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JENA



Time
Machine

1950 1960 1970 1980 1990 2000 2010

2020 2030 2040 2050 2060 2070 2080 2090 2100

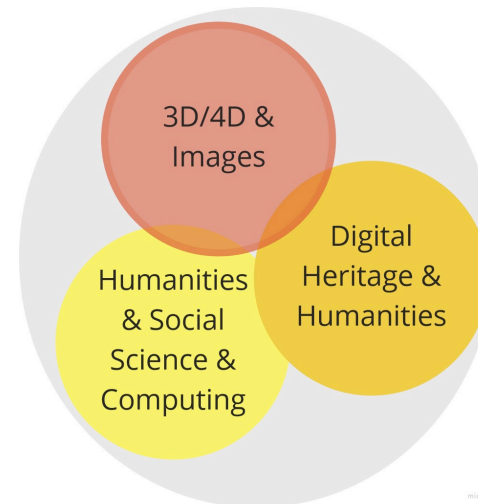
Sander Münster

Scope and prospects of 3D for Cultural Heritage

The Jena 4D R&I Group



30 members (5/2025): 4 PostDocs, 7 PhD Students
Disciplinary backgrounds: e.g. History Studies,
Computing, Geosciences, Design, Education / Social
Sciences, Business Studies, Policy Studies,
Linguistics
International: Asia, Africa, Europe

