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Report on national and international events - 1

Work Package 4

Engagement and strategic networking activities

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1 INTRODUCTION

The “Report on National and International Events – 1” provides a comprehensive overview of the diverse range of activities conducted under the OrChESTRA project between M1-M24 (01 September 2022 - 31 August 2024). This document details the strategic execution and outcomes of various events organised nationally and internationally, highlighting the project's commitment to fostering innovation and collaboration in the fields of microfluidics and organ-on-chip technologies.

OrChESTRA's approach to enhancing the research landscape includes organising impactful workshops, engaging in meaningful face-to-face meetings, and participating in key international conferences. These activities are designed not only to disseminate cutting-edge research but also to forge and strengthen collaborations among researchers. This report outlines the preparation, execution, and impact of each event, illustrating how they serve to enhance knowledge exchange, expand research networks, and facilitate the development of new collaborative research initiatives.

Through these events, the OrChESTRA project has significantly contributed to the global dialogue on microsystems technologies, bringing together experts from academia, industry, and public sectors to explore and push the boundaries of scientific research and technological innovation.

2 NATIONAL EVENTS

In scope of national events and collaborative activities, ODTÜ MEMS has taken a proactive position to expand its influence within the regional ecosystem of microfluidics and organ-on-a-chip technologies. This initiative aligns with the strategic development plans laid out by the OrChESTRA project, leveraging expertise from partners' past successes, such as the ORCHID Project and collaborations within the EUROoCS society. ODTÜ MEMS has initiated a detailed market analysis to chart potentially interested industrial actors not only locally but also across the broader of organ-on-a-chip value chain. This includes stakeholders in health, microfluidics, biotechnology, the pharmaceutical sector, etc.

To effectively engage these diverse stakeholders, a “go2industry” approach has been adopted. This approach comprises personalized introductions, participation in industry conferences, and direct face-to-face meetings, both hosted and visited. Face-to-face meetings, in particular, are pivotal events within the project framework. They provide a unique platform for in-depth discussion, real-time collaboration, and direct engagement, which are essential for fostering strong, actionable partnerships. These interactions facilitate not just the sharing of ideas but also allow for immediate feedback and iterative development of collaborative proposals, making them as significant as larger organised events in driving project goals forward.

Throughout this engagement process, ODTÜ MEMS has conducted over 75 face-to-face meetings with regional business, public, and research organisations, as well as additional meetings with international entities. These meetings are structured to cover various facets of the project’s needs:

- **Business Organisations:** 44 meetings aimed at fostering industry collaborations and enhancing the commercial applications of research outputs.
- **Public Organisations:** 13 meetings focused on aligning research objectives with public health goals and navigating regulatory frameworks, critical for translating research into public benefit.
- **Research Institutions:** 16 meetings facilitated the exchange of scientific insights and fostered joint research initiatives, enriching the project’s scientific base.

- **International Organisations:** 4 meetings extended the project's reach into global research networks, leveraging international expertise and resources.

These interactions underscore ODTÜ MEMS' dynamic approach towards creating a robust and innovative research ecosystem. By integrating these national events and meetings into its strategy, ODTÜ MEMS not only enhances its networking capabilities but also solidifies its position as a regional hub for research and development in organ-on-chip technologies. This comprehensive engagement strategy contributes significantly to the overarching goal of the OrChESTRA Project, which is to advance organ-on-chip technologies through collaborative innovation and shared expertise. In Figure 1, some of the photos from face-to-face meetings conducted under the OrChESTRA Project are displayed.

Figure 1: (a) Representatives from Health Institutes of Türkiye (TÜSEB) visit to ODTÜ MEMS (b) ODTÜ MEMS representatives' visit to Ankara Chamber of Industry (c) Visit by representatives from Ford Automotive to ODTÜ MEMS

The OrChESTRA project, in addition to targeted face-to-face meetings, has actively engaged the academic community through a series of "Student Days" and "Open Door Days", designed to bridge the gap between theoretical studies and real-world applications in the field of microfluidics and BioMEMS technologies.

Student Days: These events have proven instrumental in fostering early interest and understanding among students from various educational institutions. Through well-coordinated sessions, students gained firsthand exposure to advanced research and development activities at ODTÜ MEMS. The events were widely publicised through website, social media, e-mail lists, and announcements disseminated across different channels, ensuring robust participation.

Figure 2: (a) Banner for the announcement for Student Day (b) LinkedIn news about the visit by students from Aselsan Vocational and Technical Anatolian High School

The following student days were organised:

- **October 20, 2023:** Third-year students from METU Electrical and Electronics Engineering Department were informed about the integration of electronics with microfluidic systems, with 35 students attending.
- **November 13, 2023:** Students from "Sinop Deneyap Teknoloji Atölyesi", participated in a hands-on training focused on science and technology for young people in Sinop province, and were introduced to practical applications of theoretical concepts, attended by 39 students.
- **December 14, 2023:** Senior physics students from METU visited ODTÜ MEMS to explore the physics behind MEMS technologies, with 12 students attending.
- **December 14, 2023:** ODTÜ MEMS researchers visited Başkent University to introduce ODTÜ MEMS facilities and discuss the interdisciplinary applications of MEMS technologies.
- **December 22, 2023:** Third-year mechanical engineering students from METU were informed about the mechanical design aspects of MEMS, with 15 students attending.
- **March 5, 2024:** Students from Aselsan Mesleki ve Teknik Anadolu Lisesi, a vocational high school founded by Aselsan, a pioneering defense electronics company in Türkiye, were toured around the ODTÜ MEMS facilities, gaining insights into professional pathways in microsystems technology, with 26 students participating.
- **March 12, 2024:** Students from Bahçelievler Deneme Anadolu Lisesi, a high school located in Ankara, were introduced to practical applications of MEMS in daily life, highlighting potential career opportunities in the field, with 38 students participating.

