

## Enhancing Management and Marketing in Cultural Heritage by Using New Technologies

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**Abstract:** *The cultural heritage of Europe, both material and immaterial, is one of the most significant elements that differentiate our continent in relation with the others. Romania is an integral part of this European landscape of traditions, crafts, artefacts, monuments and citadels, and employs it for attracting tourists and generating business opportunities under its own branding. While heritage is recognized more and more for its diplomatic and economic potential, the world is undergoing a massive digital transformation in all aspects of society and the economy such as the one envisioned by the Digital Agenda for Europe.*

*The new digital technologies (VR/AR/MR, smart devices, 3D scanning and printing, big data, internet of things) can be used in the service of cultural heritage-based activities in the public and private sectors, to open up new markets, deliver innovative services and increase efficiency.*

*The present analysis starts from modern management models (e.g. UNESCO framework for cultural heritage management systems and standardized management systems such as ISO 9001/ISO31000) and explores the ways in which digital tools can be used for enhancing the administration and promotion of cultural institutions: mixed real-virtual environment exhibitions of Dacian culture to stimulate customer attendance and engagement, new product development using additive manufacturing in the field of souvenirs based on Neolithic artifacts, increasing access to cultural 3D content using online databases and virtual reality, supporting local based hospitality business by increasing the visibility of wooden churches in Transylvania.*

**Keywords:** *cultural heritage management, digital technologies, virtual/augmented reality*

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## I. Cultural heritage: a European and Romanian competitive advantage

In 2018, the European Union has declared the European Year Cultural Heritage<sup>1</sup>, an overarching celebration and showcasing of the contribution of the peoples of our continent to the tangible and intangible patrimony of humanity, a key attribute of its approach in a competitive global economy, that must be enhanced and valued in innovative ways.

The European continent has been home to many civilizations along more than 30,000 years of history and this has led to particular forms in which its inhabitants address life, death, beauty, relationships with others and many other aspects. Each area has large cache of cities, citadels, artefacts and cultural products, ranging from cave paintings to immersive virtual reality experiences. It is an incredibly complex and eclectic world and many institutions are dealing with exploring, discovering, studying and presenting these contributions for the world to see and enjoy. At the same time, many companies are seeking to derive market value from employing the use of cultural heritage in creative industry, hospitality or even more mundane business, such as transportation.

The contribution of these industries and tourism to the GDP of many European countries is an argument that must be observed when discussing of competitiveness and good management practices. The former accounts for 5.3%<sup>2</sup> and the latter brings and additional 3.9%<sup>3</sup>, which means that professional management and marketing in these fields is a significant topic for studies in any country. This is even truer in Romania, where tourism is struggling, the creative industries are just getting off the ground and the cultural institutions are mostly underfinanced and seen as outdated.

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<sup>1</sup> European Union, *The European Year of Cultural Heritage* (2018). <https://europa.eu/cultural-heritage/about> (accessed: August 21, 2019).

<sup>2</sup> Culture Action Europe, *Modernising Cultural and Creative Industries within the EU* (2019). <https://cultureactioneurope.org/events/modernising-cultural-and-creative-industries-within-the-eu/> (accessed: August 21, 2019).

<sup>3</sup> E. Coito, *Tourism* (2019), in *Fact Sheets on the European Union - European Parliament*: <http://www.europarl.europa.eu/factsheets/en/sheet/126/tourism> (accessed: August 21, 2019).

We consider that Romanian history and culture, as well as its natural beauty, would be of great interest to the world and could be capitalized upon significantly better. The focus of this study is on cultural institutions where there is a profound need for development and improvement, in market orientation, technological readiness and management models. We will present and discuss some collaborations undertaken by the Technical University in Cluj-Napoca with some institutions that understood these needs and decided to act upon them, to what we consider great success, that should be replicated as good practices.

The studies presented in this chapter stem from the possibility of transforming the valuation of cultural heritage into a true competitive advantage for Romanian, and more European institutions and companies. The authors consider that for this to happen a, modern approaches to managing and presenting assets towards the market and the potential customers should be implemented fast.

