

**University of Tokyo Ship & Ocean
Technology Workshop**

**Alternative methods for passenger
transportation in Pré-Salt cenário**

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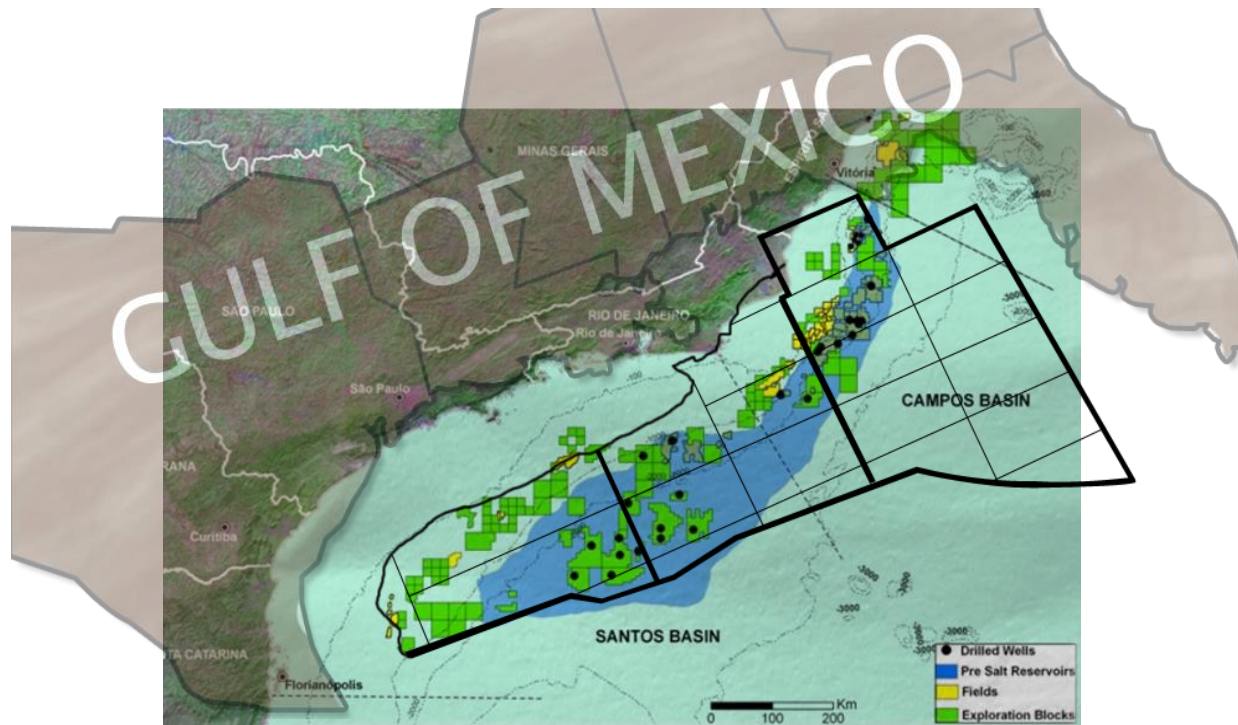
**Rio de Janeiro, Brasil
2013, November, 13th**

Summary

- Offshore Logistics Challenges
- R&D - Offshore Hub for Passenger Transportation
- Concluding remarks and opportunities for innovation

