



Royal Academy
of Engineering

UNIVERSITY OF
Southampton

Update on activities - Chair in Emerging Technologies in Intelligent & Resilient Ocean Engineering (IROE)

Susan Gourvenec

Royal Academy of Engineering Chair in Emerging Technologies, Intelligent & Resilient Ocean Engineering
Deputy Director, Southampton Marine & Maritime Institute
Professor of Offshore Geotechnical Engineering
University of Southampton, UK

Boldrewood Lunchtime Seminar
12 October 2020



Royal Academy of Engineering @RAEngNews · Oct 4, 2019

Global visionaries awarded £22 million in Academy funding for long-term research into disruptive innovations, meet our eight new Chairs in Emerging Technology, announced today: raeng.org.uk/news/news-rele... #RAEngResearch



1:14 PM Oct 4, 2019 Twitter Web App



Chairs in Emerging Technologies 2019

Professor Susan Gourvenec
University of Southampton

Professor Gourvenec will address technology gaps at each stage of the life cycle of ocean structures, from forecasting seafloor behaviour to operating novel platforms for ocean facilities.

raeng.org.uk/ciet
#RAEngResearch



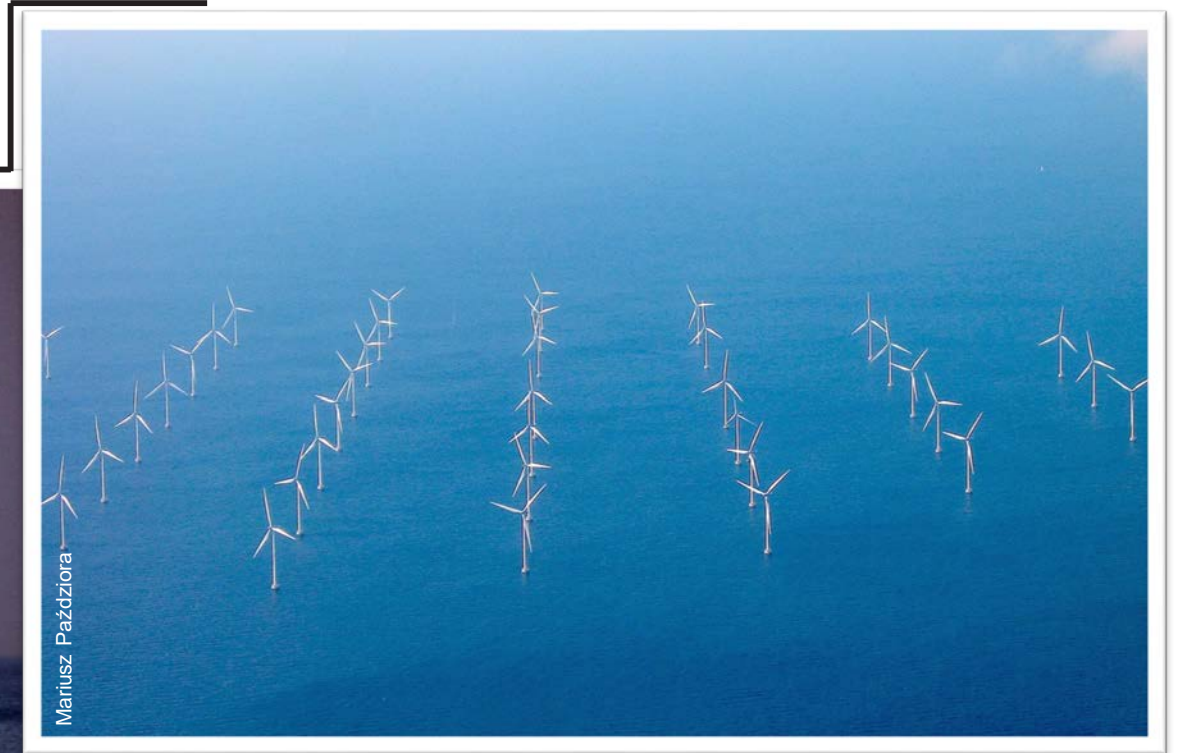
MOTIVATION

Current ocean engineering design is outdated and outpaced to meet the current demands of ocean engineering

