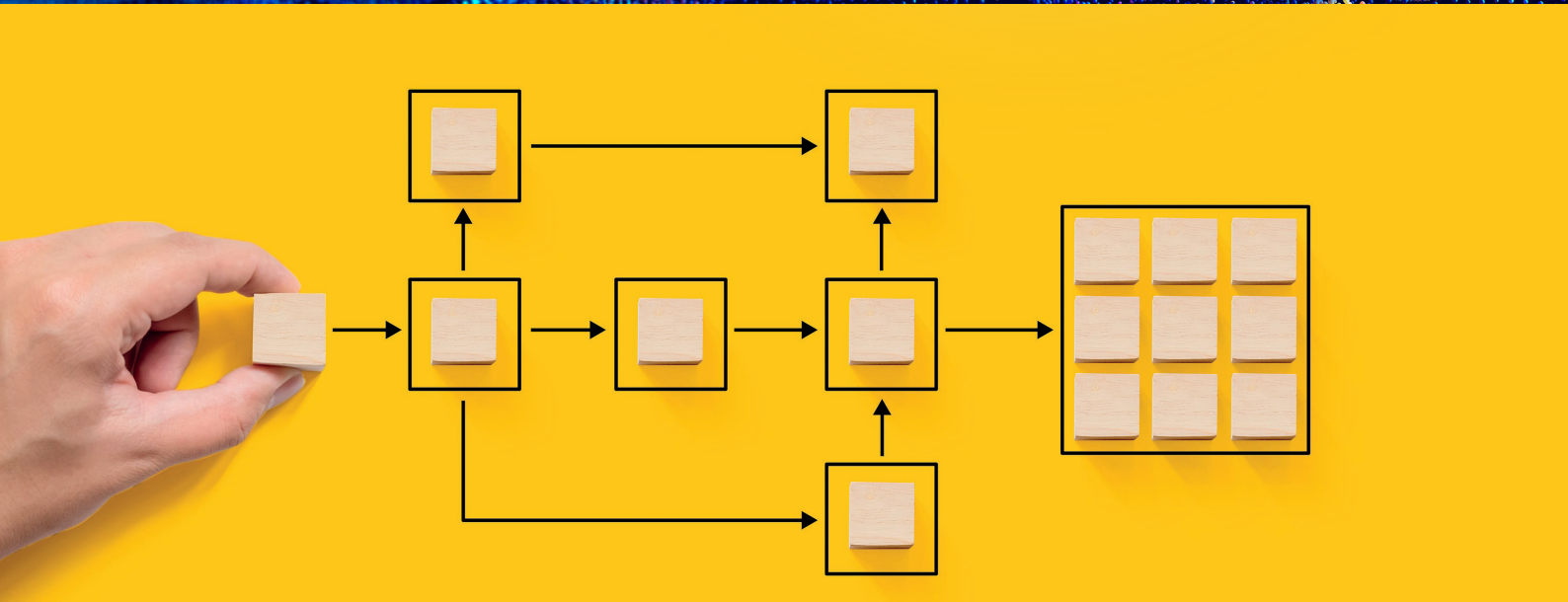




# Maneuvering Between the Expected and the Unknown: Maintaining Institutional Repository Development Under Challenging Conditions



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## Support programme:

FAIR-IMPACT's Support Programme for Repositories and Data Service Providers aimed to help participants better understand their drivers for becoming more FAIR-enabling, self-assess their current FAIR-enabling capacity, develop an action plan with considerations for stakeholder engagement, and to work on implementing this. The support programme ran between September 2024 and March 2025, during which six virtual workshops and continuous dedicated and tailored mentoring support was offered to help participants identify and establish their unique journey toward becoming more FAIR-enabling. This FAIR Implementation Story outlines the specific aims and actions of University of Maribor Library in relation to their participation in this Support Programme.

## Keywords:

Institutional Repository, Digital Library, development, FAIR Principles, cyber-attack effect

## Summary:

The University of Maribor Library participated in the FAIR-IMPACT Support Programme to enhance the implementation of FAIR principles in the University of Maribor's institutional repository, DKUM. Our efforts focused on policy improvements, increasing the FAIR-ness of data, and stakeholder engagement. We developed a FAIR Implementation Action Plan with six key objectives, including gaining CoreTrustSeal certification, improving the machine-readability of policies, enhancing visibility, and increasing the long-term value of research outputs.

Progress was significantly disrupted by a major cyber-attack in October 2024, which temporarily paralyzed university systems. Despite this, the support team adapted quickly to maintain essential services, particularly for students. Long-term challenges such as limited staffing and resources have slowed implementation, especially in areas like machine-actionable policies and FAIR signposting.

