SCIENCE MEETS LIFE

opening a window

into a whole new world

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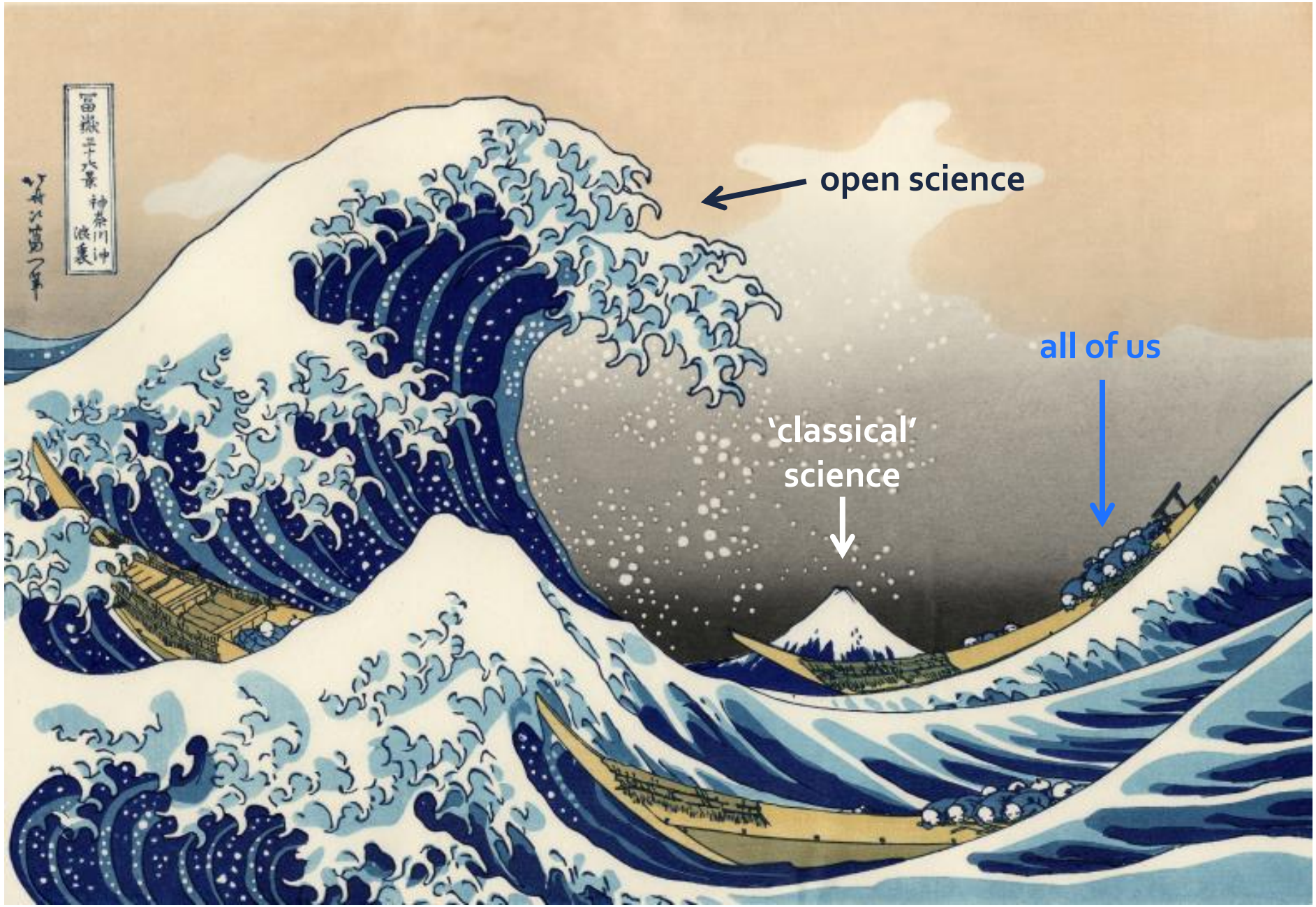

"The Great Wave off Kanagawa", by Hokusai, ~1830

open science is here to stay

what does it all entail?

open access, open data, open code

the administration of open science

the impact of open science on education

a summary in three parts

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Open science is both mandated by funders and journals, but can be a bit of a minefield legally

European Commission

English

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European Research Executive Agency

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Open science

Q&A on what you should comply with when applying for funding and implementing your project

PAGE CONTENTS

Open science in Horizon Europe

Open science and the proposal application

Open science and project implementation

Open science and Intellectual Property Rights (IPR)

Open science in Horizon Europe

Did you know that open science is a legal obligation under Horizon Europe? Its purpose is to foster greater transparency and trust for the benefit of scientific research and for the benefit of EU citizens.

Confused or unsure about how to comply with open science principles when applying for EU funding and when implementing your project?

Fear not! REA has prepared an information package and series of Q&As below. This may help you to successfully implement open science practices in your proposals and during your project if your proposal is selected for funding.

Where are the data?

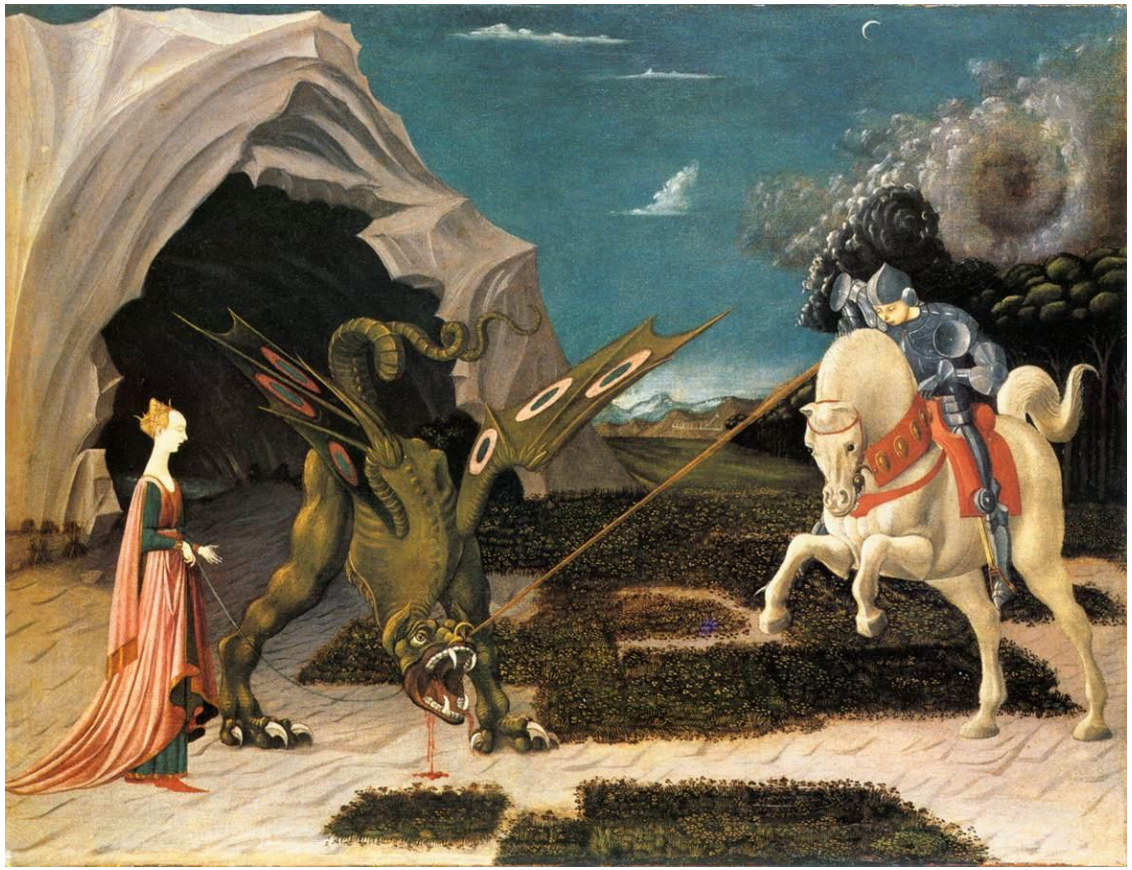
***Nature Biotechnology* now requires data availability statements to be supplied with research papers.**

As the research community embraces data sharing, academic journals can do their bit to help. Starting this month, all research papers published in *Nature Biotechnology*, *Nature* and 11 other Nature titles will include information on whether and how others can access the underlying data.

