

# International Seminar on Safety and Security of Autonomous Vessels (ISSAV) & European STAMP Workshop and Conference (ESWC)

2019

17-20 September 2019, Helsinki/ Espoo, Finland

Aalto University is proud to host the 2nd edition of the International Seminar on Safety and Security of Autonomous Vessels (ISSAV) together with the 7th edition of the European STAMP Workshop and Conference (ESWC). The ISSAV promotes all aspects of maritime safety and security in the context of autonomous vessels and maritime ecosystem. The ESWC focuses on applications and studies related to the Systems-Theoretic Accident Model and Processes (STAMP) which is a new systems-thinking approach to engineer safer systems.



## SCOPE

### *ISSAV*

Autonomous vessels have become a topic of high interest for the maritime transport industry. Recent progress in the development of technologies enabling autonomous systems has fostered the idea that autonomous vessels will soon be a reality. However, before the first autonomous vessel can be released into her actual context of operation, it is necessary to ensure that it is safe and secure. The aim of ISSAV is to promote all aspects of maritime safety and security in the context of autonomous vessels. The seminar focuses on exchanging knowledge about key safety and security challenges and opportunities in the context of autonomous vessels and the autonomous maritime ecosystem. The seminar has a special emphasis on:

- The challenges in managing safety and security in the operation of autonomous vessels and the entire ecosystem of an autonomous maritime system
- Innovative approaches for managing the safety of autonomous vessels, supporting the design, operations and managerial strategies for ensuring the safety in the functioning of the autonomous maritime system
- Digitalization as technological enabler for efficient safety and security assurance in the context of autonomous shipping
- The standardization of safety and security for autonomous vessels
- The development of intelligent security strategies for establishing resilient and robust systems for autonomous vessels
- Safety and security integration in the operative context of autonomous maritime systems
- Autonomous vessels operating in extreme environments (ice and arctic conditions)

# International Seminar on Safety and Security of Autonomous Vessels (ISSAV) & European STAMP Workshop and Conference (ESWC)

2019

17-20 September 2019, Helsinki/ Espoo, Finland

## **ESWC**

Traditional system safety approaches are being challenged by the introduction of new technology and the increasing complexity of the systems we design, manufacture and operate. STAMP and its associated tools deal with the complexity of systems and provide systematic ways to analyze and assess existing and conceptual systems proactively or detect and illustrate deficiencies revealed through investigations. The ESWC brings together researchers and practitioners who apply, or want to get familiar with, STAMP that is widely used in different sectors such as space, aviation, healthcare, defense, nuclear, railways, infrastructure, maritime and automotive. The conference covers the following topics for presentations:

- Experiences using STPA, STPA-Sec, and CAST
- Introducing STAMP, STPA, and CAST into large organizations
- Safety-guided and Security-guided design using STPA and STPA-Sec
- Using STPA to make decisions
- Accident/loss analyses
- Certification and regulatory issues
- Evaluations and comparisons with traditional techniques
- Risk management and identifying leading indicators
- Applications to security and other areas such as workplace safety
- Safety Management System development and evaluation
- Tools, processes, and other support for analysis and design using STPA and CAST
- Management and adoption experiences or challenges
- Applications to other emergent properties (beyond safety and security)



# International Seminar on Safety and Security of Autonomous Vessels (ISSAV) & European STAMP Workshop and Conference (ESWC)

