SESAME | Synchrotron-light for Experimental Science and Applications in the Middle East

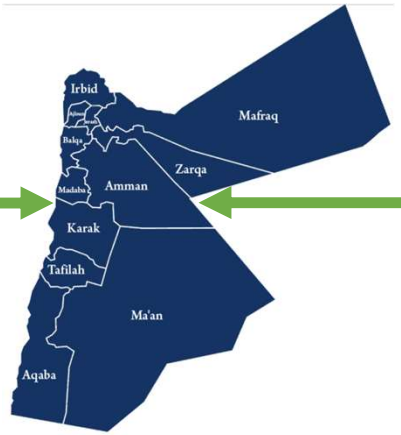
SESAME update
ICAT: A Metadata catalog service

ICAT F2F Meeting, Cosener's House, Abingdon, Oxfordshire, UK
10-11 Feb. 2026

Scientific Computing & System communications group
Salman Matalgah salman.matalgah@sesame.org.jo
Malik Al Mohammad malik.almohammad@sesame.org.jo

SESAME Synchrotron Light Source

Located in Jordan



Our doors are opened

For scientific collaboration

To the rest of the world

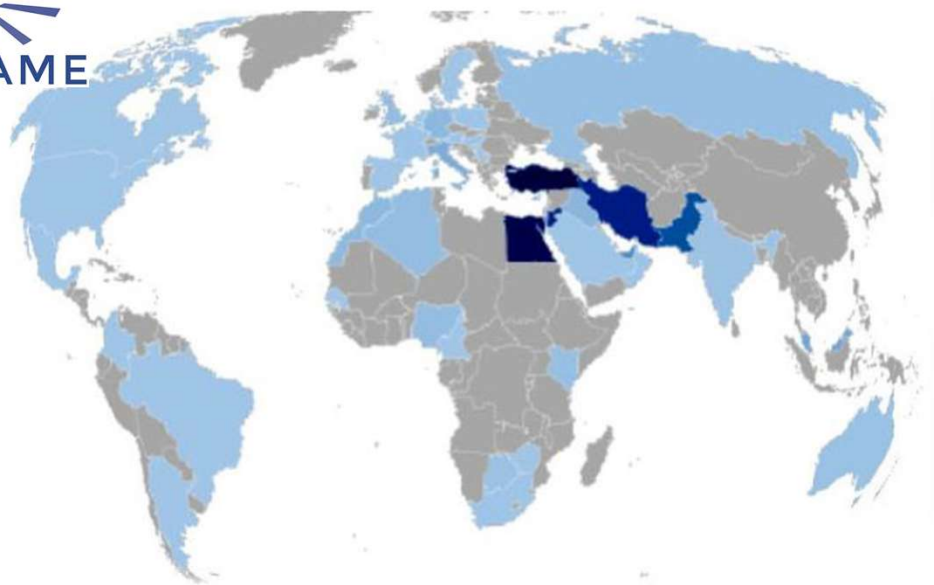
SESAME: Synchrotron-light for Experimental Science and Applications in the Middle East

A 3rd Generation Light Source that has state-of-the-art infrastructure which designed to enable the scientific research in the region for designated users communities enabling Open, peer-reviewed user access, based on Science diplomacy & regional collaboration

SESAME Beamlines
SESAME Experimental Data (SED)

No	Beamline	Energy Range	Source Type	Status
BM02	IR (Infrared) spectromicroscopy	0.001-3 eV	Bending Magnet	Serving users
BM08	XAFS/XRF (X-ray Absorption Fine Structure/X-ray Fluorescence) spectroscopy	4.5-30 keV	Bending Magnet	
ID09	MS (Materials Science)	5-25 keV	MPW	
ID11 L	HESEB: Helmholtz-SESAME Beamline	70-1800 eV	Undulator	Serving users
ID10	BEATS: Beamline for Tomography at SESAME	8-50 keV	3-Pole Wiggler	Serving users
ID11 R	TXPES: Turkish X-ray Photoemission Spectroscopy	70-1800 eV	Undulator	Commissioned 0n Dec. 2025
	MX Macromolecular Crystallography	4 - 14 keV	In-Vacuum Undulator	Planned
	SAXS (Small Angle X-ray Scattering)	8 keV	In-Vacuum Undulator	