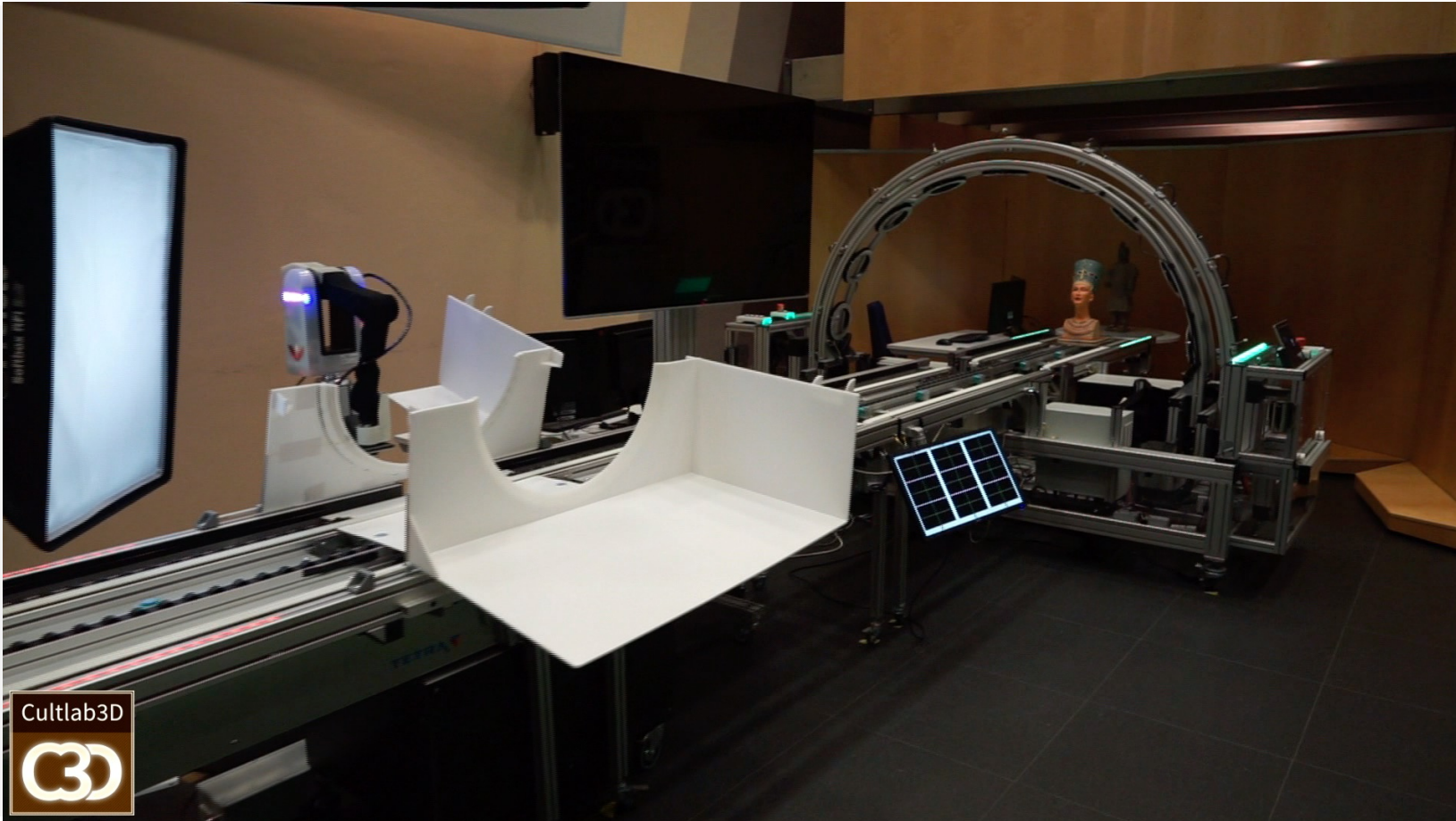


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A 3D rendered image of a mechanical assembly. It features a grey base plate with several circular holes. Two orange hexagonal bolts are visible, one of which is partially inserted into a hole. To the left, a ring of orange spheres is arranged around a central circular opening. The scene is set against a white background with a dark grey shadow beneath the base plate.

Challenges for 3D Modelling of Cultural Heritage

3D Modelling Challenges: Automated 3D Scans

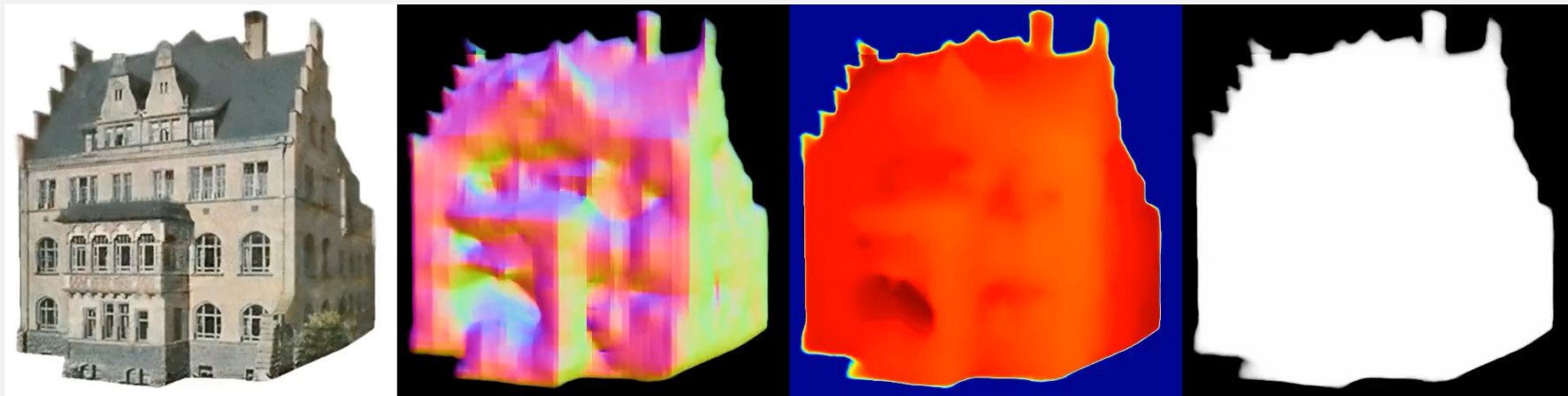


Generative AI for 3D creation



3D mesh generation from single imagery: Recent approaches as multimodal transformer architectures are proposed to generate 3D meshes from single images or even textual prompts.

