Why have we established an Australian Forum for Operational Oceanography and to whom is it relevant?

Jan Flynn (Shell Australia) and Tim Moltmann (IMOS)
Co-chairs of Inaugural Forum for Operational Oceanography

Agenda

- Who is interested in operational oceanography?
- Overview of operational oceanography around the world
  - North America
  - Europe
  - Asia
  - Australia
- Objectives of FOO
  - Operational oceanography value chain
  - Key questions for FOO
  - Development gaps
  - Development staircase
- Summary

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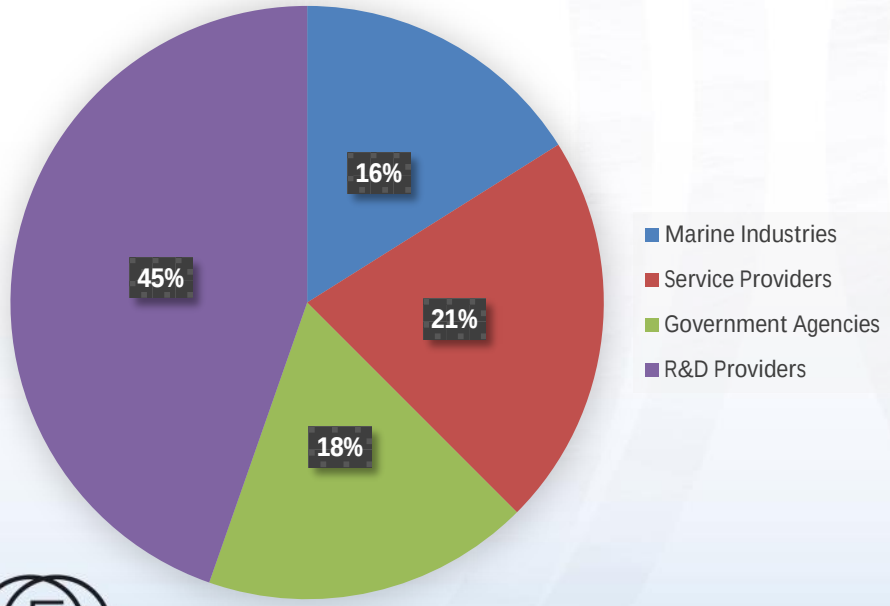
Who is interested in Operational Oceanography? - response to the inaugural event is very encouraging!

- Generous support from the Australian Government Department of Industry and Science

- Good response from R&D Providers, Government Agencies, Service Providers, and Marine Industries

Australian Government
Department of Industry and Science



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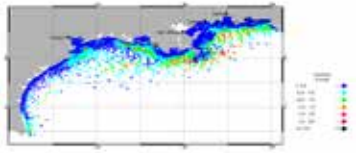
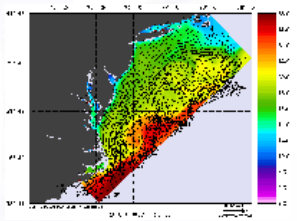
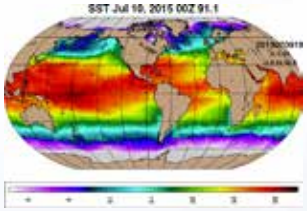
Operational Oceanography – North America

- Satellite missions and comprehensive near-real-time *in situ* observing systems
- National Ocean Service
  - Tides and currents, PORTS, HABs
  - Operational Forecast Systems
    - covering critical ports, harbours, estuaries, regions
- Regional observing and forecasting systems running operationally
  - e.g. Mid-Atlantic Bight, Pacific Islands
- Multiple global ocean forecasting systems under development
  - HYCOM/NCODA, NOAA/NCEP/RTOFS, ECCO
- Collaborative mechanisms across governments, academia, industry
  - Strong operational oceanography focus within the US Navy



"Lives and Livelihoods"





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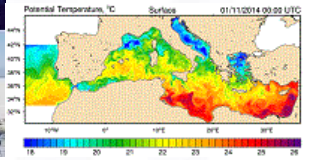
Operational Oceanography – Europe and UK

