

Institutional Repository as a tool for research management: A case study of BIUST Library.

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Abstract

The increased reliance on information communication technology (ICT), coupled with the change in the research process has led to the production of large volumes of data. This has compelled those in the information profession, especially librarians, to develop their skills set in order to cope with the new developments. Governments and funding agencies have made it mandatory for researchers to showcase their data management plans that support access, sharing and long term preservation hence academic libraries have strategically positioned themselves to support research data management services. Botswana government established the Botswana International University of Science and Technology (BIUST) in 2005 as a national strategic initiative with the main objective of helping transform Botswana's economy from being resource based to a knowledge based through skills capacity building in Science and Engineering Technology. BIUST library in its quest to ensure proper management of research output by its community piloted an institutional repository (IR) as one of its strategic objective. The paper outlines how the library implemented the IR in-house, and the approach it used. It also covers challenges faced such as lack of funds and lessons learned during the implementation process. The paper concludes by highlighting the success of the project implementation with regards to stakeholder relations. It further outlines the proposed workflow that the library intends to adopt, future plans for skills development to mitigate the challenges.

Keywords: Botswana, Institutional Repository, Research data management, Academic libraries, Botswana International University of Science and Technology

1. Introduction

Large volumes of data is generated from research today and its management is a concern. In order to maintain research integrity, institutions and researchers must ensure that relevant data is achieved, accessible and citable so that results can be verified, or data be reused in future. Shared data allows researchers to replicate experiments efficiently and add to existing datasets. In order to ensure the latter, a research data management (RDM) is an effective intervention hence, the management of research data or output is a service area of increasing interest to the academic libraries, funders and governments. Research data management describes the organisation, storage, preservation and sharing of data and use in the research project. Research funders underscore the importance of research data management by making research data management plan a requirement for the application for research grants. Flores et al (2015) states that government and funding agencies have great interest in maximizing the return on investment hence requires the researchers to properly manage and share data for new developments. This has challenged academic libraries to offer RDM services to their academic communities.

There has been a paradigm shift in research, the current research is more collaborative, computational and data intensive, hence the concept 'e-research'. Information communication technology has contributed to improvements in research data management (Joshi A, 2013). However, traditional librarians lack the requisite skills required to provide data management services, therefore development of data management skills for library staff is imperative.

The Botswana International University of Science and Technology mandate is to become a premier institution in scientific research with the intention to transform the Botswana's economy. In undertaking this role the university has an obligation to take the lead in the holistic management of research life cycle process and advice the government on research policies. This is evidenced by the different roles played by the university such as community engagements through the Science Technology Engineering and Mathematics (STEM) movement with the mandate to change the community perception towards science and technology especially the girl child. During the STEM festival participants showcase their inventions. The adoption of research management tools such as research information management systems (PURE system) and institutional repository, aims at supporting research collaboration, access, dissemination, sourcing of funds, resource sharing, data collection and preservation. In addition to that the tools are also used as a marketing tool for both the university and its researchers. The focus of the presentation is to share experiences learnt during the implementation of IR at BIUST.

2. IR as a tool for RDM

IR plays an important role in centralising, presenting and making accessible institution's intellectual capital. IRs are increasingly deployed in academic institutions to manage a variety of digital content including educational, research and archival materials. It is an organisational commitment to the stewardship of the research output. The benefits of its use as an RDM tool as indicated by different scholars (Crow, 2002a and 2002b; Lynch, 2003; Yeates, 2003) are:

- To increase university and researchers' visibility and ranking (the potential of increasing the visibility, prestige, ranking and public value of researchers and universities).
- To support research, learning and administrative processes hence improve efficiency.
- Easy management of institutional knowledge.
- Increased knowledge sharing
- Control over the digital assets of the university
- Enables the university to collate, manage and preserve materials and therefore derive maximum value from them. (Stewardship)

3. BIUST overview

The Botswana International University of Science and Technology (BIUST) was established in 2005 as one of the key players to drive the change necessary to bring a fundamental transformation of Botswana. It was founded to be a premier research-based international university of science, engineering and technology leading in teaching, learning, research, and innovation. The university started its operation in 2012 based in Oodi College of Art and Technology and relocated to a new purpose built campus in Palapye in 2014. The following were the driving factors:

The need to

- Invest in Science, Engineering and Technology (STE): It was established with the intended purpose to transform Botswana from a resource based to a knowledge economy.
- Produce skilled human resource in STE fields and localise the posts.
- Reduce the costs for students studying abroad and in return provide more opportunities for students to study locally with full sponsorship.
- Increase scientific research output in order to promote inventions and innovation.