Open-Door Days: The Open-Door Day event offered a broader platform for the general public and other stakeholders to explore the cutting-edge research conducted at ODTÜ MEMS. This event was strategically scheduled on June 10, 2024, at the beginning of the 3rd BioMEMS and Microfluidic Technologies Workshop. It provided attendees with a comprehensive overview of the latest advancements and applications in BioMEMS and microfluidics, including an opportunity to visit the state-of-the-art cleanroom facilities at ODTÜ MEMS. This initiative not only enhanced public understanding and interest in these critical technologies but also set the stage for the subsequent detailed scientific sessions that were part of the workshop. By opening its doors to the wider community, ODTÜ MEMS fostered greater transparency and interaction, bridging the gap between the research environment and societal needs. Figure 3 and Figure 4 show some pictures from the student days.

(a)

(b)

Figure 3: (a) Bahçelievler Deneme Anadolu High School visit to ODTÜ MEMS (b) Visit by METU EEE students

(a)

(b)

Figure 4: (a) METU Mechanical Engineering student visit (b) Introduction of ODTÜ MEMS to Biomedical Engineering students of Başkent University

The comprehensive engagement activities encapsulated under the national events, including face-to-face meetings, Student Days, and Open-Door Day event, have significantly strengthened the outreach and impact of the OrChESTRA Project. These initiatives both fostered stronger collaborative bonds with regional stakeholders and enriched the academic and local communities' understanding of MEMS technologies. The direct interactions during these events have opened new avenues for research collaborations, facilitated knowledge exchange, and stimulated interest among students and the public in MEMS systems. Overall, these activities have played a pivotal role in enhancing ODTÜ MEMS' visibility and solidifying its position as a regional hub for cutting-edge research and development in microfluidic technologies.

3 INTERNATIONAL EVENTS

The OrChESTRA Project places a significant emphasis on international events as a key strategy for enhancing global collaborations and knowledge exchange within the microfluidics and organ-on-chip fields. These events serve not only as platforms for disseminating research findings but also as crucial venues for developing and strengthening partnerships across regions. The project leverages a combination of attending international conferences and organising specialized workshops to achieve its collaborative goals.

Joint attendance at conferences is a cornerstone of the OrChESTRA Project's strategy to foster peer-to-peer collaborations and keep abreast of the latest scientific developments. Consortium members, including researchers from ODTÜ MEMS, TU/e, IMEC, and UFR, have actively participated in several high-profile international conferences. These include the IMMUNO-model Microphysiological Systems Training School in Türkiye, The 28th International Conference on Miniaturized Systems for Chemistry and Life Sciences - Micro-Total Analysis Systems (µTAS 2023) in Poland, Workshop on Biosensors and Bioanalytical Microtechniques in Environmental, Food, and Clinical Analysis (BBMEC) 2024 in Türkiye, and EUROoCS Annual Meeting 2024 in Italy. At these gatherings, the partners shared their research outcomes and engaged with the broader scientific community, enhancing their network and exploring new collaborative opportunities.

Simultaneously, the OrChESTRA project has established a tradition of organising impactful international workshops that attract experts and stakeholders from around the world. Notable among these are the "International BioMEMS and Microfluidic Technologies Workshops" held annually. The second and third workshops, organised by ODTÜ MEMS, exemplified successful international collaboration. These workshops

provided forums for in-depth discussion on advanced topics in BioMEMS and microfluidics, drawing over 100 attendees including leading scientists, industry experts, and students.

Furthermore, TU/e hosted a significant event under the OrChESTRA: "The International Workshop on Emerging Organ-on-Chip Technologies". Held in Eindhoven, this workshop facilitated deep dives into the current state and future prospects of organ-on-chip technologies. It featured a broad spectrum of presentations from international experts and emerging researchers, fostering a rich exchange of knowledge and ideas.

These international events are instrumental in advancing the OrChESTRA project's goals. These events enhance the project's visibility and establish its leadership in the field, fostering a dynamic community of researchers committed to advancing the possibilities within microfluidics and organ-on-chip technologies.

3.1 Joint Attendance at Conferences

Joint Attendance at Conferences is a vital aspect of the OrChESTRA project, facilitating collaborative research and dissemination among consortium members. By participating collectively in international conferences and workshops, partners enhance the visibility of their research findings, engage with a broader scientific community, and foster relationships crucial for the advancement of the project's objectives. These conferences serve as essential platforms for sharing insights, discussing innovative ideas, and exploring future collaborative opportunities. This section details the various international events attended by OrChESTRA partners.

The following events were attended by the OrChESTRA participants:

- **COST Action CA21135 IMMUNO-model, Microphysiological Systems Training School**

Date: September 20-22, 2023

Location: Izmir Institute of Technology, Izmir, Türkiye

The training session held at Izmir Institute of Technology, funded by the European Cooperation in Science and Technology (COST), focused on educating researchers about microphysiological systems. Through a series of lectures and practical exercises, participants gained hands-on experience, and even designed their own systems. OrChESTRA researchers, Dr. H. Cumhur Tekin (ODTÜ MEMS) and Dr. Ender Yıldırım (ODTÜ MEMS) contributed to the program by delivering presentations on "3D Cell Culture in Microfluidic Devices by Leveraging Magnetic Techniques" and "Fabrication of Microfluidic Devices as Microphysiological Systems," respectively.

