

2nd MC-Meeting: COST Action CA20130 (March 28,2022 – start 14:30- end 18:00, CET)

European MIC Network – New paths for science, sustainability and standards (Euro-MIC)



Attendance (in-Person): 23 MCs + Chair

(Note: on 28.03 23 MC-Countries were confirmed / on the 01.04 2 pending MCs became confirmed)

In total 20 Countries were represented at the MC-Meeting --> 11 votes needed for MC- decision

Andrea Koerdt	Dr	Germany
Andreas Erbe	Prof	Norway
Annie Biwen An-Stepec	Dr	Germany
Bo Højris	Dr	Denmark
Edna Yamasaki Patrikiou	Prof	Cyprus
Elisabete Silva	Dr	Portugal
Filipe Mergulhão	Dr	Portugal
Gabriel FURTOS	Prof	Romania
Herman de Vries	Mr	Netherlands
Jan Stoulil	Dr	Czech Republic
José Miguel Palomo	Prof	Spain
Judit Knisz	Dr	Hungary
Julian Wharton	Dr	United Kingdom
Mario Mitov	Prof	Bulgaria
Matthew Snape	Mr	Switzerland
Muhamed Farruku	Mr	Albania
Nanni Noel-Hermes	Dr	Netherlands
PANAYOTA VASSILIOU	Prof	Greece
Pauliina Rajala	Dr	Finland
Pierangela Cristiani	Dr	Italy
REGINE BASSEGUY	Dr	France
Scott Mitchell	Dr	Spain
Torben Lund Skovhus	Dr	Denmark
Yolina Hubenova	Prof	Bulgaria
Non-MC (took the minutes)		
Gregor Gluth	Dr	Germany

Attendance (Online): 4 MC+ Ms. Unger

Alina Sionkowska	Prof	Poland
Olga Marchut-Mikołajczyk	Dr	Germany
Uroš Trdan	Dr	Poland

Wolfram Fürbeth Prof Slovenia

Michelle Unger Dr Germany

Minutes:

Meeting Moderator: Andrea Koerdt & Torben L. Skovhus

General: (14:30-14:50 min)

1. Welcome (Chair and Vice Chair)
 - Start: ~14:45pm
 - Welcome by A. Koerdt and T. Skovhus
 - MC members agree to allow G. Gluth (not a member of the MC) to attend and take notes

2. Approval of the minutes of the last MC Meeting
 - MC members approve the minutes from the last meeting
 - MC approved the agenda of the present meeting
 - MC members (including online participants) introduced themselves in brief

3. Approval of the agenda (additional items should be forwarded to the chairs 1 week before the meeting, March 21 the latest)
 - Approved (see above)

4. Progress made so far by the working groups and goals to be achieved in the short term (what strategy is being pursued): (14:50- 16:00 min)
 - a. WG 1: Judit Knisz, WG leader
 - presentation given by J. Knisz (4 slides)



WG1 – Intersectoral Bridging

March 28, 2022

Chair: Judit Knisz

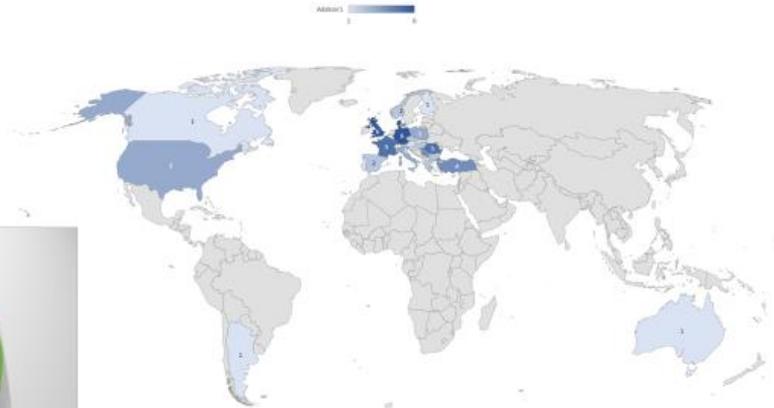
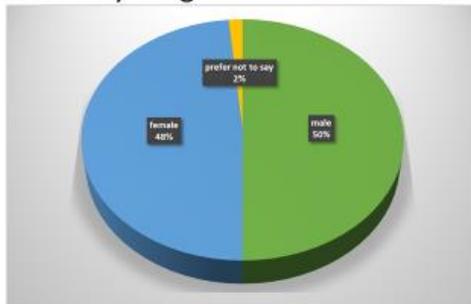
Vice chair: Jan Stoulil

Malaga/Fuengirola

Spain

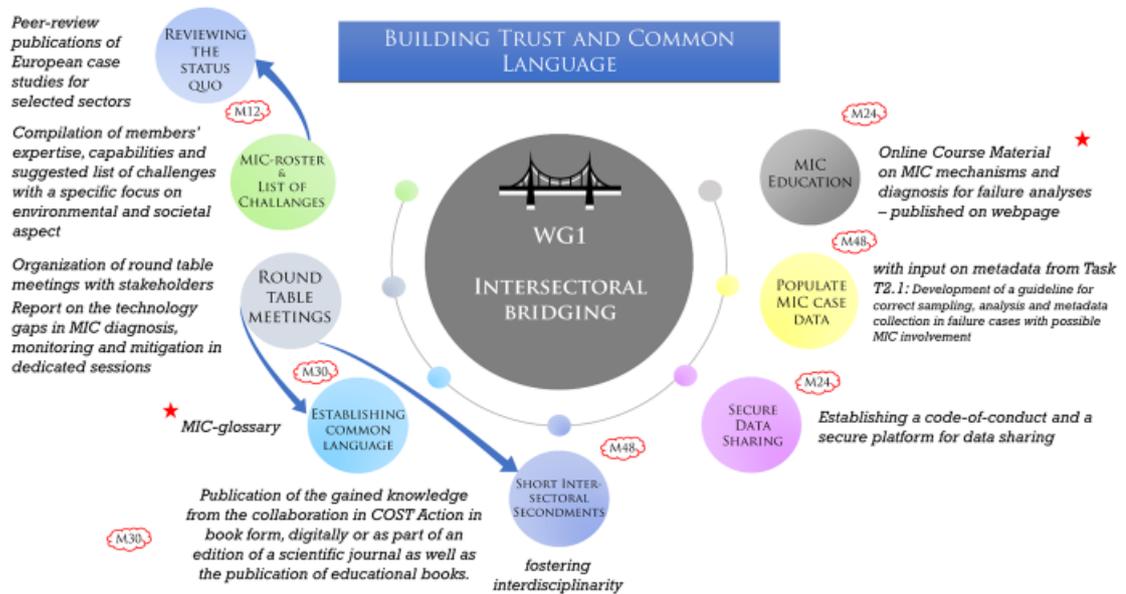
WG1

- 65 members
- 24 countries
- 38 ITC
- 20 young researchers



attendance:
 1st meeting – 34 members
 2nd meeting - 36 members
 3rd meeting – 24 members

A platform for knowledge sharing and forming the basis of a roadmap for the next decade of MIC research



Where are we at now?