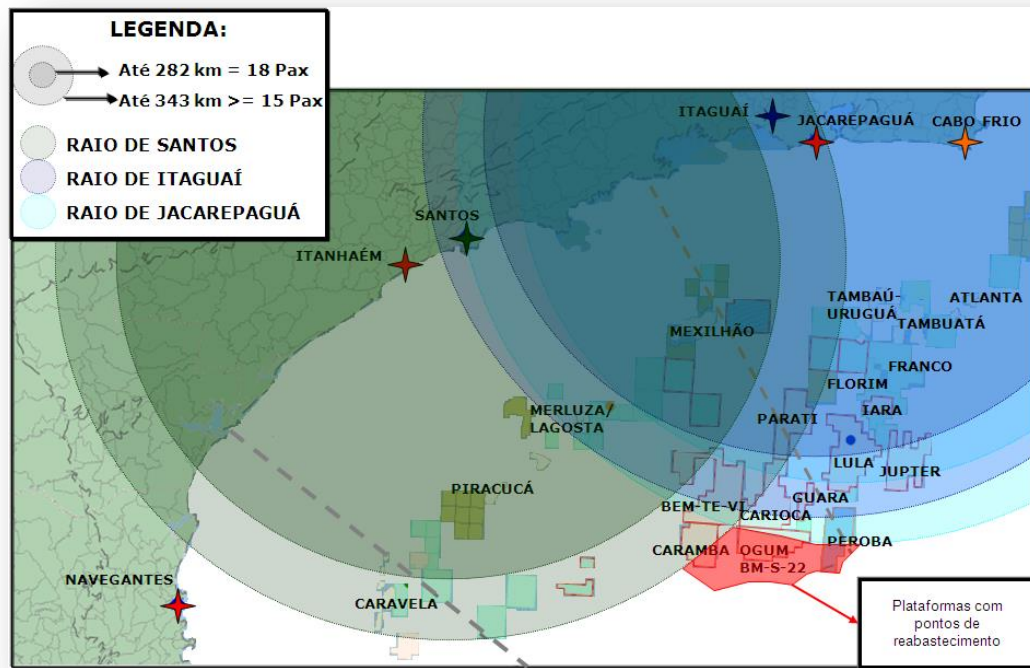
Offshore Logistics Challenges

- Long distance from shore: 300km away
- Large area : 149.000 m²
- Increase in the demand for pax and cargo transport



Offshore Hub for Passenger Transportation – R&D

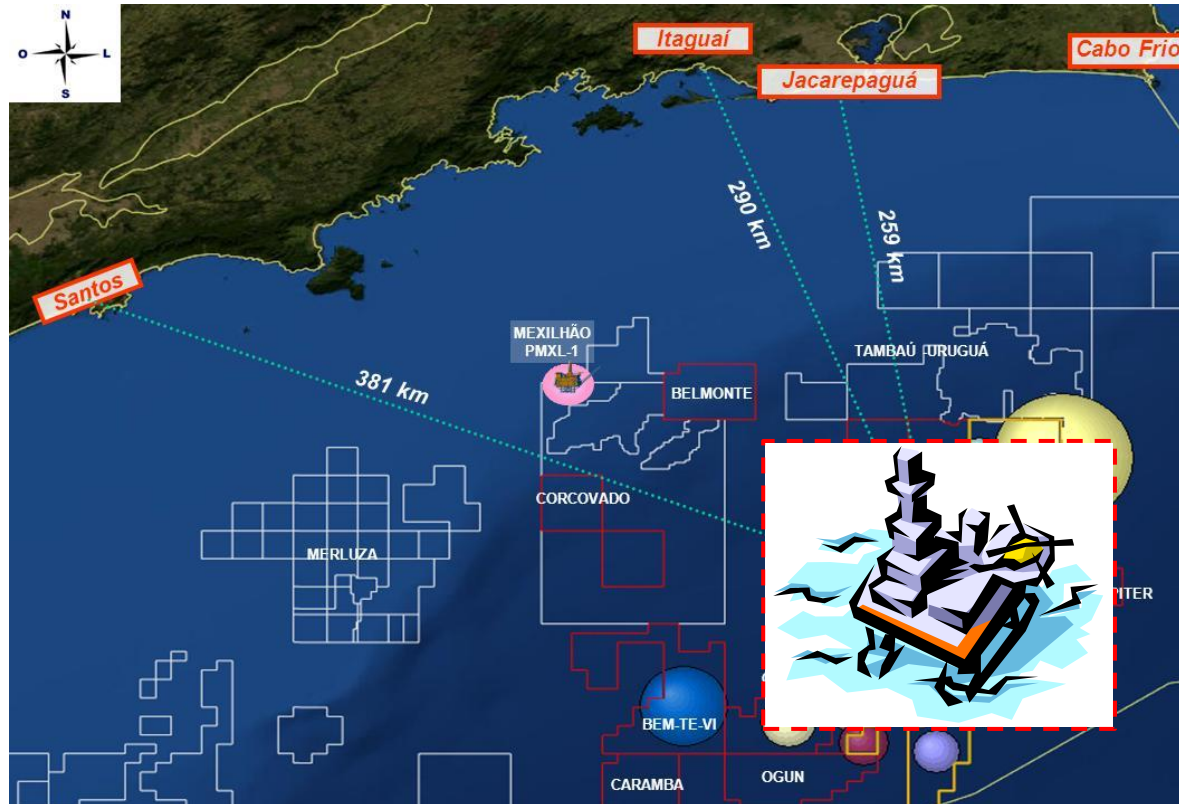
- R&D – Alternative solution for pax transportation
- Base case scenario (use of large capacity helis – S92 e EC225)
- 2200 pax/d → 800.000 pax/yr (ref: 2011)
- Demand increase for long-distance pax transportation



