WHOLODANCE

Whole-Body Interaction Learning for Dance Education

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Second Intermediate Report

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Introduction

This Deliverable provides an account of the work carried out by WhoLoDancE during months 13 to 24 covering Phase II (M13-M24). The main objective of Phase II was ***models, platform and similarity search basic development*.** The definition of both the emotional representation and music-dance representation models, the preliminary deployment of data-driven and model-driven analysis software (with relevant libraries defined). Release and test of the data management platform in its first version, and definition of the data integration and similarity search framework.

Phase II led to the successful definition of the emotional representation and music-dance representation models, as well as to the preliminary deployment of data-driven and model-driven analysis software (with relevant libraries defined). Furthermore, the data management platform was released and has been tested, while the data integration and similarity search framework has progressed in a satisfactory way, ensuring a timely achievement of the Second Milestone.

Deliverables due in the period M13-M24

Deliverable number	Deliverable title	WP number	Lead Beneficiary	Due month	Delivered date
D1.7	User Profiling	WP1	2 - ATHENA RC	16	28/04/2017
D2.5	3D avatar scenes	WP2	3 - MOTEK	16	21/04/2017
D2.6	Motion capture sequences and skeleton avatar	WP2	3 - MOTEK	18	28/06/2017
D2.7	Post processing data sets	WP3	3 - MOTEK	23	06/12/2017
D3.1	Report on semantic representation models	WP3	2 - ATHENA RC	18	28/06/2017
D3.2	Report on emotional representation models	WP3	2 - ATHENA RC	18	03/07/2017
D3.3	Report on music-dance representation models	WP3	4 - POLIMI	24	31/12/2017
D3.4	Report on multimodal signal modelling	WP3	5 - UNIGE	24	31/12/2017
D3.5	Report on data-driven and model -riven analysis methodology	WP3	5 - UNIGE	24	31/12/2017
D3.6	First report on software platform and libraries	WP3	4 - POLIMI	15	03/04/2017
D4.1	Data integration algorithm and system analysis, and framework description	WP4	6 - Peachnote GmbH	18	22/11/2017
D5.2	Beta prototype, testing & validation data management platform report	WP5	2 - ATHENA RC	18	12/07/2017
D5.3	Integration and interoperability with external services, systems and applications report	WP5	2 - ATHENA RC	24	4/01/2018
D6.3	First report on the resulting extension and integration of the ASTE engine in WhoLoDancE	WP6	2 - ATHENA RC	24	8/1/2018
D7.1	Usability and learning experience evaluation report	WP7	2 - ATHENA RC	15	31/03/2017
D7.2	First evaluation of learning personalised experience	WP7	7 - COVUNI	24	9/1/2018
D8.2	Updated dissemination materials	WP8	1 - LYNKEUS	18	3/07/2017
D8.4	First dissemination event	WP8	1 - LYNKEUS	18	20/07/2017
D8.5	Outcomes of the strategic exploitation seminar and first exploitation plan	WP8	1- LYNKEUS	18	24/07/2017
D9.6	Second Intermediate report	WP9	1- LYNKEUS	24	11/1/2018
D9.7	First periodic report	WP9	1- LYNKEUS	18	20/10/2017

Briefing of overall progress

The library of movements

within the first half of phase II a web-based users' interface of the Library of Movements was created, supplemented by a data annotation tool, which is currently used by the dance partners for the annotation of movement qualities and data segmentations. A beta version of the data platform has also been tested and released by Athena.

The blending engine

A second release of UNICA's blending engine created by Motek took place in February 2017. This prevented the risk of a lack of collaboration between partners or any compatibility issue in the second phase of the project. On this direction, particular efforts have been allocated to ensure the sharing of the data format, as well as of the frameworks and programming language used for the project, leading to Athena RC drafting a common agreed document for all partners on how to overcome possible compatibility issues. The functionalities of the software have been continuously tested by all the partners, and feedback for improvements was provided to all technical partners in the course of dedicated webinar sessions.

Similarity search tool

Peachnote and PoliMi have been busy with research and development in this area. Peachnote initially focused on identifying elements in the music algorithms that can be transferred in the dance domain and the modifications that they need to undergo in order to fit WhoLoDancE purposes. An exploratory web-based interface was created in collaboration with PoliMi that allowed to evaluate the algorithm performance. The prototype was meant to demonstrate the principles at work behind the similarity search, which made it easier to discuss further improvements and extensions of the similarity engine, such as e.g. the inclusion of high-level features that UniGe and PoliMi are able to compute from raw motion data. The discussion also helped in the implementation of a standalone service that the partners designing the high-level feature extractors and the user interface will rely upon. This service was successfully completed by June 2017. In order to optimize the functioning of the similarity search tool, algorithms are being trained to detect relevant similarities in data. To this end UniGe and PoliMi are currently working on the analysis of data acquired through the manual annotations by the dance partners.

Volumetric displays and holographic rendering

A variety of motion visualizations have been investigated either for desktop work or for holographic experiences. Covuni acquired additional data for potential developments from a series of interviews with end users within the first half of Phase II. Athena developed the Choreomorphy Interface, which allows users to see themselves within different avatars in real-time. The findings of these initiatives were taken into account in the further developments of WhoLoDancE displays. The consortium decided to integrate the Microsoft HoloLens in the WhoLoDancE platform. Work on this direction started in M21 by Motek and Athena and is currently progressing smoothly.

The movement sketching tool

Based on feedback provided by the dance partners, a number of prototypes were further developed by UniGe and PoliMi by M13, which were subsequently integrated into the 'Movement-Sketching' software'. While the library of movements is based on high-quality motion capture and other multimodal data, the 'movement sketching' paradigm allows a non-verbal access to the library of movements. Through movement sketching, dance practitioners, students, and professionals are able to create their own recordings of dance sequences by performing them, and query the repository in order to find similar dance segments. A first prototype of this software was released by UniGe in June 2017 and it is currently being improved based on regular feedback provided by the dance partners. Athena RC has been experimenting with the use of the MS Kinect to develop simple exercises that can support learners improve specific movement principles and qualities.

Data annotations

In order to perform the training of algorithms, which is necessary for an optimal performance of similarity search, movement sketching and multi-modal rendering, input from the dance partners is necessary in the form of manual annotations of the raw mocap data. The most important feedback from dance experts concerns the characterization of the captured dance sequences in respect of movement qualities, and their segmentation in correlation with rhythm. An online annotation tool was developed by Athena and PoliMi, and the dance partners were instructed how to use it. The annotations of movement qualities started in June 2017 and the segmentations in November 2017. The results of a first round of annotations were presented in October by PoliMi, and they showed that some modifications in the initial annotation scheme were necessary. In M23, a new instruction for the dance partners was released. The results of the annotations are expected to be completed by M25.

Integration in UNITY

In M14 Motek presented to the consortium a framework for an integrated Unity-based solution for the final output of WhoLoDancE, which was subsequently reviewed by the rest of the technical partners. Another complementary illustration of the architecture of the WhoLoDancE infrastructure was presented in M18 by Peachnote, UniGe, PoliMi, and Athena. This illustration provides additional details about the functional links between the various WhoLoDancE tools, which will need to be further thought of and taken into account during the UNITY and web-based integration. This addresses the need to design the system in a way that low-end educational tools can be accessed also independently from UNITY. This will allow users that cannot afford the entire WhoLoDancE package to benefit by using the least expensive WhoLoDancE technologies. The actual integration started in M21 between Choreomorphy by Athena and the Blending Engine. Integration of the remaining tools is expected in Phase III.

Pedagogic scenarios

Combining information and ideas that came up with the technical developments in the first half of Phase II, Covuni developed a number of elaborate use-case scenarios of educational and creative activities where each technical tool could be of added-value. These scenarios are being taken into account in the exploitation initiatives, and will be further elaborated in Phase III.

Exploitation Plan

At the Exploitation Seminar held in London in June 2017, a collective exploitation opportunity was examined, inspired by the multi-sided platform (MSP) concept, in correlation with the idea that, once the WhoLoDancE proof-of-concept system will be established for dance (possibly one of the most complex human bodily activities), a similar approach can be applied to other types of dance genres and to adjacent areas, like fitness, sports, martial arts, crafts and work ergonomics, and even body movements for rehabilitation. It was decided to explore the possibility of implementing a freemium general access policy, permitting browsing and some limited usability of the platform, in addition to a fee-based access to all WhoLoDancE functionalities, in order to ensure the sustainability of the platform's continuous maintenance, while providing, possibly through blockchain and smart contracts applications, an economic return not only to the technological developers, but also to the artists contributing to the motion capture sessions.

At the time of the First Periodic Review, held in Luxembourg in September 2017, a further idea had matured, prompted by the successful trend of Initial Coin Offerings as financial architectures of choice for many platforms, where participants exchange services paying for them through specially issued electronic coins (tokens), in the assumption that well-designed tokenomics not only enforce by default full transparency, but also allow to align incentives of various players operating on the platform and contributing to its growth.

The outcomes from the First Periodic Review have induced the consortium to proceed further along this line of thought, taking attentively into account the regulatory issues which are currently being debated with regard to ICOs, with the ambition to establish the first scalable, decentralised library of annotated motion

capture files along with tools to edit, blend, sell, and distribute real world body motions and the tools to leverage them into an algorithmic marketplace.

The suggestion put forward by the coordinator has been to call this platform WholoCoin. A logo has been ad hoc designed. In December 2017 (month 24), during the meeting held in Toulouse, it has been agreed that a detailed business plan will be worked upon within June 2018. The general approach will be based on the "bundle of contracts" theory of the firm, by which Lynkeus will be in charge of launching the ICO, with a fully compliant and transparent coin issuing process, with specific roles assigned to each partner, and especially to the other SMEs involved in the completion of WhoLoDancE, for developing further the achievements which will be reached by the end of the project, in view of making WholoCoin really become the expected fully operational, highly competitive and highly user-friendly multisided platform for learning, teaching, and choreographing a growing variety of bodily-movement activities.

IPR issues

A dedicated working group has started to work on WhoLoDancE related IPR issues in the last months of 2017, led by Prof. Charlotte Wealde, from Covuni, together with Ludovica Durst from Lynkeus, Katerina El Raheb from Athena, and the coordinator.

The group has started to examine the proposal of focusing on the blockchain technology, in order to allow to automate the management of copyrights and, importantly for the owners, to gather micro-payments from users and disseminate these to copyright and to contractual owners. It was deemed that IPR administration and management may in fact significantly benefit from the possibility of adopting automated solutions such as smart contracts, especially with regard to two of the issues raising major concerns: 1) how to strengthen control by the individuals over the circulation of their works and 2) how to reduce the complexity of rights administration (as they are time consuming and practically complicated).

The current round of copyright reform for the Proposal for a Directive of the European Parliament and of the Council on copyright in the Digital Single Market was also taken into account, as well as some ECJ (European Court of Justice) rulings which appear of peculiar interest for WhoLoDancE exploitation objectives.

Progress made per work package (WP)

WP1 – Learning models and technical requirements – Athena - closed at M16

Progress

WP1 has successfully accomplished all related tasks and activities that were due within the first reporting period. To meet the objectives of WP1, several activities were organized in close collaboration with the involved partners such as:

- literature survey of the state of the art on dance learning,
- questionnaires, online surveys, and interviews with dance practitioners,
- workshops, working sessions and focus groups,
- interdisciplinary discussions between dance and technical partners to achieve common understanding and vocabulary.

As a result of the successful collaboration with MOCO16 (3rd International Conference on Dance Computing), the WhoLoDancE Workshop was organized, as well as a workshop for dance practitioners at the Researcher's Night in Athens.

