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Prifysgol Abertawe

# MRE Research Project for the MRE Sector

Miles Willis 9<sup>th</sup> February 2010

To Pembrokeshire Marine Renewable Energy Industry Seminar



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# Reasons for today's talk

- Who are we?
- What have we been doing?
- What are we planning to do?
- What we can offer?



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# The Low Carbon Institute for Wales

## 1: Low carbon energy generation, storage and distribution

- PV (inc PV theme group)
- Hydrogen
- Distributed Generation
- Marine (inc Marine theme group)
- Power Take Off

## 2: Carbon reduction and energy efficiency

- Built Environment
- Large Scale Power Generation
- Electrical Product Efficiency
- Socio-economics
- Transport

## 3: Energy Graduate School

4: Dissemination and Partnerships with industry, research organisations and government





# Marine Energy Task Group for Wales

Enabling and Delivering Marine Energy in Wales

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SWANTURBINES

Wave Dragon

TIDAL ENERGY

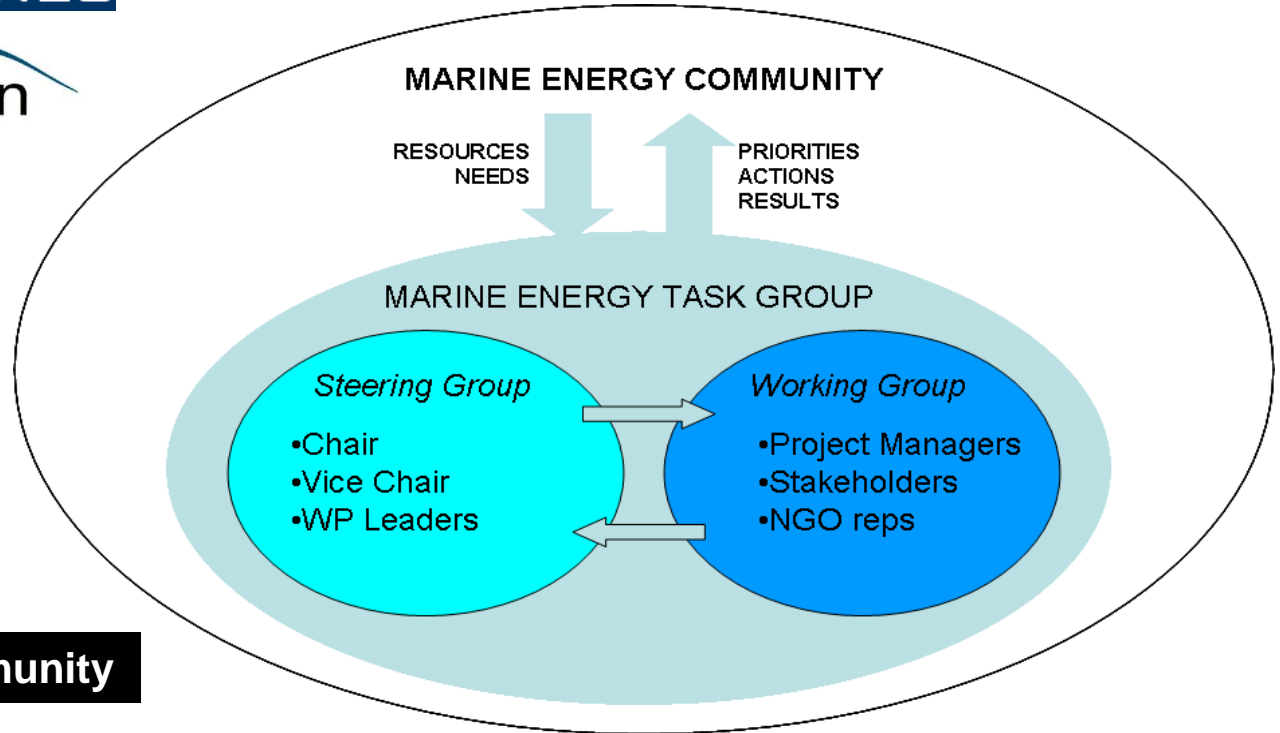
RWE npower renewables

e-on UK

THE CROWN ESTATE *Halcrow*

Severn Tidal Power Group

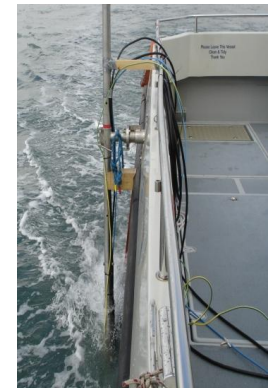
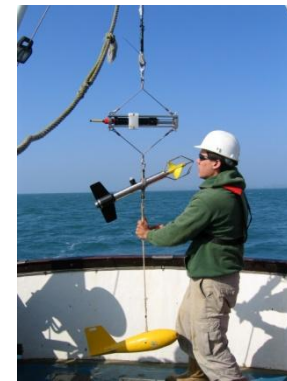
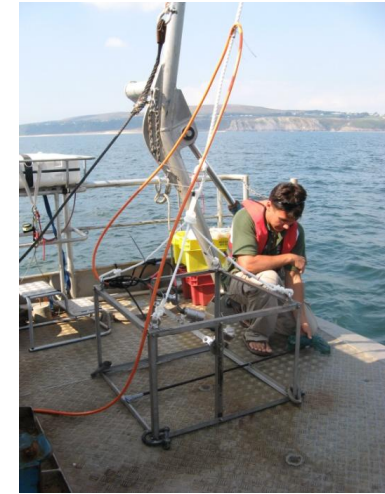
Welsh Academic Community





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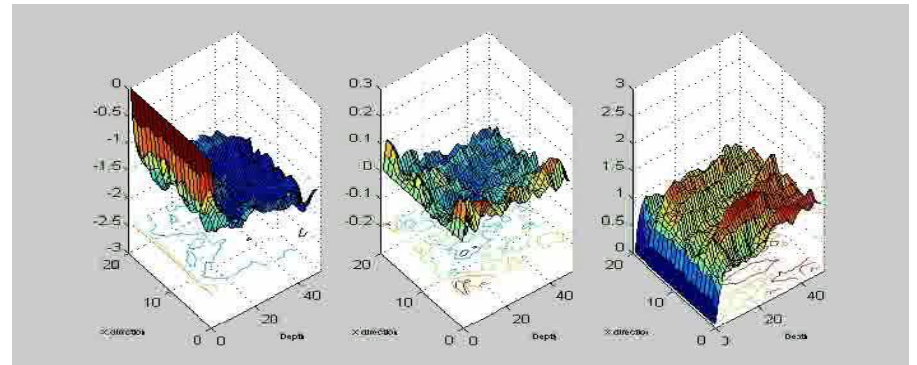
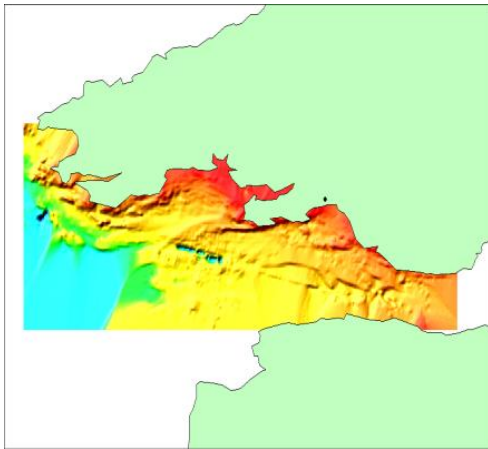
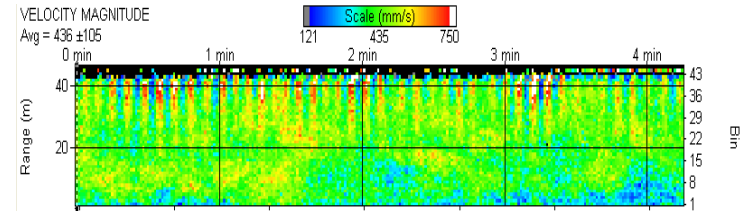
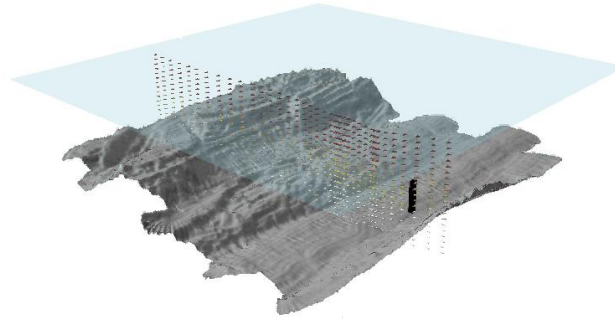
# Track Record - Field Activities





