Newsletter of the IFAC Technical Committee on Human-Machine-Systems

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(To publish your TC4.5 related information to the next newsletter, send your proposal by email to Frédéric Vanderhaegen: frederic.vanderhaegen@univ-valenciennes.fr*)*

1. The words of the NOC chair of the 13th IFAC/IFIP/IFORS/IEA symposium on Design, Analysis, and Evaluation of Human-Machine Systems, Kyoto, Japan, 2016

Scope and Aim:

Kyoto University hosted the 13th IFAC/IFIP/IFORS/IEA Symposium on Analysis, Design, and Evaluation of Human-Machine Systems in Kyoto, Japan from Aug 30, 2016 through Sep 2, 2016.

The symposium, held every triennium, continued on the success of the previous meetings, started since 1982: Las Vegas (USA, 2013), Valenciennes (France, 2010), Seoul (Korea in 2007), Atlanta (USA, 2004), Kassel (Germany, 2001), Kyoto (Japan, 1998), Boston (USA, 1995), The Hague (Netherlands, 1992), Xi'an (China, 1989), Oulu (Finland, 1988), Varese (Italy, 1985) and Baden-Baden (Germany, 1982).

The objective of the symposium was to provide an international forum for the exchange and sharing of the latest scientific and technological developments in human-machine systems research. The symposium highlighted the transformative impacts in research, theory, and application that are the result of recent technological advances. The objective of this symposium is to exchange ideas and further understanding in the areas of Human-Machine Systems, Human-Computer Interaction, Intelligent and Autonomous Systems and Decision Support Systems, etc. Indeed, nowadays progressive system redesigns are needed with respect to human computer/machine interactions to increase system reliability and transparency by increasing human-system interactions, and especially a human user's proactive participation, rather than by eliminating the human out of the loop. Such a view on the human-machine system design regards a human and an automated agent as equivalent partners, and through their mixed-initiative interactions some novel relations of mutual dependency and reciprocity would emerge as well as flexible changes of role-taking are expected. At the same time, however, introducing new technologies may bring about a new type of complex interactions among elements, and analysis is becoming necessary to focus not only on 'Sharp-Ends' which immediately cause unsafe event but also 'Blunt-Ends' which consists background of unsafe event. This is the critical feature of the socio-technical systems and was set as a main theme of this symposium at Kyoto, Japan.


Chair of International Program Committee (IPC) was Professor Frédéric Vanderhaegen (Chair of TC 4.5, University of Valenciennes, France) and Chair of National Organizing Committee (NOC) was Professor Tetsuo Sawaragi (Kyoto University, Japan). Professor Hiroshi Shimoda took a role of an Editor as well as of a co-chair of NOC. Prof. Hidenori Kimura, IFAC Fellow, was invited as an honorary guest from IFAC and gave us a welcome address at the banquet. The symposium venue was at the Sodoh Higashiyama Kyoto, which is a former private residence of the well-known painter Takeuchi Seihō.

Participants, Program and Papers:

There were a total of 125 participants from 16 different countries. All papers were reviewed by a minimum of two reviewers. Based on the reviews, 112 papers were invited to upload their final version and present their paper in the conference.

The program also proposed plenary sessions and keynotes:

- Mr. Hiroaki Okuchi (Managing Officer, Toyota Motor Corporation, Japan) who talked about "Toyota's Research into the Interaction between Automated Driving and Humans: The Mobility Teammate Concept".

- Prof. Erik Hollnagel (University of Southern Denmark, Denmark) who talked about “Being safe in an unsafe world – The practical side of resilience engineering”
- Dr. Chieko Asakawa (IBM Fellow IBM Research – Tokyo, Japan and Carnegie Mellon University, United States of America) who talked about “Making the real-world accessible”

In addition to the above, a special plenary workshop on “Lessons Concerning Resilience of Socio-Technical Systems Learned from Experiences During the Great East Japan Earthquake” was held. Speakers of the workshop were;

- Prof. Masaharu Kitamura (Research Institute for Technology Management Strategy / Emeritus Professor at Tohoku University, Japan)
- Mr. Atsufumi Yoshizawa (Former Unit 5&6 Superintendent, Fukushima Daiichi Nuclear Power Station, Tokyo Electric Power Company, Japan)
- Ms. Kyoko Oba (Japan Atomic Energy Agency, Japan)

Prof. Tetsuo Sawaragi (Kyoto University, Japan) facilitated the workshop.

