EUROPEAN COOPERATION
IN SCIENCE AND TECHNOLOGY

Electrical discharges with liquids for future applications
TD1208

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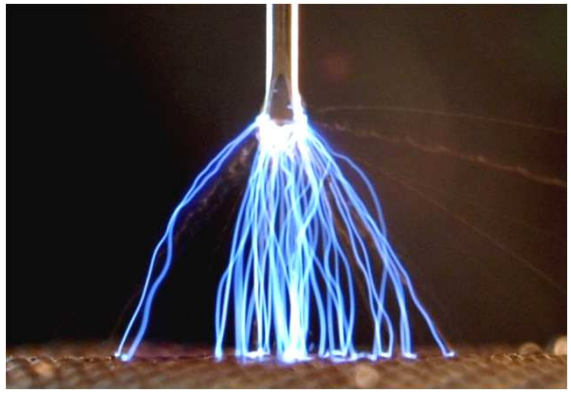
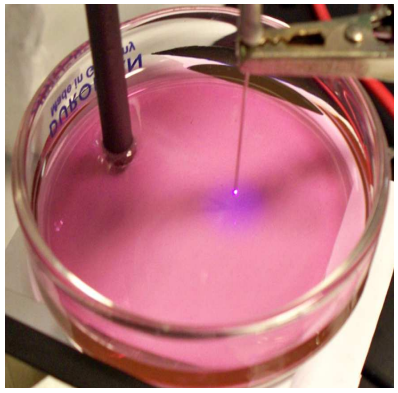
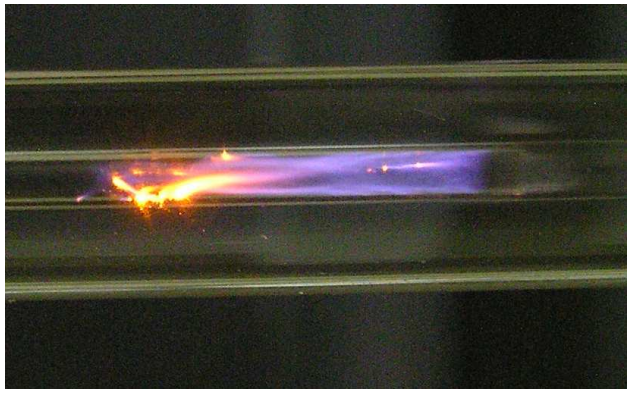
Chair **Grant holder** **Secretary**

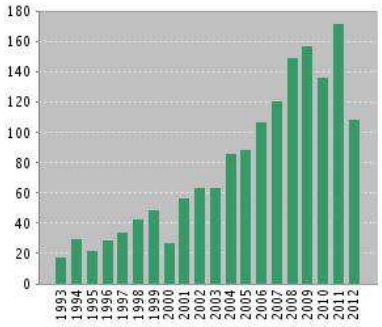
Reasons for the Action

Very hot topic opening new dimensions in non-equilibrium wet chemistry with consequent applications in

- organic synthesis
- water treatment
- nanoparticle formation
- surface treatment
- biomedicine

It is necessary to establish a broad interdisciplinary research network based around existing European infrastructures.

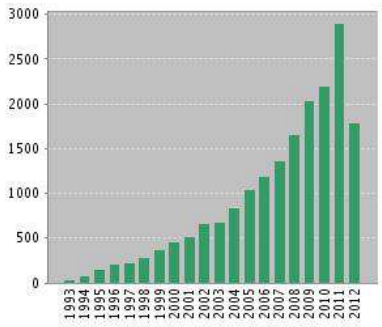
Applied research projects with industrial partners will be developed based on this platform.



