Brussels, 30 October 2015

COST 058/15

**DECISION**

---

Subject: **Memorandum of Understanding for the implementation of the COST Action "Between Atom and Cell: Integrating Molecular Biophysics Approaches for Biology and Healthcare" (MOBIEU) CA15126**

---

The COST Member Countries and/or the COST Cooperating State will find attached the Memorandum of Understanding for the COST Action Between Atom and Cell: Integrating Molecular Biophysics Approaches for Biology and Healthcare approved by the Committee of Senior Officials through written procedure on 30 October 2015.

**MEMORANDUM OF UNDERSTANDING**

For the implementation of a COST Action designated as

**COST Action CA15126**
**BETWEEN ATOM AND CELL: INTEGRATING MOLECULAR BIOPHYSICS APPROACHES FOR BIOLOGY AND HEALTHCARE (MOBIEU)**

The COST Member Countries and/or the COST Cooperating State, accepting the present Memorandum of Understanding (MoU) wish to undertake joint activities of mutual interest and declare their common intention to participate in the COST Action (the Action), referred to above and described in the Technical Annex of this MoU.

The Action will be carried out in accordance with the set of COST Implementation Rules approved by the Committee of Senior Officials (CSO), or any new document amending or replacing them:

a. "Rules for Participation in and Implementation of COST Activities" (COST 132/14);
b. "COST Action Proposal Submission, Evaluation, Selection and Approval" (COST 133/14);
c. "COST Action Management, Monitoring and Final Assessment" (COST 134/14);
d. "COST International Cooperation and Specific Organisations Participation" (COST 135/14).

The main aim and objective of the Action is to bridge efficiently the gap between atomic-scale structural determination and cellular-level in situ studies, by synergizing the power of spectroscopic, hydrodynamic, real-time microfluidic, thermodynamic and single-molecule approaches, thus shedding new light on intricate mechanisms involved in life and pathology and enabling significant discoveries of biomedical relevance. This will be achieved through the specific objectives detailed in the Technical Annex.

The economic dimension of the activities carried out under the Action has been estimated, on the basis of information available during the planning of the Action, at EUR 68 million in 2015.

The MoU will enter into force once at least five (5) COST Member Countries and/or COST Cooperating State have accepted it, and the corresponding Management Committee Members have been appointed, as described in the CSO Decision COST 134/14.

The COST Action will start from the date of the first Management Committee meeting and shall be implemented for a period of four (4) years, unless an extension is approved by the CSO following the procedure described in the CSO Decision COST 134/14.



COST is supported by the EU Framework Programme Horizon 2020

COST Association, International not-for-profit organisation/Association international sans but lucrative Register of legal Entities Brussels: 0829090573

COST Association
Avenue Louise 149 I 1050 Brussels, Belgium
t: +32 (0)2 533 3800 I f: +32 (0)2 533 3890
office@cost.eu I www.cost.eu

## OVERVIEW

**Summary**
Molecular-scale biophysics is a dynamic and ever-expanding interdisciplinary field that aims to study biological macromolecules and assemblies as a whole, at an intermediate level between atomic-resolution structural descriptions and cellular-level observations ("Between Atom and Cell"), with significant applications in biomedicine and drug discovery. The MOBIEU Action aims to seed a large-scale pan-European interdisciplinary synergistic clustering, allowing to ally and synergize the power of spectroscopic, hydrodynamic, real-time microfluidic, thermodynamic and single-molecule approaches.

This novel open network will create an optimal environment for the development of innovative integrative biophysical approaches, at the level of data acquisition, analysis and modeling, as well as for the design of unprecedented and ambitious combinations of methodologies, to decipher more efficiently crucial biological phenomena and to overcome significant biomedical challenges.

MOBIEU will also broadly disseminate knowledge, notably through the organization of a strong programme of workshops and Training Schools, and the setting up of a STSM scheme, aimed in priority to Early Career Investigators and technical scientists.

In parallel, it will place a special emphasis on the construction of a new distributed molecular-scale biophysics European infrastructure, aiming to facilitate the transnational access to instrumentation and expertise for a wide user community, in particular from Inclusiveness Target Countries.

Finally, MOBIEU will provide a platform for scientists to establish early contacts with instrument developers (at the level of concept or prototype), allowing to set-up win-win partnerships that will allow to define and develop together future instrumentation that genuinely meets the needs of the broad biomedical and life sciences communities.

| **Areas of Expertise Relevant for the Action** | **Keywords** |
|---|---|
| ● Biological sciences: Biophysics<br>● Biological sciences: Molecular biology and interactions<br>● Biological sciences: Biochemistry<br>● Nano-technology: Biophysics for nano-technology applications<br>● Medical biotechnology: Medical biotechnology, other | ● molecular-scale biophysics<br>● biomedicine and biotechnology<br>● hybrid and correlative integrative technologies<br>● R&D partnerships with instrument developers<br>● distributed Research Infrastructure |

**Specific Objectives**
To achieve the main objective described in this MoU, the following specific objectives shall be accomplished:

Research Coordination
● Find innovative ways for molecular-scale biophysics to contribute more deeply and more efficiently to deciphering crucial biological phenomena and overcoming significant biomedical challenges.
● Promote a genuine integration of technologies at the level of data acquisition, data analysis and modeling.

● Devise new multi-technological combined approaches to tackle more effectively a large variety of key biological and physic-chemical issues.

Capacity Building

● Provide a lively framework for the animation of a wide and ambitious pan-European molecular biophysics community with a substantial critical mass.
● Organise multiple theoretical and practical workshops and Training Schools, to spread knowledge about technologies, to allow the community to keep updated with fast-evolving methods and to illustrate the added value of integration of molecular-scale biophysical approaches.
● Establish a mutually agreed set of good laboratory practices and improved standard operation procedures (SOPs), protocols and standards, and to advocate them to ensure these are widely shared among and beyond the MOBIEU community.
● Undertake multi-laboratory benchmarking studies to establish the robustness and comparability of results obtained using different instruments in different places.
● Establish efficient mechanisms of transnational access to instrumentation and expertise, aimed at constructing a new distributed molecular-scale biophysics European infrastructure.
● Provide a platform for scientists to establish early contacts with instrument developers (at the level of concept or prototype), allowing to set-up win-win partnerships that will allow to define and develop together future instrumentation that genuinely meets the needs of the broad biomedical and life sciences communities.

# 1. S&T EXCELLENCE

## 1.1. Challenge

### 1.1.1. Description of the Challenge (Main Aim)

The interface between Physics and Biology (Biophysics) has been, for centuries, a fantastically rich environment for scientific and technological innovation. Recent ground-breaking advances include the development of Super-Resolution Microscopy (2014 Nobel Prize in Chemistry) and of fragment-based lead discovery approaches (yielding molecules that are now reaching the clinic, such as vemurafenib for melanoma).

The last few decades have seen the emergence of a large variety of cutting-edge biophysical techniques that have allowed very significant breakthroughs in the understanding of biomolecular mechanisms. The current challenge is to integrate and combine these different approaches in an effective way. The MOBIEU ("MOlecular Biophysics in EUrope") Action aims to ally and synergize the power of spectroscopic, hydrodynamic, real-time microfluidic, thermodynamic and single-molecule approaches. Only such a genuinely multi-technological integration of biophysical approaches to biological systems at the molecular scale can bridge in an efficient way the gap between atomic-scale structural determination and cellular-level in situ studies. This will allow scientists to shed new light on the intricate mechanisms involved in life and pathology, to disentangle more comprehensively their underlying complexity and to enable new developments in drug discovery.

