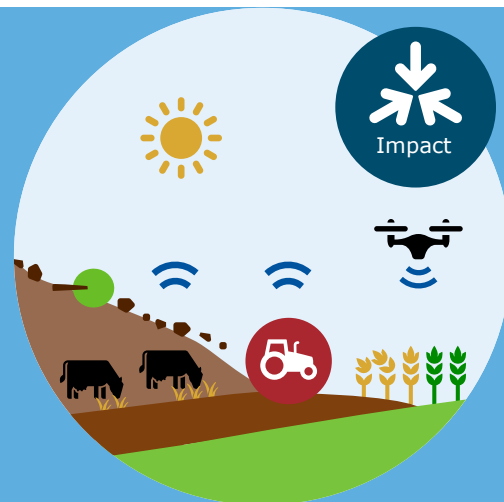


ASPAR_KR

Aspergillus fumigatus azole-resistant knowledge repository

Emerging DS/AI methods



Data Driven Discoveries in a changing climate (D3C2)

Objective: Develop a platform that promotes sharing of data and protocols from different stakeholders within the azole ecosystem. By constructing a global knowledge repository, we aim that this tool supports sustainable and reliable prevention and treatments against azole resistant strains of *Aspergillus fumigatus*.

ASPAR_KR Stakeholder Map

Within these categories, further subgroups were created. In each category, a few examples of entities and collaborators are shown.

	ACADEMIA
	PHARMA INDUSTRY
	AGRICULTURE

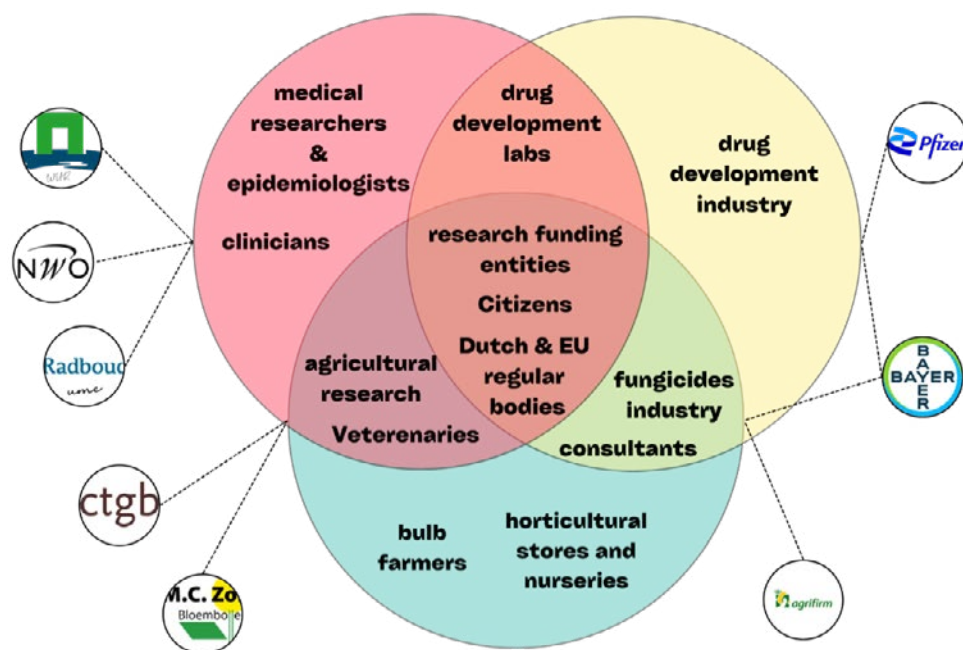


Figure 1 ASPAR_KR platform stakeholder map.

Activities

We explored in what way the *A. fumigatus* field could improve its data standardisation and sharing. We did this by:

- interviewing various stakeholders from academia and industry
- finding and applying user friendly ways to make data findable, accessible, interoperable and reusable (FAIR)
- working with technical partners on developing a FAIR-by-design service for *A. fumigatus* data sharing.

In collaboration with the [SSB group](#), we adapted the FAIR data station as a software solution to the domain of genetics. This is called FAIRDS, a FAIR data conversion tool that makes their bioinformatics workflow standardised. We extended the tool and created the base ontology for it for our domain. We have then tested it as an open-source solution with a pilot group of researchers, producing first reference FAIR data sets in Resource Description Framework (RDF), compliant to the ontology that covers our domain and compatible with FAIRDS and UNLOCK.