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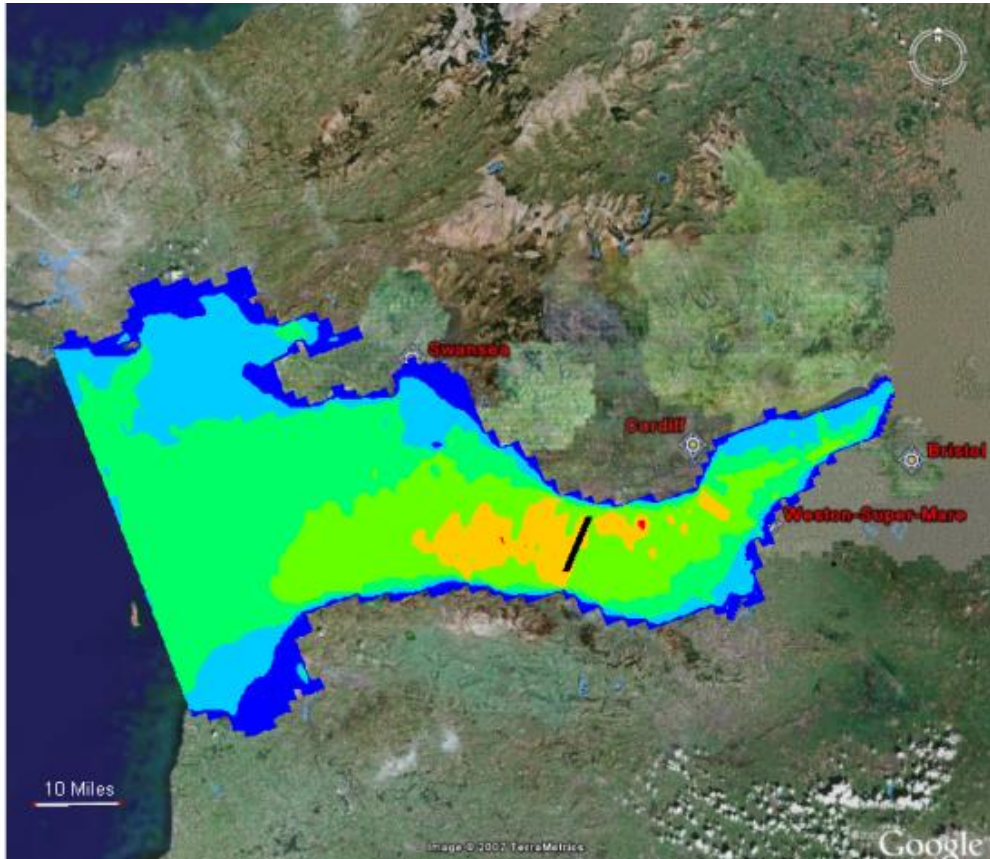
# Track Record - Resource Mapping





