



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](mailto:salman.matalgah@sesame.org.jo)

Malik Al Mohammad

[malik.almohammad@sesame.org.jo](mailto:malik.almohammad@sesame.org.jo)

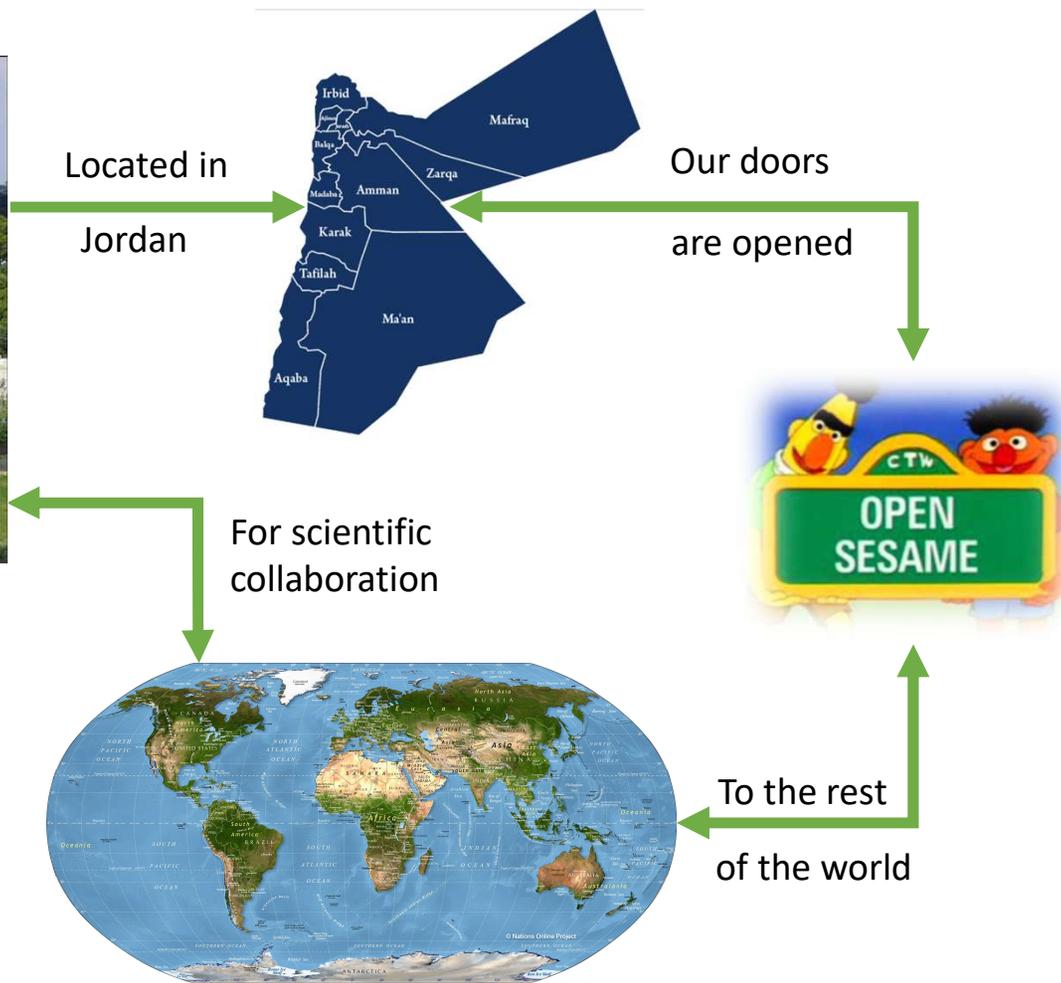


# SESAME Synchrotron Light Source



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

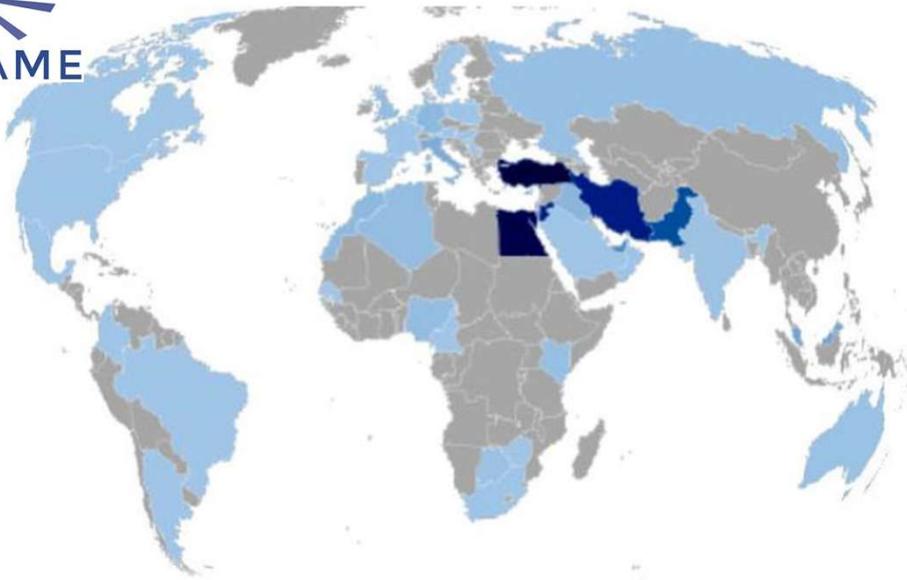
A 3rd Generation Light Source that has state-of-the-art infrastructure which designed to enable the scientific research in the region for designated users communities enabling Open, peer-reviewed user access, based on Science diplomacy & regional collaboration