All relevant deliverables have been submitted on time (D1.1, D1.2, D1.3, D1.4, D1.5, D1.6, D1.7).

In addition, a Whole-Body interaction interface has been designed and developed, as a prototype to record the actual needs of dancers using different motion capture devices such as: Synertial mocap suit, Kinect (Choreomorphy), aiming at setting sessions with dance experts in the lab and recording actual needs of such experience through observation, recording (following consent forms) interviews and short questionnaires.

WP2 – Multimodal sensing and capturing analysis - Motek

Progress

3D avatar construction (last part of T2.5).

All planned avatars have been completed and tested with many different sequences of motion capture data from the different dance genres.

Both male and female data sequences were used for the testing and optimization processes. Special attention was given to the "blob" avatar as it is a non-rigid mesh avatar.

Blending engine (Across multiple tasks)

The blending engine is nearing the last alpha stage. Most of the UI has been completed and is being tested for performance and user feedback.

The main functionality that the blending engine offers is enabling blends of every sequence to every other sequence; allowing separation of each body part required the optimisation of the current software and the creation of pre-cached blends for every blend possibility (i.e. the combination of each body part with each motion sequence).

We anticipate the beta cycle to commence around month 28-29.

Skeleton Fitting (retargeting) and visualisations (T2.6)

Work is completed on the generic avatar skeletons for each of the avatars.

The skeleton has been customized in a single case (the "blob" avatar) since it is not a rigid mesh based avatar, but rather a deformable envelope that visualises the 3D volume that the performer takes in the space.

We have taken in consideration the guidelines that were presented in the D9.5 1st Intermediate Report.

- Global scale deviations between performers
- Range of motions rotational scope per performer
- Unified mean deviation across all performers

We successfully completed an empiric unified avatar skeleton that fits the scaling of all the performers who were captured for the project. Furthermore, it can serve as a template for future motion capture sessions also outside the scope of the project.

Post processing data sets (T2.7)

The data sets were curated and trimmed before going through the post processing stage. We engaged in four post processing parallel pipelines:

- Cross sequence parallel data isolation for body segments
- Processing each sequence to fit on to all the created avatars
- Conversion of the data sets to several data formats that can be used optimally in the chosen project convergence software
- Compression of the files to shorten loading times in the blending engine and in the repository.

The data sets created were arranged in a relational database that was segmented according to several

principals, to ensure usability by all partners.

We defined and implemented guidelines for the post processing.

- Cross sequence parallel data isolation for body segments
- Processing each sequence to fit on to all the created avatars
- Unified file format conversion

For what concerns the unified compression protocol, more detailed information can be found in D2.7 Post processing data sets submitted by December 2017.

Main results

3D avatar construction (last part of T2.5)
All planned avatars are running on all the respective partners developed platforms. Several additional (optional) avatars - originated from open source 3rd parties - have been added to the list.

Blending engine (Across multiple tasks)
Running build of the engine software (on PC win10 OS) with both the assembly and the parallel blending functionalities.

Skeleton Fitting (retargeting) and visualizations (T2.6)
The production of the ready avatars has been fully tested and is waiting integration into the UNITY 3D convergence platform. Specific avatars are already running within the blending engine.

Post processing data sets (T2.7)
Approximately 80% of the data sets have been processed, converted and implemented (both on all avatars and in the blending engine).
Work is ongoing on this task which is expected to be completed on time.

Open issues

Blending engine (across multiple tasks)
There is still a lot of work to be done on shortening loading times of the data, streamlining the user operations, enabling real-time output to Unity3D platform and software development of additional functionalities allowing multiple avatars, custom sets and pros.

Skeleton Fitting (retargeting) and visualisations (T2.6)
Unity 3D integration (to commence when the blending engine is nearing completion).

Interaction and expectations with regard to other WPs

Blending engine (Across multiple tasks)
The engine has been tested and demonstrated to all partners. The dance partners have already created some test blends and are working on it to provide feedback for the continuation of the development.

Skeleton Fitting (retargeting) and visualisation (T2.6)
The fitted skeletons are present and implemented inside several partners applications (Choreomorphy from Athena and the web-based visualising platform).

Post processing data sets (T2.7)
Data sets are already partially integrated in all partners' respective applications. Unity3D integration has started and will take most of the remaining project time

Deviations from the original work plan

Blending engine (across multiple tasks)

The engine development has taken longer than anticipated. Mainly it was due to the complexity of the underlying biomechanical layer that takes real time consideration of the performer's centre of mass at any given frame, and modifies the blended data to eliminate movements that are unnatural, while adhering to the realism of the motion capture dance data.

WP3 – Semantic and emotional representation models - PoliMi

Progress

WP3 is related to three main topics: development of a semantic representation model for movement, multimodal signal analysis and modelling and development platform and software library.

As far as semantic representation model is concerned, concepts collected in the first year of the project are organized in the WhoLoDancE Ontology, which deals with four dance genres: Ballet, Contemporary, Greek Folk, and Flamenco. The WhoLoDancE Ontology models dance movements. The WhoLoDancE Ontology primarily models five main concepts: Movement Principles, Movement Qualities, Movement Descriptors and Fundamental Elements. Movement Principle are abstract concepts which are related to fundamental genre-agnostic dance skills or learning chapters collected by the domain experts. Movement Qualities refer to generic qualities of the movement such as Fluidity, Rigidity, Fragmentation, Weight, Space and Time. Movement Descriptors and Fundamental Elements are generic descriptors like actions. The WhoLoDancE Ontology can be the base for several applications within the project and for the dance community: annotation of dance recordings, high-level features extraction, similarity search and searching and browsing the library.

As far as multimodal signal analysis and modelling in relation to model movement principle and movement qualities through data-driven solutions, annotations from experts are needed to build a ground truth dataset. A web-based annotation tool has properly been built. The tool allows to label the whole or a portion of performances in the WhoLoDancE repository by using concepts expressed in the WhoLoDancE Ontology. The annotations procedure from dance experts started and will end the first months of the third year of the project.

Moreover, as for model-driven solution for multimodal signal analysis and modelling, work on the set of movement features identified in months (1-12) has been further carried on, bringing to refinements and development of new model-based features:

- Balance / equilibrium / stability: Balance is a very important aspect of each dance performance, we developed algorithms to extract the amount of balance and stability of the performer basing on motion capture data (See D3.5 for details).
- Limbs coordination: A technique to extract the degree of limb coordination has been developed and is in evaluation, it is an extension of algorithm described by Varni et al.[1] that gives an estimation of limbs coordination (See D3.5 for details).

Part of the multimodal signal analysis and modelling is joint music-movement analysis. Concerning this task, in dance practice for some dance styles, the synchronicity between music beat and movement beat is quite important. Tools that help in assessing this synchronicity are particularly helpful. For this purpose, automatic music beat tracking and automatic movement beat tracking techniques for Greek Music and Flamenco have been developed. Beat tracking algorithms are based on deep learning methods, while movement tracking algorithms are based on video and mocap feature extraction.

In the analysis of long performances, the chance to split the recording in smaller pieces that exhibits an inner coherence with respect to some specific feature is also required. A set of rule-based and machine-learning-based automatic segmentation algorithms have been developed. Since the segmentation is a fairly subjective procedure, collecting the segmentations from human experts is needed in order to validate the performance of the algorithms. Hence, a web-based tool has been implemented. The tool allows to perform manually segmentation of the performances. The collection of manual segmentation has been initiated and will end in

[1] Varni, G., Volpe, G., & Camurri, A. (2010). A system for real-time multimodal analysis of nonverbal affective social interaction in user-centric media. *IEEE Transactions on Multimedia*, *12*(6), 576-590.

the first months of the third year of the project.

Within the analysis, methodologies intra- and inter-network-driven solutions are considered. As far as intra-network-driven solution is concerned, during months 18-24, work focused on the evaluation of the graph-game theory approach to investigate the origin-target of movements, and how the movement propagates. 100 mocap recording segments were extracted and the method applied to build an evaluation platform. The platform consists of video visualisation of Shapley value on the moving skeletal structure in order to let the observer evaluate if the method demonstrates the propagation of movement. The evaluation platform is prepared together with questioners to be used by dance experts for further evaluation of the methodology based on transferable-utility games on graphs. The method has been also applied in the case of inter-network-driven solutions to measure the degree of synchronisation, coordination and leadership.

As far as the development platform and software library are concerned, various libraries have been developed for feature extraction and data fruition. The main platforms and languages used within the consortium are Unity, Eyes Web, Python. A JavaScript-based framework has been developed for visualisation and annotation web-based tools. Moreover, a Python framework for machine learning methods for music analysis has been developed.

The technologies used for the WhoLoDancE Ontology are: OWL (web ontology language) and Protege Ontology Server, an editor that allows collaborative creation within the consortium.

Also in the context of development a platform and software library, the Movement sketching tool has been developed. This software module, implemented in EyesWeb and python, let the users retrieve dance sequences from the WhoLoDancE repository starting from a recorded or performed movement. The tool requires an input device, the current implementation supports Microsoft Kinect V2, 9DOF accelerometers, Notch sensors. Using one of the input devices, the user can record/perform a movement or dance sequence. The tool analyses the recorded/performed movement, extracts movement qualities of the movement then queries the similarity search engine developed by Peachnote (WP4, see D4.1) showing a list of dance sequences picked among the most similar to the performed movement. The set of features on which the similarity is evaluated can be tuned by the user through a simple user interface.

Main results

- Creation of the WhoLoDancE Ontology to model knowledge related to dance movements.
- Creation of the performance annotation tools and activation of the annotation procedure by experts.
- Refinement and development of new model-based movement features.
- Development of tools for automatic music beat tracking for Greek Music and Flamenco and developments of tools for automatic movement beat tracking.
- Development of methods for automatic segmentation of long performances.
- Further development and evaluation of graph theory applied to inter- and intra-network-driven solution for single and multiple dancers' movement analysis.
- Refinement of software libraries to analyse individual dance qualities and design and development of the movement sketching tool.
- Started the evaluation of the developed algorithms and software libraries to analyse inter personal synchronization and social signals.

Interactions and expectations with regard to other WPs

WP3 is highly connected with all WPs, for this reason we work closely with all technical and dance partners.

Deviations from the original work plan

Some delay, not very significant, from our initial plans occurs because of the complexity of the performances annotation procedure.

WP4 - Automated analysis of multimodal features and similarity search – Peachnote

Progress

The progress on the delivery of the WP4 has been very good so far.

New similarity search techniques have been implemented.

Reusable modular components encapsulating the search and similarity functionality have been implemented, deployed and tested.

Interfaces and prototypes for searching the database of motion data have been implemented and evaluated.

Main Results

We have developed algorithms that allow for efficient search and similarity computations over a corpus of heterogenous high-dimensional mocap data.

Suitable search index structure has been identified and evaluated for the targeted application scenarios.

We have implemented the Search and Similarity Engine as a self-contained stand-alone Java application that can be accessed via a REST API. Special attention has been given to providing the functionality in a way that would allow the users of the engine to develop a wide variety of applications using the engine without further customizations or operational support. The technical partners were provided with independent deployments of the engine and have been able to independently index and use motion data for search and similarity evaluations.

Web-based user interfaces that rely on the search and similarity engine have been developed. These interfaces offer a way to inspect the performance of the engine and the suitability of the low-, mid- and high-level features used as a basis for the search.

Work on parametric functions of time in affine space has been conducted and motion sketching has been evaluated as a low-cost and performant querying mechanism for similarity search.

