



*PITSCHI: The Imaging Data Management System at
CMM, UQ – Enabling FAIR and Persistent Identifiers
– Driven Research Data Management*

Rubbiya Ali

Centre for Microscopy and Microanalysis

Email: r.ali1@uq.edu.au

Acknowledgment of Country

The University of Queensland (UQ) acknowledges the Traditional Owners and their custodianship of the lands on which we meet.

We pay our respects to their ancestors and their descendants, who continue cultural and spiritual connection to Country.

We recognise their valuable contributions to Australian and global society.



WHO WE ARE ...



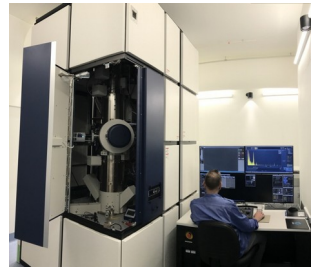
The Centre for Microscopy and Microanalysis (CMM) is an interdisciplinary research infrastructure centre at UQ, providing resources for scientific structural research and element analysis of materials using **electron, ions & X-ray beams**. Both man-made and natural/biological materials are characterised on the micro-, nano- to **Equipment.**

Transmission Electron Microscopes (TEM)

100/200/300kV TEM/STEM

Features

Field Emitter, High Voltage: 300/200 kV
Super Twin Lens, TEM/STEM
Spectroscopy: EDX, EELS, HAADF
Cryo-TEM and Tomography



Hitachi HT7700, HF 5000

Further TEMs

FEI cryoF30/ FEI analytical F20, JEM-1011,

Scanning Electron Microscopes (SEM)

FESEM/ EPMA/ FIB/SEM

Features

Field Emitter, High Voltage: 0.2-30 kV
Ga-focused ion beam 5-30kV
EDX, EBSD, BSE, Gas in-let system
Nanomanipulator, Raith Elphy System
slice&view Tomography

Further SEMs

JEOL 7800F/cryo7100F/7001F WDS-EDS/ 8200 EPMA Probe/
6610 EBSD-EDS/ 6560 La-EDS/Neoscope, Hitachi SU3500,
Zeiss Sigma CryoSEM upgraded/ TM4000

FEI FIB-SEM Scios/ FEI Volumescope

X-ray Analysis (XRD, XRF, XPS, SAXS)



Further XRay tools:

Bruker D8 XRD, Rigaku SmartLab XRD, Kratos XPS

Xenocs Xeuss 2.0 SAXS

Novel Imaging Methods...

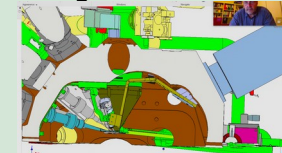
Imaging MS



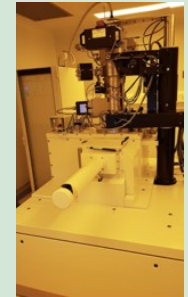
Scanning XRF



Cryo FIB/SEM



EBL (nanolithography)



Further Instruments:

Balzers BAF069, HPM-100, Bruker Ultraflex III ToF/ToF, microToF QII, Thermo QqQ-HPLC/ Waters MRT / Bruker TimsToF Pro M2

& Sample Preparation: dedicated ion etching/milling and cryo-techniques...



CMM Close to where the “Science/Research” happens..


Centre for Microscopy and Microanalysis

THE UNIVERSITY OF QUEENSLAND AUSTRALIA MICROSCOPY AUSTRALIA

Centre for Microscopy & Microanalysis

Life Science & Soft Matter

Micro/Nano Particle Characterisation





THE UNIVERSITY OF QUEENSLAND AUSTRALIA MICROSCOPY AUSTRALIA

Centre for Microscopy & Microanalysis

Structural Biology
Cryo Electron Microscopy

UQROCX
Crystallography




2024 New:
CMM NRICH



THE UNIVERSITY OF QUEENSLAND AUSTRALIA MICROSCOPY AUSTRALIA

Centre for Microscopy & Microanalysis


Material Sciences & Novel Imaging



THE UNIVERSITY OF QUEENSLAND AUSTRALIA MICROSCOPY AUSTRALIA

Centre for Microscopy & Microanalysis

UQ MP
Material Performance
Serving Industry




THE UNIVERSITY OF QUEENSLAND AUSTRALIA MICROSCOPY AUSTRALIA

Micro/Nano Particle Characterisation

Centre for Microscopy & Microanalysis

X-ray Diffraction, Spectroscopy & Imaging

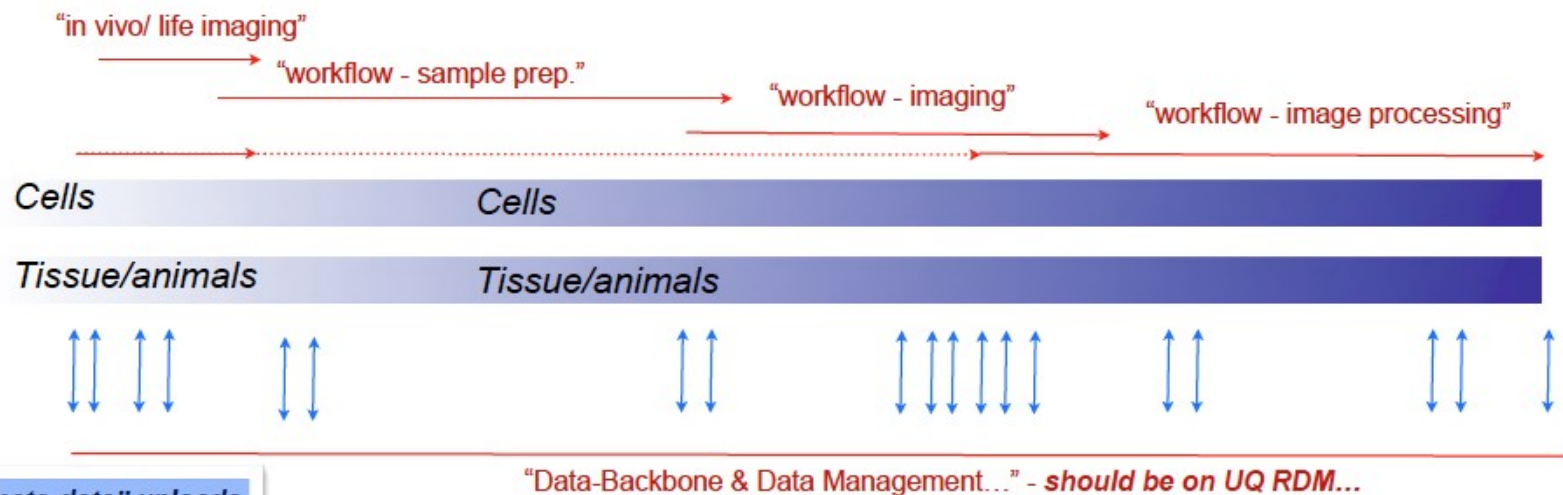


Facing the Imaging Data Monster

- CMM at UQ: 700+ researchers, 50+ instruments, 5 facilities
- Annual output: Petabytes of data from thousands of experiments
- Problems: Data silos, lost traceability, manual transfers, reproducibility risks
- Global issue: Hinders collaboration and open science



Example Experimental Workflow eg. at CMM (e.g. CLEM): Datasets & Metadata



Blue arrows are “meta-data” uploads

- sample prep information
- sample origin
- experiment information
- metadata from instruments

“Quality & Information Transfer Chain...”

