Research Data Management and Higher Education in Physics

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[4] Bergische Universität Wuppertal, Germany

DPG autumnly Spring Meeting (AGI 2.4)
September 28, 2021

Outline

Introduction

ZaPF - Federal Conference of Physics Student Councils

- ZaPF = Zusammenkunft aller deutschsprachigen Physik-Fachschaften
- Conferences take place once per semester
- About **40-60 participating** student councils[1]
- Higher education politics and **study-related** topics

[1] in less insane times

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- About **40-60 participating** student councils[1]
- Higher education politics and **study-related** topics
  - CHE advisory board for physics
  - "Studienreformforum" in collaboration with DPG (FV Didaktik)
  - Representatives at KFP
  - Student experts in accreditation
- Close collaboration with jDPG

[1] in less insane times

Introduction

Why are students talking about NFDI?

MEINUNG

Meine Meinung

Forschungsdaten effizient managen

Gutes Datenmanagement unterstützt die Forschung und schafft Mehrwerte für die Wissenschaft.

Holger Frahm

Forschungsdaten sind wichtige Grundlage und wesentlicher Output unserer Arbeit zugleich. Nicht umsonst gehören ihre Dokumentation und sichere Archivierung zur guten wissenschaftlichen Praxis. In Kollaborationen teilen wir unsere Daten mit Kolleginnen und Kollegen, um gemeinsam zu neuen Erkenntnissen zu gelangen. Damit alle Beteiligten mit den Daten arbeiten können, vereinbaren wir Standards für ihr Format und die Pflege von Metadaten. Ein Mehrwert solcher Regeln zeigt sich oft erst im Nachhinein,

Prof. Dr. Holger Frahm, Professor für Theoretische Physik und Chief Information Officer an der Leibniz Universität Hannover

- Wir haben die einzigartige Chance, ein Portfolio an nachhaltigen Datendiensten aufzubauen, das unsere Forschung optimal unterstützt.
- *We have the unique opportunity to design a set of data services which optimally supports our research.*

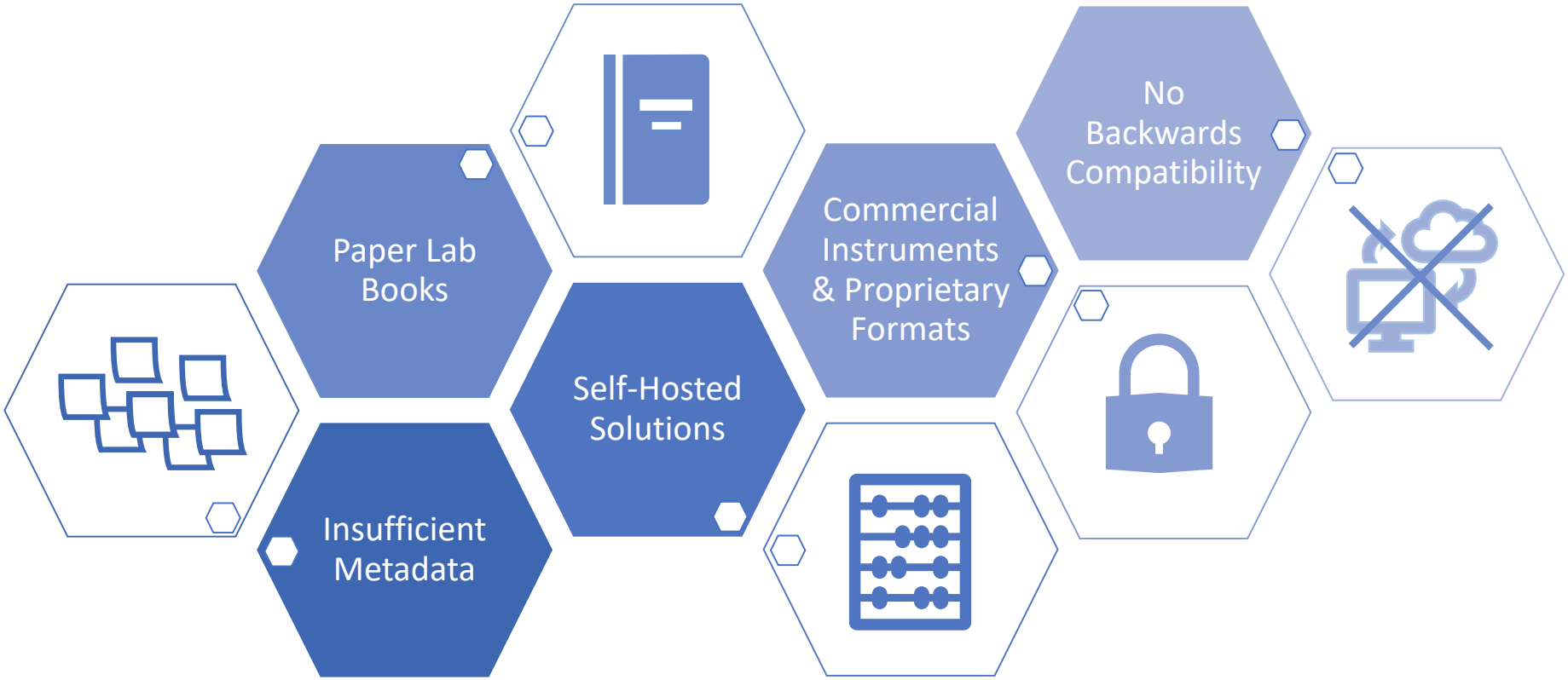
H. Frahm, Physikjournal **18,** 3 (2019)

Students' Perspectives

Initial Concerns and Ideas

Students' Perspectives

Status Quo



e.g. *Hochschulforum Digitalisierung*, Diskussionspapier **9,** (2020)

Students' Perspectives

RDM and Open Science: The O in FAIR

- Access should be **as open as possible**, open licenses (such as CC-0, CC-BY, CC-BY-SA) should be used.
- Exceptions to **protect unpublished data** etc. are possible.
- Data transparency is a chance for popular science and outreach activities.
- Non-university and for-profit research should be included as much as possible.

