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)

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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)

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PROGRAM

ISSAV

Tuesday 17.09.2019	
8:30 – 9:00	Conference registration and coffee
9:00 – 9:10	Welcome and introduction
Keynote speakers	
9:30 – 10:00	**Pierre C Sames** Senior Vice President, DNV GL - Group Technology and Research Director *"Assurance of complex cyber-physical systems – a class perspective"*
10:00 – 10:30	**Richard Balzano** Deputy Maritime Administrator, Maritime Administration, USA *"Automation and the Maritime Industry"*
10:30 – 10:45	*Coffee break*
Session I	
10:45 – 11:10	The Risks of Remote Pilotage in an Intelligent Fairway –preliminary considerations **J. Lahtinen, O. A. Valdez Banda, P. Kujala, S. Hirdaris** *Aalto University, School of Engineering, Department if Mechanical Engineering (Marine Technology), Finland*
11:15 – 11:40	A Framework for Automatic Risk-Based Decision Making for Autonomous Ships **B. Rokseth** *Norwegian University of Science and Technology (NTNU), Norway*
11:45 – 12:10	An initial hierarchical systems structure for systemic hazard analysis of autonomous ships **M. Chaal, O. A. Valdez Banda, S. Basnet, S. Hirdaris, P. Kuajala** *Aalto University, School of Engineering, Department if Mechanical Engineering (Marine Technology), Finland*
12:10 – 13:00	*Lunch*
Session II	
13:00 – 13:25	Korean Technical Innovation: toward Autonomous Ship and Smart Shipbuilding to Ensure Safety **Y. Kwon, Y. Jeong , J. Woo , D. Oh , H. Kim , I. Shin , S. Jung , S. Im , and C. Jung** *Research Institute of Medium & Small Shipbuilding, South Korea*
13:30 – 13:55	Prediction Model of Human Error Probability in Autonomous Cargo Ships **D. Zhang, M. Zhang, H. Yao, K. Zhang, C. Fan** *Intelligent Transportation Systems Research Center, Wuhan University of Technology, Wuhan, China*
14:00 -14:25	Developing a framework for Trustworthy Autonomous Maritime Systems **D. Dghaym, S. Turnock, M. Butler, J. Downes, T. S. Hoang and B. Pritchard** *University of Southampton, United Kingdom*
14:30 -14:55	Comparison of system modeling techniques for autonomous maritime systems **S. Basnet, O.A. Valdez Banda, M. Chaal, S. Hirdaris, P. Kujala** *Aalto University, School of Engineering, Department if Mechanical Engineering (Marine Technology), Finland*
15:00 – 15:15	*Coffee break*

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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*

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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	Establishment of safety and independence of automatic operation system which linked transportation in 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*

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Thursday 19.09.2019	
Session III (Continues)	
14:15 – 14:40	STPA on intentional jamming of Global Navigation Satellite Systems **S. Thorsteinsson, S. Björnsdóttir, C. Brown** *University of Iceland, Reykjavik University, Stiki, Iceland*
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 **V. Bolbot, R. Puisa, G. Theotokatos, E. Boulougouris, D. Vassalos** *Maritime Safety Research Centre, University of Strathclyde, United Kingdom*
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. Riemersma** *Values of Technology and Innovation, Delft University of Technology, Netherlands*
15:55 – 16:20	A Mathematical Model for Real-time Safety Level Calculation: An application **V. Kokkinos, A. Zeleskidis, O. Koumortzi, I. M. Dokas and B. Papadopoulos** *Civil Engineering, Democritus University of Thrace, Greece*
16:25 – 16:50	Flint (Michigan, USA), Analysis of Disastrous Water Pollution Event Using Extended STAMP Model and CAST Method **D. Hartmann and E. Danilov** *Management & Safety Engineering Unit Engineering Faculty, Ben-Gurion University, Israel*
17:00 – 18:00	*Pre-dinner drinks*
18:30	***Social dinner at Hanaholmen Culture Center and Conference*** *(Same location as the conference venue)*

