

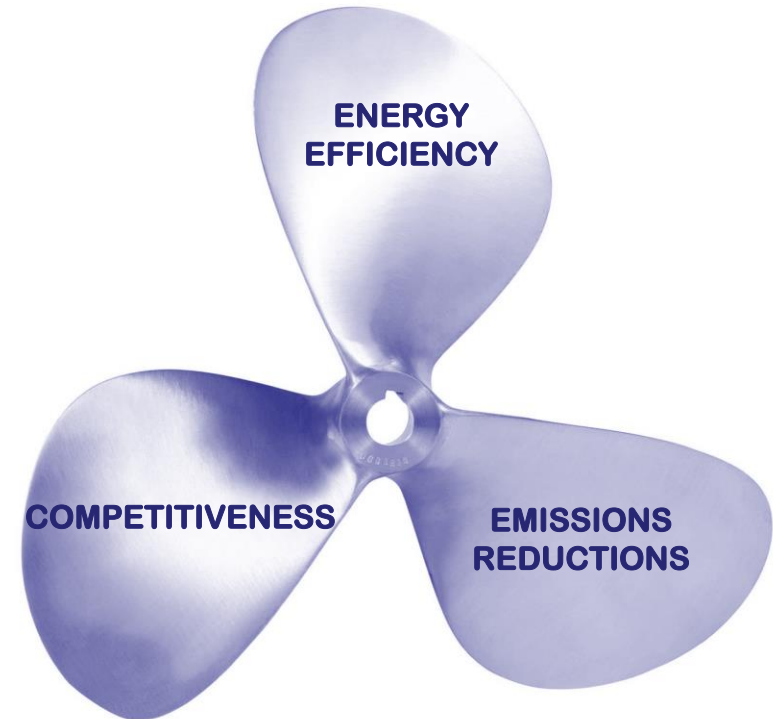


General Presentation

2017

**Norwegian Centre for improved energy
efficiency and reduced harmful emissions**

- Norwegian Centre for improved energy efficiency and reduced harmful emissions from the maritime sector.
- Centre for research-based innovation (SFI) granted by The Research Council (SFI-III)
- Main goals:
 - Improve energy efficiency
 - Reduce harmful emissions
 - Strengthen the competitiveness of the Norwegian maritime industry
- Duration: 2015 - 2023
- Budget: 24 MNOK / year
- Financing:
50% Research Council – 25% Industry Partners – 25% Research Partners
- Host institution: SINTEF Ocean AS (former MARINTEK)



INDUSTRY PARTNERS

Design, shipbuilding & equipment

- Rolls-Royce Marine
- Bergen Engines
- Vard Group
- Havyards
- Norwegian Electric System (NES)
- ABB
- Siemens
- Jotun
- Wärtsilä Moss

Ship operators

- Wilh. Wilhelmsen
- Solvang
- Grieg Star
- KGJ Skipsrederi

Other partners

- DNV-GL
- Norwegian Shipowners' Association
- Norwegian Maritime Directorate
- Kystrederiene

