New Research Vessels - An Operations Perspective

Dennis Donahue

NOAA Small Boat Program

450 Vessels < 300 GT

Managed and funded by 60 local operating units, 5 Line Offices

Central Oversight

- Acquisition Review Board
- Engineering, Operations and Compliance
- Provide guidance and lessons learned

Manage Risk - Minimize Regrets

New Vessel Strategies

Time Cost

- **Keel Up Design** - engineered for specific mission
- **New Build** - proven design with changes
- **Repurposed** - existing vessel, new mission
- **Acquired** - existing vessel, similar mission
- **Hybrid Approach**

Compromise

- **Keel Up Design** - engineered for specific mission

- **New Build** - proven design with changes

- **Repurposed** - existing vessel, new mission

USCG - Patrol Boat

ARMY - Transport

Commercial - Shrimp Boat

- **Repurposed** - existing vessel, new mission, *repeat*

USGS RV Grayling - 1977
Shrimper design converted to a research trawler. Transit from the Gulf to Michigan

NOAA RV Southern Journey - 2014
Research trawler converted to a research shrimper. Transit from the Michigan to the Gulf

- **Acquired** - existing vessel, similar mission

Multibeam surveys

Buoy Deployments

VESSEL DETAILS

Year Built	1999
Official Number	1090253
Place Built	R & S Fabrication, Inc.

DIMENSIONS

Length	150 Ft
Beam	36 Ft
Draft	12 Ft
Clear Deck	90 Ft x 30 Ft
Cargo	375 LT
Gross Tonnage	98 GT

LIQUID CAPACITIES

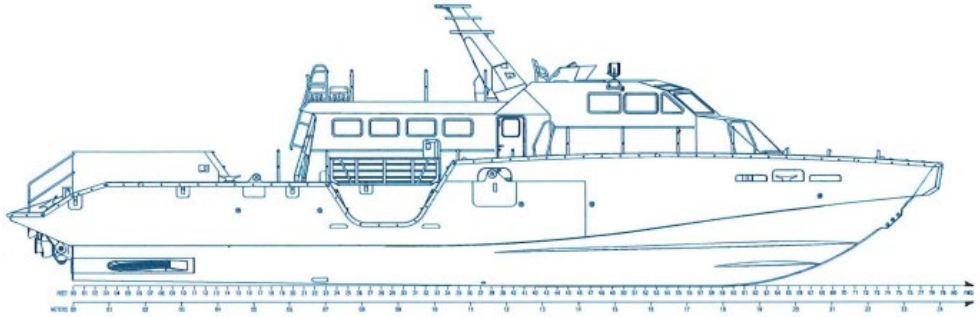
Potable Water	90,000 Gals.
Fuel	35,000 Gals.
Lube Oil	782 Gals.

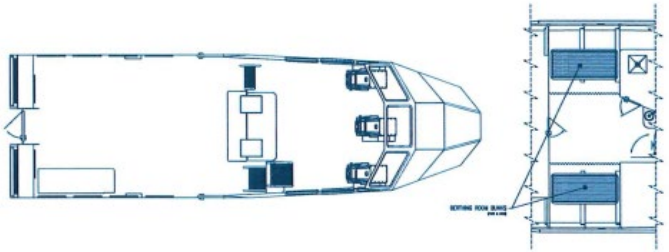
DELIVERY RATES

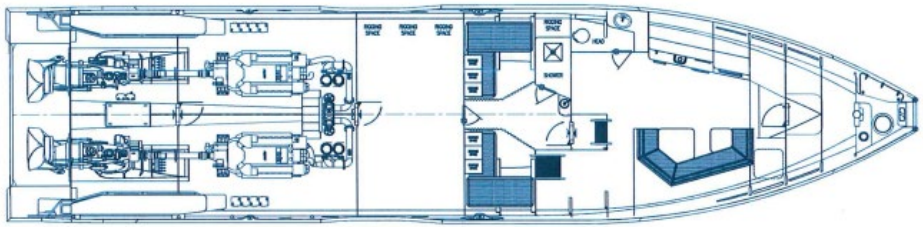
Fuel	450 GPM @ 100 Ft
Water	530 GPM @ 100 Ft.

