



Organ on Chip in Development (ORCHID)

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Executive Summary

The organ-on-chip technology has emerged as a very promising technology for the reduction of time and costs in the development of new drugs, as well as for the detection of new therapeutic targets of multiple diseases. The ORCHID project is responsible, in its different work packages, to identify the current state of technology, identify technical, regulatory and ethical issues not yet addressed and the identification of agents interested in this technology. In addition, it is intended to generate a plan for the implementation of this technology in Europe. All these objectives are accompanied by a task (work package 6) responsible for spreading the benefits and especially the possibilities of this technology to improve the quality of life of European citizens.

To get all the information that will be generated in this project across to the different social agents, a dissemination plan has been developed in order to attract attention of the scientific community, the industrial fabric and European citizens.

This is a dynamic document that will be adapted to the substantial changes that occur as a result of the development of the project.

In order to awaken the interest of the scientific community, and to serve as a tool to centralize information about this technology, one web page is going to be launched and also scientific social networks accounts (Mendeley, LinkedIn, etc.) will be generated to reinforce the communication of scientists, researchers and professionals related to the biomedical sector. In addition, the presence of this technology will be reinforced in congresses and conferences to show the possibilities of this technology to other researchers. In order to promote the use of this technology among the youngest, their participation in summer schools or workshops will be encouraged. These activities are intended to attract the attention of researchers, especially the youngest ones, so that they gradually incorporate this technology into their laboratories.

Another important objective of the project is to mobilize the European industrial stakeholders to promote the development and innovation of this technology. The cell culture microfluidic sector is an emerging field that, if it is promoted in a coordinated manner between the different actors, could position Europe at the head of the world in this technology. In this regard, it is important to note that both the industries that produce Organ on Chip devices and the biotechnological and pharmaceutical companies that use them will be able to benefit from Europe's preferential and prominent positioning.

Last but not least, it is essential to make the benefits of this technology accessible to European citizens. These benefits will not only improve our wellbeing, but we also hope that it will foster the research interest of the youngest.

The Deliverable 6.1 has been achieved in time.

Introduction and Overview

Nowadays, when you search for the term *Organ on chip* in Google, you will see the list of web pages shown on the right (enlarged image in Annex 1). As you can see, unlike other areas of knowledge, organ on chip technology does not have a reference on the internet where educational resources, as well as basic information on technological advances, product quality standards, regulation necessary for its use can be easily collected. It is important to notice that the CORDIS official web page of this European project is already among the highlighted links.

In Wikipedia, the term Organ on Chip has generated a significant increase in visits in the last two years, shortening distances with terms such as "lab on chip" or "microfluidics" (full graphic in annex 2). This indicates that this technology is increasingly arousing greater interest. That's why it is increasingly important to generate an Internet portal that brings together most of the information on this technology. It is vitally important for this portal to be reviewed by qualified scientists who filter the information that is disseminated, thus guaranteeing quality and rigor.

In the field of scientific social networks, the presence of the term "organ on chip" is quite diverse. In LinkedIn there are actually (date of analysis 15-12-2017) 2120 people who have this term in their description. However, the number of groups within this social network is still quite low compared to other similar technology terms like microfluidics or 3D culture (see Annex 3). At the moment, there are 4 groups with an average of 42 members per group. Recently, a fifth group (ORCHID: ORGAN ON CHIP IN DEVELOPMENT) has been created and managed by this research project in order to bring together the debate on technology in this social network.

In another scientific social network such as Research Gate, the presence is somewhat more discrete, although similar in some parameters to related terminologies such as "lab on chip" (see data annex 4).

In Mendeley, there is hardly any presence except for the recent group created within the framework of this project.

With respect to massively used social networks, highlight the little impact on Facebook of "organ on chip". The presence in this social network focuses mainly on the companies that commercialize this technology. The impact they generate in this social network is relatively low, as can be seen in the following links with the examples of Emulate inc. and Micronit:

<https://likealyzer.com/report/emulateinc>

<https://likealyzer.com/report/micronit>


On Twitter, although not exactly the same, the @LabonaChip account, managed by the Royal Society of Chemistry, is the reference to follow. It has 3,330 followers and uploads quite useful content of the sector. This gives it a lot of visibility and impact.

