NIOZ Fleet renewal

NICO post cruise meeting
The Hague, nov 29th, 2018

Wouter Kruijt
Project manager
Agenda

- Fleet Renewal: why?
- The project
- Steps taken
- Where are we now?
- Capabilities Pelagia II
- Next steps

Goal of today: your feedback on outline Pelagia successor
Mission NIOZ

Blue planet....

....so Blue Ships
Fleet renewal: why?

Ageing fleet, close to or beyond economic end of life
Requirements to vessels and equipment have changed

NIOZ fleet needs incorporated in NWO and KNAW’s agendas for large scale infrastructure
The project: Preparation of fleet renewal

• Successors of *Pelagia* and *Navicula*
• All activities necessary to prepare investment in two new vessels
  • Market research
  • User requirements
  • Vessel design, specification
  • Up to tender preparation
  • Investment decision foreseen 2019

After investment decision by Board NWO: next phase: Fleet renewal

• European tender
• Contract award
• Construction supervision
Functions of the vessels

• Main function oceanographic (marine) research (as is)
  • Ocean geochemistry & biochemical cycling
  • Seafloor processes
  • Marine microbiology & biology
  • Underwater archeology
  • Paleoclimate research
  • Multiple scale physical oceanography
  • Marine geology
  • Human imprint

• New will be subfunction “living lab for maritime sector”
  • Mostly non-interfering research & development, on e.g.
    • Energy systems & new fuels for shipping
    • Wind Assist
    • Underwater noise, UAV’s
    • Alternative antifouling systems
Steps taken 1/2

- Project Plan made and approved dec ‘17
  - Incl. Planning, team and budget
- Artist impressions made
- Tendering will be by NIOZ ourselves, not Rijksrederij
- NWO expressed wish towards green vessels + living lab maritime sector
- User investigation marine research Q1-2 ‘18
  - NIOZ, Universities, Institutes e.g. WMR, Deltares
- User investigation maritime research Q1-2 ‘18
  - TUDelft, MARIN, TNO, Navy, industry
- Shipyard budgettary quotes, based on Outline Specs
- Investment Plans submitted to NWO Board June 2nd ‘18
- NWO approval design & specification phase per June 19th ’18
Steps taken 2/2

- Visits other parties: learn from experiences!
  - Norway, G.O. Sars, Fridtjof Nansen
  - UK, James Cook, Discovery
  - Spain, Sarmiento de Gamboa
  - Ireland, Celtic Explorer
  - Belgium, Belgica 2
  - Rijksrederij
  - RWS, Tridens/Zirfea (moonpool, drop keel)
Where are we now?

• Design offices contracted per july 7th
  Pelagia:
    • C Job, Hoofddorp
    • Glosten, Seattle (RV support)
  Navicula:
    • Conoship, Groningen

• Definition phase: detailed user requirements
  • Started end of july until december ‘18

• Design phase: hull design + General Arrangement
  • Support by MARIN on hydrodynamical aspects
  • This is an iterative process
Pelagia requirements

• Target changes:
  • More people on board (12 => 30 + crew)
  • Larger deckspace & labs
  • Higher top speed (12 kn), transit speed 9 kn
  • Better workability, DP(2)
  • Up to date instrumentation & equipment (incl. drones)
  • Limited ice class
  • Endurance 40 days
  => bigger vessel (74m)

• Goal: equal or better than Pelagia

• Design development (iterations) until mar ’19

• Tender Specification to be made by NIOZ/CJob ready may ‘19

• Goal is NWO investment approvement mid ’19?

• Final goal is new vessel per early 2022
Pelagia outline evolvement

- Starting point: improve present Pelagia
- Outline Spec & artist impression
- Definition Phase: many more extensive requirements
  Latest outline design within limits
## Shrinking the vessel: back to basics