4. BIUST Library

The university has two faculties namely; Faculty of Science (FOS), Faculty of Engineering and Technology (FET) and the Centre for Management, Entrepreneurship and General Education. The university library provides resources and services that are responsive and aligned to the strategic goals of the university (teaching and learning, research, and innovation). These services include and are not limited to collection building (Print and E-print), research data management through the IR, and provision of information technology enabled reading space.

4.1 Motivating factor for BIUST library to undertake an IR pilot project?

The underpinning motivating factor for the library to undertake the project was to manage the BIUST community research output throughout its life cycle and to create visibility for the institution and its researchers. Another motivating factors is the availability of open source software for IRs (BIUST adopted D-space). Federer (2016) highlights that in the era of “big data” researchers are increasingly struggling with the management of research data and how to make sense of it. Therefore information professionals with their expertise are key collaborators for research teams faced by these challenges.

5. The process of developing IR at BIUST library: the starting point-

In developing the IR, the BIUST library followed the following steps which were deliberately undertaken to ensure the smooth operationalization of the project.

1. *Conducted project management workshop*: Like other projects, developing an IR is a huge task and as a starting point the BIUST library saw it necessary to kick start the project with an awareness workshop on project management. The workshop was necessitated by the amount of work that was to be undertaken by the team and lack of skills on project management by the team. To cut cost the library looked for an internal facilitator one of the university experts in the field of project management.

2. *Development and dissemination of an IR concept paper to key stakeholder*: Identification of key stakeholders was done. This was to ensure that relevant decision makers were not left behind. The key stakeholders comprised of Faculty Deans (Faculty of Science; Faculty of Engineering and Technology), Directorate of Communications and Public Affairs, Dean of Graduate Studies, Directorate of Information Technology (IT), Library leadership; Directorate of Research and Development. The concept paper was shared for buy-in before the project could be kick-started. Wilson et al (2017) states that

“for a university to achieve its objective of creating a solution to manage research data through all stages of the data lifecycle, from creation to long term curation, then all of the different groups need to share a common understanding of the purpose of the enterprise and the processes required to make it work”.

3. *Constitute IR skeletal team*: Keeping in mind different roles and input by key stakeholders the library set up a team comprising of the library team and the IT personnel for spearheading the project. From the library team a project team leader was identified. The library is responsible for knowledge and data management while IT is responsible for technical expertise. The library project leader was also taken to a capacity building workshop to bridge the skills gap.

4. *Development of IR Proposal*: With the IR team set up, the IR implementation schedule proposal was initiated and shared with the IT personnel. This was done solely for the purpose of project monitoring and implementation.

5. *Stakeholder engagement*: Consultative meetings were then held with different faculties and Directorates (Faculty of Science, Faculty of Engineering and Technology; Directorate of IT and Directorate of Research and Development together with Directorate of BIUST Institutional, Technology, Transfer and Incubation Park (BITRIP)). Stakeholders were engaged in order for the library to identify relevant policy frameworks and role of stakeholders in the implementation of the IR project as well as to lobby for support and ownership of the project by key stakeholders. Oates et al (2017) opined that effective stakeholder engagement is an essential component but we typically overlook it. She further states that stakeholders are central to the management approach and active engagement is more likely to lead to increased ownership of the process which in turn leads to better compliance and support for the project. The consultative meeting was conducted parallel with project implementation. This was done deliberately to allow the commencement of the project by setting up the platform and harvesting of research output. Furthermore, the intent

was to allow the team to have an in-depth understanding of what the project entails and to take into account the stakeholders input during the implementation stage.

6. *Setting up the platform and harvesting of research output:* As alluded above the setting up was done parallel with consultative meetings. The team started off by comparing different open software's used for developing IRs and settled for the use of D-Space software as it was widely used as shown by the figure below. The software was installed and hosted by the IT department. As the IR was set-up, the library team developed workflows. A training was conducted for staff members responsible for meta data input (populating the IR). The team also identified an IR champion for promotion purpose and agreed on the formulation of an IR task team group to allow buy-in from the BIUST community and for ownership.

