Science Communication Activities
November 24-25th 2016
CEITEC, Brno, Czech Republic

Dr Richard Bowater
School of Biological Sciences
University of East Anglia , Norwich, UK
r.bowater@uea.ac.uk

Science Communication Activities

- Specific examples:
  - Highlighting events we have been involved in
  - Examples from other scientists/organisations
- Brief history of Science Cafés
  - General aims of such events
  - Highlight different ways to deliver such events
- Opportunities for us all to get involved with

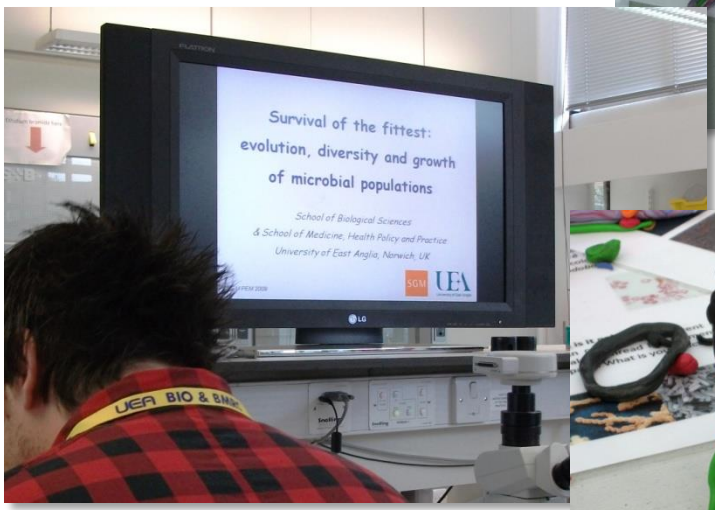
Objectives in Science Communication Activities

- Be clear about the objectives of any engagement activities and events – especially in relation to who your audience is
- Good objectives are SMART:
- S
- M
- A
- R
- T

Survival of the Fittest: Growth of Microbial Populations

- In 2009, we were awarded £1000 for an SGM Public Engagement with Microbiology Award
- For series of public engagement activities to celebrate anniversaries linked to Charles Darwin:
  - The bicentenary of his birth in 1809
  - His seminal manuscript, “On the Origin of Species”, was first published in 1859
- Scientists from the UEA and NRP engaged with the different parts of the local community
- Events were used to inform people about evolution and biodiversity – with a microbiological flavour!

Survival of the Fittest: Growth of Microbial Populations



Survival of the Fittest: Growth of Microbial Populations

SURVIVAL OF THE FITTEST

Visitors at the Forum in Norwich. L & R. Bowater

THE RECENT CELEBRATIONS of anniversaries associated with Charles Darwin led many scientists to explore new ways to discuss the importance of evolution. Scientists from the University of East Anglia (UEA) and Norwich Research Park designed a wide range of events that engaged with the local community. Realising that microbes provide some of the best evidence for Darwin's seminal theory, we developed a series of events to show how microbes can quickly respond to changes in their surroundings. These events were designed to illustrate the fundamental principles behind evolution, such as 'survival of the fittest' – the microbes that adapt the most quickly and the most successfully are the ones that survive and thrive. This ability of microbes to evolve has relevance to our everyday life, for example in the development of antibiotic resistance, bioremediation and the potential for simple organisms to inhabit environments that are extremely hostile.

With funding provided by an SGM Public Engagement in Microbiology Award, we designed and developed a series of interactive exhibits that we were able to mix and match to engage with schoolchildren, science enthusiasts and the wider public. The activities that the interactive exhibits supported also provided opportunities for academic lecturers, researchers and UEA students with an interest in public engagement to participate and develop their skills in this area. Part of the project was a suite of 5 posters that were designed by students enrolled on UEA's BSc in Microbiology. Other staff and students helped to create and present the hands-on elements, which included microscopes and agar plates that showed the wonderfully different morphologies, colours and smells that have evolved within the microbial world. Children were encouraged to 'evolve a microbe' using modelling clay and to 'grow their own bugs' from handprints. We also designed a computer presentation to show how simple mutations can lead to dynamic bacterial populations that can quickly adapt to changes in the environment.

