

Innovate UK

Results of Competition: SBRI - Nuclear Decommissioning: Integrated System Demonstrator - Phase 2

Competition Code: 1708_SBRI_NDA_PH2

Total available funding is up to £7.5million for Phase 2 of this competition (£2.5m Innovate UK, £3.5m NDA & £1.5m BEIS)

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Create Technologies Limited	Elephants to Ants: Innovation in Integration	£1,500,000	£1,500,000
Project description - provided by applicants			
Innovation in Integration			
Innovative integration is about more than just integrating innovations. Developments in robotic systems integration in the R&D space over the last 10 years have made profound changes to the way such systems are developed by making robotics open, modular and re-usable. This has resulted in big speed-ups and cost reductions for those developing new robots.			
The agility that these robotics development systems enable is perfectly suited to nuclear decommissioning, where flexibility and the adaptability in the presence of both known and unknown technical risks is the key to success. In this project we will demonstrate that this flexibility not only enables improved performance in and of itself, but that it also has a fundamental impact on the form of both the solution and the way it is deployed and operated. These new solutions will: maximise re-use (saving cost), reduce initial acquisition cost, reduce overall technical risk, reduce waste arising and accelerated decommissioning.			

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Barrnon Ltd	Barrnon Integrated Decommissioning System	£1,499,950	£1,499,950

Project description - provided by applicants

Barrnon Integrated Decommissioning System

The tasks addressed by the Barrnon Integrated Decommissioning System include characterisation, planning, visualisation, size reduction, chemical & sludge removal, contamination management, decontamination, control and mitigation of airborne contamination, waste handling, waste segregation and storage. All is achieved through the design and development of an integrated system for the decontamination and decommissioning of contaminated materials bringing existing and new technology to the workforce enabling a substantial reduction in cost whilst giving an additional reduction in operator risk and a reduction in decommissioning timescales.

This will be achieved through the use of new and innovative sensor technology, innovative robotic manipulation equipment combining a wide range of end effectors. A Novel liquid nitrogen decontamination process reduces contamination without producing any secondary waste enabling the user to down grade the waste classification, reducing the cost of waste storage.

The package will seamlessly intergrate the advances of VR technology both for characterisation and planning but also for direct operator interface, all in conjunction with existing visulisation machine control. We create a user friendly system which allows characterisation pre, during and post operation reducing the risk, speeding up the process, reducing the cost of operations.

Our equipment will offer a step change approach; each of the partners are at the forefront of their given area of expertise. Each partner is working currently on major projects globally and in instances already collaborating to deliver work. This global approach takes learning from the likes of Japan (Fukushima), Hanford (US) as well the European markets to give our product reliable deployment, in turn allowing us to create new markets swiftly for our innovation.

The technologies of the main project partners Oxford Technologies Ltd, Createc Ltd and Barrnon will combine to offer a suite of decomissioning tools readily deployable with advanced decomissioning tequniques making the process of decomissioning faster, cheaper safer.

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Nuvia Limited	Nu-Decom	£1,499,224	£1,499,224

Project description - provided by applicants

Nuvia Limited, a UK based, international nuclear engineering, project management and services contractor has teamed up with a number of the UK's top innovative technology providers in response to Innovate UK's SBRI IIND funding competition. The title of the project is "Nu-Decom" and that reflects the aim of the project which is to demonstrate a range of new decommissioning technologies that will deliver the safer, cheaper and quicker decommissioning of the UK's nuclear legacy. Nuvia have assembled a comprehensive team suited for the complex and wide ranging challenges associated with the decommissioning of the active process plants on the Sellafield site. The team includes expertise from both industry and academia, and the fields of expertise include: (1) Teleoperable systems, advanced robotics & semi-autonomous systems for challenging environments. (2) Remote radiometrics and geometric characterisation. (3) The post processing of geometric data into 3D modelling and visualisation software packages. (4) The use of games technology, virtual (VR) and augmented reality (AR) technologies to provide immersive environments for training and communications purposes. (5) The application of Artificial Intelligence (AI) to provide a knowledge base and expert systems that can be used to support and guide remote operations across the UK's decommissioning program. (6) Application of Human Factors principles. These innovative new technologies and techniques will be integrated with Nuvia's own tried and tested nuclear decommissioning expertise and knowhow which has been successfully deployed throughout the UK and on the global decommissioning market thus providing an established route to a global market for UK Technologies. The Project Team's industrial partners include:- Nuvia (Project Lead), Clicks & Links (C&L), Hu-Tech, MOOG, PaR Systems, Tacit-Connections (TC), UKAEA RACE and Imitec. The Project Team's academic partners include: University of Manchester (UoM) and the University of Bristol (UoB). As part of Phase 1 the project team will assess each step in a typical decommissioning process including:- initial characterisation, decontamination, the design & manufacture process, operator training, HAZOP and safety case processes, site preparation, installation & commissioning, Safe Systems of Work (SSoW), the Human Machine Interface (HMI), remote operations, size reduction, consumable management, materials handling, routine maintenance, remote intervention & repair, waste export routes, ex-situ size reduction, assay monitoring, waste sorting, waste sentencing & segregation, waste packaging, waste container handling and finally export from the facility. Phase 1 will investigate the feasibility of applying the range of innovative technology platforms to each of the above steps and rank and rate each of the applications and potential benefits against the required criteria i.e. improved productivity, minimising human intervention, transferability, scalability and optimising waste treatment packing and routing into the most cost efficient waste streams. The project will also consider the Technology Readiness Levels (TRL) and the cost to develop technologies to a level suitable for (a) Inactive Demonstration (Phase 2) and (b) active demonstration. The project will prioritise and make recommendations for which platforms go forward to the Phase 2 inactive demonstration.

