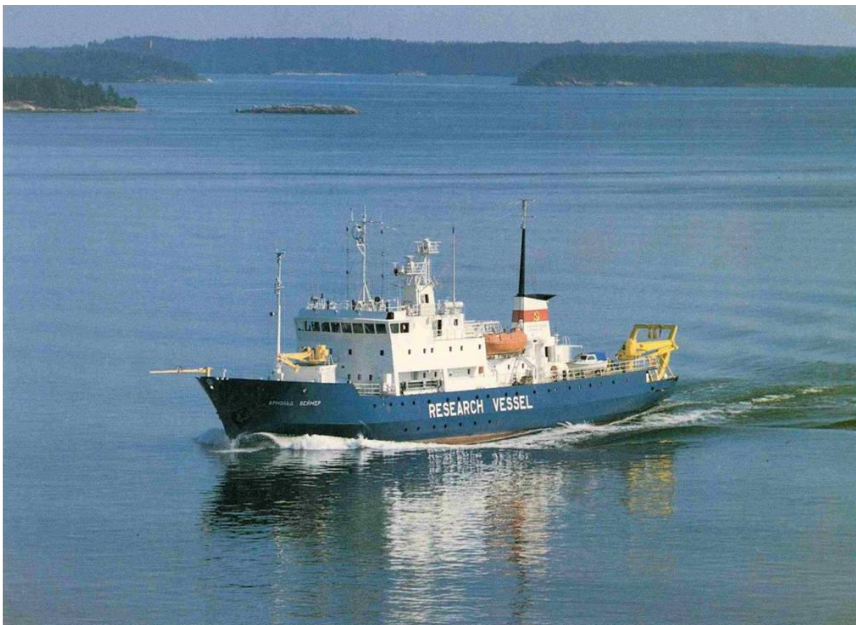


Management of a research vessel – the case of a small institute in a small country

Urmas Lips
Tallinn University of Technology

29.11.2022





Research vessels in Estonia



Salme

- Built in 1974
- Owned by TalTech since 2006
- Reconstructed in 2009
- GRT – 223 t
- Length – 31 m
- Draught – 2.5 m
- Area – Baltic Sea
- Crew up to 6
- Scientists up to 12
- 2 labs + seminar room
- Equipment: crane, cable winch, winches, A-frame etc.

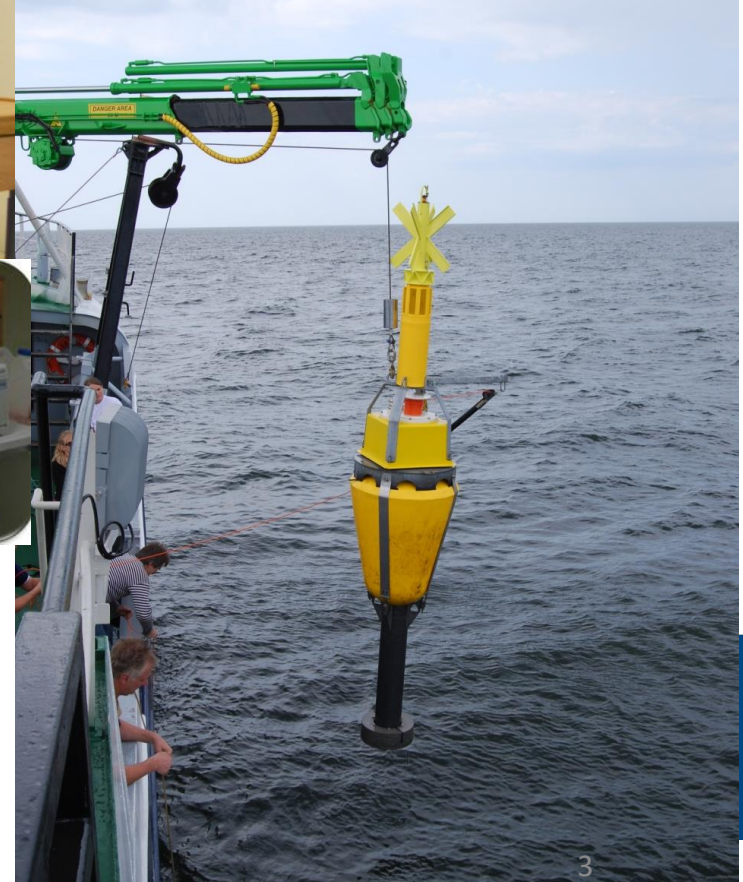
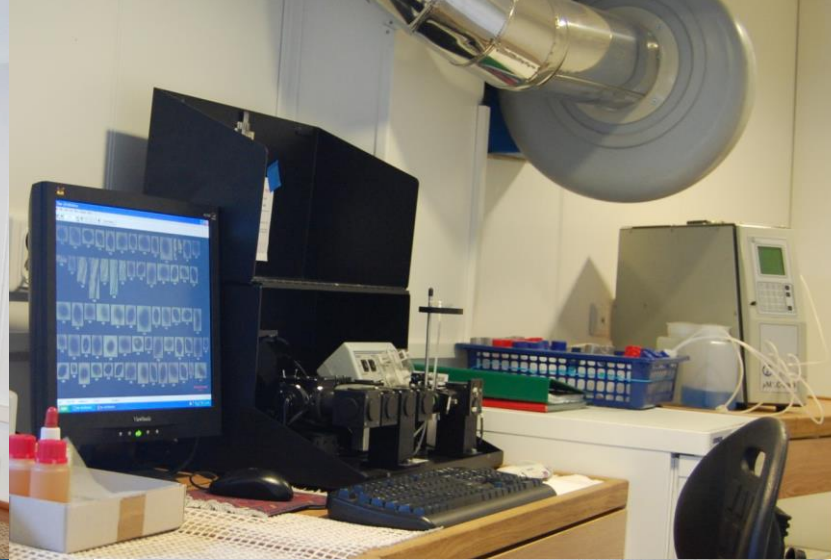
- Main governmental task – conducting offshore monitoring (a part of the national environmental monitoring program)
- Last refit conducted in 2019 (intermediate docking in 2021)
- Seaworthiness certificate valid until 07.08.2024
- Several options under discussion regarding a future RV in Estonia