Badges by Centre for Open Science

ZaPF, Positionspapier NFDI **Freiburg,** (2019).
DOI 10.5281/zenodo.5519045

Students' Perspectives

Services, Security, and Privacy

- FAIR[2] RDM systems should provide:
  - version control, high availability, continuous integration
  - contact and calendar management, publication
  - collaboration tools: messenger, video conferencing, ...
- User friendliness and security of the interface should be **audited** on a regular basis

[2] Findable, Accessible, Interoperable, Reusable
Wilkinson, M. et al., Sci Data **3,** 160018 (2016). DOI 10.1038/sdata.2016.18

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- User friendliness and security of the interface should be **audited** on a regular basis
- **CIA triad**: Confidentiality (where necessary), Integrity, Authenticity
- Generate **PIDs** [3] for all objects in the repository automatically

[2] Findable, Accessible, Interoperable, Reusable
Wilkinson, M. et al., Sci Data **3,** 160018 (2016). DOI 10.1038/sdata.2016.18

[3] *J. Philipson*, Data Science **2,** 229 (2019). DOI 10.3233/DS-190024

Students' Perspectives

Qualification Objectives

ZaPF, Positionspapier FDM im Studium **Rostock,** (2021). DOI 10.5281/zenodo.5519029

Students' Perspectives

Qualification Objectives

- Degree levels specified in EQF[4]: students work increasingly independently
- Qualification profiles of degree programmes *(Qualifikationsprofile)*
- Guiding principles for research and teaching *(Leitbilder)*

ZaPF, Positionspapier FDM im Studium **Rostock,** (2021). DOI 10.5281/zenodo.5519029

[4] European Qualification Framework, *European Council*, Official Journal , 2017/C 189/03 (2017)

Integration in Curricula

Refine Community Needs

Step by step introduction into FAIR use of data and metadata

ZaPF, Positionspapier Open Science im Praktikum **Garching,** (2020). DOI 10.5281/zenodo.5519037

Integration in Curricula

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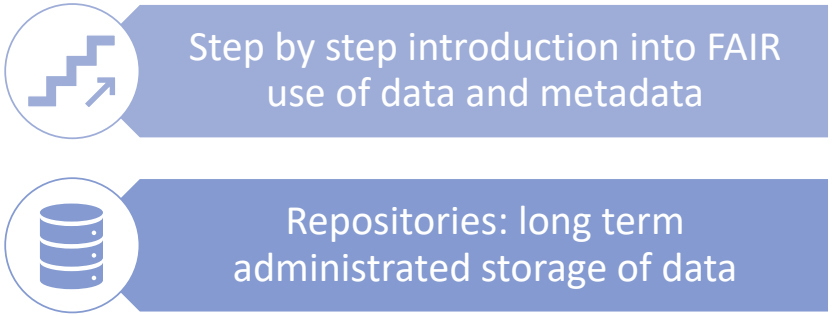

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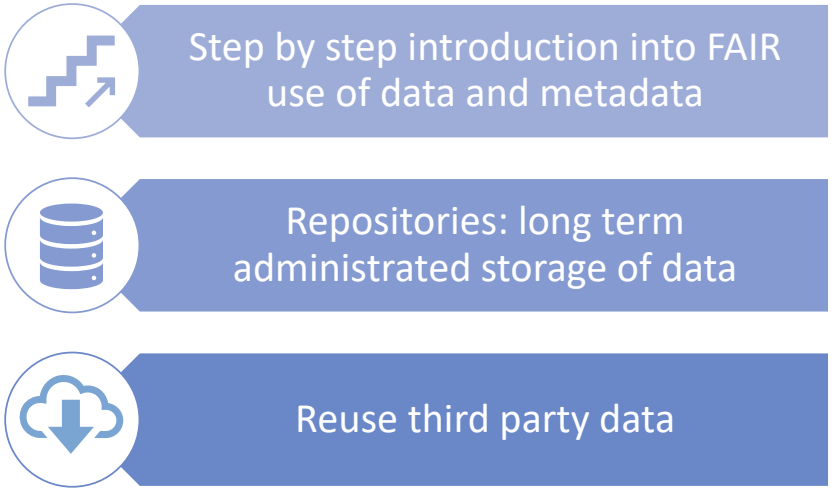

