

The logo for Total Ship Systems Engineering (TSSE) features the letters 'TSSE' in a large, bold, italicized sans-serif font. A thick horizontal black bar extends from the top of the 'S' across the top of the slide. On the right side of this bar, there is a silhouette of a ship's superstructure with four vertical masts or antennas.

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1996 Arsenal Ship Design

# Automation for Reduced Manning

- Automation:

used to describe a system that carries out a predetermined sequence of events in response to a situation!



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## Systems to be Discussed

- Integrated Bridge System (IBS)
- Standard Monitoring and Control System (SMCS)
- Damage Control System(DCS)

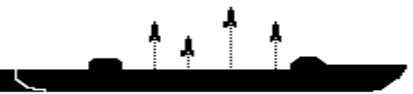


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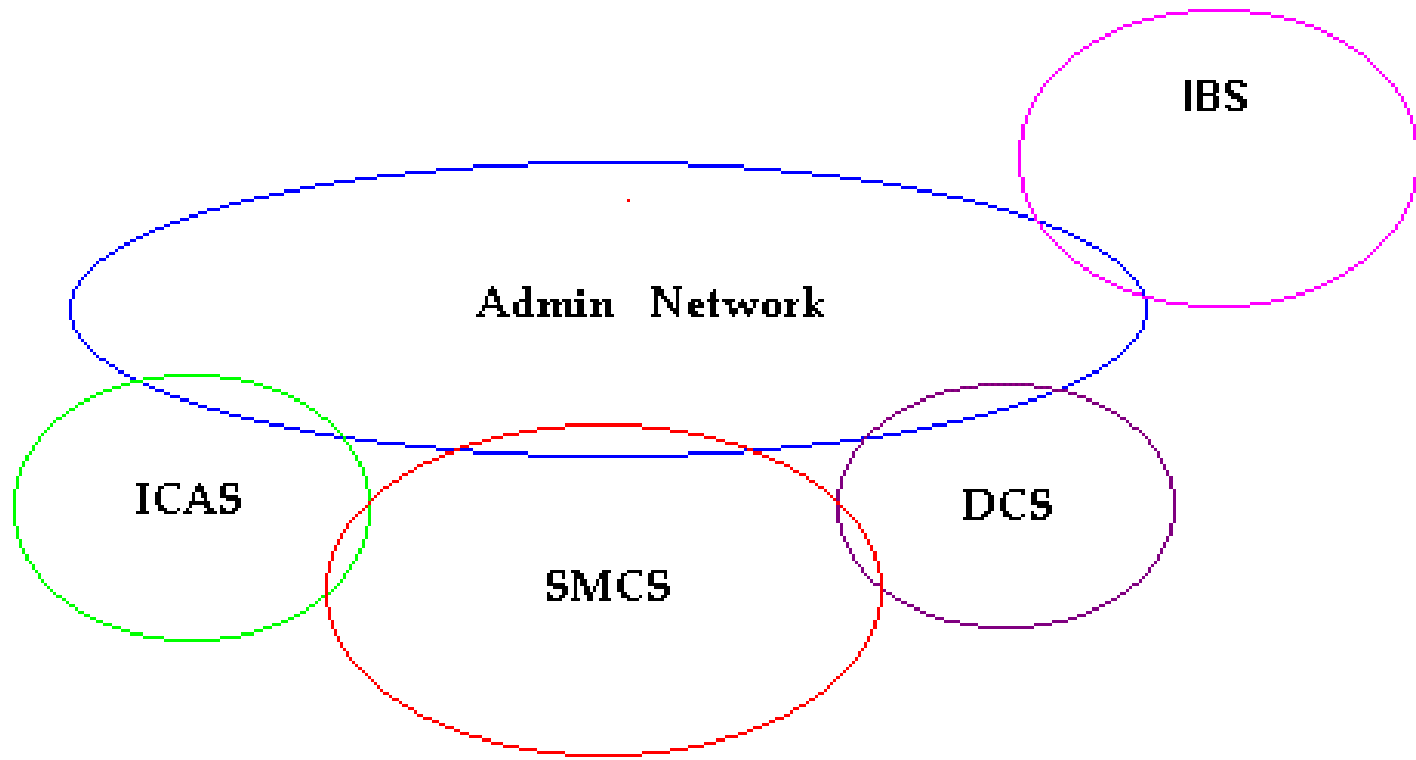


# Automated Manning Levels

- **GOAL:** Reduce Manning Levels to:
  - Bridge: 2 watchstanders
  - Engineering: 1 watchstander
  - Damage Control: 0 on watch
  - 1 small highly capable Repair Party