These statements will report the availability of the 'minimal data set' ed in blicly study. ase of ted to

long- It also ets in

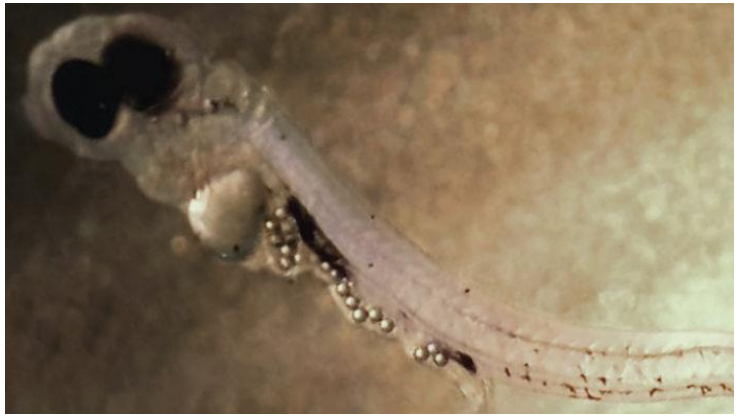
Whatever the context, open science is here today, here to stay, and will be bigger tomorrow



Saint George and the Dragon
about 1470, Paolo Uccello

https://www.flickr.com/photos/scriptingnews/3503448168
(CC BY-SA 2.0)

Open science is frequently linked to scientific integrity, and absence of data can be a very strong red flag



After an investigation, the Central Ethical Review Board in Sweden has recommended the retraction of the Report "Environmentally relevant concentrations of microplastic particles influence larval fish ecology," by Oona M. Lönnstedt and Peter Eklöv, published in Science on 3 June 2016 (1). Science ran an Editorial Expression of Concern regarding the Report on 1 December 2016 (2). **The Review Board's report, dated 21 April 2017, cited the following reasons for their recommendation: (i) lack of ethical approval for the experiments; (ii) absence of original data for the experiments reported in the paper; (iii) widespread lack of clarity concerning how the experiments were conducted.** Although the authors have told Science that they disagree with elements of the Board's report, and although Uppsala University has not yet concluded its own investigation, the weight of evidence is that the paper should now be retracted. In light of the Board's recommendation and a 28 April 2017 request from the authors to retract the paper, **Science is retracting the paper in full.**

We need to make a choice of how we frame open science

Show me your data, now!

I don't trust you!

I'll find all your mistakes!

This will not end well!

Could I look at your data?

OK, this is pretty cool!

Look what I found in here!

Your data is so useful!

And let us not forget that your data will most likely live a much longer and more useful life than your publication!

https://hero.fandom.com/wiki/Good_Cop

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A nice guide to practical open science has been written, but it has been a few years ago.

Preprint

NOT PEER-REVIEWED

"*PeerJ Preprints*" is a venue for early communication or feedback before peer review. Data may be preliminary.
Learn more about preprints or browse peer-reviewed articles instead.

Do you speak open science? Resources and tips to learn the language

Science and Medical Education

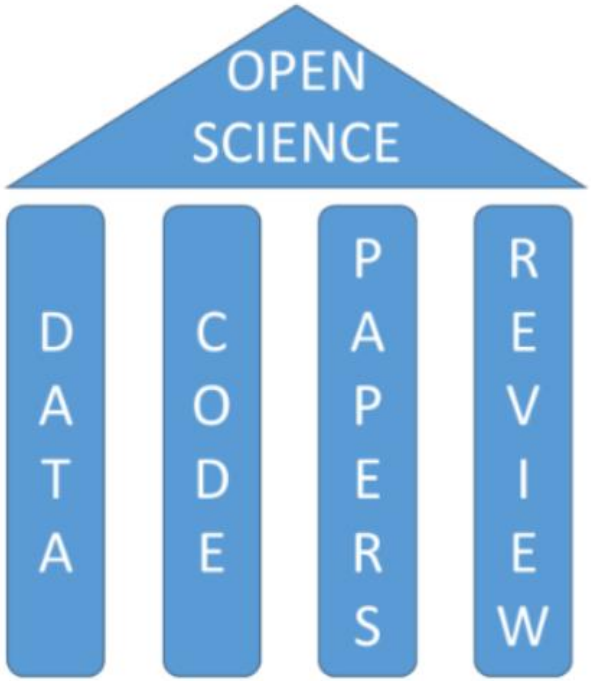
Paola Masuzzo[1,2], Lennart Martens[1,2]

January 3, 2017

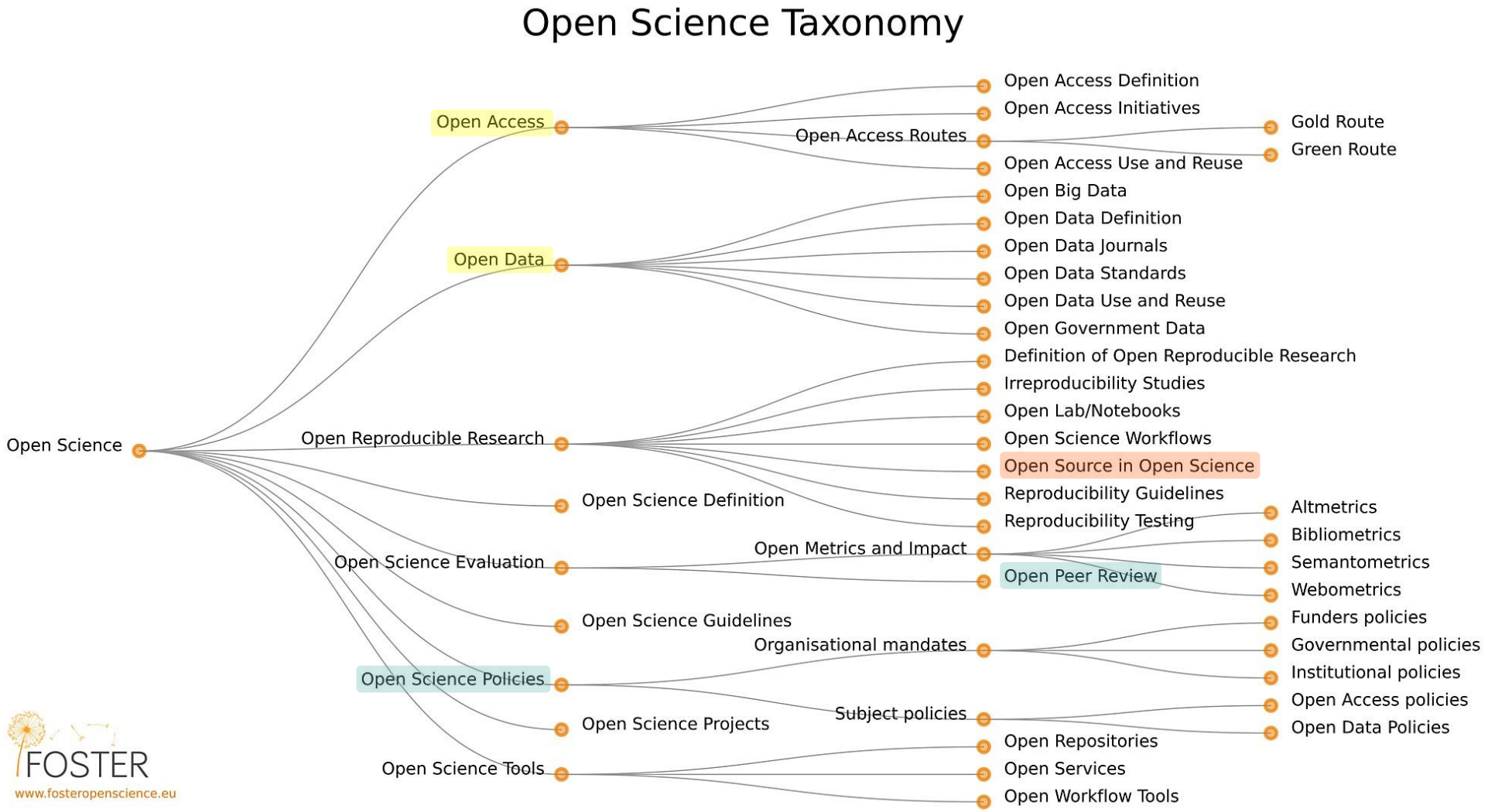
Author and article information

Abstract

The internet era, large-scale computing and storage resources, mobile devices, social media, and their high uptake among different groups of people, have all deeply changed the way knowledge is created, communicated, and further deployed. These advances have enabled a radical transformation of the practice of science, which is now more open, more global and collaborative, and closer to society than ever. Open science has therefore become an increasingly important topic. Moreover, as open science is actively pursued by several high-profile funders and institutions, it has fast become a crucial matter to all researchers. However, because this widespread interest in open science has emerged relatively recently, its definition and implementation are constantly shifting and evolving, sometimes leaving researchers in doubt about how to adopt open science, and which are the best practices to follow.



A somewhat different (more detailed) open science taxonomy has been collated by the FOSTER network



Knoth, Petr; Pontika, Nancy (2015): Open Science Taxonomy. figshare. https://dx.doi.org/10.6084/m9.figshare.1508606

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In 2010, Elsevier's reported a 36% profit margin – higher than Apple, Google, or Amazon that year

www.theguardian.com/science/2017/jun/27/profitable-business-scientific-publishing-bad-for-science