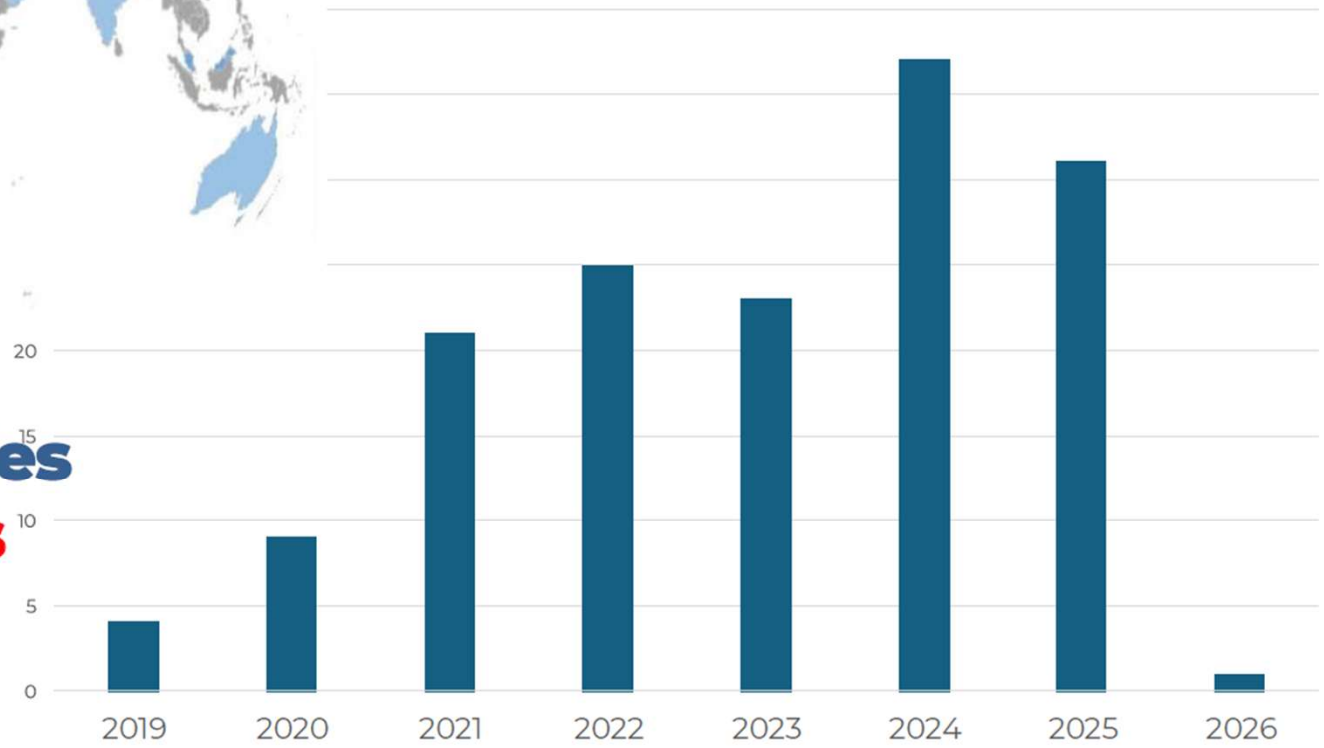
SESAME



Rapidly growing user community across the region, often accessing such facilities for the very first time.

Strong partnership with European RIs (ESRF, ELETTRA, PSI, DESY, ALBA, BESSY II, Diamond…).

1299 proposals
from 48 countries
158 publications
Average IF>5
20% IF > 7



Who we are !!

Scientific Computing & System communications Team

Roles and Responsibilities: **(Clean borders - Pure for scientific infra)**

- Administrating, operating and hosting all IT services and servers a cross the facility, Service provider for: **(1)SC Computing, (2)Data Collection & Analysis, (3)Control, (4)Machine, (5)Beamlines & (6)corporate IT** on SESAME Private cloud.
  - QTY 200+ virtual servers
  - QTY 50+ physical servers
- Manage scientific computing recourses: CPU/GPU clusters
- Manage Centralized Storage: High-end storage for servers and SESAME Experimental Data (SED)
- Maintaining access and compliancy with data policy for SED
- Maintaining LAN\WAN network access and security including VPN access
- Backup & archiving system (scientific data archiving)
- Interconnectivity for internet and data connection
- Maintain Linux distribution and other OS with the related SW Licensing

Sr. Computing & Network Admin. Team Supervisor

System Eng.

Linux System Eng.

ICAT at SESAME: A Data Journey From Experiment to Open Science

Officially Started by attending the ICAT F2F in Berlin @ **2023**

SESAME actively participated in the Fundamentals of Open Science Workshop, held at the Bibliotheca Alexandrina in Alexandria, Egypt

Followed by a technical visit ESRF to design/set-up data-management infrastructure, backup, archiver systems and learn ESRF best practices.

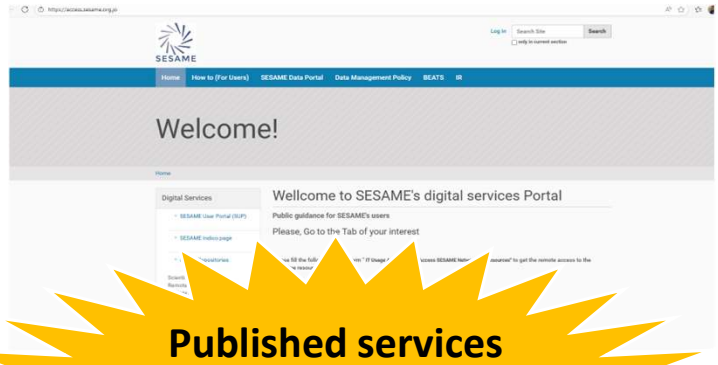
Close collaboration with the ESRF group during short visit/NOBUG

