Il “data steward”

Chi è, cosa fa e perché è fondamentale per i dati FAIR per la ricerca

13 gennaio – Open Science Café

Valentina Pasquale, PhD
Istituto Italiano di Tecnologia

ISTITUTO ITALIANO DI TECNOLOGIA

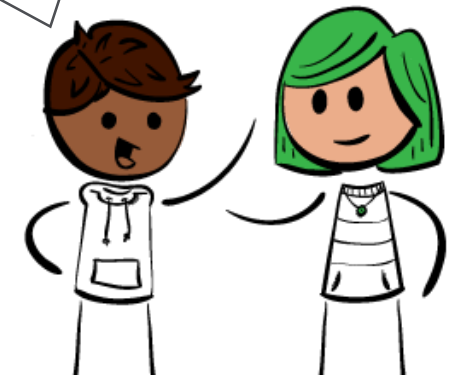
Photo by Stephanie LeBlanc on Unsplash

Che cosa succede quando i dati non sono gestiti?

I dati non sono più riutilizzabili!!!

Steve left the lab 2y ago. I would like to use his PhD data, but I can't find the HD where he saved them!

He could have used a repository to preserve data for the long-term!



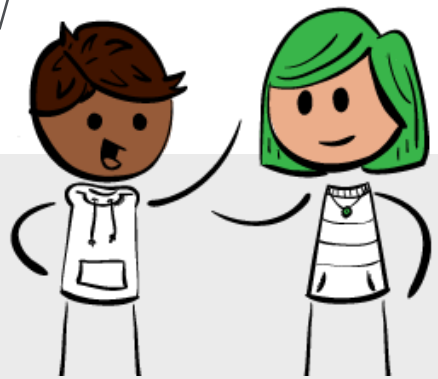
Perdita dei dati

Mancanza di documentazione

After a while....

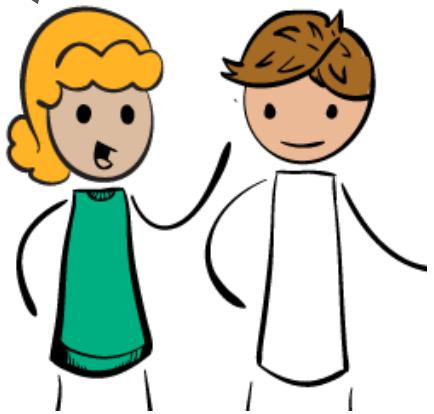
I managed to find Steve's data and the boss asked me to analyze them, but I don't know what "var1" and "var2" mean!

That's why documentation and metadata are important!!



I wish to reproduce the findings of that old paper by Prof. Rossi, so I've asked him the data. Unfortunately, the software needed to open it is no longer available!

He should have converted it to an open interoperable format!



Obsolescenza dei formati e degli strumenti software

Senza i dati, la scienza è...

Non riproducibile e poco trasparente

Senza la disponibilità dei dati a supporto delle pubblicazioni, gli studi non possono essere riprodotti e sottoposti a verifiche indipendenti (principio alla base del metodo scientifico...).

Baker, M. 1,500 scientists lift the lid on reproducibility. *Nature* **533,** 452–454 (2016). https://doi.org/10.1038/533452a

Inefficiente

I dati della ricerca possono essere utilizzati per rispondere a più di un quesito scientifico: la loro condivisione e corretta gestione abilita il riutilizzo futuro, sia per gli autori sia per altri ricercatori, evitando duplicazioni.

U. von der Leyen's speech at #davos2020 (22nd January 2020) https://www.youtube.com/watch?v=_A7Q514z_dw

Di minore impatto sociale ed economico

La scienza aperta moltiplica l'impatto della ricerca a tutti i livelli della società, risponde alla necessità di rendere conto ai cittadini dei finanziamenti pubblici alla ricerca, contribuisce al benessere collettivo e globale, ispirandosi ai valori di equità e inclusività.

UNESCO Recommendation on Open Science

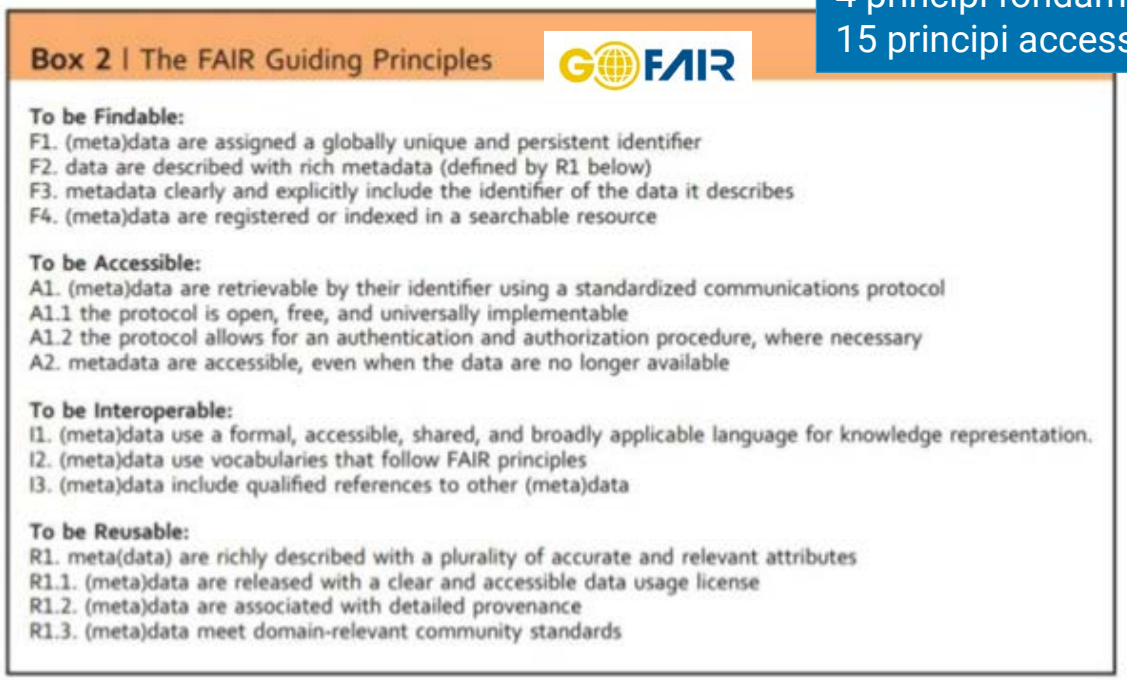
Dati FAIR

Requisito Horizon Europe!!