## SESAME Beamlines SESAME Experimental Data (SED)

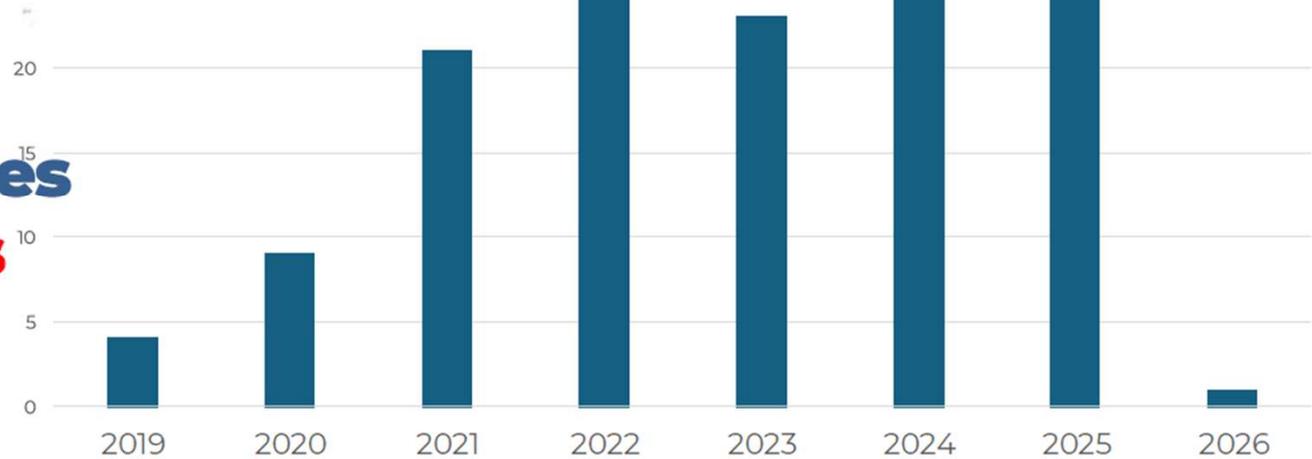
No	Beamline	Energy Range	Source Type	Status
<b>BM02</b>	IR (Infrared) spectromicroscopy	0.001-3 eV	Bending Magnet	Serving users
<b>BM08</b>	XAFS/XRF (X-ray Absorption Fine Structure/X-ray Fluorescence) spectroscopy	4.5-30 keV	Bending Magnet	
<b>ID09</b>	MS (Materials Science)	5-25 keV	MPW	
<b>ID11 L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



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

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...).