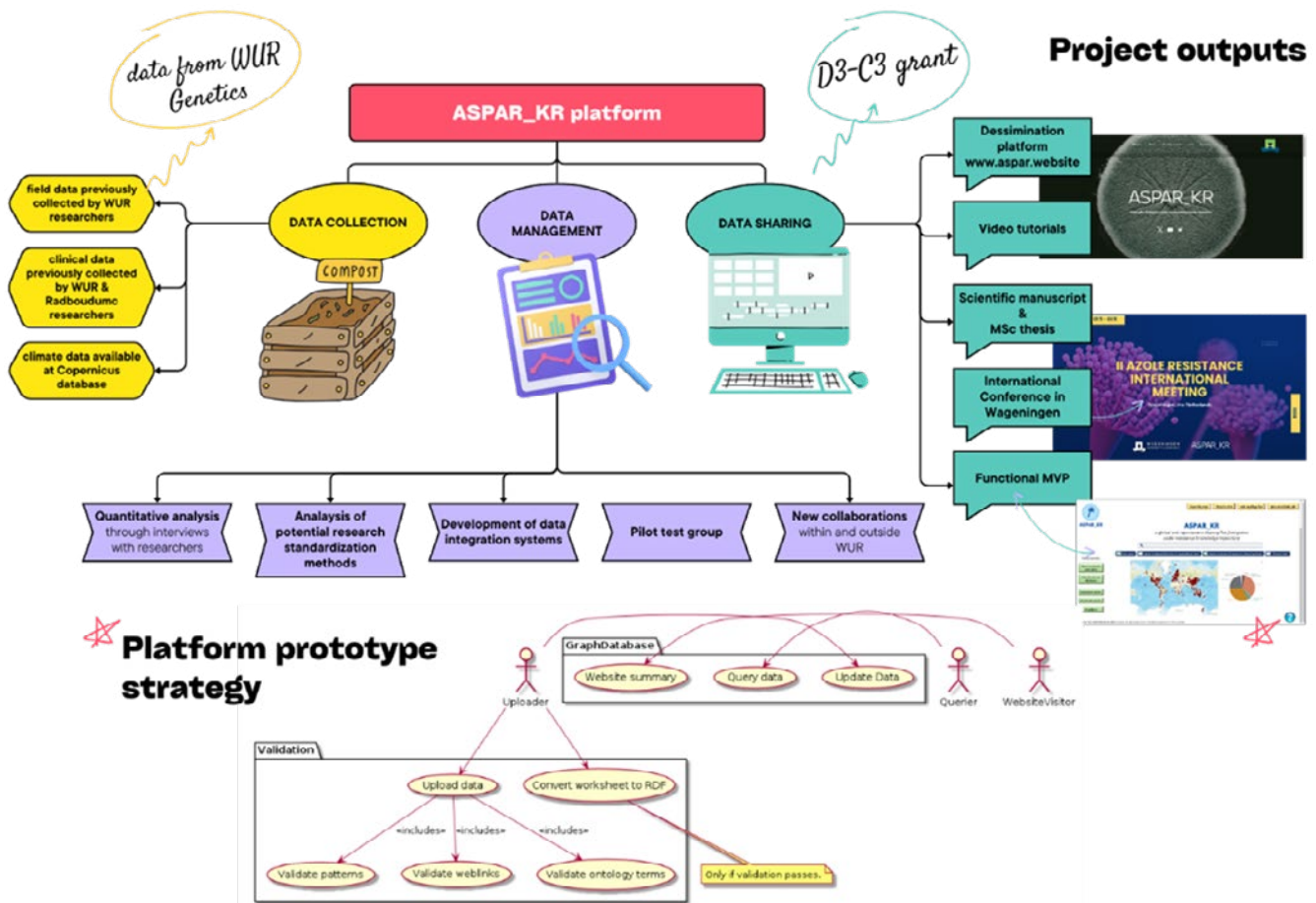


Figure 2 Project workflow and results: inputs, outputs, and strategy behind the ASPAR_KR MVP developed.

Achievement

Our team managed to adapt a workflow to create FAIR *A. fumigatus* research data from the project planning stage to writing a paper and MSc thesis (of Sibbe Bakker, completed in January 2024). Subsequently, we made proposals for further funding. After trying to build a software solution from scratch, we found that it was more feasible within the project period (one year) to adapt an existing software project to our own needs: the FAIRDS. This software program was presented at the II ARM conference that our team organised.

A new collaboration between the project and the synthetic systems biology and the UNLOCK project was started to improve the FAIRDS tool they build and use the backbone to ASPAR_KR. A highlight of this collaboration with the FAIRDS is that we proved that this tool can be applied to many other use cases besides *Aspergillus fumigatus*. An example is the tracking of microbiome data between different milk samples (data is being collected).

Outlook

The team is applying to grants to keep the collaboration, while a PhD proposal is also being written for an NWO call to continue this project. With further funding, our group will be able to continue to be a reference in azole resistance research. Meanwhile, we facilitate communication and standardisation with all stakeholders. Within this PhD proposal, Sibbe Bakker will be able to continue the collaboration with WDCC (future AI group) and GEN.

Deliverables

- An international conference was organised by the ASPAR_KR team in Wageningen to facilitate discussions among azole stakeholders, from 1 to 3 of November 2023 in Wageningen. For presentations, notes, and pictures please see https://git.wur.nl/aspar_kr/presentations/public-presentations
https://git.wur.nl/aspar_kr/presentations/public-presentations/aspar-presentation
www.aspar.website

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- A repository with code and data gathered over the course of the project was created, including already publicly available content. For more please see https://git.wur.nl/aspar_kr
 - A MSc Thesis was conducted by a bioinformatics student, Sibbe Bakker, and supervised by two team members (Dr. Anna Fensel and Mariana Silva). Besides contributing for the development of the minimal value product, this thesis also helped the team to determine the needs of the azole resistance community.

Lessons learned

Supporting researchers in standardising their data requires domain knowledge. Wet lab biologists can quickly gloss over information that is considered 'common knowledge' in their field. To avoid incorrect data interpretations, it is crucial that a data scientist carries a basic biological background and works in collaboration with biologists.

Regarding the goal of promoting FAIRification of data in life science domains, it turned out that obtaining data in standardised formats brought more challenges than expected comparing to the building of the platform itself. While users were familiar with the excel based input format of FARIDS, users had difficulties with applying the spreadsheets for direct management of fundamental research data. Many researchers are not aware of the problem of not using common data input structures on Excel or similar data management tools.

To tackle this challenge, awareness to the azole community became a project goal. A partner with a social science background could have helped in matching the qualitative data obtained through the project to the incorporation and adaption into the final MVP. Meanwhile, it became also clear the need to first establish a channel for communication with stakeholders, at global scale. To answer these needs, and share project progress, our team created a dissemination platform and organised an international conference.

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