Organ-on-a-chip - Wikipedia
<https://en.wikipedia.org/wiki/Organ-on-a-chip> • Traducir esta página
 An organ-on-a-chip (OOC) is a multi-channel 3-D microfluidic cell culture chip that simulates the activities, mechanics and physiological responses of entire organs and organ systems, a type of perfused organ. It constitutes the subject matter of significant biomedical engineering research, more precisely in bioMEMS.
 Transferring from 3D cell... Lung-on-a-chip Kidney-on-a-chip Artery-on-a-chip

Human Organs-on-Chips - Wyss Institute - Harvard University
<https://www.wyss.harvard.edu/technology/human-organs-on-chips> • Traducir esta página
 Human Organs-on-Chips on Wyss Institute Clinical studies take years to complete and testing a single compound can cost more than \$2 billion. Meanwhile,

Microfluidic organs-on-chips - Nature Biotechnology - Nature Research
<https://www.nature.com/articles/nbt.2069> • Traducir esta página
 05 Feb 2014 • 2014 • Cited 667 782 Article retraction
 An organ-on-a-chip is a microfluidic cell culture device created with microchip manufacturing methods that contains continuously perfused chambers inhabited by living cells arranged to simulate tissue- and organ-level physiology. By recapitulating the multicellular architecture, tissue-tissue interfaces, physicochemical

Organs on Chips | The Scientist Magazine®
<https://www.the-scientist.com/articles/view/Organs-on-Chips> • Traducir esta página
 23 Apr 2017 From beating hearts to breathing lungs, organ-on-chips are some of the most new tools for human biology research. Although these devices may bear closer resemblance to computer components than human body parts, scientists have now created working models for a whole range of organs, including the

Imágenes de organ on chip

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Organ on Chip in Development - CORDIS
https://cordis.europa.eu/project/rcn/112102_en.html • 1 oct 2017 Organ-on-chip technology will revolutionize the healthcare domain by offering new and ground-breaking solutions to different industries and especially for regenerative medicine and medication. Organ-on-Chip In Development (ORCHID) will create a roadmap for organ-on-chip technology and the <http://www.wyss.harvard.edu> página 3 veces. Fecha de la última visita: 12/12/17

Science and Technology

The dissemination plan is a dynamic document. What is proposed here is a roadmap that can be modified / adapted by mutual agreement between the partners in the different management meetings that the project will have.

The dissemination work package has been divided into 3 tasks. The first task is to disseminate the ORCHID project to the scientific community. The second aims to disseminate the information generated in the project among the different stakeholders of the industrial sector. The third task is to spread technology and its benefits among European citizens.

As main goal of task 1 we have to attract the attention of senior researchers and encourage interest in younger researchers in this technology.

To achieve this goal, we will try to attract the attention of researchers through the creation of a web page that serves as a meeting point for all researchers of this technology. This web page is scheduled to be launched at the end of month 3 (M3) of this project and to be updated periodically according to the generation of content and with a minimum frequency of 3 months. Once created and with content (between M8 and M10 of the project) the link will be distributed to the list of contacts generated within the framework of the project and to the different collaborators of the partners for maximum dissemination. At the end of the 12th month of the project, the contacts will be asked for a feedback through a survey to define the aspects of improvement of the web. These improvements will be implemented from month 13 and with a frequency of no more than 3 months.

This website will serve as a private repository of documentation and also as discussion forum among the members of the ORCHID project.

In addition to the creation of the web page, a Mendeley account has been created as a paper repository generated in the "organ on chip" field. This account is expected to incorporate most of the articles published before the end of project month 6. From that date, it will be a question of grouping the articles by topic and incorporating the new ones that are generated. The revisions of the advances will be made every 3 months.

