

## **Annex nr. 1 – Form**

### **1. Candidate**

**Sir Name:** Hegyi

**Name:** Alexandru

**PhD year:** 2018 (Diploma copy at the end of this document).

**Position:** CS III

**Institution:** Universitatea de Vest Timișoara, ICAM

**Phone no.:** ‘

**E-mail:**

### **2. “Gala Cercetării Românești” Edition: 2024**

### **3. Category: Științe umaniste – Premiul “Dimitrie Cantemir”**

### **4. A description of the most important scientific achievements of the last 5 years (max. 4 pages, A4 format, Times New Roman font, 12 points, 1.5 line spacing, 2 cm margins):**

Dr. Alexandru Hegyi, a researcher and innovator in the fields of archaeology, geophysics, and digital heritage, has made several significant scientific achievements over the past five years.

Most notable contributions:

- 1. Advancements in Geophysical Investigations in Archaeology:** Dr. Hegyi has been at the forefront of leveraging geophysical techniques to uncover hidden archaeological structures and landscapes in Romania and Eastern Europe. His research has significantly advanced our understanding of ancient civilizations and historical sites. His work in geophysics has an impact both in identification and description of archaeological and heritage sites through complex measurements but also within the field of advancing the methodological aspects of the field. For example, Dr. Hegyi had a major role to develop a new direction of analyzing archaeological geophysical data through automatic classification (An object-based approach to support the automatic delineation of magnetic anomalies).
- 2. Application of Remote Sensing Technologies:** Dr. Hegyi has demonstrated expertise in utilizing remote sensing technologies such as satellite imagery (optical and radar) to document and analyze archaeological sites. He has authored numerous studies in leading international journals showcasing the application of remote sensing technologies to underscore the immense potential of multispectral analyses in archaeology.
- 3. Digital Documentation of Cultural Heritage:** As the Director of the Digital Heritage Lab at Kyoto University's Maritime Asia Heritage Survey (MAHS), Dr. Hegyi has played a pivotal role in digitally documenting endangered archaeological and cultural sites across Southern

Asia's coastal regions. His efforts have led to the development of advanced workflows and methodologies for 3D documentation, including drone and DSLR photogrammetry, aerial and terrestrial laser scanning, and GIS integration. These achievements have significantly contributed to the preservation and study of cultural heritage in the region.

4. **Interdisciplinary Research Initiatives:** Dr. Hegyi's involvement in interdisciplinary research initiatives, such as the MegaForts project, has fostered collaborative efforts to explore ancient fortification systems and archaeological landscapes. Through geophysical surveys, stratigraphic analyses, and core drilling, his research has provided valuable insights into the defensive strategies and societal dynamics of European Bronze Age fortifications, contributing to our understanding of ancient civilizations and their built environments.
5. **Educational Outreach and Teaching:** In addition to his research endeavors, Dr. Hegyi has been actively involved in educational outreach and teaching activities. His expertise in geoinformatics, geospatial data analysis, and remote sensing has been shared through courses taught at the West University of Timișoara, where he has empowered students with the knowledge and skills necessary for archaeological research and heritage conservation.

Overall, Dr. Alexandru Hegyi's scientific achievements over the past five years have had a profound impact on the fields of archaeology, geophysics, and digital heritage. His innovative research, interdisciplinary collaborations, and dedication to education have contributed to advancing our understanding of ancient civilizations and cultural landscapes, while also paving the way for future discoveries and innovations in the field.

**5. Narrative Curriculum Vitae of the candidate "individual" or of each member of the research team, in the case of the "research team" candidate, from which the research results of the last 5 years should emerge, according to the quantitative indicators from Annex No. 2 to the regulations and the qualitative evaluation criteria provided in Annex No. 3 to the regulations:**

Until recently, Dr. Alexandru Hegyi was employed at Kyoto University, one of Japan's finest universities, serving as a Digital Heritage Manager and Program Specific Researcher. His position was associated with the Arcadia Foundation-funded Maritime Asia Heritage Survey (<https://maritimeasiaheritage.cseas.kyoto-u.ac.jp/>).