- Operational oceanography at EU, pan-European, and national levels
- “Copernicus” EU Earth Observation Programme
  - 3 components: space, *in situ*, services
  - Copernicus Marine Environment Monitoring Service now operational (developed from MyOcean pilot system)
- EuroGOOS, 40 members from 19 countries
  - European-scale operational oceanography
- Multiple global ocean forecasting systems under development
  - MERCATOR Ocean (see above)
  - ECMWF (ocean, waves, sea ice)
  - UK Met Office (FOAM)



esa

EuroGOOS
European Global Ocean Observing System

Mercator Ocean
Ocean Forecasters

ECMWF

Met Office

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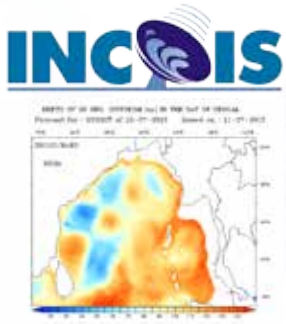
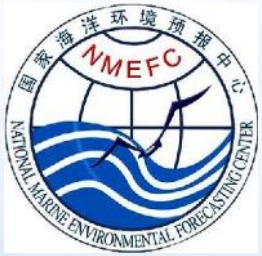
Operational Oceanography - Asia

- Developing rapidly…
- India
  - Indian National Centre for Ocean Information Services (INCOIS)
  - Single organisation integrated across ocean services, data, observations (*in situ* and satellite), and modelling
  - Integrated Indian Ocean Forecasting System (INDOFOS)
    - Emphasis on daily advisories, short term forecasts for fisheries
- Japan
  - JMA/MRI Multivariate Ocean Variational Estimation (MOVE) community model operational since 2008
  - ENSO in NW Pacific, SST prediction, oil spill forecasting
- China
  - State Oceanographic Administration's (SOA) National Marine Environmental Forecast Centre of China (NMEFC)
  - operational ocean analysis system to estimate temperature and salinity fields in the tropical Pacific Ocean
  - Operational since 2008, real time monitoring of ENSO





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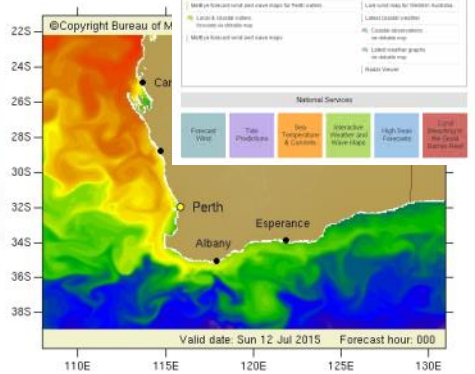
Operational Oceanography - Australia

- Bureau of Meteorology Marine & Ocean Services
  - BLUElink developed in partnership with CSIRO and RAN
  - BLUElink OceanMAPS
  - Regional services e.g. GBR Coral Bleaching and Marine Water Quality (eReefs)
- Private sector services to Industry and Government agencies
  - e.g. RPS ASA services to AMSA for Oil/Chemical Spill Trajectory Modelling, Search and Rescue
- Step change increase in marine observations over the last decade through the Integrated Marine Observing System (IMOS)
  - Funded as a research infrastructure, national collaboration, open access to all data



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Overview of Operational Oceanography around the globe

- Operational oceanography is growing rapidly in other parts of the world
- Significant investments are being made
  - e.g. new satellite missions, new centres focused on ocean services…
- Driven by needs of end users
  - operation of critical infrastructure, management of valuable environments, impact of climate change, saving lives and sustaining livelihoods
- Integration and collaboration are key
  - academia and industry, private and public sector, defence and civilian…