Example from our Threestudio/Zero123 pipeline



3D Modelling Challenges: Image fusion



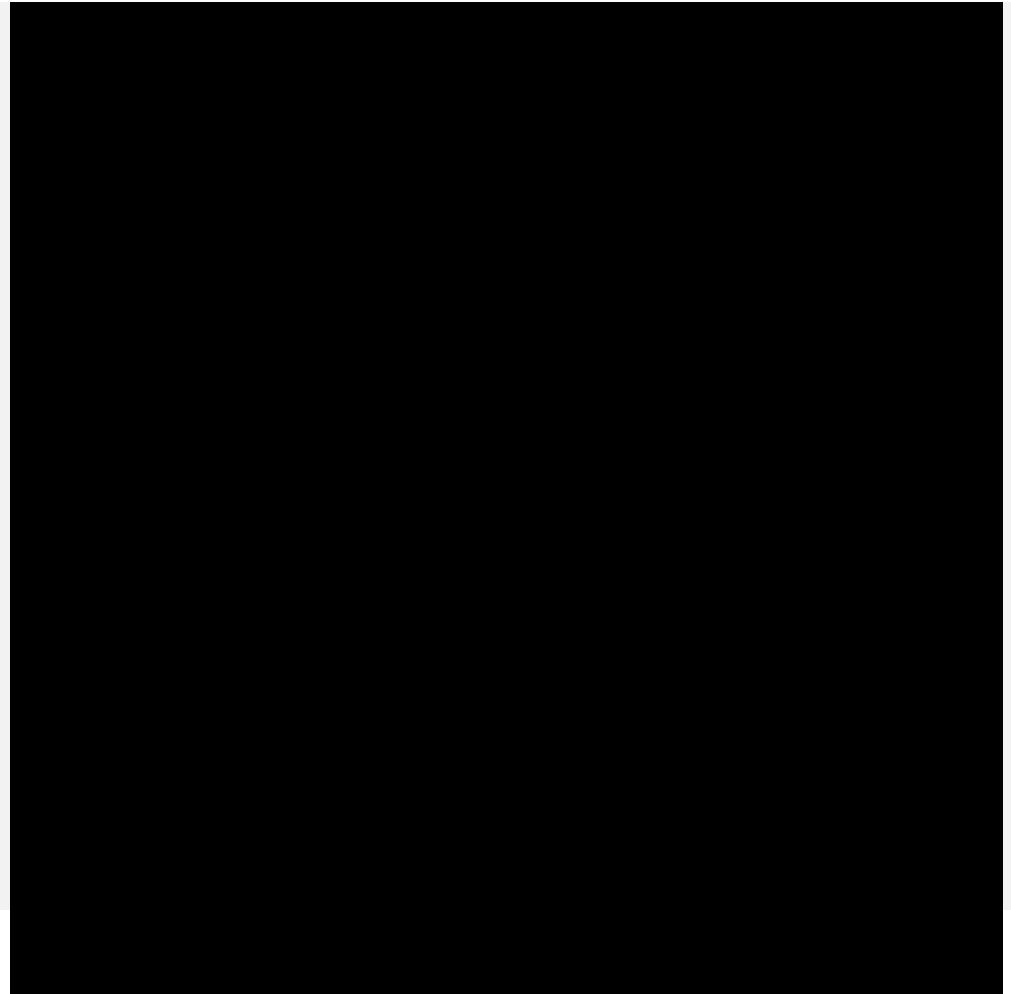
A 3D architectural rendering of a classical garden. In the foreground, a large, ornate stone fountain sits on a tiered pedestal. Behind it, a wide set of stone steps leads up to a higher level. The garden is enclosed by a white balustrade with decorative balusters. Several palm trees are planted in circular pits along the balustrade. In the background, a tall, slender monument or obelisk rises above the trees. The scene is brightly lit, casting soft shadows on the ground.