MACHINERY

Main Engines	2 – GM V12-149
Max HP	1800
Speed	13 Knots
Fuel Burn	70 GPH Cruising 9 GPH Standby
Generators	2 – GM 6-71; 75 KW
Bow Thruster	Tunnel - 325 HP
Dynamic Positioning	Bier - IVCS 2000 DP1







Built 2018
$8M build cost
85’ x 21’ x 6’
Cruise 28 kts
Sprint 40 kts
Berthing for 10 persons
Max 24 persons
Pilot house 5 persons
Work space 10 persons
Aft deck 20’x20’
Payload 7,000#

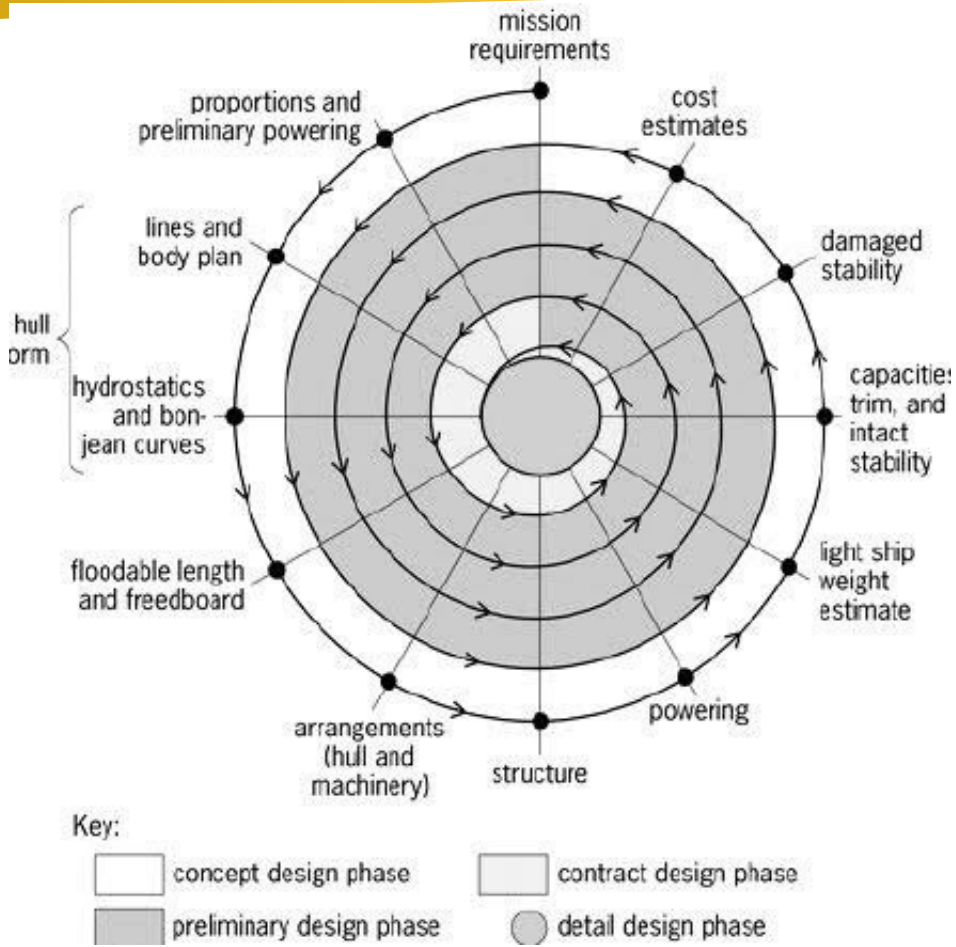

SRVx SAND TIGER
R-8501


34-52 Dive

Manage Risk - Minimize Regrets

Need an effective tool for:

New designs
Enhanced designs
Major reconfigurations
Cost control
Mission focus



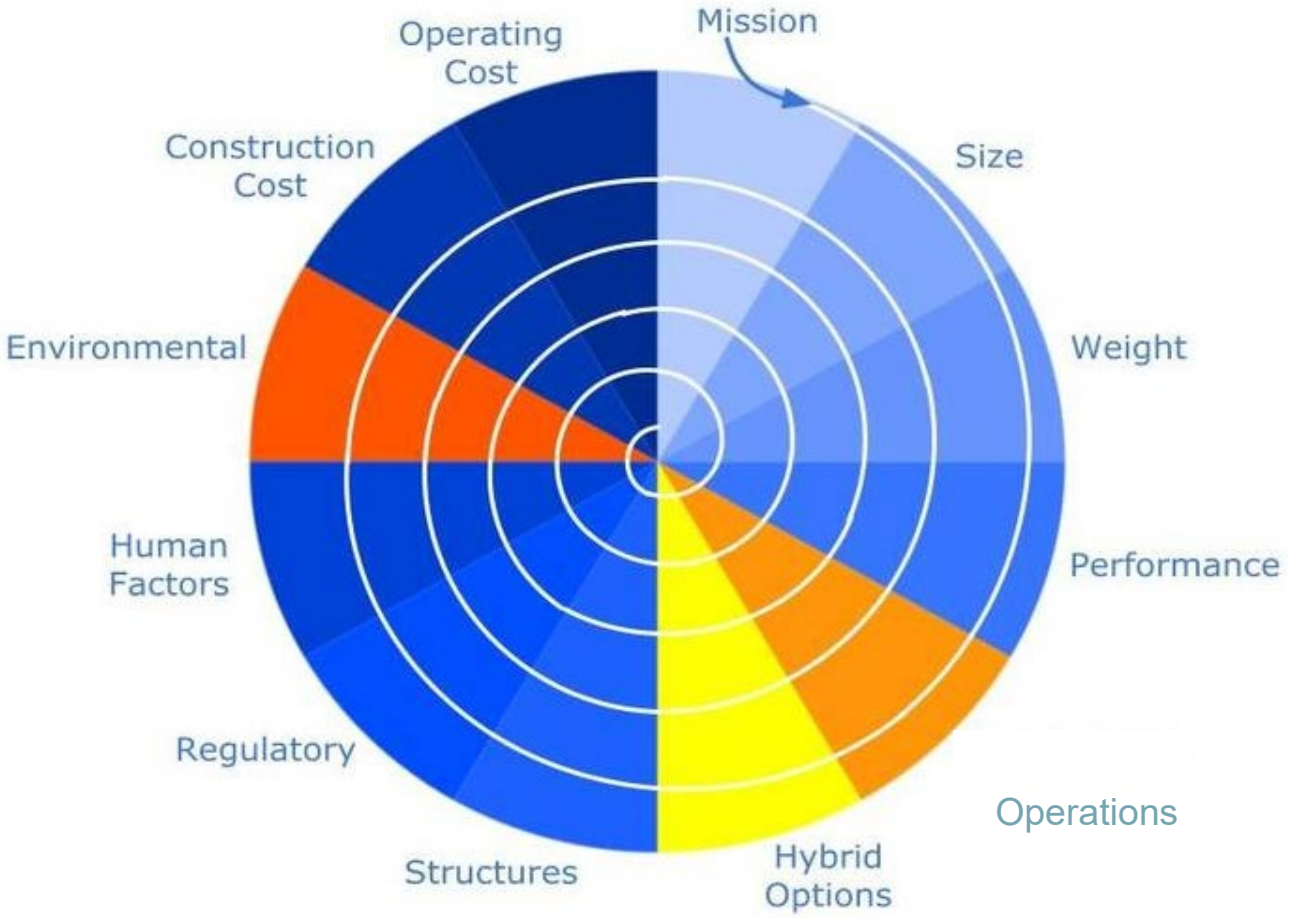
Concept

Design

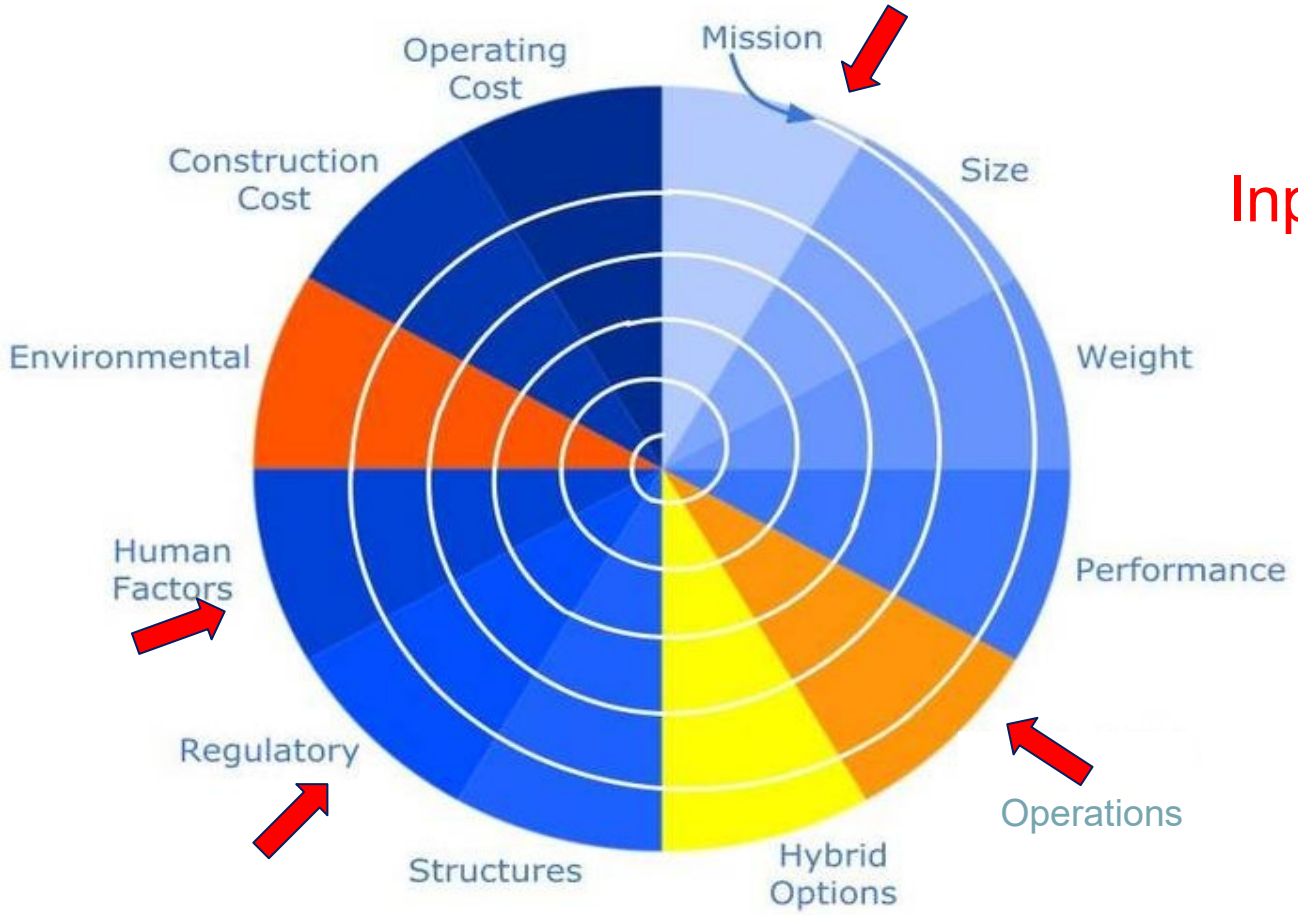
Detail

Contract

1959


Mission
Size
Weight
