The National Decommissioning Centre

Innovation through Partnership

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The Oil & Gas Technology Centre
Your Innovation Partner

Update on the National Decommissioning Centre

Prof Richard Neilson – Centre Director

ABERDEEN CITY COUNCIL

Aberdeenshire COUNCIL

The Scottish Government
Riaghaltas na h-Alba

HM Government

ONE OPPORTUNITY NORTH EAST

#ABZdeal

Who we are

Partnership between the Oil and Gas Technology Centre and the University of Aberdeen

- OGTC investing £12.7m over 7 years as part of the Aberdeen City Regional Deal funding
- UoA investing £5m over over 7 years in buildings, facilities, staff time and PhD support

Supplemented by approx. £4m of infrastructure funding from the Scottish Government's Decommissioning Challenge Fund

Our ambition

To be the global leader in research and development that transforms decommissioning and mature field management

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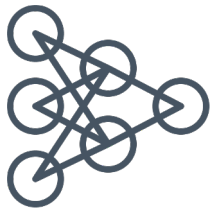
Unique global hub



Connecting

Port clusters, R&D institutions and innovation centres across the UK and internationally

Multiplying

The capability of universities and other organisations, such as the UK Catapults

Developing

A world-class supply chain that delivers for the UK and internationally

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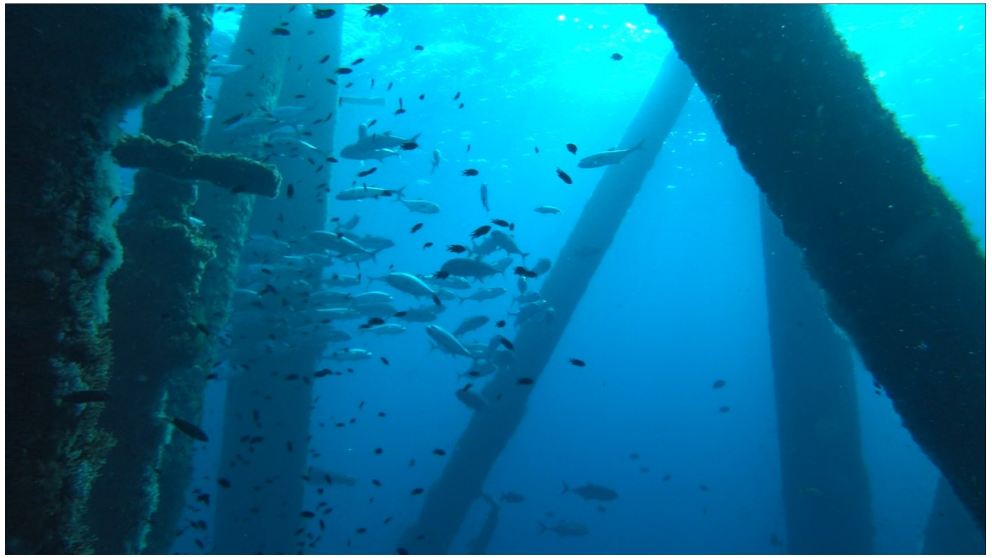
Forward plan

	Near Term 2020 – 2022	Medium Term 2022 – 2026	Long Term 2026 – 2030
Smarter SMART BASIN	• Smart Basin established for East of Shetland area • AI algorithms developed to interpret multiple data sources • Cross-sector data visualisation driving new collaborative approach	• Smart Basin established for UKCS • Simulation at basin level with multiple cross-sector data input • Regulators and industry using the smart basin as the test bed for late-life and decommissioning planning	• Smart Basin approach adopted for international basins • UKCS smart basin integrated with onshore supply chain, re-use and recycling industries • Smart Basin recognised as the primary basin level, strategic planning platform
Safer	• Improved techniques for removal of residual hydrocarbons • AI interpretation of safety data and planning information to allow targeted, pre-emptive intervention • Robotic systems development to remove human exposure to risk	• Significant improvement in incident rate for decommissioning (including onshore recycling/disposal) • Predictive analytics applied routinely to activity plans allowing cross-industry intervention techniques to be applied • Robotics deployed to undertake decommissioning activities	• Zero incidents during decommissioning (including onshore recycling/disposal) • Autonomous decommissioning
Cleaner	• Alternative, low carbon, late life and decommissioning solutions • Enhanced understanding of industry impact on the marine environment • Clarity around the regulatory interface between oil & gas infrastructure and renewables	• Net zero achieved for post COP assets • Close the debate around the impact of man-made structures on the marine environment • Clear regulatory guidelines for integrated oil & gas and renewable facilities	• Net zero achieved for operating assets • Net zero achieved for all decommissioning activity – including logistics and disposal • Smart basin optimisation of circular economy opportunities
Cheaper	• Barrier Verification chamber commissioned • Alternative removal and post removal monitoring techniques – proved through virtual prototyping / simulation • AI enabled decision making – process development	• Alternative well P&A techniques deployed commercially • Alternative removal and monitoring techniques deployed commercially – augmented reality link during deployment to simulation suite based operations control • AI enabled decision making used by industry and regulators to develop and review decommissioning programmes	• Integrated, cross-sector and collaborative approach to all decommissioning activity • International recognition of optimum decom solution deployed across UKCS

