

ZAG

ZAVOD ZA
GRADBENIŠTVO
SLOVENIJE

SLOVENIAN
NATIONAL BUILDING
AND CIVIL ENGINEERING
INSTITUTE

2ND INTERNATIONAL SUMMER SCHOOL

In situ techniques in
preservation of built heritage

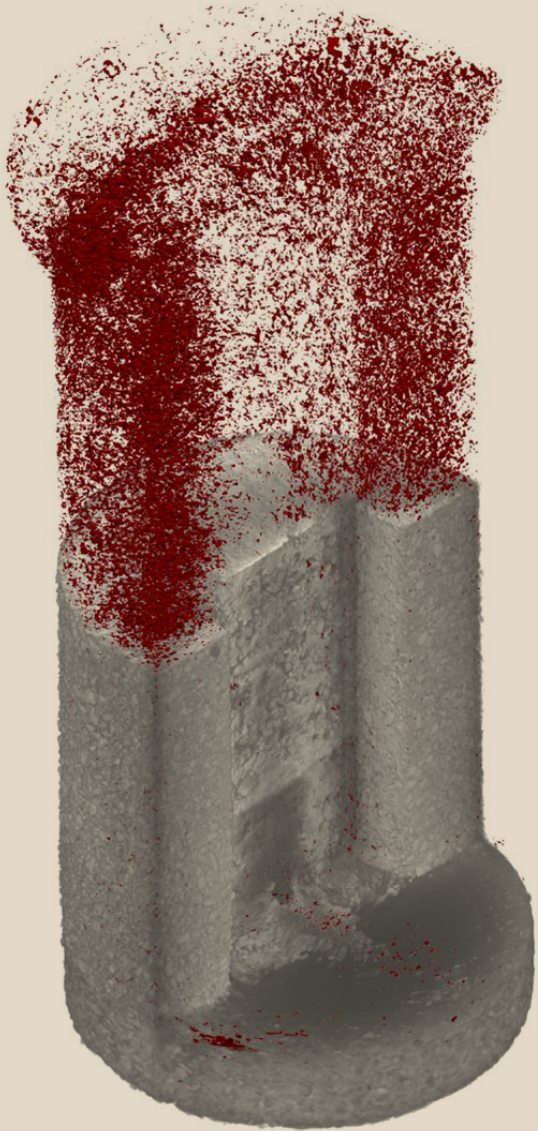
1st – 3rd July 2026

Slovenian National Building
and Civil Engineering Institute
Ljubljana, Dimičeva 12, Slovenia



INDEX

1



- 1 INDEX
- 3 AGENDA
- 5 GUIDED TOUR
- 6 LAB TOUR
- 7 ORGANIZATION
- 8 SUPPORTERS



DAY 1: WEDNESDAY, 1ST OF JULY 2026

8:30-9:00	Registration
9:00-9:20	Opening of the summer school: Maruša Mrak , Slovenian National Building and Civil Engineering Institute, Slovenia Tadeja Kosec , Slovenian National Building and Civil Engineering Institute, Slovenia Matija Strlič , GreenHer Centre of Excellence, Faculty of Chemistry and Chemical Technology, Slovenia TBD
9:20-9:55	Talking Buildings: the role of impersonation in citizen science processes for the sustainable renovation of cultural heritage buildings Panayotis Antoniadis , NetHood, Switzerland
9:55-10:30	From Values and Principles to Practice: Guiding Interventions in Built Heritage Tina Potočnik , Institute for the Protection of Cultural Heritage of Slovenia, Slovenia
10:30-11:05	Heritage of Underground Architectures with New Programmatic Potential (Slovenia) Mateja Golež , Rok Vežočnik , Slovenian National Building and Civil Engineering Institute, Slovenia
11:05-11:35	Coffee break
11:35-12:10	Biological Burden on Built Heritage – Is it Always Bad? Polona Zalar , University of Ljubljana, Biotechnical Faculty, Ljubljana, Slovenia
12:10-12:45	In Situ Spectroscopic and Microbiologic Analysis of Cultural Heritage Janez Kosel , Klara Retko , Polonca Ropret , Institute for the Protection of Cultural Heritage of Slovenia, Conservation Centre, Research Institute, Ljubljana, Slovenia; University of Ljubljana, Faculty of Chemistry and Chemical Technology, Ljubljana, Slovenia Lea Legan , Maša Kavčič , Institute for the Protection of Cultural Heritage of Slovenia, Conservation Centre, Research Institute, Ljubljana, Slovenia
12:45-13:45	Lunch break
13:45-14:20	NDT techniques used in Cultural Heritage and the ScanPyramids Project, including the Pyramids of Giza, Egypt Christian U. Grosse , Technical University of Munich, Germany
14:20-14:55	The use of Hyperspectral Imaging in Cultural Heritage Conservation John R. Gilchrist , ClydeHSL, United Kingdom Viktorija Peternel , Academy of Fine Arts and Design, University of Ljubljana, Slovenia
14:55-15:30a	Non-destructive 3D X-ray imaging techniques for Heritage Science Lucia Mancini , Slovenian National Building and Civil Engineering Institute, Slovenia, LINXS Institute for Advanced Neutron and X-ray Science, Sweden
15:30-16:05	Preserving the past, Printing the Future: 3D Technologies in Heritage Science Lidija Korat Bensa , Slovenian National Building and Civil Engineering Institute, Slovenia



