

i-Treasures and Intangible Cultural Heritage Education

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Abstract The paper draws on the i-Treasures project, an Integrated Project co-financed by EU under the ICT theme (Information and Communication Technologies) of the FP7 (7th Framework Program), which deals with the use of advanced ICT technologies in the field of Intangible Cultural Heritage (ICH) education. The project aims at going far beyond the mere ICT-enhanced dissemination; rather it is meant to support the learning and passing down of the rare know-how behind the various ICHs by means of cutting edge ICT and sensor technologies. In doing so, it focuses on four use cases: a) Rare Traditional Songs, b) Rare Dance Interactions, c) Traditional Craftsmanship and d) Contemporary Music Composition. An open and extendable platform is being developed, which provides access to rare ICH resources and offers a dedicated Learning Management System, able to sustain innovative teaching and learning practices in ICH education.

1 Intangible Cultural Heritage and its transmission

In this paper, we deal with Intangible Cultural Heritage (ICH) and its transmission and, in particular, we look at the innovative tools and methodologies adopted within the EU project i-Treasures to sustain their passing down to new generations.

Intangible Cultural Heritage is defined by UNESCO as “*the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity*”.

Following the adoption of the Convention for the Safeguarding of Intangible Heritage [UNE03], even the protection of cultural traditions has become prominent at international level, as these are considered threatened by processes of globalization. EU actions in this direction have been recently intensified taking into account the fact that, at present, safeguarding activities sensibly vary according to local and national contexts [Ali12].

While recognizing the importance and the artistic, social and cultural value of local artistic expressions, UNESCO also highlights the urgent need for preserving/safeguarding them. This implies adopting “*measures aimed at ensuring the viability of the intangible cultural heritage, including the*

identification, documentation, research, preservation, protection, promotion, enhancement, transmission, particularly through formal and non-formal education, as well as the revitalization of the various aspects of such heritage”.

UNESCO has also produced two documents mapping intangible cultural expressions in the world: 1) The *Representative List of the Intangible Cultural Heritage of Humanity* and 2) The *List of Intangible Cultural Heritage in Need of Urgent Safeguarding*, the latter one including those cultural form that require urgent measures to keep them alive.

Thus, the two lists are international inventories of traditional expressions following the five domains of intangible heritage defined in the 2003 Convention, namely:

- a) oral traditions and expressions, including language as a vehicle of the intangible cultural heritage;
- b) performing arts;
- c) social practices, rituals and festive events;
- d) knowledge and practices concerning nature and the universe;
- e) traditional craftsmanship.

Both lists are accessible online¹ and include photographs and audiovisual recordings of the cultural expressions. The primary function of these lists is that of an archival resource to raise awareness about the listed expressions and their communities.

Among these cultural expressions considered as Intangible Cultural Heritage the i-Treasures project, which is an example of the EU efforts to sustain and promote innovative research in the field, focuses on rare traditional songs and dances, traditional pottery manufacturing and on a modern emerging practice, commonly defined as “contemporary music composition” (Figure1).



Figure1. Images from the four i-Treasures use cases: Sardinian Cantu a Tenore; Rumanian Calus dance, greek pottery, contemporary music composition

As already mentioned, so far the transmission of these important cultural expressions to next generations is mainly based on oral transmission and/or personal contacts between skilled performers/artists and learners [ADO⁺13]. The

¹ <http://www.unesco.org/culture/ich/index.php?pg=00011>

“use cases” of songs, dances, pottery craftsmanship and contemporary music composition are being adopted in the i-Treasures project to test and exemplify how cutting edge technologies (both ICT and sensor technologies) can contribute to preserve the rare know-how behind these ICH expressions, and possibly foster innovative teaching and learning practices.

2 The i-Treasures project and the innovative tools to sustain ICH education

The i-Treasures project is an Integrated Project co-financed by EU under the ICT theme (Information and Communication Technologies) of the FP7 (7th Framework Program). i-Treasures has started in February 2013 and will last until 2017. It involves 12 partners from 7 countries with different expertise and different backgrounds including computer scientists, educational technologists, anthropologists, medical doctors, and physiologists.

