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MARINE AUTONOMOUS SHIP REGULATION – NEXT STEPS

The People !

Captain John Lloyd
Chief Executive Officer

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Industry perspective

"We believe remote and autonomous ships will be safer, more efficient and cheaper to build and operate. Our solutions will reduce human-machine interaction by automating tasks and processes, while keeping the human at the centre of critical decision-making"

"a flexible data resource where Ship, Fleet Operations, Academy (simulation & training) and Ship Traffic Control can all be connected to the ecosystem, effectively a community working together on a cloud-based shared data platform to enable smarter operations, safety and navigation"

Period of change – of course

Technology

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Period of change – of course

Technology

Training

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Period of change – of course

Technology

Training

Regulations

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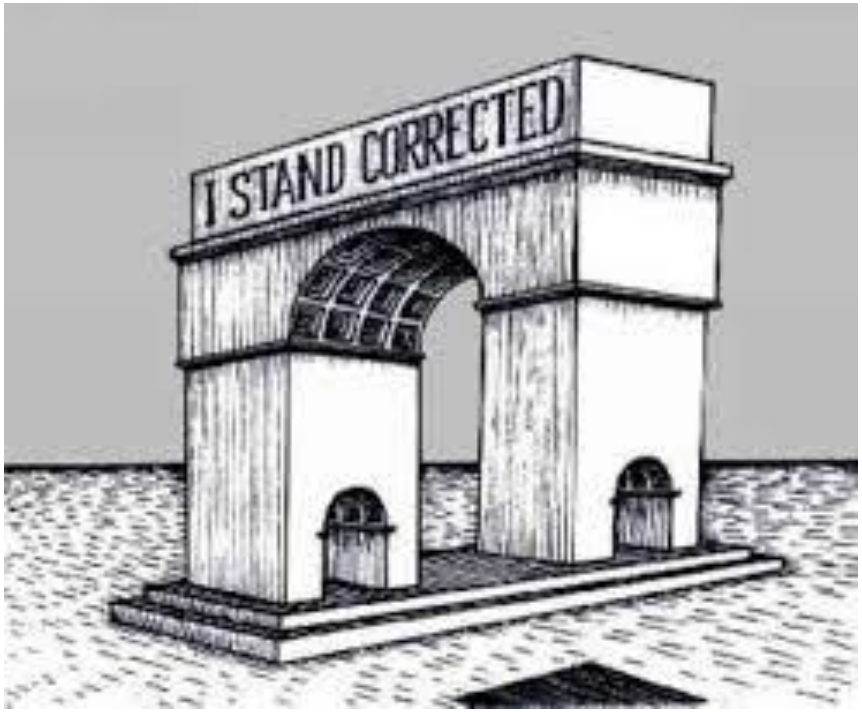
Progress



Regulatory Environment

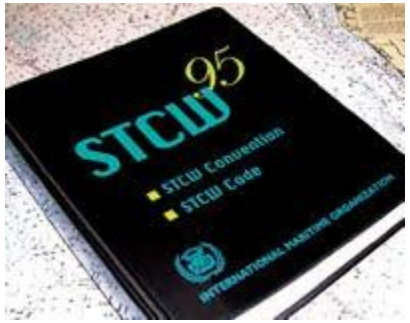
- SOLAS

Regulatory Environment

- SOLAS
- MARPOL

Regulatory Environment

- STCW 95

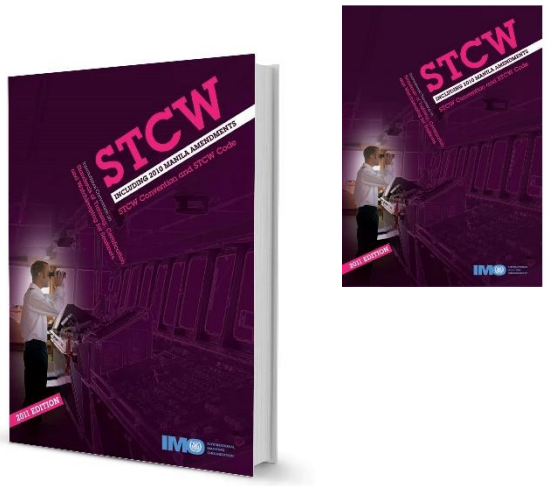


- Amended STCW 78 following Scandinavian Star and Braer incidents

- Introduced competency

Regulatory Environment

- SOLAS
- MARPOL
- STCW



Regulatory Environment

- Responsive not proactive
- Achieves lowest common acceptable standard
- Discourages innovation

