HORIZON WIDERA Twinning

Grant agreement nº: 101079473

Call topic identifier: HORIZON-WIDERA-2021-ACCESS-03-01

Organ-on-a-Chip Focused Strategic Partnership (OrChESTRA)

Deliverable D4.4

Report on collaboration activities - 2

Work Package 4

Engagement and strategic networking activities

Document type	:	R - Document, report
Version	:	1.0
Date of issue	:	M36
Dissemination level	:	PU - Public
Lead beneficiary	:	2 - TU/e
Partners contribution	:	Prepared by TU/e with input from all partners

This project has received funding from the European Union's Horizon Europe Programme HORIZON-WIDERA action under grant agreement No 101079473. The dissemination of results herein reflects only the author's view, and the European Commission is not responsible for any use that may be made of the information it contains.

Table of Contents

1 INTRODUCTION

Building upon the foundations laid in the first 24 months, this report provides an updated and comprehensive overview of the collaboration activities conducted within the OrChESTRA consortium during the period from **September 2024 to August 2025 (M25–M36)**. It follows and complements Deliverable D4.3 – Report on Collaboration Activities – 1, highlighting the consortium's sustained and expanding efforts to strengthen scientific, educational, and strategic collaborations among the partners and beyond.

During this period, the consortium maintained its strong commitment to fostering effective collaboration. The network of interactions between ODTÜ MEMS, TU/e, IMEC, and UFR continued to deepen through joint research activities, bilateral visits, and technical exchanges, particularly focusing on microfluidics, MEMS, and organ-on-chip integration. Regular consortium and technical meetings ensured smooth coordination and alignment across work packages, while additional focused sessions and workshops were held to discuss upcoming project proposals, scientific dissemination, and collaborative events.

Beyond the consortium, ODTÜ MEMS has further expanded its engagement with the regional and European innovation ecosystem, establishing new collaborative links with research organisations, industry actors, and regulatory stakeholders. These activities have been reinforced by dedicated events such as the Microfluidics Summer School, the continuation of the Career Development Programme, and international workshops co-organised with partners and new collaborators. Such activities have enhanced both the visibility and the sustainability of OrChESTRA's impact.

This period also saw significant outcomes from previously initiated collaborations, including joint publications, conference presentations, and new project proposals at both European and national levels. The consortium has further leveraged its collective expertise to align with Horizon Europe priorities and to prepare new initiatives in areas such as standardisation, microphysiological systems, and industrial adoption of organ-on-chip technologies.

In summary, the M24–M36 period was characterised by a dynamic continuation of existing collaborations and the formation of new strategic partnerships. These joint efforts have strengthened the OrChESTRA network's scientific capacity, promoted mutual learning, and consolidated the consortium's role as a growing hub for Organ-on-Chip and BioMEMS research in the European Research Area.

2 COMMON ACTIVITIES AND RESEARCH COLLABORATION

Common activities have continued to play a central role in sustaining effective collaboration within the OrChESTRA consortium during the final project year. These activities ensured that partners remained connected and strategically aligned while jointly addressing scientific and technical challenges. By combining complementary expertise in microfluidics, MEMS, and organ-on-chip systems, partners deepened their cooperation, advanced shared objectives, and enhanced the overall impact of the project.

In addition to direct research collaboration, partners maintained regular exchanges through meetings, visits, and coordinated events, which collectively strengthened communication, fostered innovation, and supported the long-term sustainability of the OrChESTRA network.

2.1 Regular Project Meetings

Throughout the period from September 2024 to August 2025 (M25–M36), the consortium maintained an active rhythm of communication through a series of regular project and technical meetings—both online and

hybrid. These meetings continued to serve as key coordination mechanisms, ensuring progress tracking, alignment on deliverables, and strategic planning across all work packages.

Beyond routine consortium sessions, several targeted meetings and joint events were organised to reinforce collaboration among partners. Notably, this included preparation and follow-up discussions for the 4th International BioMEMS and Microfluidic Technologies Workshop, the OrChESTRA Brokerage Event (Freiburg, August 2025), and the staff-exchange activities implemented under WP1. Each of these activities was closely linked to the consortium's collaborative agenda and required collective input on organisation, content alignment, and partner participation.