The sum of all data collection will help:

- to keep the essential information together (acquire data/metadata once at source - avoid failures and frauds etc..)
- to assure quality control (link to instrument DOI and reference and calibration data...)
- allows to re-use these dataset/ information to improve different methods and protocols (enhance capabilities...)
- to retrieve essential information for data processing/interpretation/publications
- to allow data mining, discovery and standardisation or sharing data with other disciplines (Med Imaging, Bio-Omics etc..)

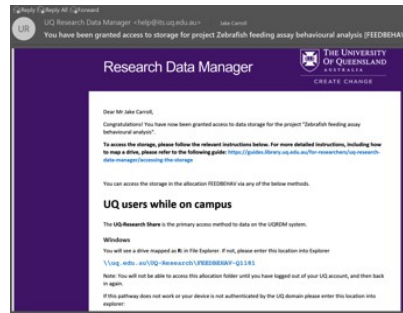
Requires a FAIR Repository or Database (Findable, Accessible, Interoperable, and Reusable)

Typical workflow at UQ



Designed at The University of Queensland

Researcher obtains a collection.

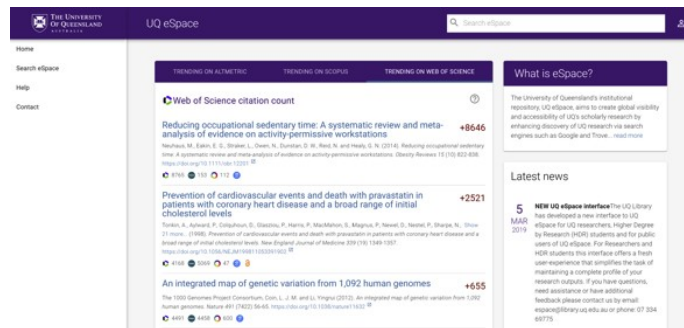
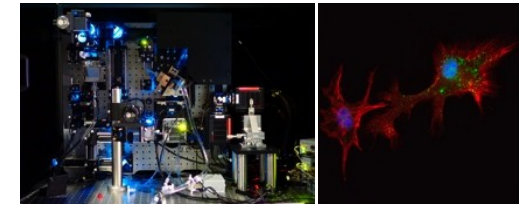


Researcher is sent an email explaining access instructions.



Collection then mounted on the instrument.

Researcher then acquires data and stores



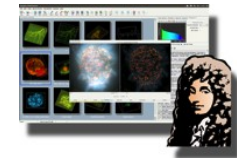
DOIs can be minted, published to UQ eSpace.
RDM can facilitate data linking back for durable URL.

UQ Data fabrics (MeDICI)



nectar

PYTORCH



It is already on the fabric. Can be accessed via CVL, supercomputers, other.

But data/datasets are not structured and not enriched with Metadata!

The Need of FAIR-compliant repository

- This raises the need for a centralized, FAIR-compliant repository—ensuring efficient access across locations and time.

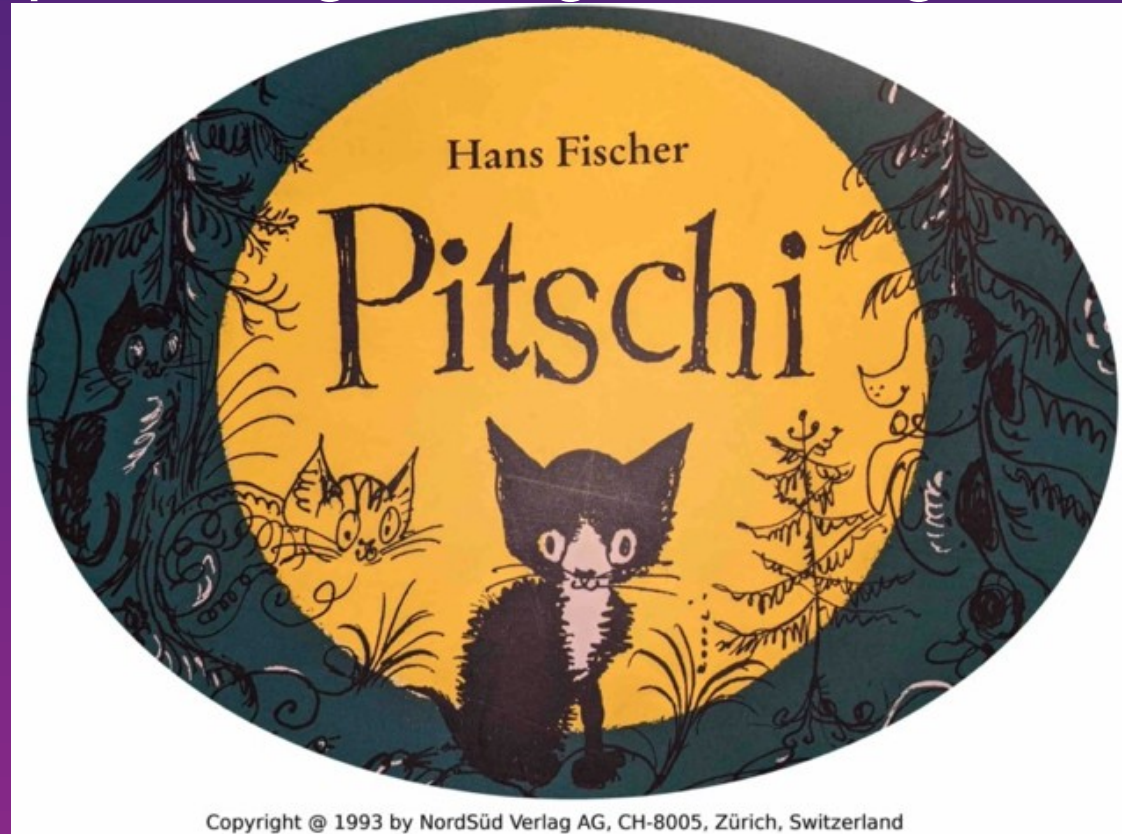


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- Findable
- Accessible
- Interoperable
- Reusable

PITSCHI:

Particle Image depoT using Storage caCHing Infrastructure



<https://clowderframework.org/>

- Open-source platform built on Clowder (NCSA framework)
- Collaboration: CMM + UQ Research Computing Centre
- Funded by ARDC, Microscopy Australia, ACCS

pitschi@uq.edu.au

Clowder

Open-source data management from the National Center

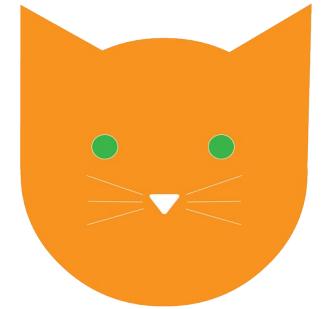
- for Supercomputing Applications (NCSA)

4CeeD is an implementation of Clowder focusing on material sciences

Selected over a wide range of existing data management

(incl. LIMS, IIMS etc..) solutions in a ARDC funded project

Full evaluation: [Data management systems for instrument data](#), Rubbiya Ali & Hoang Nguyen.