Students that took part in the events commented that 'it was an enjoyable and valuable learning experience' and 'it was a positive surprise to see how much I learnt from other people both as a science communicator, and just on an everyday level'.

The plan was to take the interactive exhibits to three different events throughout Norwich. However, the success and flexibility of the exhibits has meant that we have also continued to develop and deliver them at other events.

The first exhibition was held at UEA as part of a weekend of events entitled 'Darwin@UEA'. Almost 80 year 9 students visited the University on the Friday and well over 200 members of the public visited on the Saturday.

For the second event we took part of the exhibit to the Maddermarket Theatre in Norwich as part of a regular series of *Science Café* events. The warm summer evening helped to draw in the crowds who were able to take advantage of the bar refreshments on offer while discussing the growing problem of microbes evolving and developing antibiotic resistance.

The third event was part of the annual *Cells Alive* event, which takes place on the final Saturday of September. By locating this free event in Norwich's award-winning Forum centre, it has developed a group of loyal visitors who look forward to attending it, but the location also ensures that it catches the passing trade of families, pensioners, teenagers and visitors to the city. *Cells Alive* attracted more than 600 visitors over the course of the day and a huge variety of novel microbes (newly evolved in modelling clay!) made their way out of the Forum.

As a result of this project, we have produced several interactive exhibits that have continued to be used at a wide variety of public engagement events delivered by Norwich scientists. The contemporary and flexible nature of the exhibits has allowed us to plan using them again at events in the near future to highlight the significance and fascination of research involving microbiology.

DRS LAURA and RICHARD BOWATER are Senior Lecturers at University of East Anglia (email lauraheward@uea.ac.uk; r.bowater@uea.ac.uk)

Children at an event held in laboratories at the UEA. L & R. Bowater

THE YORK FESTIVAL of Science and Technology is a week-long event aiming to *Bring Science to Life* for all ages. The Centre for Immunology and Infection (CII), a joint venture between the Hull York Medical School and the Department of Biology at the University of York, has again promoted public understanding of microbiology at one of the Festival's showcase events, *Science Discovery Days*. Held at the famous National Railway Museum, this event allows children and adults to get hands-on experience of contemporary issues in science. This is the second year that the CII participated, and we were eager to build upon the previous year's success to demonstrate key aspects of our research in a light-hearted but educational format.

CII staff at the York Festival. M. van der Woude

The location of our stand, right in front of one of the main entrances, bodied well for a large number of potential visitors. Also working in our favour was a team of enthusiastic CII scientists to guide guests of all ages through the wide selection of original activities.

For many of the youngest visitors, the chance to dress up as a scientist and use the plethora of crayons to colour-in pictures of microbes proved irresistible. No doubt many family photo albums are now enriched with pictures of future Nobel Prize winners, and fridges are decorated with colourful bacteria and parasites.

Another popular attraction for our younger visitors was the

TRAINS, GAMES, MICROBES AND MICROSCOPES – A WINNING RECIPE FOR A GREAT DAY!