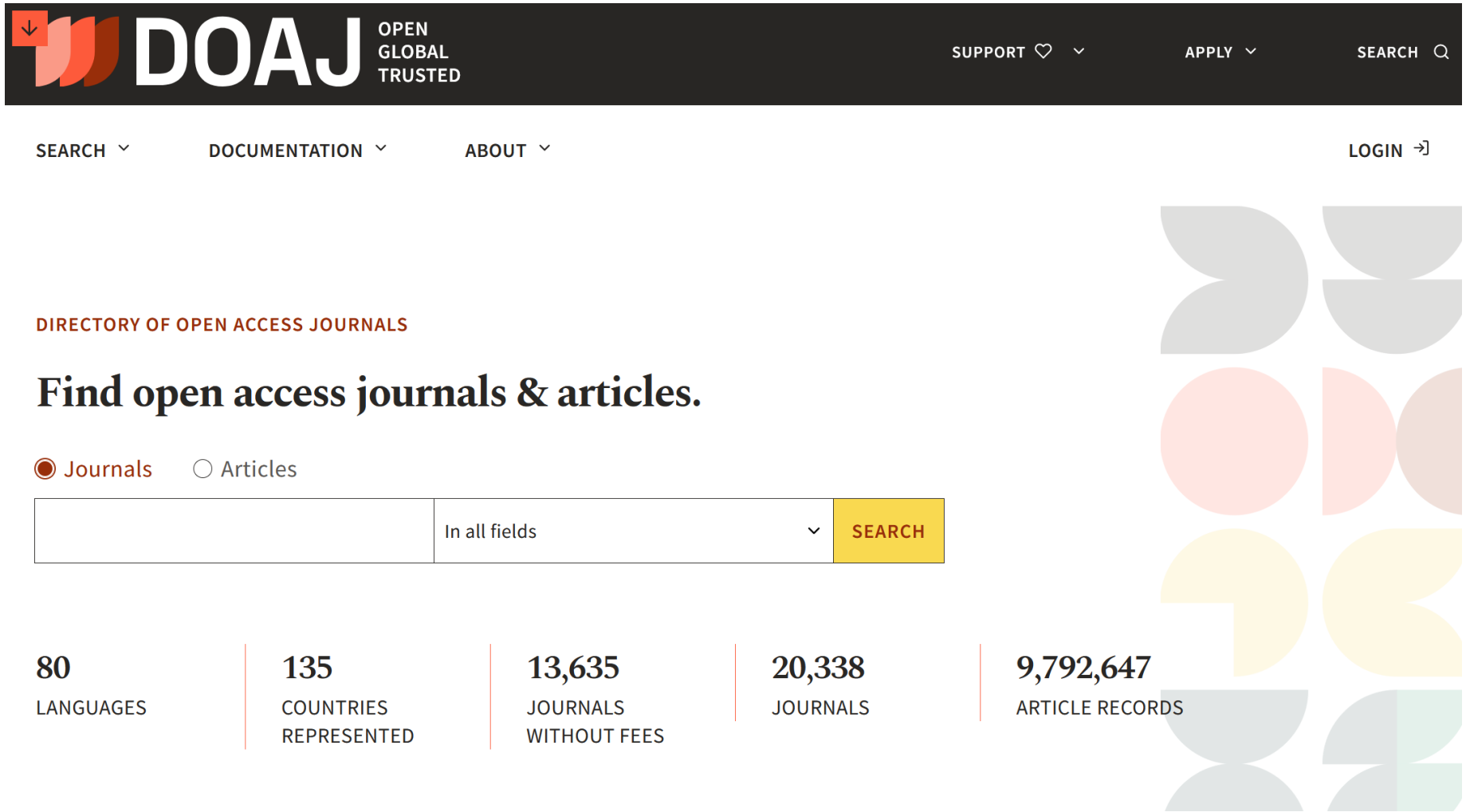
Three types of open access: gold, green, and delayed

Gold open access means you pay, as author, to have your paper open access. *Other papers in the same journal may not be, and so subscriptions remain necessary!* Journals love this as it means they get paid twice.

Green open access means that you deposit a preprint (without the 'added value' of peer review and typesetting) to a public repository such as arXiv, BioRxiv, MedRxiv, or ChemRxiv.

Delayed open access means that your paper only becomes open access after an embargo period (often a year)

The Directory of Open Access Journals helps you to find open access journals



https://doaj.org/

Green open access as a means to fast and free open access

PeerJ Preprints

zenodo

figshare

arXiv.org

bioRxiv beta

THE PREPRINT SERVER FOR BIOLOGY

ASAPbio

Innovations in peer review

JUNE 26, 2017 PROTOHEDGEHOG OPEN SCIENCE

Peer review is broken, but we hold the technological and social solutions to fix it. Right now.

We just submitted a monster paper on the history and present diversity of peer review practices to F1000 Research. It's available in advance here, and soon will be open to public commenting from anyone as it undergoes formal peer review. We wrote it in a similar manner to another paper published on Open Access last year.

INSTITUTIONAL REPOSITORIES

Ghent University has built its own institutional repository

UNIVERSITEIT GENT

ACADEMIC BIBLIOGRAPHY

Add publications and datasets Lists Sign in

Search 200 years of publications by Ghent University researchers.

Search publications and datasets Advanced search

Recently added research

New open access publications and datasets

Ghent University has a policy setting out its vision and guidelines for scholarly publishing.

- → Blood-borne extracellular vesicles of bacteria and intestinal cells in patients with ps...
- → Characterization of the genetic composition and establishment of a core collection for ...
- → Decolonizing Rather than Decentring 'Europe'
- → Data from: An Impact Assessment of Par-Baking and Storage on the Quality of Wheat, Whol...
- → Auto-scaling dataset based on the gym-hpa framework
- → jpedro1992/gym-hpa: v0.0.1-alpha

View all open access publications and datasets.

Connected with ORCID

ORCID provides a persistent identifier that will distinguish you from other researchers throughout your scholarly career.

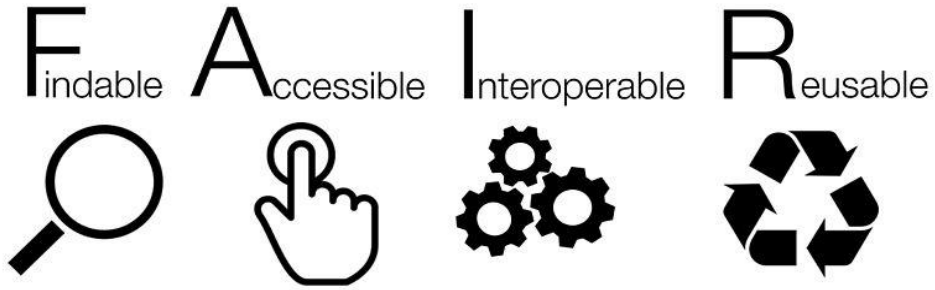
- → Choosing one type of advocacy tactics over the other?
- → The role of orphan crops in the transition to nutritional quality-oriented crop improve...
- → Mucosa-associated lymphoid tissue lymphoma translocation protein 1 inhibition alleviate...

New PhD dissertations

- → The parasite community of solitary bees and Anthropogenic filtering of the gut microbiome.
- → 3D-explicit tree representation from terrestrial laser scanning to improve radiative t...
- → Identification and characterization of protein interactions between the hepatitis E vir...
- → Studying microglia and astrocytes in the liver-brain axis during chronic experimental h...
- → Endectocide treatment of cattle as complementary tool for malaria control in Sub-Sahara...

https://biblio.ugent.be

Open data is widely organised around FAIR principles, and compliant (generic) data storage systems exist



RCSB PDB PROTEIN DATA BANK

IDR

zenodo

figshare

NEURO VAULT

CXIDB Coherent X-ray Imaging Data Bank

OpenfMRI

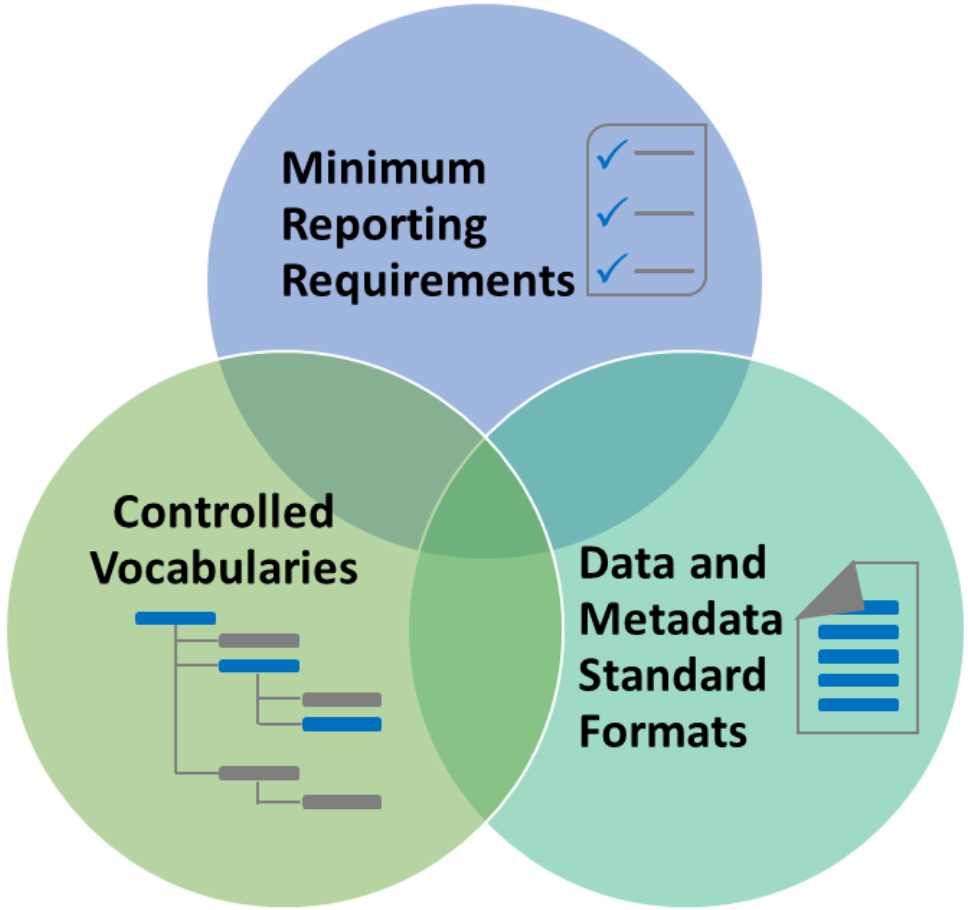
OpenTrials All the Data, on All the Trials, Linked