<https://clowderframework.org/>



Microscopy data management objectives

Make it as easy and simple as possible for users to deposit their data and metadata

End-to-end process for

- **Capture, transfer raw data to storage collections, index at image repository**
- **Integrated with instrument booking system**

One storage collection per project

- **Project owner controls access to data**
- **Move away from one collection per instrument model**

Harvest as much metadata as possible – automatically

- **Allow users to view/search their data and process it on UQ HPC cluster**

A central repository that adheres FAIR data principles



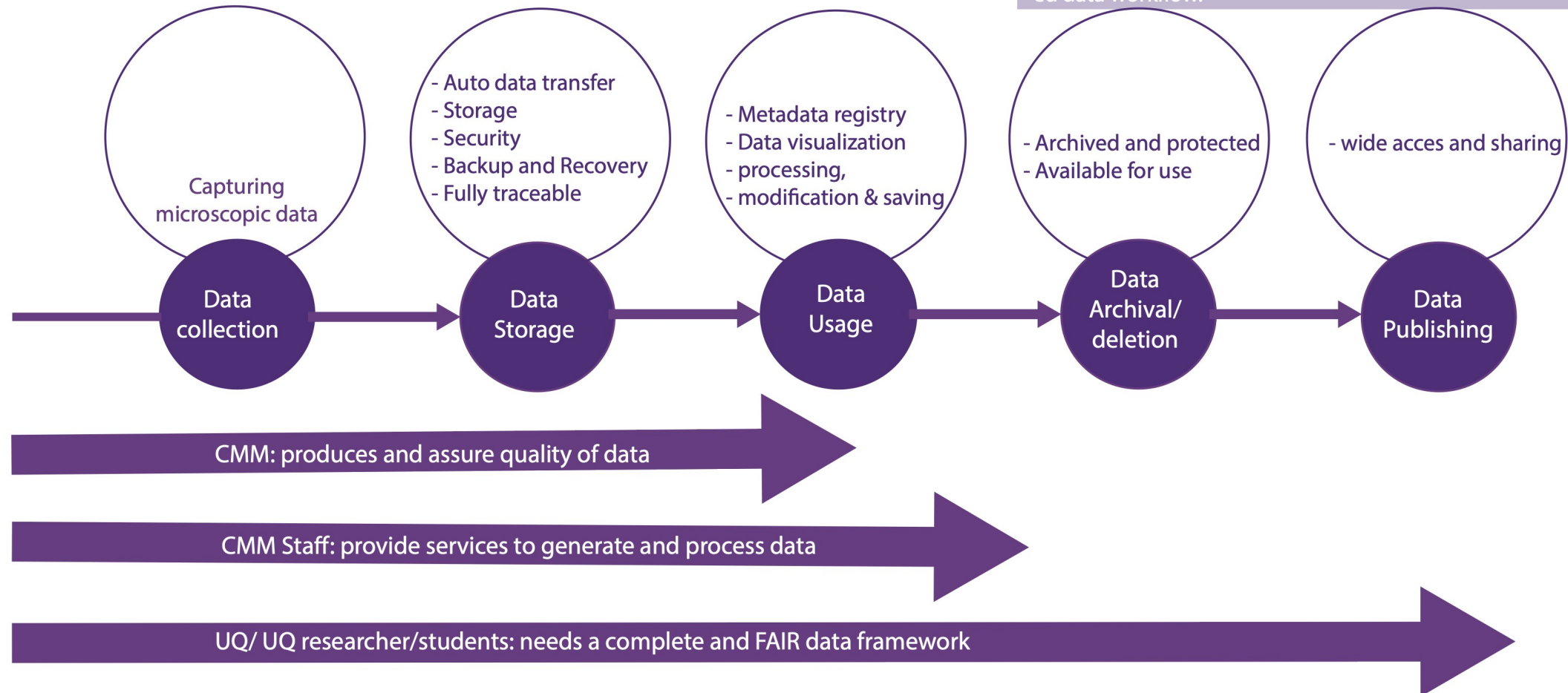
Copyright © 1993 by NordSüd Verlag AG, CH-8005, Zürich, Switzerland

Pitschi: a Findable, Accessible, Interoperable , Reusable (FAIR) research data framework.

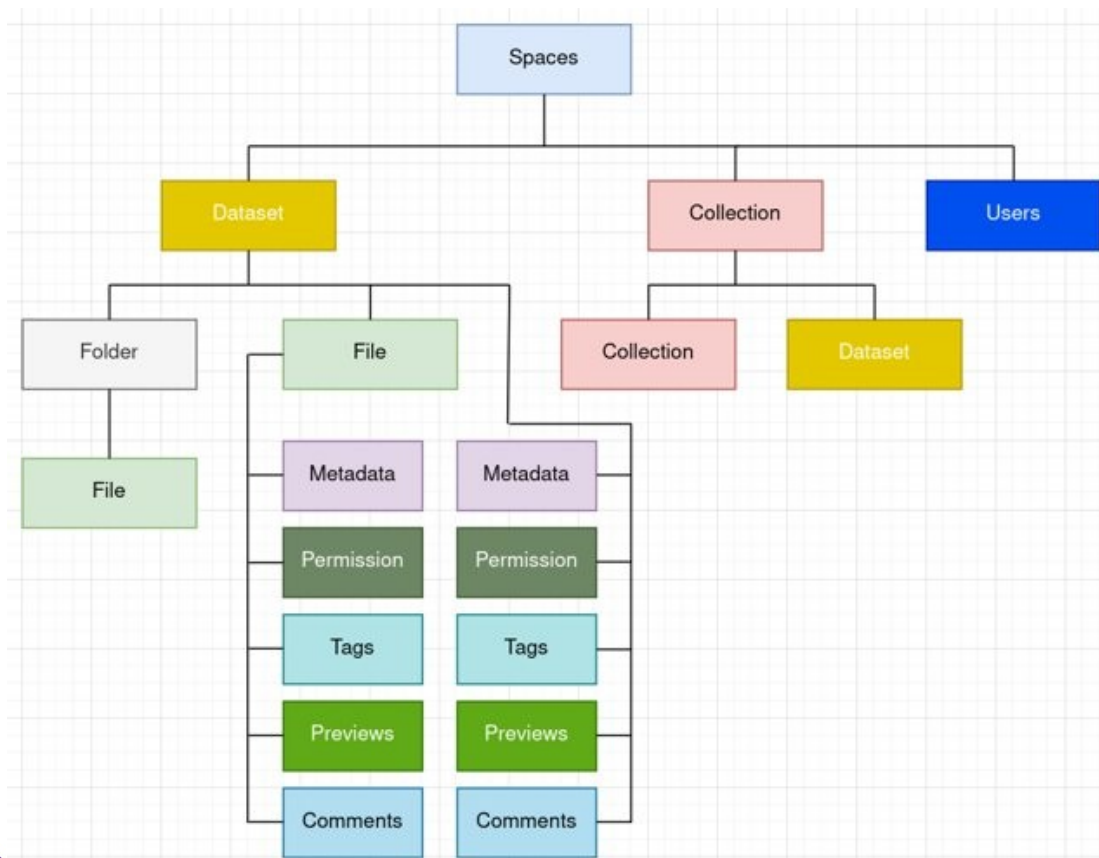
UQ Systems already in use at CMM but independently.