5 subgroups

1. **Establishing common language / Interdisciplinarity** → **Regine B**
 - MIC-glossary (common language) and report on the technology gaps in MIC diagnosis, monitoring and mitigation in dedicated sessions
2. **Code of Conduct and Secure Platform** → **Andreas E**
 - deciding on a secure platform
 - development of a code-of-conduct
3. **MIC Education** → **Torben LS**
 - Online course materials on MIC mechanisms and diagnosis for failure analyses – published on webpage
 - Monthly update of available course materials on webpage
4. **Review articles writing/Critically reviewing the status quo of MIC** → **Judit K**
 - Peer-review publication of European case study(ies) for selected sectors
 1. utilities
 2. green industrial fields
 3. marine and offshore
5. **MIC Roster/National Round-tables/Case studies data collection** → **Jan S**
 - Compilation of expert names from countries, listing them on the webpage
 - Collecting information from operators, industrial personnel regarding knowledge gaps, case studies, MIC awareness
 - Based on discussions, list challenges with a specific focus on environmental and societal aspects

- b. WG 2: Annie Biwen An-Stepec, WG leader
- presentation given by A. An-Stepec (10 slides)

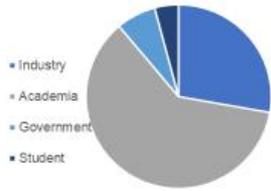
CA20130 Euro-MIC WG2- Diagnostic technology development

Progress update

Annie An-Stepec & Elsemiek Croese

Euro-MIC WG2

72 members
24 countries!
 > 44% male
 > 56% female



28.03.2022

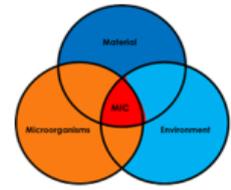
Euro-MIC WG2 progress update @ Spain COST-MIC event

Euro-MIC WG2

Key task: establish a MIC diagnosis guideline for sampling, analysis and metadata

- Metadata will provide information about the data source, environmental parameters and sampling process
- Provide scientific and practical papers on the COST Action webpage, conferences, technical and peer-reviewed journals.
- Define knowledge and technology gaps in joint project applications

Task Nr.	Task description	Objectives
T2.1	Development of a guideline for correct sampling, analysis and metadata collection in failure cases with possible MIC involvement	RC3, RC4, RC8, RC9
T2.2	Identification of a MIC research agenda for "Diagnosis" including the needs for method development and lab-to-field transition of advanced methods (D.5-D.6, D.13)	RC4, RC8
T2.3	Defining and clarifying the biggest challenges to MIC, with the goal of finding solution-oriented approaches to implement them.	RC8
T2.4	Publication of technical and peer-reviewed papers with a focus on method development targeting different sectors and communities	RC8,



28.03.2022

Euro-MIC WG2 progress update @ Spain COST-MIC event

Euro-MIC WG2

- **Research Coordination Objectives**

- **RC3:** Define environmental and process related **parameters** that need to enable an adequate and conclusive analysis of the role of MIC in the observed failure.
- **RC4:** Devise a **strategy for MIC analysis** (i.e. tests and analytical methods) taking into account differences in the availability of infrastructure and expertise of personnel in different industrial sectors. Define the basic level of analysis for reaching a conclusive identification of MIC and to bring this knowledge to respective standardization committees.
- **RC8:** Initiate **test procedures** that include MIC-relevant microorganisms and their activities for further or new development of materials or material classes.
- **RC9:** Develop **common test procedures and standards** to ensure a valid procedure for MIC damage assessment; standard procedures will ensure that valid comparisons can be made with other cases and that enough supporting data are collected.

WG member
Survey/discussions

Collaboration with
WG3

Collaboration with
WG3 and 4

Collaboration with
WG1 and 5

28.03.2022

Euro-MIC WG2 progress update @ Spain COST-MIC event

Euro-MIC WG2 → deliverables

- Online course materials on MIC mechanisms and diagnosis for failure analysis published on webpage
- Publication of the gained knowledge from the collaboration in COST Action in book form, digitally or as part of an edition of a scientific journal as well as the publication of educational books
- MIC-glossary and report on the technology gaps in MIC diagnosis, monitoring and mitigation in dedicated sessions
- Protocol for metadata collection and analysis procedure for MIC-related failure cases

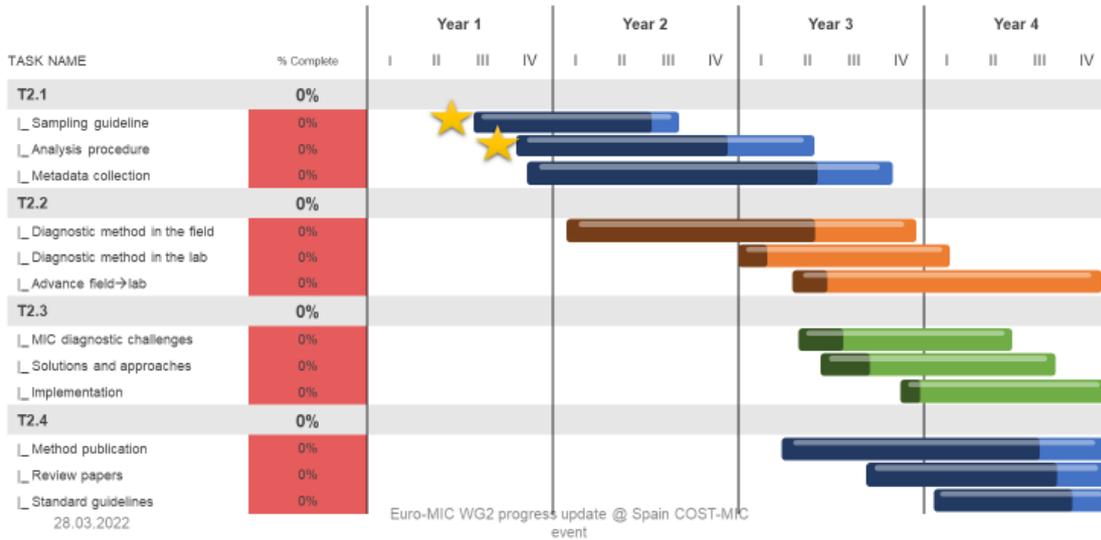
#1 Grant Period Goal → Screening of current MIC-related diagnostic tools used in the industry and compare the practical differences between the industrial sectors on a global scale

#2 Grant Period Goal → Development of a standard diagnostic method for identifying MIC failure sites, with special focuses on comparing the operating procedures between traditional energy sectors (petroleum) to renewable infrastructure systems. The method will maximize lab-to-field studies by standardizing advanced analytical methods

28.03.2022

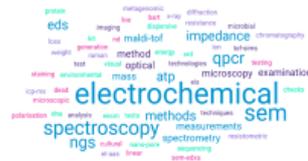
Euro-MIC WG2 progress update @ Spain COST-MIC event

Euro-MIC WG2



Euro-MIC WG2

- Survey → 16 respondents (during kick-off)
- Questionnaire on MIC detection and limitations → 20 respondents
- MS Teams Channel for group communication



To Do List
February 8, 2022 3:54 PM

Preparation for the hybrid meeting

- Short description (1 or 2 sentences) of one MIC diagnostic tool used in your research/company or MIC diagnostic tool that is important for you that you would like to know more about
- One industry partner contact from your country that uses MIC diagnostic tools or that would benefit from accurate MIC diagnosis
- Please indicate one or two limitations you see with the current state of MIC diagnostics

28.03.2022

Euro-MIC WG2 progress update @ Spain COST-MIC event

Plans for this meeting

- Initiate discussions on sampling procedures typically used by WG members
 - Advantages & disadvantages with their common practices
 - Recommended procedures
 - Reference guidelines used
 - MIC sampling of the future → what is it?