## **II. The digitalization of tools and professionalization of management**

The world economy has been going through profound structural changes in the past 10-15 years, also matched by similar transformations in society, as new, digital native generations, come of age. The challenges of mastering digitalization and mitigating environmental threats are becoming more important to peoples, countries and companies, ahead of wellbeing, economic growth and geopolitical balance, that have dominated since the end of the Second World War. The concept of Industry 4.0 launched by the German Government in 2011<sup>4</sup> is a mobilizing concept towards which many European countries are working, and which is being replicated also internationally in the US, China and elsewhere. Among the many digital technologies promoted by this approach (such as Internet of Things and Big Data Analytics) an important role is reserved for simulation in the virtual environment which is based on digitization through 4D scanning and processing with advanced CAD software.

The European Commission through the Directorate for Digital Economy has published and manages the implementation of the Digital Agenda for Europe<sup>5</sup> that extends the concept of digital transformation, specific to Industry 4.0 also, outside of the industrial domain into all economic and social sectors, including cultural heritage.

At the same time, after 30 years of success, standardized management is becoming more professional and advanced. The most recent edition of ISO 9001 has been published in 2015 and it is spreading successfully with over 1.1 million organizations certified<sup>6</sup>, helping management perform. In this direction many other

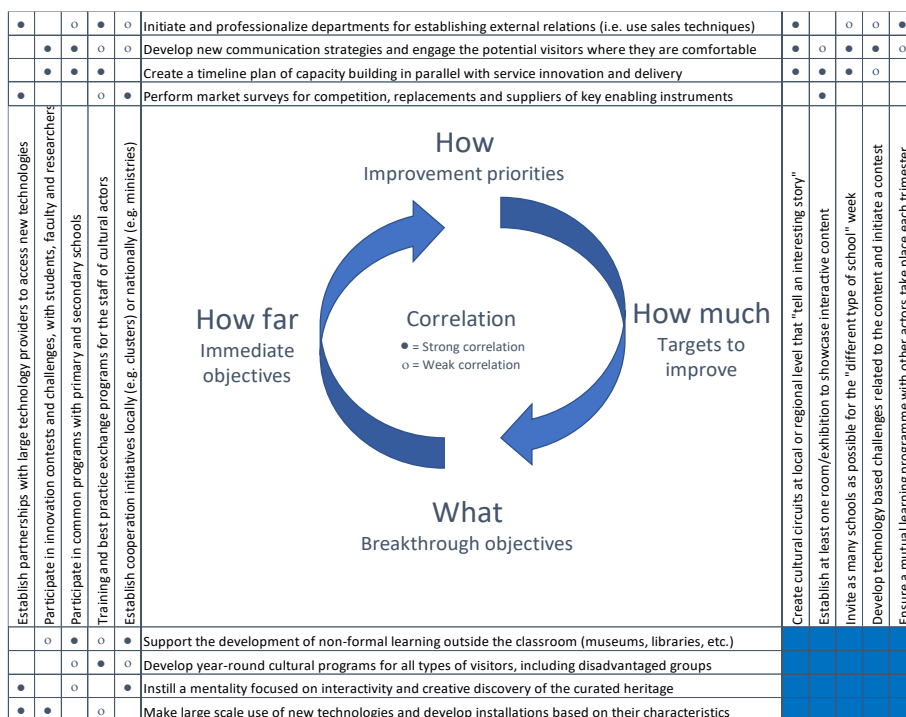
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<sup>4</sup> European Commission, *Digital Transformation Monitor - Germany: Industrie 4.0.* (2017). [https://ec.europa.eu/growth/tools-databases/dem/monitor/sites/default/files/DTM\\_Industrie%204.0.pdf](https://ec.europa.eu/growth/tools-databases/dem/monitor/sites/default/files/DTM_Industrie%204.0.pdf) (accessed: August 25, 2019).

