Newcastle University

New Inshore Research Vessel

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Long history of research vessels at Newcastle

We have said farewell to our old research vessel '*Bernicia*', the most recent in a line of vessels associated with the University and the Dove Marine Laboratory dating back to 1911.

Evadne	1911-1938
Pandalus	1938-1952
Alexander Meek	1952-1973
Bernicia	1973-2009

Research Vessel *Bernicia 1973-2009*

Main duties

- Conventional surface, mid-water and bottom trawling
- Use of static fishing gear
- Plankton sampling
- Water sampling at depths up to 200m
- Soft sediment sampling and sea floor coring
- Sea floor photography and imaging
- Marine mammal and bird surveys – visual and acoustic

- Undergraduate teaching facility
- Platform for wide variety of research programmes
- Charter for government and commercial organisations

Primary design requisites

- Good stability, sea-keeping, maneuvering and efficiency
- Flexible speed
- Engineered with a sound environmental ethos for sustainability
- Ability to take to the ground when required
- Large deck space

- Internal areas for teaching/lab-work to accommodate 12 passengers
- Overnight accommodation for 4 crew

‘In-house’ design

The use of a catamaran hull for the new research vessel was an obvious choice

It fulfils the requirements of shallow draft, large deck space, excellent stability and good speed potential

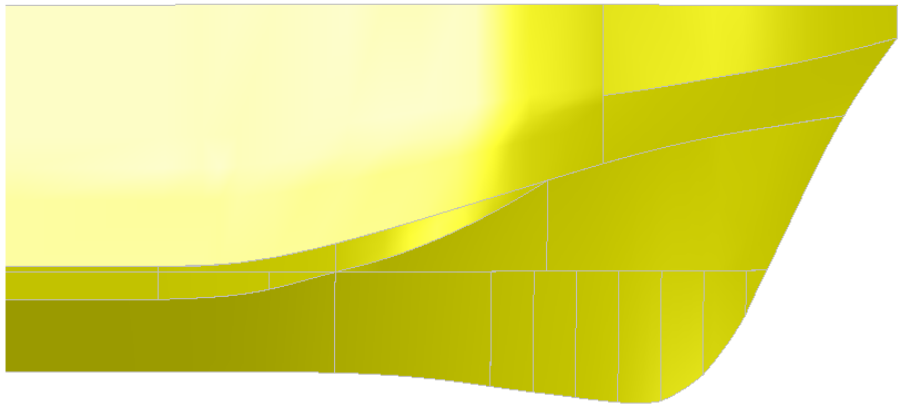
Results of ‘in-house’ studies identified the **deep-vee hullform** as an ideal candidate as it exhibits excellent seakeeping and speed characteristics

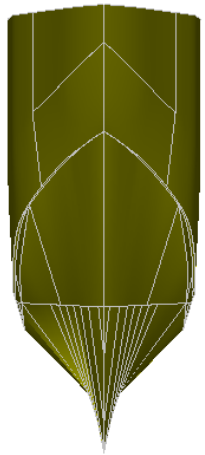
One such study resulted in the design for a new Port of London Authority patrol boat, now a proven craft with low wash and high efficiency operating on the River Thames

This became the basis for our 18m research vessel. We have lengthened the hull and further refined and developed its features

