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MARIE SKŁODOWSKA-CURIE ACTIONS

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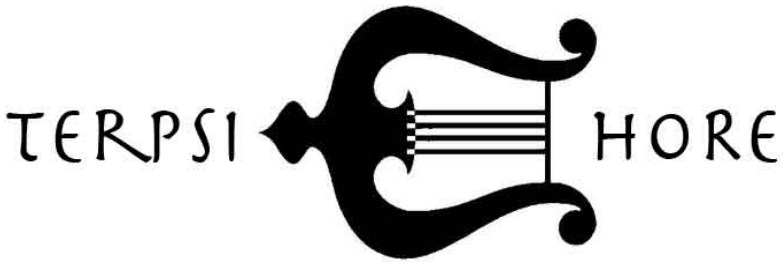

Transforming Intangib**l**e Folklo**r**ic **P**erforming Art**s** into Tang**i**ble **C**ho**r**eographic Digital Obj**e**cts

Deliverable 1.2 “Digital Choreographic Model”

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1. Introduction

The purpose of Deliverable 1.2: "The digital Terpsichore choreographic model" is to introduce the primary digital choreographic model for Terpsichore's digital data. The aim is to suggest an interoperable metadata and structural framework that will be combined with the iterative methodological framework followed in Terpsichore project. The primary purpose of Terpsichore project is to digitize, model, archive, e-preserve and present Intangible Cultural Heritage content related to folk dances. The project aims to develop Web-based cultural server/viewer with the purpose to allow user's interaction, visualization, interface with existing cultural libraries. Moreover, the proposed framework should address many different needs of the potential users, i.e., dance professionals, dance teachers, creative industries, the public, researchers and media producers. For instance, we should consider the needs of these different users, e.g., to search for information on a particular dance, learn how to dance, have the possibility to view the technical details of the digitization process. Also, users want to retrieve dances with specific criteria such as steps, lyrics, rhythm, and region. Metadata play a vital role in achieving all these goals because they encode the data mentioned above and allow the user to retrieve and view structured information from the cultural server.

The Terpsichore project is about Intangible Cultural Heritage. Organizations such as UNESCO and the European Union try to preserve and disseminate Intangible Cultural Heritage. UNESCO adopted in 2003 the Convention for the Safeguarding of the Intangible Cultural Heritage to protect and promote intangible cultural heritage. Among the cultural items included in the UNESCO lists of Intangible Cultural Heritage are traditional dances. To maintain the choreography of the traditional dances, especially in the era of the Internet, it is necessary for transmitting these dances in the next generations.

This deliverable describes the meaning of metadata and Intangible Cultural Heritage focusing on folk dances. Then we review the corresponding state-of-the-art in metadata schemes for Intangible Cultural Heritage, especially in folk dance case. We conclude with the proposed metadata schema, adequately adapted to the Terpsichore's data and the user's needs.

2. Metadata

Analyzing the word metadata, meta and data, we can conclude that metadata is data about data. In other words, metadata is documentation that describes data[1]. According to Merriam-Webster online dictionary metadata are data that provides information about other data [2]. National Information Standards Organization defines metadata as structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource[3]. Greenberg[4] gives a functional definition of metadata and describe as structured data about an object that supports functions associated with the designated purpose. The explanation mentioned above about metadata includes the aspect of structure, with a meaning of information organized systematically, usually with the use of metadata schemas [5]. As a metadata schema, according to ISO 23081, we can define a logical plan showing the relationships between metadata elements. The schemes are the basis for metadata standard because we are based on metadata scheme to develop to a metadata standard.

Libraries first used metadata to retrieve and locate the material in their collection. So, metadata primary purpose is to assist users to locate information and discover resources. Moreover, metadata are vital in electronic resource organization and digital preservation of resources and information.

In addition to these, metadata play an important role in the cultural heritage world. Libraries, archives, and museums create and use structured metadata. Furthermore, archives use metadata to describe their collections and document with historic information. Libraries focus on bibliographic metadata, and museums use them to interpret collections and define a relation between the objects[6]. Furthermore, information professionals, creators, and users of digital content recognize that metadata can ensure accessibility, interoperability and presser vability of cultural heritage information and record-keeping systems. Cultural heritage information professionals use metadata to enhance access to information objects[7].