Friday 20.09.2019	
8:30 – 9:00	Registration
Keynote speaker	
9:00 – 9:30	**Sanna Sonninen** Pilotage Director, Finnpilot Pilotage Ltd. *"Identified safety challenges in remote maritime pilotage"*
Session V	
9:30 – 9:55	XSTAMPP – Fit for Future **W. Fechner and S. Wagner** *Institute for Software Technology, University of Stuttgart, Germany*
10:00 – 10:25	Presentation of RM Studio – STPA Software Module **S. Björnsdóttir and C. Brown** *Stiki / Reykjavik University, Iceland*
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 **E. Heikkilä, M. Wahlström and G. Granholm** *VTT Technical Research Centre of Finland Ltd., Finland*
11:15 – 11:40	Development of functional safety requirements for DP-driven servicing of wind turbines **R. Puisa, V. Bolbot, I. Ihle** *Maritime Safety Research Centre, University of Strathclyde, United Kingdom*
11:45 – 12:10	An initial evaluation framework for the design and operational use of maritime STAMP-based safety management systems **O.A. Valdez Banda, F. Goerlandt, P.H.A.M.J. van Gelder, J. Salokannel** *Aalto University/ Dalhousie University, TU Delft, NOVIA, Finland (Canada/ the Netherlands)*
12:15 – 13:00	Lunch

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Friday 20.09.2019	
Session VII	
13:00 – 13:25	Exploring the Modeling of Attack Strategies for STPA **A. Altawairqi and M. Maarek** *Heriot Watt University, United Kingdom*
13:30 – 13:55	Applying STPA to the Enterprise IT System of a Large Organization **Anna G., John Y. and Katie E.** *National Cyber Security Centre, United Kingdom*
14:00 – 14:25	Border crossing point as a socio-technical system: applying STAMP and STPA to border security **L. Salmela, E. Heikkilä, S. Toivonen, R. Tiusanen** *VTT Technical Research Centre of Finland Ltd., Finland*
14:30 – 14:45	*Coffee break*
Session VIII	
14:45 – 15:10	STPA Based Approach for a Resilience Assessment at an Early Design Stage of a Cruise Ship **C. Bongermino and P. Gualeni** *University of Genoa – UNIGE, Italy*
15:15 – 15:40	Towards STAMP approach based protection of Underwater Cultural Heritage **R. Aps, L. Lees, K. Herkül, M. Roio, O. Tõnismaa** *University of Tartu/ , National Heritage Board of Estonia, TUT, Estonia*
15:45 – 16:10	STAMP-inspired identification of research gaps and safety actions' importance. Revisiting unmanned merchant vessel's safety control structure **K. Wróbel, M. Gil, J. Montewka** *Gdynia Maritime University, Poland*
16:15 – 16:30	*Conference closing*

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
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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
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Wasif Naeem, Queen's University Belfast, UK
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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

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/

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ORGANIZATIONS AND PROJECTS INVOLVED IN THE ISSAV 2019

Reliability and Safety Engineering and Technology for large maritime systems (RESET) aims to develop and apply knowledge in reliability and safety engineering and technology, applied to the design and operation of large maritime transport and offshore engineering systems. This multi- and inter-disciplinary project facilitates international cooperation and mobility between five European and four Asian universities. RESET has received funding from the European Union's Horizon 2020 research and innovation program under the Marie Sklodowska-Curie grant agreement No 730888.