Through this sustained engagement, partners ensured continuous knowledge exchange and strong alignment across work packages, thereby reinforcing the collaborative momentum and operational efficiency established in the earlier phases of the project.

2.2 Visits Between Partners

During the reporting period (September 2024 – August 2025), ODTÜ MEMS researchers continued to strengthen bilateral links with European partners through visits and staff-exchange activities. These interactions provided valuable opportunities for in-depth discussions on technical progress, future collaborations, and knowledge sharing across the consortium.

Visit and Seminar by Prof. Dr. Haluk Külah at University of Freiburg (UFR):

A key visit was conducted by Prof. Dr. Haluk Külah between 18–22 November 2024 to UFR. Meetings were held with Dr. Konstantinos Mitsakakis to review the final-phase implementation of the OrChESTRA Project, and with Dr. Stefan Zimmerman to explore collaboration prospects in biosensor technologies. Prof. Külah also met Prof. Roland Zengerle and delivered an invited seminar presenting ODTÜ MEMS research activities in biomedical microsystems. The visit contributed to consolidating scientific cooperation and identifying potential follow-up EU project opportunities between ODTÜ MEMS and UFR.

Staff-exchanges:

Staff exchanges have served as an important mechanism for strengthening collaboration and knowledge transfer within the OrChESTRA consortium. During the reporting period, several exchange missions were carried out between ODTÜ MEMS and partner institutions to enhance hands-on experience in areas such as microfabrication, sensor integration, and organ-on-chip modelling, while fostering scientific dialogue among teams.

Participants engaged in laboratory work at partner sites, gaining exposure to complementary infrastructures and methodologies. Likewise, visiting researchers contributed to joint experimental activities, shared analytical protocols, and participated in technical discussions, ensuring effective two-way knowledge transfer. These exchanges supported the harmonisation of fabrication and testing practices among partners and contributed directly to progress under WP3 Development of organ-on-a-chip platform.

The incoming and outgoing staff exchanges are as follows:

- Mehmet Oğulcan Güngör, Microsystems Research Section, Department of Mechanical Engineering, TU/e, 07–18 July 2025
- Dr. Ezgi Salmanlı, Department of Mechanical Engineering, TU/e, 07–23 July 2025
- Dr. Vildan Şanko, Department of Microsystems Engineering, UFR, 14–18 July 2025

- Dr. Hans Wyss, ODTÜ MEMS, 11–15 August 2025
- Dr. Rahman Sabahi Kaviani, ODTÜ MEMS, 11–15 August 2025

Beyond their scientific value, the exchanges deepened institutional cooperation and promoted continued communication between partners, laying the groundwork for future joint initiatives. Further details on the implementation, outcomes, and participant profiles are provided in Deliverable D1.3 – Report on Mobility, Training and Education Activities – 2.

Visit and Seminar by Dr. Hans Wyss at ODTÜ MEMS:

On 6 May 2025, Dr. Hans Wyss from TU/e visited ODTÜ MEMS as part of the OrChESTRA collaboration activities. During his visit, he delivered two technical seminars entitled "Time-dependent Capillary Micromechanics of Cancer Spheroids" and "Microfluidic Dead-End Chamber Devices for Studying the Effects of Extracellular Viscosity on Cell Viability", providing valuable insights into the mechanical and biophysical aspects of microfluidic systems.

The visit also included focused discussions with ODTÜ MEMS researchers on ongoing and potential collaboration topics related to microfluidics and organ-on-chip technologies. Additionally, Dr. Wyss met with early-stage researchers involved in the project to exchange views on experimental approaches and technical challenges. This visit contributed to strengthening cooperation between TU/e and ODTÜ MEMS, further aligning research directions and identifying concrete opportunities for future joint studies.

2.3 Other Fostering Events

In the reporting period (M25–M36), the consortium continued to implement strategic activities fostering collaboration and visibility across partners and the wider research community. Key events included the 4th International BioMEMS and Microfluidic Technologies Workshop and the continuation of the Career Development Programme.

2.3.1 4th BioMEMS and Microfluidic Technologies Workshop

The 4th International BioMEMS and Microfluidic Technologies Workshop was held on 8–9 May 2025 at the İzmir Institute of Technology (IZTECH), co-organised with OrChESTRA partners under the joint title "6th Novel Fluidic Technologies Workshop."

