The Integrated Data Management System
The Present and Future of Ship’s Information Management Technology
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• Past, present and future needs of data management systems
• Systems interrelations
• Current requirements and needs
• The office – ship integration
• Interfacing multiple tasks and software
• Interfacing hardware
• The human element
• Information control
• What is coming next
The Past...

COMMUNICATION
• Basic Communication (Radio, Telex, Common Mail)
• No Real-time Data
• Later the Inmarsat appeared with Phone and Fax and some very slow data

NAVIGATION
• Ocean Navigation was based in Celestial Observations
• Bad performing radars
• Paper charts not always updated
• Difficult to use Position Fixing systems (LORAN, OMEGA etc.)
• Sat-Nav appeared
• Basic Weather forecasts
• Etc.

OFFICE & SHIP
• Paper work
• Mostly operating with typewriters and later some PCs with Printing Faculties
• The amazing “Telex-Room”
The Present...

COMMUNICATION
• Advanced Communication (through modern satellite systems)
• Real-time Data

NAVIGATION
• Navigation based in modern systems and accurate satellite navigation
• Very good bridge integrated systems
• Electronic Charts that can be fully updated on a real-time basis
• Accurate Weather forecasts
• Voyage Optimization
• Etc.

OFFICE & SHIP
• Still too much Paper work
• Mostly operating with PCs with Printing Faculties
• The amazing “Mail Software”

Still Difficult to control the information (?)
What is Information Control

Information Control Software

- Vessels
- Industry
- Customers
- Legislation
- Company Strategies
- Future Needs
- Financial
- etc.
The Future...

• More Automated Information Exchange Systems
• Less User Interrelation
• No User Interference in routine tasks
• Huge Amount of Data
• Less Office Personnel – Ship’s Crew communication
• Less personnel required (?)
• Less cost (?)
• More advanced training
System Interrelations

Core Process

Ship’s Hardware
- Bridge
- Engine Room
- Automation
- etc

Office Communication
- Mail System
- PBX
- Etc.

Office Hardware

Industry Hardware & Software
- Weather Services
- Cart update services
- Voyage Services
- Etc.

Office Software

Ship’s Software

Ship’s Communication System
- V-SAT
- Inmarsat
- Iridium
- Etc.
Current Requirements & Needs

Continuous flow of TRUSTED and ACCURATE information from the ship and office
- WHO CONTROLS THIS INFO
- WHO DECIDES FOR NEXT STEPS and HOW
- WHAT KIND OF TOOLS DO WE HAVE

It appears that many developers today ignore the “Engineering behind the User’s mind”

First Questions for developers

- Which is the knowledge level of the common user
- Which are users’ daily processes
- What do users need to see
- How users want to see it
- Multiple Info Generation and Reporting
- etc.
The Ship-Office Integration

• Management System & Procedures
• Data Exchange & Backup
• Routine Communication / Correspondence
• Maintenance Monitoring
• Ship Performance Monitoring
• Voyage Orders
• Position and Weather Monitoring
• Crew Requirements
• Emergency Response
• Training
• Etc.
Interfacing multiple tasks and software/hardware
The Human Element behind the processes
Human Element Tree

Everyone's view is different. When we forget this, our assumptions become dangerous.
What we see is affected by what we need, our self-image, what we have done in the past, and what we want from the future.
Training and experience make it easier for us to share the same assumptions - but it's not guaranteed, and we can never share the same view.

Risk perception is affected by how much control we think we have, and how familiar and valuable something is for us.
Risk cannot be eliminated because our world is uncertain.
We need to take risks to keep things interesting. If things become boring or uneventful, we take more risks.
Risk-taking becomes dangerous when the gap between actual probability and our perception of it becomes too great. This results in a wide range of human behaviour from complicity, through past decisions to catastrophic action.

We make decisions based on our past experience and we tend to follow the course of least resistance. This is determined by a trade-off between the thoroughness demanded of us and the time and resources available to us.
Expert decision-making takes at least 10 years to acquire.

People and organisations favour efficiency over thoroughness because it's cheaper and quicker.
Rules created to increase our thoroughness can get broken if we see a more efficient way of getting the job done.

Making mistakes is normal. Mistakes are influenced by individual factors like fatigue and stress and by organisational factors like job design and deadlines.

Hindsight is the illusion that mistakes can be eliminated.
Mistakes are simply normal errors that we give to normal system behaviour that we don't want.
The pursuit of a 'just culture' is the best approach to developing a safety culture that stops mistakes becoming disasters by influencing all organisational levels.

We learn all the time - we can't help it.
Learning requires activity by the learner. Teachers do not transmit knowledge - they can only facilitate its acquisition.
Organisations need to take control of what people learn.
Failing to do so leaves people to learn from each other, possibly resulting in the acquisition of bad practice and dangerously incomplete knowledge.
Investment in training increases productivity, reduces staffing problems and helps create a 'just culture'.

Fatigue is a normal human response to a normal situation. Sleep is the only fix - nothing else will do.
Fatigue becomes dangerous when deep or cream sleep is denied. Being awake 24 hours degrades our performance the same as being 25% over the UK drink-drive limit.

Fatigue is effectively dealt with via a fatigue management plan operated at all organisational levels from boardroom to ship's crew.
Stress is a normal human response to a bad situation. It is dangerous to both people and company operations. It must be designed against, listened for, and managed away.

As individuals, we work with others to assess them, confront difficult issues and negotiate with them. Each of these areas requires re-usable skills and best practice that everyone can acquire. Doing so makes us more productive.

As team members, working with others requires a further set of skills that must also be learned: organisations wish to maximise the efficiency of their operating schedules and avoid undue expense.

Human communication is not just about transmitting a signal. It's about doing so in a way that facilitates an appropriate response to its intended interpretation.
Communication fails when not enough is specified by either party to assure intended interpretation. This may be due to bad assumptions about each other's context, or insufficient opportunity to check those assumptions.
Communication failures cause 25% of safety-critical accidents and significant avoidable expense every year.

communicate with others

make sense of things

make decisions

learn and develop

work with others

make mistakes

get tired and stressed

MCA Human Element Guide v1.0 – page 89
Information Control - Samples
Average Speed per VO Report Date UTC and VO Ballast Laden

SLIP per VO Report Date UTC

HFO Main Engine per VO Report Date UTC
What is coming next?

Thank you