Anchor Partnership

Chevron



Delighted to welcome Chevron as the NDC's first ***Anchor Partner***

- 3 PhD project scopes:
  - Acoustics to Monitor Fish on Man-Made Marine Structures
  - Quantitative Risk Assessment of Mercury in the Aquatic Environments: Linking Mobility, Bioavailability and Bioaccumulation
  - Longevity and Fate of Structures Left in Place
- Supported by a Post Doctoral researcher

Project Partnerships

Shell

Shell confirmed as the first major ***Project Partner***

- Project on Post Decommissioning Monitoring with the aim to investigate the what, why, when and how of long-term monitoring and produce guidelines.
- PDRA recruited and starts on 1/6/20.

Oil and Gas Authority

- Basin interpretation of smart city concept
- OGA partial funding for a PhD studentship
- Being advertised along with other complementary projects
- Offers of data already received from two companies

Current Research Projects – Update

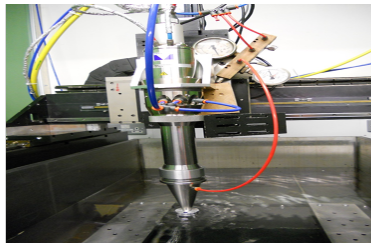
Underwater Laser Cutting

claxton

Aim – to build an effective underwater laser cutting system.

- Test rig mostly manufactured
- Laser head design finalised and due for manufacture
- Will use NDC laser
- Open water tests scheduled for beginning of Q4 2020

Underwater laser cutting

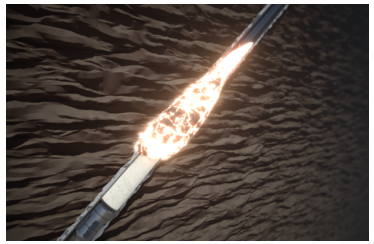


Barrier Verification Chamber

Aim – to provide a test system for developers of novel well P&A barriers.

- Main FEED completed
- Options for cost reduction being evaluated before detailed design
- Partial funding available for system build from Scottish Government Decommissioning Challenge Fund.

Barrier verification chamber



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PhD Research Programme

Financial security in relation to liabilities	Decommissioning bundles	Cleaning and waste disposal	Elimination of marine growth	Next generation DNA application to decommissioning
Business Law	Engineering	Engineering	Chemistry Biological Sciences	Biological Sciences Medicine
PhD Student Recruited Start: Apr 2020	PhD Student Recruited Start: Nov 2019	PhD Student Recruited Start: Oct 2019	PhD Student Recruited Start: June 2019	PhD Student Recruited Start: Oct 2019

Decision Making in Decommissioning

Scenario mapping, impact assessment and trade-off analysis	Quantification of greenhouse gas emissions for decommissioning	Smart Basin with OGA as industry partner
Engineering Computing	Biological Sciences Computing	Computing
PhD Student Recruited Start: July 2019	PhD Student Recruited Start: July 2019	Recruitment Ongoing

PhD 1 starting (online) Apr 2020

PhD 2 started Nov 2019

PhD 3 and 5 started Oct 2019

PhD 4 started June 2019

PhDs 6 and 7 started July 2019

PhD 8 advertised

PhD Project Ideas Jan 2020 – 16 applications, 4 shortlisted to take forward to Sandpit with OGTC memners