2019

17-20 September 2019, Helsinki/ Espoo, Finland

## PROGRAM

### ISSAV

Tuesday 17.09.2019	
8:30 – 9:00	Conference registration and coffee
9:00 – 9:10	Welcome and introduction
<b>Keynote speakers</b>	
9:30 – 10:00	<b>Pierre C Sames</b> Senior Vice President, DNV GL - Group Technology and Research Director <i>“Assurance of complex cyber-physical systems – a class perspective”</i>
10:00 – 10:30	<b>Richard Balzano</b> Deputy Maritime Administrator, Maritime Administration, USA <i>“Automation and the Maritime Industry”</i>
10:30 – 10:45	<i>Coffee break</i>
<b>Session I</b>	
10:45 – 11:10	Risk Assessment on a Container Ship considering different Autonomy Levels <b>N. P. Ventikos, A. Chmurski, K. Louzis</b> <i>Laboratory for Maritime Transport (School of Naval Architecture &amp; Marine Engineering, National Technical University of Athens), Greece</i>
11:15 – 11:40	Selecting risk assessment method for remote pilotage in intelligent fairway: A review <b>J. Lahtinen, S. Hirdaris, O. A. Valdez Banda, P. Kujala</b> <i>Aalto University, School of Engineering, Department of Mechanical Engineering (Marine Technology), Finland</i>
11:45 – 12:10	A Framework for Automatic Risk-Based Decision Making for Autonomous Ships <b>B. Rokseth</b> <i>Norwegian University of Science and Technology (NTNU), Norway</i>
12:10 – 13:00	<i>Lunch</i>
<b>Session II</b>	
13:00 – 13:25	Korean Technical Innovation toward Autonomous Ship and Smart Shipbuilding on Ensuring of Safety <b>Y. Kwon, Y. Jeong, J. Woo, D. Oh, H. Kim, I. Shin, S. Jung, S. Im, and C. Jung</b> <i>Research Institute of Medium &amp; Small Shipbuilding, South Korea</i>
13:30 – 13:55	Prediction Model for Human Failure Probability of Autonomous Cargo Ships <b>D. Zhang, M. Zhang, H. Yao, K. Zhang, C. Fan</b> <i>Intelligent Transportation Systems Research Center, Wuhan University of Technology, Wuhan, China</i>
14:00 -14:25	Developing a framework for Trustworthy Autonomous Maritime Systems <b>D. Dghaym, S. Turnock, M. Butler, J. Downes, T. S. Hoang and B. Pritchard</b> <i>University of Southampton, United Kingdom</i>
14:30 -14:55	Comparison of system modeling techniques for autonomous maritime systems <b>S. Basnet, O.A. Valdez Banda, M. Chaal, S. Hirdaris, P. Kujala</b> <i>Aalto University, School of Engineering, Department of Mechanical Engineering (Marine Technology), Finland</i>
15:00 – 15:15	<i>Coffee break</i>

**Tuesday 17.09.2019****Session III**

15:15 – 15:40 Safe navigation literature review: autonomous and connected vessels considered  
**M. Wahlström**  
*VTT Technical Research Centre of Finland Ltd., Finland*

15:45 – 16:10 Towards Simulation-based Verification of Autonomous Navigation Systems  
**T. A. Pedersen, J. A. Glomsrud and O. I. Haugen**  
*DNV GL, Norway*

16:15 – 16:40 Empirical analysis of complex network for marine traffic situation  
**Z. Sui, Y. Wen, C. Zhou, C. Xiao, F. Zhang, L. Huang and H. Chen**  
*School of Navigation, Wuhan University of Technology, China*

16:45 – 17:10 *Trustworthy versus Explainable AI in Autonomous Vessels*  
**J. A. Glomsrud, A. Ødegårdstuen, A. L. St. Clair and Ø. Smogeli**  
*DNV GL, Norway*

17:15 – 18:00 *Pre-dinner drinks*

18:30 **Social dinner at Haikaranpesä Restaurant** (*Hauenkallio 3, 02170 Espoo*)  
*Bus departing at 18:00 from conference venue (Hanasaari hotel)*

**Wednesday 18.09.2019**

8:30 – 9:00 Registration

**Keynote speaker**

9:00 – 9:30 **Vesa Marttinen**  
 Director of Cruise, Ferry and Superyachts, Wärtsilä  
*"Data & analytics to drive the safety - as rest of marine operations"*

**Session IV**

9:30 – 9:55 A Targets Detection Approach Based on an Improved R-CNN Algorithm for Inland River Crossing Area Marine Radar Image  
**C. Wu, Q Wu, S. Wang**  
*School of Logistics Engineering, Wuhan University of Technology, China*

10:00 – 10:25 Challenges of Artificial Intelligence and Machine Learning Software in Autonomous Vessels  
**A. Ashraf, J. Lilius, I. Porres, M. Walden, and L. Petre**  
*Åbo Akademi University, Finland*

