Teaching ECDIS at the U.S. Merchant Marine Academy

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Q: What is safe navigation?
A: Getting somewhere in 1 piece

- Planning a voyage
- Dock to dock without incident
- Track-keeping to the next waypoint
- Adaptation to changing conditions
- Ongoing validation of sensors
- Applying all aids effectively
- Keen visual lookout all around
- Backups at the ready

Teaching and learning ECDIS means that . . .

. . . the trainee is able to *show safe navigation* using ECDIS.

That's it.

As applied to ECDIS, this means:

While underway, alarms must sound, charts must load, routes must be made & monitored, shoals and other vessels must appear, day should end, visibility should change, ETAs should be found, courses should be steered, chart layers should be selected, . . . on top of everything else.

Why is this a crucial measure of success in ECDIS training?

- ECDIS is a centralizing tool…it is lifeless outside the context of visual navigation

- ECDIS underway is the only sensible way

Unsafe navigation using ECDIS is **unacceptable** because:

- The poor use of ECDIS may have interfered with navigation that was otherwise safe
- Faulty navigation was not improved enough with ECDIS

What I've learned about learning ECDIS

- Practice requires a variety of contexts
- Do not expect self-prioritizing of skills
- Solo watchkeeping is where the learning takes place
- Group exercises (interactive ownships) produce a social transfer of knowledge & skills

Satisfying results

- At first I expected that navigational experience was necessary to learn ECDIS
- Now I am using the ECDIS focus to provide navigational experience,
- And especially the development of good watchstanding habits

Concerns for ECDIS training

- Multiple brands of ECDIS provide more exposure at the risk of confusion, or
- Instead, learn one system very well
- Either way, success depends on the transfer of skill to an unfamiliar system
- Qualifying a trainer requires considerable effort & time underway

Structure of ECDIS training at USMMA

- Meets future STCW requirements
- Outline (50 hour course)
  - Elements of ECDIS
  - Watchstanding with ECDIS
  - ECDIS Route Planning
  - ECDIS targets, charts & systems
  - ECDIS outlook & responsibility
- Lecture & practice 50%
- Solo ECDIS navigation & testing 50%

24-workstation integrated navigation classroom (ECDIS in coaching environment)

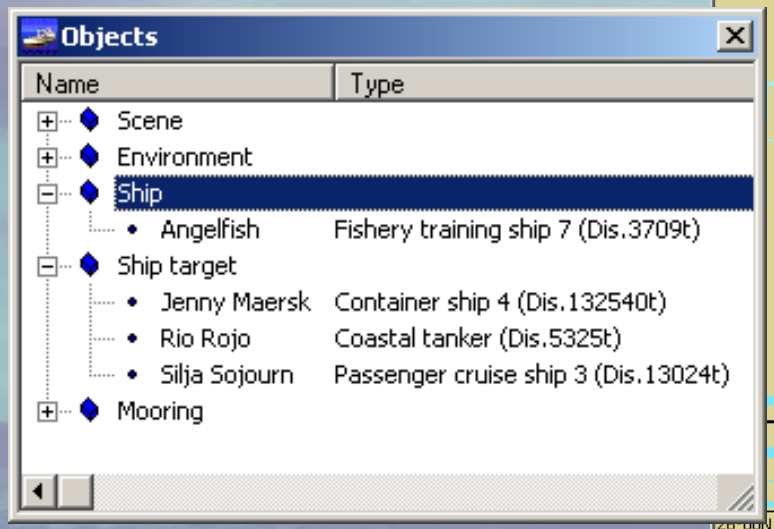
Checklist

- Checklist of 90 tasks in priority of watchstanding importance:
  - Basic tasks
  - Overall presentation of display
  - Intermediate tasks
  - Navigator's tasks
- Checklist is guidance for coaching, and basis for trainee's learning how to learn the next ECDIS to be encountered

16-workstation Integrated Navigation Lab (ECDIS navigation in solo environment)

Exercise

Piloting in open waters for 1 ownship (assign 12 times simultaneously)

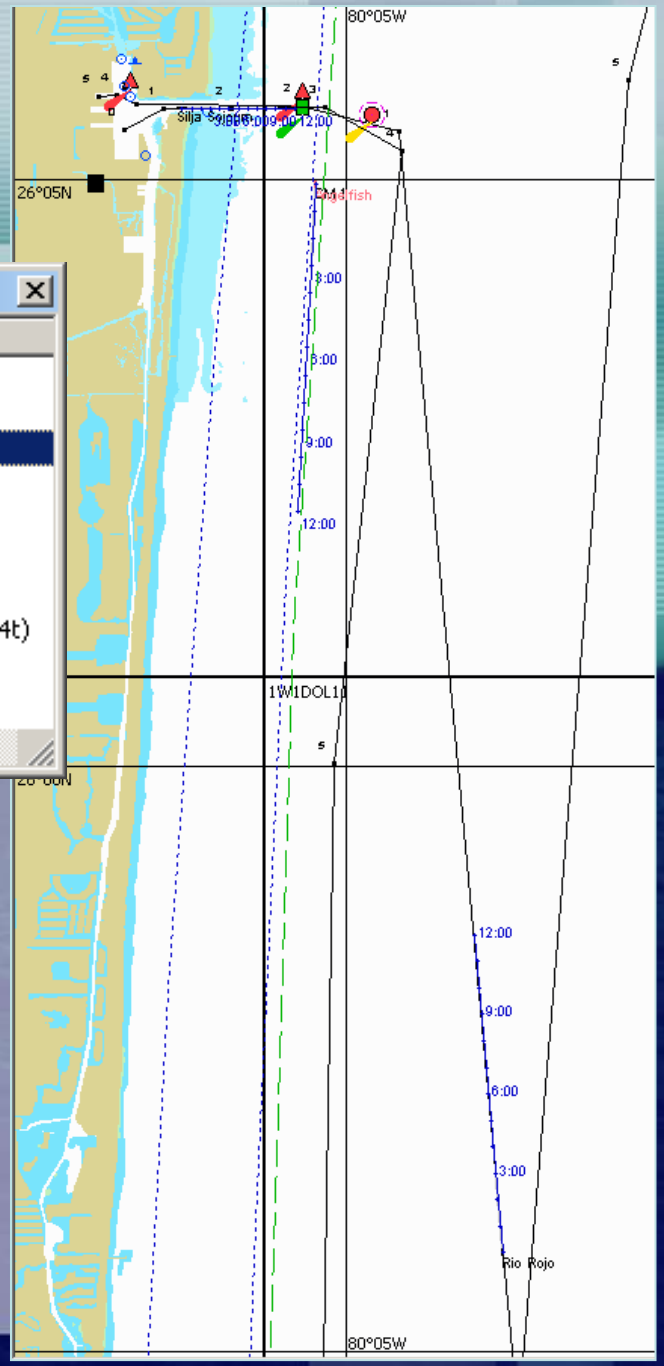


Task groups:

- Safe navigation through skills integration

Outcomes:

- Navigate with ECDIS
- Monitor SOG & COG
- Apply standing orders: > 1 nm off land,
- Stay in counter current
- 1-person watch
- Visual lookout



Exercise

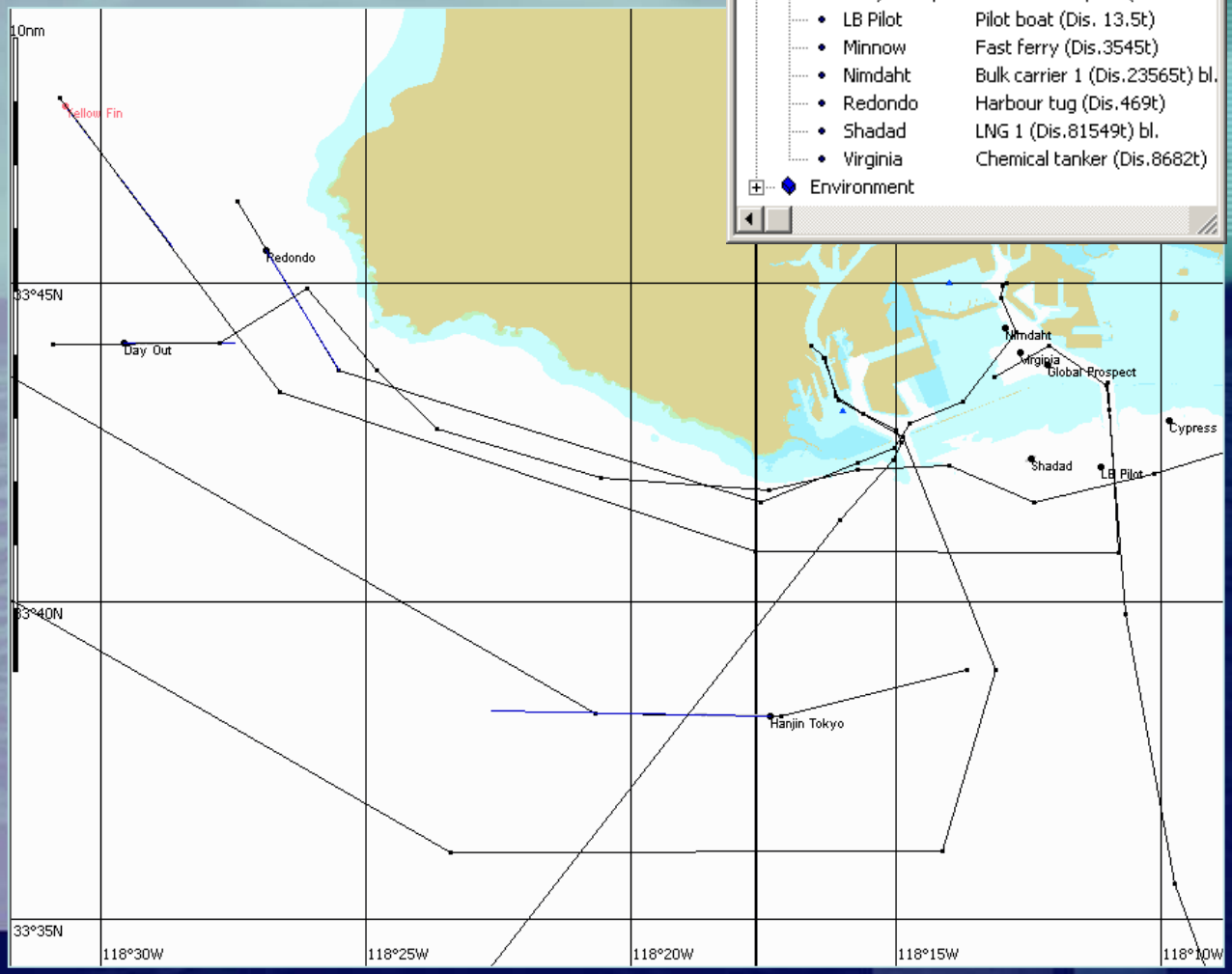
Piloting in open waters for 1 ownship (assign 12 times simultaneously)

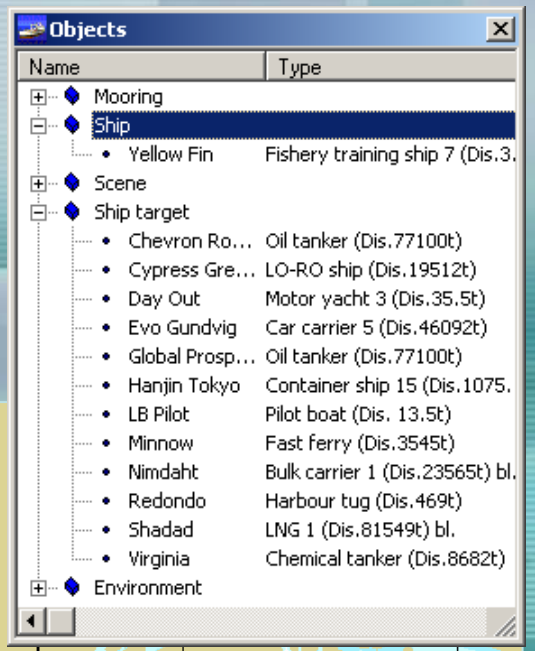
Task groups:

- Safe navigation through skills integration
- Adjust heading to maintain track

Outcomes:

- Navigate with ECDIS
- 1-person watch
- Cooperative navigation
- Visual lookout
- Limited maneuvering