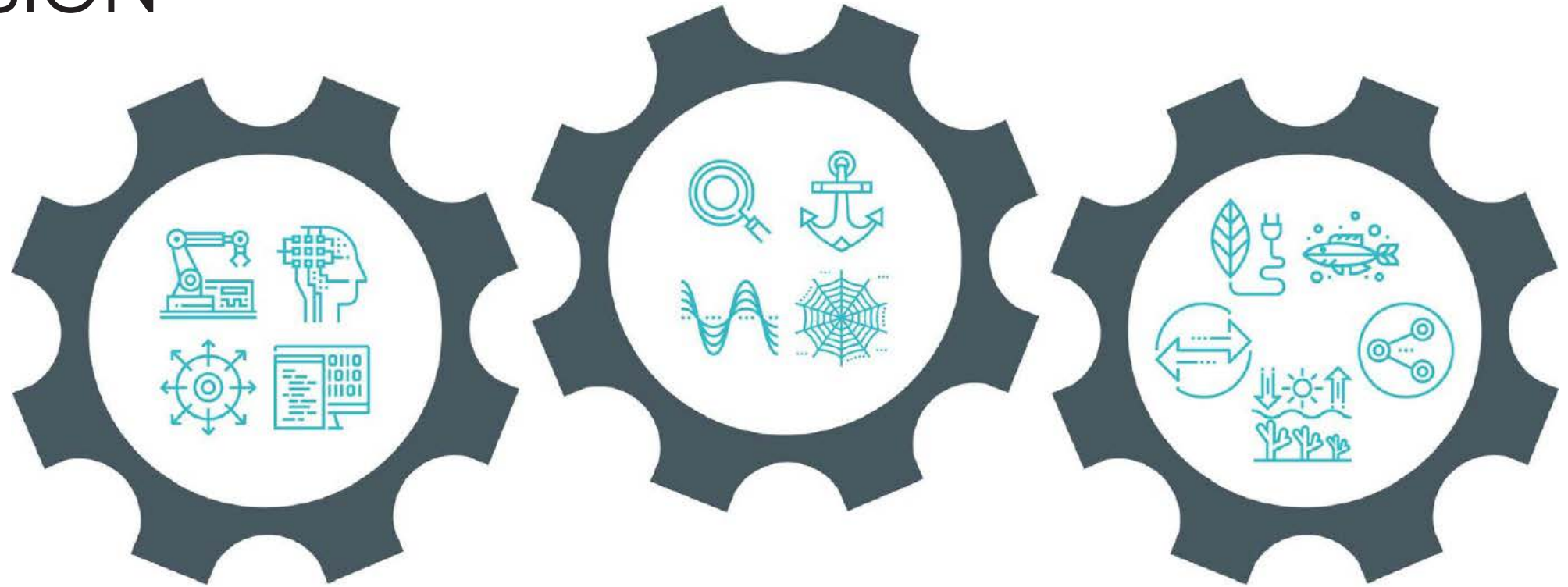


CHALLENGE

To reinvent ocean engineering design to enable greater use of ocean resources – sustainably and economically



VISION



RESEARCH GOALS



Characterisation - Create intelligent site characterisation tools for autonomous deployment or operation to upscale capability without upscaling cost



Sensing - Create living designs by embedding intelligent sensing in engineered ocean systems that inform on system health and ultimately self-certify



Stationkeeping - Create smart mooring and anchor systems for efficient and stable platforms in increasingly harsh environments



Design - Create next gen concepts and methodologies, enabling modular mass produced resilient systems, performance-based design and optimal life-cycle cost



Characterisation - Create intelligent site characterisation tools for autonomous deployment or operation to upscale capability without upscaling cost