RESEARCH PARTNERS

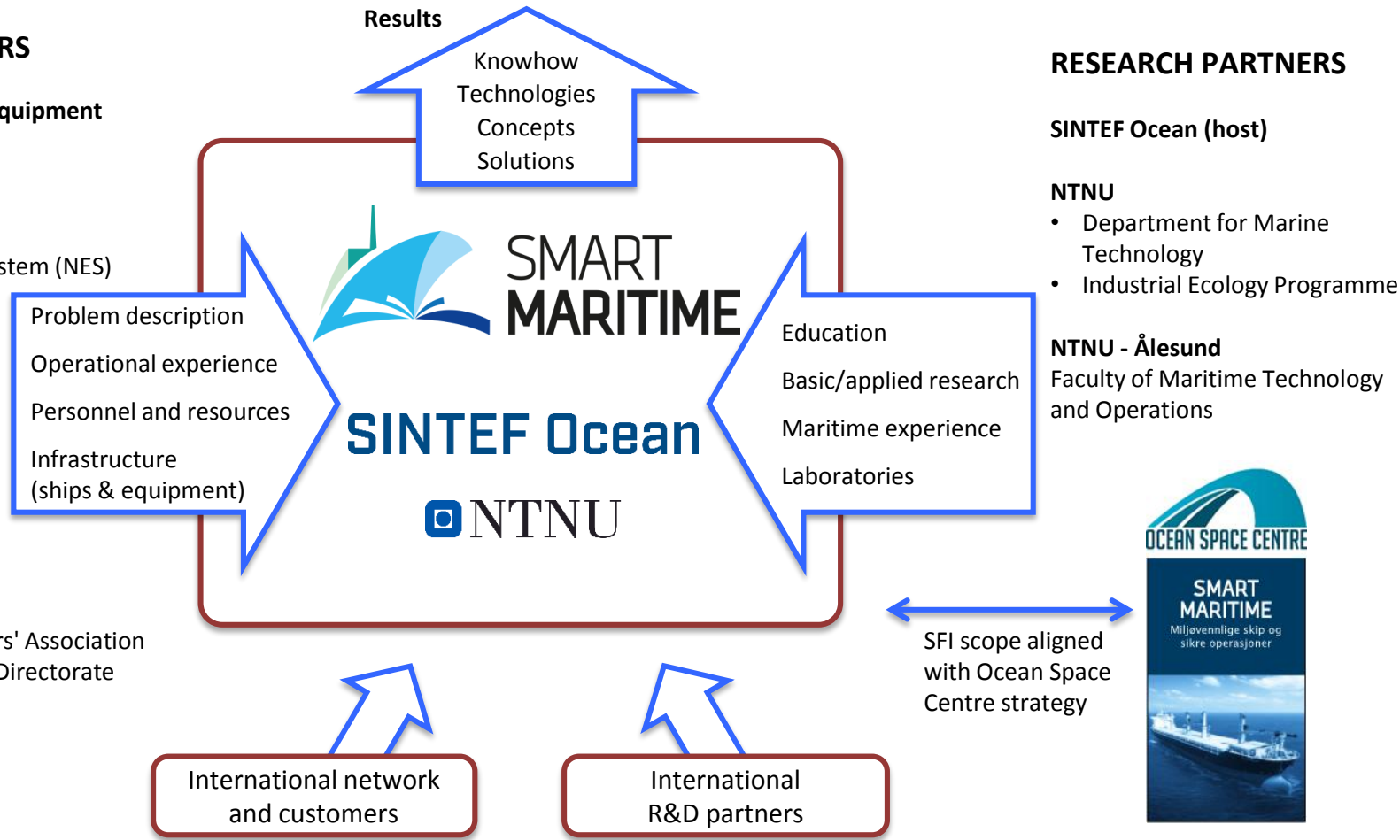
SINTEF Ocean (host)