I principi FAIR nascono nel 2016 come linea guida per una corretta gestione dei dati della ricerca.

https://www.go-fair.org/fair-principles

4 principi fondamentali
15 principi accessori



Box 2 | The FAIR Guiding Principles

To be Findable:
F1. (meta)data are assigned a globally unique and persistent identifier
F2. data are described with rich metadata (defined by R1 below)
F3. metadata clearly and explicitly include the identifier of the data it describes
F4. (meta)data are registered or indexed in a searchable resource

To be Accessible:
A1. (meta)data are retrievable by their identifier using a standardized communications protocol
A1.1 the protocol is open, free, and universally implementable
A1.2 the protocol allows for an authentication and authorization procedure, where necessary
A2. metadata are accessible, even when the data are no longer available

To be Interoperable:
I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
I2. (meta)data use vocabularies that follow FAIR principles
I3. (meta)data include qualified references to other (meta)data

To be Reusable:
R1. meta(data) are richly described with a plurality of accurate and relevant attributes
R1.1. (meta)data are released with a clear and accessible data usage license
R1.2. (meta)data are associated with detailed provenance
R1.3. (meta)data meet domain-relevant community standards

F indable
A ccessible
I nteroperable
R eusable

Per gli esseri umani e per le macchine

F ully
A (rtificial)
I (ntelligence)
R eady

La ricerca si basa sempre di più sul supporto computazionale delle macchine per trattare ed analizzare i dati, in risposta all'aumento del **volume**, della **complessità** e della **velocità di creazione** dei dati.

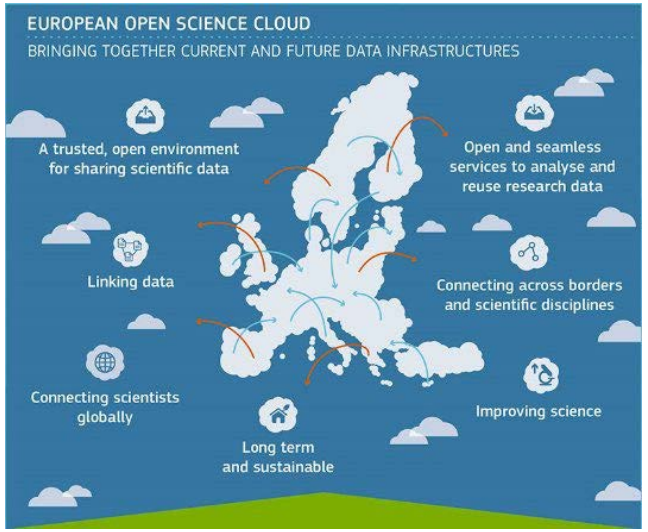
I **principi FAIR** enfatizzano non solo la riutilizzabilità dei dati da parte degli esseri umani, ma anche la capacità di **trovare**, **accedere**, **combinare** e **riutilizzare** i dati attraverso l'uso di strumenti computazionali (algoritmi) con minimo intervento umano.

Sorgente: sito web GO FAIR.

Wilkinson, M., Dumontier, M., Aalbersberg, I. *et al.* The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data* **3,** 160018 (2016). https://doi.org/10.1038/sdata.2016.18

ISTITUTO ITALIANO DI TECNOLOGIA

EOSC: il web dei dati FAIR



U. von der Leyen's speech at #davos2020 (22nd January 2020)
https://www.youtube.com/watch?v=_A7Q514z_dw

We are creating a European Open Science Cloud now.
It is a trusted space for researchers to store their data and to access data from researchers from all other disciplines. [...]

Every researcher will be able to better use not only their own data, but also those of others. They will thus come **to new insights, new findings and new solutions**. [...]

La **European Open Science Cloud** contribuirà a realizzare l'Internet dei dati e dei servizi FAIR (in inglese, "**Internet of FAIR Data and Services**"), un ecosistema di servizi, norme, linee guida, e strumenti che abiliteranno la produzione, la condivisione e il riuso di "FAIR digital objects".

Perché servono i « data steward»?

Per poter produrre dati FAIR i ricercatori hanno bisogno di un supporto professionale adeguato, così come già avviene in altri contesti (TT, comunicazione, etc.)

EOSC SRIA v1.0

Strategic Research and Innovation Agenda (SRIA)
of the
European Open Science Cloud (EOSC)
Version 1.0 15 February 2021

7.4. Critical success factors

The developments and expected impacts described above will not happen spontaneously. For these benefits to materialise a number of critical success factors (CSFs) must be in place. The following CSFs have been identified for EOSC:

- Researchers performing publicly funded research make relevant results available as openly as possible;
- Professional data stewards are available in research-performing organisations in Europe to help implement FAIR principles and support Open Science;

News Blog

We need 500.000 respected data stewards to operate the European Open Science Cloud

Interview to Barend Mons, Chairman of the High Level Expert Group on EOSC, May 2016

04/05/16 09:08

At the e-IRG workshop in Amsterdam, we had the opportunity to talk to Barend Mons who is chairing the High Level Expert Group on the European Open Science Cloud, an advisory group to the European Commission. To be successful, the European Science Cloud needs a lot of experts to operate it, Barend Mons told us. Data stewards that have a lot of knowledge about managing and maintaining data. Experts who are well respected with a solid career path. Barend Mons also discussed several other findings of the Expert group, whose report will be published very soon.

We are here at the e-IRG workshop in Amsterdam and we are talking with Barend Mons. Welcome. You just had a presentation here, and you were also part of the panel. One of the things that you focused on, was the European Open Science Cloud, because you are chairman of the Expert Group of the European Commission. So can you tell a little bit about the progress? What is the status of the European Science Cloud?

WORLD VIEW · 25 FEBRUARY 2020

Invest 5% of research funds in ensuring data are reusable

It is irresponsible to support research but not data stewardship, says Barend Mons.

Barend Mons

http://www.doi.org/10.1038/d41586-020-00505-7

ISTITUTO ITALIANO DI TECNOLOGIA

Chi è il «data steward? (1)

Il «**data steward***» è una figura professionale competente nella pianificazione e gestione responsabile dei dati della ricerca durante tutto il loro ciclo di vita.

