

Building a Cooperation Network

Germany-Jordan

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In cooperation with



WHY?



Jordan



Germany

Scientific excellence thrives on exchange and competition
among the world's best minds

**Heritage
specialists**

Archaeologists

**Museum
specialists**

**Heritage
Science at
the
Synchrotron**

**Synchrotron
scientists**

**Natural
scientists**

**Conservation
scientists**

HOW?



Jordan



Germany

What we have:

- Synchrotron facilities
- Cultural heritage (CH), and CH institutes
- Academic and research institutes
- Professionals in natural, archaeological, and heritage sciences

What we need:

- Perform science with excellence
- Preserve heritage with excellence
- Motivation
- Dedication

How?

- Raising awareness about heritage science at synchrotron
- Interdisciplinary cooperation nationally, regionally, and transregionally
- Cooperation network

Raising awareness about Heritage Science at the Synchrotron

April 2024

Expert Workshop Series

HZB Helmholtz Zentrum Berlin

Cultural Heritage and Archaeometry

BESSY III

The Materials Discovery Facility

Taking Soft- and Tender X-ray Science and Innovation to a New Level

November 2024




PETRA IV.
NEW DIMENSIONS


13 – 14 November 2024

Focus on Cultural Heritage
Workshop



December 2024

In cooperation with 

**Draft Agenda: Bridging Natural Science and Heritage in the Middle East:
German Institutions, Archaeology, Artefacts, and SESAME**

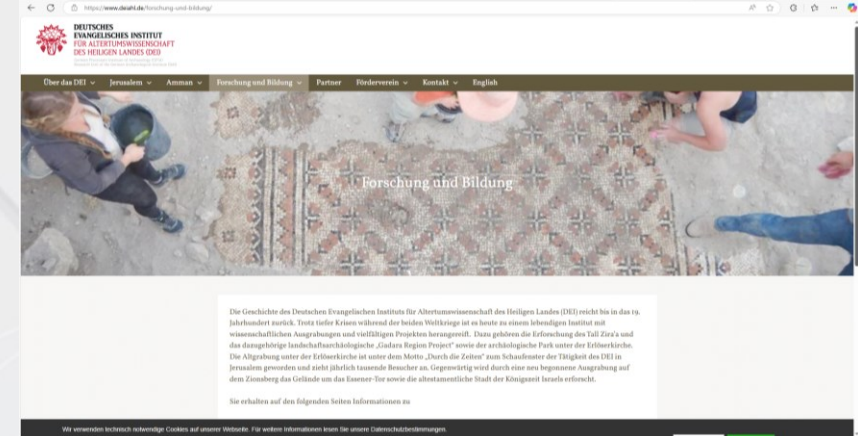
Heritage Science at the Synchrotron, where do we stand?

Examples of German–Jordanian cooperation projects in CH

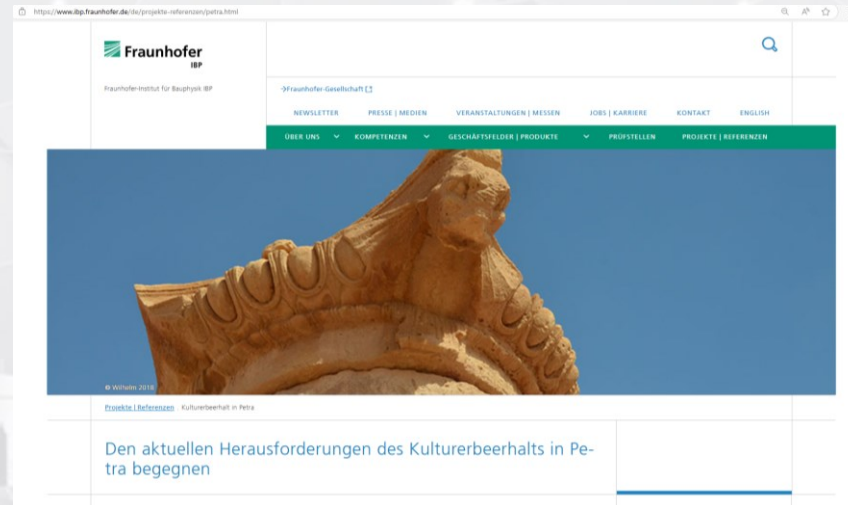
Petra Painting Conservation Project (PPCP)



German Protestant Institute of Archaeology (GPIA)