Challenges for Heritage Visualization

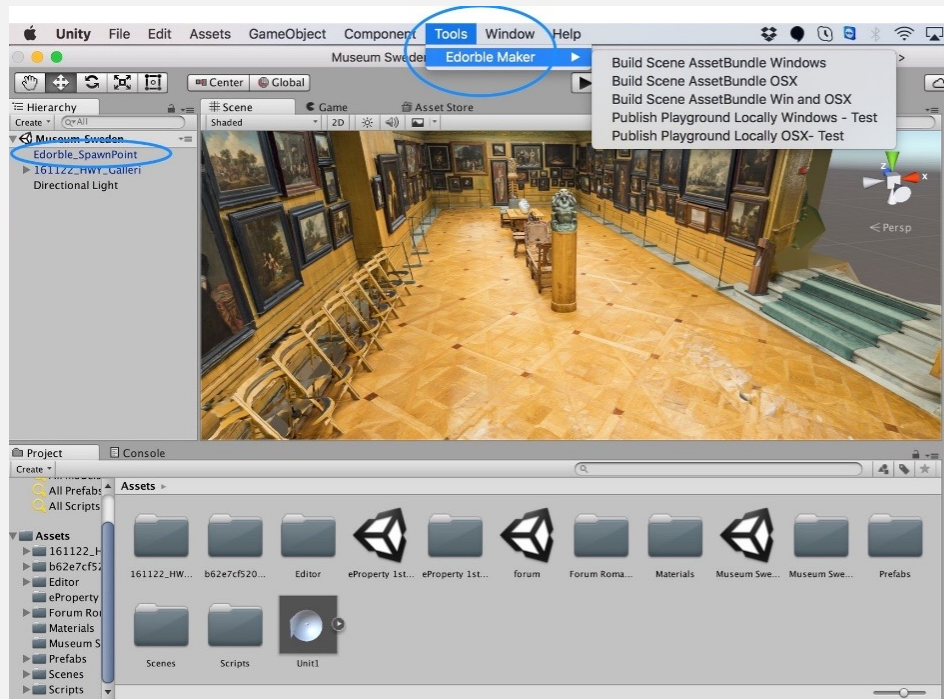
Blended experiences

Ubisoft Immersive Game Assassin's Creed aux
Invalides

<https://www.youtube.com/watch?v=kTTBID3fzzY>



Game Engines & Serious Gaming



Heritage content in Unity (Source: <https://www.linkedin.com/pulse/create-social-vr-worlds-using-unity-3d-edorble-creator-gabe-baker/>), Ubisoft Assassins Creed (Source: Ubisoft)

Spatial visualisations



Holographic projection
(Münster 2019)



Copter based 3D-“Pointcloud”
(Ars Electronica Linz – 2016)

Rapid Manufacturing



3D printing via Fused Filament Fabrication

The Dresden palace precinct (1678), model for the exhibition (© Architectura Virtualis GmbH)



3D printing via
Digital Light Processing

The Foundation of Medieval
Cities, exhibit (© Architectura
Virtualis GmbH)