DRYAD

COS CENTER FOR OPEN SCIENCE

FAIR data principles, WikiMedia Commons, CC BY-SA 4.0

Data sharing requires three building blocks: minimal requirements, CVs, and standard formats



Of course, a suitable data licence needs to be chosen as well, and here, Creative Commons licences are the most popular

Data without license may NOT be shared at all

Two Creative Commons licenses should be your top choices:

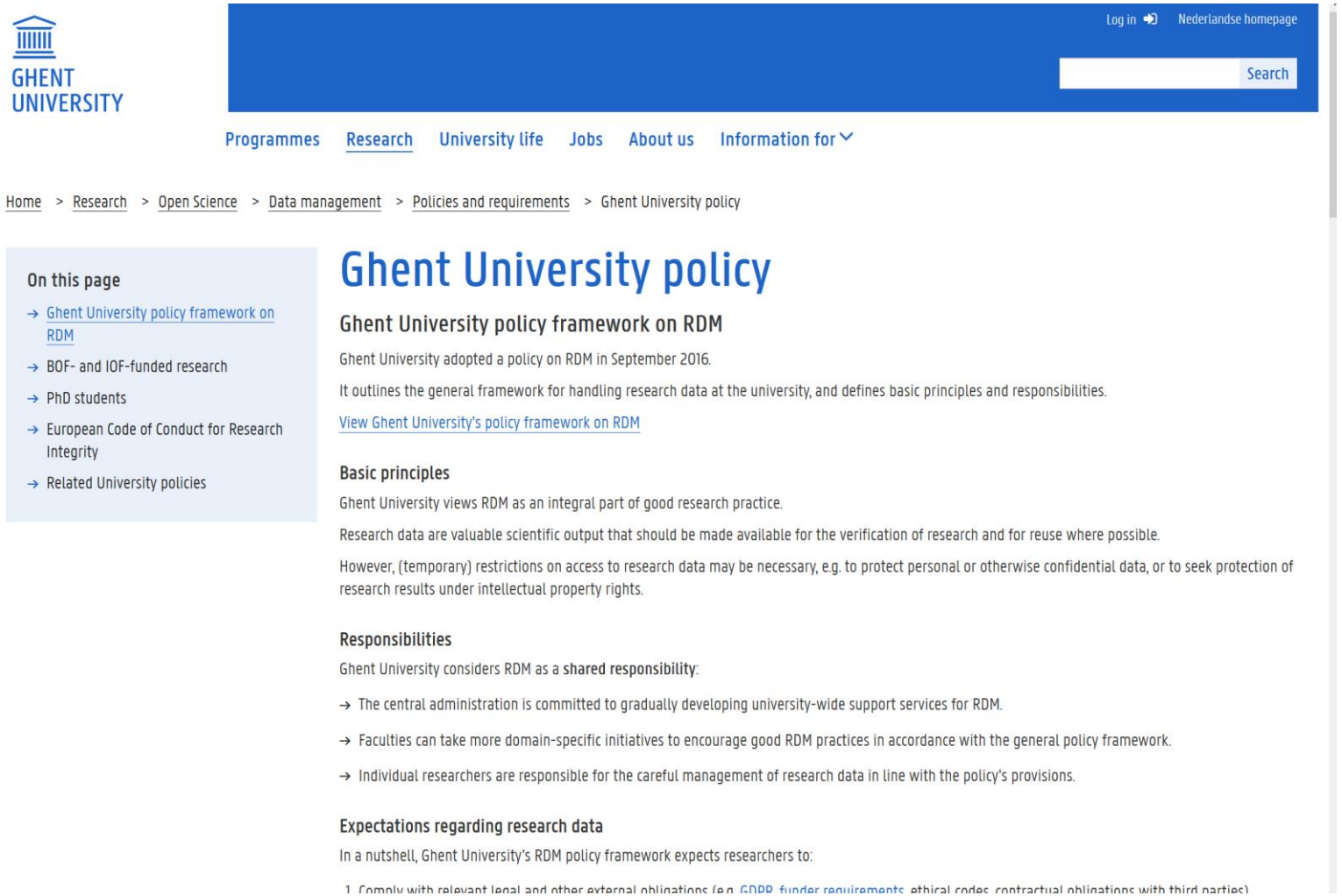
- Attribution (CC BY), only mandates recognition of the author
- Attribution-ShareAlike (CC BY-SA), as CC BY above, but all derived works need to be licensed CC-BY-SA as well (*infectious licence*)

Note that CC licenses are **not** meant for software code; see later for examples of suitable open source licenses!

Wikipedia and a lot of Flicr uses CC, amongst many others

https://creativecommons.org
https://creativecommons.org/licenses

Ghent University has defined a detaileded policy framework on research data management (RDM)



GHENT UNIVERSITY

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- Ghent University policy framework on RDM
- BOF- and IOF-funded research
- PhD students
- European Code of Conduct for Research Integrity
- Related University policies

Ghent University policy

Ghent University policy framework on RDM

Ghent University adopted a policy on RDM in September 2016.

It outlines the general framework for handling research data at the university, and defines basic principles and responsibilities.

View Ghent University's policy framework on RDM

Basic principles

Ghent University views RDM as an integral part of good research practice.

Research data are valuable scientific output that should be made available for the verification of research and for reuse where possible.

However, (temporary) restrictions on access to research data may be necessary, e.g. to protect personal or otherwise confidential data, or to seek protection of research results under intellectual property rights.

Responsibilities

Ghent University considers RDM as a **shared responsibility**:

→ The central administration is committed to gradually developing university-wide support services for RDM.

→ Faculties can take more domain-specific initiatives to encourage good RDM practices in accordance with the general policy framework.

→ Individual researchers are responsible for the careful management of research data in line with the policy's provisions.

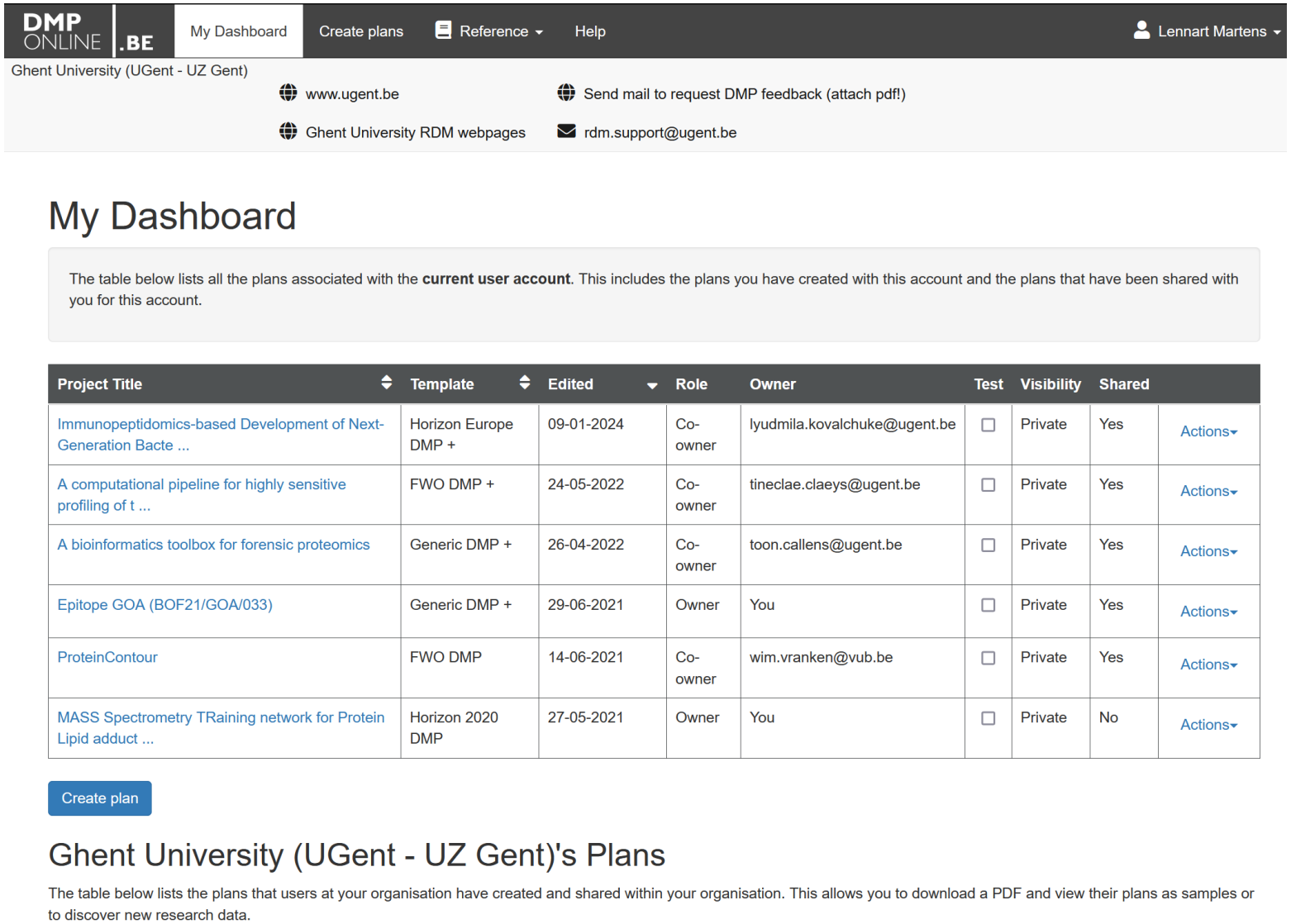
Expectations regarding research data

In a nutshell, Ghent University's RDM policy framework expects researchers to:

1. Comply with relevant legal and other external obligations (e.g. GDPR, funder requirements, ethical codes, contractual obligations with third parties)

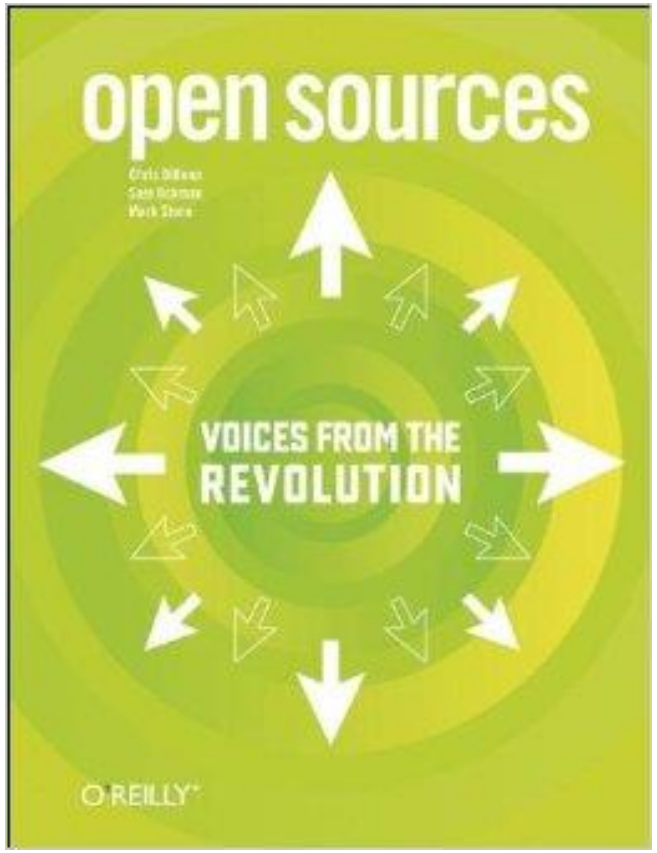
https://www.ugent.be/en/research/openscience/datamanagement/policies/ghent-university.htm

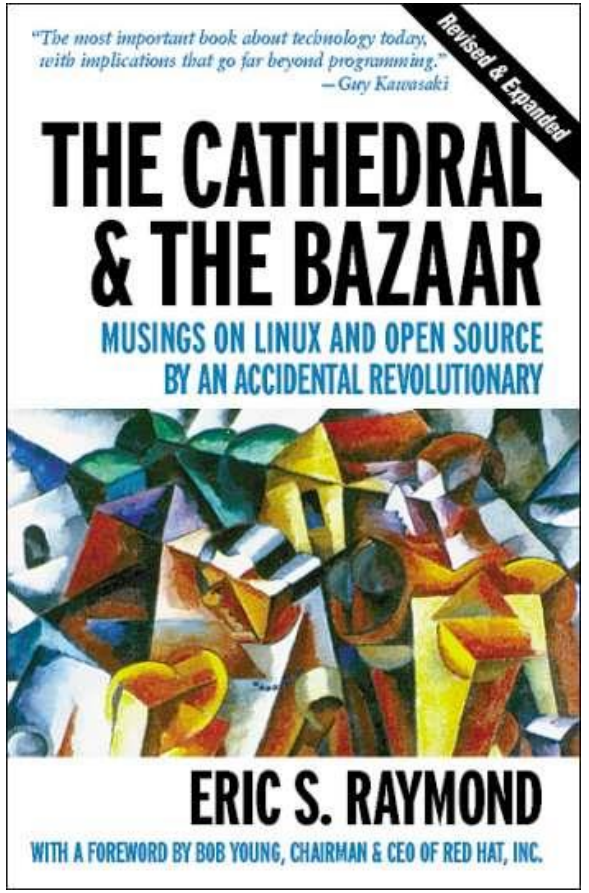
Data management plans are mandatory for all UGent funding as well as for most external funders



https://dmponline.be

The open source paradigm is old and venerable, and certainly not only linked to science





There's some choice in open source or free software licenses, and making that choice is not entirely trivial

GNU GPL: copyleft, infective

GNU LGPL: copyleft, but linking is non-infective

Apache2: open source, permissive

MIT: open source, permissive

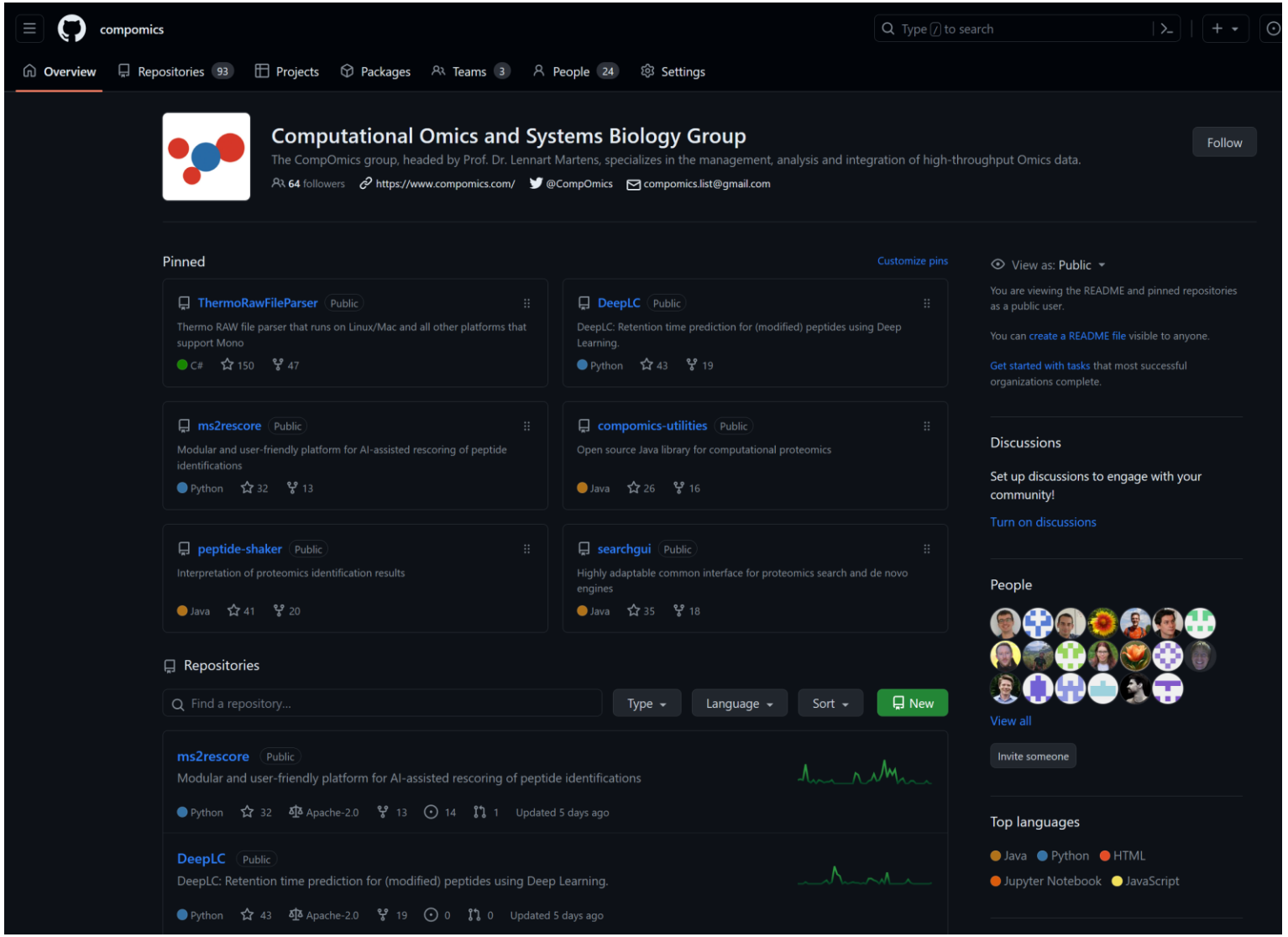
BSD: open source, permissive

Creative Commons: not meant for software!

Not all licenses can be altered afterwards, and most need explicit permission from all contributing authors!