Preparing for the future

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Working in new areas – new challenges

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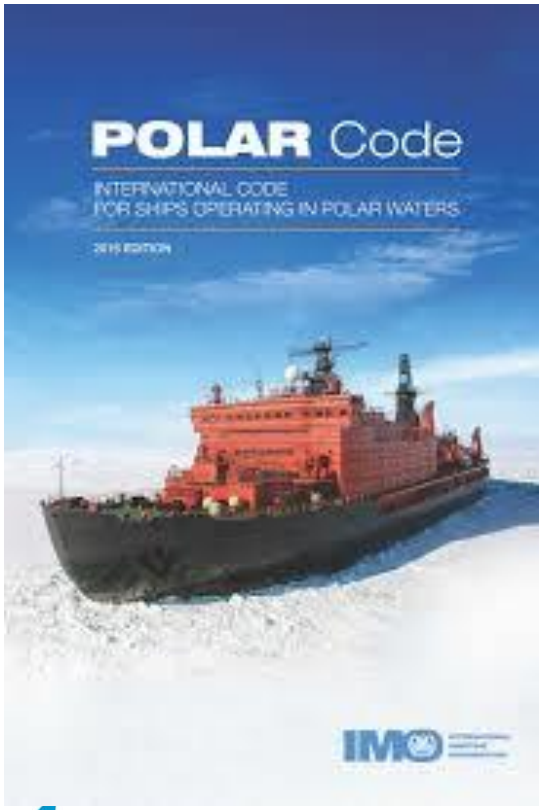
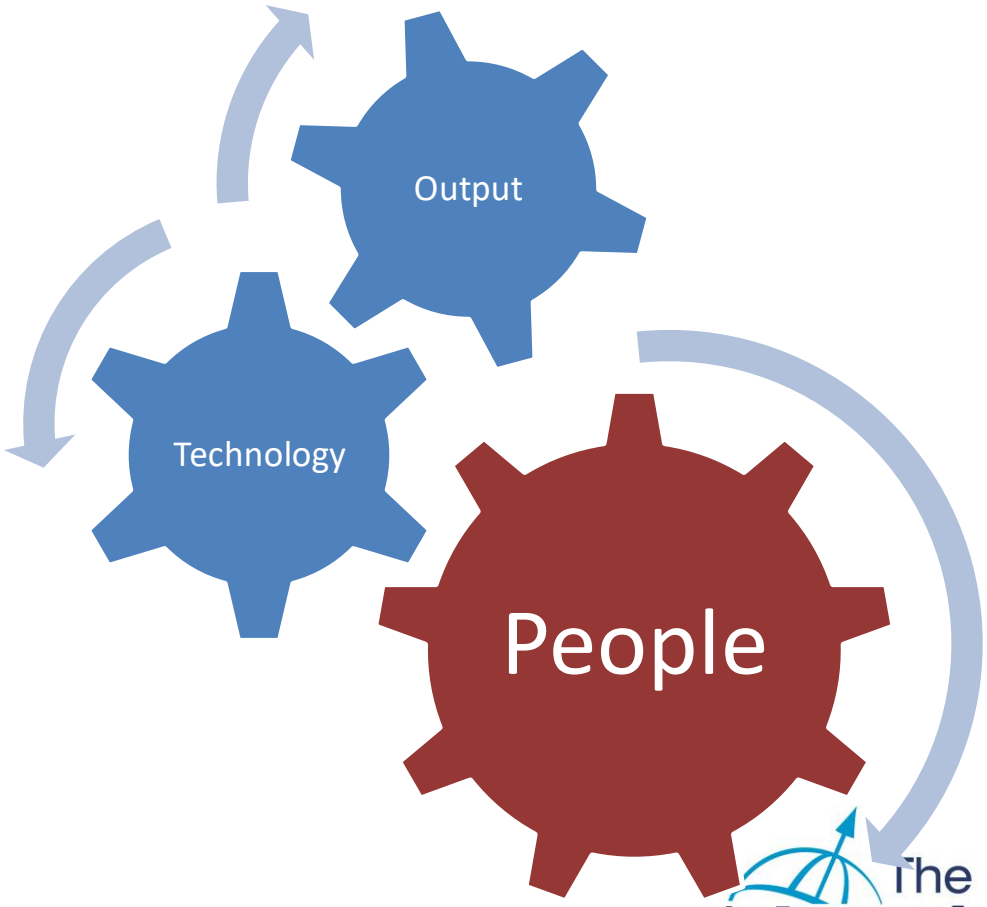
Ice – The next frontier