Moreover, a LinkedIn group "ORCHID: Organ On Chip In Development" has been created with the aim of serving as a forum for debate between the scientific community and the industrial sector. It is planned to invite the members of ORCHID throughout month 4 of the project. In month 6, the rest of the contacts generated will be invited to encourage debate among the different stakeholders. It is expected to introduce a topic for discussion in the forum each month in order to encourage dialogue and debate. In addition, all news and press releases will also be disseminated through this means.

Another objective is to contact researchers through scientific journals. The first task is to define the journals to which the results of the research carried out in the different WPs of the project are going to be sent. This task will be carried out between months 4 and 5 of the project based on the first results obtained from the different work packages. From month 12, and once the corresponding deliverables are generated, they will be sent to publish to the different selected magazines.

In the 24th month of the project, an evaluation of the impact generated with the different actions generated will be made. Number of the web page visits, number of members within the forums and number of visits of the generated articles will be assessed and compared with the starting point of the project.

Another way to reach the scientific community is through our presence in conferences and workshops. In month 4 of the project, it is planned to define the list of conferences that will be attended by the consortium. In this same month, we will try to define the minimum content that will be presented in the different congresses in order to standardize the message and reinforce the corporate identity of the project. The different project partners will be asked to generate graphic material to be disseminated in the different media of the project (Web, social networks, etc.).

The impact generated on the website will be monitored every 3 months, with special emphasis on those dates when a conference or conference was attended. In month 24th an analysis of the impact generated by the presence in the different workshops and conferences will be made.

One of the main goals of the project is to increase the interest of young researchers in our technology. For this, it is planned to generate a series of workshops throughout the project period. In month 4 of the project, a list will be made of the different workshops that are already planned for 2018. With this list, we must identify those aspects that are most relevant and those that have not been addressed to prepare a workshop organized by the consortium in 2019. Throughout month 5 of the project, the location where the joint ORCHID project workshop will be organized will be decided. Between the 7th and 10th months of the project, the scientific content of the workshop and the teachers who will give these seminars will be decided. As of month 12, international dissemination will begin through the tools available in the project and the contacts of the consortium partners. In the 16th month, negotiations will begin so that the workshop can take place successfully in month 24 of the project. At the end of the workshop, a survey will be generated to assess the impact of this activity on the training of young researchers.

Task 2 has as main goal the identification of key industrial partners to introduce them the organ-on chip benefits and needs during the establishment of the market in Europe.

The initial activity of this task is the identification of the industrial providers and end users. This task is being carried out in collaboration with the WP2 leaders.

One of the main activities of this task is the generation of a brochure that describes the purpose of the project with the aim of bringing the consortium closer to the different industrial stakeholders. This document will be completed by the end of month 4.

Surveys carried out within the framework of other WPs will be distributed among the industrial stakeholders in order to gather the necessary information to see the sector's shortcomings, its main weaknesses and identify possible opportunities.

Once the analysis of the surveys is completed, a summary report with the obtained results will be provided to the companies in order to identify possible synergies with the academy and encourage new collaborations and opportunities.

During the period of the project, collaboration opportunities within European public financing projects

(RISE, ITN, etc.) will be regularly disseminated. National public-private collaboration calls from different countries will be also distributed.

At the end of the project, the number of applications submitted and their success rate will be evaluated to evaluate the impact of this activity in the promotion of our technology in the industrial sector.

Another of the proposed strategies is participation in forums of biotechnology companies (e.g. Medica) to disseminate technology among different companies. Participation in this forum will be presented at the next consortium meeting.

Last but not least, task 3 aims to spread the importance of research on "organ on chip" and the potential economic, social and ethical benefits that this entails.

To reach the general public, Twitter and YouTube accounts have been created in order to disseminate, in a didactic way, the advances that are achieved thanks to this technology. In addition, we will take advantage of the website created in the consortium as a meeting point between citizens and researchers. At the next consortium meeting, the type of content to be disclosed and the frequency of release will be defined. Of course, all news or events that occur within the framework of the project will also be disseminated through social networks on a recurring basis.

