

Welcome to the first issue
of the OActive Newsletter!

NEWSLETTER

Issue 1: December 2018

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Keywords

Biomarkers

Big Data Analytics

Biomechanics

Augmented reality



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Advanced Personalised, Multi-Scale Computer Models Preventing Osteoarthritis



OActive at a glance

Project overview

Osteoarthritis (OA) is a degenerative disease of the joints and the most common form of arthritis that causes pain and mobility limitation and, thus, reduces independence and overall quality of life. Osteoarthritis is a complex disease in which biochemical and biomechanical factors are involved and occurs mostly in the weight-bearing joints of the lower limbs, such as the hip and in particular the knee.

OActive project was launched on November 2017, facing H2020-SC1-PM-17-2017 topic: "Personalised computer models and in-silico systems for well-being", aiming to improve healthcare by transforming and accelerating the OA diagnosis and prediction based on a more comprehensive and holistic understanding of disease pathophysiology, dynamics, and patient outcomes. The OActive project intends to make a significant leap forward adopting a multi-scale holistic analysis where patient-specific information from various levels, including molecular (e.g. biochemical/inflammatory biomarkers), cell, tissue and whole body, will be integrated and combined with information from environmental, behavioural and social risk factors to generate robust predictors for new

The prevalence of OA in people over 65 years old ranges from 12- 30%.

Around 10% of people over 55 years of age have knee OA.

FACTs

personalised interventions for delaying onset and/or slowing down progression of OA. OActive targets patient-specific OA prediction and interventions by using a combination of mechanistic computational models, simulations and big data analytics. Once constructed, these models will be used to simulate and predict optimal treatments, better diagnostics, and improved patient outcomes. Overcoming the limitation of the current treatment interventions, Augmented Reality (AR) empowered interventions will be developed allowing patients to experience the treatment as more enjoyable, resulting in greater motivation, engagement, and training adherence.

OActive core technologies

01



**Neuromusculo-skeletal
Models**

02



Biomarkers

03



**Exogenous/
environmental
risk factors**

04



**Big data
analytics &
machine learning**

05



**Personalized
interventions through
augmented reality**



Advanced Personalised, Multi-Scale Computer Models Preventing Osteoarthritis



OActive website, video and milestones

OActive website

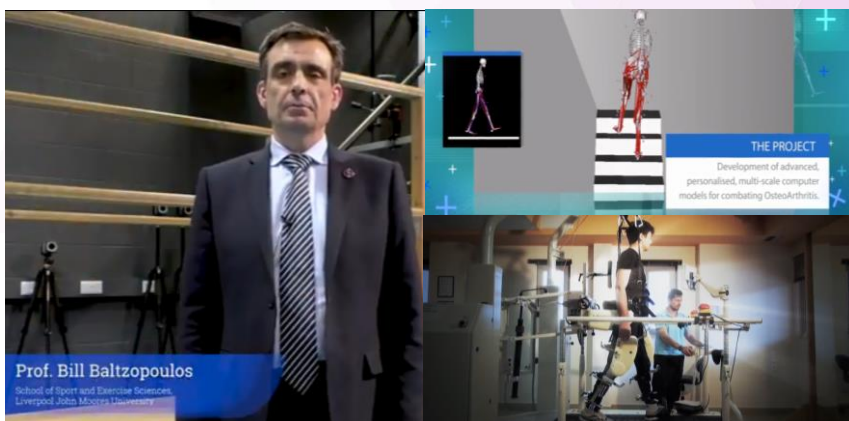
The OActive webpage is daily informed with news from the project's progress as well as updates from the scientific community interested in OA diagnosis and treatment.