Jared Charles



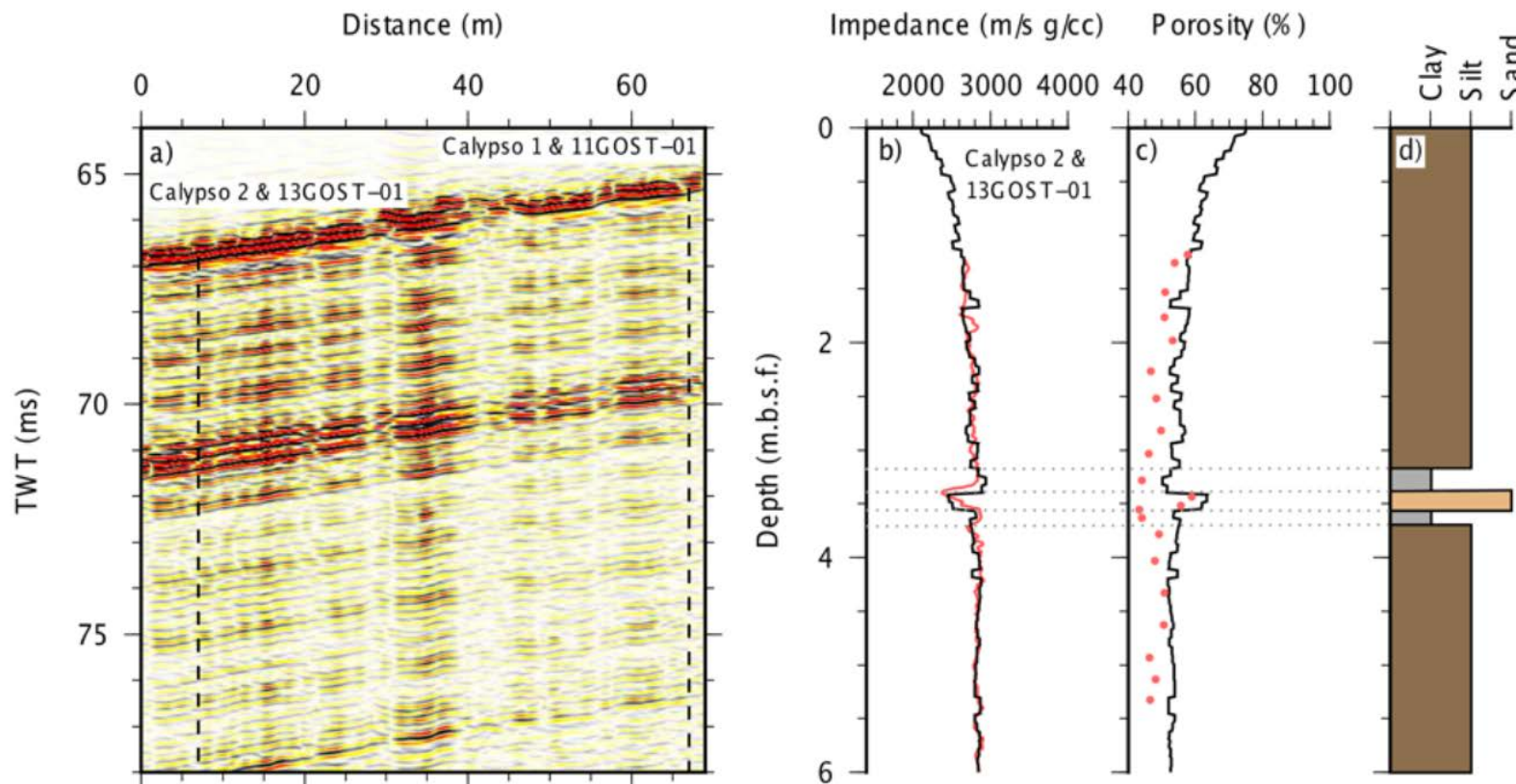
Andrew Jewitt



Mark Vardy



Tim Henstock & Justin Dix, OES



Vardy et al. 2017

Neural network approaches to derive geotechnical parameters of the seabed for engineering design from geophysical data



Characterisation - Create intelligent site characterisation tools for autonomous deployment or operation to upscale capability without upscaling cost



Noor Laham



Andrew Deeks



Yusuke Suzuki



Katherine Kwa



Dave White

Characterisation of seabed response for whole-life design

Soil properties change during design life due to the geotechnical response to external actions. Hardening and softening.