Exercise

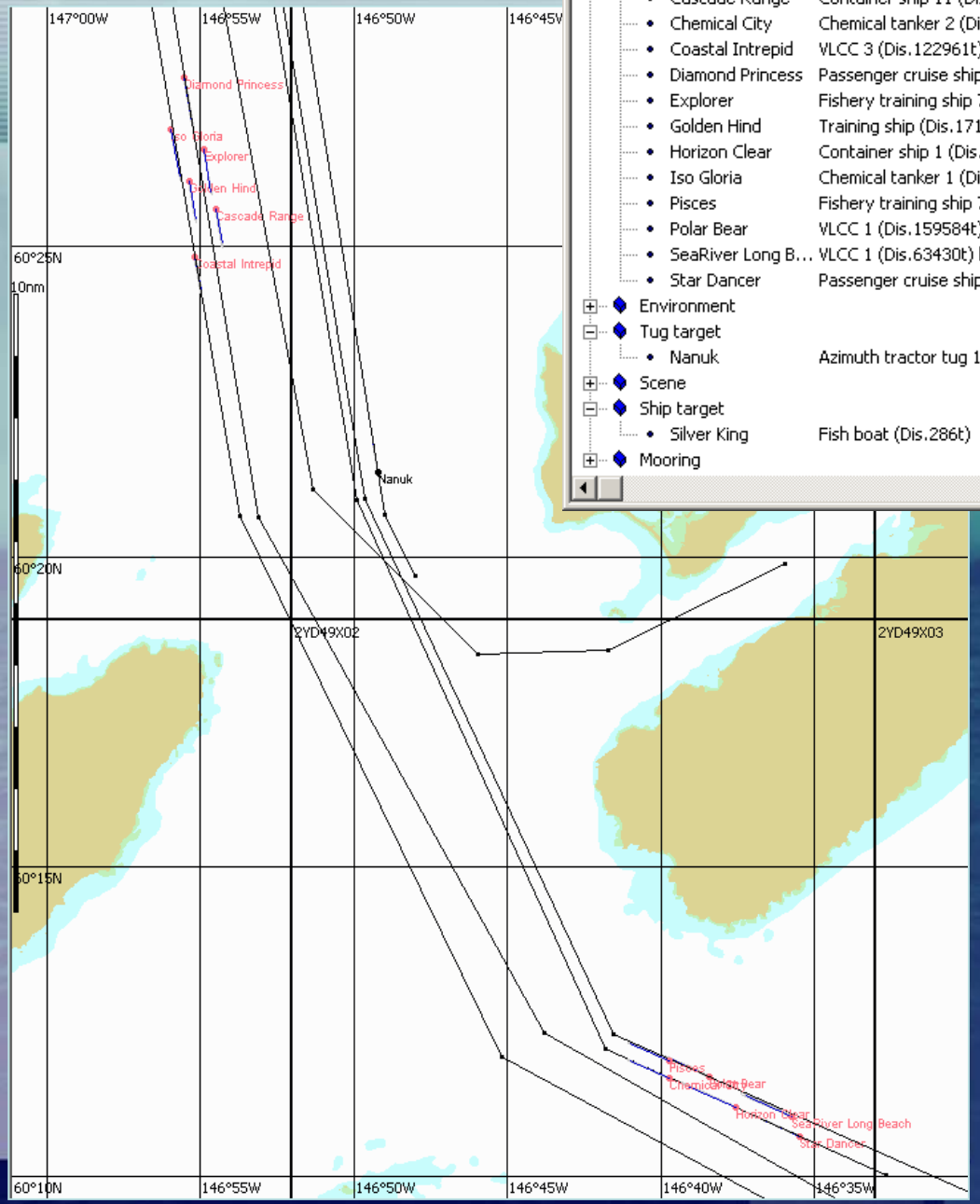
Piloting in open waters for 12 ownships (assign in one group exercise)

Task groups:

- Safe navigation through skills integration
- Adjust heading to maintain track

Outcomes:

- Navigate with ECDIS
- 1-person watch
- Cooperative navigation
- Visual lookout
- Maneuvering



Exercise

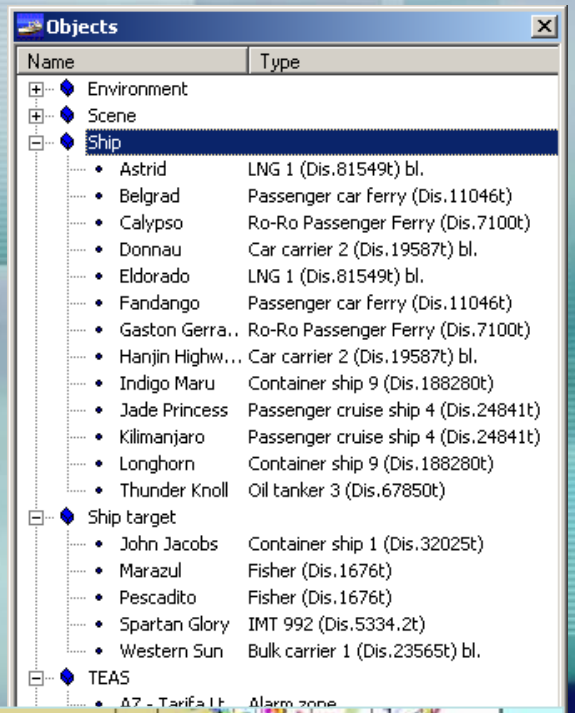
Piloting in open waters for 13 ownships (assign in one group exercise)

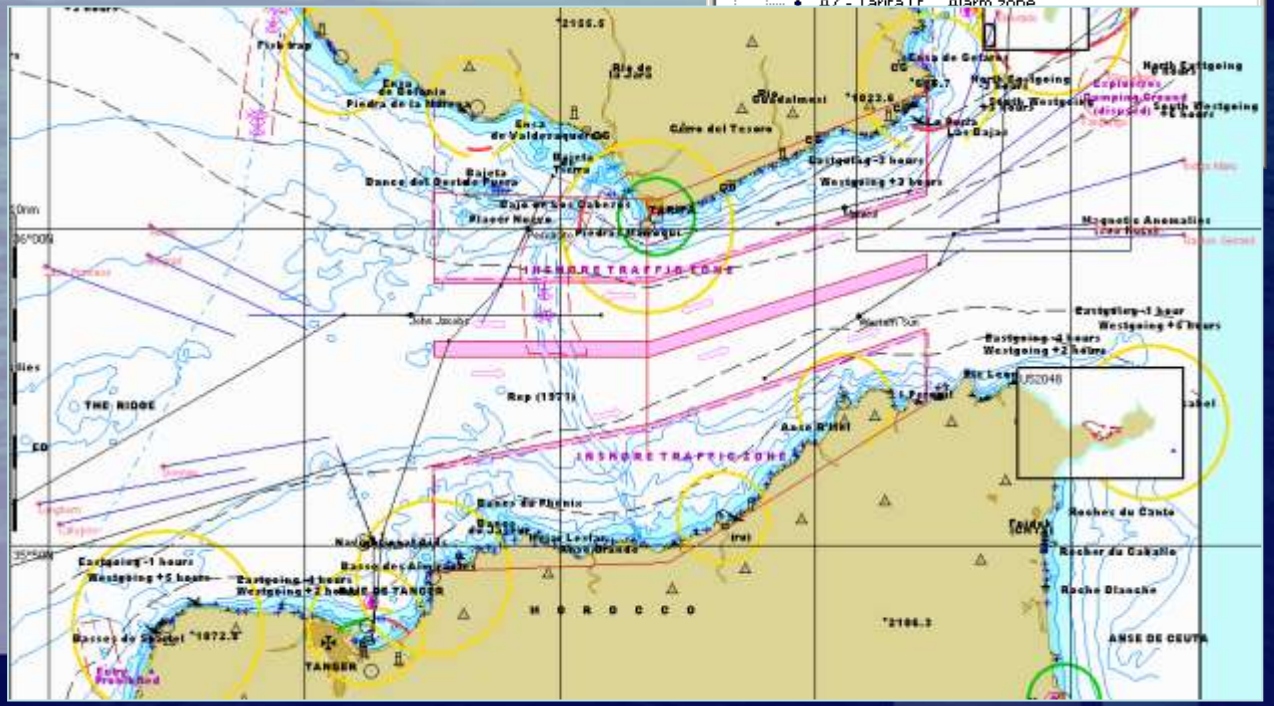
Task groups:

- Safe navigation through skills integration
- Create and apply route
- Adjust heading to maintain track
- TSS, alarm zones

Outcomes:

- Navigate with ECDIS
- 1-person watch
- Cooperative navigation
- Visual lookout
- Maneuvering





Exercises

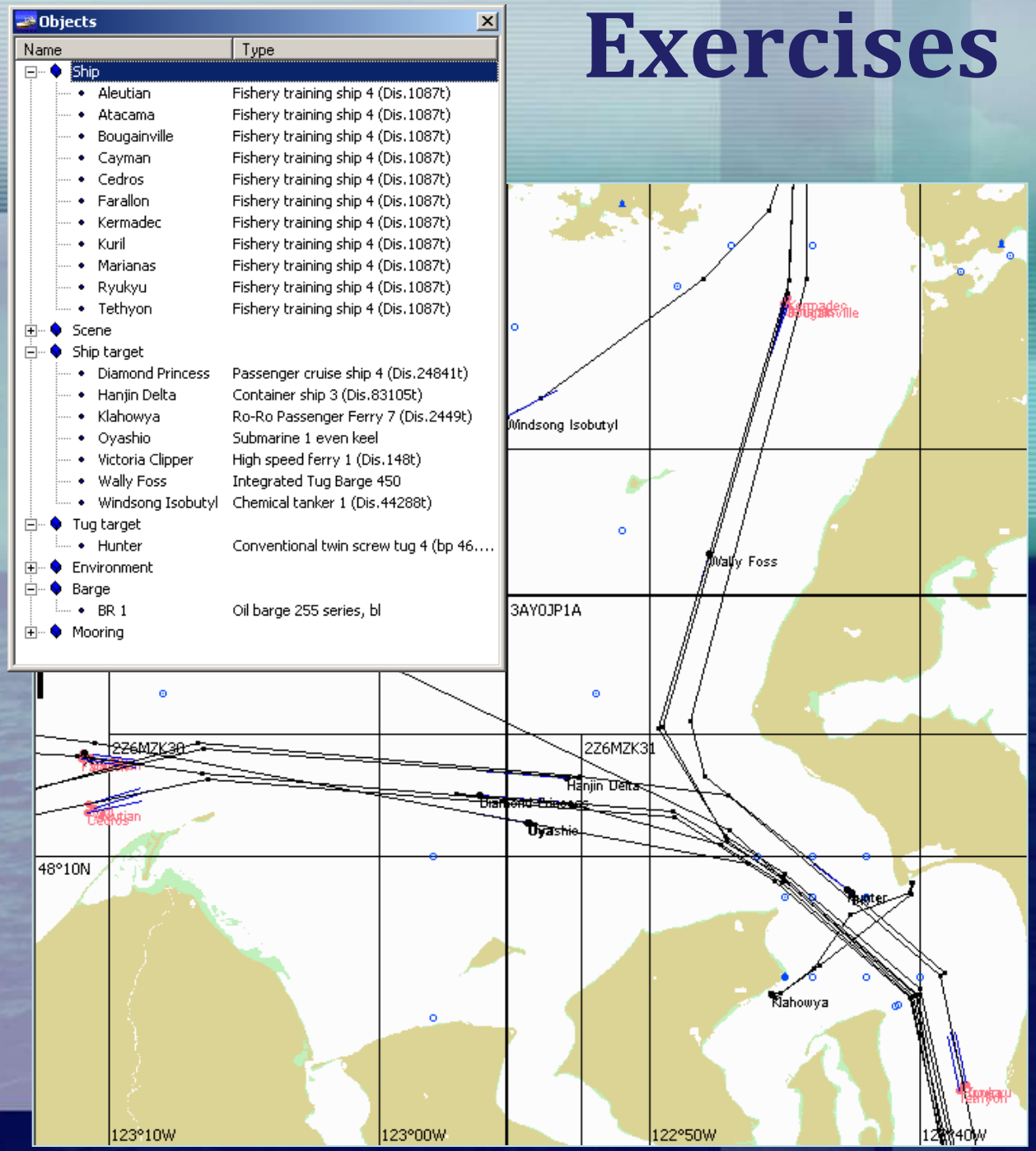
Piloting in open waters for 12 ownships (assign in one group exercise)

Task groups:

- Safe navigation through skills integration
- Adapt instruments to conditions
- Adapt track keeping to workload

Outcomes:

- Navigate with ECDIS
- 1-person watch
- Cooperative navigation
- Visual lookout
- Maneuvering