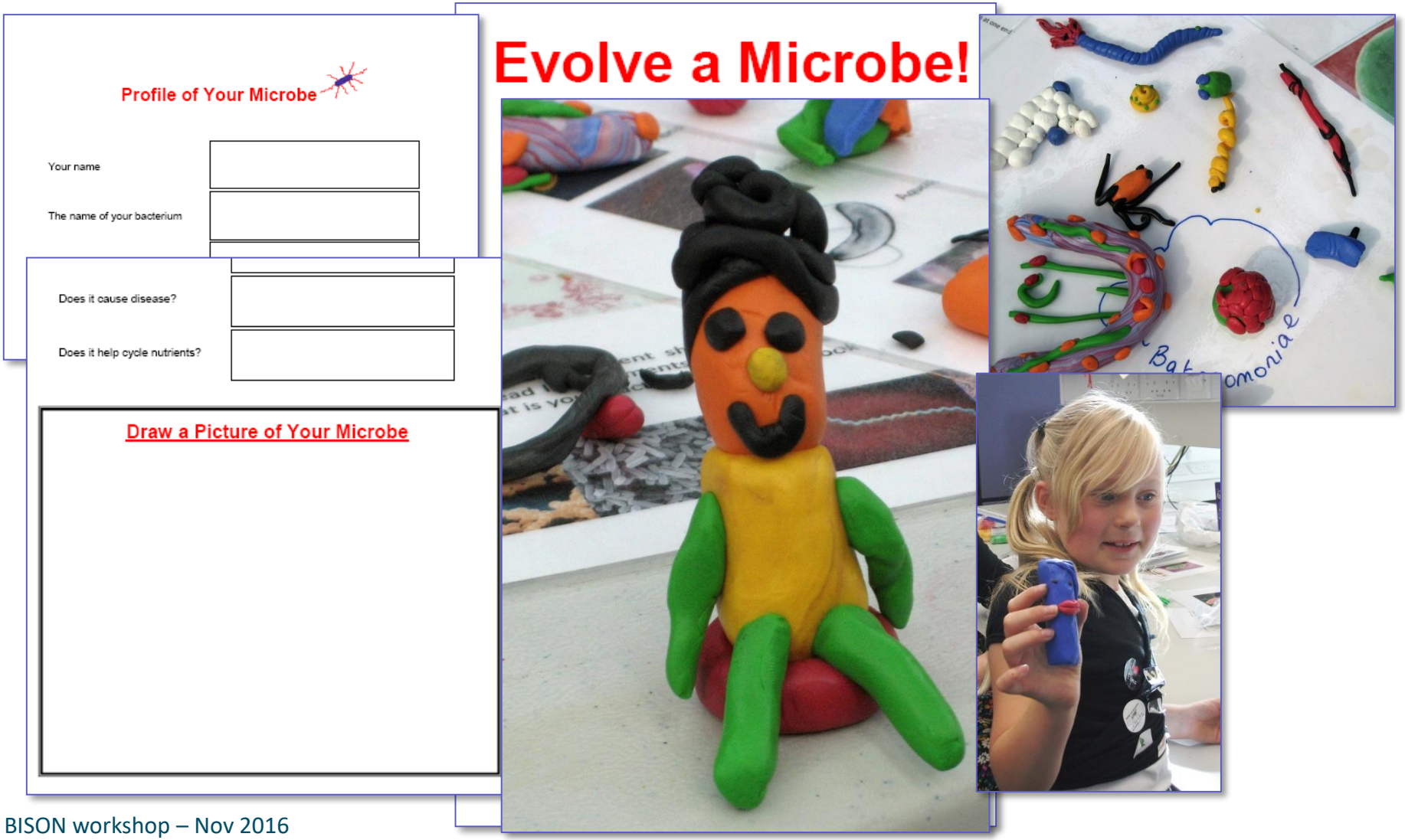
MICROBIOLOGY TODAY MAY 2011

Survival of the Fittest: Growth of Microbial Populations

- Events showed how quickly microbes can respond to their surroundings, illustrating some of the best evidence for Darwin's seminal theory
- The events illustrated the principles behind the description of evolution as "survival of the fittest": the microbes that adapt most quickly and most successfully are the ones that survive and thrive
- Highlighted relevance to everyday life, such as development of antibiotic resistance, bioremediation and the potential for organisms to inhabit hostile environments

Survival of the Fittest: Growth of Microbial Populations

Survival of the Fittest: Growth of Microbial Populations



Survival of the Fittest: Growth of Microbial Populations

Objectives of "Survival of the fittest", SGM PEM

- Overall aim was to develop exhibits/activities that would
- Objectives included:
  - Incr
    sele
  - High
  - Dev
    rang
  -

√ *Informative; √? Interesting; √ Engaging*

?? Although information provided, did people learn anything from it? Need a more formal evaluation....

√ *Information presented in several formats*

√ *Posters have been used for several events, including departmental Visit and Open Days*