Together with WG3 at the hybrid meeting in Berlin, Germany

- Discussions on WG2 dissemination
 - WG
 - COST network

Member initiated

<https://www.euro-mic.org/>

Year 1:
SAMPLING (& analyses +WG3)

28.03.2022

Euro-MIC WG2 progress update @ Spain COST-MIC event

Training and courses

Electrochemically Active Biofilms Short Course

Posted by gamry on March 17, 2022

In Collaboration with Gamry

The Biofilm Engineering Research Group

When:
August 1 - 4, 2022

Where:
Gene and Linda Voiland School of Chemical Engineering and Bioengineering
Washington State University - Pullman, WA, USA

- Learn how to quantify electron transfer in biofilms
- Hands-on with EAB reactors and potentiostats
- Biofilm-focused protocols for CV, SWV, EIS, eQCM, RDE, and more

Many members of both WG2 and 3 have expressed interests in electrochemistry and MIC

→ Courses by Euro-MIC

→ Courses by other entities

How should we coordinate this?

28.03.2022

Euro-MIC WG2 progress update @ Spain COST-MIC event

- b. WG 3: Matthew Snape, WG leader
 - presentation given by M. Snape (15 slides)



EURO-MIC (CA20130)

WG3 Update



Matthew Snape

Principal Consultant, SGS
Geneva, Switzerland

Subject Matter Expertise: Oilfield Microbiology, Facility Integrity, Production Chemistry, Field Monitoring

- 20 years of worldwide experience in oilfield microbiology, asset integrity and production chemistry at offshore and onshore industrial facilities.
- Operational value solutions driven individual with extensive field operations experience in oilfield microbiology, corrosion forensics, biocide application, H₂S control and mitigation, and reservoir souring control with hands-on field application experience developed across many regions and global customer locations.





Nicole Dopffel

Senior Scientist, NORCE Norwegian Research Centre
Bergen, Norway

Subject Matter Expertise: Geomicrobiology, Geochemistry,
Subsurface Microbial Interactions



Work Group 3 Introduction



The current situation with Covid 19 clearly demonstrates the importance of real time data for guiding the overall disease mitigation strategies.

The same principle holds true for the design of measures to prevent infrastructure failures, since both abiotic corrosion and MIC are highly dynamic processes.

Early detection of conditions that favour the initiation of MIC, such as biofilm formation and changes in local environment due to microbiological activity, is a powerful tool enabling proactive measures with minimal interference to process workflows, equipment and the environment.



Work Group 3 Key Objective



Thus, the main objective of WG3 is to collect and screen available monitoring strategies and sensor technologies to identify technological gaps and to devise concepts for the development of field-capable monitoring methods and sensors.

A special focus will be on the identification of technologies that are currently not applied to MIC.

Companies in sensor technologies, especially start-ups in the field of biotechnology, will be rostered and contacted to join the dedicated meetings as well as the COST action.

WG will translate the outcomes into joint project applications at EU and international level to accelerate the development of new strategies in MIC monitoring.

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Work Group 3 Deliverables - Overall

D - Deliverable
RC - Research Coordination Objective
CB - Capacity Building Objectives



D5 – Publication of gained knowledge from the collaboration in the COST Action in book form, digitally or as part of an edition of a scientific journal as well as the publication of educational books (MC, WG1-4)

D6 – MIC-Glossary (common language: RC1/CB2) and report on the technology gaps in MIC diagnosis, monitoring and mitigation in dedicated sessions (MCV, WG1-4)

D8 – Review or perspective article published on methods for real time monitoring (WG3).

D9 – Publication of a review article published on inspection-based MIC monitoring methods (WG3).

D13 – Publication of an open-access opinion paper on MIC Research roadmap made available via the Euro-MIC webpage (MC)

RC5 – Screen biofilm and MIC monitoring methods for field of application, assessment of their strengths and weaknesses, as well as their economic feasibility and sustainability. Identify critical knowledge and technology gaps.

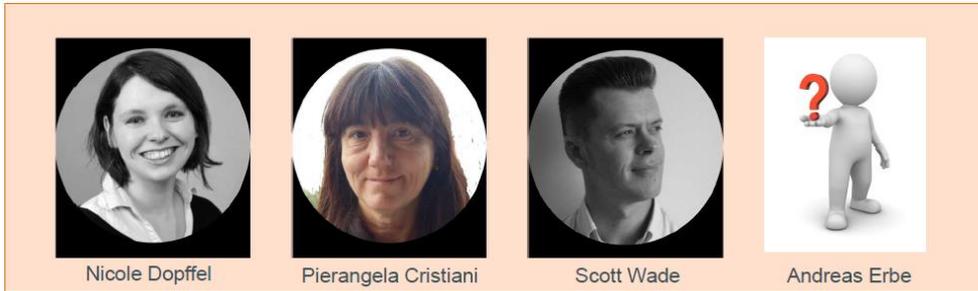
CB1 – Create a forum for European community to foster interdisciplinary and intersectoral collaborations and sharing of knowledge, best practices and most impactful development in MIC in focus areas of 'Diagnosis, Monitoring and Mitigation'.

CB7 – Establish a permanent community and contact network of experts from scientific, academic, industrial, government organisation and national/regional initiatives / platforms.

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WG3 Technical Governance Committee



WG3 Technical Author Focal Points



PRIORITY SECTORS: Marine, Water Treatment, Oil & Gas, Renewables / Green Energy, Coatings, Concrete and Infrastructure



WG3 Breakdown - 2022 Grant Period Subgroups



Strategic actions to achieve the goals (common to both goals):

Sub-Group 1 - ENGAGEMENT - Establish direct contact with existing and new key industrial stakeholders of the MIC community with focus on monitoring end users.

Sub-Group 2 - KNOWLEDGE - Review key demands to deliver effective monitoring tools and protocols considering the end user in different field conditions and working environments.

Sub-Group 3 - RESEARCH - On-line market demand surveys specially targeting the industrial sector and plant operators across multiple respective disciplines incorporating a review basis for electrochemical and advanced sensor technologies.

Sub-Group 4 - INVESTIGATE - Review past and existing monitoring tools from industry best practices with an output being the completion of a methodology SWOT analysis (Pros/Cons/Limitations for the field) on each field technique with advantages, gaps, past hurdles etc.

Sub-Group 5 - COMMUNICATE - Create a database of specialised companies on MIC monitoring technologies, key stakeholders, and contact information including contributions from industry and academia.

Volunteers are required to lead and join sub-groups for each of the five areas
Cross communication with other Working Groups is KEY!

