

		FAIR champions (Isabel Bernal)	FAIR champions (Maria Johnsson)	FAIR champions (Mark Allen)	FAIR champions (Andreas Rauber)
Rec. 1: define FAIR for implementation	CSC Institution Open Access mandate entered into force on April 1, 2019. http://digital.csc.ac.at/en/codes/2019/179077 . The mandate covers both peer reviewed publications and research data produced by CSC institutions. The mandate requires that all research data associated to publications must be FAIR and be deposited and made open (DIGITAL_CSC institutional repository).				
Rec. 2: Implement a model for FAIR digital objects	CSC researchers publishing from peer-reviewed publications in a range of CSC research areas have the option to use a Research DOI for all peer-reviewed publications. The Research DOI includes a DOI and an additional unique DOI for selected output: research data, software, and other outputs. The Research DOI is intended to support the reuse of the data. The importance of including PDNs in selected metadata elements (use license, DIGITAL_CSC)				
Rec. 3: develop components of a FAIR ecosystem	DIGITAL_CSC research data policy and related services for CSC community is at http://digital.csc.ac.at/doc/politica/policyDetails.jsp (Spanish language only). The policy explicitly indicates the types of research data that are covered by the policy. It also specifies the top level and top date related services including DOI minting, support/review of DMPs, deposition of research data, and support for the implementation of FAIR Data Principles and aggregation into broader research data infrastructures.				A number of building blocks are being developed in the context of the digital transformation initiatives for the Austrian academic sector including support for OA publishing, support for federated catalogues for metadata search, APIs to CRIS systems, support for data aggregation supporting e-anonymity, University, Institutes, Infringement of copyright, and support for data protection, and support for secure supporting data visibility based entirely on open-source components.
Concepts for FAIR implementation (Pillar 1)					
Rec. 16: Apply FAIR broadly	String of recommendations: defining a policy needs to address research data in each of the 8 broad research areas. DIGITAL_CSC produces supporting material (e.g. helpdesk, training, webinars, etc.) and provides resources and recommendations by research area, and its bulletin CSC Alerts (http://digital.csc.ac.at/en/1251/152713) includes interviews with CSC researchers, highlighting what practices data and analysis from FAIR				
Rec. 17: Align and harmonise FAIR and Open data policy	DIGITAL_CSC: Template to prepare DMPs under the framework of FG2020 research https://digital.csc.ac.at/en/1251/1207696 is an attempt to align FAIR and Open Data across the institution. On another front, there needs a lot to align FAIR and Open Data, especially in terms of data sharing and handling patents at the same time. Global negatives and best practices in this latter issue would be most welcome				While opening up access to "rawdata" data is increasingly accepted as a norm that the biggest barrier to open data is the (massive, majority) of data that is sensitive (due to privacy reasons or commercial interests). In light of COVID-19, it is important to keep in mind that FAIR data can be based entirely on open-source components that allows data owners to control their data and make it available to others. This is particularly important to address research questions while fulfilling full control of the data and maintaining its quality. The FAIR principles are being implemented through technical and legal mechanisms. (The infrastructure is based upon open-source components and is being developed by the FAIR data management group of the University of Vienna). The FAIR principles are being adopted for medical data for several years, adapting it now for the needs of a broader group of institutions. The FAIR principles are being adopted by the FAIR data manager, supporting the vision of data sharing instead of data sharing, and making data available to others. The FAIR principles are being adopted whether this is due to privacy or commercial reasons. Activities are being developed to support the FAIR principles in the medical sector, such as access provisioning for sectors with sensitive data that should be governed by FAIR principles.
Rec. 4: Develop interoperability frameworks	DIGITAL_CSC is a multidisciplinary repository and uses standard discipline agnostic metadata schemes (Dublin Core Qualified, DataCite). Crosswalks to external standards are promoted as far as possible and a lot more needs to be developed to support greater compatibility between institutions/therapeutic/research communities repositories and infrastructures. The development of a common set of standards and interoperability guidelines are much needed so that data can be FAIR for different disciplines and communities of research.				
Rec. 5: Ensure data management via DMPs	Ongoing support and training to prepare good DMPs and DIGITAL_CSC institutional points to external resources/good practices to manage data in different areas. Giving support and evaluating DMPs is a cornerstone of the FAIR implementation. It is becoming more and more common, but another library service within the portfolio of research data management. Good practices for preparing DMPs and calculating the cost and effort dedicated by institutions are key to plan solid data intensive workflows.				In the current national initiative setting up federated data management platforms, the FAIR principles are being adopted as a guiding principle. The development and full integration of m4DMP driving and connecting the various national and international data management platforms and systems and providing APIs for funds to ease the administrative load and assure the information in DMPs is (automatically) collected from the relevant source and continuously updated.
Rec. 6: recognise & reward FAIR data & stewardship	CSC institutional rewards come into force last year and 2020 is the first year of implementation. The level of compliance will have an impact on institutional research assessment exercises.				Contributions to data, services and software are becoming more recognized. A dedicated award for FAIR data and services will be introduced in the near future. The FAIR principles are being highlighted in the various European and US initiatives and several pilot for the field. Inclusion in the Austrian roadmap will be important in Europe.
