Marine mammals, tidal energy and collision risk: A UK perspective

Carol Sparling

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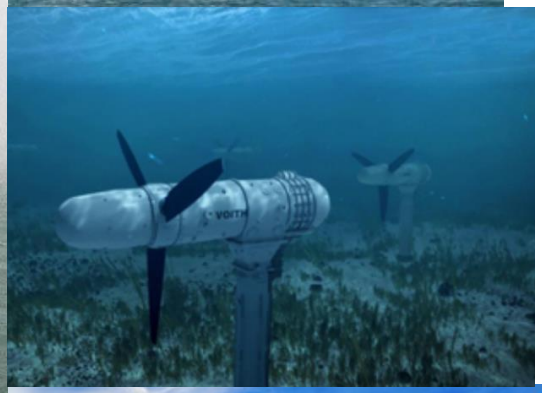
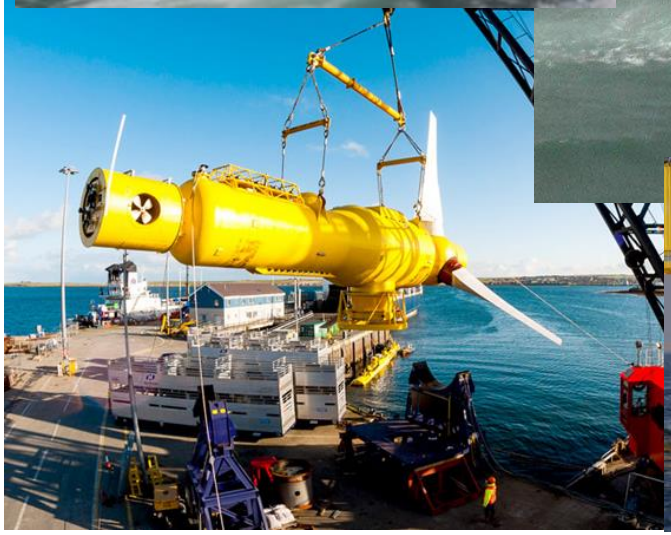
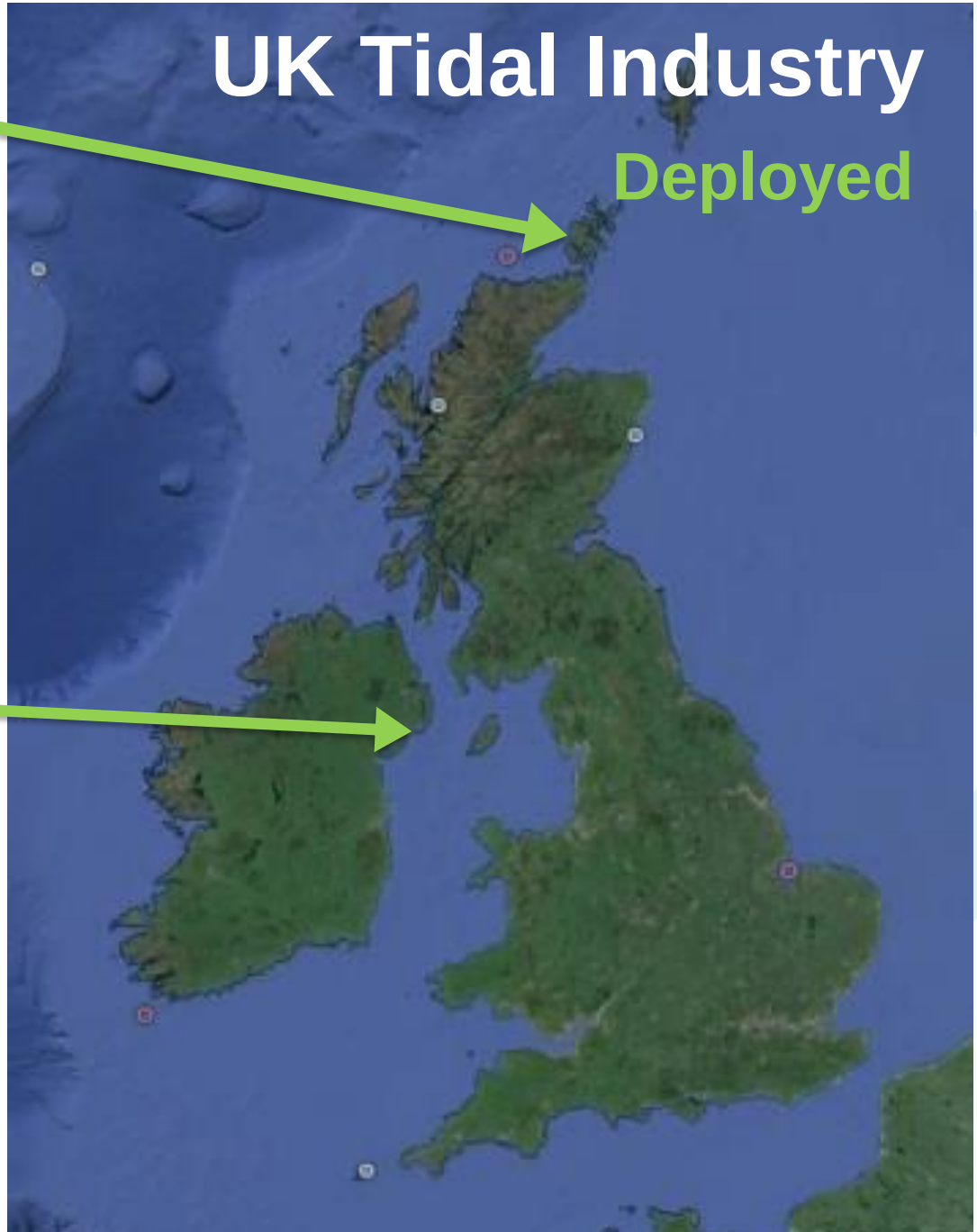



EMEC:

- Andritz Hydro Hammerfest
- Alstom
- Open Hydro
- Scotrenewables Tidal Power
- Voith Hydro

Strangford Lough

- Marine Current Turbines
- Minesto
- Schottel



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Sound of Islay

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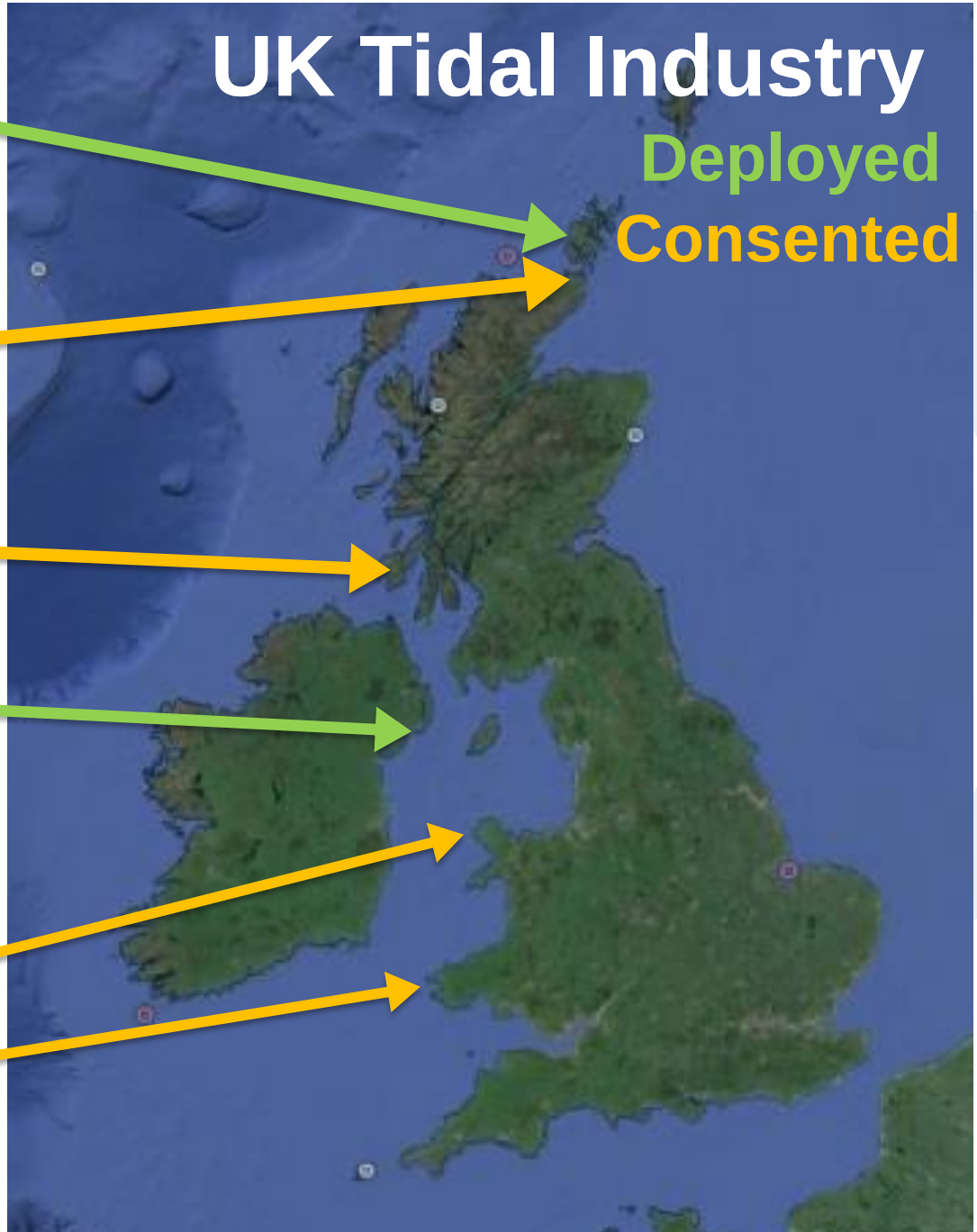
Anglesey Skerries

