CHAPTER 4

INCENTIVES AND MANDATORY RULES ON OPEN SCIENCE IN PUBLIC FUNDED RESEARCH

4.1. INCENTIVES

Some examples of incentives[13] to be adopted are:

a. **Policy incentives** – Appropriate national and institutional policies that detail out infrastructure, incentives for training of researchers and data stewards and recognising of support systems such as Research data management policy, people to develop DMP & Protection of Intellectual property).

b. **Infrastructure incentives** – From ICT provision, software, research funding and equipment.

c. **Personal incentives** – For the researchers. From getting flexibility in terms of working to career progression and recognition, to the extent that data sharing is being incorporated as a Key Performance Index (KPI).

d. **Funding Incentives** - Ensuring funds to cover open access publication costs and costs related to data management, stewardship and long-term preservation. In addition, allocating funds for Open Science activities such as (but not limited to) citizen science projects, mentoring/ training and awareness-raising activities, prizes to individual researchers for being a role model in practising Open Science in addition to those related to Open Access to scientific publications and research data. Introducing openness as a criterion in selection procedures for the awarding of grants (not limited to open access to publications and data, but also taking into consideration elements like contributing in open peer review processes, participating in citizen science projects).

e. **Social incentives** – Various infographics, leaflets, information and also videos to promote Open Science. Incentives for reimbursement are also provided (E.g.: If you buy resources or tools for your research to facilitate data sharing, the amount can be reimbursed).

4.1.1. Effective communication of incentives on data sharing

The incentives provided in Open Science must be adequately communicated in a manner that resonates well with Malaysian researchers. One way of doing it is by highlighting that Open Science could bring socioeconomic benefits from research works. As for now, incentives of data sharing are not communicated effectively. Those responsible in addressing the national incentives for MOSP, MOSTI, MOHE, or ASM would be the key entities to lead the initiative. Successful stories featuring researchers who have fostered industrial collaboration or with international players are great examples to convince the quadruple helix as a whole. Lastly, imposing Open Science practices as KPI for researchers/institutions can be considered as an incentive and it is important to have a proper policy implemented since researchers need to be given assurance on processes and protocol layers in Open Science, with data stewards will play an important role to assist researchers in managing the whole data lifecycle process.

[13] that an African Open Science Platform has adopted.

4.2. MANDATORY RULES

4.2.1. Compliance

The research entity/institution will take the grant holder's compliance with the Guidelines into account when assessing research performance and when future applications for funding are received from the grant holder. Reporting on compliance will be required both during and at the end of the funding periods for projects receiving support. In case of no compliance, the research entity/institution retains the right to reduce the grant amount at the payment of balance or afterwards.

4.2.2. Acknowledgement in all Publications

Recipients must acknowledge in all publications the name of the research entity /institution and identify the funding source using the project name, and/or acronym, and/or number in the standardise prescribed manner [provide the standardised acknowledgement here, or refer to the appropriate document/webpage where this is defined, e.g. Guidelines for Grant Applicants].

4.2.3. Provision of persistent address

Open Access for research outputs is demonstrated by providing a persistent address where the digital object can be accessed, read, downloaded.

4.2.4. Policy Review

An evidenced-based review of the policy implementation will take place [3 years] following its adoption and subsequent reviews will take place on biennial basis. After that, the policy will be reviewed and updated every [3 years].

CHAPTER 5

GOVERNANCE ON OPEN SCIENCE IN PUBLIC FUNDED RESEARCH

5.1. BACKGROUND

A sound institutional and regulatory framework is central to an effective and well-functioning STI system. Since matters pertaining to STI transcend all ministries and involve the participation of various stakeholders such as civil servants, industry, academia and the community, issues pertaining to coordination, collaboration and harmonisation assume importance. NPSTI 2021-2030 reinvigorates the nation's existing STI framework in order to enhance the execution of policies besides providing mechanisms to ensure commitment by all parties towards the development of STI in the country.

Hence, the STI governance must be enhanced to ensure effective implementation of policies and strategies with improved transparency and accountability in R,D,C such as in the Open Data Sharing initiative. As such, a Responsive STI Governance is identified as one of the Strategic Thrusts of the NPSTI 2021-2030. This Guidelines will ensure a more efficient and effective delivery system in Open Science with good STI governance.

