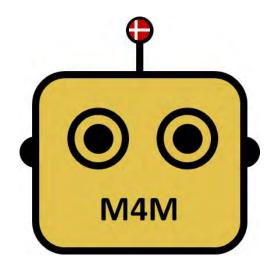


Metadata for Machines

> DeiC-webinar 21 January 2021





Program

- Introducing the DeiC rational: Why M4M?
- M4M in the flowchart of a FAIRification process
- GoFAIR & DeiC M4M workshop Summer 2020
- Three research case studies
- The need for local, national and international support functions
- Future directions and plans



Introducing the DeiC rational: Why M4M?

- Requests from researchers
- Continued collaboration with GO FAIR after Data Stewardship course
- FAIR strategy:
 - Support for academic and professional groups in defining their own implementation of FAIR principles
- Funding opportunity

M4M in the flowchart of a FAIRification process

1. Define the FAIRification rational

- a. Clarify why FAIRification and/or open access to the research data is pursued.
- b. Assess FAIRness of data to decide which metrics need improvement.
- c. Prioritise and choose datasets for FAIRification.
- d. Define who should have access to your data (domain-specific vs. broader audience).

2. Define all data elements and their relations

- a. Analyse the content of the data in terms of structure and concepts represented.
- b. Check, if there is an already existing vocabulary available, preferably from your research domain.
- c. If necessary, add vocabulary to an existing one to fit your needs, or build a new vocabulary.

M4M in the flowchart of a FAIRification process

3. Prepare your metadata

- a. Use an existing metadata template or, if not available, create one preferably in agreement with your research domain.
- b. Use the chosen vocabulary to describe the meaning of data elements and relations accurately, unambiguously, preferably in a computer-actionable way
- c. Decide on licensing (who can access data how it can be used).
- d. Link metadata to datasets.
- 4. Make decisions about software and hardware
 - a. Decide in which database or data repository your data/metadata should be stored.
 - b. Secure operations (service level agreements, costing etc.), preferably also after the original research grant runs out.

M4M in the flowchart of a FAIRification process

- 5. Implementation: Hosting the FAIR data and metadata
 - a. Implement and test operational databases, including external access, queries etc.
 - b. Or, export data to a repository that is well suited for hosting FAIR data.
- 6. Assess FAIRness of data, considering the objective
 - a. Re-assess FAIRness of your data.
 - b. If there is still room for improvement, restart from the top.



GoFAIR & DeiC M4M workshop – Summer 2020

• Rene



Three research case studies - AnaEE

- Klaus Steenberg Larsen, Associate Professor
- Coordinator of AnaEE Denmark
- Department of Geosciences and Natural Resource Management
- Section for Forest Nature and Biomass
- University of Copenhagen

UNIVERSITY OF COPENHAGEN





Example of starting a FAIRification process from scratch – with limited resources

Klaus Steenberg Larsen Associate Professor, AnaEE Denmark Coordinator Department of Geosciences and Natural Resource Management University of Copenhagen



What is AnaEE Denmark?

AnaEE (Analysis and Experimentation on Ecosystems):

- A pan-European research infrastructure for experimental field-scale research facilities (anaee.com)
- ERIC (European Research Infrastructure consortium) in preparation with planned start in 2021
- AnaEE Denmark is both a national Danish research infrastructure and the Danish contribution to AnaEE international
- Partners are UCPH, AU, DTU and RUC
- Official start of AnaEE Denmark 1 Jan 2018

Financing: 45 mill. DKK Jan 2018 – Dec 2022 20 mill. DKK from Ministry of Higher **Education and Science** 25 mill. DKK from participating universities









What is AnaEE Denmark?

AnaEE Denmark Funding will be used for:

- Updating platforms with new instrumentation for climate manipulations, sensors and greenhouse gas measurement technologies
- Opening up experimental platforms to outside users develop common access policy and procedure for users
- International membership fees
- Hosting the AnaEE Technology Centre
- Consortium coordination
- Common protocols for usage of instruments, technologies and data analysis
- ...and in-kind resources only for creating FAIR data!