Next steps

Orientations for the forthcoming work in WP4, as discussion outcomes from the M24 consortium meeting (Toulouse, 20 December 2017)

1. Enabling dance education use-cases: real-time streaming
In order to make real-time use cases possible in the dance education context, we need to be able to provide a real-time or at least a near real-time feedback based on users' motions, relying on the motions library in the real-time fashion, reusing and streaming the stored motion nearly instantaneously. This requires the ability to stream the motion data instantaneously from any place. A possible solution is provided by Amazon Web Services, and the Kinesis Video Streams service can be a good fit for this task, being designed to handle any type of streaming data. The motion data could be uploaded to the service and could be streamed from any position on demand using a REST API (encapsulated through the various AWS SDKs - JavaScript, Java, C++, etc.).

2. Enabling additional use-cases for non-professionals: accessible real-time use cases
To enlarge the WhoLoDancE audience as much as possible, it is our intention to try to develop an application to enable the use of the platform to non-professional users, for a limited number of use case options, i.e., a game application to allow the search for basic dance performances from the motion library, to be repeated at home getting a score based on similarity search, to easily try something out and have a little bit of magical or fun experience, to possibly help us spread the word about the project in a big way. Another possibility is a "ghost" application, where user's motion triggers the playback of a previously captured motion that has

been most similar to the user's motion. This latter could possibly work this way: (1) the user opens a web page on a computer with a webcam, then (2) starts moving, while the webcam or the phone camera observes, and (3) the system recognizes the motion in real-time, finds close matches in the library, and they are streamed in real-time and visualized in the browser, for example using WebGL.

Open issues

- Improving the performance of the similarity search in order to allow for real-time applications integrated with the Unity environment.
- Designing and implementing the streaming search functionality.
- Extending and making the search interface more flexible and capable of using high-level features, while also keeping it easy to use.

Interactions and expectations with regard to other WPs

The real-time search and similarity functionality will be implemented in the Unity environment once the environment becomes stable enough for such integration to become viable and useful (WP6). We are also looking forward to the feedback from the evaluation and validation of the ICT-based learning (WP7) in order to fine-tune the search and similarity engine according to the feedback provided by the users.

Deviations from the original work plan

The bulk of the work on the streaming search functionality and the real-time search will be conducted first in 2018 and not split between 2017 and 2018 as planned earlier. Work on the extension of search and similarity algorithms and API for the mid- and high-level descriptor data has also been partially postponed to 2018 due to the time necessary to collect and process the annotation data from the dance experts.

WP5 – Data Integration and data analytics - Athena

Progress

The WhoLoDancE WP5 is responsible for the overall data management infrastructure to be built and deployed by Athena with the objective to collect, store, pre-process and manage the multimodal data acquired in the project, creating an accessible web-based platform.

The main results of the work within WP5 in the second year of the project include the following:

1. Enhancement on conceptual recording of dataset information to meet the technical requirements of the project

2. Maintenance of Data storage set-up and FTP server

3. Maintenance of the Data Management System

4. Evaluation and enrichment of the metadata model

5. Design and implementation of the web-based interface for accessing (browsing and searching the recordings of the project) and creating the WhoLoDancE Movement Library

6. Integrating external services (e.g., Visualiser by PoliMi)

7. Implementing an interface for manual annotation as well as an archival system for the annotations

8. Draft a plan for further integration with external services and tools developed by other partners.

The results are documented in the deliverables

- D5.2 Beta Prototype, testing & validation Data Management Platform Report
- D5.3 Integration and interoperability with external services, systems and applications report

Main Results

The main purpose of the *WhoLoDancE Movement Library (WML)* is to provide access to the repository of the multimodal recordings of the different dance genres through a usable interface for the end-user. The main functionalities provided are browse, search, view/play and annotate the multimodal recordings. Through this web-based platform the user can browse the recording by dance genre, and search by using key-words that are included in any of the metadata of the recordings. Deliverable D5.2 Beta Prototype, testing and validation Data management platform Report describes the architecture and functional specifications of the Beta prototype WhoLoDancE platform, focusing both on the data management infrastructure and the UI used to access the platform functionalities. The second part of the document presents the testing and validation activities of the platform that have taken place in the reporting period.

The first release of the platform, WhoLoDancE Movement Library, has already been issued and used internally, following a testing procedure and a formative usability evaluation. Following the Scrum Agile methodology and principles, the development of the various modules has been implemented into smaller sprints that can be incrementally added, tested and evaluated. Following this approach, we minimize the risk of interdependencies and long-term planning. The early release of the software allows to identify the actual issues that might appear while in use and act on time with changes and modifications. For both testing and validation, as well as the user evaluation (WP7) we follow an iterative approach.

WhoLoDancE Movement Library:
http://dl132.madgik.di.uoa.gr:8084/WhoLoDancE_Movement_Library/login

Interactions and expectations with regard to other WPs

The WhoLoDancE Movement Library architecture is built upon the idea of integrating various modules and components. From day one of the design of the platform, all technical partners involved have worked together to ensure the interoperability and extensibility of the modules developed.

The current version of the WhoLoDancE Movement Library integrates a 3D player-visualiser which allows the simultaneous view of the skeleton avatar and the video (the implementation of the skeleton-video visualiser is described in D3.6), within the Annotation System. We also implemented a prototype of a similarity search system (WP4, described in deliverable D4.2) that is based on the access to the recordings stored in the Movement Library.

WP6 – Multimodal rendering, holographic/volumetric displays development, and whole-body interaction interfaces - Motek

Progress

The activities for WP6 started at M21 and work is progressing on T6.1 and T6.2.

Main results

The first results have been detailed in "D6.3 First Report on the resulting extension and integration of the ASTE engine in WhoLoDancE", submitted on M24.

Interactions and expectations with regard to other WPs

Once the Unity integration will be complete and the WhoLoDancE platform will run on the HoloLens device, results from WP3, 4 and 5 can be integrated into it.

Deviations, if ever, from the original work plan

None

WP7 – Evaluation and validation of ICT-based learning - Covuni

Progress

For WP7, the dance partners have conducted formative evaluations of the tools with the technical partners. These have been through attending a meeting/workshop in Coventry in January 2017, webinars, telecommunication meetings and email correspondence between partners. These communication activities have helped to gain a better understanding of the tools being developed and contribute to further development. The dance partners have had access to some of the tools and have been able to use and experience them independently. This has allowed us to feedback to the technical partners useful insight into the use of the tools.

The Covuni team has actively participated in the two rounds of annotations that were required by the tech partners to further develop the tools. For the first round of Annotations which were carried out over the Summer 2017, Covuni worked closely with Athena to deliver the dance annotations. The second round of annotations which are needed for Athena and PoliMi to carry out the necessary developments are tied to the webinars and telco-meetings. The annotations for the annotation tool and segmentation tool are ongoing and will feed into further work of WP7.

Covuni conducted interviews for a university ImpaKT report which is a combination of two sets of interviews. For this ImpaKT report the Covuni team decided to design a second set of questions which fed into a series of semi-structured interviews with user testers of the tools to test the WhoLoDancE project's direction and approach since the first set of interviews were conducted. This second iteration of interviews were carried out from early April 2017 until mid-May 2017 and analysis of the data occurred from mid-May 2017 until mid-June 2017. The work questioned the likely impact of the technology developed during the project on dance teaching and dance rehearsal processes and its possible uptake. Interviewees included representatives of leading UK dance companies, teachers in the private and community sector and independent artists. The aim was to identify and interview 10 respondents. The interviews adopted a methodological framework drawing on complexity theory to create a combination of cognitive maps and interview responses through inviting respondents to reflect on their work and experiences, and if and how the tool will change the way they work in the future. In summary, this report clearly identifies how digital technology, 2D and 3D visualisations, holograms and virtual reality are impacting learning and choreographic scenarios (more information is delivered in D7.2).

From the Planned Activities table in D7.1, we have contributed, as dance partners, to the formative evaluation of the conceptual framework, blending machine, content annotator and viewer, through focussed webinars.

We have organised and delivered one evaluation event in London where 10 participants came to use the blending engine and gave feedback. The collected and analysed information are detailed in D7.2. We have been involved with organising and delivering the Metabody_WhoLoDancE Toulouse event.

Covuni worked closely with K.Danse in preparation for the Metabody_WholoDancE Toulouse evaluative event, which took place on December 18 and 19, 2017 where we collected users experience evaluations through questionnaires and short, semi-structured interviews. We have offered translated materials and have been working closely with the dissemination of the event and ensuring that communication is not only reaching local, national but also international communities. We have set up a structure with local organisers for the event and aligning our efforts with Lynkeus' dissemination and communication manager to ensure that the best structures were in place beforehand, so that evaluations could happen in Toulouse, France.

Main results

In summary:

- The technical partners have been able to improve the tools
- The dance partners have actively influenced the technical improvements and made a valued contribution
- The event in London has produced some findings on the blending machine and will contribute to Motek's development of the tool.

Open issues

- Not having access to the tools and the hardware required for people to use is delaying evaluation with external dance partners and will impact on the Integrated personalised learning experience.
- The time needed to segment and annotate was more than originally planned.
- An Impact Plan and public engagement activities need to be continually considered as this is a valuable way of ensuring the wider value of the project to the dance sector and user community more generally. It is also a process that is required by the university as part of its preparations towards the UK's Higher Education Funding Council's forthcoming Research Excellence Framework (REF).

Interactions and expectations with regard to other WPs

One of the team members has provided the Flamenco movement and expertise, and has been working closely with PoliMi on the segmentation and annotation and therefore has interacted and contributed to WP3. We have disseminated widely this year and have contributed to WP8.

WP8 – Communication, dissemination & exploitation

Progress

As this second project year has seen the achievement of first prototype tools, the communication, dissemination and exploitation activities have been carried on in two main directions: in the first place, the strengthening of the engagement of specific audiences (dancers, choreographers, IT scientists) to maintain interest on the project principles and objectives, as well as to create expectations for the new tools under development; in the second place, a comprehensive analysis of the possibility of going clearly beyond the goal of guaranteeing the further sustainability of the WhoLoDancE platform, aiming to pursue a bold and innovative route based on the emerging ICO approach to raise funding.

A. Communication and dissemination

The communication and dissemination activities have followed two complementary grounds: on one side, the ***direct* engagement of stakeholders through a multiplicity of events**, including academic workshops as well as cultural events correlated with dance performances and demonstrations of the new prototypes; on the other, the ***indirect* engagement of audiences through publications** (journal articles, conference proceedings, project newsletter and free-distributed periodicals) **and web channels** (project website, social media and event platforms), which have been largely expanded.

Events of 2017

A total of **22 events** have been organised or attended by consortium partners within this year *(see full list at the end of document)*, and further **4** are already planned for 2018, including **scientific conferences and workshops, science festivals, and cultural events** where dance performances have been flanked by demonstrations of the first prototype tools. While the conferences and workshops have been primarily directed to present the project and its accomplishments to the IT and dance research community, with a production of relevant papers and proceedings, the cultural events were addressed to the public, particularly primary to high school students. In the overall, all consortium partners have been very active in searching new dissemination opportunities, organising the project-promoted events at best to reach the widest possible audience, as well as raising the public's interest about WhoLoDancE achievements.

Besides ensuring a timely promotion of the dissemination events on the project website and social media (twitter, Facebook and Instagram), the consortium has also created **two pages dedicated to the project on the Eventbrite and Evensi event platforms**, where to insert upcoming self-organised cultural events and performances.

Publications

The consortium has produced a total of **5 new peer reviewed publications** *(see full list at the end of document)* within this second year, which are all conference proceedings relevant to international workshops and conferences in the fields of dance or information technology.