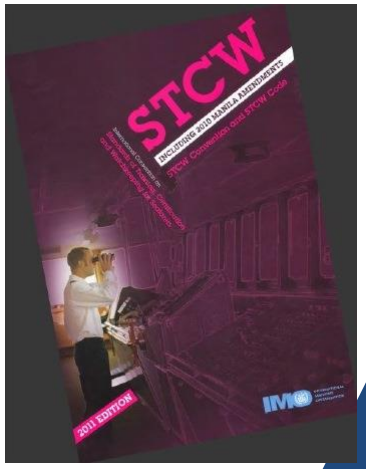
Photo courtesy of MOL LNG Transport Europe Ltd



Integration of Technology



Competence - IMO



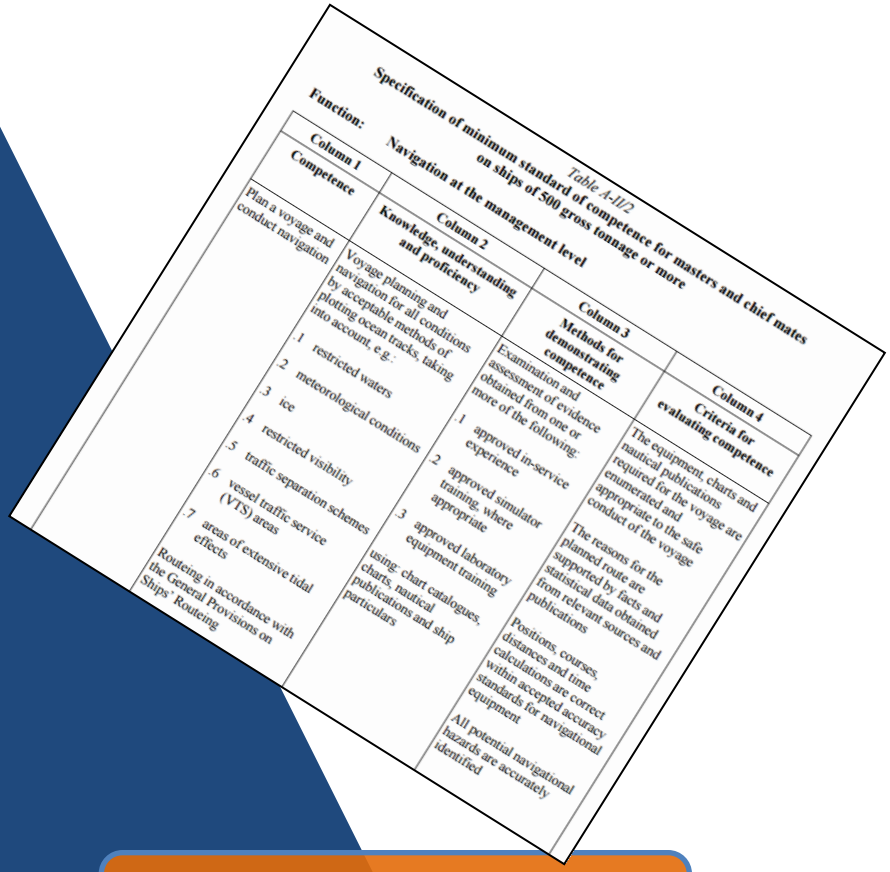


Table A-II/2

Specification of minimum standard of competence for masters and chief mates on ships of 500 gross tonnage or more

Function: Navigation at the management level

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
Plan a voyage and conduct navigation	Voyage planning and navigation for all conditions by acceptable methods of plotting ocean tracks, taking into account, e.g.: .1 restricted waters .2 meteorological conditions .3 ice .4 restricted visibility .5 traffic separation schemes .6 vessel traffic service (VTS) areas .7 areas of extensive tidal effects Routeing in accordance with the General Provisions on Ships' Routeing using: chart catalogues, charts, nautical publications and ship particulars	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved simulator training, where appropriate .3 approved laboratory equipment training	The equipment, charts and nautical publications required for the voyage are enumerated and appropriate to the safe conduct of the voyage The reasons for the planned route are supported by facts and statistical data obtained from relevant sources and publications Positions, courses, distances and time calculations are correct within accepted accuracy standards for navigational equipment All potential navigational hazards are accurately identified

