



FAIRSFair
Fostering Fair Data Practices in Europe

Professionalising Roles through Training, Mentoring, and Recognition

Key issue #3 in Assessing Capability Maturity and Engagement with FAIR-enabling Practices (ACME-FAIR)

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Professionalising Roles through Training, Mentoring, and Recognition

Introduction

Making and keeping data FAIR requires extensive and complex technical infrastructure, but it also requires systematic and sustained improvements in the human practices of managing research data. These improvements can be brought about through training, mentoring and recognition measures, which naturally also have implications for policymaking at the supra-national, sectoral, national, institutional, departmental and project levels.

The 2018 European Commission ‘Turning FAIR into Reality’ report and action plan (TFIR) is a key reference for, amongst other stakeholders, the communities of researchers and professional staff in research performing organisations (RPOs) who are looking for guidance on how to produce and manage FAIR data. TFIR recommends expansion of training in the skills for both data science and data stewardship as a key component of making and keeping data fair. TFIR is also clear that “metrics and indicators for research contributions need to be [...] enriched to ensure they act as compelling incentives for Open Science and FAIR [data]. Effective recognition and rewards are vital for culture change.” (TFIR, p. 8). These arguments are presented as priority (as opposed to ‘supporting’) recommendations as follows:

- *Recommendation 6*: Recognise and reward FAIR data and data stewardship;
- *Recommendation 10*: Professionalise data science and data stewardship roles and train researchers;
- *Recommendation 11*: Implement curriculum frameworks and training.

The messages from TFIR are echoed in FAIRsFAIR *D3.4 Recommendations on practice to support FAIR data principles*,¹ a series of recommendations for practical actions to support the realisation of a FAIR ecosystem.

Earlier work by FAIRsFAIR Work Package 3 (Data Policy and Practice) identified areas in which contemporary research culture could benefit from further support or clarification to help make more research data and other digital research outputs ‘FAIR’, i.e. findable, accessible, interoperable and reusable. Deliverable 3.4 draws on these findings, and follows the structure and themes of TFIR to set out recommended, practical actions that meet those gaps in provision. Theme C, ‘Develop professional support for FAIR data’, recognises the contribution of emerging data professional roles such as the data steward and research software engineer, and advocates for the emergence of related training and qualification opportunities, career path development, and professional societies.

The FAIRsFAIR *Recommendations on practice* also include a commitment that the project would develop a self-assessment framework to help organisations “monitor and plan their actions to enable FAIR”. It said this “could be developed based on the TFIR [Turning FAIR Into Reality] action plans, focusing on the extent to which support on FAIR is offered to their data producer communities in delivering FAIR data, or put differently, to assess how FAIR-enabling they are” (p.27). This is the commitment that led to the present ACME-FAIR framework.

¹ <https://zenodo.org/record/3924132>

Introducing ACME-FAIR

ACME-FAIR is a set of guides produced in the FAIRsFAIR project, whose main purpose is to help those managing and delivering relevant professional services to self-assess how they are enabling researchers, and colleagues who support them, to put the FAIR principles into practice (for short we refer to this as ‘FAIR-enabling practice’). ACME-FAIR can be used independently, or it can be used to complement Science Europe’s *Practical Guide to Sustainable Research Data*.² Both guides include ‘capability maturity’ matrices (or ‘rubrics’), for Research Performing Organisations (RPOs) e.g. universities, research institutes. While Science Europe’s guide targets their strategic-level management, **ACME-FAIR aims to support the operational levels of the organisation**. It can optionally be used to follow up an assessment based on the Science Europe maturity matrices. ACME-FAIR is also strongly informed by the recommendations of the European Commission’s Expert Group on FAIR data, *Turning FAIR into Reality*.³

Covering key practical issues

ACME-FAIR covers 7 key issues for FAIR-enabling practice themes highlighted by FAIRsFAIR, in response to recommendations from the *Turning FAIR into Reality* report, and issues covered by the Science Europe *Guide to Sustainable Research Data*. The table below shows how the FAIRsFAIR and Science Europe guides complement each other.