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# Track Record - Computational Activities

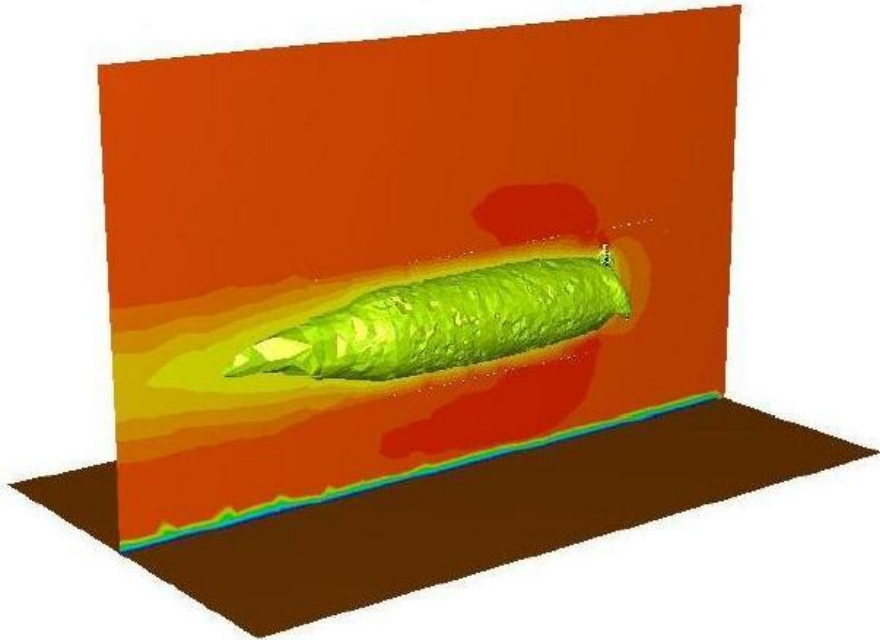


2-d and 3-d simulations  
in Severn Estuary  
(Cardiff)

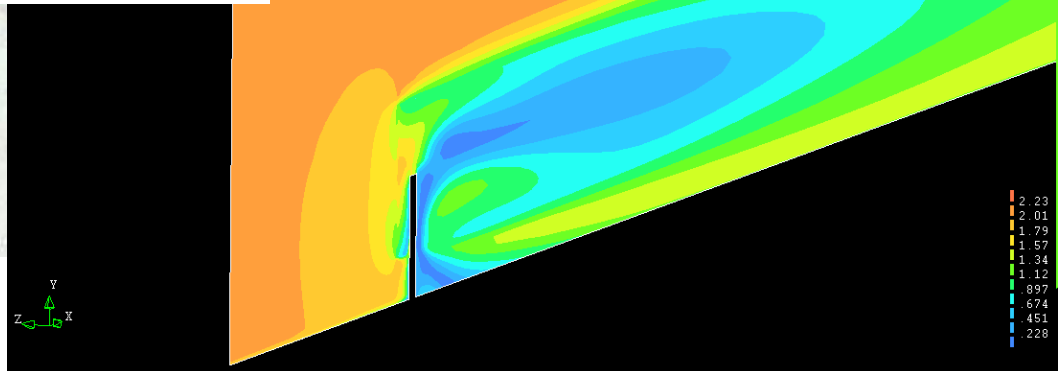


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# Track Record - Computational Activities



Tidal stream device wake effects (Swansea & Cardiff)