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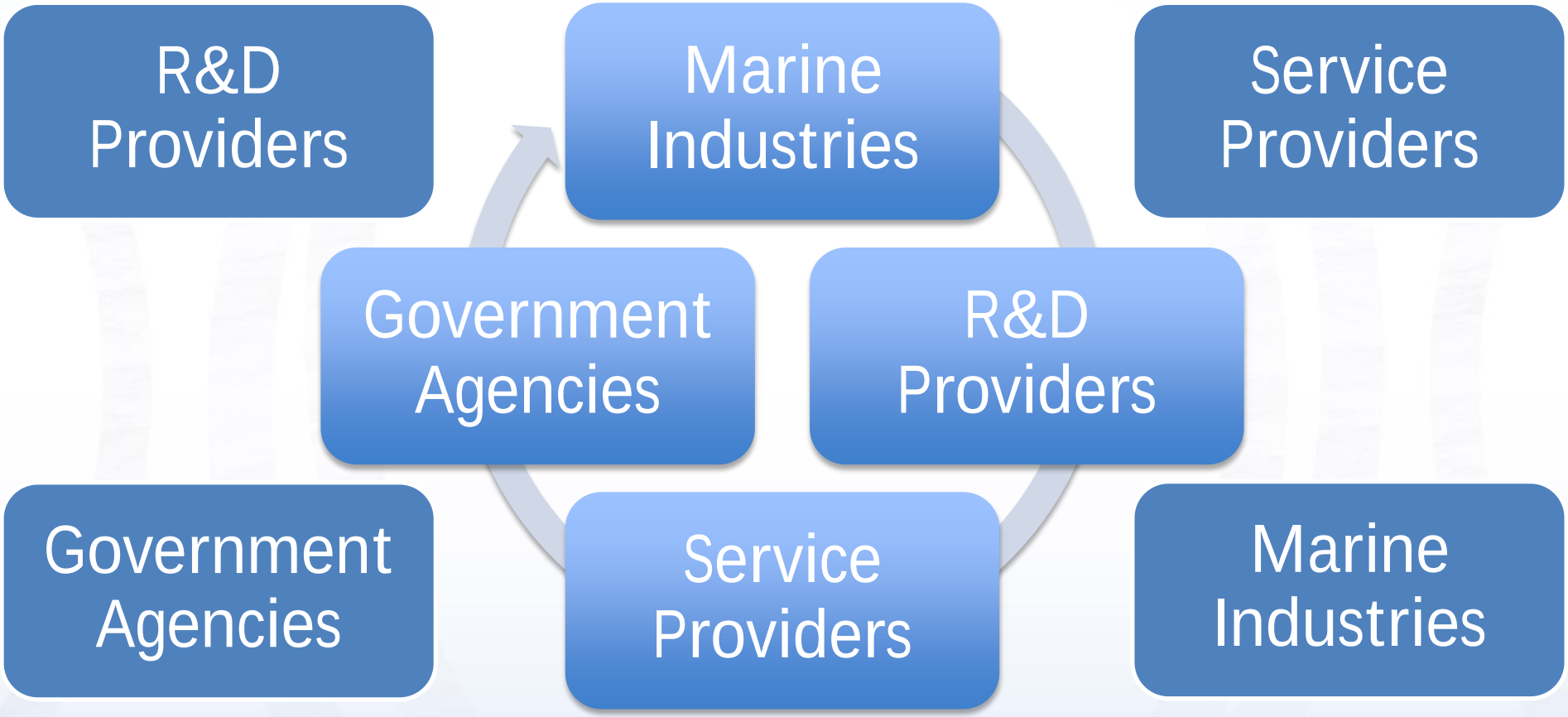
Objectives of FOO



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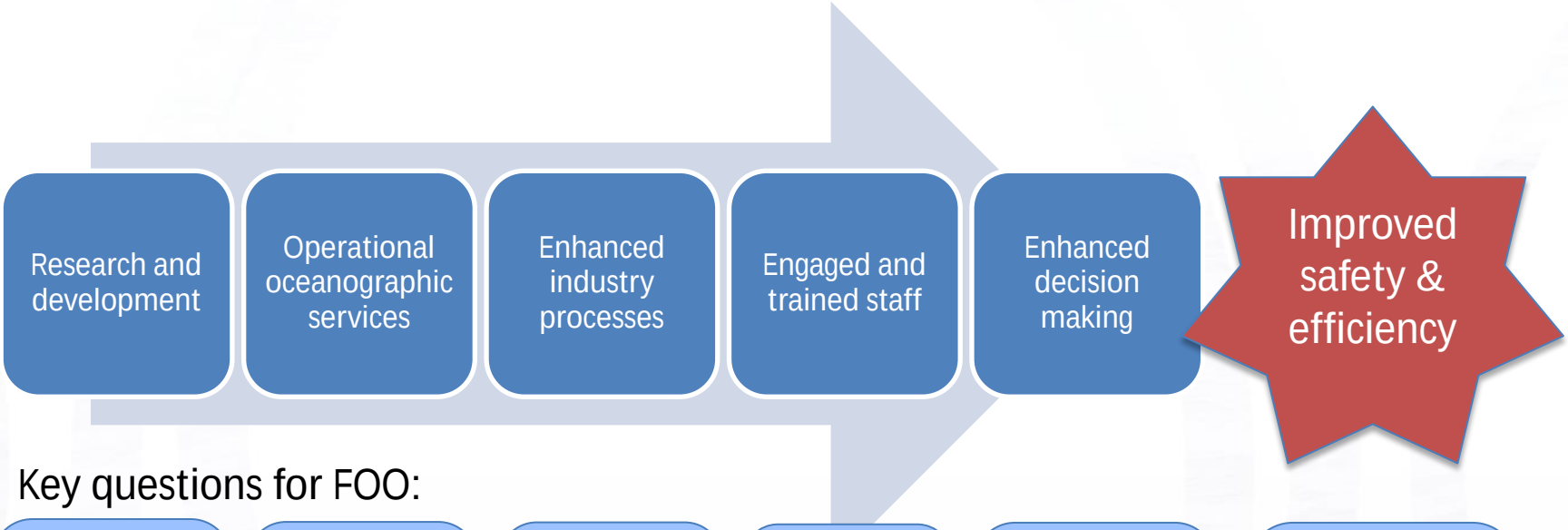
Operational Oceanography Value Chain