5.2. GOVERNANCE STRUCTURE

5.2.1. National Level

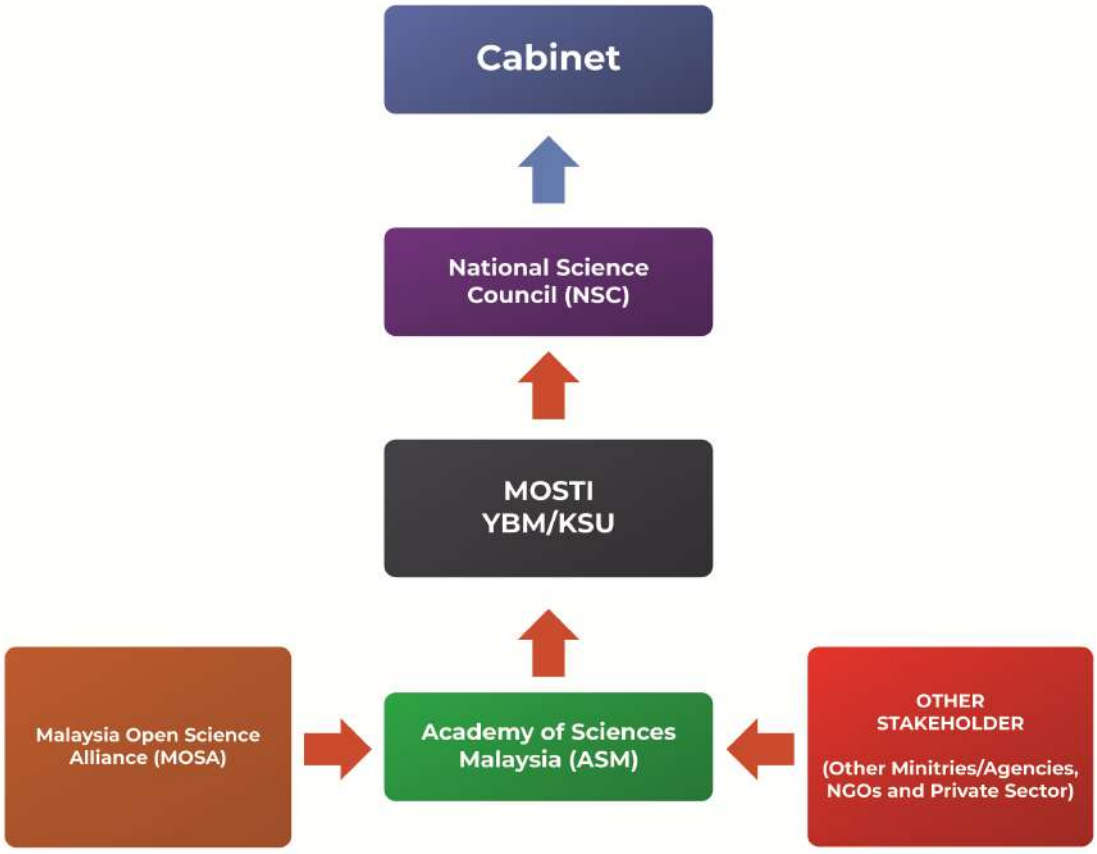
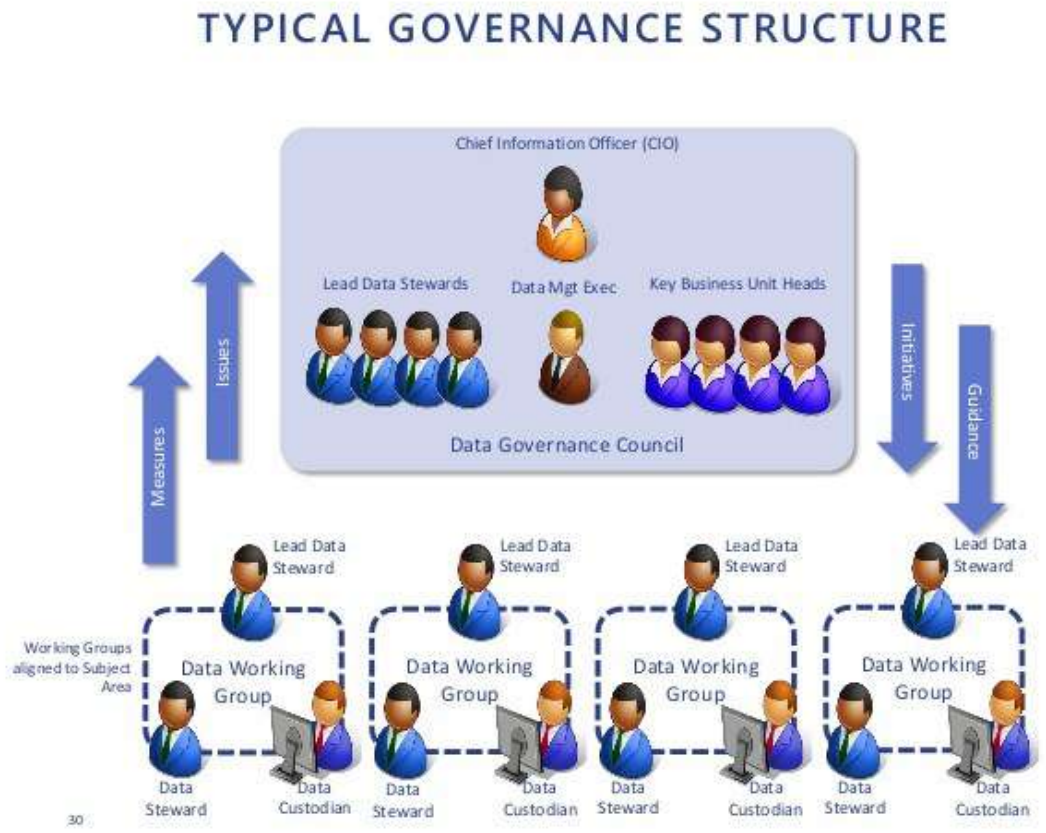