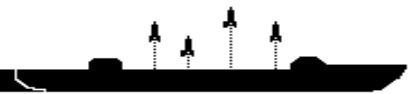


## Automated System Interaction

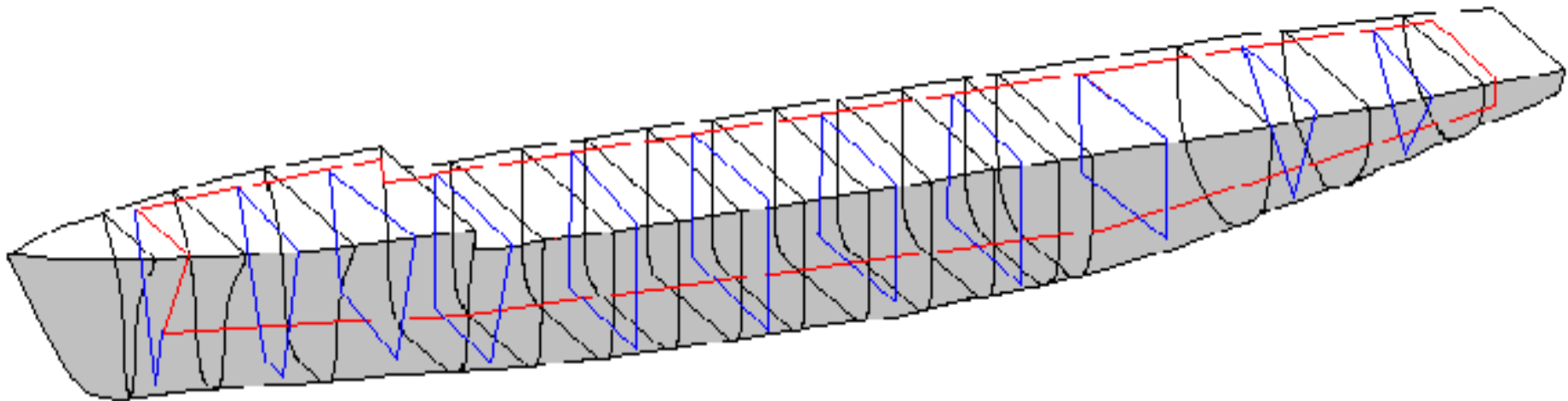


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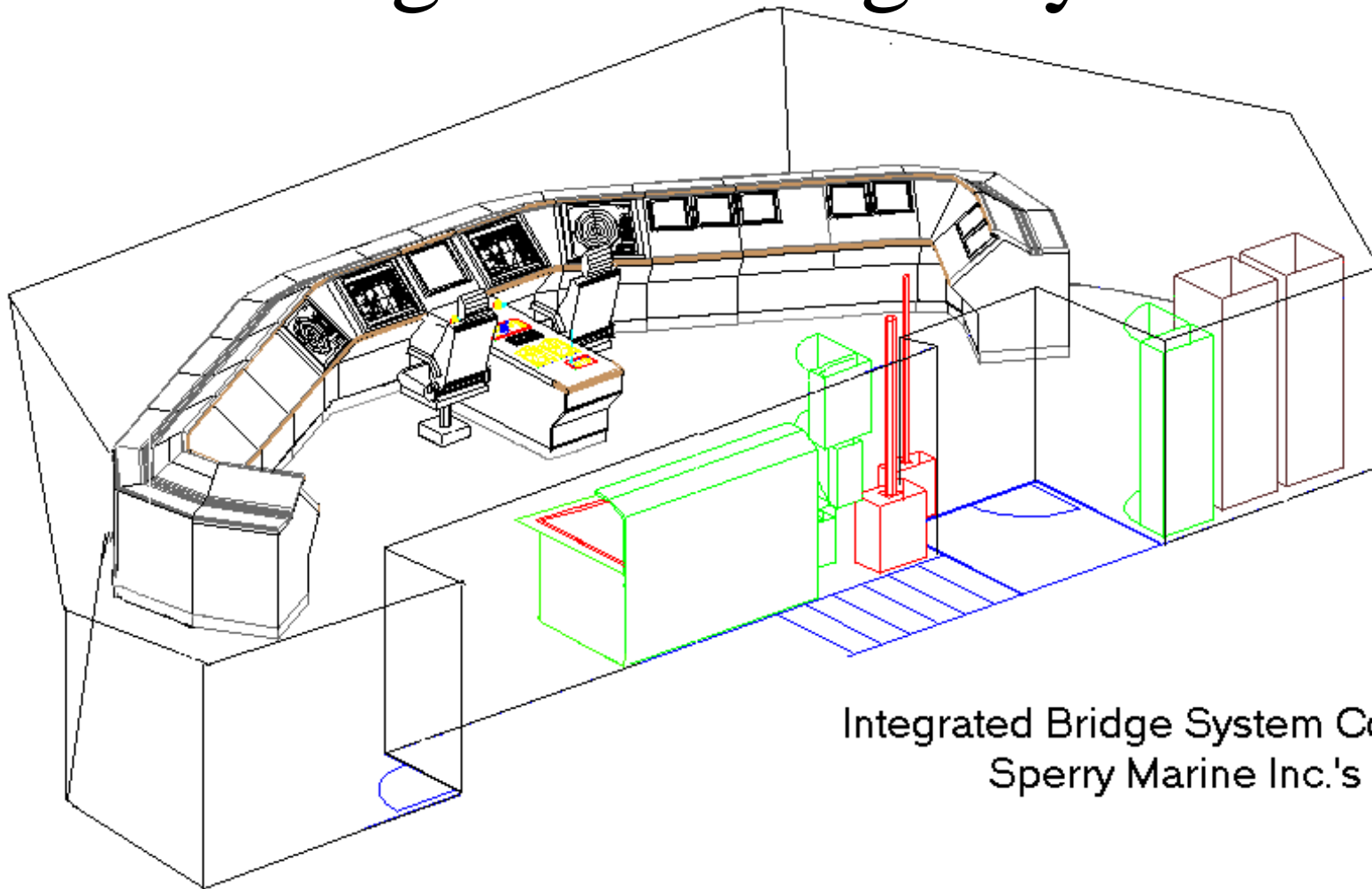
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# Zonal Network



