



Mission Document of the IFAC Working Group

“Advanced Maintenance Engineering, Services and Technology” (A-MEST)

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FOREWORD

The idea to establish a new IFAC Working Group (WG) on maintenance related topics was first initiated by discussions done in IFAC TC 4.4 and TC 5.1 in 2006 under the initiative of Prof. H. Erbe. Thus, an informal meeting was organized by Prof. Benoit Iung in Monterrey during the IFAC CEA07 Conference in October 2007. In that occasion formal support to the idea came from Prof. Carlos Pereira (TC 5.1. chairman).

The first Steering Committee (composed by Adolfo Crespo Marquez, Marco Garetti, Erkki Jantunen, Benoit Iung, Dimitris Kiritsis, Jay Lee) was formed in 2008, and deliberated on various matters related to the WG organization and developed a first Proposition document. The second Steering Committee (composed by Benoit Iung, Jay Lee, Ajith Parlikad, Carlos Eduardo Pereira, François Pérès, Shozo Takata, Marco Macchi, Christos Emmanouilidis) was formed in 2015 with the objective to reflect on past activities and on the research agenda of the WG for the next years. This Mission document is developed by the second Steering Committee.

The following list provides a summary of the events organized by the WG during the years 2007-2015.

OUTLINE OF PAST A-MEST WG ACTIVITIES

A-MEST workshops

- 1st IFAC workshop on “Advanced Maintenance Engineering, Services and Technology” (A-MEST’10), in conjunction with IFAC IMS’10, the 10th IFAC Workshop on IMS (Intelligent Manufacturing Systems), Lisbon, Portugal, July 1-2, 2010.
- 2nd IFAC workshop on “Advanced Maintenance Engineering, Services and Technology” (A-MEST’12), Seville, Spain, November 22-23, 2012.
- 3rd IFAC workshop on “Advanced Maintenance Engineering, Services and Technology” (A-MEST’16), Biarritz, France, 19-21 October 2016.

Special issues in Journals

- Publication of a Special Issue on “Advanced Maintenance Engineering, Services and Technologies”, Journal of MTM Manufacturing Technology Management, Vol. 25, No. 4, 2014, Emerald Group Publishing Limited.
- Publication of a Special Issue on “Maintenance modelling and engineering”, IMA Journal of Management Mathematics, Vol. 26, No. 2, 2015, Oxford University Press.

- Forthcoming publications of special issues/sessions in selected journals as a follow-up to IFAC A-MEST'16 (under development).

Special sessions/tracks in International Conferences

- Special session on “Advanced Maintenance Engineering, Services and Technology” during IFAC IMS'08, the 9th IFAC Workshop on IMS (Intelligent Manufacturing Systems), Szczecin, Poland, October 9-10, 2008.
- Promotion of a special session on “Monitoring and Predictive Maintenance” during INCOM'09, the 13th IFAC symposium on INCOM (Information Control Problems in Manufacturing), Moscow, Russia, June 3-5, 2009.
- Promotion of the 1st M4SM Workshop on “Maintenance for Sustainable Manufacturing”, organized by the IMS (Intelligent Manufacturing Systems) – Manufacturing Technology Platform M4SM during WCEAM'09, the 4th WCEAM (World Congress on Engineering Asset Management) Conference, Athens, Greece, September 28-30, 2009.
- Special session on “E-Maintenance Engineering, Services and Technologies for PHM development in Industry” during PHM'13, the Prognostics and System Health Management Conference, Milan, Italy, September 8-11, 2013.
- Special session on “Promoting sustainable operations through advanced maintenance engineering, services and technology” during IFAC'14, the 19th World Congress of the International Federation of Automatic Control, Cape Town, South Africa, August 24-29, 2014.
- Special session on “Asset and maintenance management for competitive and sustainable manufacturing” during APMS'14, Int. Conf. of the IFIP Working Group WG 5.7 on Advances in Production Management Systems, Ajaccio, France, September 20-24, 2014.
- Special session on “Advanced Maintenance Engineering for Competitive and Sustainable Manufacturing in a Big Data Environment” during INCOM'15, the 15th IFAC symposium on INCOM (Information Control Problems in Manufacturing), Ottawa, Canada, May 11-13, 2015.
- Special session on “Advanced Maintenance Engineering for Proactive and Predictive Maintenance” during SAFEPROCESS'15, the 9th IFAC Symposium on Fault Detection, Supervision and Safety of Technical Processes, Paris, France, September 2-4, 2015.
- Open track session on Intelligent Maintenance Systems as part of the IFAC World Congress, 9-14 July 2017, Toulouse, France.
- Special IFAC A-MEST session during WCEAM 2017, 2-4 August 2017, Brisbane, Australia (under development).