STCW Standard

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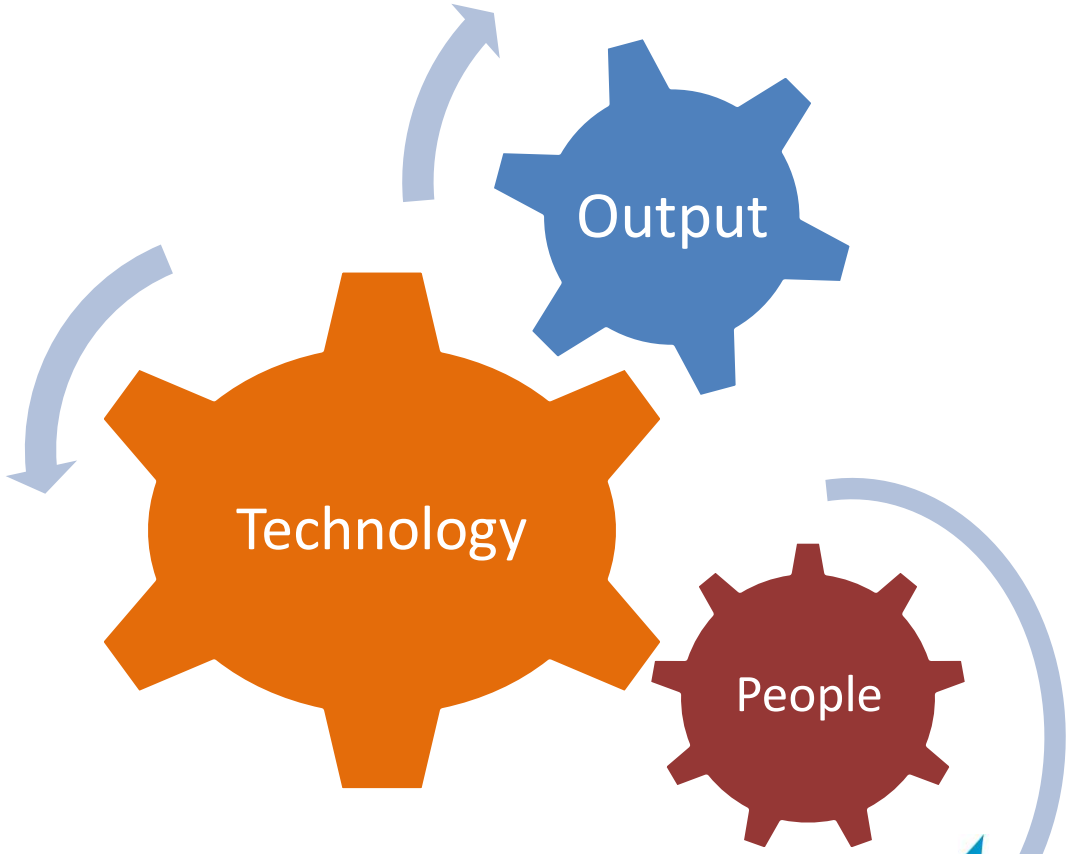
Integration of Technology



Technology

- *Delivering technology that provides effective solutions to support enhanced navigation and operation for sea freight?*