# Integrated Bridge System



Integrated Bridge System Concept  
Sperry Marine Inc.'s

# Integrated Bridge System

- Full Ship Control
- Computer Navigation System



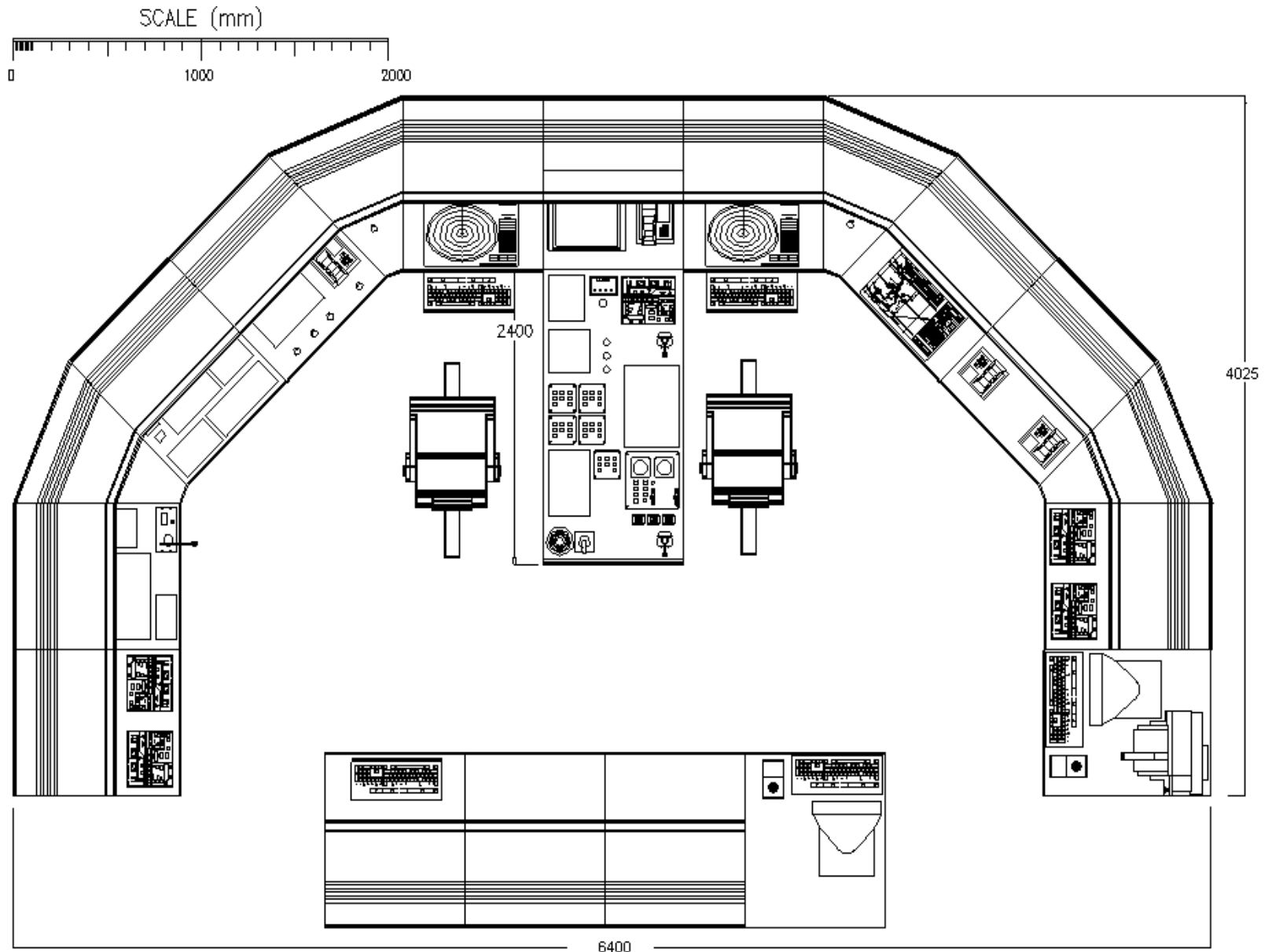
## Other Navigational Inputs

- RASCAR VT Radar
  - Collision Avoidance
  - Radar Overlaid images
- ADG3000 Autopilot
- Gyro, Doppler, GPS, Depth, and Weather
- Additional Modules: Precision Anchoring, Man Overboard, Engineering Status, and Remote TV Camera Displays



# Standard Monitoring and Control System (SMCS)

# SMCS Control Center



# Engineering Systems Monitored and Controlled

- Propulsion Machinery
- Auxiliary Machinery
- Electric Plant and Distribution Systems
- Steering Systems
- Damage Control Machinery



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# System Control

- The three main consoles