Another strategy used to reach the public is the use of mass media channels. From month 7 of the project, the most relevant media in each country will be identified to launch press releases or monographs. We will try to generate interest in our technology, report the most relevant results and stimulate discussion. In the following months we will try to close at least 2-3 press releases or interviews in the media identified as most relevant.

As a complement to this approach of science to citizens, we will participate in scientific dissemination sessions such as the European researchers night. To do this, in 6th month of the project some activities will be proposed to be carried out within the framework of these dissemination days.

At the end of each event, we will try to measure the impact of these activities on social networks.

Finally, another goal of the project will be to raise awareness among politicians of different political parties, both national and European, of the need to promote this technology as a driving force for the development of Europe.

On the 12th month, a list of politicians will be made with the capacity to promote actions in favor of the implementation of the organ on chip technology in our countries and in Europe.

Between the 18th and the 24th months, the main conclusions of the studies carried out in the different WPs will be presented to them to assess the potential of technology as a mechanism to improve the quality of life of citizens and as an economic engine of high added value.

Summary

Dissemination instrument	Measureable result	Target audience	Planning
<p>Digital platform</p> <p>The consortium will create and maintain a digital platform (project website), which enables effective communication 1) between the consortium members and 2) with external stakeholders, the press and the wider EU public. The project website will include a public and private area. The private area will be designed to facilitate dialogue and exchange of information within the consortium. The public area will provide information on the project, the consortium, the project results (including the developed tools, templates, financial instruments, etc.) and other interesting links and information related to the topic.</p>	Project website online	All	M3 online, continuous updates
<p>Newsletters</p> <p>Continuous publicity for the project will be generated through newsletters. An informative newsletter will be produced every quarter with details of the project's activities. The newsletter will be up to four pages in length and will be distributed by email to a database of contacts provided by each project partner. It will also be available as a compact PDF-document that can be downloaded from the project website.</p>	8 newsletters developed	All	M3, M6, M9, M12, M15, M18, M21, M24
<p>Project brochure</p> <p>A project brochure will be established, describing the project and its main features. The project brochure will be available in hard copy and can be downloaded from the project website as a PDF-document.</p>	1 brochure	All	M3
<p>Presentations of the results</p> <p>The project results will be presented at various conferences, seminars and workshops targeting the scientific communities. These channels enable an efficient and broad exchange of know-how and experiences as well as a comprehensive transfer of project outcomes based on direct contacts with representatives of the project target groups. We will take every opportunity that arises through invitations to such scientific and professional fora, as well as being proactive in putting forward proposals for themed workshops and symposia. Many conferences will be visited by individual partners related to their daily work. Some additional conferences will be visited specifically for the project.</p>	At least 18 presentations will be given throughout the project duration	Depending on the type of event	Throughout the project duration: M1 – M24
<p>Press releases and dedicated publications</p> <p>Press releases and dedicated publications will be prepared by the consortium in order to create awareness, stimulate discussion and inform on important results. Publications will be tailored to the specific target groups and presented in relevant journals for the targeted audience (Lab-on-Chip, Biosensors & Bioelectronics, Biomaterials, Circulation Res, FEBS J, EMBO Mol Med, BBSCR, at least one paper on ethical aspect in a relevant bioprocessing/drug development journal) and general scientific audience (Nature – 2 publications planned, Science, Nature Biotechnology, PNAS). The press releases and publications will also be available on the project website.</p>	At least 6 press releases and 6 publications.	Depending on the content: key stakeholders, general EU public, scientific community	Throughout the project duration: M1 – M24
<p>Conferences</p> <p>Annual International MicroNano Conference in Amsterdam in 2017 in combination with the annual EU-MNBS workshop (hDMT and EU DG Connect co-organizers) and in 2018</p> <p>11th World Congress on Alternatives for Animal Use in Life Science 2020: 3Rs in transition: from development to application, 23 - 27 August 2020, Maastricht, the Netherlands (hDMT co-organizer)</p> <p>Keystone symposium Organ-on-chip, USA, 2018 (chair hDMT is co-organizer)</p> <p>International Organ-on-chip symposium (IOOCS) in 2017 (Lausanne), organized by hDMT and EPFL and in 2018 (Netherlands)</p> <p>Participation once/ every 2 years to the IMI/ EFPIA congress</p> <p>Participation once/every 2 years to MicroTAS International Conference on Miniaturized Systems for Chemistry and Life Sciences.</p> <p>Participation once/every 2 years to Nanotech Montreux. (the leading European conference on miniaturization for the life sciences)</p> <p>Participation once a year to FAST Congress- Functional Analysis & Screening</p>	At least 1 project presentation per conference	Depending on the audience	Project duration M1 – M24