How to provide a competitive solution...

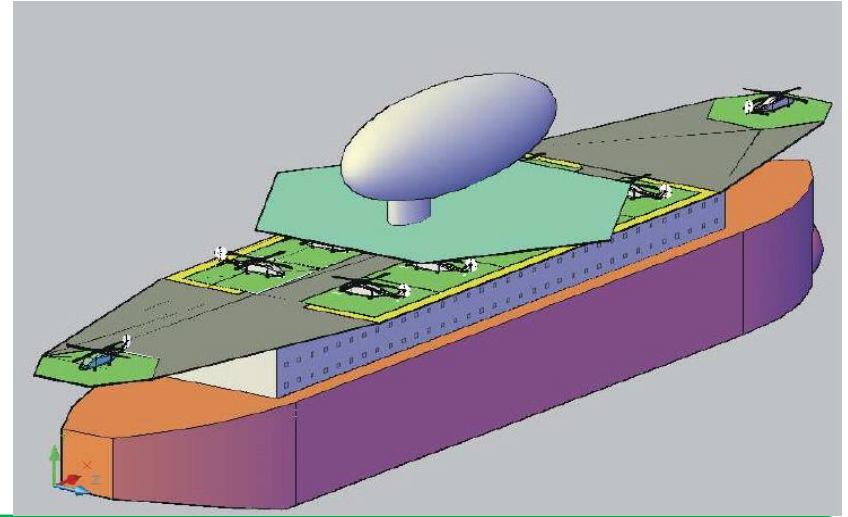


Why not consider an offshore hub platform...?



Pax transportation could use large scale means of transportation from shore to an offshore hub and then a secondary transportation from hub to offshore platforms using helis.

Some options have been evaluated..



**USA, DoD – DARPA:
Huge investments on Airship Design (proof of concept)
for heavy cargo transportation and surveillance
purposes**

**Technology: Not mature, only military applications
Too expensive to develop a commercial solution**

and evaluated..



Sea Planes, Wing on Ground effect (WIG), Vertical Take Off and Landing (VTOL)

None of them was mature and available on commercial basis or could be able to withstand offshore operation

So why not go by sea...?

**Pax transportation using ships (boats):
we have had bad experience on that !!**

**(seasickness and complicated pax
transfer from ship to platform)**



**But some new developments has been done since then...
Ships: jet propulsion, wave piercing, trimarans...
Passenger Transfer: new concept gangways...**



First tentative....

First tentative was to evaluate a ship with a pax transferring system... the solution should have similar operational availability compared to helis operations (97%) and also meet the HSE requirements.

A hull providing buoyancy and stability;

Minimum service speed of 40 knots, considering the environmental conditions described in item 2.4;

Seats for 200 PAX + Accommodation for crew members;

Dynamic position (DP) Class 2, minimum;

Minimum life of 25 (twenty-five) years;

Motion Sickness: ISO 2631-1:1997;

Noise: IMO Resolution HSC2000 CH 4.10;

Lightning: IESNA RP-12-97;

Acclimatization: ANSI/ASHRAE 55a -1995.

