EXPERT – WHAT EXPERT?

So, who exactly is an expert? This, of course, will vary from subject to subject and process to process. In Sciencewise dialogues, expert input has broadly fallen into the following categories:

- **Experts (scientific/technical/legal)** provide technical and scientific-based inputs from the whole range of science – from social science and philosophy through to physical and life sciences
- **Stakeholders** largely provide views and evidence based on a particular standpoint and often represent lobbying or special interest groups, eg the Renewable Energy Association, Greenpeace
- **Experiential** publics are members of the public who have a specific knowledge, can contribute by sharing their personal insights and stories into an issue, eg parents of children with a chronic medical condition, who have gained considerable knowledge of that particular condition over time, but who also have direct experience as users of a medical service

BROADENING THE NOTION OF WHO IS AN EXPERT

The notion of who might be perceived as an expert is under constant debate.

"…when it comes to the future of an emerging technology, no one (or everyone) is an expert." http://www.nature.com/news/2010/100804/full/466688a.html NatureNews: World View: Not by experts alone – David Sarewitz

As the Big Society starts to play out, it is possible that, with an emphasis away from centralised 'power' to more local delivery, there will come a greater recognition of the role and experiences of those individuals and organisations delivering solutions. The extension of this means a widening of whom we might perceive as experts in the future – particularly to those with increasing direct and practical, rather than academic, experience.

Couple this with the continued rise of the professional amateur, resourced and profiled by ever wider internet powered information sharing, and it is likely that the choice of which 'experts' and perspectives are pertinent, challenging and appropriate in public dialogue is sure to broaden.

So, while advocating a much stronger presence and number of scientists and academic experts to participate in public dialogue, it is also necessary to consider involving a much wider set of perspectives on an issue to equip public participants with the range of viewpoints on the subject at hand.

In conclusion, the tips to bear in mind for every dialogue is to think carefully about which, and in what way, experts are involved in public dialogue:

- Are the range of perspectives faithfully covered to give participants a holistic view of the issues?
- Who is best suited to give those perspectives – academics, NGOs, those with experiences or stories to share – do we need to look beyond the 'usual suspects'?
- How can experts themselves be participants in the process and become more able to understand fully the thoughts of public participants so that, in turn, this can help develop thinking, research and developments that are fit for purpose and in line with a society that ultimately gives the 'licence to operate' for many new technologies.

1 Participatory Science and Scientific Participation: The role of Civil Society Organisation in decisionmaking about novel developments in biotechnology. http://www.participationinscience.eu/psx2/final/PSX2_final%20report.pdf

2 Warburton, Diane – Shared Practice (2007) - Evaluation of the HFEA public consultation on hybrid and chimera embryos http://www.sharedpractice.org.uk/Downloads/HFEA%20Report.pdf

3 Mohr, Alison (2009) An independent evaluation of the BBSRC and MRC Stem Cell Dialogue Project 2008. University of Nottingham, Institute for Science and Society, P47, Final draft May 2009.

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RESEARCHERS VISUALISE HERPES VIRUS' TACTICAL MANOEUVRE

For the first time, researchers have developed a 3D picture of a herpes virus protein interacting with a key part of the human cellular machinery, enhancing our understanding of how it hijacks human cells to spread infection and opening up new possibilities for stepping in to prevent or treat infection. This discovery uncovers one of the many tactical manoeuvres employed by the virus.

The Biotechnology and Biological Sciences Research Council (BBSRC)-funded team, led by The University of Manchester, have used NMR – a technique related to the one used in MRI body scanners and capable of visualising molecules at the smallest scales – to produce images of a herpes virus protein interacting with a mouse cellular protein. These images were then used to develop a 3D model of this herpes virus protein interacting with human protein. The research was published this evening in PLoS Pathogens on 6 January.

Lead researcher Dr Alexander Golovanov from Manchester's Interdisciplinary Biocentre and Faculty of Life Sciences said, "There are quite a few types of herpes viruses that cause problems as mild as cold sores through to some quite serious illnesses, such as shingles or even cancer. Viruses cannot survive or replicate on their own – they need the resources and apparatus within a human cell to do so. To prevent or treat diseases caused by viruses we need to know as much as possible about how they do this so that we can spot weak points or take out key tactical manoeuvres."