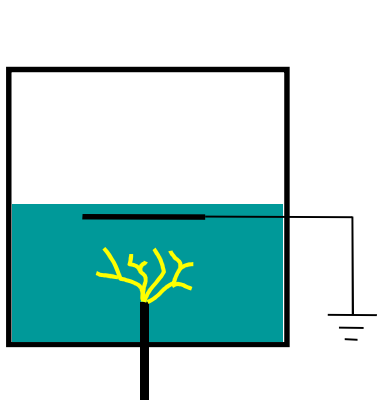
publications

discharge AND plasma AND liquid – Web of Science 27.9.2012

citations

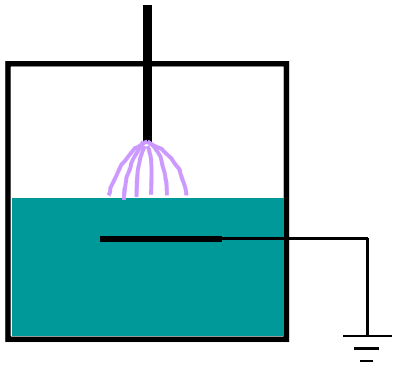


Applicable plasma-liquid systems



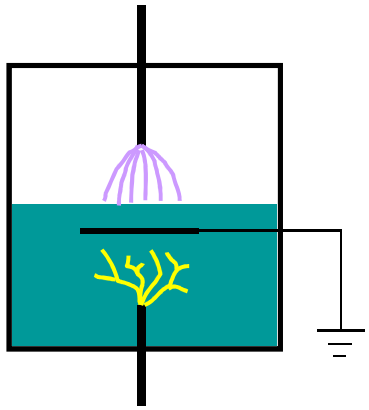
Under liquid discharge
Corona, spark, arc, pin-hole discharges, laser induced discharges