1. PPMS (RIMS)
2. UQRDM
3. CVL@Wiener

Pitschi: Integration of these UQ systems with an automated data workflow.




Pitschi



Clowder data model

- A space corresponds to a project in PPMS/ UQ RIMS
- Each space has its own RDM collection for storing raw data
 - processed data should be stored elsewhere
- Dataset corresponds to a folder in RDM
- Project RDMs are automatically mounted to Clowder

PPMS/RIMS


PPMS for the Centre for Microscopy and Microanalysis - CMM

[HOME](#) [BOOK](#) [ORDER](#) [REQUEST](#) [DOCUMENTS](#) [SCHEDULES](#) [STATISTICS](#) [REPORTS](#) [PUBLICATIONS](#) [PROFILE](#) [LOGOUT](#)

Project ref. #1176

Project details

Project title:
1176 - Hoang Nguyen - Clowder@CMM

Participants:
Ali Rubbiya (project admin), Goodwin Candice, Lajevardipour Alireza, Nguyen Hoang

Main group for this project:
ABRAMSON

Project type:
CMM-Projects

Project visibility (from project type):
CMM core facility, all CMM systems, all CMM services/consumables

Account number:
none

Project expiration date:
none

Abstract/description:
We aim to automate the data capture, metadata extraction, and data archival process using a combination of tools/technologies such as MeDICI, PPMS, Clowder, etc.

Project affiliation:
Customised


Project active:
yes

Discipline (Physical/Engineering, Bio/Med, Env/Geo Sc):
Bio/Medical

Project Notes:
none

UQRDM Collection #:
CMM4CEED-Q3504


Pitschi


 Pitschi You Explore Create Selections Help
 Search

Spaces

My Spaces
Use Spaces to collaboratively work with your team to manage and annotate data.

[Create](#) 12 ⌵ ⌵ ⌵



1179 - Sarah Ali - Holo3dCell


Project ID:1179
RDM Collection:Q3715
Project Type:CMM-Projects
Project Group:CMM - WEPF GROUP
Desc: Integrating 3D segmentation of electron microscopic data using Mixed Reality approach.
May 10, 2021

📁 0 👤 6 🗑️ 🔍

[🔗 Collections in Space](#)

[🔗 Datasets in Space](#)

[★ Follow](#)



1176 - Hoang Nguyen - Clowder@CMM

Project ID:1176
RDM Collection:Q3504
Project Type:CMM-Projects
Project Group:EAIT - ABRAMSON GROUP
Desc: We aim to automate the data capture, metadata extraction, and data archival process using a combination of tools/technologies such as MeDICI, PPMS, Clowder, etc.
May 10, 2021

📁 2 👤 5 🗑️ 🔍

[🔗 Collections in Space](#)

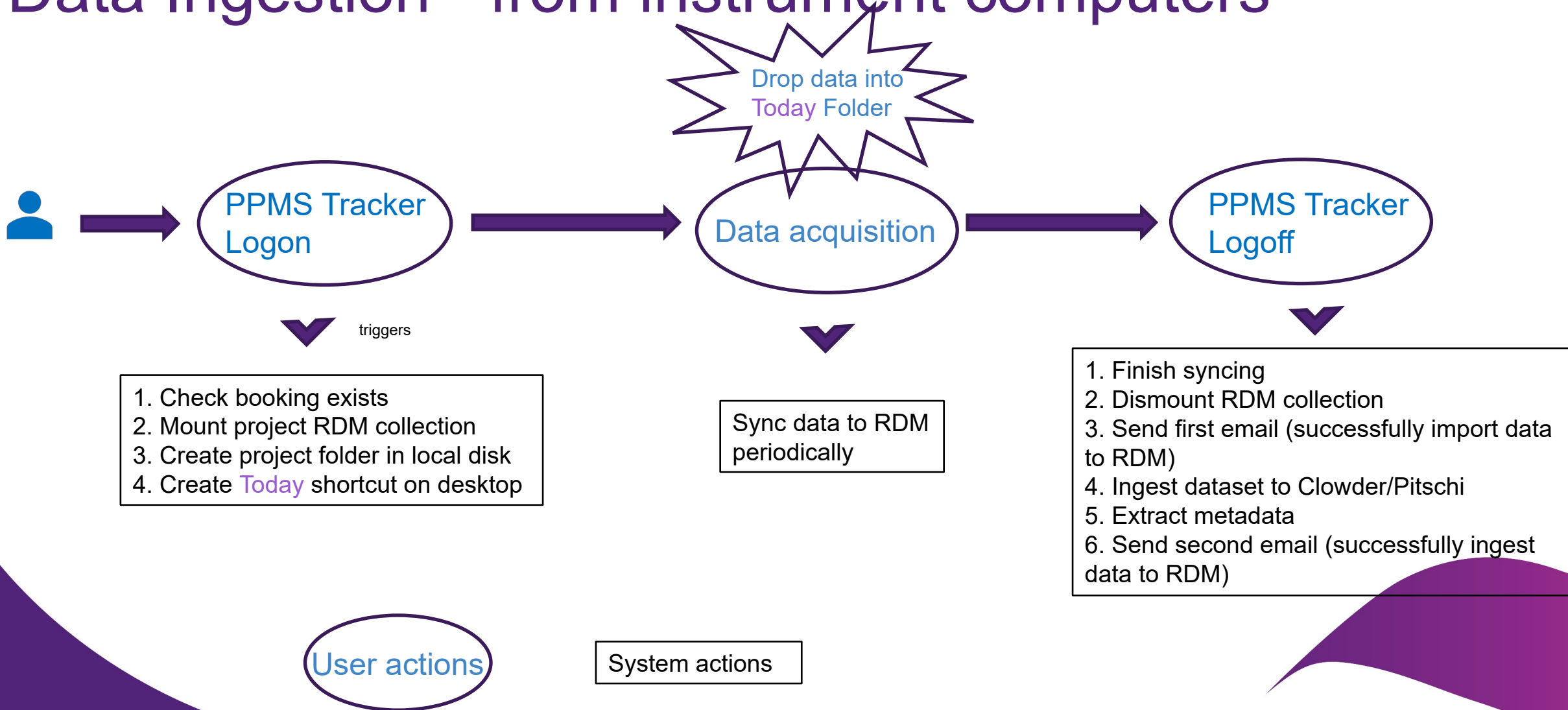
[🔗 Datasets in Space](#)