Exercises

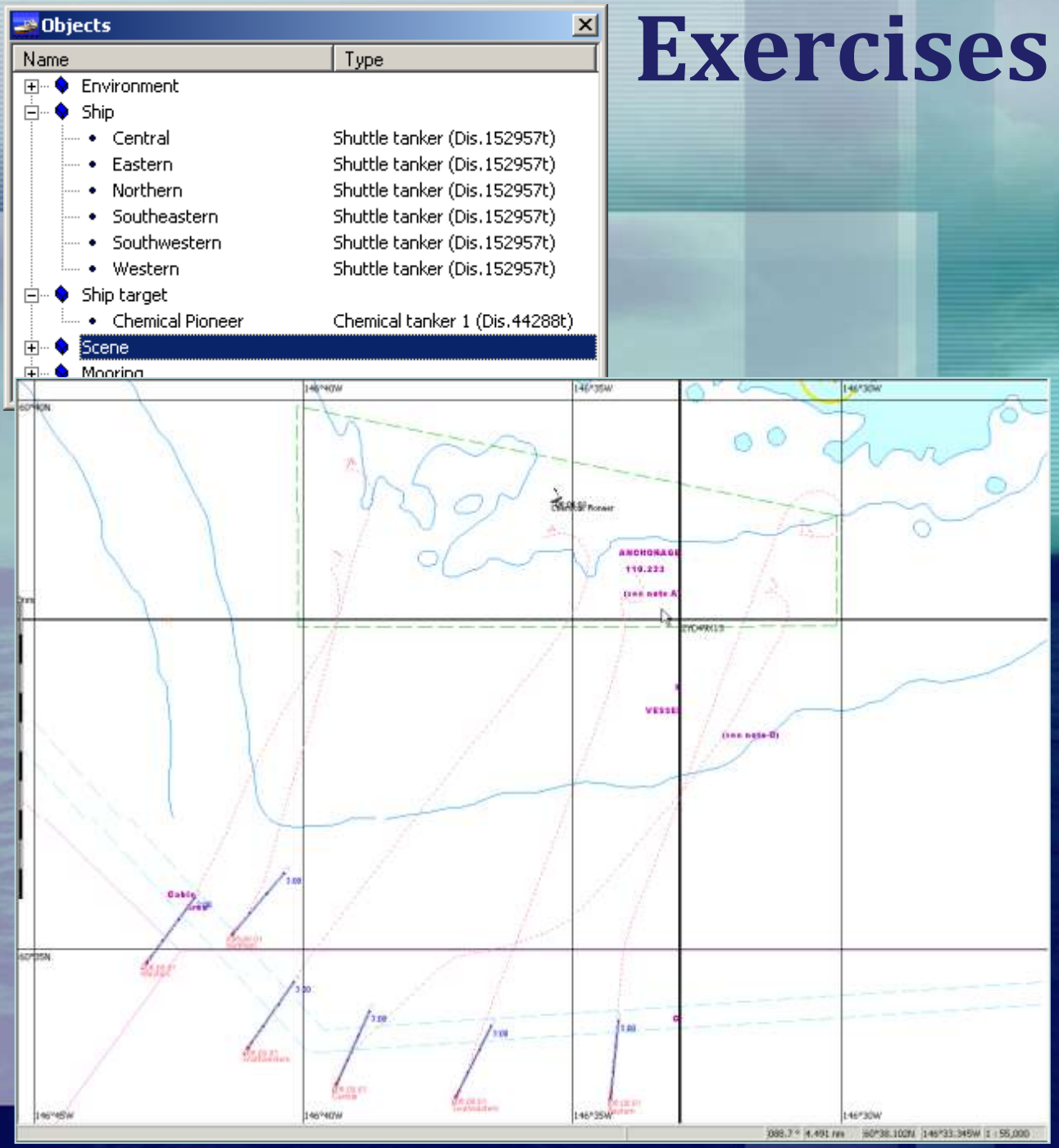
Piloting in semi-confined waters for 6 ownships (assign 2x)

Task groups:

- Safe navigation through skills integration
- Create & apply route
- Adjust heading to maintain track
- Create & apply user layer for anchoring

Outcomes:

- Navigate with ECDIS
- 1-person watch
- Cooperative navigation
- Visual lookout
- Maneuvering



Exercise

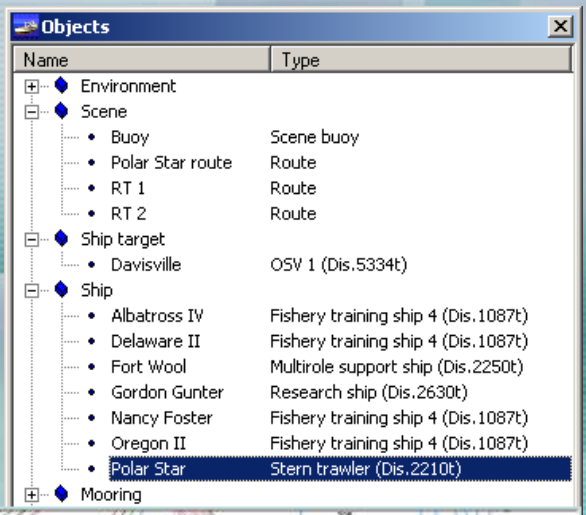
Piloting in open waters for 6 ownships (assign in one group exercise)

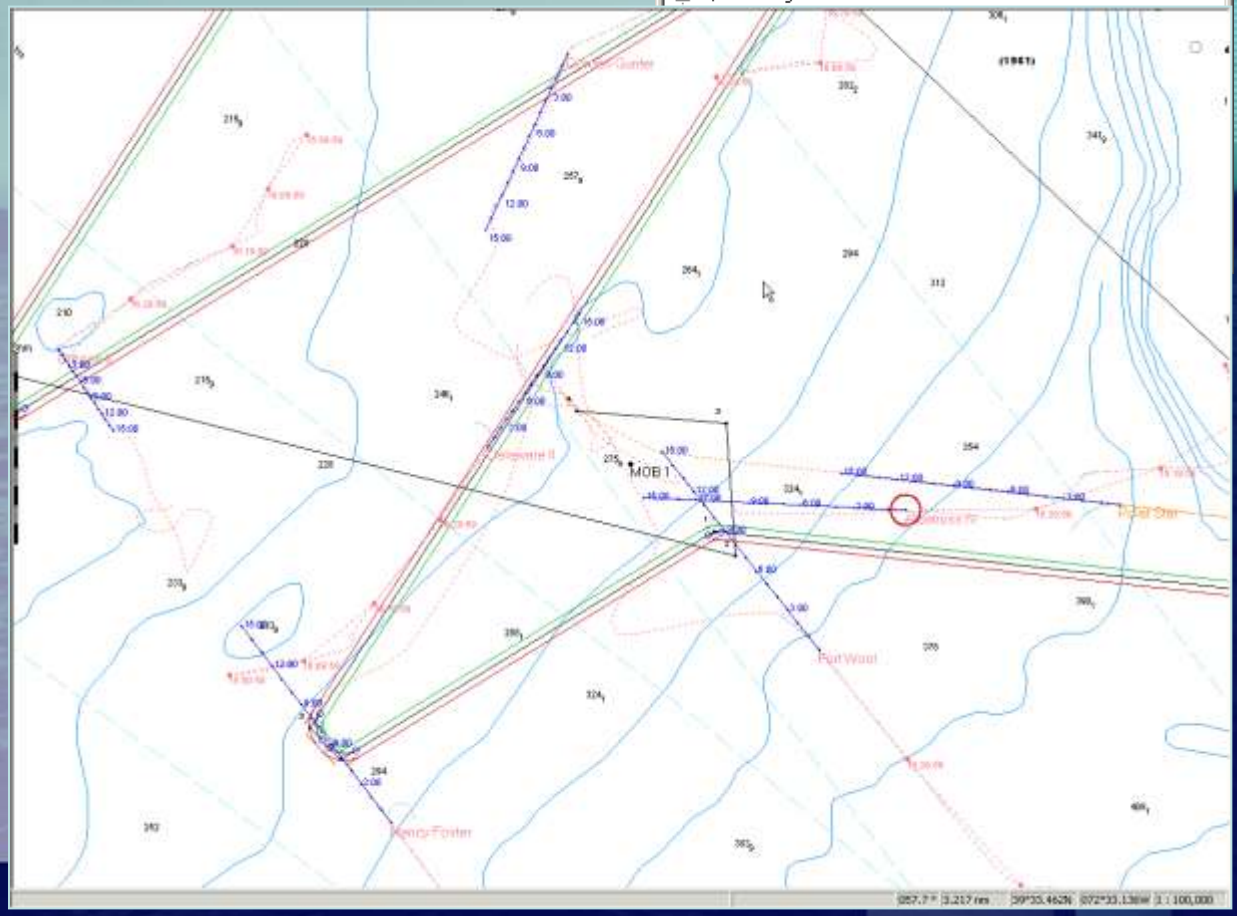
Task groups:

- Safe navigation through skills integration
- Adapt ECDIS route to SAR
- Find MOB

Outcomes:

- ‘Email’ ECDIS route
- 2-person watch
- Cooperative navigation
- Team & communications
- Visual lookout
- Maneuvering





Exercises

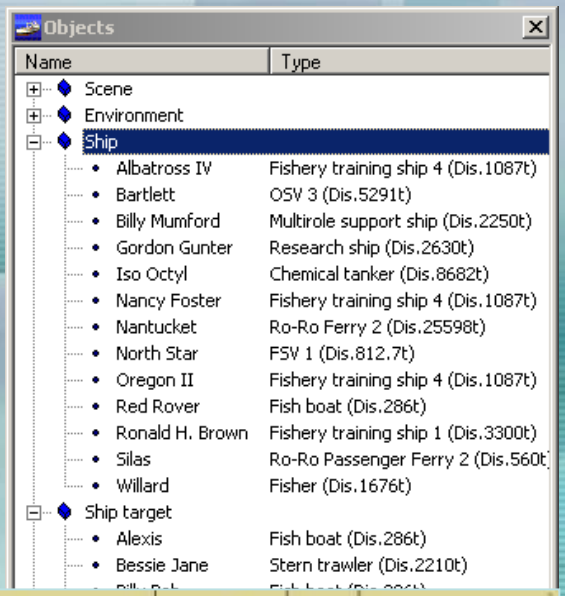
Piloting in open waters for 13 ownships (assign in one group exercise)

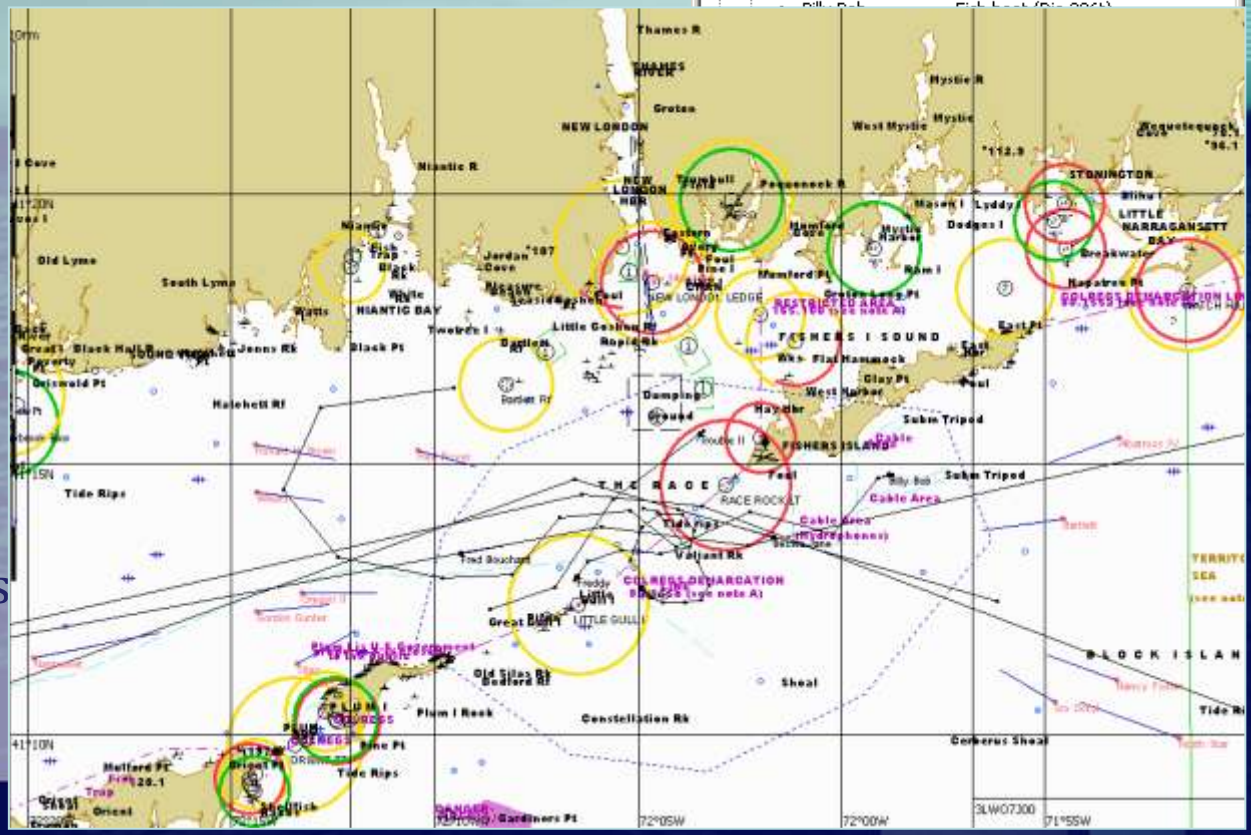
Task groups:

- Safe navigation through skills integration
- Adapt instruments to conditions
- Adapt track-keeping to workload

Outcomes:

- Navigate with ECDIS
- 1-person watch
- Cooperative navigation
- Team & communications
- Visual lookout
- Maneuvering