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WG3 Sub Group Leads



Sub-Group 1 - ENGAGEMENT
Sub-Group 2 - KNOWLEDGE
Sub-Group 3 - RESEARCH
Sub-Group 4 - INVESTIGATE
Sub-Group 5 - COMMUNICATE

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Primary Task Assignment – WG3



Consider the elements for MIC diagnosis with focus on the electrochemical basis and the potential adoption of existing or future new sensor technologies in a sustainable and economic format.

- I. Spatial relationship between microbes and the corrosion damage
 - II. Corrosion products consistent with microbial reactions
 - III. Microorganisms verified as contributory to electrochemical reactions
 - IV. Microorganisms that support the corrosion mechanism in the assessed environment
 - V. Presence of a local environment that can sustain microbial survival (eH, pH, BOD)
- ✓ Think 'Outside the box' – What does the automotive industry utilise for assessing long term body panel environmental corrosion?
 - ✓ Full inclusion – 'No bad ideas' & 'Sustainability and Simplicity can Rule'

ACTION: Suggest 3 current or future methodologies including industry literature, case studies and industry contact points / companies.

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Task Feedback



Monitoring Methods for MIC	George Licina	NACE 2007 Paper 07336	Scott Wade
(Potential) monitoring techniques for MIC	Andreas Erbe	File Note (See Task 2)	Andreas Erbe
Detection of microbiologically influenced corrosion by electrochemical noise transients	A.M. Homborg, C.F. Leon Morales, T. Tingac, J.H.W. de Wit, J.M.C. Mol	Electrochimica Acta 136 (2014) 223–232	Nani Noel-Hermes
Corrosion monitoring in microbial environments	Pierangela Cristiani a and Giorgio Perboni		Pierangela Cristiani
MICROBIAALLY INFLUENCED CORROSION OF INDUSTRIAL MATERIALS	MEETING OF TASK 5 held on April 13, 2000 at VENEZIA (Italy) Istituto Grandi Masse (ISDGM–CNR) Organised by P. CRISTIANI	BIOCORROSION NETWORK - (Brite-Euram III Thematic Network N° ERB BRRT-CT98-5084	Scott Wade & Pierangela Cristiani
Introductory guide to Sensors	https://www.keyence.eu/ss/products/sensor/sensorbasics/proximity/feature/	KEYENCE CORPORATION	Nicole Dopffel

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Secondary Task Assignment – WG3 - SWOT



RC5 – Screen biofilm and MIC monitoring methods for field of application, assement of their strengths and weaknesses, as well as their economic feasibility and sustainability. Identify critical knowledge and technology gaps.

	Strengths	Weaknesses
TECH 1	<ul style="list-style-type: none">• Field Portable• Cost Effective	<ul style="list-style-type: none">• Track Record• Reliability
	Opportunities	Threats
TECH 1	<ul style="list-style-type: none">• Adaptable to new field conditions• Combined with Redox Probe function	<ul style="list-style-type: none">• Unproven basis• Not Ex Rated for Hazardous Areas

ACTION: Work on SWOT basis Vs Technology - Share in Dropbox and initial files with your initials e.g. XXX XXX (MSn) – Q1 2022

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Task Feedback



Challenges:

1. Many electrochemical techniques can be used for monitoring e.g. localised corrosion → they cannot normally detect whether something is MIC or “non-MIC” corrosion. They may be able to detect presence of biofilms, however, biofilm presence is not necessarily sufficient for MIC.
2. Monitoring techniques for the presence of microorganisms – even specific ones - would not normally be able to detect corrosion.

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Task Feedback - Example



Frequency domain electrochemical methods

Especially methods extracting the nonlinear aspects may be promising, such as nonlinear impedance spectroscopy, including odd random phase electrochemical impedance spectroscopy (ORP-EIS; see, e.g., [DOI: 10.1002/elan.200804471](https://doi.org/10.1002/elan.200804471) for an introduction, more developed versions of data analysis available lately), or electrochemical frequency modulation (EFM, one example for MIC: [DOI: 10.1016/j.electacta.2013.04.144](https://doi.org/10.1016/j.electacta.2013.04.144)).

Strengths: Sensitive to effects “beyond” the semicircles in EIS; good to have impedance data on nonstationary systems; suitable for fast, integrated measurements; in principle field compatible

Weaknesses: Not specific to MIC; not many groups use it [example ORP-EIS – one group]; very few applications to MIC; complicated data analysis; requires electrical access to material to be monitored; requires equipment to work

Opportunities: Very few applications to MIC; also not commonly used in monitoring

Threats: Physical chemistry and data analysis to involved for monitoring

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SGS

- c. WG 4: Elisabete Silva, WG leader
- presentation given by E. Silva (17 slides)

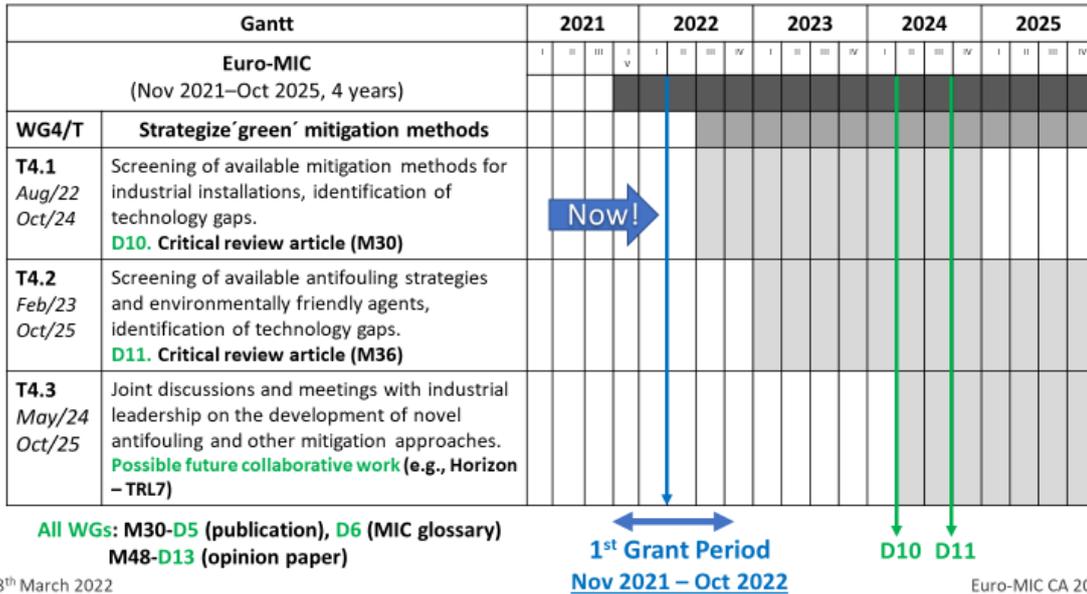
1st MC-WG Meeting EUROPEAN MIC-NETWORK
20th-28th February (Málaga)

WG4
Strategize
'green' mitigation methods

Lead (Chair): Elisabete Silva – University of Lisbon, PT
Vice-lead: Anette Rasmussen - Corrosion Advice ApS, DK