[★ Follow](#)

Projects with valid UQRDM Q-Collection # synced from RIMS/PPMS daily

Users in synced projects can log into Pitschi (with UQ SSO)

Data Ingestion - from instrument computers



Data Ingestion - from instrument computers

Successfully imported dataset to RDM Summarise 🗨️ 😊 ⏪ ⏩ ↶ ↷

 **pitschi@rcc.uq.edu.au** <pitschi@rcc.uq.edu.au>
 To:  Rubbiya Ali; Cc:  Pitschi

Friday, 15 August 2025 at 12:32 pm

Dear Ali Rubbiya,

Pitschi has successfully imported dataset from **Bruker M4 Tornado XRF** into RDM **CMM4CEED-Q3504** for project **"1176 - PITSCHI - NRIC Data Repository in RIMS"**.

You can view the dataset using the following systems (please allow time for synchronization):




- **Cloud RDM** [here](#).
- **Windows** Enter this text into File Explorer: `\\data.qbi.uq.edu.au\CMM4CEED-Q3504\NRICH-Bruker-M4TornadoXRF\2025\uqrali1_1176_250815_testPITSCHI_M4Tornado.`
- **MacOS** Go to Finder and then on the menu Go-> Connect to Server.... Enter this text: `smb://data.qbi.uq.edu.au/CMM4CEED-Q3504/NRICH-Bruker-M4TornadoXRF/2025/uqrali1_1176_250815_testPITSCHI_M4Tornado.` Please use your UQ username (eg: uq\uqxxxxxx) and password.
- **Linux** Enter this text into File Manager (Caja, Nautilus, etc): `smb://data.qbi.uq.edu.au/CMM4CEED-Q3504/NRICH-Bruker-M4TornadoXRF/2025/uqrali1_1176_250815_testPITSCHI_M4Tornado.` Please use your UQ username (eg: uq\uqxxxxxx) and password.
- **CVL** Look for collection: **Q3504** and then **NRICH-Bruker-M4TornadoXRF\2025\uqrali1_1176_250815_testPITSCHI_M4Tornado**
- **Image Processing Portal** [here](#)

You will receive another email once the dataset has been successfully ingested into Pitschi.

Regards,
Pitschi Team

Data Ingestion - from instrument computers

Successfully ingested dataset Summarise 📄 😊 ↶ ↷

 **pitschi@rcc.uq.edu.au** <pitschi@rcc.uq.edu.au>
 To:  Rubbiya Ali; Cc:  Pitschi

Friday, 15 August 2025 at 12:39 pm

Dear Ali Rubbiya,

Pitschi has successfully ingested dataset from Bruker M4 Tornado XRF into the Clowder space for project "1176 - PITSCHI - NRICH Data Repository in RIMS".

