenschaftlicher Ergebnisse

a) Die DFG erwartet, dass die mit ihren Mitteln finanzierten Forschungsergebnisse zügig publiziert und dabei möglichst auch digital veröffentlicht und für den entgeltfreien Zugriff im Internet (Open Access) verfügbar gemacht werden. Die entsprechenden Beiträge sollten dazu entweder zusätzlich zur Verlagspublikation in disziplinspezifische oder institutionelle elektronische Archive (Repositorien) eingestellt oder direkt in referierten oder renommierten Open Access Zeitschriften publiziert werden.

OA policy since 2006: The DFG expects researchers to provide open access to their publications, through deposit in OA repositories or publishing in peer-reviewed OA journals. Researchers should retain a non-exclusive right to self-archive with embargo period not exceeding 6-12 months.

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Kennedyallee 40 · 53175 Bonn · Postanschrift: 53170 Bonn
Telefon: + 49 228 885-1 · Telefax: + 49 228 885-2777 · postmaster@dfg.de · www.dfg.de

d) Sofern Forschungsergebnisse ausschließlich in gedruckten Medien veröffentlicht werden, erbittet die DFG ein Belegexemplar. Falls eine Veröffentlichung nicht über den Buchhandel zugänglich ist (sog. „graue Literatur"), sondern nur in Form eines gedruckten Forschungsberichts (Report) bekannt gegeben wurde, bittet die DFG darum, je ein Exemplar der Zentralen Sammelstelle für Forschungsberichte bei der Technischen Informationsbibliothek, Welfengarten 1b, 30167 Hannover, und der zuständigen Hochschulbibliothek zuzusenden.

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Verwendungsrichtlinien für SFB, http://www.dfg.de/formulare/5_01/5_01.pdf

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Researcher **decides where to publish**

Check SHERPA RoMEO to see what OA and self-archiving options are available www.sherpa.ac.uk/romeo

Publish in an **open access journal**

Pay Article Processing Charge (APC) - *if required*

Immediate open access (via publisher)

GOLD OA ROUTE

GREEN OA ROUTE

Publish in a **subscription-based journal**

Search for a repository http://service.re3data.org/search or http://opendoar.org/

Self-archive in a repository, based on publisher policy.

Immediate or delayed open access, depending on publisher's policy

IF OPTION EXISTS
e.g. a **'hybrid' journal**
(*a subscription-based journal that has a paid open access option*)

Pay Article Processing Charge (APC)

Immediate open access (via publisher)

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Adapted from Sarah Jones, see also: http://www.dcc.ac.uk/blog/fostering-open-science

HOW TO ?

C
to

w

publisher)

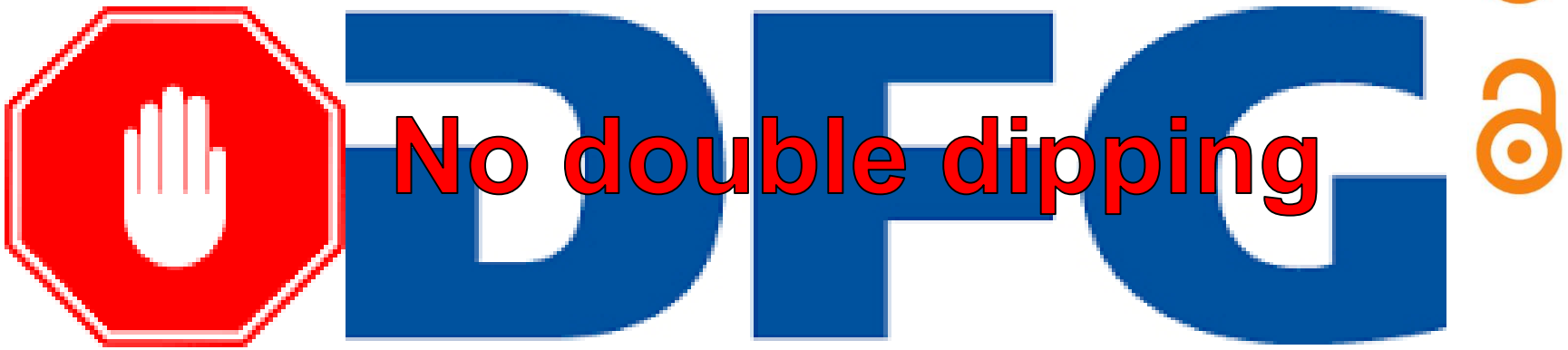
Adapted from Sarah Jones, see also: http://www.dcc.ac.uk/blog/fostering-open-science