An essential part of this Action will be to create a fertile environment for the translation of physical principles into novel marketable instrumentation and methodologies for life science and medical applications, which will be achieved through active collaboration with industrial partners.

### 1.1.2. Relevance and timeliness

The diversity of the approaches developed by biophysicists in academic and industrial environments is dazzling, and their creativity has been increasing exponentially in recent decades. Keeping up with the pace of discovery, enabling the breakthrough of truly meaningful innovations and ensuring they find relevant biomedical applications in an optimal time-scale is simply impossible at the level of individual laboratories, however outstanding they may be. Such a goal requires the alliance of a large diversity of centres of excellence (research laboratories and technological facility resources) with complementary expertise and intertwined strong points.

In the past, the tendency has been for technologically-oriented scientists to gather around a single core technology (crystallography, nuclear magnetic resonance, etc.), and it is only recently that, in fields such as atomic-scale structural biology (INSTRUCT) or biomedical imaging (EUROBIOIMAGING), initiatives have aimed at genuinely integrating a diversity of approaches, resulting in significant leverage effects.

The MOBIEU Action aims to seed a large-scale synergistic clustering in the field of molecular-scale biophysics. The timeliness of the need to unite the forces of molecular biophysics in Europe has notably been highlighted by the very recent emergence of the Association of Resources for Biophysical Research in Europe (ARBRE), an open pan-European initiative launched in June 2014 that has already attracted more than 70 resource laboratories/infrastructures/core facilities (with very different sizes and specialities) from all over Europe, and that will act as an incubator for the MOBIEU Action. At another level, the timeliness of the Action is also notably highlighted by the fact that the biological therapeutics market is increasing at a fantastic pace world-wide, creating a strong demand for novel biophysical quality control and characterization methods that a network such as MOBIEU will help fulfil.

## 1.2. Specific Objectives

### 1.2.1. Research Coordination Objectives

The objective of MOBIEU is to potentiate and coordinate a wide variety of transnational research projects, aiming to find innovative ways for molecular-scale biophysics to contribute more deeply and more efficiently to deciphering crucial biological phenomena and overcoming significant biomedical challenges.
Two principal avenues will be pursued:

1. Promoting a genuine integration of molecular-scale biophysical technologies at the level of:
    a. Data acquisition: MOBIEU will instigate the development of novel correlative and hybrid approaches, for instance multiple-detection analytical ultracentrifugation (AUC), combining fluorescence with light and small-angle X-ray scattering (SAXS), extending projects such as Open AUC*;* coupling of surface plasmon resonance (SPR) with spectroscopic methods such as surface-enhanced Raman scattering (SERS) or atomic force microscopy (AFM); combination of AFM with fluorescence and single-channel electrophysiology; and the expansion of plasmon waveguide resonance (PWR) in the mid infrared region. Simultaneously acquiring different read-outs from a single experiment not only saves time and reduces sample consumption, but also allows for a far more global and robust insight into the properties and mechanisms of the biological system under study. Finally, it reports much more powerfully on the complementarity of techniques than is possible by performing independent replicated experiments.
    b. Data analysis: MOBIEU will catalyse the design of novel integrative software allowing the global simultaneous analysis of data from different experiments using multiple technologies, building on the success of examples such as the software suite SEDPHAT (developed by an NIH group*).*
    c. Modelling: MOBIEU will stimulate the development of novel modelling algorithms, for instance to calculate macromolecular envelopes and high-resolution structures integrating constraints from several hydrodynamic and spectroscopic methods such as SAXS, AUC, light scattering, thermophoresis, viscometry, AFM and electron spin resonance (EPR).
2. Devising new multi-technological combined approaches to tackle more effectively a number of key biological and physico-chemical issues, such as:
    a. Obtaining, in close-to-physiological experimental conditions, molecular-level insight into the dynamic mechanisms of formation of molecular assemblies that occur in healthy and pathological states, with direct implications for the diagnosis, prognosis and treatment of a variety of diseases.
    b. Investigating in real time the molecular basis of processes controlling cell biology, such as cell differentiation and cell matrix deposition, by combining molecular biophysics technologies (such as quartz crystal microbalance (QCM-D) and AFM-based force spectroscopy) with classical and super resolution confocal live cell imaging.
    c. Shedding light on the nature of the coupling between binding and folding events involving partially or totally intrinsically disordered proteins, which represent more than 30% of eukaryotic proteins.
    d. Understanding thoroughly the structural and dynamic molecular features of the widespread interfacial processes that involve lipidic membranes and amphitropic proteins (that can exist alternatively in a water-soluble and a lipid bilayer-bound state).
    e. Unravelling the correlations between the thermodynamic and kinetic parameters of biomolecular interactions, notably between drugs (chemical compounds or biologics)


COST is supported by the EU Framework Programme Horizon 2020
COST Association
Avenue Louise 149 I 1050 Brussels, Belgium
t: +32 (0)2 533 3800 I f: +32 (0)2 533 3890
office@cost.eu I www.cost.eu

and their targets, as well as those involved in signalling pathways and host-pathogen interactions.

### 1.2.2. Capacity-building Objectives

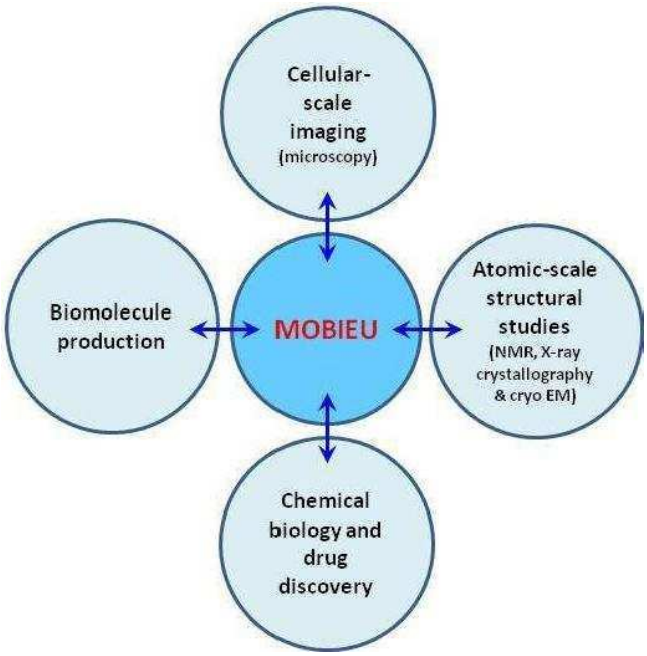
One of the major aims of MOBIEU is to organise and animate a pan-European molecular biophysics community with a substantial critical mass. A large number of European scientists are would-be members of this community, extending far beyond those currently associated with ARBRE. Some of the laboratories potentially concerned are more "research topic oriented", while others are more "technology oriented", with a focus on developing a specific expertise and/or organised as research infrastructures. There is tremendous potential for synergy in the drawing together of such a diverse set of researchers, unified by a common understanding of the capacity of molecular-scale biophysics to empower research discovery and innovation. But this community has not clustered up to now, due to a lack of communication and mutual acquaintance: this COST Action initiative will be the perfect opportunity for many laboratories in the field across Europe to overcome this relative isolation, with a significant positive impact on the reach of their research.
MOBIEU will pursue the following capacity-building objectives:

1. Training and human capacity development: the Action will organise multiple theoretical and practical workshops and Training Schools, to spread knowledge about technologies, to allow the community to keep updated with fast-evolving methods and to illustrate the added value of integration of molecular-scale biophysical approaches. It will also actively encourage human mobility through the setting-up of a Short-Term Scientific Mission (STSM) scheme, especially aimed at graduate and PhD students, Early Career Investigators (in particular post-doctoral trainees) and technicians/engineers (who are too often disregarded in other European mobility schemes).
2. Optimisation of data quality: the Action will endeavour to establish a mutually agreed set of good laboratory practices and improved standard operation procedures (SOPs), protocols and standards, and to advocate them to ensure these are widely shared among and beyond the MOBIEU community. Multi-laboratory benchmarking studies will also be undertaken to establish the robustness and comparability of results obtained using different instruments in different places (building on the experience of pioneering studies carried out in recent years for technologies such as SPR, circular dichroism and AUC).
3. Establishment of efficient mechanisms of transnational access to instrumentation and expertise: this is necessary on the one hand to avoid unnecessary duplication of costly investments across Europe, and on the other hand to enable investigators (in particular from Inclusiveness Target Countries) to design and perform experiments that they cannot carry out in-house. Several research centres active in the field of molecular biophysics have acquired in recent years significant experience into sharing instrumentation and ensuring it is open to a wide community, for instance within the INSTRUCT infrastructure, which is part of the European Strategy Forum on Research Infrastructures (ESFRI) road-map. This experience will be promoted and expanded to a much larger ensemble of laboratories (taking into account their local specificities), seeding a new distributed molecular-scale biophysics European infrastructure.
4. Partnership with instrument developers and manufacturing companies: MOBIEU will establish an active technological watch scheme, aiming to detect and evaluate as upstream as possible novel biophysical approaches of interest under development both in academia and industry. More specifically, it will aim to establish an efficient bidirectional win-win relationship with European instrument manufacturing companies, more specifically with the goal of defining collectively future instrumentation that meets the needs of the user community.

## 1.3. Progress beyond the state-of-the-art and Innovation Potential

### 1.3.1. Description of the state-of-the-art

MOBIEU spans the full spectrum of molecular-scale biophysical approaches that allow the study of biological macromolecules and assemblies as a whole, at an intermediate level between atomic-resolution structural descriptions and cellular-level observations ("Between Atom and Cell"). This dynamic and ever-expanding interdisciplinary field, of major significance in the improvement of health and the combating of disease, sits at the crossroads of several research areas which are linked together through it, as sketched in the following diagram:




The scope of technologies that are of relevance to MOBIEU includes (but is not limited to):

- hydrodynamic approaches: analytical ultracentrifugation (AUC), light scattering (dynamic and static), small-angle X-ray and neutron scattering (SAX&SANS), microscale thermophoresis (MST), electrophoretic mobility, precision viscometry, ...
- spectroscopies: fluorescence, infrared, circular dichroism (CD), Raman, electron spin resonance (ESR), nuclear magnetic resonance (NMR; for aims other than structure determination, e.g. the study of conformational dynamics and interactions), ...
- real-time biosensing based on: surface plasmon resonance (SPR), quartz crystal microbalance (QCM), plasmon waveguide resonance (PWR), interferometry (biolayer (BLI), dual polarization (DPI) or backscattering (BSI)), ...
- fast and ultra-fast kinetics using stopped-flow and temperature jump devices
- microcalorimetry: isothermal (ITC) and differential scanning (DSC), differential scanning fluorimetry (DSF).
- atomic force microscopy (AFM) and single-molecule approaches.
- structural mass spectrometry.

Presently, many biophysical laboratories and infrastructures are separately able to ensure the provision of excellence in experimentation and analysis. However, the range of technologies available at a given site is currently too often determined by the expertise and historical interests of local research groups. For a given question, there is a variety of different technical approaches that can help provide an answer, but the derived information depends on the approaches that are chosen.

Each technique has its strong points and pitfalls, and, to maximise the chances that the physical bases of phenomena of biomedical relevance are fully understood, their biophysical study should be driven not by the technologies locally available but by the research question or hypothesis to be investigated.
The solution clearly is the development of a synergistic network of expertise and technologies, which cannot all be hosted in one place (due to financial and spatial constraints) and arguably ought not to be (due to the desirability of an even sharing of resources). The technological synergies that currently exist in the field of molecular-scale biophysics are far from optimal, notably because infrastructural networks have been insufficiently comprehensive or open, and because the understanding of how each technique operates and what are its limitations is by no means universal.

### 1.3.2. Progress beyond the state-of-the-art

Much further beyond what has been achieved to date, MOBIEU will be a truly interdisciplinary network, that will enable teams of physical, chemical and biological scientists to nucleate together: this will allow them to rapidly identify and find novel ways to answer difficult biological questions through technological combination and integration potentiated by network-wide expertise sharing, thus reducing significantly the timescale needed to obtain solutions.
Together as a network, MOBIEU will find new ways to combine different biophysical methods, to an extent never attained previously, yielding a richer and more robust insight into biological systems and chemical biology. The Action will instigate a deeper integration of multiple approaches within one single experiment (or resorting to a single sample) and the development of integrative software suites, led by the aspiration to answer challenging biological questions more efficiently. This will be done in the context of an open network, within which the contrasting strengths of MOBIEU's member scientists will gear together to provide opportunities for the most effective implementation of biophysical methods currently possible.
Significant methodological breakthroughs are expected from such a novel set-up. Notably, MOBIEU will help catalyse the emergence of novel biophysical approaches, taking as examples the recent development of versatile electrically switchable nanolevers for the analysis of the dynamics of macromolecules and their assemblies, or of acoustic force spectroscopy to characterise interactions of biomedical relevance or intrinsically disordered protein domains at the single-molecule level.

### 1.3.3. Innovation in tackling the challenge

The MOBIEU Action will foster the development of novel biophysical integrative technologies and of novel multi-technological combinations (and generate new intellectual property), always driven by challenges posed by biological and biomedical questions. Such developments will be facilitated by MOBIEU's pledge to partner closely with (and attract into the network) instrumentation developers (academic or industrial, in particular SMEs), technological entrepreneurs and inventors. Many of the most innovative technologies that have been brought to the market in recent years have indeed been developed by start-up companies that originated from academia, or in the frame of public/private partnerships. Recent examples include native mass spectrometry and microscale thermophoresis (MST). Taking advantage of the breadth of its technological span and the wealth of expertise of its stakeholders, MOBIEU will ensure that fruitful contacts can be established with technology developers at an early stage (concept or prototype), in order to trigger active discussions about technique optimisation and biological applications. MOBIEU members will engage in evaluation tests (using the wide variety of biomolecular systems it has access to), joint research initiatives and R&D agreements (with industrial partners) to help stimulate a virtuous circle of innovation.
The track record of MOBIEU member laboratories and facilities in partnering with the commercial sector will provide an excellent basis for bringing together not only the dispersed expertise within the network, but also the financial and human resources of private companies, and the ideas and intellectual property of biophysical laboratories and facilities across Europe. MOBIEU will stimulate the mobility of researchers between academia and industry as a means of enhancing a culture of

longer-term, structured interaction and cooperation between both sectors in terms of knowledge transfer and development of cross-sector skills and competence.
Of note, MOBIEU will create an ideal environment to enable member technological core facilities to engage actively into methodological research, far beyond their traditional role as support structures. In parallel, MOBIEU will also devise novel processes concerning transnational access to biophysical instrumentation and expertise, as well as novel working models for biophysical facilities or contract research laboratories operating on a (partial or full) cost-recovery basis. Finally, MOBIEU will contribute novel optimized SOPs, protocols and standards that will be of interest to a broad scientific community, much beyond MOBIEU members.
All in all, the principle of openness within the MOBIEU Action, and its breadth of technology, will promote a more efficient and wider sharing of expertise, access and knowhow than available elsewhere in Europe or anywhere in the world in the field of molecular-scale biophysics.