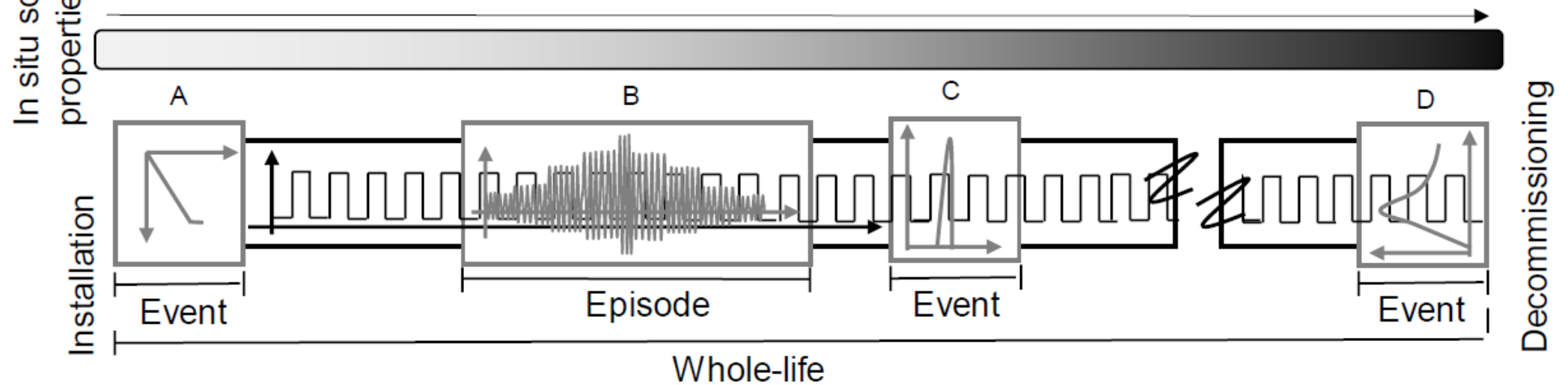


Fig. 1. Temporal spectrum of actions over the design life of a structure (Gourvenec 2018a)



Stationkeeping - Create smart mooring and anchor systems for efficient and stable platforms in increasingly harsh environments