10:30 – 10:55 Safety related cyber-attacks identification and assessment for autonomous inland ships  
**V. Bolbot, G. Theotokatos, E. Boulougouris and D. Vassalos**  
*Maritime Safety Research Centre, University of Strathclyde, United Kingdom*

10:55 – 11:10 *Coffee break*

**Session V**

11:10 – 11:35 Assessment of the Required Subdivision Index for Autonomous Ships based on Equivalent Safety  
**J. de Vos and R. Hekkenberg**  
*Department of Ship Design, Production & Operation, Delft University of Technology, the Netherlands*

11:40 – 12:05 Operational Demonstration of an Autonomous Offshore Multicomponent Robotic System  
**J. Villa, J. Taipalmaa, M. Gerasimenko, M. Ukonaho, H. Zhang, A. Pyattaev et al.**  
*Unit of Automation Technology and Mechanical Engineering, Tampere University, Finland*

12:10 – 12:35 Construction Mode Detection for Autonomous Offshore Heavy Lift Vessel Operations  
**J. Ye, V. Reppa, M. Godjevac, R. Negenborn**  
*Dept. of Maritime and Transport Technology, Delft University of Technology, the Netherlands*

12:40 – 13:05 Remotely Operated Search and Rescue Ships in the Canadian Arctic: Their Risk Dimensions and Regulatory Implications to the Arctic Search and Rescue Agreement  
**J. Yoo and F. Goerlandt**  
*Dalhousie University, Canada*

13:10 – 13:15 *Conference closing*

13:15 – 14:10 *Lunch*



# International Seminar on Safety and Security of Autonomous Vessels (ISSAV) & European STAMP Workshop and Conference (ESWC)

2019

17-20 September 2019, Helsinki/ Espoo, Finland

## ESWC

### Wednesday 18.09.2019

#### Tutorials

13:00 – 16:30 STPA Hazard Analysis Introduction and Application  
**John Thomas**  
*Massachusetts Institute of Technology, USA*

16:30 – 18:00 CAST Accident Analysis Introduction  
**John Thomas**  
*Massachusetts Institute of Technology, USA*

### Thursday 19.09.2019

8:30 – 9:00 Registration and coffee

9:00 – 9:15 Welcome and introduction

#### Keynote speaker

9:15 – 9:45 **John Thomas**  
Executive Director of MIT's Partnership for Systems Approaches to Safety and Security  
*"Recent STAMP/STPA developments and new applications to autonomy"*

#### Session I

9:50 – 10:15 STPA Applied to a Hyperledger-based Autonomous Railway System  
**A. Pelser, R. Zondervan, N. Silvis-Cividjian**  
*Vrije Universiteit Amsterdam, Netherlands*

10:20 – 10:45 STPA for safety analysis of cooperative material handling machinery – Concept and initial experiences  
**T. Kivelä and K. Furmans**  
*Institute for Material Handling and Logistics, Karlsruhe Institute of Technology, Germany*

10:50 – 11:05 *Coffee break*

#### Session II

11:05 – 11:30 STPA in Pension Fund Investments  
**S. Björnsdóttir, P. Jensson, S. Thorsteinsson**  
*Stiki, Reykjavik University, and University of Iceland, Iceland*

11:30 – 11:55 STPA in early design phase for Defense in Depth concept for the nuclear industry  
**L. Bar Or, S. Arogeti and D. Hartmann**  
*Management & Safety Engineering Unit, Engineering Faculty, Ben-Gurion University, Israel*

12:00 – 12:25 Independence of automatic operation system in a university and the surrounding area  
**Y. Ishitsuka**  
*Hosei University, Japan*

12:30 – 13:30 *Lunch*

#### Session III

13:15 – 14:10 *STPA Analysis Applied on Different Operational Modes of the Same System: A Case Study on the Fully Autonomous Aerial Rescue System ROLFER*  
**E. Lygouras, I. Dokas, A. Gasteratos, S. Charalampidou, A. Zacharopoulou**  
*Democritus University of Thrace, Greece*