needed E>1 MV/cm



Gas phase discharge
Corona, glidarc, glow discharge, plasma jets

needed E>30 kV/cm

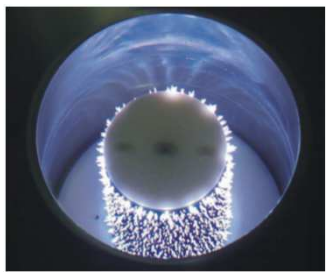


Hybrid systems

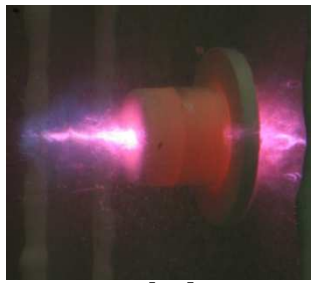
needed E>1 MV/cm

Possible power supplies
DC, AC, HF, RF
(nanopulsed), pulsed, continuos

point to plate

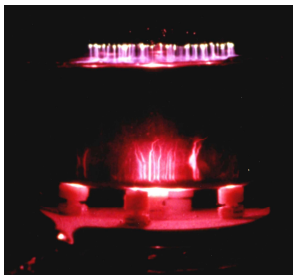


coaxial composite



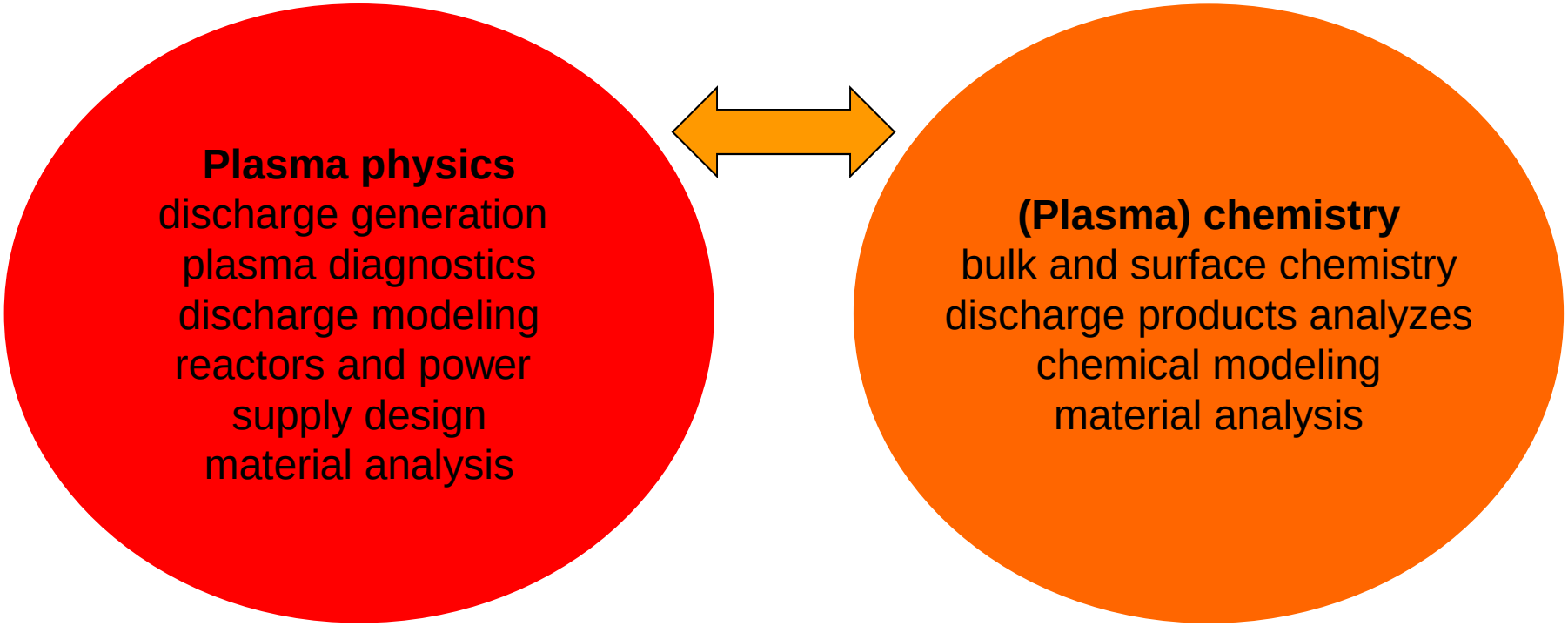
pin-hole

above water

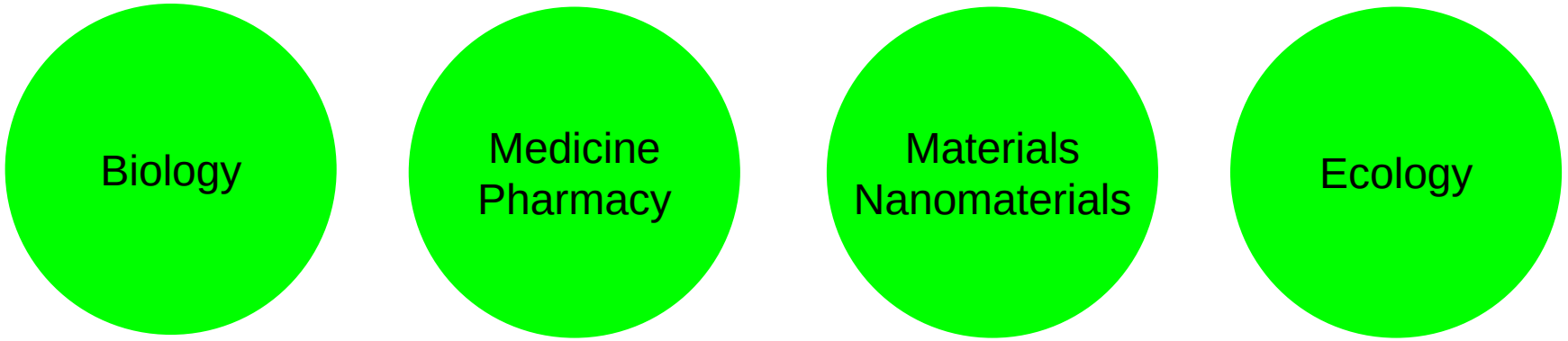


hybrid

Structure of experts

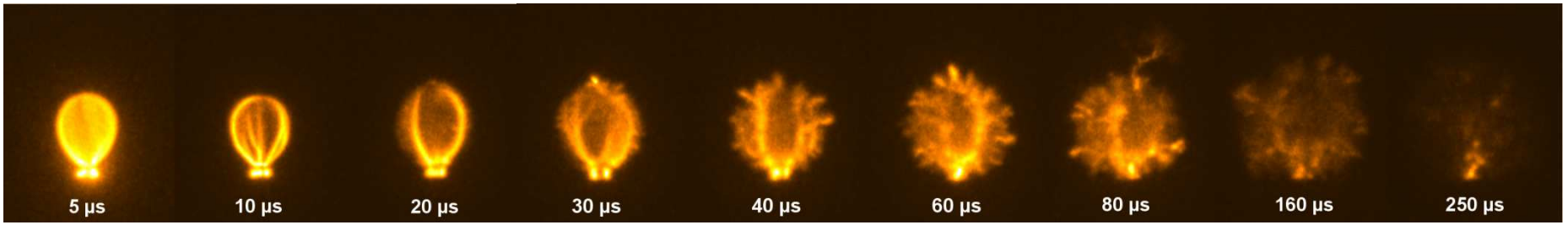


Applied research



Action objectives

1. To understand discharge ignition mechanisms directly in the liquid phase.
2. Identify and understand fundamental physical phenomena in plasma-liquid interactions.
3. Identify the dominating chemical processes in liquids initiated by plasmas.
4. Develop physical-chemical models linked to the topic.
5. Control and utilize the strong non-equilibrium chemistry initiated by plasma-liquid interaction.
6. Develop strategies for specific interdisciplinary applications of the plasma-liquid systems for technological practice.