Challenges for User Engagement

Storytelling

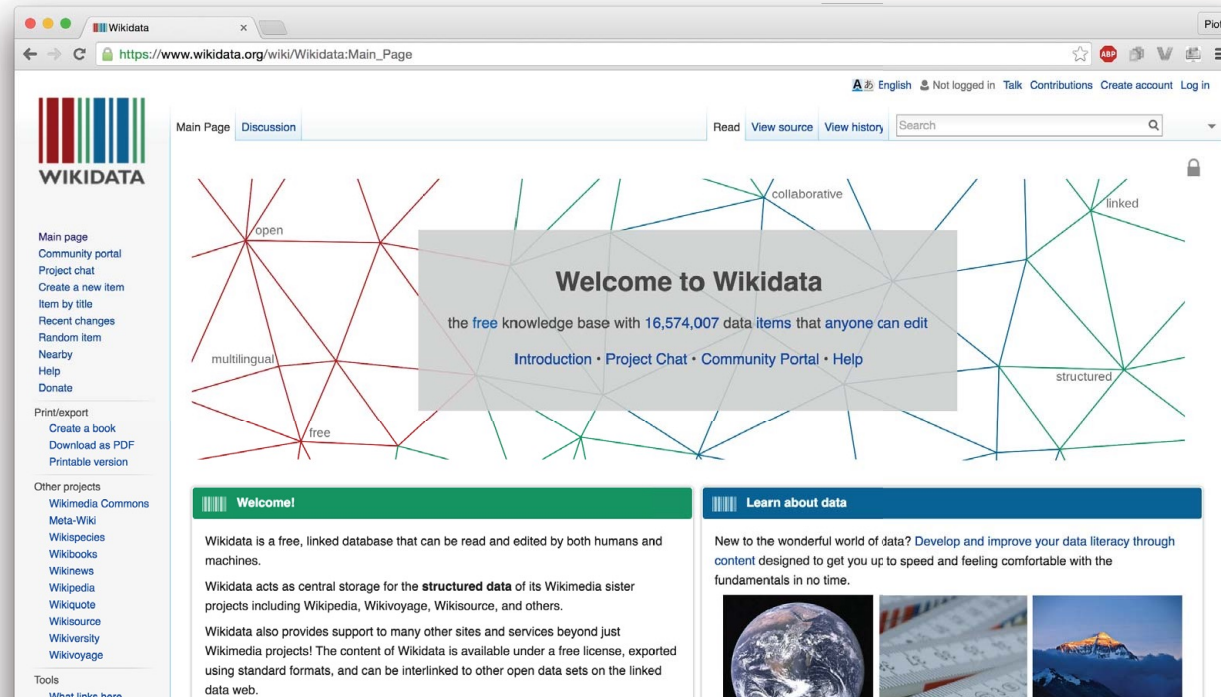
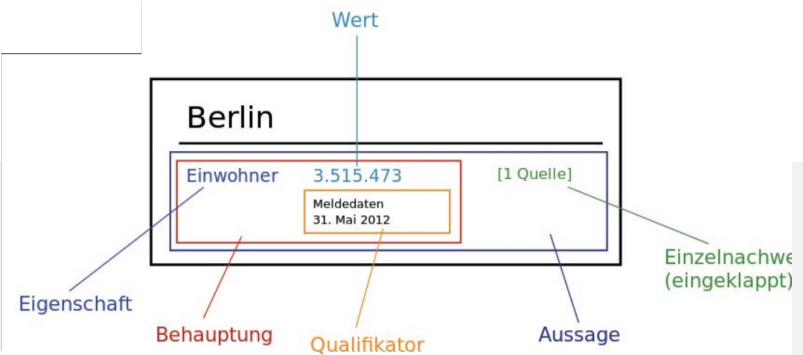
<https://www.google.com/culturalinstitute/exhibit/visualising-angkor/AR6A-vMq?hl=en-GB>



Visualizing Angkor - Tom Chandler


Citizen Science

www.wikidata.org (since 2012)





User generated 3D models

<https://sketchfab.com/models/311d052a9f034ba8bce55a1a8296b6f9>

 Sketchfab

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Van gogh Room  STAFF PICK

★ 455 👁 135.2k 📄 829

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95 comments

 by **ruslans3d** PRO

+ FOLLOW

ABOUT THIS MODEL

Van gogh Room

Art Spotlight Article - <http://blog.sketchfab.com/post/129846505579/art-spotlight-van-gogh-room?>link to finished app - <https://play.google.com/store/apps/details?id=com.artalive3d.livewallpaper>

Here the original painting:





Challenges for Heritage Data

<http://www.drematrix.de/projects/dokuvis-a-documentation-system-for-digital-reconst/>

[Zurück zum master](#)