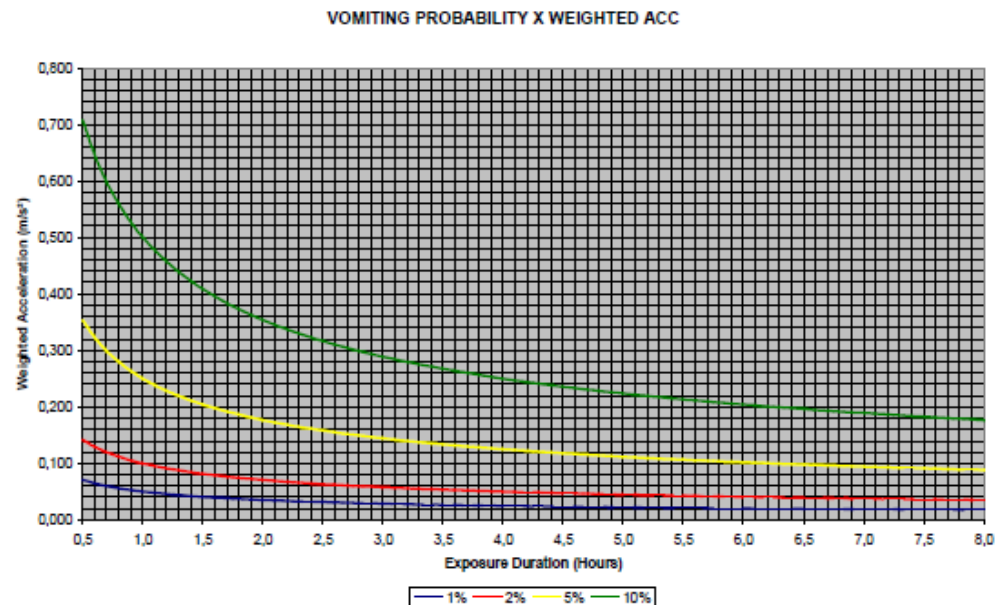
Vomiting probability of 10%;

6.0 hours exposition;

Environmental conditions described in item 2.5.1;

Service and zero speed;

Wave heading varying from 0 to 360 degrees;



Too restrictive...

No solution was found... The scenario was too restrictive...

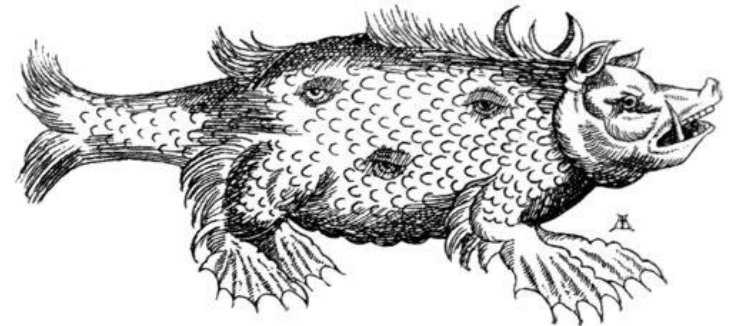
4.5 meters significant wave height, for all range of periods;

30 knots wind speed;

1.39 m/s surface current speed from any direction, out of alignment with waves and winds up to 45 degrees;

Ship should have good motion performance during cruising speed and also during pax transfer at zero speed.

