Enterprise Medical Imaging in Public Health Facilities in Zambia: Towards a Useful and Interoperable PACS Platform

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2nd Southern Africa Regional Hub Workshop (BETTEReHEALTH 2022)
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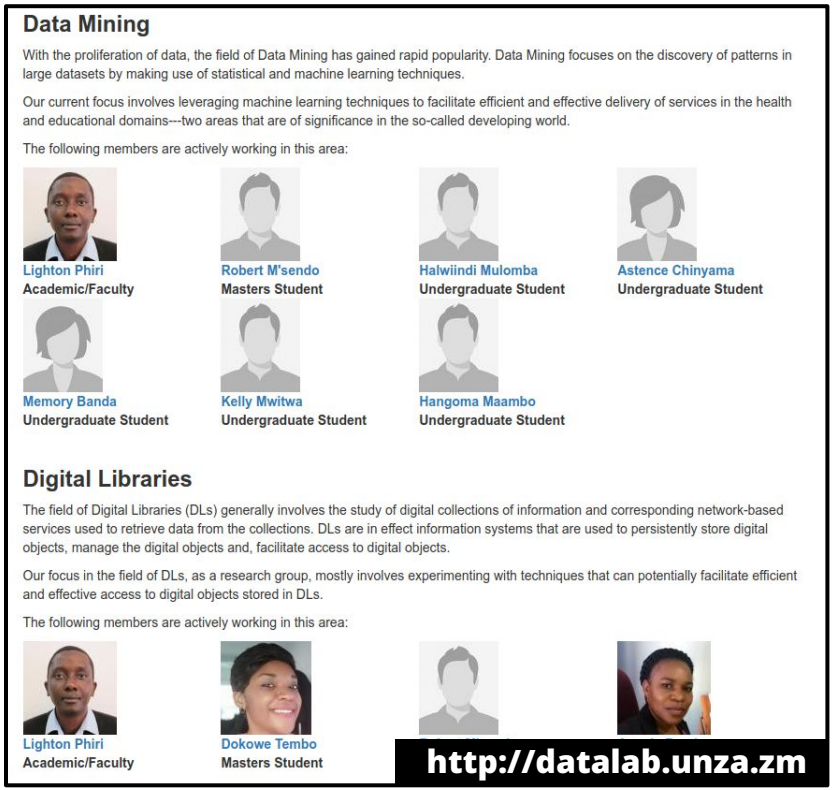
About The DataLab Research Group

- **The DataLab research group at The University of Zambia is composed of faculty staff and students—undergraduate and postgraduate—working in three main areas**
  - Data Mining
  - Digital Libraries
  - Technology-Enhanced Learning



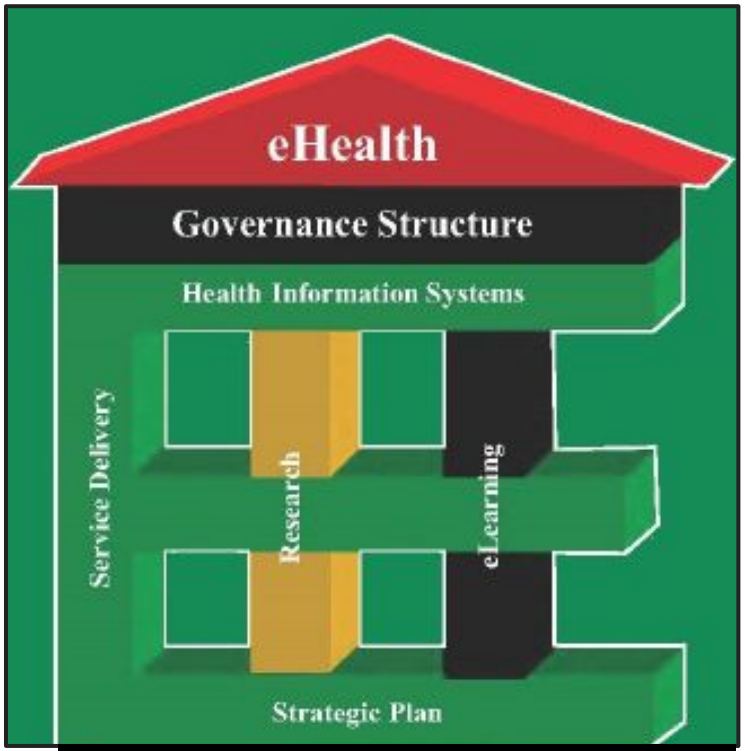
Digital Health Conference

Outline

- Zambia eHealth Strategy
- Zambian Health Sector at a Glance
- Radiological Workflows
- Preliminary Baseline Studies
- Enterprise Medical Imaging
- Ongoing Work: Usable & Interoperable PACS
- Conclusion & Future Work

Introduction: eHealth Strategy (2017-2021)

- **eHealth Strategy**
  - **Vision:** Quality, timely, secure and accessible Health information through an integrated national
  - **Mission:** promote effective and efficient delivery of Health to all Zambians using ICTs
- **Draft Digital Health Strategy still work in progress**



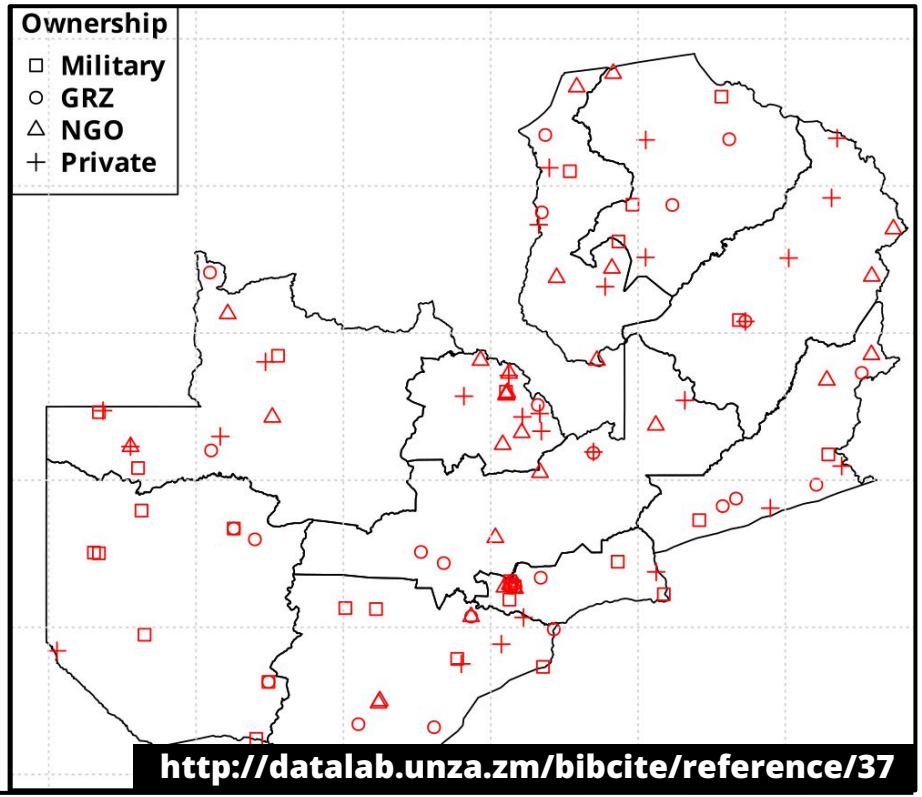
https://www.moh.gov.zm/?wpfb_dl=89

"Health Strategy 2017–2021 "
Ministry of Health, Republic of Zambia

Introduction: Health Sector in Zambia

- **~2815 health facilities**
  - Government of the Republic of Zambia (GRZ), Military, Non-Governmental Organisations (NGO) and Private