10

10

11

10

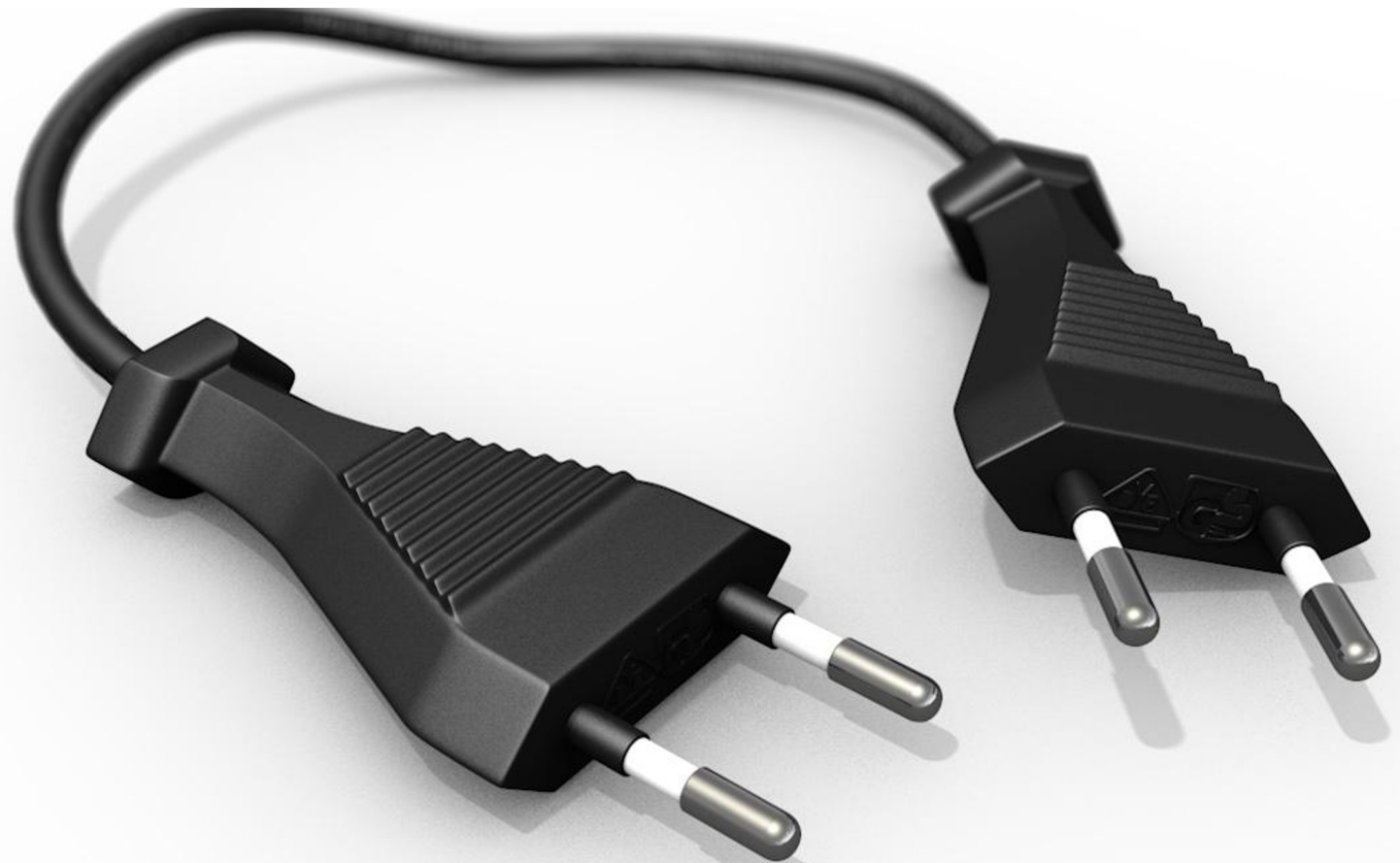
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- Das Gelände des heutigen Theaterplatzes optimal ausfüllender Schlossbau
- Aufgesockelt sich präsentierende, monumental wirkende und von kühler Noblesse geprägte Schauseite zur Elbe
- Negativ auffallend ist das gewaltige Satteldach über dem ebenseitigen Galerienark in Vergleich zu den daher niedrig wirkenden Seitenflügeln
- Starke Kontrawirkung der monumental-klassizistischen Schlossarchitektur zur vergleichsweise kleinteiligen Zwingerarchitektur, lässt den Zwingerhof gleichsam als eine Art "Vorgarten" erscheinen
- Der in der Vereinzelung der aus dem Entwurfprozess resultierenden Auffriststellung (LIDS Plansammlung, II 8 III B, 4) sich kapriziös gebendes zwingerseitiges Kuppelbau wirkt in der Zusammenschau mit dem dazu vergleichsweise zwergenhaften zentralen Kronentor als Gegenüber geradzue monumental, wenn