***stewardship**: «pianificazione e gestione *responsabile* ed *etica* delle risorse».

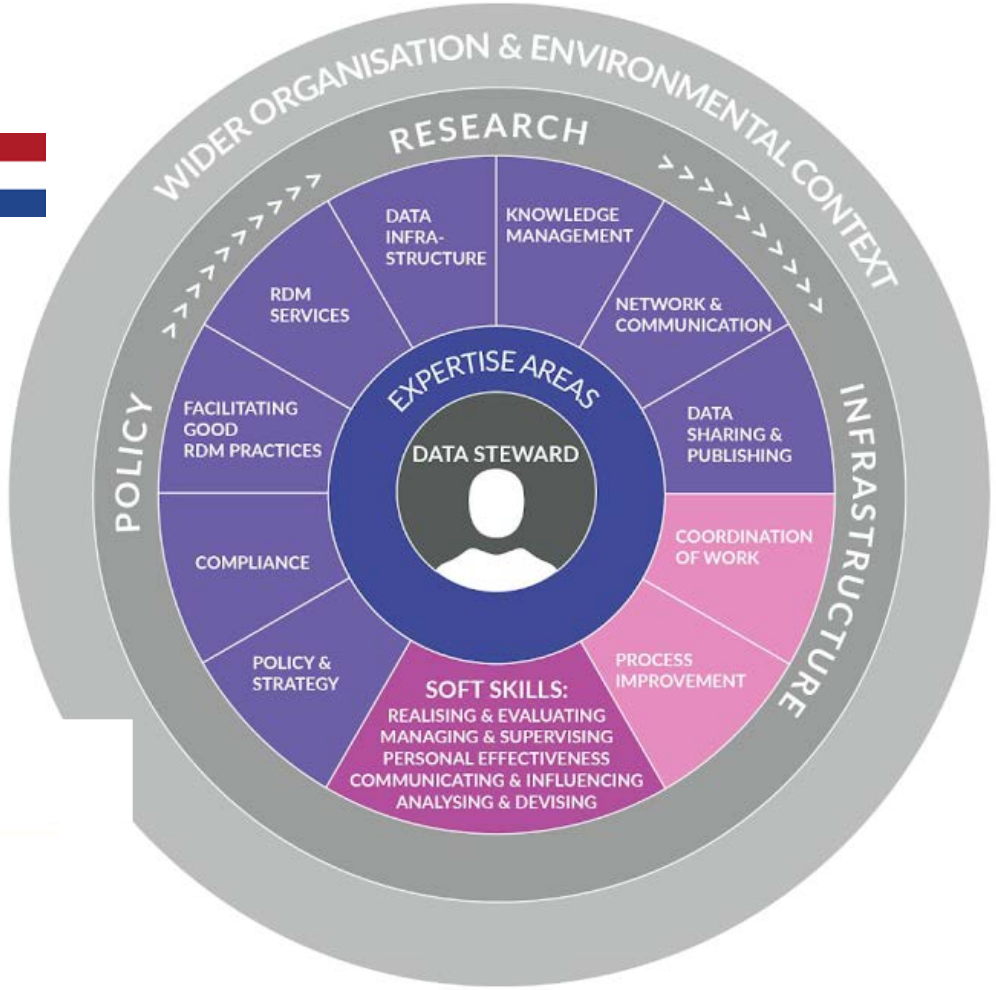
> *"The concept, function and tasks of a "data steward" are highly dependent on the place of employment. However, the common theme is that the DS is **the person that acts as a bridge between the organisation, the infrastructure and the users (including customers)**. Accordingly, title given to a role of a data steward varies greatly - from 'data manager', 'core data expert' to 'data science researcher' as seen in **Table 3**".*

TABLE 3. Titles given to the role of a DS.

Preferred term	*n*
Don't know	37
Data manager	29
DPO	13
Data Steward	10
Data librarian	6
Information Management Specialist	4
Arkivar / Digitaliseringskonsulent	3
Data scientist	2
Dataansvarlig	2
IT specialists	2
Records manager	2
Consultant	2
Colleague	2
Administrative medarbejder - IT	2
Project managers / dept. coordinator	2
Business intelligence analyst	1
Data Engineers	1
Data handler	1
Data koordinator (coordinator)	1
Data specialists	1
Data / system owners	1
Datadisciple	1
IT Risk Management	1
IT-koordinator	1
Systemanasvarlig og digitaliseringskonsulent	1
Projektmedarbejder	1
Research Data Officer	1
Research supporter	1

Lorna Wildgaard et al. (2020). National Coordination of Data Steward Education in Denmark: Final report to the National Forum for Research Data Management. Zenodo. https://doi.org/10.5281/zenodo.3609515

Chi è il «data steward»? (2)



Competenze

- ✓ Servizi di *research data management*, infrastrutture dati e di ricerca
- ✓ Gestione della conoscenza
- ✓ Conservazione e pubblicazione dei dati
- ✓ Conformità a leggi e normative istituzionali, nazionali ed internazionali in materia di gestione dei dati

Abilità

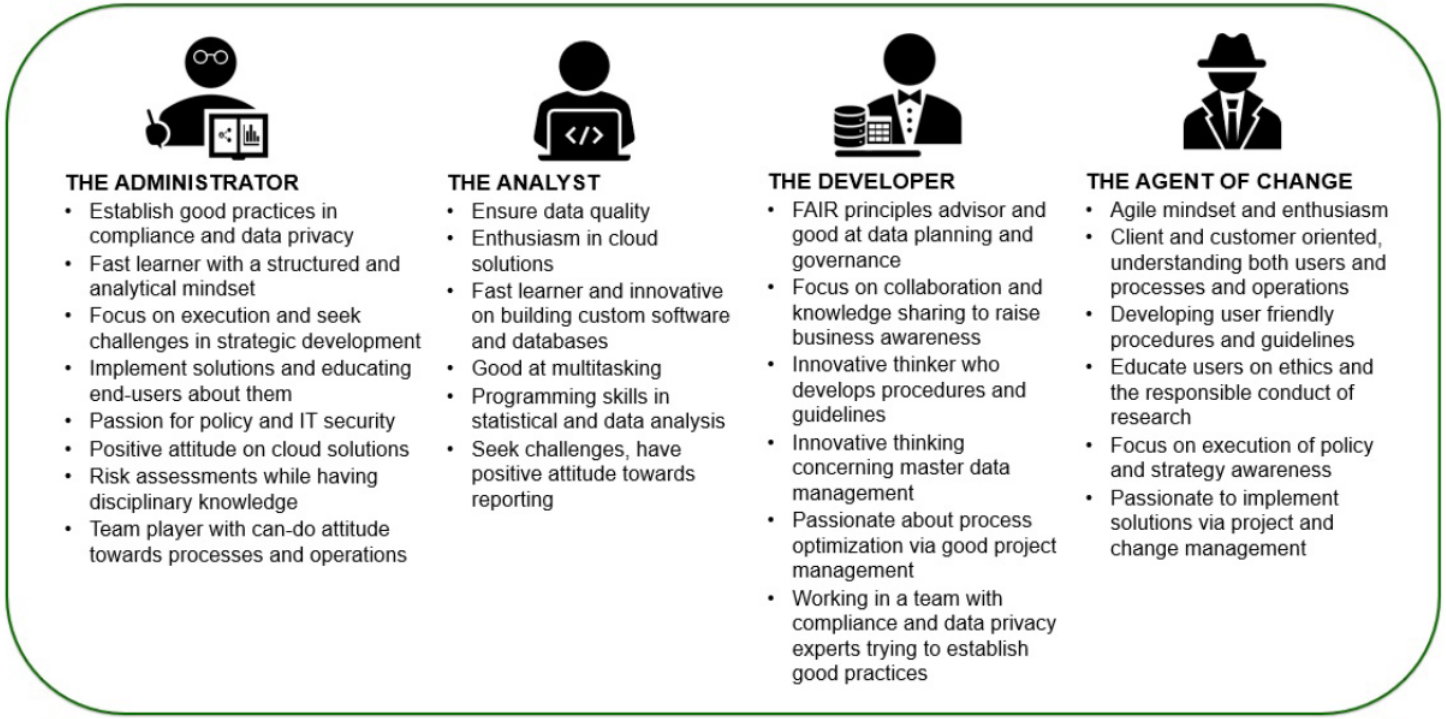
- ✓ Organizzazione e coordinamento del lavoro
- ✓ Comunicazione e sensibilizzazione
- ✓ Gestione e miglioramento di processi
- ✓ Didattica e formazione