"Enterprise Medical Imaging in the Global South: Challenges and Opportunities"
Ernest Obbie Zulu and Lighton Phiri (IST-Africa 2022)



Introduction: Health Sector in Zambia

- **Our work focused on GRZ health facilities**
  - 151 facilities classified as Level 1, 2 or 3 Hospitals
- **Only 9 GRZ Radiologists, operating in five facilities**

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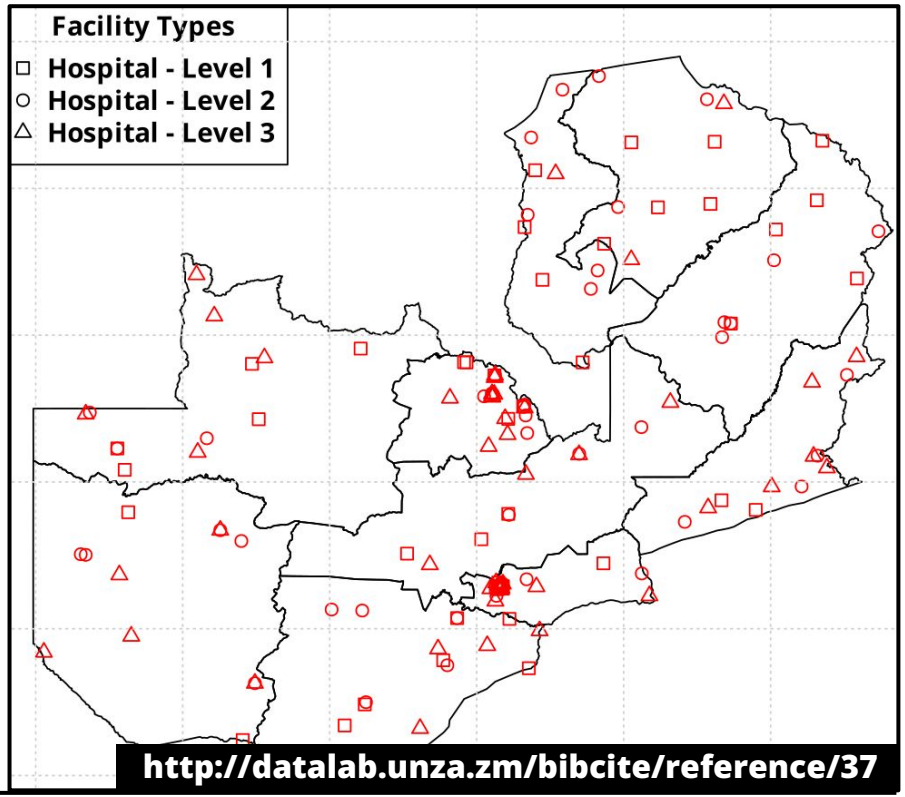
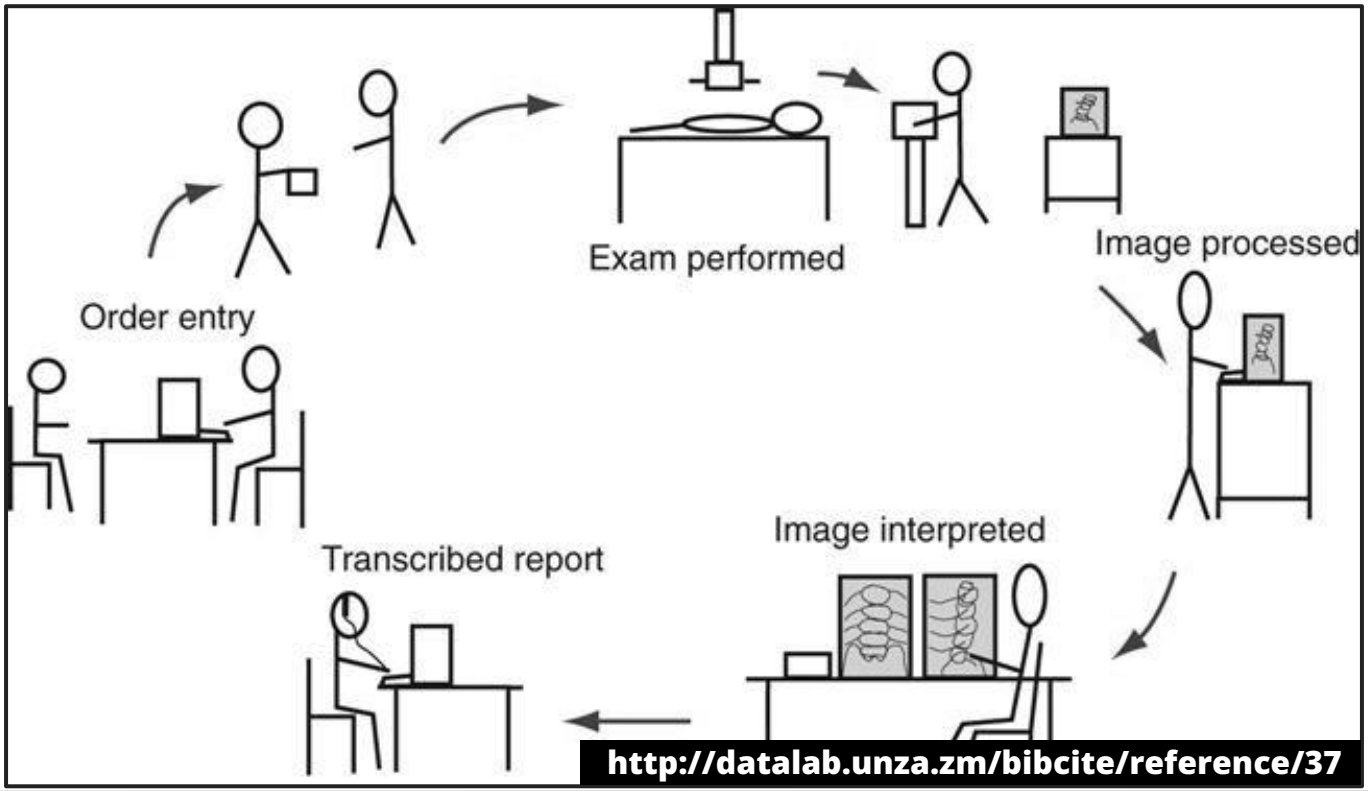
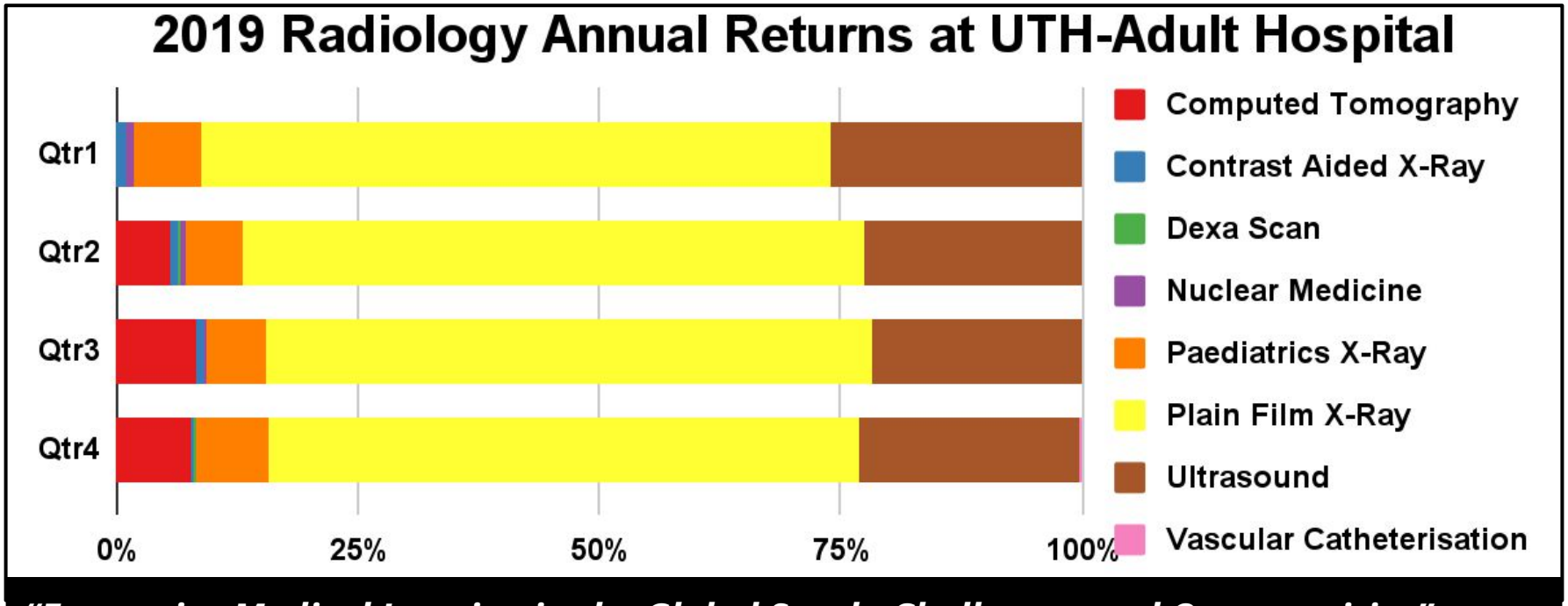