<https://www.oactive.eu>

OActive video

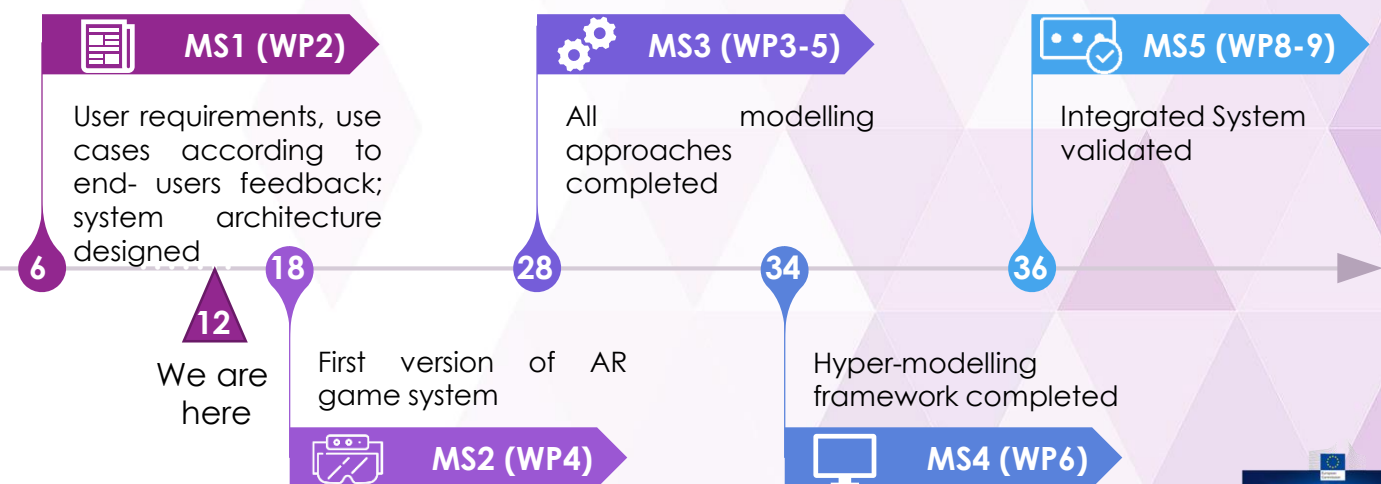
The teaser video of the H2020 OActive project has been published! Enjoy a quick preview of what is the mission of the project!

<https://www.oactive.eu/category/news/>



Professor Bill Baltzopoulos presenting the OActive project

OActive milestones



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OActive Physical Meetings

The project's kick off meeting was hosted by the Department of Life and Health Sciences, University of Nicosia, Cyprus, on the 27th-28th November 2017.



The 6M OActive project meeting took place in Liverpool on 30th May of 2018, hosted by the Liverpool John Moores University (UK).

OActive 12M Meeting just took place in Valencia on 27th of November 2018, hosted by Department of Physical Medicine and Rehabilitation, Health Research Institute La Fe (Spain).



Advanced Personalised, Multi-Scale Computer Models Preventing Osteoarthritis



Attendance to events

Info day of the Hellenic Society of Biomechanics “Knee Biomechanics”, 27 January 2018, Greece



CERTH attended the “Knee Biomechanics” info day organized by the Hellenic Society of Biomechanics, on the 27th of January 2018, in Thessaloniki, Greece. The work presented was entitled: “Advanced personalised musculoskeletal in silico models for preventing osteoarthritis”. The main focus of the infoday was anatomy, depiction, sports injuries, total arthroplasty, physiotherapy, and rehabilitation.

OpenSim Advanced User Workshop, 28-31 March 2018, UK



University of Patras (VVR Group) received the Grand Technical Award, among the twenty teams that participated in the OpenSim Advanced User Workshop that was held at Stanford University during 28-31 March 2018. The paper submitted, entitled “Multi-scale analysis of the knee complex”, aims to develop multi-scale, patient-specific models of the knee to predict and prevent the progression of osteoarthritis using coupled rigid-body and finite element analyses.

5th Technology Transfer Exhibition – Patras Innovation Quest (Patras IQ), 27-29 April 2018, Greece



University of Patras attended the 5th Technology Transfer Exhibition - Patras IQ, presenting the OActive project, building links with related projects and participating in demonstration activities related to augmented reality.