More importantly, as we realized that not all consortium publications were publicly available, we enacted some **specific actions to make all publications Open Access**, in compliance with the Grant Agreement. In fact, a **"WhoLoDancE" *Community*** (i.e. a single project-dedicated page and file archive) has been established in **Zenodo**, the publishing archive funded by the CERN, the OpenAire project and the European Commission. Here, all public deliverables have been deposited for public consultation; for journal articles and conference proceedings, the OA permissions are being verified and, where necessary, the process of granting authorisation for green open access (i.e. archiving of full text in public archives) is currently in progress.

Also, **a banner** has been produced in two formats (vertical and horizontal), to facilitate the consortium partners in inserting proper **acknowledgments to the European Union**, with specific mention of the project name, Horizon Programme, Grant Agreement code and EU flag, in both peer-review publications and other print and web-based dissemination materials (posters, leaflets, press releases etc.).

The **Issue #1 of the project newsletter** was released in January 2017. Besides providing an overview of the status of the project, it reported the motion capture session activity carried out during the first year, first prototype tools developed within the first year (blending machine, tools for similarity search, virtual and holographic visualisation, low-end motion capture and movement sketching), as well as project workshops, users' board sessions, consortium meetings and public presentations.
Issue #2 of the newsletter, currently in preparation, will contain a general update of all project achievements of this second year, including data annotation and movement segmentation activity, implementation of the blending engine, movement sketching tool, first user interface for similarity search, multimodal analysis and synchronisation, holographic rendering, and the integrated Unity platform. Also, it will include a perspective of the movement principles and dance learning scenarios, the exploitation opportunities and ICO hypothesis identified so far, and the dissemination events planned for the last year of the project.

Web and social media

The presence of a wide and dynamic audience of dance professionals, as well as the large production of high-quality multimedia, constitute the perfect ground for an important use of web and social media channels, which had been initially somewhat underused. To better exploit web channels potential, we have implemented a series of actions, reported below.

The **project website** has been updated and modified to better serve the project needs, removing some pages which were empty or useless and reorganising the menu to improve the overall readability and navigability. In addition to this,

- The **home page** was added with a **"news" box** (central, just below the project title) in place of the previous "objectives" box where to highlight upcoming events, newsletter releases and other news, and "**social media" bar** (on the left, in vertical position) to directly connect to the different social media channels; we have also sped up the photo slide and removed the "WHOLODANCE KEYWORDS" bar;
- The **publications** page was inserted, with academic publications, newsletter and other types of media coverage;
- The **media** page is being currently updated with the latest materials, reorganised in folders dedicated to each event (for photos) or added with relevant event details (for videos);
- The **consortium** page was added with a map with all the consortium partners locations, to facilitate people interested in the project to directly contact the institutions within their own country.

The website is being updated on a weekly basis with the new **upcoming events, publications, deliverables and media**. In September the **google analytics** function was implemented, to analyse the website statistics over time.

The **social media** needed to be strengthened and further implemented. To this aim, we have started to post on a more regular basis on the existing ones (e.g. Twitter, Facebook), and created other accounts where needed to take the most out of our wide and high-quality photos and videos (e.g. Instagram, Pinterest), or project achievements and publications (LinkedIn, ResearchGate). Specific efforts have been put into the further engagement of social media audiences, searching for new followers and maintaining a constant interaction with likes, re-posts and comments. Vimeo and Flickr, respectively, will be devoted to archiving and making available for sharing and re-use all the photos and video materials produced within the project. To this aim, photos and videos are currently being watermarked with project credits, and licensed under Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) licence, implying that all project material will be free to share and adapt, providing (1) appropriate credit is given to the project, (2) the material is used for non-commercial purposes, and (3) they must be shared as-is, else if you remix, transform, or build upon the material, you are not allowed distribute the modified material.
You can find below an overview table of the current project communication channels, materials used, type of audience engaged and frequency of updates.

Channel	Frequency of updates	Contents	Audiences
Website	Weekly	Events, publications, videos, photos, public presentations, deliverables	Dancers and choreographers, general public
Twitter	Daily	Events, project meetings (announcements, real-time tweets), project news (project updates), other news (dance, other relevant themes)	Dance institutions and companies, dancers and choreographers IT, big data, analytics and machine learning researchers
Facebook	Daily	Automatic posting from twitter (see above), events, photos, videos	Dancers and choreographers, general public
Pinterest	Weekly	Photos and videos of project activity and events	Dancers and choreographers, companies
Instagram	Weekly	Photos and videos of project activity and events	Dancers and choreographers, general public
Vimeo	Periodic	Videos of project activity and events	Dancers and choreographers, IT scientists
Flickr	Periodic	Photos of project activity and events	Photography professionals and lovers
LinkedIn group	Weekly	Events, project news (project updates), other news (dance and other relevant themes)	Dance and IT professionals
ResearchGate	Periodic	Project details, achievements, prototypes, reports, public deliverables, publications	Academic community, particularly IT, big data, analytics and machine learning researchers

Statistics on the impact of the social network of the project within the months 13 – 24 of the project

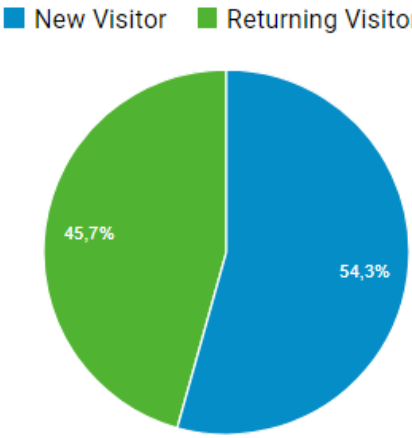
Report date: December 27th, 2017

Channel	Type	Developed since	Current audience size
Website	-	Y1	1.351 sessions, 732 users, 4.522 page visualisations (since Sept 2017)
Twitter	Account	Y1	282 followers
Facebook	Page	Y1	303 likes, 300 followers
Pinterest	Account	Nov 2017	1 follower
Instagram	Account	Nov 2017	52 followers
Vimeo	Account	Y1	1.865 plays, 399 finishes, 7 likes
Flickr	Account	Dec 2017	11.964 views, 0 follower
LinkedIn	Group	Nov 2017	8 members (Consortium partners only)
ResearchGate	Project	Y2	0 Recommendations, 19 Followers, 123 Reads

Website *(1 Sept– 27 Dec 2017)*

Website user sessions since 1 September 2017

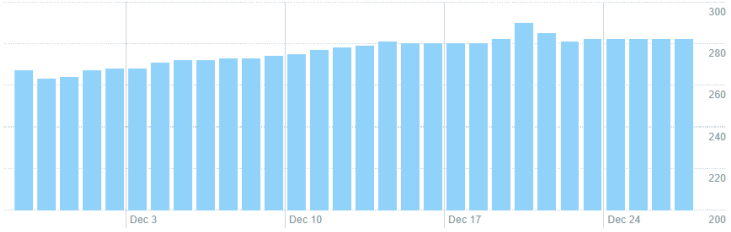
1.351 sessions	732 users	4.522 page visualisations	3,35 page/session	00:04:42 average session duration

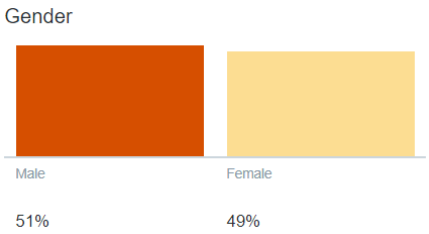


1. Italy	343	25,39%
2. Greece	304	22,50%
3. United Kingdom	108	7,99%
4. France	99	7,33%
5. United States	90	6,66%
6. Australia	80	5,92%
7. Spain	48	3,55%
8. Germany	42	3,11%
9. Poland	31	2,29%
10. Russia	26	1,92%

Number and percentage of sessions per country

Twitter *(Y1 – 27 Dec 2017)*





Audience trend in the last month (M24)

Age

Age category	% of audience
13 to 17	1%
18 to 24	15%
25 to 34	56%
35 to 44	18%
45 to 54	5%
55 to 64	2%
over 65	4%

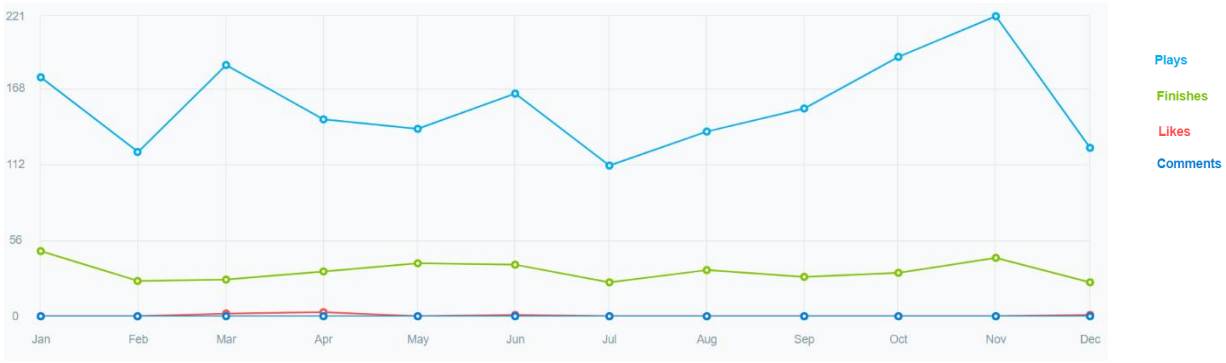
Interests

Interest name	% of audience
Technology	54%
Tech news	54%
Business and news	51%
Science news	51%
Politics and current events	48%
Performance arts	46%
Movie news and general info	46%
Business news and general info	40%
Books news and general info	39%
Dance (Hobbies and interests)	37%

Country

Country name	% of audience
United Kingdom	31%
United States	14%
Greece	8%
Italy	7%
Spain	5%
France	5%
Netherlands	4%
Canada	4%
Ireland	4%
Germany	3%

Vimeo *(1 Jan – 27 Dec 2017)*



Users' trend of 2017

Localization of Vimeo users within Y2

Region	Plays	Finishes	Impressions	Avg. % Watched
Greece	300	64	1.812	60
Italy	268	66	1.862	50
United Kingdom	191	51	2.432	58
Netherlands	163	50	2.505	53
United States	152	19	5.576	50
France	150	27	1.681	52
Germany	126	26	2.554	60
Israel	58	9	857	60
Belgium	41	10	353	46
Australia	40	11	581	54

The ten most represented countries among Vimeo channel users. Plays: The number of sessions in which a person has hit the play button on a video. Finishes: the number of sessions in which a video is played all the way to completion. Impressions: the number of times the player is loaded with this video. Avg. % watched: the furthest point in the timeline a video is played to in one session divided by the total length of the video.

Addressing the reviewers' remarks

As several criticisms on the actual communication and dissemination strategy were raised during the first review at M18, the consortium has carefully considered the reviewers' remarks to include them among the priorities for the second half of the project. You can find in the table below a detailed description of these critical points and how the consortium planned to address them.