<sup>5</sup> European Commission, *Digital Agenda for Europe: key publications* (2017). <https://ec.europa.eu/digital-single-market/en/digital-agenda-europe-key-publications> (accessed: August 25, 2019).

<sup>6</sup> ISO, *The ISO Survey of management system standard certifications - 2017 - Explanatory note* (2018). <https://isotc.iso.org/livelink/livelink/fetch/->

standards have appeared, out of which ISO 31000<sup>7</sup> is worth mentioning as it helps risk management become more mature, which is critical in the fluid business context of the present. Also, the specific framework of management instruments for leading cultural institutions, published by UNESCO<sup>8</sup>, deals with the most important aspect that are necessary to ensure a sustainable and viable organization in this field.



**Fig. 1 Hoshin Kanri type planning matrix for digitalizing cultural institutions**

In order to study the degree to which Romanian cultural institutions are relating to these international models, we have formed a panel of 5 experts from museums, academia, and cooperating companies and conducted interviews with them. Some of their strategic and operational recommendations for the average cultural actor in Romania are presented in the form of a Hoshin Kanri X matrix in Fig. 1<sup>9</sup>.

8853493/8853511/8853520/18808772/00\_Executive\_summary\_2016\_Survey.pdf?nodeid=19208898&vnum=-2 (accessed: August 25, 2019).

<sup>7</sup> ISO, *Risk management - ISO 31000* (2018).

<https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100426.pdf> (accessed: August 25, 2019).

<sup>8</sup> G. Wijesuriya, J. Thompson, C. Young, *Managing cultural World heritage. Resource Manual* (Paris: UNESCO, 2013).

<sup>9</sup> X Matrix template used from J. Lindell, *Hoshin Kanri* (2015), from ToolsHero: <https://www.toolshero.com/strategy/hoshin-kanri/> (accessed: August 30, 2019).

### III. Tech aids culture - museums meet the market ... and it is a match!

The collaboration of the TU Cluj-Napoca with cultural institutions (museums, university schools, NGOs, etc.) has been an enduring imitative for cca. 10 years now, with many events, scientific studies and funding projects being developed in common. We present below a synoptic table of the most important collaborations in the past 3 years, which are have served to test and validate the management concepts and the technologies descried chapter (see Table 1 and Fig. 2).

**Table 1. General overview of cultural events and related management challenges**

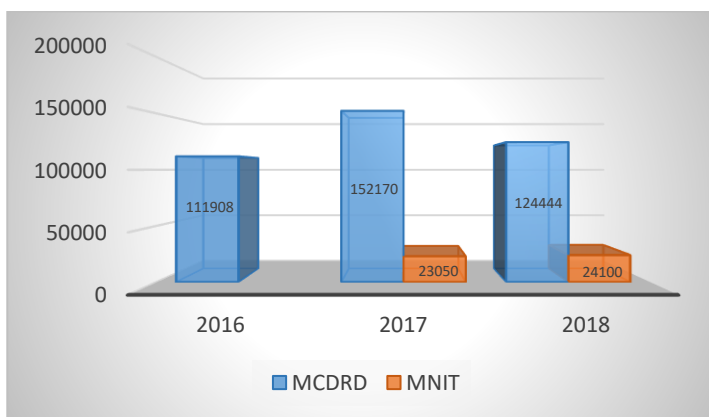
Event name	Year	Cultural impact	Management challenges
The white night of museums	2017, 2018, 2019	Demonstrations of 3D scanning and virtual reality applications were presented to the public	Requirements identification Management of resources Developing brand identity
Exhibition: Dacian encounters in the virtual environment (MCDR - MNIT)	2017	A new type if interactive exhibition developed during the DACIT projects	Complex project management Public acquisitions/tenders Development of scenarios
The traditional museum in the digital world (Qulto International, Cultware SR)	2017: 18 Oct.	Presentation and demonstrations regarding the use of digitized models and interactivity	Management of changes Analysis of risk categories Cultural paradigm shift
creatiVE Summer School	2017, 2018, 2019	Presentations and demonstrations on the digitization and valuation of cultural heritage in virtual museums	Human resources development Monetization strategies Technology management
Exhibition: Iron Metallurgy (MCDR)	2018: 10 Jan.	Presenting the main aspects related to iron processing in the Dacian Kingdom's capital area	Niche marketing and PR Configuration management Multi-location implementation
Exhibition: Iron processing in the Dacian era (MNIT)	2018	Presenting different categories of artifacts: carpentry, metallurgical, agricultural tools; parts produced /repaired by the Dacians	Niche marketing and PR Product portfolio integration Multi-location implementation

