

NAMRIP

Network for AntiMicrobial Resistance and Infection Prevention

Timothy Leighton FREng FRS
Chair, NAMRIP



Public Health
England



GlaxoSmithKline



Royal United Hospitals Bath
NHS Foundation Trust



University Hospital Southampton
NHS Foundation Trust

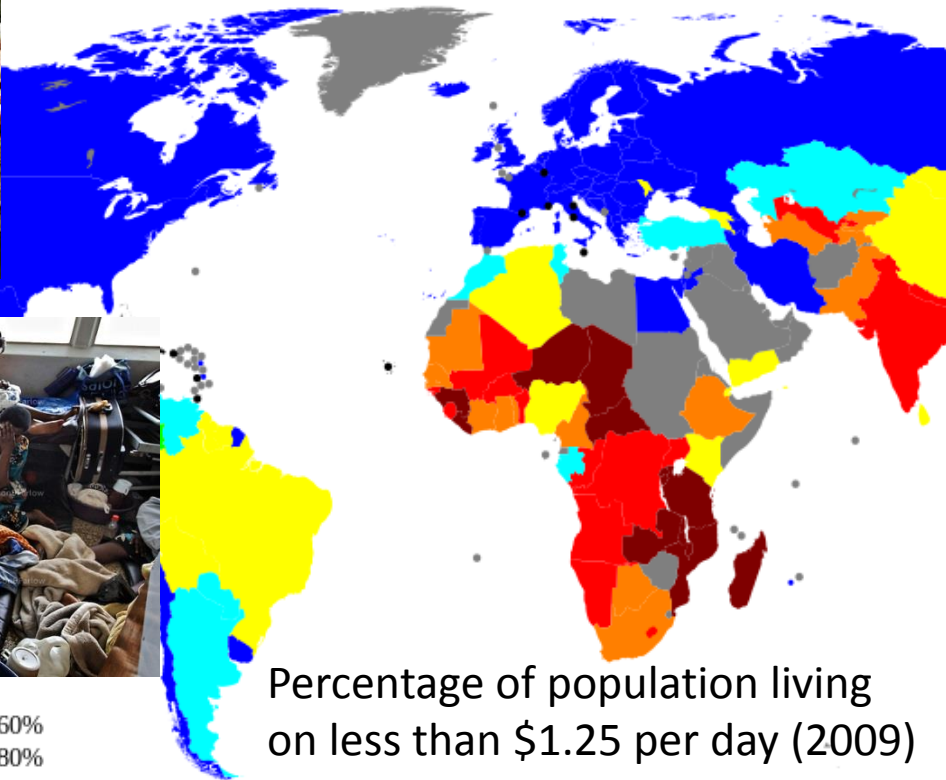


Ultrawave
Precision ultrasonic cleaning equipment

Are we too optimistic about the apocalypse?

We don't have 35 years.