  - have full control capability of any engineering system
  - example: CIC can display and control all navigation functions acting as a redundant bridge control center
- Local Operating Panels are single screen displays but have full control capabilities...just one system at a time!

## Location of Control Stations

- Main Control Centers
  - Bridge, CIC, Engineering Control
- Local Operating Panels
  - Main engineroom, generator room, forward generator room, and located with other major machinery

# **Integrated Condition Assessment System (ICAS)**

- Monitors, tracks, and provides a complete machinery condition assessment.



# Damage Control System (DCS)





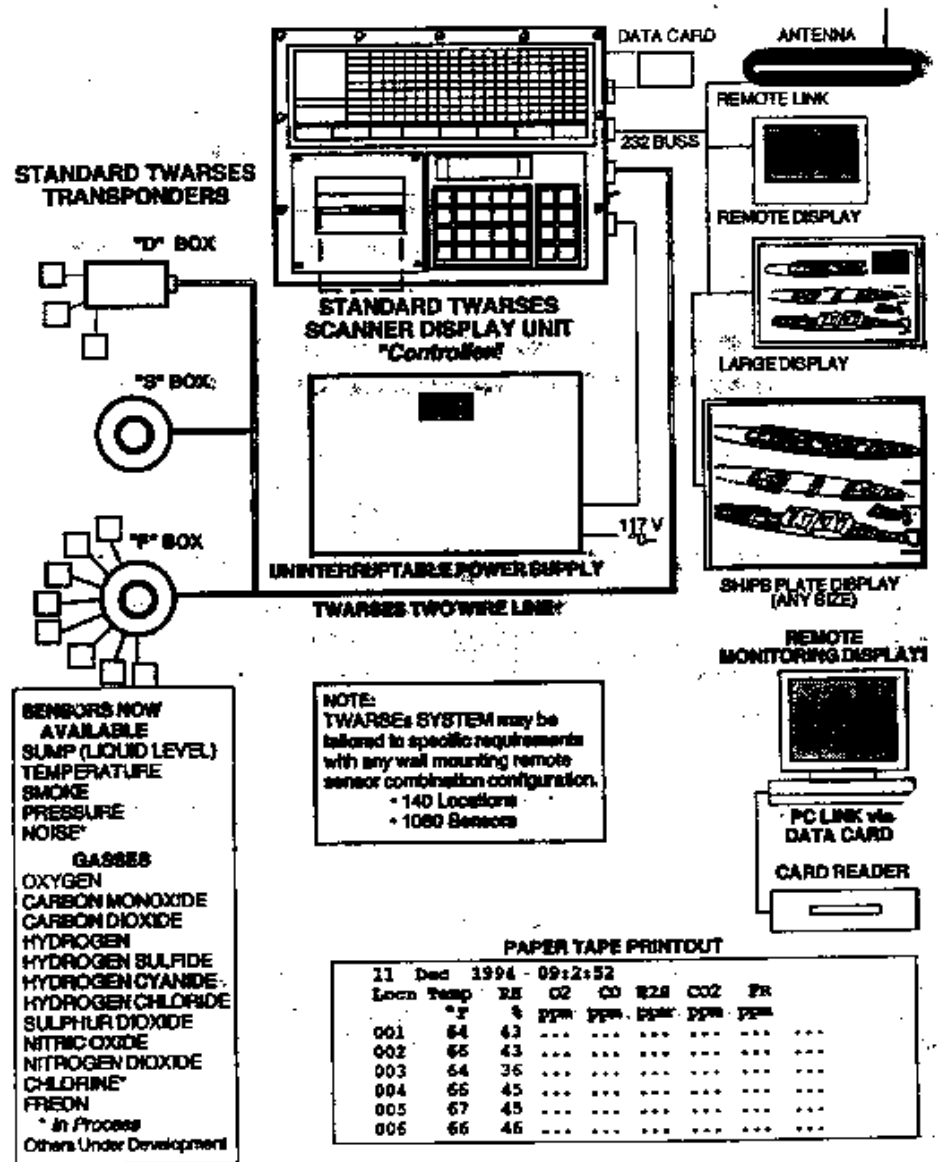
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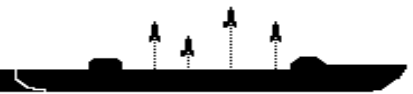