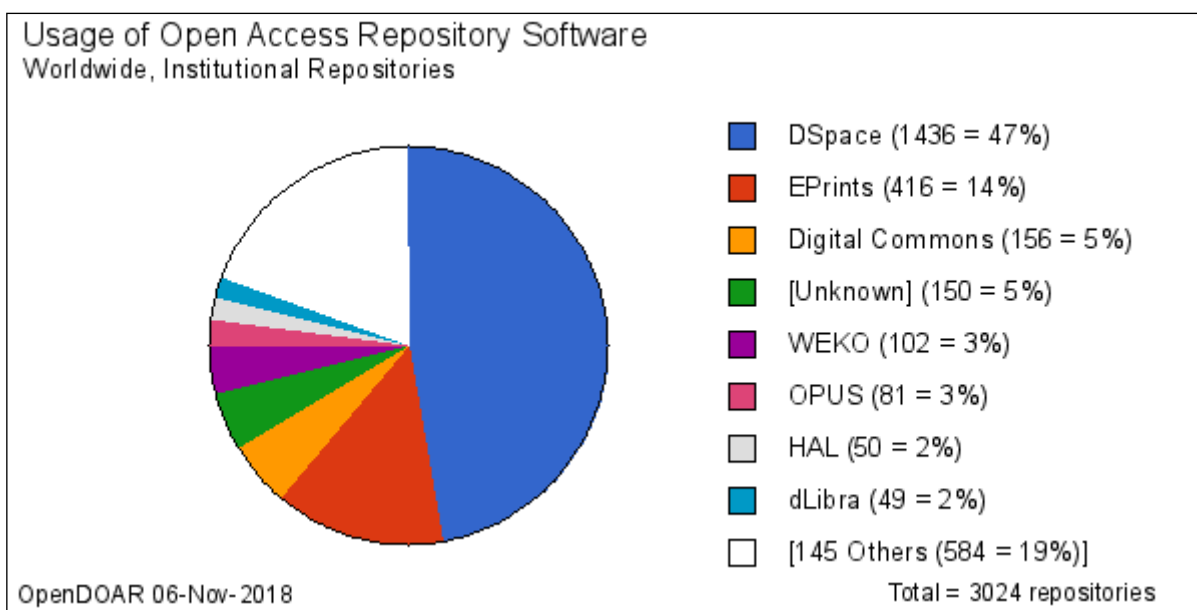


Figure1: Usage of Open Access Repository software- Worldwide
Source: OpenDOAR 06-Nov-2018