Looking ahead, the library aims to complete postponed tasks, deepen cooperation with data stewards, contribute to national and international open science initiatives, and support policy changes to embed FAIR principles in PhD research processes.



## ■ Introduction:

Members of University of Maribor Library joined the FAIR-IMPACT Support Programme for Repositories and Data Service Providers to strengthen the implementation of FAIR principles at our institution, focusing on awareness of researchers, improving infrastructure and aligning with relevant regulations. Our main goal was to improve our institutional repository, [Digital Library of University of Maribor \(DKUM\)](#). At the beginning we were somewhat concerned about the timeline due to limited time and resources needed to achieve all the objectives. However, through the programme we realized that improving a repository that follows good practices and FAIR principles is a never ending process.

## ■ Approach taken:

We followed the programme plan, which in its first step suggests completing the self-assessment checklist (Checklist to assess your current and aspirational FAIR-enabling capabilities). We focused on five aspects: policy, FAIR data assessment, supporting the FAIR-ness of objects, displaying trustworthiness and engaging with the community. We identified the most room for progress in the first two aspects. In the area of supporting the FAIR-ness of objects we were already on a high level, which was later confirmed with Automated FAIR Data Assessment Tool – F-UJI (<https://www.f-ujl.net/>). With this tool we have been highly evaluated at Findability, Accessibility and Interoperability. However, results showed that we need most improvements in the area of Reusability. The remaining two aspects from the self-assessment checklist require only minimal, mostly long-term improvements.

In the next step we used a tool that consists of three clusters of drivers in the aspect of Serving Depositors, Serving Reusers and Serving your Organisation. We scored individual drivers on a five-level scale from 1 (not a driver) to 5 (very strong driver) and got a visualization that showed us our repository is well planned in all three clusters of drivers, with the lowest score in cluster Serving Reusers.

Based on the previously created material we drafted FAIR Implementation Action Plan with six Objectives and a total of nine actions. The mentors from the FAIR-IMPACT programme were very helpful throughout this whole process. They guided us, advised us and encouraged us to create an action plan that will guide the further development of our repository, even though we are aware that financial and staff resources are limited. We determined six objectives:

- 1. Trusted repository.** First action under that objective was to write a manual and Terms of use for our new entry points – webpages for research data (DKUM Data) and preprints (UM Preprints) in order to better support researchers. Both are integrated into DKUM in the background. This action was completed by preparing the terms of use for both new webpages and forwarding them to developers group and decision makers at our library. Second action involves obtaining recognition as a trusted repository through certification - CoreTrustSeal. The first part is planned to be completed by the end of the year and we hope to fulfil the conditions to get the CoreTrustSeal certificate.
- 2. Machine-actionable policy.** We aim to enhance the machine-actionability of research objects through two actions – obtaining the policy identifier and creating structured markup to support machine-readability. Both actions were introduced to the Development Working Group (DWG) at the university level for further consideration. Due to limited resources, this objective has been assigned long-term priority status (beyond the timeframe of the support programme).
- 3. FAIR Signposting.** Since the term was new for our support team, we conducted basic research to understand its relevance and potential benefits. Due to limited resources—and after consultation with the developers' group at FERI (The Faculty of Electrical Engineering and Computer Science)—we decided not to include the implementation of FAIR Signposting in this year's action plan for the repository. We will most likely include it in the next two years.
- 4. Meeting the conditions for inclusion in the Re3data global register.** Actions under this objective include making research data FAIR and the primary content of the repository. Before the programme started we began developing



a new entry point for research data (DKUM Data) to get more segregated data in our digital library and to fulfil the conditions to get included to the Re3data register. The implementation was delayed because of a cyber-attack at University of Maribor in November from the end of 2024 to the year 2025 and still proceeds.

**5. Publish outputs of long-term values.** Actions are publishing outputs of long-term values, using community-recognised controlled vocabularies - e.g. we already have PID (handle), but we would like to implement DOI for better visibility). The progress is expected to be a long-term and ongoing process, depending on funds.

**6. Visibility and findability.** Under the last objectives we defined two actions. First is to update the search functionality on the DKUM website. The second action focuses on raising awareness among researchers about our services. We also aim to strengthen direct contact with departments to encourage the deposit of research outputs in line with FAIR principles. Progress on this objective is expected to be long-term and will depend on the interest of stakeholders and users.