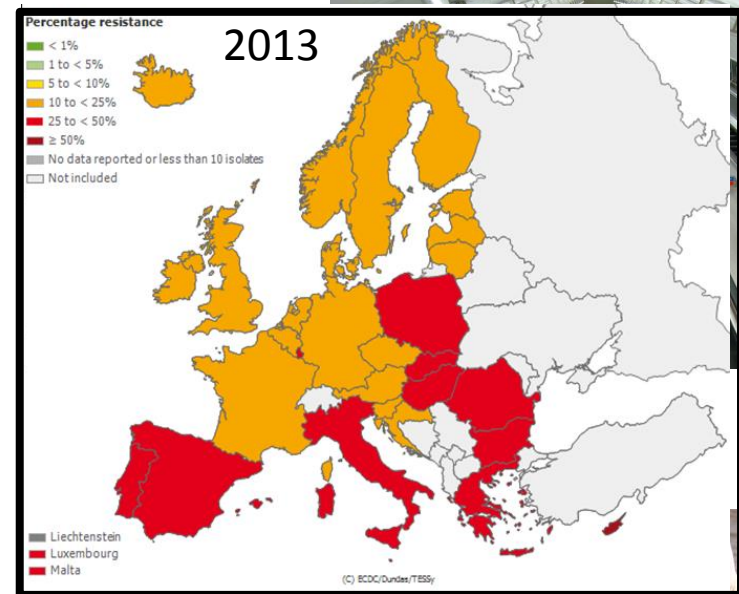
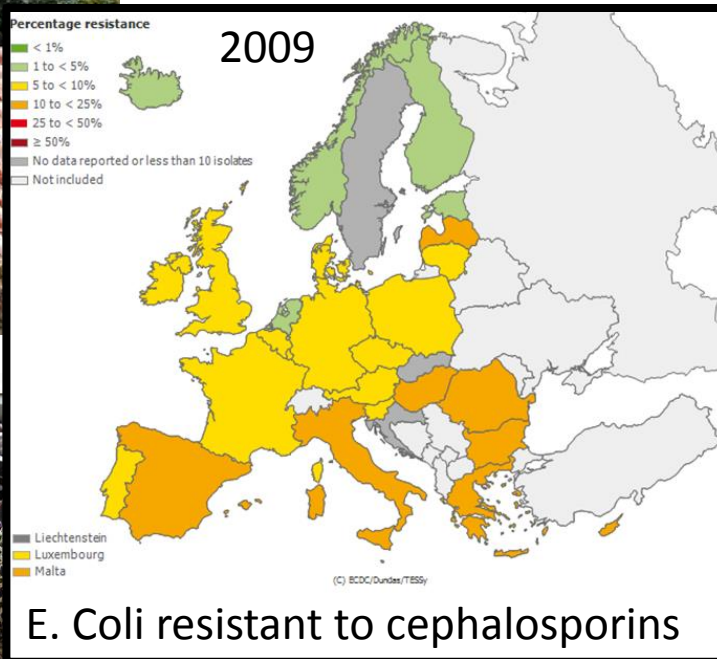
- ★ Behaviour, economics and social science are as important as STEM subjects... so which Research Council and Government Dept will adopt it? This is not a healthcare issue.
- ★ Superbugs evolve faster than do humans, technology, medicine, leadership, economies, infrastructure and will. It is crazy to put in place artificial barriers between them for AMR.



Are we too optimistic about the apocalypse?

We don't have 35 years.

- ★ Behaviour, economics and social science are as important as STEM subjects... so which Research Council and Government Dept will adopt it? This is not a healthcare issue.
- ★ Superbugs evolve faster than do humans, technology, medicine, leadership, economies, infrastructure and will. It is crazy to put in place artificial barriers between them for AMR.



Food retail affects AMR
AMR will affect food retail

+



The science world is freaking out over this 25-year-old's answer to antibiotic resistance

Could this be the end of superbugs?

FIONA MACDONALD 26 SEP 2016



A 25-year-old student has just come up with a way to fight drug-resistant superbugs *without* antibiotics.

The new approach has so far only been tested in the lab and on mice, but it could offer a potential solution to antibiotic resistance, which is now getting so bad that the United Nations recently declared it a "[fundamental threat](#)" to global health.



News story

English | 中文

UK and China start global fund to tackle drug resistant infections

From: Department of Health and Prime Minister's Office, 10 Downing Street
First published: 23 October 2015
Part of: China

New fund to drive global response to antimicrobial resistance announced by Prime Minister during Chinese President Xi Jinping's State Visit.



The UK and China will establish the Global Antimicrobial resistance (AMR) Research Innovation Fund and encourage further investment from other governments and the private sector, helping to address one of the greatest problems facing the world of medicine today.

AMR occurs when antibiotics are overused, and bugs that would normally have been fought off by them become resistant.

The new fund will invite bids from industry, academia and other bodies. It will aim to create international partnerships to build a global response and support new research to reduce the spread of antibiotic resistance.

Lord Jim O'Neill, who is leading a global review into the growing issue of AMR, warned in a report last year that a continued rise in resistance by 2050 could potentially lead to 10 million people dying every year and cost the world up to \$100 trillion.

The Chief Medical Officer for England, Dame Professor Sally Davies, has predicted that unless tackled now, AMR could lead to the end of modern medicine as we know it. It could lead to routine operations and even childbirth becoming increasingly dangerous without the required antibiotics. In the UK, over 25,000 deaths a year are attributed to drug resistant infections.