Radiological Workflows



Baseline Studies: Radiological Workflows in Public Health Facilities in Zambia (1/3)



"Enterprise Medical Imaging in the Global South: Challenges and Opportunities"
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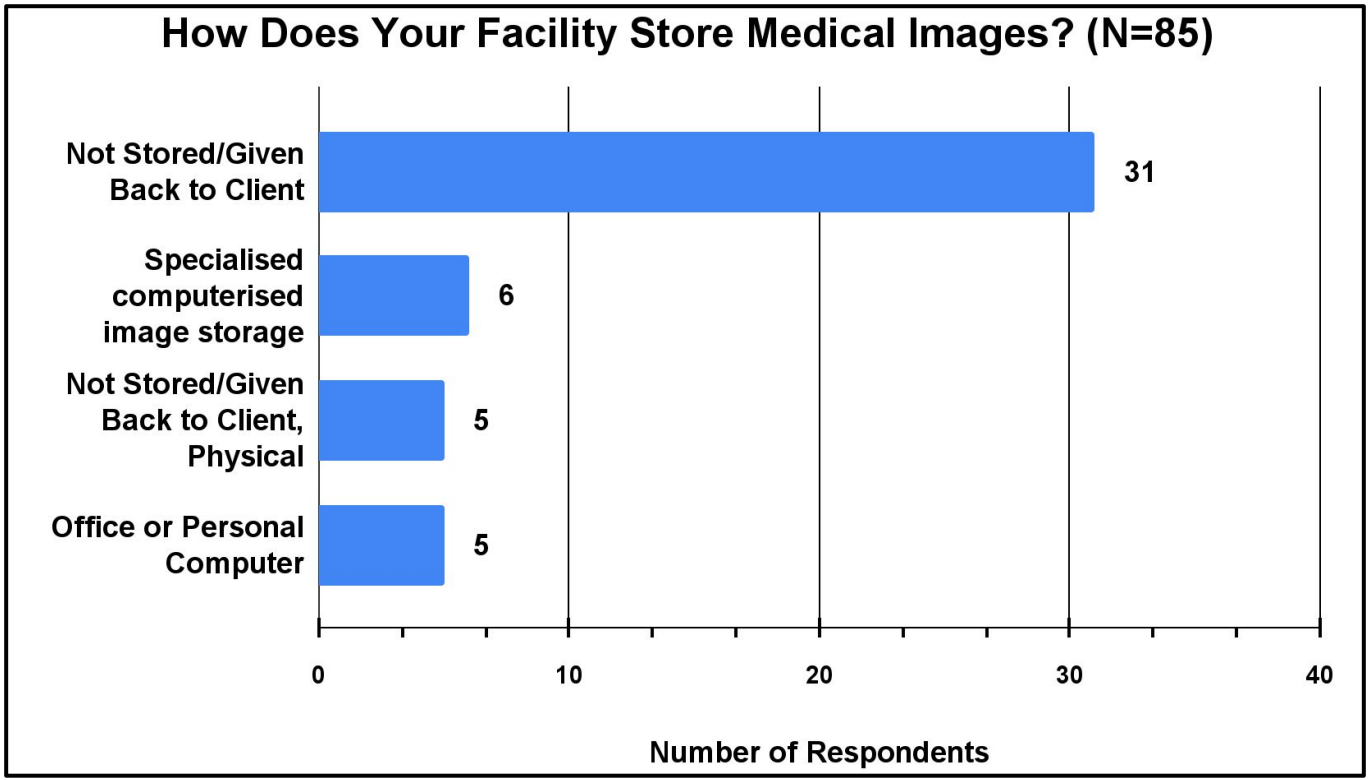