WG4 - Strategize 'green' mitigation methods



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WG4 - Overview



Task Nr.	Task description	Objectives	Deliverables	WGs
T4.1	Screening of available mitigation methods for industrial installations, identification of technology gaps	RC6, CB1	D.5-D.6 – M30 D.10 – M30	All WG4 & WG5
Deliverables description	D.10 Critical Review article on mitigation methods for industrial installations (WG4 & WG5) D.5 Publication of the gained knowledge from the collaboration in COST Action in book form, digitally or as part of an edition of a scientific journal as well as the publication of educational books. (All WGs) D.6 MIC-glossary (<i>common language: RC1/CB2</i>) and report on the technology gaps in MIC diagnosis, monitoring and mitigation in dedicated sessions. (All WGs)			
T4.2	Screening of available antifouling strategies and ecological agents, identification of technology gaps	RC6, CB1	D.5-D.6 – M30 D.11 - M36 D.13 - M48	All WG4 & WG5 All
Deliverables description	D.11 Critical review article on antifouling coating strategies and environmentally friendly agents (WG4) D.13 Opinion paper on MIC research roadmap made available via the Euro-MIC webpage (All WGs)			
T4.3	Joint discussions and meetings with industrial leadership on development of novel and other mitigation approaches	RC6, CB1, CB7	Possible future collaborative work (e.g., Horizon – TRL7)	

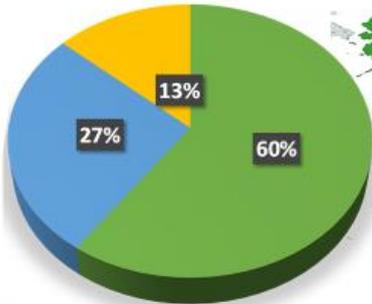
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WG4-Overview/Updates



81 Members



- Education & Associated Organizations
- R&D Government/Intergovernmental entities, others
- Business enterprise

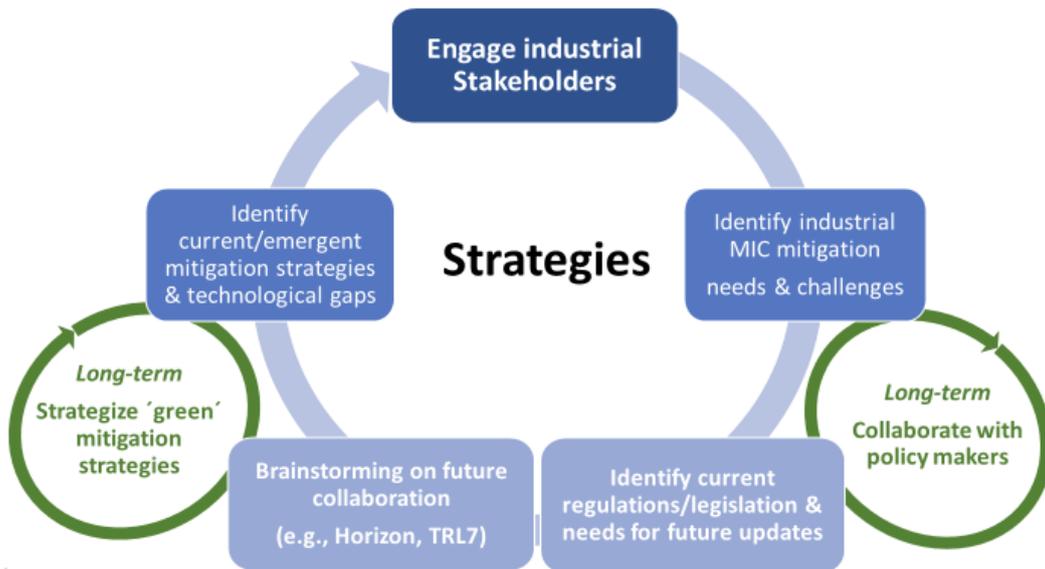
Global Network! 25 Countries



28th March 2022

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WG4 - Short-term actions



28th March 2022

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WG4 – Planned short-term actions

Engage Stakeholders



Identification of potential Stakeholders (e.g., Antifouling coating players, Water management sector, biocide producers, others in MIC mitigation sectors business, ...).
A common objective for all the WGs and which will benefit from a joint effort.



How to avoid contacts overlapping & uncoordinated communications?

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WG4 – Decision taken

Stakeholder CONTACT LIST * Required data to avoid contact overlapping.

*Working Group Assigned	* "Bridging" Cost member	* Stakeholder Company name	* Sector(s) of Stakeholder's business	*Wish to be included in Euro-MIC website
WG2, WG3 and WG4	Nanni Noel-Hermes <small>Who will do the contact? Enter in this column the Name of the Cost Member under this title who will engage the Stakeholder. You may enter "OTHER" if you wish someone else to make the contact.</small>	ndures B.V.	Renewable energy (maritime & offshore), Navy, Paint suppliers, Water companies & real estate, shipping, Oil & Gas	yes
WG4	Frank Scheiber, Nanni Noel-Hermes	Dr. Brill & Partner, Institut fuer Hygiene und Mikrobiologie	It is a testing lab of biocides also involved in research on green alternatives.	
WG4	Edna Yamasaki	Water Development Department / Nicosia Water Board	Water distribution	
WG2, WG3 and WG4	Nanni Noel-Hermes	MIC Europe		

Shared with Core Group

Required from WG4 Members:

- a) **Members working on the business sector** can include their data on the Stakeholders' spreadsheet
- b) Can express their willing to be listed in the **Euro-MIC website as MIC mitigation specialised company**
- c) All members can include **potential Stakeholders they can contact or new suggested contacts**
 - Stakeholder contacts (optional).
 - Additional sheet included for upcoming appointments (optional).

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Stakeholders' engagement

One important **key task** for getting in contact with Stakeholders.



Organize marketing material such as flyers, webpage text, etc. in order to **have a common/uniform message**.



Communication Team can assist on this, however they need inputs from WGs, such as key messages, information on main objectives.



WG4 Data input for the Communication Team was collected Survey-updated 15th March! Now closed.

34 Participants in the survey (44%)

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5. For the preparation of communication materials with the support of the Cost Communication Team, it is crucial to define key attractive words or sentences to be used on those. Could you suggest some potential attractive keywords/sentences?

Some few examples:

- MIC can speed up corrosion of industrial surfaces by 10 to 100 times.
- Worldwide the effect and costs of MIC are massive and underestimated, being related to approximately up to 20 % of all corrosion in aqueous systems.
- WG4 taskforce is to strategize eco-friendly and long-lasting preventive and control measures against MIC threats.
- **Keywords:** ecological agents, smart protective coatings...