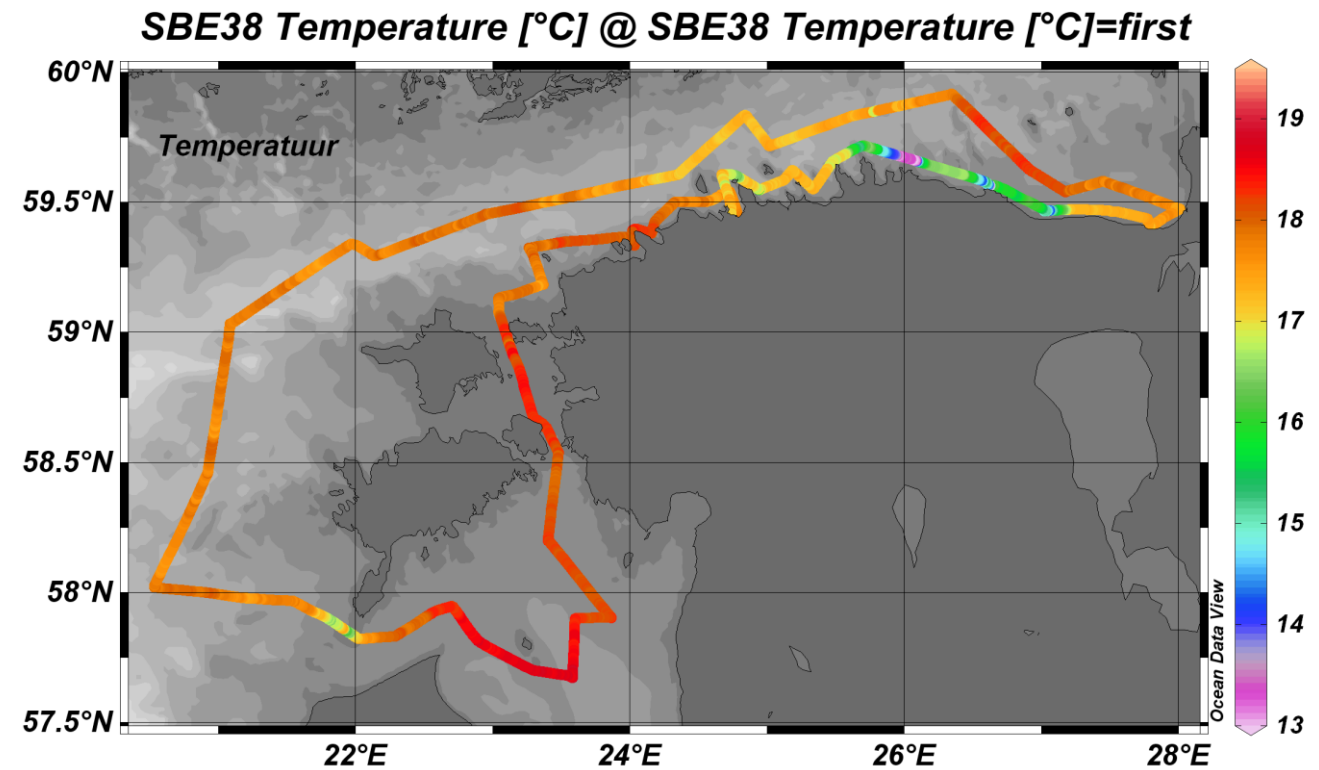
Former research vessels in Estonia in the 1970s – 1990s