- Marine Current Turbines

Ramsey Sound

- Tidal Energy Limited



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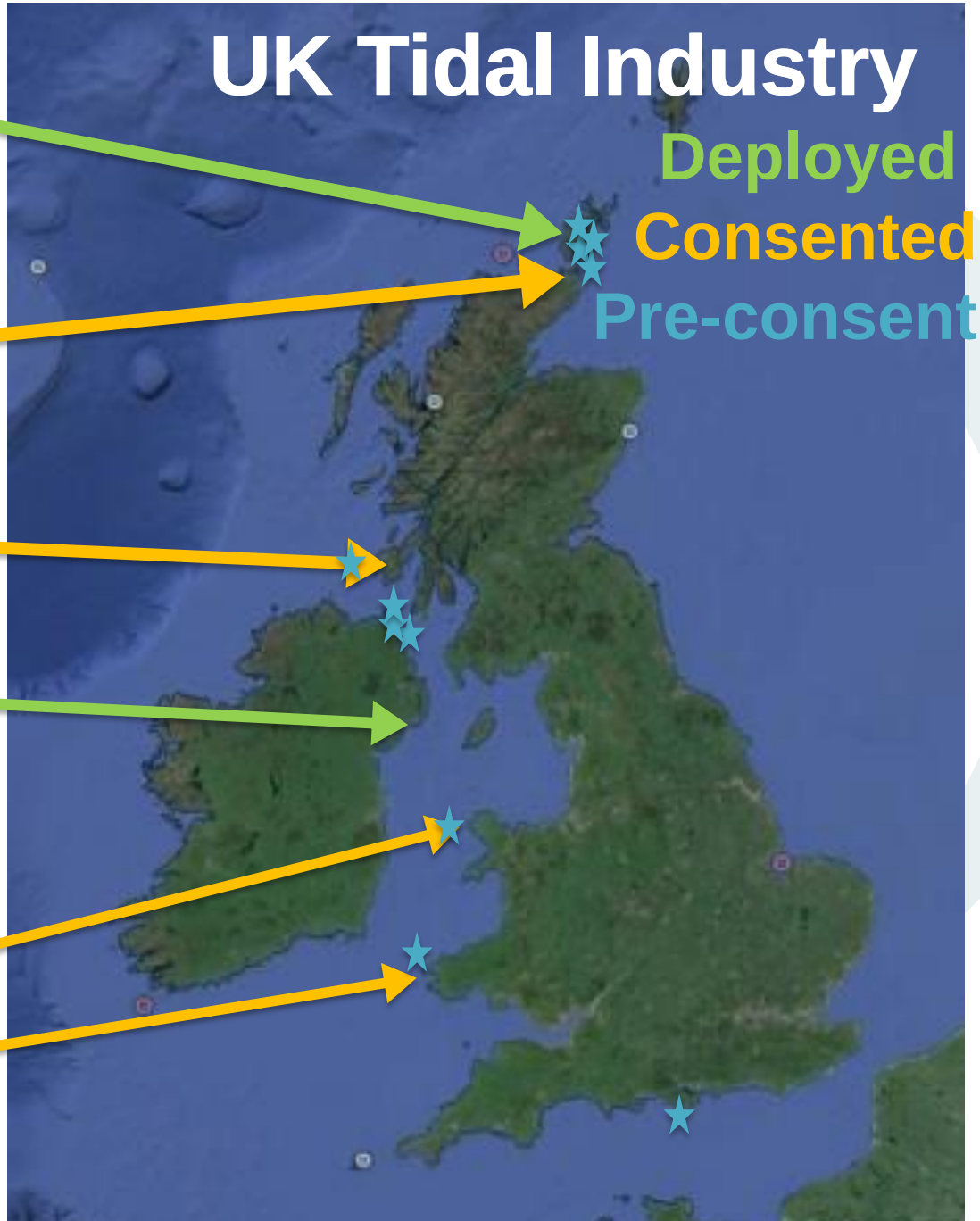
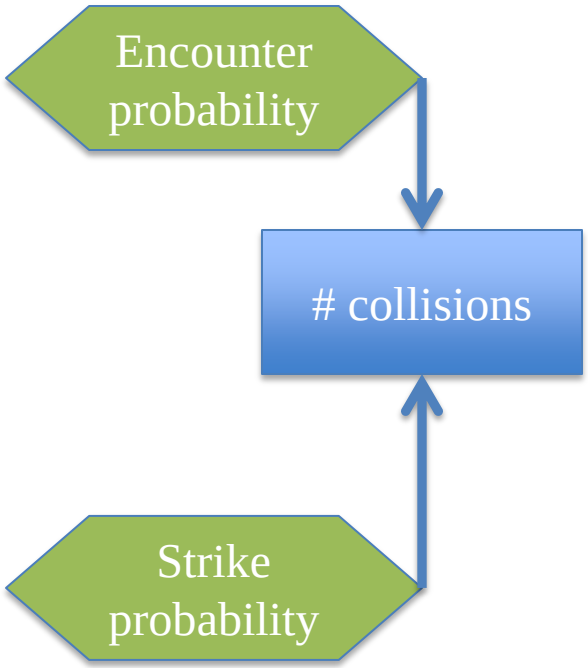


Marine mammals and collision risk:



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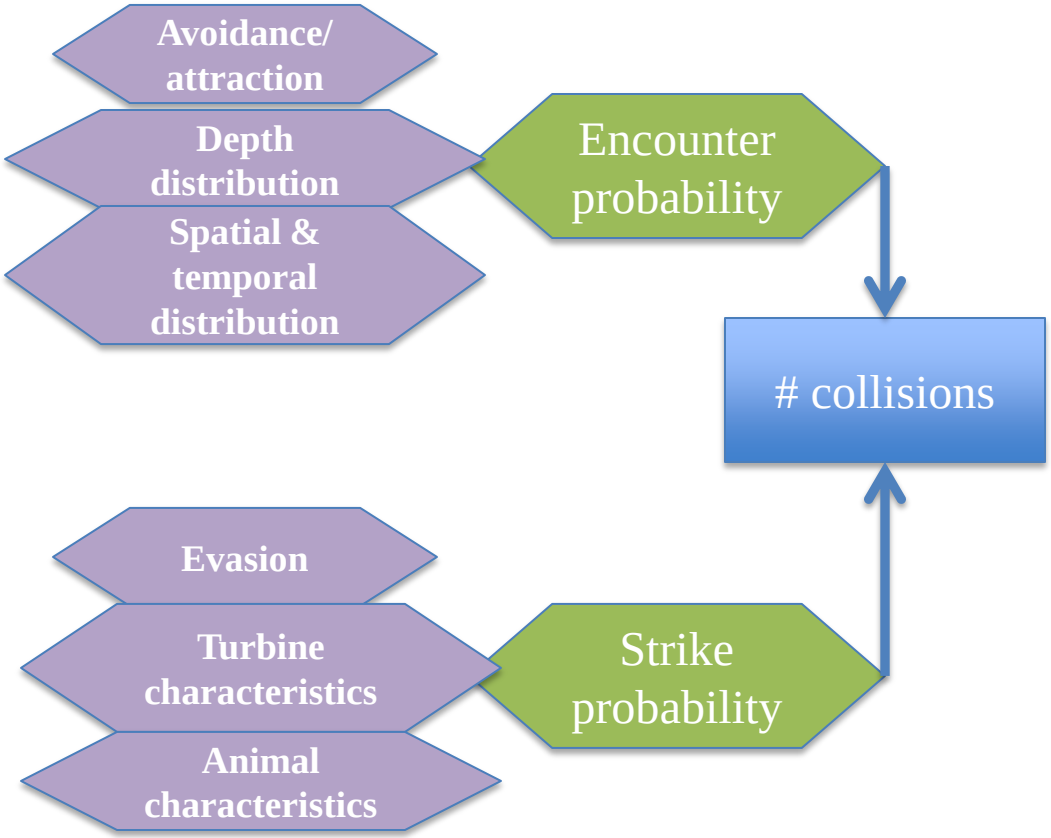