Through a sophisticated methodology, the Maritime Asia Heritage Survey (MAHS) aimed to digitally document historical and archaeological sites across Southern Asia's coastal and island environment. One of the project's objectives was to utilize cutting-edge technology to document endangered archaeological and cultural resources.

Within the context of the MAHS project, Dr. Hegyi was responsible for the Digital Heritage Lab, which he established from the ground up at the project's inception. This lab now operates a complex workflow for digitally documenting and studying endangered heritage. His responsibilities included both management and research. Dr. Hegyi supervised all field teams in Indonesia, the Maldives, Vietnam, and Thailand on a daily basis, each consisting of approximately 7 specialists. Additionally, he oversaw the big data workflow, employing traditional and cutting-edge methods to construct and shape open-access 3D documentation. This involved various remote-sensing techniques, combinations of drone and DSLR photogrammetry, aerial and terrestrial laser-scanning, GIS, satellite imagery, and other techniques to document and study cultural heritage sites.

Dr. Hegyi was also the Principal Investigator and Director of the MegaForts project (<https://megaforts.projects.uvt.ro/>), financed by the Romanian government and administered by the West University of Timișoara. The project secured funding through a national competition and aimed to explore the fortification systems of major European Bronze Age fortifications built after 1500 BCE in a narrow area between the Tisza and Mureș rivers. The project utilized aerial and ground remote sensing (applied geophysics) and core drilling for stratigraphy analyses, micro-morphology assessment, soil sampling for various studies, including radiocarbon dating, to explore the defensive systems.

In terms of academic qualifications, Dr. Hegyi completed his PhD in March 2018 at the West University of Timișoara, where he was pursuing an M.A in Interdisciplinary Archaeology. His doctoral thesis focused on the interpretation of geophysical data in archaeology using advanced GIS approaches. During his PhD, he conducted extensive research in applied geophysics for archaeology and heritage sites, utilizing various methods and tools (magnetics, ER, ERT, GPR). He developed a segmentation algorithm for the identification and classification of geophysical anomalies, published in *Archaeological Prospection*, a peer-reviewed publication by Wiley International.

Dr. Hegyi is proficient in using advanced photogrammetry or LiDAR scans to create 3D models of heritage monuments, archaeological sites, and heritage objects. He has extensive experience in combining and integrating photogrammetry and LiDAR point-clouds to develop high-resolution models and VR applications/products. Additionally, he established a network for spreading legacy work with different specialties, particularly architecture and conservation/restoration, due to his involvement in restoration projects where digital documentation played a crucial role in preserving materials and facilitating accurate restoration.

In terms of spatial analysis, Dr. Hegyi is proficient in geoinformatics and various GIS-related software. He taught a full course in geoinformatics applied to archaeology and geomorphology at West University of Timisoara.

Dr. Hegyi also possesses extensive knowledge in satellite remote sensing, particularly optical and radar (Synthetic Aperture Radar), which can be utilized to assess landscape archaeology and history. One of his recent studies described the potential of integrating radar and optical data to quickly assess how floods in Pakistan harmed the UNESCO site of Mohenjo-Daro.

He has been involved (leading or participating) in several international archaeological, heritage, and environmental initiatives in Eastern Europe, the Balkans, and Asia over the years.

With three years of physio-pedagogical studies, Dr. Hegyi received two teaching certificates enabling him to teach at the university level throughout the European Union and beyond. For two consecutive years, he taught three courses at Timisoara West University in Romania: General Topography in Geomorphology and Archaeological Sciences (B.A. level); Introduction to Geoinformatics (B.A. level); and Introduction to Applied Geophysics in Archaeology and Geomorphology research (M.A. level).