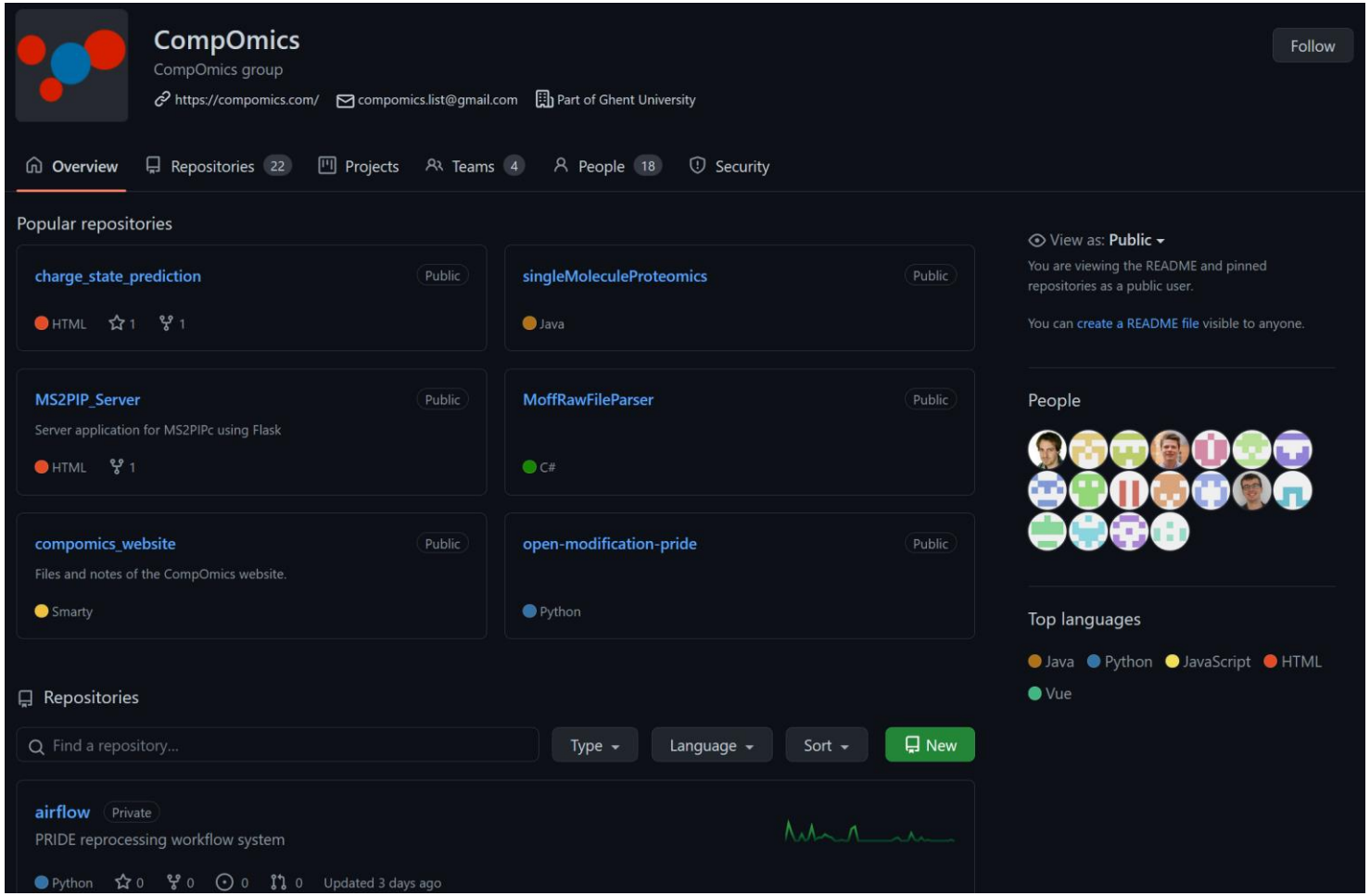
https://opensource.org/licenses/category
https://en.wikipedia.org/wiki/Comparison_of_free_and_open-source_software_licenses
http://choosealicense.com/licenses

Open source code should be hosted on a third-party platform, like GitHUb, BitBucket, or similar



https://github.com/compomics

Ghent University has its own local GitHub server, used during development or in case of potential IP



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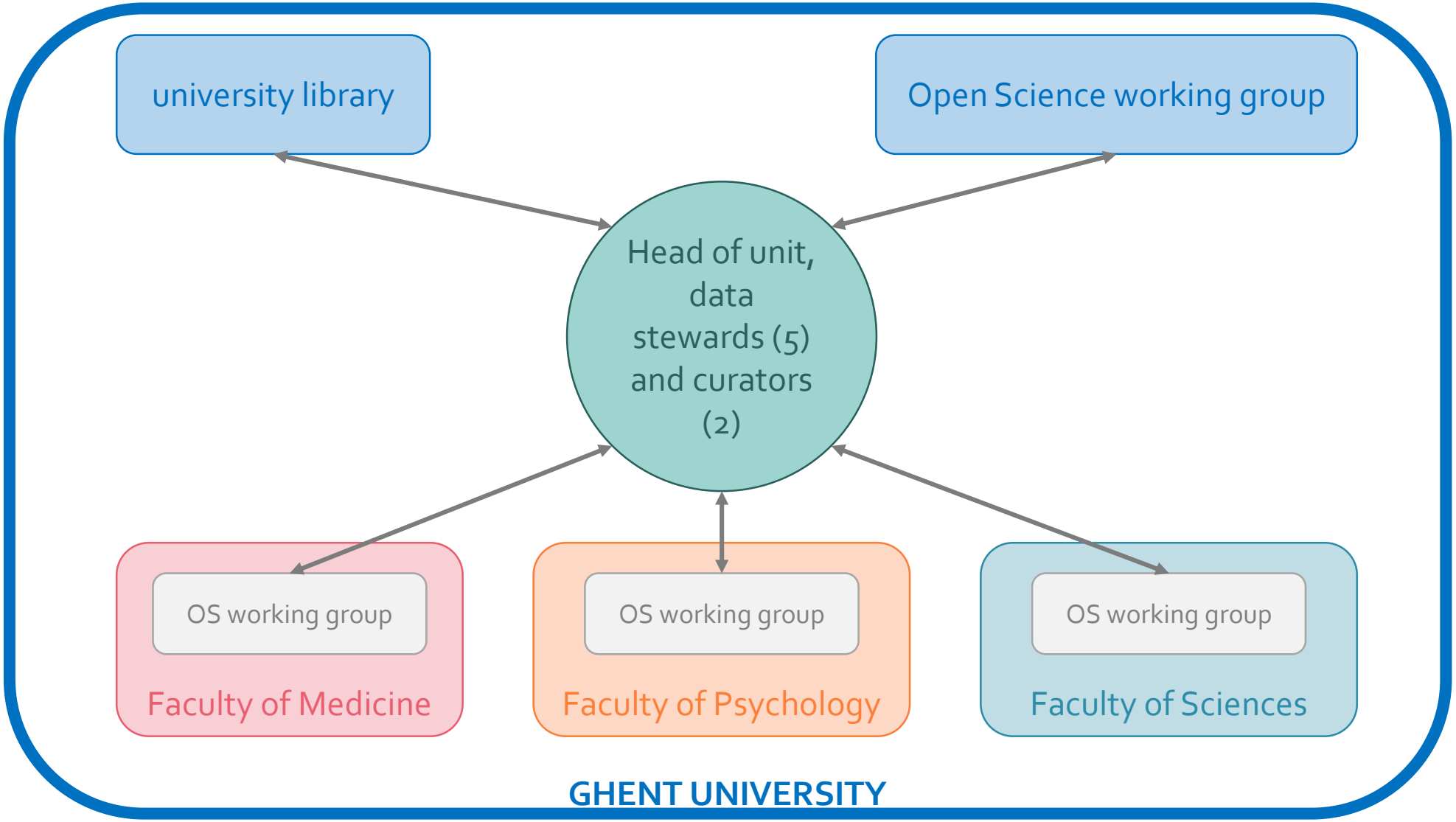
Ghent University has working groups at different levels, with a central, connecting role reserved for data stewards



The roles of the data stewards is to broadly support open science practices, and help fulfill requirements

How can we help?

We offer a range of **advisory, training, and curation services** regarding (the management of) research data:

→ Data Management Plan support (templates, guidance, feedback, examples)

→ Online information and guidance

→ RDM helpdesk

→ Consultations with individual researchers & groups

→ Training, info sessions, & other events

→ User support for Library RDM tools (e.g. DMPonline.be; OSF for UGent)

→ Curation of datasets and software registered in Biblio

→ Curation of datasets and software submitted e.g. to the Ghent University Zenodo Community, or on request

https://www.ugent.be/en/research/openscience/datamanagement/support/data-stewards-curators.htm

The six data stewards are each assigned to a topic cluster

Who are we?

As data stewards and data curators we are members of the **open science team** within Ghent University Library (Boekentoren), which is part of the University's Research Department.

We have experience with research and data in various disciplines, thus forming a team with complementary skills and areas of expertise.

Our group includes 1 coordinator, 5 data stewards, and 2 data curators:

Open science coordinator

→ Myriam Mertens

Data stewards

We act as a main RDM point of contact for each of the 5 faculty clusters.

We aim to be as visible and accessible as possible within the faculties, for example through activities such as consultations with researchers, training, and other events.

→ Cluster **Law, Arts & Humanities** (Faculties of Arts & Philosophy; Law & Criminology): Thomas Van de Velde

→ Cluster **Social and Behavioural Sciences** (Faculties of Economics & Business Administration; Psychology & Educational Sciences; Political & Social Sciences): Ziad Choueiki

→ Cluster **Natural Sciences** (Faculty of Sciences): Paula Oset

→ Cluster **(Bioscience) Engineering** (Faculties of Engineering & Architecture; Bioscience Engineering): Stefanie De Bodt

→ Cluster **Life Sciences & Medicine** (Faculties of Medicine & Health Sciences; Veterinary Medicinen; Pharmaceutical Sciences): Laura Standaert

Data curators

→ Evelien Dhollander

→ Kevin Leonard

https://www.ugent.be/en/research/openscience/datamanagement/support/data-stewards-curators.htm

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Focusdag

Woensdag 8 november 2017
9.30u - 17.00u
Paleis der Academiën, Brussel

lennart martens, Jonge Academie

Jonge Academie

DEPARTEMENT
ECONOMIE
WETENSCHAP &
INNOVATIE

Open Science is actually expanding the value of our research

Value is increasingly recognized to be found in (collections of) data from scientific research, and in shared code

Opportunities abound for those who wish to tap into the information made available through open science.