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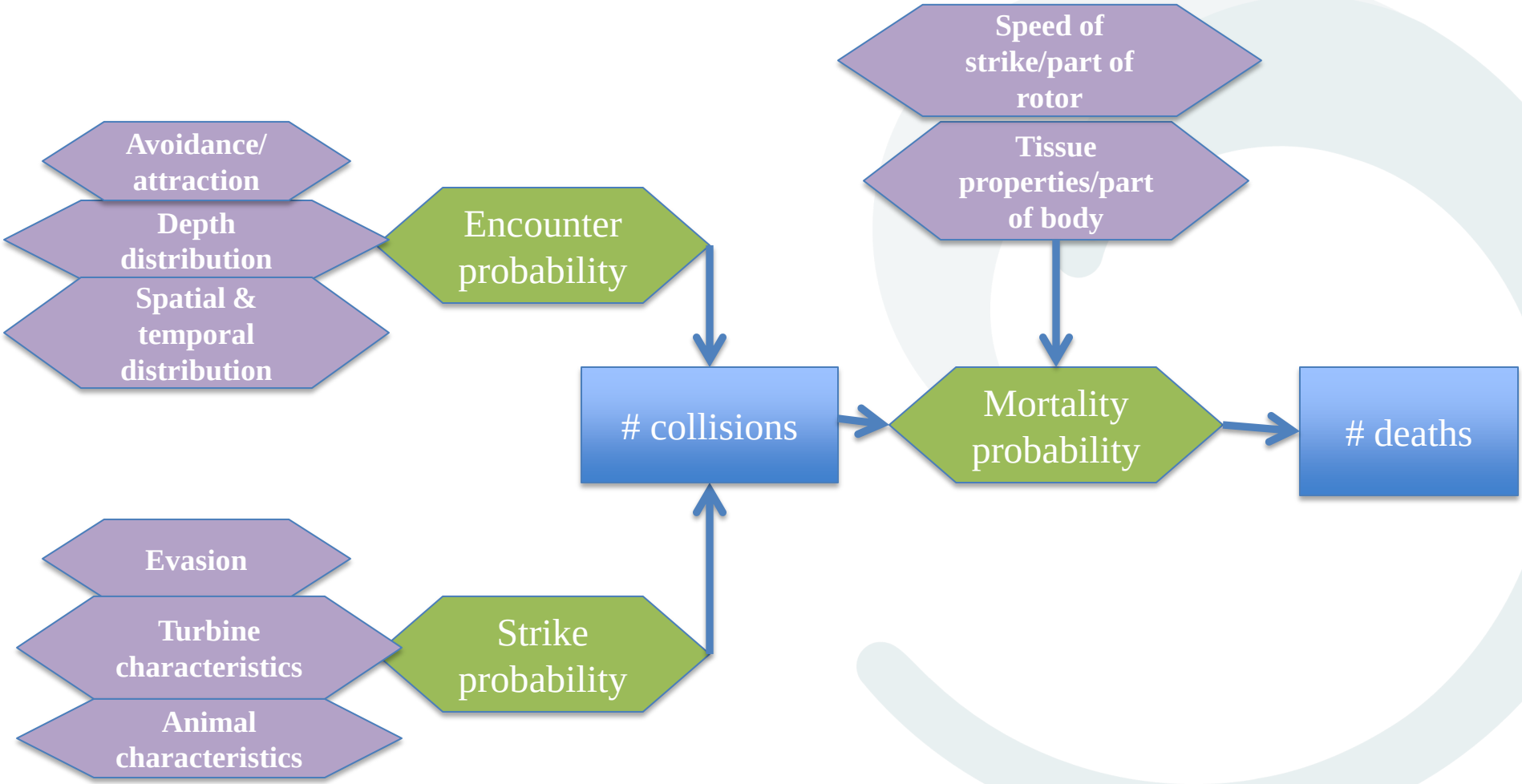
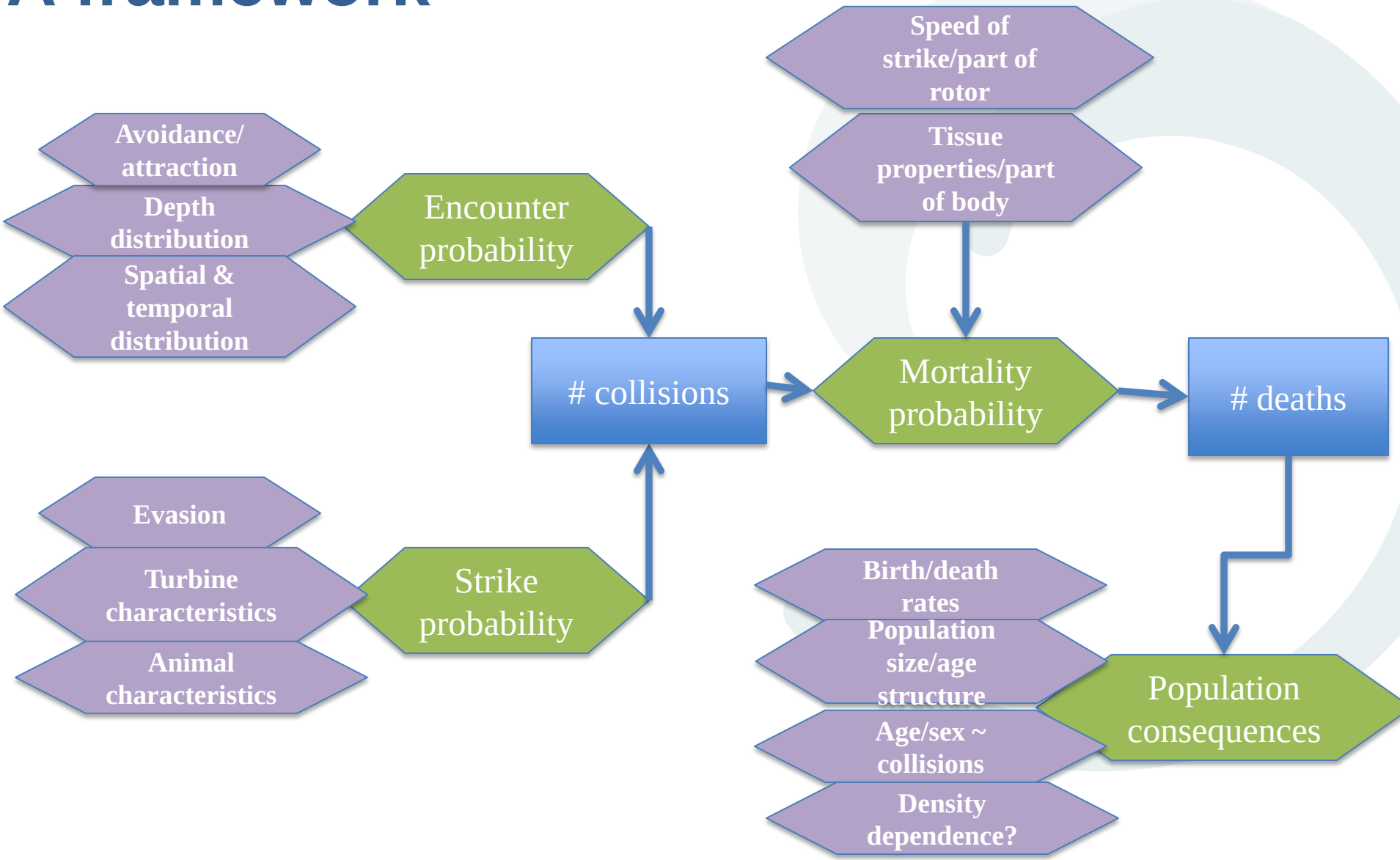
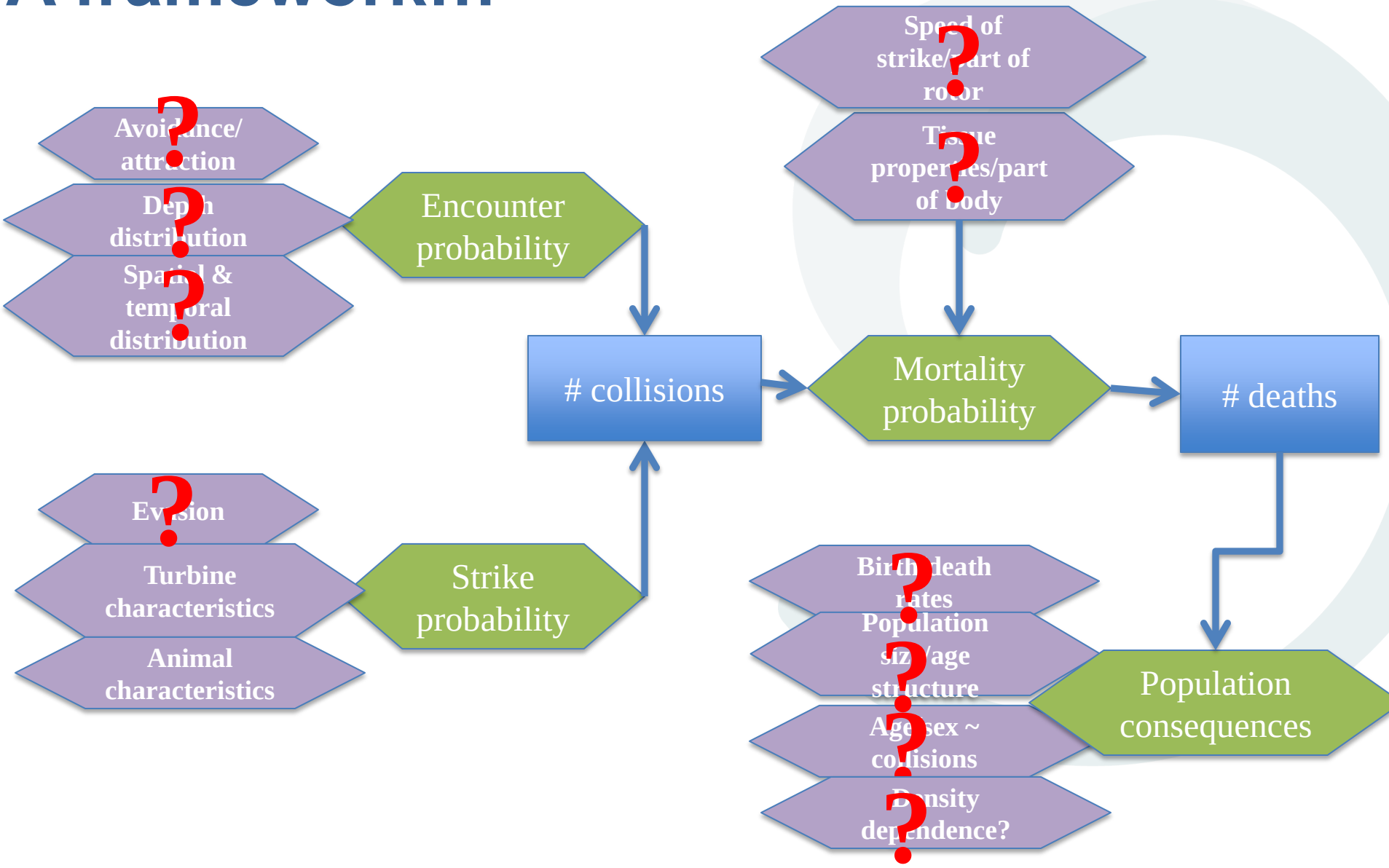


Marine mammals and collision risk: A framework



Marine mammals and collision risk: A framework…



Marine mammals and collision risk: A UK perspective

Conservation legislation driving UK main consenting issues

- EC Habitats Directive
  - Habitat Regulations Assessment (HRA)
  - European Protected Species (EPS)