- **µTAS 2023 Conference**

Date: October 15-19, 2023

Location: Katowice, Poland

Dr. Ender Yıldırım and Ayşen Gümüştaş from ODTÜ MEMS, alongside Dr. Hans Wyss from TU/e, participated in the 27th International Conference on Miniaturized Systems for Chemistry and Life Sciences (µTAS 2023) in Katowice, Poland, from October 15-19, 2023. This conference allowed them to network extensively with leading researchers both in the organ-on-chip sector and across the broader spectrum of microfluidics and miniaturized analytical systems.

- **Workshop on Biosensors and Bioanalytical Microtechniques in Environmental, Food, and Clinical Analysis (BBMEC) 2024**

Date: May 20-23, 2024

Location: Izmir, Türkiye

This event offered a crucial forum for exploring the latest advancements in biosensor technology. Dr. Can Dinçer from UFR and Dr. Meltem Okan from ODTÜ MEMS attended, showcasing the OrChESTRA project. Dr. Okan presented on the "Development of an Integratable Electrochemical Dopamine Sensor for Assessing Levodopa Efficacy in Gut-on-a-Chip Models", highlighting the project's innovative aspects. The workshop encouraged significant interactions with other collaborators, enhancing our joint endeavors to advance biosensing and organ-on-a-chip technologies.

- **EUROoCS Conference 2024**

Date: July 3-5, 2024

Location: Milan, Italy

The EUROoCS 2024 Conference, organised by the European Organ-on-Chip Society, was held in Milan from July 3-5, 2024. This pivotal event brought together global leaders and innovators to discuss the advancements and growing significance of organ-on-chip and microphysiological systems in biomedical research. Several OrChESTRA researchers, including Dr. Haluk Külah, Dr. Ender Yıldırım, Dr. Meltem Okan Aydın, Dr. Ezgi Salmanlı, Zeynep Çağlayan Arslan, and Ali Can Atik from ODTÜ MEMS and Dr. Wolfgang Eberle from IMEC, actively participated and presented four posters. These presentations, which detailed the collective research achievements and ongoing efforts within the consortium, provided a valuable platform to exchange knowledge, discuss advancements, and explore potential collaborations, significantly contributing to the shared goal of advancing organ-on-chip technologies. The event was also instrumental to have discussions on further scientific collaboration and follow-up opportunities with Dr. Dries Braeken, Scientific Director IMEC and EUROoCS Board member, and several of his team members from IMEC. Dr. Yıldırım also highlighted the organ-on-a-chip initiative in Türkiye enabled by the OrChESTRA project in the special "National OoC Initiatives" session alongside other national initiatives from Italy, Finland, France, the United Kingdom, Portugal, and the Netherlands.

3.2 Events

The OrChESTRA Project strategically emphasizes international events to foster global collaborations and enhance knowledge exchange within the microfluidics and organ-on-chip fields. These events serve as crucial platforms for both disseminating research findings and strengthening international partnerships. Over the course of the project, ODTÜ MEMS has organised several significant events that also facilitated academic exchanges.

Notably, the "2nd and 3rd BioMEMS and Microfluidic Technologies Workshops" organised by ODTÜ MEMS, and the "International Workshop on Emerging Organ-on-Chip Technologies" hosted by TU/e, have each played pivotal roles in advancing the discourse within the scientific community. These workshops gathered leading experts and stakeholders from around the globe, providing in-depth discussions on the latest advancements and challenges in the sector.

Additionally, the Organ on a Chip Masterclass offered targeted hands-on training, further enriching the learning experiences of the participants. These meticulously planned events not only enhanced the visibility of the OrChESTRA project but also cemented its role as a hub for pioneering research in microfluidics and organ-on-chip technologies, setting a strong foundation for ongoing and future collaborations.

3.2.1 2nd BioMEMS and Microfluidic Technologies Workshop

The "2nd BioMEMS and Microfluidic Technologies Workshop," initially planned for February 2023, was rescheduled to March 28-29 due to the delays caused by the earthquake disaster in Türkiye. The rescheduling provided an opportunity to realign the workshop's agenda with the evolving priorities of the OrChESTRA project and the broader scientific landscape.

Figure 5: LinkedIn news of the 2nd BioMEMS and Microfluidic Tech. WS

During the planning phase, a focused effort was made to contact potential speakers who were aligned with the current scientific directions and objectives of the project. The selection of speakers encompassed both OrChESTRA project partners and key stakeholders within the broader organ-on-chip community with whom ODTÜ MEMS Centre maintains strong connections. This approach ensured a comprehensive and diverse range of discussions, significantly enhancing the workshop's content and relevance.