Recommendation from EC reviewers	Actions taken
To publish the conceptual framework and generic principles developed by the project in a journal	Besides publishing a dedicated article in the project newsletter, a relevant peer review publication is being prepared by Athena RC and is planned to be published in early 2018.
To pay more attention to dissemination of papers and materials already produced via website, social media etc.	A dedicated Publications page has been created on the project website, containing publications details (title, authors, journal) and link to the published abstract or full-text (when applicable) on the publisher website or in the Zenodo WhoLoDancE Community. Also, the articles are now also promoted through the twitter account upon online publication.
To disseminate in mainstream media to the public, information about the technical innovations & cultural aspects of the project e.g. the first motion capture of Traditional Greek Dance and highlight preservation of culture aspects as well as technical innovation.	We are going to report on these aspects through the upcoming Issue #2 of the project newsletter, in a white paper currently in preparation, and we are also exploring other publication opportunities in freely distributed periodicals.
To engage more with the dance community, such as dance schools and companies, and focus dissemination activities on contacting potential users, e.g. through dance festivals, if possible.	The consortium is currently working on the preparation of a relevant stakeholders' list with dance professionals, schools and institutions, and is actively working on further engaging these subjects through social media, particularly twitter and Instagram. Some consortium-organised events (e.g. Metabody_WhoLoDancE Toulouse 2017) are (and will be) specifically targeted to dance community audiences.

Open issues

One additional objective, suggested at the consortium meeting in Toulouse, has targeted the involvement of larger, non-technical and non-dance-professional audiences, which have not been really reached so far. To this aim, PoliMi has suggested the development of a mobile application for dance learning. The app should allow non-professionals to search for basic short dance performances and repeat them, from anywhere, and get a similarity-based score, computed from the application recording the performance with the use of a gyroscope. Even if this would constitute just a limited functionality when compared to the full-featured integrated platform, such a development might contribute to spread the use of analytics-based dance applications, particularly among non-professionals.

Interactions and expectations with regard to other WPs

All partners have been actively collaborating in the communication and dissemination activities, by searching for new dissemination opportunities, directly engaging with stakeholders, and producing high-quality contents for the dissemination materials (newsletter, posters, publications). During the project's events, all partners have put great efforts at the organisation level (careful event planning, direct invitation of dance companies, institutions and professionals, production of leaflets and poster), as well as by enthusiastically engaging with the public, performing dance lessons, and demonstrations (e.g. traditional Greek folk dance) or showcasing the project tools and their potentials, producing wide and high-quality multimedia material, and maintaining active on social media (posts tagging the projects, likes and re-tweets).

Deviations, if ever, from the original work plan

As mentioned before, the initial communication and dissemination plan did not include a large use of image-based social media. Thanks to the large and high-quality production of media contents, obtained thanks to

the employment of professional photographers as well as from partners, we have been capable to start a larger social media campaign based on Instagram, Pinterest and Flickr also, which is expected to largely extend the project community during the last year of the project, creating a wide-based audience for the open launch of the WhoLoDancE platform.

B. Exploitation

The exploitation seminar held in London in June 2017

The Exploitation seminar held in London in June 2017 has allowed a significant conceptual convergence among all WhoLoDancE partners. Besides gathering basic information about individual exploitation objectives, an ambitious collective exploitation opportunity was also examined as possible proof-of-concept exercise, inspired by the multi-sided platform (MSP) concept, as developed by the 2014 Nobel Laureate for Economics, Jean Tirole.

The idea entails that, once the WhoLoDancE proof-of-concept system will be established for dance (possibly one of the most complex human bodily activities), a similar approach can be applied to other types of dance genres and to adjacent areas, like fitness, sports, martial arts, crafts and work ergonomics, and even body movements for rehabilitation.

WhoLoDancE has the recognized potential of recording, reconstructing, and preserving the representation and heritage of priceless movement skills, providing cutting edge digital technology by which a growing community of users will be able to acquire relevant in-depth knowledge and experiment with new ways of learning and teaching, as well as of designing new anatomically sound movements and choreographies.

WhoLoDancE partners agreed that an integrated web-based and Unity-based platform will be a most efficient and sustainable solution, leveraging the technical developments that have already taken place and taking advantage of the dominant position of Unity as the cross-platform engine of choice for video games and simulations development on consoles and mobile devices. Additionally, it was unanimously agreed that enabling a wider use of less costly low-end devices would be an additional important goal; hence, it was decided to consider a multi-layered software licensing approach. This would allow, by the end of the project, to implement a freemium general access policy, providing browsing of and some limited access to the platform for free, in addition to a fee-based access to all WhoLoDancE functionality. These fees should trigger a feedback mechanism to support further acquisition of motion captures, broadening the content database and ensuring its sustainability, while providing, possibly through blockchain and smart contract applications, an economic return not only to the technology developers but also to the artists contributing to the motion capture sessions.

Analyses carried on in preparation of the Exploitation Plan: tokenomics and ICOs

On the premise that the internet has been forcing virtually all industries to upgrade their economic models and to transform assets that were not traditionally exchanged into economic goods or services, WhoLoDancE partners have agreed to check also the possibility of issuing digital tokens, launching an Initial Coin Offering (ICO).

The idea is to follow the trend in which ICOs are becoming the financial foundation of choice for many platforms, where participants exchange useful services paying for them through specially issued electronic coins (tokens), the value of which fluctuates mostly in response to the supply-demand dynamics in the platform. These tokens are typically convertible into fiat currencies, thus allowing value creation, acting as more traditional financial instruments, but more importantly as ways to implement strong traceability and thus attribution and property of both the coin and the transacted asset. This in turn makes them both scalable and secure, liberating data from silos, generating demand and lowering distribution costs. By giving permanence to all pertinent digital information in the platform economy, well-designed tokenomics not only

enforce full transparency by default, but also allow the alignment of incentives of various players operating on the platform and contributing to its growth.

In 2017, ICOs have been successfully launched by a significant number of innovative businesses in several economic and geographical areas, succeeding to leverage two main economic functions. On one side, ICOs have provided start-ups with a crowd-funding mechanism for raising capital at a much faster speed then private or institutional investment. Shorter time to liquidity in turn has allowed acceleration of development plans, increasing the chances of success. At the same time, ICOs have also initiated the establishment of communities of stakeholders who then become the initial set of players in the target marketplace.

The initiative under consideration within the WhoLoDancE consortium will be aimed at leveraging both effects. Initial investors participating in the ICO will be able to directly contribute to the development roadmap of an already functional platform that will be further extended, integrated, and prepared for scaling. Capital raised through the public token offering will further propel the publicly shared development plans to which the stakeholders' community will be able to submit feature requests. The idea is that the capital raised will be invested in motion capture services targeting to meet demands for the most popular classes of movements in the community.

Outcomes, regarding exploitation, from the First Periodic Review

During the EC First Periodic Review of WhoLoDancE, held in Luxembourg in September 2017, these orientations were first presented to the P.O. and the Reviewers. In the subsequent interim report, we received several important remarks, which were cautiously combining appreciations and warnings.

On the one hand, the project was deemed to be "promising in terms of developing the implementation of new technologies in dance and choreography... and … in terms of creating new tools for both professional and amateur use, with some potential for the preservation of non-tangible heritage (Greek dance)". On the whole, it was said, "the approach and methodology are still relevant" and "there is a possibility that the work within the project could be an open resource for developing a new teaching scheme for dance as well as new impact on neurological research on movement and its representation". There was also a clear acknowledgment that "it was proposed to use a very innovative route to sustainability, built around the emerging ICO approach to raise funding", and that "the results and the work itself has the potential of 'social attraction' and there could be some more work done on the dissemination process and popularizing of the results via social media tools and mainstream media, not only within the dance community but also within other movement related fields (e.g. sports, medicine), new technologies and virtual reality".

On the other hand, the reviewers also posited that "detailed exploitation plans are required for how the educational outcomes of the project can be made widely available, at a cost that is acceptable to users", and "the project needs to research the various options available for commercial exploitation of the project outputs, including thinking beyond the dance application domain in the case of the software platform (e.g. there may be opportunities for this technology platform in other domains, such as digital media archives)". They additionally remarked that it was "not clear from the documentation how [exploitation] will be achieved in practice. This was extensively discussed at the review meeting and a comprehensive albeit potentially high-risk strategy was proposed … The plan of using the ICO method (that actually is an unregulated means of crowd funding) in order to co-finance the future development of the platform, needs to be thoroughly researched and perhaps reviewed in order to not abuse the confidence in the project of potential users". Finally, the reviewers highlighted that "there are 3 SMEs in the project consortium, (…). However, the impact on SMEs is not sufficiently discussed".

Regulatory issues with regard to ICOs

These remarks were all thoroughly discussed by WhoLoDancE partners in the biweekly TC meetings that have regularly followed the Review in Luxembourg in September, and then again in the semi-annual consortium meeting held in Toulouse on December 20th.

While sharing the concern of The Economist that "ICOs may indeed be a bubble, but perhaps a mostly healthy one, generating much innovation" (What are initial coin offerings?, 22nd August 2017), we have been tracking the work of regulators who are taking a very pragmatic stance on the issue based on the assumption that, while at least some of the tokens that are distributed in ICOs can be considered securities, which need to be regulated as such, many are novel but legitimate ways to reduce cost and time for generating value-driven economies for predefined intangible assets, provided that compliance is strictly enforced. In July 2017, the America's Securities and Exchange Commission has in fact issued a report specifying what types of offerings need to be registered (or apply for an exemption). The SEC has indeed argued that the technology is irrelevant, and when tokens are used to raise funds, they should be dealt with as securities. The burgeoning ICOs community, however, has maintained that, although such tokens are initially used to raise funds, they normally also have a precise function in the projects they finance, as the specialised medium allowing supply and demand to appropriately meet, and hence should not be treated as securities. In addition, while securitization converts illiquid assets into financial securities, tokenization allows the representation of an asset by a unique identifier, allowing the ownership rights to be transferred and recorded on a digital medium, e.g., the blockchain distributed ledger.

By attending the first European ICO Summit, organised by Smart Valor in Zurich in September 2017, we attested and confirmed that, in conjunction with regulators, the sector has agreed to and is jointly working on a self-imposed code of conduct in order to provide adequate guidance to upcoming ICO projects in terms of best practices, aiming at maximum transparency through total digitization. Of course, it should be kept in mind that some of the potential investors into an ICO are not the direct users of the services provided by its platform but are today's new rich in crypto currencies, who plan to repeat their past success investing in a variety of promising initiatives with high value increase potential. Indeed, while these investors do not really need the tokens for direct use and are fully aware of the risks involved, the primary target of the planned WhoLoDancE ICO must be the growing community of all its potential users. The speculative type of investors can possibly be instrumental in providing some of the seed funding and they would need advice and rating rather than protection, but the real customers and initial purchasers will be the platform users who are willing to acquire the tokens for accessing its innovative services.

The WholoCoin initiative

Aware of these complex issues, the WhoLoDancE partners have entrusted the coordinator, Lynkeus, with the task to analyse the best ways to implement the relevant tokens.

The ambition is to establish the first scalable, decentralised library of annotated motion capture files along with tools to edit, blend, sell, and distribute real world body motions and the tools to leverage them into an algorithmic marketplace. The shared hope is that eventually this platform will allow artists, craftsmen, athletes or anyone else able to perform skilful movements to capture their performance in local motion-capture environments, to upload this content into a quality controlled, integrated environment, and share them with a global audience.

The suggestion put forward by the coordinator has been to call the project platform WholoCoin. A logo has been ad hoc designed, inspired by Patrick Steen's sculpture *Dancing waves*, in Ostend, Belgium.

Proposed logo:

The hope is that the WholoCoin concept will represent a “first” in the dynamic exploitation of a successful EU-funded H2020 project. It will also possibly act as a highly visible testimony of the financial attractiveness that the outcome of a project may eventually have, given the strong scientific and entrepreneurial background guaranteed by the highly competitive EU selection process, such as the one that WhoLoDancE went under.

The WholoCoin platform will have the ambition to serve all industries concerned with or utilising human movements in digital formats, including technology developers and service providers working in those markets.