Fraunhofer-Institut für Bauphysik IBP



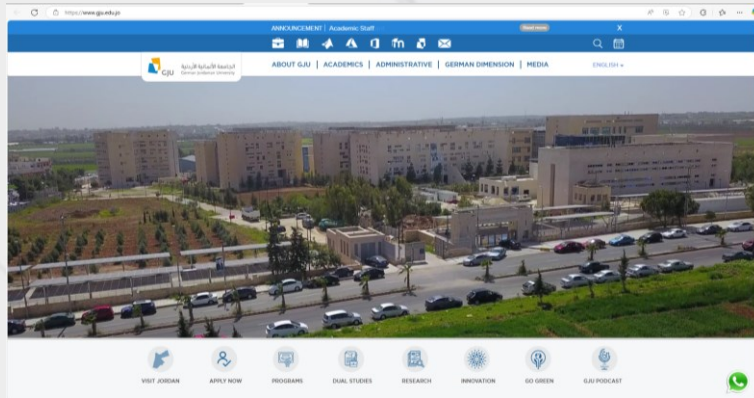
UNESCO and GIZ



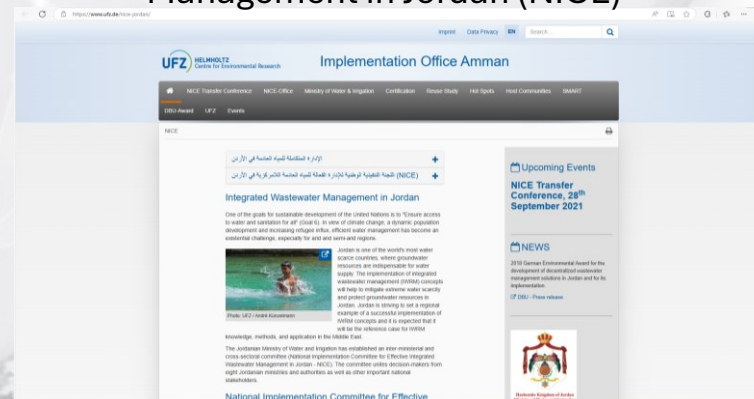
Heritage Science at the Synchrotron, where do we stand?

Examples of German–Jordanian cooperation projects in natural sciences

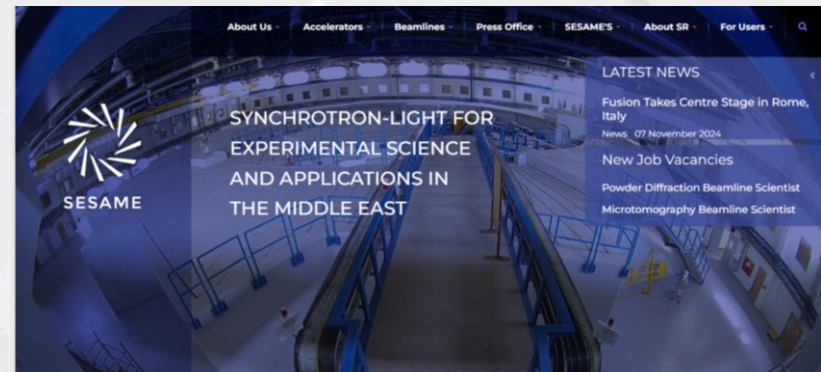
German Jordanian University (GJU)



National Implementation Committee for Effective Integrated Wastewater Management in Jordan (NICE)



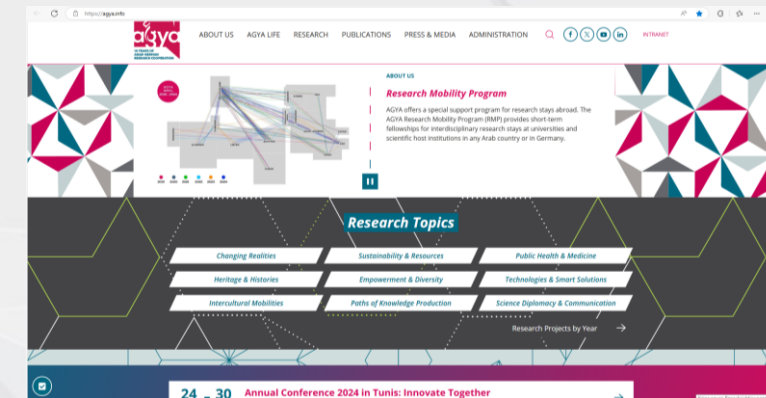
SESAME – The first synchrotron radiation facility in the Middle East