Working group meetings

- Founding (1st WG) meeting during IFAC CEA'07, the IFAC Conference on CEA (Cost Effective Automation in Networked Product Development and Manufacturing), Monterrey, Mexico, October 2-5, 2007.
- 2nd WG meeting during IFAC IMS'08, the 9th IFAC Workshop on IMS (Intelligent Manufacturing Systems), Szczecin, Poland, October 9-10, 2008.
- 3rd WG meeting during the 1st IFAC official workshop on “Advanced Maintenance Engineering, Services and Technology” (A-MEST'10), in conjunction with IFAC IMS'10, the 10th IFAC Workshop on IMS (Intelligent Manufacturing Systems), Lisbon, Portugal, July 1-2, 2010.
- 4th WG meeting during COMADEM'11, the 24th Int. Congress on COMADEM (Condition Monitoring and Diagnostics Engineering Management), Stavanger, Norway, May 31 June 1, 2011.
- 5th WG meeting during the 2nd IFAC official workshop on “Advanced Maintenance Engineering, Services and Technology” (A-MEST'12), Seville, Spain, November 22-23, 2012.
- 6th WG meeting during the 3rd IFAC official workshop on “Advanced Maintenance Engineering, Services and Technology” (A-MEST'16), Biarritz, France, October 19-21, 2016.

Doctoral workshops

- Promotion of the series of doctoral workshops on “Product & Asset Life Cycle Management” (PALM, IFIP series) held in Aprica (Italy) 2009, Islantilla (Spain) 2010, Lyon (France) 2011, Giardini Naxos (Italy) 2012, Les Diablerets (Switzerland) 2014, Belfort-Montbéliard (France), July 2015, Urrunge – Saint Jean de Luz (France) 2016.

MISSION

Mission statement

The mission of the A-MEST WG is “to create, share and promote new knowledge pertaining to technology, engineering and management of advanced maintenance systems”.

Rationale behind the mission statement

- Maintenance is a wide and interdisciplinary area, leveraging on a blend of technology, engineering and management methodologies to provide decisive contribution to a company’s business goals.
- Design and improvement of advanced maintenance systems can only be achieved considering the different interconnected engineering methodologies and technologies together.
- The importance of maintenance services has been increasing rapidly, fostering the involvement of specialists to provide competences, technologies and resources; today, it is gaining momentum also as effect of new business models and technology development, and considering its impact for the establishment of new management approaches.
- Blending technology, engineering and management is a relevant means in order “to go beyond”, by implementation of proactive strategies not only focused on maintenance objectives but also on the objectives of environmental protection, wealth and safety of people.

Relevance of the mission

The maintenance area, considered as a blend of technology, engineering and management, is still not well represented in scientific journals, as it is dispersed in many specialized issues. Under this view, the WG can contribute to raise and strengthen the scientific level of maintenance-related topics and the consideration of maintenance as a scientific area.

STRATEGIC GOALS AND ACTIVITIES

- 1 Federate and promote research and establish interfaces with relevant research fields.
 - Promote maintenance as an interdisciplinary science, blending knowledge from management, engineering, technological and technical field.
 - Contribute to the development of a general framework for advanced maintenance systems, establishing interfaces with production management and manufacturing plant control.
 - Promote and evolve the research agenda, including perspectives and foresight in the field, with regard to the intersection of technology, engineering and management.
 - Involve new and experienced researchers in the A-MEST WG community, considering the relevance of their knowledge and expertise to contribute to the research agenda, and the need to enhance global coverage and participation.
 - Promote the relationships of the WG with other technical committees TCs within IFAC, besides the TC 5.1, and with other scientific and technical organizations and communities (e.g., IFIP, ESREL, ISEAM, PHM, EFNMS, ...).
- 2 Promote competence, growth and exchange of students, PhDs and young researchers.
 - Involve young researchers in the A-MEST WG community, through actions specifically done to attract their interest.
- 3 Promote academia-industry partnerships and highlight the impact of maintenance in industry and society.
 - Promote industry-academia partnerships, attracting industrial experts through specific actions for their active involvement in the A-MEST WG community.
 - Promote the role of maintenance for sustainability (economic, environmental, social impacts), highlighting technological enablers.
- 4 Promote and improve education and training in maintenance.
 - Steer the organisation of events, special sessions and other activities to facilitate best knowledge diffusion,
 - Maintain active push towards education and training activities in the above events via tutorials, industrial case studies and facilitate the exchange of junior and/or senior researchers and professionals.