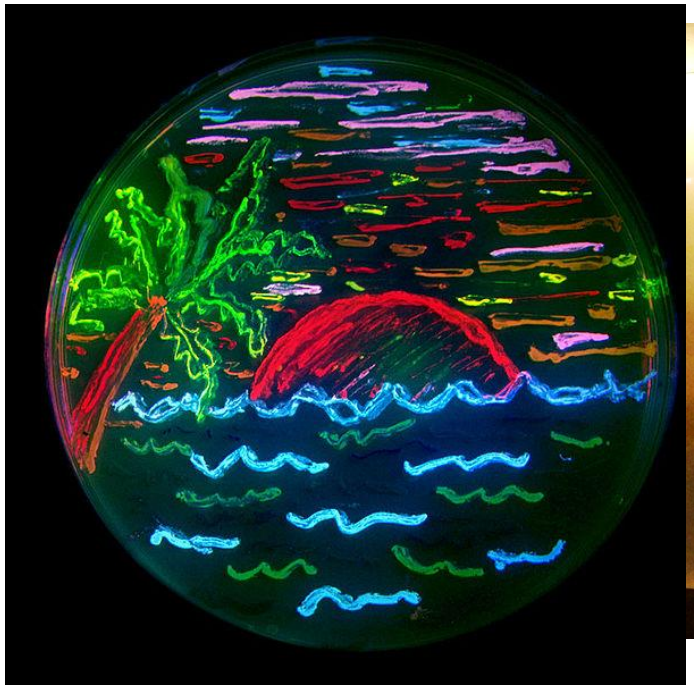
√ *"Fantastic experience! Helped me to think about science in a different way" – Jaeger Hamilton*

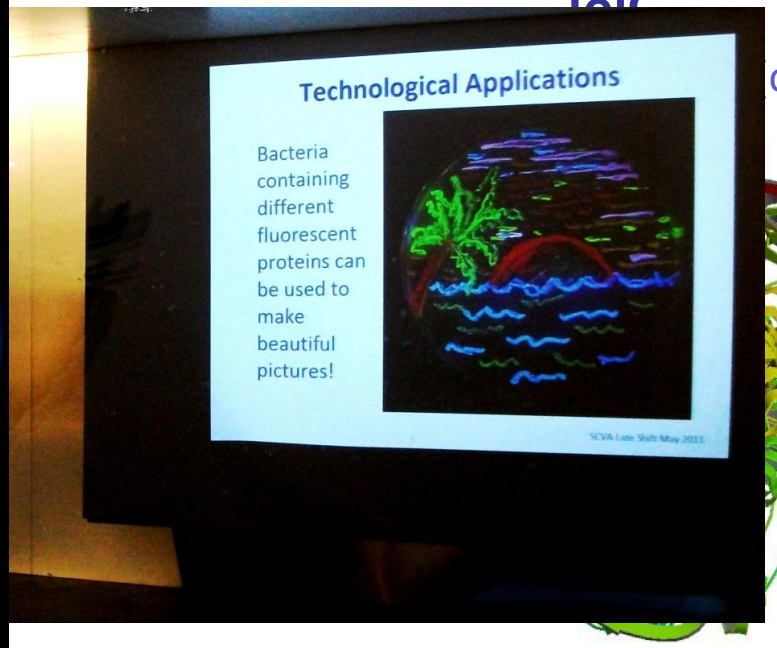
Were the objectives met?

Engaging with Artists

- Scientists need to engage with non-traditional audiences
- UEA is home to the Sainsbury Centre for Visual Arts (SCVA) – an inspirational public art museum
- We are keen to build links with the SCVA, especially to use their skills to discuss our science in different ways
- Take time to build relationships with experts who will help achieve your aims
- Focus on topics that have a broad interest – antibiotic resistance, species biodiversity, etc.