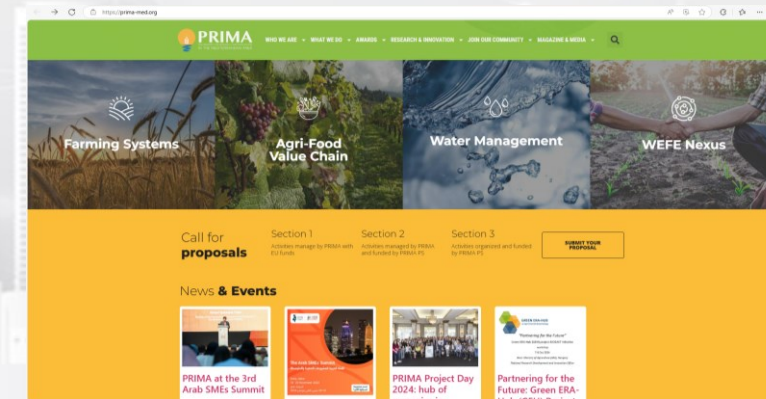
HESEB Helmholtz-SESAME
Soft X-Ray Beamline
for SESAME



Arab-German Young Academy of Sciences and Humanities (AGYA)



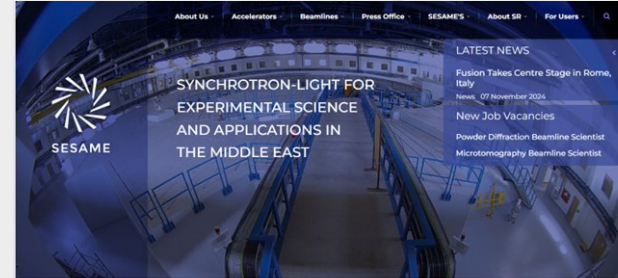
Partnership for Research and Innovation in the Mediterranean Area (PRIMA)



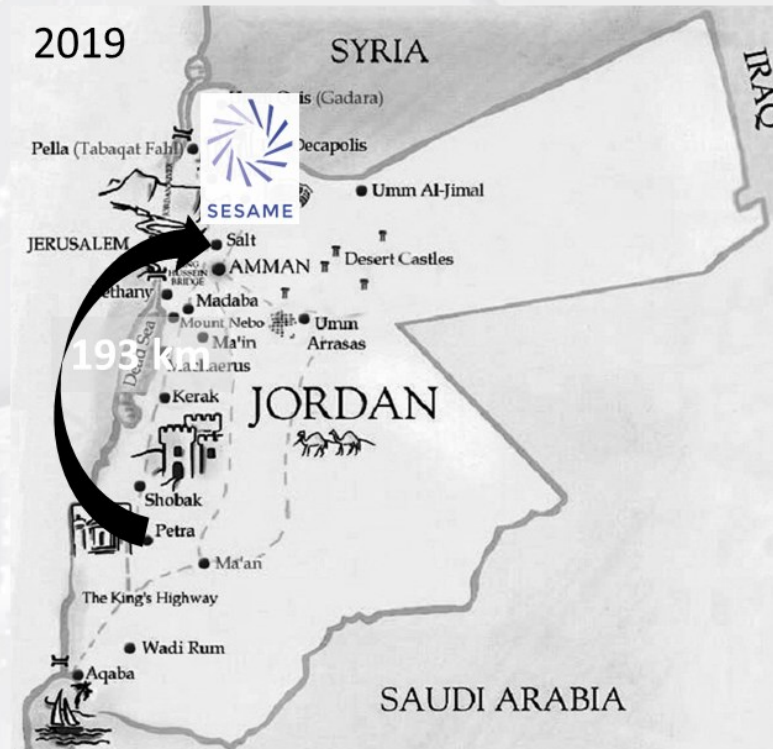
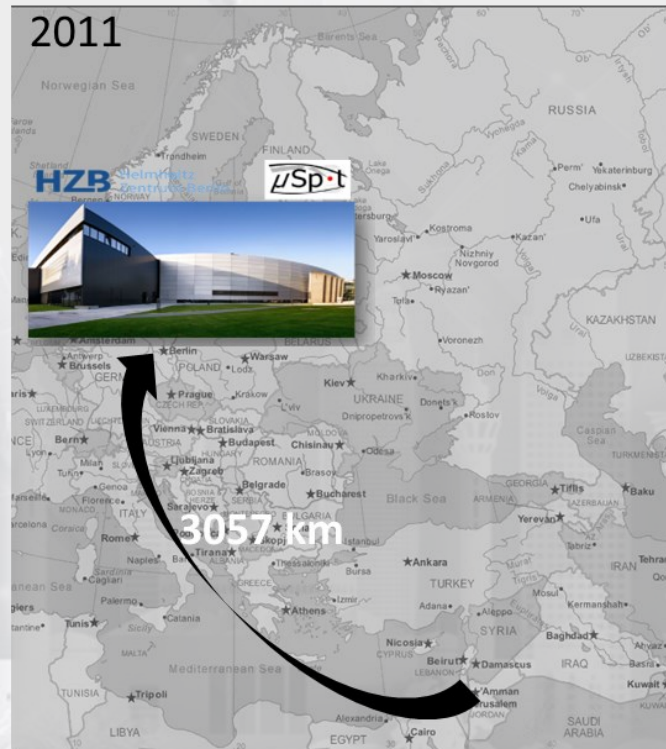
Heritage Science at the Synchrotron, where do we stand?