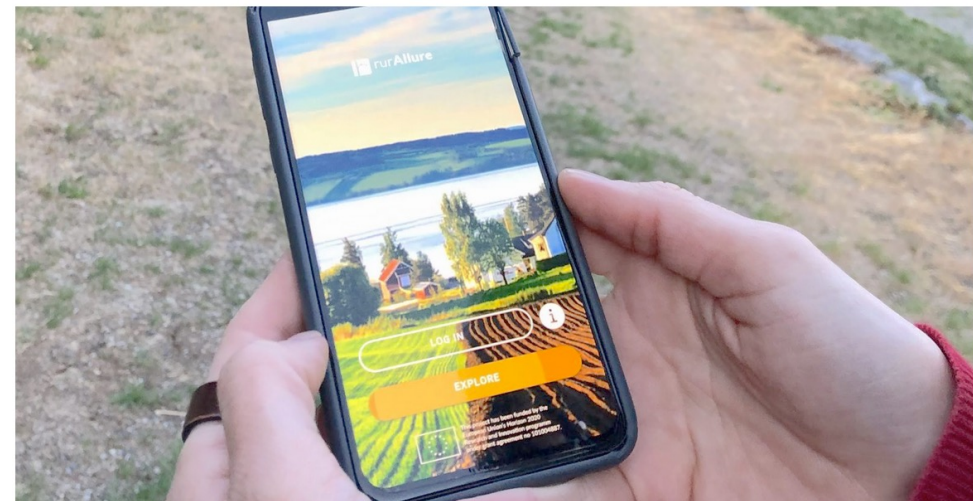
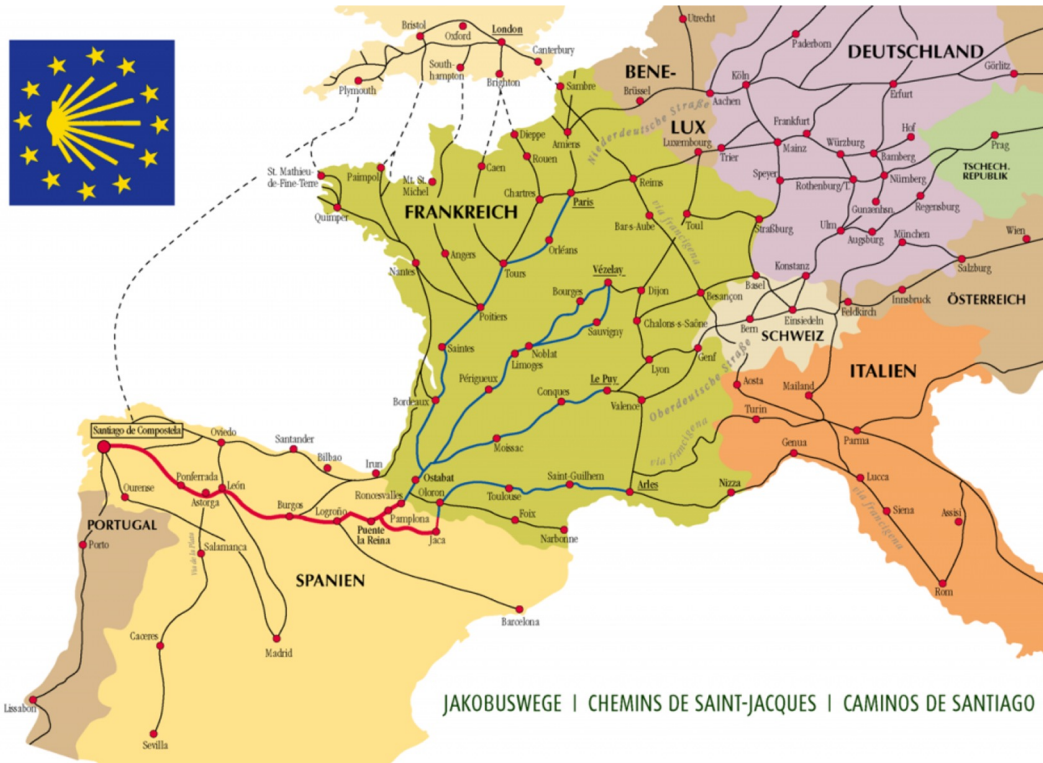