The figure below represents the overall project process by BIUST library

Fig 2. BIUST IR implementation process

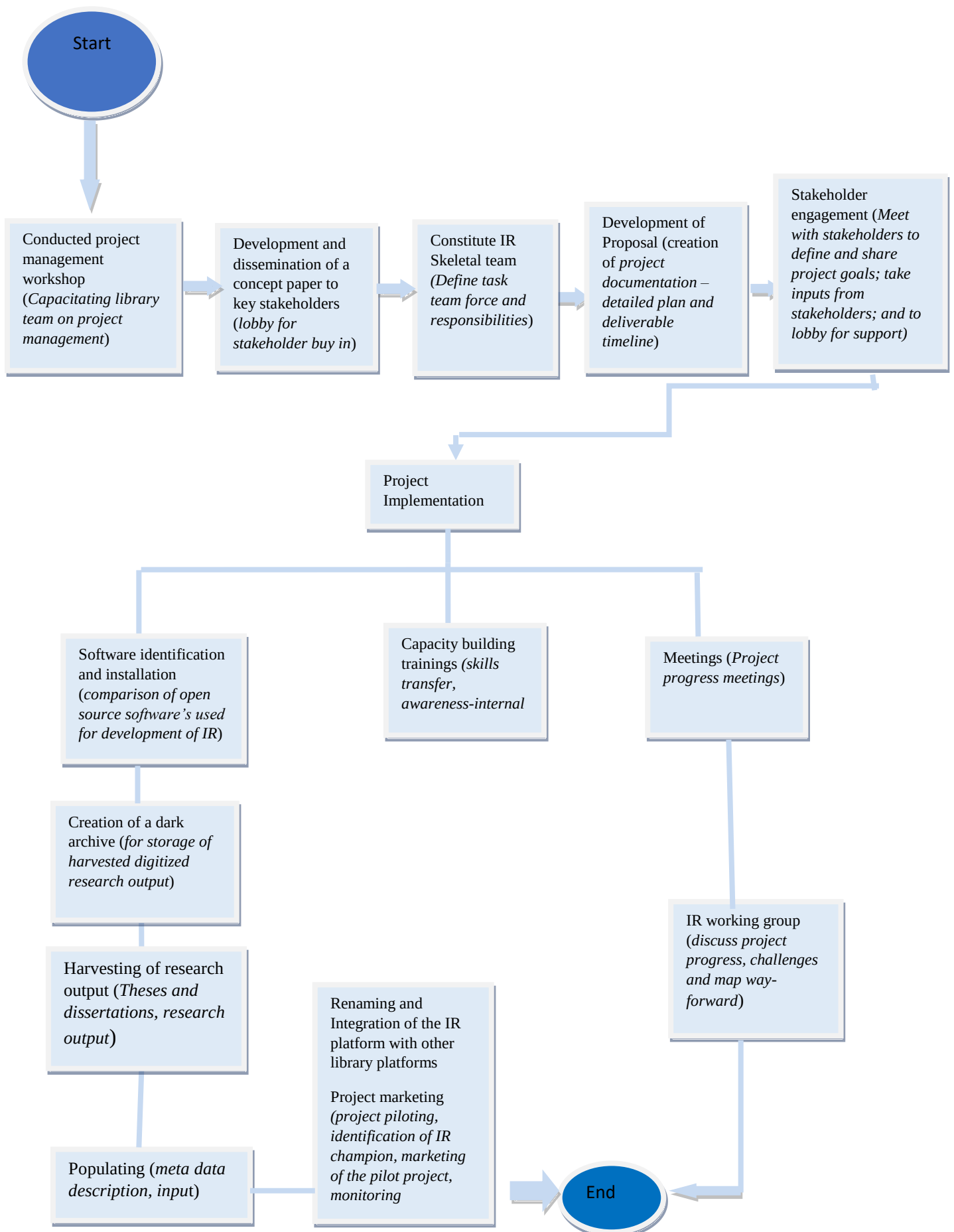
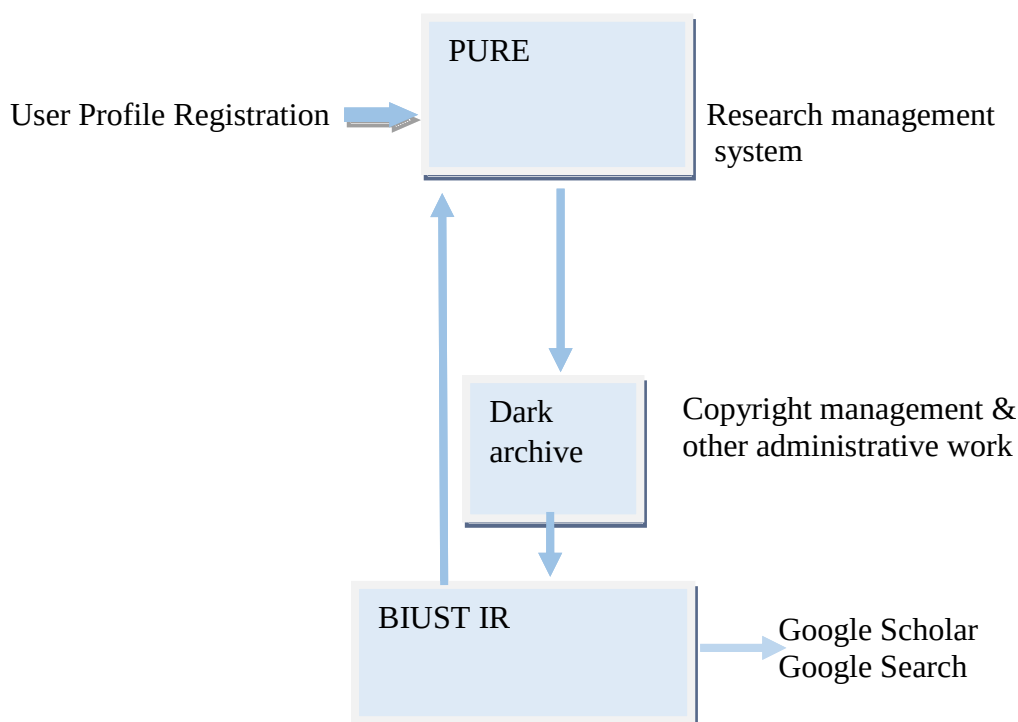


Fig 3. BIUST Library workflow from PURE to BIUST IR

The figure below represent the workflow of the BIUST IR. PURE is the research information management system adopted by the institution for profiling researchers.