NTNU

- Department for Marine Technology
- Industrial Ecology Programme

NTNU - Ålesund

Faculty of Maritime Technology and Operations



RESEARCH ORGANISATIONS

SINTEF Ocean

 NTNU

DESIGN, EQUIPMENT, SHIP BUILDERS



Rolls-Royce

ABB



SIEMENS

VARD™
a Fincantieri company



norwegian
electric systems



SHIP OPERATORS



Wilh. Wilhelmsen



SOLVANG ASA



**KRISTIAN GERHARD JEBSEN
SKIPSREDERI**
PART OF THE KRISTIAN GERHARD JEBSEN GROUP

OTHER PARTNERS



Kystrederiene



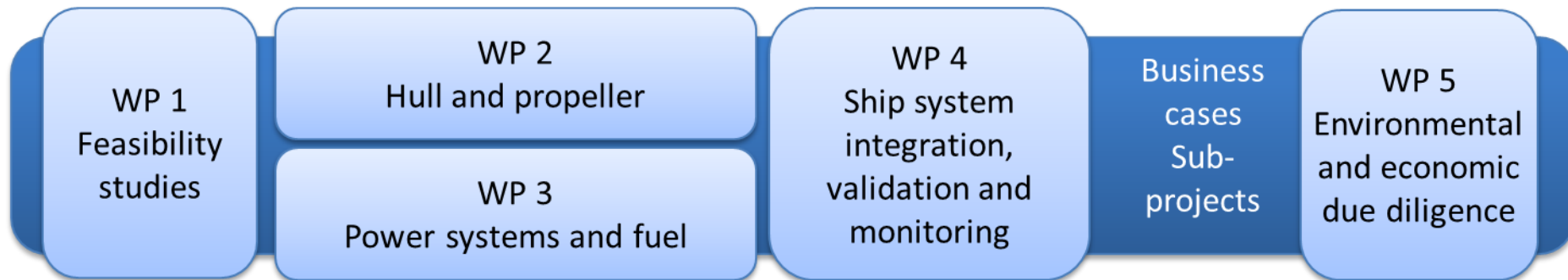
Norges
Rederiforbund
Norwegian
Shipowners'
Association



Sjøfartsdirektoratet
Norwegian Maritime Authority

Smart Maritime Structure

- 5 Work Packages (WP) integrated through business cases (Sub-projects) in cooperation with industrial partners
- Multidisciplinary and holistic approach



9 PhD
8 Post Doc

WP1 Feasibility Studies

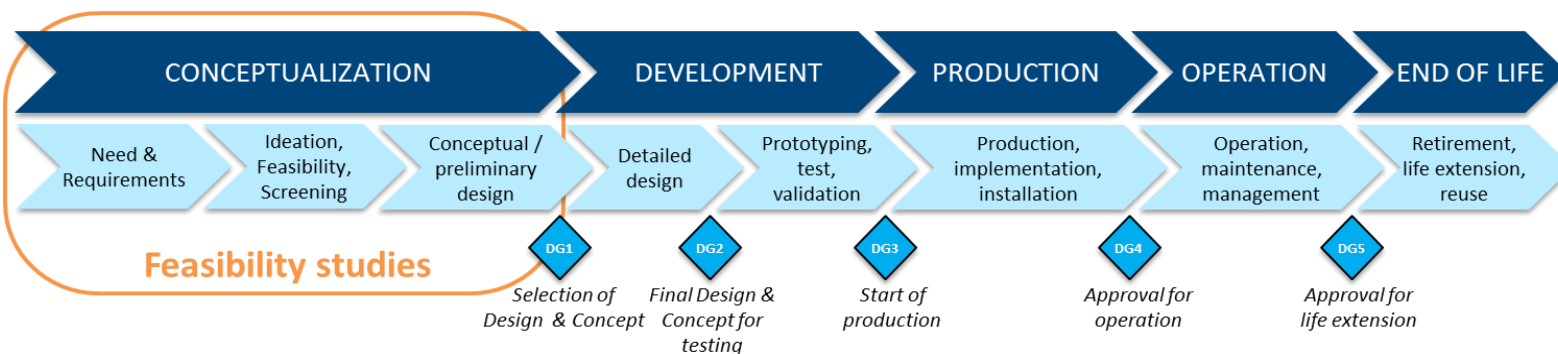
WP leader: Haakon-Elizabeth Lindstad, SINTEF Ocean



The main purpose of feasibility studies is to enable investigation of alternative concepts early in the project to identify the most promising options.

Objective

Develop and test assessment models that enable ship designers and innovators to investigate a number of alternative designs at an early stage.



WP2 Hull and Propeller optimization

WP leader: Sverre Steen, NTNU



Objective

Identify potential for energy savings by means of hull and propulsion optimization, and apply and introduce novel approaches to improve energy efficiency.

Calm water
performance

Energy-saving
devices

Novel propulsion

Operations in
waves

Friction-reduction
Novel overall-design
(main dim.)

Effect of waves and
off-design operation
Evaluation of in-
service performance

Flapping foil
propulsion
Wave-foil
propulsion
Wind-assisted
propulsion

Speed loss
Interaction with
engine
Operational profile
Above-water geom.