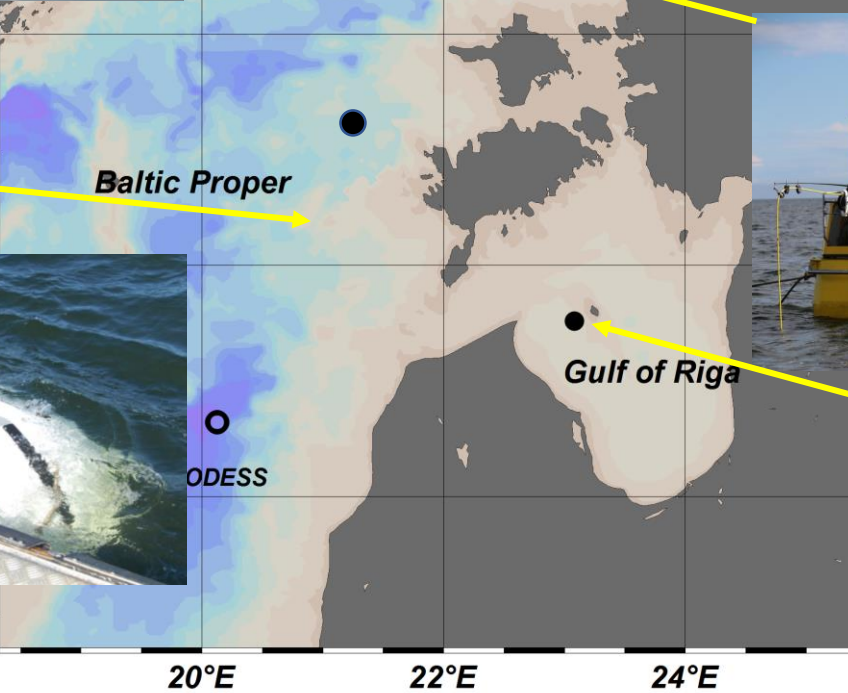
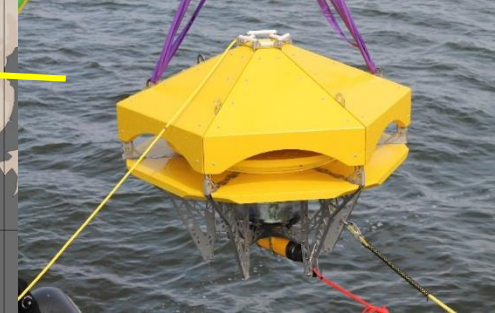


Scientific equipment and laboratories



Delivery of data in near real time





Days at sea and budget

Marine research and monitoring activities

- National monitoring program ca 30 days
- Research projects ca 15-20 days
- Applied tasks for authorities and companies ca 10-20 days
- International contracts (mostly Latvian monitoring) ca 15-25 days

Budget

- In practice, the vessel has been at sea from 70 to 115 days a year (max was in 2014)
- Budget ca 350 000 EUR per year
- If more than 90 days at sea, the budget is larger, up to 400 000 EUR per year; if less, some part has to be paid from the budget (Department, University)
- Expenses are covered mostly from the projects (part of TalTech budget)
- Responsibility to secure funding mostly lies on one research group

Governmental support via project funding, e.g., project money was applied for the last refit from Environmental Investment Centre (up to 80% was covered), and monitoring tasks are agreed upon **via the public procurement process**



RV Salme survey schedule 2020

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
January	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
February	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon
March	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
April	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
May	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
June	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed
July	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
August	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon
September	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu
October	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat
November	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
December	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu

Survey type

MSI Basic Research

Other activity

Brake

RV Salme survey schedule 2022

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
January	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon
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March	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu
April	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
May	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
June	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
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November	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu
December	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat

SWOT analysis

The following ownership/management options were analysed:

- M1 – TalTech
- M2 – Estonian universities and marine research institutes
- M3 – Private company
- M4 – International consortium

The following financial schemes were analysed:

- F1 – Fully covered by the users
- F2 – Mixed financing scheme, where the expenses in the harbour are covered by the government and users pay for expenses at sea
- F3 – Fully covered from the state budget



SWOT analysis (Estonian universities)

Strengths	Weaknesses
• The ability to invest in a larger and more competitive research vessel than alone • Flexibility to use the research vessel to the maximum extent for the needs of Estonian universities/institutes by making joint decisions about the equipment to be purchased and installed on the vessel • Investments in new equipment and developments can be shared between members of the research vessel consortium • Sharing of claims or insurance deductibles between consortium members • Promotes cooperation between Estonian universities • Sharing skills and knowledge at the Estonian level • The optimal life of the research vessel and the balance of administrative costs • Estonia's stronger position on the international scientific scene through the achievement of common goals and a unified image	• In the case of large investment needs, excessively influenced by the budgetary resources of one country • Expensive maintenance and refit costs • Liability for damage claims or insurance deductibles in case of breakage of ship parts is the responsibility of the Estonian state only • Estonia does not have enough ship hours in total for the ship to be in use in sufficient volume • In the case of Estonia, the home port would be Tallinn. The response time to strategic points in the Baltic Sea is longer than for a regionally shared ship, making the possible purchase of ship hours unattractive and inconvenient for potential foreign customers. • Sharing of skills/knowledge limited to Estonia • Setting and achieving common regional goals is more difficult than in the case of an internationally divided ship • A lower probability of the ship's availability in unforeseen situations in case of sudden need, but still sufficient within the borders of Estonia • More administration activities • More compromises in design activities, more complex process

