UK Code of Practice & Safety Critical Systems

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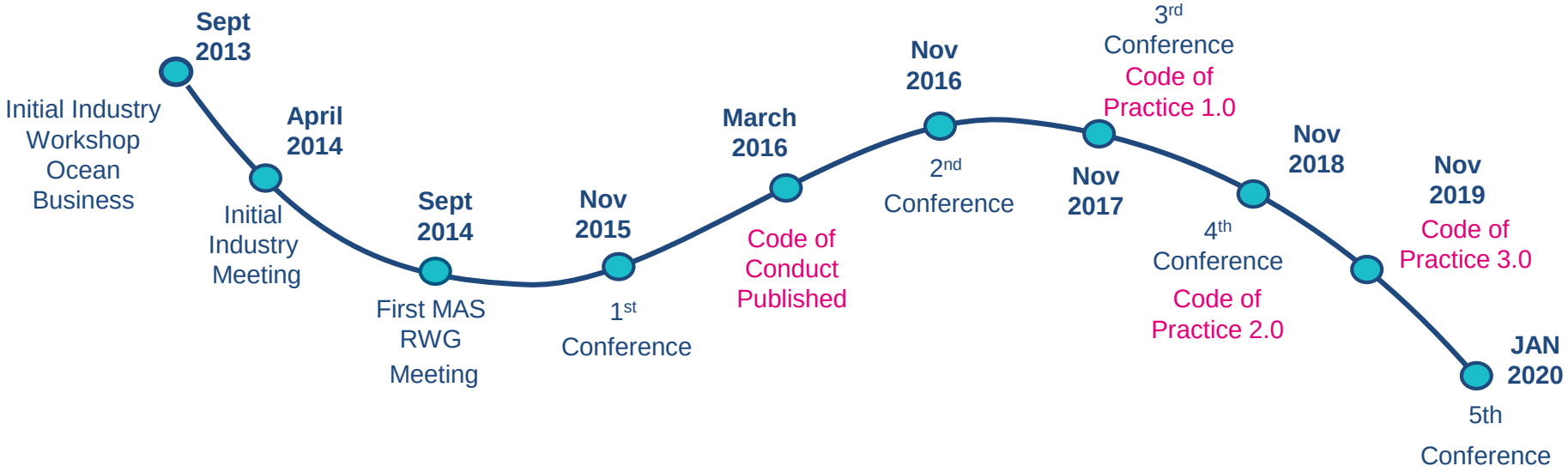
Overview

- Development of The Code of Practice
- Code Contents and significant changes
- Looking Ahead
- Safety Critical Systems
- Next Steps

Development of the MASS UK Industry Conduct Principles and Code of Practice v.3.0

- UK Maritime Autonomous Systems Regulatory Working Group (MASRWG)
- Chairmanship of James Fanshawe, support of Maritime UK
- 53 organisations contributed
- Regular meetings, sub-committees for continuing discussions

The Timeline



Code Contents

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Significant Changes Incorporated

- Code of Conduct and Code of Practice now in a combined document
- 53 Organisations Authorities have contributed (Version 2.0 - 34)
- Key Changes:
  - ❑ Terms and Terminology update to reflect IMO and ISO 23860*
  - ❑ New Chapter 5: Automation on Inland Waterways
  - ❑ Summarises the current position for automation on Inland Waterways in Europe to reflect the increasing interdependence of vessels operating between inland waterways and other sea areas.
- Chapter 6 Ship Design & Manufacturing Standards for MASS
  - ❑ Includes early statement on Safety Related Systems / Software
- Chapter 10 Remote Control Centre – Operation
  - ❑ New terminology and revised roles and responsibilities
- Chapter 12 Operator Standards of Training, Qualifications, Competence and Watchkeeping
  - ❑ Significant Revisions

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* ISO 23860 Ships and Marine Technology; Terminology related to automation of Maritime Autonomous Surface Ships (MAS)

Looking Ahead

Following Publication of Version 3.0

- Formed 3 Sub Groups
- Governance and Regulation (Chair, Richard Westgarth)
  - Covers: Future Workstreams, Leadership, Stakeholder Engagement, Regulatory Framework, Legal, Insurance, Business Services and Trading.
- Codes and Operations (Chair, James Fanshawe)
  - Covers: the Codes of Conduct and Practice, Infrastructure, Test and Demo Environments, Technology Developments, Registration and Conference.
- People and Skills (Chair, Gordon Meadow)
  - Covers: Training and Skills, Human Element and Ethics.

Watch out for Version 4.0!

Safety Critical Systems

Why should we be concerned?

- As we enter the 2020's - development of smart and autonomous ships, smart ports, smart trading systems, adoption of AI technologies such as Machine Learning will continue to challenge our ability to keep pace;
- Numerous examples from other sectors of some of the potential difficulties we may face:
  - Increased Complexity
  - Data driven systems
  - Unpredictable systems
  - Transfer of decision making from people to machines
  - Ethics and societal acceptance
- Throughout the Code, reference is made to Safety, Risk Assessments, Software Integrity……but I would suggest it needs much greater detail

"Autonomous Systems disrupt established practices of system design, moral responsibility, legal liability and safety assurance"

Mind the gaps: Assuring the safety of autonomous systems from an engineering, ethical, and legal perspective: Simon Burton et al 2019

Software is everywhere

- MASS are complex systems with highly interlinked components
  - Communications
  - Sensors, sensor fusion and decision making
  - System monitoring and reporting
  - Remote Control Stations
  - Artificial Intelligence and machine learning
  - Human / system interactions
  - Oh – and the ship!
- This is a challenge for all sectors

Safety Impacts of Software

- Software is brilliant – means it is used everywhere;

- Numerous ways it can contribute to safety, e.g. if:
  - the system is completely automated by software
  - the software produces and/or presents information to an operator that is used as the basis for decision-making
  - the software can act in such a way as to introduce, realise or prevent mitigation of a hazard (e.g. a control system)
  - software interacts with other system components

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Boeing 737 Max Joint Authorities Technical Review

- Broad Recommendations:
  - …derive from the increasing complexity of aircraft systems, particularly automated systems and the interaction and the interrelationship between systems.
  - As aircraft systems become more complex, ensuring that the certification process adequately addresses potential operational and safety ramifications for the entire aircraft that may be caused by the failure or inappropriate operation of any system
  - As systems become more complex and may interact in unforeseeable ways, the likelihood increases that regulations and standards will not address every conceivable scenario.
  - To the extent they do not address every scenario, compliance with every applicable regulation and standard does not necessarily ensure safety.
  - Moreover, as systems become more complex, the certification process should ensure that aircraft incorporate fail-safe design principles.

Thank you

Copies of the Code of practice are available to buy at: https://www.maritimeuk.org/media-centre/publications/maritime-autonomous-surface-ships-industry-conduct-principles-code-practice/

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