OA routes

- Gold: OA Journal → (AP Charge) →
- Green: SB-Journal → Self-Deposit →
- Hybrid: SB-Journal → pay OA-AP →

OA routes

- Gold: OA Journal → (AP Charge) →
- Green: SB-Journal → Self-Deposit →

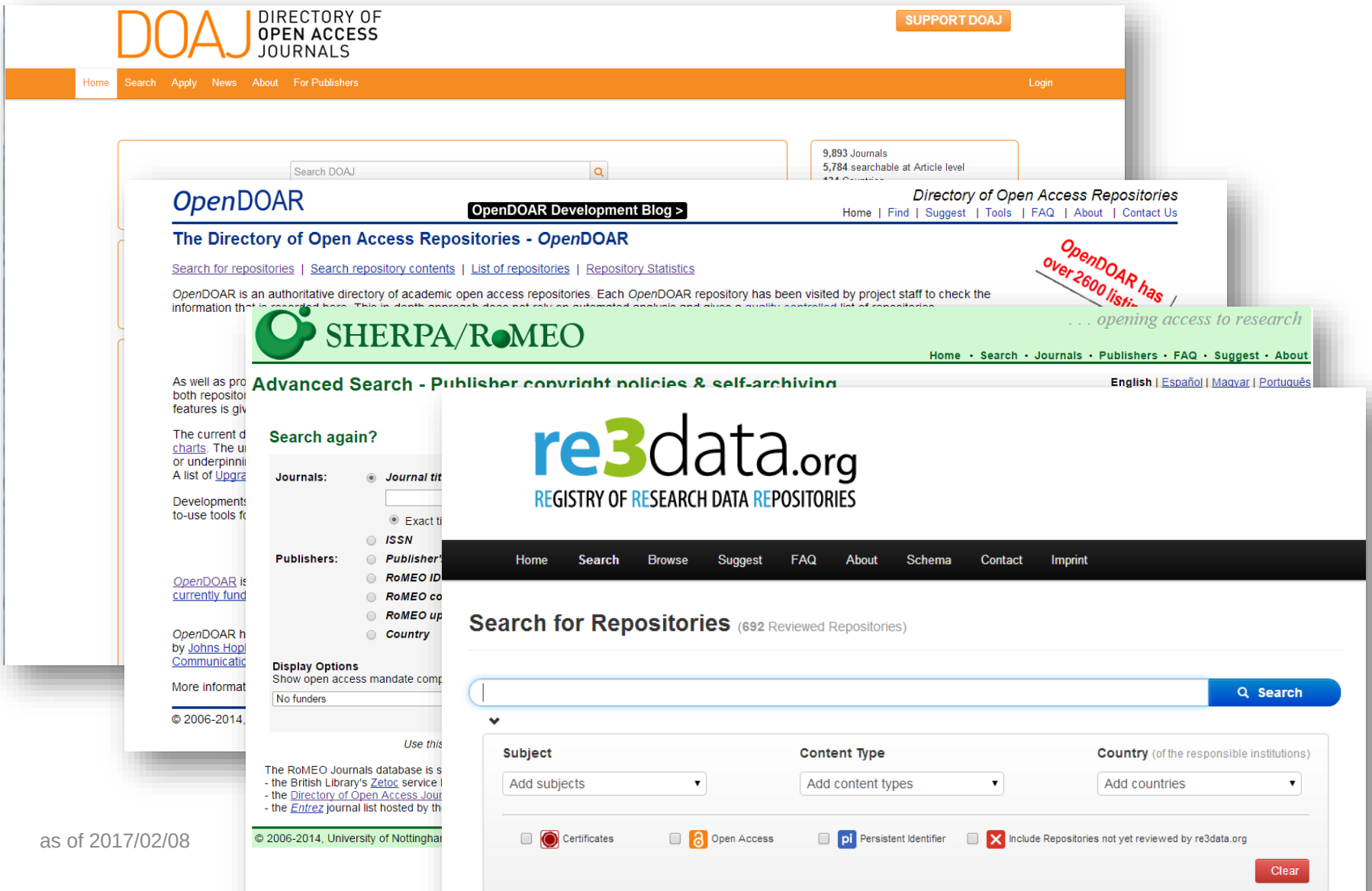


Recommendations

- retain a non-exclusive right to self-archive (Zweitveröffentlichungsrecht)
- Avoid hybrid publications