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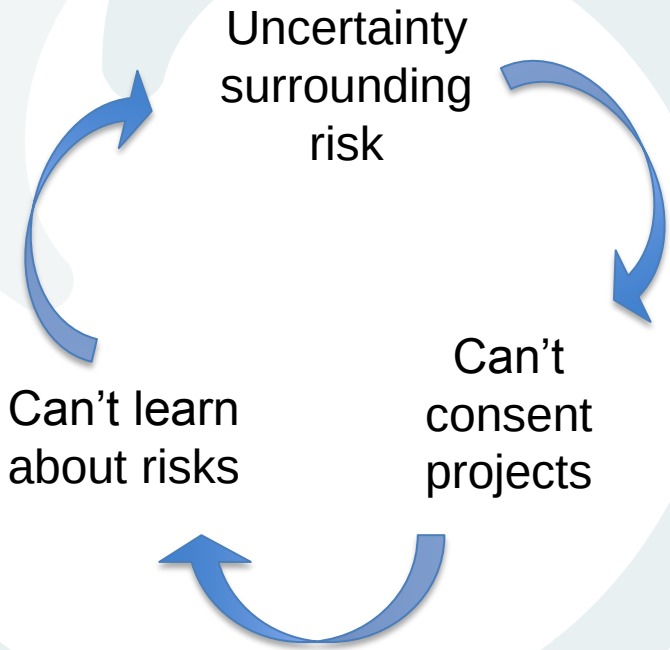
Marine mammals and collision risk: A UK perspective

Onus is on developers to demonstrate that their project **will not have a likely significant effect** on the features of a European protected site or on a population of a European Protected Species – difficult to prove a negative!



Marine mammals and collision risk: A UK perspective



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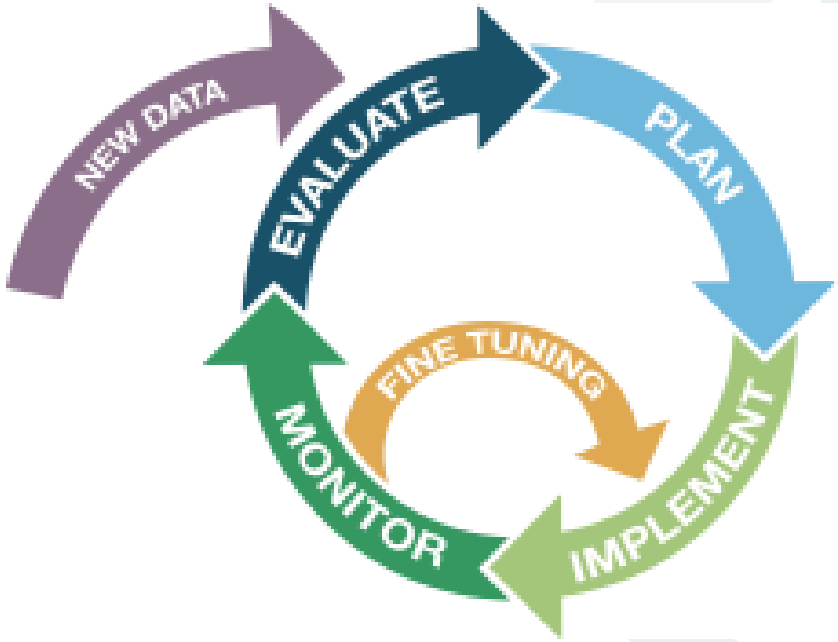
DEPLOY and MONITOR with ADAPTIVE MANAGEMENT



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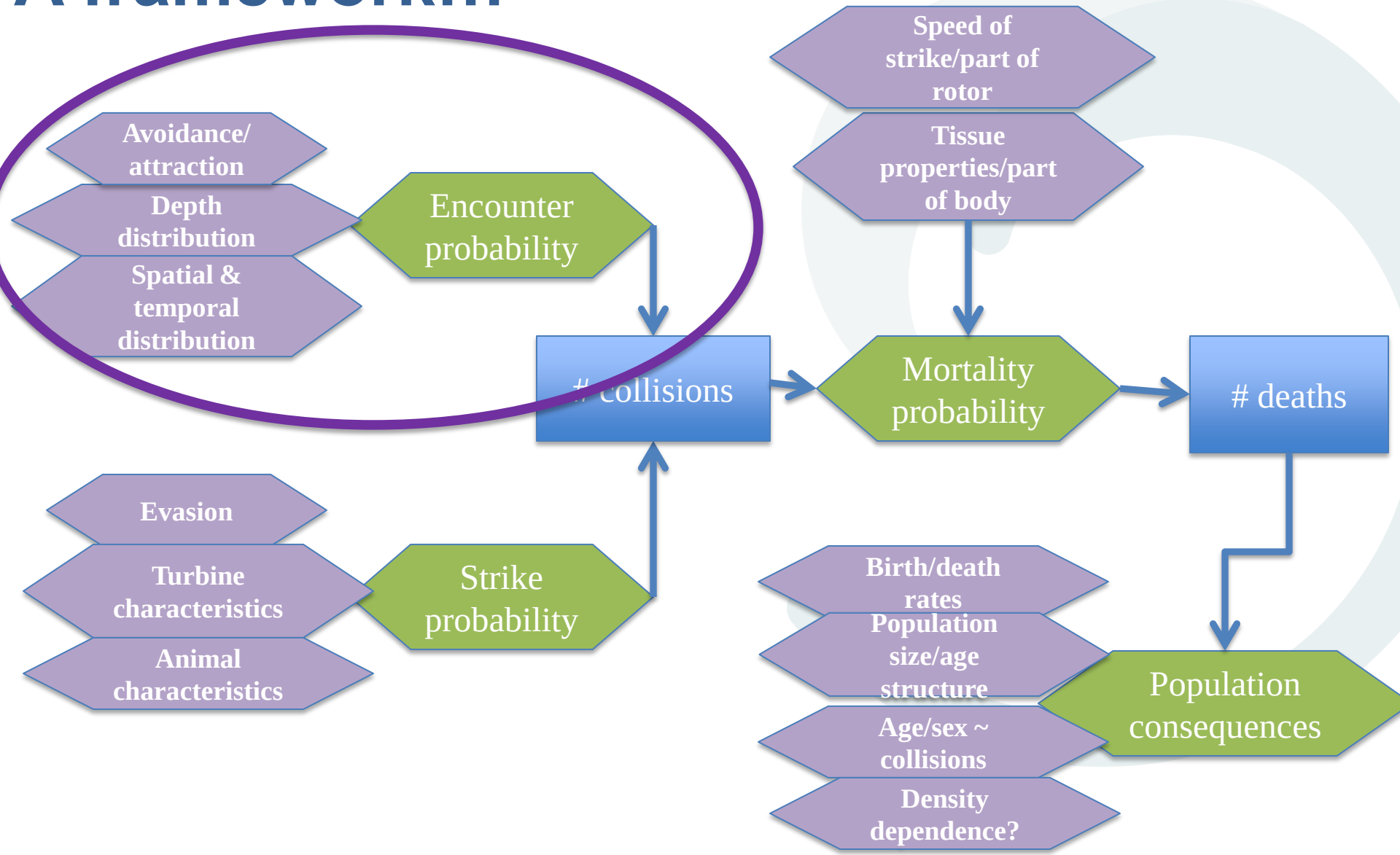
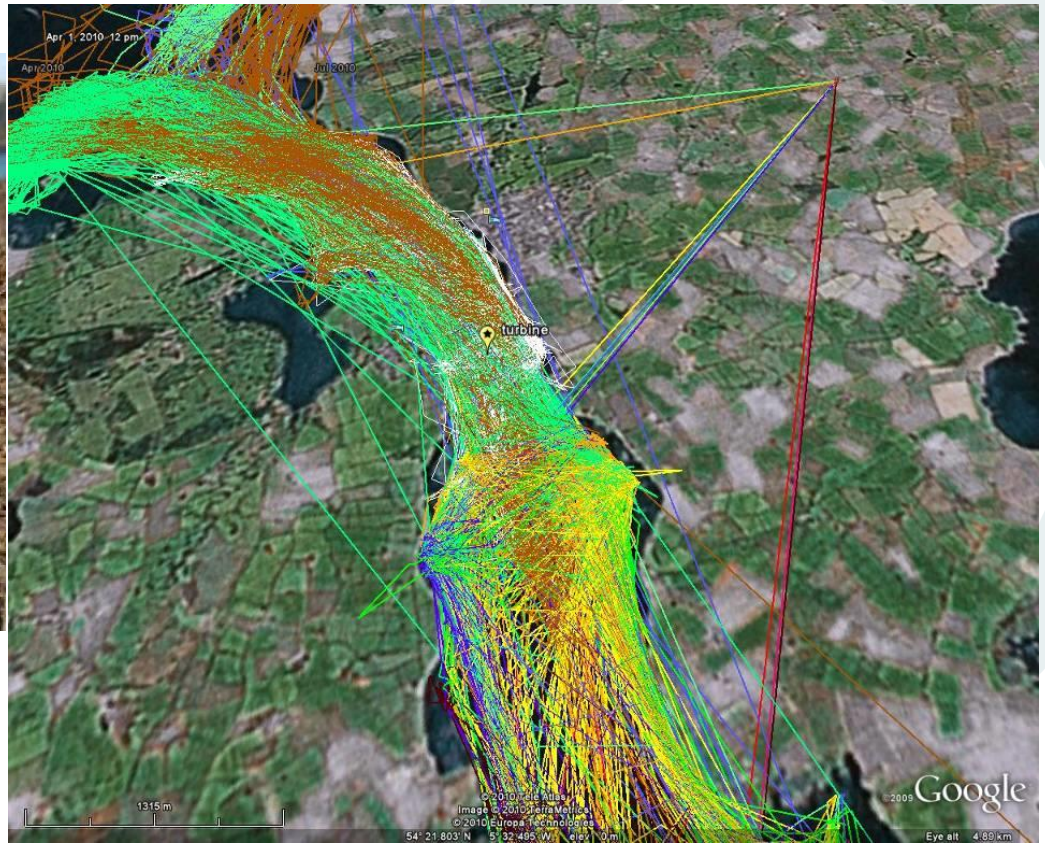
Marine mammals and collision risk: A UK perspective