#### **Facts and Figures:**

- Total number of papers: 53
- 6 papers indexed in Web of Science as a first author in Q1 and Q2. Total AIS: 4,28.
- 17 papers indexed in Web of Science and other international data bases as co-author or first author.
- H-index: 7 (Google Scholar)
- H-10 index: 4 (Google scholar)

**6. List of publications of the "individual" candidate or of each member of the research team, in the case of the "research team" candidate, highlighting the relevant publications of the candidate in the last 5 years and the joint publications of the members of a research team in the case of the "research team" candidate. A link to the candidate's webpage where the publications can be found is also provided:**

#### **Publication ISI Web of Science as First author:**

1. Alexandru Hegyi, Athos Agapiou, Rapid Assessment of 2022 Floods around the UNESCO Site of Mohenjo-Daro in Pakistan by Using Sentinel and Planet Labs Missions, Sustainability, 15(3):20849, 2023, DOI: 10.3390/su15032084.

IF: 3.9, AIS: 0.66

2. Alexandru Hegyi, Vlad Andrei Lăzărescu, Michal Pisz, L.szl. Lenkey, Mihly Pethe, Alexandru Lucian Onaca, Mădălina Nica, Geophysical Investigations within the Latus Dextrum of Porolissum Fort, Northwestern Romania-The Layout of a Roman Edifice, *Heritage*, 2023, DOI: 10.3390/heritage6020046.

IF: 1.7, AIS: 0.34

3. Alexandru Hegyi, Dragoș Diaconescu, Petru Urdea, Apostolos Sarris, Michal Pisz, Alexandru Lucian Onaca, Using Geophysics to Characterize a Prehistoric Burial Mound in Romania, *Remote Sensing* 13(5):842, 2021, DOI: 10.3390/rs13050842.

IF: 5, AIS: 0.84

4. Alexandru Hegyi, Apostolos Sarris, Florin Curta, Cristian Floca, Sorin Fortiu, Petru Urdea, Alexandru Onaca, Fabian Timofte, Michal Pisz, Sergiu Timiuț, Madalina Nica, Daiana Maciulschi, Deserted Medieval Village Reconstruction Using Applied Geosciences, *Remote Sensing* 12(12):1975, 2020, DOI: 10.3390/rs12121975.

IF: 5, AIS: 0.84

5. Alexandru Hegyi, Miroslav Vernica, Lucian Drăguț, An object-based approach to support the automatic delineation of magnetic anomalies, *Archaeological Prospection*, *Archaeological Prospection* 27(4), 2019, DOI: 10.1002/arp.1752.

IF: 1.8, AIS: 0.8, articol indexat și în Arts and Humanities Citation Index

6. Alexandru Hegyi, Petru Urdea, Cristian Floca, Adrian Ardelean, Alexandru Onaca, Mapping the subsurface structures of a lost medieval village in the southwestern Romania by combining conventional geophysical methods, *Archaeological Prospection*, 26(1), DOI: <https://doi.org/10.1002/arp.1720>.