# 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!!**

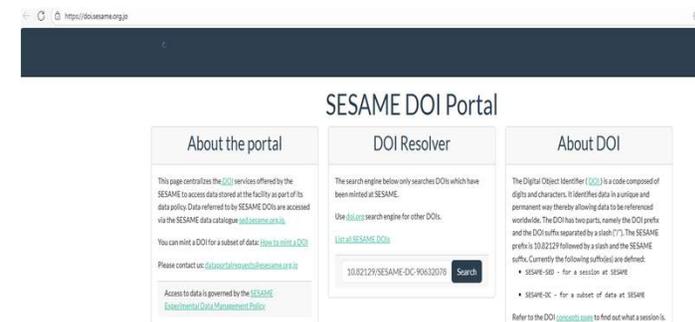
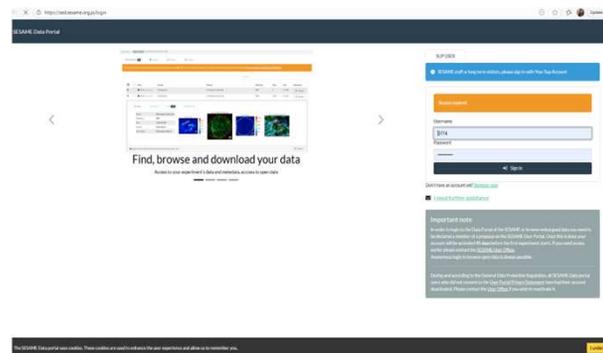
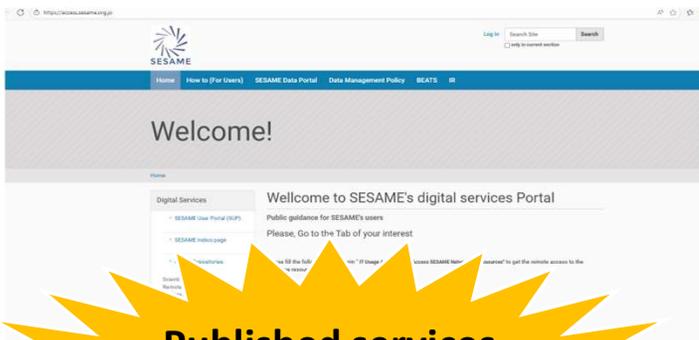
The real challenge: All activities for ICAT development and adaptation has no supporting project





## 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

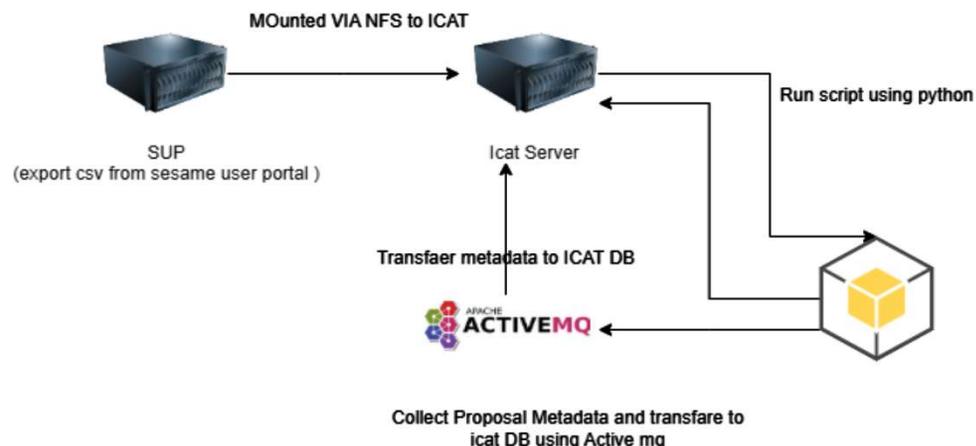
All proposals are retrieved from the SUP Oracle database and saved into a CSV file. This file includes all key details such as:  
 Proposal title, Proposal name, Start\End dates, PI, user info etc..

