

Modern Icebreaking Research Vessels

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1. Introduction and background

- Constant need of polar research vessels (PRVs)
 - ◆ Understanding the complex phenomenon which appear on our planet is predominant
 - Constant development of fields related to polar research vessels (PRV's) is present
 - ◆ Awareness of global climate change
 - ◆ Technologies
 - ◆ Marine science & ship technology
 - ◆ Regulation
- Possible to conduct research in new areas, new ways with more effective vessel concepts



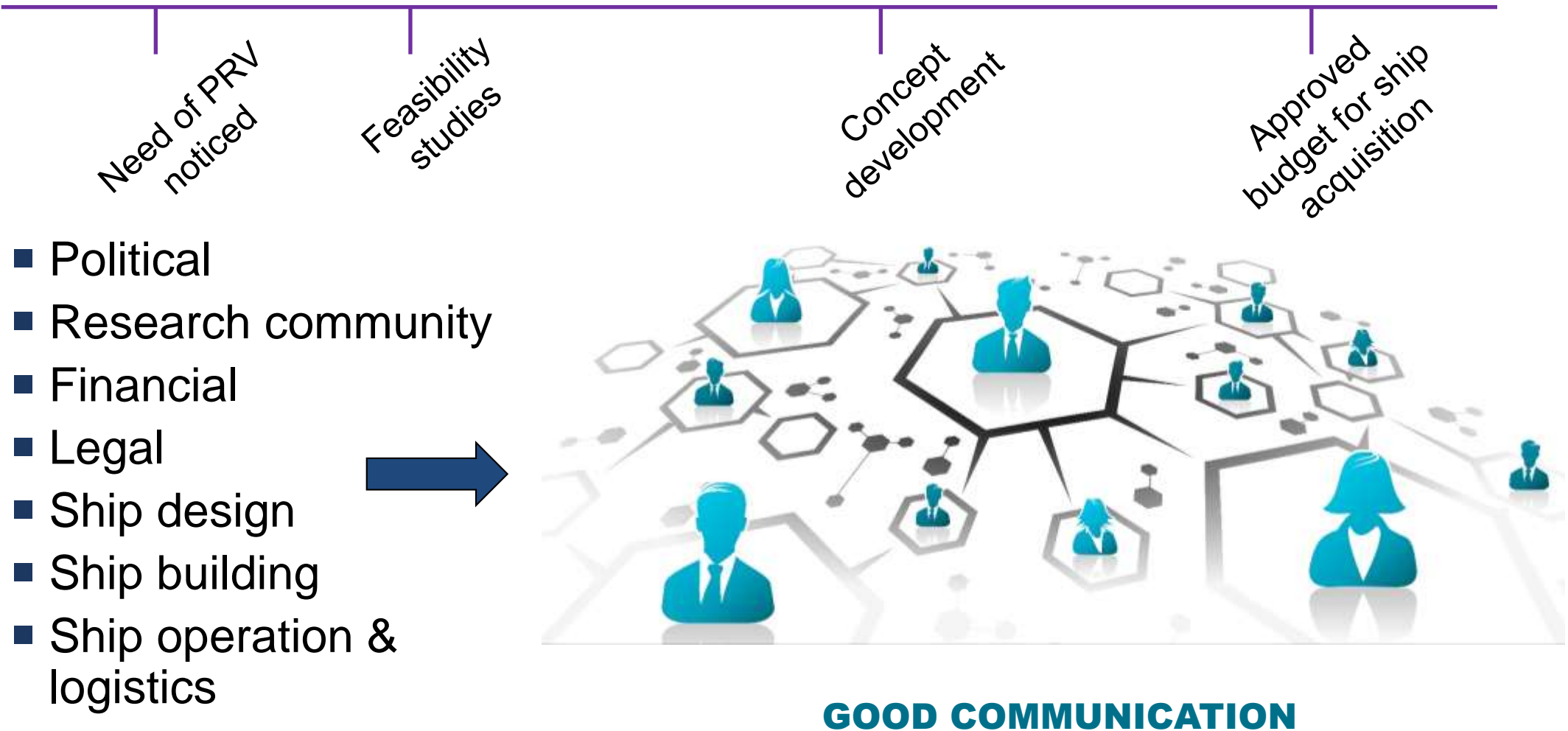
1. Introduction and background

- Combination of
 - ◆ Enthusiastic scientists
 - ◆ Green values
 - ◆ Governmental and international laws
 - ◆ Tens of stakeholders

→ Complex procurement process of prototype PRVs



2. Initial phase in the acquisition process



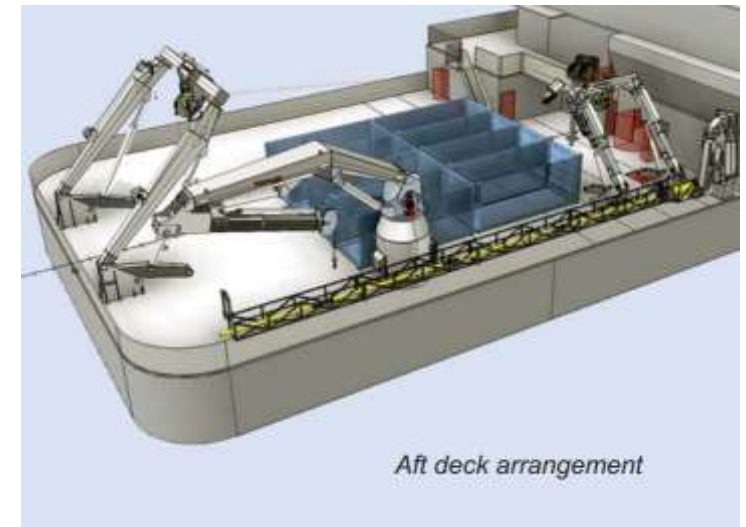
2. Important in the early phase of the project