Exercises

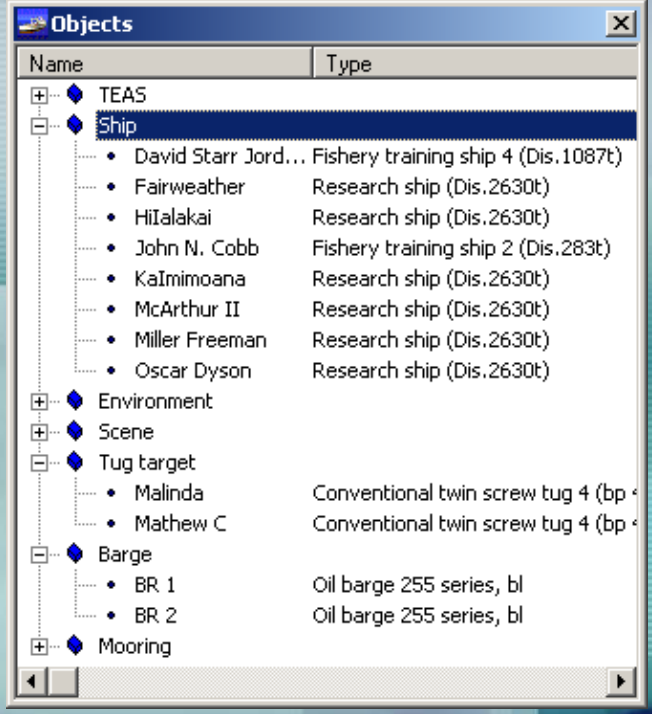
Piloting in open waters for 13 ownships

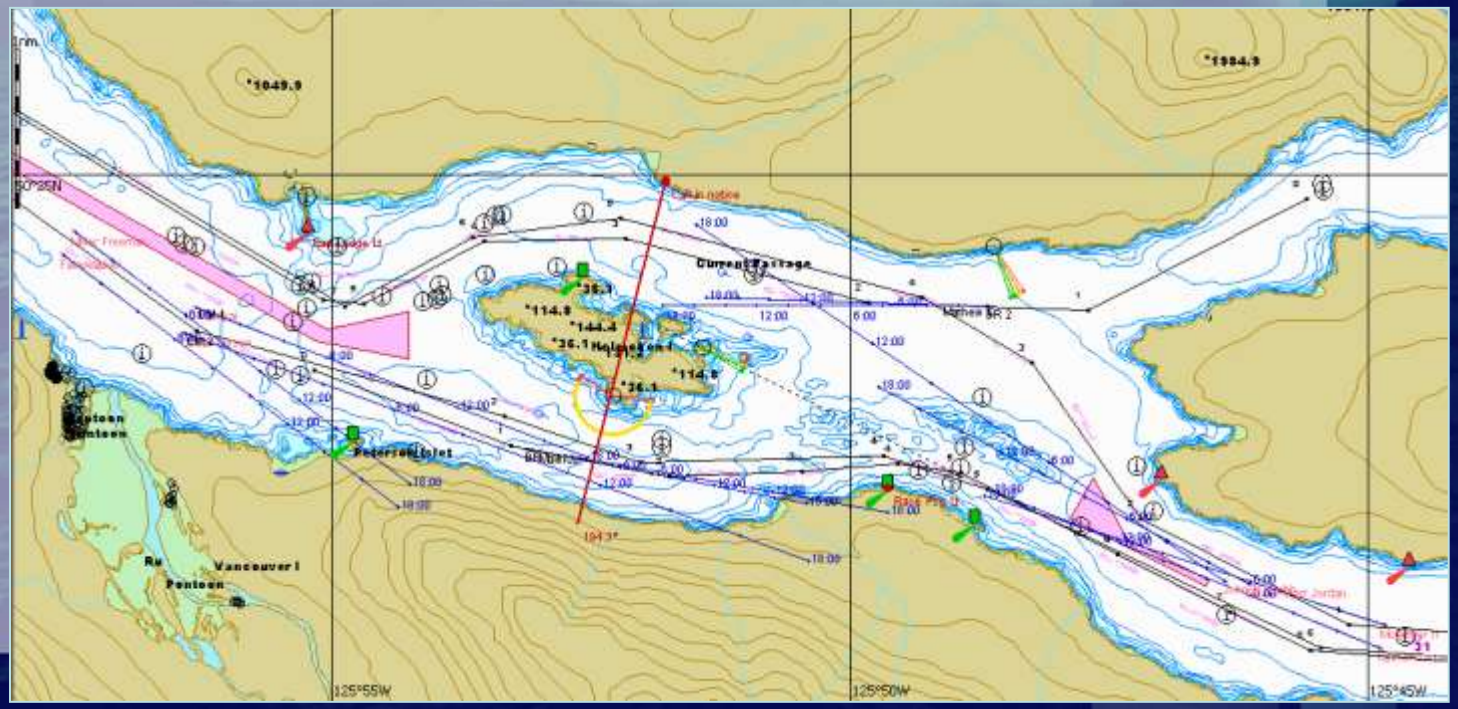
Task groups:

- Safe navigation through skills integration
- Adapt instruments to conditions
- Create & apply route
- Adjust heading to maintain track

Outcomes:

- Navigate with ECDIS
- 1-person watch
- Cooperative navigation
- Visual lookout
- Maneuvering





Competency Evaluation

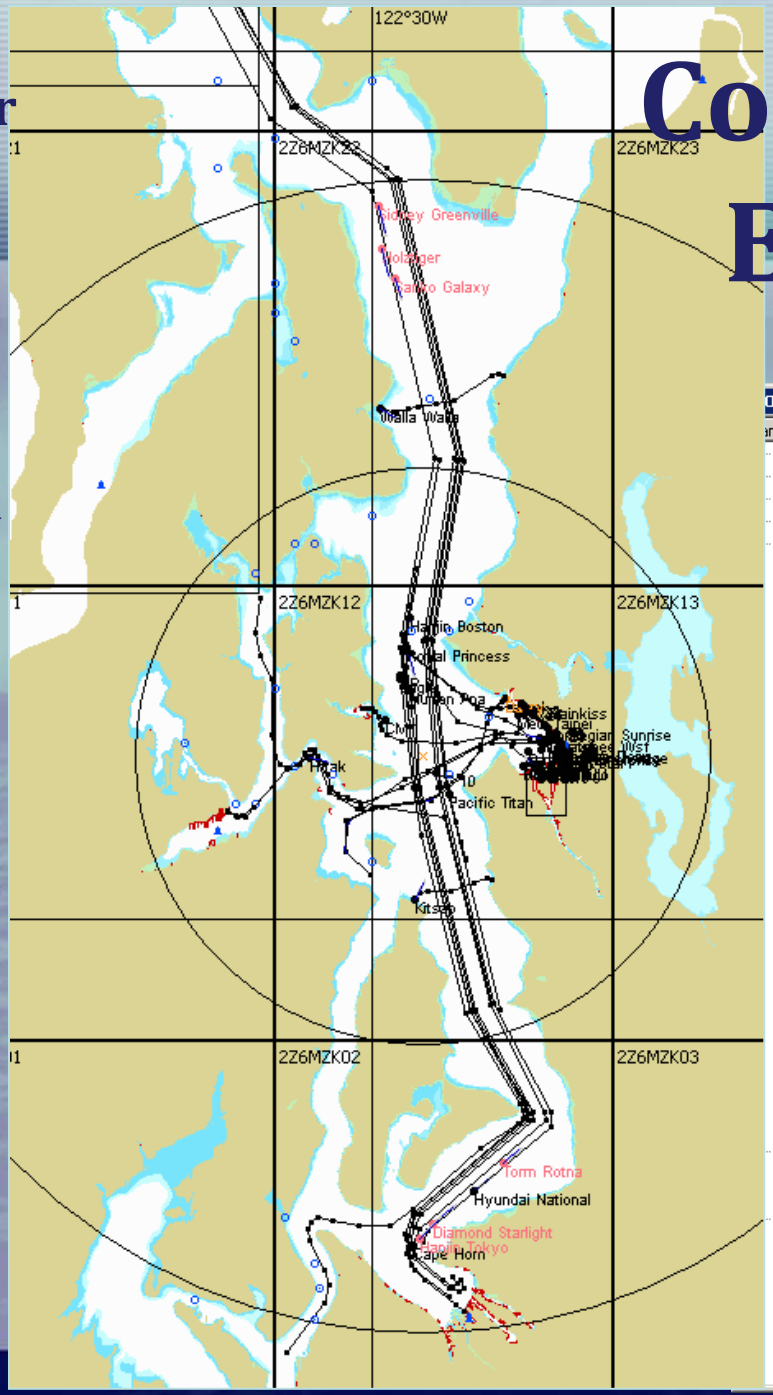
Piloting in open waters for 6 ownships together

