

# Emerging Technology in Maritime Piloting

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# Technology is Everywhere



- Autonomous cars
- Autonomous ships
- VR/AR

# In maritime, we've successfully incorporated some new technologies

- Carry-on Portable Pilot Units (PPU's)
- Smart Phones / tablets



But...are we optimizing technology to create a better way to pilot ships?



Or are we simply layering technology on the old ways and calling it a day?

# Maritime Piloting – What?

## “Control of a complex system”

- FEEDBACK - Pilot gets feedback from many different sources
- CONSTRUCT - Based upon his/her understanding of the controlled system (knowledge), the pilot compares the present state to the desired state
- CONTROL - Pilot takes action (uses his /her skills) to achieve or maintain the desired state

# Maritime Piloting – What?

## “Control of a complex system”

- FEEDBACK - Pilot gets feedback from many different sources
- CONSTRUCT - Based upon his/her understanding of the controlled system (knowledge of where the ship needs to be), the pilot compares the present state to the desired state
- CONTROL - Pilot takes action (uses skills and tools) to achieve or maintain the desired state

# Traditional Feedback

- Primarily visual and sensory
- Some reliance on instruments (e.g., Radar, AIS, gyro compass)
- Other telemetry (rudder angle indicator, E.O.T., anemometer, extended alarm system, etc.)
- Ship's crew



# Non-Visual Feedback

- With technology (primarily PPU's) - pilots are increasingly their reliance on information that can be received via a computer screen or other similar instrumentation to augment or replace visual feedback.
- *A pilot's comment about using PPU's:  
"I'm a better pilot with it."*



SBAS  
HDOP: 1.0

6.5 kn  
SOG

-0.7 °/min  
ROT

296.4°  
HDG + 0.0°

296.6°  
COG



Safety Contours Based on Safety: 13.0 m, Shallow: 10.0 m, Tide: 0.0 m (Manual Input). Soundings are Corrected.

50 m  
Reservation Point  
1700 m/296°

ETA  
03:15

1 m  
XTD

Main Basin  
3.13 NM

ETA  
03:38

03:06

# So . . . What Next?

Using this new technology (PPU's etc.), can we safely pilot ships in zero visibility?

- Use tech to replace visual feedback?
- What management measures would be necessary?
  
- Note: The pilot would still have access to onboard instruments, telemetry and feedback from the ship's crew

# Could we use tech to provide shore-based assistance to support the on-board Pilot?

- Shore-based copilot
- Minimize human error
- Double-check during higher risk shipmoves
- Second set of eyes



# Could pilots use tech to provide navigational assistance to masters entering port with no pilot onboard?



- Shift pilot boarding closer to shore (or inside port limits?)
- Improve pilot safety during weather events
- Reduce delays during weather events
- Decrease emissions and idle gangs
- Mitigation measures?

# Could we use tech to remove the pilot to a remote location?

- Complete transit?
- Partial transit?
- Under certain circumstances?
- What management measures would be necessary?



# What Else is Possible?

Assuming our objective is to improve  
marine safety and efficiency . . .

In what ways might we integrate this and  
other emerging technologies into our  
day-to-day business?

# Thank You

# Questions

Emerging Technology and Maritime Piloting  
The Technology is here; how should we utilize it?

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<http://csum-dspace.calstate.edu/handle/10211.3/142084>