According to Library of Congress, we can distinguish three types of metadata: descriptive, structural, and administrative. Descriptive metadata have as a purpose to help users to identify, search and locate information and objects like title, author. Structural metadata are used to describe the relationship between the part of a resource. Administrative metadata provides information to help manage a resource, such as when and how it was created, file type and other technical information, and who can access it[8]. Moreover, metadata may include another two types that contain information about access rights and restrictions that ensure the long-term preservation and access to the information resources. The preservation metadata can consist of details about format migration and data refreshment [9].

3. Intangible Cultural Heritage

The Convention for Safeguarding the Intangible Cultural Heritage defines it 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[10].

Moreover, intangible cultural heritage covers the domains of:

- Oral traditions
- Performing arts
- Social practices
- Rituals
- Festive events

Knowledge and practices concerning nature and the universe or the knowledge and skills to produce traditional crafts[11].

UNESCO gives attention to dance as a part of Intangible Cultural Heritage, so dances are included either in the Representative List or the Urgent Safeguarding List. The UNESCO lists include dances like Argentinean tango, Spanish flamenco, Chhau dance from India, Bigwala music and dance from Uganda, Huaconada from Peru[12]. From the above, we can conclude the importance of protecting and transmit to other generations the intangible cultural and especially the dance. The World Intellectual Property Organization[13]to point the importance of promoting and respecting traditional cultures and expressions will benefit people, local communities, and nations. The protection of cultural expressions could contribute toward the promotion of innovation.

Digitization with the help of new technology offers the possibility to document, record the intangible cultural heritage, since heritage elements that are not so visible and disappear we can preserve in a visual and digital format[14].

In addition to these, safeguarding intangible heritage should include locating the heritage and pay attention to heritage elements that are in a danger of disappearing. Another step is to catalog and deposit in a local or national digital platform to spread the knowledge to the internet, also to preserve and conserve for the society[15].

As mentioned before, folk dance is an essential part of Intangible Cultural Heritage. It is vital to define dance and especially folk dance more definitively. According to Merriam-Webster, a folk dance is a dance that originates as a ritual among and is characteristic of the ordinary people of a country and that is transmitted from generation to generation[16]. Also, we can define dance (as cited in [17]) as rhythmic or patterned movement[16]. Royce expands the aforementioned definition and describes dance as patterned movement performed as an end in itself[18]. From the above, we can conclude that dance movements or choreography is the basis for a dance.

It is a fact that it is not easy to define the meaning of folk dance. Folk dance was part of a community life and had a significant function. According to Hoerburger [19], folk dance had as a purpose the pleasure or the recreation. In addition to these, we can broaden the definition of folk dance and include a variety of dance forms which survive as, or are based on, local or national tradition. These dances with their music, which may be sung or played upon 'folk' instruments, have been passed from generation to generation and have acquired through tradition the stable and identifiable forms that we know today[19].

Furthermore, Encyclopedia Britannica[20] defines the term folk dance and analyze examples of folk dances from European countries, also Hawaiian dance and Korean dance focusing on the movements of the dance, the rhythm of the music and the clothes the dancers wear. In an extended analysis of Snodgrass[21] about the folk dances across the world the author describes the history and origin of each and summarize the same features of each dance as the Encyclopedia Britannica.

4. Intangible Cultural Heritage Metadata

Various research efforts are focusing on digitization, archiving and preservation of intangible cultural heritage and performing-art content. I-Treasures was a European project that had as a purpose to develop an open and extendable platform to provide access to ICH resources. On that framework, the project had as a purpose to propose novel methodologies and new technological paradigms for the analysis and modeling of ICH. The project focused on four different cases of ICH a) Rare Traditional Songs, b) Rare Dance Interactions, c) Traditional Craftsmanship and d) Contemporary Music Composition[22]. In the i-Treasures project, the metadata schema for their platform used a combination of Dublin Core Metadata Element Set, i-Treasures Model, ESE – European a Semantic Elements[23].

Another European research project related to ICH and especially to dance is Wholodance. Wholodance has a purpose to develop and apply breakthrough technologies to Dance Learning. The result of the project will benefit dance practitioners ranging from Researchers and Professionals to Dance Students and the Interested Public. In the project, they will investigate bodily knowledge by applying techniques for the automated analysis of dance movements. Moreover, they will capture the dance movement to create virtual bodies that will enhance the teaching of dance and give the choreographers the opportunity to create new choreographies[24]. To achieve the aforementioned goals in their research about ontological representation of dance movement El Raheb et.al.[25][26]use OWL to assign annotations representing movement sequences of a dance-recording video.