Figure 5.1. Governance of Open Science in Malaysia's Public Funded Research

5.2.2. Institutional Level

At this institutional level involves the governance of Open Science at institutions of higher learnings (IHLs) and the public research institutions (PRIs). Each institution will already have the governing body which has adopted the best international practices in Open Science Management. These institutions will continue to adopt and practise their good governance system and should always ensure they are in line with the national STI agenda, in particular the Open Science Initiative under the NPSTI 2021-2030.

BOX 5.1



Source: Christopher Bradley (2018)

For the purpose of this Guidelines, the recommended structure for the institution of higher learning and public research institution will harmonised as far as possible and will adopt the best practices in Open Science. Some variations are allowed as long as the main core structure exist and does not deviate from the original principle of Open Science. Examples of such governance structures for both kinds of institutions are illustrated below.

a. University or Institution of Higher Learning

Figure 5.2. Governance of Open Science in Malaysia's Higher Learning Institutes

b. Public Research Institute

Figure 5.3. Governance of Open Science in Malaysia's Public Research Institute

5.3. ROLES AND RESPONSIBILITIES

In relation to this Guidelines, the following entities are responsible for the following:

5.3.1. The Ministry of Science, Technology and Innovation (MOSTI):

(a) Familiar with and adhere to legislation, regulatory requirements, contractual obligations, ethical approvals, funding bodies' policies, and other licences and terms of use of research data.

(b) Ensure effective communication processes to manage research data and research records in accordance with the University, Research Institute or Government Entity policy and related Malaysia rules and regulations, or as otherwise determined by other statutory requirements, funding agency guidelines, or contractual arrangements with research partners by providing service support.

(c) Implement, coordinate, and review the execution of the Policy.

(d) Ensure that the Policy is updated on a regular cycle to take into account the latest funder requirements, and national research directives and guidelines.

(e) Provide training, support, advice and guidelines that promote a best-practice approach towards Open Data Sharing in Open Science and FAIR principle.

(f) Monitor compliance of researchers with this Policy and associated procedures.

(g) Acts as a "supra-national entity" that assumes the main role in defining international coordination, collaborations or co-operations in relation to agreements or guidelines in addressing open science issues at international fora.

5.3.2. University, Research Institution and Other Government Entity

(a) Familiar with and adhering to legislation, regulatory requirements, contractual obligations, ethical approvals, funding bodies' policies and other licences and terms of use of research data.

(b) Provide or secure approved IT infrastructure for the safe and secure storage of research.

(c) Ensure backup, archival and monitoring processes are in place to prevent loss of research data.

(d) Provide access to services and facilities for the storage, backup, registration, deposit, curation and archiving of research data.

(e) Provide technical support to maintain all systems (such as the University data repository and DMP submission system) required for compliance with the research data policy.

(f) Ensure that all research projects include a DMP and that it is attached to the relevant record in the Institutional Repository.

(g) Ensure that their Principal Investigators (PIs) adhere to their obligations as detailed in this policy.

(h) Task data stewardship to be responsible for data requirement, data definition and data quality.

5.3.3. Principal Investigators (PIs) And Researchers

(a) Familiar with and adhere to legislation, regulatory requirements, contractual obligations, ethical approvals, funding bodies' policies and other licences and terms of use that pertain to their research data.

(b) Have overall responsibility for the proper and effective management of research data generated during the research project, in accordance with the University, Research Institute or Government Entity policy and guidelines.

(c) Ensure research data are accurate, complete, authentic and reproducible.

(d) Keep clear and accurate records of the research methods and data sources, including any approvals granted, during and after the research process.

(e) Prepare a DMP and submit it online into the institutional repository. PIs and researchers shall provide an updated version whenever there are substantive changes to the research project.

f) Submit the research data to institutional repository no later than the first online publication of the article.

g) Deposit any data which is retained elsewhere at the Institutional Repository no later than two days after the data was deposited into the international data service or domain repository.

h) Ensure that formal agreements are reached with external collaborators and parties, if any, on the ownership, rights, use and sharing of research data arising from the research project before commencement of project.

i) Exclusive rights to reuse or publish research data should not be handed over to any external organisation without retaining the rights to make the data openly available for re-use, unless this is a condition of funding.