## 1.4. Added value of networking

### 1.4.1. In relation to the Challenge

Only a coherent distributed network, involving a large diversity of academic and industrial research laboratories, facilities and infrastructural centres, can tackle with success the challenge of genuine multi-technological integration of molecular-scale biophysical methods, while minimising the risk of being too strongly biased by personal background and preferences. Large- scale networking is essential to ensure a comprehensive sampling of all biophysical techniques, which is needed to ensure that experimentation is driven by the biological questions being asked, and not by the techniques available locally at each site. The existence of the MOBIEU network will also allow to generate a significantly higher number of occasions for molecular-scale biophysicists across Europe to interact physically, thus fostering a dynamic seeding of novel joint research projects.
The synergies potentiated by networking will also be all-important to attain the capacity building objectives of MOBIEU, in particular through the constitution of operational working groups. For instance, only such a network will simultaneously allow for:

- regular contacts between members of the Action, allowing to identify more efficiently on the one side where the training needs are and on the other who has the capacity to provide the corresponding trainings. Thus, the Action will be able to set up highly valued and timely training events and STSMs to foster human capacity development within and beyond the molecular biophysics community.
- the constitution of a large representative core of laboratories accustomed to work together, which is a pre-requisite for undertaking efficiently large-scale benchmarking actions and comparability studies.
- the merger of the experience of many scientists with different backgrounds, that can be put to profit to elaborate community-wide protocols and guidelines, which in return can only become "universal" through implementation in and dissemination through the large laboratory base involved in the network.
- the exchange of first-hand experience that is required to coin an effective mechanism of transnational access to instrumentation and expertise.
- the creation of a common forum with instrument developers and manufacturing companies to allow a multi-centric evaluation of novel technologies and approaches in a biological context.

### 1.4.2. In relation to existing efforts at European and/or international level

To our knowledge, the only existing transnational network world-wide in the field of molecular- scale biophysics is the recently launched ARBRE initiative. Although the success of ARBRE in bringing together a large number of molecular biophysicists from across Europe has shown its timeliness, it

remains a loosely structured initiative. The current MOBIEU Action (which will build on the foundations laid by ARBRE) is of a clearly different level, with highly integrated working groups focusing on the tackling of specific challenges, with the aim of uniting the European molecular-scale biophysics community in a constructive and lasting manner.
The MOBIEU Action will be (to some extent) complementary to the ESFRI INSTRUCT (Integrated Structural Biology) infrastructure, which has enabled the set-up of an efficient network of facilities and Large Instruments (e.g. synchrotrons and neutron sources) in the field of atomic- scale structural biology. Of note, the structural biology pipeline implemented by INSTRUCT and its national affiliate structures (such as FRISBI in France) includes a "biophysical characterisation" step, which could be regarded as a very limited prefiguration of what the MOBIEU Action intends to attain. However, the current representation of molecular-scale biophysical methods within INSTRUCT is very much defined by the local expertise of only 6 INSTRUCT centres (out of a total of 16) that are active at this level, rather than having the kind of comprehensiveness and commitment to innovation and testing of new techniques that MOBIEU aims to achieve. Constructive relations will be established between MOBIEU and these 6 centres, thus enabling the set-up of a close partnership with INSTRUCT and, from there, mutually beneficial relations with the European structural biology communities.
Another key interplay is envisioned with biomedical imaging initiatives (e.g. EUROBIOIMAGING), in order to extend the multi-technological integration promoted by MOBIEU to the interface with microscopy-based techniques (fluorescence correlation spectroscopy, optical nanoscopy, etc.) that allow to answer related questions in the context of the cell. Similarly, close cross relationships will be established with the chemical biology communities, notably at the European level (e.g. EU-OPENSCREEN).
MOBIEU will also establish privileged links with the informal network Protein Production and Purification Partnership in Europe (P4EU), with whom a sub-group of Working Group 4 of MOBIEU (see section 3.1) will work to establish community-wide procedures for quality control of purified protein samples.
Potential interfaces can finally be foreseen with other ongoing or recent COST actions, such as "Advanced Paramagnetic Resonance Methods in Molecular Biophysics" (P15), "AFM4NanoMed&Bio" (TD1002), "Native Mass Spectrometry and Related Methods for Structural Biology" (BM1403), and "Understanding Movement and Mechanism in Molecular Machines" (CM1306).

# 2. IMPACT

## 2.1. Expected Impact

### 2.1.1. Short-term and long-term scientific, technological, and/or socioeconomic impacts

The MOBIEU Action will foster the emergence of a new community, focused on broadening expertise and inspiring novel methodological development at the interface of biology, physics and chemistry. This will be beneficial for both academic and industry sectors involved in the fields of biomedical and life sciences, complementing and expanding existing atomic-scale structural biology initiatives, and bridging the gap with those focused on cellular-level imaging.
The Action, through active engagement with technology developers (in academia and industry), will contribute to the development of novel methodologies and technologies, and of ways to push existing biophysical instrumentation in novel directions beyond state-of- the-art. The breadth of the MOBIEU network will allow to rapidly assess new experimental approaches before they become established as mainstream methodologies, and to evaluate (through benchmarking studies) how innovative and useful for biomedical applications is a new technology before it is made available commercially. This will have a large impact on both the institutions (academic or industrial) that develop these