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Cavendish Nuclear Ltd	Sellafield In-Cell Decommissioning System (SIDS)	£1,398,328	£1,398,328

Project description - provided by applicants

Our project will combine three existing technologies to create a system which will be make it safer and more efficient for operators to see exactly what is inside cells before they begin the task of removing and packaging the items.

We will integrate Cavendish Nuclear's 3D gamma dose rate scanning equipment - Radscan with robotic deployment snake arm laser cutting technology

This will enable operators to efficiently identify what is Intermediate Level Waste (ILW) and what is Low Level Waste (LLW) and allow them to target which type of waste they should remove first from each cell.

It will enable operators to plan and synchronise the type of waste being removed at any point in time to match the capacity of the ILW and LLW waste routes that are currently available on Sellafield site.

In addition to Radscan and snake arm laser cutting technology, our project will also integrate Virtual Reality (VR) technology.

Based on the scanned 3D data, VR will be used to programme the motions for the robotic deployment system, so that operator can monitor operations rather than manually controlling the operations of the equipment.

Our project will also explore the feasibility of deploying remotely positionable explosive cutting devices.

The innovation in our approach is the combination of these existing technologies into one platform that integrates the benefits of all of the technologies into a single user interface.

Cavendish Nuclear has an established track record of combining different systems and technologies into integrated systems to provide solutions to decommissioning challenges across nuclear sites.

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Amec Foster Wheeler Nuclear UK Limited	Integrated Innovation for Nuclear Decommissioning	£1,497,239	£1,497,239

Project description - provided by applicants

Our aim is to develop a modular integrated platform that will combine state-of-the-art technology with tried and tested decommissioning 'know-how'. We will use experience from the conventional decommissioning sectors, combined with cutting-edge space, defence, medical and industrial technologies, to produce a streamlined, safety orientated solution. The project will be developed using our experience of the pragmatic integration of complex technology to generate a step-change in decommissioning performance, that will be Cheaper, Faster and Safer as follows:

- An innovative modular control and automation strategy that can be proven and validated within the nuclear environment (Cheaper, Faster)
- Draw on cross-sector innovations and a pioneering approach to reliability and fault recovery: our approach removes the need for manned entry to cells (Safer, Faster, Cheaper)
- A philosophy of minimal in-situ characterisation (Cheaper, Faster)
- A planning approach that enables simulation within a virtual environment, optimising sequence, process and waste management (Safer, Faster)
- A remote de-planting process that reduces operations at height, and removes the need for temporary platforms, scaffolds and man entry (Safer, Faster, Cheaper)
- A suite of innovative modular waste handling and processing tools that characterise, size-reduce, sort and decontaminate waste, using a repeatable and scalable process (Faster, Cheaper)
- Optimised waste characterisation by moving analysis to the waste (Safer, Faster, Cheaper)

Our team (Amec Foster Wheeler [Lead Partner], Airbus Defence and Space Ltd., Clicks and Links Ltd., Damavan Imaging SAS, Digital Concepts Engineering Ltd., IS-Instruments Ltd., Lancaster University, Salford University, and TWI) builds on existing relationships, creates new ones, and comprises nuclear and out-of-sector expertise, innovative SMEs and applied academic innovation; we will collaborate to bring true innovation in thought and technology to this decommissioning challenge.

Amec Foster Wheeler's world-class track record in delivering and integrating complex, multi-partner projects gives us confidence that we can deliver the project successfully within tight constraints. Our strong position in the nuclear decommissioning market provides a platform to commercialise any technology developed both in the UK and overseas.

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