Engaging with Artists



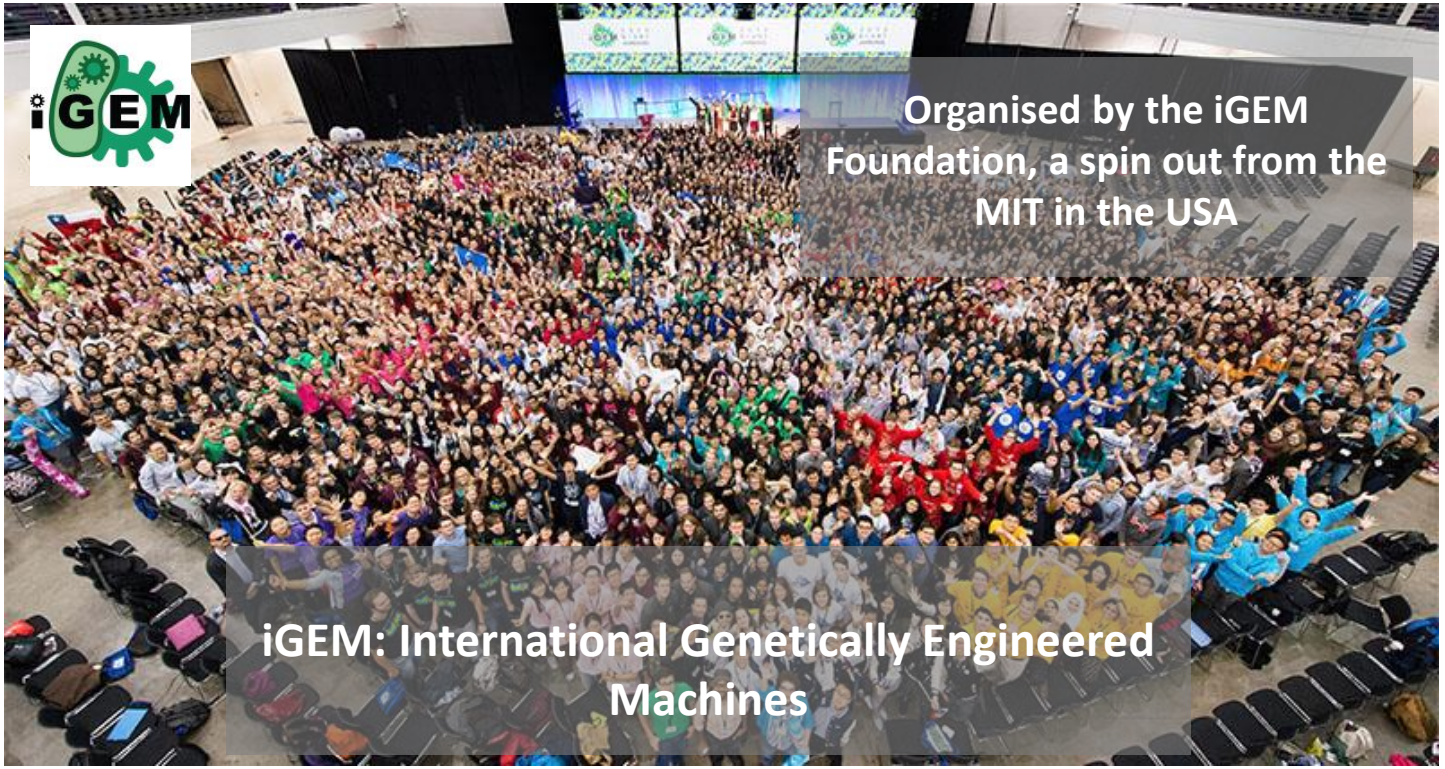


- Take time to build relationships with experts who will help achieve your aims
- Focus on topics that have a broad interest – antibiotic resistance, species biodiversity, etc.

Engaging with Artists

- Take time to build relationships with experts who will help achieve your aims
- Focus on topics that have a broad interest – antibiotic resistance, species biodiversity, etc.

iGEM: What is it?



A Global Synthetic Biology Competition for University Students – usually "research-intensive"