Mijke Jetten et al. (2021). Professionalising data stewardship in the Netherlands. Competences, training and education. Dutch roadmap towards national implementation of FAIR data stewardship. Zenodo. http://doi.org/10.5281/zenodo.4623713

ISTITUTO ITALIANO DI TECNOLOGIA

Chi è il «data steward»? (3)

Profili professionali



THE ADMINISTRATOR

- Establish good practices in compliance and data privacy
- Fast learner with a structured and analytical mindset
- Focus on execution and seek challenges in strategic development
- Implement solutions and educating end-users about them
- Passion for policy and IT security
- Positive attitude on cloud solutions
- Risk assessments while having disciplinary knowledge
- Team player with can-do attitude towards processes and operations

THE ANALYST

- Ensure data quality
- Enthusiasm in cloud solutions
- Fast learner and innovative on building custom software and databases
- Good at multitasking
- Programming skills in statistical and data analysis
- Seek challenges, have positive attitude towards reporting

THE DEVELOPER

- FAIR principles advisor and good at data planning and governance
- Focus on collaboration and knowledge sharing to raise business awareness
- Innovative thinker who develops procedures and guidelines
- Innovative thinking concerning master data management
- Passionate about process optimization via good project management
- Working in a team with compliance and data privacy experts trying to establish good practices

THE AGENT OF CHANGE

- Agile mindset and enthusiasm
- Client and customer oriented, understanding both users and processes and operations
- Developing user friendly procedures and guidelines
- Educate users on ethics and the responsible conduct of research
- Focus on execution of policy and strategy awareness
- Passionate to implement solutions via project and change management

In generale, i «**data steward**»...

... hanno un **titolo di PhD**

... possiedono **nozioni su come i dati vengono raccolti e gestiti** in un **dominio di ricerca specifico**

... conoscono gli **aspetti legali della gestione dei dati** (privacy, proprietà intellettuale) ed **etici**

... possibilmente hanno esperienza pregressa nella **ricerca**, **programmazione**, **gestione di database e infrastrutture di ricerca**, **sicurezza dei dati**

... hanno buone capacità **comunicative**, **didattiche** e **organizzative**

... **comprendono la psicologia dei ricercatori** e parlano lo stesso linguaggio specifico

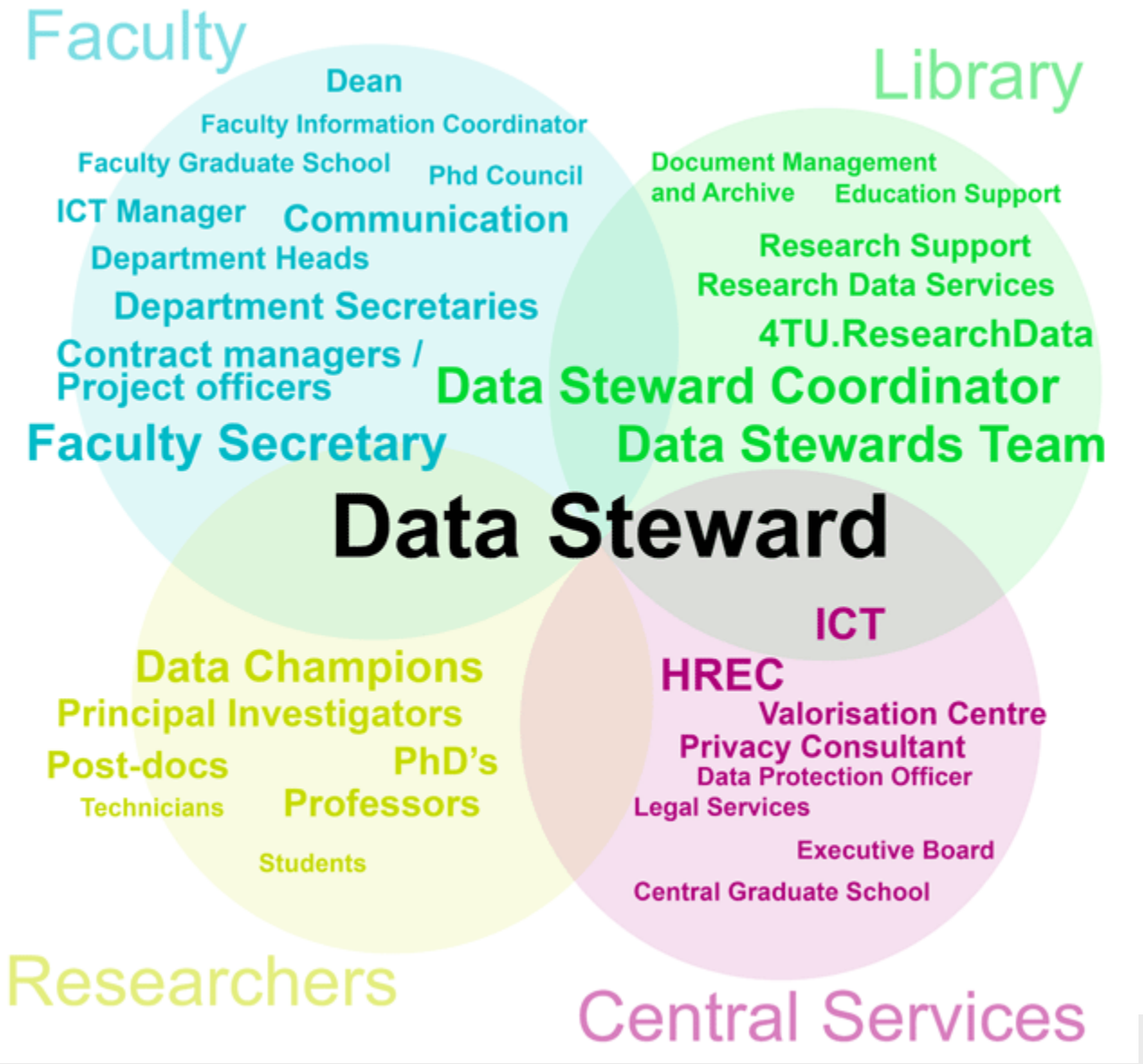
... desiderano intraprendere un **percorso di carriera che non è né puramente scientifico né tecnico**