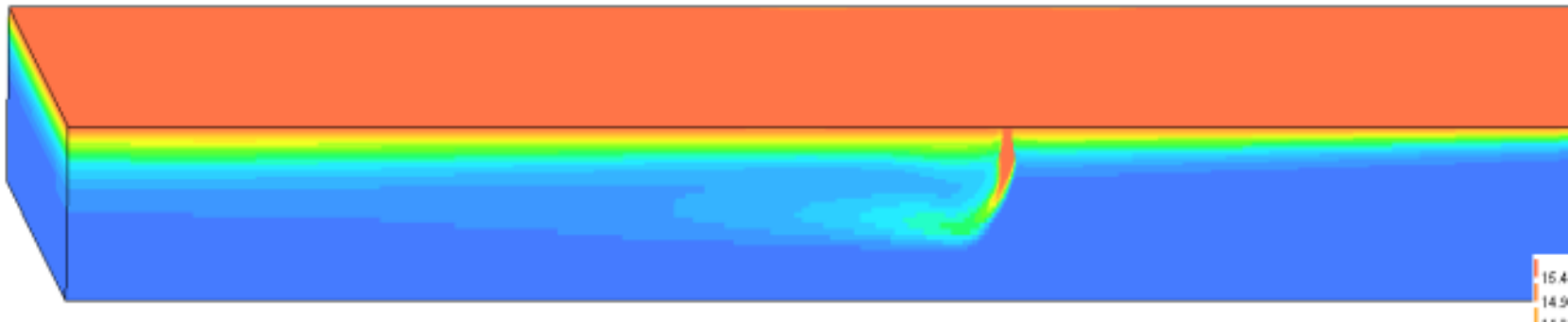


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# Track Record - Computational Activities