1. Defining the policy environment	- Policy environment
2. Developing sustainable business models	- Financial aspects
3. Professionalising roles through training, mentoring, and recognition	- Training
4. Supporting data management planning	} Technical preparedness
5. Defining data interoperability frameworks	
6. Selecting data, services, and repositories for FAIR	
7. Ensuring trusted curation	

Table 1. Mapping key issues addressed in ACME-FAIR (left) to Science Europe’s guidance (right)

The ACM-FAIR guides are a series, with one guide for each of the issues in Table 1. Each includes a brief introduction, together with the explanation above, followed by a checklist describing the scope of the capabilities covered. Each guide then offers a rubric or set of tables describing maturity and community engagement dimensions of these capabilities.

Why use ACME-FAIR?

The ACME-FAIR aims to be useful to services providing researchers with support on FAIR implementation. Its fundamental role is to offer a framework for discussion within and between organisations. It has 3 main use cases:

1. For the service to self-assess its readiness to support FAIR, by establishing current and desired levels of communication and adoption of community practices and the organisational maturity of the support offered for these.

² Tommaso Boccali, Anne Elisabeth Sølvsnes, Mark Thorley, Stefan Winkler-Nees, & Marie Timmermann. (2021). Practical Guide to Sustainable Research Data. <https://doi.org/10.5281/zenodo.4769703>

³ European Commission, Directorate-General for Research and Innovation, (2018). *Turning FAIR into reality : final report and action plan from the European Commission expert group on FAIR data*, Publications Office. <https://data.europa.eu/doi/10.2777/54599> (p.57)

2. Provide a basis for dialogue with colleagues to set out a roadmap for improving on current support, e.g. through training and skills development to improve the communication and adoption of community practices.
3. Support sharing of consistent information between peer organisations about their current levels of maturity and community engagement around FAIR-enabling practices, e.g. with national or international coordination and facilitation.

Organisations that perform research vary a great deal, both in how they are organised internally, and the environments they operate in. No capability model can take all of these factors into account, so anyone involved in planning a roadmap for their organisation's services in this area is likely to want or need more specific guidance on the topics covered. The ACME-FAIR guides will be developed further to reference some of these. FAIRsFAIR also offers a set of examples in the form of 'Implementation Stories' that cover the same themes.⁴

Background

ACME FAIR is partly based on the Digital Curation Centre's *RISE* self-evaluation framework for research data service development⁵, and partly on the guide '*Do I-PASS for FAIR*', which was produced in the context of the Dutch Coordination Point Research Data Management.⁶

ACME FAIR uses a two-dimensional scale, comprising 0-3 maturity levels for each of the 7 issues, and 0-3 levels of communication and adoption of practice. The **maturity levels** are a simplified version of the first 3 levels of the widely adopted *CMMI* (Capability Maturity Model Integration) framework⁷.

The levels of "**community engagement**" are separated out from maturity for the following reasons:

- Community engagement is essential for all of the practice areas covered.
- While the maturity goal of optimising alignment with *organisational* standards and practice is relevant to Research Performing Organisations, for research data support it is equally important to align with *community* standards, as defined by research domains and professional communities of practice.
- Identifying areas where maturity and engagement are at differing levels may be helpful to identify pockets of good practice in one or the other, or areas to target for further action.

Capability dimensions: maturity and community engagement

The maturity and community engagement dimensions both indicate progression from no activity (level 0), through ad-hoc coverage of some practice areas (e.g. varying widely across research projects), through to more standardised approaches across the organisation. The maturity and community engagement dimensions are described in more detail as follows:

Maturity

0. **Not addressed.** The relevant professional services for research support do not coordinate any support capability for researchers in this area of focus. Some staff may help but it is not a formally recognised part of their job.

⁴ <https://fairsfair.eu/implementation-adoption-stories>

⁵ Rans, J and Whyte, A. (2017). 'Using RISE, the Research Infrastructure Self-Evaluation Framework' v.1.1 Edinburgh: Digital Curation Centre: www.dcc.ac.uk/guidance/how-guides

⁶ Taco de Bruin, Sarah Coombs, Jutta de Jong, Irene Haslinger, Henk van den Hoogen, Frans Huigen, Mijke Jetten, Jacko Koster, Margriet Miedema, Sief Öllers, Inge Slouwerhof, Ingeborg Verheul, & Jacqueline Ringersma. (2020). Do I-PASS for FAIR. A self assessment tool to measure the FAIR-ness of an organization (Version 1). Zenodo. <https://doi.org/10.5281/zenodo.4080867>

⁷ CCMI. e.g. https://en.wikipedia.org/wiki/Capability_Maturity_Model_Integration

1. **Initial.** May be incomplete and falling short of the intent of the area of focus. Aware of and addressing performance issues.
2. **Managed.** Complete coverage delivering the full intent of the area of focus, minimally in some aspects. Lacking full alignment with overall organisational standards and practice, but identifies and monitors performance objectives. Includes and builds on level 1.
3. **Defined.** Complete coverage that delivers the full intent of the area of focus and aligns with overall organisational standards and practice. Identifies and monitors performance objectives that expand alignment to the whole organisation. Includes and builds on level 2.