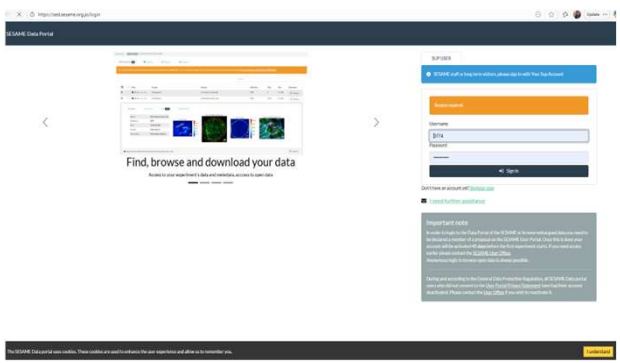
Great thanks to ESRF for their continuous support. **Community support is essential!!**

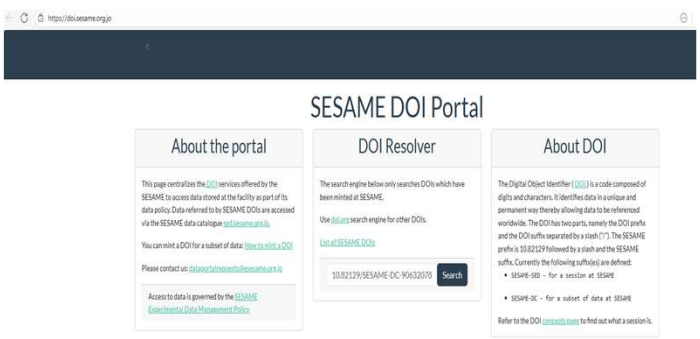
The real challenge: All activities for ICAT development and adaptation has no supporting project

Updates & Key Highlights

- Data Services are commissioned & published:
  - SESAME's digital services Portal https://access.sesame.org.jo/
  - SESAME Experimental Data (SED) portal https://sed.sesame.org.jo
  - SESAME DOI Minting with DataCite https://doi.sesame.org.jo
- Centralized user accounts & synchronized with SUP to enable Single Sign On (SSO) for all services at the facility integrated MS active directory







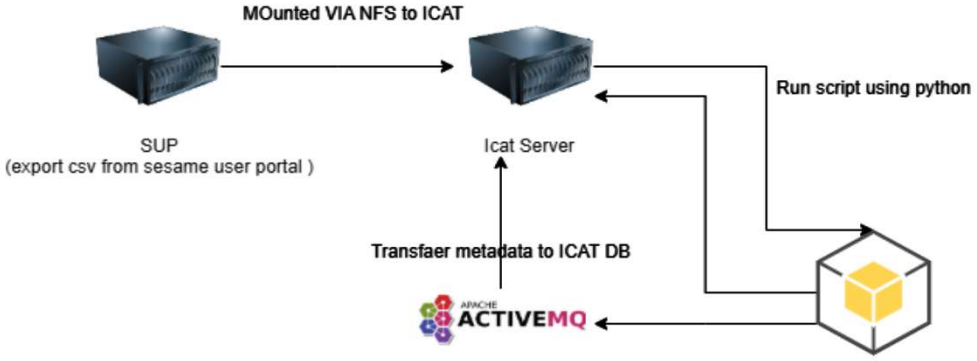
Published services But!! Info & how-to needed to be circulated to users!!

TO BE ANNOUNCED

Ingesting proposals metadata from SUP

What it Does

For every proposal submitted & scheduled during each semester call via CFP (Call For Proposal), SESAME Data Ingestor (SDI) handles metadata ingestion into the ICAT database.



How it Works

1. Proposal Data Collection

All proposals are retrieved from the SUP Oracle database and saved into a CSV file. This file includes all key details such as: Proposal title, Proposal name, Start\End dates, PI, user info etc..

2. Metadata Ingestion via ActiveMQ

The CSV data is then sent through ActiveMQ, which feeds the information into the ICAT database.

This includes:

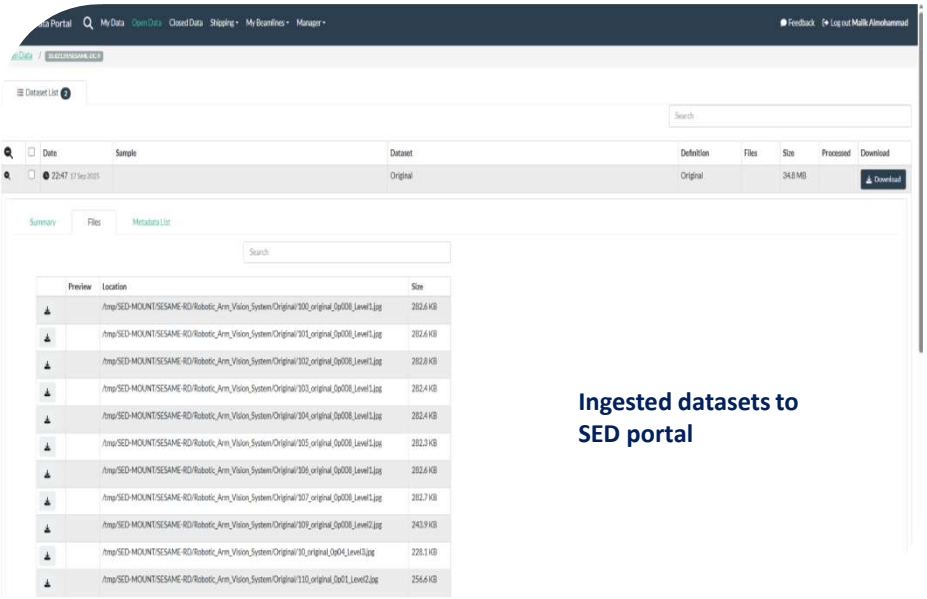
- Creating the proposals (investigations)
- Adding users and linking them with appropriate permissions