# Damage Control System

- Graphic Displays
- Provides Real time Damage Control Information for Decision Making
- Utilizes SMCS to control DC Equipment

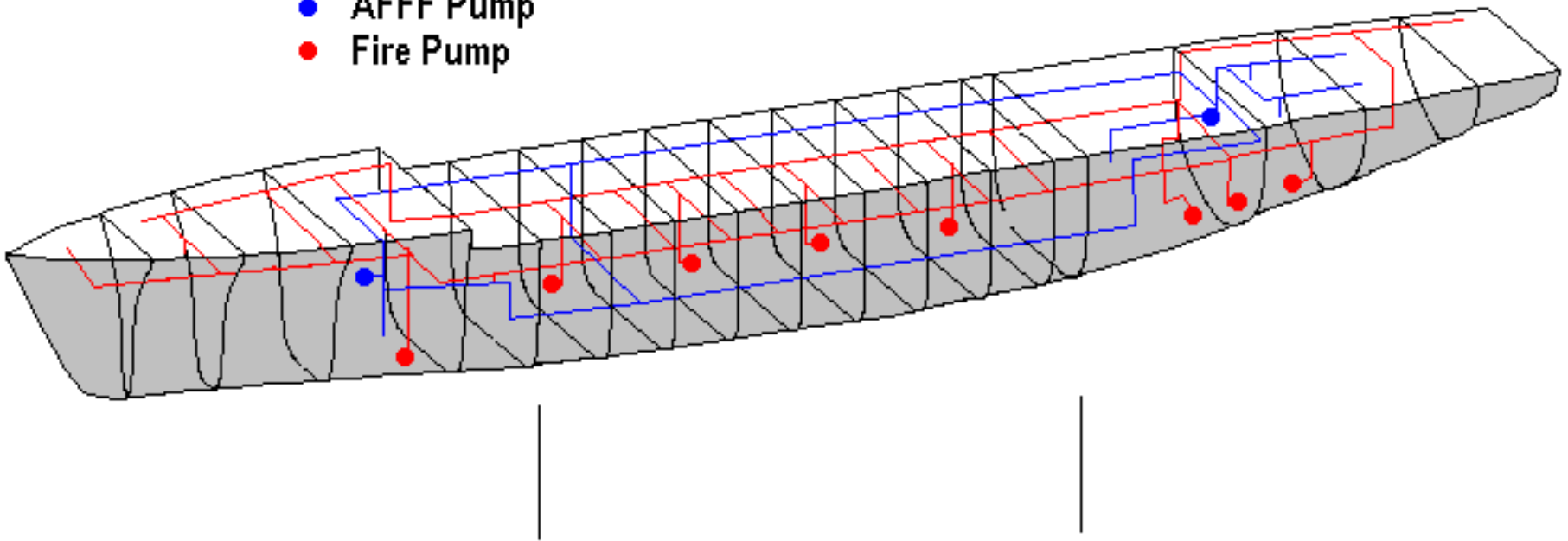
# Two Wire Automatic Remote Sensing Evaluation System