On the demand side, the platform will leverage current trends in the wide-spread use of motion-capture content in industries such as animation, gaming, virtual reality, digital fashion, performance training systems, rehabilitation and other clinical applications. The system will support multiple content access modalities, ranging from simple browsing to on-platform manipulation, e.g., making use of search and comparison, annotation and blending engines, to select, analyse, modify, and publish, new content files from the aggregation of pre-existing ones.

The selected blockchain system will be used as the ledger of reference for transacting WholoCoins and executing Smart Contracts. Through these, content creators will define terms and conditions under which their work can be purchased, used, and distributed, while data fingerprinting, timestamping and other data protection technologies will enforce proper and legal use of content files. Earnings will be in due course convertible into fiat currencies.

Motion-capture services will be advertised through the platform by a number of qualified providers whose technologies will be directly compatible with the library.

The library will organise movements based on a rich set of metadata to capture authorship, content descriptions, types of motion-capture platforms, file specifications, etc., allowing rich classifications and easy navigation.

WholoCoin will aim at establishing for the first time a marketplace to share motion-capture files in creative and scientific contexts, and at the same time foster the creation of new content by providing users with tools to search, compare, select and finally blend human movements in novel dynamic sequences. Generating new, anatomically sound movements and forms will in turn activate a content-based network effect increasing the value of the user experience. Musculoskeletal constraints frameworks, encoded in the blending engine, guarantee the creation of sound body dynamics with the highest creative flexibility for users to experiment and, in the process, enrich the content repository.

While a detailed business plan will now become necessary for proceeding further, the general approach will be based on the “bundle of contracts” theory of the firm, by which Lynkeus will be in charge of launching the ICO, with a fully compliant and transparent coin issuing process, with specific roles assigned to each partner, especially all technical ones, among which Athena and Motek intend to be heavily involved in the core strategic team. Peachnote (the other SME) and all the other partners will as well play key roles in the completion of WhoLoDancE, developing further the achievements which will be reached by the end of the project, and having WholoCoin really become the expected fully operational, highly competitive and very

user-friendly multisided platform for learning, teaching, and choreographing a growing variety of bodily-movement activities.

C. IPR issues

A dedicated working group has started to work on WhoLoDancE related IPR issues in the last months of 2017. The group is led by Prof. Charlotte Wealde, Chair in Intellectual Property Law at the Centre for Dance Research of Covuni, together with Ludovica Durst from Lynkeus, Katerina El Raheb from Athena, and the coordinator.

An interesting initial outcome has been the acknowledgment that IPR strategies within the dance community diverge widely. For some, the driver to exert control is economic – to make money from exploitation –, for others the way the work is represented, closer to moral rather than economic concerns. Therefore, IPRs management needs to address the fragmentation of goals in dancers' perceptions, to be articulated (through licences) in broad permissions or special provisions.

To address IPRs issues, different solutions can be provided, depending on whether general copyright rules may apply – referring to "performance rights" –, or specific contracts shall be defined taking into account the parties' needs (agreements with the performers, etc.). The main difference will be, in case of litigation, that copyright rules are valid for any subject involved, while contracts apply only to the parties involved.

With regard to WhoLoDancE platform, the most applicable legal form is likely to be contracts, possibly of the common license type. Identifying participating stakeholders' needs (partners of the project) is of the primary importance for establishing a first comprehensive legal framework, from which different uses of copyrights or contracts may be derived, tailored for the project's purposes.

The WholoCoin solution will be based on proposing blockchain as new technology, allowing to automate the management of copyright and, importantly for the owners, to gather micro-payments from users and disseminate these to copyright and to contractual owners.

IPR administration and management may in fact significantly benefit from the possibility of adopting automated solutions such as smart contracts, especially with regard to two of the issues raising major concerns: 1) how to strengthen control by the individuals over the circulation of their works and 2) how to reduce the complexity of rights administration (as they are time consuming and practically complicated).

Copyright can be used for controlling digital representations of a dance, and for forming the basis of a revenue stream allowing to exploit this dance through control over the exclusive rights granted by copyright, thus helping to plug the funding gap[2].

Regarding the legal context related to IPR management, it shall also be noted that, at the European level, there's a current round of copyright reform for the Proposal for a Directive of the European Parliament and of the Council on copyright in the Digital Single Market. In particular, in the preamble to the Copyright Directive state, some general principles are foreseen, such as, in Recital 9, that "Any harmonisation of copyright and related rights must take as a basis a high level of protection, since such rights are crucial to intellectual creation. …" and in Recital 10, "If authors or performers are to continue their creative and artistic work, they have to receive an appropriate reward for the use of their work …".

Furthermore, some ruling decisions of the ECJ (European Court of Justice) may present interesting considerations in the light of the objectives of the project.

[2] As clearly described by prof. Charlotte Wealde in her paper titled "*A Collecting Society for Dance: has the time come?*".

For instance, in “Infopaq International A/S v Danske Dagblades Forening” (Case C-5/08) the Court, while explaining the standard of intellectual creation needed for copyright to subsist – and in this case confirming that single words are not protected by copyright (Paras 37 – 48) – states at the same time, that: “As regards the parts of a work, it should be borne in mind that there is nothing in Directive 2001/29 or any other relevant directive indicating that those parts are to be treated any differently from the work as a whole. It follows that they are protected by copyright since, as such, they share the originality of the whole work. In the light of the considerations referred to in paragraph 37 of this judgment, the various parts of a work thus enjoy protection under Article 2(a) of Directive 2001/29, provided that they contain elements which are the expression of the intellectual creation of the author of the work.”

Under a different perspective, in “Football Association Premier League Ltd, v QC Leisure” (Joined Cases C 403/08 and C 429/08) the ECJ while explaining (Paras 96 – 99) that “sporting events cannot be regarded as intellectual creations classifiable as works within the meaning of the Copyright Directive. That applies in particular to football matches, which are subject to rules of the game, leaving no room for creative freedom for the purposes of copyright”, the ECJ also states that “none the less, sporting events, as such, have a unique and, to that extent, original character which can transform them into subject-matter that is worthy of protection comparable to the protection of works, and that protection can be granted, where appropriate, by the various domestic legal orders. […] Accordingly, it is permissible for a Member State to protect sporting events, where appropriate by virtue of protection of intellectual property, by putting in place specific national legislation” (Par. 100-104).

The working group activities are going to continue with regular monthly TCs in 2018.

WP9 – Coordination & management

Progress

During Phase II, several management activities were conducted to keep the project on track, to align the activities performed by the various partners, to solve emerging issues, and to ensure the accomplishment of the key intermediate results.

Five general meetings were organised in this period:

- A consortium meeting in Coventry – at M13
- An internal review meeting in London - at M18
- The second user's board session in London – at M18
- A consortium meeting before the project review in Luxembourg – at M21
- An internal review meeting in Toulouse – at M24.

Finally, the Teleconferences were regularly held during the past twelve months.

Strategic project governance activities

The management team provided the consortium with the formal tools for producing consistent deliverables while ensuring a thorough quality control of the produced documents, as well as checking the necessary alignment with the self-assessment goals.

The management strategy was implemented following an agile approach, focusing on the early implementation of working pieces of software, made available for testing and refinement by all the other partners, also building on the expertise of the dance partners. This approach made it possible to demonstrate, during the Users' board meeting in London in June 2017, the project mid-term review in Luxembourg 2017 the progress of a number of software solutions, presenting a variety of working features, such as the blending machine, the data annotator, the similarity search interface, the movement sketching tool, the sound-movement alignment, etc.). After the mid-term review in M21, the management directed the partners into intensifying the efforts for completion of the remaining technical developments and initiation of integration in UNITY.

The involvement of several Dance and Technology experts in the Users' Board Session organised at M18, made it possible to gather interesting feedback on future enhancements and to better understand the needs of some key stakeholders, thus helping WhoLoDancE to be more focused on the technological solutions which are more likely to respond to the community expectations. Additionally, the Users' Board session allowed to disseminate the intermediate project outcomes to a selected audience.

Finally, project teleconferences were regularly organised during this period. In the period M13-M21 the meetings were substantially on a monthly basis. After M21 a teleconference dedicated to the results of the EC review was organised. This gave the opportunity to the consortium to thoroughly examine the comments by the reviewers and decide whether any major deviations in the already scheduled activities was deemed necessary. The meeting concluded that only minor efforts were needed to address the comments, mainly towards Communication & Dissemination and the data annotations. After M21 the frequency of the meetings was intensified along with the intensification of efforts for completion of technical developments and initiation of the integration in UNITY.

Main results

Consortium workshop, Coventry 24th January 2017

On the 24th of January 2017 the WhoLoDancE consortium gathered at the Institute of Creative Enterprise in Coventry. All participants attended a number of dance workshops instructed by the dance partners. The purpose of this meeting was to establish a common ground of understanding of basic movement principles

among dance and tech partners, to ensure the technical developments necessary within the framework of WhoLoDancE, such as directionality, rhythm, and qualities of movements.

After completion of the dance workshops, the tech partners presented prototypes of tools showing examples of how to teach orientation or other movement principles.

Consortium meeting – Coventry, 25 January 2017
This meeting concluded with the following list of priorities for the first half of the second, which was used as a roadmap for all content-related activities:

1. Introduce expressivity/quality of movements as metadata:
    a. added to the selection of the mocap files included into the Library of Movements;
    b. allowing to take these expressivity/quality metadata into account while making use of the Blending Machine.
2. Develop a web-based users' interface allowing the dance partners to annotate such expressivity/quality metadata on the already performed mocap (both whole sequences, as well as segmentations).
3. Introduce the possibility of making use of a similarity search tool based not only on the similarity of movements, but also on the movement examples highlighted by the annotated expressivity/quality metadata.
4. Allow all technical partners to contribute to the expressivity/quality and similarity extension of the Library of Movements and Blending Machine features, with due guarantees of non-infringement of Motek's IPR.
5. Identify the initial pedagogic tools allowing to make use of the performed mocap, as well as of other possible lower-end technologies, aiming at realistic teaching/self-learning purposes.

Consortium meeting – London, 26 June 2017
This meeting served the following purposes:

1. Validation of the successful completion of the priorities set in the previous meeting in Coventry.
2. Partners' consensus on a number of technical developments concerning the WhoLoDancE infrastructure, data annotations and segmentations, extraction of high-level features, similarity search and 3D visualizations.
3. A thorough discussion on exploitation possibilities, preferences, risks and opportunities, whose outcomes have been summarized in deliverable D8.5
4. Preparation for the 2nd Users' Board Session and the mid-term review in M2

2nd Users' Board Session – London, 27 June 2017
The second Users' Board session was held in in partnership with MOCO 2017. All partners participated and ten external experts, as listed here below, were present as well.