FAIR culture (Pillar 2)					
Rec. 18: Cost data management	Under evaluation. On a general note, aspect: good practices and data policies in place and should be a priority recommendation. CSC mandate covers long tail and big data and different infrastructures are being put in place to support these. The FAIR principles are very closely linked to preservation and global FAIR Data practices and recommendations. The FAIR principles are being adopted and seem to be more closely aligned. Institutional services being offered to the researcher community are being developed to support the FAIR principles and preservation of institutional research data. For research institutions and universities, the FAIR principles are being adopted and implemented.				Cost estimation is a key component in the m4DMP infrastructure developed at TU Wien, with an initial focus on provisioning of cost estimates for data management plans and a focus on long-term and off-stream preservation. Effort is being made to highlight these in the various European and US initiatives and several pilot for the field. Inclusion in the Austrian roadmap will be important in Europe.
Rec. 19: Select and prioritise FAIR digital objects	The closely links with long term preservation strategies. Recommendations and how to select selection criteria in long term digital preservation plans (http://digital.csc.ac.at/en/1251/1207696). What is the value of the object, and how well may it be adapted for FAIR Digital Objects. Considerations about content and perspective as also important for selection. It is addressed.				
Rec. 20: Deposit in Trusted Digital Repositories	DIGITAL_CSC got awarded with DSA late 2015. Too much strain on repositories coming for several types of certifications may be counterproductive and inefficient.				
Rec. 21: Incentivise reuse of FAIR outputs	Under evaluation. On a general note, aspect: good practices and recognition of efforts that show, measure and monitor the degree and extent of FAIR data reuse are very hardly also to conduct return on investment analyses.				A series of digital repositories are being developed for a range of content types. One of them is a relational database management system (RDBMS) based data store as part of the national digitization initiative for Austrian universities. This may be complemented with an additional high performance storage system for large amounts of data (e.g. medical and commercial) based on the principles of the DECODEPP infrastructure (http://decompp.tuw.ac.at/) at TU Wien for several years to support data visibility of sensitive data.

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FAIR ecosystem (Pillar 3)	Rec. 7: support semantic technologies	Usage of several discipline specific controlled vocabularies/ontologies including COM4 Vocabularies, Funrefit, DataCite controlled lists and recommendation to use subject thesauri/ontologies when relevant (eg. LCC). Ongoing implementation of SCHEMIX standard.		The International Virtual Observatory Alliance (IVOA) has a Semantic Working Group that has produced 4 standards that are used for semantically describing astronomical data products. One of them is http://ivoa.net/documents/. This includes content descriptors and a schema for describing the data product. These standards are not limited to astronomy. These Semantics standards are implemented at some level at all major astronomical data centers. The IVOA is currently working on IVOA-DFN0 as a first step to inclusion of the operational VO framework into SCHEMIX.	
	Rec. 8: Facilitate automated processing	GA-PMH and SWORD and metadata exports into several formats supported as to facilitate harvesting and aggregation			
	Rec. 9: Certify FAIR services	Ongoing. It is important to harmonize across all existing certification options in order to avoid duplication and too much strain on repositories resources. We are looking into how to harmonize the different types of emerging which are important for repositories that also hold other types of objects (eg. file or requirements for repositories).		The importance and usefulness of CoreTrustSeal certification is becoming more visible in the field of astronomy. The CDS (http://cds.u-strasbg.fr) has recently been certified. This is a very positive development for us because it helps us with describing our own processes, and also because it helps us communicate and fit into the wider data sharing community.	
	Rec. 22: Use information held in DMPs	Under evaluation	RDA has two working groups on DMP: "Expanding Data Management Plans from Researcher's Current Standards WG" working group started in RDA Kickstart in March 2018 and DMP WG started 27 May 2020. The "Expanding Data Management Plans WG" states that they will build on a pre-existing structure of DMPs and will not start from scratch. As many universities have CRIS systems today, it would be very interesting to see how these can be integrated with DMPs. There are few use cases in different universities, maybe some use cases in different universities.		
	Rec. 23: Develop components to meet research needs	Hands on and online training provided to CSC community researchers and support staff, including data elements and data scientists on a regular basis. CSC is also developing a series of training modules on data management in different thematic research infrastructures to better learn about domain specificities, needs and how institutional services may further develop.			
	Rec. 24: Incentivise research infrastructures to support FAIR data	Precisely estimating the cost of FAIR increase is a major concern and related recommendations should be a priority. Such estimation has to cover short term and long term periods, which is challenging as it is constantly changing. Learning...			