The 3D model shows how the viral protein piggybacks onto the molecular machinery components inside human cells, promoting virus replication and spread of infection through the body.

"When you look at the image, it's like a backpack on an elephant: the small compact fragment of viral protein fits nicely on the back of the human protein," said Dr Golovanov.

By studying the images along with biochemical experiments using the human version of the cellular protein, the team has uncovered the mechanism by which the viral and cellular proteins work together to guide the viral genetic material out of the cell's nucleus. Once there, the genetic material can be utilised to make proteins that are used as building blocks for new viruses. The researchers have also confirmed that this relationship between the two proteins exists for related herpes viruses that infect monkeys.

Dr Golovanov continued, "Our discovery gives us a whole step more detail on how herpes viruses use the human cell to survive and replicate. This opens up the possibilities for asking new questions about how to prevent or treat the diseases they cause."

Professor Janet Allen, BBSRC Director of Research, said "This new research gives us an important piece of the jigsaw for how a particular viral infection works on a molecular level, which is great news. Understanding the relationship between a human, animal or plant – the host – and the organisms that cause disease – pathogens – is a fundamental step toward successful strategies to minimise the impact of infection. To study host-pathogen relationships we have to look in detail at the smallest scale of molecules – as this study does – and also right through to the largest scale of how diseases work in whole systems – a crop disease in the context of a whole area of agricultural land, for example. BBSRC's broad portfolio of research into host-pathogen relationships facilitates this well."

550 MILLION YEARS AGO RISE IN OXYGEN DROVE EVOLUTION OF ANIMAL LIFE

Researchers funded by the Biotechnology and Biological Sciences Research Council (BBSRC) at the University of Oxford have uncovered a clue that may help to explain why the earliest evidence of complex multicellular animal life appears around 550 million years ago, when atmospheric oxygen levels on the planet rose sharply from 3% to their modern day level of 21%.

The team, led by Professor Chris Schofield, has found that humans share a method of sensing oxygen with the world's simplest known living animal – *Trichoplax adhaerens* – suggesting the method has been around since the first animals emerged around 550 million years ago.

This discovery, published on 17 December in the January 2011 edition of EMBO Reports, throws light on how humans sense oxygen and how oxygen levels drove the very earliest stages of animal evolution.

Professor Schofield said "It's absolutely necessary for any multicellular organism to have a sufficient supply of oxygen to almost every cell and so the atmospheric rise in oxygen made it possible for multicellular organisms to exist.

"But there was still a very different physiological challenge for these organisms than for the more evolutionarily ancient single-celled organisms such as bacteria. Being multicelluar means oxygen has to get to cells not on the surface of the organism. We think this is what drove the ancestors of *Trichoplax adhaerens* to develop a system to sense a lack of oxygen in any cell and then do something about it."

The oxygen sensing process enables animals to survive better at low oxygen levels, or 'hypoxia'. In humans this system responds to hypoxia, such as is caused by high altitudes or physical exertion, and is very important for the prevention of stroke and heart attacks as well as some types of cancer.

Trichoplax adhaerens is a tiny seawater organism that lacks any organs and has only five types of cells, giving it the appearance of an amoeba. By analysing how *Trichoplax* reacts to a lack of oxygen, Oxford researcher Dr Christoph Loenarz found that it uses the same mechanism as humans – in fact, when the key enzyme from Trichoplax was put it in a human cell, it worked just as well as the human enzyme usually would.

They also looked at the genomes of several other species and found that this mechanism is present in multicellular animals, but not in the single-celled organisms that were the precursors of animals, suggesting that the mechanism evolved at the same time as the earliest multicellular animals.

Defects in the most important human oxygen sensing enzyme can cause polycythemia – an increase in red blood cells. The work could also open up new approaches to develop therapies for this disorder.

Professor Douglas Kell, Chief Executive, BBSRC said "Understanding how animals – and ultimately humans – evolved is essential to our ability to pick apart the workings of our cells. Knowledge of normal biological processes underpins new developments that can improve quality of life for everyone. The more skilful we become in studying the evolution of some of our most essential cell biology, the better our chances of ensuring long term health and well being to match the increase in average lifespan in the UK and beyond."