Event name	Year	Cultural impact	Management challenges
Round table: 3D Heritage - Initiatives in documenting and capitalizing on the digitization of cultural heritage in Romania	2018	Annual Session of Scientific Communications of MCDR - techniques for digitizing multimedia applications in museums	Stakeholder engagement Management plan proposals Monetization strategies
Special event for the participants to the International Mathematical Olympiad	2018	Digitization demonstrations, presentation of VR applications and guides in the exhibition Iron processing in the Dacian era	Requirements identification Community engagement Corporate social responsibility
Special event dedicated to participants in the kick-off event EEA and Norway Grants organized by the Arts Council Norway and Norwegian Directorate for Cultural Heritage in Oslo	2018: 29 May	We presented the virtual tour made during the implementation period of the project. The stand was visited by officials from Romania and Norway.	Vision statement & fulfilment Performance measurement Effective communication
Exhibition: Tradition and influence (MCDR)	2019	Presenting a visual perspective on the Dacian civilization in the Orăștie Mountains	Cultural paradigm shift Facilities management Enhancing quality of life
MuseumFest (Museum of Buzău County)	2019: 10-12 May	Within the Tech & Culture section, virtual and augmented reality applications were presented	Dissemination strategy Partnership development Financing strategies
Open day at the archaeological site Sarmizegetusa regia (MCDR, MNIT, UBB)	2019: 1 Sept.	The proposal for the reconstruction of the Great Circular Temple was presented on the site using VR	Dissemination strategy Multi-location implementation Real-time resource allocation
International Exhibition of Cultural Heritage in Paris	2019	Participation and presentation of the project, experience exchange	Dissemination strategy Partnership development Multicultural communication



**Figs. 2. Concrete aspects while implementing new approaches to cultural heritage management and marketing**

As an output of the DACIT project, TUCN and the partner museums have set up two interactive exhibition demonstrators, one at the National Museum of Transylvanian History of Cluj-Napoca (MNIT) and one at the Museum of the Dacian and Roman Civilization of Deva (MCDRD). These events are running since 2016 and are presenting a real-virtual mix of Dacian culture and artefacts, with the goal to stimulate customer attendance, especially the younger generations, and to drive up engagement and maximize the dissemination potential of the presented historical elements. Among the technologies employed in these two locations we can mention: 3D modelling and simulation displayed via video-projectors, motion tracking devices that allow for the interaction of the visitors and the artefacts, haptic instruments that simulate the perception of touch, interactive touchscreens, QR codes for presenting additional information and VR versions of the exhibition room, and the Dacian sacred site at Sarmizegetusa. The exhibitions have been advertised through websites, Facebook pages, posters, press conferences and news items on local and national outlets. Also, some important events that have taken places in the two cities (conferences, competitions, visits) brought over their participants for organized tours, with the museum guides and TUCN researchers. The annual reports of the two institutions reflect on the activities associated with the exhibitions and present increases in the official number of visitors, connectable to all the museums showings, including these ones (Fig. 3).