This hybrid workshop brought together researchers, students, and industry stakeholders, providing a strong platform for networking and collaboration. The open call attracted 42 abstracts, of which 38 were accepted (24 poster-only and 14 pitch + poster presentations).

Representatives from ODTÜ MEMS, IZTECH, and TU/e actively participated, with Dr Hans Wyss contributing to the scientific sessions and discussions. The event successfully demonstrated the consortium's collaborative spirit and expanded its research network within the BioMEMS and organ-on-chip domains.

Over two days, the workshop facilitated knowledge exchange between academia and industry, fostering new cooperation opportunities and increasing the visibility of OrChESTRA's activities within the broader European microfluidics community. Further details on the event are provided in Deliverable D4.6 Report on National and International Events – 2.

2.3.2 Career Development Programme

The Career Development Programme, implemented under WP1, continued during this reporting period with its second phase, focusing on mentorship, seminars, and one-to-one guidance for Early-Stage Researchers (ESRs). Through regular mentor–mentee meetings and shared training sessions led by experts from TU/e, IMEC, and UFR, the initiative further strengthened inter-partner collaboration and knowledge exchange. This collaborative mentoring framework not only enhanced the scientific and professional growth of ESRs but also contributed to consolidating links between the consortium partners through joint training and mentoring activities. The programme thus served as a sustainable model for building research capacity and fostering long-term institutional cooperation within OrChESTRA. Details on the implementation and evaluation of this phase are provided in Deliverable D1.6 – Report on Career Development Programme – 2

2.3.3 Brokerage Events

The series of brokerage activities in-person in Ankara on 26 August 2025 followed by a hybrid in Freiburg on 27 August 2025, organised under OrChESTRA provided an effective platform to strengthen collaboration and alignment among consortium partners, while simultaneously extending outreach to external stakeholders.

The event gathered representatives from OrChESTRA partners, including IMEC, UFR, and ODTÜ MEMS, and facilitated direct exchanges on potential follow-up collaborations in the areas of organ-on-chip technologies, microfluidics, and biosensing. Through pitch sessions and bilateral matchmaking discussions, partners explored complementarities between their ongoing research lines and identified shared interests for future joint initiatives.

Beyond its role as a dissemination activity, the brokerage event reinforced the consortium's internal cooperation by supporting joint project ideation, strengthening institutional links, and aligning strategic perspectives across partners. Further details and documentation are available in Deliverable D4.6 – Report on National and International Events – 2.

2.4 Joint Proposal Submissions

During the reporting period (M25–M36), OrChESTRA partners maintained their strong engagement in joint proposal preparation and follow-up activities, building on the foundations established in earlier stages. The consortium's collaborative approach— developed through regular coordination meetings, bilateral exchanges, and targeted proposal workshops—continued to result in tangible outcomes, including new submissions and the progression of previously prepared proposals. Detailed information on the proposals prepared and submitted throughout the project lifetime is provided in Deliverable D4.2 – Jointly Prepared Proposals Submitted.

The following developments took place during this period:

- **MicroLife – Center of Excellence for Microdevices for Health**

The proposal, coordinated by ODTÜ MEMS in collaboration with IMEC, successfully passed the Stage-1 evaluation under the HORIZON-WIDERA-2025-ACCESS-01 (Teaming for Excellence) call. Stage-2 preparation was launched during this reporting period, focusing on infrastructure, human resources, and pilot research design, with IMEC continuing to provide strategic input as the key advanced partner.

- **PHANTOM – Phage Therapy and Host-Adapted Nanosensing Technology in Organ-on-Chip Model**

The PHANTOM proposal was prepared and submitted under the EIC Pathfinder Open 2025 call, coordinated by ODTÜ MEMS. The proposal was developed using the technical outputs and capabilities gained under WP3 – Development of organ-on-a-chip platform – including validated OoC modules, integration know-how, and assay workflows. These achievements provided the foundation for extending the research scope from initial gut-on-a-chip studies to more advanced lung- and alveolus-on-a-chip systems, enabled by the competencies consolidated through OrChESTRA. The proposal received a high evaluation score (4.30/5) but was not selected for funding due to budget limitations.