6. Challenges

The team experienced the following challenges during project implementation:

- Project delay: meeting delay impacted on project progress
- Lack of budget: The project was initiated without a budget allocated for it.
- There was no unit dedicated to the research data management activities of the library aligning with the research and knowledge management trends (IR) hence the team was overstretched which affected the project progress.

7. Lessons learned from the project implementation

Like any other project there were lessons learned by the BIUST library team throughout the project implementation.

1. The team learnt that it was important to have a business proposal model as much as the concept note because the business proposal model is more detailed in what is required and carries more weight.
2. Need for buy-in from the top management before implementation so that the project is not a library project but an institutional project. Chiware and Becker (2018) pointed out that as academic libraries and research institutions are becoming more involved in the provision of research support services and respond to open science, open access and open initiatives there

is need to align to the institutional goal. Stakeholder engagement is crucial and when key stakeholders are taken on board their level of engagement is very high and there is willingness when the idea is understood. There should be continuous update on the project progress.

3. Identification and analysis of key stakeholder role very crucial mostly because this has implications on the resources required during implementation. For example it is important to involve the IT from start to take into account the infrastructural components.
4. Capacity building is continuous.
5. The task team group should be identified at the initial stage for policy formulation.

9. Recommendations

Based on the experiences learnt from the project implementation, this paper recommends the following steps to be considered before implementation.

1. Analysis of the stakeholders engaged in IR implementation is a must: Identification, analyses and engagement of key stakeholders is crucial during the implementation phases. It was found that stakeholder engagement is crucial in the successful completion of the project because value can be derived from the inputs from stakeholders. Duplication of efforts would also be avoided. Moreover, stakeholders are key influencers. The key stakeholders are the Research department, Faculties and Information Technology. The engagement of stakeholders also assists with role clarity. Loi (2016) supports this by pointing out that a critical sustainability survival mechanism for any modern day organisation is effective and rigorous stakeholder engagement, particularly given the stakeholder's rich environment in which organisations operates. The findings by Loi (2016) further indicates that stakeholder management can be a core competence that draws resources capabilities.
2. Creating awareness and buy-in for the entire library staff members: It is important not only for the IR team but for the entire library team to be aware of the project since most if not all of them will be involved in the processes and workflows of the project. Repository support project (2017) supports this view by pointing out that normally the IR projects emanates from the library due to the skills sets and library staff plays the role of marketing the IR because of their strong relations with faculties (academic staff).
3. Need for capacity building: The development of an IR requires the technical skills hence the need for continuous capacitating of both the project leader and the IT personnel. Benchmarking exercises and skills transfer should be encouraged.
4. Development of a schedule of plan and continuous monitoring of the deliverables: This would enable a common understanding.
5. Comparison of software used for IR development should be done at the initial stage. It is advisable to choose a software which is widely used to cater for skills gaps and sharing experiences.
6. Policy development: It is advisable for a setup committee to be chaired by the highest level of the institution for ownership. And policy development should be a priority.

Project Gantt Chart

IR Concept Note to Internal Stakeholders											
IR Proposal											
Software Application & Specification Comparison, Selection											
Software Installation & Customisation											
Definition of Workflows											
Dark Archive											
Presentation to Internal Stakeholders											
IR Guidelines											
IR Procedures											
IR Pilot site											
Training-Subject Librarians											
Populating/Uploading IR Content											
Promoting & Marketing IR											
IR Permanent Site											
IR Launch											
Evaluation											
	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar

10. Conclusion

In conclusion there is no doubt that a project such as IR has noticeable impact both at institutional, individual and country level and is a platform that is evolving with time and provide the best practice in terms of research data management. The benefits derived from using an IR as a tool for increased knowledge sharing has the benefits to change the economic landscape of developing countries. And through the provision of research data management using IR the library is able to provide data management training and services to BIUST community and encourage a cultural shift towards an effective data stewardship. This further foster learning and teaching. On the other hand the experience coupled with the project activities such as stakeholder engagement worked in the best interest of the library because through interactions with key stakeholders' strong relationship were cultivated and nurtured. In addition to that the library was able to identify some gaps in the project build-up such as lack of a task group, IR champion and policy which are very crucial to the initial implementation of the project. The policy should be aligned with any policy that the institution has that support both open science and research development and innovation. And the role of the library was much more appreciated hence better working relationships. The library team gained invaluable set of skills both soft and technical.

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