- Understanding of the price effect of the wish list
 - ◆ No surprises in the budget
 - ◆ Project can proceed within schedule
 - Understanding of conflicting performance requirements and their effect on the ship design
- Reasonable and balanced targets help the project to proceed in schedule and within budget.
- Intended research performance and operational areas are achieved

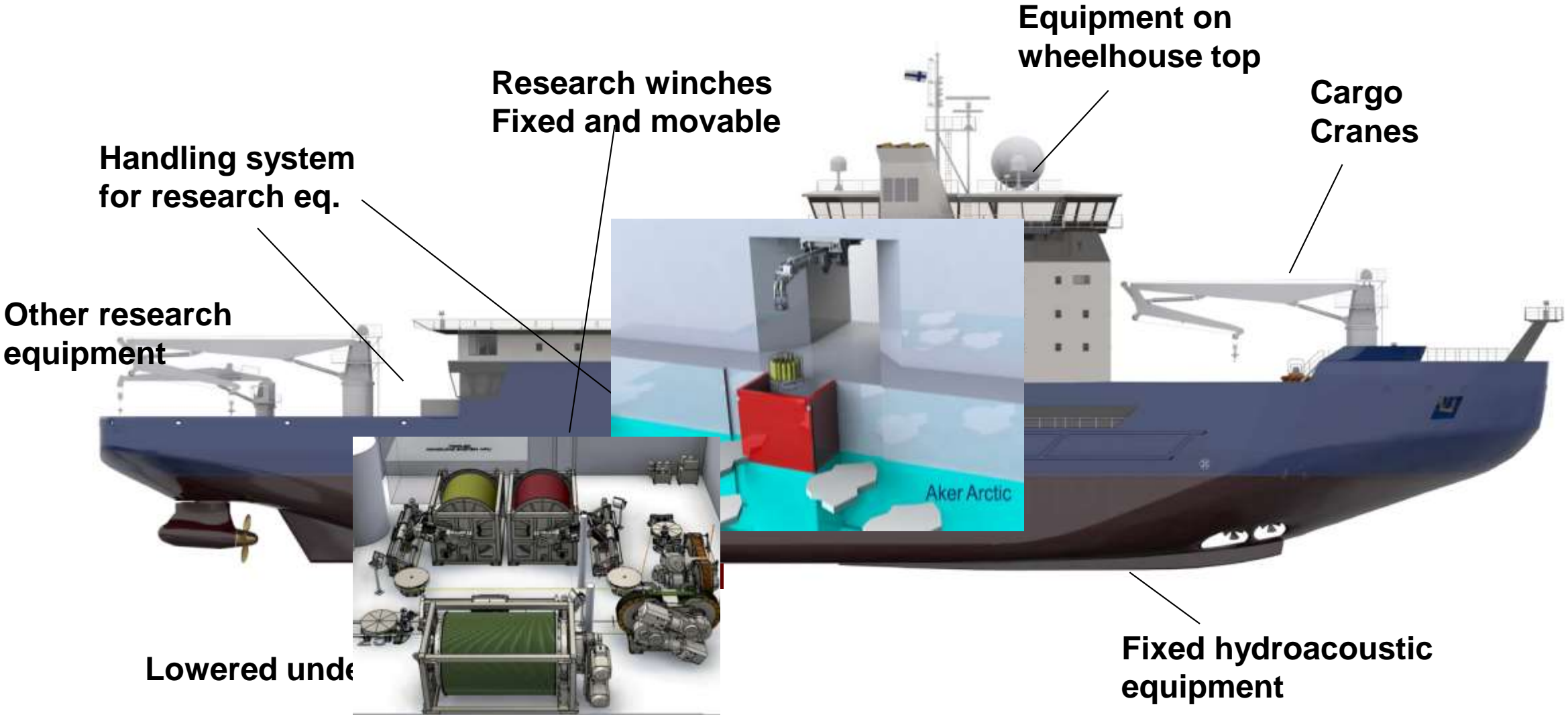


3. Trends and compromises

- Combination of research activities & logistics
- Easy mobilized and demobilized equipment & systems
- Extensive operational profiles → dimensioning profiles to be justified
- Ice vs open water performance contractions
 - ◆ Ice class and underwater noise requirement
 - ◆ Icebreaking performance vs bubble sweep-down and slamming
 - ◆ Icebreaking hull form vs seakeeping (Anti-rolling)
 - ◆ Optimisation of propulsion system for max icebreaking and economic speed in open water
- Class notations
 - ◆ Required class notations
 - ◆ Additional voluntary notations
 - Understanding the content and background of notations
 - Extensive combination of voluntary notations ≠ good design



4. Research discipline vs naval architecture



5. Conclusion

- Priority of essential factors is challenging
- Different approaches but similar topics and goals to consider
- Importance of including various stakeholders in early phase
- Solving the biggest technical contradictions in early phase
- Growing needs → increased modularization → future upgrade reservations → more challenging projects
- Understand the link between research needs, ship operation and naval architecture.



THANK YOU!
QUESTIONS?



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