Key questions for FOO:

- What research gaps need to be closed?
- How can research outcomes be better coordinated?
- How can research outcomes best be deployed?

- What operational services are needed?
- What features will an operational service have?
- How can information best be presented?

- How does Industry respond to operational services?
- What does Industry need to change?

- What new capabilities or skills need to be developed ?
- Training materials required?

- Which decisions is Industry trying to enhance?
- Are there new ways to look at decision making processes?
- Are the requirements the same for different Industry sectors?

- What does improved safety and efficiency mean to Industry?
- How should value be measured?
- What metrics can be used to measure improvements?

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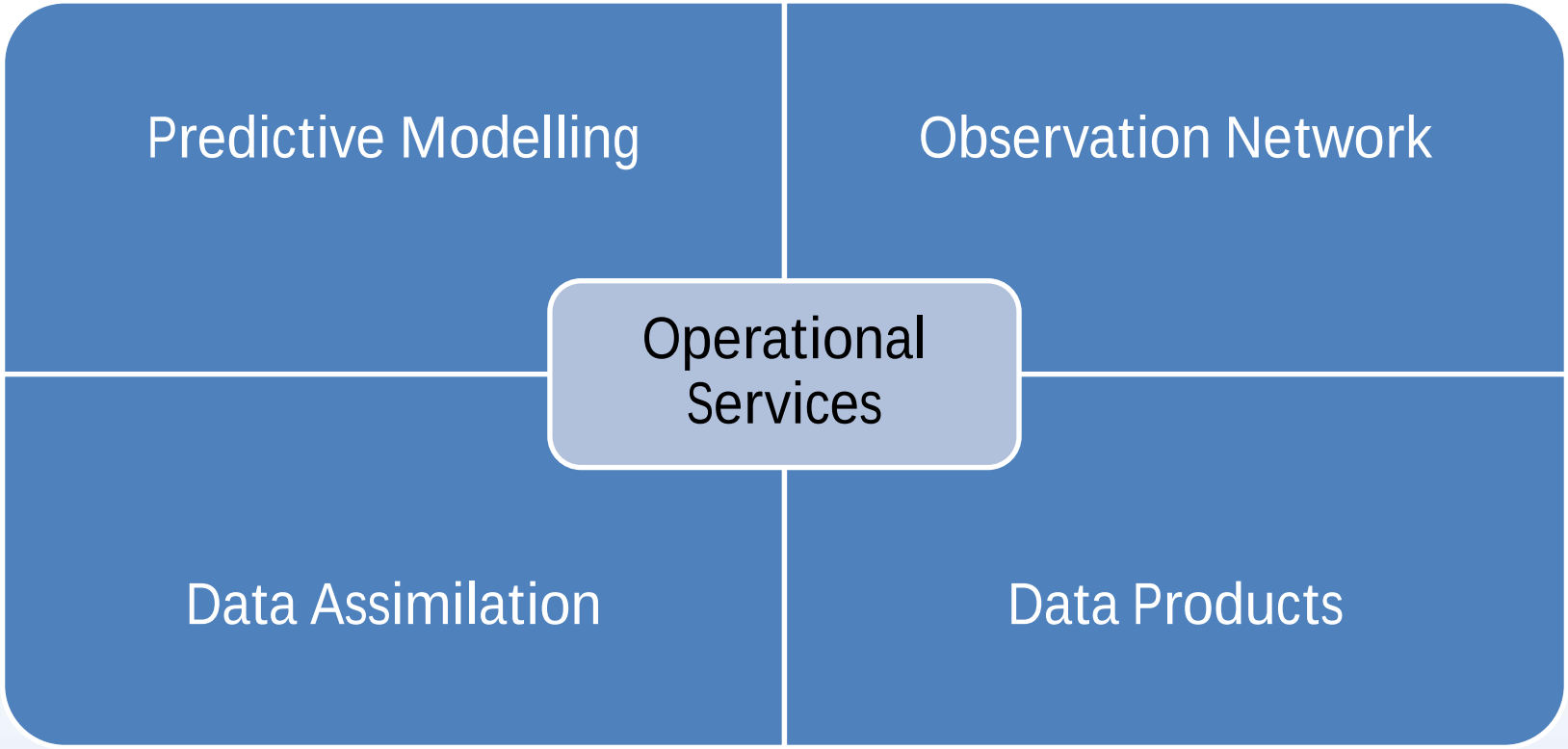
Where are the gaps?