PPCP

SESAME



**Heritage Science
at the Synchrotron**



**Across time and
borders**

Across scales ...

PPCP@SESAME: Lab and synchrotron analysis of Petra's gilded wall paintings

Identification of gilding materials and their distribution -original & altered- using SEM-EDX, and SR-2D- μ FTIR

Varnish (+ oxalates)

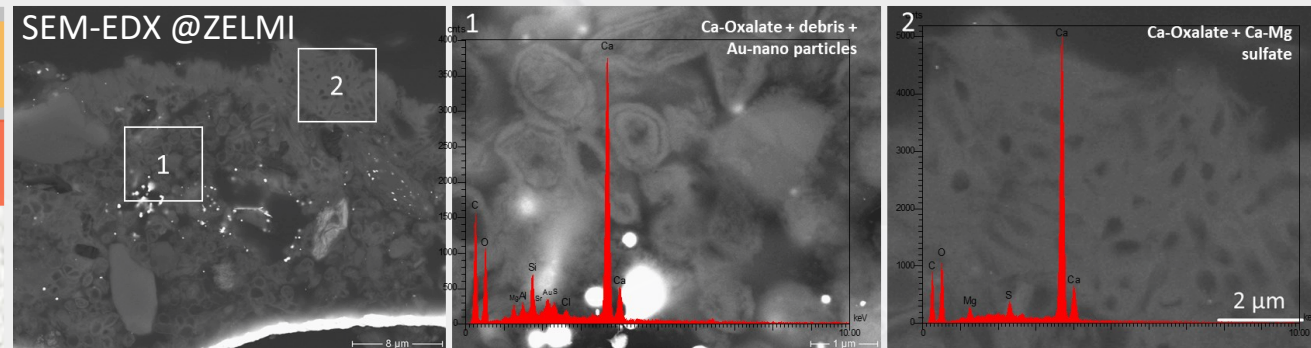
Gold layer (186 – 850 nm \pm 10 nm)

Gum Arabic/Animal Glue

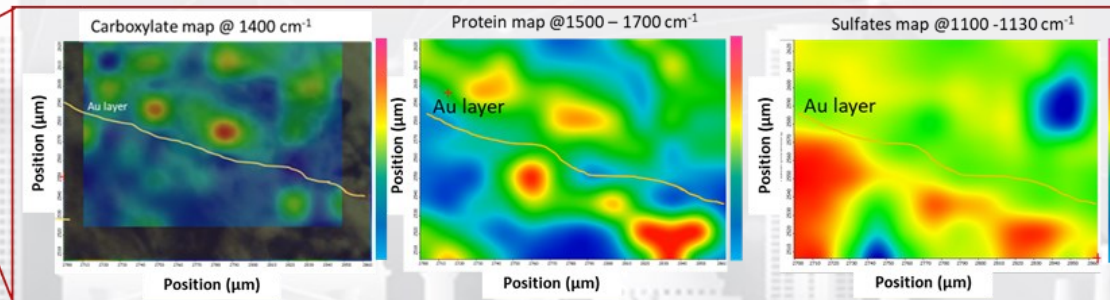
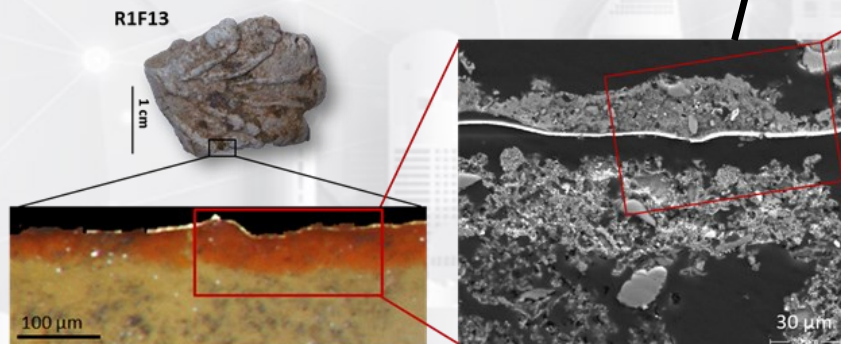
Iron based layer (6 – 35 μ m \pm 1 μ m)