### 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



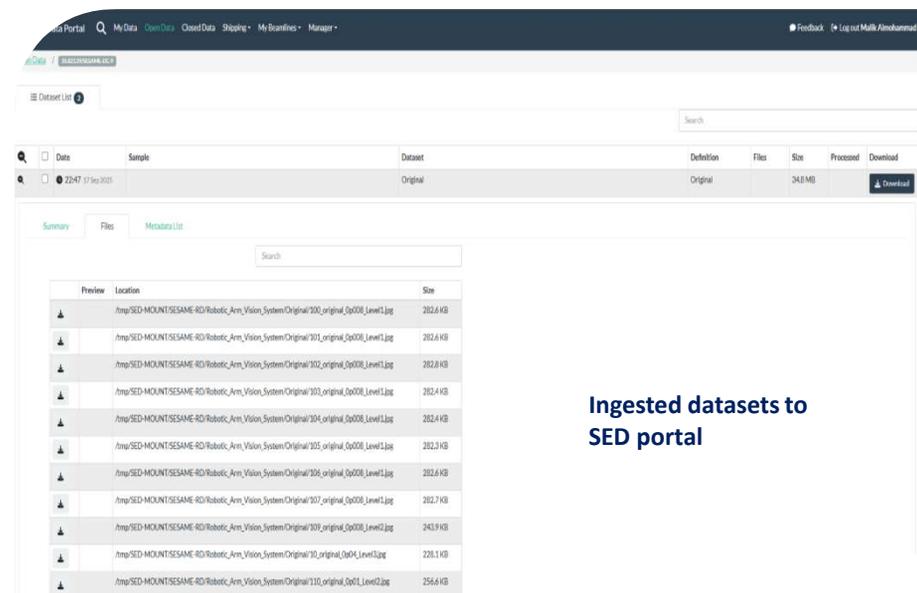
<https://sup.sesame.org.jo>



# 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



The screenshot shows the SED Portal interface. At the top, there is a navigation bar with 'My Data', 'Open Data', 'Closed Data', 'Shipping', 'My Beamlines', and 'Manager'. Below this is a search bar and a 'Dataset List' section. A table displays dataset information:

Date	Sample	Dataset	Definition	Files	Size	Processed	Download
22:47 17 Sep 2021		Original	Original		34.6 MB		Download

Below the dataset list, there is a 'Files' section with a 'Metadata List' table:

Preview	Location	Size
▲	http://SED-MOUNT/SESAME-RD/Robotics_Arm_Vision_System/Original/202_original_0x2008_Level1.jpg	202.6 KB
▲	http://SED-MOUNT/SESAME-RD/Robotics_Arm_Vision_System/Original/201_original_0x2008_Level1.jpg	202.6 KB
▲	http://SED-MOUNT/SESAME-RD/Robotics_Arm_Vision_System/Original/202_original_0x2008_Level1.jpg	202.8 KB
▲	http://SED-MOUNT/SESAME-RD/Robotics_Arm_Vision_System/Original/201_original_0x2008_Level1.jpg	202.4 KB
▲	http://SED-MOUNT/SESAME-RD/Robotics_Arm_Vision_System/Original/204_original_0x2008_Level1.jpg	202.4 KB
▲	http://SED-MOUNT/SESAME-RD/Robotics_Arm_Vision_System/Original/205_original_0x2008_Level1.jpg	202.3 KB
▲	http://SED-MOUNT/SESAME-RD/Robotics_Arm_Vision_System/Original/206_original_0x2008_Level1.jpg	202.6 KB
▲	http://SED-MOUNT/SESAME-RD/Robotics_Arm_Vision_System/Original/207_original_0x2008_Level1.jpg	202.7 KB
▲	http://SED-MOUNT/SESAME-RD/Robotics_Arm_Vision_System/Original/207_original_0x2008_Level2.jpg	243.9 KB
▲	http://SED-MOUNT/SESAME-RD/Robotics_Arm_Vision_System/Original/201_original_0x2008_Level3.jpg	228.1 KB
▲	http://SED-MOUNT/SESAME-RD/Robotics_Arm_Vision_System/Original/210_original_0x2008_Level2.jpg	256.6 KB