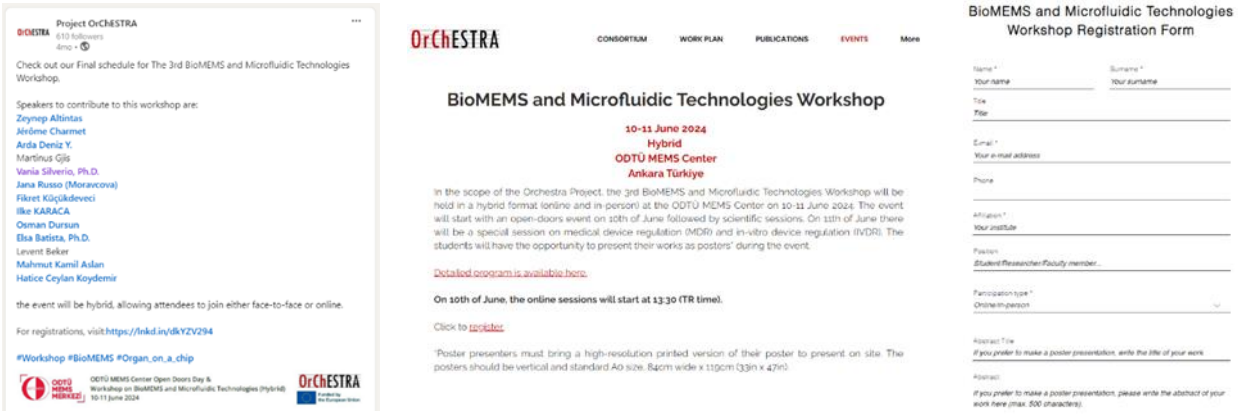
The event, conducted in an online format, seamlessly facilitated robust exchanges of knowledge among attendees. This platform enabled effective dissemination of the latest research and technological advancements in BioMEMS and microfluidics, enriching the collaborative spirit among the diverse set of participants. Announcements for this workshop were made through both the project's website and LinkedIn page (Figure 5), ensuring a broad reach and engagement from the community. The programme of the workshop is given in Appendix I.

3.2.2 3rd BioMEMS and Microfluidic Technologies Workshop

Preparation Phase: The planning for the 3rd BioMEMS and Microfluidic Technologies Workshop began with the formation of an organising committee to ensure a seamless execution of the event. The committee was comprised of members including:

- Prof. Dr. Haluk Külah (ODTÜ MEMS, METU)
- Dr. Ender Yıldırım (ODTÜ MEMS, METU)
- Dr. Hüseyin Cumhur Tekin (ODTÜ MEMS, İYTE)
- Dr. Hans Wyss (TU/e)
- Dr. Wolfgang Eberle (IMEC)
- Dr. Can Dinçer (UFR)
- Gamze Kozanoğlu (ODTÜ MEMS)
- Pınar Burat (ODTÜ MEMS)
- Gizem Özdemir (ODTÜ MEMS)

The organisation committee collaborated to set the workshop's strategic direction and content. Initial tasks involved creating a dedicated website (https://www.orchestra-project.eu/biomems-microfluidics-workshop) for the event where registration could be handled efficiently, enhancing participant accessibility and management. Promotional materials were also developed to enhance visibility and engage potential participants. Discussions were held with various firms to design and produce unique promotional items such as pens and microscope ruler-slides. These items were distributed not only during this workshop but were also utilised in subsequent events like EUROoCS, the International Workshop on Emerging Organ-on-Chip Technologies in the Netherlands, and the Masterclass held at ODTÜ MEMS. Additionally, a special banner was crafted specifically for this workshop, setting a professional tone and visually communicating the event's academic and scientific focus. The workshop was extensively promoted through the OrChESTRA website, LinkedIn, and email lists, with registrations managed via the workshop's dedicated website. Figure 6 displays various images from the LinkedIn news feed and the project website. These preparatory steps were crucial in building a robust platform for the exchange of knowledge and ideas among attendees.



(a) (b) (c)

Figure 6: (a) Image from LinkedIn news (b) Image of project website dedicated to the workshop (c) Online registration form for the workshop

Event: The 3rd BioMEMS and Microfluidic Technologies Workshop, held on June 10-11, 2024, in a hybrid format at the ODTÜ MEMS Centre, commenced with an open-doors event. This session provided a comprehensive overview of the latest advancements in BioMEMS and microfluidics. The event facilitated dynamic discussions and networking among over 100 researchers and experts, enhancing both learning and potential collaborations.

Day 1: June 10, 2024, began with a series of introductory presentations and a site visit, offering attendees a firsthand look at the cutting-edge research and applications being developed at ODTÜ MEMS. The subsequent sessions featured distinguished speakers such as Zeynep Altıntaş from Kiel University, who discussed "Hydrogel Microneedle Array for Multiplexed Assessment and Intelligent Therapy of Chronic Wounds", and Jerome Charmet from Haute Ecole Arc and the University of Bern, who presented on fluid processing for biosensing. The day concluded with insightful talks from Arda Deniz Yalçınkaya from Boğaziçi University on flexible metamaterial sensors, Martinus Gijs from EPFL on using microfluidic chips to study Caenorhabditis elegans, and Vania Silverio from INESC MN, who elaborated on developing a standardized 96-well platform for cell culture investigations under static and dynamic flow conditions.

Day 2: The second day of the workshop featured a special session on regulatory frameworks that delved into the intricacies of medical device regulation (MDR) and *in-vitro* device regulation (IVDR). Esteemed panellists

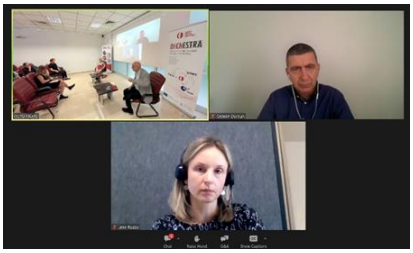
including Jana Russo from MedTech Europe, Fikret Küçükdeveci from Kardinero Medical Systems Inc., İlke Eren Karaca from the Health Industry Employers' Association of Türkiye, and Osman Dursun from Medloft Consultancy Doo shared critical insights on the current standards and emerging trends within regulatory practices.