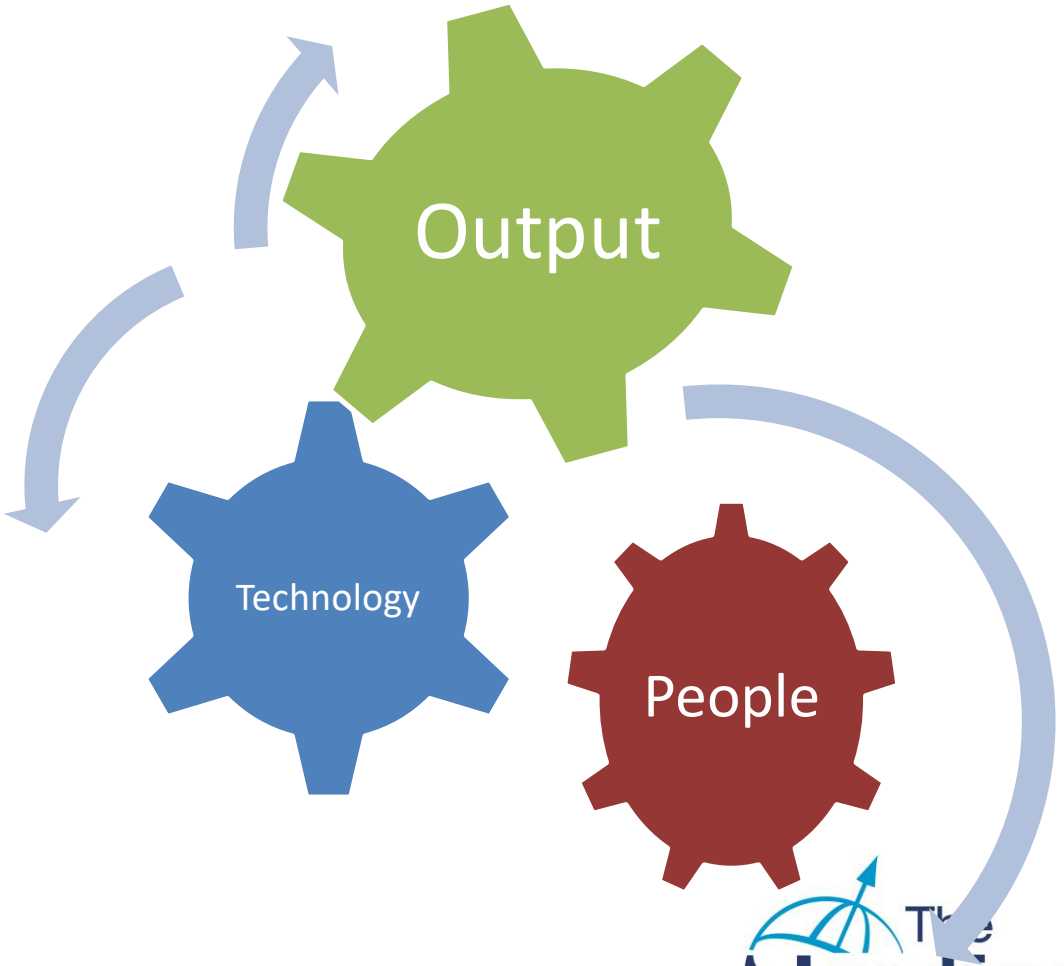
Automation – common uses

- Auto-pilot
- Course tracking
- ECDIS
- Engine monitoring
- Fire protection
- Pollution control

New Technologies – new challenges

- Remote sensors
- Increased monitoring
- External support
- Teamwork not supervision

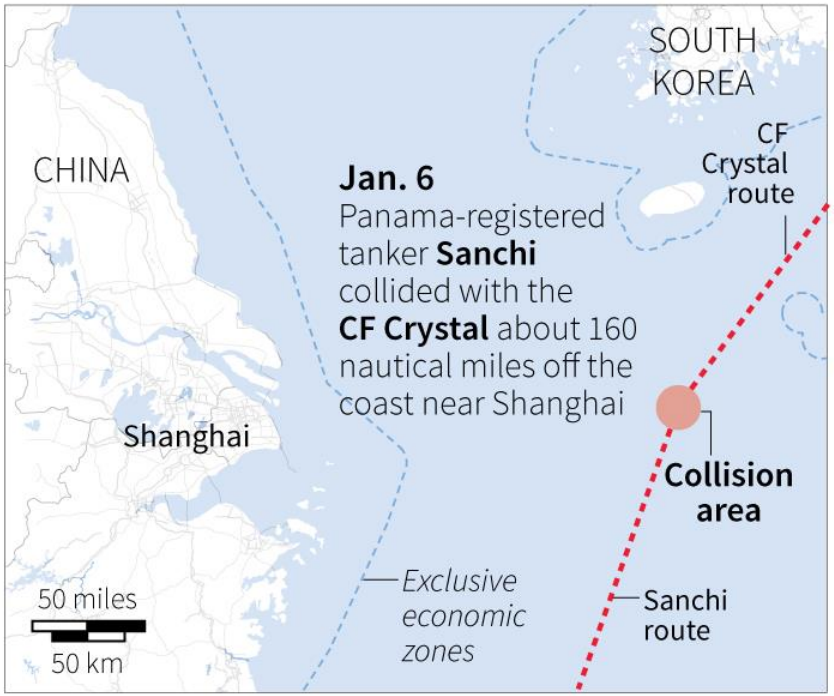
Integration of Technology



Is it working?

Ship collision off China's coast

A tanker carrying Iranian oil and run by the country's top oil shipping operator was ablaze and spewing its cargo into the East China Sea on Jan. 7 after colliding with a Chinese bulk ship, the Chinese government said.