Performance
Operations
Hybrid Options
Structures
Regulatory
Human Factors
Environmental
Construction Cost
Operating Cost

2020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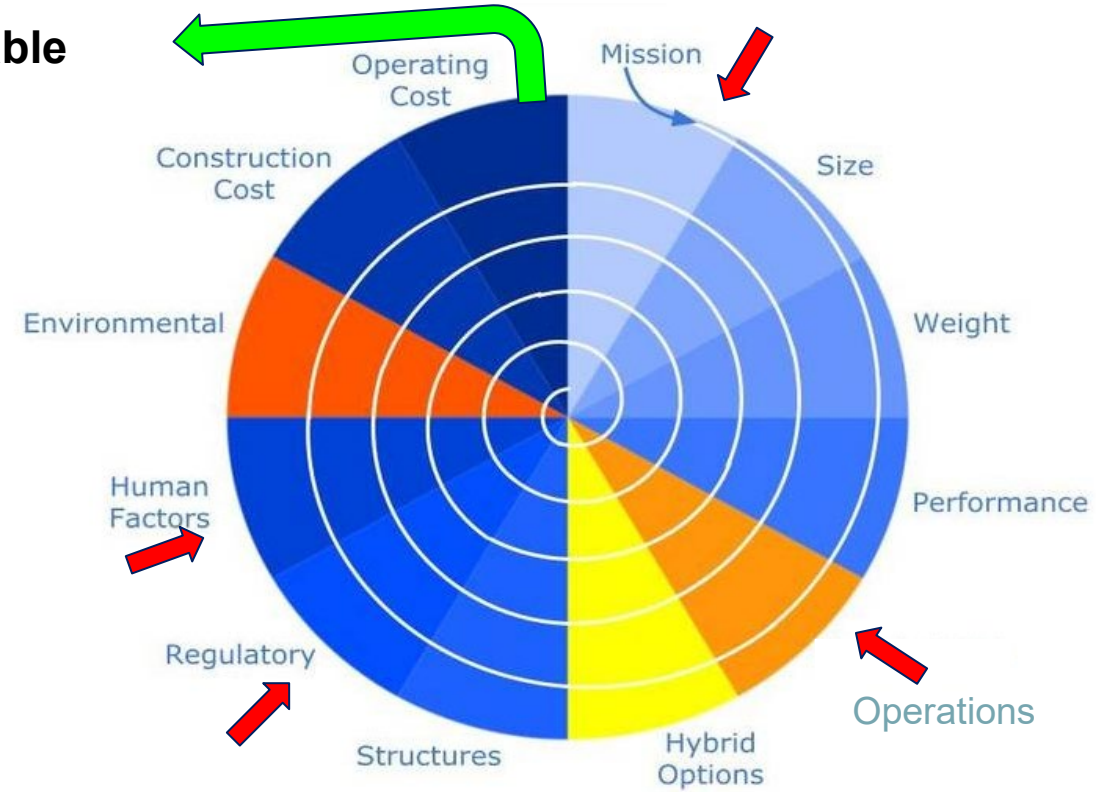
Inputs