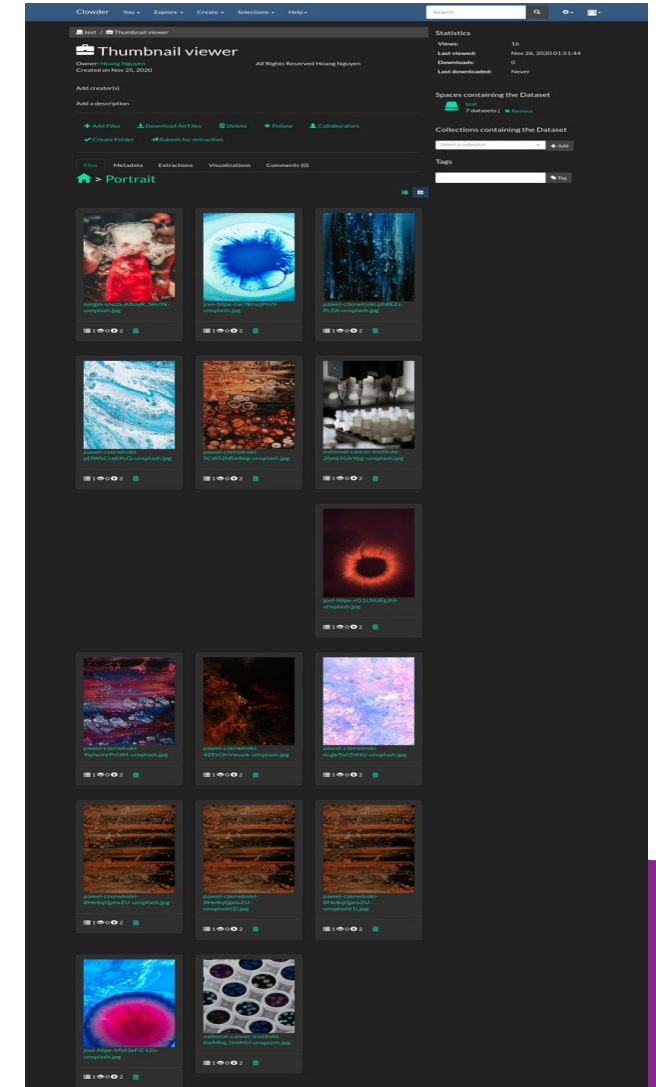
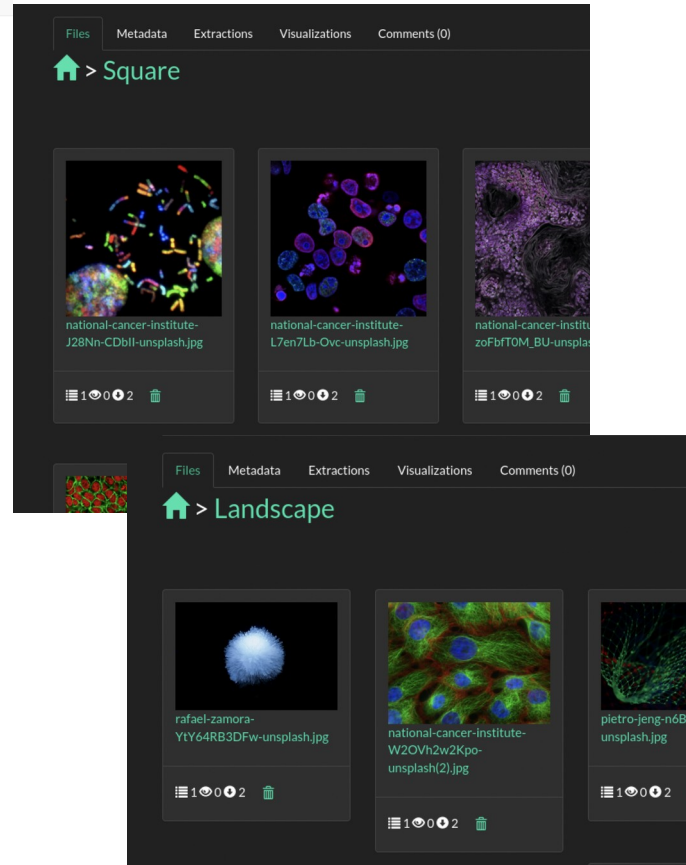
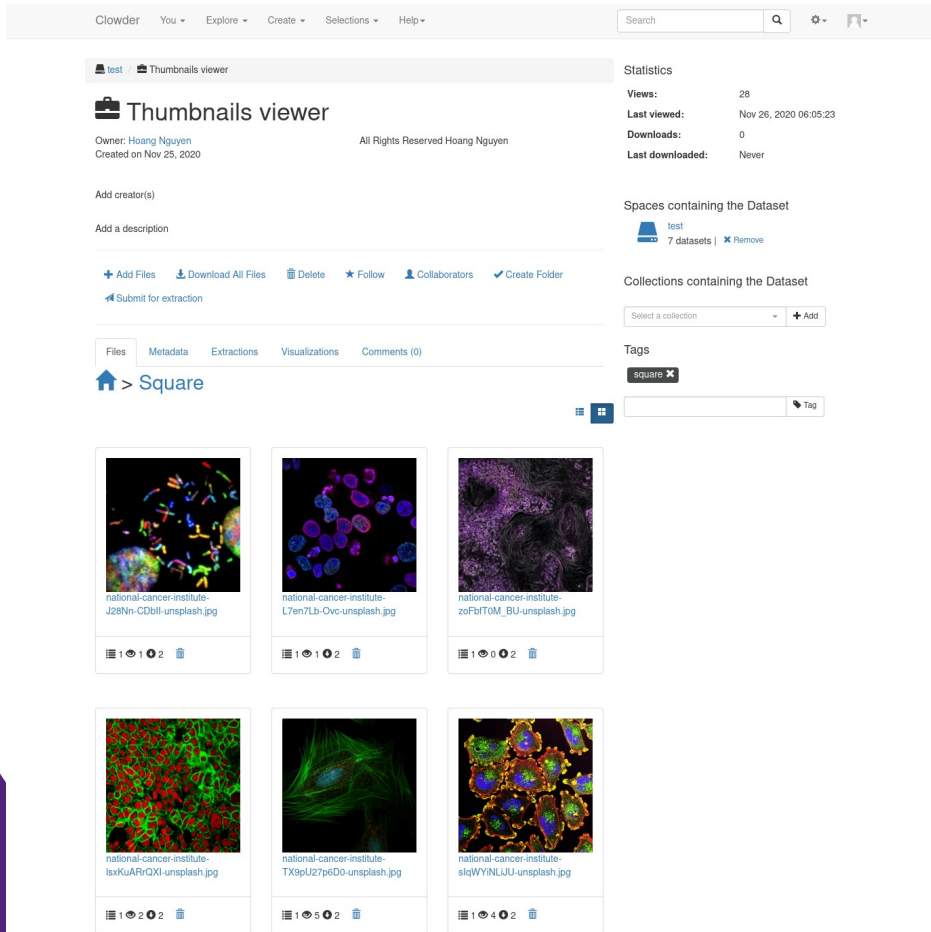
You can view the dataset using the following systems (please allow time for synchronization):

- **Pitschi** [here](#)
- **Cloud RDM** [here](#)
- **Windows** Enter this location into File Explorer: \\data.qbi.uq.edu.au\CMM4CEED-Q3504\NRICH-Bruker-M4TornadoXRF\2025\uqrali1_1176_250815_testPITSCHI_M4Tornado. Please use your UQ username (eg: uq\uqxxxxxx) and password.
- **MacOS** Go to Finder and then on the menu Go-> Connect to Server.... Enter this text: smb://data.qbi.uq.edu.au/CMM4CEED-Q3504/NRICH-Bruker-M4TornadoXRF/2025/uqrali1_1176_250815_testPITSCHI_M4Tornado. Please use your UQ username (eg: uq\uqxxxxxx) and password.
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- **CVL** Go to collection: **Q3504** and then NRICH-Bruker-M4TornadoXRF/2025/uqrali1_1176_250815_testPITSCHI_M4Tornado
- **Image Processing Portal** [here](#)

Regards,
Pitschi Team

Clowder/PITSCHI image browser

<https://pitschi.rcc.uq.edu.au/>



Example: How it clicks together with PIDs

ORCID Integration with User Profiles on the PITSCHI Portal

Pitschi You ▾ Explore ▾ Create ▾ Selections ▾ Help ▾

Rubbiya Ali
Profile Source : Cilogan
r.ali1@uq.edu.au

Institution
Office of the Deputy Vice-Chancellor (Research)

Orcid ID
0000-0003-3241-5692

Followed by 0 people
[Edit Profile](#)

[Spaces](#) [Datasets](#) [Collections](#) [API Keys](#)

Use Spaces to collaboratively work with your team to manage and annotate data.

ORCID Connecting research and researchers

Sign in / Register English ▾

Search the ORCID registry...