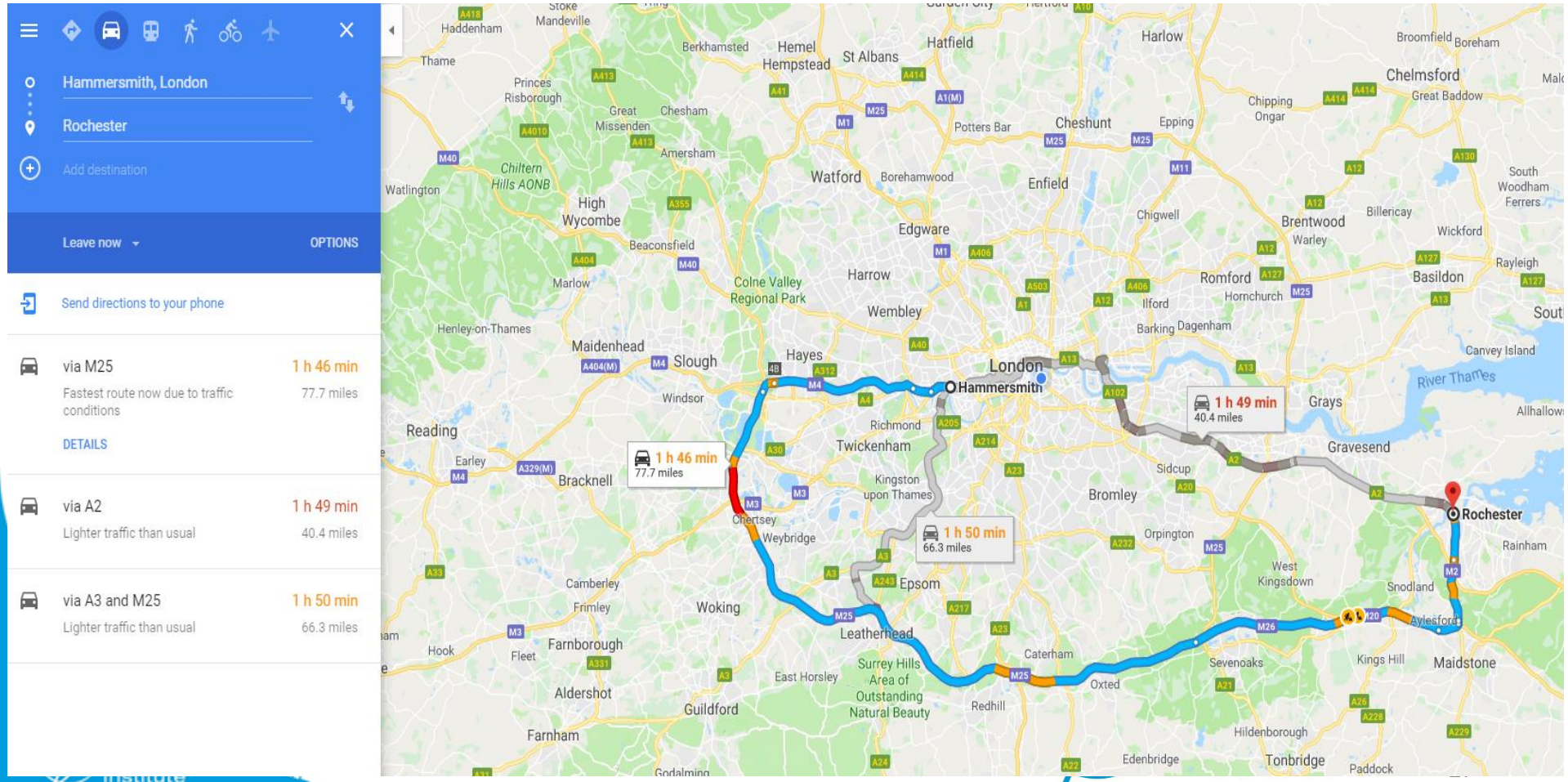
Sources: Chinese Ministry of Transportation; Reuters ship tracking. Vessel routes based on last reported position and final destination.

G. Cabrera, 07/01/2018 REUTERS

Automation

Delivering Innovation – New Opportunities

Technology at work



How the digital industry can help?

- *Delivering effective partnerships between digital industry and ship operators to support innovation*

Skills for the future

What do we have?

- Technical competence
  - Capable seafarers
  - Competent to today's standards

- Compliance-led culture
  - Overburdened by process
  - Insufficient opportunity for innovation
  - Acceptance that 'minimum will do'

Skills for the future

What do we need?

- Hard Skills
  - Computer skills
  - Analytical skills

- Soft Skills
  - Critical thinking
  - Creativity
  - Problem solving

Capable for the future

Personal

Initiative and Drive

Learning

Adaptive

Social Intelligence

Empathy

Entrepreneurial thinking

Critical thinking

Ethics and integrity

Communication

Collaboration

Creativity

Problem solving

Digital acumen

Customer focus

Technical knowledge and professional skills

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Preparing for Novel Situations

- Only a human with both knowledge and the *ability to reason* can make intelligent decisions to perform skills correctly and safely.