Oscar Festa

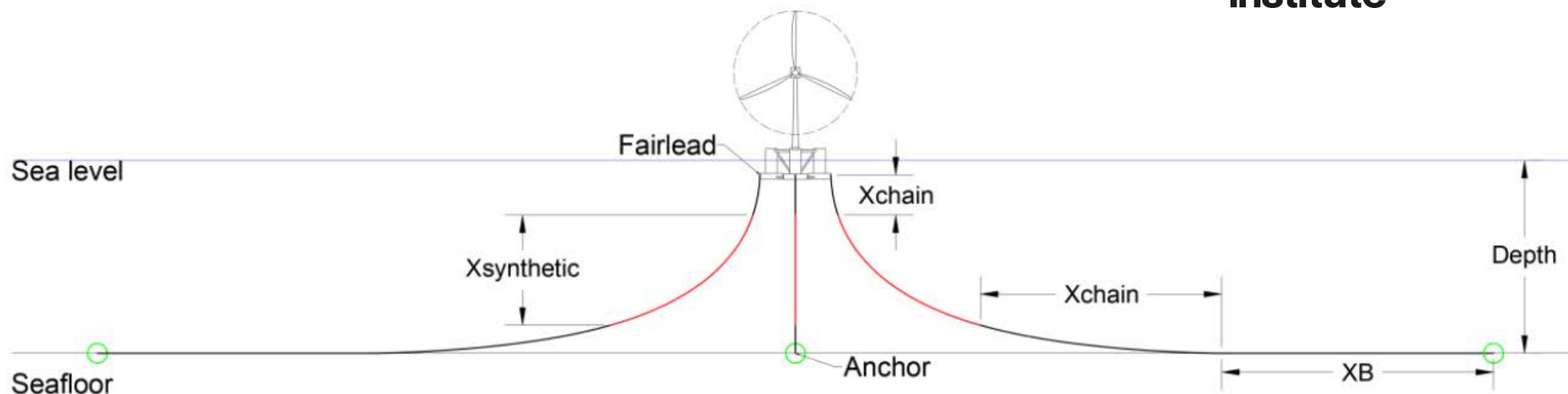


Adam Sobey



Gabe Weymouth

**The
Alan Turing
Institute**



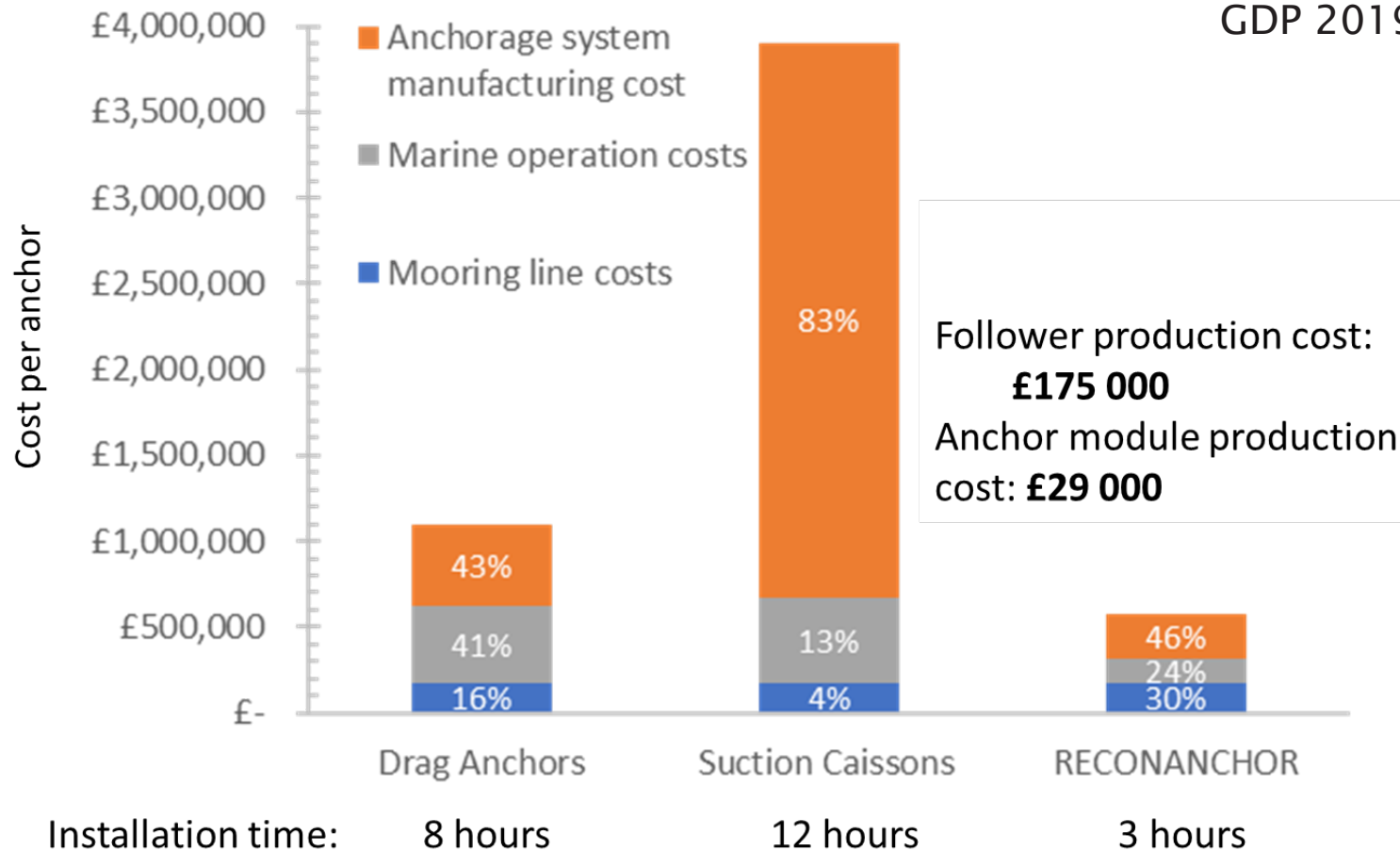
Responsive mooring systems to absorb peak loading + ML methods to optimize layout