CaSO₄ matrix

SEM-EDX @ZELMI

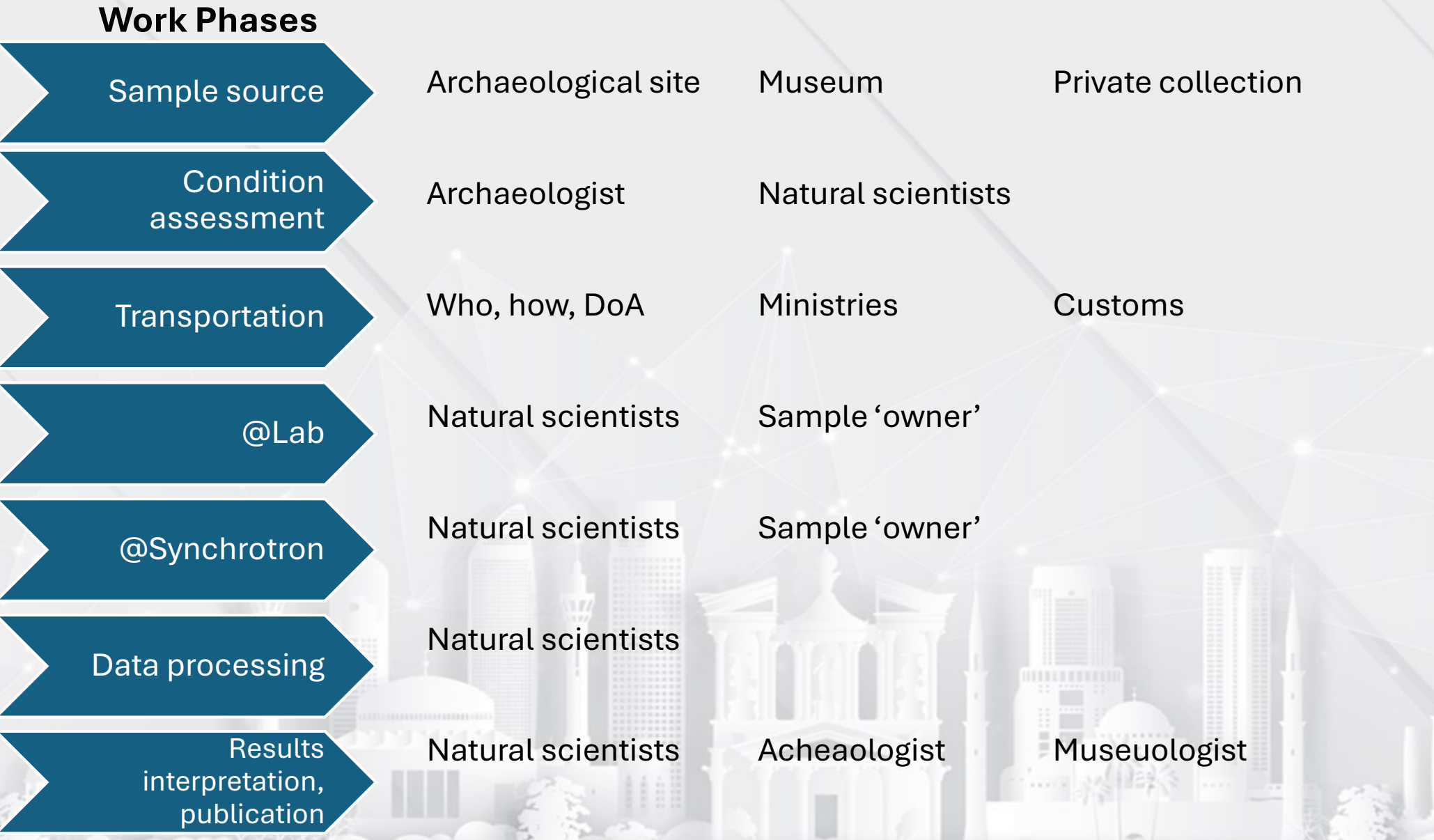


SR 2D- μ FTIR @EMIRA beamline (SESAME, Jordan)