Rubbiya Ali

ID <https://orcid.org/0000-0003-3241-5692>

Personal information

Emails & domains

Verified email domains
uq.edu.au

Other IDs

Scopus Author ID: 56220162900
ResearcherID: D-9044-2017

Countries

Australia

Activities

Employment (1)

Centre for Microscopy and Microanalysis: Brisbane, AU

2018-01-01 to present | Data Informatics Manager
Employment

Organization identifiers

ROR: <https://ror.org/00eaqy86>
Centre for Microscopy and Microanalysis: Brisbane, Queensland, AU

Added: 2024-11-05
Last modified: 2024-11-05

Source: Rubbiya Ali

ORCID website automatically connects to the ROR database

ROR Search Registry... ABOUT REGISTRY COMMUNITY BLOG DOCUMENTATION

4 ROR search home page

ROR ID <https://ror.org/00eaqy86>

Centre for Microscopy and Microanalysis

ORGANIZATION TYPES

Facility

OTHER NAMES

Acronyms
CMM (en)

RELATIONSHIPS

Parent Organizations
The University of Queensland
Related Organizations
Microscopy Australia

LOCATIONS

Brisbane (GeoNames ID 2174003), Australia

WEBSITE

<https://cmm.centre.uq.edu.au>

ROR ID of CMM linked with UQ and MA

Example: How it clicks together

Instrument PID and ROR Integration with Datasets on the PITSCHI Portal

The screenshot displays the PITSCHI portal interface for a dataset. The main content area shows the dataset ID 'uqegault_4894_251010' and its owner, Pitschi Clowder. A red box highlights the 'Spaces containing the Dataset' section, which lists '4894 - Emilie Gauthier - Biopolymer films' with 2 datasets. Another red box highlights the 'Metadata' section, showing fields for 'system: CMM-SU350050103', 'author: uqegault', 'projectid: 4894', 'bookingid: 473575', 'PID: https://researchdata.edu.au/hitachi-scanning-electron-su3500-b/1955369', and 'ROR: https://ror.org/00eaqry86'.

Example: How it clicks together with PIDs

Files **Metadata** Extractions Visualizations Comments (0)

Add metadata Basic Advanced

Select field

Metadata

Extracted by <http://clowder.ncsa.illinois.edu/extractors/deprecatedapi> on Oct 10, 2025

system: CMM-SU350050103

author: uqegault

projectid: 4894

bookingid: 473575

PID: <https://researchdata.edu.au/hitachi-scanning-electron-su3500-b/1955369>

ROR: <https://ror.org/00eaqry86>

ARDC Research Data Australia


EXPLORE ABOUT MYR

Search is restricted to Services and Tools

All Fields Search for Services and Tools

Advanced Search Map S

Service or Tool

 **Hitachi Scanning Electron Microscope SU3500-B**

Also known as: SU3500-B
The University of Queensland

Viewed: 1167

Brief description

Lay-person description of instrument (100 words limit)

The Hitachi SU3500 is a conventional tungsten emitter Scanning Electron Microscope (SEM). It is a variable pressure (VP) SEM capable of both high and low vacuum modes of operation. It is fitted with two electron detectors (ET-Secondary and Backscatter for both Low Vacuum and High Vacuum) with a very flexible and user-friendly stage arrangement that holds multiple specimens.

Hardware specifications

ROR Search Registry... ABOUT REGISTRY COMMUNITY BLOG DOCUMENTATION

Search Registry...

<https://ror.org/00eaqry86>

Centre for Microscopy and Microanalysis

ORGANIZATION TYPES
Facility

LOCATIONS
Brisbane (GeoNames ID 2174003), Australia

OTHER NAMES
Acronyms
CMM (en)

WEBSITE
<https://cmm.centre.uq.edu.au>

RELATIONSHIPS

Parent Organizations
The University of Queensland

Related Organizations
Microscopy Australia

Some record data is not displayed in this view. See JSON view for full record data
Record last modified 2025-02-26. Is there an issue with the data on this record? Suggest a change

Example: How it clicks together with PIDs

Good News: First instrument PID published within UQ eSpace last week

<https://doi.org/10.48610/7add080>

Type & Collection	
Type of work	Instrument
Collections	Research Services and Tools

UQ eSpace Search eSpace

Zeiss Sigma VP

Zeiss(2025). Zeiss Sigma VP. The University of Queensland.<https://doi.org/10.48610/7add080>

Additional information

Zeiss	
Zeiss Sigma VP	

General description

This HR-SEM is highly suitable for soft matter and biological samples, as it is equipped with Schottky (thermionic) field emission gun and Gemini ® optics, which enable imaging at low voltage and high resolution. It also has cryo-SEM capabilities, with decoupled stage and shield cooling mechanism, which is more rapid and efficient. Its stage can hold up to 9 samples at once, and it has a resolution limit of approximately 1nm at room temperature conditions. It currently has two secondary electron detectors, and is planned to have a backscattered detector installed in 2025.

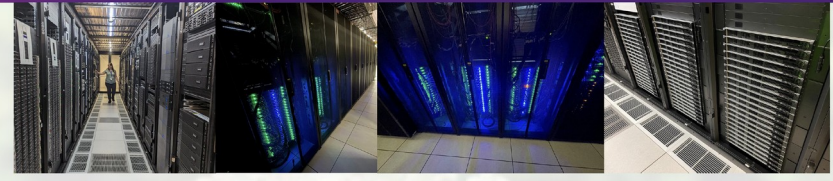
Hardware specification

Electron Gun: Schottky FEG
Gemini Column : beam booster

Publisher	The University of Queensland
Publication Date	2025
Instrument Identifier	https://doi.org/10.48610/7add080
Owner	Centre for Microscopy and Microanalysis
Owner Email	cmm@uq.edu.au
Owner Identifier CMM ROR ID	00eaqy86
Model	Zeiss Sigma
Instrument type	Scanning Electron Microscope

The UQ eSpace team
The UQ research data services team

Linked to HPC at UQ...



HPC Bunya: UQ's new evergreen supercomputer

- We took many of the lessons from Wiener and the feedback from this community.
- ~10,000 cores of cutting-edge AMD Milan and Genoa CPUs.
- 2TB of DDR5 memory per node.
- 200Gbit/sec RDMA networking.
- All the applications you want us to put on there. If you need something, ask!
- The most powerful supercomputer in the Go8.
- Multiple avenues of entry. SLURM scheduler to "submit to the queue" is just one of them.
- 6 different OU's contributed financially so far, above our already generous central funding.
- GPUs include: Nvidia H100s, A100s, L40s and AMD's MI210s.
- 1,100 researchers, 239 different lab groups, 18.4 million jobs run since January 2023.

CRICOS code 00025B 33

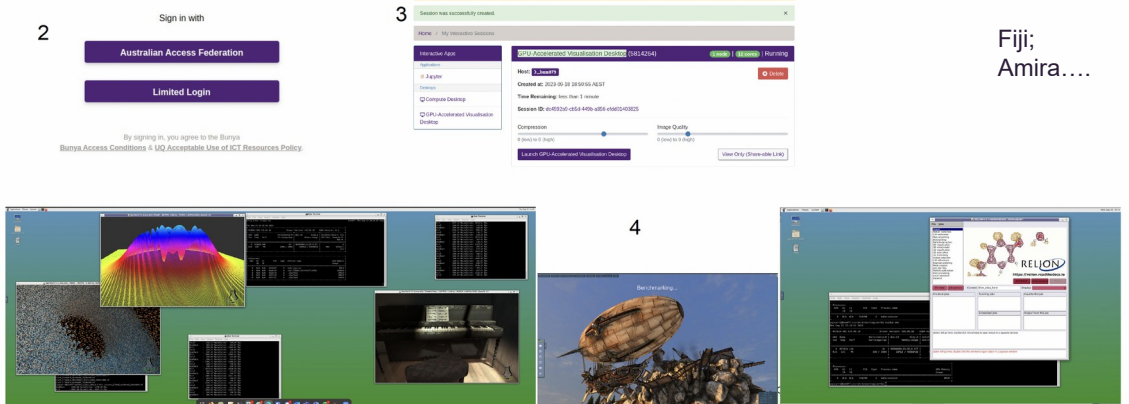
Bunya is more than just a "terminal green screen" supercomputer. It's also a desktop viz powerhouse.