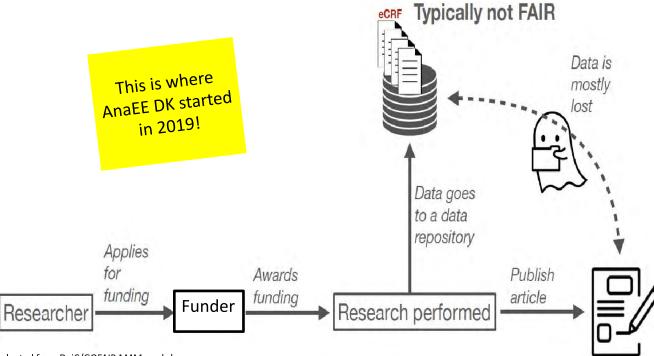
AnaEE Denmark FAIR data strategy

AnaEE Denmark FAIRification started from scratch

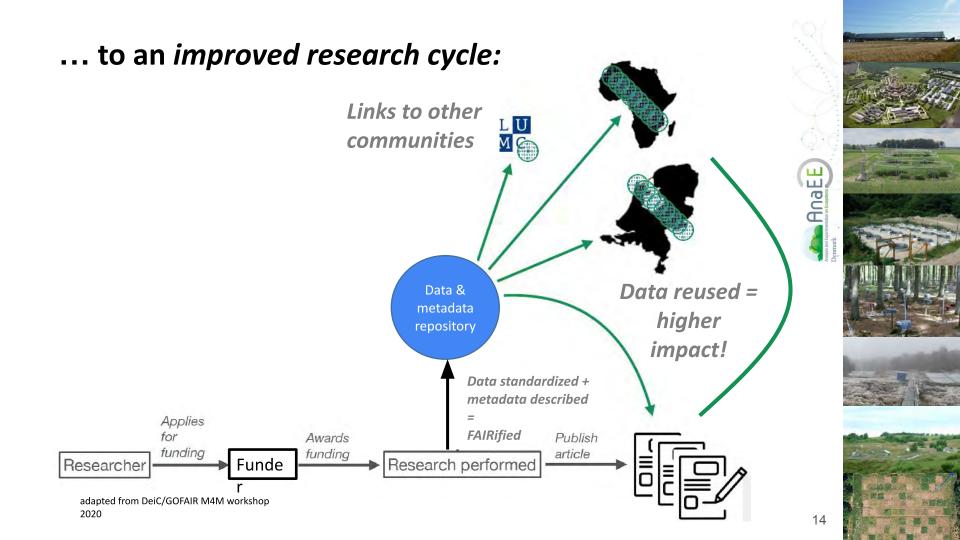
- Decentralised data storage no common database (same at international level)
- Go for DOIs resources and repositories are now becoming available at the Universities, e.g. ERDA at UCPH, LOAR (Royal Library, AU), and DTU Data at DTU
- Develop standardized metadata descriptions across platforms Start here!
- Data in several categories:
 - "Easy": Standard meteorological data from experiments
 - "Difficult": Measured response data (highly variable)

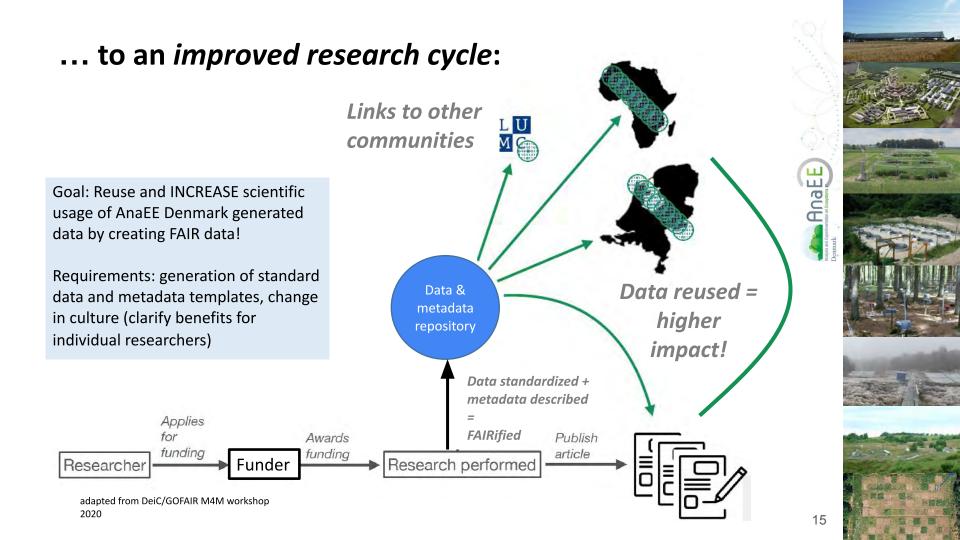


Better and more efficient science – moving from a *typical research cycle*:



AnaEE





AnaEE Denmark FAIR data projects – co-funded by DeiC

- Project 1: 10 MM in total in 2019
- Project 2: 5 x 2-3 days workshops in June-October 2020 with DeiC + GOFAIR. No MM, but free workshops

Strategy: Lowest hanging fruits first: Do what you can – skip what you can't

Main outcomes

- A lot of learning!
- 3 "FAIRified" meteorological datasets
- A FAIRification roadmap for AnaEE Denmark
- First machine-readable metadata (work in progress)
- FAIRified greenhouse gas exchange data (work in progress)



The steps we went through (in short):

- ☐ Find a persistent data repository, i.e. ERDA (UCPH) and LOAR (Royal Library for AU)
- Create templates for data and meta data
- Get a PID (in our case DOI ERDA and Royal Library can provide)
- Create machine-readable metadata (M4M)

Link to data: anaee.dk/access/



Data repositories and PIDs (access at anaee.dk):



The European research infrastructure AnaEE (Analysis and Experimentation on Ecosystems) addresses the grand challenge of ensuring sustainable and optimal usage of ecosystem services in a changing world through coordinated research using state-of-the-art experimental research platforms across natural gradients of climate in Europe.

AnaEE Denmark is the national Danish node of AnaEE and provides access for public and private sector researchers to nine Danish ecosystem-level experimental research facilities in agriculture, forests, heath- and grasslands as well as in streams/lakes.

AnaEE Denmark is a consortium consisting of six departments from University of Copenhagen, Aarhus University, Roskilde University and Technical University of Denmark.









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Data repositories and PIDs (access at anaee.dk):



> Home

) About

) Platforms

M Access

Related activities
 Contact

> Anaee International

AnaEE > Access

Access

Access to data

AnaEE is currently developing common tools for easy and open access to a range of existing and online data from the different AnaEE research platforms. Links will be provided as these tools are being developed.

Currently, you can openly access meteorological data from three of the research facilities here.

Physical access to platforms

AnaEE Denmark platforms are fully open to users from outside the AnaEE Denmark consortium and we strongly encourage potential users to contact us if they think our platforms could be useful for the execution of research projects. Instrument testing, etc.

We are currently developing a standardized procedure for granting physical access to the platforms. Until this is ready, please find contact information for each platform under 'Platforms'. You are also welcome to contact the AnaEE Denmark coordinator directly to hear more about the possibilities on each of the AnaEE Denmark platforms.