Task groups:

- Use all ECDIS functions
- Safe navigation through skills integration
- Adapt & apply & modify route
- Adapt track keeping to workload
- TSS, alarm zones

Outcomes:

- Navigate with ECDIS
- 1-person watch
- Cooperative navigation
- Visual lookout
- Maneuvering



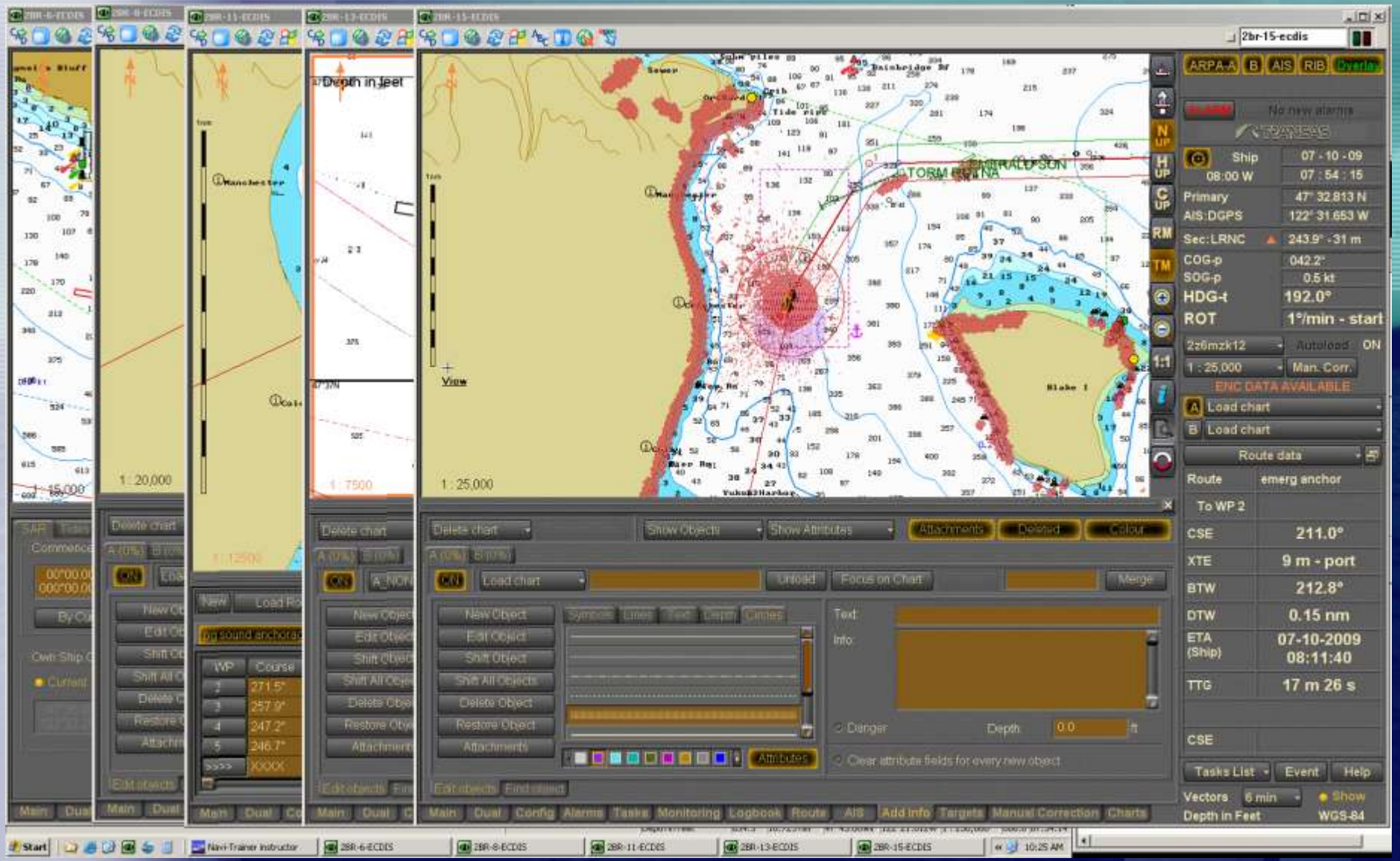
Solo competency evaluation

Score (24 pts required):

3=uses most/all, 2=uses some, 1=uses none

- Use navigation systems interfaced with ECDIS
- Verify settings of interfaced sensors
- Check that settings conform to procedures
- Monitor info on ECDIS for safe navigation
- Verify position by alternate means
- Adjust settings to suit conditions
- Use ECDIS-managed track control autopilot
- Maneuver using accepted navigation practice
- Manage contacts by AIS & radar interface*
- Assess environmental factors*

Instructor Station – remote non-interfering observation of ECDIS use and vessel events



ECDIS simulation performance standards are being proposed

- Enable all of the operational capabilities of ECDIS
- Provide complete visual and communications scene
- Provide for application of backup methods

The training is accountable

- ECDIS is an integrating device, and its use must be mastered in solo watchstanding
- For the most part, students will learn what we teach them

My first 21 Axioms of ECDIS:

(in no particular order, and all discovered the hard way)

- No one setting suits all conditions
- The mouse will kill you
- When in doubt, right click
- If it's clickable, it will get clicked
- Structure your practice to master the basics
- Exercise the 7-second glance
- Stick to the single-point query
- Skilled use includes stepping back from the ECDIS
- Never under estimate the problem of partial use
- Make friends with every menu

more...

...continued

- Do as you would on a paper chart, and so much more
- Move the line, check the line
- Luckily, you cannot edit the route you're monitoring
- Check all source sensors and connected devices
- Treat the ECDIS as if it were steering the vessel
- Detect and resolve ambiguities
- The ECDIS display will have many readers
- Enable only the alarms you want to hear
- ECDIS is mostly about chart data
- Procure, install, select, initialize, and then load
- ECDIS use should enhance the safety of navigation

Thank you.

Questions?

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