WP3 Power Systems and Fuel

WP leader: Eilif Pedersen, NTNU

Objective

Improve current designs and explore novel technologies, systems and solutions for power generation which are energy and emission efficient.

Power Systems
for E³O

Engine Process
Optimisation

Waste Heat
Recovery

Hybrid Power
Systems

Flexible E³O Power
Systems
Variable load cycles
Power/Propulsion
System Simulation
and optimisation
PMS/EMS

Advanced
combustion control
Engine system
optimisation
Alternative fuels
including LNG
Exhaust gas cleaning

Combined cycles
Turbo-compound
systems
Thermoelectric
power generation
Heat management

Hybrid concepts
Energy storage
systems (Batteries)
Energy converters
and transmissions
Optimal control

E³O – Energy and Emission Efficient Operation

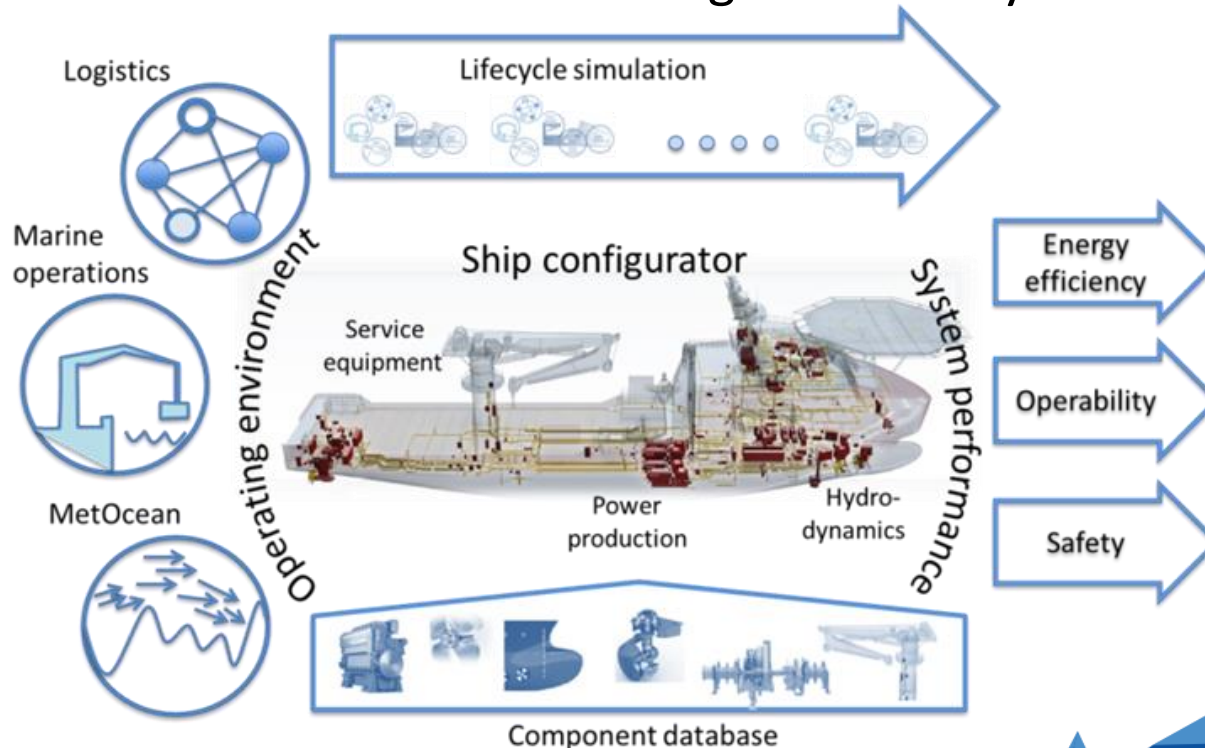
WP4 Ship System Integration and Validation

WP leader: Trond Johnsen, SINTEF Ocean



Objective

Enable performance evaluation and benchmarking of designs on a ship system level and validate the results through laboratory and full-scale tests.