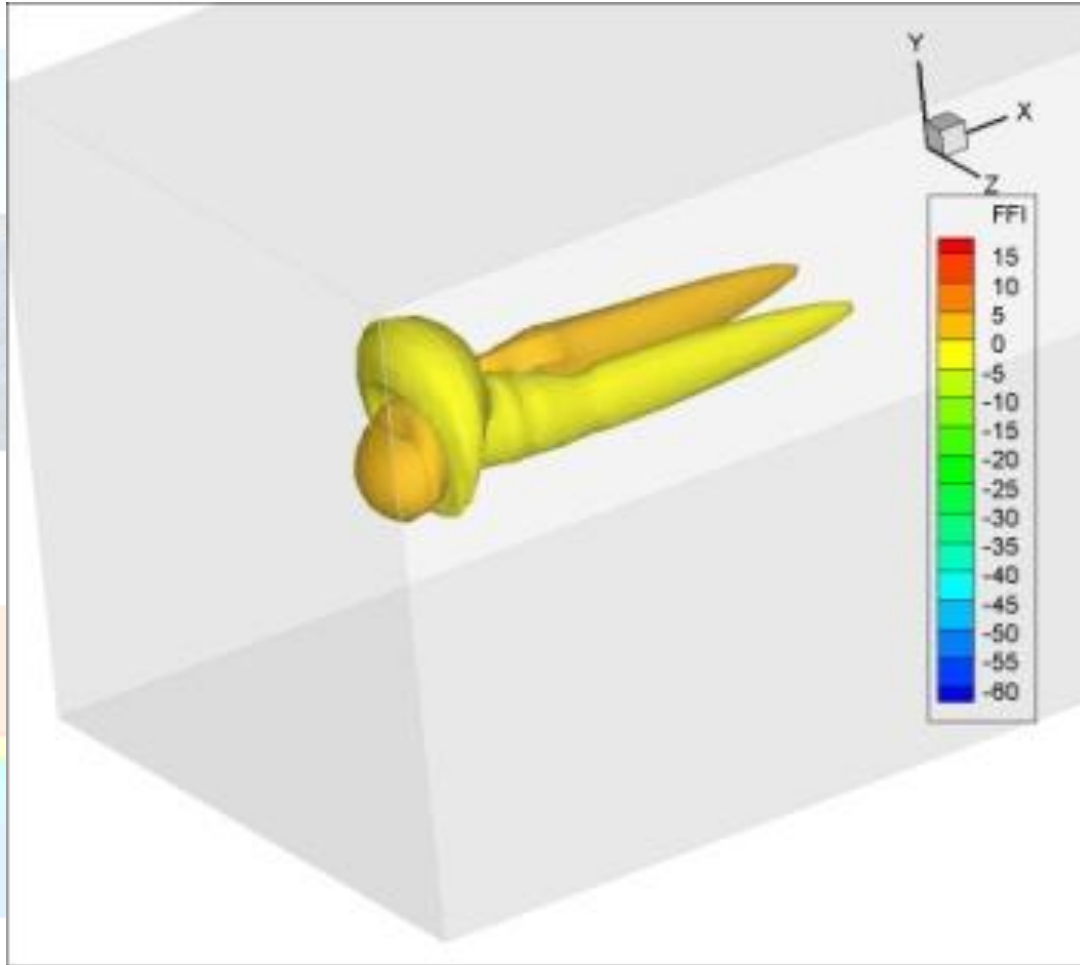
Water mixing effects -  
Wavedragon



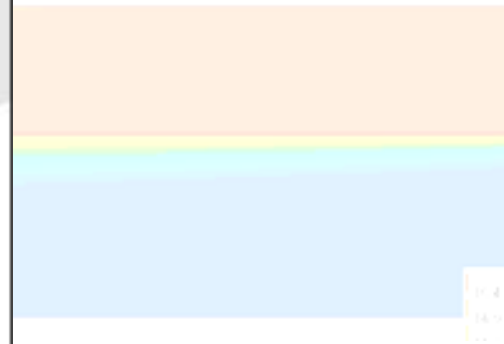


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# Track Record - Computational Activities