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Our location

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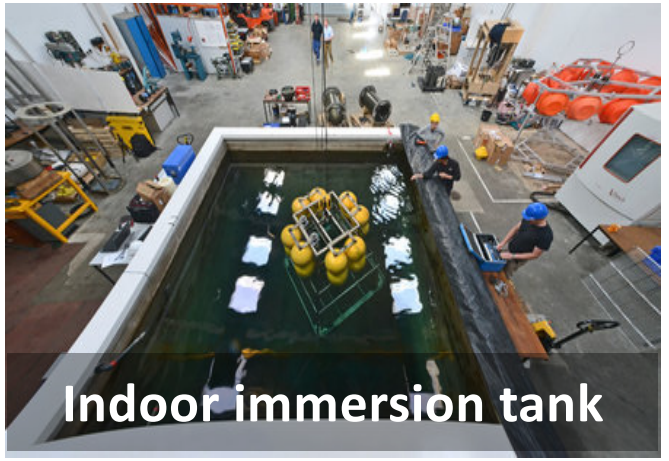
Our facilities


Hyperbaric testing


Indoor immersion tank


Environmental chamber


Industrial laser


Supercomputer


Advanced workshop

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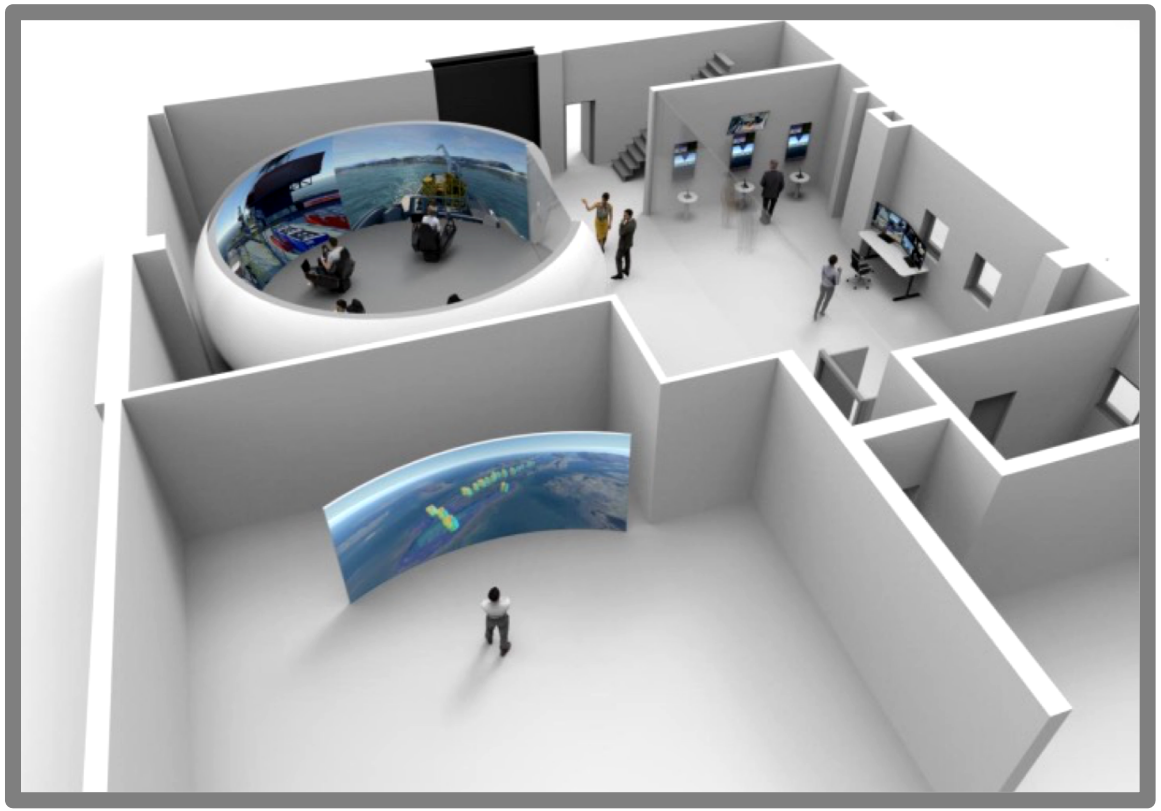
Simulator



Simulator – Current Status

Simulator Capability

- A walk-in 300-degree visual immersive environment
- 4 stations with ability to assign control of any object/asset in the scene to one of the stations (chairs) for example ROVs, Cranes, personnel, Vessels etc.
- All simulation based on real time physics calculations
- Ability to create and modify simulation in runtime
- Ability to split screen into 4 different stations/objects
- All objects within scene have full effect from user-controlled environment, for example vessel to be fully affected by ocean, waves, wind current etc.
- Ability to import CAD data to the simulator system.