Thursday 19.09.2019

### Session III (Continues)

14:15 – 14:40	STPA on intentional jamming of Global Navigation Satellite Systems <b>S. Thorsteinnsson, S. Björnsdóttir, C. Brown</b> <i>University of Iceland, Reykjavik University, Stiki, Iceland</i>
14:45 – 15:10	A comparative safety assessment for Direct Current and Direct Current with hybrid supply power systems in windfarm Service Operation Vessel using STPA <b>V. Bolbot, R. Puisa, G. Theotokatos, E. Boulougouris, D. Vassalos</b> <i>Maritime Safety Research Centre, University of Strathclyde, United Kingdom</i>
15:10 – 15:25	Coffee break

### Session IV

15:25 – 15:50	Changing risks in existing gas infrastructure in the Netherlands: are traditional hazard analysis methods equipped for an energy transition? <b>B. Riemersma</b> <i>Values of Technology and Innovation, Delft University of Technology, Netherlands</i>
15:55 – 16:20	A Mathematical Model for Real-time Safety Level Calculation: An application <b>V. Kokkinos, A. Zeleskidis, O. Koumortzi, I. M. Dokas and B. Papadopoulos</b> <i>Civil Engineering, Democritus University of Thrace, Greece</i>
16:25 – 16:50	Flint (Michigan, USA), Analysis of Disastrous Water Pollution Event Using Extended STAMP Model and CAST Method <b>D. Hartmann and E. Danilov</b> <i>Management &amp; Safety Engineering Unit Engineering Faculty, Ben-Gurion University, Israel</i>
17:00 – 18:00	Pre-dinner drinks
18:30	<b>Social dinner at Hanaholmen Culture Center and Conference</b> <i>(Same location as the conference venue)</i>

Friday 20.09.2019

8:30 – 9:00 Registration

### Keynote speaker

9:00 – 9:30  
**Sanna Sonninen**  
Pilotage Director, Finnpiilot Pilotage Ltd.  
*"Identified safety challenges in remote maritime pilotage"*

### Session V

9:30 – 9:55	XSTAMPP – Fit for Future <b>W. Fechner and S. Wagner</b> <i>Institute for Software Technology, University of Stuttgart, Germany</i>
10:00 – 10:25	Presentation of RM Studio – STPA Software Module <b>S. Björnsdóttir and C. Brown</b> <i>Stiki / Reykjavik University, Iceland</i>
10:30 – 10:45	Coffee break

### Session VI

10:45 – 11:10	Towards maritime traffic coordination in the era intelligent ships: a systems theoretic study <b>E. Heikkilä, M. Wahlström and G. Granholm</b> <i>VTT Technical Research Centre of Finland Ltd., Finland</i>
11:15 – 11:40	Development of functional safety requirements for DP-driven servicing of wind turbines <b>R. Puisa, V. Bolbot, I. Ihle</b> <i>Maritime Safety Research Centre, University of Strathclyde, United Kingdom</i>
11:45 – 12:10	An initial evaluation framework for the design and operational use of maritime STAMP-based safety management systems <b>O.A. Valdez Banda, F. Goerlandt, P.H.A.M.J. van Gelder, J. Salokannel</b> <i>Aalto University/ Dalhousie University, TU Delft, NOVIA, Finland (Canada/ the Netherlands)</i>
12:15 – 13:00	Lunch



Friday 20.09.2019

## Session VII

13:00 – 13:25	Exploring the Modeling of Attack Strategies for STPA <b>A. Altawairqi and M. Maarek</b> <i>Heriot Watt University, United Kingdom</i>
13:30 – 13:55	Applying STPA to the Enterprise IT System of a Large Organization <b>Anna G., John Y. and Katie E.</b> <i>National Cyber Security Centre, United Kingdom</i>
14:00 – 14:25	Border crossing point as a socio-technical system: applying STAMP and STPA to border security <b>L. Salmela, E. Heikkilä, S. Toivonen, R. Tiusanen</b> <i>VTT Technical Research Centre of Finland Ltd., Finland</i>
14:30 – 14:45	<i>Coffee break</i>