COST is supported by the EU Framework Programme Horizon 2020
COST Association
Avenue Louise 149 I 1050 Brussels, Belgium
t: +32 (0)2 533 3800 I f: +32 (0)2 533 3890
office@cost.eu I www.cost.eu

technologies and on those institutions (notably within Inclusiveness Target Countries (ITC)) that would want to have access to these innovations as early as possible and wonder whether investing in them is justified.
MOBIEU will also provide a platform for training in the operation of instrumentation, in experimental design and in data analysis, as well as for sharing ideas regarding established and novel protocols. Training will be aimed in particular at Early Career Investigators (ECI) and technical scientists from both academia and industry, with a large variety of backgrounds (life sciences, medicine, physics, chemistry, engineering, bioinformatics, etc.). This will drive an increase in the general awareness of and knowledge about molecular biophysics methods among the broader scientific community, and promote the dissemination of the novel techniques and approaches evolved by the Action to scientific areas outside the MOBIEU community. In turn, this will have a huge impact on institutions across Europe where these methods will be used and further taught to the local staff and students, leading to better time- and cost-efficiency and increased quality of research.
Furthermore, the large-scale comparability studies in which the Action will be involved will help in the development of suitable standards and reagents, and in the standardization of equipment control procedures and good laboratory practices across Europe. This will raise the quality of the data that are generated by the community to the highest standards, and downstream will increase the quality of the resulting publications and so, in the long-term, the quality of grant submissions. This consolidation process will also help the molecular biophysics facilities and infrastructures upgrade their quality management procedures. Furthermore, it will be of major interest to pharmaceutical companies, several of which are already involved in this Action, to help them optimise their SOPs. This general enhancement of practices will help to ensure the reliable applicability of the results of research, and lead to improved design and manufacture of therapeutics, for the benefit of society at large.
One of the important goals of MOBIEU will be to provide a privileged forum between biophysical scientists and instrument manufacturers (several of which are already associated to the Action), in particular small European start-up companies, to garner feedback on their concepts from the community that is likely to use and purchase their instrumentation. The Action will greatly help the manufacturers, by optimising the "Gartner Hype Cycle" for emerging technologies, allowing to discriminate the new technologies that won't survive the initial hype from those that are truly innovative and useful for the life sciences community, and for which commercial viability has to be ensured. This will potentially have a large impact on the long-term direction of biophysical instrumentation development and on the instruments that research institutions will purchase, thus helping to deliver the right tools for the right laboratories across Europe. This will also have a significant socioeconomic impact by helping novel instrument manufacturing companies to emerge, with positive knock-on effects in terms of job creation and consolidation of the European biotechnological industry.

## 2.2. Measures to Maximise Impact

### 2.2.1. Plan for involving the most relevant stakeholders

Important efforts have already been made through a variety of channels (web-mining, networking at scientific meetings, word-of-mouth) to identify and attract relevant stakeholders from all over Europe (in particular ITCs), with significant success.
Minimal criteria for participation to MOBIEU are:

- provision of access to biophysical instrumentation (and relevant training) for a scientific community.
- provision of expertise and/or services in the field of molecular-scale characterisation of biological systems.
- participation in methodological research driven by biological/biomedical questions.

Preliminary contacts have already allowed MOBIEU to attain a significant critical mass, and drawn >100 academic and industrial participants from the following 18 COST countries (among which 7 ITCs) to be actively involved in the preparation of the Action or to state their strong interest in future participation: Austria, Belgium, Czech Republic, Denmark, France, Germany, Hungary, Italy, Lithuania, Netherlands, Poland, Portugal, Republic of Serbia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.
However, the potential number of participants to the MOBIEU Action exceeds by far those that have already been involved. Identifying and attracting new participants to the Action is one of the major tasks of Working Group 1 (see section 3.1.1. below). All MOBIEU members will be provided with a slide pack and other promotional material to assist in the recruitment of both academic and industrial new stakeholders.
To attract new academic stakeholders (both from research laboratories and core facilities/infrastructures), an important web-mining effort will be continued, resorting among other means to scientific social networks (ResearchGate, LinkedIn, etc.). A variety of European and international mailing-lists will also be used, including those of ARBRE, the European Biophysical Societies Association (EBSA) and of each national biophysical society. Participation of MOBIEU members in scientific/technological congresses, forums and events, and the writing of position and opinion papers will also be used as a means to invite new participants to establish contact and express their interest. Special attention will be focused on participants from ITCs and on ECI.
Significant efforts will also be deployed to attract new participants from industry, more specifically from pharmaceutical companies and contract research organizations on the one side, and from instrument manufacturing companies on the other. At this level, word-of-mouth and direct personal contacts propagated by each of the MOBIEU members will play a key role.
Networking activities organised by the MOBIEU Action will also help to raise public awareness about its importance, and to liaise with structural biologists, biologists at large, biotechnological and health sector industries and public authorities.
Finally, a key element in the attractiveness of MOBIEU is its long-term future prospects aimed at ensuring its sustainability beyond the 4 years of COST funding: a variety of associated projects is already being devised at present, involving several members of the Action (and potentiated by it), special attention being given to European funding schemes such as Marie Sklodowska-Curie, Research Infrastructure (Integrating Activities), Teaming and Twinning (to cement the relations with members from ITCs), and Innovation in SMEs (for its industrial members).

### 2.2.2. Dissemination and/or Exploitation Plan

The members of the Action share a strong will to build broad scientific and human relationships within and outside Europe. All consortium partners are ideally suited for the strongest possible networking actions, all being able to talk to their governments at different levels, all being strongly interdisciplinary and able to dialogue not only with biophysicists but with physicists, chemists, biochemists, biologists, medicinal chemists, medical doctors, etc., all involved in teaching, and all with proven ability to organise international scientific events.
MOBIEU will disseminate its results and information about its activities to six types of target audiences: 1) the biophysical community, 2) the broader scientific community, 3) the pharmaceutical industry and contract research organisations, 4) the instrument manufacturing companies, 5) the policy and decision makers at national and European levels, and 6) the general public.
One of the principal dissemination tools will be a high-grade web-site (with information relevant to all target groups), that will include:

- a database of member laboratories (with information about their instrumentation and expertise) to facilitate access, sharing and mobility initiatives, and joint research project set-up

- information about meetings and training events, mobility opportunities and the STSM scheme
- guidelines, manuals, protocols and tutorials
- standards for good laboratory practice and quality control
- links to publications and presentations directly emanating from MOBIEU

MOBIEU will adapt its other dissemination efforts to the specificities of each target group:

1. the emphasis will be placed on making molecular biophysicists aware of the existence of MOBIEU, through publications and position papers in peer-reviewed scientific/technological journals (focused on biophysics or method development, or more general), presentations at major international congresses and meetings, and participation in workshops and courses (beyond those organized by MOBIEU). This will allow MOBIEU to attract new academic members, focusing in particular on Early Career Investigators.
2. beyond publications and conferences, dissemination tools will include seminars in key research institutions across Europe, and training and teaching actions focused in particular on graduate and PhD students and on technical staff, especially in ITCs, with a variety of scientific backgrounds.
3. MOBIEU members will participate in industry exhibitions and forums, and use all possible means to establish personal relations with R&D scientists and decision makers, facilitating in particular the dissemination of SOPs, protocols and standards and the participation of pharma industry biophysical analysis facilities in multi-laboratory benchmarking activities and research projects.
4. MOBIEU members, as users and developers of biophysical instrumentation, will work hand-in-hand with manufacturing companies to promote novel relevant technologies, notably through the co-organization of showcasing events. Progressively, the win-win relations that will be established will bring these companies (especially those that are at a starting phase) to become partner members of MOBIEU.
5. Policy and decision makers, and organisations that influence industrial, public and political opinion, will be provided with the necessary information as to how the European society can benefit at a variety of levels (see above) from the implementation of solutions generated by the MOBIEU Action.
6. MOBIEU will actively contribute publications and presentations in scientific popularisation media and other media oriented towards the general public, to lead it to endorse biophysical research efforts in Europe. It will also engage in public outreach activities, targeted in particular at high school children (open doors events, science days, and presentations and mini-workshops in schools) to generate new interest and attract new people to this critical field for biomedical research.

