Exploring 3D Reconstruction at the Brno Institute of Social Sciences: A Transformative Training Journey

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Earlier this month, I, along with 17 other participants, had the privilege of attending a week-long training on **3D reconstruction** at the Brno Institute of Social Sciences in the Czech Republic. What began as a personal adventure quickly evolved into one of the most exciting and enlightening academic and professional experiences of my career.

Day 1: Anticipation and Departure

The journey began with little sleep but plenty of anticipation. The night before my flight had been spent with friends, enjoying live rhumba music and the mesmerizing voice of a local performer. Despite my fears of oversleeping, my excitement for the trip stirred me

awake before the alarm. With coffee in hand and a suitcase packed, I was ready for a week that would stretch both my mind and skills.

Day 2: From Prague to Brno

Navigating Prague's transport system was my first test. The language barrier made simple tasks, like buying tram and train tickets, surprisingly complex. Though, with the kind help of fellow passengers, I eventually made it to Brno. The train ride, full of seat swaps and linguistic puzzles, reminded me that travel is as much about patience as it is about arrival.

That evening, with some participants in the training, we explored some of Brno's historic sites like the town hall and the haunting Ossuary beneath the cathedral. It was the perfect prelude to a week of thinking deeply about preservation, documentation, and memory.

Day 3: Foundations of 3D Modelling

The training began with theory. We were introduced to the **fundamentals of 3D reconstruction**, covering methods such as:

- **Image-based modelling**
- **3D scanning**
- **Computed tomography (CT)**
- **3D printing**

We also unpacked the anatomy of a 3D model: point clouds, wireframes, meshes, and the importance of tie points. The discussions made clear that while the technology is complex, the core principle remains simple: *more angled imaging and more precision yield better models.*
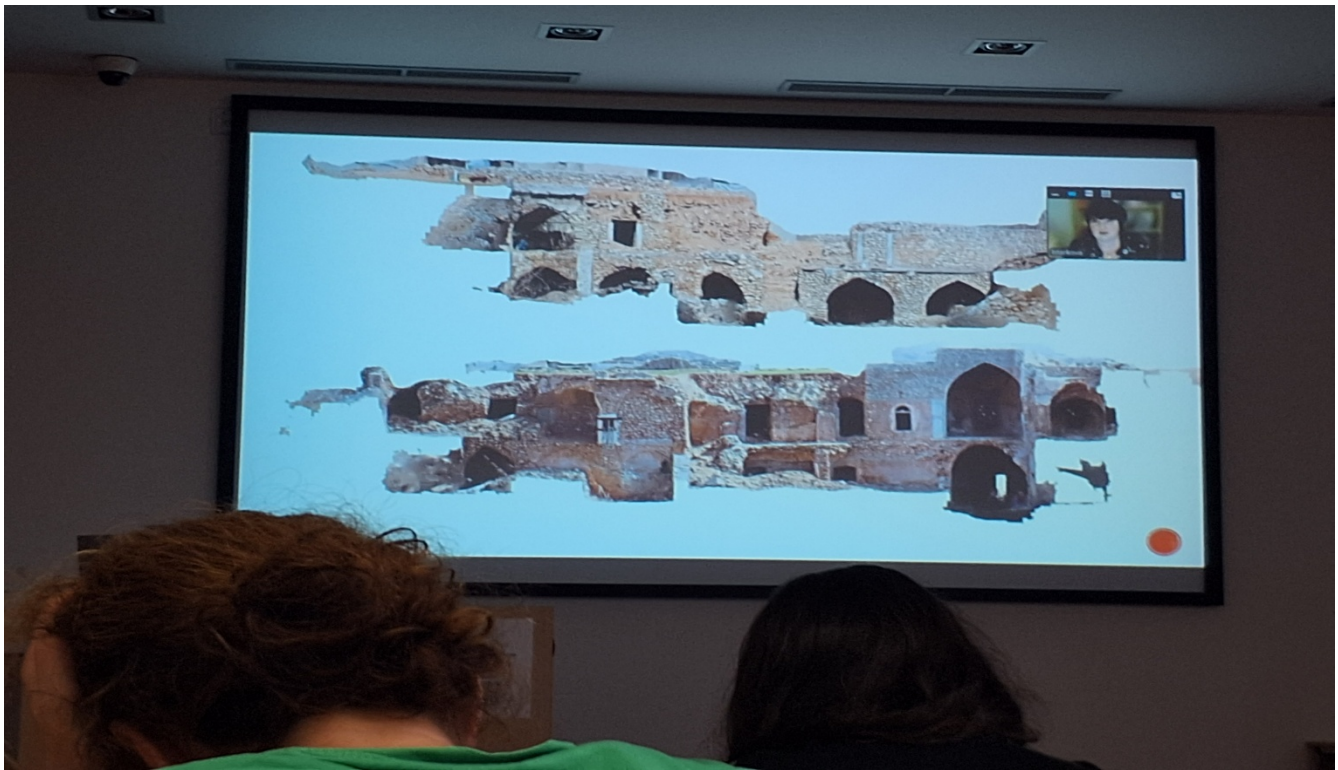
Day 4: Practical Documentation

Theory gave way to practice. Armed with cameras and patience, we learned the meticulous process of documenting monuments; from capturing photographs in the field to processing them in RealityCapture software. Creating both dense and simplified

models tested our focus, but it also proved immensely rewarding to watch raw images transform into tangible 3D forms.