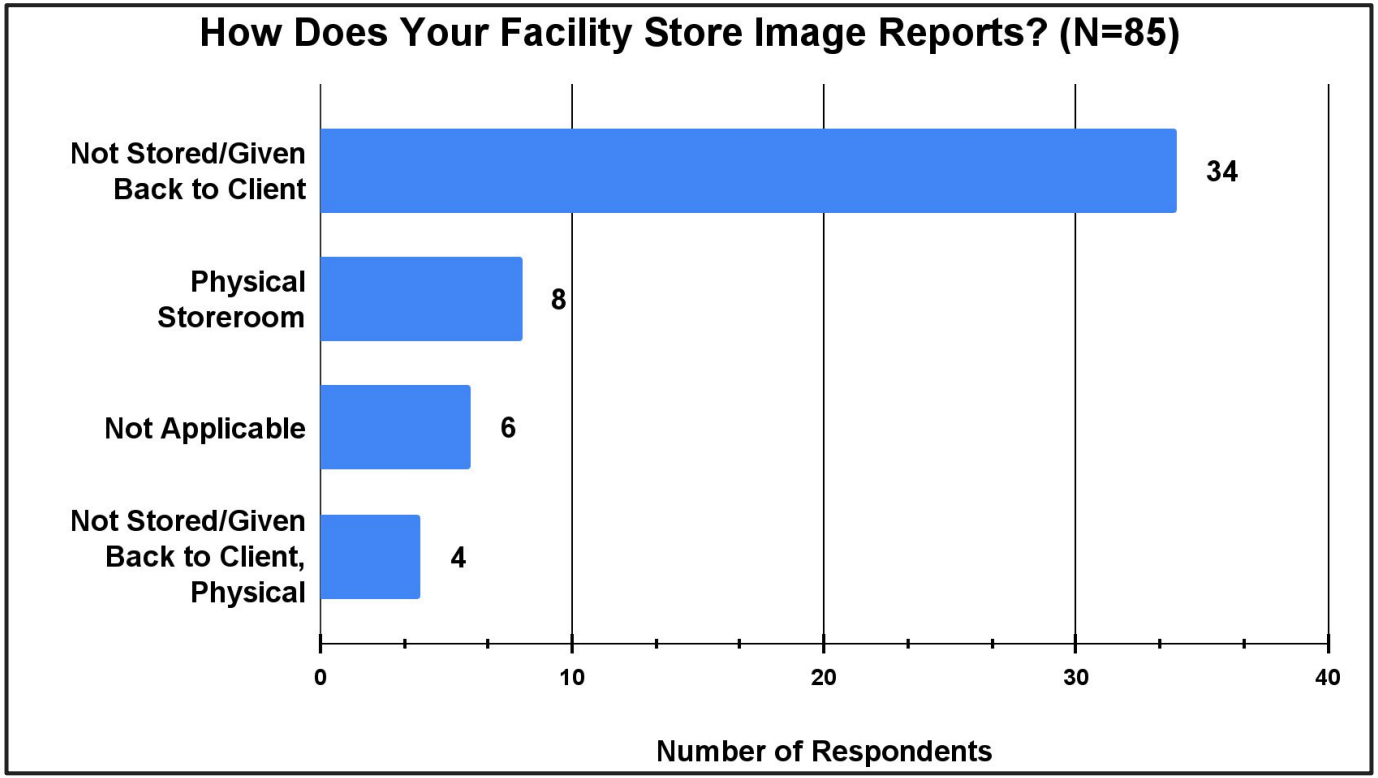
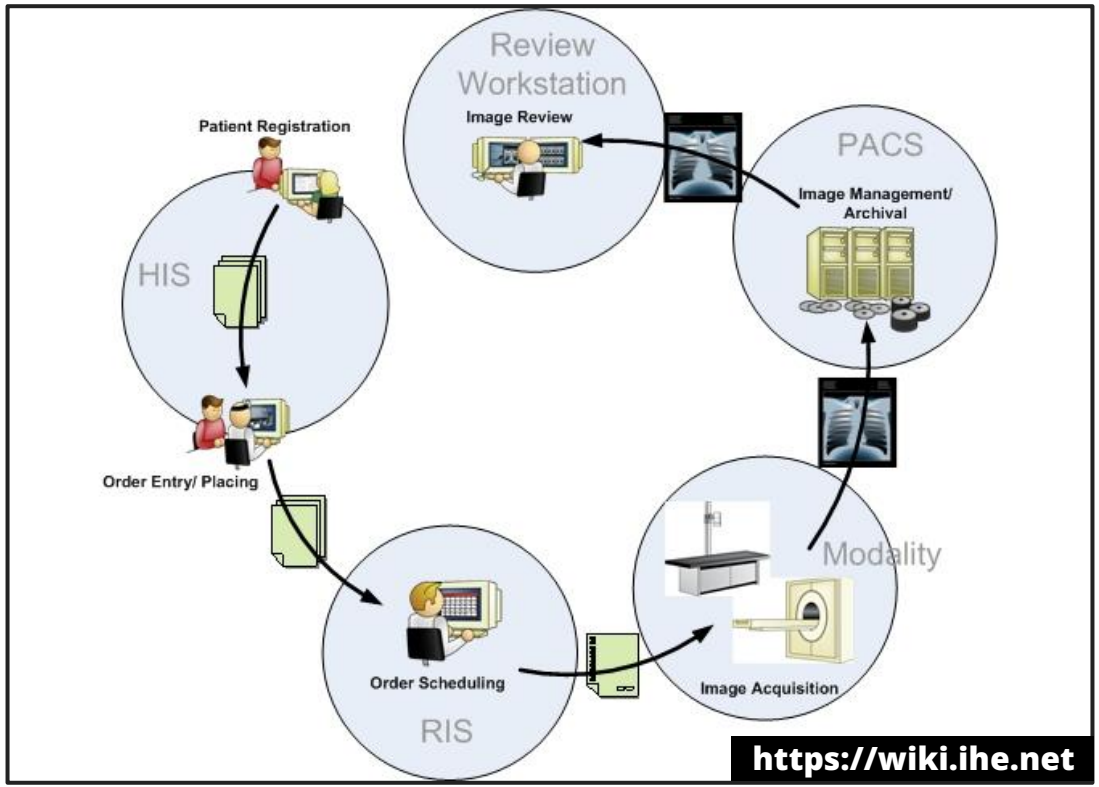
Baseline Studies: Radiological Workflows in Public Health Facilities in Zambia (2/3)



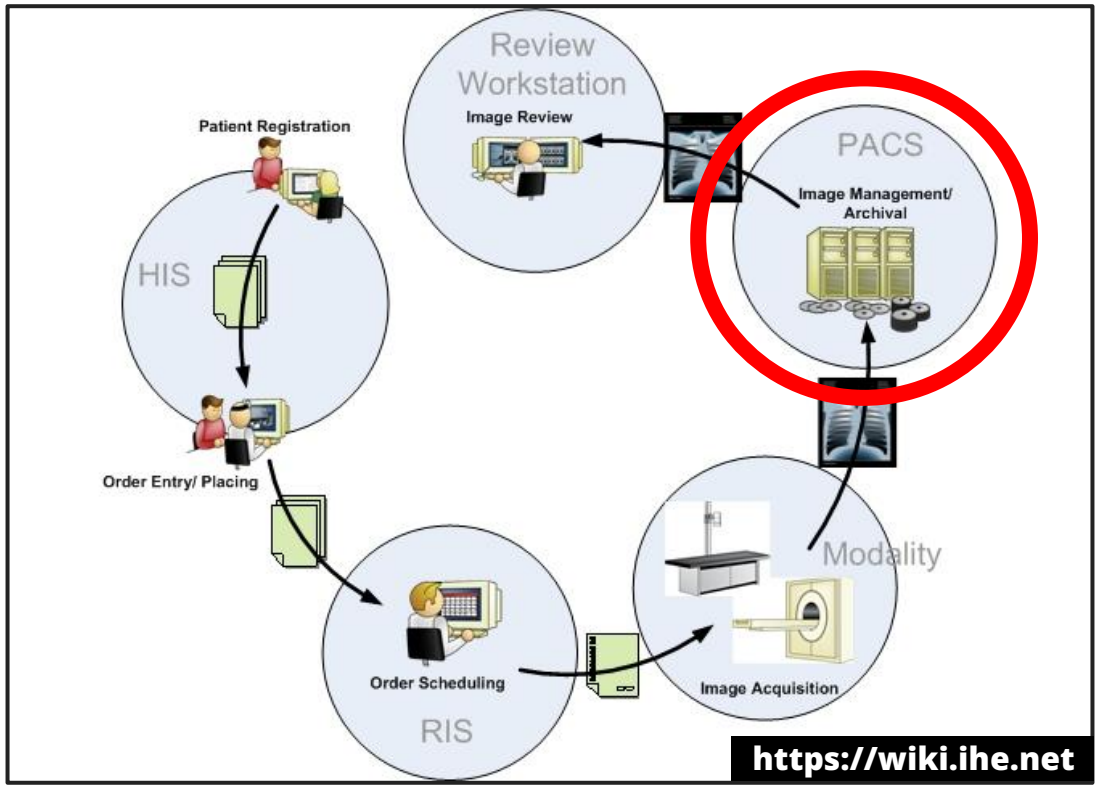
Baseline Studies: Radiological Workflows in Public Health Facilities in Zambia (3/3)