Contact

Klaus Steenberg Larsen

AnaEE Denmark Coordinator PhD, associate professor

University of Copenhagen Department of Geosciences and Natural Resource Management Rolighedsvoj 23 DK-1958 Frederiksberg C

DIR (+45) 3533 7654 MOB (+45) 9356 5583 <u>ksl@jgn.ku.dk</u>



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Data repositories and PIDs (access at anaee.dk):

AnaEE-DK ×

C @ erda.dk/public/vgrid/AnaEE_DK/index.html

On this page meteorological data from 3 sites in Denmark can be found.

For details about the measured variables, please see the metadata file associated to each site. The metadata is stored in the same location as the data.

Brandbjerg/CLIMAITE

Data from CLIMAITE (Brandbjerg), Copenhagen University: <u>doi.org/10.17894/ucph.c58a99c2-da7b-444a-b1c0-11f00c70041c</u> For more information about the site: <u>CLIMAITE/Brandbjerg.(Copenhagen University)</u>

Højbakkegård

Data from Højbakkegård, Copenhagen University: doi.org/10.17894/ucph.8d941a14-b098-4ca5-b177-412f50be1731

For more information about the site: Højbakkegård (Copenhagen University)

Foulumgård

Data from Foulumgård, Aarhus Universit : dx.doi.org/10.21994/loar4109

For more information about the site: Foulum (Aarhus University)

For more information about the AnaEE-DK project: AnaEE DK



AnaEE

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Authors:	Pullens, J.W.M. Kørup, K. Plauborg, F.				Admin Tools		
Keywords:	AnaEE Denmark				E	dit	
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period 20180525 to 20191231. The time resolution is hourly and contains a data flag for each variable to indicate the quality of the data. The dataset is supplemented by a metadata file with similar filename. This file gives information about units, sensors, logging intervals and data quality assurance procedures for the dataset. This dataset is an update of the data set previously published (DOI: http://dx.doi.org/10.21994/loar4105). This dataset entails the full calendar year of 2019 and due to an issue with our software, the old dataset did not contain the correct precipitation data. The data is now is corrected and it resulted in 133 mm higher precipitation in the period 4 March to 31 December 2019. Format: ASCII (csv), comma separated. Data variable names and data files were created following a structure similar to the ICOS project (https://www.icos-ri.eu/), with some additions when needed. The ICOS meta-data standards are described at https://meta.icos-cp.eu/resources/cpmeta/atcMeteoTimeSer. Table-driven variable codes (GRIB codes) are provided for each data variable according to WMO guidelines of variable codes (https://public.wmo.int/en). For more information on variable codes of WMO, see https://www.wmo.int/pages/prog/www/WMOCodes/WM0306_v12/LatestVERSION/LatestVERSION.html

URI: <u>https://loar.kb.dk/handle/1902/4296</u> <u>http://dx.doi.org/10.21994/loar4109</u>

Appears in <u>AnaEE</u> Collections:

Files in This Item:				
File	Description	Size	Format	
FOULUM_20180525_2019123 1_HOURLY.csv	Meteorological site-level data from agricultural fields at Foulum (Den mark) from 25 May 2018 to 31 December 2019	1.42 MB	CSV	View/Open
FOULUM_REF_METADATA_201 80525_20191231_HOURLY.csv	Metadata for the meteorological site-level data from agricultural fiel ds at Foulum (Denmark) from 25 May 2018 to 31 December 2019	3.69 kB	CSV	View/Open





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Metadata file (metadata on variables – adapted from ICOS)

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	PA	hPa	Air pressure	2 m	Vaisala PTB101B	1 minute	1 minute values, 10 minute mean	Data were flagged for gapfilling by applying vith	
	NETRAD	W m-2	Net shortwave radiation	1.5 m	Kipp & Zonen CNR1	1 minute	1 minute values, 10 minute mean	Data were calculated and not flagged	4.2.0.4.0
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Machine-readable metadata: Openly available tools:

BioPortal – a catalogue of ontologies from 1000 different communities

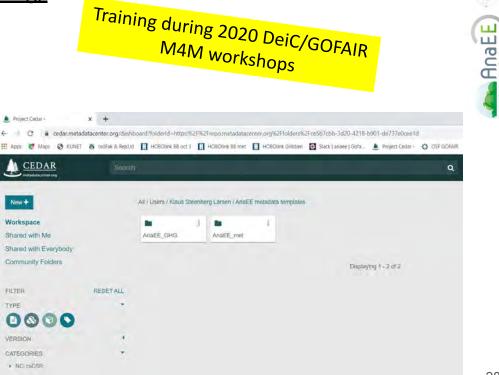
https://bioportal.bioontology.org/

CEDAR:

cedar.metadatacenter.org

CEDAR can help you <u>map your data</u> to ontologies

create machine-readablemetadata code –without doing code!



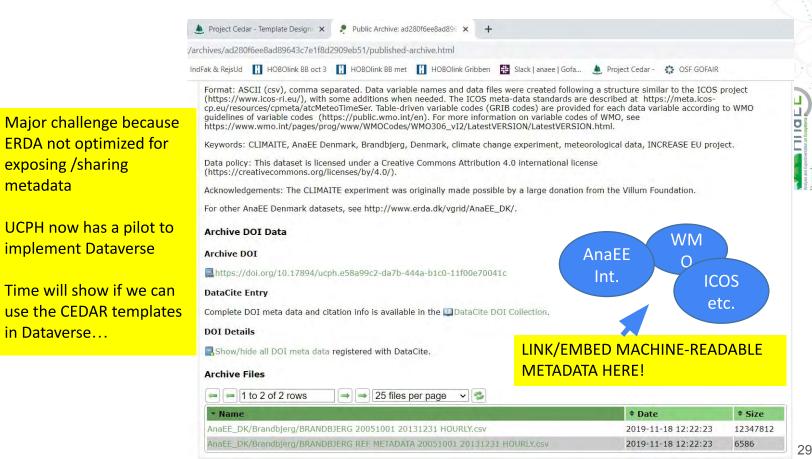


FAIR data with machine-readable metadata

exposing /sharing

in Dataverse...