It builds on current developments in the field, with the aim of identifying and devising new appropriate technological tools and defining suitable methods for the safeguarding and transmission of ICHs; in doing so it is also meant to apply participatory methodologies in public engagement of local communities. The idea is to empower local actors to use new technologies in the transmission and dissemination of intangible heritage expressions for the benefit of sustainable community development. To this end, the project aims to establish strong connections with local actors and community representatives and include local stakeholders in major phases of the development and use of the online platform.

One of the main assumptions of the project is that although modern technologies should not replace human interactions in the transmission of intangible heritage, but they can contribute significantly to processes of dissemination, especially among younger generations. For this reason, a particular focus of the project is the final development of territorial schools that will act as local hubs for the transmission of local intangible heritage expressions, by relying on the methods and tools developed in the framework of the project itself.

As said above, the project concentrates on four “use cases”. Each use case is further instantiated in different “sub-use cases” which actually are the real, concrete ICHs that are considered and studied within the project and for which suitable modalities and tools are devised and tested.

Table 1 contains the list of the specific sub-use cases tackled in the project:

<i>Use Case</i>	<i>Sub Use case</i>	<i>Country</i>
RARE SINGING	Byzantine music	Greece
	Cantu in Paghjella	Corse-France
	Canto a Tenore	Sardinia- Italy
	Human Beat Box	Worldwide
RARE DANCING	Căluș dance	Romania
	Tsamiko Greek dance	Greece
	Walloon traditional dance	Belgium
	Contemporary dance	Worldwide
CRAFTS MAN- SHIP	The art of pottery	Greece France Turkey

<i>Use Case</i>	<i>Sub Use case</i>	<i>Country</i>
CONTEMPORARY MUSIC COMPOSITION	Based on music patterns of Beethoven Haydn or Mozart	Worldwide

Table 1 - List of the ICHs considered in the project.

2.1 Setting up the knowledge base: technologies and methods

The ultimate tangible outcome of the i-Treasures project will be: “*an open and extendable platform providing access to ICH resources, enabling knowledge exchange between researchers and contributing to the transmission of rare know-how from Living Human Treasures to apprentices*”².

Different steps are being followed in order to develop the above platform.

As first step relevant and detailed information on the different artistic expressions recognized as ICHs are obtained from skilled performers, experts and researchers.

This step mainly entails an accurate and detailed definition of users and system requirements [PAD⁺14] allowing from the one hand to have a clear picture of each single ICH and from the other hand to define what the system will do.

As a second step, based on the identified requirements, key aspects and features of the considered ICHs are “captured” by using advanced ICT and sensor technologies.

In particular this step will entail capturing any relevant performer’s posture and movements (especially: total body, feet, leg, hand and fingers, vocal tract, gaze, face, etc.), capturing sounds (through recordings, etc.), capturing contextual conditions (i.e., accessories and tools of any kind used by the performer), capturing any interactions with others, capturing single roles, single styles, and detect synchronization aspects (among performers, among different ‘actions’ by the same performer, etc.).

To do this, the system will need to include a variety of sensors, including: optical sensors, depth sensors, inertial sensors, electroglottographs sensors (EGG), electroencephalograms sensors (EEG), ultrasound sensors and other sensors (such as for example piezoelectric accelerometer, universal breathing belt, etc.).

As examples, regarding the *rare singing* use case:

- a) facial expression analysis technologies could enable the detailed recording of the singers’ expressions and singing techniques;
- b) EEG analysis could provide information about the performers’ emotional state;
- c) vocal tract sensing technologies could be used to document the various changes of the vocal tract during the performance;
- d) motion capture technologies could give an indication of the performers’ body movements;
- e) acoustic tools, such as spectrograms or the Text-to-Song tool could give additional information about acoustics.

² www.i-treasures.eu

With respect to the case of *dance*:

- a) motion capture technologies can provide a detailed representation of the movements of the human body in performance, bringing new insights to motional and gestural aspects whose examination is not always possible due to complex outfits and costumes;
- b) facial expression analysis can contribute to the examination of the emotional state of the dancers when performing.

Similarly, regarding the case of *craftsmanship and pottery*, motion capture tools can be used again for the detailed documentation of hand and finger movements during the creation process.

Concerning *contemporary music composition*, technologies such as motion capture tools and EEG could potentially provide combined information on movements and emotional conditions.

As third step, a thorough process of modeling the data available will be carried out, by relying on advanced Semantic Multimedia Analysis techniques. This will enable the combination of different levels of information and data, for documentation and subsequent use in learning and training activities.

The available data will thus give life to a knowledge base containing a wealth of information never available before; this will allow shaping a variety of different teaching/learning paths, serving different scopes and specific educational needs, all aimed at contributing to the transmission of these peculiar artistic and cultural expressions. Besides, further research could be conducted on these data, thus opening the doors to the discovery of new peculiarities characterizing these undisclosed domains.

In a broader view, the combination of all the mentioned technologies will contribute significantly to the documentation of the rare knowledge behind each ICH, to its dissemination and to the enactment of a novel approach to its safeguarding, based on ICT- enhanced education, specific training and advanced pedagogical interaction.

2.2 Educational assets: technologies and approaches

The ultimate outcome of the project will be an innovative educational platform, which will allow accessing both the available dedicated contents and the envisaged, specific learning processes.

The platform is meant to guarantee access to data and relevant information concerning the ICHs. This means that the system will allow the storage of multimedia information (video, audio, images, text, etc.) and provide adequate and multi-searching functionalities to allow easy retrieval of this information. It will also guarantee multilingual and universal access facilities.

As to the learning process, it is expected to take the learners beyond the so far adopted strategy of “learning by imitation”. The learners will be exposed to multi-modal and multi-sensory learning experiences; they will be enabled to carry out individual trials and receiving appropriate feedback, so to reach increased levels of competence in an easier, more direct, quicker and effective way”.

The educational processes to be conducted through the platform and the LMS (Learning Management System) will be grounded on specific ‘educational scenarios’ and will also rely on an innovative 3D sensorimotor learning module, able to support users to learn, practice and master one specific ICH.

The i-Treasures educational scenarios, available through the dedicated LMS will be designed by means of an *ad hoc* online tool called “Pedagogical Planner” which supports the design, construction, delivery and the online sharing of structured pedagogical plans [OBE⁺10].

On the basis of each pedagogical plan specific “educational scenarios” will be built, that will be then delivered through the Learning Management System.

The 3D sensorimotor learning module main functionalities can be summarized as follows:

- a) The system by means of a virtual instructor gives instructions and briefly shows what to do.
- b) The user wears the sensors, starts practicing the ICH and the sensors ‘capture’ her/his performance.
- c) The module visualizes the user’s performance.
- d) The module compares the user’s performance with the expert’s performance.
- e) The module provides both auditory and visual feedback. In particular, as far as auditory feedback is concerned, a noiser sound or a louder high harmonic can be used, depending on how close is the performance of the learner compared to the one of the experts. Colocalization can be used as main visual feedback (i.e. superimposition on the ultrasound video of the expert and of the learner).

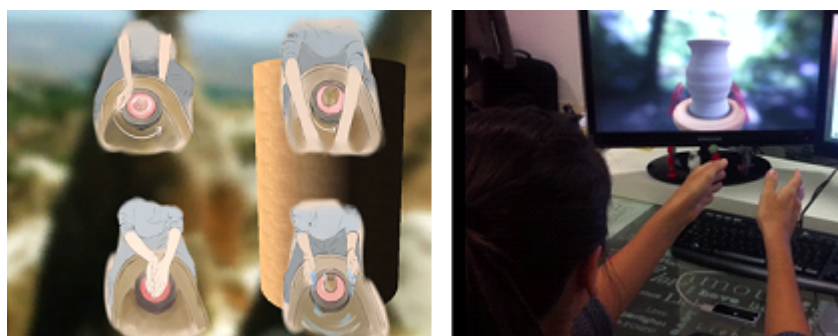


Figure 2. Example of the 3D sensorimotor learning affordances related to the specific ICH craftsmanship-pottery (aspects of instructions- left part and user’s inputs- right part)

3 Conclusions

We have drafted some of the main features of the i-Treasures project as an example of how new technologies and in particular new sensor technologies can apply to the field of Cultural Heritage safeguarding and education.

These new approaches represent a step forward with respect to the employment of traditional ICT-related techniques [OP11] and open new ways for supporting teaching and learning processes of artistic and cultural living intangible expressions.

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