SWOT analysis (Estonian universities)

Opportunities	Threats
• To balance the budget of the research vessel through the sale of free ship-hours to foreign countries • Organize joint practice lessons for students • Strengthen Estonia's reputation as a country that pays great attention to marine research • Can design and buy a ship that fits ideal for Estonian needs • To attract more foreign doctoral students to Estonia • Better coordinate activities related to maritime surveillance in Estonia, create a cooperation model • To establish a center of excellence for Baltic Sea marine monitoring research	• Due to the longer location-based response time, in the event of an accident or technical failure, the risk of losing data or, in worse cases, devices • People in the same fields risk doing the same investigations in different places and not sharing data • Some important cooperation project or opportunity may be missed abroad • In the event of a serious ship breakdown and a simultaneous lack of funds, the risk that the ship will be stopped for a longer period of time and endangers the achievement of research objectives or the money obtained from the sale of ship hours • In the event that other Baltic Sea countries decide to acquire a research vessel separately from Estonia, because Estonia has one, the Estonian state isolates itself from cooperation projects of other countries



SWOT analysis (mixed financing)

Strengths	Weaknesses
• The ideas are realized because the current costs fit within the groups' operating costs • State tasks are completed without problems (moderate additional costs for non-participants) • The crew's salary is insured • More accurate pricing due to fuel price fluctuations	• Presupposes the organization of a competition for the duration of the use of the vessel • Does not motivate the ship's crew to work hard/maintain the ship, as fixed costs are covered - the owner needs to implement performance metrics
Opportunities	Threats
• A higher proportion of ship hours and priority order in booking for the bearer of fixed costs • When selling ship hours out of the circle of shareholders, reduces the share of fixed costs through the requirement of 100% of total costs.	• No risks were identified for this funding scheme



SWOT analysis (SUMMARY)

	M1 TalTech		M2 Estonian universities		M3 Private company		M4 Baltic Sea consortium	
F1 Users	Risks	-4	Risks	-2	Risks	+5	Risks	0
	Procurement	-5	Procurement	-3	Procurement	0	Procurement	+5
	Administration	+2	Administration	0	Administration	+4	Administration	+4
	Research range	0	Research range	+2	Research range	0	Research range	+5
	National objectives	+2	National objectives	+5	National objectives	0	National objectives	+2
	Eurofleets/TNA	0	Eurofleets/TNA	+2	Eurofleets/TNA	-3	Eurofleets/TNA	+5
	Total Score	-0.83	Total Score	+0.67	Total Score	+1.00	Total Score	+3.50
F2 Mixed	Risks	-4	Risks	-3	Risks	+4	Risks	+1
	Procurement	-5	Procurement	-3	Procurement	0	Procurement	+5
	Administration	+3	Administration	+1	Administration	+4	Administration	+4
	Research range	0	Research range	+2	Research range	+1	Research range	+5
	National objectives	+2	National objectives	+5	National objectives	+1	National objectives	+3
	Eurofleets/TNA	0	Eurofleets/TNA	+2	Eurofleets/TNA	-3	Eurofleets/TNA	+5
	Total Score	-0.67	Total Score	+0.67	Total Score	+1.17	Total Score	+3.83
F3 Government	Risks	-5	Risks	-4	Risks	+5	Risks	0
	Procurement	-5	Procurement	-3	Procurement	0	Procurement	+5
	Administration	+4	Administration	+2	Administration	+5	Administration	+4
	Research range	0	Research range	+3	Research range	+3	Research range	+5
	National objectives	+2	National objectives	+5	National objectives	+3	National objectives	+2
	Eurofleets/TNA	0	Eurofleets/TNA	+2	Eurofleets/TNA	0	Eurofleets/TNA	+5
	Total Score	-0.67	Total Score	+0.87	Total Score	+2.67	Total Score	+3.50