Fish  
Interactions

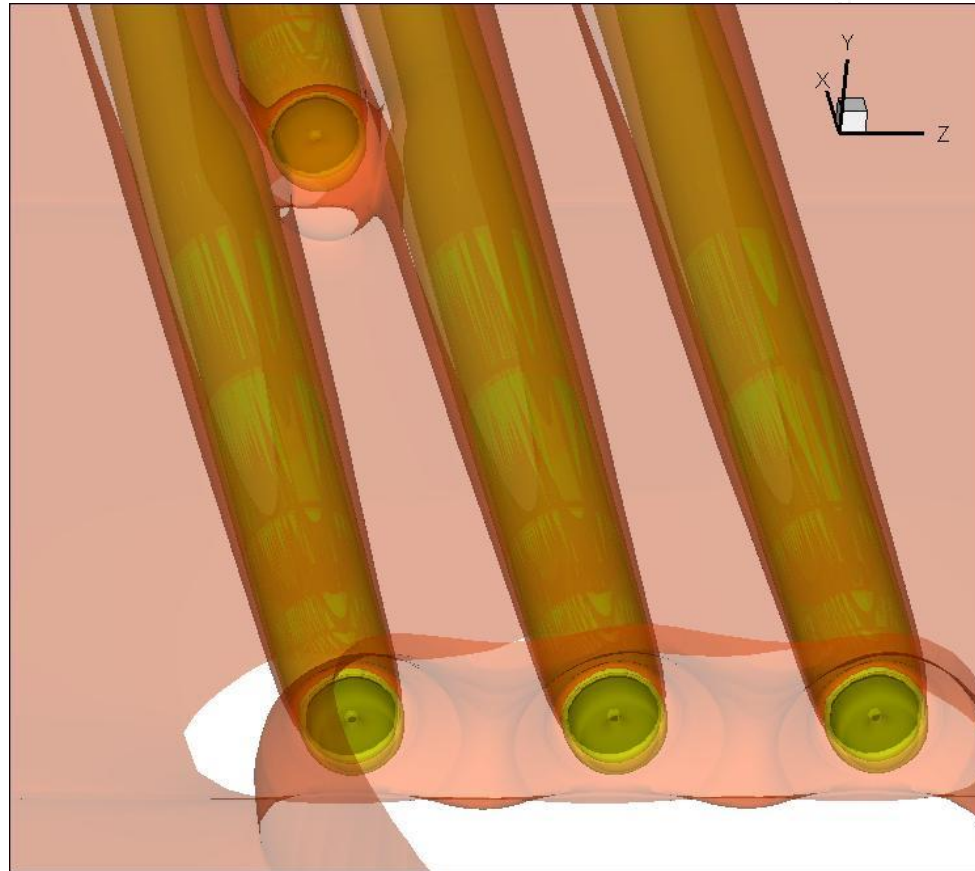




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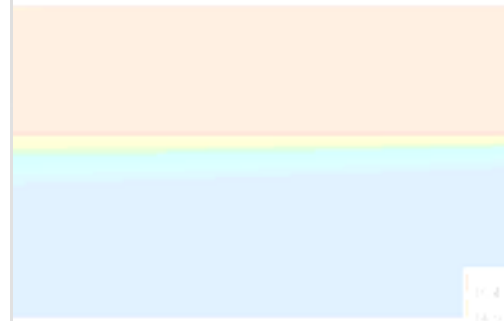
# Track Record