- Copyright Law, publication agreements and international law can be tricky if you are not a lawer
- Check your institutional policy
- Some information can be found on: www.open-access.net
- SUB-department Electronic Publishing can help you! -> http://www.sub.uni-goettingen.de/elektronisches-publizieren/

Finding OA journals and repositories



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SHERPA /RoMEO

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Search - Publisher copyright policies & self-archiving

One journal found when searched for: **1433-7851**

Journal:	**Angewandte Chemie International Edition** (ISSN: 1433-7851, ESSN: 1521-377
RoMEO:	This is a RoMEO **white** journal
Paid OA:	A paid open access option is **available** for this journal.
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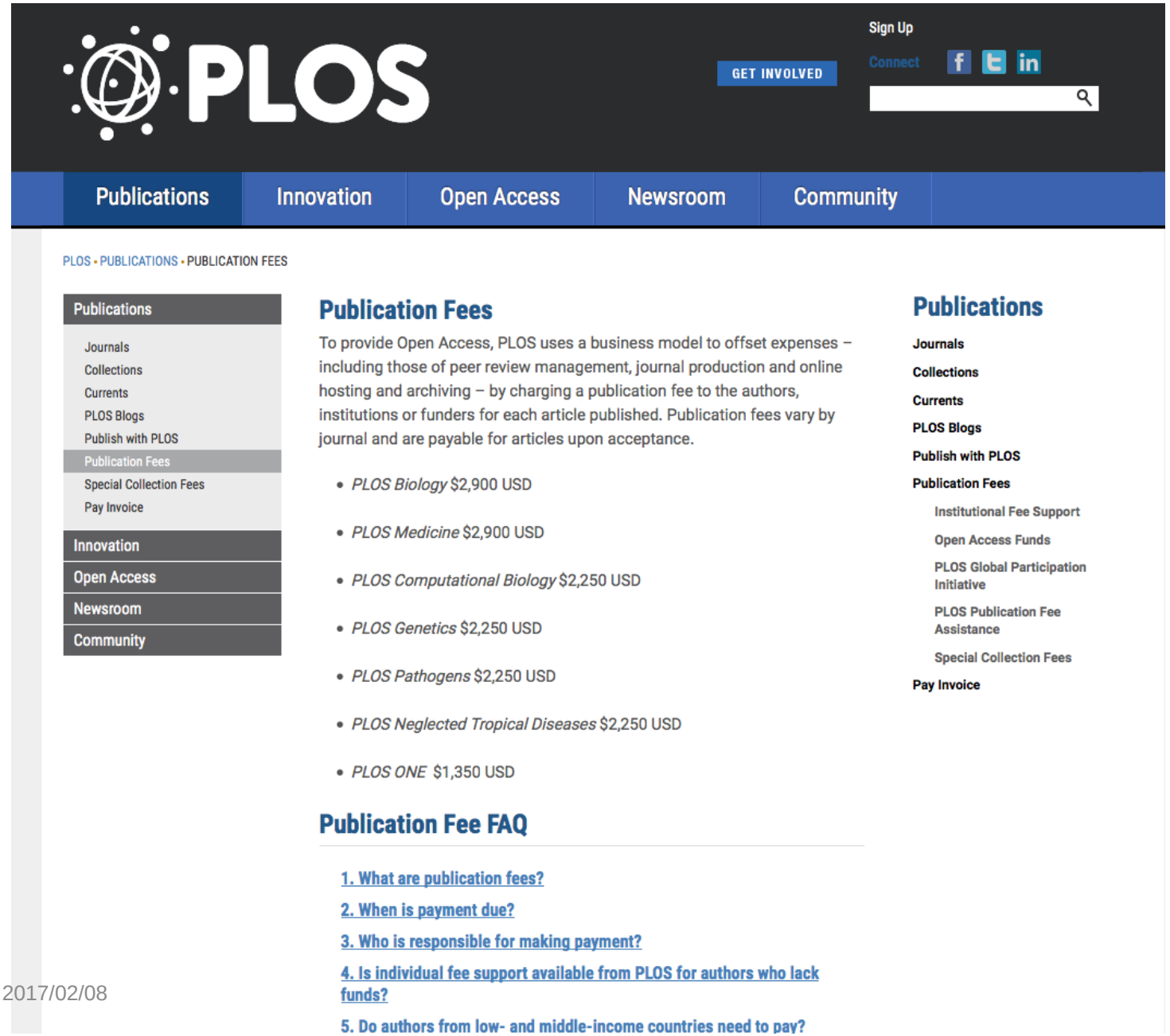