Ingested datasets to SED portal

  
**Beamline Instrument**  
 Raw experimental output



  
**Beamline Storage / NFS**  
 Mounted filesystem



  
**SED Ingestion Agent**  
 Dataset detection  
 Metadata extraction  
 Validation



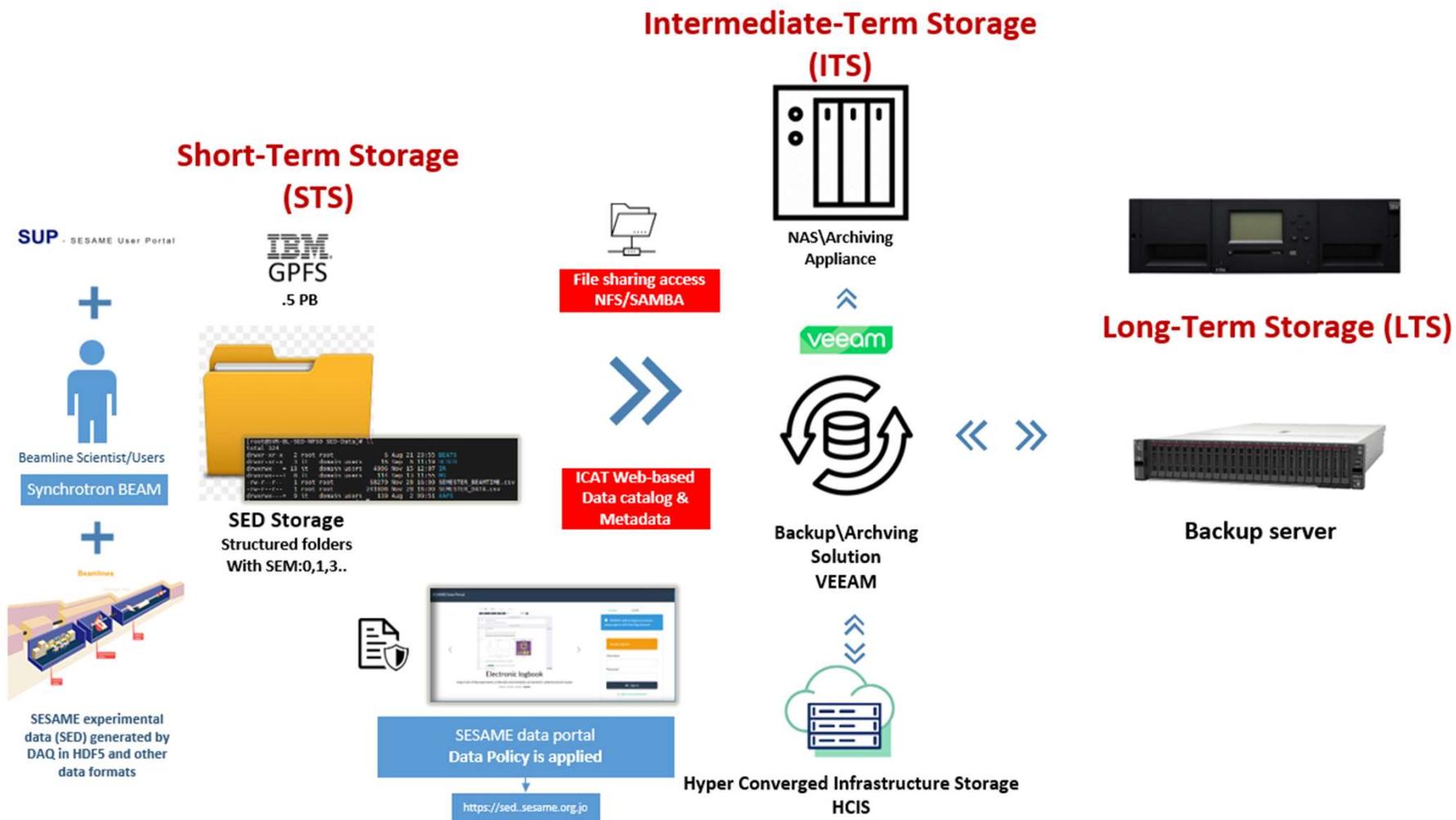
  
**ICAT Catalogue**  
 Investigations  
 Datasets  
 Parameters



  
**SED Portal**  
 Discovery  
 DOI  
 ORCID (next)



# 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

The screenshot shows the 'Open Data' section of the SESAME Data Portal. It features a search bar and a table of datasets. A blue callout box labeled 'Datasets Browsing' is overlaid on the right side of the table.

Date	Sample	Dataset	Definition	Files	Size	Processed	Download
20247-17 Sep 2025		Original	Original		34.8 MB		Download

The screenshot shows the login page of the SESAME Data Portal. It includes a navigation menu at the top, a central search area with the text 'Find, browse and download your data', and a login form on the right. A blue callout box labeled 'SED Login page' is overlaid on the bottom right.