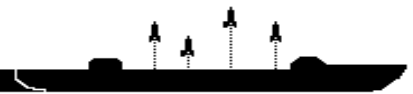
## Firemain, AFFF and Water mist

- AFFF Pump
- Fire Pump

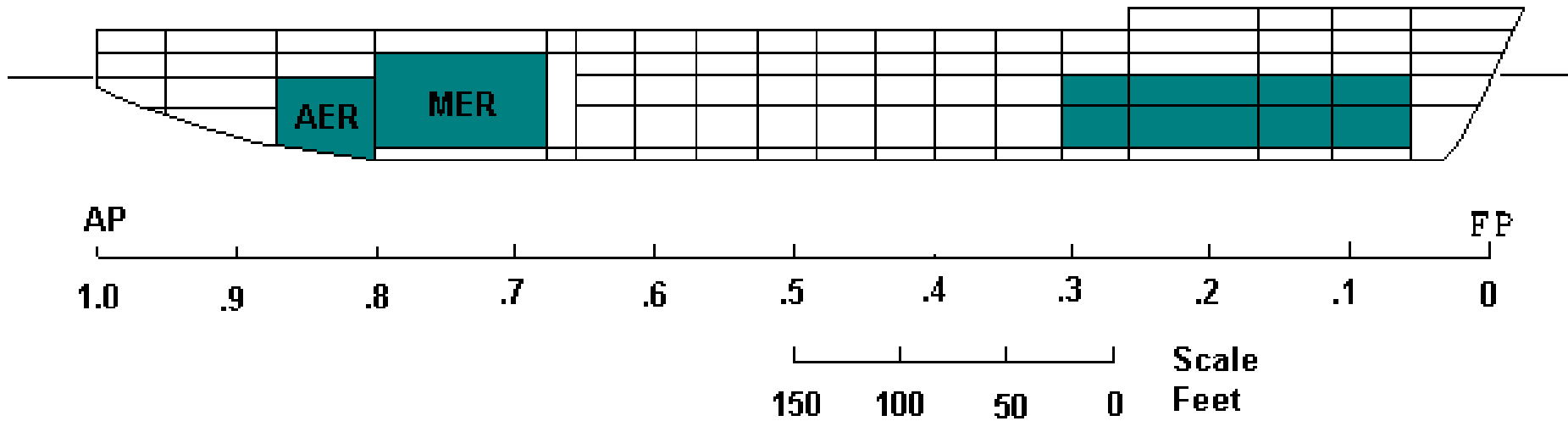




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# Foam in Salvage Coverage





# Automation and Survivability

Highly Survivable Ship

Automation to help Control Damage



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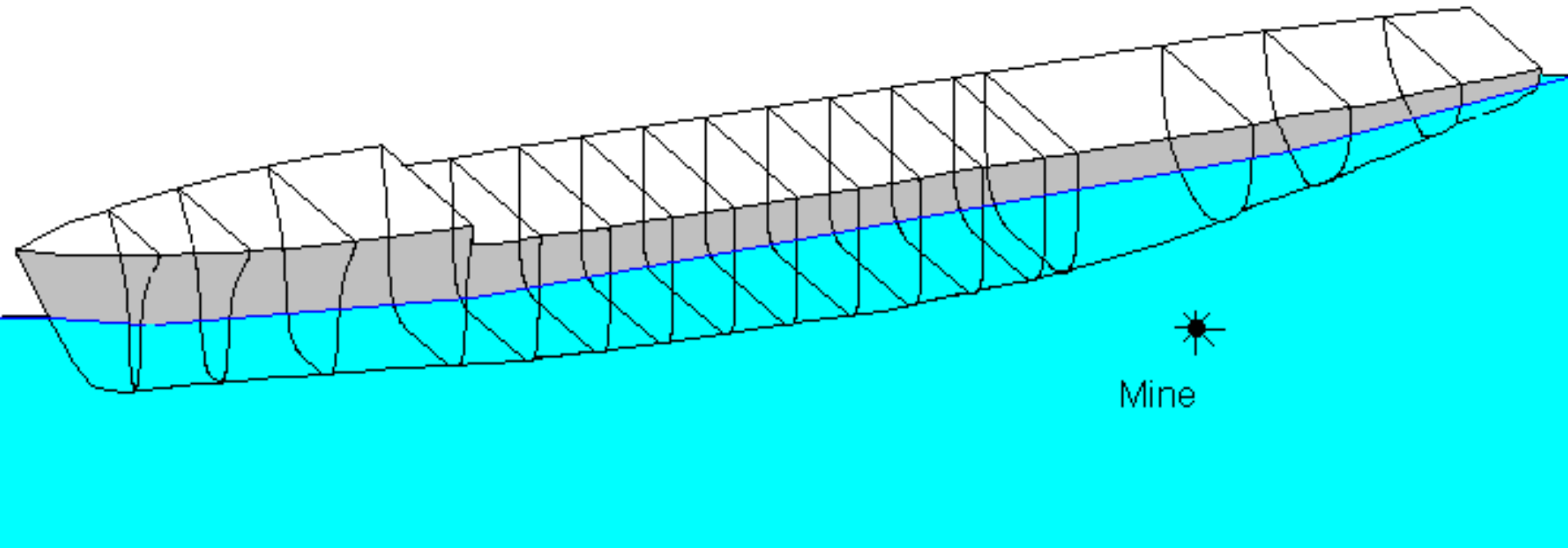