Research Alliance for Autonomous Systems (RAAS)
RAAS innovation ecosystem is an open and international alliance of researchers and industry professionals targeting at science-based innovations for autonomous mobility. Research Alliance for Autonomous Systems (RAAS) consists of 17 Finnish research organizations and 10 international research partners. We have altogether 200 researchers in the ecosystem. VTT is the coordinator of RAAS and the innovation ecosystem is funded by the Ministry of Economic Affairs and Employment of Finland (TEM). In RAAS, there are 9 different Research Task Forces and 4 focus domains out of which one is maritime. More information is available at https://autonomous.fi/

ISTLAB - Intelligent Shipping Technology Test Laboratory
The goal of the project is to build a jointly used laboratory and innovation environment for the study and development of smart maritime transport. Led by the Satakunta University of Applied Sciences, the project's main partners are the Finnish Meteorological Institute and Finnish Geospatial Institute. During the project, the main project party will also prepare the procurement of a remotely controlled / autonomous test vessel as part of the ISTLAB laboratory in cooperation with international and/or Finnish manufacturers.

Maritime Safety Research Centre (MSRC) at University of Strathclyde founded with sponsorship from RCCL and DNV GL supports the development and nurture the implementation of life-cycle risk management by fostering formal cost-effective measures of risk reduction that lead to sustainable safety improvements for ships and offshore assets. MSRC also supports the development of a modern regulatory framework to promote and uphold safety culture as well as methods for enhancing safety of marine Cyber-Physical and autonomous systems.
Website: https://www.strath.ac.uk/research/maritimesafetyresearchcentre/

International Workshop on Autonomous Systems Safety (IWASS) lead by NTNU in Norway aims to identify common challenges related to safety, reliability, and security (SRS) of autonomous systems, covering marine, land vehicles, and aerospace systems https://www.ntnu.edu/imt/iwass . The first IWASS has proceedings available via the following LINK

Autonomous Shipping Initiative for European Waters (AUTOSHIP) aims at speeding-up the development of the Next Generation of Autonomous Ships by building and demonstrating in real environment two remote and autonomous vessels (a Short Sea Shipping vessel and an Inland Water Ways barge). Digital tools and methodologies for design, simulation and cost analysis will be developed covering the whole range of autonomous ships.
https://trimis.ec.europa.eu/project/autonomous-shipping-initiative-european-waters

Safety Science Virtual Special Issue:
Autonomous Vessels Safety

Osiris A. Valdez Banda, Pentti Kujala, Spyros Hirdaris

Abstract

As a multi-billion industry controlling 90% of all world trade, the shipping community is continuously striving for improved operational margins while preserving and enhancing human and environmental safety standards. Technology availability implies that autonomy concepts could prove useful in terms of tackling challenges associated with ocean-based transportation by 2030 or earlier.

Autonomous vessels could help us reduce challenges due to human error and help increase profit margins assuming that risks associated with security, operations and the emergence of technologies (e.g. machine learning , artificial intelligence, sensors) are well mitigated by sound performance driven standards.
At the after neath of the 2nd International Seminar of Safety and Security of Autonomous Vessels (ISSAV) 2019 that will take place at Aalto University, Finland, from 17–18 September 2019 (https://www.aalto.fi/events/issaveswc-2019) we carry out the publication of the Virtual Special Issue on 'Autonomous Vessels Safety comprising of high quality journal articles contributing to topics on:

- Autonomous and interconnected shipping operations
- Safety and security management of autonomous maritime systems in extreme environments
- Digitalization for efficient safety and security assurance
- Standardization of safety and security for autonomous vessels
- Intelligent security strategies for establishing resilient and robust systems
- Autonomy agile risk based methods, tools and applications

Submission Method

The length of submitted papers will be between 7,000 and 10,000 words. Submitted papers must be unpublished and not currently under review by other journals.

All papers should be submitted via the Safety Science submission system. While submitting a paper to the special issue, please choose the article type "VSI: Autonomous Vessels Safety" otherwise your submission will be handled as a regular manuscript. All submissions will go through the journal's standard peer review process. Criteria for acceptance include originality, contribution, scientific merit and relevance to the theme of the Special Issue. For author guidelines, please visit the website of the journal at http://www.journals.elsevier.com/safety-science

Important Dates

The intended timeline for the overall publication process of this Virtual Special Issue is:

- Special issue article type becomes available in Evise: May 8, 2019
- Submission deadline of full papers: December 31, 2019 (New deadline)

Guest Editors

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