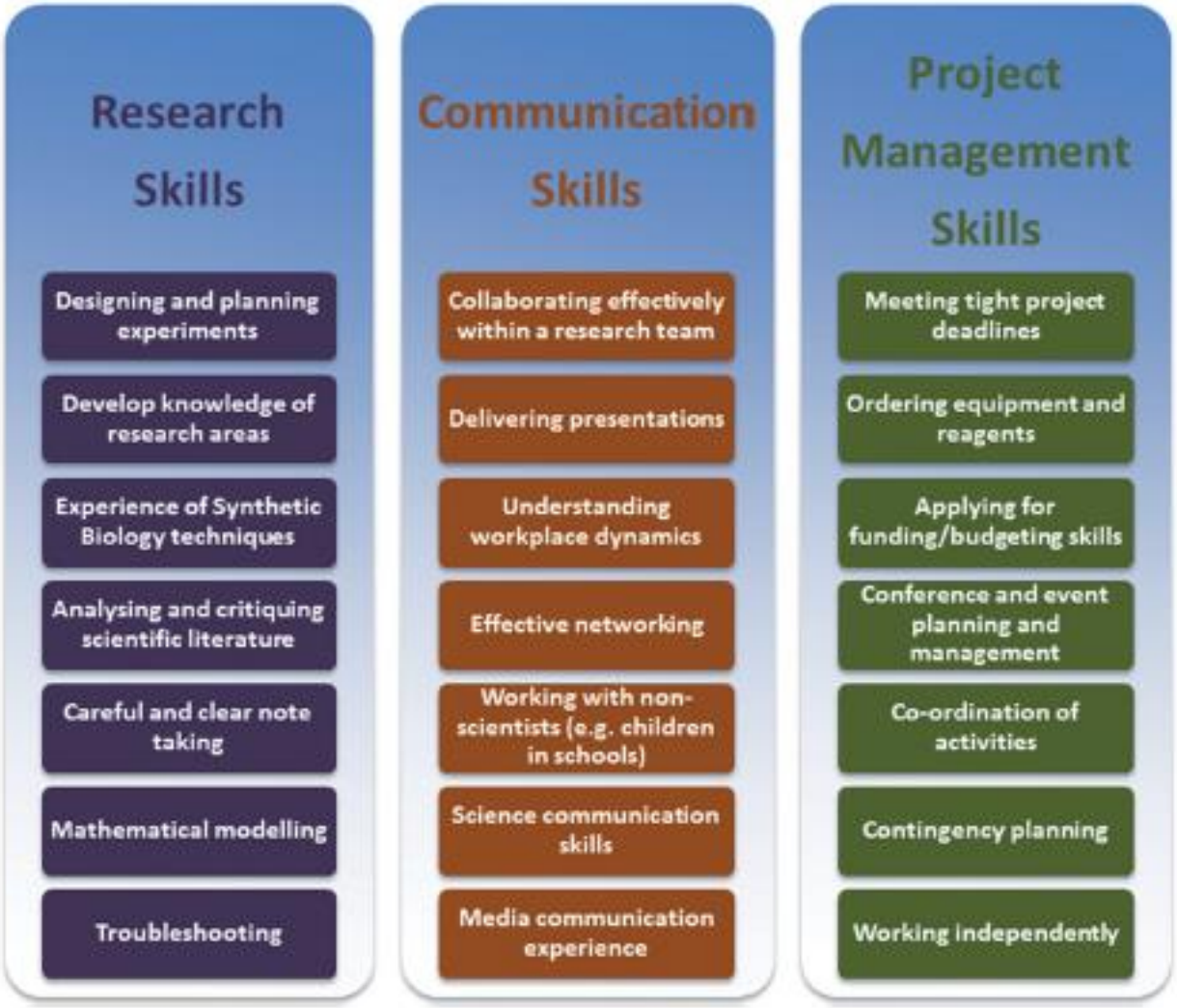
Leads to Jamboree at end of projects

What is Involved in iGEM?

- The team (Students + Advisers) develop a Synthetic Biology project that must be completed within each competition period
- Teams compete to win medals (Gold, Silver or Bronze) and prizes

- Genetic engineering must be performed within the project, following quite strict criteria
- Must involve Human Practices (outreach) and consideration of ethical issues of the project