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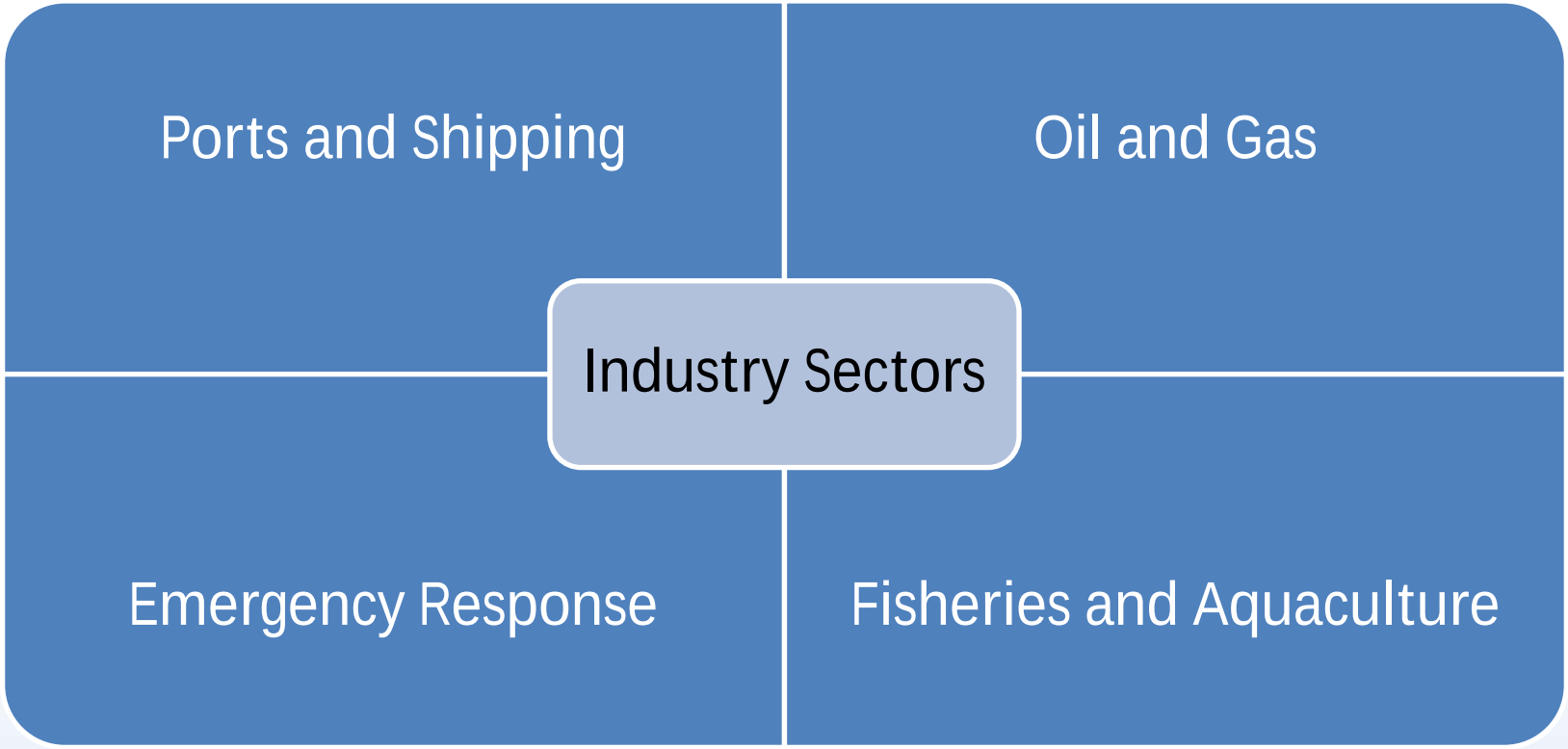
Where are the gaps?