Lorna Wildgaard et al. (2020). National Coordination of Data Steward Education in Denmark: Final report to the National Forum for Research Data Management. Zenodo. https://doi.org/10.5281/zenodo.3609515

ISTITUTO ITALIANO DI TECNOLOGIA

Various stakeholders that the Data Stewards interact with at TU Delft

E’ essenziale che i Data Stewards abbiano eccellenti capacità di comunicazione e comprendano i punti di vista di differenti ruoli all’interno dell’Università.



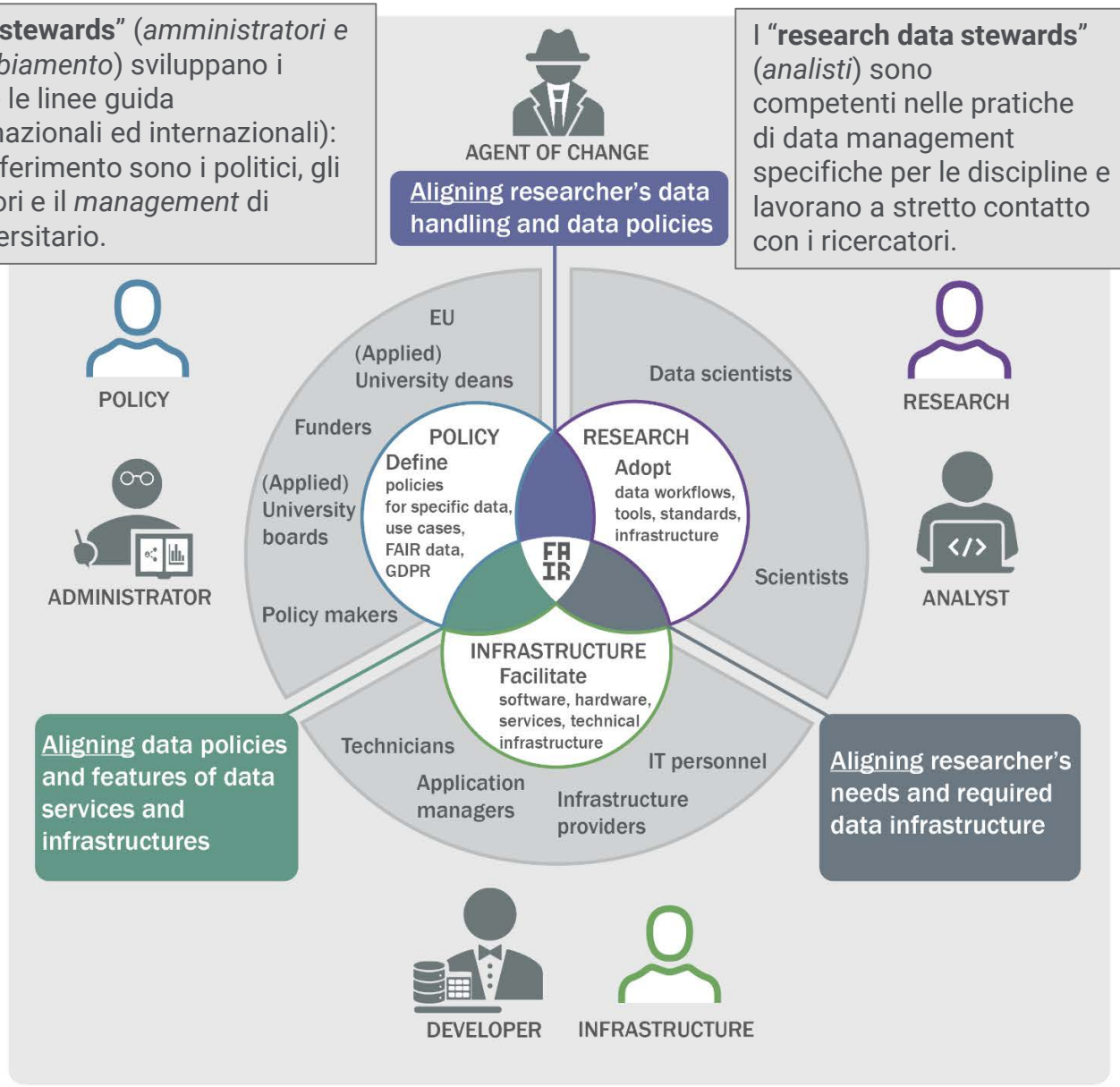
Plomp, Esther, Nicolas Dintzner, Marta Teperek, and Alastair Dunning. 2019. “Cultural Obstacles to Research Data Management and Sharing at TU Delft”. *Insights* 32 (1): 29. DOI: http://doi.org/10.1629/uksg.484

ISTITUTO ITALIANO DI TECNOLOGIA

Ruoli e competenze nei modelli olandesi e danesi

I “**policy data stewards**” (*amministratori e agenti di cambiamento*) sviluppano i regolamenti e le linee guida istituzionali (nazionali ed internazionali): i soggetti di riferimento sono i politici, gli enti finanziatori e il *management* di ricerca e universitario.

I “**research data stewards**” (*analisti*) sono competenti nelle pratiche di data management specifiche per le discipline e lavorano a stretto contatto con i ricercatori.



Gli “**infrastructure data stewards**” (*sviluppatori*) hanno il ruolo di facilitatori e supervisionano la realizzazione dell'infrastruttura tecnica per i FAIR data.