Innovative Features

Anti-slamming bow – using local knowledge

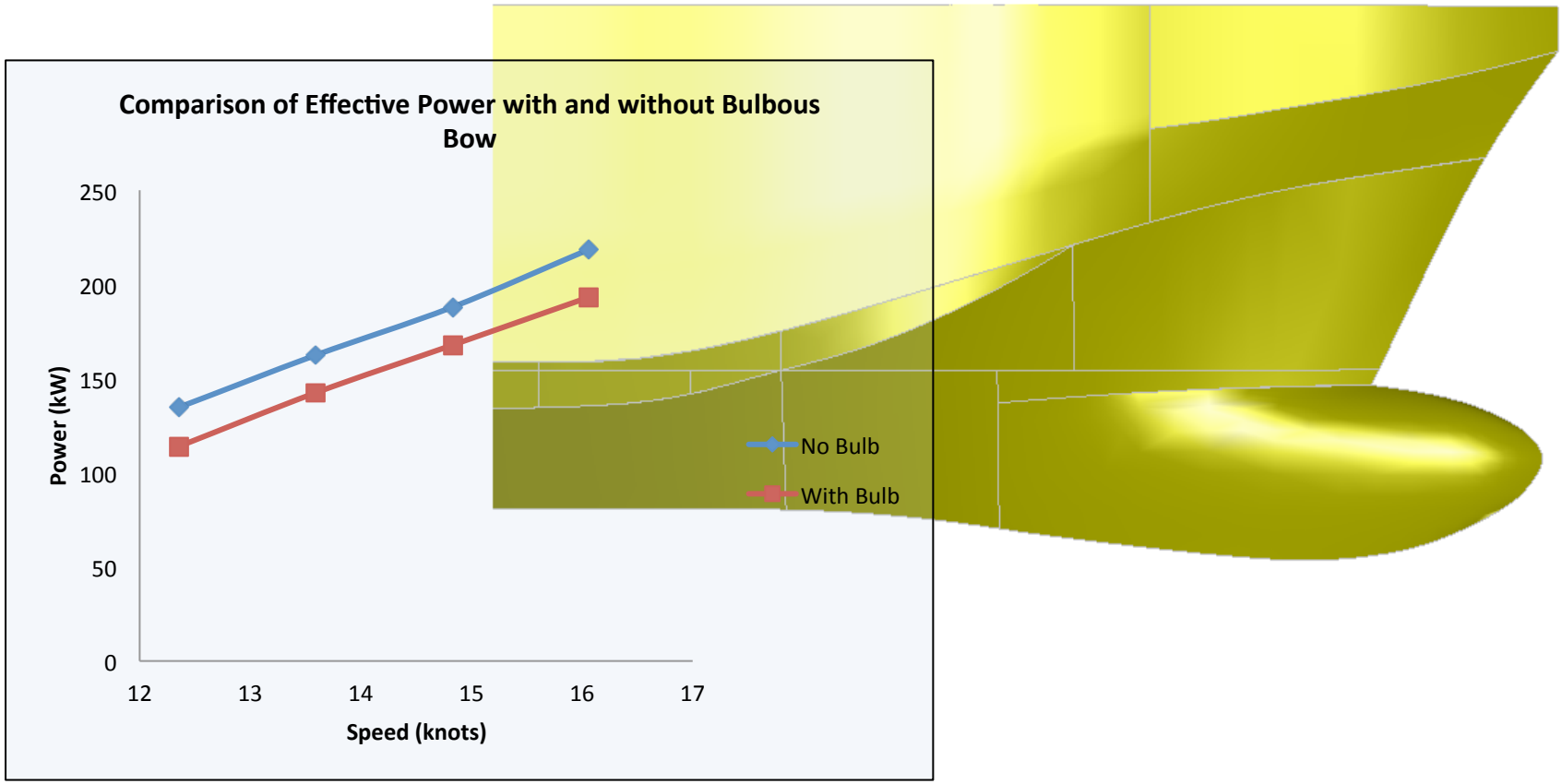




Northumberland Coble

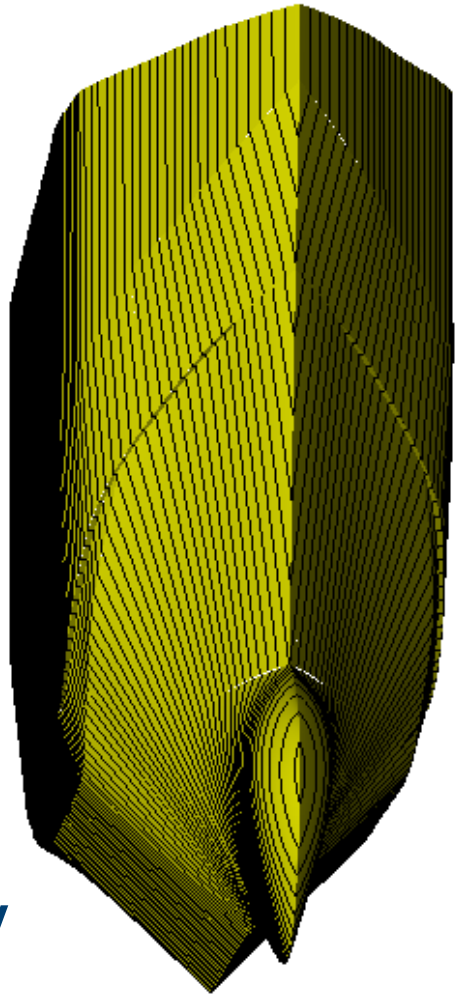