The screenshot shows the 'Metadata List' for a specific dataset. It features a table with columns for Name and Value. A blue callout box labeled 'Metadata for specific dataset' is overlaid on the right side of the table.

Name	Value
__volume	66409932110
BeamReadyPVName	BEAMREADY:ShutterPermit
BeamReadyValue	1
CalculatedRotSpeed	0
CameraObjective	Unknown
CameraPVPrefix	FLIR:
CameraTubeLength	0
CloseShutterPVName	1100H-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	110EH-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.io>

- 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/>



### SESAME DOI Portal

#### About the portal

This page centralizes the DOI services offered by the SESAME to access data stored at the facility as part of its data policy. Data referred to by SESAME DOIs are accessed via the SESAME data catalogue [sed.sesame.org.io](https://sed.sesame.org.io).

You can mint a DOI for a subset of data: [How to mint a DOI](#)

Please contact us: [dataportalrequests@sesame.org.io](mailto:dataportalrequests@sesame.org.io)

Access to data is governed by the [SESAME Experimental Data Management Policy](#)

#### DOI Resolver

The search engine below only searches DOIs which have been minted at SESAME.

Use [doi.org](#) search engine for other DOIs.

[List all SESAME DOIs](#)

10.82129/SESAM

#### About DOI

The Digital Object Identifier (DOI) is a code composed of digits and characters. It identifies data in a unique and permanent way thereby allowing data to be referenced worldwide. The DOI has two parts, namely the DOI prefix and the DOI suffix separated by a slash ("/"). The SESAME prefix is 10.82129 followed by a slash and the SESAME suffix. Currently the following suffix(es) are defined:

- SESAME-SED - for a session at SI
- SESAME-DC - for a subset of dat.

Refer to the DOI [concepts page](#) to find out what a session is.