Networking – Improving knowledge and Capability

- Gaining advantage and seeing perspectives previously invisible

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Do people matter?

- *"truly human skills, from leadership to creativity, will remain highly relevant and winning organizations will strike the right balance – leveraging the best of technology to elevate, not eliminate their people"*

Accenture Strategy

Harnessing Revolution Creating the future workforce (2018)

Skills for the future

- Innovative learning
- Innovative learners
- Flexible learning
- Responsive regulation
- Responsible employers
- Supportive Professional Bodies

STCW

- Standard of competence:

Every candidate for certification as master or chief mate of ships of 500 gross tonnage or more shall be required to demonstrate the competence to undertake, at the management level, the tasks, duties and responsibilities listed in column 1 of table A-II/2. (15 pages)

UK Model for Deck Cadets

Figure 4: Indicative model for deck officer trainee scheme, incorporating HNC and /or HND awards

Stage	Phase	Duration	Content
Access Course and Initial Training	1 First college/university phase	18 weeks	STCW Basic Training - Personal Survival Techniques, Elementary First Aid, Fire Prevention and Fire Fighting, Personal Safety and Social Responsibilities. FEC/HEI and company induction. Study skills. English/communications, mathematics and IT to support HN studies. Key/core skills. Introductions to - the Shipping industry; Shipboard operations; Ship construction and stability; Nautical science; Bridge watchkeeping. Theoretical and practical aspects of Efficient Deck Hand (EDH), Proficiency in Survival Craft and Rescue Boats (PSC&RB) certificates.
	2 First sea phase	34 weeks/ 8 months (approx)	Shipboard induction, familiarisation and development of basic seamanship and seafarer skills Undertake planned training documented in the Training Record Book
Training and Development	3 Second college/university phase	30 weeks	Assess/consolidate learning from Phase 2. HN units required for OOW: Chartwork and tides; Navigational mathematics and science; OOW Meteorology; Bridge watchkeeping; Marine cargo operations; OOW Ship stability; Naval architecture – ship construction; Celestial navigation; Marine emergency response and communication; Marine law and management. Optionally - STCW Short course: GMDSS; HNC completion.
	4 Second sea phase	50 weeks/ 11 months (approx)	Emphasis moves from basic skills to bridge/cargo handling duties and responsibilities, including understudying the role of the OOW Complete programme of shipboard training documented in the Training Record Book
Skills Development and Certification	5 Third college/university phase	17 weeks	Optionally - STCW Short course: GMDSS; HNC completion. STCW short courses: Certification of PSC&RB and EDH; Medical first aid. NARAS(O) – simulator; Advanced fire fighting. SQA/MCA OOW examinations. MCA oral examination for OOW certificate of competency.
	Additional	26 weeks	HND units: Information Technology; Passage planning; Management of bridge operations; Further marine meteorology; Ship stability – theory and practical application; Marine vessel structures and maintenance; Management of vessel operations; Shipmasters business; Shipboard management; Safety management systems. HND programme completed. Successful completion of HND (Part 2) academic assessments provides prequalification to Chief Mate/Master level. (Marine engineering systems; Emergency planning; SQA/MCA Chief Mate papers and the Mates oral examination will need to be undertaken after the necessary sea service.)

Preparing for Novel Situations

- Only a human with both knowledge and the ability to reason can make intelligent decisions to perform skills correctly and safely.

- The deeper the knowledge, the more readily adaptable the person is to more widely fluctuating conditions

An (eu) alternative??