Skills Developed in iGEM Projects



Kelwick *et al.* (2015) *FEMS Microbiology Letters*, **362**, fnv129

NRP-UEA iGEM Teams

NRP-UEA iGEM Teams

NRP-UEA iGEM Teams

HOUSE OF CARBS

Gold

2016

Silver

Outreach of NRP-UEA iGEM Teams

NRP-UEA iGEM 2014 Team

THE HEWETT SCHOOL

CUT EVENT

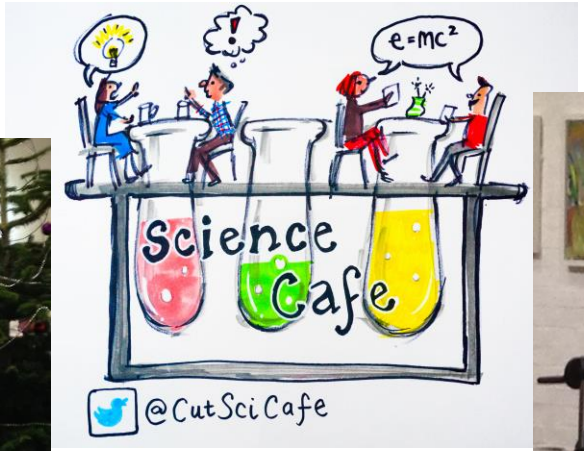
SCIENCE CAFE

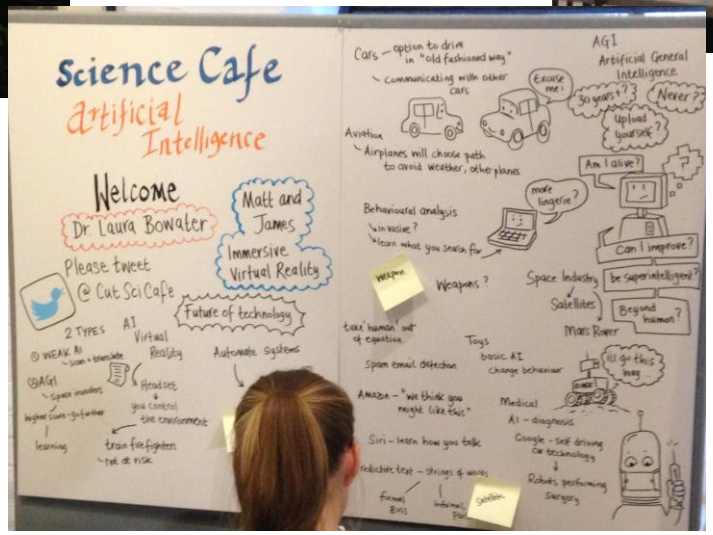
ETHICS OF PUBLIC CONSULTATION

Halesworth, Suffolk, UK

- Halesworth is a market town in north east Suffolk
- Steeped in the history of brewing, malting and agriculture
- It is home to The Cut Arts Centre - performing arts in a converted Maltings