Operation under shutdown

Marine mammals and collision risk: A framework…



Seal tracking in vicinity of operational tidal turbine



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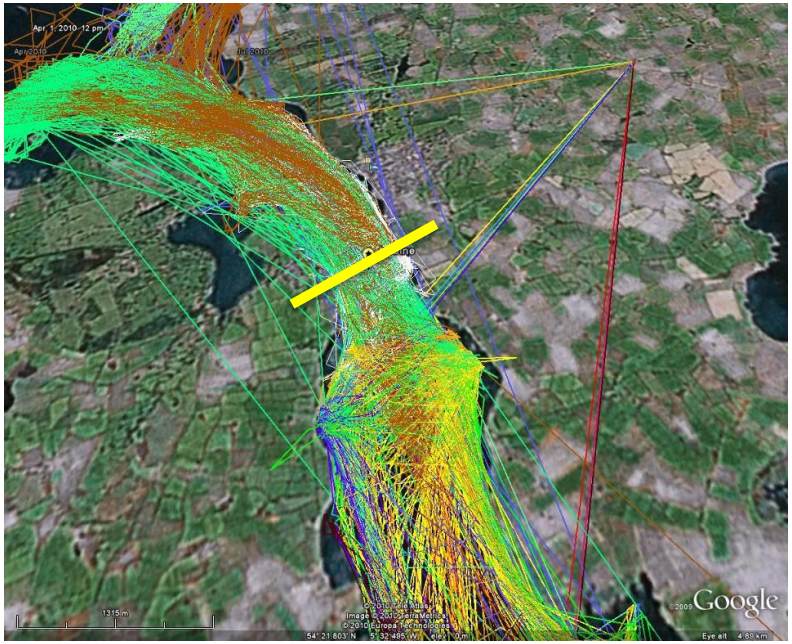
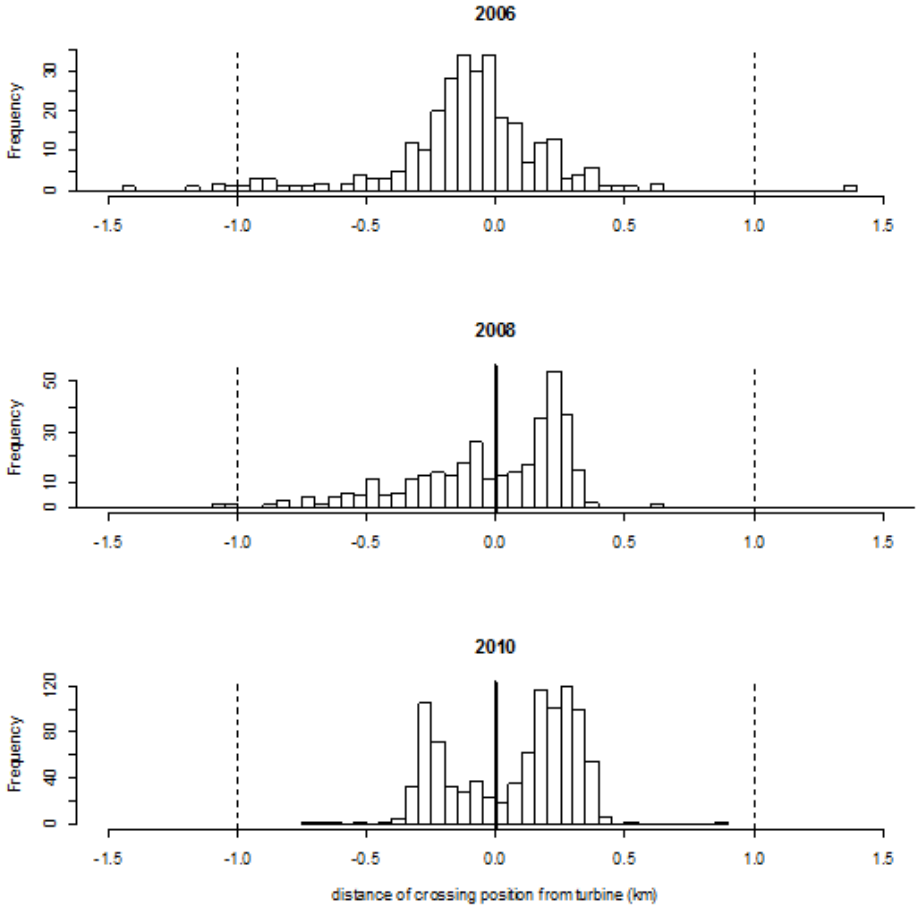
Seal tracking in vicinity of operational tidal turbine

Macro avoidance?





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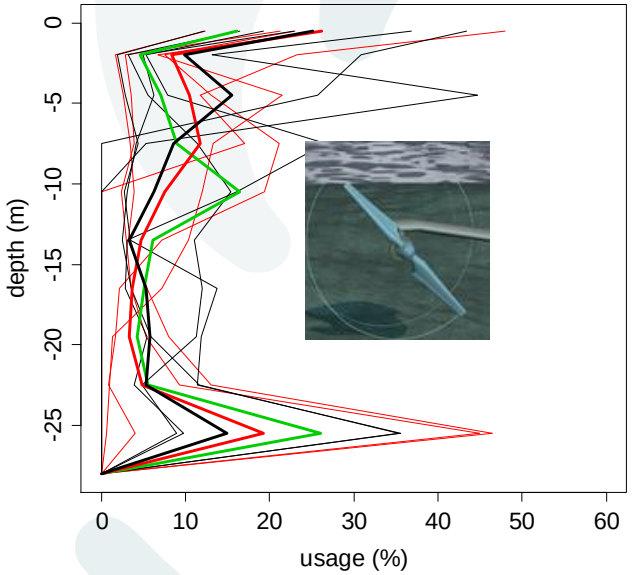
Seal tracking in vicinity of operational tidal turbine

Depth distribution



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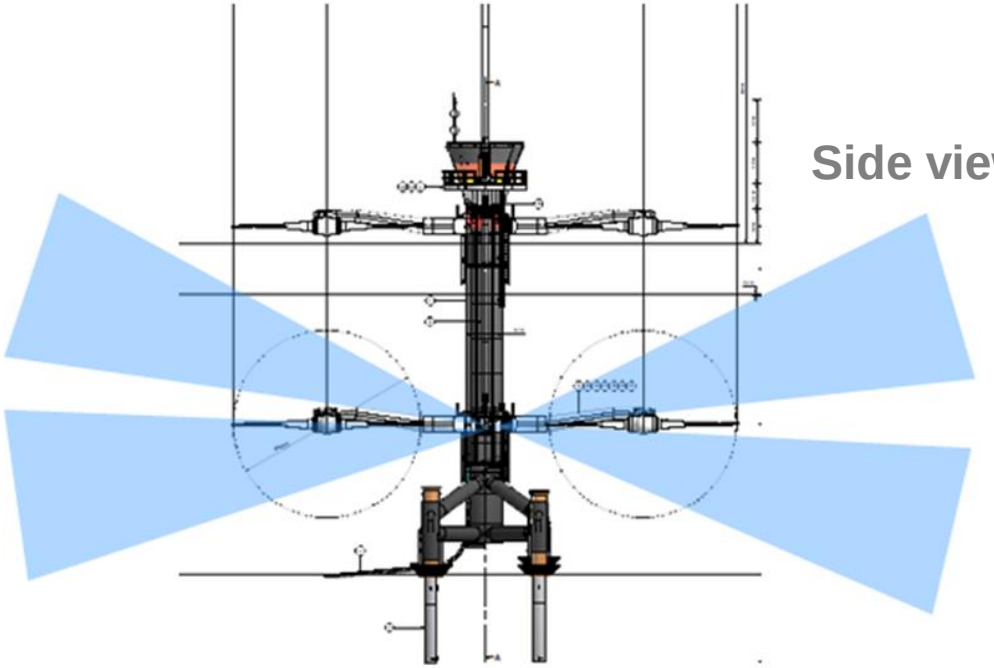
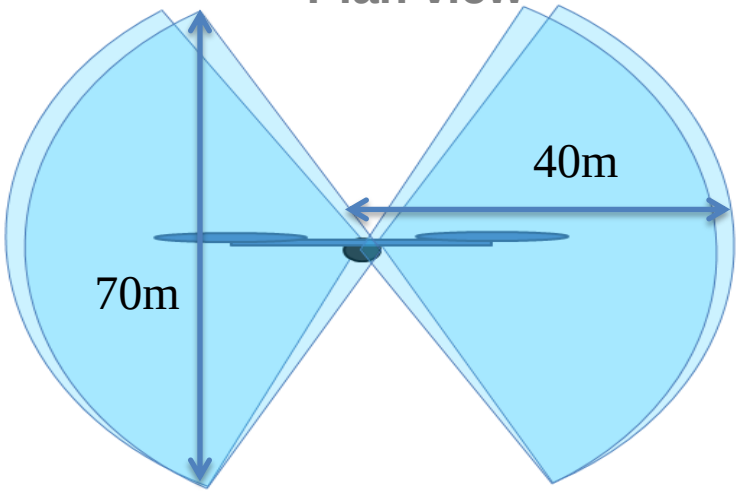
Licenced trial removal of mitigation with active acoustic monitoring



Side view

Plan view



- Data on passage rates in the presence of an operating turbine (compare these with previously estimated –refine collision risk
- Evidence for evasion/avoidance???