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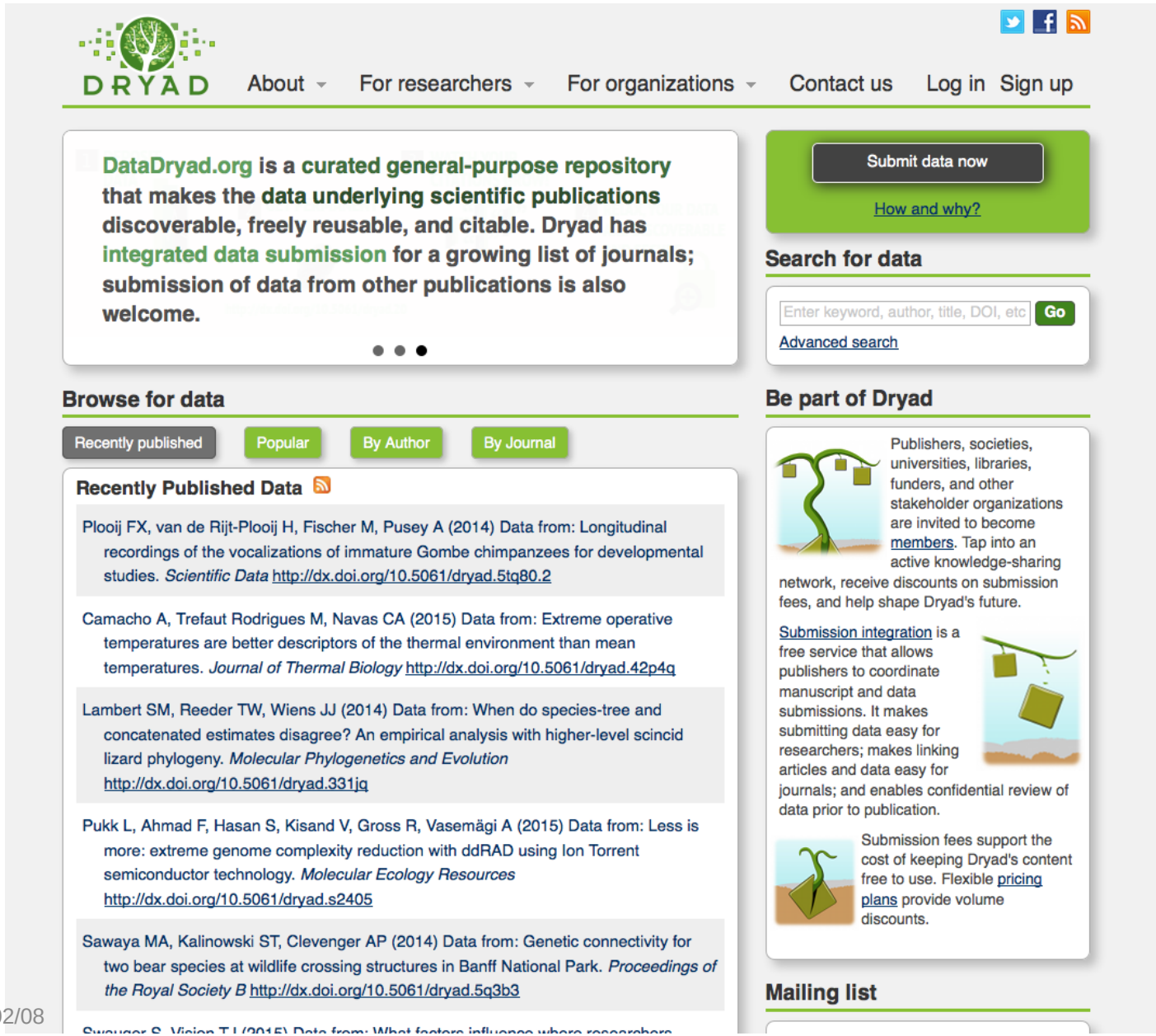
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Camacho A, Trefaut Rodrigues M, Navas CA (2015) Data from: Extreme operative temperatures are better descriptors of the thermal environment than mean temperatures. Journal of Thermal Biology http://dx.doi.org/10.5061/dryad.42p4q
Lambert SM, Reeder TW, Wiens JJ (2014) Data from: When do species-tree and concatenated