At last we identified eight stakeholder groups, relevant for our Action Plan and considered their interaction with our repository. We added a new group in Slovenia - Data stewards. We determined that they have both, high interest and high influence on the success of our Action Plan, especially in terms of community engagement, training and support. We hope that cooperation with data stewards will help raise awareness of FAIR data among researchers. Since this group is still in a training phase at the national level, the data steward community at the University of Maribor currently includes four members, one of whom—based at the University of Maribor Library—acts as the coordinator. It was valuable for us to establish connections with more experienced members of the FAIR-IMPACT programme and to receive practical advice from them (e.g. examples of active networks of data stewards).

## ■ Challenges encountered and addressed:

The biggest challenge we faced during the programme was a large-scale ransomware cyber-attack targeting the central IT infrastructure of the University of Maribor on 23 October 2024. The attack rendered all major services inaccessible, including email, university websites, the Moodle environment, digital identity, academic, human resources, and financial information systems, as well as communication and storage tools such as MS Teams and OneDrive.

In the immediate aftermath no essential services – such as internet connection, digital identity and communication channels, were available for staff and students, as the entire system had been completely shut down as a preventive measure. As a result, we were left without the necessary conditions to carry out our daily work and support users effectively. Gradually, the university systems were brought back online one by one, over the following months. Some were modified or improved, which required us to adapt to new functionalities and workflows. Additionally, internal processes at DKUM had to be tested and, in some cases, adjusted to ensure they functioned correctly within the updated system environment. In the meantime we also had to provide alternative solutions for our users - especially students in the final stages of thesis submission to DKUM. According to UM regulations, thesis submission is one of the requirements students must fulfil before graduating. A mandatory part of the process is also the similarity report, which is an integral component of thesis submission at DKUM. Without it, students are not allowed to defend their theses and complete their graduation process. During this period, the development of FAIR principles for our institutional repository became a secondary priority and most of our goals from the Action plan were postponed. The cyber-attack had the biggest impact on Meeting the conditions for inclusion in the Re3data global register (Objective 4), that we planned to complete in December.

Another ongoing issue, one we have been aware of from the beginning, is lack of time, staff and financial resources needed to achieve the goals set out in the Action Plan. These constraints had the most significant impact on the following objectives: Machine-Actionable Policy (Objective 2), FAIR Signposting (Objective 3), and Publishing Outputs of Long-Term Value (Objective 5). For these three objectives we, as part of the support team, were able to research the purpose of chosen objectives and potential benefits. For each objective, we explored possible next steps and shared suggestions with the Development Working Group (DWG) or other relevant decision-makers at the university library. Given the existing limitations and barriers, we assigned these objectives a “longer-term” priority status, beyond the timeframe of the support programme.





## ■ ■ Impact:

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Improving a repository that follows good practices and FAIR principles is a never ending process. Mentors guided us throughout the programme and helped us reflect on our goals in a way that our Action Plan could be helpful and useful in the future, even though we have not enough resources now.

Something unpredictable can always happen and disrupt well prepared plans, that account for all predictable issues. During the last few months we learned how to adapt quickly to new working conditions during and after cyber-attack, so that our researchers and students were able to use DKUM with as little issues as possible. We immediately implemented alternative work processes for them.

## ■ ■ Future plans:

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For the future we plan to continue working towards our long-term objectives and finish the postponed actions as soon as possible. We will continue to cooperate with all stakeholder groups, especially with Data stewards, as they become more involved in data management and open science at our university.

As part of the National Open Science Community in Slovenia we are collaborating on publishing a manual focusing on research data. This manual is being created jointly by several institutions in Slovenia, within the national project SPOZNAJ, that introduces open science principles into scientific research.

At the university we are also preparing amendments to the university's regulations, which are expected to come into effect next year. The revised regulations will require PhD candidates who work with research data to follow open science and FAIR principles and to prepare a Research Data Management Plan as an integral part of the process of writing a PhD dissertation. We wish to educate young researchers about the importance of a well set Data Management Plan and to internalise FAIR principles through their research work. We hope we can achieve our goals by providing instructions for our students in collaboration with data stewards.

## ■ ■ Key messages:

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Here we describe some advice for other participants in similar situation:

- ☐ Create an idealised plan and present its individual parts to the appropriate stakeholders at the appropriate time. Plan can wait for an appropriate moment, even though the implementation is not possible right now.
- ☐ Find a community where you can share experiences and tips.
- ☐ Be flexible and creative in key situations. You can have a great plan, but everything can change in one moment.
- ☐ For us becoming more FAIR-enabling means improving our repository and processes at the university and aligning them with the FAIR principles. Above all it was the most important to us to provide better accessibility and faster findability.





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