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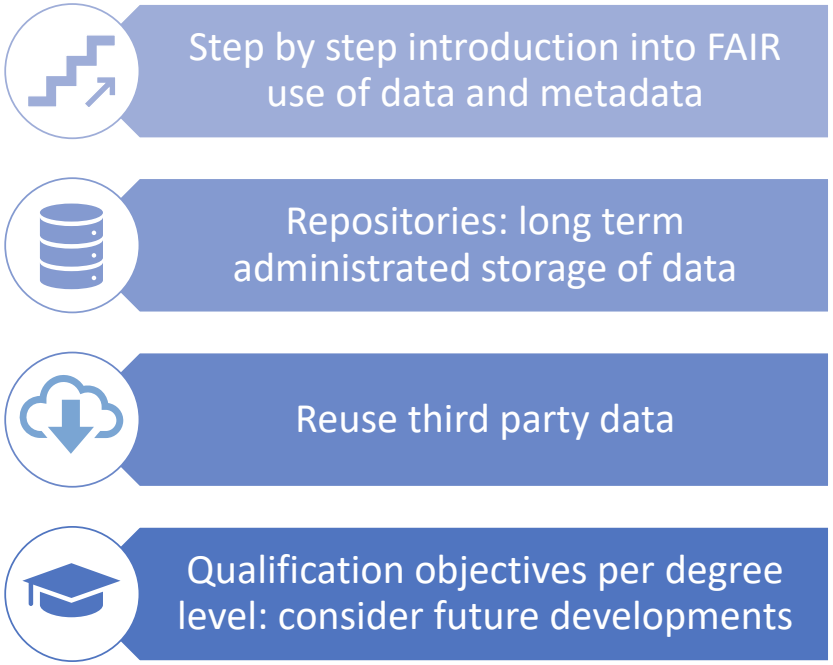

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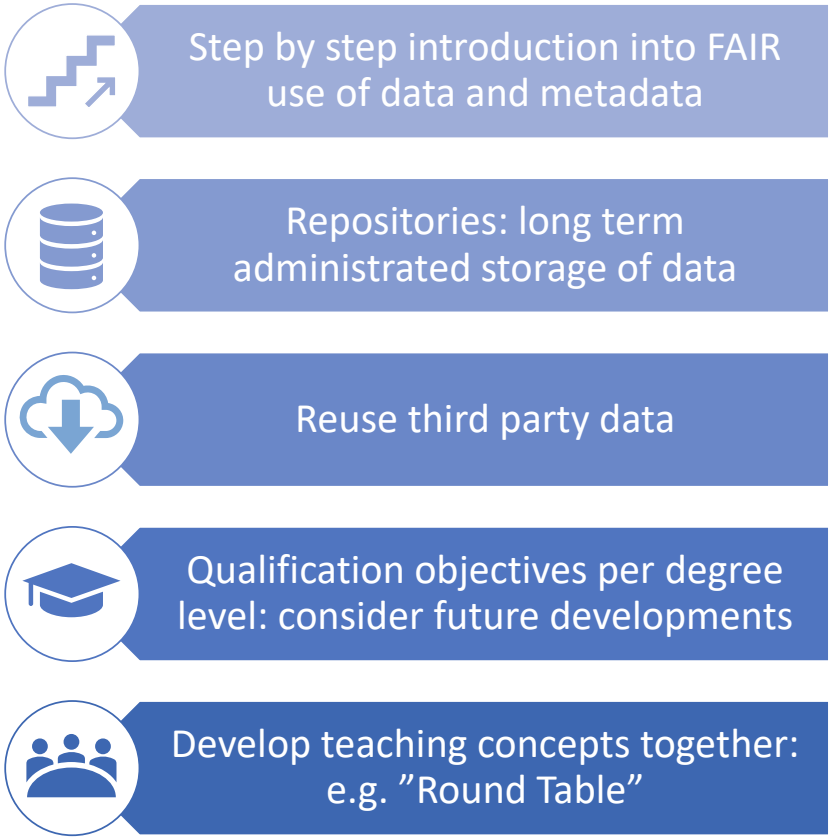

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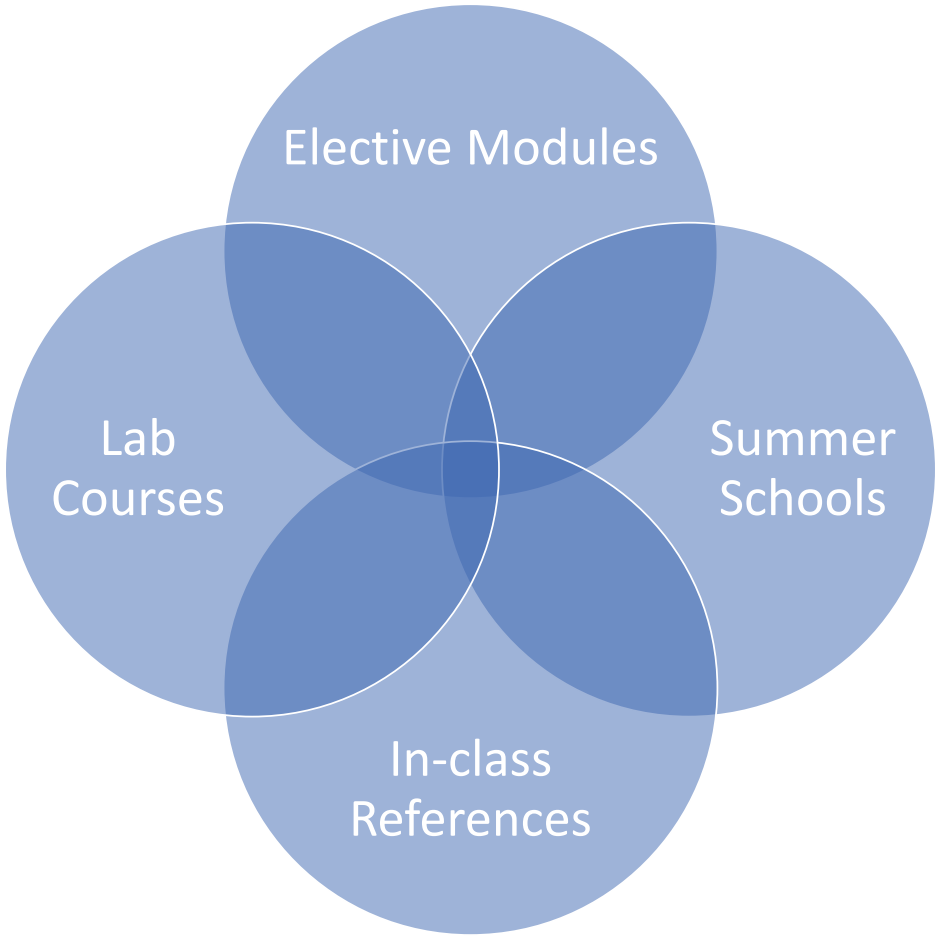
Integration in Curricula