University of Patras had a poster presentation during the Patras Innovation Quest Exhibition

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Attendance to events

56th Congress of the Spanish Society of Rehabilitation and Physical Medicine SERMEF, 16-19 May 2018, Spain



OActive project was presented at the 56th Congress of the Spanish Society of Rehabilitation and Physical Medicine by the Department of Physical Medicine and Rehabilitation, Health Research Institute La Fe (**HULAFE**). The Congress covers the scientific fields of neurorehabilitation, skeletal muscle pathology, pain, management, innovation and the relationship with patient associations.

Virtual Physiological Human (VPH), 5-7 September 2018, Spain



University of Patras participated in the Virtual Physiological Human conference, taking place in Zaragoza, Spain. With the work entitled "The Effect of Kinematic and Dynamic Redundancy on the Assessment of Joint Reaction Loads" they have presented OActive results related to the estimation of the bounds of the joint reaction loads for a gait movement.

Researchers' Night, 28 September 2018, Cyprus



UNIC attended the Researchers' Night taking place on 28 September 2018 (Limassol, Cyprus), celebrated in more than 300 European cities with a great involvement of the research / academic community. Through a variety of scientific actions, experiments and events, research welcomes both academia as well as the wider public.

Healthio, 16-18 October 2018, Spain



Healthio is the healthcare conference, held in Barcelona from 16 to 18 October, 2018. The focus of the event is to bring together patients, professionals and companies in the health sector. **LEITAT** participated in Healthio conference presenting OActive project.



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Attendance to events

26th annual meeting of the European Orthopaedic Research Society, 25-28 September 2018, Ireland



Ri.MED presented the OActive project during a keynote speech at the 26th annual meeting of the European Orthopaedic Research Society in Galway, Ireland, on 25-28 September 2018. Over 120 renowned engineers, scientists, clinicians and entrepreneurs delivered inspiring talks, whilst exhibitors, sponsors & corporate partners presented the state of the art in the field.

First Ri.MED Research Retreat, 11 October 2018, Italy



Ri.MED attended the First Ri.MED Research Retreat, in Palermo, Italy, that took place on October 11th 2018. Mission of the Foundation is the development of biotechnological and biomedical research approaches, aimed at transferring innovative therapies to patients, dissemination of scientific knowledge and training of highly qualified professionals in Life Sciences.

Science and Innovation Festival, 11-13 October 2018, Greece



ANIMUS and **CERTH** attended the Science and Innovation Festival that was held on 11-13 of October 2018. The event was hosted by the University of Thessaly and its main objectives were to inform the public on the high quality scientific research done in Greece, to provide answers to complex scientific issues, to inspire and create new standards in the field of science and, of course, to encourage young people to think about a career close to science.



ANIMUS and **CERTH** presenting a system consisting of a 40x60x15cm force platform and a synchronized camera inviting individuals to participate in the tests that help them learn how to place their body and knees to minimize unnecessary burden.

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Attendance to events

4th Annual European Microbiome Congress, 3-15th November 2018, UK



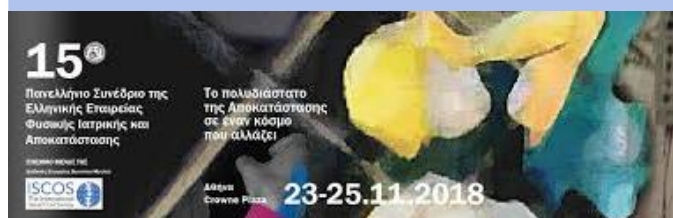
LEITAT participated in the Annual European Microbiome Congress, taking place on 3-15th November 2018, in UK. The Congress has become a trusted learning and networking platform for leading academics, practicing clinicians, pharmaceutical and nutrition companies, biotech entrepreneurs and investors, government and regulatory bodies and industry leaders who require insight into the latest microbiome research, clinical trials and multi-disciplinary collaborations.

26th Panhellenic Congress of Rheumatology, 6-9 December 2018, Greece



AXIA has attended the 26th Panhellenic Congress of Rheumatology that took place on 6-9 December 2018, in Athens, Greece. The Congress's agenda covers the whole range of Rheumatic Diseases, including problems in daily practice of Rheumatology.