Due to the excellent quality of the selection and of the papers, several awards were distributed. The initial filtering for the best papers was based on the reviews that were given to each paper. After the initial filtering, four senior committee members judged the quality of the remaining papers based on the technical soundness, awareness of literature, technological contribution, originality of the concepts, style and clarity, technical presentation and importance of results. The following awards were decided.

- Young Author Best Paper Award was presented to Frank Michiel Drop, Daan Marinus Pool, Max Mulder, Heinrich H. Bülthoff for the paper entitled “Constraints in Identification of Multi-Loop Feedforward Human Control Models”. This was awarded to the best paper presented by PhD student or Post doctoral researcher younger than 35 years, who should be the first and corresponding author of the paper.
- The European best paper award: Alexandre Kostenko, Philippe Rusffet, Christine Chauvin, Gilles Coppin for the paper entitled “A Dynamic Closed-Looped and Multidimensional Model for Mental Workload Evaluation”
- The American best paper award: Tamsyn Edwards for the paper entitled “Multifactor Interactions and the Air Traffic Controller: The Interaction of Situation Awareness and Workload in Association with Automation”
- The Asian best paper award: Yukio Horiguchi, Takaya Suzuki, Tetsuo Sawaragi, Hiroaki Nakanishi, Tomoharu Takimoto for the paper entitled “Extracting Train Driver’s Eye-Gaze Patterns Using Graph Clustering”


The selection committee that decided these awards was composed by: F. Vanderhaegen (France), S. Nõmm (Estonia), J. Zhang (China) and T. Sawaragi (Japan).

The 14th symposium will be held and organized by Prof. Sven Nõmm from Tallinn University of Technology, Estonia and the further plans will be discussed at the TC 4.5. meeting that is planned during the 2017 IFAC World Congress at Toulouse, France.

Prof. Tetsuo Sawaragi, NOC chair of the 13th IFAC/IFIP/IFORS/IEA Symposium on Analysis, Design, and Evaluation of Human-Machine Systems

2. The words of the outgoing TC 4.5 chair

Dear colleagues,

This year was my last IFAC/IFIP/IFORS/IEA symposium as TC Chair. It was a pleasure to serve the IFAC Technical Committee on HMS during two terms. I wrote my first newsletter as a TC chair in 2010 after our symposium in Valenciennes, France. Since this period of time, I wrote with you two newsletters per year that summarized all our activities (see on our web site: http://tc.ifac-control.org/4/5/newsletter).

I was the IPC chair of the 13th version of our symposium on Analysis, Design, and Evaluation of Human-Machine Systems, in Kyoto. This international event gathers researchers, professors, associated professors, industrials, engineers, and students from different research communities that work or are interested on Human-Machine Systems. This symposium is organized in association with important international federations or groups: IFAC (Automatic Control), IFIP (Information Processing), IFORS (Operational Research) and IEA (Ergonomics). Our TC HMS meeting organized during this symposium has determined a new TC HMS Chair, and validated the place of our next symposia in 2019 in Estonia, in 2022 in USA, in 2025 in China and in 2028 in Netherlands. This shows that our symposium is very important and famous, and we have to continue this dynamic improvement of our community into IFAC.

Thanks for contributing to the success of our last international symposium in Kyoto. I will discuss with organizers of invited sessions of our symposium in order to invite the contributors of their sessions to write extended versions for special issues on IFAC journals or on Cognition Technology & Work journal (see: http://www.springer.com/computer/hci/journal/10111). Extended versions of papers will also require to authors of the paper awards and of the initial selection of best papers.

I welcome Prof. Jianhua Zhang who will chair our TC, our new TC co-chairs and our new TC members. This new team will be officially validated during the IFAC World Congress in Toulouse but its activities begin now! Before this congress, we are in a transition mode and I remain in the loop!

Human-Machine Systems is an important topic that is well-recognized and developed in the domain of Automatic Control via the IFAC federation. The impact of this research domain is due to all of yours contributions. Next year, the IFAC World Congress will be held in Toulouse (France) and I invite you to submit papers about HMS to show to the Automatic Control community the advances on HMS when human factors are integrated during the design, the analysis, the use, and/or the evaluation of automated systems implemented into robots, transport systems, manufacturing systems, cyber-physical systems, or other complex human-machine systems.

