



**COST**

**Flowing matter**

**MP1305**

**Start date: 06/05/2014**

**End date: 05/05/2018**

**Year: *Starting***

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# Scientific context and objectives

## (1/2)

- **Background / Problem statement:**

Flowing matter lies at the crossroads between industrial processes, fundamental physics, engineering and Earth Sciences. Depending on the microscopic interactions, an assembly of molecules or of mesoscopic particles can flow like a simple Newtonian fluid, deform elastically like a solid or behave in a complex manner. When the internal constituents are active, as for biological entities, one generally observes complex large-scale collective motions. The phenomenology is further complicated by the invariable tendency of fluids to display chaos at the large scales or when stirred strong enough. A fundamental understanding of flowing matter is still missing impeding scientific progress, effective control on industrial processes, as well as accurate predictions of natural phenomena. Flowing matter frequently presents a tight coupling between small-scale structures and large-scale flow urging for a unifying approach. The Action will coordinate existing research efforts into a synergetic plan of collaborations and exchanges to develop an innovative multi-scale approach able to encompass the traditional micro-, meso-, and macro-scales descriptions. Breakthroughs in the understanding of flowing matter will impact on fundamental key scientific issues, such as the glass, the elasto-plastic and the jamming transitions, as well as industrial applications including health, energy, cosmetics, detergents, food, paints, inks, oil and gas.

- **Brief reminder of MoU objectives:**

- *Support the scientific research for the development of a unified picture of flowing matter.*
- *to support the fundamental research in complex fluids, active matter and complex flows;*
- *to stimulate the development of novel multi-scale methods and models;*
- *to disseminate the results towards other communities;*
- *to foster the multidisciplinary / multisectorial training of ESRs;*
- *to promote ESRs commitment towards outreach activities.*



# Scientific context and objectives

## (2/2)

- **Research directions:**
- **The Action will facilitate the exchange between 3 scientific communities:**
  - **Complex fluids**
  - **Active matter**
  - **Complex flows**
- **There is no other project or network facilitating this exchange**



# Working groups

- 1. Experimental techniques**
- 2. Numerical techniques**
- 3. Analytical techniques**
- 4. Applications, dissemination and outreach**



# Future Plans and Challenges

[What are critical phases to be implemented or topics to be addressed **for the upcoming year?**]

- A challenge will be to deploy the COST instrument in a way to maximize the exchange between communities that have not interacted much till today.