Community engagement: practice awareness, adoption, and collaboration

This dimension identifies the level of engagement the organisation (or the relevant services it offers) has with the communities it serves, about maintaining and updating data stewardship practices and identifying new areas for the development of policy and implementation standards. It includes actively communicating and promoting existing and emerging approaches to the immediately impacted communities and the wider data infrastructure landscape.

0. **Not addressed.** The relevant professional services for research support do not coordinate any support capability for researchers in this area of focus. Some staff may help but it is not a formally recognised part of their job.
1. **Awareness:** the service monitors data stewardship practice in the community or communities it serves, and makes local practitioners aware of it.
2. **Adoption:** the service or its host organisation also supports practitioners to embed community practice locally.
3. **Collaboration:** the service also engages with the design, development, and review of community practice. Consults and collaborates widely, potentially also taking a community coordination and leadership role.

Please give us your feedback

The Digital Curation Centre (DCC) maintains ACME-FAIR. Feedback on this guide was gathered in the FAIRsFAIR project, and changes have been made to reflect that. DCC very much welcomes your thoughts on how to improve it further, especially suggestions of guidance to reference on each of its themes. Please give your feedback using this [short questionnaire](#). It asks how far you agree with 4 simple statements, and invites you to add any comments you wish. Please note that it collects no personal information.

ACME Checklist: Professionalising roles through training, mentoring and recognition

The ACME-FAIR checklist identifies six main capability areas under this theme. Four capability areas are assessed on the *maturity* scale, measuring integration of the capability with organisation-level standards and practices. Another two capability areas are assessed on the *community engagement* scale, measuring adoption of broader community standards and practices.

The Science Europe *Practical Guide to Sustainable Research Data* includes a capability maturity matrix that complements ACME-FAIR at a high level. The relevant capabilities it describes include:

- Training: training and competency enhancement for both researchers and RDM support staff.

- Communication and awareness raising: researcher engagement as well as engaging with the broader stakeholder community (such as scientific communities, other RPOs) to seek alignment of approaches.

The scales used in the Science Europe guide are broadly consistent with ACME-FAIR. It may be helpful to use it prior to using ACME FAIR, but this is not necessary to use ACME-FAIR effectively.

As a first step, consider the capabilities in the checklist below that are relevant to your organisation. This may help you narrow down your goals in using ACME-FAIR, which might include assessing only those capabilities already under development, only those under consideration, or both.

Which capabilities is your organisation developing or considering doing in future?

Maturity	Current	Considering
1) Defining professional roles and profiles for enabling FAIR?	<input type="checkbox"/>	<input type="checkbox"/>
2) Training professional services staff and researchers about producing FAIR data?	<input type="checkbox"/>	<input type="checkbox"/>
3) Developing FAIR-enabling educational curricula for students?	<input type="checkbox"/>	<input type="checkbox"/>
4) Recognising FAIR skills acquisition through certification, accreditation, or HR processes?	<input type="checkbox"/>	<input type="checkbox"/>
Engagement		
5) Advocating and raising awareness of FAIR data policy and principles?	<input type="checkbox"/>	<input type="checkbox"/>
6) Mentoring in FAIR data skills through professional support networks?	<input type="checkbox"/>	<input type="checkbox"/>

These capabilities might be developed by a single unit within a Research Performing Organisation, for example by a Research Data Management Service. More likely, several areas of the organisation will also be involved, e.g. a Graduate School, Doctoral Training Centre, or Staff Development unit.

The next step in using ACME-FAIR is to discuss with the relevant colleagues what can realistically be achieved to meet needs of researchers, other stakeholders such as funders, and the organisation. To inform that, you may find the scope notes below helpful. They describe each capability for this theme covered in the framework..

Scope

We define capabilities as follows below, and then describe levels of maturity and engagement.

Defining professional roles and profiles for enabling FAIR

- Identifying and describing the roles in the organisation that are involved in enabling FAIR data, and the requirements for their expertise.
- Providing a framework that defines career pathways for the roles using appropriate terminologies.
- Monitoring recruitment and progression in these roles.