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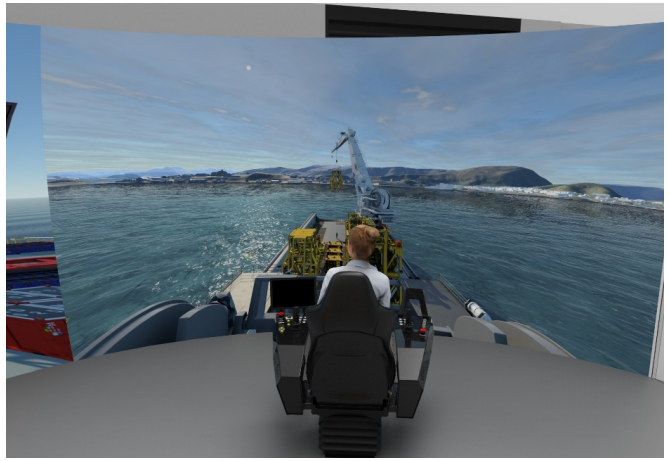
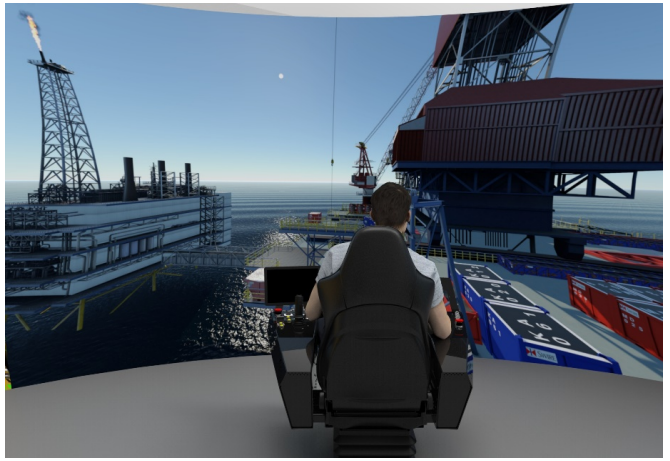
Simulator Stations

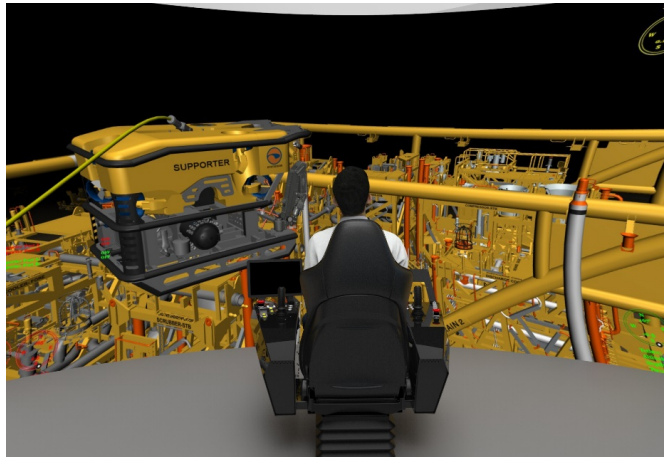
Ship





Crane

ROV



Personnel

Example operations

- Ship to rig operations
- Ship to ship operations
- Subsea lifts with AHC
- Jacket removal and installation
- Topside removal and installation (heavy lift)
- Standard deck lifts including attachment and operation of all tugger and sling hoist winches
- Complex multi crane operations

Synergy with Smart Basin – the Concept

The concept of Smart Basin is based around the established Smart City concept which utilises

- Data gathered either directly by instrumentation or other sources
- Data visualisation to show the spatial distribution of a parameter – e.g. overlay of CO_2 emissions, air borne particulates, power usage, traffic flow etc. onto the city
- Modelling to better understand how systems interact and change the data - e.g. how changes in traffic flow affect emissions and particulates
- Decision making based on the modelling

Smart Basin – the Concept

The aim of Smart Basin is to provide

- Virtual model of the entire basin starting with an exemplar area, either east of Shetland or southern North Sea.
- Data visualisation to show the spatial distribution of a parameter – e.g. CO_2 emissions, power usage, vessel traffic, available local renewable capacity etc.
- Modelling to better understand how interactions between operators e.g. campaigns and/or renewables could improve the efficiency of decommissioning, optimal reuse and energy transition.
- Basin-wide decision making based on the modelling