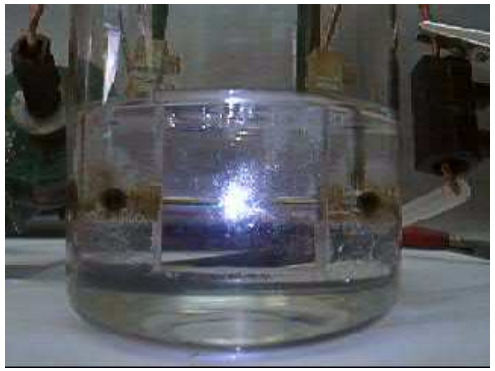
pulsed corona in air bubbles

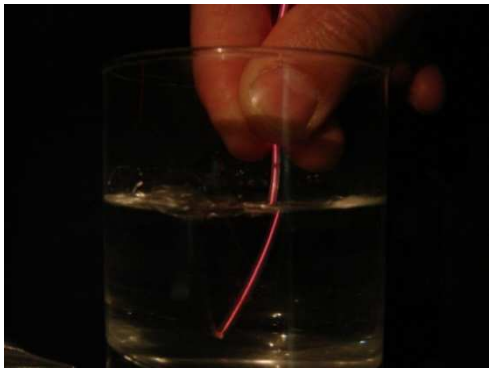
Target groups

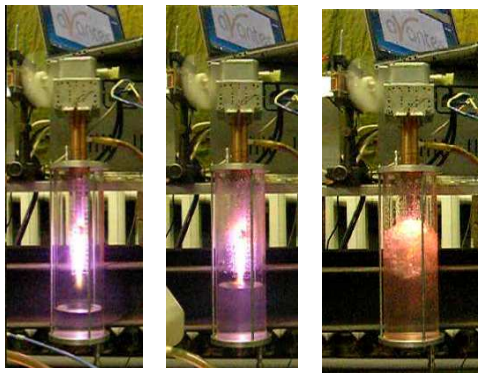
1. Academic members with expertise in physics, chemistry, biology, medicine and engineering, who study basic phenomena as well as applications of low-temperature plasma-liquid interactions.
2. Organizations focused on water treatment (both drinking and waste).
3. The chemical industry with interest in special compounds such as drugs, bioactive materials, etc.
4. Biomedical research centers and clinics.
5. Companies developing plasma reactors, power supplies and devices.
6. Industries using surface treatment technologies for specific applications (space research, automotive industry, medical instruments, etc.).
7. Industries and the research community using nanomaterials for different applications (drug delivery, cosmetic, composites, energy storage/generation etc.).