https://sup.sesame.org.jo

Ingesting row-data from Beamline Storage

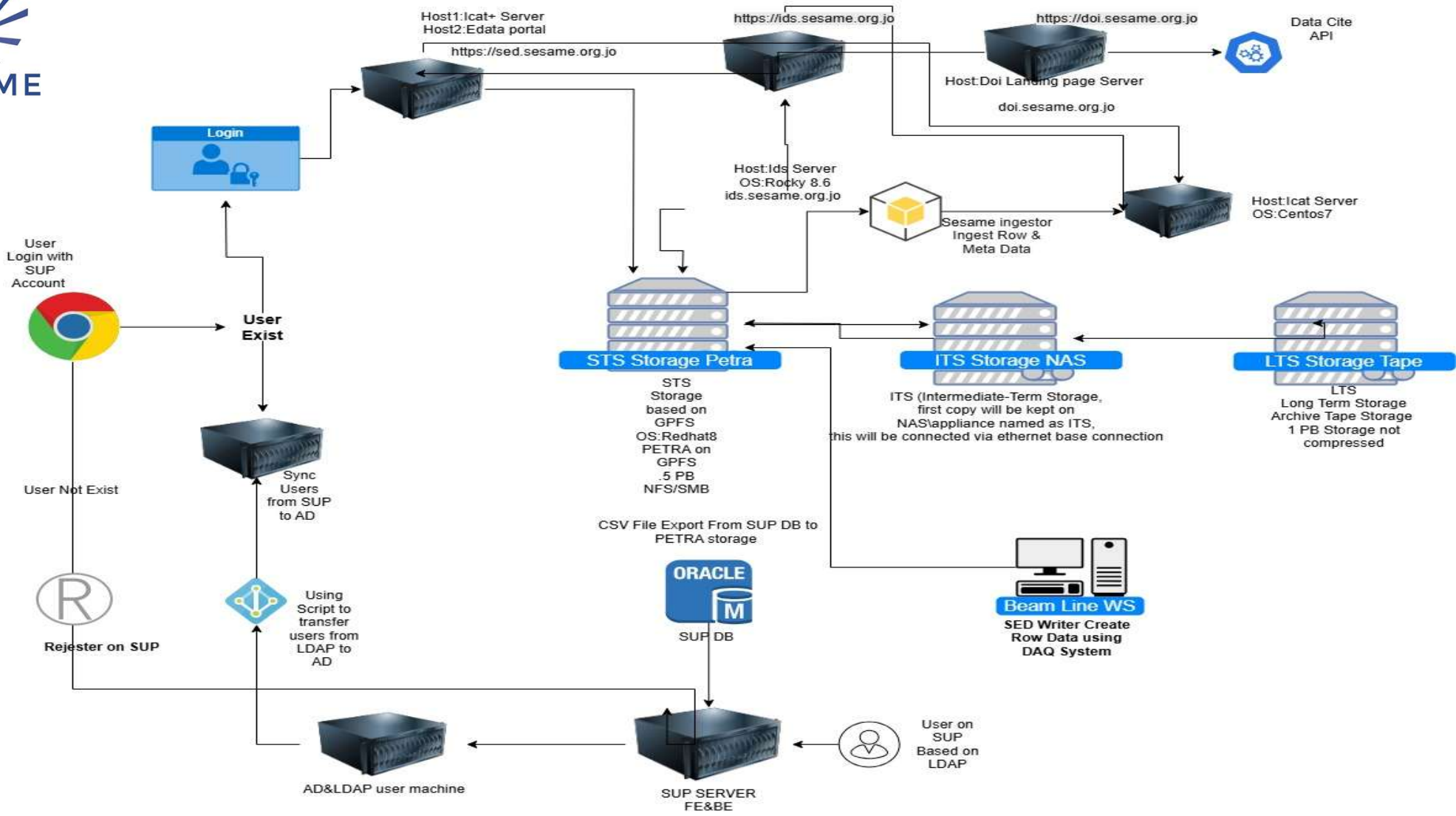
SESAME DATA Ingestor (pseudo-code style)

- Detect new data in Beamline storage
- Create the datasets into ICAT DB with specific conditions to comply with DB requirements
- Register datafiles
- Extract metadata from the row-data
- Validation and report