DAY 2: THURSDAY, 2ND OF JULY 2026

7:30	Bus departure for excursion from the Slovenian National Building and Civil Engineering Institute, Dimičeva 12, Ljubljana
10:00-16:00	<p>Guided tour: Servite monastery, Koper</p> <p>The Servite Monastery in Koper is one of the city's most important historic landmarks and the only monument of national significance within the old town. Its origins date back to the Middle Ages. Over the centuries, different periods have left their mark on the building, from Roman antiquity to the Baroque era. Today, it is best known for its Gothic-Renaissance cloister. For many people across Istria and the Karst region, however, it is remembered as the maternity and children's hospital where generations were born. Following a comprehensive restoration led by the University of Primorska, the monastery is taking on a new role. It is becoming a place of learning, community, and shared heritage. During the visit, we will learn about the renovated monastery spaces and the building's rich history.</p> <p>Guided tour: Archaeological Park San Simon and interpretation center, Izola</p> <p>The Archaeological Park San Simon preserves the remains of one of the most important Roman seaside villas in Slovenia. Built in the 1st century AD, the villa was connected to the largest harbour in northern Istria of its time. It was renowned for its rich architectural design and extensive floor mosaics, which today represent the largest preserved area of Roman mosaics in Slovenia. Visitors can admire these mosaics in their original location and explore the remains of the ancient harbour and residential complex. The park offers a unique insight into daily life, trade, and maritime activity in Roman Istria nearly two thousand years ago. As part of the University of Primorska Science Centre, it connects cultural heritage with research and education, bringing scientific knowledge closer to the wider public.</p> <p>InnoRenew CoE visit</p> <p>InnoRenew CoE was established in 2017 and today operates within the University of Primorska. Its research focuses on renewable materials and sustainable construction, with a particular emphasis on wood and innovative ways of using it in the built environment. The centre's international and interdisciplinary team of researchers connects scientific knowledge with practical challenges, transferring research outcomes to industry and society. During the visit, we will learn about the centre's research activities, its laboratories, and innovative approaches to sustainable construction and the use of renewable materials.</p>
18:00	Arrival to the Slovenian National Building and Civil Engineering Institute, Dimičeva 12, Ljubljana