Many of the most valuable companies on the planet already know that large scale data analysis is very much worthwhile

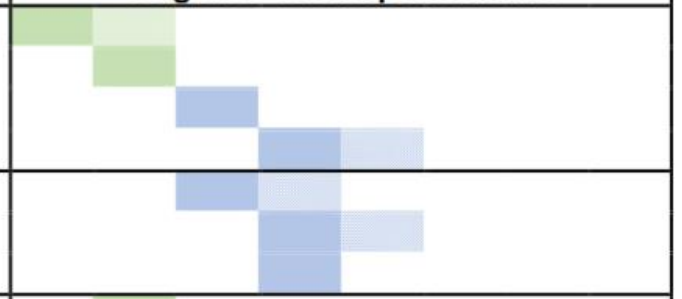
We also need to introduce changes into how we train, and into how we evaluate

We have to provide people with the right skillset

- *Basic data management skills for everyone*
- *Basic data consumption skills for everyone*
- *Specialisation for Data Stewards*
- *Specialisation for Data Scientists*

We need to stimulate and reward original thinking on the (re-)use of open data, as it contains enormous potential!

In the Faculty of Medicine, we created adaptable educational guidance to bring open science skills into the curricula

		RDM-eindcompetenties	Volgorde van implementatie
1. Verantwoordelijke dataproducenten	1.1 Inbedding in doelstellingen voor verantwoord en correct onderzoek	1.1.1 Kennis van regels en normen inzake RDM 1.1.2 Inzicht in verantwoordelijkheid onderzoeker voor RDM 1.1.3 Kennis van RDM oplossingen 1.1.4 Toepassen van RDM oplossingen	
	1.2 Uitbreiding van technische kennis/vaardigheden	1.2.1 Kennis van beveiliging en encryptie 1.2.2 Toepassen van beveiliging en encryptie 1.2.3 Kennis van opslag/archiveringsstrategieën	
2. Gesofistikeerde dataconsumenten	2.1 Inbedding in doelstellingen voor (statistische) data analyse	2.1.1 Kennis van publieke databronnen 2.1.2 Inzicht in nut en beperkingen publieke data 2.1.3 Toepassen: het opvragen van publieke data 2.1.4 Kennis van grootschalige analyse van publieke data	
	2.2 Uitbreiding van technische kennis/vaardigheden	2.2.1 Kennis van formaten voor publieke data 2.2.2 Toepassen automatische dataverwerking 2.2.3 Toepassen van grootschalige (her)analyse van publieke data	

basic level, advanced level, specialisation level

Crokaerts, Martens and the RDM WG: Subleerlijn Research Data Management (RDM) - Implementatie Binnen Onderzoeksleerlijn Bama-stelsel, UGent, 2019

We created detailed learning goals, matched to the final competencies in the previous table (i)

1. DATA & WET

1.1 Ethiek en confidentialiteit		
Leerinhoud	**Specificiteit**	**Eindcomp.**
Algemene Verordening Gegevensbescherming (AVG) of *General Data Protection Regulation (GDPR)*		
– basisprincipes	Generiek	1.1.1
– GDPR *Code of Conduct* UGent / UZ Gent	Generiek/FGE	1.1.1
– GDPR versus RDM	Generiek	1.1.1
Privacy en persoonsgegevens		
– Classificatie		
– confidentiële vs niet-confidentiële data	Generiek	1.1.1
– anonieme data vs persoonsgegevens	Generiek	1.1.1
– sensitieve vs niet sensitieve persoonsgegevens	FGE	1.1.1
– geanonimiseerde vs gepseudonimiseerde persoongegevens	FGE	1.1.1
– *Informed Consent* (Wat?, Waarom?)	FGE	1.1.1
– *Small Cell Risk Analysis (SRCA)*	FGE	1.1.1
Good Clinical Practice (GCP) (Wat?, Waarom?)	FGE	1.1.1

2. SITUERING RDM

2.1 Belang RDM		
Leerinhoud	**Specificiteit**	**Eindcomp.**
Definitie (Wat is RDM?)	Generiek	1.1.2
FAIR Guiding Principles - Findable, Accessible, Interoperable and Reusable / Open Science (Open Research Data)	Generiek	1.1.2
Voordelen/uitdagingen (Waarom RDM?)	Generiek	1.1.2

2.2 Research lifecycle		
Leerinhoud	**Specificiteit**	**Eindcomp.**
Definitie verschillende fasen levenscyclus onderzoeksdata	Generiek	1.1.2

basic level
advanced level
specialisation level

Crokaerts, Martens and the RDM WG: Subleerlijn Research Data Management (RDM) - Implementatie Binnen Onderzoeksleerlijn Bama-stelsel, UGent, 2019

We created detailed learning goals, matched to the final competencies in the previous table (ii)

2.3 RDM & wetenschappelijke integriteit		
Leerinhoud	**Specificiteit**	**Eindcomp.**
Definitie (Wat wordt er verstaan onder wetenschappelijke integriteit?, schendingen)	Generiek	1.1.2
RDM binnen Europese gedragscode voor wetenschappelijke integriteit (*EU Code of Conduct*)	Generiek	1.1.2

3. PLANFASE

3.1 Datamanagementplan		
Leerinhoud	**Specificiteit**	**Eindcomp.**
Definitie DMP	Generiek	1.1.1 1.1.3
Belang/Voordelen/Beperkingen	Generiek	1.1.2
DMPonline.be tool	Generiek	1.1.3 1.1.4

4. ONDERZOEKSFASE

4.1 Data verzamelen		
Leerinhoud	**Specificiteit**	**Eindcomp.**
Datatypes	Generiek	1.1.3
Bestandsformaten		
– soort: open formaat vs. gesloten, …	Generiek	1.1.3
– voorkeursformaten *(Recommended Standard Data Formats)*	Opleiding	1.1.3
Datavolumes en schaalbaarheid	Generiek	1.1.3
Data Capture Methods	Generiek	1.1.3
– typevoorbeeld *REDCap*	FGE	1.1.3 1.1.4
Datakwaliteit	Generiek	1.1.3 1.1.4
Dataverzameling in samenwerkingsverband (*Collaborative Data Collection*)	Generiek	1.1.3

4.2 Data documenteren		
Leerinhoud	**Specificiteit**	**Eindcomp.**
Belang	Generiek	1.1.2
Niveau: projectniveau vs dataniveau	Generiek	1.1.3 1.1.4
Metadata	Generiek	1.1.3 1.1.4
Consistente data: *Codebook / Data Dictionary*	Generiek	1.1.3 1.1.4
Activiteitenverslag: *Audit Trail*	Generiek	1.1.3 1.1.4
Standaarden		
– *Minimal Reporting Standards*	Opleiding	1.1.3
– Relevante ontologieën (bvb. biomedische)	Opleiding	1.1.3
– *Standard Operating Procedures (SOPs)*	Generiek	1.1.3 1.1.4

4.3 Data organiseren		
Leerinhoud	**Specificiteit**	**Eindcomp.**
Betekenisvolle bestandsnamen *(File Naming Conventions)*	Generiek	1.1.3 1.1.4
Gestructureerde en consequente folderstructuur	Generiek	1.1.3 1.1.4

basic level
advanced level
specialisation level

We created detailed learning goals, matched to the final competencies in the previous table (iii)

5. GEBRUIKERSFASE

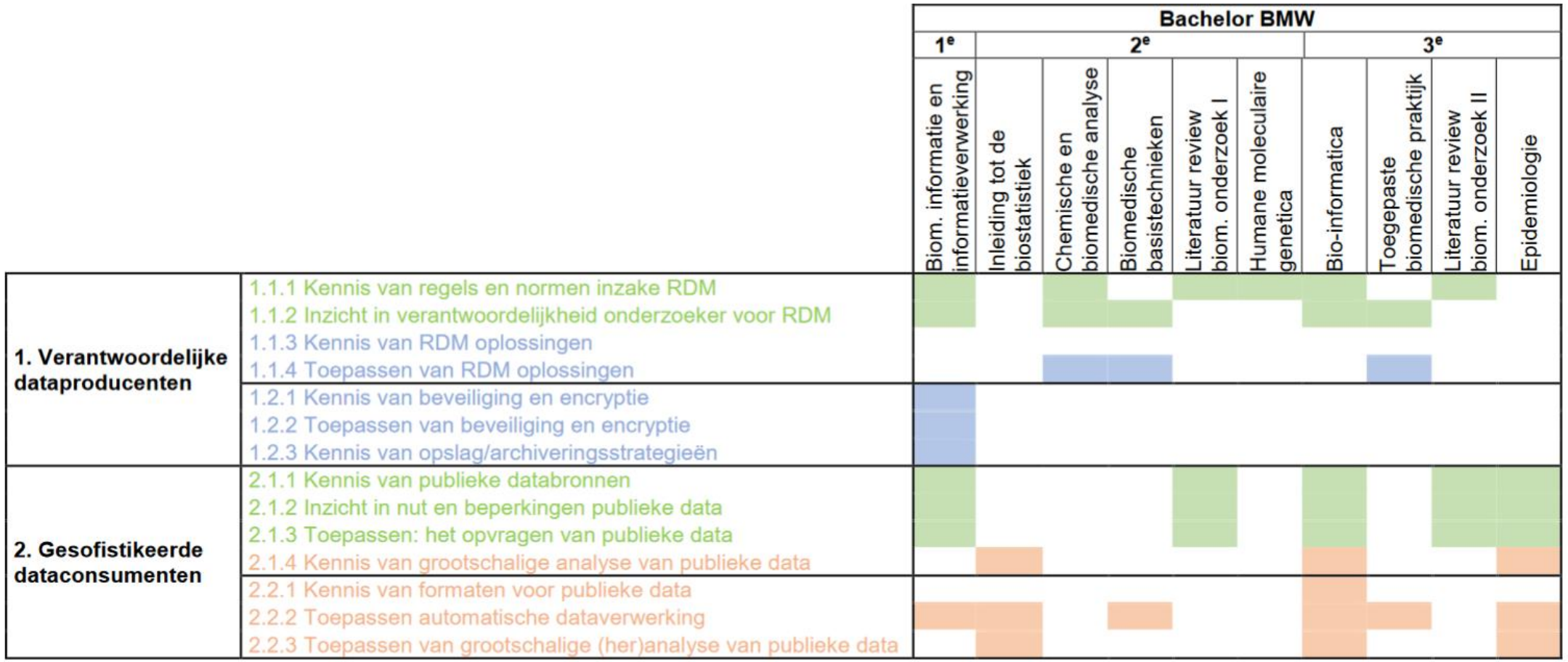
5.1 Data zoeken/opvragen		
Leerinhoud	**Specificiteit**	**Eindcomp.**
Publieke databronnen in de levenswetenschappen		
– publiek beschikbare statistische info (vb. Statbel)	Generiek	2.1.1
– typevoorbeelden: eHealth, healthdata.be, NIH	FGE	2.1.1
– biomedische databronnen	FGE	2.1.1
– *World Health Organization (WHO)* platform (incl. clinicaltrials.gov, EU Clinical Trials Register, International Clinical Trials Registry Platform)	FGE	2.1.1
Publiek beschikbare data		
– belang citeren (vindbaarheid, geven van credit (impact, *Altmetrics*))	Generiek	1.1.2
– nut en beperkingen		
– heterogeniteit van publiek beschikbare data	Generiek	2.1.2
– kwaliteit van publiek beschikbare data	Generiek	2.1.2
– volledigheid van publiek beschikbare data	Generiek	2.1.2
– GDPR, nl. persoonsgegevens als belangrijke limitatie	FGE	2.1.2
– opvragen d.m.v. databronnen (vb.PubMed, NCBI)	Generiek	2.1.3
– (meta)verwerking	Opleiding	2.1.3

