

# MSCA-ITN-EID COMETE

Next-Generation Computational Methods for Enhanced  
Multiphase Flow Processes

## Final Conference

CISM & Esteco, 28-29/03/2023



# What is COMETE?



## **i** About

Title: COMETE: Next-Generation Computational Methods for Enhanced Multiphase Flow Processes  
Call: MSCA-ITN-2018-EID  
Type of Action: MSCA-ITN-EID  
Duration: 48 months  
Project Start Date: 01/11/2018  
Project End Date: 31/10/2022

**Marie Skłodowska-Curie Actions (MSCA)  
Innovative Training Networks (ITN)  
H2020-MSCA-ITN-2018**

## **WEBSITE:**

**158.110.32.35/COMETE/**

In this project, we aim at building a computational framework and a network of competence to extend the applicability of state-of-the-art formulations to industrially-relevant multiphase turbulent flows. We focus on applications characterized by the transport of particles/droplets in two-phase flows with gas-liquid or liquid-liquid deformable interfaces, which are ubiquitous in process, chemical, and power engineering.

# Partners



- Beneficiaries

## Academic

**UNIVERSITY of UDINE**



**TU WIEN**



**IMP-PAN GDANSK**



## Non Academic

**EURO  
HEAT PIPES**



**EURO  
HEAT  
PIPES**

**ESTECO**



- Partner Organizations

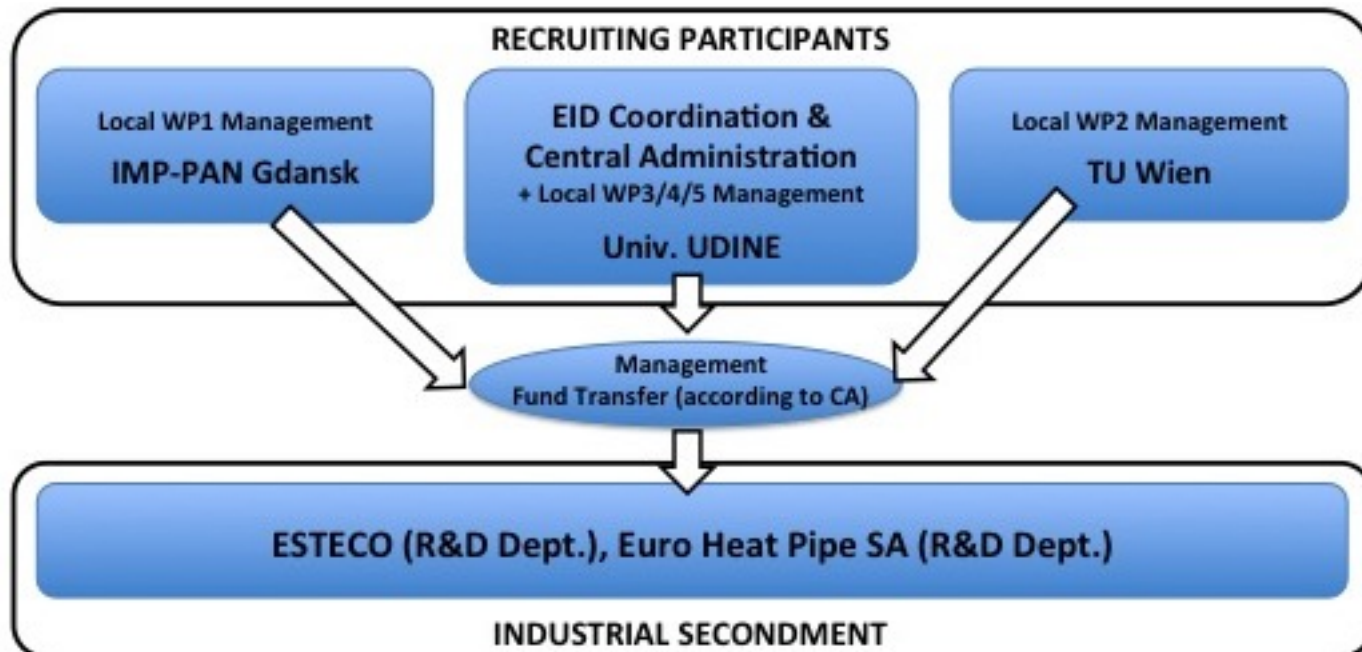


# Governance

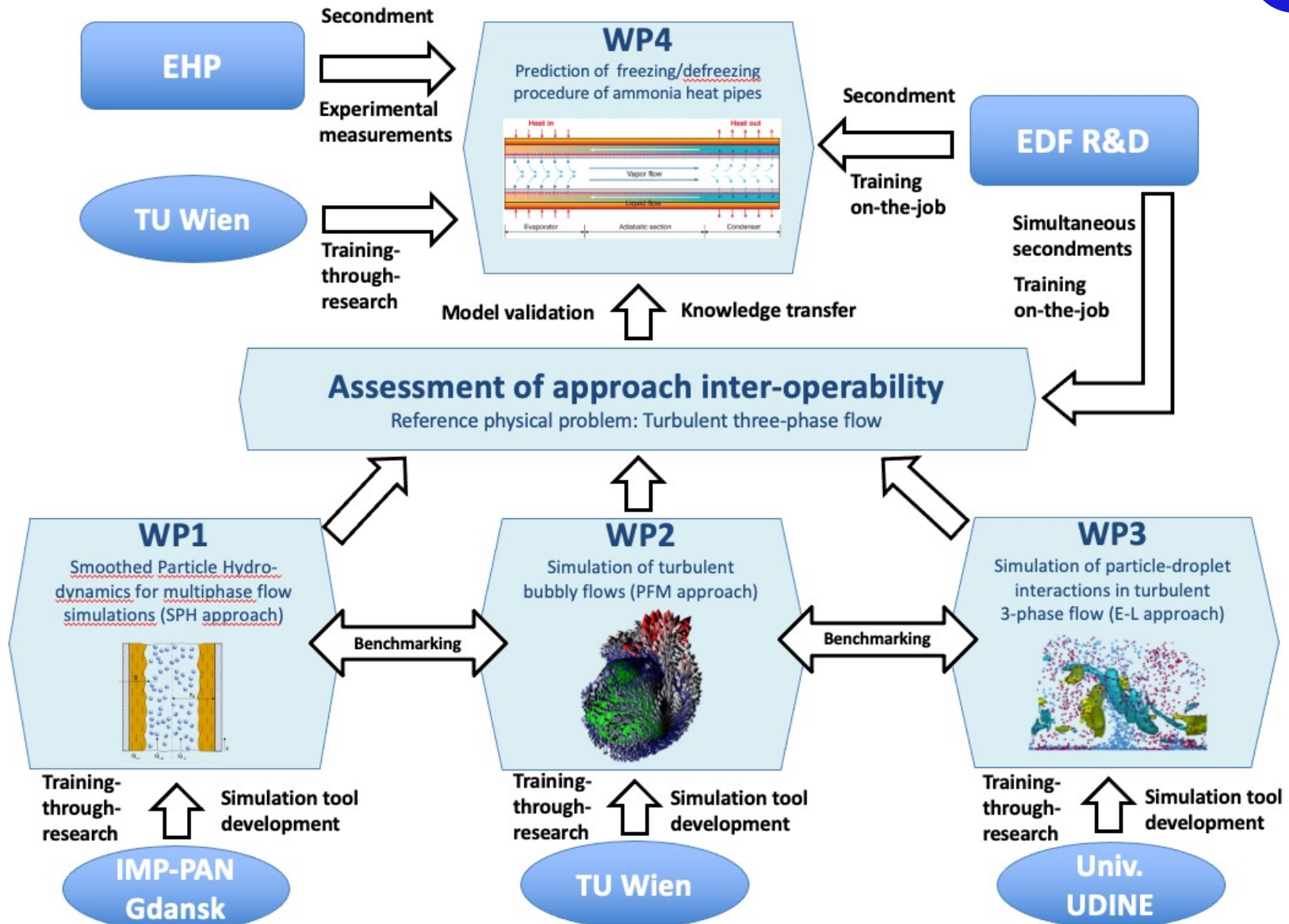


## Supervisory Board

Cristian Marchioli	EID Coordinator, Outreach Coordinator, Representative of Univ. Udine
Alfredo Soldati	Research Coordinator, Representative of TU Wien
Jacek Pozorski	Training Coordinator, Representative of IMP PAN Gdansk
Mikael Mohaupt	Representative of EHP
Carlo Poloni	Representative of ESTECO
Sarah-Amalia Aronzohn	Project Officer