The Cut Science Café

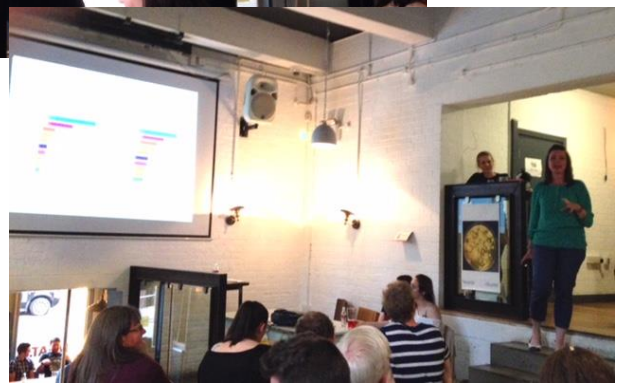




The Cut Science Café

Different Types of Science Cafés

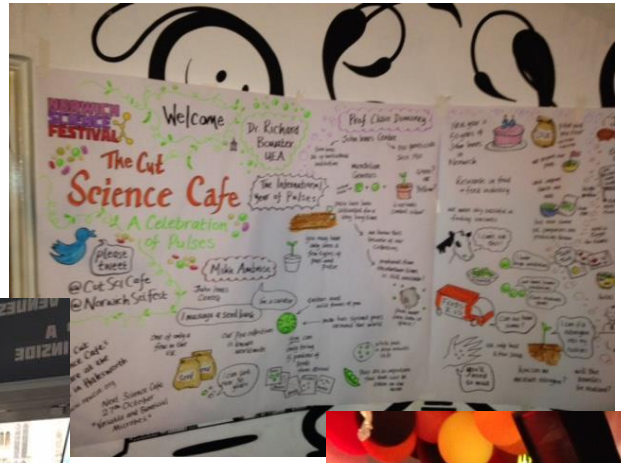
- *Pint of Science, Norwich 2016*



- *Norwich Science Festival 2016*

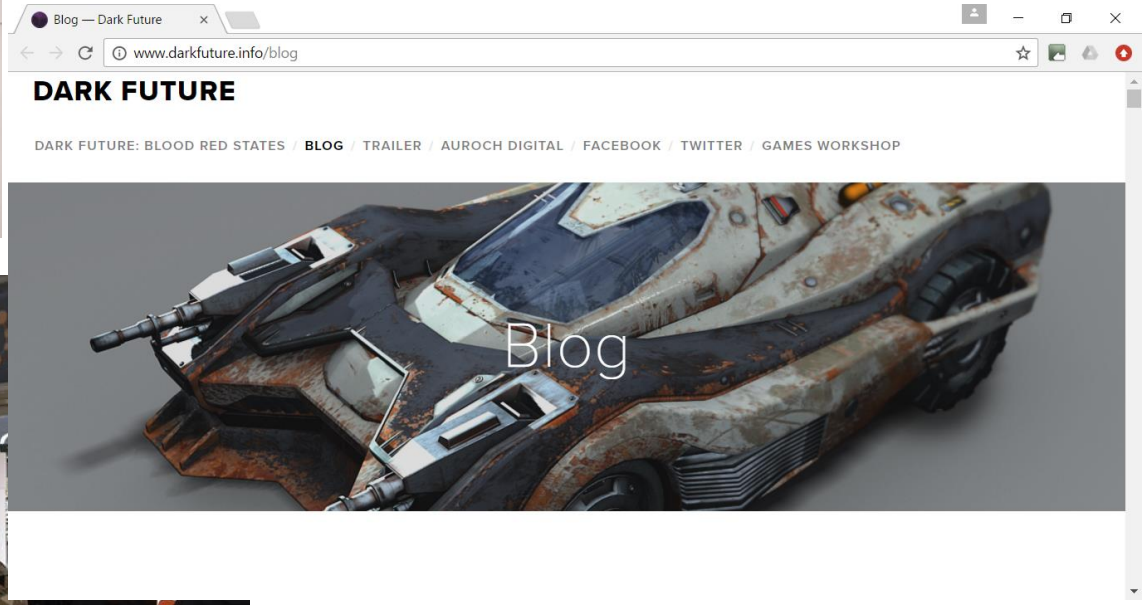
Norwich Science Festival 2016

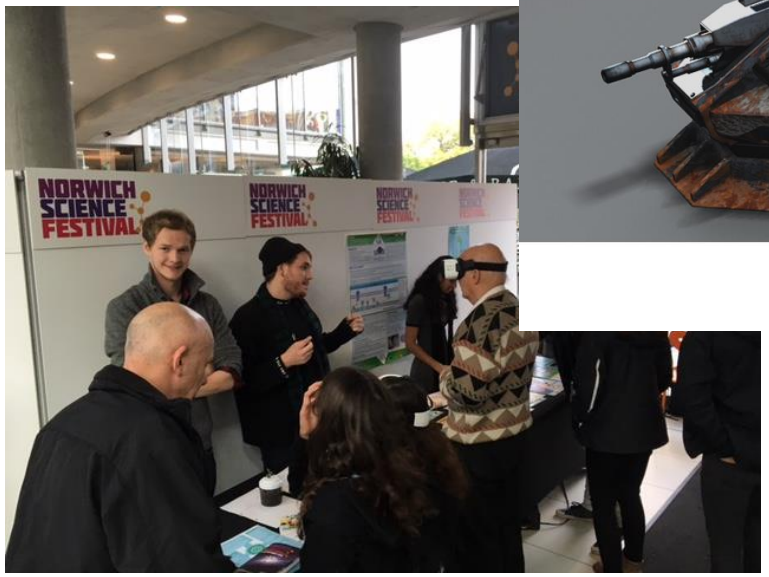
- *Norwich Science Festival 2016*



Virtual Science Realities

- *Auroch Digital: Dark Future*





Summary

- Lots of different opportunities to get involved in science communication activities
- Consider the aims of such events
- Can engage and link to a wide range of different audiences
- They take time, but can be very rewarding

Acknowledgements

UEA

- Undergraduate students from UEA, 2011-2016
- Richard Kelwick (BIO, now Imperial College)
- John Munnoch (BIO, now Univ. of Strathclyde)
- Laura Bowater (MED)
- Julea Butt (BIO/CHE)
- Tom Clarke (BIO)
- Matt Hutchings (BIO)
- Tom Shakespeare (MED)
- Colwyn Thomas (BIO)
- Mark Wilkinson (MED)
- Kay Yeoman (BIO)

Collaborators

- Mark Banfield – John Innes Centre, NRP
- Paul O'Maille – John Innes Centre, NRP
- Nicola Patron – Sainsbury Laboratory/Earlham Institute, NRP

Acknowledgements