Effective Use of the Design Spiral

- Maintain process discipline
- Allow the process to define what is possible
- Don’t mix *Mission* and *Operations* Requirements
- Require focus groups to prioritize requirements
- Validate requirements by frequency, duration, potential
- Avoid tunnel vision when considering a “replacement”
- Cost considerations are not concept phase inputs

Case Study - GLERL Concept Plan

Comparable Existing Vessels

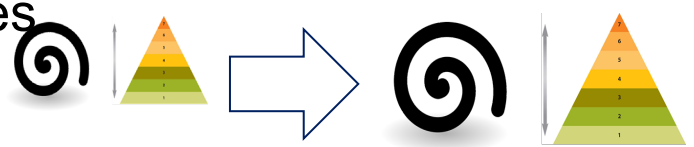


Mission Requirements

Priorities

1. **Current** NOAA GL Projects (GLERL, ONMS, NCCOS, OCS)
   - Ecosystem Sampling
   - Site Exploration
   - Deployment of Observing Platforms

2. **Known** proposed projects - emerging issues
   - Mapping - Hydrography and Benthic
   - Winter Ops

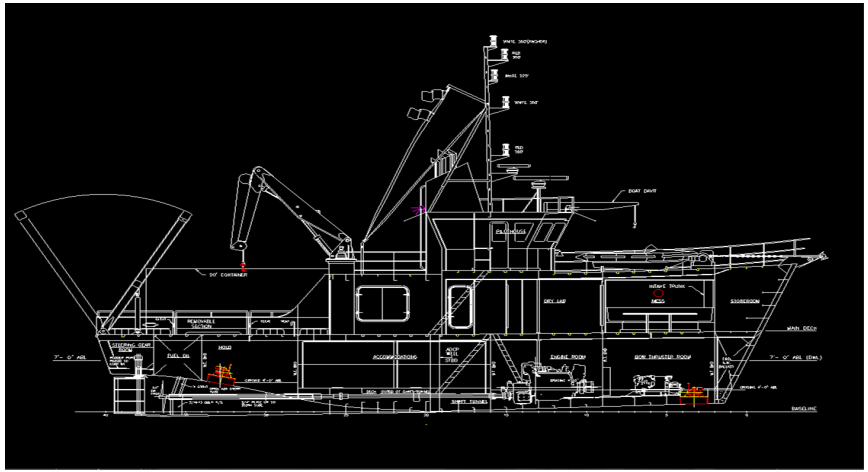


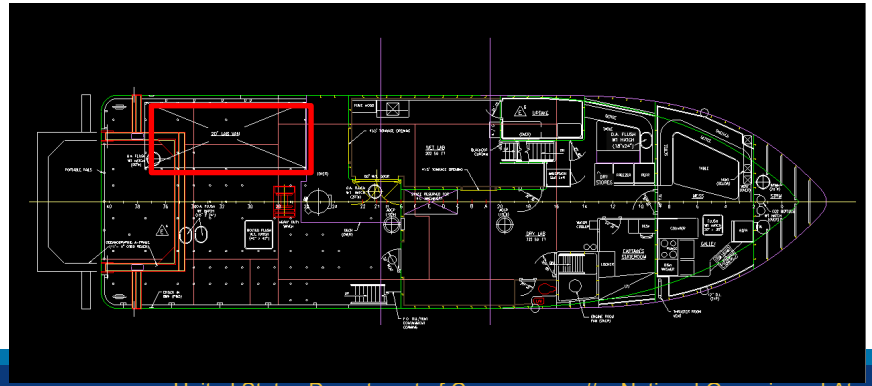
3. **Past** 20 year projects – all platforms

4. **Peer** projects – other coastal activities

Requirements are converted to space, weight and hardware detail.
Resulting displacement defines vessel size and propulsion