Graduate Students and Young Researchers



PJ & JB, Phy. Did. B , manuscript accepted (2021).
DOI 10.5281/zenodo.5168523

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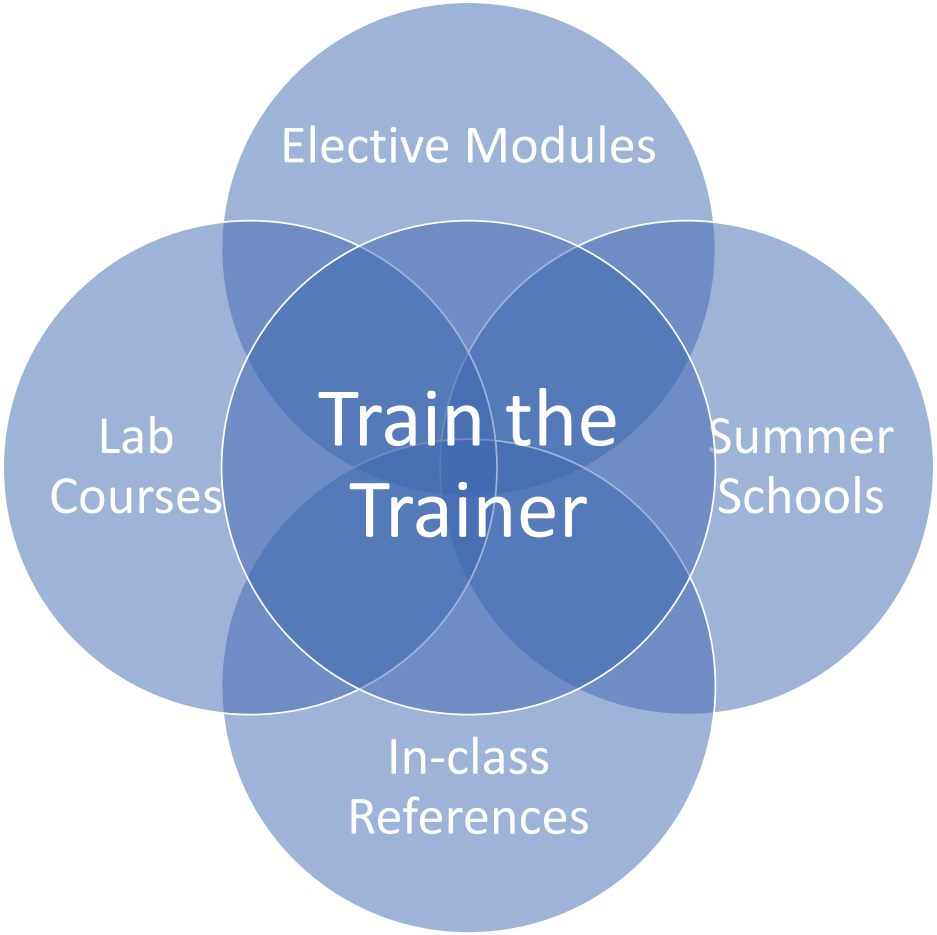

