Reseach Data Management WorkFlow

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Outline

- Introduction (Is Data the new oil?)
- Data knowledge areas
- Data Management Plan (DMP)
- Data Acquisition / Cleaning/ Conversion
- Data Analyses
- Publishing/ Storage / Reuse – FIAR Principle
- Data publication and citation support

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Introduction

- In the 1980 most profitable firms were oil compagnies
- Currently the most most profitable firms are data oriented

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Data knowledge areas

- ✓ Data engineering
- ✓ Data analytics
- ✓ Data Analysis
- ✓ Artificial Intelligence (AI)
- ✓ Machine learning
- ✓ Deep learning

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Data knowledge areas

- ✓ Data engineering
- ✓ Data analytics
- ✓ Data Analysis
- ✓ Machine learning
- ✓ Deep learning

Data Management Plan (DMP)

When DMP is needed?

- ❑ A DMP is a formal document you develop at the start of your research project which outlines all aspects of your data (i.e. what you will do with your data during and after your research project)
- ❑ DMP is not a static document, but needs adjustment at regular intervals

Why manage data?

- Data is the new oil
- Make your research easier
- Stop yourself drawing in irrelevant stuff
- Save data for later
- Ovoid accusation of fraud or bad science
- Write a data paper
- Share your data for re-use
- Get credit for the data

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Benefit of DMP for the institution

- Opportunity to engage with researchers and improve RDMA
- Raise awareness of support available
- Collate information to inform service delivery
- Ensure the institution is not exposed to risk
- Provide gratification and openness
- Ability to recovery cost via grants

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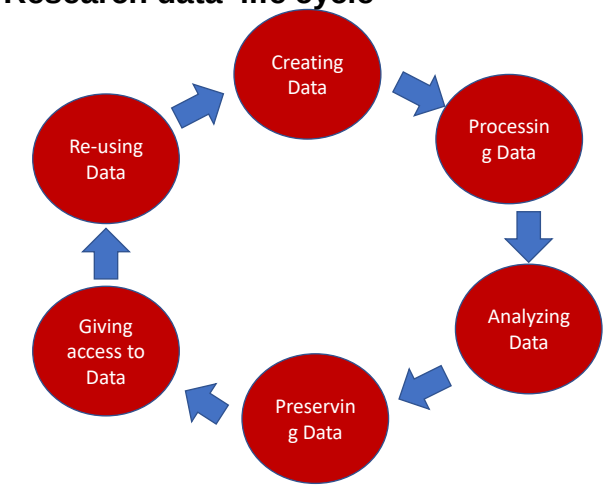
Research data life cycle



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Tips on writing DMP

- Keep it simple, short and specific
- Seek advice –consult and collaborate
- Base plans on available skills and support
- Ensure the institution is not exposed to risk
- Make sure implementation is feasible
- Justify any resource or restrictions needed

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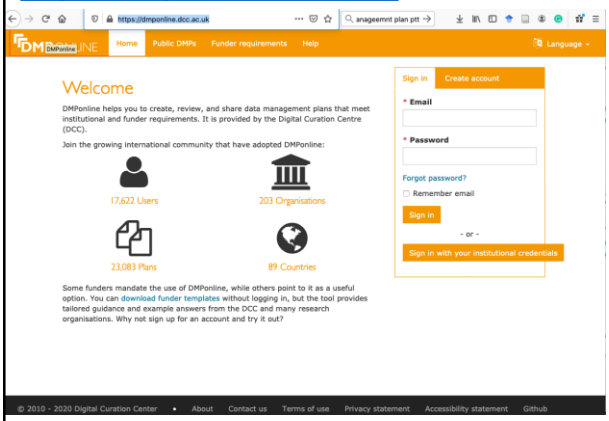
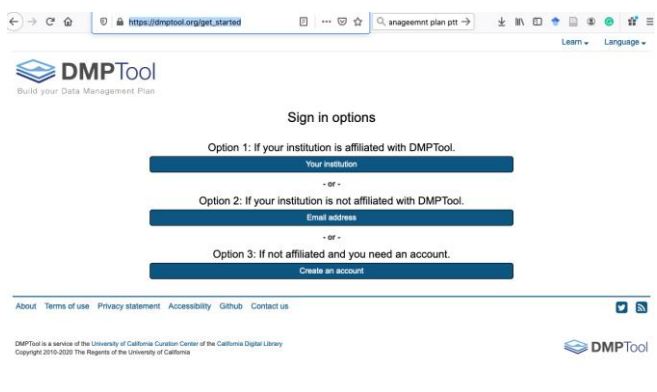
Tools for DMP