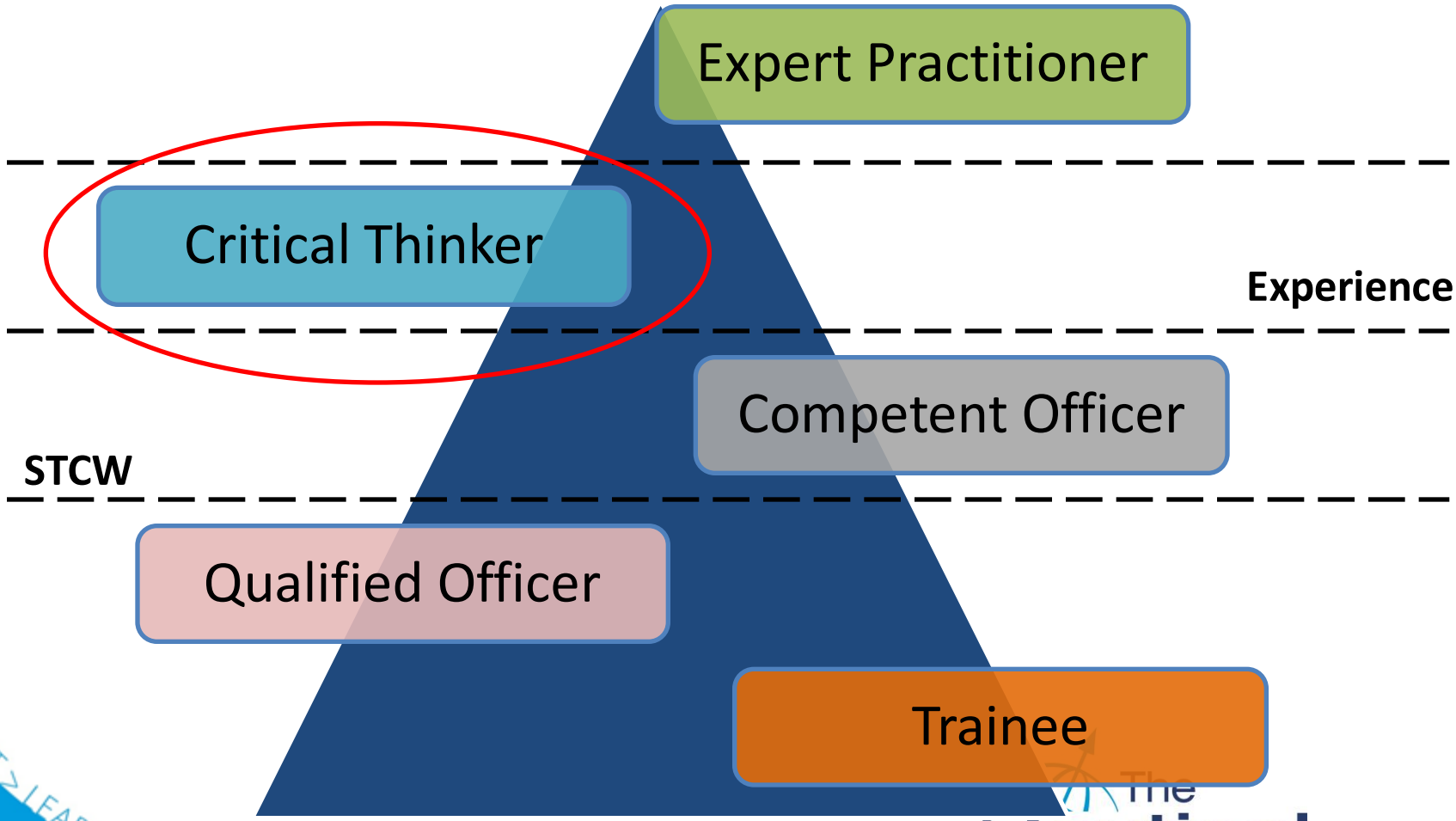
Course Plan

Semester 1	2	3	4	5	6	7	8
Basic Seamanship	Training as Deck Cadet	Navigation 1	Navigation 2	Navigation 3	Maneuvering	Training as Deck Cadet	(Ship Handling)**
Practical Training		Marine Engineering	Ship Theory	Dangerous Goods	Cargo Operations		Cargo Handling
English		Mathematics 2	Meteorology	Maritime English	Emergency Mgm.		
Physics		Computer Science	Tele-communications	Watchkeeping (Simulat.)	Practical Training		
Mathematics 1		Business Economics	Personnel Management	Elective Profile 1*	Elective Profile 2*		Elective Profile 3*
Shipping Law		Civil Law	Merchant Shipp. Law	Medical Care			B.Sc. Thesis

* Students may choose between the following elective profiles:	
Maritime Technology:	Physics in Maritime Applications, Maritime Technology (Lecture), Maritime Technology (Seminar)
Maritime Economics:	Shipping Economics, Transport Management, Terminal Operations
Pilotage and VTS:	Fairways and Pilotage, Communication and Intercultural Management, Vessel Traffic Services and Accident Analysis


Technology and
Science

Progressing a Career



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Chief Executive Officer

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Acknowledgements

- Barnett M; World Maritime Journal; Searching for the Root Causes of Maritime Casualties; 2005
- Human Error and Marine Safety; Dr. Anita M. Rothblum U.S. Coast Guard Research & Development Center
- Goldberg M; Maritime Logistics Professional (Journal); Maritime Training Issues; 2012
- Dr C Haughton – maritime educational expert (various)
- QTAC – Queensland Australia

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