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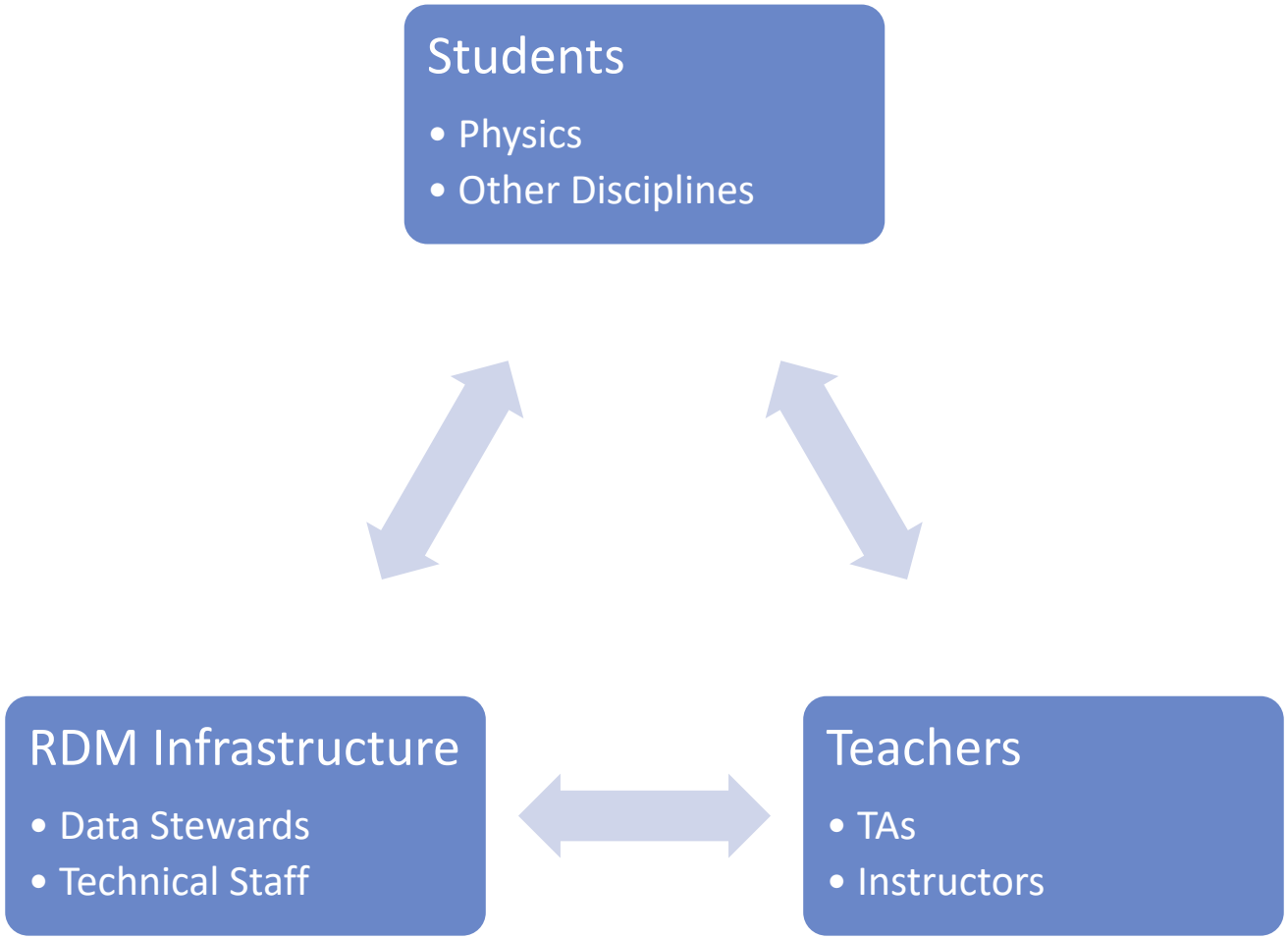
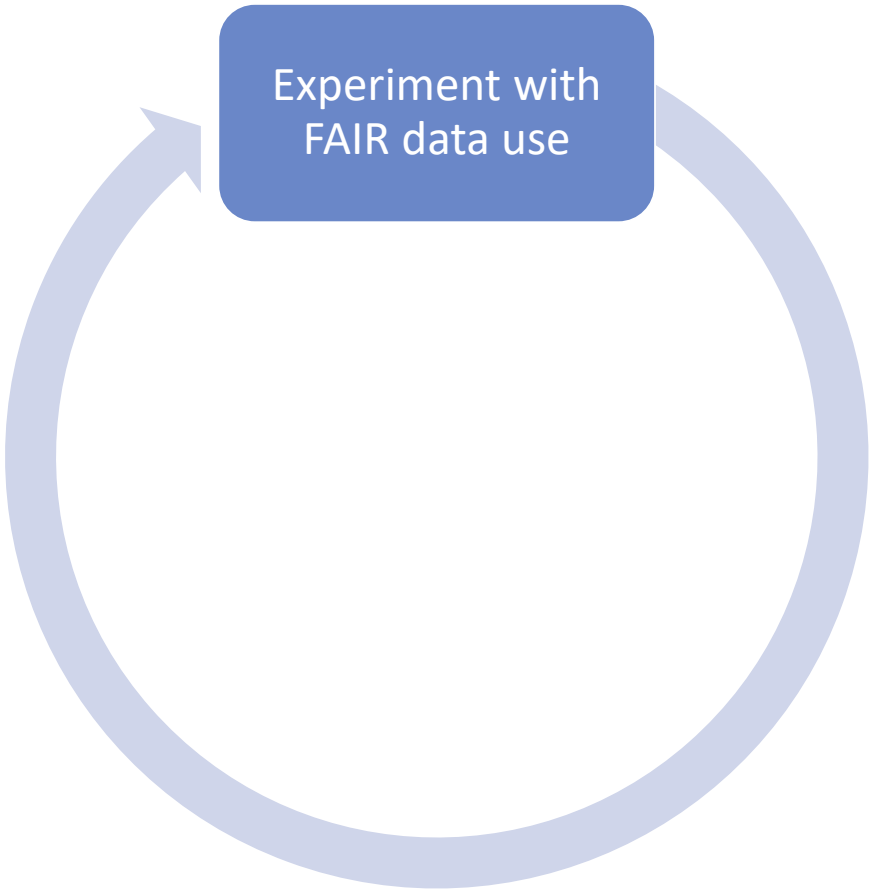
Example: Lab Courses