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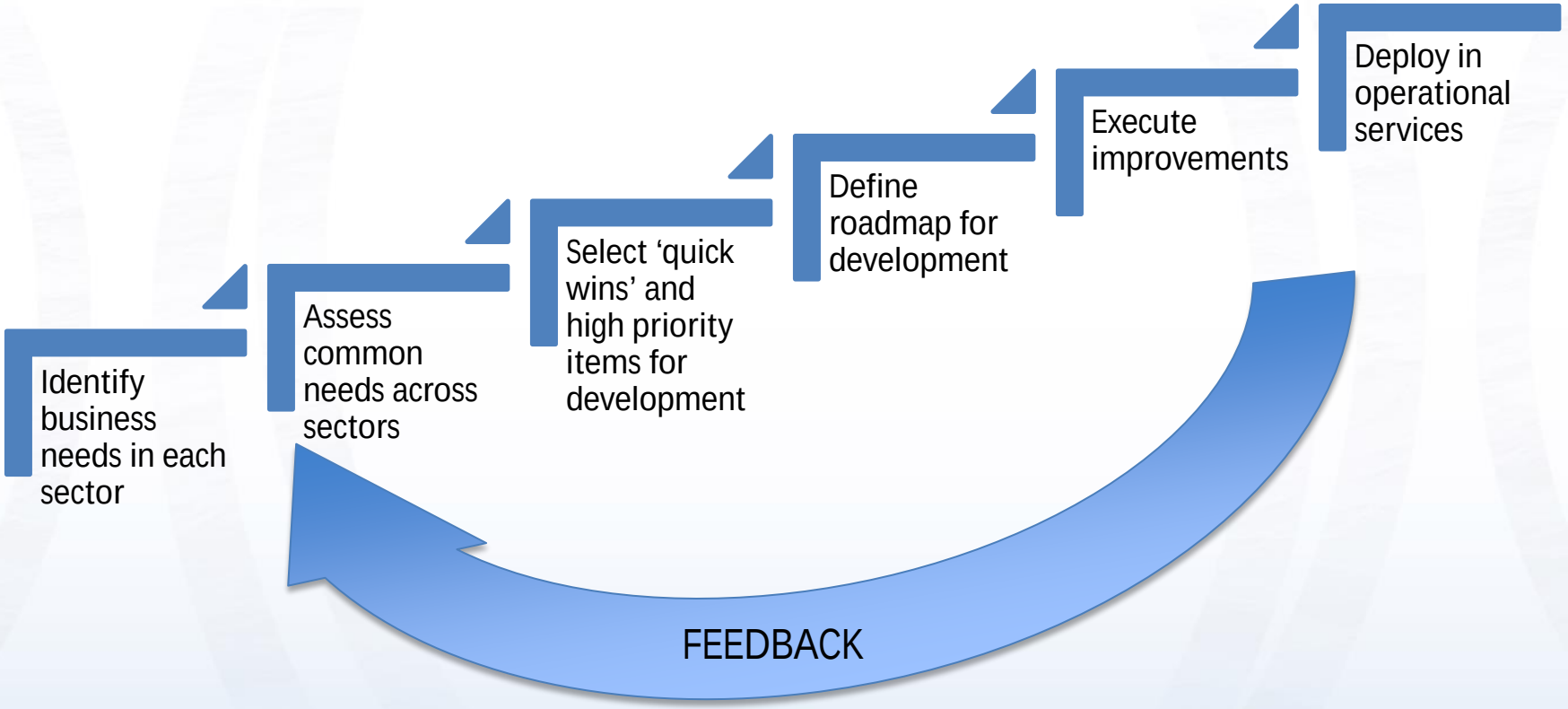
Development Staircase



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Summary

Goal	• Improved safety and efficiency for Marine Industries
Reality	• Australia lags behind Asia, Europe and North America in operational oceanography
Opportunity	• With better collaboration and integration, we can achieve more
Way forward	• FOO provides a mechanism to develop a Road Map for future development

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Thank you

For discussion...

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