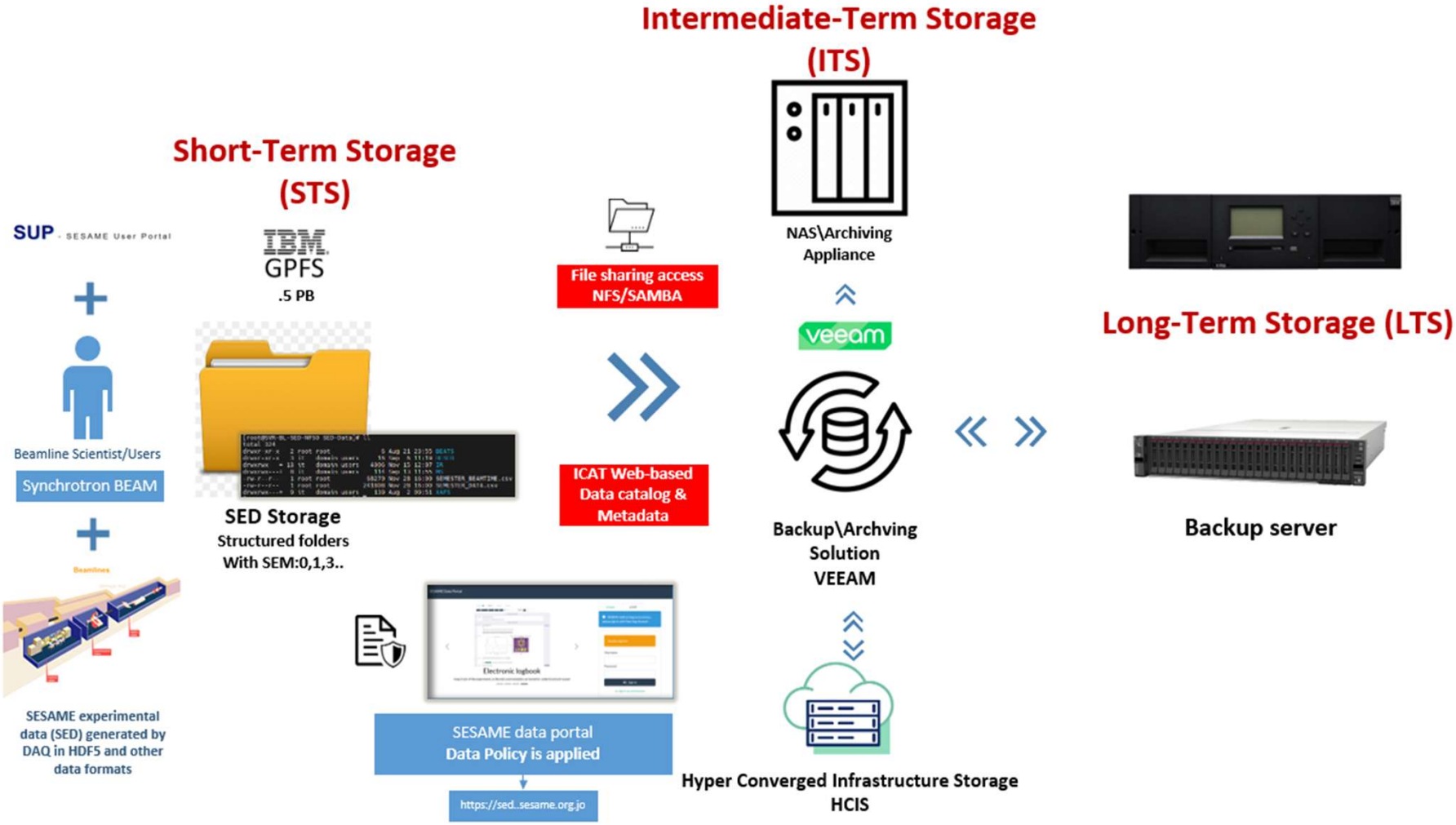


Ingested datasets to SED portal

Data Lifecycle at SESAME

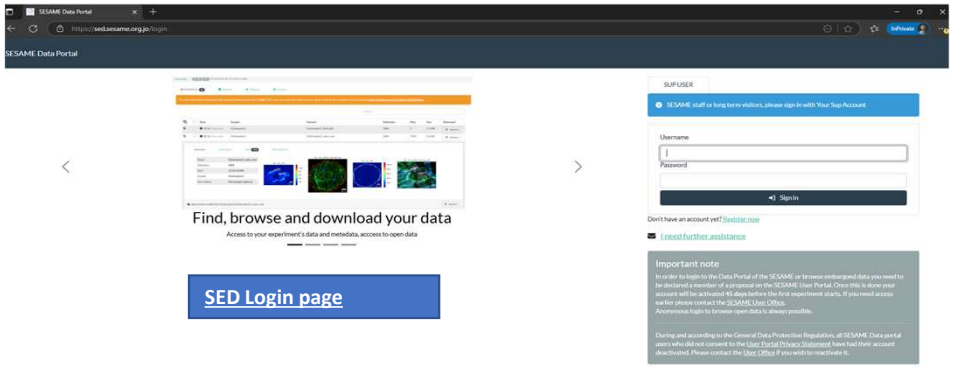


Storage Infrastructure at SESAME

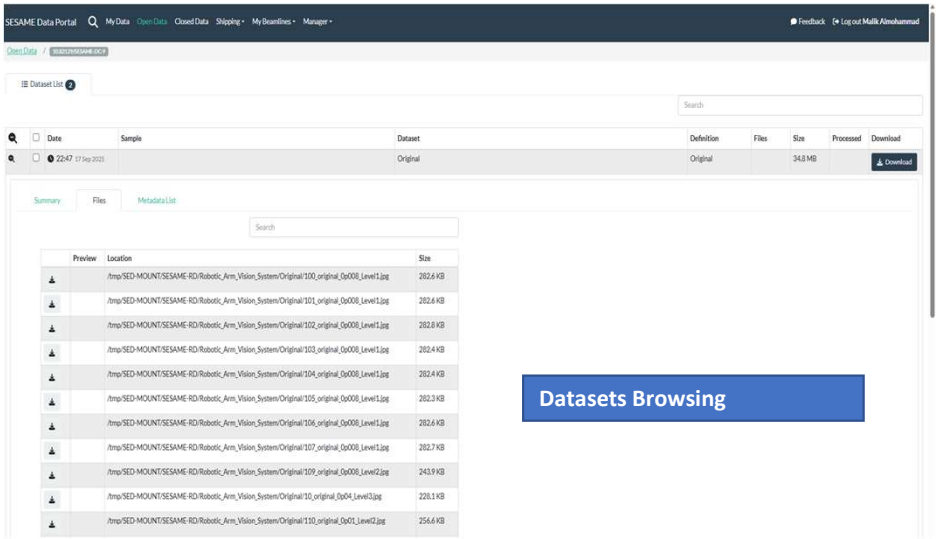


ICAT Plus - User Experience\Feedback

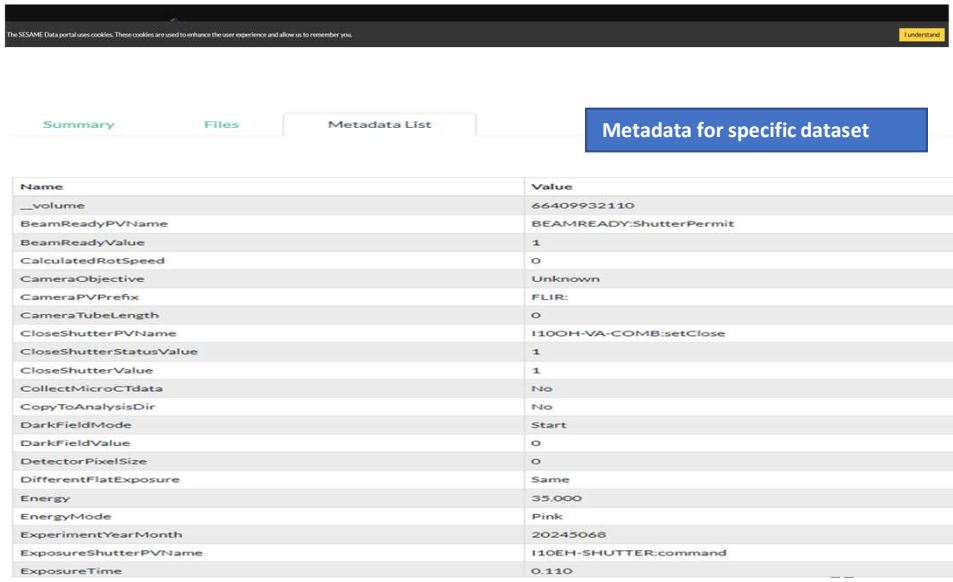
- One portal for users all data services
- User friendly for Search\Browse investigations effectively
- Easy access to datasets and individual files



SED Login page



Datasets Browsing



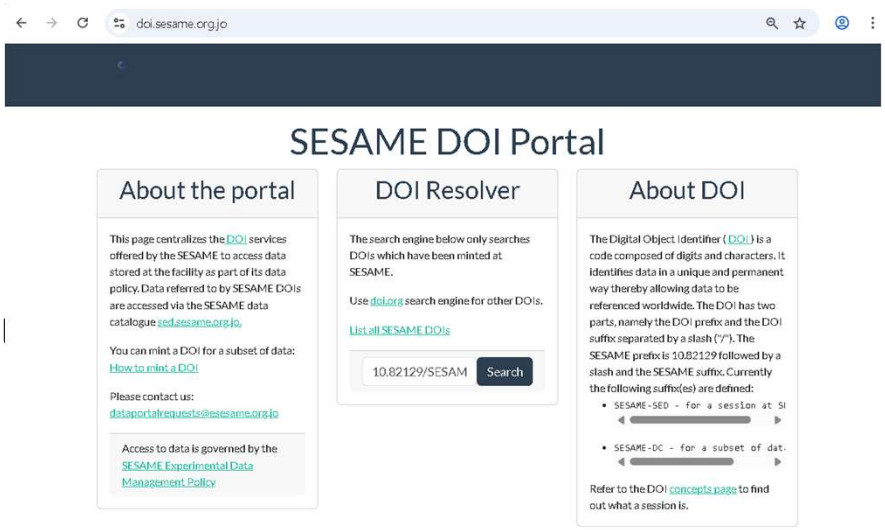
Metadata for specific dataset

Name	Value
__volume	66409932110
BeamReadyPVName	BEAMREADY:ShutterPermit
BeamReadyValue	1
CalculatedRotSpeed	0
CameraObjective	Unknown
CameraPVPrefix	FLIR:
CameraTubeLength	0
CloseShutterPVName	I10OH-VA-COMB:setClose
CloseShutterStatusValue	1
CloseShutterValue	1
CollectMicroCTdata	No
CopyToAnalysisDir	No
DarkFieldMode	Start
DarkFieldValue	0
DetectorPixelSize	0
DifferentFlatExposure	Same
Energy	35.000
EnergyMode	Pink
ExperimentYearMonth	20245068
ExposureShutterPVName	I10EH-SHUTTER:command
ExposureTime	0.110