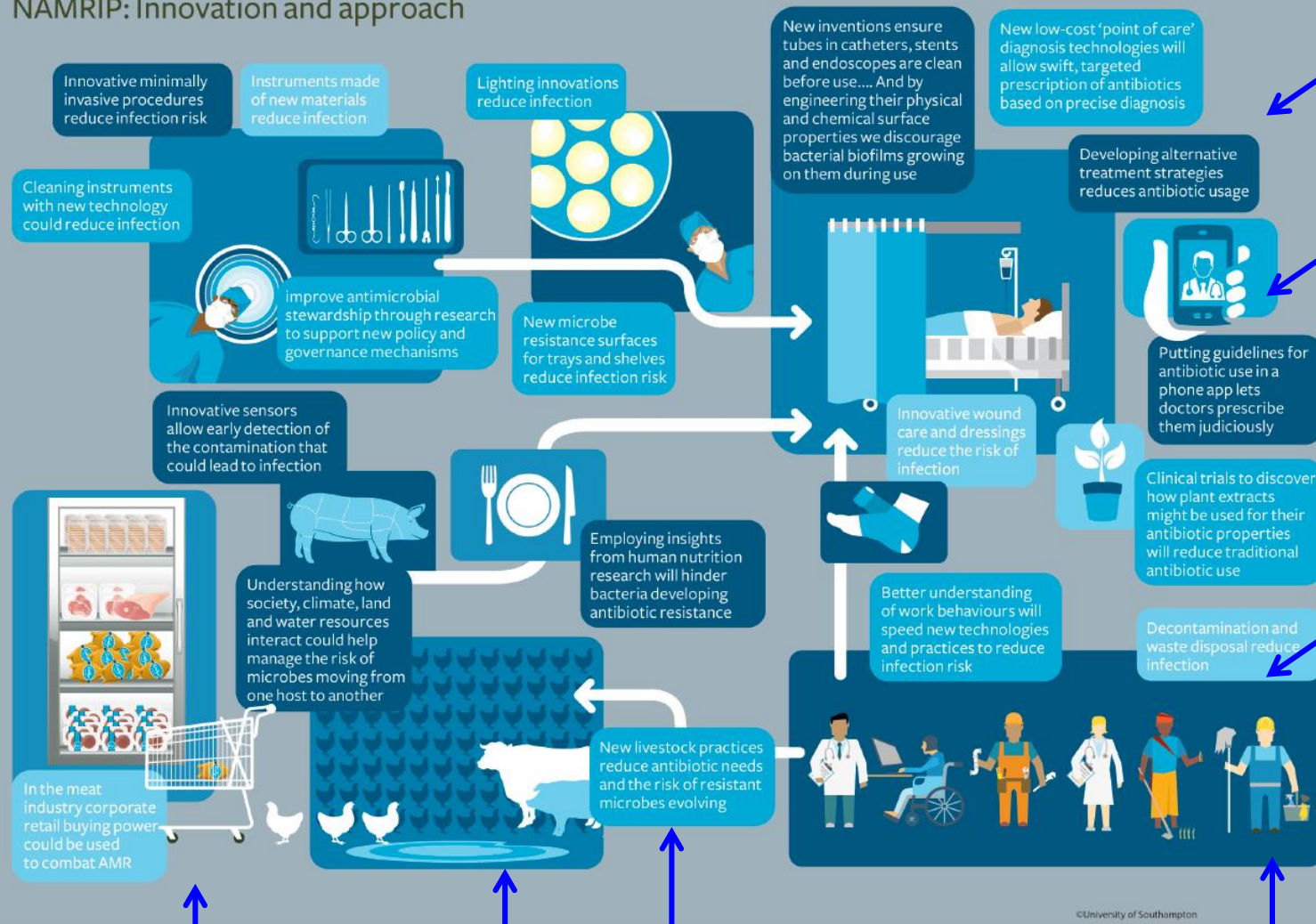
In the next slide, the click on the underlined links to show movies and web pages