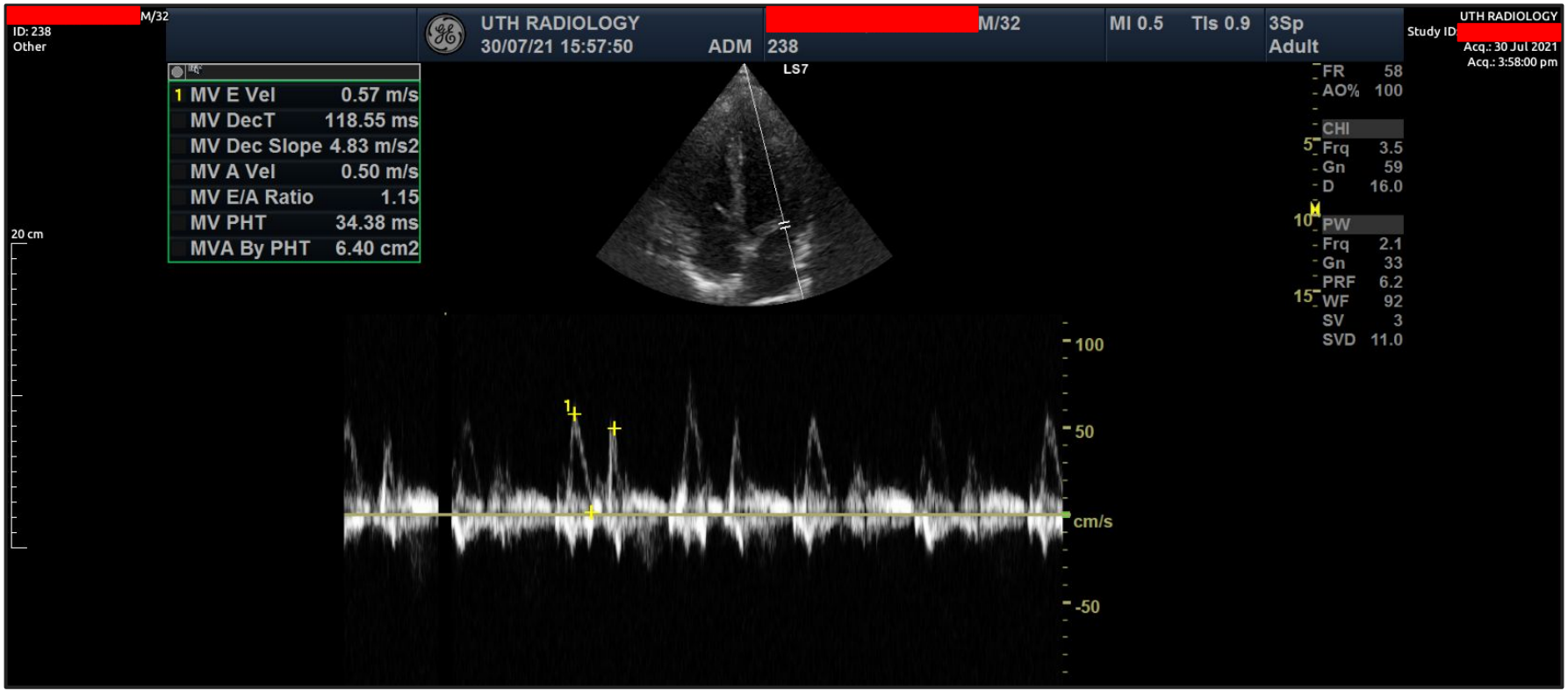
Radiological Workflows Using Enterprise Medical Imaging Strategies



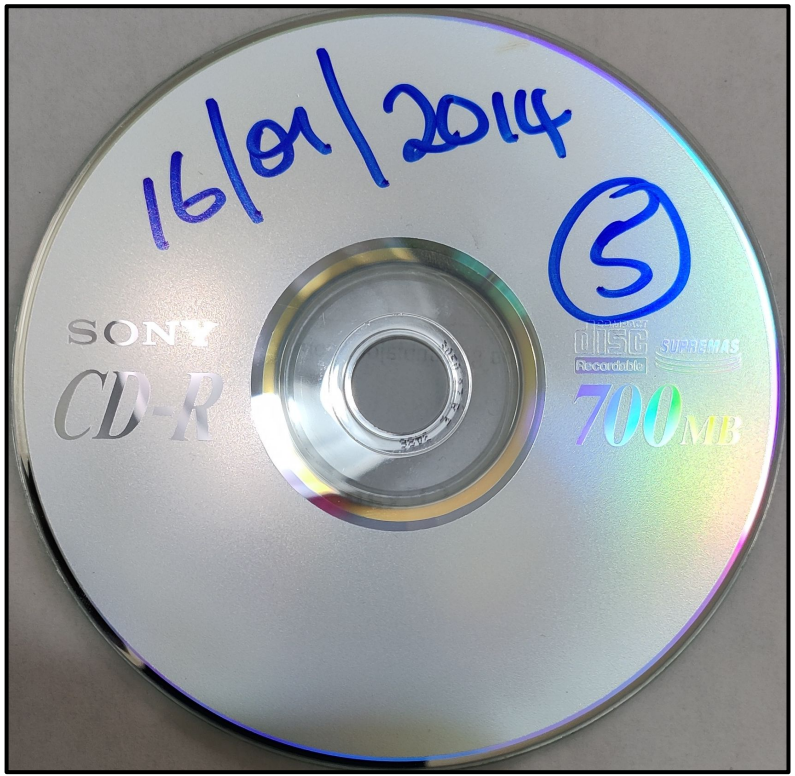
Ongoing Work: Towards a Useful and Interoperable PACS Platform



Ongoing Work: PACS Platforms Store, Manage and Facilitate Access to Images



Ongoing Work: Current Organisation of Medical Images (1/2)



- Inefficient image organisation
- Example: Optical discs originate from University Teaching Hospitals (UTHs)
  - COVID-19 studies

```
lightonphiri@lightonphiri-Lenovo-ideapad-320-15IKB:~/
isc-uth22-medical_imaging/cd_archive/EMI PROJECT/JAN
-max-depth=1
1.7M    ./Microsoft.VC80.CRT
2.3M    ./Microsoft.VC80.MFC
12M     ./DICOM
36M     .
lightonphiri@lightonphiri-Lenovo-ideapad-320-15IKB:~/
isc-uth22-medical_imaging/cd_archive/EMI PROJECT/JAN
```

Ongoing Work: Current Organisation of Medical Images (2/2)