Open Science - from development to reality

ICAT as OS enabler for SESAME DOI Minting with DataCite

https://doi.sesame.org.jo



- Fully functional DOI minting service via SESAME Experimental Data (SED) Portal
- Automated metadata extraction for investigations/datasets
- Project adapted in collaboration with ASREN via Datacite Global Access Fund (GAF)
- Ability for DOI minting of legacy datasets

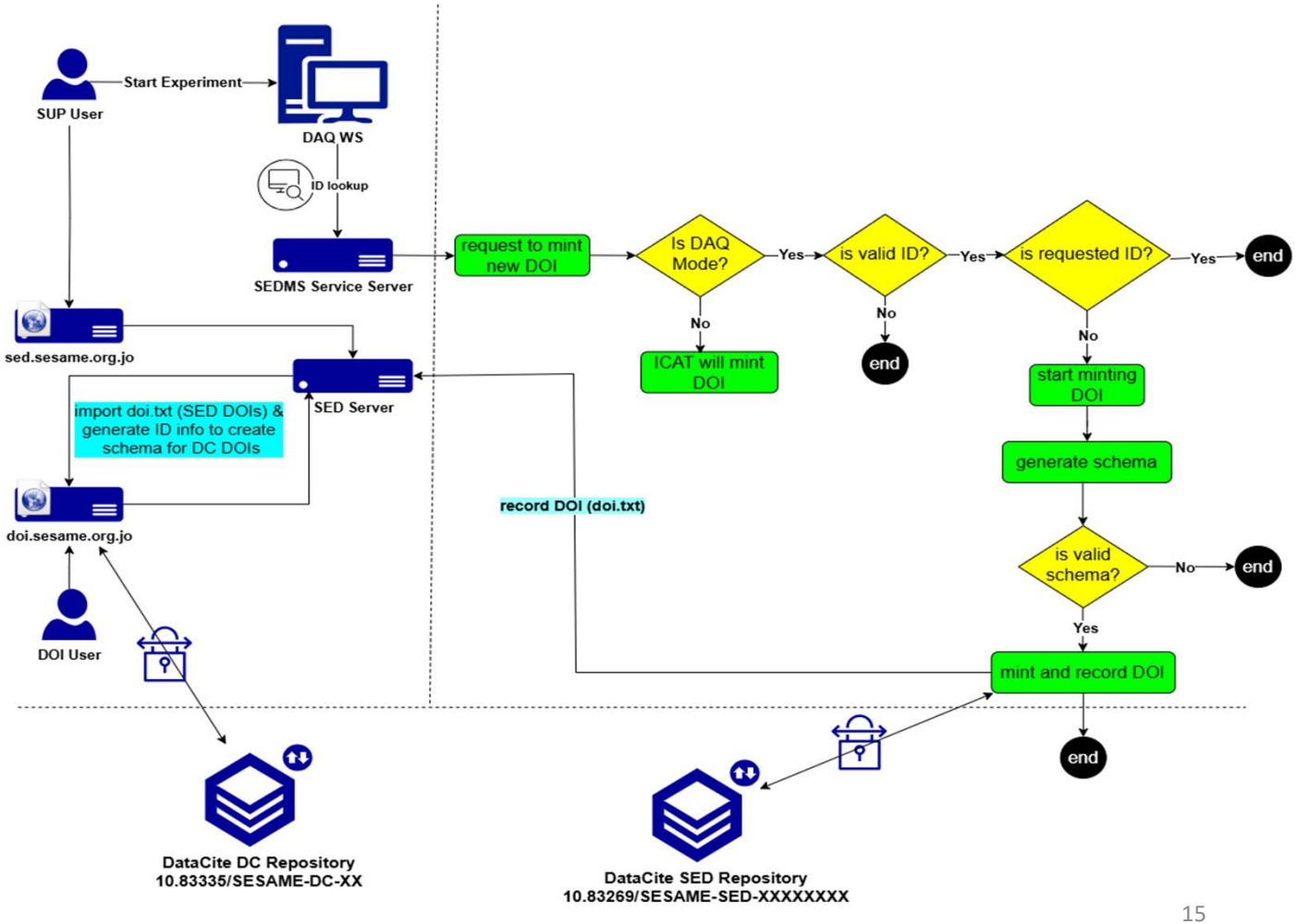
https://datacite.org/blog/advancing-research-sharing-through-datacites-global-access-fund-asren-sesame/