	Name	**Affiliation**
1	Elizabeth Waterhouse	Dancer & Theorist, Bern University
2	Annamaria Carusi	University of Sheffield
3	Kim Vincs	Professor Swinburne University, Australia
4	Scott deLahunta	Senior research fellow, Coventry, University (C-DaRE)

5	Sarah Fdili-Alaoui	Assistant professor at LRI-Université Paris-Sud 11
6	Claudia Ribeiro	Blackbox - Arts & Cognition platform
7	Carla Fernandes	Principal Investigator, Blackbox - Arts & Cognition platform (funded by ERC)
8	Kim Kothen	PhD candidate, Coventry University (C-DaRE)
9	Asaf Bachrach (via skype)	Labodanse Paris
10	Karin Greenhead	Lecturer in Dalcroze Eurhythmics, Royal Northern College of Music

During this session the WhoLoDancE consortium had the chance to present the most significant aspects of its work and demonstrate the functionalities of the technical tools that have been developed, i.e. the data annotator, the blending engine, the similarity search engine and the movement sketching software and devices. Having achieved a high level of technical developments the past months, the session gave the opportunity for in-depth discussions on functional details of the tool, refinement of the educational objectives, the importance of data management and ways to achieve good data annotations and IPR management. The invited participants provided positive feedbacks and showed to be very interested in staying informed about the upcoming progress.
The most important findings and recommendations by the invited experts are summarized below:

1. The mocap data collected within the framework of WhoLoDancE are of impressively high quality. In order to enable dance practitioners and researchers to use these data effectively, the WhoLoDancE team will need to stay focused on **delivering a comprehensive scheme for the execution of data annotations** by a reasonable large amount of highly qualified experts.
2. WhoLoDancE proves to play a leading role in the operationalization of significant dance notions, allowing technical experts to translate them into measurable indicators for the development of technical tools. This presents the opportunity to have the definitions developed by WhoLoDancE formalized among the international dance community. (Comment by Sarah Fdili-Alaoui). To this end the possibilities offered by the Research Data Alliance could be explored. The team could consider to **development of international protocols**, standards and guidelines of the use of definitions, annotation process etc.
3. Until recently, the formulation of dance and motion-related research questions has been driven and limited by the available mocap technologies. The advanced mocap technologies used within WhoLoDancE prove that from now on it is possible to **formulate research questions without it being necessary to first think about the technical limitations of the available mocap tools**.
4. The technical developments within WhoLoDancE are impressive, yet the perspective of a large number of dance practitioners is still missing. Although this makes sense given the time needed for development and validation of the technical tools**, it would be good to intensify efforts to incorporate feedback from a large number of real practitioners** in the final developments of the tools and in the integration phase. A way to achieve this is to **involve the dance community in trial annotations** and the use of the WhoLoDancE tools.
5. **WhoLoDancE lends itself perfectly as a case study of IPR management** issues within the creative industry. The consortium is faced with the challenge of developing an IPR framework for an uncommon system of data-collection, -use and -reuse. Given the complexity of the technical

developments (mocap, signals and other sources of data), dealing with IPR becomes increasingly complex too. A starting point for the development of the IPR framework is to identify what brings value in this respect. Experts agreed that **value lies in the way that data are used, reused and enriched**.

6. An opportunity to be taken into account in the further technical developments is that the WhoLoDancE data and tools could be modified and reused in the future for purposes other than dance education and practice. In order to accommodate this opportunity, **the final design of the annotator and the library of movements needs be customizable**, i.e. flexible enough to allow necessary modifications in the future.
7. WhoLoDancE uses a variety of avatars. This is **a great advantage for the education of less advanced dancers**, who tend to be easily intimidated. Moving in a bulky avatar such as the blob, would make them more confident to play with dynamics, practice movement qualities and be more expressive.

Preparation of the 1st Periodic Report and EC Review – Luxembourg, September 2017

This task involved a consortium meeting the day before the EC review in the EC premises, which allowed partners to rehearse their presentations.

Consortium meeting – Toulouse, 20 December 2017

This meeting gave the opportunity to the partners to discuss in depth about the final stages of the technical developments of WhoLoDancE and the UNITY and web-based integration of the various tools. The following priorities were set for the first half of the final year:

1. Completion of data annotations by the dance partners by January 31st, 2018.
2. Completion of the integration of technical tools by June 30th, 2018
3. Users' interface ready by June 30th, 2018

Organization of 22 teleconferences

Most of the teleconferences had the form of progress meetings. Some of them were webinars dedicated to specific technical issues.

Open issues

No open issues.

Interactions and expectations with regard to other WPs

The partners are collaborative and proactive with regard to the project management and coordination of the project.

Deviations, if ever, from the original work plan

No deviations.

Financial, administrative and consortium management relevant information

Financial and administrative information

As mentioned above, during this period, the Consortium prepared the First Periodic Report, providing information on both the technical activities and the relevant resources consumption for the reporting period (i.e. 1st January 2016 – 30th June 2017). The preparation, kicked-off during the project meeting held in London on June 2017 (see above), was completed with the submission of the Report on August 30th, 2017 in view of the First Periodic Review, held in Luxembourg on September 8th.

As outcome of the review process, the technical activities have been approved, and all cost claims for the first reporting period have been accepted. An upcoming interim payment of € 833,146.25 was therefore notified by the EC on November 23rd, 2017.

As explained in the EC notification, the amount was below the overall request (€ 1.846.030,10) because the consortium reached the 90% limit for interim payments, taking into consideration also the pre-financing (€ 2.166.180,25, including the guarantee fund – which will be distributed at the end of the project).

The resources were duly distributed to the partners. Before the distribution, the Consortium agreed on a slight re-distribution of the project resources, in favour of the dance companies. This re-allocation has been deemed necessary to ensure the dance companies with a minimum of additional funds for continuing to provide their high-level contribution to the project, which has proved to be a crucial element of success in the first reporting period. In fact, the dance companies original budget was determined – at the time of the project proposal preparation - on the basis of the assumption of a more limited contribution from their side, specifically focused in the first 6 months of the project (requirement gathering and motion capture) and then in the final year (final validation). In the unrolling of WhoLoDancE, this initial activities' forecast proved to be underestimating their potential contribution, and in fact the dance companies were requested to be further engaged in the project activities, providing their expertise and input not only in the motion capture process, but also in the various phases of development of the technical tools and the learning scenarios implemented within the project.

For this reason, the Consortium easily reached an agreement to distract part of each partner's accepted funding (see column Original RP1 below) to provide the dance companies with a slight increase of their budget. As it appears from the table below, the main contributor has been Peachnote, who was the partner with the highest level of underspending at the end of the First Reporting Period. Thus, it was decided to leverage on Peachnote's budget for the time being, while agreeing that, whenever Peachnote should need to consume all of its initial budget within the end of the project, then the other partners will provide an additional contribution, thus returning the anticipated resources to Peachnote (or, in reverse, whenever any residual underspending were to eventually be maintained, a further reallocation might occur for covering other technical needs).

PARTNER	REP 1 CLAIMED	Original RP1	New RP1
LYNKEUS	€ 180.000,63	€ 81.237,49	€ 80.018,93
ATHENA	€ 275.281,81	€ 124.239,58	€ 122.375,99
MOTEK	€ 514.116,30	€ 232.029,84	€ 228.549,39
POLIMI	€ 266.441,03	€ 120.249,58	€ 118.445,84
UNIGE	€ 206.286,80	€ 93.100,91	€ 91.704,39
PEACHNOTE	€ 114.148,85	€ 51.517,41	€ 36.517,41
COVUNI	€ 151.835,24	€ 68.525,95	€ 67.498,06
STOCOS	€ 47.905,00	€ 21.620,38	€ 34.515,75
K.Danse	€ 49.165,13	€ 22.189,10	€ 28.636,79
LCGW	€ 40.849,31	€ 18.436,02	€ 24.883,71
TOT	**€ 1.846.030,10**	**€ 833.146,25**	**€ 833.146,25**

The resources made available in this way (for a total of **€25.790,75**) have been distributed to the dance companies as follows:

STOCOS	50%	€ 12.895,38
K.Danse	25%	€ 6.447,69
LCGW	25%	€ 6.447,69

The reason for the highest contribution to Stocos was that Stocos contributed with two dance genres (and not only one as initially foreseen) to the motion capture sessions, thus facing double costs.

Consortium Management

No specific Consortium Management activities were needed in this period.

WhoLoDancE meetings

The following tables report about the Project's cooperation activities that have been performed in the second twelve months of the project.

Physical meetings

Meeting	Location	Date
Consortium meeting & Workshop	Coventry University	24-25 January 2017
General Meeting & Users' Board Session (in partnership with MOCO 2017)	London	26-29 June 2017
Consortium meeting & EC Review	Luxembourg	6-7 September 2017
General Meeting & Workshops	Toulouse	20 December 2017

TC list

N°	Teleconference	Date
1	1st WhoLoDancE General TC	21 February 2017
2	Technical webinar	2 March 2017
3	2nd WhoLoDancE General TC	5 May 2017
4	Technical webinar	10 May 12017
5	3rd WhoLoDancE General TC	18 May 2017
6	4th WhoLoDancE General TC	19 May 2017
7	Technical webinar	1 June 2017
8	5th WhoLoDancE General TC	6 June 2017
9	Technical webinar	7 June 2017
11	6th WhoLoDancE General TC	13 June 2017
12	Technical partners TC	21 June 2017
13	7th WhoLoDancE General TC	18 July 2017
14	Technical webinar	28 July 2017
15	8th WhoLoDancE General TC	29 August 2017

16	Technical webinar	6 October 2017
17	9th WhoLoDancE General TC	13 October 2017
18	10th WhoLoDancE General TC	31 October 2017
19	Technical webinar	4 November 2017
20	11th WhoLoDancE General TC	13 November 2017
21	12th WhoLoDancE General TC	27 November 2017
22	13th WhoLoDancE General TC	11 December 2017

Dissemination Activities

Conferences, Workshops

A list of the external meetings (conferences, workshops, etc.), attended or organised within the Consortium, held during the reporting period or foreseen for the next reporting period is given in the table below with a brief description of type, scope and number of persons attending events.

Type of activity (workshop, conference, publication, etc.)	Title of the event/publication	Date	Location/dissemination channel	Your role (speaker, exhibitor, author, etc.)	Type of audience
Presentation	WhoLoDancE project	10 March 2017	Digital Echoes	Athena, presenter	Scientific interdisciplinary community
Conference	"Dancing Data. Digital Philosophy in Movement"	16 March 2017	Sapienza University of Rome	Lynkeus, presenter	Scientific community
Workshop	Dance and Technology Workshop	20-24 March 2017	Zurich University of the Arts (Switzerland)	Stocos. Teachers	Dance community
EC Workshop	H2020 Participatory Meeting for Digital Learning projects	27 March 2017	European Commission, Euroforum building, Luxembourg	Edwin Morley-Fletcher (Lynkeus) and Katerina El Raheb (Athena): presenters	European Digital Learning Projects
Invited presentation	Whole-Body Interaction tools for Dance Learning	26 May 2017	Digital Tools and Cultural Management, organised by the General Secretariat of Information and Communication in Greece	Athena, presenter	Wider audience
Conference	Robust music identification approach based on local spectrogram image descriptors	May 2017	Berlin, Germany	PoliMi speaker	Scientific community
Invited presentation	Managing and Enriching Dance Data & Movement Knowledge	5-9 June 2017	Gesture and & Artificial Intelligence in Industry and Arts	Athena, Presenter	Professionals and young researchers