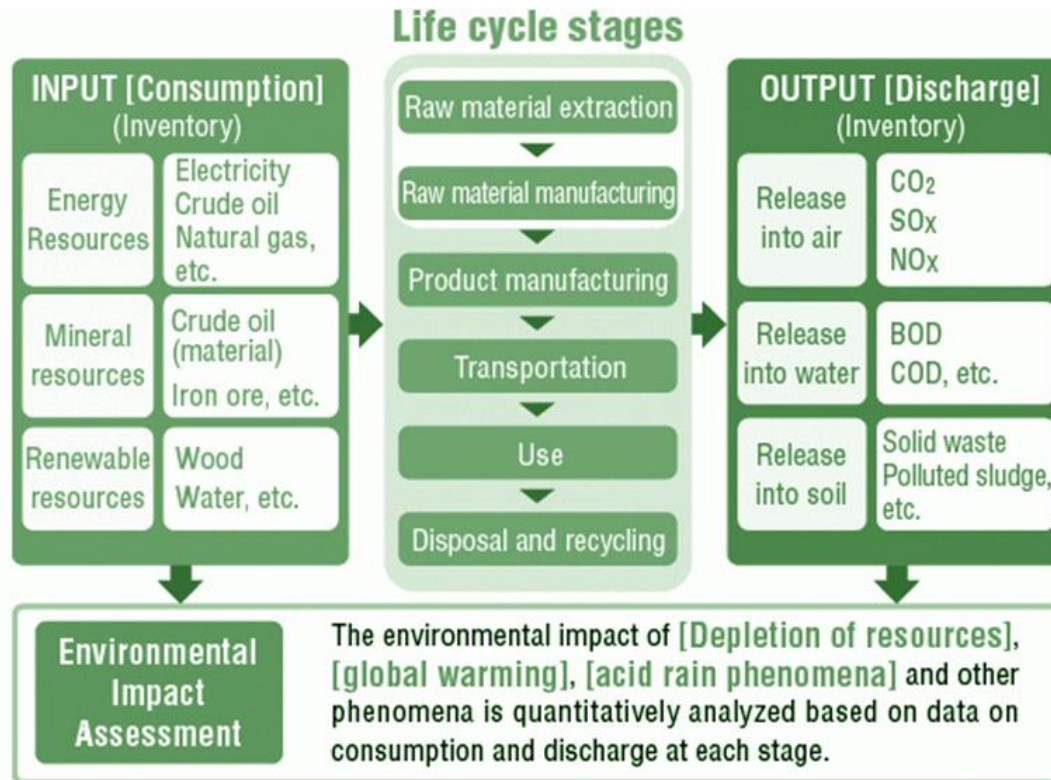
WP5 Environmental and Economic due Diligence

WP leader: Anders Strømman, NTNU



Objective

Systematically assess the environmental and economic performance parameters of different ship and shipping system designs.



Smart Maritime Centre Management



Centre Director
Per Magne Einang



Deputy Centre Director
Anders Valland



Adm. Coordinator
Agathe Rialland



WP Leader (WP1)
Haakon Lindstad



WP Leader (WP2)
Sverre Steen



WP Leader (WP3)
Eilif Pedersen



WP Leader (WP4)
Trond Johnsen



WP Leader (WP5)
Anders Strømman



Organisation

General Assembly
(All Partners)

Board
(Majority from User Parties)
(Leader: User Partisipant)

Technical Advisory Committee
(WP leaders, User Partisipants)

Centre Management Group
(WP leaders, Center leader)

Scientific Advisory Committee
(Leading international capacities)