RESEARCH AGENDA

The research agenda includes a list of topics of interest. The events where the A-MEST WG will be involved (workshops, special issues in journals, special sessions, etc...) will allow to integrate, extend and specify the topics in accordance with the mission statement.

- Maintenance strategies, organizational and economical methods
- Maintenance business model design, processes and technology development
- Maintenance effectiveness evaluation: economic, environmental and social impacts
- Maintenance performance improvement
- Lifecycle management and lifecycle simulation
- Maintenance within Asset Management
- Total productive maintenance (TPM)
- Maintenance management and production management
- Value-based maintenance
- Maintenance related services
- Reliability, statistical approaches
- Reliability and maintenance engineering
- Maintenance and dependability, fault tolerance and management, contribution to safety
- Diagnostics, prognostics, reasoning and decision support
- Condition monitoring, sensors, signal analysis and failure analysis
- Prognostics and health management (PHM)
- Data management issues, information modelling, semantic technologies; maintenance metadata; big data analytics pertaining to maintenance
- Emerging technologies in maintenance, such as e-maintenance, mobile maintenance, automation in maintenance, sensors technology, wireless sensing and networking, internet of things, cyber-physical systems, cloud technologies, augmented and virtual reality
- Human factors in maintenance; innovative education, training and knowledge management
- Maintenance, machine to machine communication, manufacturing plant control

PLAN OF ACTIVITIES

The WG will pursue its statutory objectives through the following activities.

- Invitation of new and experienced researchers to join the A-MEST membership. The candidate members are invited by current members with a view to contribute to the global coverage of the group from different world regions. Membership criteria include a strong contribution in the research agenda of the group and demonstrated commitment for active involvement in A-MEST activities. A new member is proposed by an existing member and its curriculum vitae is circulated for approval within the membership, considering the aforementioned criteria.
- Organization of A-MEST workshops in which discussions and cross-fertilization among the participants are promoted. Activities like panel discussions to share experience, and presentations of working papers will be encouraged. Besides, as education and training is considered significant by industry, relevant sessions should be encouraged during the workshops, e.g. tutorials to attract people from industry. On the other hand, it is advisable to involve industrial experts, as invited speakers or through the organisation of industrial visits in conjunction with the workshops. Last but not least, specific actions to attract young researchers should be promoted, e.g. tutorial sessions for Ph.D. students during the workshops, or a joint organization of events as A-MEST workshops and doctoral workshops.
- Besides the organisation of A-MEST workshops, the contribution in other targets is recommended, in the form of usual scientific actions: special sessions in conferences (e.g. after the identification of main specific conferences every year as a target to invite the organization of special sessions); journal special issues (considering especially but not only IFAC journals relevant to the A-MEST topics).
- The creation of a map of who is active in which research area ("who's who") is fostered to better co-ordinate the activities.
- Web visibility of the WG is considered relevant for the benefit of both WG and WG members. The web visibility will allow describing the WG mission, scope and all the relevant information about the WG activities (e.g. a list of future events); besides, the list of A-MEST members with their full

information will be provided. Web visibility will be established through the IFAC official website; other mechanisms, such as a LinkedIn group, will be considered.

- Initiation and management of a quarterly Newsletter to maintain regular information flow to the A-MEST members. The Newsletter may highlight information of common interest (projects, publications, events, project opportunities/calls).
- Devising and developing the WG strategic goals and activities (SG&A) through the WG Steering Committee and with feedback/interaction with the membership base.

BENEFITS OF BEING PART OF THE WG

- Be part of a network integrated within IFAC scientific community
- Up to date who's who (list of maintenance experts)
- Improved mechanism for knowledge sharing
- Up to date information on science, engineering, technology, services for advanced maintenance
- Development of informal and formal partnerships for joint initiatives, as well as research and innovation projects in thematic areas that fall within the research agenda of the group.
- Attendance of maintenance events organized in conjunction with IFAC or other related organisations / networks

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