- Inefficient image organisation
- Some medical images are stored on external hard drives
  - Medical images are stored and organised on generic filesystem in hierarchical folder structures

```
lightonphiri@lightonphiri-Lenovo-ideapad-320-15IKB:~
isc-uth22-medical_imaging/uth_drives/transcend_4tb/u
pth=1
3.2G    ./2020_JUL
180M    ./2021_SEP
6.5G    ./2021_JUL
9.8G    .
lightonphiri@lightonphiri-Lenovo-ideapad-320-15IKB:~
isc-uth22-medical_imaging/uth_drives/transcend_4tb/u
```

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isc-uth22-medical_imaging/uth_drives/transcend_4tb/u
2021_SEP
└── 20
    └── GM135425
        ├── L9KECUGM
        ├── L9KECUGO
        ├── L9KECUGQ
        ├── L9KECUGS
        └── L9KFC1OU
```

Ongoing Work: Current Organisation of Medical Images (2/2)

- **Some medical images are stored on external hard drives**
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```
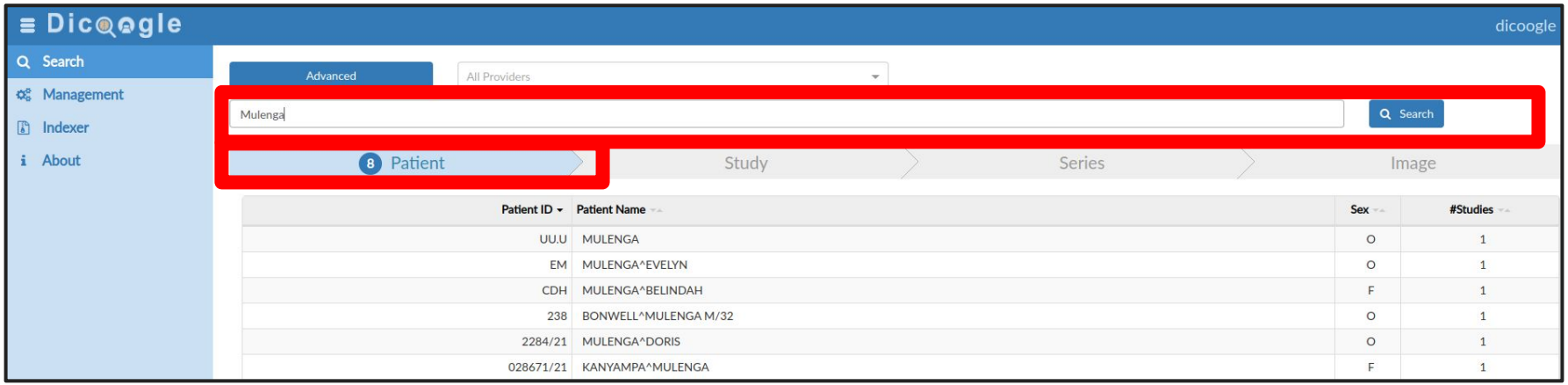
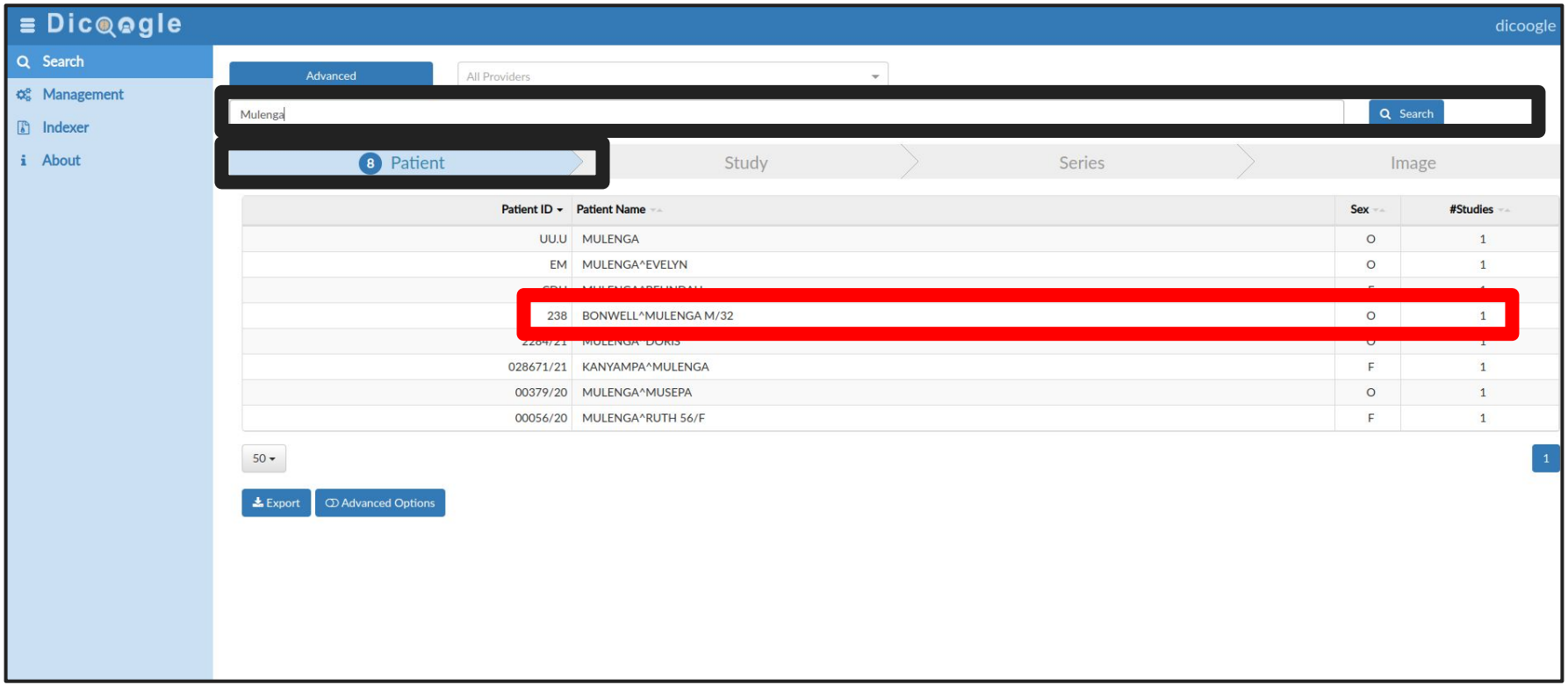

Ongoing Work: Standards-Based, Interoperable & Useful PACS Platforms (1/2)