estimates disagree? An empirical analysis with higher-level scincid lizard phylogeny. Molecular Phylogenetics and Evolution http://dx.doi.org/10.5061/dryad.331jq
Pukk L, Ahmad F, Hasan S, Kisand V, Gross R, Vasemägi A (2015) Data from: Less is more: extreme genome complexity reduction with ddRAD using Ion Torrent semiconductor technology. Molecular Ecology Resources http://dx.doi.org/10.5061/dryad.s2405
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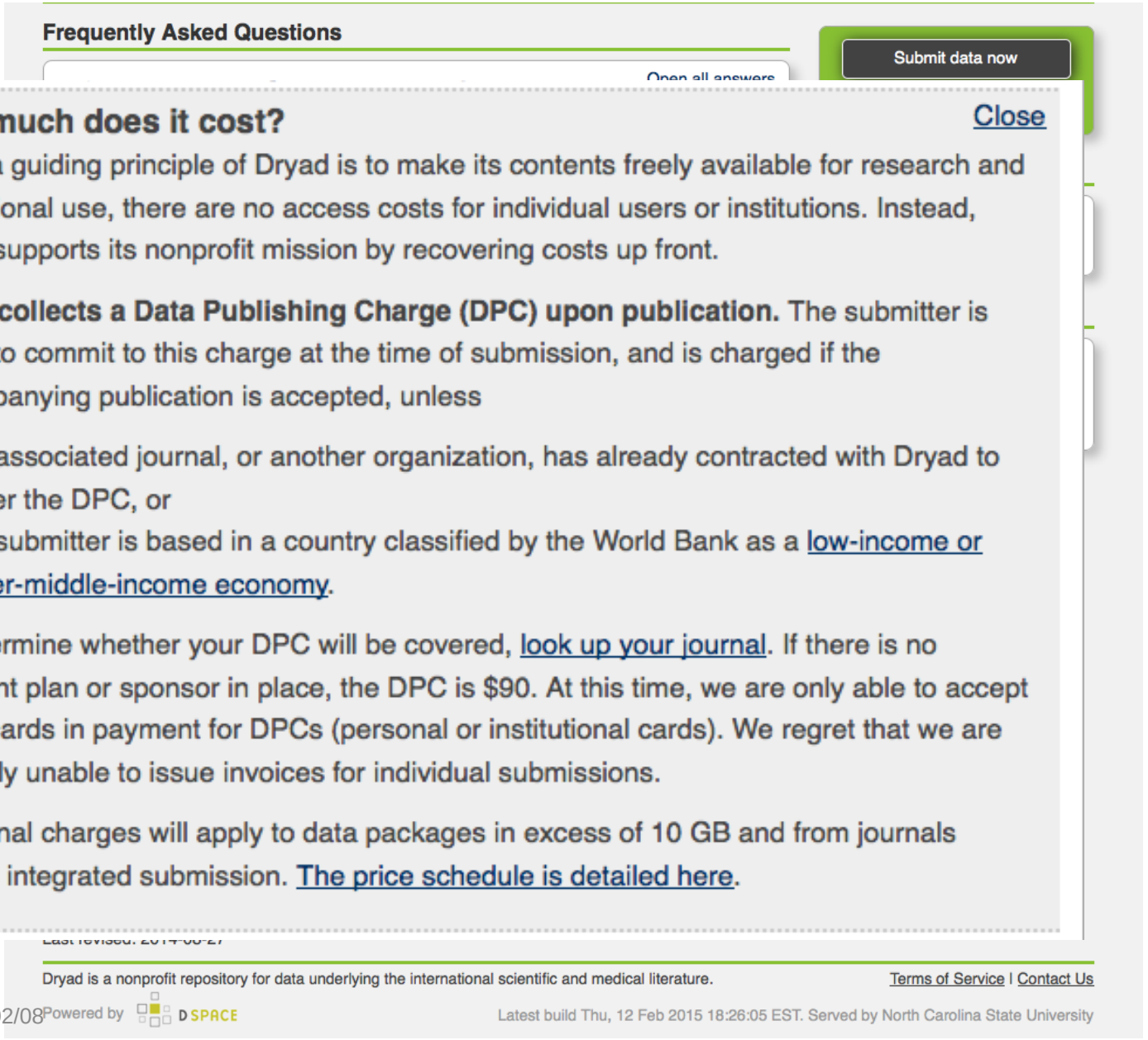