National Forum for Research Data Management- Denmark

Four roles of a data steward

ZonMw/ELIXIR project- The Netherlands

Three roles of a data steward

Valentina Pasquale – Istituto Italiano di Tecnologia

Modified from Frederike Schmitz. (2020). The roles of data stewards in the data stewardship landscape identified in Denmark and the Netherlands. Zenodo. https://doi.org/10.5281/zenodo.4321265

ISTITUTO ITALIANO DI TECNOLOGIA

Educazione dei «data steward» (1)

Modelli di formazione ed educazione dei data steward

Martin Lillholm, Data Steward Education Copenhagen University, Challenges in professionalizing data stewardship BoF RDA P15

KØBENHAVNS UNIVERSITET

Students with Bachelor degree

Directed corporate employment

- *One-year master programme*
  For students who fulfill requirements to basic programming skills, study skills, subject knowledge and academic language level.
- *Two year master programme*
  For students who do not meet the requirement for programming and study skills follow a *pre-master's year before the master's* and then continue with the one-year master.
- *Two-year candidatus*
  Traditional university candidatus combining theory, methods and internships. A dissertation in the area of DS is required.

Students with a PhD or equivalent

Directed corporate or academic employment

For PhDs from any field at university faculties or part of research teams in industry. Educational programmes are a collaborative endeavor between faculties, library or knowledge centers, Centers for Information Security, Data Steward Community, Research coordinators, Project PI's, System Developers, Communication and Teaching teams, the Graduate School (for PhD training) & Human Research Ethics Committees.

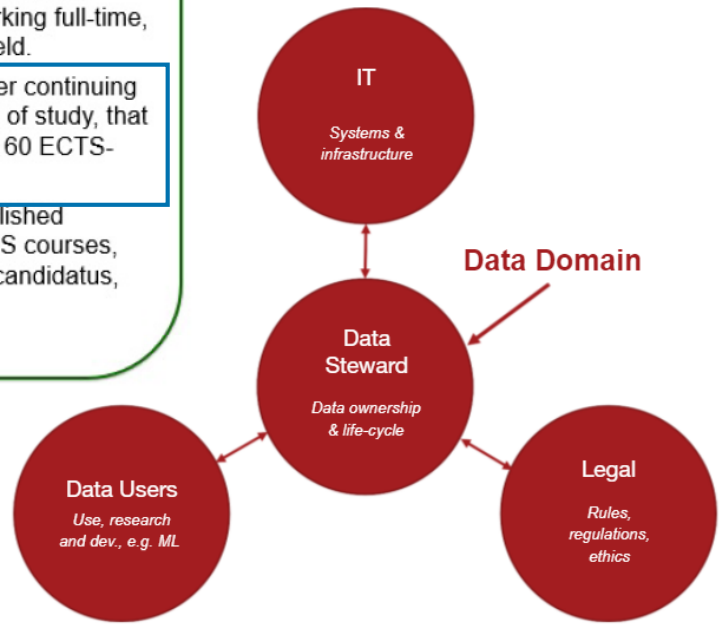
- *Requirements:* Short courses, workshops, mentorships, online modules, summer school programmes & MOOCs, that immerse the student in the DS Community.

Continuing and professional education

Directed corporate or academic employment

Flexible master programme

- For students who have professional experience and wish to improve their DS skills but keep working full-time, or already have a master's degree in any field.
- The programme is a part-time flexible master continuing education program with a prescribed period of study, that the student individually plans, and a total of 60 ECTS-points.
- The student combines elements from established programmes, thus it is a requirement that DS courses, such as the one year master and two year candidatus, are available through the Open University.



Flessibilità, Integrazione, Formazione continua

Lorna Wildgaard et al. (2020). National Coordination of Data Steward Education in Denmark: Final report to the National Forum for Research Data Management. Zenodo. https://doi.org/10.5281/zenodo.3609515

ISTITUTO ITALIANO DI TECNOLOGIA

Educazione dei «data steward» (2)

Université de Montpellier

DIPLÔME UNIVERSITAIRE
SCIENTIFIC DATA MANAGEMENT
UNIVERSITÉ MONTPELLIER

Programme de la formation

Comprendre l'environnement des données de la science

- Module 1 : Territoires, innovation et financement
- Module 2 : Recherche, gouvernance et données
- Module 3 : Données, innovation et droit

En savoir +

Maîtriser les outils d'analyse des données de la science

- Module 1 : Extraire les données
- Module 2 : Gérer les données et les métadonnées
- Module 3 : Explorer et fouiller les données
- Module 4 : Sécuriser les données
- Module 5 : Protéger les données personnelles

En savoir +

Gérer l'ouverture des données de la science

- Module 1 : Construire un plan de gestion de données (PGD)
- Module 2 : Stocker et archiver les données
- Module 3 : Diffuser et partager les données
- Module 4 : Valoriser et réutiliser les données

En savoir +

CODATA – RDA Data Schools

- Principles and practices of Open Science
- FAIR data and using data ethically
- An introduction to research data management and the research data lifecycle
- How to prepare a data management plan
- Introduction to persistent identifiers and licensing
- A grounding in how to compile bibliographies
- How to find data more efficiently
- How to publish data Software and data carpentry
- How to use Github
- Introduction to theory and practice of visualization
- Introduction to machine learning
- Grounding in use of computational research infrastructures