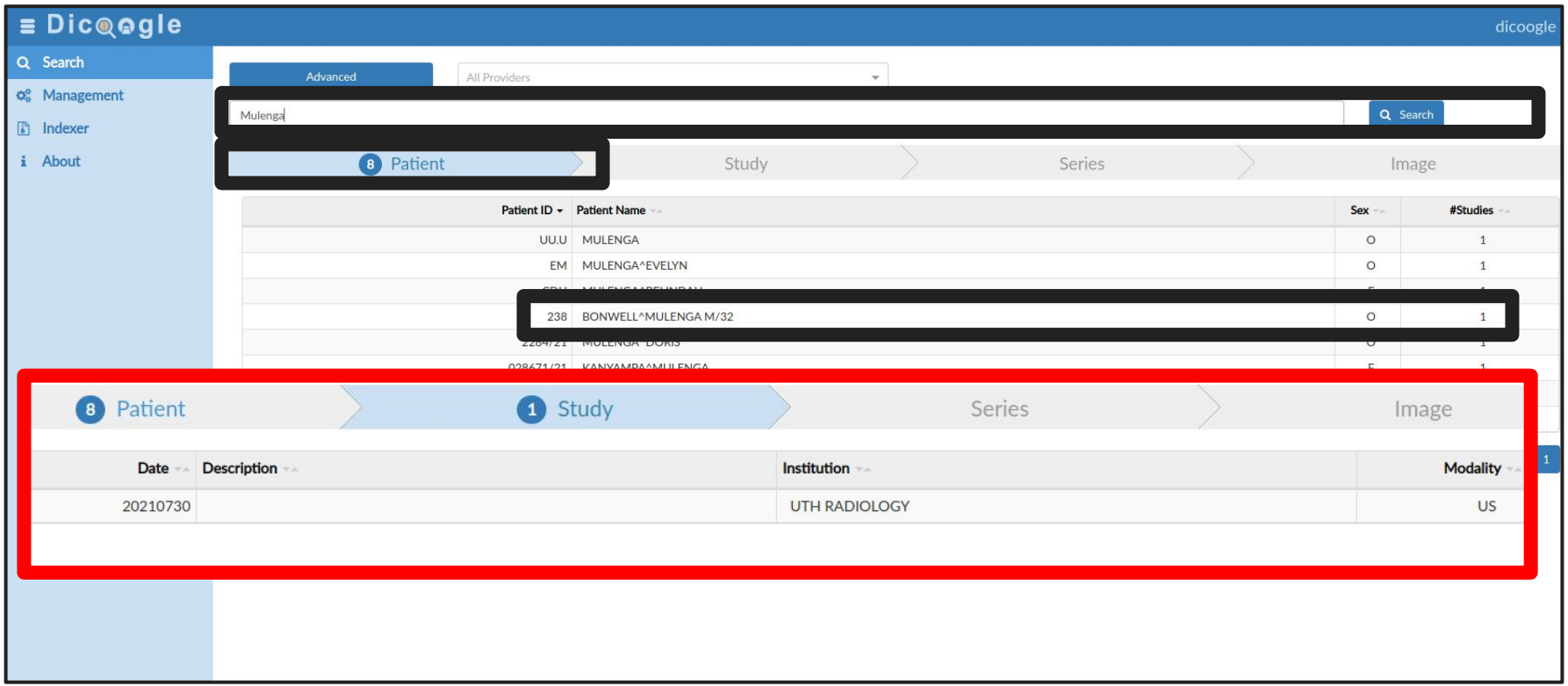


- Standards-based platforms using international standards
- Interoperable with other systems used in health facilities
- Useful to key stakeholders involved in radiological workshops: Physicians, Radiographers and Radiologists

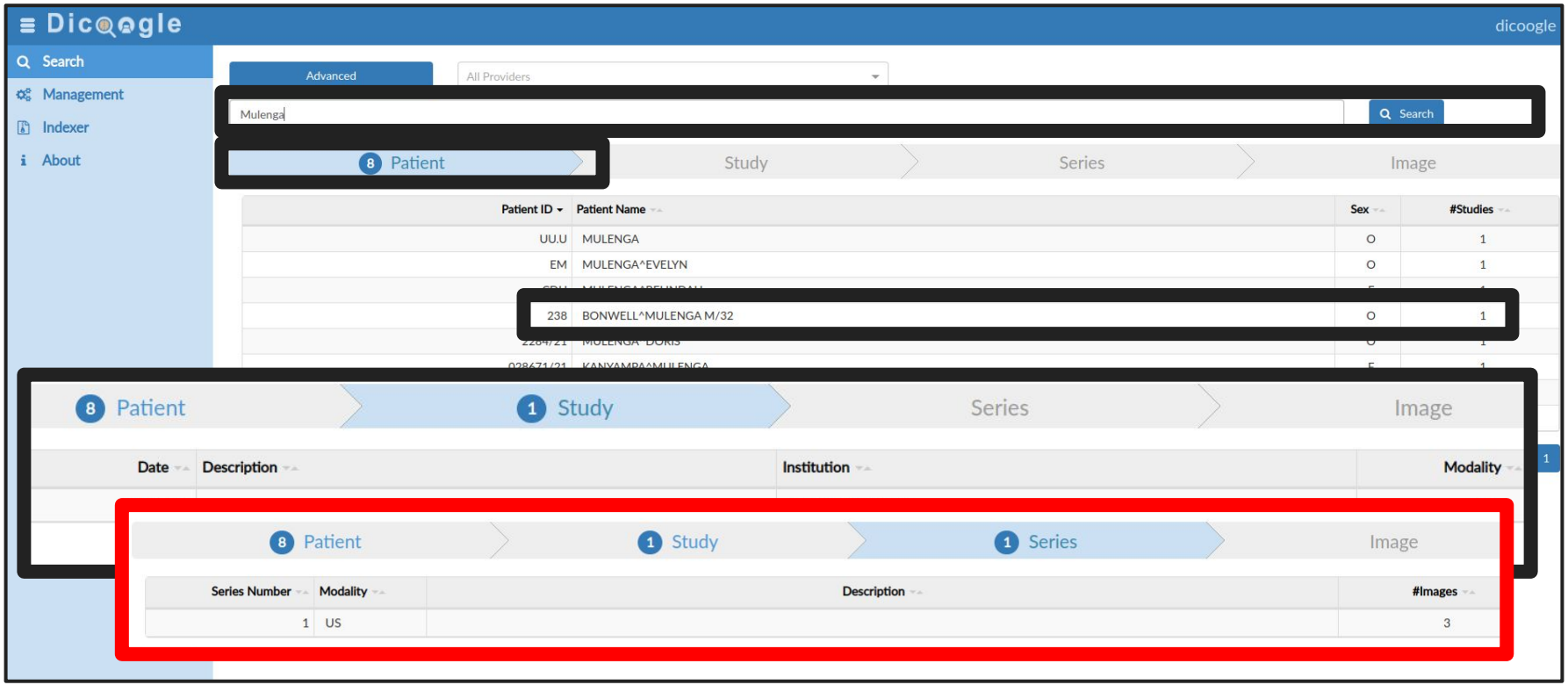
Ongoing Work: Standards-Based, Interoperable & Useful PACS Platforms (2/2)



Ongoing Work: Standards-Based, Interoperable & Useful PACS Platforms (2/2)



Ongoing Work: Standards-Based, Interoperable & Useful PACS Platforms (2/2)



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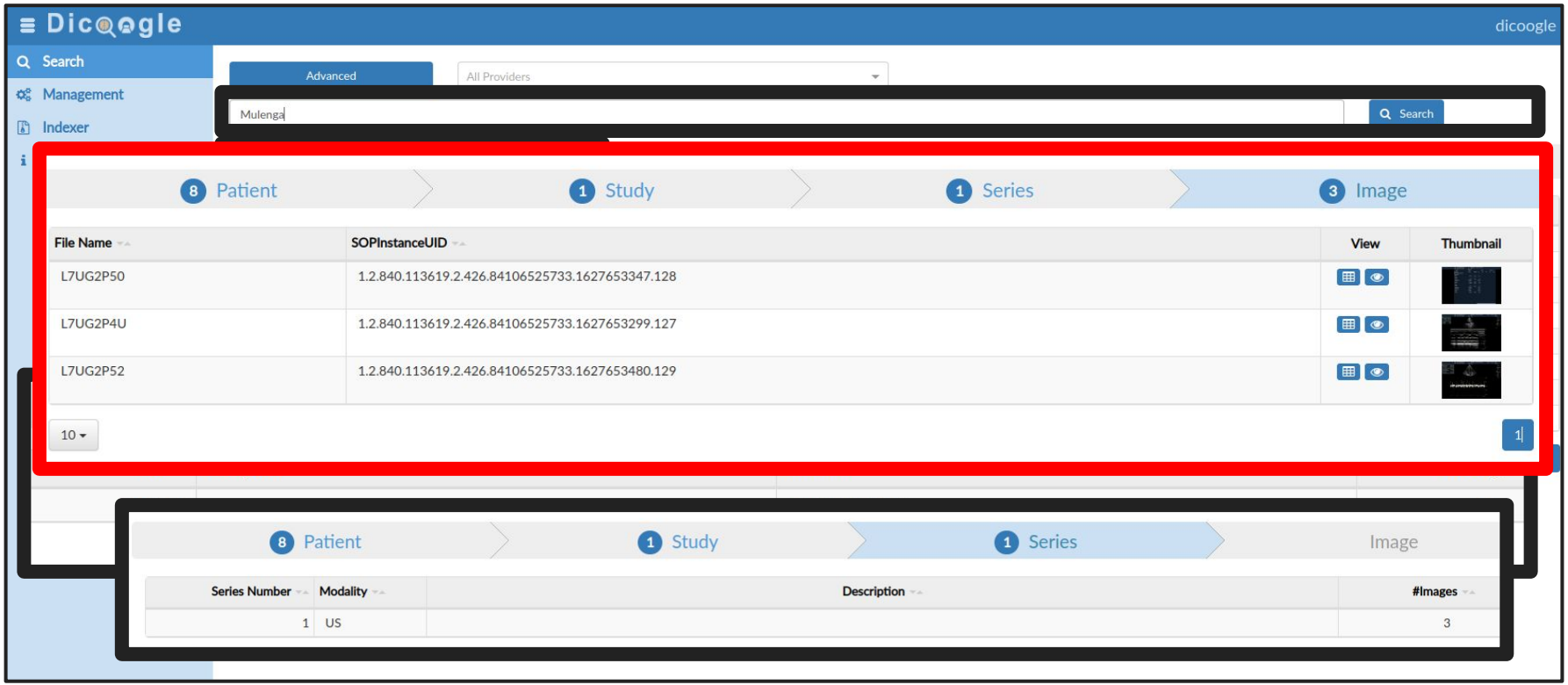

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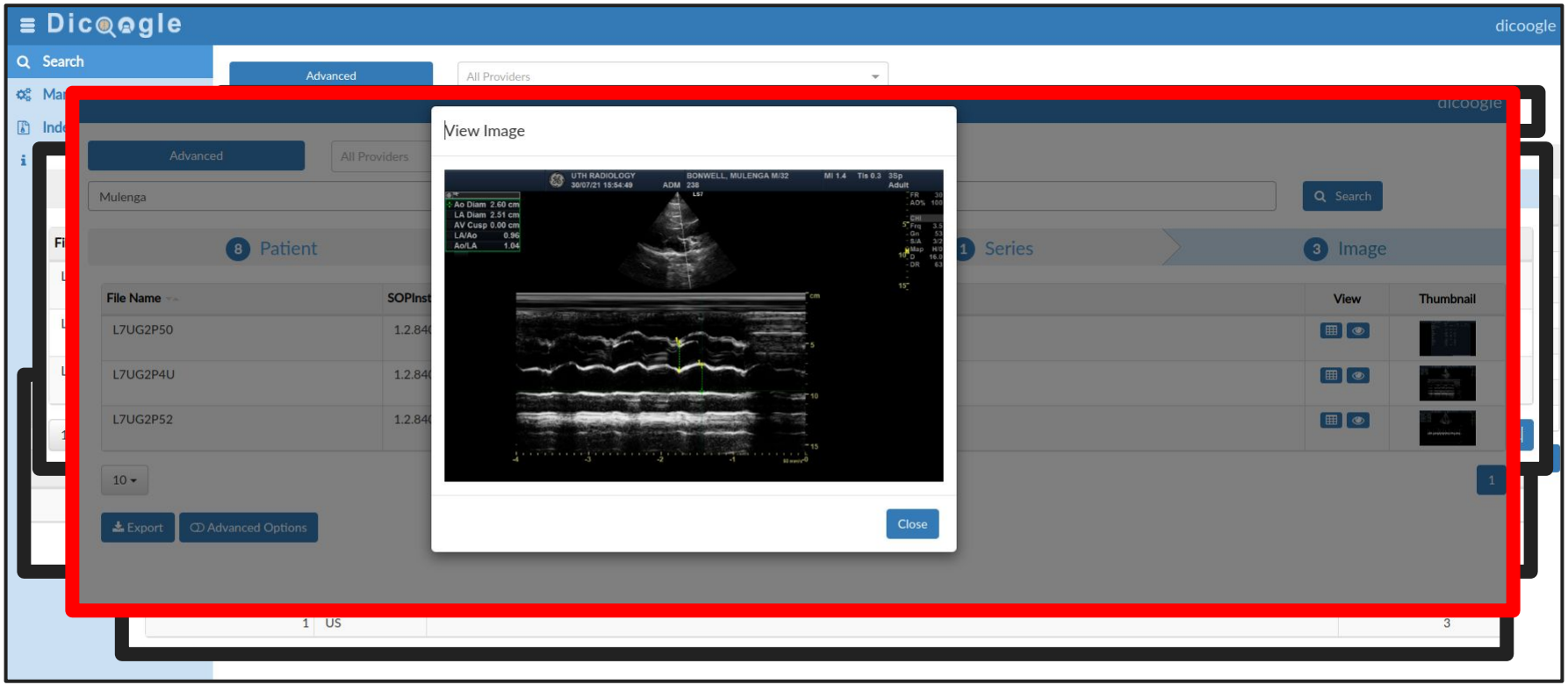

Conclusion and Future Work

- **PACS platform anticipated to facilitate effective storage, management and access of medical images**
- **PACS platform design can potentially be standards-based to facilitate interoperability with current HMS**
- **Current and future work**
  - Requirements elicitation to design a useful PACS platform
  - Usefulness and usability evaluation of PACS platform
  - Design and implementation of RIS platform
  - Feasibility of using artificial intelligence for semi-automated interpretation of common pathologies
  - Interactions with key stakeholders: Ministry and Infratel

Q & A Session

- Comments, concerns and complaints?

Bibliography

[1] Zulu, E.O., and Phiri, L. (2022). Enterprise Medical Imaging in the Global South: Challenges and Opportunities. In Proceedings of 2022 IST-Africa Conference (IST-Africa 2022).

[2] Zulu, E.O. and Phiri, L. (2021). Enterprise Medical Imaging for Streamlined Radiological Diagnosis in Zambian Public Health Facilities. The University of Zambia.

[3] C. J. Roth, L. M. Lannum, and K. R. Persons, 'A Foundation for Enterprise Imaging: HIMSS-SIIM Collaborative White Paper', J. Digit. Imaging, vol. 29, no. 5, pp. 530–538, Oct. 2016, doi: 10.1007/s10278-016-9882-0. [Online]. Available: https://doi.org/10.1007/s10278-016-9882-0

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