metadata







Final product from DeiC/GOFAIR M4M workshops 2020: A FAIRification roadmap for AnaEE Denmark

Content:

- 1. Strategic Rational for a FAIRification roadmap
- 2. Understanding FAIRification What is FAIR data?
- 3. Automated Machines Access to FAIR data
- 4. Upholding the FAIR Principles
- 5. Gradually Increasing the Levels of FAIRness
- 6. A necessary move from *typical research cycle*
- 7. ... to improved research cycle
- 8. Reassessing Organization, Technology, Politics, Economy

- 9. Coordinating the AnaEE FAIRification roadmap
- 10. Aiming for community harminization and specialization
- 11. Aiming for an Improved Division of Labor
- 12. Roadmap & shorter-term FAIRification Workplans
- 13. Roadmap & Technical Breakdown and To-do's
- 14. Local and National Data Stewardship Support
- 15. Formulating FAIRification Success Criterions
- 16. Summary of AnaEE Denmark FAIRification roadmap



Three research case studies – DTU Wind Energy

- Nikola Vasiljevic, Special Consultant for Digitalization
- Department of Wind Energy
- Technical University of Denmark



Technical University of Denmark



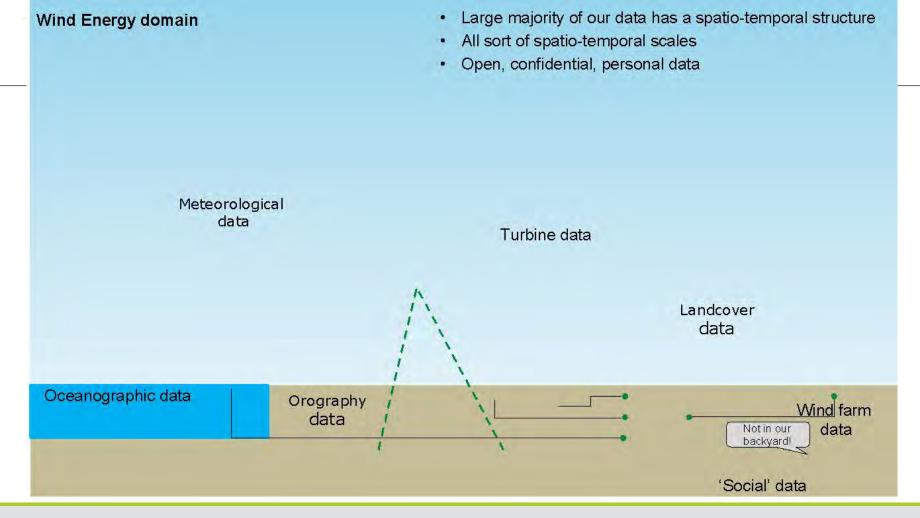
>Disclaimer

This presentation contains opinions which not necessarily reflect the DTU Wind Energy



>DTU Wind Energy – who are we

- > DTU Wind Energy is **one of the largest and most well-known** university department for wind energy in the world with **250 employees**.
- > DTU Wind Energy consists of three divisions (and many sections):
 - Wind Energy Systems
 - Wind Energy Materials and Components
 - Wind Turbine Design
- We deal with: Aerodynamic Design Composite Materials Composite Mechanics and Structures Fluid Mechanics • Wind Turbine Structures • Component Design • Wind Turbine Loads and Control • Meteorology • Remote Sensing • Resource Assessment Modelling • Test and Measurements • Integration and Planning • Social impact • ...
- > We cover entire lifecycle of wind power plant



DANISH *einfrastructure* cooperation



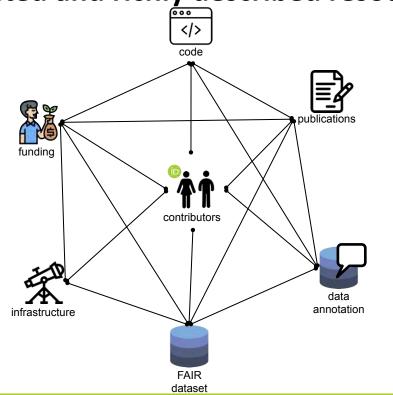
> Physical infrastructures we operate

- > <u>Test Centre for large wind turbines Høvsøre</u>
- Test Centre for large wind turbines Østerild
- > <u>Research Facilities:</u>
 - <u>Composite Laboratories</u>
 - <u>Drivetrain</u>
 - <u>Large Scale Facility</u>
 - Poul la Cour Wind Tunnel
 - <u>Research Wind Turbine V52</u> (Risø test station)
 - <u>Windscanner</u>

(+ a number of virtual infrastructures)



Interconnected and richly described resources



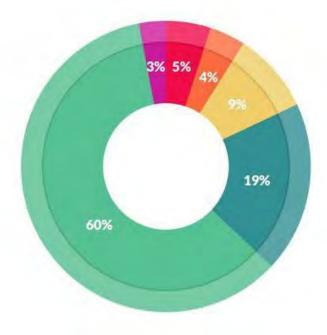
Full chain of custody Researcher at center



>Why?



>How much time we spend analysing data?