## Conclusions

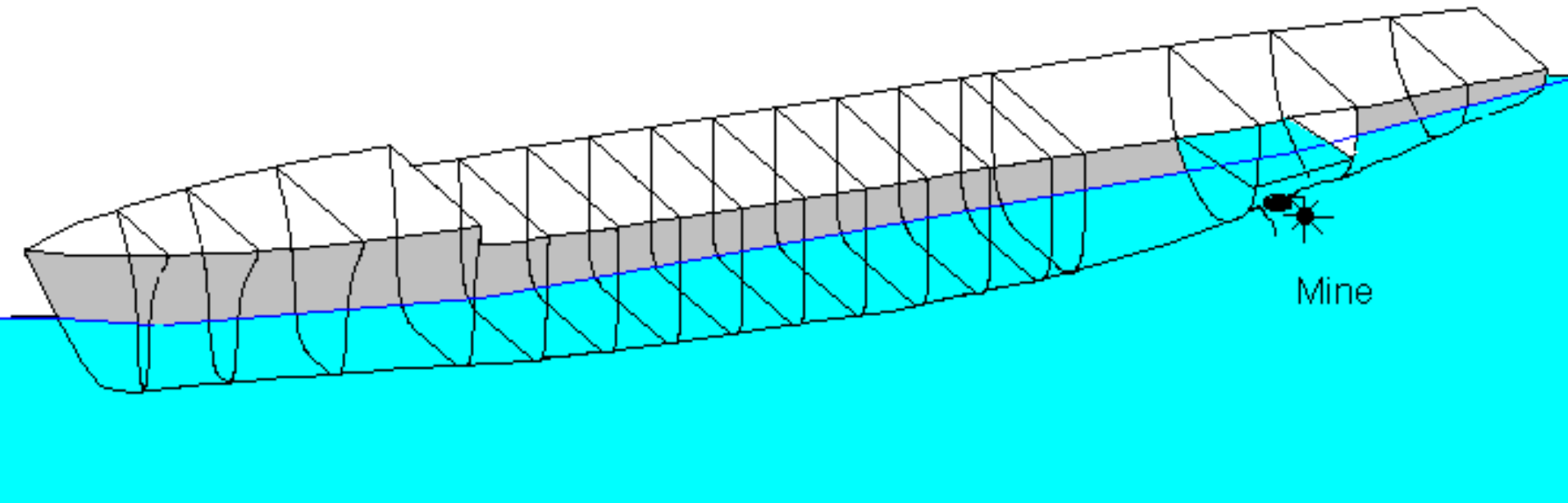
- The systems shown are available today and are proven systems.
- The Arsenal Ship will have to embrace the technology to achieve a substantial manpower savings without loss of mission capability.
- A True Balance between Automation and manning must be achieved!