5.2 Data (her)gebruiken		
Leerinhoud	**Specificiteit**	**Eindcomp.**
Belang (heranalyse, serendipiteit, individueel hergebruik)	Generiek	1.1.2
Methoden voor grootschalige, heterogene (her)analyse van publieke data		
– omgaan met grote hoeveelheid data	Generiek / Opleiding	2.1.4 2.2.3
– omgaan met heterogene data	Generiek / Opleiding	2.1.4 2.2.3
– omgaan met onvolledige data	Generiek / Opleiding	2.1.4 2.2.3
– kwaliteit van data bepalen	Generiek / Opleiding	2.1.4 2.2.3
Bestandsformaten voor de meest courante publieke databronnen	Opleiding	2.2.1
Geautomatiseerde dataverwerking in populaire omgevingen of programmeertalen		
– gebruik maken van bestandsformaten (vb. csv, json, xml)	Generiek	2.2.2
– van automatisatie in bestaande omgeving naar eigen scripts in Python of R	Opleiding	2.2.2
– notie van machine leren (ML) en artificiële intelligentie (AI) (vb. classificatie van radiologische beeldvorming d.m.v. AI)	Opleiding	2.2.2

basic level
advanced level
specialisation level

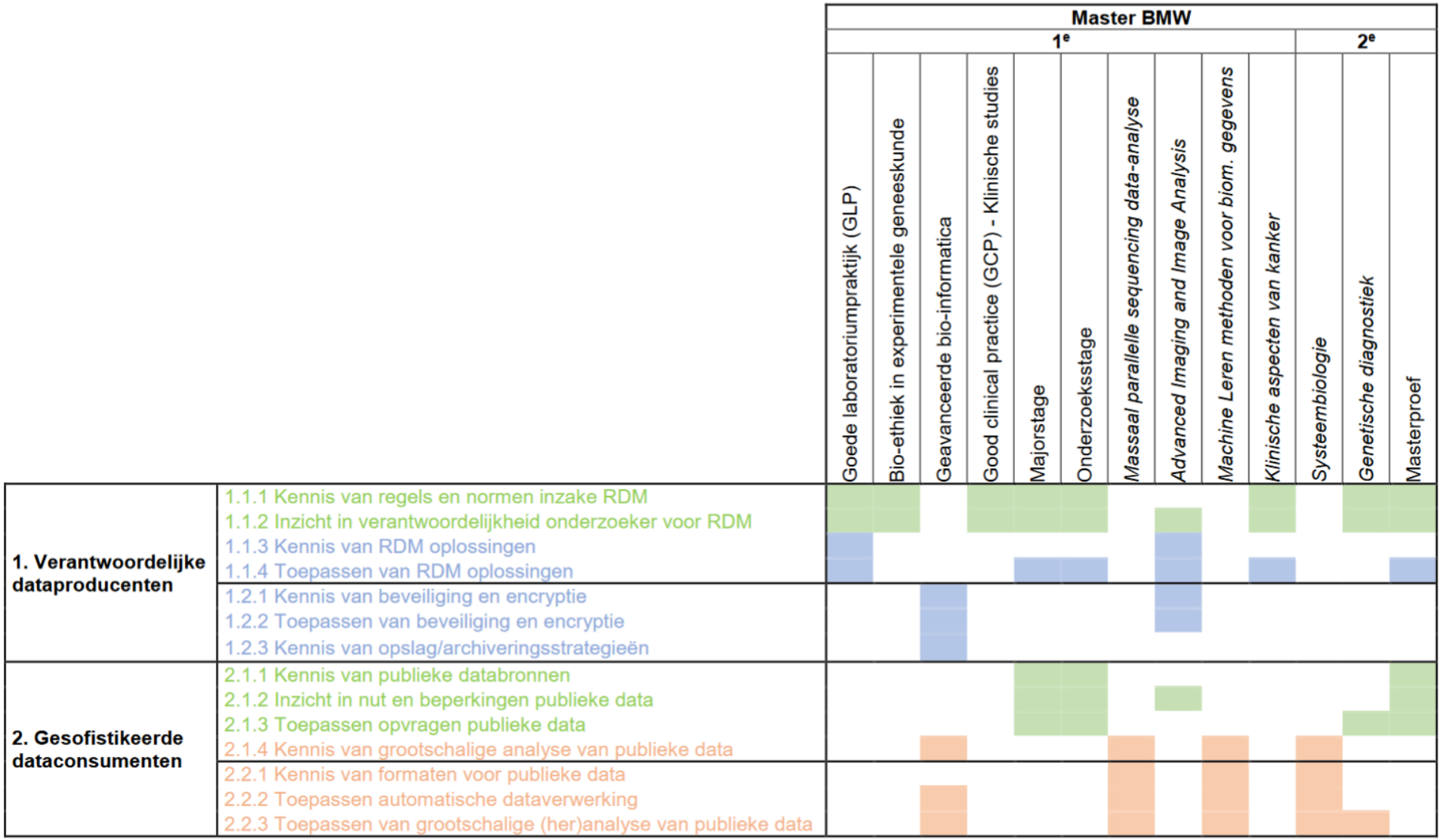
Crokaerts, Martens and the RDM WG: Subleerlijn Research Data Management (RDM) - Implementatie Binnen Onderzoeksleerlijn Bama-stelsel, UGent, 2019

An example implementation from the Biomedical Sciences was also provided, here for the Bachelor



Crokaerts, Martens and the RDM WG: Subleerlijn Research Data Management (RDM) - Implementatie Binnen Onderzoeksleerlijn Bama-stelsel, UGent, 2019

An example implementation from the Biomedical Sciences was also provided, and here for the Master



Crokaerts, Martens and the RDM WG: Subleerlijn Research Data Management (RDM) - Implementatie Binnen Onderzoeksleerlijn Bama-stelsel, UGent, 2019

open science is here to stay

what does it all entail?

open access, open data, open code

the administration of open science

the impact of open science on education

a summary in three parts

Open science brings many good things, and we should be ready for these

Open science makes the work accessible to anyone

Open science allows people to build much more efficiently on previous work

Open science helps maximize the usefulness of each individual research effort

Data tend to have a (much!) longer shelf life than our (limited) interpretations

Open science fosters creativity, and stimulates revolutionary research

Summary – policy aspects

Focus on promise

- Share successful ideas/approaches/grant proposals
- Organise communities for exchange
- Inspire uptake

Positive reinforcement

- Highlight and reward open science success stories
- Adapt CVs to value meritorious open science effort
- Financially support firmly open science-related efforts (creation and maintenance of data, code, tools – can be hardware, software, skilled support staff)

Passive enforcement

- Count only open artefacts in bean-counting exercises
- Force non-paper contributions onto CVs
- Introduce valuation of actual re-use/impact metrics

Summary – implementation steps

Facilitate adherence to requirements

- Solid support for administrative tasks (DMPs)
- Support for open science practices (institutional, or third-party repositories)
- Support for open science-related text in proposals

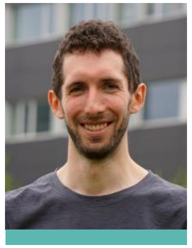
Invest in education

- Train responsible data producers
- Train sophisticated data consumers
- Train future large-scale data scientists across domains!

Connect to industry

- Stay in touch with where they are moving
- What do they need in terms of:
  - Skilled staff
  - Resources and tools
  - Networking

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