Master degree in DATA SCIENCE & SCIENTIFIC COMPUTING

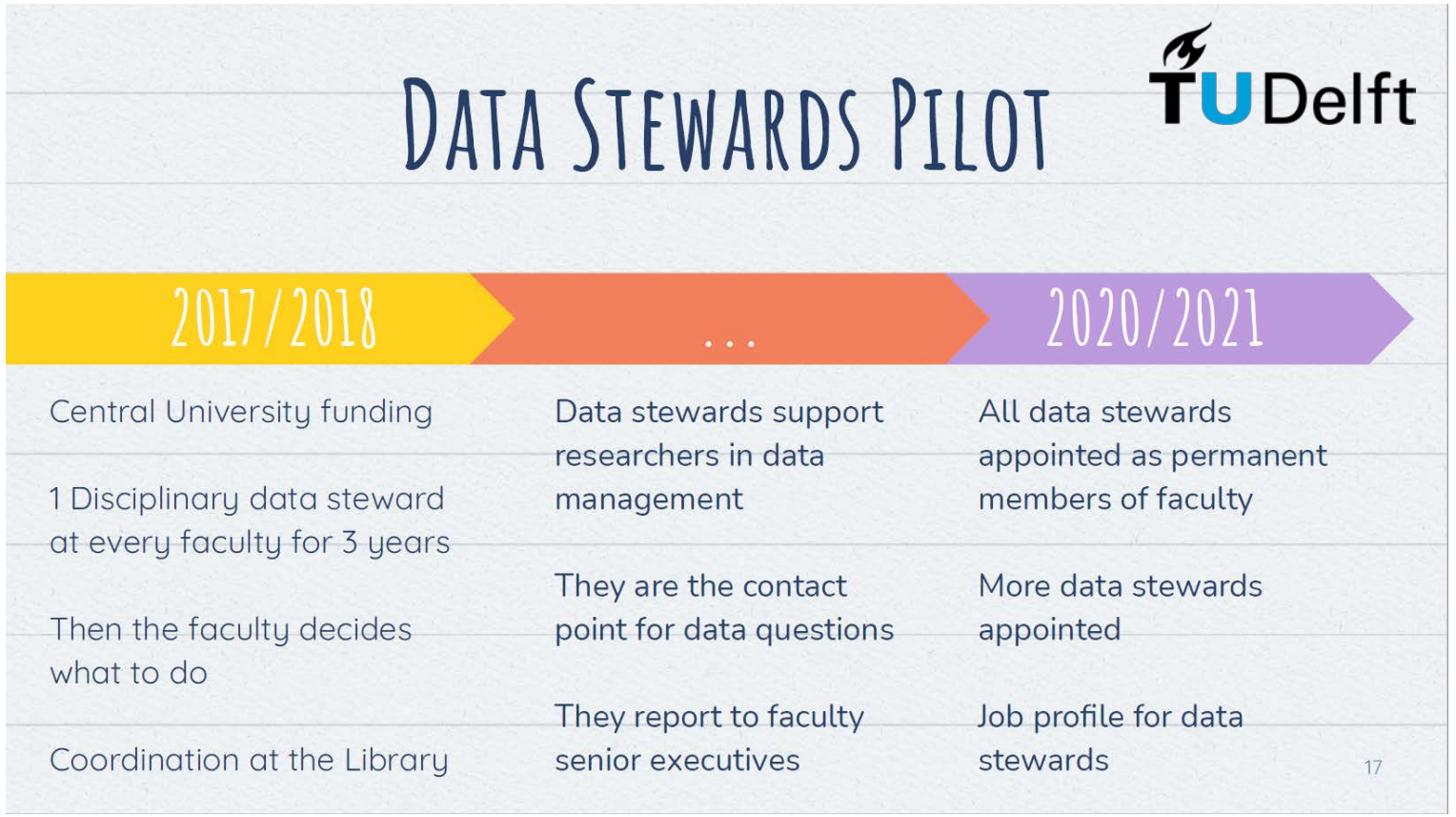
- Artificial Intelligence and Machine Learning
- Data Science and Applications
- Computational Science and Engineering
- Data Management and Engineering

Università di Trieste, Università di Udine, SISSA e ICTP

iit ISTITUTO ITALIANO DI TECNOLOGIA

Percorsi di carriera

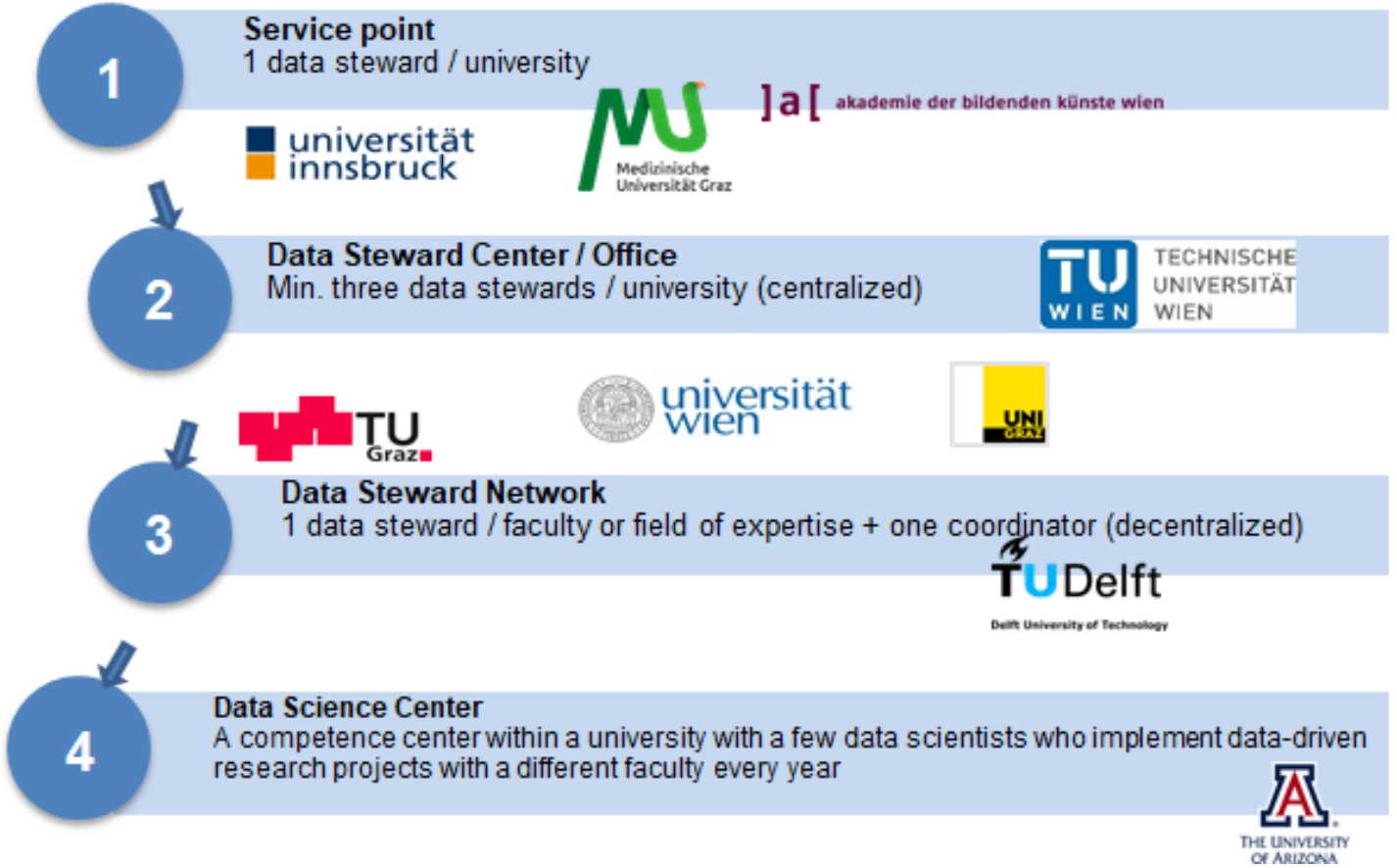
In alcuni paesi europei (Olanda, UK, Danimarca, Austria, etc.), la figura professionale del "data steward" è stata già introdotta all'interno dei Dipartimenti di ricerca e/o Facoltà e segue un **percorso di carriera separato dalle carriere scientifiche** e con un suo riconoscimento all'interno del **supporto alla ricerca**.