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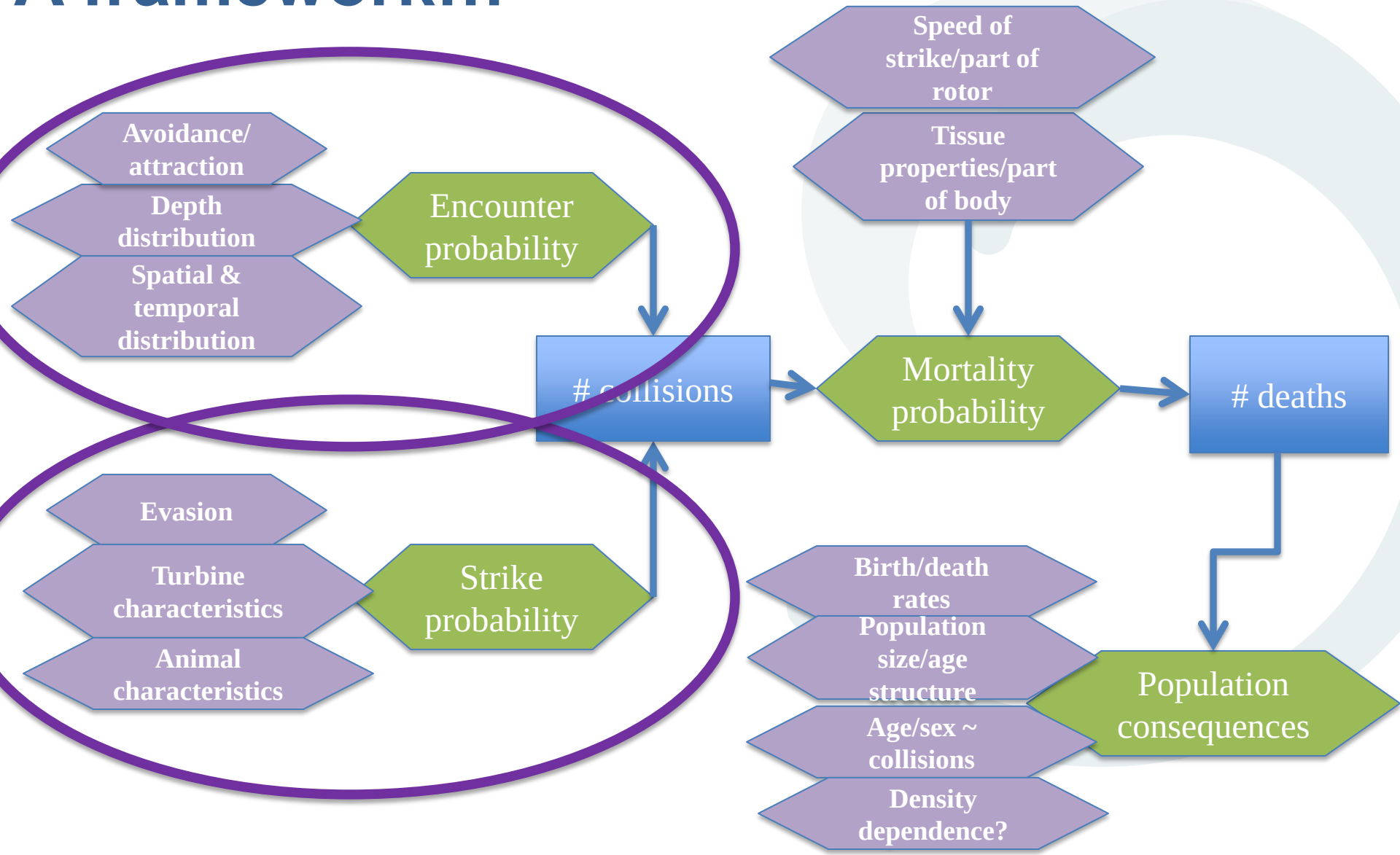
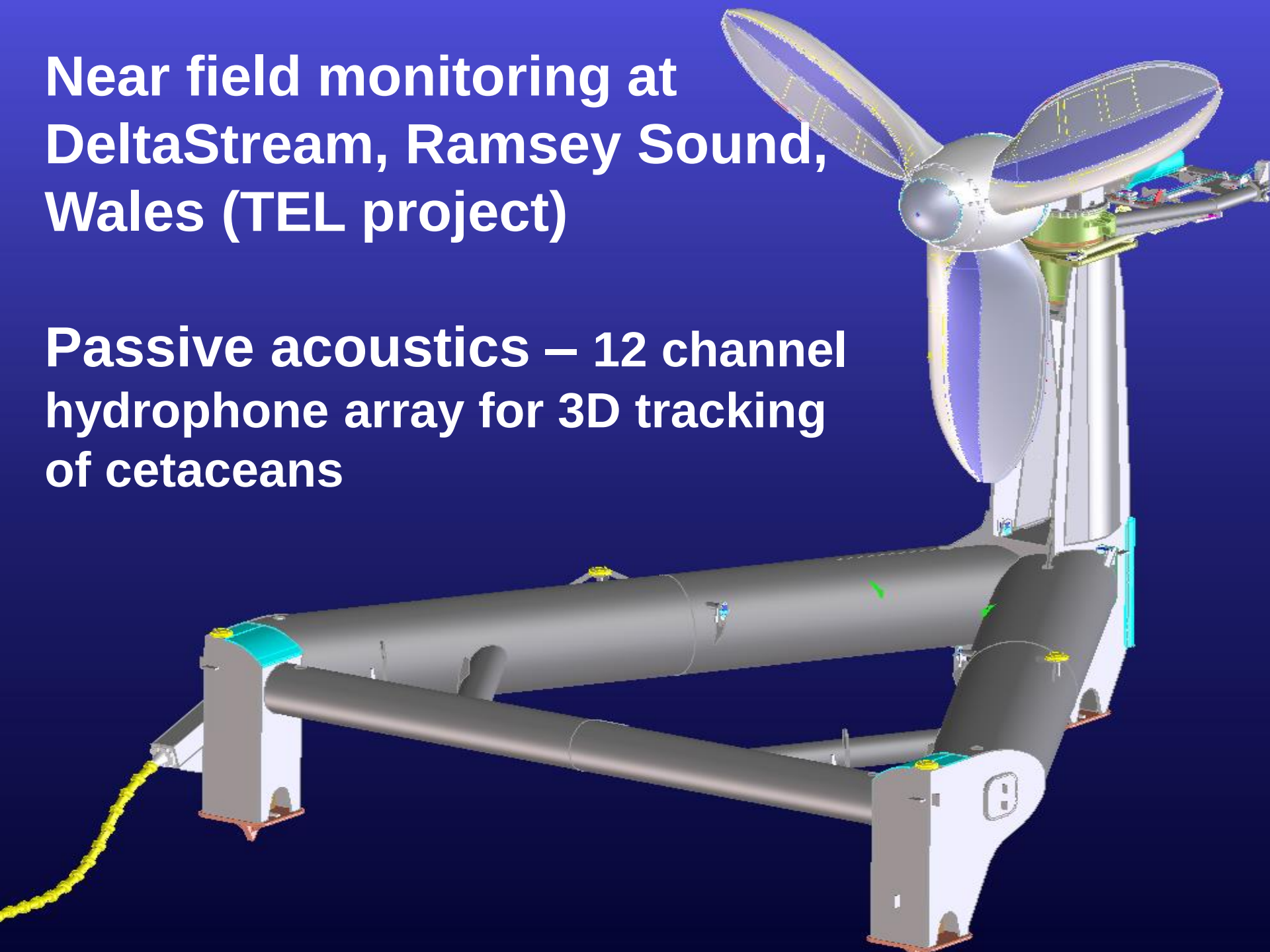
Marine mammals and collision risk: A framework…



Near field monitoring at DeltaStream, Ramsey Sound, Wales (TEL project)