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- General **information and support** for publishing and policies (IPR, funders)
- **Publishing fund** for publishing in OA journals
- **Digital Repositorie**s
  - **eDiss**: PhD theses
  - **GoeScholar**: peer-reviewed parallel publications
  - **GoeDoc**: working papers etc.
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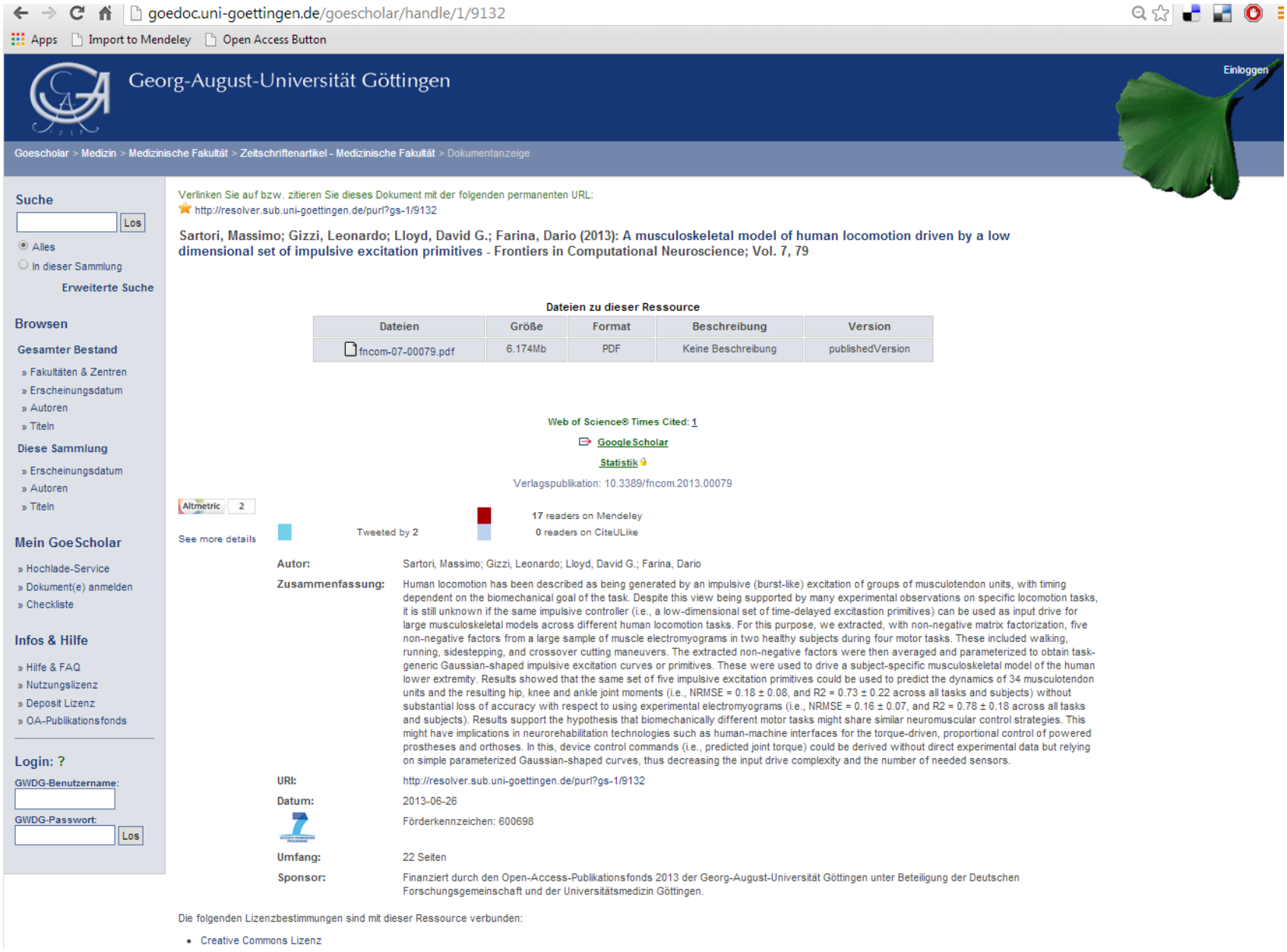