COST polices

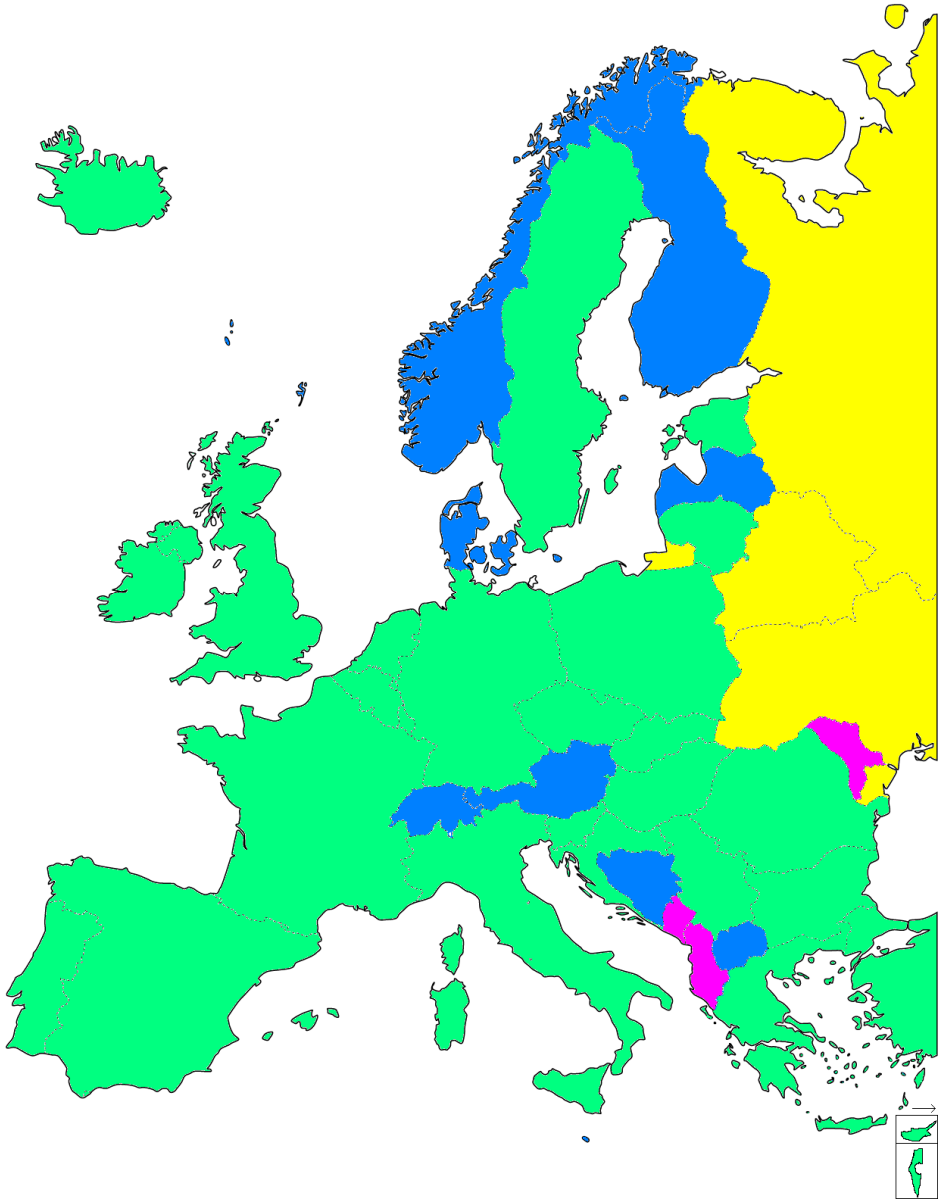
- Inclusiveness – participation of west x east COST countries.
- Early stage researchers (ESR) – PhD students and post-docs up to 8 year after PhD.
- Gender balance.
- International cooperation – mainly international publications and projects.
- SMEs/industry participation.







Participating countries



27 countries (~ 75 groups)
- Intention Malta, Montenegro

Other states (22 groups)
- Australia (1)
- Belarus (2)
- Japan (5)
- Russia (6)
- Ukraine (2)
- USA (4)

3 participants from industry

~ 25% females among senior scientists

> 40% females overall

~ 50% Early stage researchers (Post-doc, PhD)

Working groups

WG1 Plasmas generated directly in the liquid phase

WG2 Atmospheric plasmas interacting with liquids

WG3 Elementary physical and chemical processes initiated by discharges

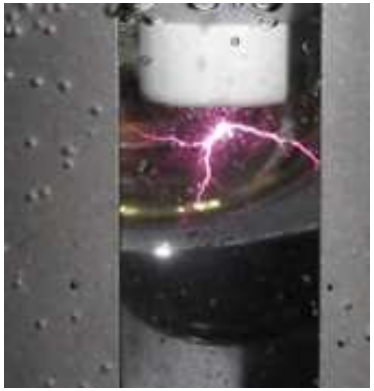
WG4 Interaction of plasma reactive species with materials and surfaces