DataCite  
Global Access Fund



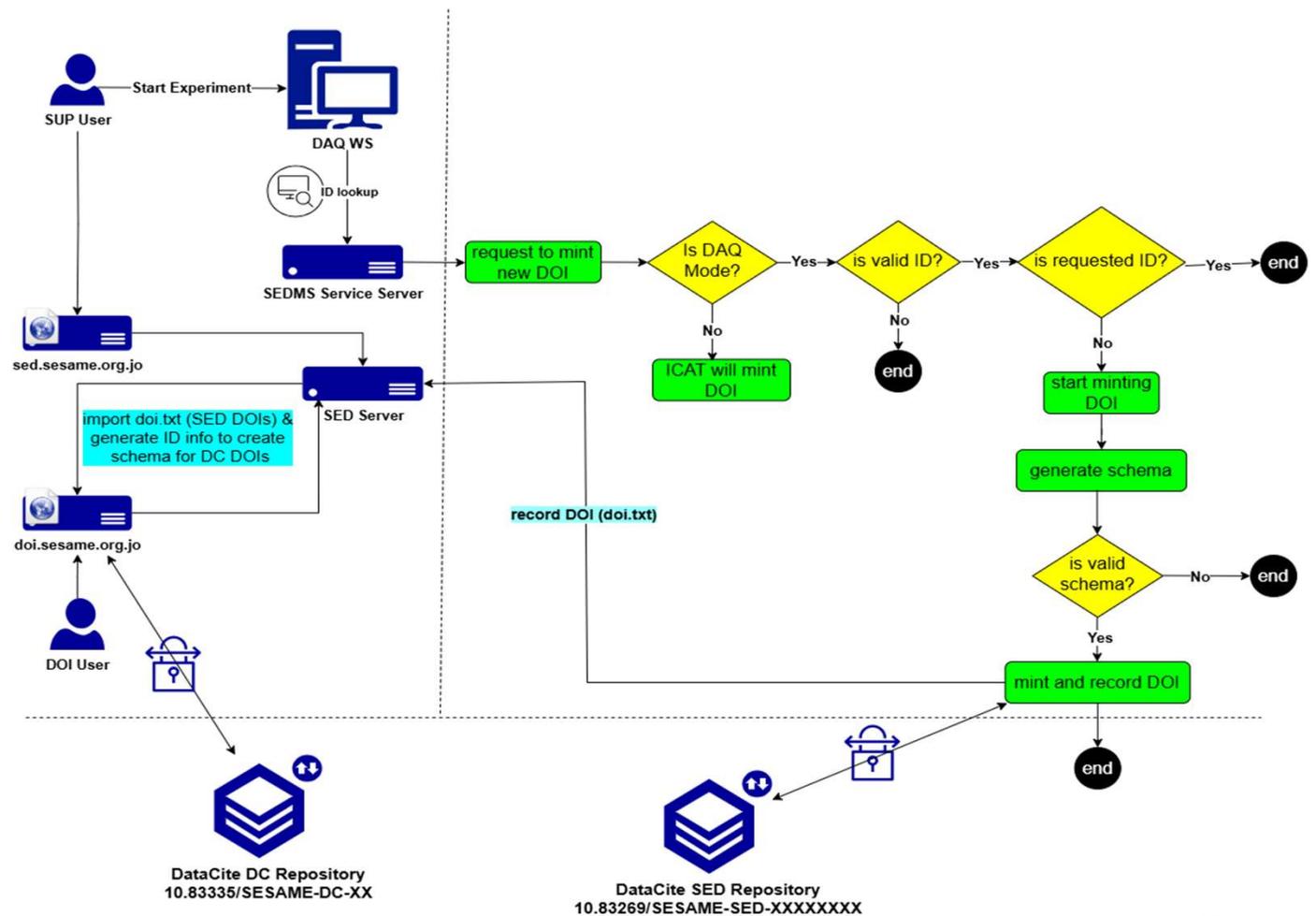


## DOI Workflow for at SESAME

Step to get DOI	Description	Service
<b>1. User registration and Proposal Submission</b>	User register at SUP, Researchers submit proposals via the SESAME User Portal (SUP).	<a href="https://sup.sesame.org.jo">https://sup.sesame.org.jo</a>
<b>2. Experiment &amp; Data Collection</b>	Approved users conduct experiments at SESAME beamlines.	SEDM service
<b>3. Metadata Generation</b>	The system records metadata in the ICAT-based SESAME Data Portal.	In-house development and systems integration
<b>4. DOI Assignment</b>	A Digital Object Identifier (DOI) is issued for the dataset. <ul style="list-style-type: none"> <li>• <b>Option1:</b> Automatically by data acquisition system</li> <li>• <b>Option2:</b> User request to mint dataset(s) via ICAT</li> </ul>	SESAME defined policy
<b>5. Data Access &amp; Citation</b>	Researchers access the dataset via the SESAME Data Portal and use the DOI for citations, DOI landing page to be established and connected to SED.	<a href="https://sed.sesame.org.jo">https://sed.sesame.org.jo</a> <a href="https://doi.sesame.org.jo">https://doi.sesame.org.jo</a>

# DOI Workflow Chart for SESAME Experimental Data

<b>DataCite Fabrica</b>	Testing environment, JSON Schema
<b>Datasets</b>	Generate DOI Only for Users Datasets
<b>Template</b>	Agreed schema for SED & DC DOIs
<b>Automation</b>	<ul style="list-style-type: none"> <li>- For <b>SED</b>: request to mint DOI once start collecting data, or scheduling task to assign DOI for scheduled experiments</li> <li>- For <b>DC</b>: request to mint DOI on demand for data subsets</li> </ul>





# 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](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)



SESAME Synchrotron-light • You  
Synchrotron-light for Experimental Science and Applications in the ...  
3w • 5

SESAME actively participated in the Fundamentals of Open Science Workshop, held at the Bibliotheca Alexandrina in Alexandria, Egypt, from 5–6 November 2025.  
The workshop was organized by the Arab States Research and Education Network (ASREN) and the Bibliotheca Alexandrina (BA) under EUMEDplus project to explore how Open Science is transforming research. It aimed to highlight key principles, showcase global and regional best practices, and foster connections among researchers and institutions driving the future of open, collaborative, and accessible science in the Arab region and middle east.

SESAME contributed with a keynote session delivered by Mustafa Alzubi, titled "Advancing Open Science (OS) at SESAME Synchrotron: A Real Open Science Model." The presentation 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.

[SESAME | Synchrotron-light for Experimental Science and Applications in the Middle East Bibliotheca Alexandrina-LibraryASREN News](#)  
[DataCite GÉANT @EUMEDplus](#)



You and 96 others 5 reposts

Like Comment Repost Send

3,549 impressions View analytics



## 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/>





## 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**