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Sartori, Massimo; Gizzi, Leonardo; Lloyd, David G.; Farina, Dario (2013): A musculoskeletal model of human locomotion driven by a low dimensional set of impulsive excitation primitives - Frontiers in Computational Neuroscience; Vol. 7, 79

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Autor: Sartori, Massimo; Gizzi, Leonardo; Lloyd, David G.; Farina, Dario

Zusammenfassung: Human locomotion has been described as being generated by an impulsive (burst-like) excitation of groups of musculotendon units, with timing dependent on the biomechanical goal of the task. Despite this view being supported by many experimental observations on specific locomotion tasks, it is still unknown if the same impulsive controller (i.e., a low-dimensional set of time-delayed excitastion primitives) can be used as input drive for large musculoskeletal models across different human locomotion tasks. For this purpose, we extracted, with non-negative matrix factorization, five non-negative factors from a large sample of muscle electromyograms in two healthy subjects during four motor tasks. These included walking, running, sidestepping, and crossover cutting maneuvers. The extracted non-negative factors were then averaged and parameterized to obtain task-generic Gaussian-shaped impulsive excitation curves or primitives. These were used to drive a subject-specific musculoskeletal model of the human lower extremity. Results showed that the same set of five impulsive excitation primitives could be used to predict the dynamics of 34 musculotendon units and the resulting hip, knee and ankle joint moments (i.e., NRMSE = 0.18 ± 0.08, and R2 = 0.73 ± 0.22 across all tasks and subjects) without substantial loss of accuracy with respect to using experimental electromyograms (i.e., NRMSE = 0.16 ± 0.07, and R2 = 0.78 ± 0.18 across all tasks and subjects). Results support the hypothesis that biomechanically different motor tasks might share similar neuromuscular control strategies. This might have implications in neurorehabilitation technologies such as human-machine interfaces for the torque-driven, proportional control of powered prostheses and orthoses. In this, device control commands (i.e., predicted joint torque) could be derived without direct experimental data but relying on simple parameterized Gaussian-shaped curves, thus decreasing the input drive complexity and the number of needed sensors.