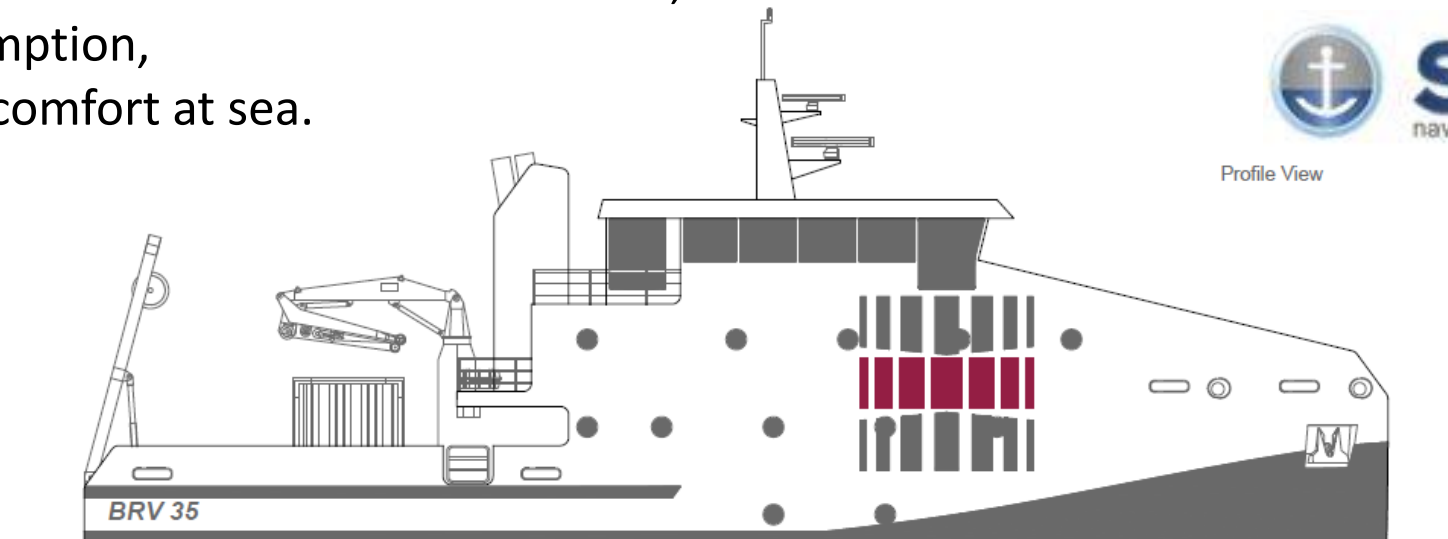
SWOT analysis (SUMMARY)

	M1 TalTech		M2 Estonian universities		M3 Private company		M4 Baltic Sea consortium	
F1 Users	Risks	-4	Risks	-2	Risks	+5	Risks	0
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	Administration	+2	Administration	0	Administration	+4	Administration	+4
	Research range	0	Research range	+2	Research range	0	Research range	+5
	National objectives	+2	National objectives	+5	National objectives	0	National objectives	+2
	Eurofleets/TNA	0	Eurofleets/TNA	+2	Eurofleets/TNA	-3	Eurofleets/TNA	+5
	Total Score	-0.83	Total Score	+0.67	Total Score	+1.00	Total Score	+3.50
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	Procurement	-5	Procurement	-3	Procurement	0	Procurement	+5
	Administration	+3	Administration	+1	Administration	+4	Administration	+4
	Research range	0	Research range	+2	Research range	+1	Research range	+5
	National objectives	+2	National objectives	+5	National objectives	+1	National objectives	+3
	Eurofleets/TNA	0	Eurofleets/TNA	+2	Eurofleets/TNA	-3	Eurofleets/TNA	+5
	Total Score	-0.67	Total Score	+0.67	Total Score	+1.17	Total Score	+3.83
F3 Government	Risks	-5	Risks	-4	Risks	+5	Risks	0
	Procurement	-5	Procurement	-3	Procurement	0	Procurement	+5
	Administration	+4	Administration	+2	Administration	+5	Administration	+4
	Research range	0	Research range	+3	Research range	+3	Research range	+5
	National objectives	+2	National objectives	+5	National objectives	+3	National objectives	+2
	Eurofleets/TNA	0	Eurofleets/TNA	+2	Eurofleets/TNA	0	Eurofleets/TNA	+5
	Total Score	-0.67	Total Score	+0.87	Total Score	+2.67	Total Score	+3.50

New Baltic Sea Research Vessel (designed within the Eurofleets2 project)

The intended operation area for this 35 m monohull vessel is the Baltic Sea, including the shallow coastal areas. The vessel is adapted to the use by oceanographic institutes, agencies, Universities, and the design is defined by:

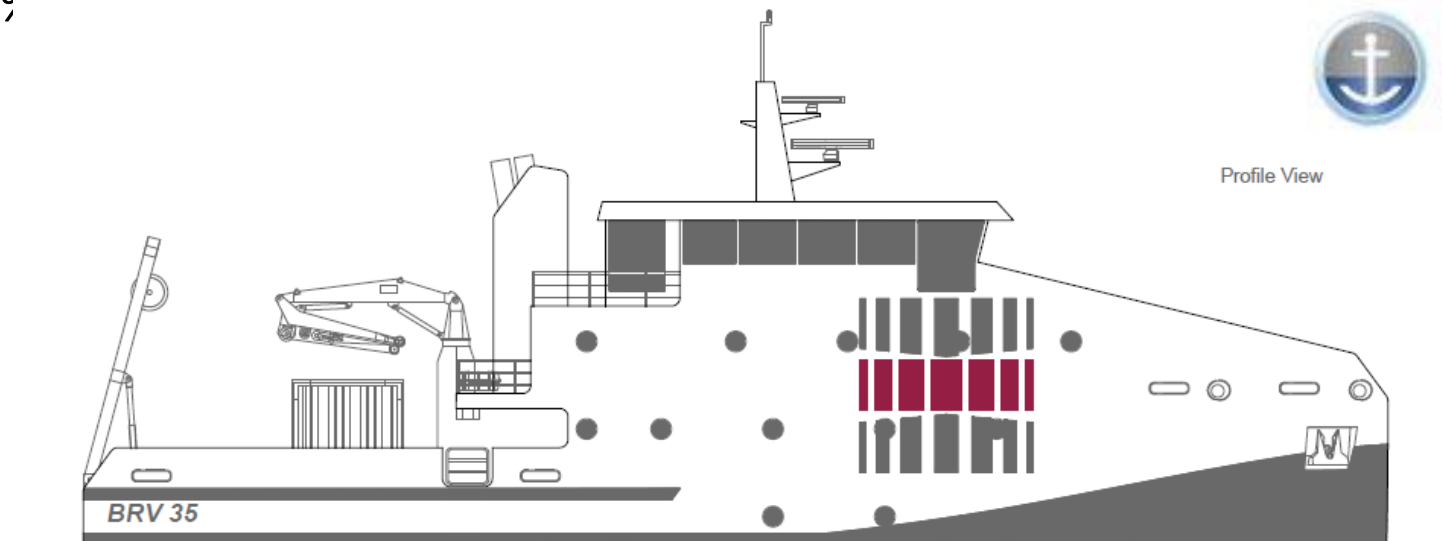
- flexibility for various missions,
- good integration of latest technologies,
- very good sea keeping and good manoeuvrability,
- robust and low-maintenance construction,
- low consumption,
- very good comfort at sea.



Requirements for BRV35

The vessel has to be able to conduct multi-disciplinary research. A scenario of usage of the vessel could be specified as follows:

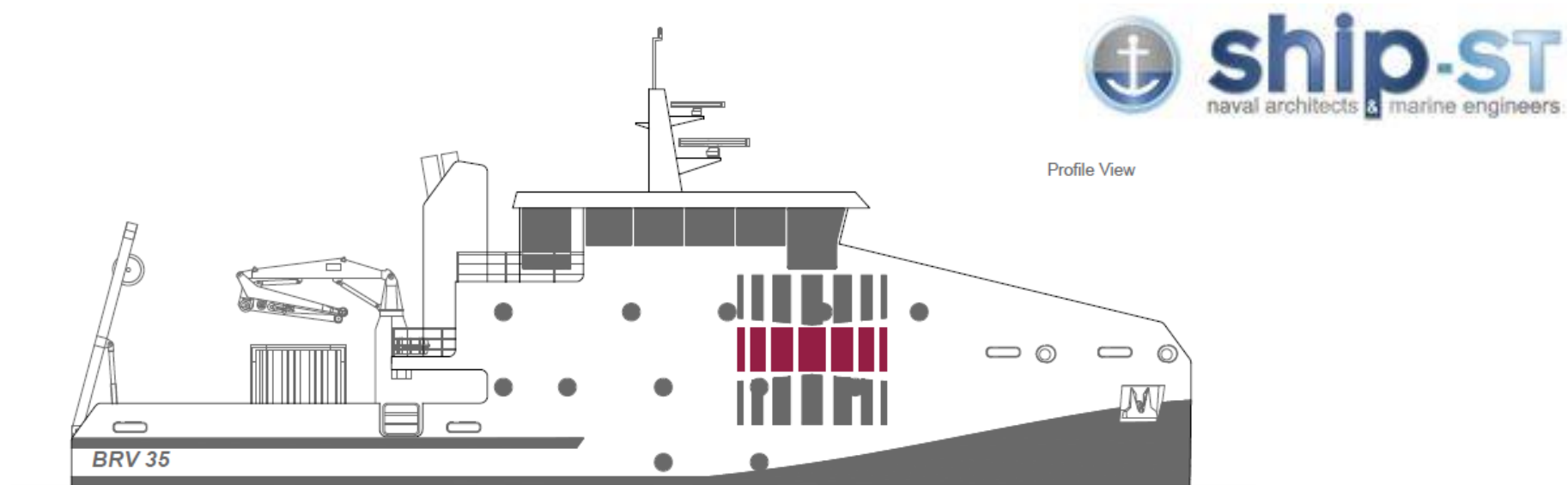
- Offshore and coastal hydrography and oceanographic missions (including environmental monitoring) – 40% of time,
- Biological surveys (including bird watching) – 5%,
- Geological surveys – 10%,
- Operating submarine systems – 5%,
- Service of buoys and other systems in off-shore areas – 5%,
- Transit – 10%,
- Harbours – 25%