Following the panel, the workshop shifted focus to a vibrant student poster presentation session, offering a platform for budding researchers to display and discuss their innovative projects. This session facilitated meaningful interactions between students and established experts, enhancing the educational experience and fostering potential collaborations.

In the afternoon session, the event continued with a series of impactful presentations by renowned experts. Elsa Batista from the Portuguese Institute for Quality discussed the metrological traceability and accuracy of measurement quantities related to organ-on-chip technologies. Levent Beker from Koç University showcased wireless skin-interfaced devices designed for preventive medicine, highlighting the integration of advanced biosensors and wireless technology. Mahmut Kamil Aslan from ETH Zurich and ODTÜ MEMS Center explored the capabilities of microfluidic platforms for single-cell manipulation and analysis, underscoring the precision and versatility of these systems in modern biological research. Hatice Ceylan Koydemir from Texas A&M University concluded the session with insights into engineering portable imaging and sensing technologies that advance human health. The second day culminated in the Best Poster Award Ceremony, where the exceptional contributions of participating students were recognized, encouraging further academic endeavors and innovation in the field.

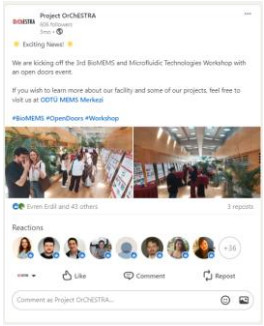
The comprehensive coverage of this two-day event, underscored its success in fostering learning, collaboration, and innovation within the academic and professional communities. The detailed program and registration form are documented in Appendix II, reflecting the event's pivotal role in shaping future directions for the field of BioMEMS and microfluidic technologies.

(a)



(b)

(c)



(d)

Figure 7: Various pictures from the 3rd BioMEMS and Microfluidic Technologies Workshop (a) presentation by ODTÜ MEMS, (b) the "Implementation of MDR and IVDR" session, (c) the presentation on "Metrological traceability and accuracy of organ-on-chip related measurement quantities," and (d) LinkedIn news posted after the event.

3.2.3 International Workshop on Emerging Organ-on-Chip Technologies

Preparation Phase: The groundwork for the International Workshop on Emerging Organ-on-Chip Technologies began with a series of internal meetings which led to the formation of an organising committee. This committee was tasked with the crucial roles of planning and executing the workshop, ensuring a seamless flow from inception to completion. The members of the committee included:

- Dr. Hans Wyss (TU/e)
- Prof. Dr. Jaap den Toonder (TU/e)
- Dr. Burcu Gümüşçü Sefunç (TU/e)
- Joceline Niemarkt (TU/e)
- Dr. Ender Yıldırım (ODTÜ MEMS)
- Gamze Kozanoğlu (ODTÜ MEMS)
- Pınar Burat (ODTÜ MEMS)

The committee utilised Microsoft Teams as a collaborative tool to manage the comprehensive to-do list, ensuring all aspects of the event were meticulously organised. Speaker selection was carried out, focusing on individuals who had made significant impacts in the field and could provide valuable insights into the advancements and applications of organ-on-chip technologies. Following speaker confirmations, a detailed program was crafted, and a dedicated website (https://www.orchestra-project.eu/ooc-emerging-tech-workshop) was set up to facilitate the registration process. This website served as the central hub for event information, allowing for streamlined participant engagement. Additionally, the event was actively promoted on LinkedIn to maximize visibility and attract a diverse group of attendees. Figure 8 provides images of the preparatory efforts that were crucial for ensuring the success of the workshop and facilitating robust engagement from the global scientific community.

(a) (b) (c)

Figure 8: Images showing (a) the Microsoft Teams to-do list utilised for event planning, (b) the project website dedicated to the workshop, and (c) the LinkedIn announcement of the event

Event: The International Workshop on Emerging Organ-on-Chip Technologies, hosted by TU/e on June 27, 2024, in Eindhoven, Netherlands, provided a crucial forum for delving into the current and future landscape of organ-on-chip and microfluidic technologies. This one-day event, designed to facilitate deep engagement with cutting-edge research both online and in person, attracted a diverse group of over 100 experts and enthusiast attendees. The workshop featured a comprehensive lineup of presentations from leading global experts in the field, who shared insights into their pioneering research and developments. The sessions included in-depth discussions on the integration of microelectromechanical systems (MEMS) with organ-on-chip applications, highlighting innovative approaches to enhancing the functionality and application scope of these technologies. Advanced presentations on new methodologies and materials that are pushing the boundaries of what's possible in organ-on-chip systems. Interactive sessions that explored the practical challenges and solutions in scaling these technologies from the lab to market. Junior researchers also had the opportunity to present their work both in person and online, which enriched the discourse and allowed for a broader sharing of ideas and feedback.

The workshop facilitated knowledge exchange and fostered networking opportunities, paving the way for future collaborations and initiatives. This event emphasised TU/e's role as a pivotal player in advancing organ-on-chip technologies, reinforcing its commitment to fostering innovation through international collaboration and academic exchange. The outcomes of this workshop are expected to influence ongoing and future projects within the OrChESTRA consortium, contributing significantly to the field's development.