# Scientific Planning



# Training Activities



	Main Training Events & Conferences	ECTS	Lead Institution	Action Month
1	<p>Advanced Training School (ATS): <i>Direct numerical simulations of solid particles, drops and bubbles in turbulence</i></p> <ul style="list-style-type: none"> <li>• Direct simulation approaches to HPC of multiphase flow</li> <li>• Interface capturing/tracking techniques</li> <li>• Collective particle/drop/bubble dynamics in turbulent flows, including heat transfer and phase change phenomena</li> </ul>	N/A	Univ. Udine	15  <b>Jan 2020</b>
2	<p>ATS: <i>Deposition, resuspension and agglomeration of particles in wall-bounded turbulence</i></p> <ul style="list-style-type: none"> <li>• Phenomenology of multiphase wall-bounded turbulent flows</li> <li>• Unified particle deposition models (with combined hydrodynamic and physico-chemical approaches)</li> <li>• Experimental/modelling issues in multilayer deposition/resuspension</li> </ul>	N/A	IMP-PAN Gdansk	18  <b>Apr 2020</b>
3	<p>ATS: <i>Fluid dynamics effects in particle formation</i></p> <ul style="list-style-type: none"> <li>• Introduction to turbulent particle aggregation and breakage</li> <li>• Derivation of breakage/aggregation rates from simulations</li> <li>• Population balance models for multiphase flows</li> <li>• Fully-resolved simulations for multiphase flows</li> </ul>	N/A	TU Wien	21  <b>Jul 2020</b>
4	<p>ATS: <i>Software Optimization and Uncertainty Quantification in Multiphase Flow CFD</i></p> <ul style="list-style-type: none"> <li>• Introduction to Design of Experiments, Optimization algorithms and Surrogate modelling</li> <li>• Montecarlo, Lati Hypercube, Polynomial Chaos for UQ</li> <li>• Process automation for engineering models</li> </ul>	N/A	ESTECO	27  <b>Jan 2021</b>
5	Final Networking Conference	N/A	ESTECO	46

# Dissemination, Communication & Outreach Activities



## Communication and public engagement

Website	<a href="http://158.110.32.35/COMETE">http://158.110.32.35/COMETE</a>
Link to EU Societies & Associations	Euro-Science Open Forum (via ESTECO), ERCOFTAC, European Mechanics Society, EFCE, AIT, ANIMP, ...
Open Days	Public presentations, Lab tours
Science Festivals	European Researchers Night (Lange Nacht der Forschung)
Fluid Journeys	ESR's experience on social media
Promotional Videos	From simulations and experiments, put online

## Dissemination of research

Conferences	ICMF, EFMC, ETC, T&I, ICNMMF, ...
COMETE's final conference	Month 46 (August 2022)
Scientific publications	Peer-reviewed journals, conference proceedings, ...
Website	ESR's homepage
Other	Outreach & Public Engagement events

# Kick-Off Meeting - Group Picture



**TU Wien, 22 October 2019**



# Agenda



## **Tuesday, March 28, 2023 (Venue: CISM, Piazza Garibaldi 18, Udine)**

16:00 – 16:05 Welcome from the local organizers

16:05 – 16:20 Cristian Marchioli - *Overview of the COMETE project*

16:20 – 16:45 Gregory Lecrivain – *Direct numerical simulation of a flexible fiber interacting with a fluidic interface*

16:45 – 17:10 Coffee Break

17:10 – 17:35 Kevin Miranda – *Freezing/defreezing in VCHPs*

17:35 – 18:00 Jure Ravnik - *Recent results in modelling and simulation of particle laden flows*

## **Wednesday, March 29, 2023 (Esteco, Galleria Padriciano 99, Trieste)**

09:30 – 09:45 Welcome from the local organizers

09:45 – 10:10 Francesco Zonta - *Surface and internal waves in turbulence*

10:10 – 10:35 Eleonora Spricigo – *SPH for multiphase flows*

10:35 – 11:00 Coffee Break

11:00 – 11:25 Francesca Mangani – *Heat transfer in drop-laden turbulent channel flow*

11:25 – 11:50 Alessio Roccon - *Water-lubricated channel flow*

11:50 – 12:00 Closure

12:00 – 13:30 Lunch Break

13:30 – 14:30 Lab tour



**Thank you very much  
for attending!**