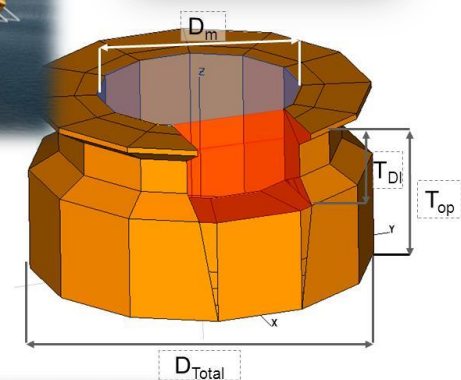
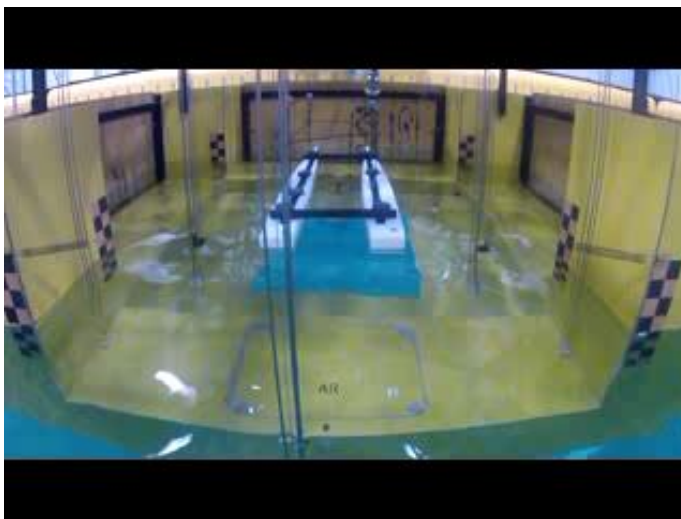
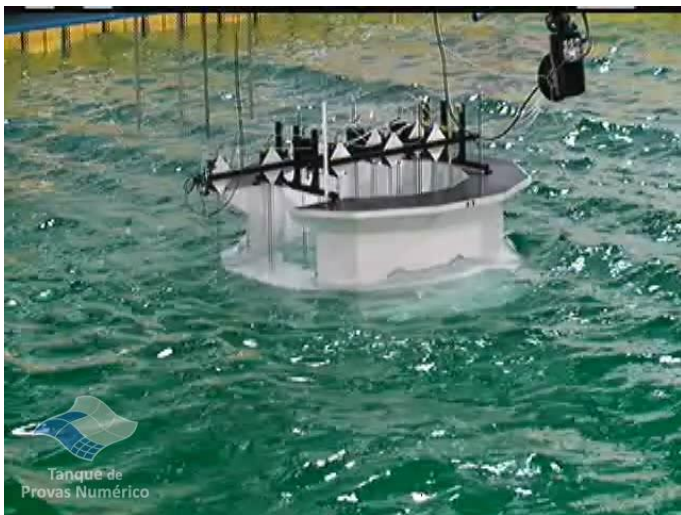
We have been told we were looking for something like “the sea-pig”...



A second chance...



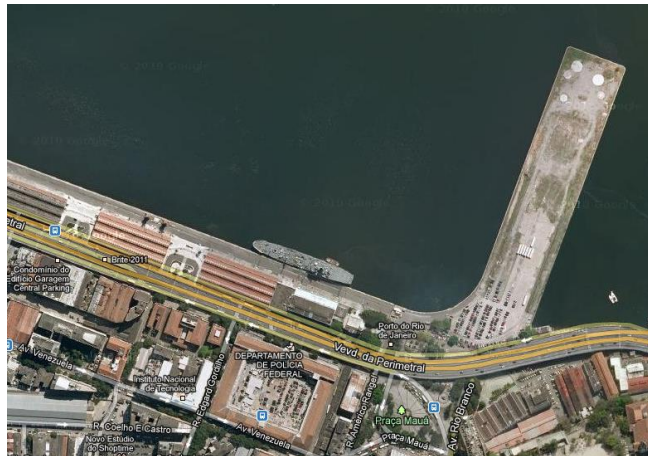
Several analysis...



and also simulations...



Finally a competitive solution was developed!



Harbor



Ship



Pax HUB



Helis



Offshore Platform

Cost competitive solution

Significant reduction of helis fleet

Concluding remarks and opportunities for innovation

- There is a large room for improvements regarding both offshore pax and cargo transportation;
- Aircraft design is very expensive, there are minor advances in developing new alternatives / concepts;
- High performance ship design and also passenger transferring systems have improved significantly;
- Research, development and innovation have a very good prospect in improving offshore logistics operations.

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Thanks for your attention!

Rio de Janeiro, Brasil
2013, September, 13th