Our community has a future huge challenge to take into account safety and security related to the control, the prevention and the recovering of undesirable events or threats such as acts of terrorism, natural disasters, or other crises. I take this opportunity to convey my sincere condolences and support to people who have lost family members or friends after such recent events that have taken place around the world. The term of resilience is often used when such events are successfully recovered. The successful control of instability is called resilience and I think that dissonances cause this instability. The study of such a concept might be useful for studying the safety and security of human-machine systems such as transport systems, cyber-physical&human systems, manufacturing systems, etc. I invite you to take a look on this recent article I wrote for initiating such a discussion around our community: *Vanderhaegen, F., (2016), A rule-based support system for dissonance discovery and control applied to car driving, Expert Systems With Applications, 65, 361-371*.

So let's go ahead and have fun to contribute to the success of our TC by organizing its scientific events and by participating to its activities!

Prof. Frédéric Vanderhaegen, Chair of the IFAC TC HMS from 2010 to 2017

3. The words of the incoming TC 4.5 chair

If you are a researcher or practitioner with an interest in Analysis, Design, Modeling, Control and Performance Evaluation of Human-Machine Systems in general and design and analysis of complex technical, engineering, biomedical, or social systems with tight coupling, synergy, interaction, or integration with humans, in particular, you are warmly welcome to join this Technical Committee (TC) as it is well suited to your professional need and services.

The primary goal of this TC is to exchange ideas and the latest research progresses/findings/discoveries in the diverse areas of Human Factors, Human Performance, Human-Machine Systems, Human-Machine Symbiosis, Human-Computer Interaction (HCI), Human-Automation Interaction, Human-Systems Integration, Human-Machine Hybrid Intelligence, Brain-Machine Interaction, Brain-Computer Interfacing, Neuroergonomics, Cognitive Psychology, Engineering/Technical Psychology, Cognitive Neuroengineering and Neurotechnology, Intelligent and Autonomous Systems, and Decision-

Support Systems. On the other hand, new applications of the advanced industrial, information and communication, and intelligent technologies to the design, analysis and evaluation of human-machine systems in a wide range of application domains are also a major research concentration in this field.

Some theoretical and practical concepts used in this field, such as resilience engineering, situational awareness, human-automation symbiosis, interaction or cooperation, human reliability or stability, are in fact shared with other scientific communities, including Computer Science, Ergonomics or Human Factors, Cognitive Psychology, and social sciences. For this reason, the cross-disciplinary exchange and discussion of research ideas and results makes the impact of the scientific events and activities organized by the IFAC TC 4.5 more significant, productive and far-reaching.

All the theoretical and practical contributions to various research topics in the field of Human-Machine Systems are presented on the successful and prominent triennial IFAC Symposium on Analysis, Design, and Evaluation of Human-Machine Systems, which has a continuous and brilliant history of more than three decades so far. The 14th IFAC symposium on HMS will be held in Tallinn, the beautiful and historical capital city of Estonia, in 2019.

On behalf of this TC team I sincerely welcome you to join our community, participate in our future academic events and activities (in particular the TC-sponsored symposia) by contributing and sharing your valuable research expertise and experience in this exciting field, which has become increasingly important when coping with more and more complex systems in this information-intensive age.

At last, but not at least, I would like to express my sincere gratitude to all the past TC Chair and Co-Chairs for their outstanding contribution to the success of the scientific events and activities sponsored by this TC. Their further suggestions and advice would be highly appreciated.

Prof.Jianhua Zhang, New chair of the IFAC TC HMS

4. The new list of the IFAC TC 4.5 chait, co-chairs and members

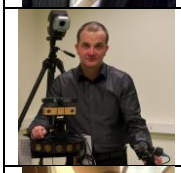
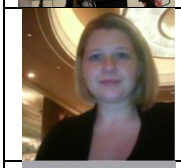
Find enclosed the final list of our TC 4.5 members. Please, do not hesitate to inform F. Vanderhaegen if some information is wrong, or if new members have to be included.

The chairs of the IFAC TC 4.5 have changed since September 2016. The new list of chair/co-chairs is announced above. We shall work together and try our utmost to attract academics, researchers and practitioners from all over the world to join the Human-Machine Systems community as well as to further strengthen and invigorate fruitful scientific discussion, exchange and cooperation among researchers in this increasingly important field of a marked cross-disciplinary nature.