- **traiNK-ceLL – On-Chip Digital Validation of Allogeneic Cannabinoid Receptor-Based eNK Cell Therapy Targeting Personalised Lung Cancer Niche**

The traiNK-ceLL proposal was submitted under the HORIZON-HLTH-2025-01-TOOL-01 call and was coordinated by ODTÜ MEMS. The project combines immunotherapy, microfluidics, and AI technologies, reflecting OrChESTRA's growing impact in the field of precision medicine. The proposal is currently under evaluation.

- **PACIFIC – Randomised Clinical Evaluation of Inhalable Phage Therapy for Pseudomonas aeruginosa in Cystic Fibrosis**

The PACIFIC proposal was coordinated by ODTÜ MEMS and submitted under the HORIZON-HLTH-2025-01-DISEASE-01 call. This initiative scales up the organ-on-chip and AI-integration competencies matured under OrChESTRA to the clinical validation level. The proposal is currently under evaluation.

- **RETIN-A-EYE – Machine Learning Platform for Personalised Intravitreal Anti-VEGF Therapy Using Drug-Loaded Polymeric Nanoparticles**

The RETIN-A-EYE proposal was prepared and submitted under the M-ERA.NET 2025 call in collaboration with Ege University and Warsaw University of Technology. The proposal successfully passed the Stage-1 evaluation and progressed to Stage-2 preparation during this reporting period.

- **BRAINPOL – Brain Health and Pollution: Occupational Exposure to Particulate Matter and Airborne Pesticides as Determinants of Alzheimer's and Parkinson's Diseases**

The BRAINPOL proposal was submitted under the HORIZON-HLTH-2025-03-ENVHLTH-01 (two-stage) call. This proposal demonstrates OrChESTRA's expanding scientific scope into environmental and neurodegenerative health domains. The proposal is currently under evaluation.

- **TÜBİTAK 1004 – Development of Smart and AI-Based Technological Solutions Platform within the One Health Framework**

The TÜBİTAK 1004 platform proposal, coordinated by ODTÜ MEMS, included a sub-project titled "Development of an organ-on-chip platform integrated with MEMS sensors." Although the proposal was not selected for funding, its preparation process enabled the consolidation of technical expertise and strategic partnerships initially fostered through OrChESTRA WP3 activities. The effort also reinforced ODTÜ MEMS's positioning in the national research landscape for future large-scale initiatives under the One Health framework.

In summary, the proposal development activities during M25–M36 reflect a clear transition from preparatory networking to large-scale project coordination and leadership by ODTÜ MEMS. Several proposals advanced to higher evaluation stages (e.g. MicroLife Stage-2, RETIN-A-EYE Stage-2), while others extended OrChESTRA's research reach into new thematic areas such as personalised medicine, antimicrobial resistance, and environmental health. These efforts demonstrate the consortium's sustained momentum in leveraging Horizon Europe opportunities and ensuring long-term impact beyond the project duration.

2.5 Joint Scientific Publications

Building upon the collaborative research conducted under WP3 "Development of organ-on-a-chip platform (intestinal drug absorption)", consortium partners have continued to produce and contribute to high-impact scientific publications, conference papers, and review articles.

These joint works reflect the consolidated expertise of ODTÜ MEMS, UFR, TU/e, and IMEC teams, as well as affiliated researchers, highlighting OrChESTRA's growing scientific visibility in the Organ-on-a-Chip and BioMEMS fields.

They also demonstrate the consortium's sustained engagement in multi-disciplinary dissemination, connecting microfluidics, biosensing, and organ-on-chip technologies with biomedical and analytical research domains.

Peer-reviewed articles (published or accepted)

- M. Okan, V. Sanko, H. C. Tekin, E. Yildirim, H. Kulah (2025). MIP-on-the-Flow: Precision Sensing on the Smallest Scale. Trends in Analytical Chemistry, 194, 118511.

  (This paper presents an advanced microfluidic sensing system based on molecularly imprinted polymers, developed within OrChESTRA WP3 activities.)
- V. Sanko, H. C. Tekin (2025). Electrochemical Sensors for Rapid Cardiovascular Disease Diagnostics. ACS Sensors, 10(9), 6316–6346.