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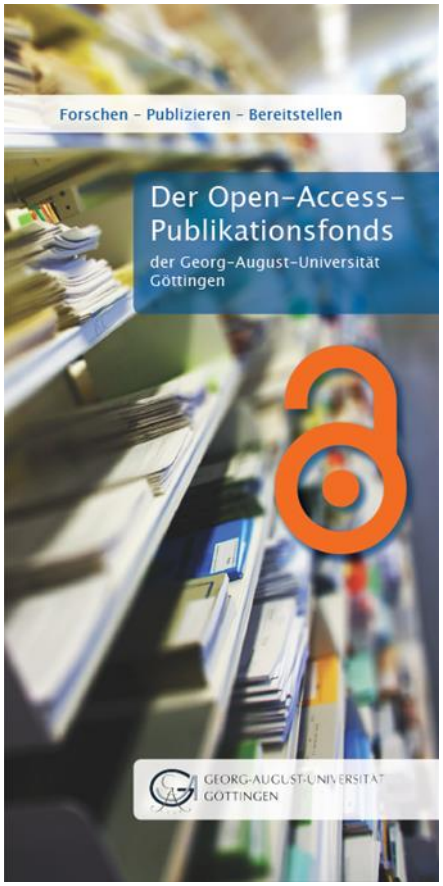

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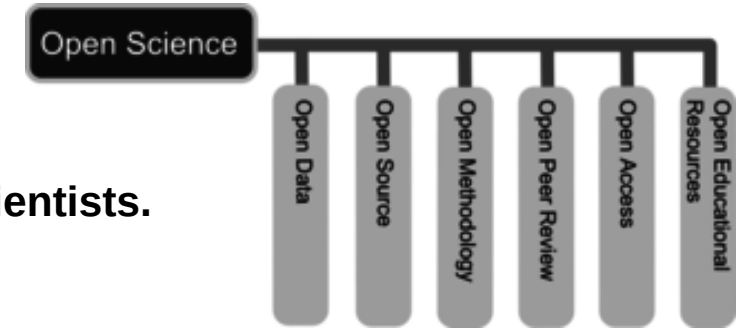

Cons:

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- **The public will misunderstand science data.**
- **Increasing the scale of science will make verification of any discovery more difficult.**

Pros:

- **Open access publication of research reports and data allows for rigorous peer-review**
- **Science is publicly funded so all results of the research should be publicly available**
- **Open Science will make science more reproducible and transparent**
- **Open Science has more impact**

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Open Science at UGOE

- Open Science network established in Dec 2016
- #OpenScienceGoe
- First Open Science Meet-up at December 6, 2016:
  - Tweets at: https://storify.com/dbeucke/open-science-meet-up
- Next meeting at March 1st, 14-17
  - Get involved! Registration:

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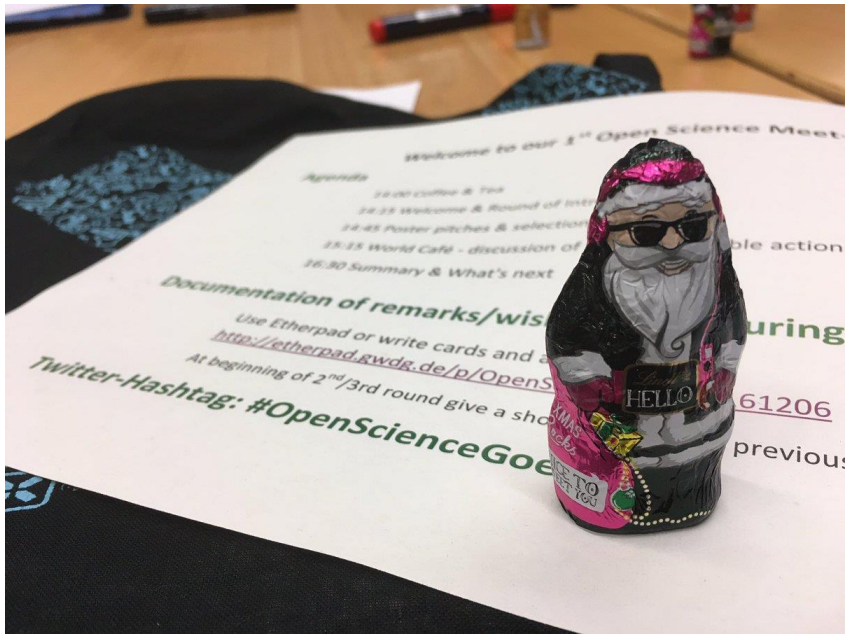

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Exercise: Backup & Restore

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Wrap up: Best Practices

- **Plan your RDM before you start**
- **Discuss your approach**
- **Backup your data**
- **Explain your data**
- **Share your data**

Thank you!

Questions?

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