Training professional services staff and researchers in producing FAIR data

- Providing up-to-date guidance on the training opportunities and resources relevant to enabling FAIR and available from external sources
- Providing an ongoing, regularly updated programme of data stewardship training for staff at all levels of the organisation.

- Monitoring how well training materials and events deliver learning outcomes that meet individual professional development aims, and meet changing requirements for the competences expected of their roles, in line with sector expectations.

Developing FAIR-enabling educational curricula for students

- Providing training to students on data management and data-intensive research projects and are working to formalise learning outcomes and objectives for these using workshops and other training opportunities.
- Engaging with relevant departments and doctoral training centres to understand discipline-specific training needs, and identify or produce comprehensive, up-to-date and relevant training to be embedded in research and taught programmes.
- Providing both generic and domain-relevant training in digital skills for research data stewardship across disciplines, from undergraduate through to postgraduate level and life-long learning educational programmes.

Recognising FAIR skills acquisition through certification, accreditation, or HR processes

- Identifying skills development activities that lead to certification or accreditation, for research staff and emerging professional support roles
- Identifying measurable objectives for FAIR enabling activities in staff development frameworks, recognising skills acquisition and application in research contexts
- Encouraging membership of relevant professional bodies, and incentivising collaborations between researchers and professional support staff with metrics that recognise the contributions of all members of research teams

Advocating and raising awareness of FAIR data policy and principles

- Providing information across the organisation on FAIR data policy and principles, including promotion of the data policies of appropriate funders to relevant staff and students.
- Providing regular advocacy events to promote adoption of FAIR policy and practices, through organisational channels relevant to staff, student and research groups' specific interests.
- Engaging with relevant policy fora, professional groups, and research infrastructures about enabling FAIR in our organisation, seeking leadership roles and demonstrating influence on advocacy for FAIR principles in these contexts.

Mentoring in FAIR data skills through professional support networks

- Establishing support desks to help staff find guidance and training in FAIR data competences.
- Supporting the development of FAIR data skills through professional communities, including in emerging roles such as Data Stewards and Research Software Engineers, and for trainers and leaders of digital skills initiatives.
- Encouraging staff in relevant roles to participate in mentoring, and support their peers through established professional networks.

ACME rubric: Professionalising roles through training, mentoring, and recognition

Professionalising roles through training, mentoring, and recognition	Maturity			
	1) Initial	2) Managed	3) Defined	Maturity level (0-3)
	<p>1) Initial May be incomplete and falling short of the intent of the area of focus. Aware of and addressing performance issues</p>	<p>2) Managed Delivering the full intent of the area of focus, though minimally in some aspects. Lacking full alignment with overall organisational standards and practice, but identifies and monitors performance objectives. Includes and builds on level 1.</p>	<p>3) Defined Complete coverage that delivers the full intent of the area of focus and aligns with overall organisational standards and practice. Identifies and monitors performance objectives that expand alignment to the whole organisation. Includes and builds on level 2.</p>	
Defining professional roles and profiles for enabling FAIR	<p>We are in the process of recognizing the different roles in the organisation involved in enabling FAIR; We are investigating the scale of requirements across the organisation for data stewardship expertise, liaising with departments and services.</p>	<p>We have a solid understanding of our requirements for enabling FAIR across the organisation and agreed role descriptions. We know how many data stewards are needed. We provide an ongoing, regularly updated programme of training for data stewardship staff at all levels of the organisation.</p>	<p>Our organisation has a framework specifying career pathways for roles enabling FAIR, and is monitoring recruitment and progression in these roles. These roles are consistently described using appropriate skills terminologies.</p>	
Training professional services staff and researchers	<p>We provide guidance on the training resources relevant to enabling FAIR that are available from external sources, and regularly refresh this guidance in response to the availability of new training opportunities or resources. Online courses are linked from a webpage available to all professional staff and researchers. Appropriate links are made between FAIR principles and those for open science, reproducibility and research integrity.</p>	<p>We provide relevant training courses on an <i>ad hoc</i> basis and monitor uptake and demand for training. Some resources are locally developed to supplement externally sourced ones, to align with the organisation's needs and connect with its services. These courses target researchers at different stages of their careers, library staff and other members of the organisation and take into consideration disciplinary differences. Training objectives are aligned with the organisation's strategy towards FAIR data.</p>	<p>Our organisation has a regular programme of training, which has stable funding and is publicised across the organisation. A significant amount of online training material is provided to meet the needs of its researchers and staff. Materials are described using an appropriate skills terminology, and reused by others in the sector. Competencies for relevant researchers and professional support staff are defined in standard role descriptions and applied to job adverts, and professional development frameworks. Training is provided, which facilitates successful skills acquisition towards agreed professional development aims.</p>	