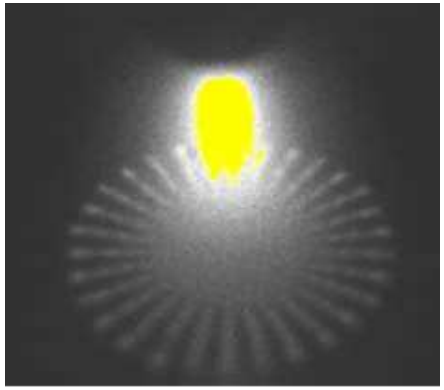
4.1 Applications in water treatment

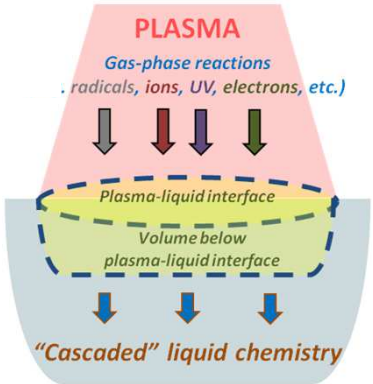
4.2. Biomedical applications

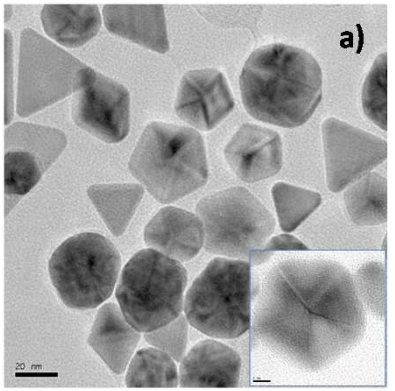
4.3 Applications in nanoparticles formation and surface treatment

4.4. Organic chemistry applications









Action activities

Meetings

annual meeting – 3 days

WG meetings – 1 - 5 days, shorter connected to existing conferences

MC meeting – ½ day

Training schools

Short term scientific missions

Dissemination

Action website – www.cost-plasma-liquids.eu

presentations at existing conferences

public presentations

Overall benefits

Formation of broad multidisciplinary research network.

Increased understanding of physics and chemistry in plasma-liquid interactions.

Understanding strongly non-equilibrium wet chemistry.

New physical-chemical complex models of plasma-liquid interactions.

Attracting young people to novel field of strongly non-equilibrium chemistry.

Increase of academic collaboration with industry in more applied fields.

Construction and production of selected user friendly systems for research/pilot plant purposes.

Foundation of the relevant chemical reactions database.

Development of strategies for specific interdisciplinary applications of plasma-liquid systems for technological practice.

Action proposal preparation

Define subject targeting as many as possible countries, ideally interdisciplinary

Look for preferred EU topics

Look for the WG fields (4-5 WG is ideal)

Search good WG leaders (communicative, according to COST polices)

Look for future chair (good organizer, reflect again COST polices)

Look for the grant holder (remember also national rules, international payments, account in EUR, etc.)

Look for the STSM coordinator (communicative, according to COST polices)

COST Association supports networking, no direct scientific support. Local projects connected to Action in CZ, only.

Don’t forget that proposal is about science but it is not science!

Action Chair

Preparation of Memorandum of Understanding

Coordination of all activities

Final selection of speaker for meetings and training schools

Confirmation of STSMs

Preparation of Work and Budget plan – linked to MoU objectives

problem with decrease of budget and fixed grant periods

Reporting is rather complicated – not linked to budget periods and goals set there. Some parts can be given from eCOST but manually

Organization of voting for new Action members

All tasks are much easier if WG leaders are very communicative and good in organization

Also, it is a great benefit if all Action participants can collaborate

Action Grant holder

Before application as grant holder study in detail COST rules and national rules. They are very different!!

Legal and financial representatives of your organization must agree with they roles and they must accept rules.

You need account in EUR, don’t forget for bank charges.

Financial reporting in eCOST system is simple but not all is eligible. Signing (now electronic) is long term after the reporting period.

Budget is sometimes delayed – prepare your organization for this.

Grant holder overheads are up to 15%, be careful about overheads of your institution.

Action grant secretary

No support is given in advance – you need existing person

Secretary is not for the full time job but sometimes is job over 1.0

Good knowledge of at least English is necessary, better as many languages as possible – revision of documents in more than all EU languages is necessary

Response of eCOST system is very slow (huge database)

Not all is under your control (was mail delivered?, was grant letter downloaded, etc.)

Account data given in eCOST are not sufficient for international payments from CZ

Participants usually don’t read rules – many corrections are necessary

Action – how to join

Look for the existing Actions

Look for the time schedule of new Actions approvals

Ask your foreign friends if any new Action is planned

Contact your National COST coordinator for nomination as MC member or MC substitute

Prepare proposal according rules and get confirmation of Action chair or coordinator – Czech specific point

No problems during the first 12 months of Action life;
later online voting of MC members is necessary

Action – participate or not?

Participate – YES!

Action chair – revise your ability – time, organization skills, contacts

Action vice-chair – should be

WG leader – should be

Action MC member/substitute – YES

STSM coordinator – should be

Grant holder – be very careful, study all legal details, look for specific rules at your institution

Grant secretary – good experience but NEVER MORE

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Thank you for your attention