TC 4.5 Chair:

	Prof Jianhua Zhang, Head of Intelligent Systems Group, School of Information Science and Engineering, East China University of Science and Technology, Shanghai 200237, P.R. China

TC 4.5 Co-Chairs:

	Prof Frédéric Vanderhaegen, University of Valenciennes, France
	Prof Tetsuo Sawaragi, Kyoto University, Japan
	Dr Sven Nõmm, Tallinn University of Technology, Estonia
	Dr Tamsyn Edwards, San Jose State University/ NASA Ames Research Center, USA
	Mr. Kenichi Tanaka, Mitsubishi Electric Company, Japan

List of members with email:

Dr. Götz Botterweck	goetz.botterweck@lero.ie
Dir. Laurent Bourrouilhou	lbourrou@ureason.com
Prof. Dr. Guy A. Boy	gboy@fit.edu
Prof. Dr. Galip Cansever	agalipcansever@gmail.com
Prof. Jose Roberto Castilho Piqueira	jose.piqueira@poli.usp.br
Prof. Pablo Castells	pablo.castells@uam.es
Prof. Myung Jin Chung	mjchung@ee.kaist.ac.kr
Dr. Yun Hyung Chung	yhchung@kins.re.kr
Professor Dr. Giovanni De Poli	Giovanni.DePoli@dei.unipd.it
Prof. Tadeusz Dobrowiecki	dobrowiecki@mit.bme.hu
Dr. Tamsyn Edwards	tamsyn.e.edwards@nasa.gov
Prof. Peter F. Elzer	elzer.home@t-online.de
Prof. Cesare Fantuzzi	cesare.fantuzzi@unimore.it
Prof. Dr. Florin-Gheorghe Filip	ffilip@acad.ro
Dr. Robert Fuchs	robert_fuchs@jtekt.co.jp
Dr. Robert Genser	rgenser@aon.at

Dr.-Ing. Dipl.-Inf. Daniel Görlich	daniel.goerlich@hochschule-heidelberg.de
Dr. Dong-Han Ham	d.ham@mdx.ac.uk
Dr. Peter G. Higgins	phiggins@swin.edu.au
Prof. Erik Hollnagel	Erik.Hollnagel@gmail.com
Prof. Baosheng Hu	bshu@xjtu.edu.cn
Dr. Husni Idris	Husni.Idris@engilitycorp.com
Prof. Dr. Koichi Inoue	inoue@entre.osaka-sandai.ac.jp
Dr. Meike Jipp	meike.jipp@dlr.de
Prof. Dr.-Ing. Gunnar Johannsen	G.Johannsen@Uni-Kassel.de
Dr. Andrzej Kasinski	Andrzej.Kasinski@put.poznan.pl
Dr. Kensuke Kawai	
Dr. So Young Kim	SYKim@ge.com
Professor Alex Kirlik	kirlik@uiuc.edu
Dr. Naoyuki Kubota	kubota@tmu.ac.jp
Dr. Alar Kuusik	alar.kuusik@ttu.ee
Dipl.-Inf. Sandro Leuchter	sandro.leuchter@ieee.org
Prof. Dr. Alexander H. Levis	alevis@gmu.edu
Prof. Dr. Morten Lind	mli@elektro.dtu.dk
Dr. Franck Mars	franck.mars@irccyn.ec-nantes.fr
Dr. Lena Mårtensson	lena.martensson@indek.kth.se
Prof. Dr. Patrick Millot	patrick.millot@univ-valenciennes.fr
Prof. Daihwan Min	mismdh@korea.ac.kr
Prof. Mirolyub Mladenov	mladenov@uni-ruse.bg
Dr. Roberto Montanari	roberto.montanari@unipr.it
Prof. Dr. Ir. Max Mulder	m.mulder@tudelft.nl
Dr. Anja Naumann	Anja.Naumann@dlr.de
Dr. S. Narayanan	s.narayanan@wright.edu
Dr. Sven Nomm	sven.nomm@ttu.ee
Dr. Janet M. Noyes	J.Noyes@bris.ac.uk
Mr. Holger Oortmann	holger.oortmann@siemens.com
Dr. Carl A. Pickering	cpicker6@jaguarlandrover.com
Prof. Amy Pritchett	amy.pritchett@isye.gatech.edu
Prof. Bernard Riera	bernard.riera@univ-reims.fr
Dr. Ling Rothrock	lxr28@engr.psu.edu
Prof. Dr.-Ing. Matthias Rötting	roetting@mms.tu-berlin.de
Prof. Jose Luis Pons Rovira	jose.pons@csic.es
Dr. Lorenzo Sabattini	lorenzo.sabattini@unimore.it
Prof. Dr. Eng. Tetsuo Sawaragi	sawaragi@me.kyoto-u.ac.jp
Prof. Dr.-Ing. Ludger Schmidt	L.Schmidt@uni-kassel.de
Prof. Rossi Setchi	setchi@cardiff.ac.uk
Prof. Marcin Sikorski	Marcin.Sikorski@zie.pg.gda.pl
Dr. Francisc Sisak	sisak@marconi.unitbv.ro
Dr. Charlotte Skourup	charlotte.skourup@no.abb.com
Prof. Johan Stahre	johan.stahre@chalmers.se
Prof. D. Sc. Vadim L. Stefanuk	stefanukv@iitp.ru
Kenichi Tanaka	Tanaka.Kenichi@ah.mitsubishielectric.co.jp
Prof. Kay Chuan Tan	isetankc@nus.edu.sg
Prof. Tibor Vámos	vamos@sztaki.hu
Prof. Frederic Vanderhaegen	frederic.vanderhaegen@univ-valenciennes.fr
Prof. Kim J. Vicente	vicente@mie.utoronto.ca
Prof. Peter Wieringa	p.a.wieringa@tudelft.nl
Prof. Wan Chul Yoon	wcyoon@kaist.ac.kr
Prof. Dr.-Ing. Jianhua Zhang	zhangjh@ecust.edu.cn