	1) Initial May be incomplete and falling short of the intent of the area of focus. Aware of and addressing performance issues	2) Managed Delivering the full intent of the area of focus, though minimally in some aspects. Lacking full alignment with overall organisational standards and practice, but identifies and monitors performance objectives. Includes and builds on level 1.	3) Defined Complete coverage that delivers the full intent of the area of focus and aligns with overall organisational standards and practice. Identifies and monitors performance objectives that expand alignment to the whole organisation. Includes and builds on level 2.	Maturity level (0-3)
Developing FAIR-enabling educational curricula for students	We do not yet have a curriculum on FAIR data stewardship specifically designed to connect with learning objectives of other taught curricula or research project aims. However, we provide training to students on data management and data-intensive research courses and are working to formalise learning outcomes and objectives for these using workshops and other training opportunities.	We engage with providers of training on FAIR-enabling skills in relevant departments and Doctoral Training Centres, to understand discipline-specific training needs. This allows comprehensive, relevant, and up-to-date training to be successfully identified and / or produced, and embedded in research and taught programmes.	Our organisation provides both generic foundational and domain-relevant digital skills training for research data stewardship across disciplines, from undergraduate through to postgraduate level and life-long learning educational programmes. We monitor changes in academic and societal needs and update the curricula to respond to these changes. Mentorship in relevant skills is included in the specified requirements for research supervision.	
Recognising skills acquisition through certification, accreditation, or other HR processes	We identify skills development activities leading to certification or accreditation, for research staff and emerging professional support roles, e.g. Data Stewards and Research Software Engineers. We are considering how to change HR processes (e.g. recruitment, job appraisal, promotion) to recognise good practice in enabling FAIR data.	We identify measurable objectives for some FAIR enabling activities in our staff development frameworks. These enable staff to identify when FAIR enabling competences have been acquired, or applied in making data FAIR. We encourage membership of relevant professional bodies.	Staff development processes recognise skills acquisition and application in research contexts, and include FAIR-enabling activities within agreed professional development plans. We incentivise collaborations between researchers and professional staff with metrics that recognise the contributions of all members of research teams (e.g. using the CRediT taxonomy).	

Community engagement: Practice awareness, adoption and collaboration				
	1) Awareness: the organisation monitors community practice and makes local practitioners aware of it.	2) Adoption: the organisation also supports practitioners to embed community practice locally. Includes and builds on level 1.	3) Collaboration: the organisation also engages with the design, development, and review of community practice. Consults and collaborates widely, potentially also taking a community coordination and leadership role. Includes and builds on level 2.	Engagement level (0-3)
Advocating and raising awareness of FAIR data policy and principles	We provide broad but limited information across the organisation on FAIR data policy and principles. Research data policies, e.g. of appropriate funders, are promoted to all relevant staff, and students.	We provide regular advocacy events, e.g. workshops, webinars to promote adoption of FAIR policy and practices, through organisational channels relevant to staff, student and researcher groups' specific interests. Guidance on how to apply relevant policies is provided and promoted. Induction of new researchers includes information about data policies.	Our organisation engages with relevant policy fora, professional groups, and research infrastructures, about enabling FAIR data. We seek leadership roles, and can demonstrate we have some influence on advocacy in these contexts.	
Mentoring in FAIR data competences through professional support networks	We are establishing digital skills support desks to help staff find sources of guidance or training in FAIR data competences.	We support the development of FAIR data skills through engagement with professional communities. These include communities for emerging roles e.g. Data Stewards and Research Software Engineers, and for trainers and leaders of digital skills initiatives. We offer support to research teams on sourcing or developing FAIR data skills, tailoring the support to their needs. We encourage mentorship in FAIR data skills as an integral part of research supervision.	Our organisation proactively encourages staff in relevant roles to participate in mentoring, and to support their peers to develop FAIR data skills through established professional networks e.g. for library, information and computing professionals, research managers and administrators.	