'Patience *is a virtue you must to have.'*

## Day 5: Exploring Methods and Tools

We explored various scanning techniques; ranging from CT scanning, and **LiDAR-enabled iPhones.** We then delved deeper into advanced handheld systems like the **Artec LEO** and SLAM-based approaches. The emphasis was not just on learning how these tools work, but also on recognizing the errors we should avoid in future practice. '*You shall go wrong; though there are errors you need not repeat'*
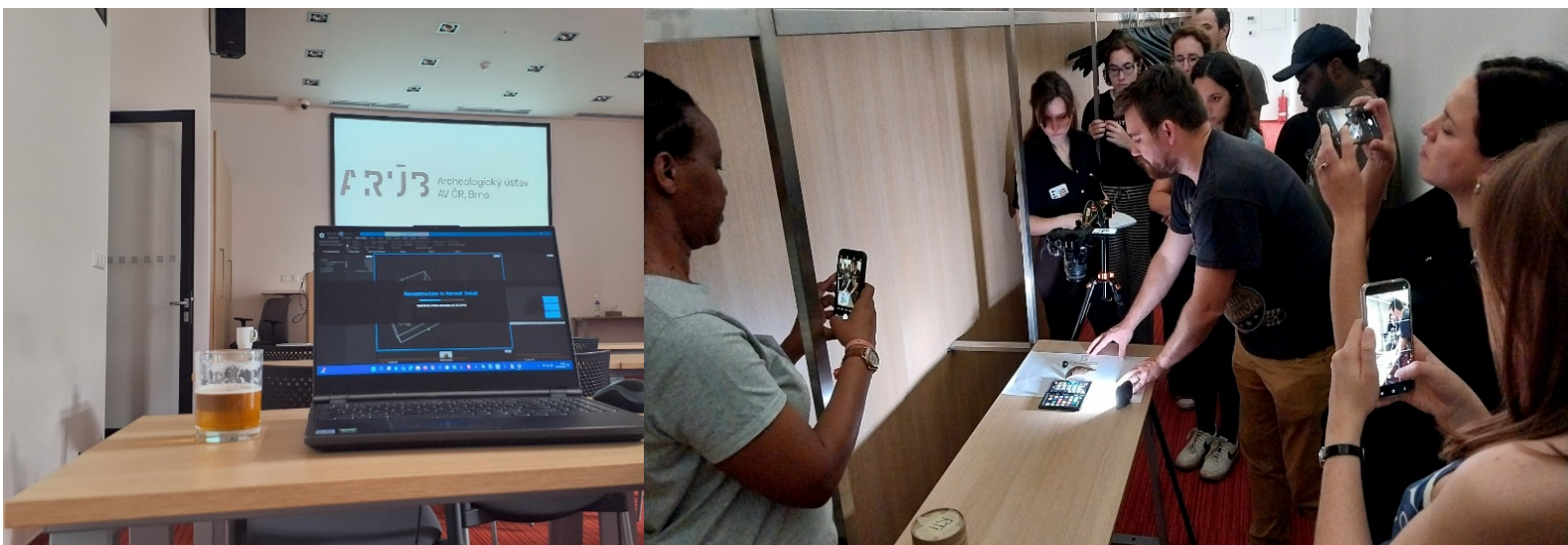
Day 6: Virtual Reality and Digital Archaeology

This day stretched our imagination. We explored the journey from a base model to photorealism, emphasizing interpretation, layout, and storytelling in **virtual archaeology**. Using platforms such as Blender and Sketchfab, we saw how digital tools can breathe life into cultural heritage and make it accessible in immersive new ways.