## 2.3. Potential for Innovation versus Risk Level

### 2.3.1. Potential for scientific, technological and/or socioeconomic innovation breakthroughs

The pledge of MOBIEU to foster the integration of multiple detection and measurement physical techniques within a single experiment will no doubt lead to significant methodological breakthroughs and generate novel intellectual property. Networking will have significant leverage effects at this level, maximizing the chances of success of such ambitious endeavours. It is important to highlight that several members of the Action have already been involved in pioneering projects leading to correlative and hybrid innovations, involving for instance combined single-channel electrical conductance/fluorescence microscopy, SAXS/AUC and SPR/Raman approaches, allowing an increasingly cost- and time-efficient application of techniques. Current MOBIEU members have also

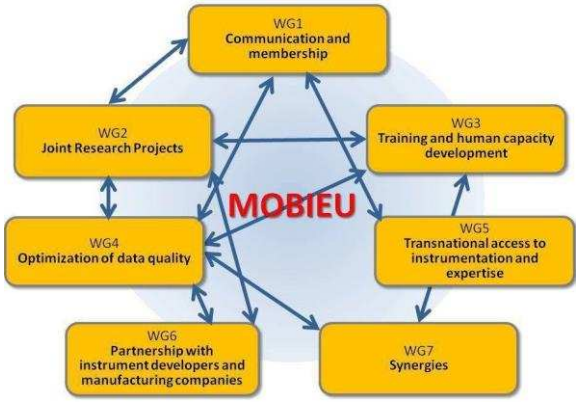
already been at the forefront of the development of novel methods in data analysis and modelling (for example of hydrodynamic data).
There are currently no networks that allow scientists specialised in molecular-scale biophysical instrumentation to share ideas on innovative strategies. MOBIEU would explicitly address this need and constitute an important new forum owing to its combination of openness and a focus on technique evaluation, use, development and sharing. The realism of this aim is underpinned by the complete coverage of current technology among the laboratories and facilities involved in the Action, allowing an unparalleled ability to compare techniques and develop new methodological approaches.
The inclusion of industrial members within the Action will make it an excellent arena for pioneer developers and manufacturers of novel instruments to test and validate their technologies against the competition and against the full range of different possible biomedical applications. The sheer range of biological systems under study among MOBIEU members will provide an opportunity to explore comprehensively the ways in which innovations can be implemented. The MOBIEU Action will also provide a forum for feedback to companies and for constructive criticism, which will help in developing the techniques and in pinpointing faster which are most useful for a particular research question or type of biological system.
At this level, the two principal risks are (i) that insufficient breadth of expertise and push for innovation are included in the MOBIEU network (ii) that the Action fails to engage instrument manufacturers as efficiently as intended. Other risks are addressed in part 3.1.3.
Regarding the first concern, the present network involved in the Action already encompasses expertise in all current biophysical methods of relevance to biomedical research, and its record in terms of methodological development is sizeable and will no doubt be enriched by the intake from new members, in particular inventive ECI. Furthermore, the MOBIEU research programme is sufficiently robust and advanced to be able to absorb innovations efficiently. The established cooperative bonds of MOBIEU network members with the ESFRI infrastructures (INSTRUCT, EU-OPENSCREEN, EUROBIOIMAGING, ELIXIR, EuBI, EATRIS) and their intertwining with the European and global biophysical community will allow this Action to track changes in the field in a timely manner and to be a promising interface for the absorption of knowledge and the building of collaborations beyond interdisciplinary borders. Concerning the second issue, the experience so far is that both small and large European companies are very interested in engaging with the MOBIEU COST Action, precisely because they sense that MOBIEU will be of value to them, by helping them to focus and prioritise the development of new technologies, and then to deploy them and make them available at large scale.

# 3. IMPLEMENTATION

## 3.1. Description of the Work Plan

### 3.1.1. Description of Working Groups

This MOBIEU will be initially structured in 7 autonomous Working Groups (WG), each of them led by two coordinators, paying particular attention to gender balance, and to representation of ECI and of members from ITCs. The WGs will ensure that the goals of the Action are realised, by focusing on the following topics (the timeline being provided in the Gantt Diagram in section 3.1.2):




**WG1: Communication and membership**

The objective of WG1 will be to promote the network and to organise plenary Action meetings, as well as to identify and attract new stakeholders, and establish a comprehensive searchable member database. WG1 will also set-up the Action website and continuously update and improve its contents.

- *Task 1:* Organize two plenary meetings per year (Deliverables 1) to meet face-to-face with all members of the Action.
- *Task 2:* Set-up a website (Deliverable 2) that will be an effective support for both internal and external communication.
- *Task 3:* Create a comprehensive member database (Deliverable 3), including information such as instrumentation available at each site, expertise of each member and access modes, and that is searchable by members as well as non-members.
- *Task 4:* Identify new stakeholders involved in molecular-scale biophysics research across Europe and actively approach them to discuss their integration into the Action, using a promotional slide pack as a support. Results of these contacts (Deliverables 4) will be presented at plenary MOBIEU meetings.
- *Task 5:* Engage with scientific popularisation media and policy-making institutions to promote the European molecular biophysics research (Deliverable 5) and show how, when forces are joined, this leads to world leadership.

**WG2: Joint Research Projects**

The objectives of WG2 will be to propose, catalyse, set-up and follow-up collaborative research projects, each involving several MOBIEU partners, aimed at developing novel methodologies/technologies and software (more specifically aiming to integrate several biophysical approaches) or answering biological questions using unprecedented and ambitious combinations of biophysical methodologies.

- *Task 1:* Identify all relevant ongoing projects (in relation with WG1) that could benefit from involving new MOBIEU partners (one example is the Scattering-AUG Equipment (SAUCE) project, aiming to develop an ultracentrifugal sample environment that will facilitate the simultaneous acquisition of SAXS/SANS and hydrodynamic data for complex non-crystalline systems). The list of projects (Deliverable 6) will be discussed during a special session at a plenary MOBIEU meeting.
- *Task 2:* Support the ongoing projects to expand and adapt their objectives, and provide ideas and advice as to how to obtain additional funding.
- *Task 3:* Identify areas and questions (Deliverable 7) that could be addressed by new research projects and the corresponding expertise that needs to be mobilised within the network, in relation with WG1 (an example is finding new ways to combine AFM, NMR, CD, fluorescence spectroscopy and light scattering/viscometry, together with optical microscopy and



COST is supported by the EU Framework Programme Horizon 2020

COST Association
Avenue Louise 149 I 1050 Brussels, Belgium
t: +32 (0)2 533 3800 I f: +32 (0)2 533 3890
office@cost.eu I www.cost.eu

electrophysiology, to further determine the features and functional implications of structural disorder, or to obtain new insights into viral pathogenesis).

- *Task 4:* Promote the formation of operational project consortia (Deliverable 8) involving several MOBIEU partners and help to catalyse the writing of grant applications for these projects, at a national, European and intercontinental level.

**WG3: Training and human capacity development**

The objective of WG3 will be to stimulate the organisation of workshops and Training Schools (both for MOBIEU members and the scientific community in general), and of human mobility (STSMs, aimed more specifically towards ECI and technical staff).