https://dmponline.dcc.ac.uk/



https://dmptool.org/get_started



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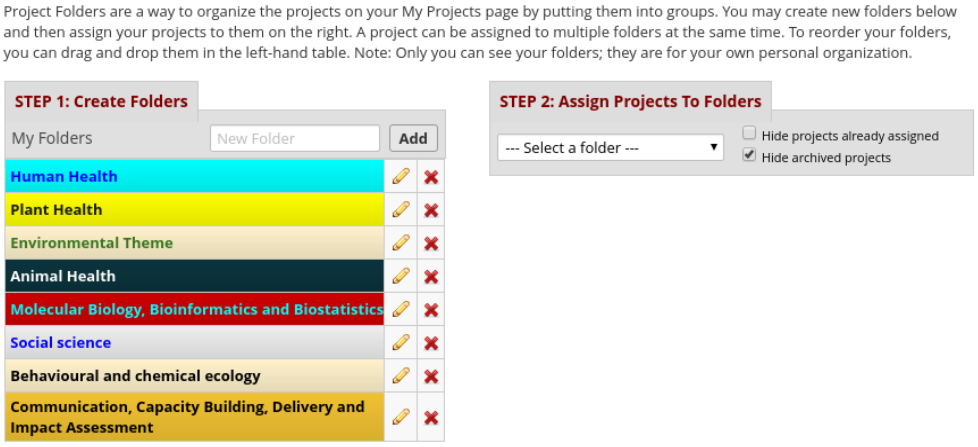
Data Acquisition / Cleaning/ Conversion

Illustration with RedCap

Digital Data Collection Tool



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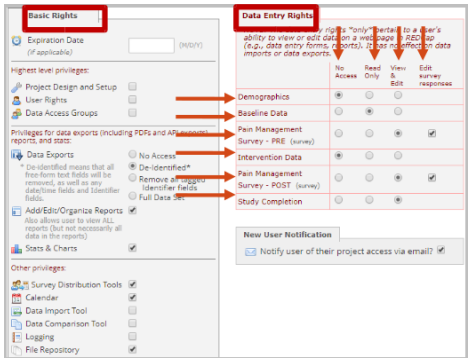
Data Acquisition / Cleaning/ Conversion

Illustration with RedCap
Digital Data Collection Tool

Role name (click role name to edit role)	Username or users assigned to a role (click username to edit or assign to role)	Expiration (click expiration to edit)	Data Access Group (click DAG to assign user)	Project Design and Setup	User Rights	Data Access Groups	Data Export Tool	Reports & Report Builder	Graphical Data View & Stats	Calendar
–	**aespira** (Andrew Espira) API Token	never	–	✓	✓	✓	Full Data Set	✓	✓	✓
Data manager	**abneel** (Abneel matharu) API Token	never	Tunga_2020	✗	✗	✗	Full Data Set	✓	✓	✓
	amina (Amina Abubakar)	never	Tunga_2020							
	francis (Francis Mutebi) API Token	never	Tunga_2020							
	htonnang (Henri Tonang)	never	–							
	ibrahim (Ibrahim kiche)	never	Tunga_2020							
	randu (randu kithi) API Token	never	Tunga_2020							
PI	**lynne** (lynne elson) API Token	never	Tunga_2020	✓	✗	✓	Full Data Set	✓	✓	✓
	ufillinger (Fillinger Ulrike) API Token	never	Tunga_2020							



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Data Acquisition / Cleaning/ Conversion

SOLANUM SPECIES ON TETRANYCHUS EVANSI

Experiment site = *icipe* **Duduville Campus**

DATA COLLECTOR NAME/INITIALS: **L.K. Murungi**

Experimental year=2009-2011

Treatments = Host plant species

Pest	Host Plant Species	Source
Tetranychus evansi	*S. sarrachoides (GBK 028726)*	Gene bank
	Solanum villosum Miller (MW 13	AVRDC
	Solanum scabrum (SS 52	AVRDC
	Solanum americanum Miller (SA)	AVRDC
	Solanum tarderemotum Bitter (MW 03)	AVRDC

LEGEND(For each measurement made; use this convention)

spp	= species
no_eggs	= number of eggs
Gla_tricho	= glandular trichomes
gla_tricho1	= glandular trichomes1
Non-gla_tri	= Non-glandular trichomes
non-gla_tri1	= Non-glandular trichomes1
Rep	= replicate

Metadata | Protocol | Rawdata

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Data Acquisition / Cleaning/ Conversion

