University of the West of England, Bristol
Nuclear focused -
Science, Skills & Supply Chain projects

John Lanham, Neil Willey, Glenn Parry, John Savage – UWE, Bristol.

SOUTH WEST NUCLEAR HUB

University of the West of England, Bristol

UWE Bristol has a wide range of research, expertise and projects that will contribute to the knowledge base of the south west nuclear hub. The focus of UWE's work is to deliver sustainable and scalable solutions to the challenges and issues facing business working in the nuclear industry – examples include :

Professor Neil Willey, Dr Eleni Siasou and Nicol Caplin work on the uptake and effects of radioisotopes on plants. Neil Willey is Chair of the UK Co-ordiating Group for Environmental Radioactivity (COGER). COGER has for over 40 years provided a forum for the discussion of environmental radioactivity between academics, regulators and industry.

Professor Tony Pipe and Professor Alan Winfield - BRL – Bristol Robotics Laboratory – are working to exploit the remote and autonomous capabilities of intelligent robotics systems to provide safe and flexible tools for the accident and emergency scenarios, decommissioning and end-of-life work on reactor systems. Professor Winfield led the EU supported EURathlon project in 2015.

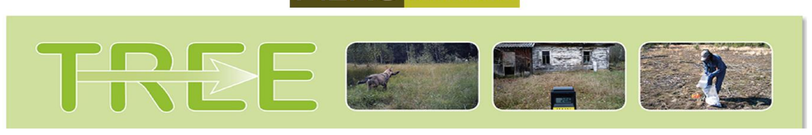
Dr Glenn Parry is Associate Professor of Strategy and Operations Management and works to provide understanding and improvement in the process of complex engineering delivery. Tools developed include Enterprise Imaging developed whilst working with BAE Systems, to provide a visual depiction of the resources and/or resource providers who come together to create deliver complex engineering service systems – this approach is applicable to the complex supply chains that exist in the nuclear industry.

John Savage – has worked with first tier construction supply chain partners to develop CIRCLE – a bespoke training and education programmes to ensure site engineering teams comply with specific industry licences and sector standards.

Additionally UWE works closely with **Bridgwater College** to provide a range of Foundation and Bachelors degree programmes that have been designed to meet the future skills requirements of major nuclear based employers in the locality and region and is seconding staff into the National College for Nuclear to assist with programme and curriculum development.

Researchers at UWE are members of the TREE Consortium

NERC SCIENCE OF THE ENVIRONMENT



TRansfer - Exposure – Effects (TREE):

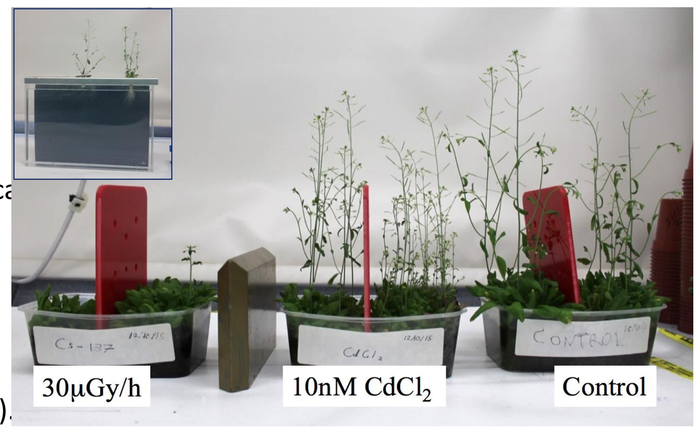
integrating the science needed to underpin radiological assessments for humans and wildlife

Centre for Ecology & Hydrology · University of the West of England, Bristol · University of Stirling · University of Portsmouth · Lancaster University · The University of Nottingham · University of Salford Manchester · SUERC · Research with Plymouth University · Environment Agency · Radioactive Waste Management

Plus 10 Partners, and 12 Associates

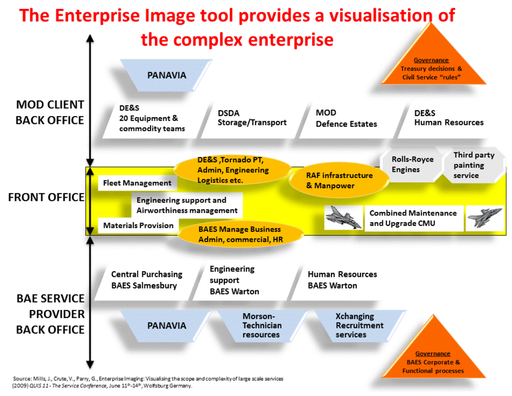
The Effects of Chronic Low-Level Ionising Radiation on Plants