More suggestions:

- Multiple line of evidence MLOE is needed to diagnose MIC - no single number will tell.
- Microorganisms can tolerate some biocides after long exposure time - this is not the same as resistance to biocides!
- **TIP:** Eco-friendly / environmental friendly are not scientific terms! We should as scientists stick to words such as toxic, hazardous, bio-degraded, etc. not political phrases.
- **Keywords:** secondary metabolite, environmental friendly biocide, hard thin coatings with antifouling effect
- Bridging academia and industry; Bring academia closer to industry; Define applicable, eco-friendly solutions for industry; Get the world greener
- Synthesis and characterization of ecological corrosion inhibitors for metalworking fluid, cooling water.
- Ecological corrosion inhibitor synthesis (such as esters and amides) for the MIC phenomenon seen in the metalworking industry.
- **keywords:** microbially influenced corrosion inhibition, antimicrobial coatings, antimicrobial compounds, Reuse of water, New material, antimicrobial coating, Nanotechnology, wastewater, marine systems

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5. For the preparation of communication materials with the support of the Cost Communication Team, it is crucial to define key attractive words or sentences to be used on those. Could you suggest some potential attractive keyworks/sentences?

More suggestions:

- You are also responsible, MIC as a threat to clean and safe water delivered at your home.
- MIC and health
- No MIC with smart protective coatings
- Carbonates that are created on the metal surface can prevent corrosion.
- The role of methanogens on anaerobic corrosion is still not known.



This WG4 data input was sent to the Communication Team! And to WGs Leaders.



From a first preliminary analysis, this data expresses the importance of working on the MIC glossary (*common language: RC1/CB2*) - Common goal: interact/share with other WGs

Examples:

- Microbial corrosion, microbiologically influenced corrosion (MIC), microbially influenced corrosion, microbially induced corrosion (MIC) or biocorrosion
- Antifouling, Anti-Biofouling | Anti-biofilm | Antimicrobial, antibacterial

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WG4 – Decision taken

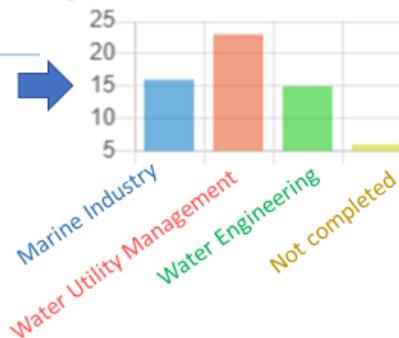
Criteria for data acquisition on MIC Mitigation/Antifouling strategies & Legislation & Regulation

Industrial Sectors & other related entities

- **Marine Industry** (offshore, renewable energy, transport, other activities)
- **Water Utility Management** (includes water treatment, distribution and operation)
- **Water Engineering** (Infrastructures: bridges, channels; Processing (chemical industries, onshore/renewable energy sector)

SURVEY updated (15th March):
Collect WG4 members interests
&
for setting sub-groups.

Updated!

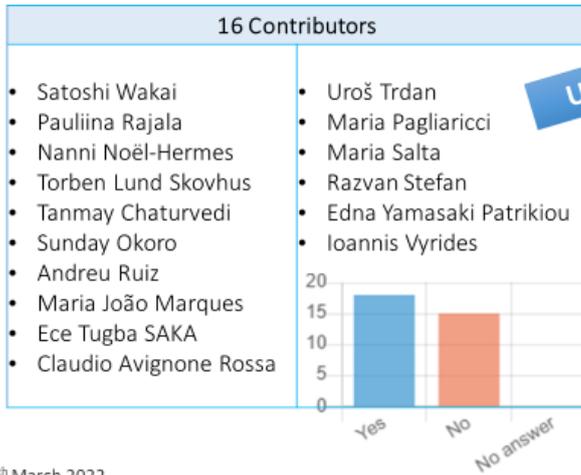


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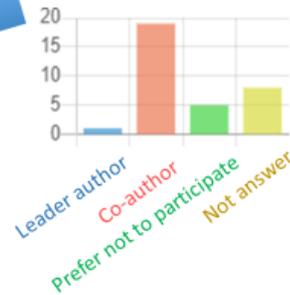
WG4 – Other sub-groups/roles

Other sub-groups: Screening open/upcoming project calls



Updated!

Roles for Review Papers



29th March 2022

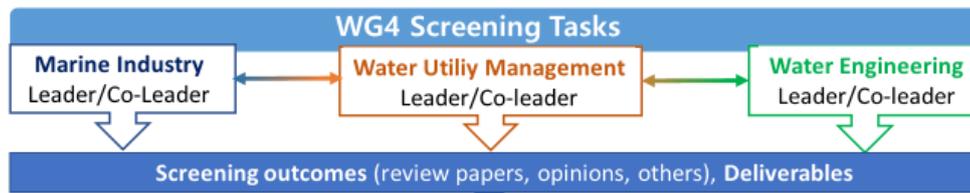
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Contributors for review articles		
Marine Industry (17)	Water Utility Management (20)	Water Engineering (20)
Leader: Nanni Noël-Hermes	Leader: Claudio Avignone Rossa	Leader: Pauliina Rajala
Co-author	Co-author	Co-author
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4th March 2022

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WG4 – Setting sub-groups



Strategize 'Green' mitigation strategies

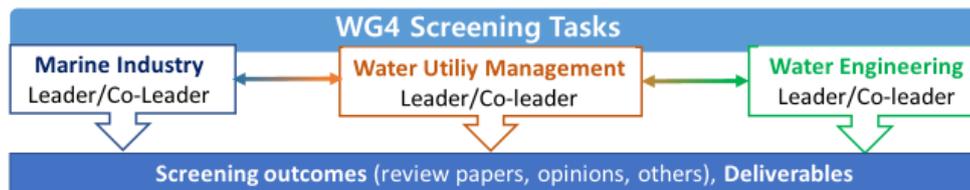
Screening project calls (*sub-group*)

- **Compile/Screening** (Inter)national project open/upcoming calls.
- Compile **Members profiles** (strengths/expertise)
- **Build** competitive **consortium** (Euro-MIC)
- **Joint Project Applications** (liaising with the industry)

29th March 2022

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WG4 – Setting sub-groups



Strategize 'Green' mitigation strategies

Screening project calls (*sub-group*)

- **Compile/Screening** (Inter)national project open/upcoming calls.
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29th March 2022

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Summary of the WG4 activities

- **WG4 SharePoint was created** (with ability to work online).
- **Strategies for Stakeholder engagement** were defined and discussed.
- **A Stakeholders' spreadsheet** was built and is being filled by WG4.
- **Common/uniform message marketing material is being organized** with the support of the communication team.
- **Four screening sub-groups were settled** and will be consolidated in next 3rd meeting: *Marine Industry*, *Water utility management*, *Water engineering* & *Project calls screening/proposal planning*.
- **Roles and responsibilities for review papers** were established.

Synergies with WGs

- Stakeholder' spreadsheet (ALL)
- Marketing Material (ALL)
- Screening tasks (ALL, WG5 - Standards)
- MIC glossary (ALL)
- Projects/Collaborative work (ALL, WG3-strategize based on early detection)



- d. WG 5: Julian Wharton, WG leader
- e. - presentation given by J. Wharton (12 slides)

MC meeting

WG5 Achieving Standardization

Lead: Julian Wharton – University of Southampton, UK

Vice lead: Rick Eckert – Microbial Corrosion Consulting

1st Meeting Euro MIC-NETWORK
28th March 2022 Fuengirola (Malaga)

WG5 Overview

The transition of new detection and mitigation methods into routine process control and inspection measures requires the availability of standardized procedures:

- Thus, [the outcome of the WG2, WG3 and WG4](#) will be reviewed to select candidates for standardization.
- The Action will increase the presence in relevant standardization committees such as AMPP (formerly NACE International), ASTM, Energy Institute, DNV and ISO and [initiate round robin tests for selected technologies](#), as is appropriate.