5.3.4. Data steward

Role:

a) Familiar with and adhere to legislation, regulatory requirements, contractual obligations, ethical approvals, funding bodies' policies and other licences and terms of use of research data.

b) Advise, support and train researchers on data life cycle and good data management practices, from initial planning to post-publication. This includes storing, managing and sharing research outputs such as data, images, models, programmes and codes.

c) Advise and educate researchers on the practices that support open science and reproducibility of research, ethical, policy and legal considerations during data collection, processing and dissemination.

Responsibilities:

a) Implement a data strategy and roadmap aligned with the Open Science goal.

b) Classify the most important data governance.

c) Manage the content of scholarly publications and research data metadata.

d) Prioritise the data quality projects and metrics, and build a data quality programme.

e) Partner with IT on infrastructure.

5.3.5. Data Curator

Role:

a) Provide metadata and ontological support for datasets.

b) Provide support and expertise to researchers engaged in research data management planning, data acquisition, data sharing and long-term data stewardship.

c) Support deposit and stewardship of datasets in digital repository platforms.

Responsibility:

a) Responsible for organising and integrating data collected from various sources, which involves annotation, cataloguing, indexing, publication and presentation of the data such that the value of the data is maintained over time, and the data remains available for reuse and preservation.

5.3.6. Open Science Manager

Roles:

a) Drive discussions across the organisation to develop and execute an implementation strategy for open science, especially research data and analysis preservation.

b) Ensure a smooth operation of open science tools and services, and participate in national or international open science collaborations.

c) Develop the organisation's strategic approach to plan for evidence research impact.

Responsibilities:

a) Connect People

Facilitate discussion among stakeholders in the research community, including the researchers, their collaborators, their funding agencies, the industries and the policy makers, to identify present and future open science needs and develop corresponding strategies to address them in a financially sustainable manner.

b) Keep Abreast

In partnership with the IT department and other teams inside or outside the organisation, operate existing data and analysis curation services, monitor their efficiency in serving the research community, expand their adoption and drive further improvements of these tools following the demands of the user community.

c) Strategise

Collaboration represents the interest of the organisation and delivers strategic input to governance bodies of open science collaborations.

d) Benchmark

To identify and develop impact case studies.

5.4. DATA MANAGEMENT IN OPEN SCIENCE

Data Management is defined as an administrative process by which the required data is acquired, validated, stored, protected, and processed, and by which its accessibility, reliability, and timeliness is ensured to satisfy the needs of the data users (Business Dictionary).

Figure 5.4. Data Management in Open Science
Source: https://dmp.qut.edu.au/faq (2014)

5.4.1. Data Management Plan (DMP)

a. What is the Data Management Plan (DMP)?

a) A data management plan is a formal document that records how the research data arising from the research project will be handled during and after the project is completed, describing what data will be shared and/or made open, and how it will be curated and preserved.

b) Along the line in making research data Findable, Accessible, Interoperable and Reusable (FAIR), a DMP should comprehensively describe the types of research data that will be collected, processed, curated and preserved, and how these research data can be made, shared and available to be accessed and re-used in compliance with relevant laws and policies which regulate access to and use of data.

b. Why is the Data Management Plan is important?

a) Data Management Plan (DMP) is a key element for good data management. A fully developed DMP will help researchers plan how the research data will be treated throughout their research projects and research data before, during and after the completion of the research project. Ensuring a good DMP in place from the start of the project will improve efficiency, protection quality and access to the created research data, and prevent possible pitfalls such as loss of data, mismanagement in ownership of raw research data and privacy violation.

b) Creating an DMP at the start of a research project is required by Guidelines on Open Science in Public Funded Research. Compliance with the Guidelines is likely to be made compulsory by research funders, the Government, and institutions in the near future.

c) Data Management Plan is a living document that must be updated over the course of the project whenever significant changes are made, including among others, decisions to file for a patent, new data and changes in research project team composition. Once a research project has had its funding application approved and has begun, the Principal Investigator must submit the first version of a DMP as a deliverable of the research project within the first 6 months of the project.

c. What are key components of a Data Management Plan (DMP)?

a) The Guidelines provides an DMP template, detailing the main sections to be included in the DMP. The following DMP template is prepared as a guidance for local institutions to develop its own DMP template in the near future as tabulated in **Table 5.1**.

b) The DMP template aims to maximise the potential for access to and re-use of research data that takes into account the balance of openness and data sharing, proprietary and Intellectual Property Rights, privacy concerns, security risks and protection for certain types of scientific information according to stipulated legal provisions. This DMP template, therefore, recognizes possible opt-outs for research data sharing.