Challenges for Application

Visitor guiding

Database of over 3,500 heritage sites





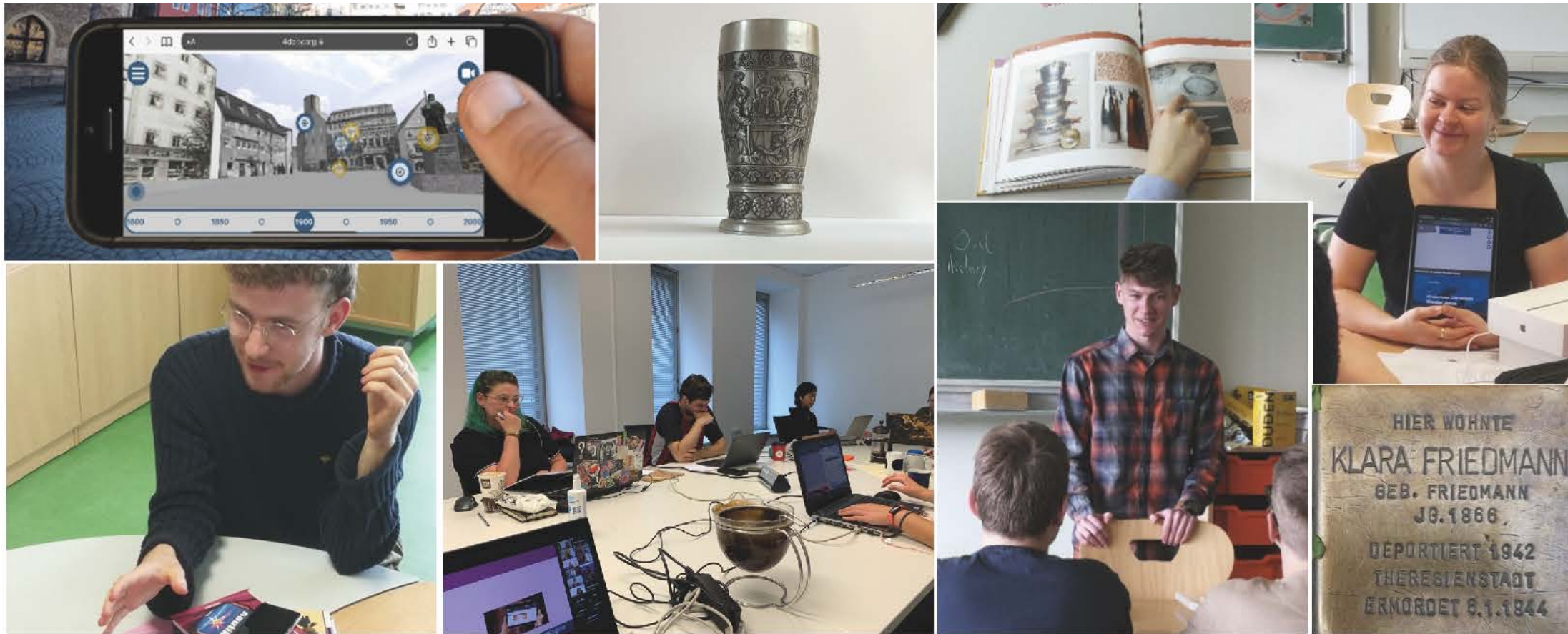
Co-collection

Rephotography of the city
contest:

4000+ images (2022)

600+ images (2024)





Education

9 courses - designed and run by students

6 schools (primary schools, community schools) and teaching facilities

14 students from various disciplines

110 pupils aged 7-16 years



Co-funded by
the European Union