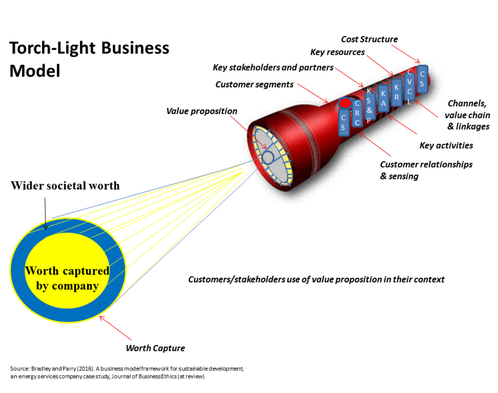
We investigate the effects of IR on plants over generations. We have analysed genomic and proteomic effects, are analysing developmental and morphological effects and will shortly be analysing physiological and epigenetic effects. There can be effects of IR on plants below current protection limits (4th generation of *A. thaliana* shown). We hypothesise that, in contrast to a common suggestion, effects are not due to direct oxidative stress to plants (Smith et al., 2014).



Managing complex supply chains - Enterprise Imaging

The Enterprise Image tool provides a visualisation of the complex enterprise





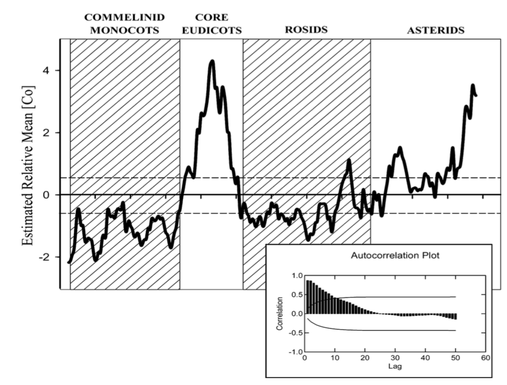
Source: Bradley and Parry (2016). A business model framework for sustainable development; an energy services company case study, Journal of BusinessEthics (at review)

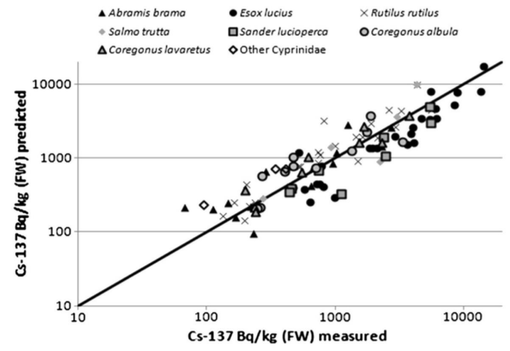
Enterprise Imaging is useful for manager working in complex multi-organisational operations. Dr Parry's work on business modelling and value delivery developed with Dr Peter Bradley (Economics) provides a business model framework that captures the essence of an organisation, its aims, resources, operation and finances. The business model is an object that can act as a tool to support planning of strategy and operations – it has been used by Thames Water and a number of engineering SMEs.

Predicting the Transfer of Radioisotopes to Flora & Fauna

Different species can, under identical exposure regimes, have very different uptake of radioisotopes. This is a significant source of uncertainty in predicting the transfer of radioisotopes into the biosphere. We identify phylogenetic effects in the uptake of elements and use them to clarify predictions of transfer (e.g. Willey & Wilkins 2008; Fig A). The Caryophyllids (beets, pinks, cactii etc) of the Eudicot group have high uptake of several radionuclides.

As part of the NERC TREE consortium we are analysing phylogenetic effects in the transfer of isotopes of I, Se, Tc and U to flowering plants. Using previously published data we are carrying out ionomic analyses to further investigate the phylogenetic constraints on plant mineralogy that might underpin the effects on radionuclide transfer to plants. We have used a similar approach to predict values for fish (Beresford et al., 2013; Fig B) and in the TREE project are extending our analyses to other groups of fauna.





References

[1] Smith J, Willey NJ, Hancock J (2014) *Biology Letters* 8: 594-597

[2] Willey NJ & Wilkins J (2008) *Env. Sci & Tech.* 42, 2162-2167

[3] Beresford et al. *Sci.Tot. Env.* 463-464: 284-292.

EURathlon – 2015 – Intelligent autonomous robots for emergency response and incident support.

This EU supported challenge draws upon a range of expertise and technology to design and deliver effective response solutions to a range of outdoor industrial incidents including reactor and power-station accidents.

The 2015 Event was led by BRL's Professor Alan Winfield

euRathlon
An Outdoor Robotics Challenge for Land, Sea and Air