Stage of Trial	Protocol	Notes
Pre-planting of host plant	Establish list of required host plant species and their source. The planting site (greenhouse) temperature should be monitored using a HOBO Pro Series Temp, relative humidity(RH) data logger. Average daily temperature should be 23C±1°C	
Seedling Transplant	Seedlings are transplanted into pots (29cm in diameter) filled with a mixture of soil, compost and sand (3:2:1, v/v) 28 days after sowing. Plants are watered daily and each pot is fertilized with 3g calcium ammonium nitrate (26% N) 2 weeks after transplanting.	
Mites Sourcing	Mites are sourced from a colony maintained on potted tomato plants (variety Moneymaker obtained from the East African Seed Company, Nairobi, Kenya), in a rearing room at a temperature of 25±1°C, 50–70% RH and 12h photoperiod.	
Trichome Identification and quantification	Twelve fully expanded young leaves are collected at random from 4-week-old plants of each respective nightshade species. . Identification and classification of the trichomes are made based on the presence or absence of glands. Trichome counts are made under a 32× dissecting microscope fitted with a square grid to assist in counting. Ten squares (each 0.11mm2) are selected at random on the abaxial surface of each leaf. Three replicates each with 36 leaves are carried out for respective plant species.	*Densities are expressed as the number of trichomes/mm2.
Mite placement for fecundity	Four leaf disks (25mm in diameter) of the respective species are maintained individually in one Petri dish (86mm in diameter) stacked with cotton wool moistened with tap water and placed into plastic trays (36× 23× 2.3cm). A single female deutonymph and two males are carefully picked from the colony and transferred to the respective leaf disks for oviposition. These rearing units are placed in an incubator maintained at 25 ± 1°C , 70–80% RH and a 12h photoperiod. Males areremoved 48h later, after the female has emerged. The number of eggs laid per female is monitored daily during the first 10 days of the oviposition period. The leaf disks are changed every 4 day	*Fecundity tests are carried out on leaf disks of the same age as leaves on which the number of trichomes is counted and representing each investigated species. *Five replicates, each with 20 deutonymphs, are evaluated for each plant species.
Evaluation of the effect of trichomes on mite movement	Evaluation should be quantified with a no-choice thumbtack bioassay. One leaf of each species is attached to a board of Styrofoam through a metallic thumbtack (9mm in diameter) placed at the centre of its abaxial surface. One replicate should consist of four leaves of each species individually placed on the Styrofoam boards. Ten female spider are transferred with a fine camel-hair brush to the head of each thumbtack. The trial is carried out on a laboratory bench at 23±1°C. Distances travelled by each mite onto the leaf surface are measured as the shortest distance (in cm) between the mite and the thumbtack edge, and are recorded after 15, 30, 45 and 60min. Three replicates, each with 40 spider mites, should be carried out for each plant species.	*Mites that stay on the thumbtack are considered to have travelled a distance equal to zero.

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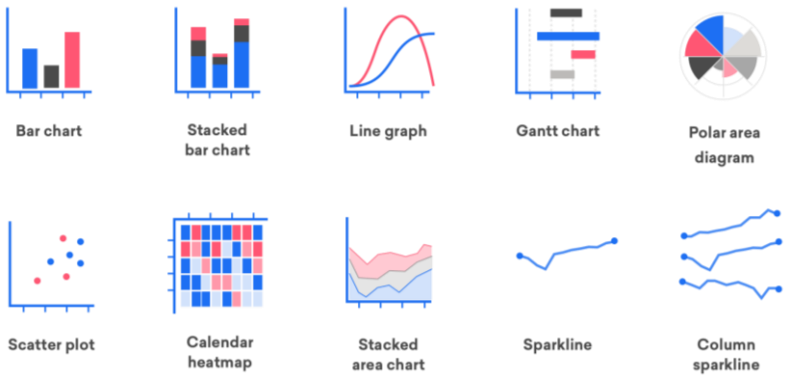
Data Analyses



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Publishing/ Storage / Reuse – FIAR Principle

To be Findable:
F1. (meta)data are assigned a globally unique and eternally persistent identifier.
F2. data are described with rich metadata.
F3. (meta)data are registered or indexed in a searchable resource.
F4. metadata specify the data identifier.

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 Re-usable
R1. meta(data) have 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 their provenance.
R1.3. (meta)data meet domain-relevant community standards

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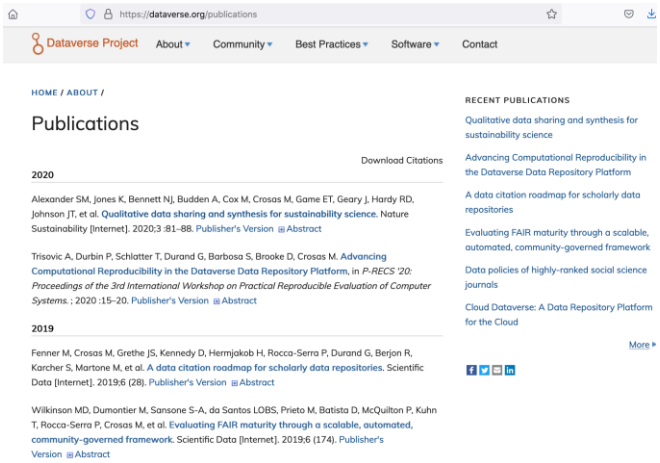
Data publication and citation support



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