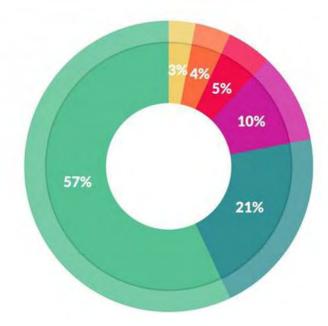
What data scientists spend the most time doing

- Building training sets: 3%
- Cleaning and organizing data: 60%
- Collecting data sets; 19%
- Mining data for patterns: 9%
- Refining algorithms: 4%
- Other: 5%

Source: Forbes



>What we don't like to do?



What's the least enjoyable part of data science?

- Building training sets: 10%
- Cleaning and organizing data: 57%
- Collecting data sets: 21%
- Mining data for patterns: 3%
- Refining algorithms: 4%
- Other: 5%

Source: Forbes



If we don't spend time handling data at the moment of their creation, we will 'waste' 80% of resources anytime we or anyone else need to use them (again).

Data engineering/stewardship is not perceived as 'cool' activity compering to data analytics, however it has much more lasting impact then trendy data analytics methods.



>Our interaction with the FAIR principles

- > 2017 EERA JP WIND IRPWind Open Data Initiative (European level)
- > 2018 Internal project and FAIR ambassadors (University/Deprtment level)
- > 2019 RDA Ambassadorship ('Individual' level)
- > 2020 Running/participating in M4M workshop, interaction with the RDA (National/International level)



>Our interaction with the FAIR principles

- > 2017 EERA JP WIND IRPWind Open Data Initiative (European level)
- > 2018 Internal project and FAIR ambassadors (University/Deprtment level)
- > 2019 RDA Ambassadorship ('Individual' level)
 - Participation in <u>FAIR Data Stewardship</u> training organized by NeiC
- > <u>2020 Running/participating in M4M workshops</u>, interaction with the RDA (National/International level)
 - Developing and demonstrating sheet2rdf and OntoStack
 - Generated controlled vocabulary of 100+ wind energy parameters
 - Training Dutch Covid Program data stewards

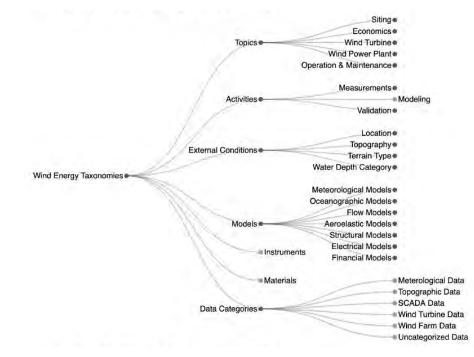


>2017 – dealing with FA of FAIR

- > As part of the IRPWind Open Data initiative <u>Drafted Wind Energy Taxonomies of</u>:
 - Topics
 - Activities
 - External Conditions
 - Models
- > The taxonomies were drafted by employing the expert elicitation (16 international domain experts)
- > The taxonomies were drafted with the ambition to use them as controlled terminologies to 'tag' data enabling search by means of controlled terms
- For the purpose of 'tagging' data, thus using controlled terminologies we have drafted <u>Dublin Core Wind</u> <u>Energy Application Profile</u>, in other words a **metadata template for datasets**



Taxonomies



Source: http://data.windenergy.dtu.dk/taxonomy/



>Dublin core profile

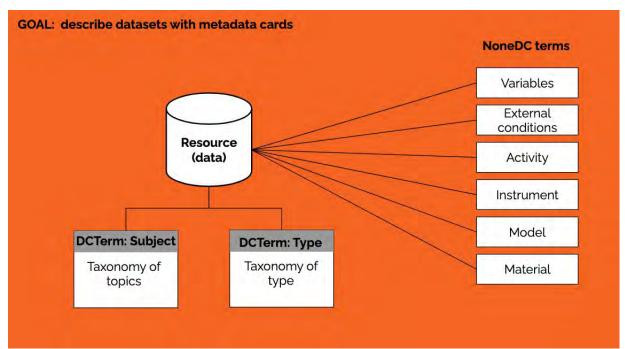
		Mandatory	Highly Likely	Maybe	Highly Unlikely	Impossible
1	Title					
2	Creator			ORCID?		
3	Subject	WE Taxonomy			i	
4	Description		1			
5	Publisher			Custom?	3	
6	Contributor	1		ORCID?		
7	Date		W3C DTF			
8	Туре	WE Taxonomy]]	
9	Format	MIME/IMT				1
10	Identifier			URI/DOI?		
11	Source					
12	Language	RFC 3066 (?)				
13	Relation					
14	Coverage		ISO 3166?			
15	Rights	1				

Source: https://zenodo.org/record/4013191

DANISH **CINFRASTRUCTURE** COOPERATION



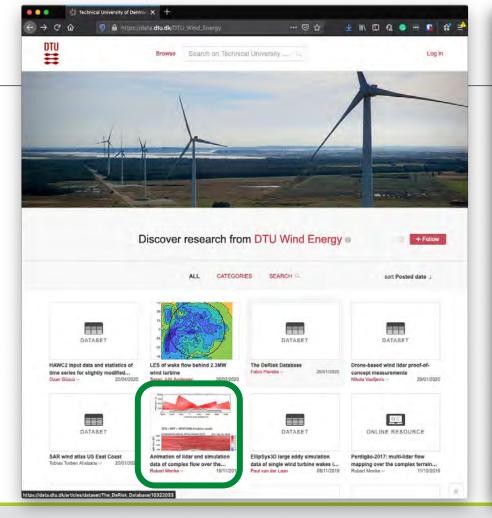
>Dublin core profile





>2018 – implementing <u>FA</u> of FAIR

- > Updated taxonomies with a pull of <u>depertamental FAIR ambassadors</u>
- > A part of DTU Library pilot project for implementation of <u>DTU-data</u>, university data publishing platform
- > DTU-data is an instance of figshare
- > Extended FigShare metadata template to take in account our taxonomies





39.709389, -7.738033

DATE

Start date: 2017-05-14 Stop date: 2017-05-15

TOPIC

- Siting;>Resource assessment
- Siting;>Wind Mapping

MODELS

- Meteorological;>Mesoscale
- Flow;>RANS

ACTIVITIES

- Measurements;>Field experiment
- Modeling

EXTERNAL CONDITIONS

- Location;>Onshore;>Inland
- Terrain type;>Complex;>Hilly
- Terrain type;>Complex;>Ridge
- Terrain type;>Complex;>Other

DATA CATEGORY

- Meteorological data
- Other data



>2020 – tackling machinic <u>I</u> of FAIR / controlled terminologies

- > Switched from JSON to RDF
- > Configured and deployed OntoStack to:
 - Build and maintain controlled terminologies:
 GitLab CI/CD or Github actions executing <u>sheet2rdf</u> sheet2rdf is also used in Dutch Covid Program
 - Serve terminologies to humans and machines:
 Edge routing with traefik in front of Jena Fuseki and SKOSMOS
- > OntoStack runs on:
 - DTU Web Server: <u>http://data.windenergy.dtu.dk/ontologies/</u> Servers several wind energy related ontologies
 - DeiC VM: <u>http://ontology.deic.dk/</u> To start it will be used for Danish M4Ms

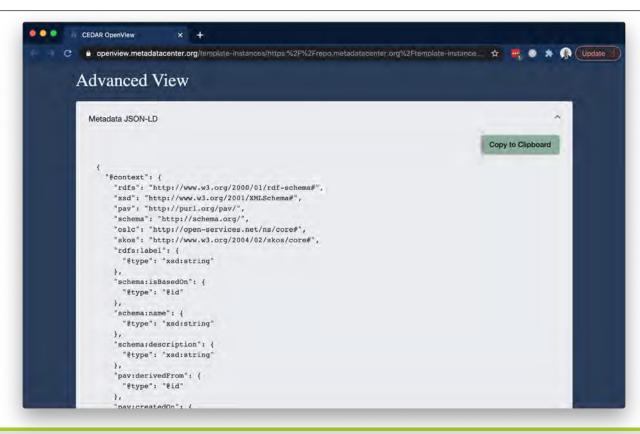


>2020 – tackling machinic <u>I</u> of FAIR / metadata templates

- > Selected NetCDF data format for sharing / publishing data
- > Extending our Dublin Core Application Profie making it machine actionable
- > Using DataCite metadata schema (4.3) as a base template for dataset metadata
- > Extend template with missing fields that will provide information about:
 - (geo)spatio-temporal structure of data
 - data quality
 - what (and how) produced data
- 90 fields belonging to 20 groups of which, 23 mandatory (5 manual entries),
 24 recommended (4 manual entries) and 43 optional (15 manual entries)
- > Created Generic Dataset Metadata Template accessible in CEDAR Workbench

DeiC

>Machinic metadata





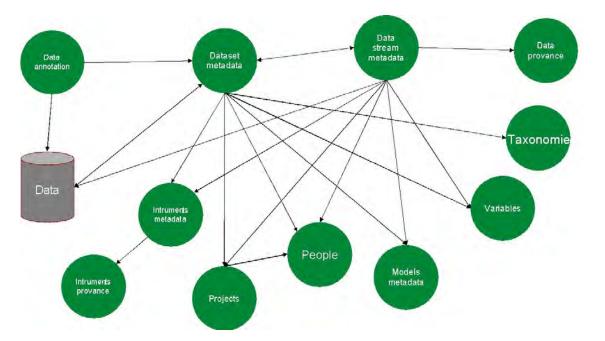
wind_speed:	
<pre>database_column: ['theta']</pre>	
<pre>dimensions: ['time','y','z']</pre>	
type: 'float64'	
attributes:	
_standard_name: 'wind_speed'	
<pre>concept_id: 'http://data.windenergy.dtu.dk/controlled-terminology/wind-en</pre>	ergy-parameters/wind_speed'
units: 'm.s-1'	



Ontology viewer		Vocabularies About Feedback He		
Wind Energy Parameters		Content language English - Searc		
Alphabetical Hierarchy Groups	AtmosphericParameters > w	vind speed		
AtmosphericParameters wind_direction wind_speed	PREFERRED TERM	wind_speed 😼		
f-WindTurbineBladeParameters	DEFINITION	Speed is the magnitude of velocity. Wind is defined as a two- dimensional (horizontal) air velocity vector, with no vertical component. (Vertical motion in the atmosphere has the standard name upward_air_velocity.) The wind speed is the magnitude of the wind velocity.		
	BROADER CONCEPT	AtmosphericParameters		
	ENTRY TERMS	horizontal_wind_speed Vh		
	CREATOR	https://orcid.org/0000-0002-9381-9693		
	ABBREVATION	WS		
	PREFERED UNIT	m s-1		
	URI	http://data.windenergy.dtu.dk/controlled-terminology/wi energy-parameters/wind_speed 🧏		
	Download this concept:	RDF/XML TURTLE JSON-LD		



>Where are we going with all of this?



Arrows are semi-random, did not want to overthink.

DeiC

Summary

- > Everything that has been done so far it has been done with:
 - 'bottom-up' **guerilla** approach (there was no 'top-down' initiative)
 - largely by 1-2 persons
 - mainly done in 'leisure time' (no firm funding)
- Solutions which started in wind energy are now used in other domains ...and they were also produced by re-using someone else work
- So there is abs no point in "silosing" and building 'your own' solutions since 'your domain' so special ...grab solutions from front-runners, adapt!, that's what I did
- > If you want to be 'FAIR' you can:
 - Start reusing, adapting, building and testing solutions
 - Don't count on (massive) funding to do this work (expect to work for 'free')
 - Don't expect that your first solution is going to be perfect



Three research case studies – Danish BioImaging

- Clara Prats, Associate Professor
- Core Facility for Integrated Microscopy
- Faculty of Health and Medical Sciences
- University of Copenhagen

UNIVERSITY OF COPENHAGEN



Biolmaging Research in a FAIR Data perspective

Clara Prats, Associate Professor Core Facility for Integrated Microscopy Faculty of Health and Medical Sciences University.eff.Sanandragging.dk www.eurobioimaging.eu

DANISH BIOIMAGING NETWORK



Danish Biolmaging

EuroBiolmagin



Light and Electron Microscopy

Pre-clinical Imaging

Image Analysis

DBI NODES AaU, AU, DCRC, KU, RUC & SDU

🔂 AU & DTU

🚮 KU & DTU

Figure 1 - Danish BioImaging will be a multi-site national infrastructure consisting of nine imaging open access facilities, DBI-Nodes. Two DBI-Nodes, one at AU and one at DTU, will offer pre-clinical imaging technologies. Five DBI-Nodes will offer access to advanced microscopy applications (AU, DCRC, KU-CAB, KU-CFIM and SDU) at the local level and access to specific cutting-edge technologies at the national and international level. Computer scientists from KU-DIKU and DTU will develop novel userfriendly image analysis solutions based on their latest scientific research and implement them as remotely available workflows though DeiC or as local customized image analysis workflows at the imaging facilities.





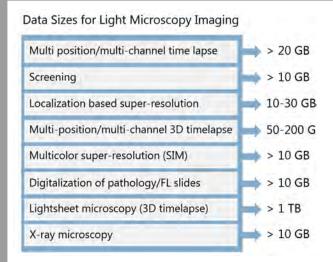
INDIA



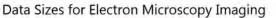
Biolmaging



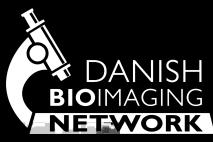
New imaging technologies are accelerating the life sciences as never before. They also generate a rapidly increasing amount of data (images), which need to be stored, documented and shared with the scientific community to comply with the FAIR principles











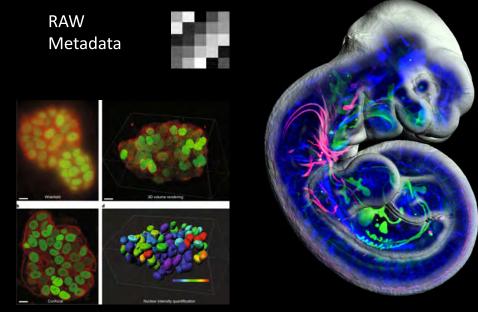
Expected DBI data production in TB:

year	DBI
2021	7.400
2022	8.140
2023	8.954
2024	9.849
2025	10.834

~45 Petabytes

We need to define guidelines

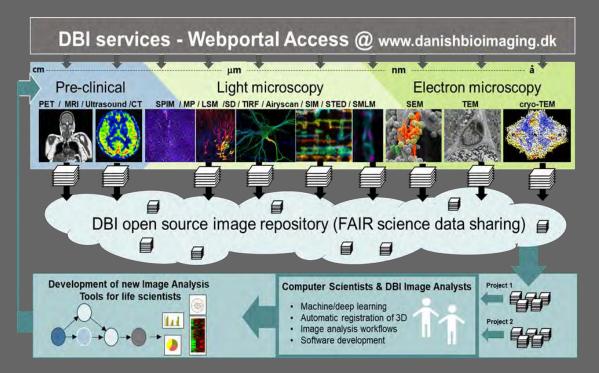
- For how long does data need to be kept?
- What data needs to be kept to ensure Interoperable & Reusable?

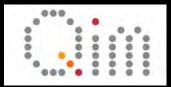




Danish Biolmaging- image repository

Findable Accessible Interoperable Reusable







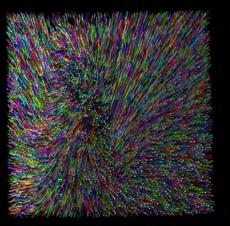
Professor at DTU Anders Bjorholm Dahl

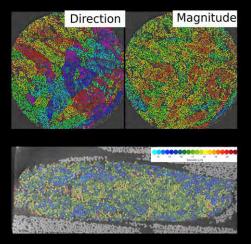


Professor at KU Jon Sporring

Center for Quantification of Imaging Data from Max IV (QIM)

DTU and DIKU are already building platforms to support 3D imaging analysis focused on MAX IV generated data, as part of the 3D Imaging Center at DTU and the ERDA system at Niels Bohr Institute, KU.











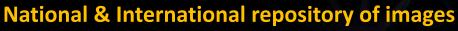
- Data ownership
- Data quality check
- Raw versus processed data annotated data
- Big -to- Huge data

Centralised versus decentralised

- <u>minimise duplication</u> = storage space
- <u>minimise data transfer</u> = time consuming







- accessible and safe
- Intelligent image data archival and retrieval
- Quality / integrity of data Sharing computing solutions
- Image processing and analysis solutions for bioimaging data quantification and modeling
- High performance infrastructure dedicated to massive computational demands including interactive and non interactive remote computing
- GPU based computing for deep learning and AI-based image analysis (XAI)



Questions?

Clara Prats – Cprats@sund.ku.dk







The need for local, national and international support functions

Diba Terese Markus, RDM consultant CLAAUDIA Research Data Services



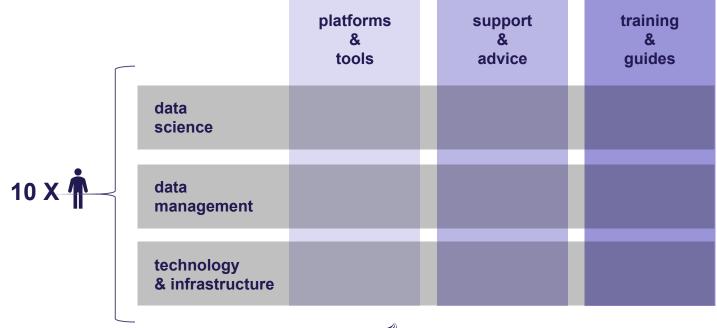
AALBORG UNIVERSITY



CLAAUDIA



- a cross-functional team





The need for local, national & international support functions



SUPPORT FOR WHOM?

SUPPORTING WHAT?

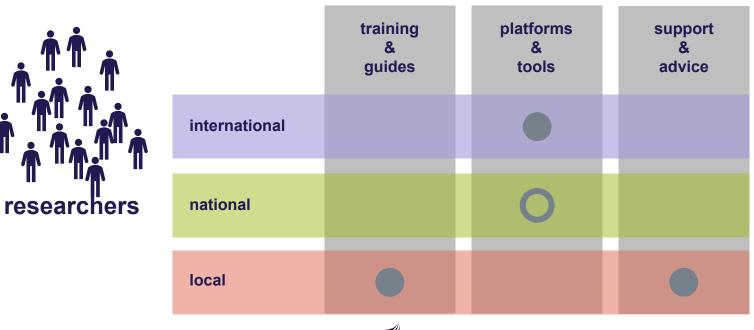






M4M support needs









Research Vocabularies Australia

ABOUTUS

An easily accessible portal to controlled vocabularies used in research

A controlled vocabulary reflects agreement on terminology used to lubble concepts. When research communities agree to use common language for the concepts in datasets, then the discovery, linking, understanding and leuse of research data are improved.

Research Vacabularies Australia (RVA) makes it easy to find and use controlled vocabularies used in research, it also makes it possible for Australian resoarch and an antibations to publish, re purpose, create, and manage their own controlled vocabularies. Vocabularies change over time, se the service enables management of new versions will'e relatining supersedid versions.

Over time the <u>RVA</u> portal aims to describe any controlled vocabularies, commonly used by or relevant to Australian researchers. Some vocabularies are itsis accessible directly from this portal (re download able and queryable); some are to be accessed essentiare and are simply described here. The ARDC can work with research organizations to enable software interaction with instanti vocabularies, and to develop the service in resoarce to mend.

· Make a vocabulary machine readable (more navity integrated into other's

Create new or import existing vocabularies and manage them with your

Provide vocabularies

systems).

munity's input.

· Upload and describe a vocabulary to share with others

Ways of using the service



Australian Research Data Commons

https://ardc.edu.au/services/research-vocabularies-australia/

Use vocabularies

- · Find and learn about controlled vacabularies relevant to research
- Access those vocabularies and reuse them in your community
- Integrate vocabularies into your local information systems at a technical level

Give feedback on vocabularies

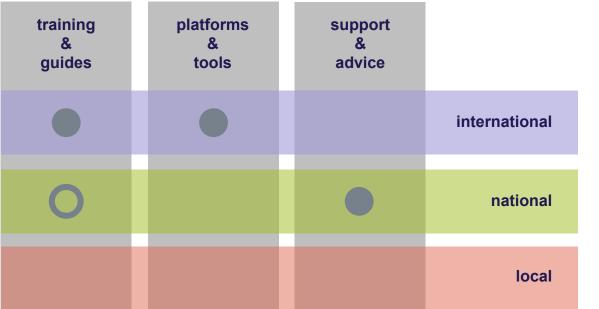
You can also Request the addition of a vocabulary or suggest changes to a

Anyone can search, browse and access the vocabularies described in the <u>BVA</u> <u>genal</u>. You can also self-legister to describe or upload a vocabulary however access to the editor is restricted to the ARDC partner institutions (Australian research organisations, including universities, research institutes, collecting organisations and poverniment agencies.) To use the <u>BVA editor</u> to create a new machine-readable vocabulary you will need to <u>register here</u>. <u>Contact us</u> to sign up for a life soccurit.

AALBURG UNIVERSITET

vocabulary.

Support needs when ramping up M4M workshops





data stewards RDM consultants

ΔΙΙΠΙΔ

RESEARCH DATA SERVICES



Going forward with M4M workshops - challenges @ local level



GETTING ORGANISED

- Gathering the team
- Acquiring the competencies needed

MARKETING

- Timing
- Getting the message right
- Avoiding the 'yet another thing we researchers have to do' pitfall

FACILITATING

- Mastering the WS format
- Handling differences in participant skill set levels
- Making it work with BYOD (Bring Your Own Data)





Future directions and plans

- Goal: Make FAIRification tools and methods easier available for everyone to use
- Create general tools to use for discipline specific metadata definitions
- Scale up process to include more researchers and (potential) data stewards
- Possible for non-techies to join, lower barriers
- Practical approach, both in terms of time and content of workshops
- Easy onboarding to FAIR for machines
- Collaborative effort



Plans for future

- Condensed M4M to be held for BioImaging community April 2021
 - still experimental, but already including lots of experience
- If successful, complete and publish course material and toolbox
- If there is interest: Establish training program for workshop facilitators
- Continued cooperation with GO FAIR
 - co-designing the M4M format, integrate with GO FAIR M4M Handbook
 - learn from GO FAIR's facilitator training program
 - cooperation with other active parties, e.g. GO FAIR US
 - consider future options for e.g. certification, GO FAIR DK office
- Support continued FAIR strategy and implementation plan development