  (A comprehensive review discussing state-of-the-art electrochemical sensing technologies for cardiovascular biomarker detection.)
- P. Saglam-Metiner, S. Yanasik, YC. Odabasi, J. Modamio, M. Negwer, C. Biray-Avci, A. Guler, A. Erturk, E. Yildirim, O. Yesil-Celiktas (2024). ICU patient-on-a-chip emulating orchestration of mast cells and cerebral organoids in neuroinflammation. Communications Biology, 7(1), 1627.

  (This publication, acknowledging OrChESTRA, reports a neuroinflammation model-on-chip integrating human cell types and sensor readouts.)
- N. Brasier, J. Wang, W. Gao, J.R. Sempionatto, C. Dincer, H.C. Ates, F. Güder, S. Olenik, I. Schauwecker, D. Schaffarczyk, E. Vayena, N. Ritz, M. Weisser, S. Mtenga, R. Ghaffari, J. A. Rogers, J. Goldhahn (2024). Applied body-fluid analysis by wearable devices. Nature, 636(8041), 57–68.

  (A collaborative paper co-authored by OrChESTRA partners, demonstrating sensor-based monitoring strategies relevant to microphysiological systems.)
- M. Johnston, S. Dissanayake-Perera, J.J. Collins, M.M. Stevens, C. Dincer (2025). Convergence of nanotechnology and CRISPR-based diagnostics. Nature Nanotechnology, 1–9.

  (Highlights integration trends between CRISPR-based biosensing and nanotechnology, contributing to the broader scientific impact of OrChESTRA collaborators.)

Book chapters (in press)

- E. Salmanlı, M. Okan, V. Sanko* (2026). Applications of AM-Enabled Biosensors in Wound Care. In Revolutionizing Wound Care and Early Monitoring: State-of-the-Art Additive Manufacturing-Enabled Biosensors, Elsevier.
  (This chapter discusses biosensor applications developed within the microfabrication context of OrChESTRA.)

Conference presentations and posters

- M. Okan, Z. Çağlayan Arslan, A.C. Atik, E. Salmanlı, H. Wyss, C. Dinçer, W. Eberle, H.C. Tekin, H. Külah, E. Yıldırım (2024). Development of an Integratable Electrochemical Dopamine Sensor for Assessing Levodopa Efficacy in Gut-on-a-Chip Models. BBMEC 13 – May 20–23, 2024, Çeşme, İzmir, Türkiye.

  (This presentation reported sensor integration strategies for dopamine detection in gut-on-chip models targeting Parkinson's Disease drug response monitoring.)
- M.O. Güngör, Z. Çağlayan Arslan, M. Okan Aydın, V. Şanko, H. Külah, E. Yıldırım (2025). ISO 22916-Compliant Organ-on-Chip Block for Fluidic Circuit Integration Using Thermoforming and 3D Printing.

  In Abstract Book of the 4th BioMEMS and Microfluidic Technologies Workshop, İzmir Institute of Technology (IZTECH), İzmir, Türkiye, May 8–9, 2025.