Technologies. Boston, MA-USA. Participation to Gordon Research Conference on drug safety in June 2018 in Easton MA USA			
Workshops Organisation of one INSERM workshop on organ-on-chip in 2018. This workshop targets both scientists and clinicians to promote lifelong formation on organ-on-chip technologies. Training workshops organized by hDMT (2 per year) 1 workshop on regulatory and ethical aspects in 2018 organized by imec 1 day workshop on organ-on-chip in Flanders/Belgium with local stakeholders in 2018 Session on organ-on-chip at FlandersBio 2019 for the bio-community			

Conclusion

The Deliverable 6.1 has been achieved in time.

Appendix

Appendix 1:

Organ-on-a-chip - Wikipedia

<https://en.wikipedia.org/wiki/Organ-on-a-chip> ▼ Traducir esta página

An organ-on-a-chip (OOC) is a multi-channel 3-D microfluidic cell culture chip that simulates the activities, mechanics and physiological response of entire organs and organ systems, a type of artificial organ. It constitutes the subject matter of significant biomedical engineering research, more precisely in bio-MEMS.

Transitioning from 3D cell ... · Lung-on-a-chip · Kidney-on-a-chip · Artery-on-a-chip

Human Organs-on-Chips - Wyss Institute - Harvard University

<https://wyss.harvard.edu/technology/human-organs-on-chips/> ▼ Traducir esta página

Human Organs-on-Chips on Wyss Institute | Clinical studies take years to complete and testing a single compound can cost more than \$2 billion. Meanwhile...

Microfluidic organs-on-chips : Nature Biotechnology : Nature Research

<https://www.nature.com/articles/nbt.2989> - Traducir esta página

de SN Bhatia - 2014 - Citado por 705 - Artículos relacionados

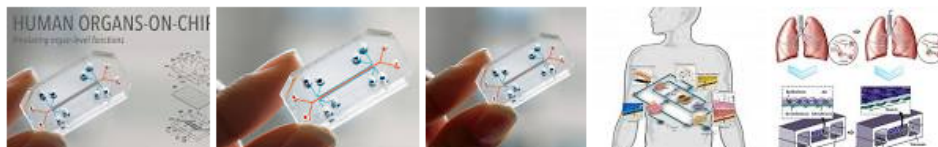
An organ-on-a-chip is a microfluidic cell culture device created with microchip manufacturing methods that contains continuously perfused chambers inhabited by living cells arranged to simulate tissue- and organ-level physiology. By recapitulating the multicellular architectures, tissue-tissue interfaces, physicochemical ...

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28 ago. 2017 - From beating hearts to breathing lungs, organs-on-chips are some of hottest new tools for human biology research. Although these devices may bear closer resemblance to computer components than human body parts, scientists have now created working models for a whole range of organs, including the ...