3.2.4 Organ on a Chip Masterclass by AZAR Innovations

Preparation Phase: Collaboration with AZAR Innovations (https://azar-innovations.com/), facilitated through TU/e, paved the way for the detailed planning and execution of the Organ on a Chip Masterclass. Initial discussions with AZAR set the stage for a well-structured event, with a detailed to-do list provided by AZAR to clarify the roles and responsibilities of all parties involved.

Figure 9: The project website dedicated to the Masterclass

A dedicated webpage (Figure 9) was created to announce the event, and a registration link was set up using a pre-prepared questionnaire by AZAR to categorize participants into two distinct groups, one focusing on biological aspects and the other on engineering principles, each limited to 20 participants to maintain an intimate and focused learning environment. During the registration process, participants were required to fill out a form that included specific questions to better align the Masterclass content with their interests and experience. Questions such as “Which organ model(s) are you interested in (bone/cartilage, brain, heart, immune system, kidney, etc.)?”, “What disease areas are you interested in?”, and “Prior experience with Organs-on-chip?” were pivotal in selecting attendees, ensuring that the participants matched the intended profile for the event. The target audience for the Masterclass included academic or industrial biomedical scientists interested in exploring opportunities that organs on chips offer, those getting started with organs on chips, or those looking to gain more experience with different organ-on-a-chip models. Specifically, the Masterclass aimed to cater to Master students, PhD Students, and postdocs in academia with experience in *in vitro* cell culturing, as well as scientists and technicians from the industry with similar backgrounds. Repeated confirmations were sought from registrants to finalize their participation, ensuring committed

attendees. Accommodations were arranged at METU's guesthouse for the attendees from outside Ankara and abroad.

The seminar room at ODTÜ MEMS Centre was specifically arranged for the Masterclass, with group tables set up and all necessary equipment and consumables strategically placed to facilitate an effective learning experience. ODTÜ MEMS was also tasked with supplying essential materials and equipment such as microscopes, pipettes and pipette tips, tissues, gloves, waste bags and holders, syringes, tweezers, demi water, Eppendorf tubes, Falcon tubes, etc. ensuring that all necessary resources were available for the hands-on sessions. These preparations ensured that the Masterclass was not only educational but also operationally seamless, fostering an environment conducive to advanced learning and interaction.

Event: In collaboration with AZAR Innovations, ODTÜ MEMS Centre hosted a detailed Masterclass on Organ on a Chip technologies, tailored into two focused sessions. The first session, dedicated to biologists on July 9-10, delved into biological applications and experimental techniques of organ-on-chip systems. The subsequent session, aimed at engineers, on July 11-12, concentrated on the engineering aspects and integration of these technologies.

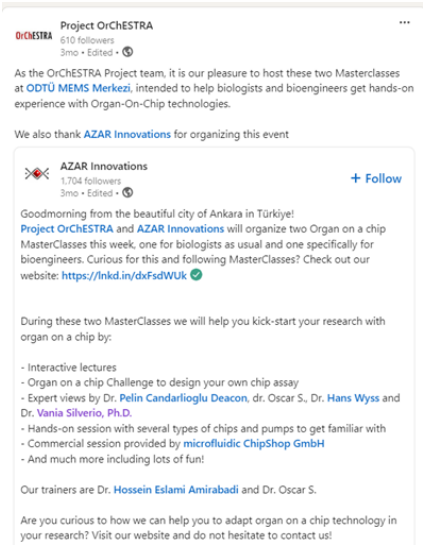
The Masterclasses were enriched with interactive lectures and practical exercises. Participants were grouped and tasked with the 'Organ on a Chip Challenge', where each group designed an organ-on-chip system based on a specific organ assigned to them. At the end of each session, groups presented their designs, which were then evaluated in a competitive selection process to determine the best organ-on-chip design.

Experts such as Dr. Oscar Stassen, Dr. Hans Wyss, Dr. Vania Silverio, and Dr. Pelin Çandarlıoğlu provided valuable insights during the Masterclasses. Hands-on sessions allowed participants to work with various types of chips and pumps, enhancing their practical understanding of the technology. Additionally, a commercial session by Microfluidic ChipShop GmbH offered insights into the latest market-available resources and tools.

The success of these Masterclasses has solidified the strategic partnership between ODTÜ MEMS and AZAR Innovations. Plans are in place to continue these educational workshops, aiming to regularly enhance the educational offerings in microfluidic and organ-on-chip technologies at ODTÜ MEMS. This ongoing collaboration is dedicated to establishing ODTÜ MEMS as a leading hub for research and innovation in this rapidly evolving field.

(a) (b)

Figure 10: Images showing (a) AZAR's presentation, (b) special session with Microfluidic ChipShop



(a)

(b)

Figure 11: Images showing (a) LinkedIn news posted after the event, (b) First session: Biologists group

4 CONCLUSION

The OrChESTRA Project, with its comprehensive range of national and international events, has significantly advanced the field of microfluidics and organ-on-chip technologies. The project's diverse activities, including workshops, Masterclasses, and joint conference attendances, have fostered a rich environment of collaboration and knowledge exchange.

Through various 'Student Days' and 'Open Door Days', ODTÜ MEMS has engaged a wide range of participants from the academic community and the general public, enhancing the visibility and understanding of cutting-edge research. These events not only showcased the technological advancements but also opened dialogues on potential career paths and research opportunities in microsystems technologies. Additionally, strategic face-to-face meetings with various stakeholders have expanded the project's collaborative network, paving the way for future innovations and research initiatives. These interactions have been instrumental in aligning the project's objectives with industry needs and regulatory frameworks, ensuring that the research conducted is both relevant and impactful.