<table>
<thead>
<tr>
<th></th>
<th>Pelagia I</th>
<th>Outline Spec P II</th>
<th>PII design oct</th>
<th>PII design nov</th>
<th>remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length</strong></td>
<td>66</td>
<td>75-80</td>
<td>&gt;75</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td><strong>Widt</strong></td>
<td>12.8</td>
<td>15</td>
<td>16.2</td>
<td>15.5</td>
<td>Stability!</td>
</tr>
<tr>
<td><strong>Draft</strong></td>
<td>4.2</td>
<td>4.5</td>
<td>5</td>
<td>&lt;5</td>
<td></td>
</tr>
<tr>
<td><strong>Displacement</strong></td>
<td>1671</td>
<td>2500</td>
<td>Ca 3650</td>
<td>&lt;2900</td>
<td></td>
</tr>
<tr>
<td><strong>Displ GT</strong></td>
<td>1615</td>
<td>&lt;3000</td>
<td>Ca 3500</td>
<td>&lt;3000</td>
<td></td>
</tr>
<tr>
<td><strong>Speed max/cruise</strong></td>
<td>11 / 9</td>
<td>12 / 10</td>
<td>12 / 10</td>
<td>12 / 9</td>
<td>bunkercap.</td>
</tr>
<tr>
<td><strong>Fuel consumption cruise</strong></td>
<td>4.5</td>
<td>9.6</td>
<td>ca 8</td>
<td>M3/day</td>
<td></td>
</tr>
<tr>
<td><strong>Crew</strong></td>
<td>11 + 2</td>
<td>19</td>
<td>19</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td><strong>Scientists</strong></td>
<td>12</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>&gt; 26</td>
</tr>
<tr>
<td><strong>Installed power</strong></td>
<td>1.87 MW</td>
<td>Ca 3.7 MW</td>
<td>&lt;3 MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Workdeck m²</strong></td>
<td>135 / 75</td>
<td>225 / 150</td>
<td>364/ 290</td>
<td>370/300</td>
<td>Without/with containers</td>
</tr>
<tr>
<td><strong>labcontainers</strong></td>
<td>5 + 4</td>
<td>5 + 8</td>
<td>5 + 8</td>
<td>4 + 8</td>
<td>Fixed labs limited</td>
</tr>
</tbody>
</table>
Pelagia capabilities

Main scientific facilities in short:

- NIOZ labcontainers (in container hold and on deck, sheltered access)
- CTD hangar
- Geo hangar/geo lab
- Wet lab
- Dry lab
- Multifunctional lab
- Drone facilities
- Acoustic equipment (gondola mounted Multibeam, USBL, Side scan sonar, ADCP etc);
  - One drop keel
- A-frames at stern and midships, deck cranes
- Winches (incl. deep sea winch)
- KNMI weather station
- Piston coring
- Aquaflow system
- Sensors & IT infrastructure
Pelagia details

Concept vessel arrangement

- Living area
- Quarters, cabins
- Working deck/spaces
- Incubation racks PM
- Container hold
- Drop keel
- Gondola acoustics
Pelagia details

Main deck

- e.g. ROV containers
- Labcontainers
- UC CTD

CTD hangar with deployment arm

Drop keel

Up to 35 m coring

Pallet size lift B-deck till container hold
Pelagia Blue Ship

• New and different:
  • Green: zero emission by 2030?
    • Green Passport
    • Diesel Gensets at start (Worldwide operations)
    • Batteries for in-port or DP mode on station
    • Non-CO2 fuels preparation
      • Tanks
      • Generator rooms
    • Refit 2030 (50% new fuels)
  • Maritime sector non-interfering research
    • Energy test containers
    • Wind Assisted Propulsion
    • Digital Twin (sensors)
Steps ahead

- Financing
  - Target is to get operational costs financed
  - Then investment “secured”
  - So not too big or expensive vessels…….
  - Target ready Q1 ‘19

- Specification Phases
  - Investment approvals Q1 and Q2 ‘19
    - Preference to start Navicula earlier:
      - Replacement urgent (age present vessel 40 yrs)
      - Try-out for bigger Pelagia, better not 2 vessels tendering at same time

- Open European tenders
- Contract awards to shipyards

Goal: **New Navicula ready early 2021**
**New Pelagia ready early 2022**
Any questions?

• Comments to pelagia2@nioz.nl
• erica.koning@nioz.nl
• wouter.kruijt@nioz.nl
Pelagia details
A-deck
Pelagia details

B-deck
Pelagia details

C-deck
Pelagia details

D-deck (main deck)
Pelagia details

E-deck