Mission - Concept Characteristics



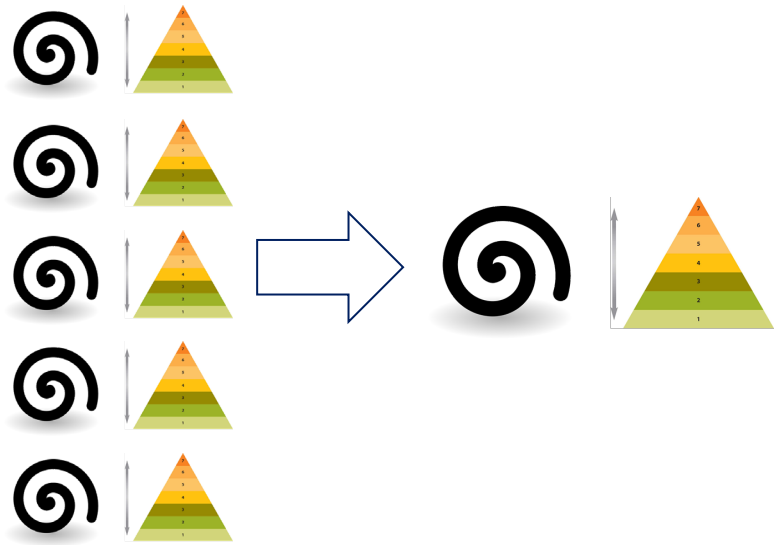


- Great Lakes SRV – Mission Capabilities
  - Dry lab
  - Wet lab
  - Lab trailers
    - Dive support
    - Lab
    - ROV AUV support
    - Winter ops
  - Working deck – 20T mission load
  - 10,000# stern A-frame
  - 10,000# Deck crane
  - 5,000# J-Frame
  - 3- Conductive cable winches
  - Double trawl winches
  - Dynamic positioning
  - Speed control to 2kts
  - Transducer well / daggerboard
  - Transom diver platform
  - Telepresence

Operational Requirements

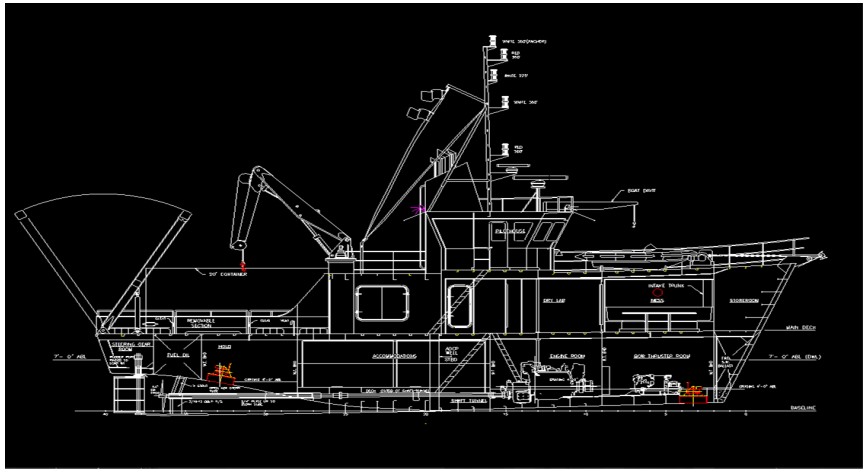
Priorities

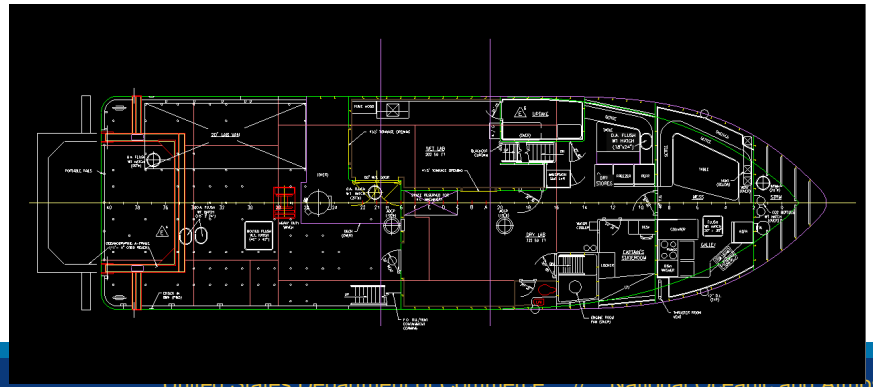
1. Ports of call - draft and length limitations
2. Competitive cost structure
3. License and manning requirements
4. Net zero emissions, Green options
5. Berthing, galley, QWL elements



Requirements refine hull design, propulsion and general arrangement.