In an extended research about metadata in digital folklore collections, Lourdi [27] concluded that main metadata standards used for cultural heritage collections are Dublin Core Metadata Element Set (DC), Dublin Core Collections Application Profile (DCCAP), Metadata Encoding and Transmission Standard (METS), Categories for the Description of Works of Art (CDWA), VRA Core Record (VRA Core Record), Machine Readable Cataloging (MARC), Text Encoding Initiative (TEI), Encoded Archival Description(EAD), Metadata Object Description Schema (MODS), RSLP Collection Description (RSLP), CIDOC/CRM.

Dublin Core Metadata Element Set has a purpose to exchange and retrieve information for the digital objects in the web. The Dublin Core consists of 15 metadata elements, and with the help of Dublin Core Qualifiers we can extend the prototype to adjust the needs of the collection it is necessary to describe[28]. In a research[29] to suggest a metadata standard for Chinese Intangible Cultural Heritage, the scientists analyzed the mainstream metadata standards systems such as ISAD(G), Encoded Archival Description, International Standard Archival Authority Record, Encoded Archival Description, Text Encoding Initiative, and Dublin Core. Furthermore, they examined the parameter that metadata standard should reflect the cultural value of intangible cultural heritage and the UNESCO guidelines for the world heritages convention they suggested a scheme based on Dublin Core with 14 metadata elements and 67 filed names.

Kettula and Hyvönen[30],studied how they can describe with metadata a video that contains a craft process of shoemaking. In their proposed metadata schema, they moved from an object-oriented approach to an event-centric approach. The crafting process was presented in six main sequences which were annotated with a keyword at the start and the end of the film. The metadata schema that they used to describe the shoemaking process is based on an RDF ontology. The RDF graph gives the possibility to link to other digital objects such as nail and leather objects.

Kannan et al. [31][32] in their research they developed a dance information system, called DanVideo, that gives users the opportunity to retrieve dance videos from semantic metadata. In order to build the architecture of the system, the researchers used the MPEG-7 metadata standard to annotate dance videos. Moreover, they examined what users wish to search for in the system and they concluded that dance learners and viewers would like to have the possibility to search for emotions expressed by the dancers, the history of the dance, recording location, the origin country of the dance, the song that accompanies the dance and the costumes of the dancers.

Mallik et al. [33][34] in their research focused on annotation in MPEG video on Indian dances. In their approach, they created an ontology that correlates heritage resources and multimedia data. To construct the ontology, they used the Multimedia Web Ontology Language (MOWL) to annotate new multimedia objects.

Stavrakis et al. [35][36] in their effort to digitize Cypriot folk dances, so local community and especially young people to learn folk dances created a dance database schema and for each dance entry the metadata they used was the name of the dance, the type of the dance, the region the dance originates and a description.

Kim [37] developed ChoreoSave, a prototype online system by analyzing a dance work into components that are then represented using the EPrints software (http://software.eprints.org). To define the metadata standard for the ChoreoSave online system, Kim researched14 digital library programs and concluded that the most frequent metadata standards mentioned were METS, Dublin Core, and combinations of metadata standards. The metadata

fields for the ChoreoSave included the name of the choreographer, the title of the dance, a set of performers, musical or sound accompaniment and a movement vocabulary.

Tan et al. [38]in an effort to represent the knowledge comes from the dance called “FuneralDance” they created an ontology based on CIDOC CRM. Moreover, according to the system the designed, the concepts and properties of this filed can be selected from CRM. In addition to these, to construct their domainal ontology, all concepts, properties, and instances are designed by using WebOntology Language (owl).