User Perspectives



Example: Lab Courses

FAIR Data in Student Experiments



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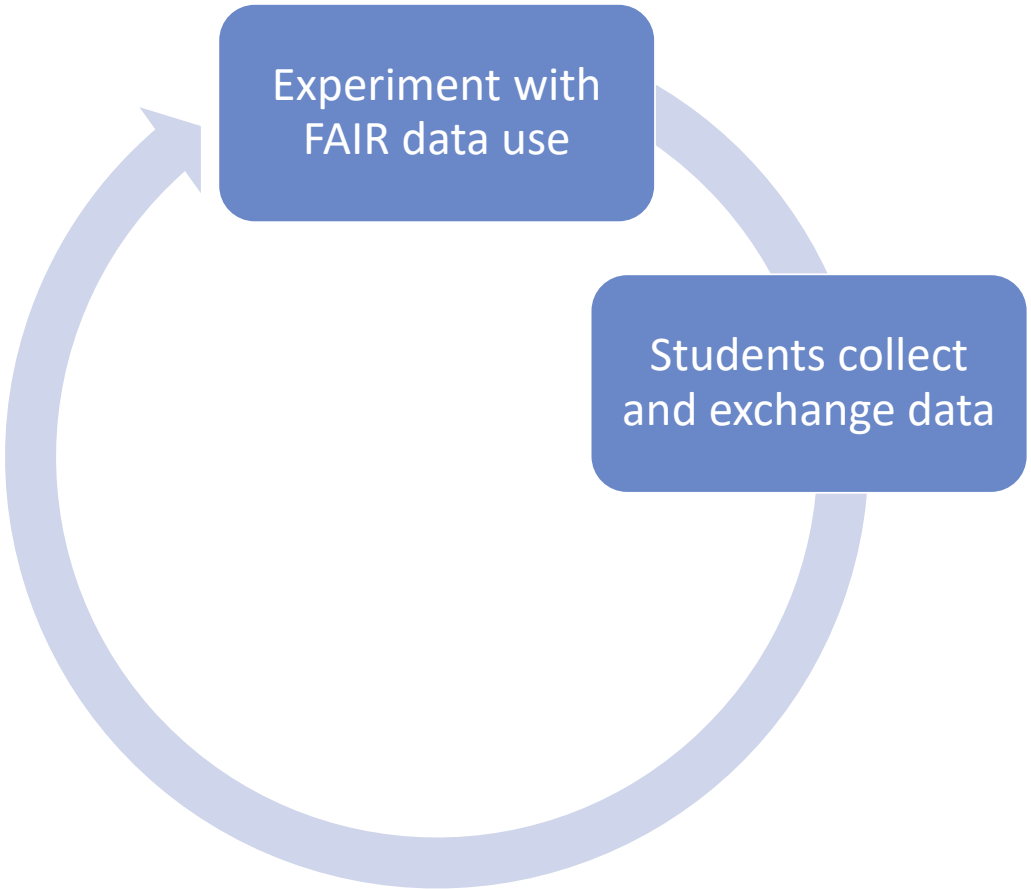

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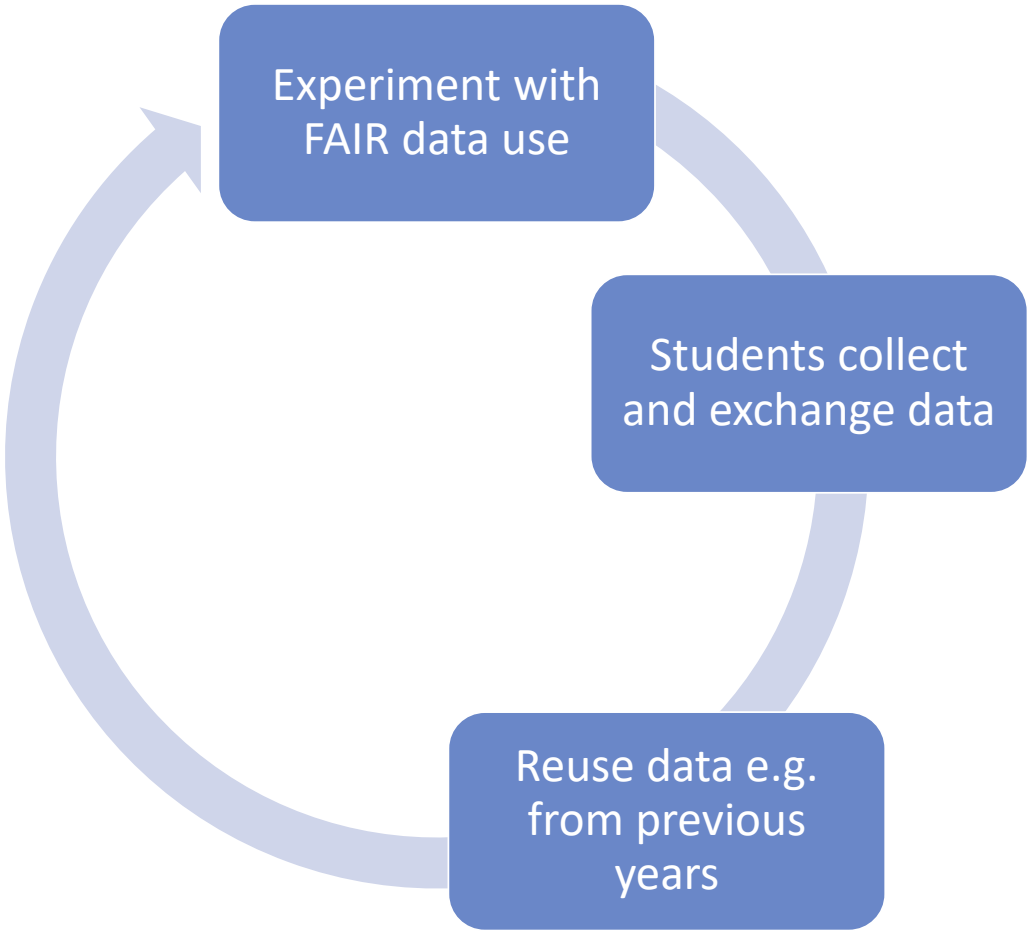