	Rec. 10: Professionalise data science & stewardship roles	Professional training programme dedicated to data management began since 2015 via the institutional repository team. The training can be hands-on workshops and online and targeting different institutional communities including researchers, students, IT staff, librarians, and administrative staff, staff from several departments such as European/International projects, and others. The training is open to anyone who wants to learn about the portfolio of library services at CSC. In addition, CSC released the first "Data Science and Stewardship Roles" training manual available at https://meta.kit.edu/datascience/ two years ago and courses cover aspects such as data management, data curation, data stewardship, data science techniques, as well as other aspects including data policies, data management plans, data sharing, data reuse, and data citation. In general, this area is one of the most fruitful and productive across institutions and disciplines. CSC is currently involved in the preparation of a new training module on updating and accreditation for different stakeholders and communities. CSC is also involved in the preparation of a new training module on the data management universe would be useful to show the variety and the many paths that can be pursued.	The research data management consortium "Swedish National Data Service SN2" in Sweden is organizing different types of training in RDM for its members. The training is organized by the Swedish National Data Service working-group focused on training, see http://www.snd2.se/training/research-data-service/ .	in Astronomy data science prominent. Stewardship roles are less prominent, but there is the opportunity with FAIR / EOSC / Open Science to make this more visible and recognized. There is a lot of the level of interest and need for this in the field of Astronomy (LIGO, Gaia, Planck, probably in 2021 (postponed from 2020)). Also there are national research data management centres in the UK (e.g. NFDI4Health, https://nfdi4health.ac.uk/), and in Germany (e.g. DFG, https://www.dfg.de/en/research-institutions/research-data-management.html) particularly the most recent event in 2017: http://ids.u-strasbg.fr/2017/05/16/index.html (2017 postponed meeting: http://ids.u-strasbg.fr/2018/)	
	Rec. 11: Implement curriculum frameworks and training	In addition to ongoing initiatives to advance curriculum frameworks, CRFs, professional exchanges, official accreditation etc we need new and improved mechanisms to facilitate the exchange of information and awareness about existing opportunities and resources. There are good examples of how to do this in the education space but more can be done to reach out to all interested parties.			
Skills for FAIR (Pillar 4)	Rec. 12: Develop metrics for FAIR digital output				
	Rec. 13: Develop metrics to certify FAIR services				
	Rec. 25: Implement and monitor metrics				
	Rec. 26: Support data citation and next generation metrics			IDS WG on Dynamic Data citation is compiling a report on implementation of recommendations to support precise identification and citation of arbitrary subsets in dynamic data, to complement the on-going documentation during the plenary sessions and webinars.	
Incentives and metrics for FAIR data and services (Pillar 5)	Rec. 14: Provide strategic and coordinated funding	Providing funding that goes beyond the duration of projects is essential to maintain services such as ontologies and metadata schemas. Lack of funding for maintenance of these services is a major problem, especially for many controlled vocabularies, as NSBO reported a few years ago in a report on the state of controlled vocabularies in the sciences (https://www.ivoa.net/documents/controlledvocabularies.pdf). Proper allocation of funding may come from collaborative initiatives amongst controlled vocabularies. An example may be this recent one: https://www.ivoa.net/documents/controlledvocabularies.pdf . Other areas where funding could be provided include the creation of controlled vocabularies, thesauri, etc. Some well known registries for the latter are the Semantic Web Registry (https://www.semwebregistry.org/), and other more recent ones such as FAIRsharing. sustainability issues may also be addressed by funding the creation of controlled vocabularies and ontologies and amongst controlled vocabularies that are looking into the same properties of quality and interoperability. This would also support the creation of training and professional competence. Creating an ontology or taxonomy and then maintaining it is a time consuming process and then broadly used and maintained. The Controlled Vocabulary and Thesaurus Design and Maintenance Task Force (CVTF) is addressing these issues and addresses their creation and sustainability in detail.	Open Science and FAIR principles are becoming more visible in Astronomy. It is being made to include them at the right level in the 10-year planning document for the European Space Agency (https://esa.esa.int/research/astronomy-and-space-science/astronomy-space-science-10-year-plan-2020-2030). The European Academies' Science Council (https://www.nationalacademies.org/our-work/european-survey-on-european-open-science-and-research-data-management) has also recommended a way to get sustainability and encourage them to have data FAIRification included in their operational budget.		
	Rec. 15: provide sustainable funding	We are in the midst of a change of paradigm moving from a scholarly organization perspective to a business perspective. Sustainable costs and budgets related to FAIR data management is a realistic way and that means to have a clear understanding of what is being funded. The question is: who could also say that this governance has to be FAIR. Also regular evaluation of the usage of the services and the potential for enhanced collaboration with the legacy players and the transition to FAIRification are important background. Funding of services should be transparent and this should be emphasized in the document.	Maintaining of disciplinary interoperability frameworks require sustainable funding. We cannot afford to lose what has already been built!		
	Rec. 27: Open EOSC to all providers but ensure services are FAIR	We are in the midst of a change of paradigm moving from a scholarly organization perspective to a business perspective. Sustainable costs and budgets related to FAIR data management is a realistic way and that means to have a clear understanding of what is being funded. The question is: who could also say that this governance has to be FAIR. Also regular evaluation of the usage of the services and the potential for enhanced collaboration with the legacy players and the transition to FAIRification are important background. Funding of services should be transparent and this should be emphasized in the document.			