Operations - Concept Characteristics





- Great Lakes SRV – Concept Characteristics
  - GRT <200
  - LOA 95’
  - B 28’
  - D 10’
  - Cruise 12k
  - Berthing 16 (8 doubles)
  - Twin screw
  - BioDiesel-Electric Propulsion 1500 Hp
  - Bow / Stern Thrusters
  - Dynamic positioning
  - Aft ballast tanks – mission load
  - Rated for GL winter navigation - “Nov- April with support”

Regulatory Requirements

Priorities

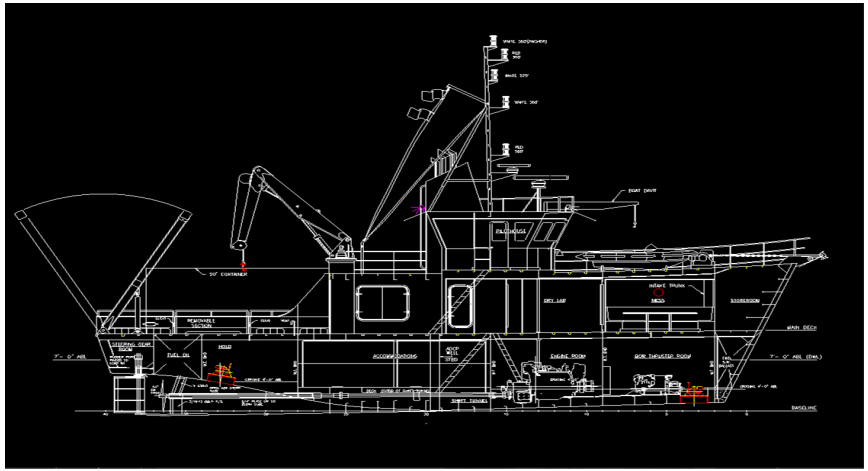
1. NOAA 109-125
2. 46 CFR Subchapter T - Small Passenger Vessel
3. 46 CFR Subchapter U - Oceanographic Research Vessel
3. 46 CFR Subchapter C - Uninspected Vessel
4. 46 CFR Subchapter S - Stability - GL Winter service
5. Public vessel exemption

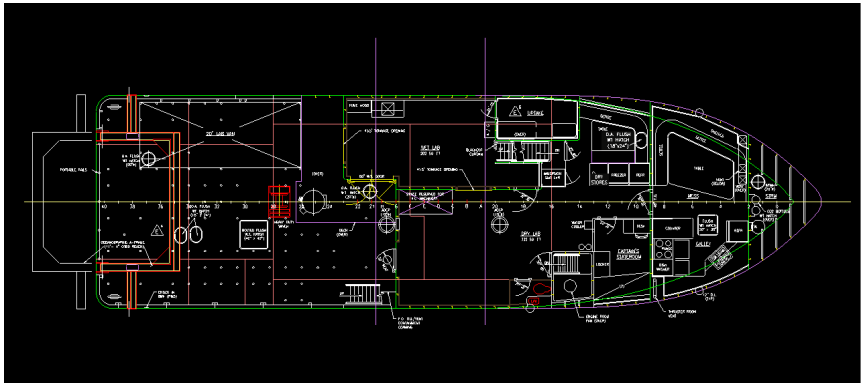
Comparables

1. Concept requirements converted to a CAD design
2. CAD design evaluated against US research fleet
3. Identify comparables
4. Cost, capability and reality check