'All models are wrong; the practical question is how wrong do they have to be to not be useful'
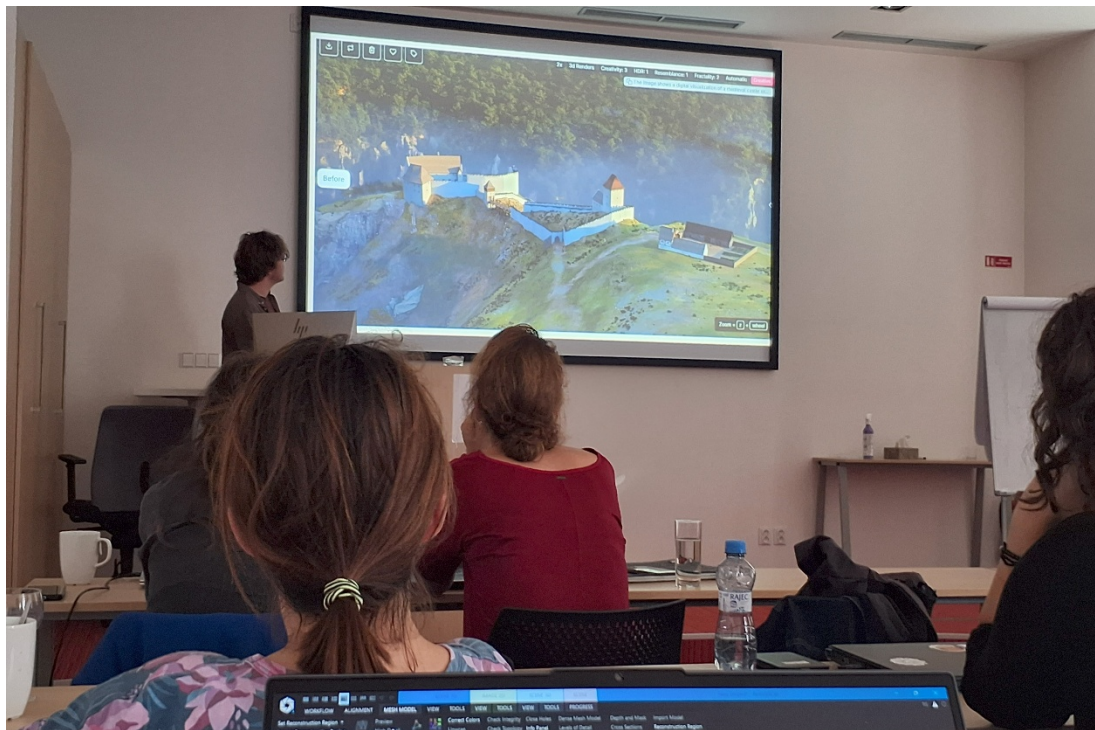
Day 7: Hands-On Practice

We recapped our learning through practical sessions with the **Artec LEO scanner** and **Reflectance Transformation Imaging (RTI)**. Documenting small artefacts gave us a taste of the painstaking accuracy required in professional heritage recording. The blend of theory and practice over the week left us with both competence and confidence.

Day 8: Reflections on the Journey

As the train travelled me back from Brno to Prague, the countryside of well-tilled farmlands and pine forests provided a fitting canvas for reflection on my life back home. I left the Czech Republic with a renewed appreciation for the potential of **Structure-from-Motion (SfM)**, digital modelling, and 3D documentation.The learning was enriched by the generosity of our instructors: Vojtanosek, David Spáčil, and Thomas. In whom their expertise was anchored in every lesson. The warm guidance and hospitality of Zuzana and the entire Brno Institute fraternity, who welcomed us into their space.

Take Home from 3D ATRIUM

I gained hands-on practical experience within the 3D reconstruction process. This ranges from careful data capture planning in the field. The processing and aligning of images into point clouds. The mesh creation, cleaning, clipping, texturing, and publishing of the model in Sketchfab. The sessions also emphasized simple, practical project solutions for common challenges and errors encountered, such as poor lighting, insufficient image overlap, scaling, or noisy data. These newly acquired troubleshooting skills will be invaluable in real-world projects. The training further strengthened my skills with other software platforms, such as Metashape and Blender.
Finally, the training reinforced the value of open, collaborative practices from the group work assignments with my fellow training participants. The insights and questions raised during the training on 3D workflows encompass not only model generation but also knowledge sharing, community empowerment, and interdisciplinary dialogue support. For instance, Marco offered to help improve my skills in Blender. I could not have asked for a better cohort.

The benefits of this training extend beyond my personal technical skills. I am confident that I am better equipped to share the knowledge and train others. The knowledge on 3D reconstruction is far useful shared among students, since it will increase their passion for heritage and archaeology. Thus, extending the impact of digital humanity tools gained within archaeology and heritage practice.

Closing Thoughts

The 3D ATRIUM training was more than an ordinary academic exercise. It blended far travel, different cultures, and cutting-edge technology into a transformative journey. Brno, with its rich history and open-hearted loving people, offered the perfect canvas for exploring how **3D reconstruction can reshape our understanding of heritage, storytelling, and memory**.

The Czech Republic will always have a permanent place in my heart, and Brno will always be remembered as the city where images turned into

monuments; and monuments turned into a living memory of virtual reality that I will always hold locked deep in my subconscious. *Děkuji!!!.*