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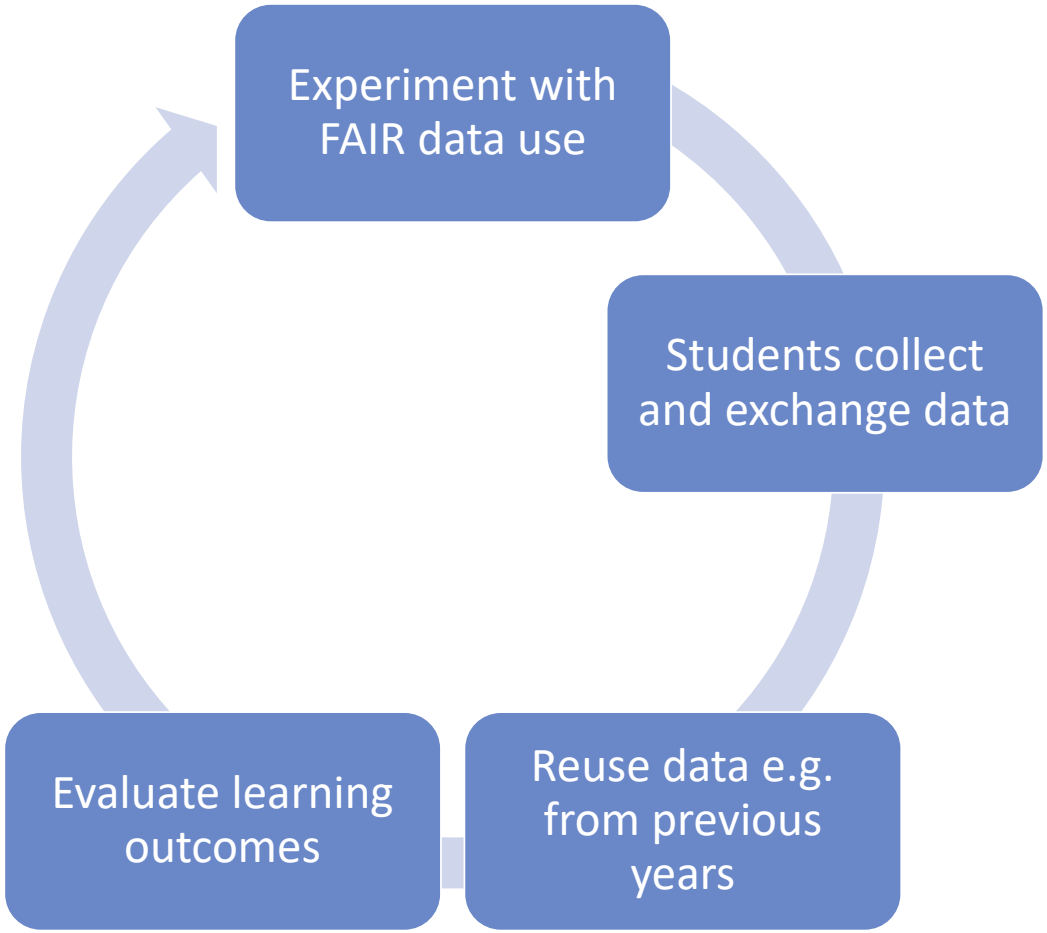

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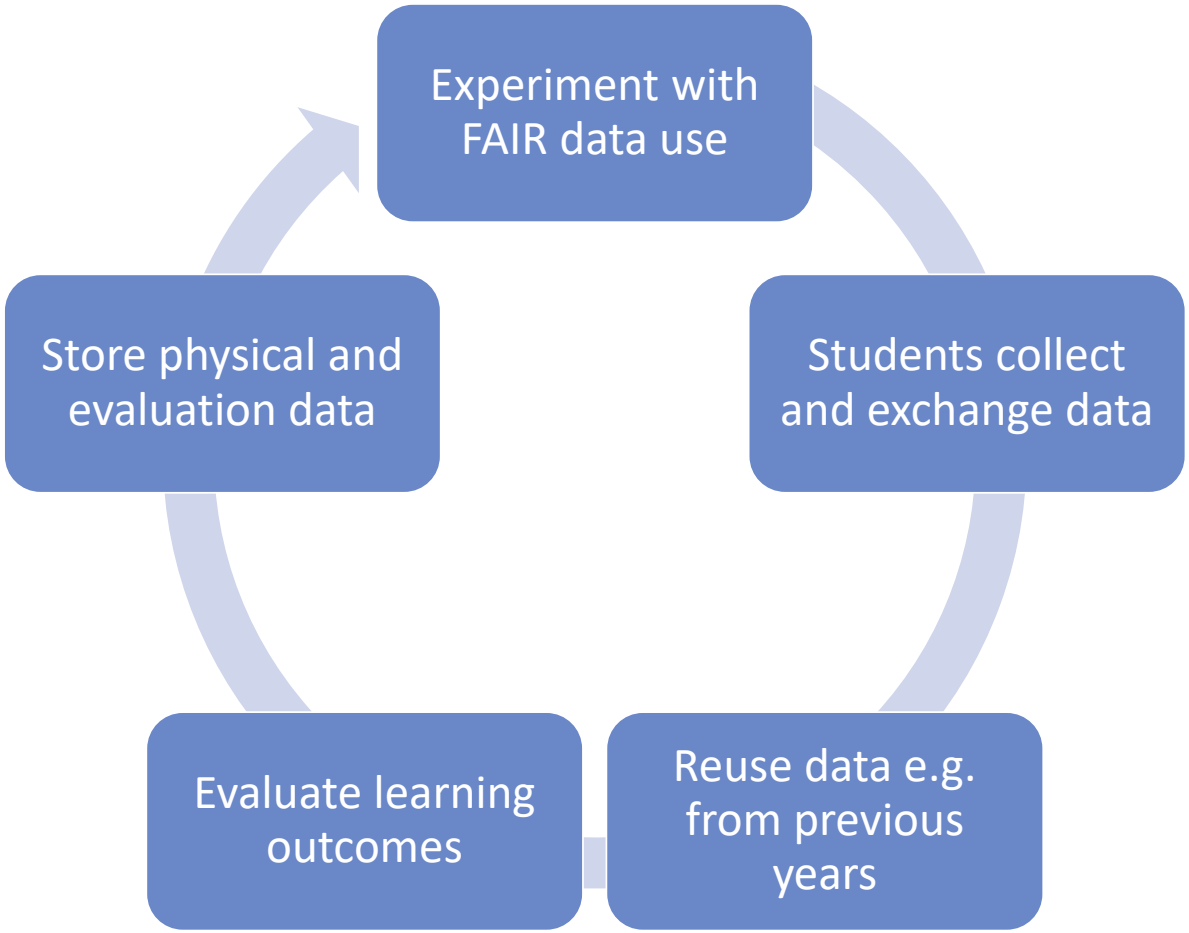

