

SMM Workshop 2006

Maritime technology and human integration

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Technological aids?

”When we need it the most,
it is not helping...”

Subjects

- PhD research
 - Integration work
- MTO-sea
 - How to make a safe system?
- What can we do?



Disintegration



- A steering lever: when moved to starboard, ship turns to starboard.
- A lever for one bowthruster: when moved to port, arrow indicator and ship turns to starboard.
- A lever/joystick for second bowthruster: when moved to starboard, ship turns to starboard.
- The pilot mistook the levers in the dark, and the ship ran aground.

A field study: 2000-2004

Data from	How	Number of subjects
Mariners onboard	Informal, contextual	~40 15 ships
Shipping companies, teachers, pilots, manufacturers, etc.	Formal, Informal	~70
Class, IMO, NI, Maritime Authorities etc.	Discussions	~30
Mariners, maritime stakeholders	Polling, discussions	116

Main results: Humpty Dumpty...

Work is broken into pieces

- Technically integrated systems are seldom well integrated with the operator.
- Operators perform integration work
- Technology can become a barrier between the operator and the task
- Problems caused by technology cannot be solved only with more technology
- Manufacturers need, and want, more knowledge of the task
- Operators can tell us about their task but not about good workplace design

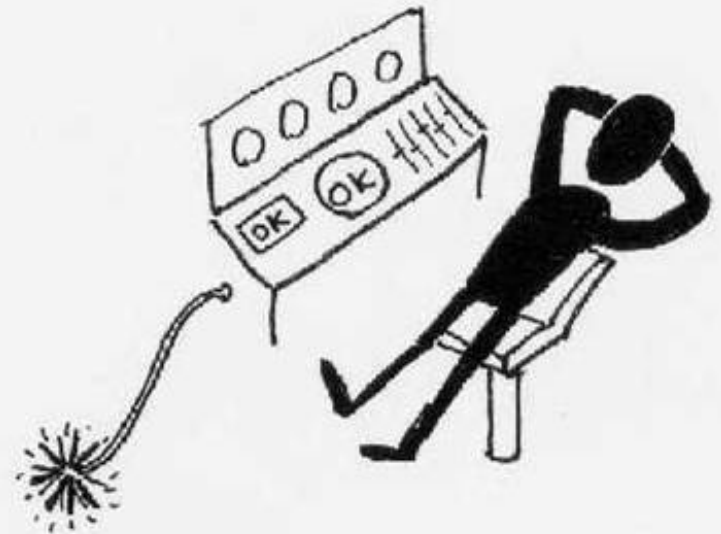
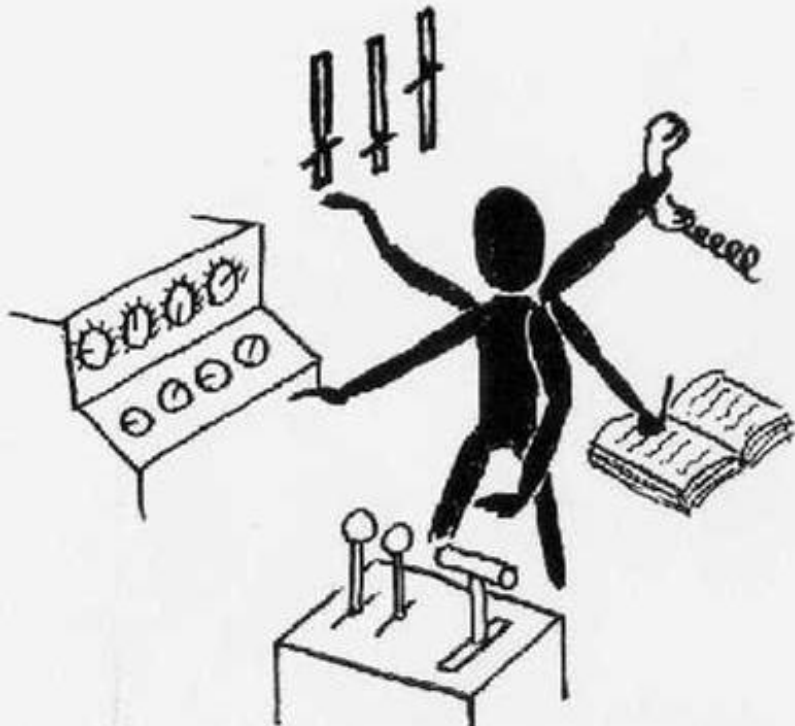
Integration work: across and between



- **Information presentation**
- **Humans and machines**
- **Rules, regulations and practice**
- **Learning and practice**

Integration work: a process

- Mariner- and technology-driven
 - Distributed in space and time
 - Workload smoothing



Making integration hard

“Instead of being standardised, we have to handle it”

“Why do they have to show all their muscles on all the screens?”

Redundancy

- Adds safety
- Adds work

Shipping company
technical director:
“Isn't there anything we can
remove?”



MTO-sea

“Making safety by tying the knot”

- With Kalmar Maritime Academy
- With JV Earthy and Brian Sherwood-Jones

MTO-sea

- Cadets learn basic usability, science
- Cadets study bridge
- Researchers study bridge
- Academy learns about state of domain
- Cadets learn to formulate feedback
- Feedback reaches correct recipients

Examples from MTO-sea



Ship's clock
-29 buttons
-Manual 10 pgs

Examples from MTO-sea





Examples from MTO-sea

DIY Integration (technical)

- VMS
- Radar
- GPS
- AIS
- Echo sounder



DIY integration (manual)

What can we do...?

- Involve mariners – include pilots
 - Watch them work, don't give design responsibility
- Training
 - Introductory & lifelong learning
- Reskilling without deskilling
 - Take your time – human-technology teambuilding
- The people responsible need to...
 - ...be interested in people as well as in technology
- Find out when they need it the most