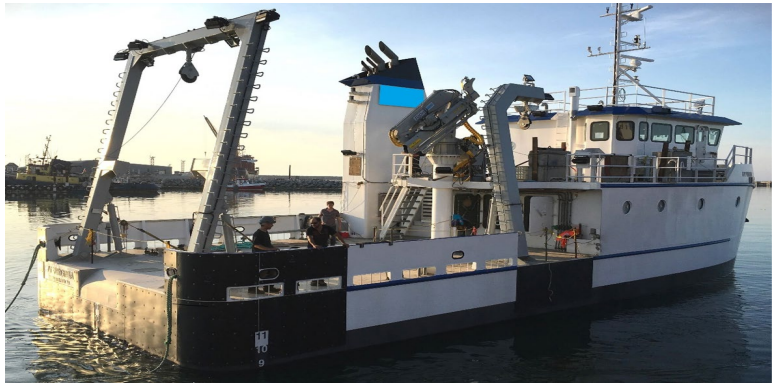
	Comparables					
	GL SRV	Laurentian	Manta	Walton Smith	Connecticut	Virginia
GRT	<200	120	77	326	139	153
LOA	95	80	83	96	90	93
Beam	28	21	30	40	26	28
Draft	10	9	4	7	8.5	10
Cruise Speedkts	12	10	25	10	10	12
Speed Control kts	2	2	5	2	1	2kts
Endurance days	14	10	5		14	
Thrusters	2	No	No	2	2	1
Dynamic Positioining	Yes	No	No	No	Yes	yes
Twin screw	Yes	no	Yes	Yes	No	No
Mission Load	20T	2T	1T	1T	12T	20T
Propulsion	D/E Hybrid	Diesel CPP	Diesel WJ	Diesel CPP	Diesel	Diesel coupled
Berthing	16	10	14	19	18	14
Dry lab	250	50	250	19	200	200
Wet Lab	250	150	250	19	200	250
Deck Space	1000	300	575	700	950	900
Trailers mount	8x20	No	No	No	Yes	Yes
Stern A frame	10,000#	4,000#	4,500	6000#	16,000#	10,000#
Deck Crane	10,000#	2,000#	1000#	1000#	9,700	10,000#
J -Frame	5,000#	1,000#	no	1,000#	2,000	5,000#
Conductive winches	3	2	2	3	2	2
Trawl winch	2	1	1	2	2	2
Winter Nav rating*	Yes	No	No	No	Yes*	No
Moon pool	24"	No	24"	24"	20"	24"
Transducer well / fin	24"	16"	Swing arm	24"	Well	Well
MBES	2040 Dual	No	yes	No	Yes	Yes
SSS	Yes	No	yes	Yes	yes	yes
POSMV	Yes	No*	yes	No	yes	yes
Ferry Box	Yes	No	Yes	Yes	Yes	Yes
Year Built		1974	2008	2020	1998/2017	2019
Construction Cost	$10-12M		$8M	$13M	$9/2.5M	$10M

Concept Design



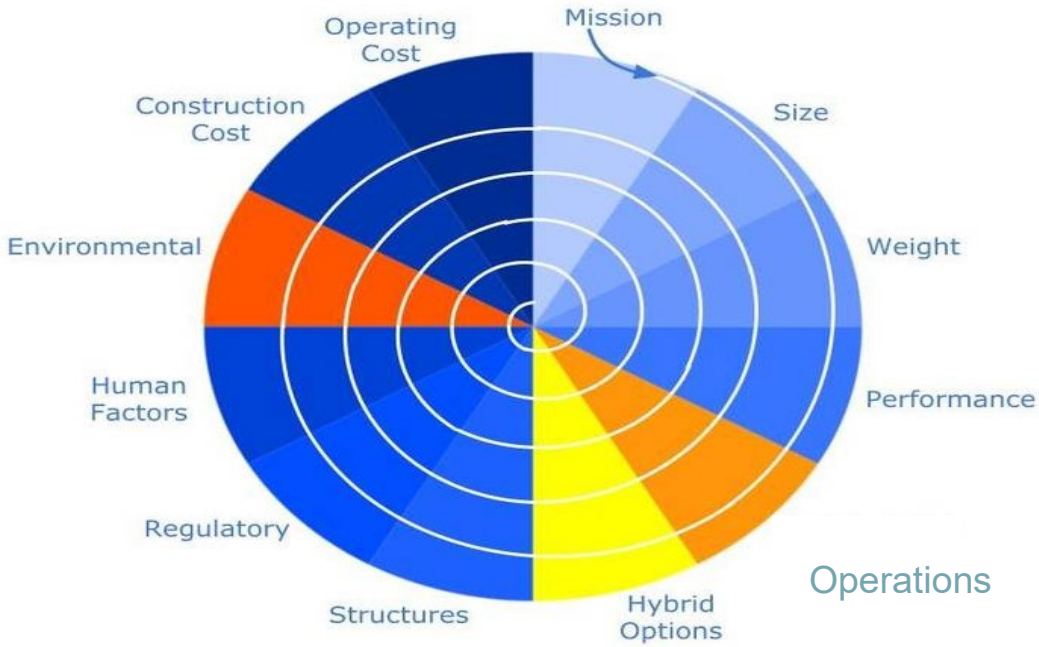


Comparable



New Vessel Strategies

- **Keel Up Design**
- **New Build**
- **Repurposed**
- **Acquired**



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