5. Data for Digital Choreographic Model

From the metadata definition, we can conclude that it is essential to define the data accurately to construct the metadata schema. The primary goal of the Terpsichore project is the digitization and 3D representation of traditional dances performances. These performances include elements such as the dancer and the dance it is performed (music, lyrics, choreography, etc.). A proposed categorization of the data elements that are essential for the project is illustrated in Fig. 1. From the figure, we can observe that it is necessary to deal with complex and a variety of data including both descriptive data about the traditional dance being performed, as well as data from recording and 3D representation. Specifically, if we examine Figure 1, as seen above onwards, the dance include data about the country/region of origin and its history, the music, including the rhythm, the score, as well as the lyrics, and the choreography described by the Labanotation[39]. In addition to these for recording, it is important to collect data such as the number and the kind of sensors, the calibration parameters, the recording software and the data from recording. The next category includes the 3D environment of the digital representation and the data from that category are the description of the scene, the lighting, as well as objects (e.g. stick, sickle) that may be present or used during the performance of the dance. Finally, the data for the dancer digital representation include the gender, the costume of the dancer, the body shape, body motion features and the facial expressions.

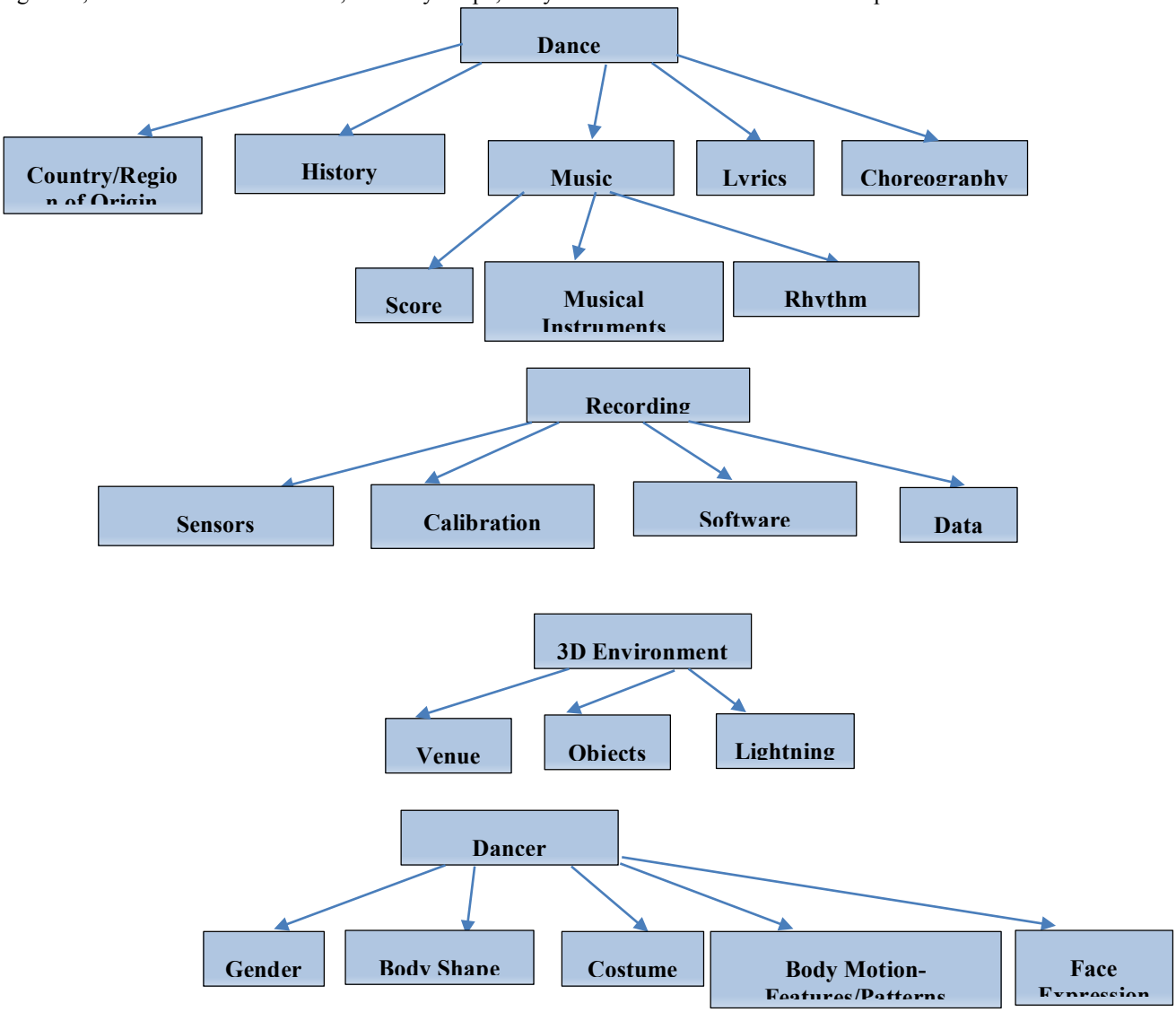

Figure 1: Dance data description scheme

6. Proposed Metadata for Digital Choreographic Model

After the analysis of the data, it is essential to define the metadata elements that will describe this data. The following table is an initial attempt to identify the metadata in the metadata scheme.