Stationkeeping - Create smart mooring and anchor systems for efficient and stable platforms in increasingly harsh environments



GDP 2019/20





Sensing - Create living designs by embedding intelligent sensing in engineered ocean systems that inform on system health and ultimately self-certify



Annelie Baines



Gabe Weymouth

**The
Alan Turing
Institute**

“

investigate the efficacy of frequent but spatially sparse data on mooring lines to assess mooring line integrity that will enable continuous monitoring and targeted intervention.

”

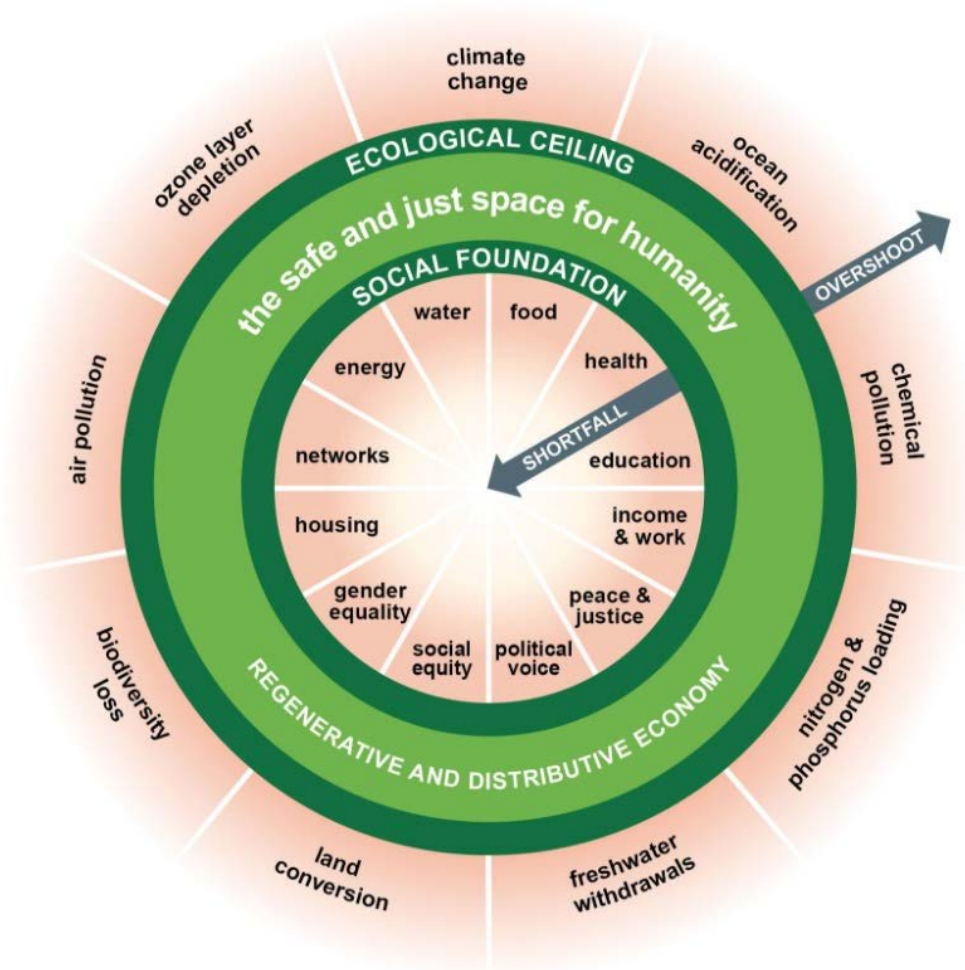




Design – Create next gen concepts and methodologies, enabling modular mass produced resilient systems, performance-based design and optimal life-cycle cost