Task Nr.	Task description	Objectives
T5.1	Selection of methods of high field-applicability in the three areas “Diagnosis, Monitoring and Mitigation”, and initiation of round robin tests	RC8, RC9
T5.2	Increasing the participation of relevant actors in standardization committees	RC9, RC10

Putting Science into Standards

From Gantt chart

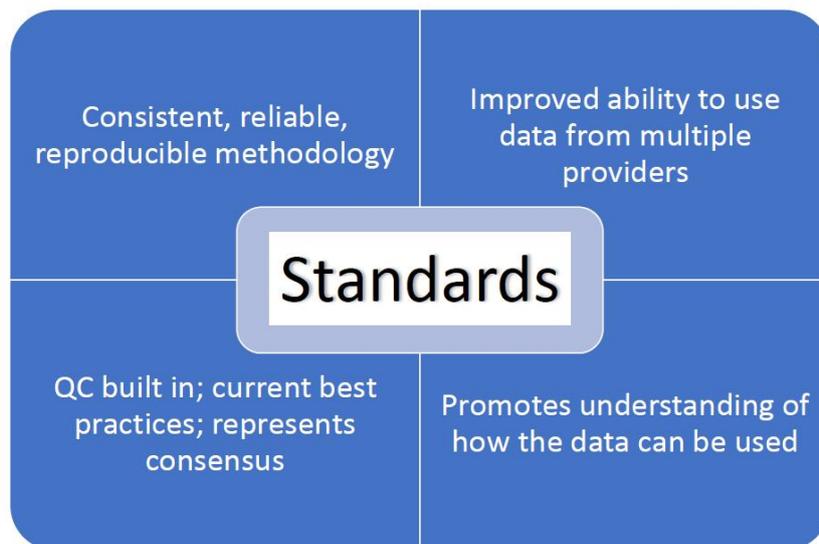
WG/T	Working group / Task title	Del. Nr	1 st year				2 nd year				3 rd year				4 th year			
			I	II	III	IV												
WG5	Achieving standardization																	
T5.1	Selection of methods of high field-applicability in the three areas "Diagnosis, Monitoring and Mitigation", and initiation of round																	
T5.2	Increasing the participation of relevant actors in standardization committees																	

[Biocides - OECD](#)

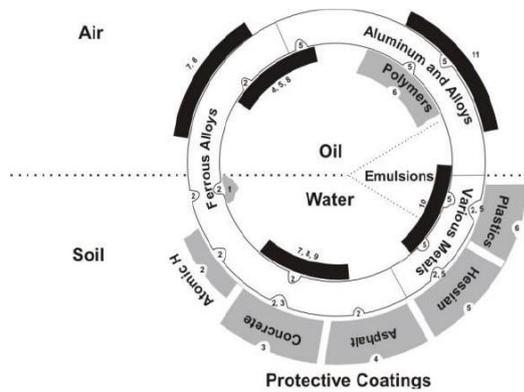
[Biocides Conference \(europeanbiocides.net\)](http://europeanbiocides.net)

JRC Conference & Workshop – Organ on chip: building a roadmap towards standardisation ([KJ0121400ENN.en.pdf](#))

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After E.C. Hill, Microbial Aspects of Metallurgy, New York, American Elsevier, 1970.

Offshore wind turbines have perhaps been guilty of underestimating the challenges of keeping their foundations free from corrosion ([Foundations built on corrosion protection | Windpower Monthly](#)).

CA20130 Euro-MIC WG5

WG5 kick-off meeting

35+ WG5 members
 20 countries
 9 young researchers

- Held Dec 8th 2021 (online)
 - 21 participants
 - **Key outcomes:**
 - Capture standardization committee representation;
 - What does industry want from standardization?
 - What does academia want from standardization?

CA20130 Euro-MIC WG5

AMPP SC 22 Biodeterioration

Chair Jason Lee, Vice Chair Torben Skovhus

Met March 9th 2022 at AMPP Annual Conference and with virtual attendees in the meeting

Status of the standards currently under development:

TM21465, Molecular Microbiological Methods - Sample Handling and Laboratory Processing

Document Program Manager (DPM) Renato De Paula

- **Status:** The standard has been under development with excellent participation from committee members with diverse backgrounds in three working groups, several of whom are involved in some way with the COST Action as well. The draft standard has incorporated feedback from the committee and is now being prepared for ballot.

CA20130 Euro-MIC WG5

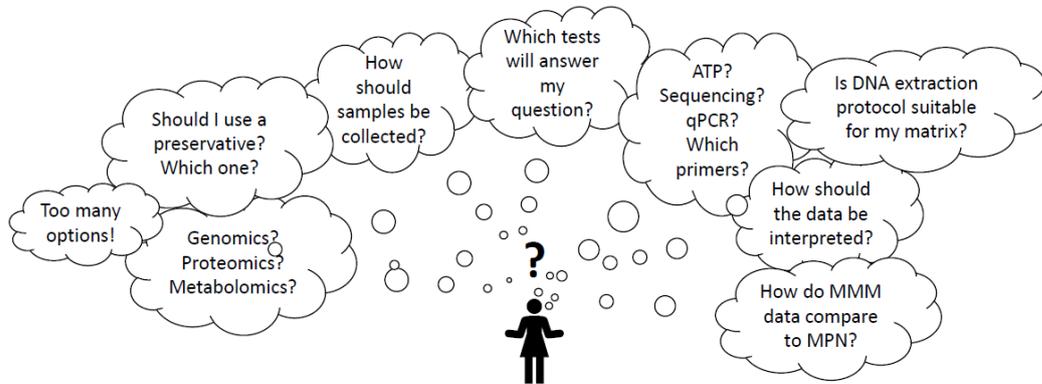
What does industry want from standardized test methods?

Consensus guidelines with basic requirements that help address:

- Lack of access to deep expertise in molecular microbiological methods (MMM) application and interpretation
- Inability to compare results between labs, vendors, service providers
- Limitations to historical trending when results are not comparable (due to changing methods and technologies)

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Industry end users want an authoritative source
for “turn key” access to the technology



CA20130 Euro-MIC WG5

WG5 Discussion points

Budget

- Need to think about next years budget plan. What do we want to spend the money on?
- Short-term scientific missions are a mobility grant.
- What ideas do we have to assign some money for some student grants or knowledge transfer?

CA20130 Euro-MIC WG5

WG5 Discussion points

Round robin (RR) – proficiency testing/experimental methodology

- a **round robin test** is an interlaboratory test (measurement, analysis, or experiment) performed independently several times (**ASTM E691***)
 - To determine the **reproducibility of a test method or process**
 - **Verification of new methods** of analysis (verify whether new method agrees with established protocols)
- Each participating laboratory receives identical samples, the same measuring, testing and analysis tasks and along with the same time period to carry out the tests. This allows comparison of the results and statements to be made and the measurement accuracy of the participating institutes to be compared.