## - Computational Activities



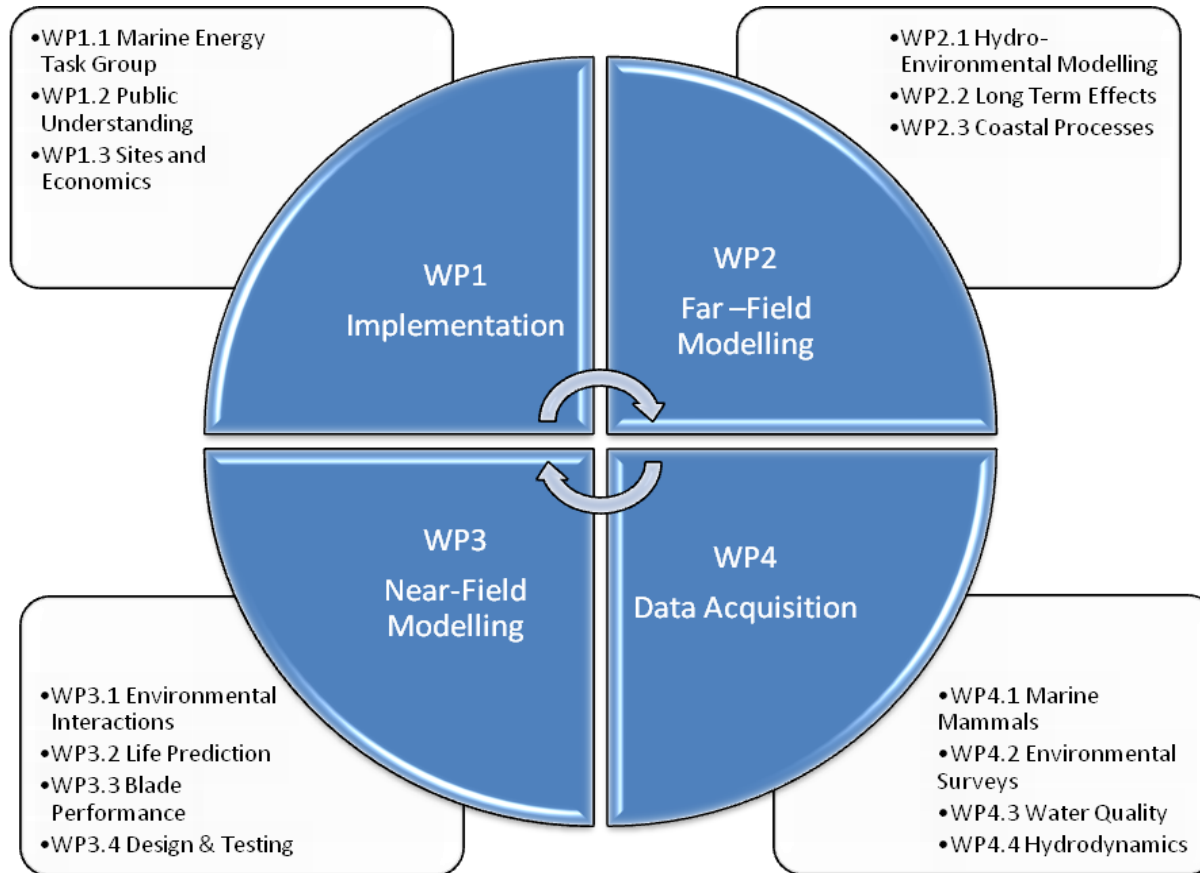
Modelling tidal stream  
device arrays

23  
01  
79  
57  
14





# Strategic Research Programme





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# WP1 Implementation



Professor Mark Cross  
Swansea University

- Task Group Activities (Swansea)
- Public Understanding (All)
- Site Appraisals + Economics (Swansea)
- Outreach (All)



Dr Miles Willis  
Swansea University



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# WP2 Far-Field Modelling



Professor Roger Falconer  
Cardiff University

- Hydro-Environmental Modelling (Cardiff)
  - Coarse and fine grid models around the Welsh coast
  - Interaction of devices with large bodies of water
  - Physical models



Professor Alan Davies  
Bangor University

- Long Term Effects (Bangor)
  - Climate change effects
  - Long term sediment movement
  - Aquaculture and fisheries



Professor Mike Phillips  
Swansea Metropolitan  
University

- Coastal Processes (Swansea Met)
  - Coastal zones
  - Beach behaviour and response



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# WP3 Near Field Modelling



Dr Nick Croft  
Swansea University

- Environmental Modelling (Swansea)
  - Computational fluid dynamics
  - Noise, scouring, sedimentation
  - biota interactions



Dr Tim O'Doherty  
Cardiff University

- -Life Prediction (Cardiff)
  - Fluid solid interactions
  - Non-uniform loading
  - Materials optimisation



Dr Ian Masters  
Swansea University

- Blade Element Modelling (Swansea)
  - Torque, power and axial thrust
  - Loads under storm conditions, waves, turbulence
  - Verification and benchmarking



Dr Alison Williams  
Swansea University

- Early Stage Design and Testing (Swansea)
  - Reactive mode
  - Assessment and design
  - Feasibility studies
  - Sector interface



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# WP4 Data Acquisition



Powell Strong  
Pembrokeshire College

- Marine Mammals (Pembrokeshire College)
  - Local environment effects
  - Ramsey Sound (Marine SAC)
  - Prior to, during and after TST installation
  - Harbour Porpoise, grey seals, birds



Dr Ian Horsfall  
Swansea University

- Environmental Boat Surveys (Swansea)
  - *RV Noctiluca*
  - Fish migrations, abundances, behaviour
  - Benthic and pelagic populations
  - Using “ships of opportunity”



Professor Dave Kay  
Aberystwyth University

- Water Quality (Aberystwyth)
  - Providing data to hydro-environmental models
  - Ecological and health impacts
  - Effects of flow on microbial coliform decay



Dr Chris Wooldridge  
Cardiff University

- Hydrodynamic Surveys (Cardiff)
  - *RV Guiding Light*
  - Monitoring flow using ADCP
  - 2-d/3-d bathymetry
  - Optimisation of Welsh “Research Fleet”



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# Maximising Impact and Value for Money

- Extending existing work of PMSS, RPS, Pemb College
- Independent research to dovetail into future SEA process
- Work with assembled focus group and stakeholders
- Approx 50 staff (~15 of which are full time post docs)
- Research students
- Experience of writing environmental impacts
- Research boats + specialist equipment
- “Real-site” focus for computational and survey teams