The series of workshops and the Masterclasses organised in collaboration with partners like AZAR Innovations have drawn global attention, with participants from across the world. These events have been crucial in disseminating research findings and engaging with a broader scientific community. The active participation in conferences such as EUROoCS and µTAS has further solidified the project's standing in the international arena, leading to meaningful exchanges and the establishment of new collaborative ventures.

In conclusion, the OrChESTRA project has successfully created a dynamic and interactive platform for researchers, industry experts, and the public to collaborate and innovate. The achievements noted in various events reflect the project's ongoing commitment to advancing scientific knowledge and technological developments in microfluidics and organ-on-chip systems. The groundwork laid by these collaborative efforts promises to drive future research directions and foster a sustainable model of innovation in the field.

5 APPENDICES

Appendix I: The Programme of the 2nd BioMEMS and Microfluidic Technologies Workshop

ODTÜ MEMS Center
Workshop on BioMEMS and Microfluidic Technologies
28-29 March 2023

Funded by the European Union

	TR time	CET	28 March 2023, Tuesday
Session 1	09:30-10:00	08:30-09:00	**Haluk Külah**, Middle East Technical University
	10:00-10:30	09:00-09:30	**Roland Zengerle**, University of Freiburg *Microfluidic platforms and commercialization strategies at IMTEK and Hahn-Schickard*
	10:30-11:00	09:30-10:00	**Hans Wyss**, Eindhoven University of Technology *Using microfluidics as a toolbox for studying the behavior of soft materials*
	11:00-11:30	10:00-10:30	**Paul Vulto**, MIMETAS B.V. *Organ-on-a-Chip technology for comprehensive disease modelling and drug development*
	11:30-13:00	10:30-12:00	Lunch Break
Session 2	13:00-13:30	12:00-12:30	**Vania Silverio**, INESC MN *Accelerating Innovation of Microfluidic Technology – the Role of Standardization*
	13:30-14:00	12:30-13:00	**Özlem Yeşil Çeliktaş**, Ege University *Have organ-on-chips contributed to breaking Eroom's law?*
	14:00-14:30	13:00-13:30	**Wolfgang Eberle**, IMEC *Scalable microfabrication for high-content organ-on-a-chip applications*
	29 March 2023, Wednesday		
Session 3	09:30-10:00	08:30-09:00	**Jaap den Toonder**, Eindhoven University of Technology *Microfluidics technology for Organ-on-a-Chip*
	10:00-10:30	09:00-09:30	**Ali Koşar**, Sabancı University *Micro Scale Hydrodynamic Cavitation and its Biomedical Applications*
	10:30-11:00	09:30-10:00	**Can Dinçer**, University of Freiburg *CRISPR-powered multiplexed biosensors for point-of-care management of infectious diseases*
	11:00-11:30	10:00-10:30	**Ender Yıldırım**, Middle East Technical University *Ultrasonic assisted methods for scalable manufacturing of lab-on-a-chip*
	11:30-14:30	10:30-13:30	Lunch Break
Session 4	14:30-15:00	13:30-14:00	**Devrim Pesen Okvur**, İzmir Institute of Technology *Organ-on-Chip Disease Models*
	15:00-15:30	14:00-14:30	**Hüseyin Cumhur Tekin**, İzmir Institute of Technology *Magnetic-based 3D cell cultures in miniaturized systems*
	15:30-16:00	14:30-15:00	**Petek Korkusuz**, Hacettepe University *In vitro Spermatogenesis Platforms*
	16:00-16:30	15:00-15:30	**Petra Dittrich**, ETH Zurich *Single-cell analysis in microfluidic chamber*
	16:30-17:00	15:30-16:00	Discussions and Closing Remarks

Appendix II: The Programme of the 3rd BioMEMS and Microfluidic Technologies Workshop and the Registration Form

ODTÜ MEMS Center Open Doors Day &
Workshop on BioMEMS and Microfluidic Technologies (Hybrid)
10-11 June 2024