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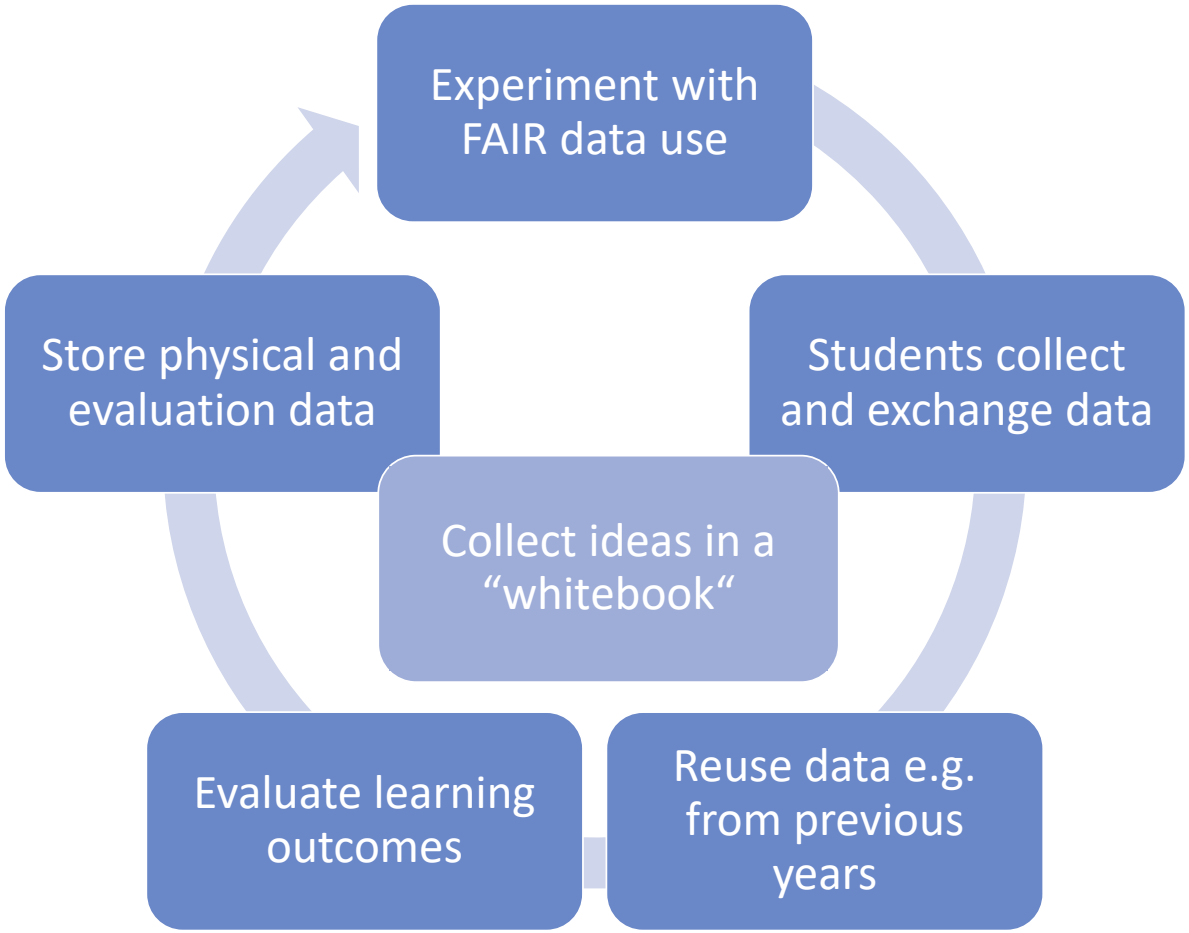

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Conclusion

General Aspects of RDM

- Clear policy on **access, privacy, licensing** etc. from the very beginning
- **User friendliness** is paramount
- Implement RDM on the level of **curricula** and qualification objectives

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Implementation in higher education

- **Awareness** for a FAIR handling of data
- Students carry knowledge **into their research group** and are able to create understandable data
- Reach a large group of future scientists with **little effort**

Conclusion

Collaborators

- Janice Bode, Uni Münster
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- Merten Dahlkemper, CERN/Uni Göttingen
- Benjamin Wolba, formerly KIT
- Zusammenkunft aller deutschsprachigen Physikfachschaften e.V.
- jDPG, A-Team NFDI
- Collaborating NFDI Consortia

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