- *Task 1:* Identify the needs and priorities in training and human capacity development. A survey will be conducted, to incorporate the community feedback on the subject. The survey results (Deliverable 9) will be published in the Action website and discussed at a plenary MOBIEU meeting.
- *Task 2:* Put together an integrated and comprehensive program for training and human capacity development (Deliverable 10), based on the outcome of task 1.
- *Task 3:* Promote the organisation of a minimum of 3 Training Schools and 3 workshops (Deliverables 11), addressing specific technological issues or covering a broad integrated ensemble of biophysical approaches to biological questions.
- *Task 4:* Set up a STSM program (Deliverable 12), aimed at fostering the integration between technologies and the exchange of expertise, and at potentiating joint research programs (in relation with WG2) and benchmarking actions (in relation with WG4).

**WG4: Optimisation of data quality**

The objective of WG4 will be to establish good laboratory practices and improved standard operation procedures (SOPs), protocols and standards that can be applied within and beyond the MOBIEU community. It will also stimulate and set-up multi-laboratory benchmarking studies to determine the comparability of results obtained and procedures followed on different instruments in different places.

- *Task 1:* Perform a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of biophysical methods to identify in particular which practices need consolidating, where there are opportunities for method development or integration, and where there is risk of inappropriate use of techniques or methods of analysis. Results (Deliverable 13) will be published in the Action website and discussed at a plenary Action meeting, in particular with WG2 and WG6 members.
- *Task 2:* Identify priorities for SOP, protocol and standard development (Deliverable 14).
- *Task 3:* Set-up multi-laboratory studies and elaborate improved SOPs, protocols and standards based on their findings. Results (Deliverable 15) will be reported and discussed during a plenary MOBIEU meeting, to gather feedback from MOBIEU members not directly involved in WG3.
- *Task 4:* Disseminate the SOPs, protocols and standards to all MOBIEU network nodes, and follow up on their implementation via direct contacts between WG4 members and MOBIEU laboratories. Gather information on the outputs that have proved widely transferable and that have enabled improved practices or research successes, as well as on the issues that have been identified upon implementation, to allow follow up and fine adjustments. Publish final results (Deliverable 16) in the Action website and as papers in peer-reviewed journals.

**WG5: Transnational access to instrumentation and expertise**

The objective of WG5 is to promote efficient mechanisms of access and sharing of both instrumentation and expertise that, as far as possible, can be harmonised across Europe.

- *Task 1:* Identify the teams (e.g. INSTRUCT centres) that have already organised processes for access and sharing (in connection with WG1) as well as those that currently have no organised mechanism of access, but would like to.
- *Task 2:* Collect the experience of the teams that have already organised their access. Summarise relevant information, including access modes, tariffs, additional financial support, and quality management. Match problems encountered with solutions identified. Results (Deliverable 17) will be presented during a plenary Action meeting.
- *Task 3:* Propose mechanisms (Deliverable 18) to promote transnational access within all MOBIEU centres that are willing to participate, particularly those with specific/singular instrumentation and expertise, leading to more efficient processes at the levels of instrument access, data analysis, STSMs, trainings, user visits and collaborative research projects.
- *Task 4:* Set-up a formal application (Deliverable 19), as a "Starting Community", for a Horizon 2020 Research Infrastructure Integrated Activity (INFRAIA call), to support and promote transnational access to molecular-scale biophysical instrumentation in an even more effective manner.

**WG6: Partnership with instrument developers and manufacturing companies**

The objective of WG6 will be to carry out an active technological watch, with the aim of detecting and evaluating as early as possible novel biophysical approaches of interest. It will also aim to establish win-win partnerships with European instrument manufacturing companies, with the goal of helping to define future instrumentation that meets the needs of the biomedical and life sciences user community, within MOBIEU and beyond.

- *Task 1:* Set-up a mechanism (Deliverable 20) for continuous upstream detection of novel physics-based methods and technologies under development that could be applied to solve biological questions.
- *Task 2:* Identify the corresponding academic or industrial (manufacturing companies) partners and approach them. Results of these initial contacts (Deliverable 21) will be presented during a plenary Action meeting.
- *Task 3:* Set-up impartial multi-laboratory comparative studies (in relation with WG4), to evaluate the potential of new methods with relation to existing ones, and joint methodological research projects (in relation with WG2), to help consolidate novel methodologies and expand their field of applicability to biological questions (Deliverable 22).
- *Task 4:* Establish R&D partnerships (Deliverable 23) with the relevant developers and involve them in the MOBIEU Action (as members or associates).

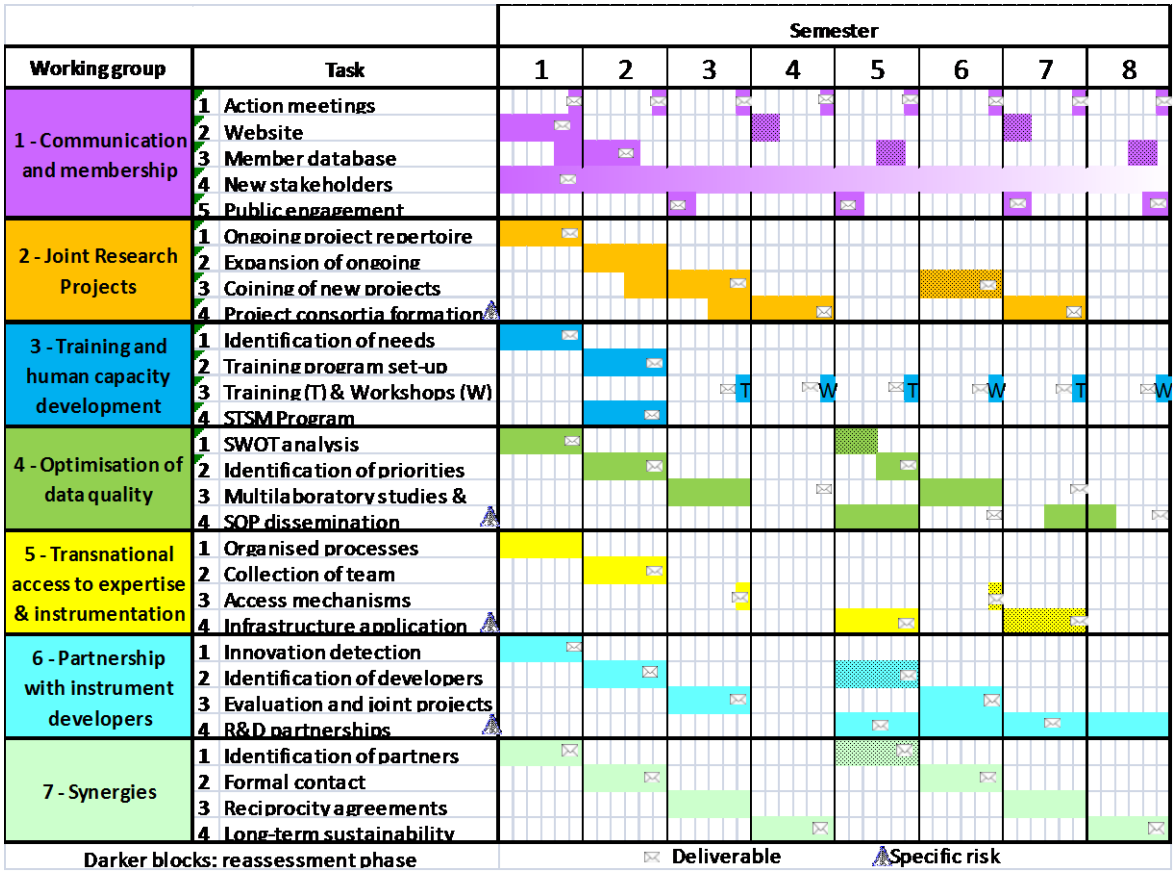
**WG7: Synergies**

The objective of WG7 will be to develop constructive interactions with other scientific/technological communities, such as informal networks (ARBRE, P4EU), formalised ESFRI infrastructures (INSTRUCT, EU-OPENSCREEN, EUROBIOIMAGING, ELIXIR, etc.) and learned societies (EBSA, Biophysical Society, etc.).