Rebecca Sykes



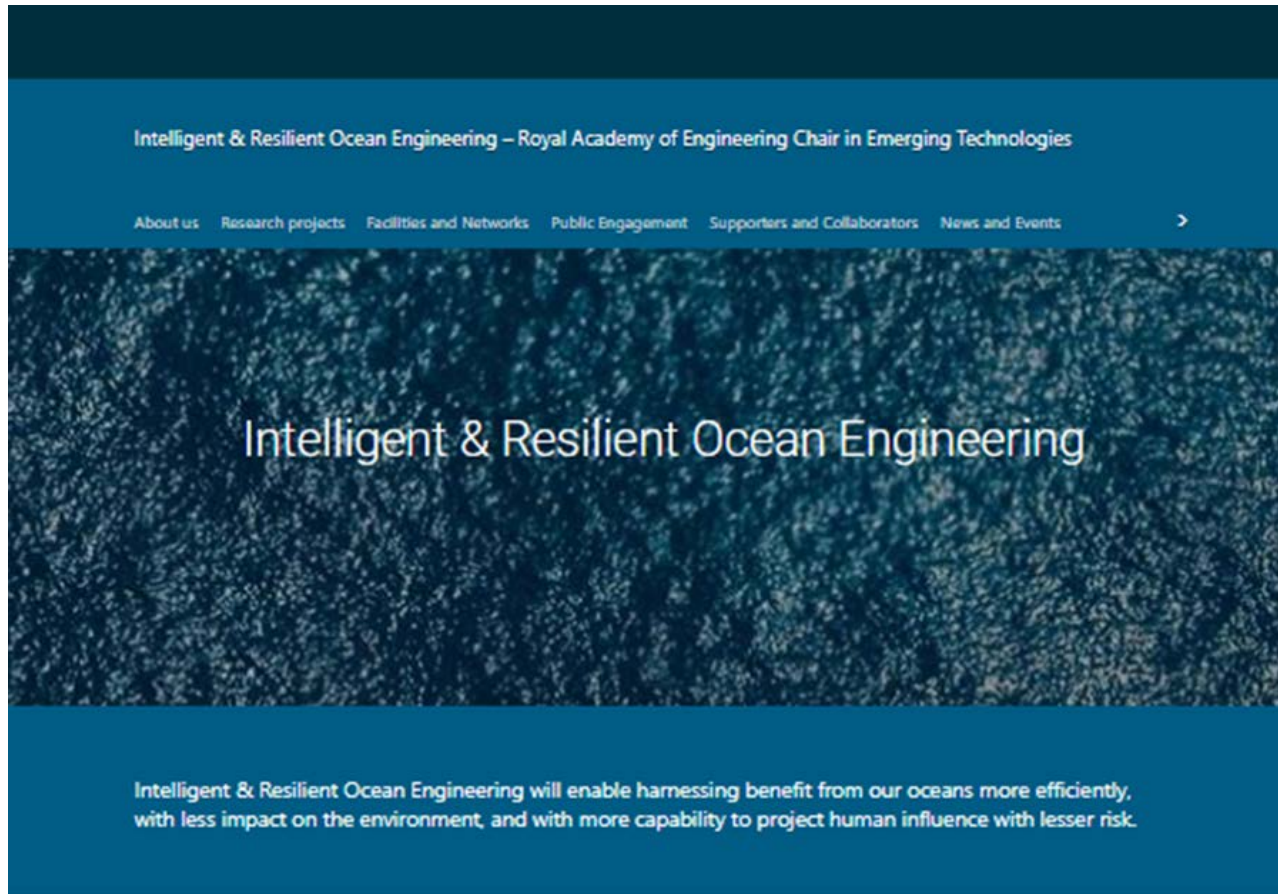
Humanity's 21st century challenge is to meet the needs of all within the means of the planet.