  (This paper presents the design and fabrication of an ISO 22916:2022-compliant organ-on-chip block developed using thermoforming and 3D printing techniques to ensure modular and reusable fluidic integration.
- M.O. Güngör, M. Okan, V. Sanko, H. C. Tekin, H. Kulah, E. Yıldırım (2025). Microfluidics Made Simple: A Low-Cost, High-Performance Biosensor Platform Using SPEs, MIPs, and Rapid Injection Molding. 35th Anniversary World Congress on Biosensors, 19–22 May 2025, Lisbon, Portugal.
- Gumustas, A., Torul, H., Ozkan Hukum, K., Tamer, U., Yildirim, E. 'Conducting Polymer Based Amperometric Sensor for the Determination of Lactate Dehydrogenase'. 35th Anniversary World Congress on Biosensors, 19-22 May 2025, Lisbon, Portugal.
- Torul, H., Gumustas, A., Tamer, U., Yildirim, E. 'Enhanced Electrochemical Biosensor for Sensitive NADH Detection'. 35th Anniversary World Congress on Biosensors, 19-22 May 2025, Lisbon, Portugal.
- Atik, AC., Topçu Ö., Balcı LD., Yılmaz, AM., Hanalioğlu, Ş., Külah H. 'MEMS-Based Microfluidics-Integrated Thin-Film Parylene-C Multi-Electrode Array for Subdural Neuromonitoring and Therapeutic Modulation in Traumatic Brain Injury'. 35th Anniversary World Congress on Biosensors, 19-22 May 2025, Lisbon, Portugal.
- Atik, AC., Topçu, Ö., Okan Aydın, M., Şanko, V., Balcı, LD., Külah H. 'A Miniaturized Implantable Electrochemical Sensor for Real-Time Monitoring of Brain Tissue Oxygen'. 35th Anniversary World Congress on Biosensors, 19-22 May 2025, Lisbon, Portugal.
- Balcı, LD., Atik, AC., Elçi, A., Külah H. 'Addressing Adhesion Challenges in Hybrid Parylene C and SU-8 Neural Probe Fabrication'. 35th Anniversary World Congress on Biosensors, 19-22 May 2025, Lisbon, Portugal.
- P. Saglam-Metiner, S. Yanasik, YC. Odabasi, J. Modamio, M. Negwer, C. Biray-Avci, A. Guler, A. Erturk, E. Yildirim, O. Yesil-Celiktas. ICU patient-on-a-chip emulating orchestration of mast cells and cerebral organoids in neuroinflammation. 2025 MPS World Summit, Brussels Belgium.

In addition to the above published works, two research articles are currently in preparation as extended versions of conference papers previously presented by OrChESTRA researchers. These forthcoming publications will elaborate on the experimental findings, fabrication methods, and performance analyses introduced in the conference contributions, thereby strengthening the scientific dissemination outcomes of the OrChESTRA project.

The scientific outputs produced during M25–M36 demonstrate the maturation of OrChESTRA's collaborative research efforts, particularly in the areas of sensor-integrated organ-on-chip systems, polymer-based microfluidics, and biomedical sensing. These publications, reviews, and presentations not only enhanced the project's scientific visibility but also solidified ODTÜ MEMS's and partner institutions' standing as leading contributors in the European microfluidics and organ-on-chip research community.

2.6 Joint Attendance at Conferences

Joint attendance at international conferences continued to serve as a key dissemination and networking mechanism among OrChESTRA partners. During the second reporting period (M25–M36), participation was primarily focused on organ-on-chip, microfluidics, and biosensing domains. These events provided visibility for the consortium's work, opportunities for dissemination of research outcomes, and fostered new collaboration prospects.

Details of the joint attendance at international conferences during this reporting period, including abstracts, oral presentations, and posters, are provided in Deliverable D4.6 "Report on National and International Events – 2." A concise summary is presented below:

- **µTAS 2024 Conference, (The 28th International Conference on Miniaturized Systems for Chemistry and Life Sciences)**

Date: 13–17 October 2024
Location: Montreal, Canada

ODTÜ MEMS (Dr. Cumhur Tekin) and IMEC (Dr. Dries Braeken) participated in the conference as parallel attendees, engaging in informal exchanges and following emerging trends in microfluidics and life sciences systems. Attendance was aimed at identifying collaboration themes for future joint research activities.

- **4th BioMEMS and Microfluidic Technologies Workshop**

Date: 08–09 May 2025
Location: İzmir Institute of Technology (IZTECH), İzmir, Türkiye

OrChESTRA partners participated jointly in the 4th International BioMEMS and Microfluidic Technologies Workshop, which was organised in collaboration with the "6th Novel Fluidic Technologies Workshop." The event gathered experts from across Europe and Türkiye to present research in microfluidics, biosensing, and organ-on-chip systems. ODTÜ MEMS and TU/e were represented by multiple researchers, including Dr Hans Wyss, who took part in technical discussions and scientific sessions. Their participation contributed to strengthening cross-institutional ties and ensuring that OrChESTRA's advancements were disseminated across both academic and industrial audiences. The event also provided an opportunity to highlight OrChESTRA's contribution to scientific exchange and visibility within the international BioMEMS research community.