Dr. Zhicheng Zhang	zhicheng.zhang@areva.com
Prof. Dr.-Ing. Detlef Zühlke	zuehlke@mv.uni-kl.de

5. The call for participation to IFAC World Congress, Toulouse, France, 2017

The next IFAC World Congress will be held in Toulouse, France, July 9-14 2017: http://www.ifac2017.org/

Our TC members are invited to propose contributions by submitting regular papers, invited sessions or open invited tracks.

The list of the Open Invited Tracks is available on: https://www.ifac2017.org/OIT. We have 11 tracks from our CC4 MECHATRONICS, ROBOTICS AND COMPONENTS. The deadline for making such a submission is over but you can submit your contributions into these tracks. As it is important to have a visibility about Human-Machine systems contributions during this congress, we have time to make other kinds of make submissions for:

- Invited session. Deadline: **October 15, 2016**.
- Regular paper submission. Deadline: **October 31, 2016**.

Our colleagues Valeria Villani and Cesare Fantuzzi has proposed an Open Invited Trask session entitled “Adaptive User Interfaces for Industrial Applications”. For submitting papers to his session, please use the invited session identification code “x412i”, and upload your submission on the web site page: https://www.ifac2017.org/submit. For more details about this session, see on:
https://www.ifac2017.org/sites/www.ifac2017.org/files/IFAC17_0148_MS_TC41.pdf.

A tutorial on Human-Machine Systems will be proposed by F. Vanderhaegen in collaboration with the national research network GDR MACS, the international research network GDR I HAMASYTI and the research group GRAISyHM. Oliver Carsten from Leeds has accepted to organize a session of 3 hours on safety analysis in transportation domain. If you are interested for organizing another session, please contact F. Vanderhaegen.

Hoping to see all of you in Toulouse soon.

5. Events related to human-machine systems

All IFAC events are listed on: http://www.ifac-control.org/events/@@events_view

Some events are directly related to our IFAC TC 4.5:

- 12th IFAC Workshop on Intelligent Manufacturing Systems, IMS 2016, December 5-7 2016, Austin, TX, USA.
- 1st IFAC IEEE, EECI, NSF Conference on Cyber-Physical & Human-Systems - CPHS 2016, December 7-9 2016, Florianopolis, BRAZIL.
- IFAC World Congress 2017, July 9-14 2017, Toulouse, FRANCE: http://www.ifac2017.org/