Conference	Faculty of Arts Research Conference	20 June 2017	Coventry University	Covuni, Speaker	Research community
Conference Demo	The EU ICT H2020 WHOLODANCE Dance Learning Applications	28-30 June 2017	MOCO 2017, London, UK	Athena, Author, Presenter	Scientific community
Conference	Graph restricted game approach for investigating human movement qualities	30 June 2017	MOCO 2017, London, UK	UniGe, Speaker	Scientific and artistic community
Conference	Limbs synchronization as a measure of movement quality in karate	30 June 2017	MOCO 2017, London, UK	UniGe, Speaker	Scientific and artistic community
Performance Demo	Pablo Palacio, Muriel Romero and Daniel Bisig	30 June 2017	MOCO 2017, London, UK	Stocos, presenters, performers	Scientific and artistic community
Conference	Conferencias del Espacio de Creación e Investigación Sonora	6 July 2017	Universidad Autónoma de Madrid-UAM (Spain)	Stocos, author, presenter	Scientific and artistic community
Conference	International Dance and Somatic Practices Conference	7-9 July 2017	Coventry (UK)	Sarah Whatley Rosamaria Cisneros Ruth Gibson Karen Wood	International somatic practices and dance community, wider audience
Workshop	Calibre network meeting	17 July 2017	Loughborough University, London	Covuni, Speaker	Network team members
Conference	TaPRA conference	31 August 2017	University of Salford	Covuni, Speaker	International theatre research community
Conference	DataAche: Digital Research in the Humanities and Arts	11-12 September 2017	Plymouth university	Covuni, Speaker	International research and artist practitioner community
Workshop targeted to dance experts + demo	Whole-Body Interaction tools for Dance Learning	22-29 September 2017	Researcher's Night in Lavrio and Athens	Athena, Presenter	Dance community, wider audience
Conference	MMSP2017	16-18 October 2017	Luton, UK	PoliMi, Author and speaker	Scientific community
Evaluation workshop	MoCap drop in session	3 November 2017	London	Covuni, Facilitator	Invited participants

Workshop	WhoLoDancE	8 November	Athens	Lykeion ton Hellinidon	Greek dance club members
Workshops & Demos	Metabody_WhoLoDancE Toulouse	18-19 December, 2017	Toulouse, France	All partners	Scientific and artistic community
Workshops & Demos	International Performing Arts event at Matadero	17-18 April 2018	Madrid, Spain	All partners	Scientific and artistic community
Workshops & Demos	MOCO 2018	28-30 June 2018	Genoa, Italy	All partners	Scientific and artistic community
Satellite Workshop	European Signal Processing Conference	7 September 2018	Rome, Italy	All partners	Scientific community
Workshop & Performance (still in negotiation)	Roma Europa Festival	October/November 2018	Rome, Italy	All partners	Scientific and artistic community

Meeting on WhoLoDancE held at the Lykeion ton Hellinidon Club in Athens on 8th November 2017 with the attendance of Oshri Evan-Zohar (Motek)

Programme of the Metabody_WhoLoDancE event held in Toulouse on 18-19 December 2017

SONIFICATION INTERACTIVE

Stocos (Madrid, Espagne) et K. Danse
Atelier | Auditorium (10h > 13h)

Découvrez de manière interactive les manières dont **le mouvement et la musique peuvent être reliés entre eux** par l'utilisation créative de la technologie.
Grâce à une **rétroaction auditive en temps réel du mouvement** de l'utilisateur, les participants peuvent écouter les aspects qualitatifs de leurs mouvements, comme la fluidité, la symétrie dynamique ou le poids, révélant alors des aspects intimes des activités corporelles d'un danseur. Le cadre interactif devient un environnement créatif pour les méthodes de composition chorégraphique et musicale.
Avec Muriel Romero, Pablo Palacios et Marianne Masson.

SEGMENTATION MANUELLE DE SÉQUENCES DANSÉES

Polimi
Atelier | Salle ADLIB (10h > 12h)

Dans cet atelier, nous présentons un outil basé sur le Web pour **annoter manuellement une séquence de danse en petits segments**. Les résultats de cette annotation sont utilisés pour comprendre comment les experts en danse décomposent les séquences. Aussi, ils permettent de **développer de nouveaux algorithmes** pour identifier automatiquement les moments les plus saillants.
Avec Michele Buccoli et Massimiliano Zanoni.

DISCUSSIONS AUTOUR DU PROJET WHOLODANCE

Avec tous les partenaires artistiques et scientifiques.
Rencontre | Auditorium (14h30 > 16h30)

MARDI 19 DÉCEMBRE
9H > 13H & 14H > 18H

Les participants aux ateliers sont répartis en quatre groupes, avec rotation toutes les heures.

FLAMENCO & TECHNOLOGIE NUMÉRIQUE

Covuni (Coventry, Angleterre) et Athena RC
Atelier | Salon Jaune (9h > 11h)

Deux parties structurent cet atelier : D'abord, les participants sont en mesure **d'apprendre quelques éléments de base de la danse flamenco** et de voir comment elle se rapporte à l'interface web de la bibliothèque de mouvements WhoLoDancE.
Ensuite, les participants peuvent parcourir un grand nombre de séquences de danse filmées et enregistrées en motion capture afin d'en explorer son **utilisation à des fins éducatives et chorégraphiques**.
Avec Rosa Cisneros et Katerina El Raheb.

DANSES GRECQUES & TECHNOLOGIE NUMÉRIQUE

Lykeion ton Hellinidon (Athènes, Grèce) et Athena RC
Atelier | Salon Jaune (11h > 13h)

Vous avez l'occasion de **danser des danses traditionnelles grecques et de pénétrer dans le monde de la technologie**. Découvrez les détails de danses grecques que vous venez d'apprendre, en regardant l'avaler les danser depuis la librairie de mouvements capturés en motion capture, en utilisant différents outils créés par les scientifiques du projet WhoLoDancE (ICE H2020-ICT-2015).
Avec Amelia Markatzi et Katerina El Raheb.

PRÉSENTATION DU PROJET METABODY 2017

Iaime del Val
Rencontre | Salon Jaune (17h > 18h)

PERFORMANCE R.C.O.

K. Danse et Sarah Fdili Alaoui
Auditorium (18h30)

Athena RC (Athènes, Grèce) | www.athena-innovation.gr/en
La mission d'Athena RC est de mener des recherches de haut niveau en informatique et en sciences computationnelles et de s'assurer que cette recherche a un impact sur la société, en particulier en ce qui concerne les besoins locaux. La vision d'Athena RC est de servir l'ensemble du cycle de vie de la recherche, de la recherche fondamentale et appliquée à la construction de systèmes et produits.

CasaPeganini / InfoMus (Gênes, Italie) | www.infomus.org
CasaPeganini / InfoMus, réalise des recherches scientifiques et technologiques, développe des systèmes multimédia, des interfaces homme-machine multimodales et des applications. Le principal axe de recherche du centre est la compréhension et le développement de modèles computationnels de comportements expressifs et sociaux non verbaux. La fertilisation croisée des théories scientifiques, humanistes et artistiques caractérise la méthodologie de recherche.

Peechnote (Munich, Allemagne) | www.peechnote.com
Peechnote GmbH est responsable de l'analyse des données séquentielles qui correspondent aux caractéristiques de moyen et haut niveau décrivant les données collectées à partir du mouvement dansé. Peechnote développe des applications musicales basées sur de la collecte de données et du traitement de signal. Peechnote a reçu le soutien EXIST du Ministère allemand de l'économie et de la Communauté Européenne. Elle a inventé une méthode efficace pour de la recherche de similarité (moteur de recherche) en s'inspirant des techniques utilisées dans le commerce de la bio-informatique.

Motek (Amsterdam, Pays-Bas) | www.motekentertainment.com
Motek est l'un des pionniers dans le domaine de la motion capture, avec une histoire de développement et de production de nouvelles technologies intégrant les techniques en provenance du monde de la recherche, de la médecine et de la robotique pour en réaliser des solutions pratiques et disponibles pour la diffusion.

Polimi, Politecnico di Milano (Milan, Italie) | www.polimi.it
Le Politecnico di Milano, classé parmi les 50 meilleures universités du monde (classement QS) dans tous les domaines de la science et de la technologie, est le plus grande université technique d'Italie et d'Europe. Le laboratoire de traitement de l'image et du son (ISPG) de Polimi a une longue expérience dans le domaine du traitement du signal multimédia, avec un accent particulier sur l'analyse et le traitement audio, acoustique, de l'image et du mouvement.

Covuni (Coventry, Royaume-Uni) | www.coventry.ac.uk
Parmi l'un des principaux centres de recherche pour la danse en Europe, le travail de Covuni, Centre de recherche en danse (C-DaRE) de l'Université de Coventry, est ancré dans la création, l'analyse et la publication de diverses pratiques de danse, sous forme analogique et numérique. Ses chercheurs collaborent à échelle internationale avec des artistes et des organismes de recherche, et sa recherche est financée par des conseils de recherche nationaux et internationaux, des trusts et l'Union Européenne.

Lykeion ton Hellinidon - Lyceum Club des Femmes Hellènes (Athènes, Grèce) | www.lykeionellinidon.gr
Le Lyceum Club des Femmes Hellènes fut fondé en 1911 par une des premières championnes du mouvement féministe, en Grèce, Callirhoé Parren. Parmi ses buts principaux : l'étude, la préservation et la diffusion de la culture populaire du pays, et en particulier de la musique et de la danse.

Instituto Stocos (Madrid, Espagne) | www.stocos.com
Instituto Stocos est un projet qui se concentre sur l'analyse, la recherche et le développement de l'interaction entre le geste corporel, la musique et l'imagerie visuelle interactive, en translatant des concepts et des abstractions issus de disciplines scientifiques dans des contextes performatifs.

Metabody (Iaime del Val) | www.metabody.eu
Metabody est un projet artistique et scientifique qui interroge l'homogénéisation des expressions induites par les technologies actuelles d'information et de contrôle, qui réduisent toutes nos actions à des comportements prévisibles. Metabody propose alors de les réinventer à travers un nouveau concept d'architecture interactive qui vaine d'aspect physique et numérique, constituent des environnements dynamiques, participatifs et performatifs pour l'extérieur et l'intérieur.
Iaime del Val, artiste transdisciplinaire, philosophe et activiste, est fondateur du projet Metabody.

Compagnie K. Danse (Toulouse, France) | www.k-danse.net
K. Danse a à son actif un vaste corpus de réalisations où s'hybrident danse contemporaine et arts numériques. Les œuvres questionnent les frontières entre fiction et réalité, la construction sociale du corps, le rapport aux nouvelles technologies. Une passion : inventer de nouvelles écritures pour le spectacle vivant.

Articles published, press coverage, website development

Type and Scope	Title	Author(s) and affiliation	MM/YYYY	Details/Comments
Journal article	Somatic Practices: How Motion Analysis and Mind Images Work Hand in Hand in Dance	Sarah Whatley, Covuni	02/2017	Handbook of Human Motion
Conference proceedings	On Achieving Diversity in Recommender Systems	Kyriakidi M, Stefanidis K, Ioannidis Y, Athena	05/2017	Proceedings of the ExploreDB'17
Conference proceedings - Chapter	BalOnSe: Temporal Aspects of Dance Movement and Its Ontological Representation.	El Raheb K, Mailis T, Ryzhikov V, Papapetrou N, Ioannidis Y., Athena	05/2017	European Semantic Web Conference 2017
Conference Paper	Piano&Dancer: Interaction Between a Dancer and an Acoustic Instrument	Palacio P, Bisig D., Stocos	06/2017	Proceedings of the 4th International Conference on Movement Computing
Conference proceedings	Using multi-dimensional correlation for matching and alignment of MoCap and Video signals	Michele Buccoli, Bruno Di Giorgi, Massimiliano Zanoni, Fabio Antonacci, Augusto Sarti, PoliMi and UniGe	10/2017	IEEE Multimedia Signal Processing

Conclusions

WhoLoDancE has now concluded the Phase II of the project, which was related to the models, platform, and similarity search basic development. Albeit some minor delays in the completion of specific tasks, within some Work Packages, the second Milestone of the project has been successfully attained and the use of resources has been accurately managed.

Means of verification:

1. All relevant deliverables have been submitted.
2. The First Prototype of the IT tools has been released.

Overall, it can be said that WhoLoDancE is on a good track and no major deviations from the original workplan have been experienced.