WP1:
Feasibility studies

WP2:
Hull and propeller

WP3:
*Power systems
and fuel*

WP4:
*Ship system
integration
and validation*

WP5:
*Environmental and
economic due
diligence*

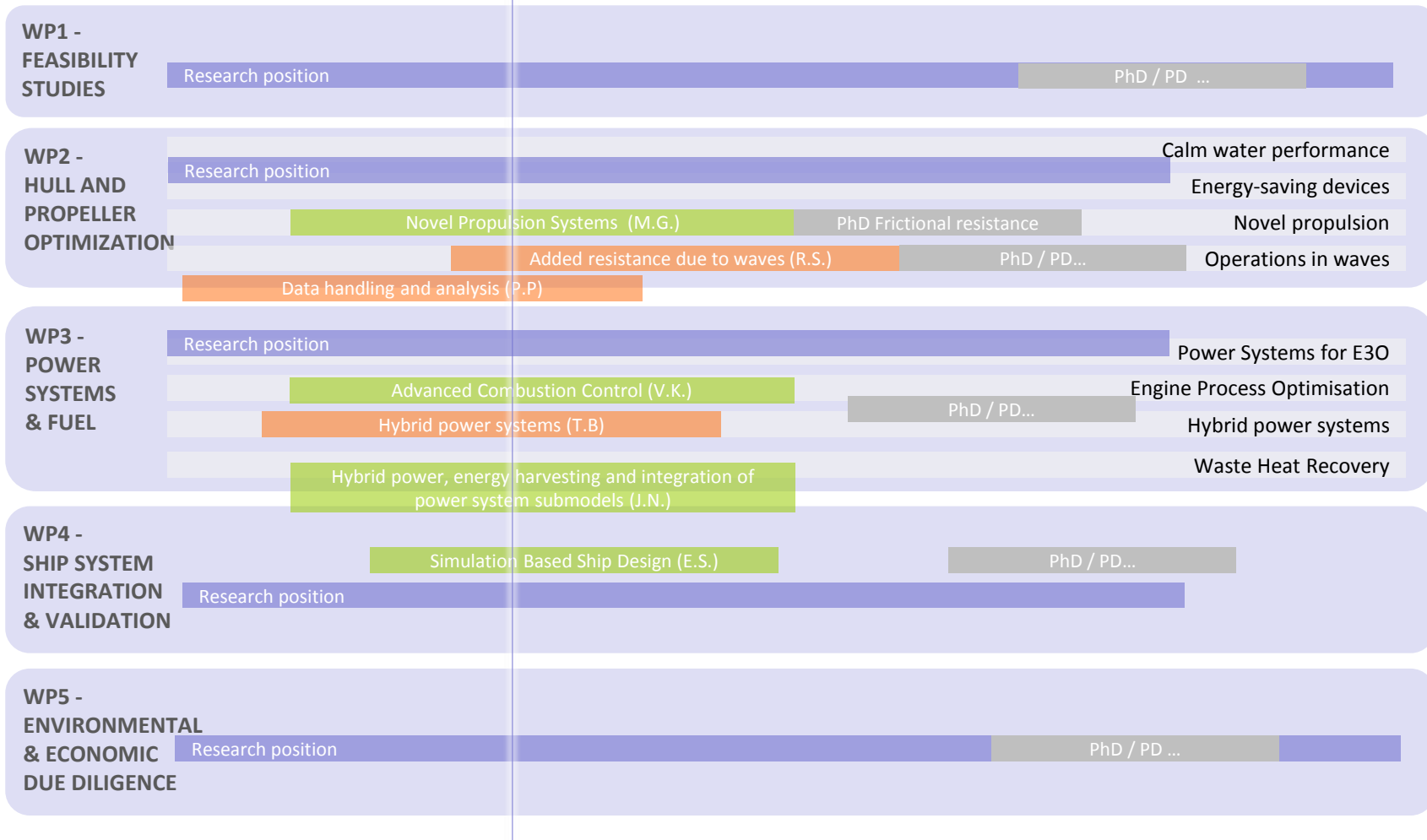
Sub-Project 1

Sub-Project 2