- **Biosensors 2025 (35th Anniversary World Congress on Biosensors)**

Date: 19–22 May 2025
Location: Lisbon, Portugal

ODTÜ MEMS researchers (M. Oğulcan Güngör, Ayşen Gümüştaş, Ali Can Atik, Leman Dicle Balcı) and former UFR researcher Can Dinçer attended Biosensors 2025. The event focused on biosensing, lab-on-chip technologies, and translational diagnostics. ODTÜ MEMS delivered an oral presentation and six poster presentations on topics including electrochemical biosensors, organ-on-chip integration, and microfabrication for brain injury and neurodegenerative disease monitoring.

Attendance strengthened networking among OrChESTRA partners and promoted technical exchange with EU-based SMEs and research institutes (The complete list of presentations and abstracts is available in D4.6.).

- **MPS World Summit 2025 (jointly organised with EUROoCS)**

Date: 9–13 June 2025
Location: Brussels, Belgium

IMEC (Dr Dries Braeken, Dr Wolfgang Eberle) participated in the event with multiple abstracts and posters. While ODTÜ MEMS did not have a formal presentation, the centre maintained active engagement through its affiliated researcher network. A poster from Prof. Özlem Yeşil-Çeliktaş's group ("Intensive care unit (ICU) patient-on-a-chip model: Biomimicry for emulating mast cells and cerebral organoids in neuroinflammation") was discussed on site, with Pelin Sağlam Metiner—former student and collaborator—contributing to the exchanges with poster teams.

This poster, acknowledged under the OrChESTRA project, is considered both under joint attendance and joint publication activities. The abstract was published in the ALTEX 2025 Proceedings. Further details of this participation are provided in Deliverable D4.6 "Report on National and International Events – 2."

3 NEW COLLABORATIONS

During the final year of the OrChESTRA project, ODTÜ MEMS continued to expand its collaborative network through targeted one-to-one meetings with external stakeholders. A total of 49 new meetings were conducted, engaging with business organisations (23), public organisations (12), research institutions (6), and international organisations (8). These interactions helped identify follow-up collaboration opportunities from previous events (such as the BioMEMS Workshops and Brokerage Events), strengthened ties with industrial and research partners, and supported the development of new project concepts and joint proposals. The activities further reinforced ODTÜ MEMS's visibility and strategic positioning within both national and European microfluidics and organ-on-chip ecosystems.

Other significant collaborations:

Collaboration with Karlsruhe Institute of Technology (KIT): As part of his mission to Germany between 18–22 November 2024, Prof. Haluk Külah visited the Karlsruhe Institute of Technology (KIT) to explore new collaboration prospects in the field of microtechnology. During the visit, he met with Prof. Jan Korvink, Head of the Institute of Microstructure Technology, and held in-depth discussions on potential areas for joint research and forthcoming European project applications. The meetings

provided a valuable opportunity to present ongoing R&D activities at ODTÜ MEMS and to identify mutual interests in microfabrication and microsystem technologies. This visit marked an important step in initiating contacts with KIT's research teams, laying the groundwork for future cooperation and strengthening ODTÜ MEMS's connections with leading institutions in Germany.

Collaboration with Eliava Institute of Bacteriophage, Microbiology and Virology, Georgia: The collaboration between ODTÜ MEMS and the Eliava Institute of Bacteriophage, Microbiology and Virology in Georgia represents a major expansion of OrChESTRA's scientific network beyond the consortium, building a strategic bridge between microfluidic engineering and phage therapy research. The partnership was initiated through joint work on the EIC Pathfinder Open 2025 proposal titled PHANTOM "Phage Therapy and Host-Adapted Nanosensing Technology in Organ-on-Chip Model". This highly interdisciplinary initiative integrates OrChESTRA's expertise in organ-on-chip technologies with Eliava's globally recognised know-how in bacteriophage biology, aiming to establish a microfluidic-based model for personalised, phage-driven infection prevention.

Following the strong collaboration established through PHANTOM, the partnership further evolved with the preparation of a second proposal under HORIZON-HLTH-2025-01-DISEASE-01, titled PACIFIC "Randomized clinical evaluation of inhalable phage therapy for Pseudomonas aeruginosa in cystic fibrosis, integrating alveolus-on-chip and AI decision support". The proposal reflects the partners' shared interest in bridging experimental model development with translational health research.