Passive acoustics – 12 channel hydrophone array for 3D tracking of cetaceans



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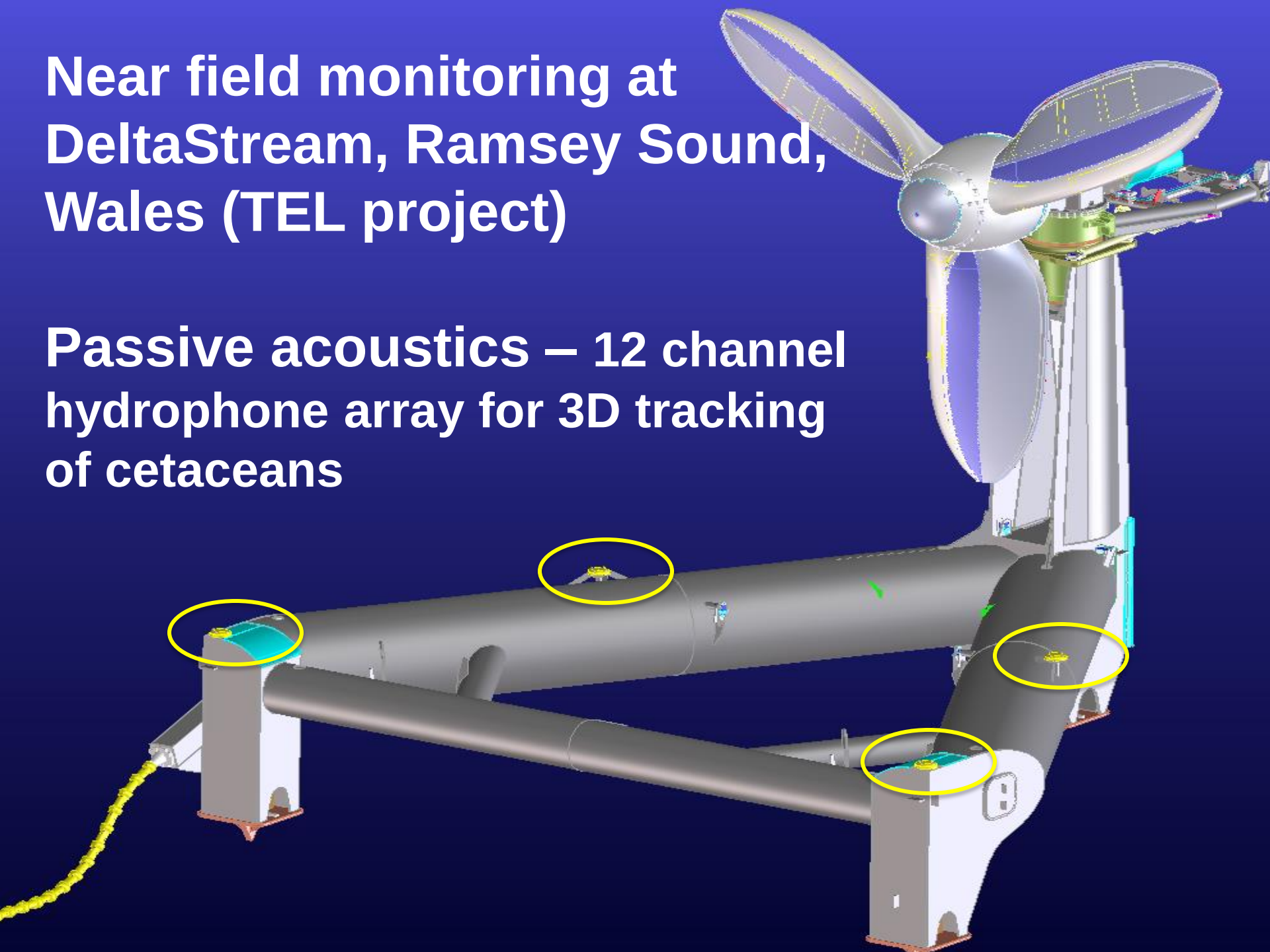
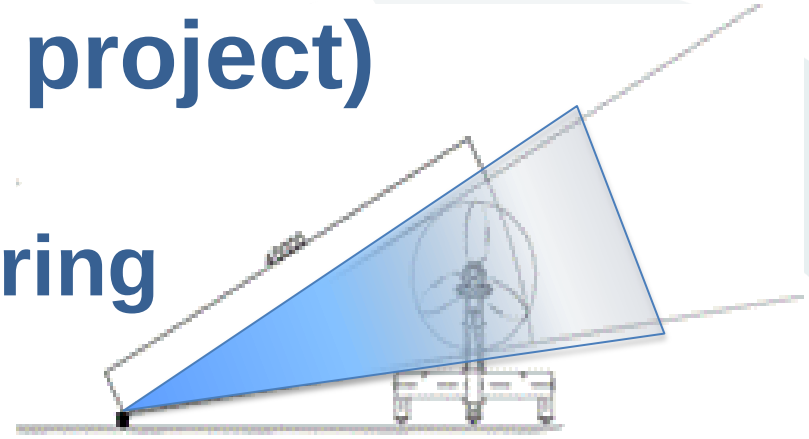
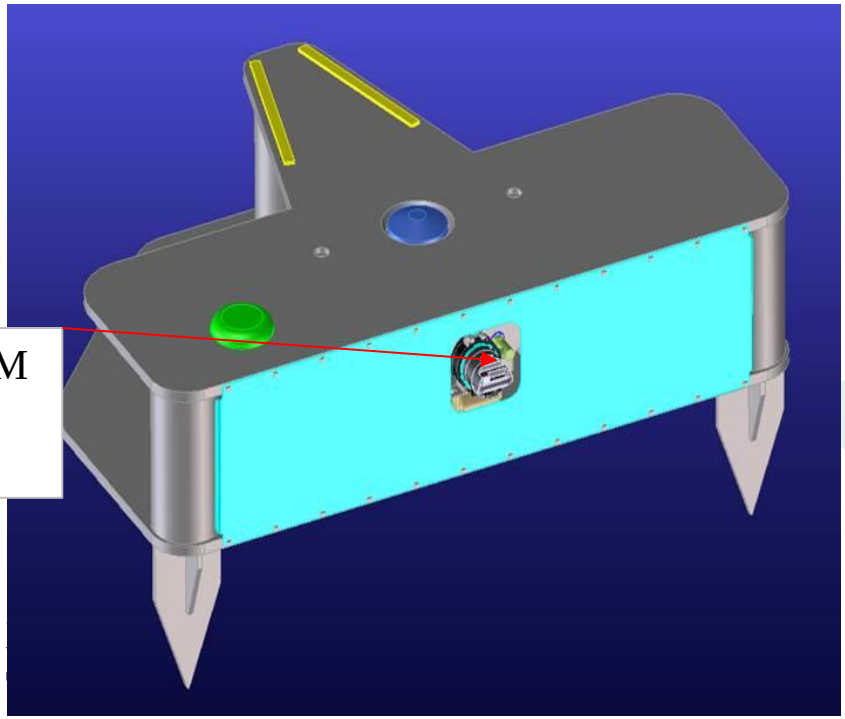


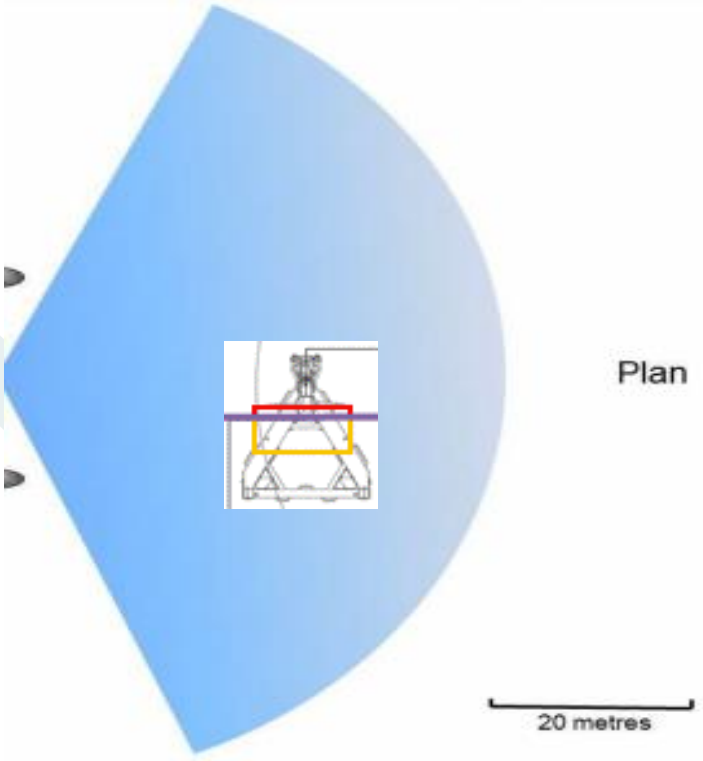
Near field monitoring at DeltaStream, Ramsey Sound (TEL project)

Active acoustic monitoring





MULTIBEAM SONAR on RAMP



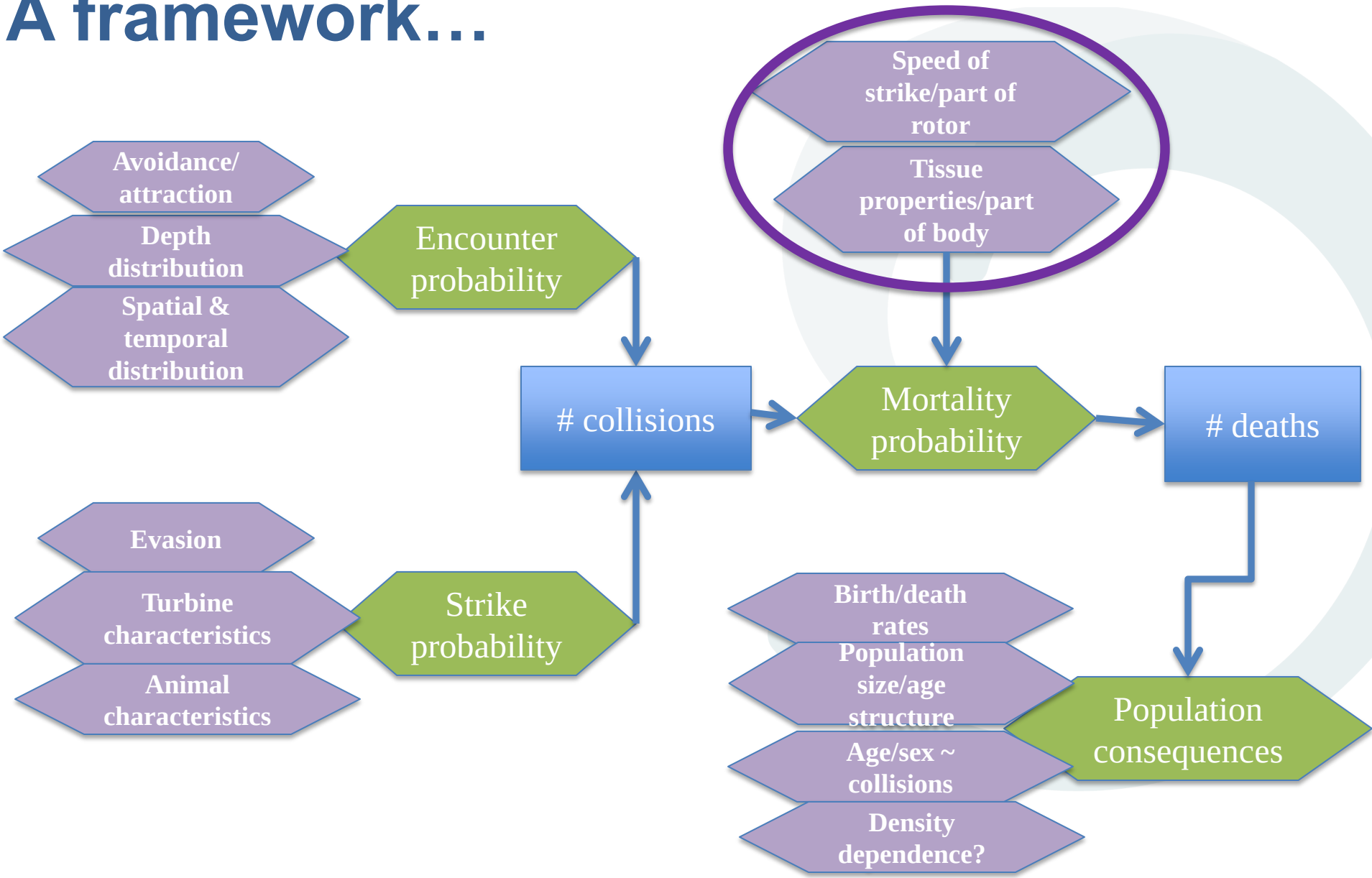
Scottish Government Demonstration Strategy Project