**Fig. 3 Evolution of visitors for the museum implementing the pilot exhibitions**  
(Sources of data: Annual activity reports retrieved from <http://www.mcdr.ro/despre-noi-mcdr-deva> and <https://www.mnit.ro/rapoarte-si-studii/>)

Another successful complementary between cultural heritage research and engineering came in the form of new product development using additive manufacturing for producing souvenirs based on Neolithic artefacts. The team at TUCN has scanned, processed and prepared for deployment the famous and controversial Tărtăria tablets that contain an ancient and enigmatic writing system. Although there is still ongoing debate about their historicity and value, they have an obvious appeal to the public which is interested in knowing more and showing them to visitors and tourists. For this reason, the scanning we produced can be used both



for scientific study without damaging the originals, but can also be processed, scaled, and integrated into other products in the form of 3D printed souvenirs. The product concept has been developed and the production process is ready, with the market tests proving the interest of the potential customers. The developed souvenirs are ready to become part of the offering of the MNIT, and the obtained revenue could contribute to their further investigation. Moreover, the working methodology is validated and can be applied later to any similar case.

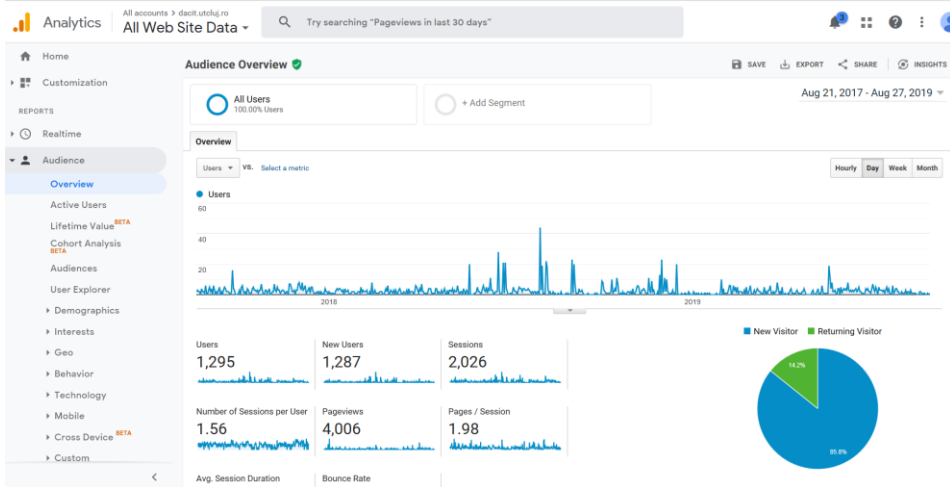
An important aspect in working with digital cultural heritage is taking advantage of the digital medium and dramatically increasing the availability of the restored artefacts by making them available online in virtual museums (as above) or dedicated databases and repositories. Some of these tools can make use of advanced technologies such as virtual reality for helping the visitor interact with the cultural subject. Through the DACIT project, TUCN has contributed a record number of 500 digitized artefacts to the European platform, becoming number 6 in Europe in terms of 3D digital content made freely available to the citizens of the continent. This achievement, and the others from the project, have led to the institution, TUCN, receiving a Special Mention from the Jury of the European Heritage Awards 2019. Other endeavours in disseminating cultural heritage over the internet to more consumers include:

- 9 digitized or digitally restored imperial gates through the project ASTERCRIG (“Multi-disciplinary assessment of the imperial gates of 15th-19th century churches for conservation and restoration by classical and digital methods for ensuring community viability”, PN-II-PT-PCCA-2013-4-1882, leader Babeş-Bolyai University Cluj-Napoca) which are available on the site Sketchfab in interactive 3D format: <https://sketchfab.com/astercrig>;
- over 300 medieval and pre-modern paintings digitized and processed for authentication through the project IDArt (“Elaborating Complex Methodologies Regarding the Attribution and Authentication of Medieval and Early Modern Paintings Belonging to the National Cultural Heritage”, PN-III-P1-1.2-PCCDI-2017-0812, leader “George Oprescu” Institute of Art History Bucharest – Romanian Academy), which will become available in the near future;
- over 30 specific or full digital reconstructions of the 6 Dacian citadels situated in the Orăştie Mountains in collaboration with the Multiannual archaeological research program “The Dacian Fortresses” of the Ministry of Culture;
- 4 printed/digital catalogues, some with VR visualization capabilities in anaglyph format (including glasses).