Slide by Marta Teperek, «Data & Software roles of the future: Data stewardship and the Digital Competence Centre at TU Delft", GenOA Week 2021, slides video

Ricognizione dei modelli di "**data stewardship**" in diverse Università e Organizzazioni di Ricerca.

Data Stewardship models



Slide credit: Ilire Hasani-Mavriqi, Sarah Stryeck (TU Graz)
Adattamento da: DSCC-IN National Chapters Meeting, October 4th-5th 2021 slides

ISTITUTO ITALIANO DI TECNOLOGIA

Piani nazionali per Open Science

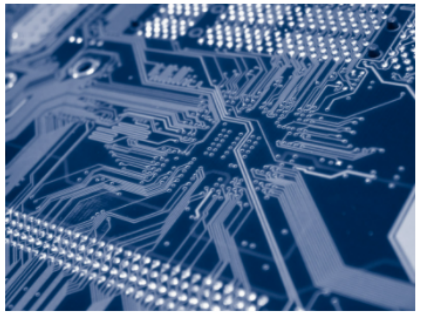
In generale, le Organizzazioni di Ricerca straniere che hanno già avviato questo percorso di introduzione dei "data steward" beneficiano di **fondi statali a tempo determinato per la fase di "start-up"**, legati all'implementazione di una pianificazione nazionale.

https://www.nwo.nl/en/news/setup-thematic-digital-competence-centers

Setup thematic Digital Competence Centers

1 December 2021

The scientific field and NWO are jointly establishing thematic Digital Competence Centers. Researchers and institutions will work together in these network organisations to develop exchangeable and reusable data and software, with the associated competencies, for specific research themes. Interested parties that want to become actively involved in this development can contact NWO.



https://www.ouvrirlascience.fr/le-fonds-national-pour-la-science-ouverte/

Le Fonds national pour la science ouverte

Le Fonds national pour la science ouverte constitue l'instrument financier du Plan national pour la science ouverte. Il a pour vocation de soutenir financièrement des projets et des initiatives concourant au développement de la science ouverte, afin de

nfdi Nationale Forschungsdaten Infrastruktur

https://www.dnb.de/EN/Professionell/ProjekteKooperationen/Kooperationen/NFDI/nfdiInfo.html

The Federal Government and the states are providing up to EUR 90 million a year in funding for the development of the German National Research Data Infrastructure. Their aims are to make systematic, sustainable improvements that will facilitate access to research data, to catalogue data that until now was mostly stored in decentralised repositories, and to make it permanently available to more users. With this, they are supporting the establishment of up to

In **Italia**, attendiamo la pubblicazione del primo **Piano Nazionale Scienza Aperta** (anticipato nel Programma Nazionale per la Ricerca 2021-2027), che dovrebbe anticipare la messa a disposizione di risorse nazionali per supportare la Scienza Aperta (es. attraverso i bandi PNRR).

Sostenibilità a lungo termine

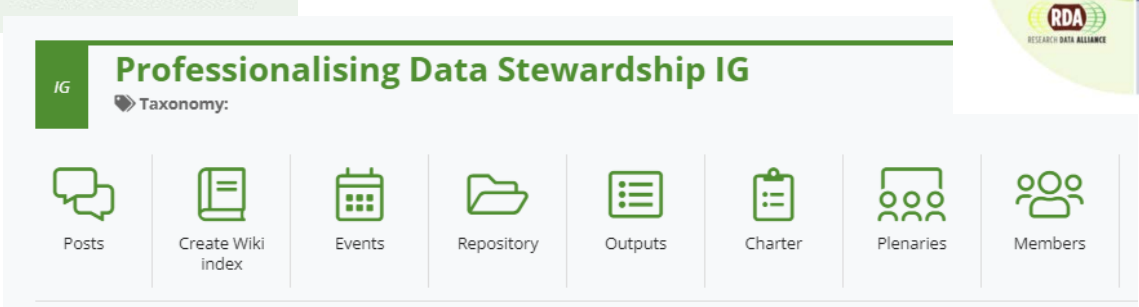
In quasi tutti i casi (anche all'estero) la **sostenibilità a lungo termine è lasciata alle Organizzazioni di Ricerca**, che dovranno implementare un modello di gestione dei *data steward* che preveda l'inserimento a tempo indeterminato nella struttura di supporto alla ricerca.

Contratti a tempo determinato, legati ad una progettualità esterna, potranno essere utilizzati per garantire la formazione iniziale dei data steward e l'inserimento graduale attraverso progetti pilota, mirati anche al coinvolgimento diretto dei ricercatori.

Parola chiave: collaborazione

Il ruolo delle *community of practice*

RDA *Interest Group* per la professionalizzazione dei *data stewards*.



https://www.rd-alliance.org/groups/professionalising-data-stewardship-ig

- TG1. a business case for data stewardship
- TG2. data stewardship terminology
- TG3. the integration of data stewardship across an organisation
- TG4. job profiles for data stewards
- TG5. training for data stewards
- TG6. career tracks for data stewards
- TG7. networking and knowledge exchange
- TG8. certification.

Rete internazionale dei *Data Stewardship Competence Centers*, focalizzata sulla convergenza e condivisione di iniziative territoriali nazionali.

Data Stewardship Competence Centers (DSCC)

https://www.go-fair.org/implementation-networks/overview/dscc/

Competence Centre per Open Science, FAIR e EOSC

Un network di infrastrutture, iniziative ed esperti per mettere in pratica la scienza aperta e i principi FAIR ai risultati della ricerca, armonizzando lo sforzo nel partecipare all'European Open Science Cloud (EOSC)

Emma Lazzeri, Gina Pavone, *Il Centro di Competenza ICDI: formazione e supporto al servizio della scienza aperta e di EOSC*, video

Contatti

Valentina Pasquale
valentina.pasquale@iit.it

Research Data Management @IIT
rdm@iit.it

Grazie per l'attenzione!

ISTITUTO ITALIANO DI TECNOLOGIA

ISTITUTO ITALIANO DI TECNOLOGIA
Sede Legale: Via Morego, 30 16163 Genova
Uffici di Roma: Via Guidubaldo del Monte, 54 00197 Roma
Tel. 010 2896
www.iit.it