ATRIUM Summer School 2025: My Journey into 3D Archaeology in Brno (15th-19th, September,2025)

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ATRIUM Summer School on 3D Models in Archaeology was held at the Institute of Archaeology of the Czech Academy of Sciences, located in the historic center of Brno, Czech Republic. Over the course of one intensive week, participants, including me, from around the world and diverse archaeological and cultural heritage backgrounds received hands-on training in HBIM (Historic Building Information Modeling), photogrammetry, laser scanning, 3D model reconstruction, and Reflectance Transformation Imaging (RTI), among other digital techniques. The program ran daily from 9:30 a.m. to 5:00 p.m., followed by social events and guided tours around Brno.

The program was led by a fantastic team of instructors, each bringing their own professional expertise: **Vojtěch Nosek**, archaeologist and digital documentation specialist, who guided us through the fundamentals of HBIM and the use of 3D models in archaeology. **Tomáš Chlup**, photographer and archaeological imaging expert, who helped us understand the importance of mastering camera settings for high-quality photogrammetry.**David Spáčil**, field archaeologist and 3D documentation trainer, who led our outdoor practice at the Cathedral of St. Peter and Paul and showed us how to apply theory in real environments. **Dr. Lenka Starková**, researcher in spatial archaeology and 3D modelling, who delivered the keynote lecture on photogrammetry, LiDAR, and HBIM in heritage care. **Jan Unger**, specialist in virtual archaeology, who introduced us to the potential of immersive reconstructions. **Martin Košťál**, digital heritage researcher and reconstruction expert, who shared his practical workflows and software insights for creating complete virtual models.

Every morning began at 9:30 a.m., and every day was filled with lectures, hands-on training, and discussions, followed by social evenings or tours. It felt like an intense but rewarding blend of academia, technology, and friendship. From what I learn this program, the tools we

worked with, **photogrammetry, laser scanning, HBIM, RealityScan, Metashape, Blender, CloudCompare, RTI,** were gateways to new ways of seeing the past, ways that can preserve monuments, artifacts, and even stories for future generations.

Day 1: Getting Started with 3D and Cameras

The first day began with Vojtěch Nosek, who gave us a clear introduction to HBIM (Historic Building Information Modeling) techniques and the principles of 3D in archaeology. It was a structured start that set the tone for the week ahead.

In the afternoon, Tomáš Chlup delivered a lively lecture and demonstration on photography for archaeology. His focus was on using cameras beyond the AUTO setting—adjusting focus, aperture, shutter speed, and ISO to get clean, usable images for photogrammetry. He demonstrated how small tweaks in technique can make a significant difference in 3D model quality.

The day finished on a lighter note with a social evening, where we could relax and get to know each other outside the classroom. After a full day of technical training, it was refreshing to share stories, laugh, and build friendships.

Day 2 and Day 3: From Cathedrals to Artefacts

Day 2 took us out into the field for a very hands-on experience. Under the guidance of David Spáčil, we documented the Cathedral of St. Peter and Paul, one of Brno's most iconic landmarks. Split into groups of three, we carefully photographed sections of the building. David, Vojtěch, and Tomáš moved between the groups, checking our work and offering practical advice. In the afternoon, we uploaded our photos and used RealityScan for 3D reconstruction. Watching the tomstone from the cathedral dataset transform into a virtual model was like witnessing magic, imperfect, but full of potential.

Day 3 brought us indoors, where Vojtěch shifted focus to small artifact documentation. Photographing artifacts required careful lighting and precise settings. Later, we learned to process the datasets with RealityScan and Metashape, which allowed more advanced control and refinement.

That evening, the organizers hosted a group dinner. What started as a simple meal turned into a lively social night, proof that the summer school was as much about community as it was about technology.

Day 4: Virtual Archaeology and Expert Talks

Day 4 was different: no practical exercises, but instead a full day of theoretical lectures that expanded our horizons. The morning began with Jan Unger, who introduced the concept of Virtual Archaeology, explaining how 3D scans evolve into immersive reconstructions that engage scientists and the public alike. It was inspiring to see how archaeology can transcend static data and become interactive experiences.

Next came Martin Košťál with his talk *"From 3D Scan to Virtual Reconstruction."* His presentation was packed with practical resources:

- PureRef for organizing reference images
- Magnific AI for enhancing textures
- Blender add-ons like GeoScatter and Botaniq for vegetation
- Blender Studio tutorial, which is referred to as the Swiss Army Knife of digital visualization tools
- He also showed us how to use RealityScan for creating textures quickly, and recommended online tutorials for anyone eager to dive deeper. What struck me was his down-to-earth approach: not every method requires expensive equipment; sometimes, even a smartphone can be a powerful tool.

Although we didn't test these tools that day, the lectures were eye-opening. They gave us a roadmap of possibilities and left us eager to experiment further.

Day 5 and Reflections: Hands-On Challenges and Farewell

The final day was all about freedom and exploration. Each team got to pursue its own project. My group chose to scan a bronze dagger, a tricky object due to its reflective surface. To solve

this, we used AESUB spray, which temporarily coats the object to reduce reflections and allow accurate scanning.

Other participants explored Reflectance Transformation Imaging (RTI) or refined their models from earlier in the week. Later, we came together to learn about enhancing models with Blender and CloudCompare, tools that push 3D models from rough meshes into polished, analyzable results.

The day ended with smiles, shared files, and promises to stay in touch. The summer school officially closed, but I left with far more than technical skills. I left with a global network of colleagues, new friends, and the excitement of knowing I can now apply 3D methods to my own archaeological work.

The ATRIUM Summer School wasn't just a week of training,it was an experience that reshaped how I think about archaeology and heritage. It showed me that digital archaeology is more than just technology; it is a language that builds bridges between the past and the present, between theory and practice, and between people from every corner of the world. Every lecture, every hands-on session, and every conversation revealed that 3D documentation is not only about precision and data, it's about preservation, storytelling, and accessibility. With these tools, the fragile remains of ancient monuments, artifacts, and landscapes can live on, not only in archives but also in vivid reconstructions that connect scholars, communities, and future generations.

Most importantly, ATRIUM taught me that archaeology thrives when it is shared and collaborative. The friendships I made, the skills I gained, and the inspiration I carried home are proof that the future of heritage care lies in networks of people willing to combine tradition with innovation.

Leaving Brno, I didn’t just take home digital models and notes I carried with me a vision of how archaeology can continue to grow in the digital age: creative, sustainable, and global.