- *Task 1:* Identify all organisations, networks and interest groups with which MOBIEU should be interfacing or partnering. Results of this survey (Deliverable 24) will be presented and discussed at a plenary Action meeting to establish priorities.
- *Task 2:* Establish formal contact with the selected partners and devise potential synergies and joint activities, such as workshops and Training Schools (in relation with WG3) or interdisciplinary benchmarking studies or position papers (in relation with WG4). A list of potential activities (Deliverable 25) will be drawn and discussed at a plenary Action meeting.
- *Task 3:* Seek reciprocity, i.e. active participation and contribution of MOBIEU to events and activities organised by its partners.

- *Task 4:* Prepare a plan for long-term sustainability and operational stability of MOBIEU's relations with its partners (Deliverable 26). Relevant options for further cooperation will be identified and presented at a plenary Action meeting.

### 3.1.2. GANTT Diagram




### 3.1.3. PERT Chart (optional)

Not Applicable

### 3.1.4. Risk and Contingency Plans

The Action aims at covering all potential issues through a large panel of seven focused WGs that will be the key to the success of the Action. However, several risks could threaten the implementation of the MOBIEU work plan, some of which were already identified and addressed in section 2.3.
Four tasks of the work plan have been highlighted in the Gantt diagram above as presenting present risks that will be addressed as follows:

- WG2 and WG5: failure to succeed in grant applications -7 active support will be sought from institutional grant offices and National Contact Points to optimise the writing of proposals, and potential funding sources will be diversified.
- WG4: failure to roll out efficiently SOPs and protocols -7 the SWOT analysis and the dissemination plan will be thoroughly re-assessed and
- WG6: failure to establish efficiently R&D partnerships with instrument manufacturers -7 active support will be sought from institutional legal and technology transfer offices to overcome regulatory and contractual issues.

Finally, the life and dynamic of the network could be globally threatened by two further risks:

- failure of the members to work together effectively for the good of the Action



COST is supported by the EU Framework Programme Horizon 2020

COST Association
Avenue Louise 149 I 1050 Brussels, Belgium
t: +32 (0)2 533 3800 I f: +32 (0)2 533 3890
office@cost.eu I www.cost.eu

- failure of the members to maintain engagement on the long run.

Concerning the first, some of the Action members already have, at a small scale, shown their capacity to work together, either by organizing pilot meetings, workshops and courses in several European countries (including ITCs such as the Czech Republic and Portugal) or by launching and participating to trial benchmarking exercises, several of which are on the way to being published. These preliminary successful synergies make it highly likely that the community can largely expand these successes in the framework of a structured Action. On the second issue, the MOBIEU management will limit the probability that members disengage because they are too busy or because other commitments take priority, by actively ensuring that individuals are recognized and valued for their participation in MOBIEU, notably by their host institution.

## 3.2. Management structures and procedures

The success of the consortium depends on an effective management structure tailored to the complexity of the MOBIEU initiative with good communication channels. Gender balance and participation of ITCs at all the management levels of the Action will be actively promoted.
The Action will be governed by a Management Committee (MC), operating according to COST implementation rules. The MC will meet regularly over the web (using appropriate web- meeting tools) and twice a year in person: it will be in charge of reviewing the achievements of the Action, proposing solutions for pending problems, determining the general strategic direction of the Action and deciding on major management, networking, and dissemination issues.
Emanating from the MC, a Steering Committee (SC) composed of 8 elected members (including Chair and Vice-Chair) will be established, in particular to oversee the activity of the WGs and to ease cross-interactions. Each WG will have a privileged contact person within the SC. Any modification of the strategic goals and activities of the WGs, as well as propositions for creation/closure of a WG, will be reviewed by the SC prior to submission to the MC.
The WG structuring of the network will indeed be dynamic: new WG initiatives will be encouraged to emerge in a bottom-up fashion by issuing regular calls for ideas. Conversely, the SC will conduct intensive brainstorming and monitoring of the world-wide context of molecular biophysics (through mining of the web content, publications and scientific events) to detect potential issues to be addressed by novel WGs.
Each WG will be headed by a duo, which is the best format to ensure robustness, and it is expected that the targeted activities of the WGs will be a key factor for the ambitious outputs of the Action. The WGs will be able to propose to adapt their activities to a changing context (to be approved by the MC). They will meet regularly over the web, and at least annually face-to-face, at the same time as the MC and plenary meetings of the Action.
To facilitate communication between Action members, mailing-lists and e-mail aliases will be set-up at each level of information exchange (network in general, MC, SC, and WGs).
To maximize attendance, MC and plenary Action meetings will, as often as possible, be coupled to international congresses of relevance to the MOBIEU community, for example those organised by EBSA, the Protein Society or "Core Technologies for Life Sciences" (CTLS).

## 3.3. Network as a whole

One of the principal singularities and assets of this Action is that it brings and blends together a large ensemble of partners with highly complementary expertise: 1) top-level laboratories that conduct either method-oriented or biology-oriented research of excellence; 2) core facilities/infrastructures, recognised at a regional, national or European level, that provide access to cutting-edge biophysical instrumentation and expertise to a wide scientific community; 3) biophysical characterisation

laboratories from pharmaceutical industry and contract research organisations; 4) instrument manufacturing companies.
Through upstream work, the network of proposers of MOBIEU, together with the large number of laboratories (and companies) across Europe that has expressed a strong interest in joining the Action at a further stage, has already attained a sizeable critical mass (with a close to balanced gender distribution), covering quite thoroughly the rich field of molecular-scale biophysics. The Action network can however still be strengthened significantly by new members to be identified and attracted, in particular ECI (who are too sparsely represented in the initial network) with distinct personal backgrounds and expertise, helping them to overcome the relative isolation they might experience at the beginning of their career.
The Action members are genuinely distributed all over Europe, including a significant proportion of members from ITCs. The Action will carry on with its efforts to include members from countries that are still not represented and attain an even pan-European geographical distribution, which will be a key for the full success of its dissemination plan, especially when aiming to reach the broader scientific community, the policy and decision makers, and the general public.
All in all, the MOBIEU network, by uniting forces and knocking down barriers, will undoubtedly help the European molecular-scale biophysics community to remain at the forefront of the international competition.


COST is supported by
the EU Framework Programme
Horizon 2020
COST Association
Avenue Louise 149 I 1050 Brussels, Belgium
t: +32 (0)2 533 3800 I f: +32 (0)2 533 3890
office@cost.eu I www.cost.eu