DOI Workflow for at SESAME

Step to get DOI	Description	Service
1. User registration and Proposal Submission	User register at SUP, Researchers submit proposals via the SESAME User Portal (SUP).	https://sup.sesame.org.jo
2. Experiment & Data Collection	Approved users conduct experiments at SESAME beamlines.	SEDM service
3. Metadata Generation	The system records metadata in the ICAT-based SESAME Data Portal.	In-house development and systems integration
4. DOI Assignment	A Digital Object Identifier (DOI) is issued for the dataset. • **Option1**: Automatically by data acquisition system • **Option2**: User request to mint dataset(s) via ICAT	SESAME defined policy
5. Data Access & Citation	Researchers access the dataset via the SESAME Data Portal and use the DOI for citations, DOI landing page to be established and connetcted to SED.	https://sed.sesame.oreg.jo https://doi.sesame.org.jo

DOI Workflow Chart for SESAME Experimental Data

DataCite Fabrica	Testing environment, JSON Schema
Datasets	Generate DOI Only for Users Datasets
Template	Agreed schema for SED & DC DOIs
Automation	- For **SED**: request to mint DOI once start collecting data, or scheduling task to assign DOI for scheduled experiments - For **DC**: request to mint DOI on demand for data subsets



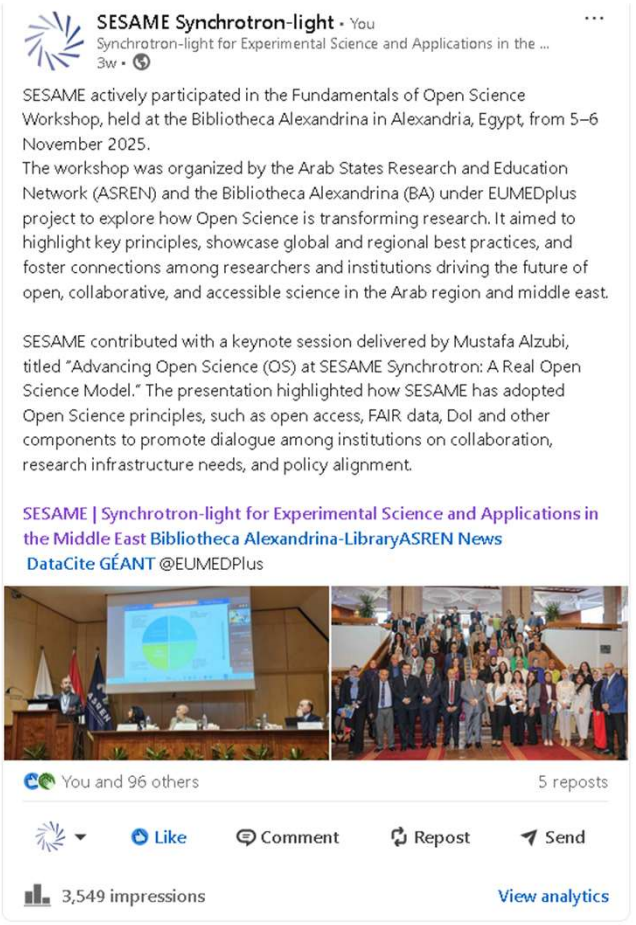
Open Science - from development to reality

Advancing Open Science at SESAME Synchrotron: A Real Open Science Model

SESAME actively participated in the Fundamentals of Open Science Workshop, held at the Bibliotheca Alexandrina in Alexandria, Egypt, from 5-6 November 2025

Highlighted how SESAME has adopted Open Science principles, such as open access, FAIR data, DoI and other components to promote dialogue among institutions on collaboration, research infrastructure needs, and policy alignment

https://www.linkedin.com/posts/sesame-synchrotron-light_sesame-actively-participated-in-the-fundamentals-activity-7393556056221573120-nYDe?utm_source=social_share_send&utm_medium=member_desktop_web&rcm=ACoAACZNMiMBGnr2QvZOLfswrBwEUEoc0XP5vVY



Announcement:
Open Science Policy Writing (Online)

Will be presenting ICAT as a tool to enable the Open Science from development to reality

EUMEDPlus Project Workshop: Open Science Policy Writing (international)

- **Scheduled on : 16 Feb 2026 (online)**
- Target: dedicated workshop specifically focused on the development and writing of Open Science policies. This workshop aims to equip regional practitioners and policy-makers with the knowledge and skills necessary to effectively draft, implement, and promote open science policies within their institutions
- Registration/Application: Please refer to the event page for how to apply
- Event page: https://indico.sesame.org.jo/event/35/

Bridging the Mediterranean

Networks • Services • People

Challenges

- Data archiving, implementation and integration, data on Tape for Long-Term Storage (LTS)
- Rapid data Growth (tomography), and large dataset downloads from SED portal, Globus to be implemented?!
- SESAME User Portal (SUP) Operational sustainability: Upgrades for front-end and DB servers
- Strengthening cybersecurity through 2FA and Single Sign-On (SSO)
- No security measures on cybersecurity monitoring and threat protection
- To assure Community alignment

Roadmap & Next Steps

- ORCID integration:
  Connecting researchers and contributors using persistent identifiers
- implementing proxy services across all SESAME data services
- E-Data Portal upgrade
  Migrating to the latest ESRF-based platform and extending API capabilities
- Richer data interaction
  Enabling in-browser HDF5 (H5) viewing directly within SED
- Improved interoperability
  Stronger integration between ICAT, SED, DOI services, and external tools with Sub systems

Thanks