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Organ on Chip in Development - CORDIS

cordis.europa.eu/project/rcn/211282_es.html ▼

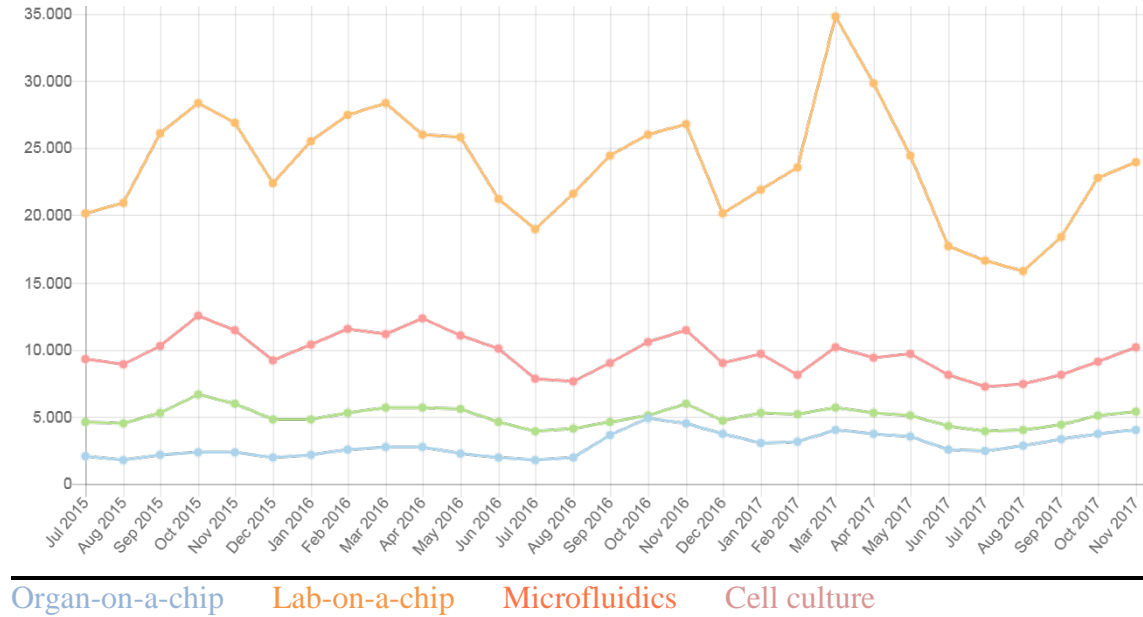
1 oct. 2017 - Organ-on-chip technology will revolutionize the healthcare domain by offering new and ground breaking solutions to different industries and especially for regenerative medicine and medication. ORgan-on-Chip In Development (ORCHID) will create a roadmap for organ-on-chip technology and the ...

Has visitado esta página 3 veces. Fecha de la última visita: 12/12/17.

List of web pages offered by google after the search for the term Organ on chip

Appendix 2:

The monthly visits to en.wikipedia.com also show the interest that a certain concept has in the network.



Evolution in the last two years of the visits made to the terms organ on chip, lab on chip, microfluidics and cell culture

Appendix 3:

Table with the linkedin groups closest to the organ on chip technology.

LINKEDIN GROUPS	Link	Members
Lab on a chip and microfluidic devices	https://www.linkedin.com/groups/713657/profile	13375
Lab on a chip Community	https://www.linkedin.com/groups/4927727/profile	368
Stem Cell Clinical Trials	https://www.linkedin.com/groups/4117443/profile	8430
3D cell biology: tools and techniques	https://www.linkedin.com/groups/3498095/profile	14367
Microfluidic MEMS Device. Lab on a chip	https://www.linkedin.com/groups/1418137/profile	1544
Micronit	https://www.linkedin.com/groups/832637/profile	480

Title description, link and number of group members

Appendix 4:

+ List of data provided by Research Gate after the search for the term Organ on chip

Q organ on chip ×						
Researchers	Projects	Publications	Questions	Jobs	Institutions	Departments
25+	50+	1,000+	25	25+	100+	1,000+

+ List of data provided by Research Gate after the search for the term Organ on chip

Q lab on a chip ×						
Researchers	Projects	Publications	Questions	Jobs	Institutions	Departments
1,000+	100+	1,000+	100+	25+	1,000+	10,000+