15th National Congress of the Greek PRM Society, 23-25 November 2018, Greece



ANIMUS attended the 15th National Congress of the Greek PRM Society, that was held on 23-25 November 2018, in Athens, Greece. The congress gathers specialists from the Physical Medicine and Rehabilitation sector around the country in order to discuss on aspects that relate with the healthcare system.



AXIA at the 26th Panhellenic Congress of Rheumatology



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Progress Updates

The OACTIVE consortium is currently working on most of the work packages in the project. In WP2, the Data Collection Protocol was designed, and user requirements were defined. In WP3 the preliminary results for: 1) automatic segmentation from MRI and patient specific geometric parameterization and 2) first version of a finite element model have been obtained. Regarding historical archiving of the longitudinal data (biomechanical - MRI) KU Leuven collected OA data that can be used as starting point. Future studies will focus on improving the geometry representation towards patient specificity and on improving FE model and implementing simulation case studies.

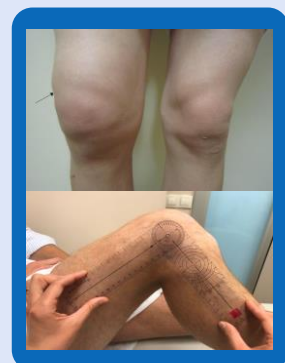
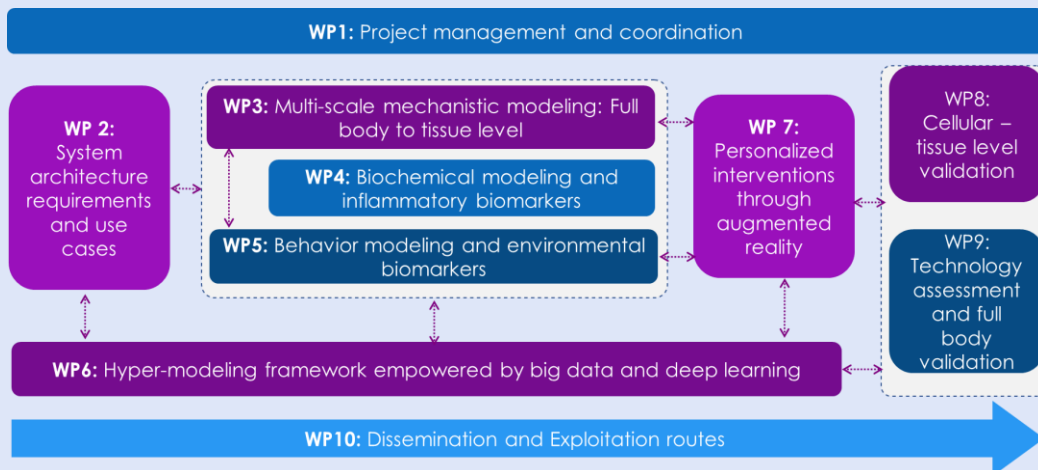
The Biomarker group, working on WP4, finalized the decision on the ELISA kits to be used for biomarker measurements and set-up the criteria for fluid and fecal sample collection. Following bioethics approval, the groups initiated subject recruitment and sample collection. Recruitment will continue, and biomarkers levels and clinical evaluation of patients will be determined.

Approval from ethics committee, obtained to address the social determinants in the KU Leuven and HULAFE sample of knee OA patients took place in WP5. Work was initiated on a systematic review on socio-economic and environmental determinants in knee OA. As concerns WP6 a systematic review that focuses on machine learning applications on

OA is being prepared. Regarding WP7, work is currently performed on the hardware and software specifications and on a gait retraining demo. In WP8 sample collection has begun, and the preliminary optimization of the cartilage hydrogel component is under way. Additionally, preliminary analysis was initiated for the development of systems capable of applying controlled loads within the bioreactor. Future work will focus on completing the sample collection, develop the engineered in vitro model and implement the first prototype of the bioreactor. Regarding WP9 work on clinical studies was initiated.