DAY 3: FRIDAY, 3RD OF JULY 2026

8:30-9:00	Registration
9:00-9:35	Electrochemical Impedance Spectroscopy as a Tool for Non-Destructive Testing of Bronze Sculptures Helena Otmačić Čurković, Dajana Mikić, Angela Kapitanović, Marko Viskić, University of Zagreb Faculty of Chemical Engineering and Technology, Croatia
9:35-10:10	Subsurface investigation of wall paintings by electromagnetic tools Cristiano Riminesi, National Research Council of Italy, Italy
10:10-10:40	Coffee break
10:40-11:15	Enabling comfort in heritage buildings Katja Žagar, Slovenian National Building and Civil Engineering Institute, Slovenia
11:15-11:50	Story of Wooden Shingle Roofs in Slovenia: Between myths and data Miha Humar, Boštjan Lesar, University of Ljubljana, Biotechnical Faculty, Slovenia
11:50-12:50	Lunch break
12:50-13:25	Looking Inside Heritage Structures: Testing Methods and Seismic Resilience Ana Brunčič, Meta Kržan, Slovenian National Building and Civil Engineering Institute, Slovenia
13:25-14:00	Applications of Optical Fiber Distributed Sensing in Structural Health Monitoring Yaser Ghafoori, Slovenian National Building and Civil Engineering Institute, Slovenia
14:00-14:35	Ensuring Fire Safety of Cultural Heritage Buildings: Risks, Approaches and Case Studies Aleš Jug, Slovenian National Building and Civil Engineering Institute, Slovenia
14:35-14:45	Closure of the summer school
14:45-15:45	Lab-tour at Slovenian National Building and Civil Engineering Institute

GUIDED TOUR

5



Servite monastery



InnoRenew CoE



The archaeological park San Simon



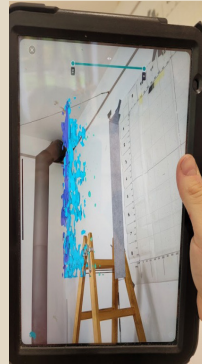
Mosaic in the archaeological park San Simon



THE TOUR WILL INCLUDE 3 STOPS:

NDT methods at ZAG

During one of the laboratory tour stops, participants will be introduced to selected non-destructive testing (NDT) methods used for the investigation and assessment of materials and structures. The presentation will include different **Unmanned Aerial Vehicles (UAVs)** equipped with various imaging systems and sensors for data acquisition and documentation. Participants will also explore the principles and applications of **Ground Penetrating Radar (GPR)** and **Ultrasonic Tomography**, advanced techniques used for the non-invasive investigation of internal structures, material properties, and hidden features of built heritage and engineering structures.



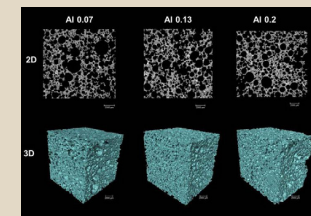
The Laboratory for Building Physics

The Laboratory for Building Physics which deals with the field of the **thermal and acoustic characteristics** of materials and structures, the **energy efficiency of buildings**, and **suitable living conditions** in buildings, and carries out various research and testing work in accordance with the presently valid European and other national standards.



X-ray computed microtomography (microXCT)

X-ray computed microtomography (microXCT) is currently one of the most advanced non-destructive techniques for 2D, 3D, and 4D characterization of internal structures and their evolution over time. Owing to its ability to investigate heterogeneous and complex materials without causing any damage, microXCT is particularly valuable in the field of cultural heritage. It enables detailed examination of stone, ceramics, metals, wood, and other constituents commonly found in historic objects and structures. Such analyses provide essential information on manufacturing technologies, material degradation processes, and state of preservation, thereby supporting informed conservation and restoration strategies. At ZAG, two microCT systems are available: the XRadia XCT-400 and the EasyTOM XL Ultra.



7 ORGANIZATION

ORGANIZING COMMITTEE:

Maruša Mrak, Katarina Šter, Tadeja Kosec, Lidija Korat Bensa, Zala Žarkovič, Petra Šajna and Zrinka Mileusnić
Slovenian National Building and Civil Engineering Institute, Slovenia

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E-RIHS.si: European research infrastructure for heritage science – Slovenia

GreenHer Centre of Excellence

University of Primorska, Faculty of Humanities, Slovenia

ARIS research core funding No. P2-0273: Building structures and materials

ARIS research core funding No. IO-0032: Testing of Materials and Structures

ARIS research project No. J2-4424: An integrated approach for conservation of cultural heritage wall paintings

ARIS research project No. J7-60128: Break through in humanities and cultural heritage with artificial intelligence

ARIS research project No. J7-50226: Next generation analytical tools for heritage science

ARIS Bilateral project Slovenia-Croatia No. BI-HR/23-23-015: Durability study of bronze protection for outdoor application



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FOR HERITAGE SCIENCE - SLOVENIA



AID HCH

HUMANITIES AND CULTURAL HERITAGE WITH ARTIFICIAL INTELLIGENCE