Dance	Recording	3D Environment	Dancer
Title	Title	Venue description	Gender
History	Description	Objects and their description	Face Expression
Country/Region of Origin	Location in GPS format and human readable	Description of the lightning	Traditional costume description
Time of origin	Number of sensors		
Dance variations	Sensor type and characteristics		
Music motif	Calibration		
Lyrics	Software		
Dance annotation			

Table 1: Metadata elements

Specifically, it is important to mention that dance can be performed in different places, for example, we may have a performance of the traditional Greek dance Kalamatianos in a theater, in a festival or in a village which is the physical environment where the dance was developed through all kinds of social events. In these circumstances, the dance is the same, but the recording and the 3D representation is different. From the above, we can conclude that for the proposed metadata schema we can follow the logic of the FRBR schema. FRBR is a conceptual entity-relationship model that is oriented to achieve a more holistic approach to retrieval and access from a user's perspective. Main group entities are work, expression, manifestation, and item. Work is a distinct intellectual or artistic creation. Expression is the specific intellectual or artistic form that a work takes each time it is realized. Manifestation is the physical embodiment of an expression of a work. Item is a single exemplar of a manifestation[40]. In our case the work is the dance, the expression is the varieties of the dance, and the manifestation is the recording of a venue a dance is performed. Moreover, we use the FRBR logic because we can create a record three levels work, expression, manifestation. The logic of three levels gives the possibility to create a record that describes the metadata of the dance and in that record to embody all the records referring to that dance. From our previous example we can create a record that describes the traditional Greek dance Kalamtianos and in that record, the user can find all the recordings of the project Terpsichore.

From the previous analysis, we have the structure of the proposed metadata schema. Moreover, it is essential to define the encoding of the metadata. Here we should examine the metadata schemas that can be used in ICH.We can conclude that METS is focused on encoding descriptive, administrative, and structural metadata usually in a digital library, so it is not oriented to describe intangible cultural heritage[41]. From the examples [42] of the implementation of METS by the Library of Congress, we can understand that METS orientation is on tangible items than intangible, so it is not an appropriate metadata schema to encode our metadata elements. MODS and MARC are schemes that are widely used by libraries and have as a purpose to describe bibliographic elements. According to the guidance of the Library of Congress[42], we can easily understand that MODS is not suitable for encoding metadata elements for the case of traditional dances. EAD is focused on describing archival collections. From the best practice guideline of EAD [43], we can easily conclude that EAD is referring to archive description and not to describe intangible cultural heritage. RSLP is a metadata model for the description of collections and is a prototype that can replace EAD based on DC[27].CDWA is metadata set that contains guidelines for the description of art, architecture, and other cultural works. CIDOC/CRM is a metadata for the exchange of information between cultural heritage institutions [44].

Hence, it is necessary to define a new metadata standard to that will encode all the metadata elements previously referred to the Table 1. Since we have a variety of metadata elements, it is not easy to cover the encoding of all these elements with a single metadata schema. The Dublin Core is a metadata schema that can be used as interoperable metadata standard and structural framework. Dublin Core is widely used in digital libraries and used

by the OAI-PMH standard as a protocol[45]. The OAI-PMH is a protocol that used by many digital libraries and the Europeana [46] to harvest metadata from other digital libraries. With the help of Dublin Core, we can encode elements of the dance such as title, history, country/region of origin, time of origin. Moreover, we can use MusciXML[47] to describe and encode musical motifs. Text Encoding Initiative(TEI) [48] is a metadata standard we can use to encode the lyrics of the traditional dance song. TEI is a standard for the representation of texts in digital form.

MovementXML[39] is based on LabanXML[49] and has as a purpose to represent in XML-based the semantics of Labanotation. MovementXML is the ideal XML schema to encode the dance annotation. With the help of MovementXML and especially with the element define-movement we can put smaller movements together to form a higher-level movement. Furthermore, it is essential to consider one of the goals of the Terpsichore project is the extraction of semantic signatures and ontologies. Ontologies will be created by folk dance experts, to model the domain knowledge. The domain knowledge is, in essence, the elementary and high-level concept properties and relationships definition and it will be defined in a structured and principled manner using ontology. Domain experts (e.g. folk-dance experts/teachers) will provide the necessary domain knowledge, which in turn will be translated to formalized knowledge in the form of ontology. These ontologies will be very useful for knowledge-assisted of the recorded dance performance. The Ontology Web Language (OWL)can be used to this end with input taken from the use case experts[50].

In addition to these, the description of the traditional costume of the dancer we propose to use the VRA standard. VRA[51] is data standard suitable to describe and encode metadata for paintings, drawings, sculpture, architecture, photographs, as well as book, decorative, and performance art. Furthermore, in a project[52] about cataloging 42 fashion objects, the researchers compared three metadata schemas USMARC, Dublin Core and VRA and concluded that VRA is the suitable metadata schema for the description of the fashion objects.

Finally, to encode the metadata of the recording and the 3D environment, it is necessary to create new metadata fields to encode these metadata elements. Also, gender and face expression of the dancer is essential to encode with some new and appropriate metadata elements. It is vital to develop our metadata fields for the cases mentioned above because the existing metadata schema does not cover those cases.

In order to fully understand the proposed metadata schema, we give an example of the folk dance Syrtos Kalamatianos in XML format. Syrtos Kalamatianos is a popular folk dance in Greece and Cyprus.

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xmlns:rdg2="http://rdvocab.info/ElementsGr2/"
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xmlns:role=http://rdvocab.info/roles/
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<!-- frbr Work -->
<dance>
<dc:title>Kalamatianos</dc:title>
<dc:subject> Folk dancing, Greek </dc:subject>
<dc:description>
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Syrtos Kalamatianos is one of the best-known dances in Greece. It is a popular Greek folk dance throughout Greece and Cyprus and is often performed at many social events. As is the case with most Greek folk dances, it is danced in open circle by man and woman. Its basic dance motif is performed in twelve movements, with intense movements from men and leaner from women and the musical beat is 7/8 (3+2+2). The first dancer has the ability to perform different dancing figures. The dancers are holding by hands by the palms in the W position (sometimes this hand position is performed only by the first and the second dancer, while the rest of the dancers have their

hands lowered from the palms). In all of Greece there are many different songs that accompany Syrtos Kalamatianos.

In the 19th century, Syrtos Kalamatianos was called Syrtos O Peloponisios, it was danced in the south area of Greece, Peloponnesus and it is believed to have acquired the name Kalamatianos because it was accompanied by songs with references (lyrics) to Kalamata, a town in this area. Most of the Greek traditional dances are commonly named after the villages or areas where they danced, the songs or the musical instruments that accompanies them, the traditional costumes etc.

The roots of circle dances as Syrtos Kalamatianos can be found in antiquity. Sappho makes a description with the women of Crete, who danced around an altar pressing on flowers (*PlesFr-ALGr* 14), Aristophanes and Euripides in many parts of their work, also refer to circle dances (Aristophanes, *The Birds* 917-9, *The Clouds* 333, Euripides, *Iphigenia at Aulis 1054-7*) and Homer in the Iliad (18.590-606) describes adolescents (*νέοι*) and virgins (*παρθένες*) which danced in a circle, caught by the wrists of their hands where the virgins wore thin tunics and wreaths, while the young men were dressed in oil-clad tunics and had swords hung from their gold and silver bands. Also according to Lucian (*The Dance 12*) a common dance of adolescents and virgins was ὅρμος (hormos), where young people danced next to each other, forming a chain (όρμος means chain-necklace), preparing war moves and followed by virgins, all together creating a chain of dancers, who present through their dancing skills, wisdom and bravery.

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7. Conclusion

In that document, we have presented our recommendation for a metadata schema for the digital choreographic model for the TERPSICHORE project. From the analysis of the metadata necessary to describe folklore dances, we can conclude that encoding ICH is complicated because we have to consider factors such as the environment and the emotions. The proposed metadata framework is suitable not only for the TERPSICHORE project but also for the description of folklore dances. The next step is the creation of the cultural server/viewer to implement the proposed metadata and investigate the problems and configurations necessary for the metadata schema.

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