Innovative Features

Bulbous bow – improved power and efficiency



Innovative Features

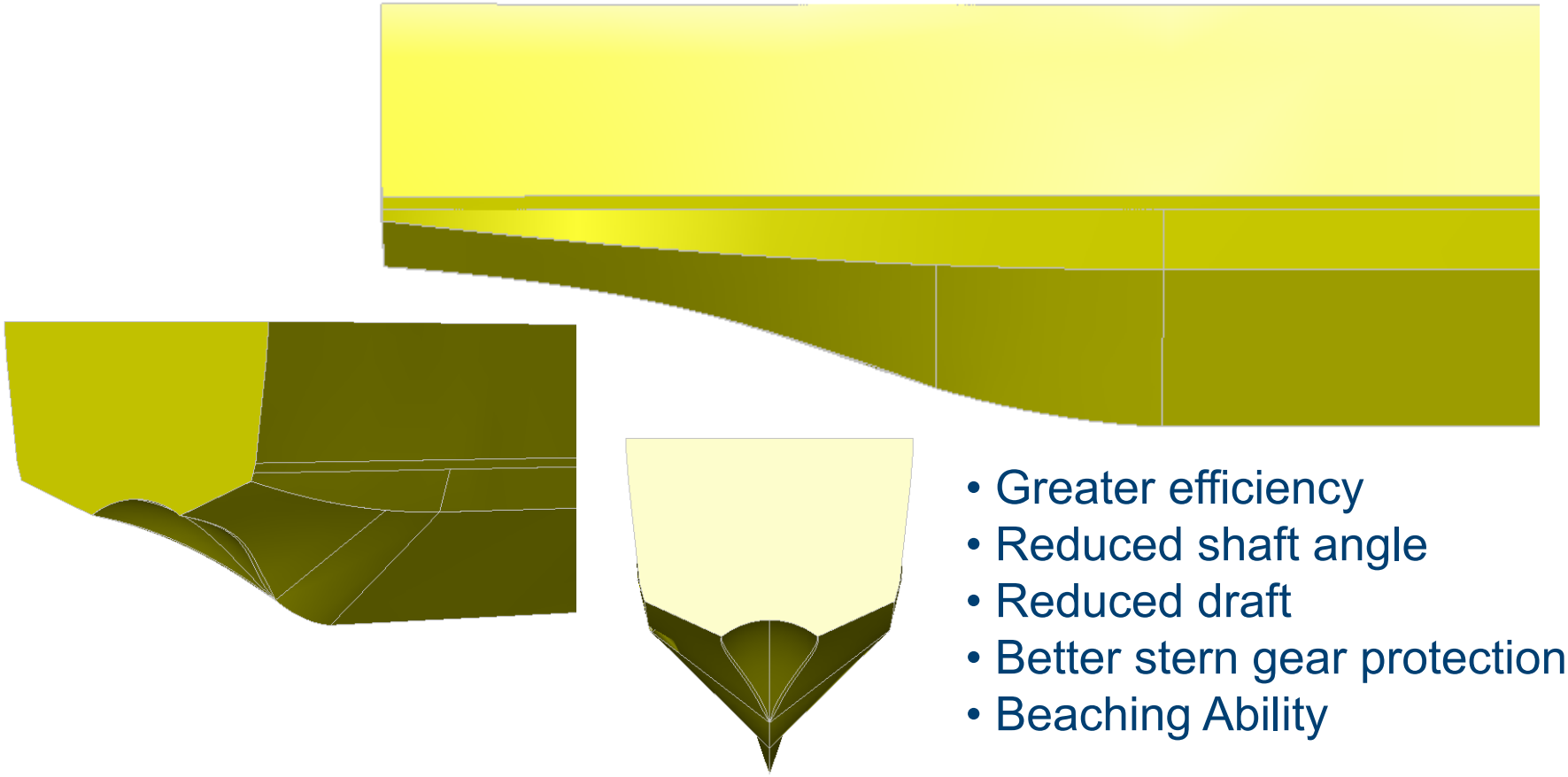
Anti-slamming bulb (ASB)