## Session VIII

14:45 – 15:10	STPA Based Approach for a Resilience Assessment at an Early Design Stage of a Cruise Ship <b>C. Bongermio and P. Gualeni</b> <i>University of Genoa – UNIGE, Italy</i>
15:15 – 15:40	Towards STAMP approach based protection of Underwater Cultural Heritage <b>R. Aps, L. Lees, K. Herkül, M. Roio, O. Tõnismaa</b> <i>University of Tartu/ , National Heritage Board of Estonia, TUT, Estonia</i>
15:45 – 16:10	STAMP-inspired identification of research gaps and safety actions' importance. Revisiting unmanned merchant vessel's safety control structure <b>K. Wróbel, M. Gil, J. Montewka</b> <i>Gdynia Maritime University, Poland</i>
16:15 – 16:30	<i>Conference closing</i>

## ISSAV and ESWC 2019 PROGRAM COMMITTEES

### ISSAV & ESWC CHAIR

Pentti Kujala

Osiris A. Valdez Banda (Co-chair)

### ISSAV

Pentti Kujala, Aalto University, FI

Osiris A. Valdez Banda, Aalto University, FI

Spyros E. Hirdaris, Aalto University, FI

Hannu Karvonen, VTT Technical Research Centre of Finland Ltd, FI

Pieter van Gelder, Delft University of Technology (TU Delft), NL

Rudy Negenborn, Delft University of Technology (TU Delft), NL

Jakub Montewka, Gdynia Maritime University, PL

Børge Rokseth, Norwegian University of Science and Technology (NTNU), NO

Marilia Ramos, Norwegian University of Science and Technology (NTNU), NO

Floris Goerlandt, Dalhousie University, CA

Gerasimos Theotokatos, University of Strathclyde, UK

Wasif Naeem, Queen's University Belfast, UK

Stephen R. Turnock, University of Southampton, UK

Xinping Yan, Wuhan University of Technology, CH

John Thomas, Massachusetts Institute of Technology, US

Pierre C Sames, DNV GL, NO

Vesa Marttinen, Wärtsilä, FI



## ESWC

Martin Rejzek, Zurich University of Applied Sciences, CH  
Nektarios Karanikas , Queensland University of Technology, AU  
Svana Helen Björnsdottir, Stiki, IS  
John Thomas, Massachusetts Institute of Technology, US  
Stefan Wagner, University of Stuttgart, DE  
Sven Stefan Krauss, Zurich University of Applied Sciences, CH  
Anastasios Plioutsias, Amsterdam University of Applied Sciences, NL  
Ioannis Dokas, Democritus University of Thrace, GR  
Robert J. de Boer, Northumbria University (Amsterdam Campus), NL  
Simon Whiteley, Whiteley Aerospace Safety Engineering & Management Limited, UK  
Osiris A. Valdez Banda, Aalto University, FI  
Jakub Montewka, Gdynia Maritime University, PL  
Børge Rokseth, Norwegian University of Science and Technology (NTNU), NO  
Asim Abdulkhaleq, Robert Bosch, DE

## Local Organizing Committee

Osiris A. Valdez Banda; Pentti Kujala; Spyros E. Hirdaris; Sunil Basnet, Meriam Chaal; Ketki Kulkarni and Sophie Cook.

## Contact Information:

For more information about the ISSAV & ESWC 2019 please visit the website

<https://www.aalto.fi/events/issaveswc-2019>

or contact Osiris A. Valdez Banda [osiris.valdez.banda@aalto.fi](mailto:osiris.valdez.banda@aalto.fi)

## Special Issue Autonomous Vessel Safety in Safety Science

*The International Seminar on Safety and Security of Autonomous Vessels 2019 is linked to the **Virtual Special Issue** “[Autonomous Vessels Safety](#)” in *Safety Science*”. The most outstanding papers of the conference will be invited to submit the papers to this special issue. Authors submitting abstracts to the ISSAV 2019 will receive an invitation letter with instructions for the submission of manuscripts to the **VSI: Autonomous Vessels Safety (deadline for submission of manuscripts is now extended to 31.12.2019)**.*

## Venue:

Hanasaari Culture Center and Conference Hotel, Espoo, Finland.

<https://www.hanaholmen.fi/en/>