Sub-Project 3

Sub-Project n

2015 — 2016 — 2017 — — — — — 2020 — — — — — 2023

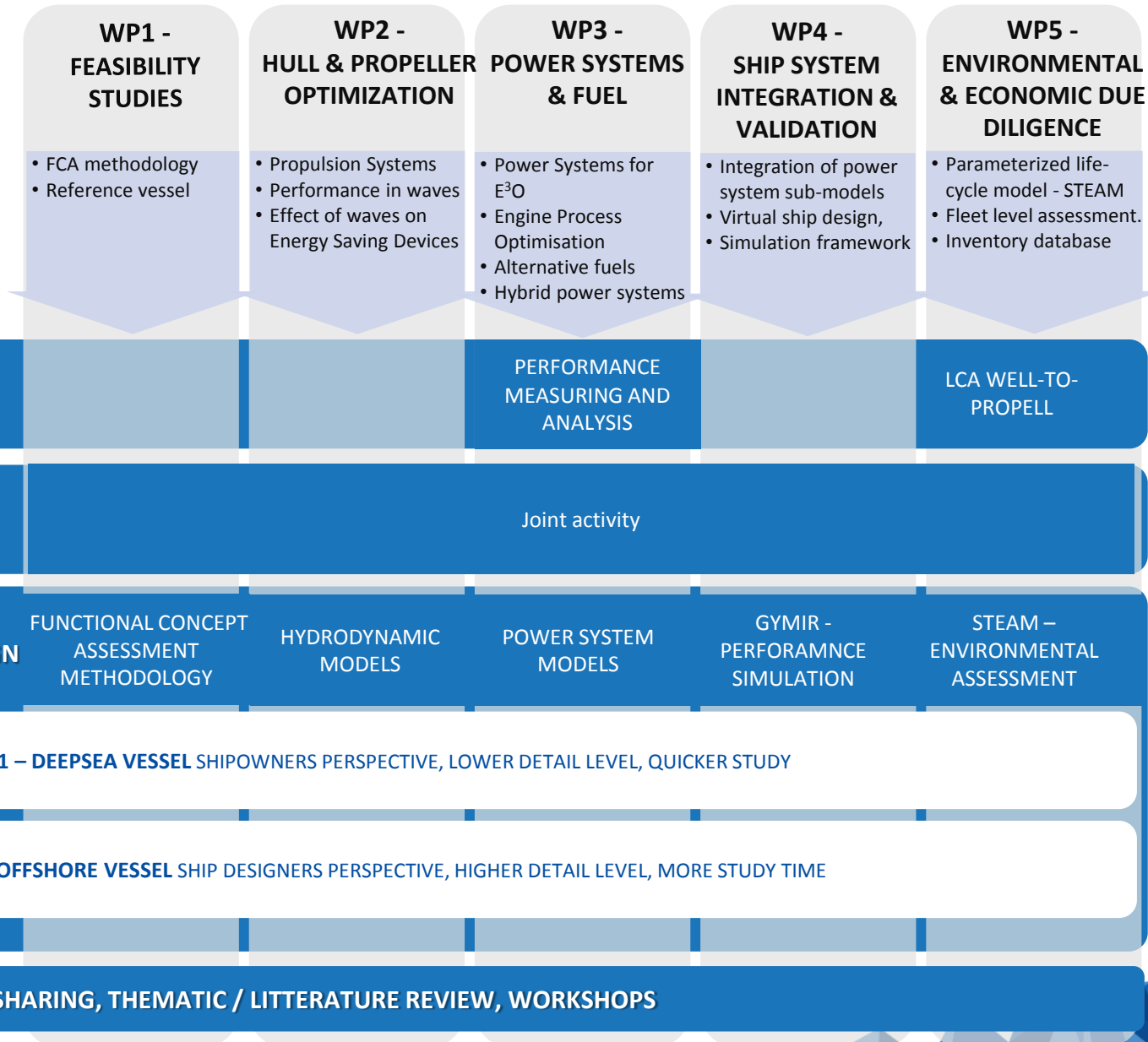


PhD
PD
Research position
Planned

**9 PhD
8 Post Doc**



Activities 2017





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