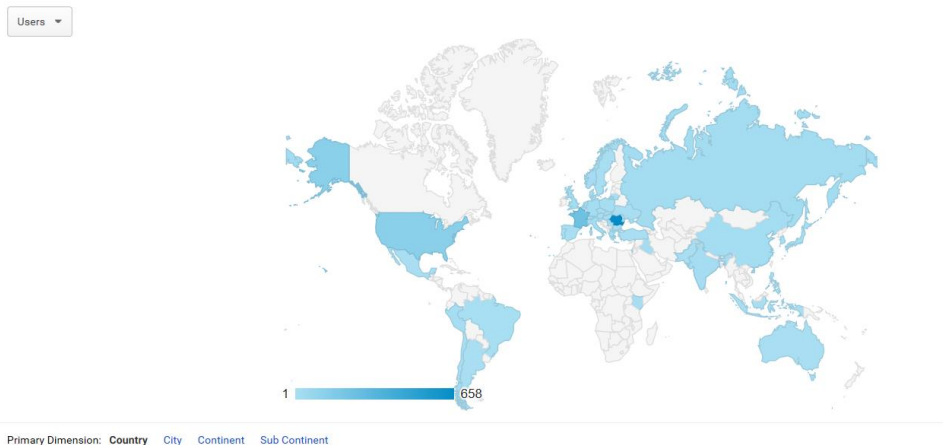


**Fig. 4 Collection of various results of the collaboration between the TUCN team and cultural institutions**

Some of these results can be seen in Fig. 4. Regarding their degree of visibility, the Google Analytics statistics regarding access to the page [dacit.utcluj.ro](http://dacit.utcluj.ro) managed by TUCN show a steady interest and a consistent behaviour of the visitors (Fig. 5), as well as a very good international scope, with users connecting from all over the world (Fig. 6).



**Fig. 5** User interest and engagement regarding the digitized cultural heritage and the virtual museum produced by the DACIT project



**Fig. 6** Geographical distribution of users of the site of the DACIT project

An important indirect effect combining the real and the virtual versions of cultural heritage is supporting local based hospitality businesses by increasing the visibility of the patrimony objects. This aspect goes beyond the actions of one or a few cultural institutions and has the potential to influence local communities. For

example, in the case of the digitized, studied and reconstructed wooden churches in Transylvania that have formed the object of the projects mentioned before, we can infer an increase of the influx of tourists, which translates to more overnight stays, as well as meals and other expenses of the visitors that bring extra revenue in these areas. However, the existing data sources do not permit yet the verification of this hypothesis.

#### IV. Conclusions and outlook

We believe that Romanian cultural institutions have a good position and good results in enhancing cultural management and marketing through technologies and their experiences will be of interest on an international scale. The partnerships presented are constantly evolving and gaining strength, with more technical challenges being addressed, and more management practices being added. Some of these, in which the authors are involved include the possibility of instituting cross-sectoral research institutes, developing advanced university degrees in digital cultural heritage and restoring patrimony through partnerships with the final goal of developing networks of stakeholders for the benefit of customers.

The fortunate meeting of cultural heritage, advanced technology and good management and marketing approaches constitutes a solid foundation upon which the rich history of our country can reach out to the world, influencing both its citizens and foreign visitors. The team at TUCN to which the authors belong is now moving into the next phase of this cross-sectoral development, in which various automation instruments will be developed and created that will facilitate the better connection to heritage of both the public and researchers. In this area, we are currently developing, within the IDArt project mentioned above, a software and a database that will be trained to help in attributing various religious paintings to certain periods, styles or even painters. Another area of interest in which we are currently working is related to increasing the effectiveness of VR/AR devices in delivering cultural heritage content in terms of historical and cultural accuracy and user engagement. Further on, these tools will be deployed through the internet and partner museum and their contribution to a better fulfilment of their mission in society will be again gauged by management specific instruments.

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