*ASTM E691 – Conducting an Interlaboratory study to determine the precision of a test method

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CA20130 Euro-MIC WG5

5. Break and Networking (16:00- 16:30)

Break

6. Discussion and feedback to WG leaders (16:30- 17:00)

- T. Skovhus mentions attempt of NACE committee to write a review on MIC; was never finalized → current COST Action focus should not be too broad – stay focused!
- Comment by [French lady]: COST Action should focus on methodology
- Comment by J. Knisz: Group leaders should be involved in the work of the other working groups (attend all meetings if possible, or at least read minutes)
- Comment by E. Silva agrees that group leaders should be responsible for contact to other working groups

- A. Koerdt comments that COST website will be online soon; contact details will be available there
- T. Skovhus comments that output of the working groups will depend on what members contribute
- A. Erbe comments that it might be worth to check whether existing methods can be applied to new materials, or whether new methods must be developed
- A. An-Stepec comments that the educational aspect is very important; for example, how do you discriminate MIC from abiotic corrosion?
- T. Skovhus mentions database on MIC-related genomes (on GitHub) from the GenoMIC project

7. MC-Decisions (17:00-17:45):

- a. W&B Plan finalized at MC meeting in Berlin August 24, 2022
 - A. Koerdt asks the working group leaders to decide which communication tool to use
 - A. Koerdt reminds people to advertise the COST action to get more members and MCs
- b. STSM (discussion on how to use this option)
 - Comment by Jose Miguel Palomo Carmona: Could be used to start a research project/proposal by using the money to perform preliminary experiments (possibly even publishable); sending Master students for example
 - Max. 3 month; max. 3000 EUR each
 - T. Skovhus mentions that it can be used to initiate a round robin testing programme (pays for first meeting for exchange of protocols etc., at least)
 - A. Koerdt reminds people to remind people from their country of the ITC grant (max. 1200 EUR each)

8. Reimbursement rules for the future:

a. During MC-Meetings:

- a. Only one MC member will be reimbursed per country and meeting? (Of course, the other MC members can still come, but will not be reimbursed)
 - Vote: FOUR (4) against; TWELVE (12) in favor; ONE (1) neutral => APPROVED
- b. No refunding for the MC in the country where the MC-Meeting will take place
 - Vote: NOBODY against => APPROVED
- c. General lowering of DA (daily allowance) by 70% so that more people receive refunds
 - Vote: NOBODY against => APPROVED

b. WG-Meetings:

- a. Members of core group (elected!) [e.g., working group leaders, vice group leaders] get every time refund as they are the most active people
 - Vote: NOBODY against => APPROVED
- b. Mainly YR&I get refund (YR&I as defined by COST)
 - Vote: NOBODY against => APPROVED

- c. Refund is depending on **active** participation ('active participation' defined by group leaders)
Vote: NOBODY against => APPROVED
- d. For Working Group members only one reimbursement per person per Grant period (October-October) [only in case of budget problems]
Vote: NOBODY against => APPROVED

c. Training school:

- a. Should only Trainer get reimbursed or also the Trainees
Recommendation of the core group: Only trainers should be reimbursed, because otherwise it will be too expensive for the COST; T. Skovhus mentioned that there are several other sources of funding available for PhD students (i.e. trainees)
Vote: NOBODY against => APPROVED

d. Workshop/Conference:

- a. (In Berlin): Professor Dr. Lisa Gieg gets reimbursed?
Vote: NOBODY against => APPROVED
- b. Transfer of money for the STSM to the Berlin Event to support Lisa Gieg?
Vote: NOBODY against => APPROVED

- 8. Short discussion and ideas on how to get more countries to join the MC (17:45-18:00)
 - People from China (and the rest of the world for that matter) can become member of COST Action, but can't be reimbursed!
 - Every new member of COST Action will increase the budget for the next grant period (even if people from the same country are already members)

9. Next meeting (Berlin)

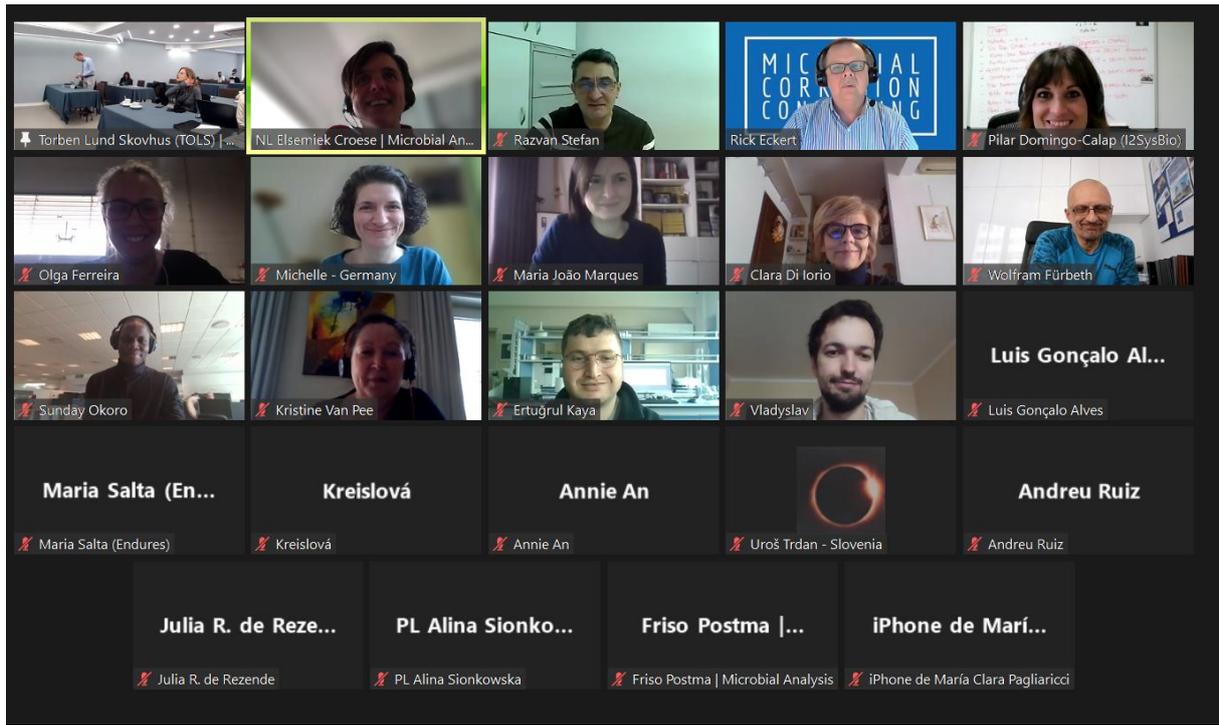
→ Skipped to working group meetings tomorrow as we were running out of time

10. AOB

→ Skipped to working group meetings tomorrow as we were running out of time

Meeting close at 18:00 pm CET

Online Group Photo from March 29, 2022:



Group Photo outside after the WG meeting March 29 2022:

