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Supporting Open Science at Aalto University
Support services and technical infrastructure

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1st NetCastPL4.0 Convention / 11.4. 2025

Who we are and what we do

Open Science and ACRIS team:

- A team at Aalto University's Research Services dedicated to helping researchers with Open Science and Aalto Current Research Information System (ACRIS)

- Information specialists assigned as contact persons to support each School of the university

Taija Tuoresjärvi

- Contact person for Open Access publishing and the ACRIS system at Aalto School of Engineering
- Helps researchers publish with Open Access in journals or via self-archiving accepted manuscripts

Lucie Hradecká

- Contact person for Research Data Management at Aalto School of Engineering
- Helps with Data Management Plans and connects researchers to other data management specialists

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Benefits of Open Science?

Benefits of Open Access Publishing

More exposure for your work

Practitioners can apply your findings

Researchers in developing countries can see your work

Higher citation rates

Taxpayers get value for money

Compliant with grant rules

The public can access your findings

Your research can Influence policy

Why Open Science?

Why not open science? Three cases from Aalto University rewarded research

- <u>3D visualization</u>: plays, films and performances can be used to present science and its achievements to different audiences

- <u>Open solar data time series</u> from over four decades: easier sharing, finding, referring and supplementing solar data, collaboration

- <u>Catalysis research group</u>: Power of example: showing e.g. how to open a code may inspire others to openly share their outputs too

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Open Research Data: Benefits and challenges

- **Societal impact**

  - Increase access to data for evidence-based decision making, research and innovation

  - Maximize the benefits of research supported by public funding

  - Participation of the public: lower burden on respondents if data are reused, access to larger samples when data can be combined

- **Transparency and reliability of research**

  - Data available for scrutiny -> higher accountability, supports validation of results

  - Articles that also share the underlying data tend to get more citations

Not all data can be open: for example, personal data in research with human participants, confidential data covered by intellectual property rights, data underlying patentable innovations, data related to topics with security concerns, …

-> **Openness is a spectrum** ("As open as possible, as closed as necessary")

Piwowar, H.A., Day, R.S., Fridsma, D.B. (2007). Sharing Detailed Research Data Is Associated with Increased Citation Rate. *PLOS ONE* 2(3): e308. https://doi.org/10.1371/journal.pone.0000308
Hradecka, L. (2023). Tailoring organizational support services for research data management in the open science context : service self-assessment tool pilot. Master's thesis, University of Oulu. https://urn.fi/URN:NBN:fi:oulu-202312073541

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Not just open: FAIR data and reproducibility

- Openness ≠ automatic guarantee of quality or reusability of data: we also need data that are **well managed and FAIR**

  - **Research data management:** data are well organized and documented – others (or your future self) can understand what the data mean and how they were created

    - Folder structure, clear file names, documentation of the meaning and origin of the data – README files ...

  - **FAIR: Findable, Accessible, Interoperable, Reusable**

    - For humans as well as machines, for example:

      - Standard machine-readable licenses such as CC licenses [R]

      - Persistent identifiers such as DOI [F]

      - Discovery metadata e.g. authors, title, keywords, … in standard formats [F, A, I, R]

      - …

  - What else could be needed for **reproducibility**? Software, more information about methods/workflows/protocols?

Higman, R., Bangert, D., & Jones, S. (2019). Three camps, one destination: the intersections of research data management, FAIR and Open. *Insights: The UKSG Journal*, *32*(1), 18. https://doi.org/10.1629/uksg.468
Chen, X., Dallmeier-Tiessen, S., Dasler, R., et al. (2019). Open is not enough. Nature Physics 15(2), 113–119. https://doi.org/10.1038/s41567-018-0342-2

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Well managed research data

Would you be able to use this data?

What would you need to be able to understand and use it?

Real data example:

Statistics Finland & Prime Minister's Office: Citizens' Pulse 16/2021 [dataset]. Version 1.0 (2021-12-22). Finnish Social Science Data Archive [distributor]. http://urn.fi/urn:nbn:fi:fsd:T-FSD3613
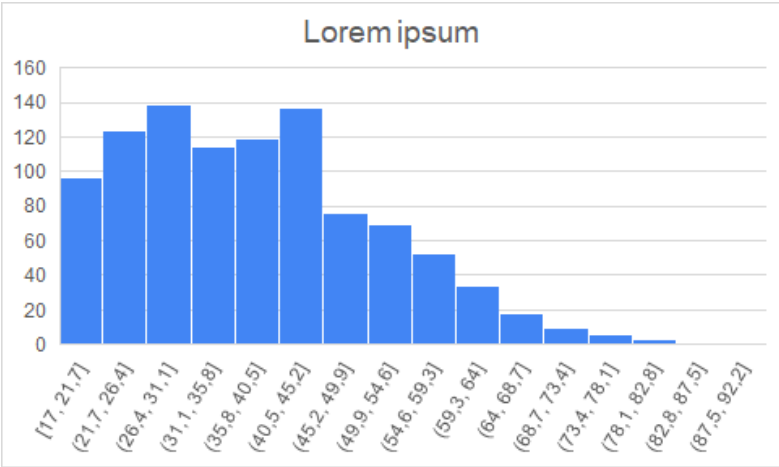
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FAIR research data

Interesting article

John Smith, Jane Taylor, Anna Smith, et al.

…

Figure 1:

Lorem ipsum

Data Availability Statement
Data will be made available on request.

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Would this data be accessible and findable?
Are plots and figures reusable and interoperable?

Published May 31, 2021 | Version 1.0.0   Dataset   🔓 Open

ALD Al2O3 thickness profile in microscopic rectangular channel, TMA-water 300 degC 500 cycles, PillarHall(TM) LHAR3-1b, V0001

Puurunen, Riikka[1] (iD); Ylivaara, Oili[2] (iD)

[Show affiliations]

Contributors

Data collector: Marles, Jaana[1]

Related persons:

Yim, Jihong[2] (iD); Ylilammi, Markku[3]; Korpelainen, Virpi[1] (iD); Haimi, Eero[2] (iD);
Verkama, Emma[2] (iD); Utriainen, Mikko[1] (iD)

[Show affiliations]

Thickness profile data measured for aluminium oxide thin film grown by atomic layer deposition (ALD) using trimethylaluminium and water as reactants at 300 degrees Celsius on an all-silicon lateral high-aspect-ratio (LHAR) test structure of type PillarHall(TM) LHAR3 (layout v1b), nominal gap height 500 nm. Part of this data has been used in the publication "Saturation profile based conformality analysis for atomic layer deposition: aluminum oxide in lateral high-aspect-ratio channels" https://doi.org/10.1039/D0CP03358H, where this sample was number 8 (unique manufacturing code V0001, see Table S3 of the supplementary info, which also contains details of the layouts: http://www.rsc.org/suppdata/d0/cp/d0cp03358h/d0cp03358h1.pdf).

Thickness profiles have been measured optically after removal of the top membrane by adhesive tape, by spectroscopic reflectometry in the visible wavelength range. In the optical thickness measurements, the refractive index is assumed constant (refractive index vs. wavelength this has been determined earlier for similar films also grown at 300 degrees Celsius) and thickness is allowed to vary. The optical model consists of smooth single-crystal silicon and ALD aluminium oxide films. Any silicon oxide below the ALD film is counted in the aluminium oxide thickness. Also roughness will impact the measurement result. For each measurement point, the location, the fitted thickness, and the goodness of fit is presented. For the 50x magnification, measurement spot diameter size is estimated as about 5-6 micrometers. The raw data have the centre of measurement as zero point of horizontal axis. The data needs to be shifted horizontally to have the zero point at the beginning of the LHAR cavity. Sometimes, the removal of the membrane has not worked in the beginning of the cavity (where the support pillars in the PillarHall LHAR3 design are more densely located) and the measurement has been made on a place that includes membrane remnants. In such cases, the fit of the optical model to the results has been poor and the data points should be rejected.

Notes

Funding for PillarHall-3 LHAR prototype fabrication at VTT was provided by the Academy of Finland via the Finnish Centre of Excellence on Atomic Layer Deposition and via Tekes (currently: Business Finland) via the PillarHall TUTL project (1125/31/2016). The work at Aalto University was supported by Puurunen's starting grant and by the Academy of Finland (COOLCAT consortium, decision no. 329978 and ALDI consortium, decision no. 331082).

Files

Files (124.6 kB)

Name	Size	
		[Download all]
ALD-thickness-profile V0001 LHAR3-M08-F05-1B-500 Al2O3 300C 500cyc 0.1-4.0-0.1-4.0s.xlsx	124.6 kB	[Download]
md5:9e1d5117fa6011fa1b61d0074f0674a7		

Keywords and subjects

atomic layer deposition | saturation profile | ALD saturation profile | trimethylaluminium | conformality | ALD | PillarHall(TM) | LHAR

Details

DOI
DOI 10.5281/zenodo.3974438

Resource type
Dataset

Publisher
Zenodo

Languages
English

Rights

Creative Commons Attribution 4.0 International

Citation

Puurunen, R., & Ylivaara, O. (2021). ALD Al2O3 thickness profile in microscopic rectangular channel, TMA-water 300 degC 500 cycles, PillarHall(TM) LHAR3-1b, V0001 (1.0.0) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.3974438

Style: APA

Export

JSON   Export

24.4.2025   9

Good practice: Data Management Plans

- Required in EU projects and by many other funders

- Ideally, also a useful tool for the researchers!

- Risk management tool: Avoid "time machine problems" - issues you could only fix by inventing a time machine

  - Planning ahead helps you recognize what data can be opened, and what data should be protected (e.g., ethical pre-review or GDPR compliance documents must be completed before you start collecting data)

  - If secure storage and backups are not planned, lost data may be gone for good

  - If you're about to publish your data, and notice you forgot to document the settings used on an instrument a year ago, you won't be able to remember and fill in the missing information

- Tool to agree on common practices: if everyone does things differently, it will be more difficult to collaborate, manage the data, and prepare FAIR datasets for publication

  - E.g., using a shared file naming convention and/or shared template for README files takes some time at first, but it's quicker than having to open each file and trying to figure out what's in it, which version, etc.

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Researcher's point of view?

Who wouldn't want their research to have more impact, high quality, and reliability?

However:

Researchers have limited time and many competing tasks, requirements, and things that would be beneficial to do.

Research data management sometimes requires learning new skills, new tools and services.

Institutional support is necessary to enable data sharing! Universities, funders, national assessment systems etc. should:

- Reward efforts in research data management

- Provide appropriate technical infrastructure

- Provide training and support services for researchers

Van den Eynden, V. (2018). What Motivates Researchers to Manage and Share Research Data. In:
Kruse, F. & Thestrup, J. B. (eds.), *Research data management: A European perspective* (pp. 43-52).
Berlin: De Gruyter Saur.
Van den Eynden, V. & Bishop, L. (2014). Incentives and motivations for sharing research data, a
researcher's perspective. A Knowledge Exchange Report. http://repository.jisc.ac.uk/id/eprint/5662

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Researcher's voice:

"*Puurunen talks about **sustainable open science**, meaning open science practices that are useful to both society and the researcher in the long term. For example, **opening research data for the sake of openness is not sustainable if the data are not well-documented and no one can understand and use them**. Researchers' time is a limited resource, and it is neither sustainable nor reasonable to put effort into everything possible. Sustainability of IT resources and energy usage should also be considered when we think about what data should be preserved in data repositories for decades.*

*A key factor in advancing open science** would be that **researchers understand the benefits it can bring to them**. Puurunen recommends **opening research data and code supporting results presented in research articles. Sharing the data and code makes it easier to validate the results, and this supports the quality and reliability of research.** From a more selfish point of view, **openly accessible data and code will also remain accessible to the author.** This is especially useful for doctoral and post-doctoral researchers, who will likely move on to another organisation for their next position, and they might not be able to easily access the data collected at their previous institute.*"

Photo: Charlotte Forsgård / Aalto University.

Aalto Open Science Award Honorary Mention 2023 – Professor Riikka Puurunen leads by example to foster sustainable open science

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Open Science support services at Aalto University

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Services and resources supporting open access 1/3: Tools for Open Access

ACRIS

Aaltodoc

Your university's institutional repository

DOAJ

Journal Search Tool

arXiv

JOURNAL CHECKER TOOL

Jisc Open policy finder
Formerly Sherpa services

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Services and resources supporting open access 2/3: Open Access Agreements

- <u>Open access agreements with publishers</u>; both negotiated by the national consortium FinElib and Aalto's own agreements

- Either APC fee fully covered or a 15% discount on APC

- Mainly hybrid journals, all eligible for publication channels in EU projects

- Publishers: ASME, Elsevier, Elsevier Cell Press, Emerald, IEEE, Nature Research, Springer, Taylor & Francis, (Wiley: agreement will be signed soon)

➔ What can the researchers do?

- Check before you submit: Does my university have an agreement with this journal? What about the co-authors' universities?

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Services and resources supporting open access 3/3: Deposit to institutional repository; Communication

- Open Science and ACRIS team deposits full texts of Open Access articles to our institutional repository (EU requirement: make the bibliographic metadata and the article file accessible on an alternative non-commercial platform - sustainability of access)

- <u>Open access publishing through manuscript service</u> (Green OA, self-archiving)

  - Every time metadata of a non-open access publication is imported to Acris, a message is sent to the Aalto author to send the accepted manuscript (post-print, AAM) version of the publication to <u>manuscripts@aalto.fi</u>

  - Once the author has sent the manuscript, the Open Science and ACRIS team uploads it in Acris according to the publisher's terms (e.g. embargo periods)

  - Please note that in EU projects, depositing the accepted manuscript is often not compliant: embargo periods are not allowed, and most publishers don't allow the CC-BY license for accepted manuscripts of non-OA articles

➔ What can the researchers do?

- Find your institutional repository, ask your support services for instructions: do they deposit files for you, or do you need to do this yourself, etc.

- Support services include communicating and guidance:

<u>Open science and research news</u> on aalto.fi pages, included also in Research funding info emails sent monthly to ENG, EU project kick-off meetings: open science requirements explained, <u>Aalto University Open Science and Research pages</u>
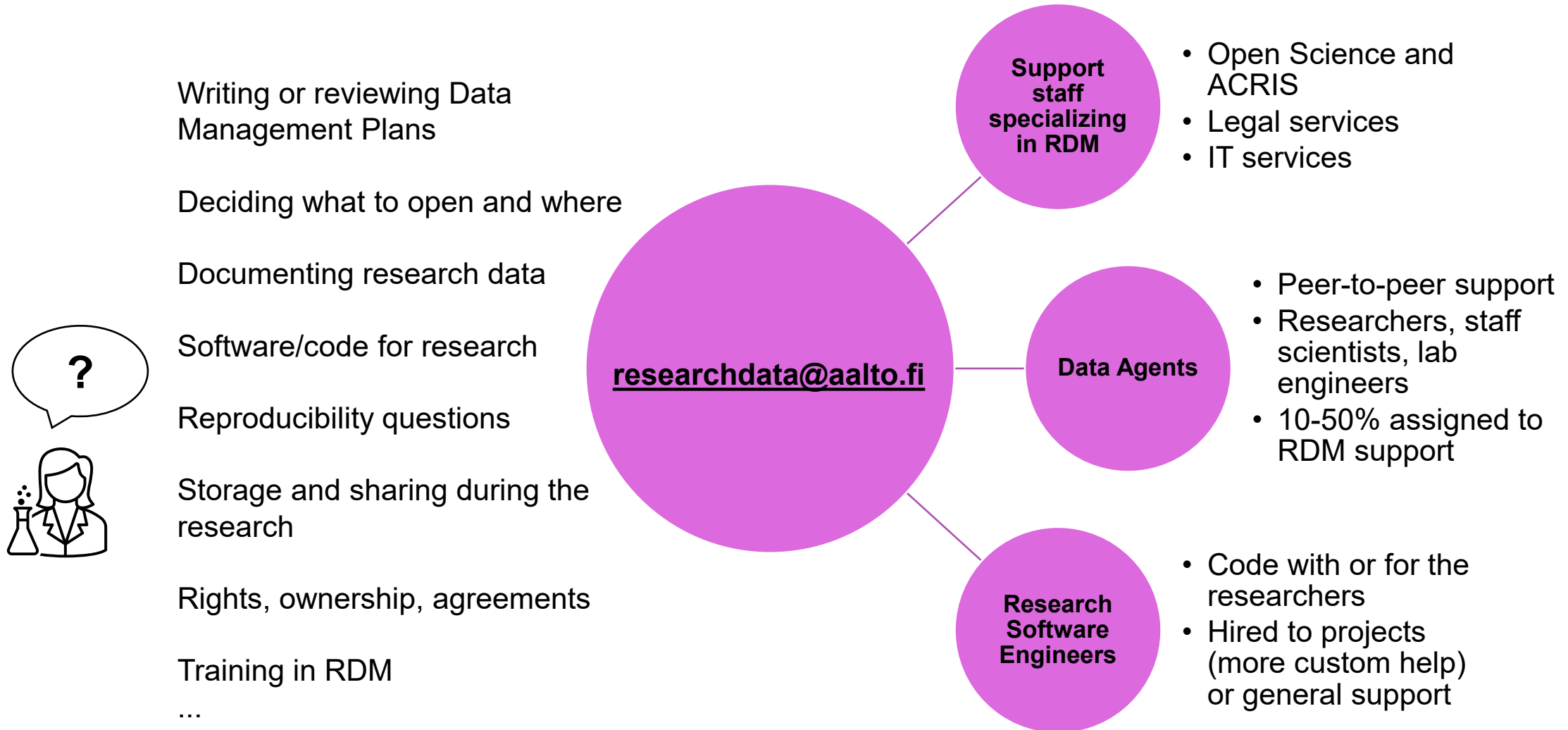
Technical infrastructure for RDM at Aalto University

Consider: tools for different stages of the data life cycle, existing trustworthy services available nationally or internationally

Examples:

- **Storage and processing during the research**
  - Secure internal storage: network drives with access control and regular automated backups (in-house)
  - High Performance Computing (in-house cluster and national services)
- **Secure sharing with collaborators during the research**
  - Institutional licenses for commercial cloud services
- **Publishing and long-term storage**
  - National repository (<u>Fairdata-services</u>), <u>Zenodo</u>, discipline-specific repositories, …
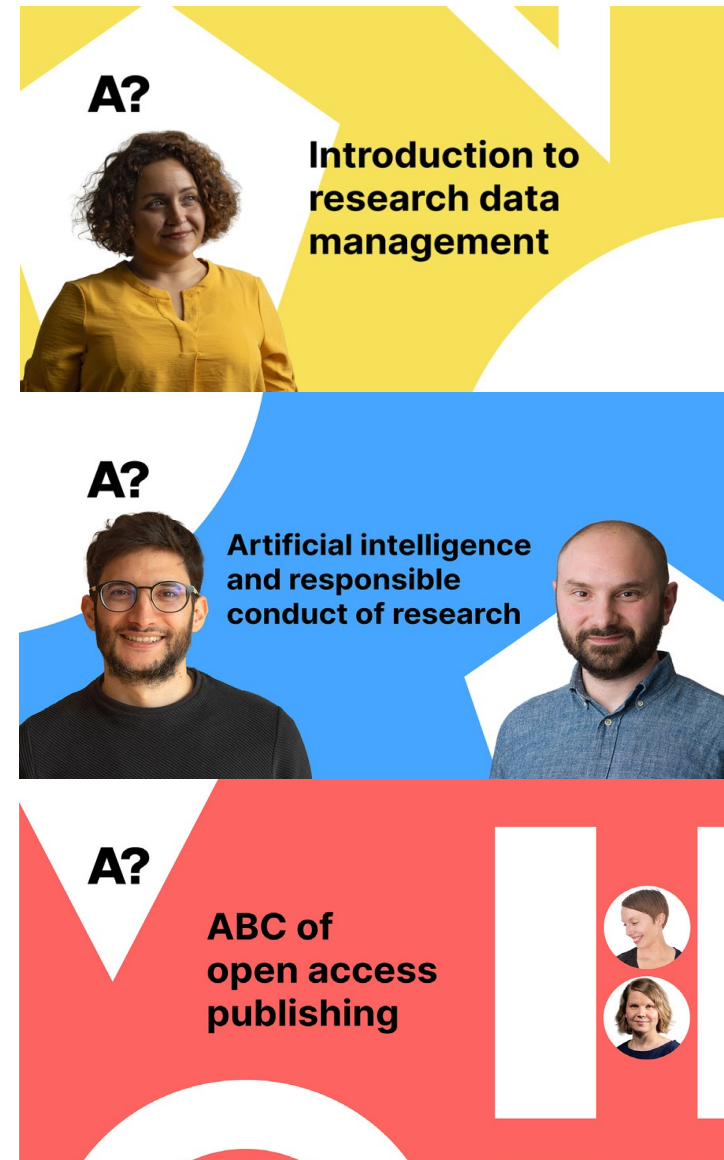 - In-house repository under development (audiovisual data, archiving and digital preservation)

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The Aalto Open Research Network

Writing or reviewing Data Management Plans

Deciding what to open and where

Documenting research data

Software/code for research

Reproducibility questions

Storage and sharing during the research

Rights, ownership, agreements

Training in RDM
...

?

researchdata@aalto.fi

Support staff specializing in RDM

- Open Science and ACRIS
- Legal services
- IT services

Data Agents

- Peer-to-peer support
- Researchers, staff scientists, lab engineers
- 10-50% assigned to RDM support

Research Software Engineers

- Code with or for the researchers
- Hired to projects (more custom help) or general support

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Open webinar series on Open Science / RDM

- Anyone can register and participate (occasional exceptions possible)

- Many diverse topics from introductory training to researchers' talks about discipline-specific practices

- See the webinar series website

- Recordings and slides available on our Youtube channel

A?
Introduction to research data management

A?
Artificial intelligence and responsible conduct of research

A?
ABC of open access publishing

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Kiitos
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