Main parameters of BRV35

The vessel is designed for autonomy of 12 days at sea (1200 nautical miles at speed 10 knots). The main particulars are:

- Length overall - 35.0 m
- Length between perpendiculars - 32.2 m
- Beam overall - 8.2 m
- Design draught - 2.50 m
- Depth at main deck - 4.00 m
- Design speed - 12 knots

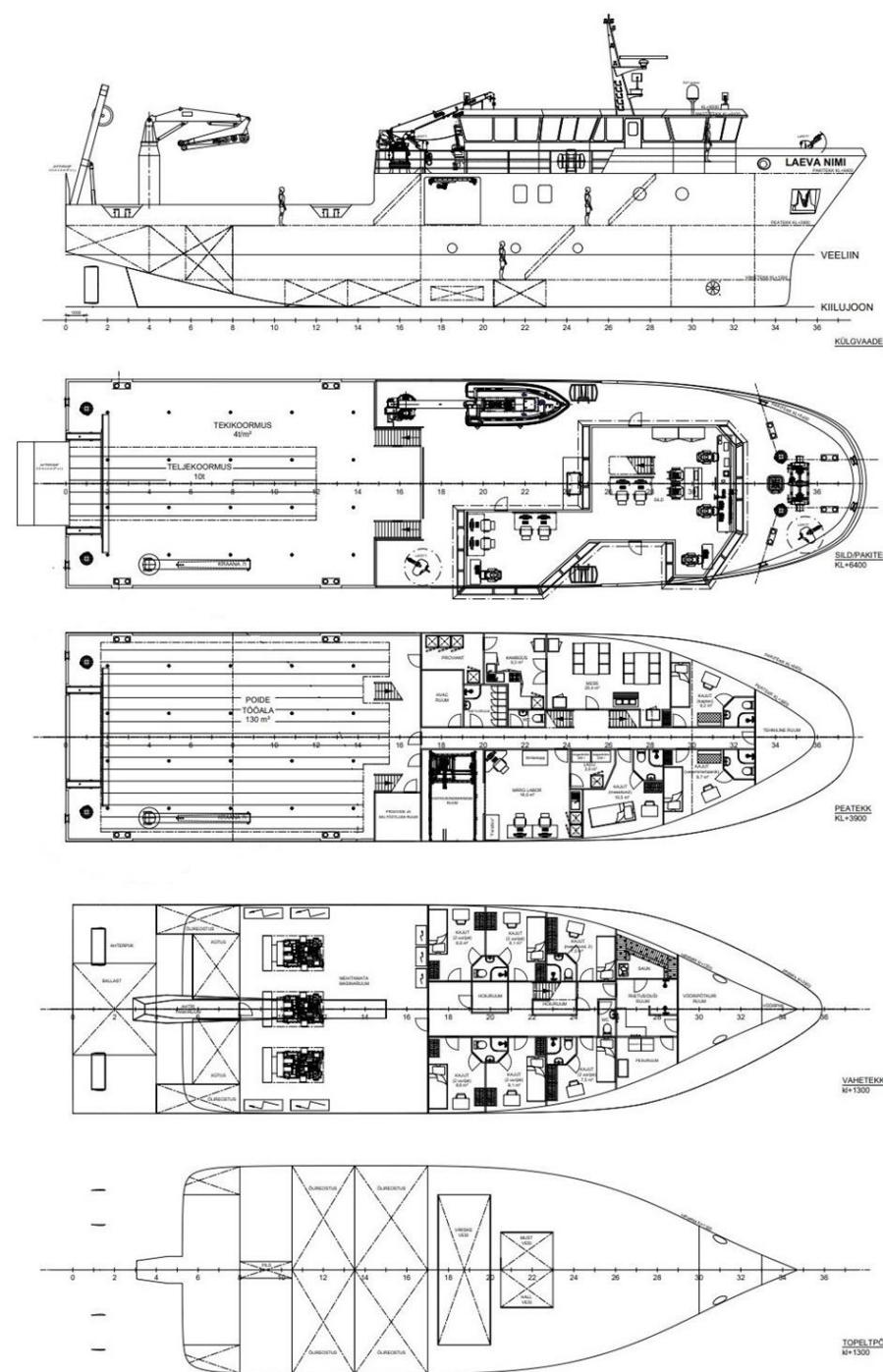


New multi-purpose vessel

Tasks:

- Deployment of navigational buoys
- Research and monitoring
- Rescue operations (oil and HNS)