The bulb greatly improves efficiency yet maintains the anti-slamming properties of the hull through its slender profile and narrow entry

Innovative Features

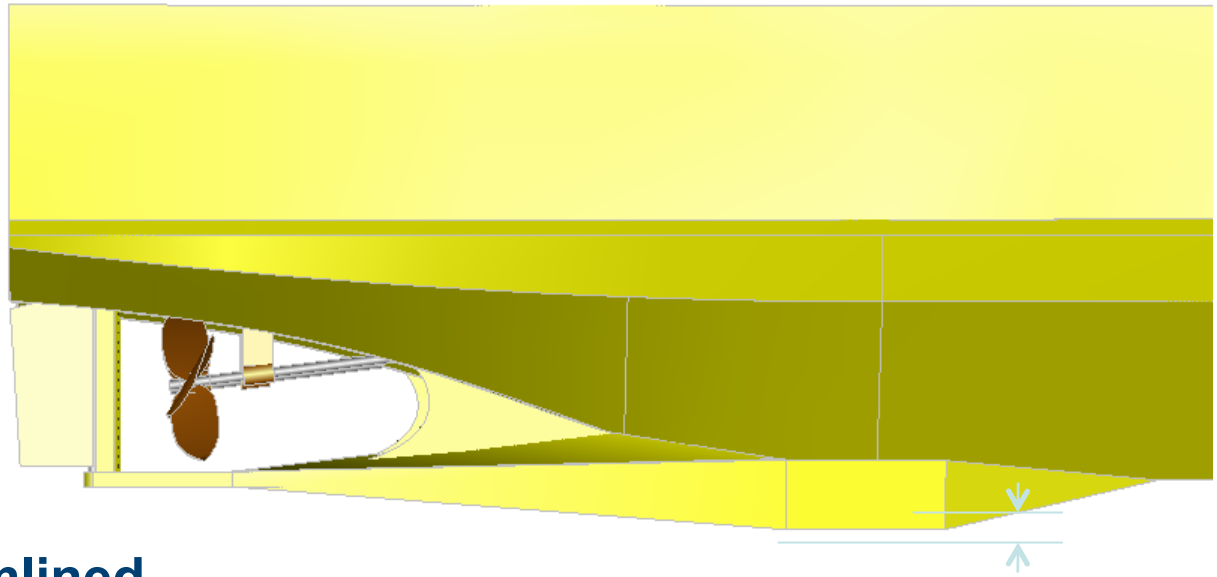
Tunnel stern and cut-up



- Greater efficiency
- Reduced shaft angle
- Reduced draft
- Better stern gear protection
- Beaching Ability

Innovative Features

Unconventional skeg



- **Streamlined**
- **Reduced draft**
- **Full stern gear protection**
- **Designed for beaching**

Efficient hull form design

Proven efficiency of the new hull form shows up to a 40% saving in power (and therefore energy) when compared against existing hullforms of similar dimensions

Of course this figure is obtained through comparison with a poor hullform but it highlights the importance of good design for all marine vehicles where needless energy is wasted making spray and waves.

Reduced fuel consumption results in fewer emissions and less pollution, less wastage of natural resources and the bonus of a financial saving to the user