While the collaboration is still at a preparatory stage, these joint proposal efforts have helped establish a valuable channel for scientific exchange between ODTÜ MEMS and the Eliava Institute, laying the groundwork for potential future cooperation in infection modelling and advanced therapeutic technologies.

Collaboration with Alveolix: The collaboration between ODTÜ MEMS and Alveolix represents a tangible outcome of OrChESTRA's outreach and networking activities. Alveolix, a Swiss organ-on-a-chip company, and ODTÜ MEMS initiated their partnership through joint preparation of the BRAINPOL – Brain Health and Pollution: Occupational Exposure to Particulate Matter and Airborne Pesticides as Determinants of Alzheimer's and Parkinson's Diseases proposal, submitted to the HORIZON-HLTH-2025-03-ENVHLTH-01 (two-stage) call. Building on the recent progress of ODTÜ MEMS in the organ-on-a-chip field enabled by the OrChESTRA project, and leveraging Alveolix's established expertise in this domain, the collaboration is expected to extend beyond the BRAINPOL proposal, paving the way for sustained joint activities and further research partnerships.

Collaboration with Warsaw University of Technology: A new collaboration between ODTÜ MEMS and the Warsaw University of Technology was similarly initiated and enabled through the networking and visibility gained under the OrChESTRA project. The partnership resulted in the joint submission of the proposal RETIN-A-EYE – Machine Learning Platform for Personalised Intravitreal Anti-VEGF Therapy Using Drug-Loaded Polymeric Nanoparticles, coordinated by the Warsaw University of Technology. Within this project concept, ODTÜ MEMS contributes its expertise in organ-on-a-chip technologies toward the development of a retina-on-chip platform designed to model retinal physiology and support the evaluation of nanoparticle-based therapeutic strategies.

4 CONCLUSION AND OVERALL IMPACT

Throughout its three-year implementation (M1–M36), the OrChESTRA project has successfully fostered a robust and sustainable collaboration framework among its consortium partners — ODTÜ MEMS, TU/e, IMEC, and UFR — while extending its reach to a wider network of academic, industrial, and public stakeholders across Europe. The project's activities have strengthened institutional cooperation, promoted interdisciplinary exchange, and contributed to building long-term partnerships in the field of microfluidics and organ-on-chip technologies.

The consortium maintained regular coordination through technical and consortium meetings, complemented by bilateral visits, staff exchanges, and joint events that provided opportunities for direct knowledge transfer and network expansion. Key activities such as the International BioMEMS and Microfluidic Technologies Workshop, the Career Development Programme, and Brokerage Events played a central role in connecting partners with new collaborators, identifying research synergies, and aligning scientific priorities.

Joint research and dissemination efforts have also produced tangible outcomes. Partners contributed six peer-reviewed publications in high-impact journals and collectively participated in international conferences such as EUROoCS, µTAS, and Biosensors 2025, ensuring visibility within the global organ-on-chip and BioMEMS community. In parallel, the consortium partners jointly developed and submitted two collaborative project proposals under Horizon Europe, addressing topics ranging from organ-on-chip technologies and medical device development. These efforts have not only advanced OrChESTRA's scientific scope but also laid the groundwork for sustained joint initiatives beyond the project.

Throughout its duration, OrChESTRA partners co-organised and actively contributed to three "International BioMEMS and Microfluidic Technologies Workshop", one "International Workshop on Emerging Organ-on-Chip Technologies – Eindhoven", and two brokerage events, which served as major platforms for showcasing results, exchanging expertise, and initiating new cooperation opportunities. Collectively, these achievements demonstrate the consortium's strong performance in fostering collaboration, generating new knowledge, and ensuring the project's long-term impact.

Overall, OrChESTRA has significantly enhanced the collaborative capacity and international visibility of its partners, while positioning ODTÜ MEMS as a central hub for research and training in microfluidics and organ-on-chip technologies. The partnerships, skills, and networks developed through the project provide a strong foundation for future joint research, technology transfer, and European collaboration initiatives that will continue to expand the project's legacy well beyond its completion.