- Develop and test sensor technologies – PAM & AAM

- Develop analytical tools – 3D PAM tracking & AAM automatic detection, classification and tracking

- Deployment at Meygen project Pentland Firth

Marine mammals and collision risk: A framework…



Understanding the consequences of collisions

- PNNL strike modelling
- SMRU carcass collision trials
- X-Med EXtreme Loading of Marine Energy Devices due to Waves, Current, Flotsam and Mammal Impact (Manchester Uni)

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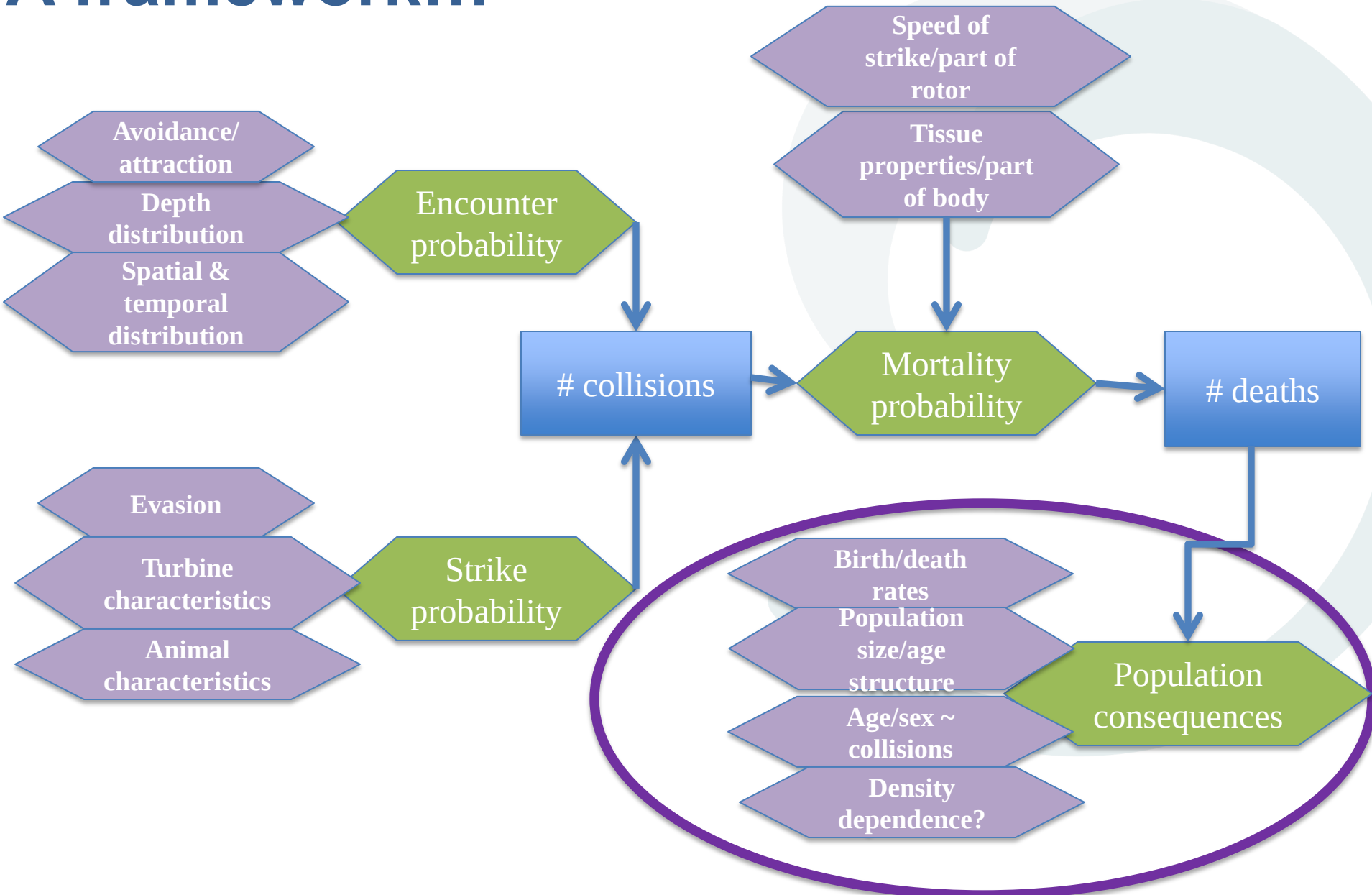
Marine mammals and collision risk: A framework…



Understanding the population level consequences of collisions

- PBR/threshold approach
- Adapted PCoD model (PCoC)

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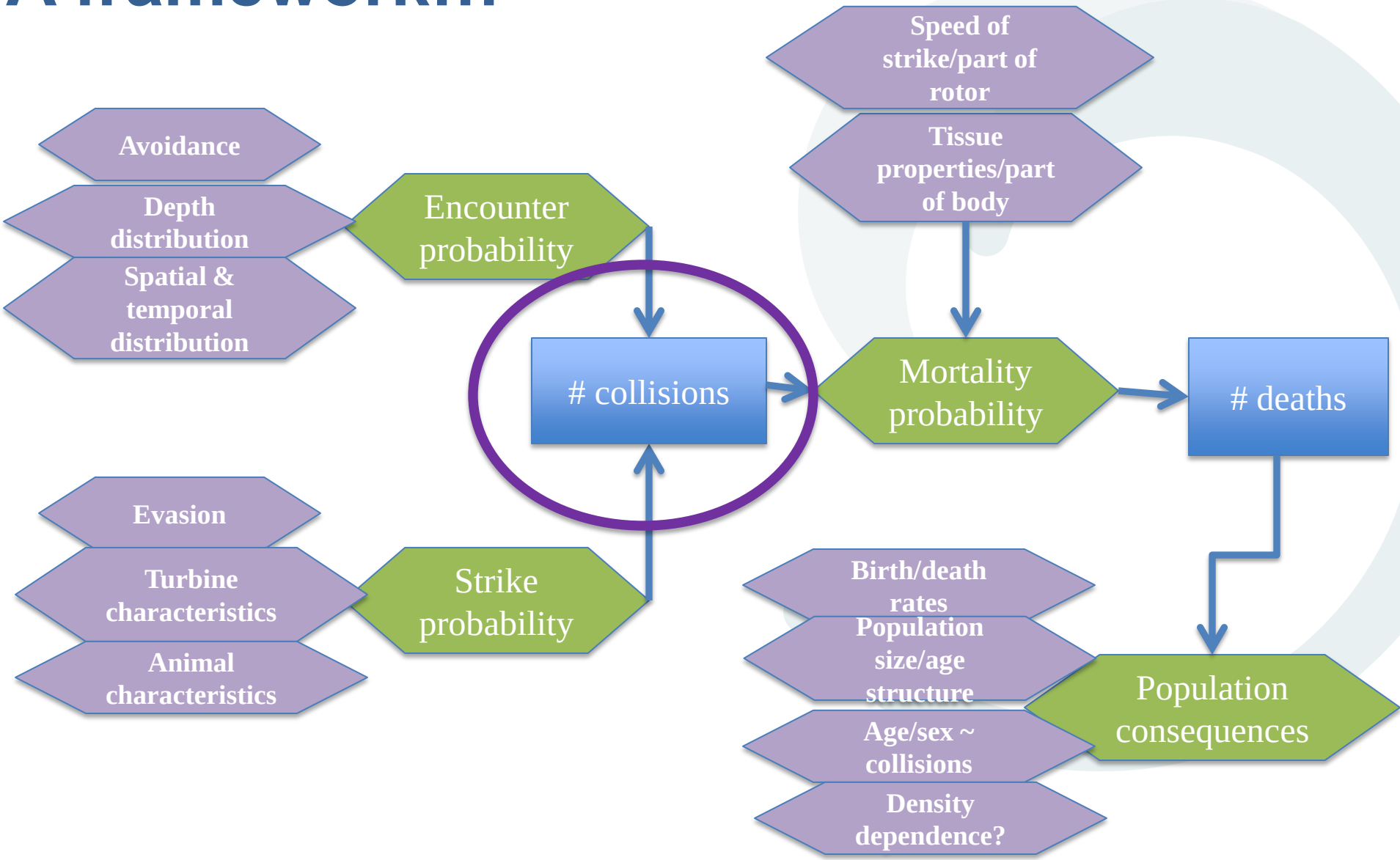

Verifying predictions…..

- Collision-o-meter???

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Marine mammals and collision risk: UK lessons learned…

- Site selection important to manage out risks
- Deploy and monitor, and monitor and monitor: de-risk at early stage of industry
- Don’t be too quick to mitigate (but develop mitigation approaches in parallel and be prepared to)
- Design and integrate monitoring early

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Marine mammals and collision risk: UK lessons learned…

COLLABORATION IS KEY TO SUCCESFUL PROGRESS UNDER UNCERTAINTY

- Developers, regulators, conservation agencies, academia working together and learning together

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Thanks to…

Sea Mammal Research Unit
Marine Current Turbines
Tidal Energy Limited
MeyGen
Scottish Government
Northern Ireland Dept of Environment Marine Division
Natural Resources Wales
Royal Haskoning DHV
Department of Energy and Climate Change

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