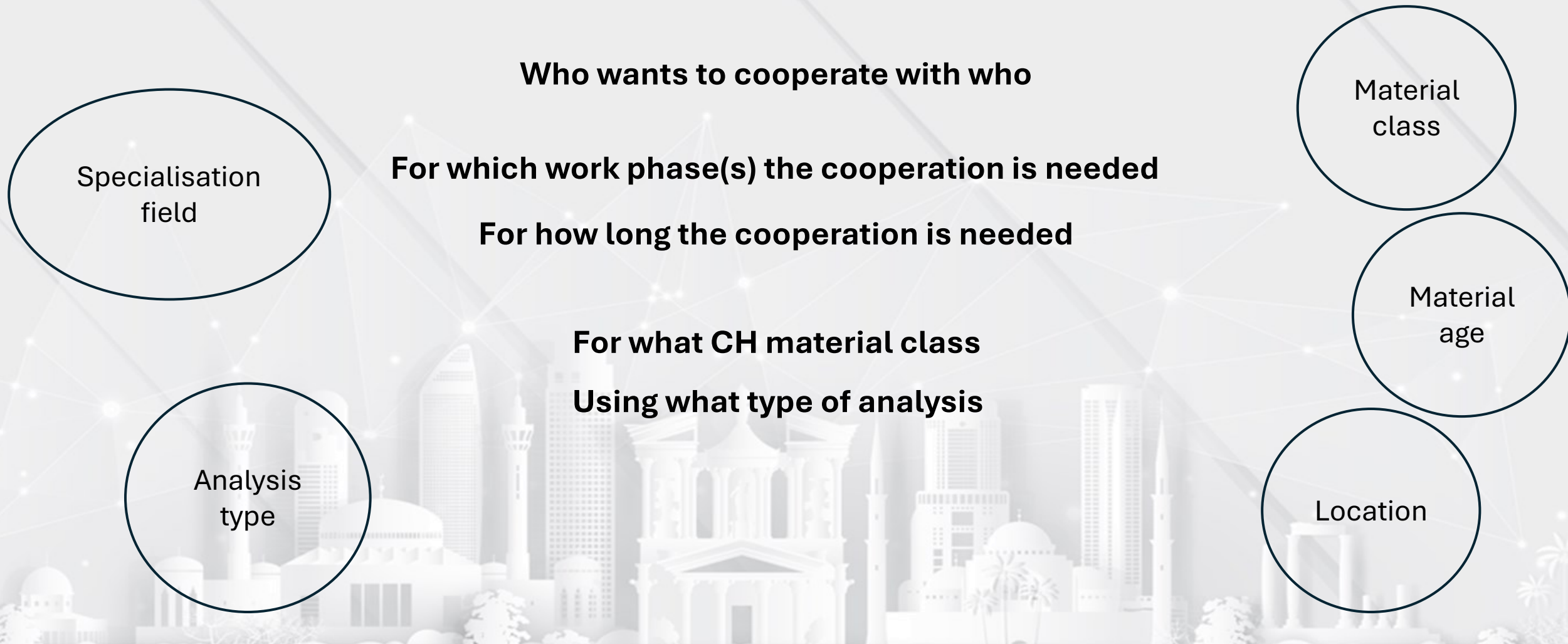


EMIRA beamline@SESAME: 650 – 4000 cm⁻¹, 10¹³ photons/s / 0.1 % bandwidth, resolution 0.2 cm⁻¹, beam size 5x5 μ m² HxV. Map size 120 x 165 μ m².

Heritage Science at the Synchrotron: Interdisciplinary cooperation



Heritage Science at the Synchrotron: Cooperation network



Final Remarks



Interdisciplinary cooperation
and networking

**Heritage
Science at
the
Synchrotron**

- Reaching out for CH and natural science specialists → more workshops
- Online database of CH researchers in Jordan and Germany (as a start)
- Establishing cooperation nuclei

**Thank you for your attention
and let's discuss this more**