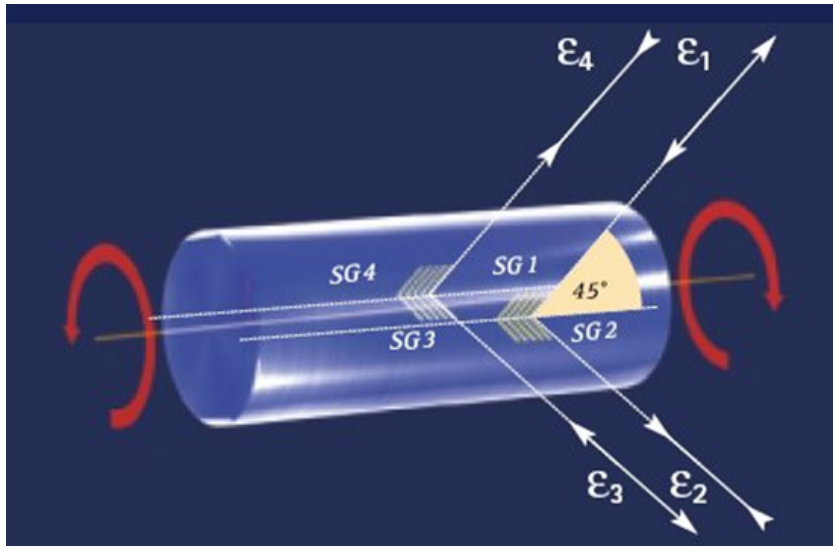
Savings are attained through the novel design of the vessel, which also has a reduced wake and low wash characteristics so is ideal for operation in sensitive environments where erosion is detrimental i.e. estuaries

Innovative Features

Performance monitoring system

The boat will be equipped with an integrated performance monitoring system recording real-time data including:

- Shaft torque and thrust
- Engine speed
- Fuel consumption
- Wind speed and direction
- Ship speed
- Trim and draft
- Ship motions
- Rudder angle
- Water depth



Model testing

Perhaps the most crucial part of the design process

Computational Fluid Dynamics (CFD) cannot yet predict all aspects of water flow around a body

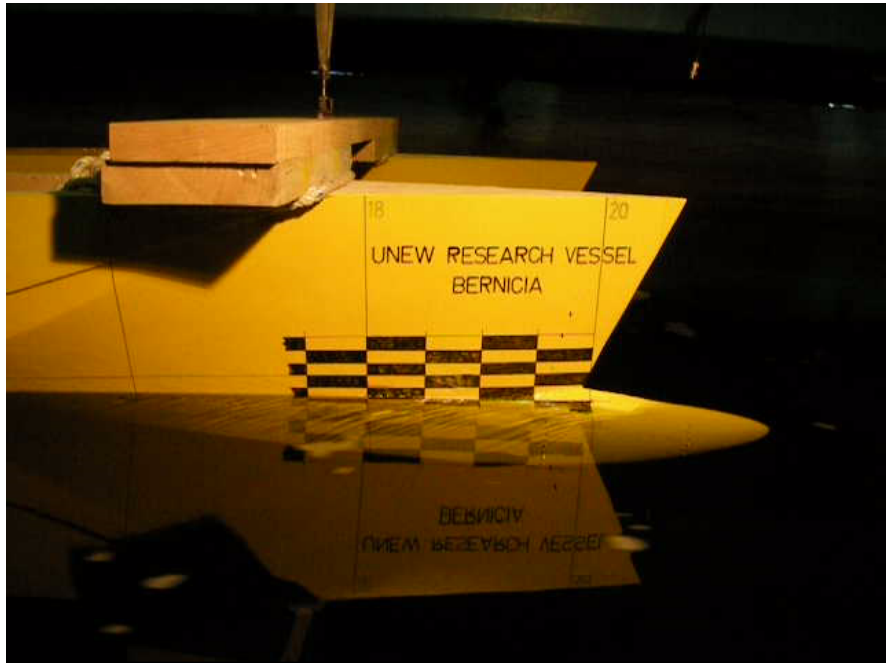
Scale model testing in a towing tank is indispensible, firstly to confirm the CFD predictions and secondly to identify flow and behavioural characteristics that would be otherwise missed by the CFD

We have utilised two model testing programs as part of this project

1.) Large scale model testing at ITU in Istanbul (1/5th scale 3.5m model)

2.) Small scale model testing at UNEW faciltiy (1/12th scale 1.5m model)

Model testing



New Bernicia
s/L=0.3 Fn=0.806
Vm=2.956 m/s Vs=19.91 kn

The new vessel – June 2011

Principal specifications

Length Overall.....	18.0m
Beam Overall.....	7.2m
Design Draft.....	1.64m
Displacement (light).....	28 tonnes
Payload.....	5 tonnes
Max Speed	20 knots
Cruising Speed.....	15 knots
Engines	2 x 600hp
Propulsion.....	5-bladed propellers
Classification.....	MCA Category 2

