

Project duration: 1st November 2021 – 31st October 2024

Project title: Inspection and security by Robots interacting with Infrastructure digital twins (IRIS)



Deliverable D1 - Comprehensive analysis of the current methodology of structural health monitoring

Authors:

Sapienza University of Rome: Vincenzo Gattulli - Marianna Crognale – Cecilia Rinaldi

Universiapolis-International University of Agadir: Amine Bendarma

University of Sannio: Pasquale Daponte

University of Cassino and Southern Lazio: Erika Ottaviano

University of Zilina: Zdenek Dvorak - Lucia Figuli - Bohus Leitner – Daniel Papán

Military University of Technology: Konrad Wojtowicz

CONTENT

1. Introduction	4
2. Actual state at participant countries	6
2.1. Actual state in Italy	6
2.2. Actual state in the Slovak Republic	7
2.3. Actual state in Poland	12
2.4. Actual state in Morocco	13
2.5. Specific actual state underwater constructions	15
3. Legal requirements for structural inspections in different countries	16
3.1. NATO and European Union	16
3.2. Analysis of the legal framework of Slovak Republic	17
3.3. Analysis of the legal framework of Italy	20
3.4. Analysis of the legal framework of Poland	25
3.5. Analysis of the legal framework of Morocco	27
3.6. Comparison of individual legal approaches of different countries	29
4. Current methodology of structural health monitoring.	31
4.1. Inspections	31
4.2. Underwater inspections	32
4.3. Equipment	33
4.3.1 <i>Non-Destructive Evaluation Equipment</i>	34
4.3.2 <i>Coring Equipment</i>	34
4.3.3 <i>Underwater Photography and Video Equipment</i>	34
4.4. Current new methods of inspections: inspections using drones	36
4.5. Accuracy of measurements by drones	41
5. Summary and Goals to research	44
5.1. Towards full automation	46
5.1.1 <i>Towards full automation – state of art (previous research and projects)</i>	47
5.1.2 <i>Literature review</i>	47
5.1.3 <i>SHM, NDT</i>	51
5.1.4 <i>UAV, UGV</i>	52
5.1.5 <i>BIM</i>	53
5.1.6 <i>Robotic systems</i>	53
5.1.7 <i>Sensors</i>	55
5.1.8 <i>Underwater environment</i>	57
5.1.9 <i>Information management systems</i>	58
5.1.10 <i>Towards full automation</i>	59
5.1.11 <i>Limitation of the current research</i>	60
Projects review	61
6. Conclusion	63
7. References	64