OrChESTRA Funded by the European Union

	TR-time	CET	10 June 2024, Monday
Open Doors	9:00-13:00	8:00-12:00	*ODTÜ MEMS Open Doors Event* *Introduction of ODTÜ MEMS – Presentation* *Site visit*
	13:00-13:30	12:00-12:30	Coffee break
Session 1	13:30-14:00	12:30-13:00	Opening Remarks
	14:00-14:30	13:00-13:30	Zeynep Altıntaş, *Kiel University* Hydrogel Microneedle Array for Multiplexed Assessment and Intelligent Therapy of Chronic Wounds
	14:30-15:00	13:30-14:00	Jerome Charmet, *Haute Ecole Arc (HES-SO), University of Bern* Going with the flow - fluid processing for biosensing
	15:00-15:30	14:00-14:30	Coffee Break
Session 2	15:30-16:00	14:30-15:00	Arda Deniz Yalçınkaya, *Boğaziçi University* Microfluidics integrated Flexible Metamaterial Sensors
	16:00-16:30	15:00-15:30	Martinus Gijs, *EPFL* Studying the roundworm Caenorhabditis elegans using microfluidic chips
	16:30-17:00	15:30-16:00	Vania Silverio, *INESC MN* Development of a standardized 96-well platform for investigating cell cultures in static and dynamic flow environments
			11 June 2024, Tuesday
Special Session	10:00-12:00	9:00-11:00	*Panel: Implementation of MDR and IVDR* *Jana Russo, MedTech Europe, Manager Medical Devices* *Fikret Küçükdeveci, Kardinero Medical Systems Inc.* *İlke Eren Karaca, Health Industry Employers' Association of Turkey* *Osman Dursun, Medloft Consultancy Doo*
	12:00-13:00	11:00-12:00	Student Poster Presentations
	13:00-14:00	12:00-13:00	Lunch Break
Session 3	14:00-14:30	13:00-13:30	Elsa Batista, *Portuguese Institute for Quality, IPQ* Metrological traceability and accuracy of organ-on-chip related measurement quantities
	14:30-15:00	13:30-14:00	Levent Beker, *Koç University* Wireless skin-interfaced devices for preventive medicine
	15:00-15:30	14:00-14:30	Mahmut Kamil Aslan, *ETH Zurich, ODTÜ MEMS Center* Microfluidic Platforms for Single-Cell Manipulation and Analysis
	15:30-16:00	14:30-15:00	Hatice Ceylan Koydemir, *Texas A&M University* Engineering portable imaging and sensing technologies to advance human health
	16:00-16:30	15:00-15:30	Best Poster Award Ceremony & Closing Remarks

OrChESTRA CONSORTIUM WORK PLAN PUBLICATIONS EVENTS

BioMEMS and Microfluidic Technologies
Workshop Registration Form

Name * *Your name*
Surname * *Your surname*
Title *Title*
E-mail * *Your e-mail address*
Phone
Affiliation * *Your institute*
Position *Student/Researcher/Faculty member...*
Participation type * *Online/in-person*
Abstract Title *If you prefer to make a poster presentation, write the title of your work.*
Abstract *If you prefer to make a poster presentation, please write the abstract of your work here (max. 500 characters).*

Register

Appendix III: The Programme of the International Workshop on Emerging Organ-on-Chip Technologies

Timetable June 27 - Morning

9:00 9:20	Arrival and coffee Welcome & Opening remarks		
9:30	IS	**Jaap M.J. den Toonder** Microsystems, TU/e	*"Microfluidic technology enables lumen-based Organ-on-a-Chip"*
10:00	Short talks 1	Guillem Monso	*"Brain-on-chip for AI Computing"*
		Oksana Savchak	*"Exploring digital microfluidics platforms for biomedical research"*
		Ali Can Atik	*"Modelling of Villi Differentiation in a Gut-on-a-Chip Platform Integrated with Interdigitated TEER Sensor"*
10:30	IS	**H. Cumhur Tekin** Izmir Institute of Technology	*"Magnetic Levitation for 3D Cell Culture in Miniaturized Platforms"*
11:00	Coffee		
11:30	IS	**Ender Yildirim** METU MEMS, Ankara, Turkey	*"Capillary pressure barriers for spatial confinement in organ-on-a-chip devices and their fabrication"*
12:00	Short talks 2	Ana Carina Baeta Manjua	*"Designing an electromagnetic microchip for cardiovascular studies"*
		Gülden Akçay	*"Brain-on-Chip: A New Approach for Studying Brain Microenvironment"*
12:20	Lunch		

Timetable June 27 - Afternoon

13:30	IS	**Burcu Gumuscu** Biomedical Engineering, TU/e	*"Exploring the Potential of Microfluidics for Automating Cell Experiments"*
14:00	Short talks 3	Seren Kecili	*"Magnetic levitation-based formation and dynamic rotation of 3D clusters of microspheres and HUVEC cells in a microfluidic chip"*
		Mohammad JouyBar	*"Tubular microchannels influence endothelial orientation: modeling cancer metastasis on a chip"*
		Meltem Okan Aydin	*"Synthetic Receptors: Harnessing Molecularly Imprinted Polymers for Advanced Sensing Platforms"*
14:30	IS	**Andries van der Meer** Twente University, Enschede	*"Organs-on-Chips: From Platform Technology to Applications in Drug Development"*
15:00	Coffee		
15:30	IS	**Haluk Külah** METU MEMS, Ankara, Turkey	*"A Fully Implantable Artificial Ear"*
16:00	Short talks 4	Jia-Jun Yeh	*"In-line biocompatible micropumping chip module for a standardized and modular organ-on-chip platform"*
		Pan Zuo	*"3D-Oxygen Gradient Chip for Cancer Cell Migration Research"*
16:20	IS	**Ozlem Yesil Celiktas** Ege University, Izmir, Turkey	*"The promise of engineered multicellular systems-on-chip"*
16:50	Drinks and networking		
18:00	Dinner in town		

Useful Information

Venue (Talks, Lunch & Dinner)

- **Talks** will be held in the main lecture room of the **Institute for Complex Molecular Systems (ICMS)** at TU Eindhoven. The building name is Ceres, room number is **Ceres 0.31**.
- **Coffee Breaks and Lunches** will be offered in the ICMS common area in the center of the ICMS building.
- The **Conference Dinner** will be held at the "Sizzling" restaurant, Stationsplein 3A, 5611 AB Eindhoven

How to get to TU/e and the ICMS?

Funding

This workshop is organized in the context of the **OrChESTRA consortium**, which brings together European research organisations with synergistic scientific and innovative expertise, establishing a long-term, strategic and productive partnership.

OrChESTRA

Funded by the European Union

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