The build

The build

The build – turning the hull

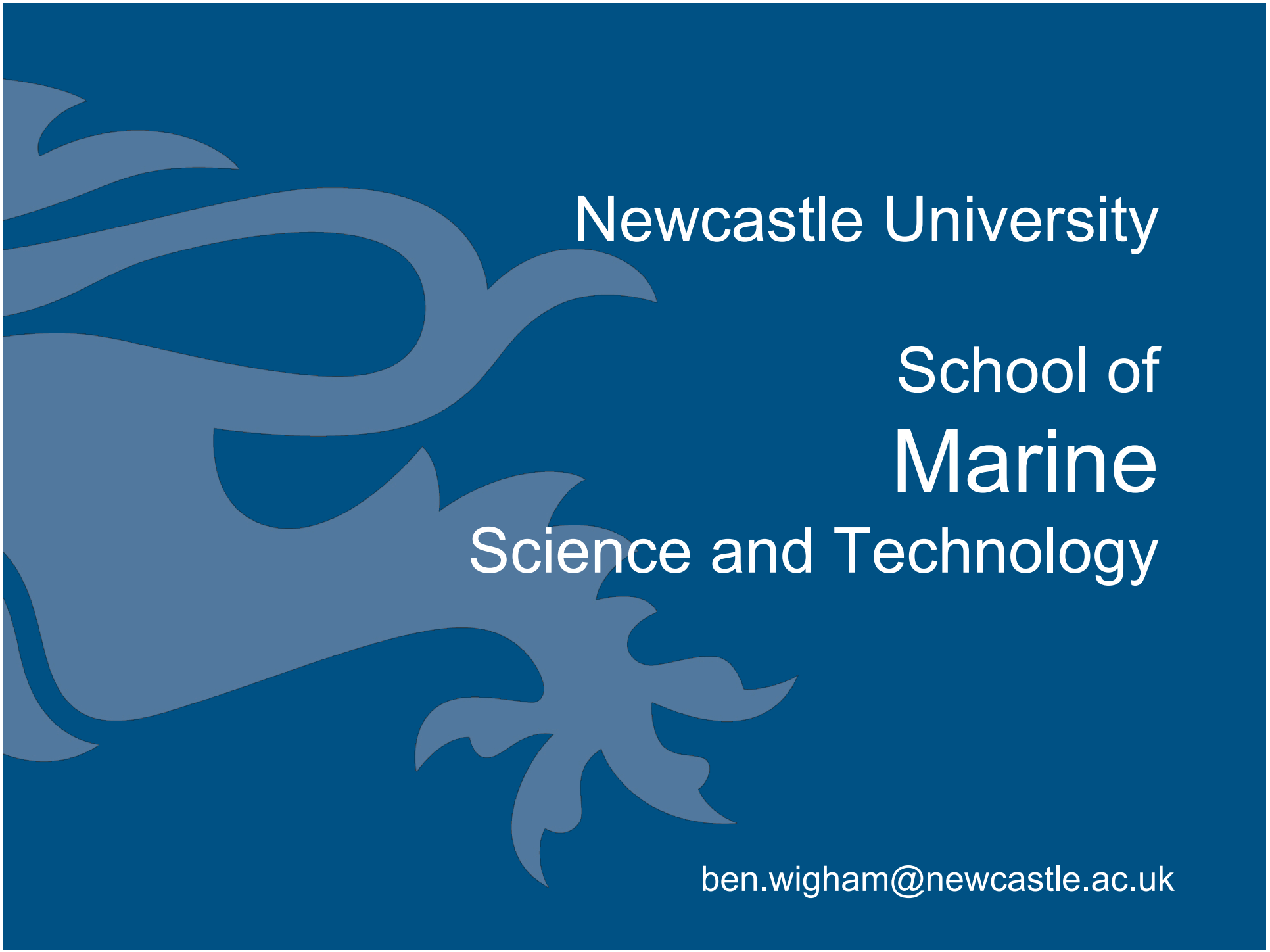





The build

The build

The build – April 2011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