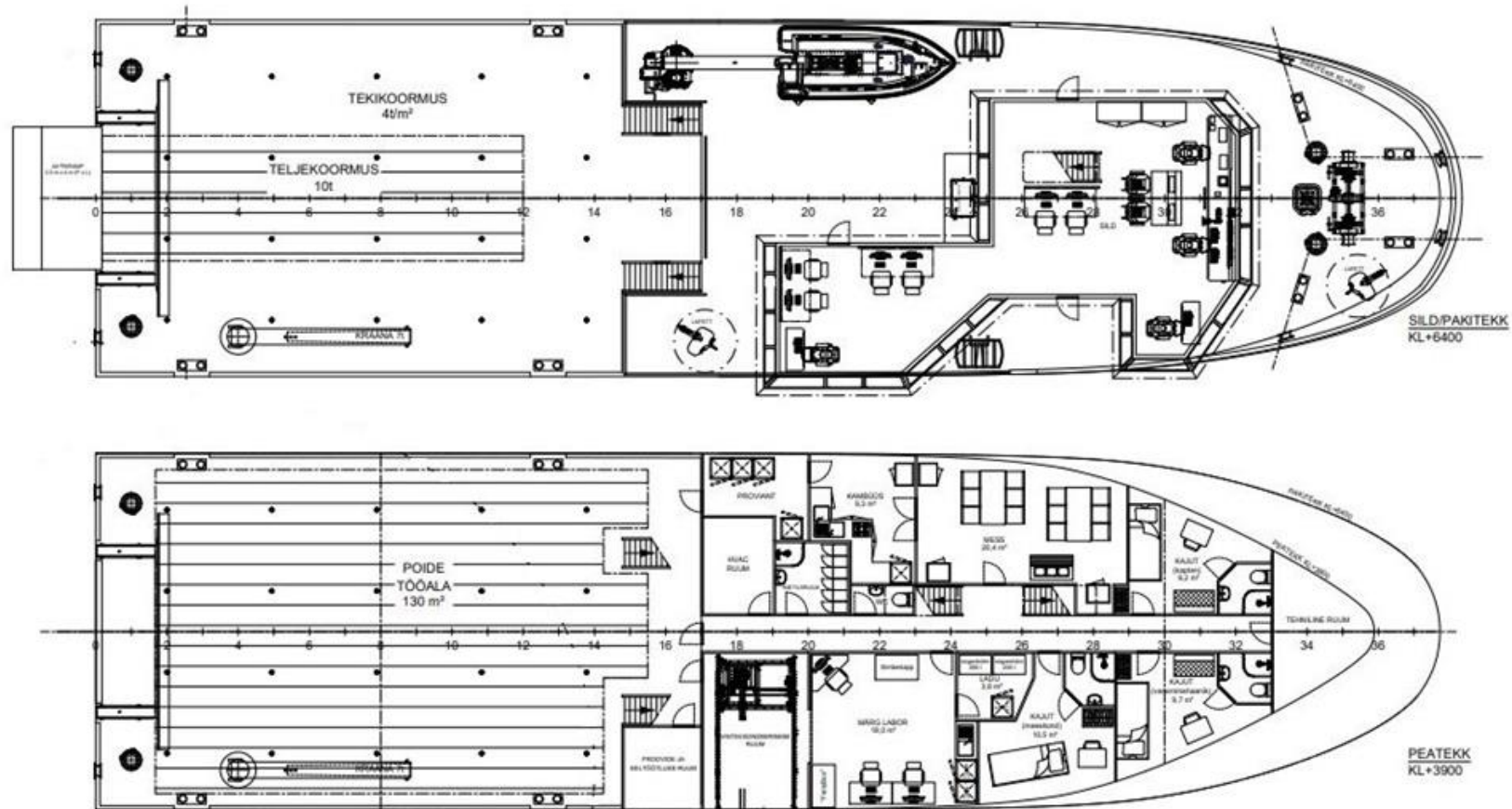
It is in the budget plan, but final decision not made yet



New multi-purpose vessel - requirements

Research requirements (agreed what could be included considering all other tasks):

- 90 days at sea
- Laboratory space 45-50 m², one lab inside the vessel, one as a container
- Number of researchers 8
- RIB
- Sonar
- Winches (including cable)
- Room for rosette/water sampling
- A-frame for towed instruments
- Dynamical positioning
- Endurance 10 days
- Area – Baltic Sea



Future options

The preferred ownership/management option is M4 – International consortium. Challenges and questions to consider:

- Consortium of Baltic Sea institutes (flag?)
- Consortium of Baltic Sea research vessel operators with their vessels of different sizes, capabilities, etc

It is not financially feasible to build a research vessel for Estonian use only (100-120 days at sea is too low number)

National fleet

- A multi-purpose vessel will be part of national fleet
- Vessels/boats available depending on the task
- Coordination (scheduling system) has to be agreed

Questions?

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