Raworth 2017, Doughnut Economics

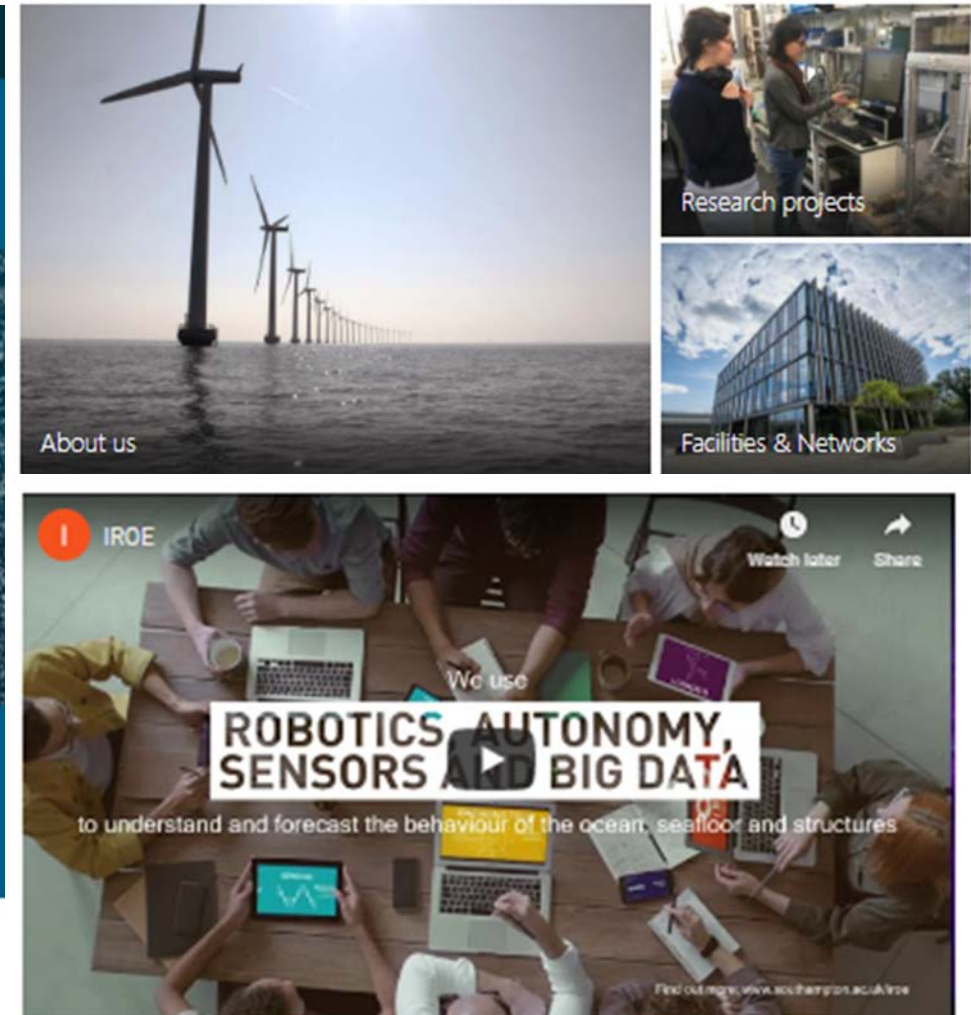
‘Reimagining Ocean Development’ through the Doughnut ... & role of emerging technologies as an enabler

Can we? Should we?

FIND OUT MORE, GET INVOLVED



www.southampton.ac.uk/iroe



HARNESSING OCEAN POTENTIAL

Chair in Emerging Technologies: Intelligent & Resilient Ocean Engineering

Harnessing benefit from our oceans more efficiently, with less impact on the environment, and with more capability to project human influence with lesser risk.



Find out more

www.southampton.ac.uk/iroe



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