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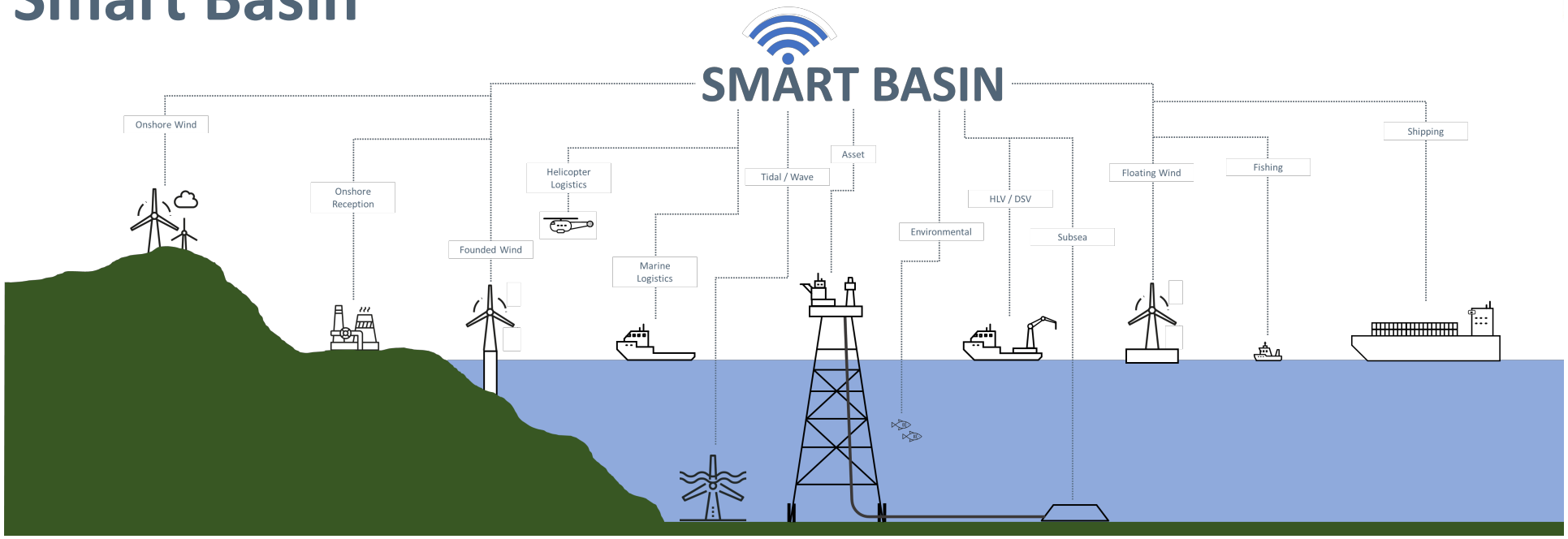
Smart Basin – the Concept

Smart Basin



Oil & Gas Authority

Synergy with Safe Haven Data Hub

- The simulator and Smart Basin projects will interact with a DCF funded project to develop a robust and secure data sharing platform for oil & gas decommissioning
- The project will explore the use of the Grampian Data Safe Haven (DaSH) which enables the secure processing and linking of health data for the Scottish population as a basis for the data sharing platform.
- The platform will allow secure access at different levels of detail e.g. an operator will have full sight of its data but could allow aspects to be seen by the supply chain.
- Recruitment in process along with the Smart Basin PhD

Safe Haven Data Hub

DaSH
Grampian Data Safe Haven
University of Aberdeen • NHS Grampian

Other Future Projects

- We are in discussion with a number of companies about use of the simulator to trial new technologies
- We are in discussion with a number of companies about how to support them in bids to the European Space Agency call for Decommissioning of Energy Assets
- We are finalising collaborative projects with
  - Chulalongkorn University in Thailand – Integral Process Optimization for Sustainable Offshore-structure Dismantling Yard
  - Curtin University, Australia, Risk-based Marine Impact Assessment of Naturally Occurring Radioactive Materials (NORMs) and Mercury from Decommissioning Oil and Gas Infrastructure

How to get involved

Anchor Partnership

- 3-5year commitment
- Bespoke portfolio of company specific and/or collaborative projects
- Representation on the NDC partners group
- Space for the research team within the NDC
- Preferential access to NDC facilities

Project partner

- Typically shorter term commitment
- Company specific project(s)
- Preferential access to NDC facilities

Summary

- State of the art decommissioning research across the life cycle
- State of the art facilities – simulator, laser, high power computing etc.
- Industry-led, collaborative, innovative
- Building critical mass of expertise
- Interdisciplinary
- Signposting to the best facilities for specialist requirements
- Knowledge transfer through networking, forums, CPD, PhDs etc

Questions?