1 <https://bunya-ondemand.rcc.uq.edu.au/>

2 **Sign in with**
 Australian Access Federation
 Limited Login

3 **Session was successfully created**

4 **Fiji; Amira...**



This matters because it is an interactive "on demand" method of using all the power of a supercomputer. Importantly, it allows you to bridge worlds...

UQ HPC OnDemand Files Jobs Clusters Interactive Apps My Interactive Sessions

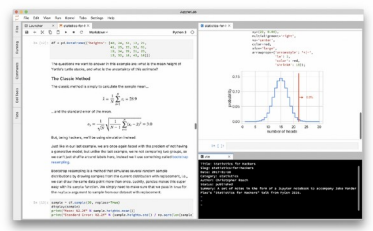

Applications
 Jupyter
 Desktops
 Compute Desktop
 GPU-Accelerated Visualisation Desktop

cryoSPARC

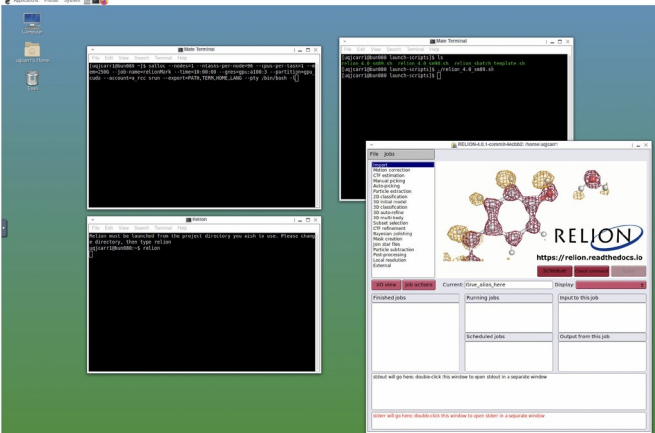
AlphaFold

OPEN OnDemand
 OnDemand provides an integrated, single access point for all of your HPC resources.
 Message of the Day

GPU-Accelerated Visualisation Desktop

...but, we removed some barriers. You can now use both bits of this supercomputer, together.



Use the most powerful visual GPU in the world (L40) for your FP32 desktop workloads.

Use the most powerful MI/AI GPU in the world (A100, H100) for your FP8/16 supercompute runs.

CRICOS code 00025B 40

Rollout progress

Metrics and highlights

	2022	2024	2025
Labs	4	5	5
Instruments	22	>50	>60
Projects	100	400	700
Users	160	280	680
Datasets	270	5,000	12,000
Files	650,000	4,000,000	9,000,000
Data (TB)	80	>420	>1000

Cryogenic electron microscopes are the biggest data generators at CMM

Weekly RDM/Pitschi training is part of the on-boarding process for new users

Key enhancements

Since 2022

Enhancement	Win client	Datamover	XAPI
Training sessions	✓		✓
Supervised / Fee-for-service sessions		✓	
Multiple cameras/detector support		✓	
User feedback option		✓	
Session recovery improvements	✓	✓	✓
RIMS data sync improvements		✓	✓
Remote logging	✓	✓	
Auto-update	✓		
Timestamp (Watermark)/ file		✓	
ROR & PID's integration	✓	✓	

Comment

<https://doi.org/10.1038/s41565-025-02009-9>

The rising danger of AI-generated images in nanomaterials science and what we can do about it

Nadiia Davydiuk, Elisha Krieg, Jens Gaitzsch, Patrick M. McCall, Günter K. Auernhammer, Mu Yang, Joseph B. Tracy, Sara Bals, Wolfgang J. Parak, Nicholas A. Kotov, Luis M. Liz-Marzán, Andreas Fery, Matthew Faria & Quinn A. Besford

 Check for updates

Generative AI has made it trivial to generate fake microscopy images that are indistinguishable from real images, even for experts. As researchers in nanoscience, it is time for us to face this reality and discuss strategies to conserve the integrity of our discipline.

nanomedicine, and so on. Regrettably, there is a history of scientific misconduct with microscopy methods, generally linked to cropping and pasting images of nanostructures to give an unrepresentative or wrong impression of sample quality. However, this problem has recently become more serious because generative artificial intelligence (AI) is now capable of creating customized fake derivatives of any microscopy or image-based technique. These AI-generated images are virtually indistinguishable from real microscopy images even to a trained human

What next...



Clowder 2 features

User highlights

- New web interface**
- Shareable links**
- Dataset versioning and history**
- Custom metadata**
- Mandatory metadata**
- Collaborator groups**
- Jupyter integration**

Clowder Search

Visualizations User Metadata Machine Metadata Analysis Analysis History Version History



VIEW SHARE LINK

Visualization Information

3.33 MB
Size

image/png
Content type

2024-07-23 10:45:24
Updated on

nlsa.image.preview
Uploaded as

Chen Wang
Uploaded by

669fd01478f322201e18a19
Visualization id

None
Descriptions

Description of the visualization

MORE SHARE LINK

A gateway to the Virtual Cell/ Cells/ Organoids/ Tissues...? Digital Twins

What next: From Implementation to Innovation

- Adding a cool feature: **embedding full metadata**—like provenance, instrument details, PIDs, and a unique data ‘fingerprint’—right into exported image files for sharing with external collaborators outside PITSCHI, tracking every change to raw data stored on UQ RDM!
- Enhancements include **expanded data synchronization capabilities** to support a broader range of instruments and onboarding for commercial users and new third-party laboratories...
- Planning **substantial infrastructure and application upgrades** to enhance Pitschi's capabilities, aiming to improve user experience, expand functionality, and ensure robust support across all sites
- This update highlights **our commitment to advancing data management** in microscopy, driving greater efficiencies, and supporting the research community with reliable, cutting-edge tools

Thank you

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The UQ eSpace team

CRICOS 00025B • TEQSA PRV12080 The UQ research data services team

QRIScloud, MeDICI, RIMS, and RDM teams

ARDC Australian Characterisation Commons at Scale