# Mine Hit Example

- Mine strikes Auxiliary Machinery Room Zone 14

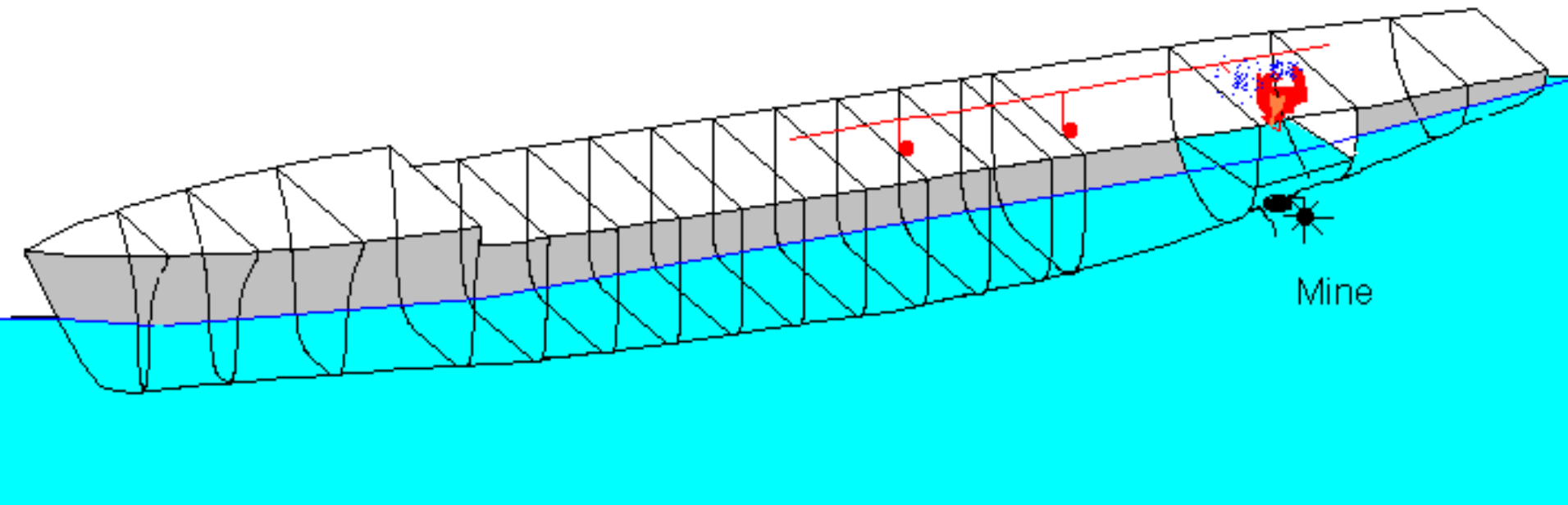


- Zone 14 begins to flood. Remote detection reports a fire and flooding!
- SMCS Secures the Space: Material, Electrical, & Ventilation
- DCS Evaluate Stability and Damage,
- Attempts to Control!

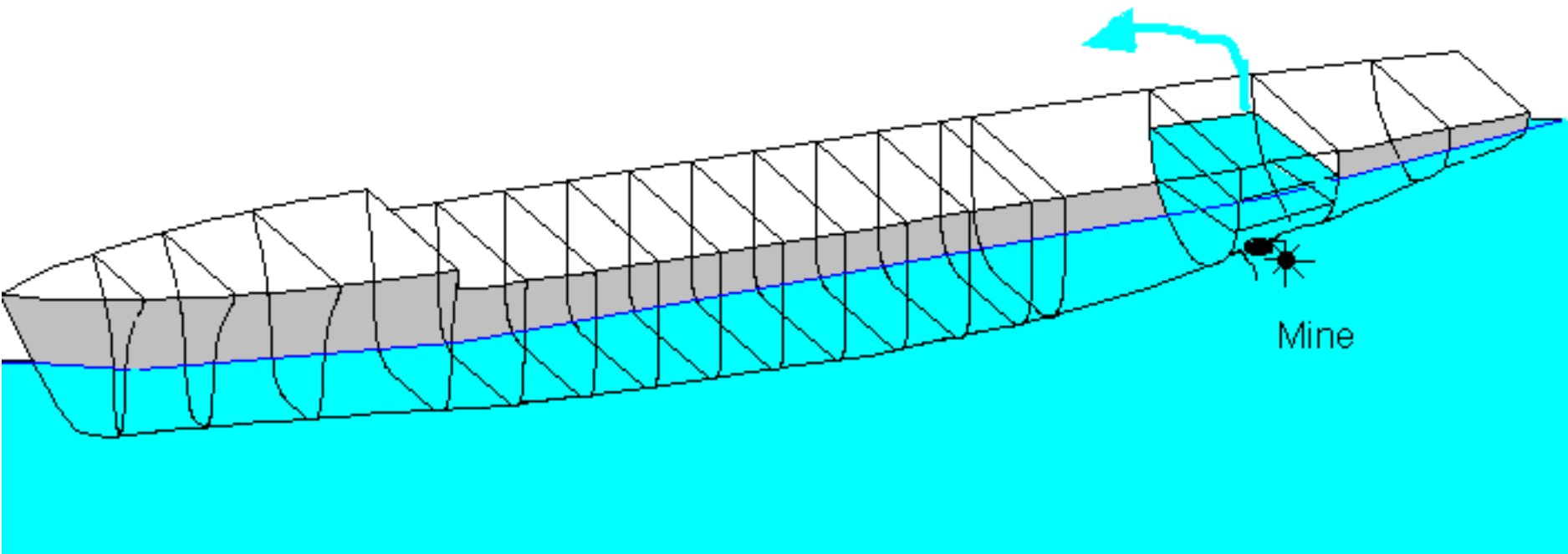




- DCS/SMCS Energizes Fire Pumps and sprays water mist to extinguish fire!
- Bilge drainage energized to handle fire fighting water and flooding.
- Electrical load is evaluated by SMCS and additional generators are provided.



- Fire's out but still have flooding!
- Pumps are working but not enough!
- SMCS shifted electric load to PTGs and EDG, Minimal loss of power! Ship is able to continue to launch missiles!
- DCS recommends Foam in Salvage!



- Foam In Salvage System Activated!
- Auxiliary Machinery room can not flood!
- Ship will not sink and can continue to fight!