In WP 10 the OActive Website is build and there is a strong presence in social media, including facebook, twitter and LinkedIn. The project Brochure, Poster, Roll-up and Flyer are developed and are freely available through the project website and social networks, while the project teaser video is published. Publications in international journals, conferences and workshops are ongoing. Contact with medical associations, aging people associations and commercial associations is addressed. The development of the exploitation strategy includes already the identification of potential market sectors, description of market requirements and competition and identification of present available exploitation opportunities.

WP structure

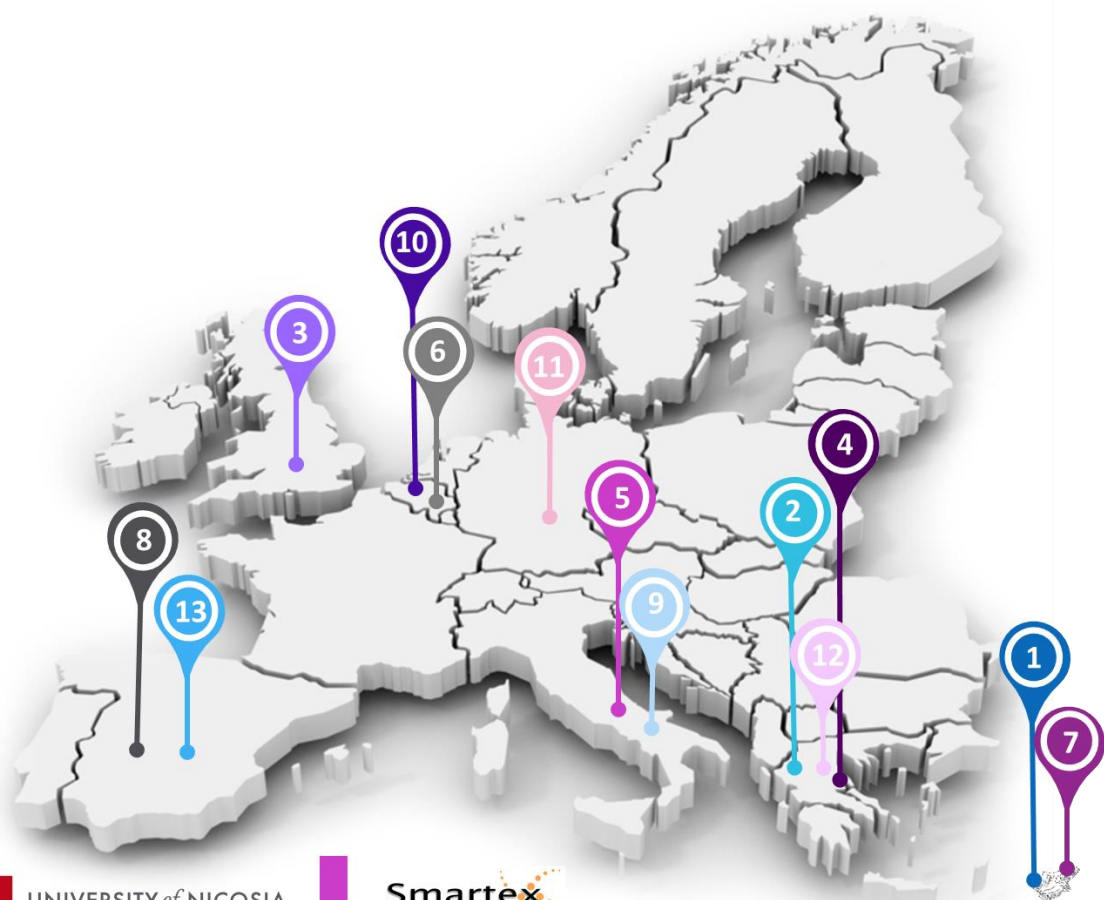


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Meet the partners

The project Consortium is made up of 13 partners representing various water sectors from 7 EU countries, including Spain, Germany, Greece, UK, Belgium, Italy and Cyprus.



Project Number
777159

Duration
36 months

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€ 4,984,033.75

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1st November 2017

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H2020-SC1-PM-17-2017