### **Selected papers indexed in ISI Web of Science and other international databased:**

1. Aurora Pețan, Alexandru Hegyi, Freely available LiDAR-derived digital terrain model (DTM) uncovers the heartland of the Dacian Kingdom, *Digital Applications in Archaeology and Cultural Heritage*, Elsevier BV, Volume 31, 2023, doi 10.1016/j.daach.2023.e00292.
2. Tamas Bartyik, Petru Urdea, Timea Kiss, Alexandru Hegyi, Gyorgy Sipos, The Role of Past Climatic Variability in Fluvial Terrace Formation, a Case Study from River Mureș (Maros), Romania, *Quaternary*, 6(2):35, 2023, DOI: 10.3390/quat6020035.
3. Dīaa Sheishah, Gy.rgy Sipos, K.roly Barta, Enas Abdelsamei, Alexandru Hegyi, Alexandru Onaca, Abbas M. Abbas, Comparative evaluation of the material of the artificial levees: a case study along the Tisza and Maros Rivers, Hungary, *Journal of Environmental Geography*, 16 (1-4), 2023, DOI: 10.14232/jengeo-2023-44452.
4. Athos Agapiou, Alexandru Hegyi, Florin Gog.ltan, Andrei Stavilă, Apostolos Sarris, Cristian Floca, Leonard Dorogostaisky, Exploring the largest known Bronze Age earthworks in Europe through medium resolution multispectral satellite images, *International Journal of Applied Earth Observation and Geoinformation*, 118(15), 2023, DOI: 10.1016/j.jag.2023.103239.
5. Athos Agapiou, Alexandru Hegyi, Andrei Stavilă, Observations of Archaeological Proxies through Phenological Analysis over the Megafort of Csan.dpalota-Juh.sz T. tanya in Hungary Using Sentinel-2 Images, *Remote Sensing*, 15(2):464, 2023, DOI: 10.3390/rs15020464.
6. Michal Pisz, Vlad Lăzărescu, Alexandru Hegyi, Understanding the anomaly: reinterpreting Porolissum Roman town with emerging GPR and ER data, In book: *Advances in On- and Offshore Archaeological Prospection*, 2023, DOI: 10.38072/978-3-928794-83-1/p43.
7. Dīaa Sheishah, Gy.rgy Sipos, Alexandru Hegyi, P.ter Koz.k, Enas Abdelsamei, Csaba Toth, Alexandru Onaca, D.vid Gergely P.ll, Assessing the Structure and Composition of Artificial Levees Along the Lower Tisza River (Hungary), *Geographica Pannonica*, 26(3):258-272, 2022, DOI: 10.5937/gp26-39474.

8. Alexandru Lucian Onaca, Emil Gachev, Florina Ardelean, Adrian Ardelean, Aurel Persoiu, Alexandru Hegyi, Small is strong: Post-LIA resilience of Europe's Southernmost glaciers assessed by geophysical methods, *Catena*, 213(3):106143, 2022, DOI: 10.1016/j.catena.2022.106143.
9. Patrick Daly, R. Michael Feener, Noboru Ishikawa, Ibrahim Mujah, Maida Irawani, Alexandru Hegyi, Krisztina Baranyai, Jędrzej Majewski and Benjamin Horton, Challenges of Managing Maritime Cultural Heritage in Asia in the Face of Climate Change, *Climate*, 10(6):79, 2022, DOI: 10.3390/cli10060079.
10. Cristian Floca, Florin Gog.Itan, Alexandru Hegyi, Patrick Chiroiu, Sorin Forțiu, Using the water power in preindustrial Banat. A historical archaeology study on the Lower Timiș River, *Ziridava*, 2021.
11. Aurel Perșoiu, Nenad Buzjak, Alexandru Onaca, Christos Pennos, Yorgos Sotiriadis, Monica Ionita, Stavros Zachariadis, Michael Styllas, Jure Kosutnik, Alexandru Hegyi and Valerija Butorac, Record summer rains in 2019 led to massive loss of surface and cave ice in SE Europe, *The Cryosphere*, 15, 2383–2399, 2021, DOI: 10.5194/tc-15-2383-2021.
12. Andrei Stăvilă, Alexandru Hegyi, Bogdan Craiovean, Non-invasive archaeological research performed in the Middle Bronze Age settlement from Alioș-Valea Alioșu (Timiș County, Romania). Structures, chronology, and perspectives, *Ziridava*, 2020.
13. Michael Pisz, Agnieszka Tomas, Alexandru Hegyi, Non-destructive research in the surroundings of the Roman Fort Tibiscum (today Romania), *Archaeological Prospection* 27(1), 2020, DOI: 10.1002/arp.1767.
14. Alexandru Hegyi, Miroslav Vernica, Lucian Drăguț, An object-based approach to support the automatic delineation of magnetic anomalies, *Archaeological Prospection*, *Archaeological Prospection* 27(4), 2019, DOI: 10.1002/arp.1752.

**7. The list of research projects won by the candidate and their value:**

1. Maritime Asia Heritage Survey Project, Kyoto University, 8 million USD.
2. MegaForts Project, West University of Timișoara, 250 000 lei.
3. EnviArch, West University of Timișoara, 2 million EUR.