Preventing infection

Sensing and diagnostics

Mapping microbes

NAMRIP: Innovation and approach



NAMRIP phone app used by 70% doctors surveyed



Online handwashing trainer reduces infections



Movie: 3D printing of shoes for cattle

Movie: Enhancing microscopy by concentrating microbes

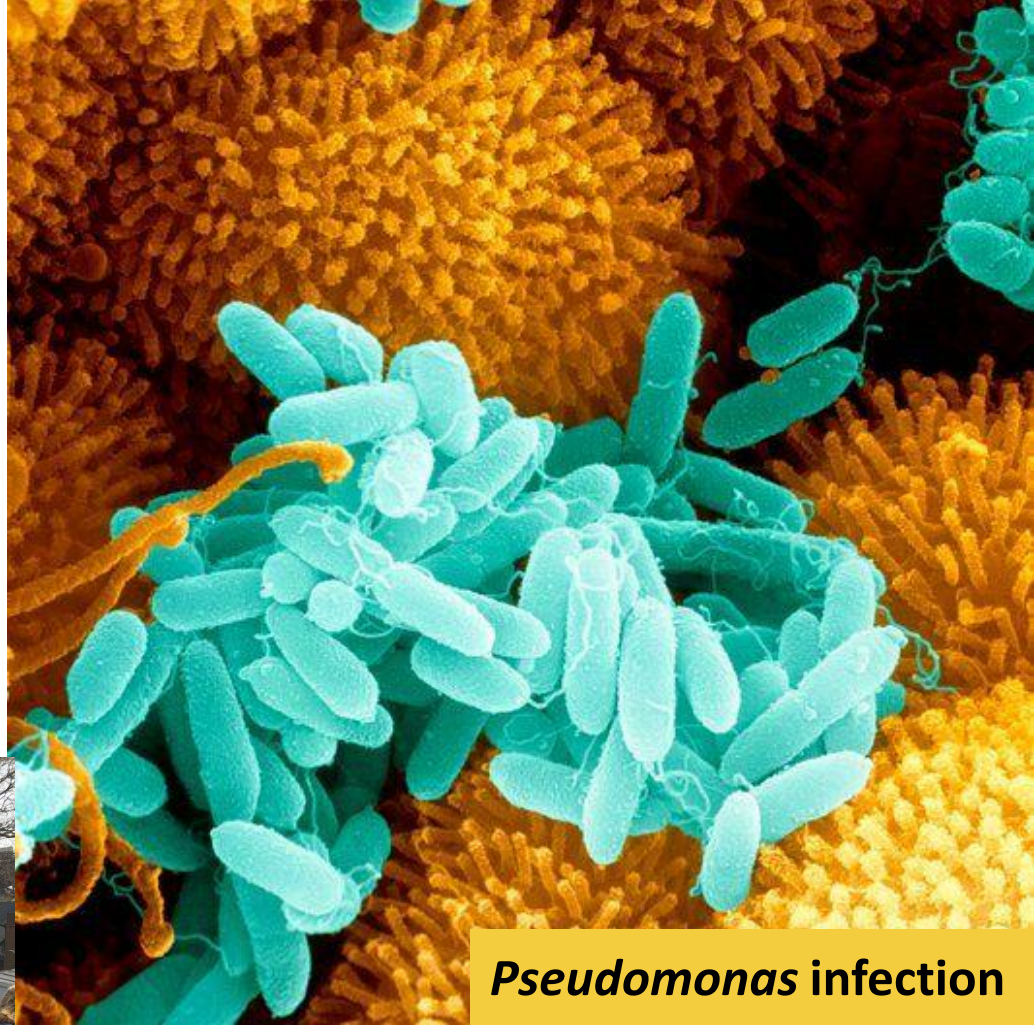
Clean water, sewage and waste

Behaviour in the wider world

Sugar up the nose

Some bacteria produce proteins called lectins that stop cilia movement enabling them to establish an infection.

Simple sugars (which might be sprayed in the nose) bind to bacteria before they can bind to us.



Pseudomonas infection



NAMRIP members: Claire Jackson,
Peter Lackie, Ray Allan

3D printed clogs for cattle



NAMRIP members:
Emma Roe,
Shoufeng Yang,
Timothy Leighton

Photo courtesy of Heather Thomas



Preventing Infection

Our interdisciplinary research spans medicine, engineering and biological science faculties



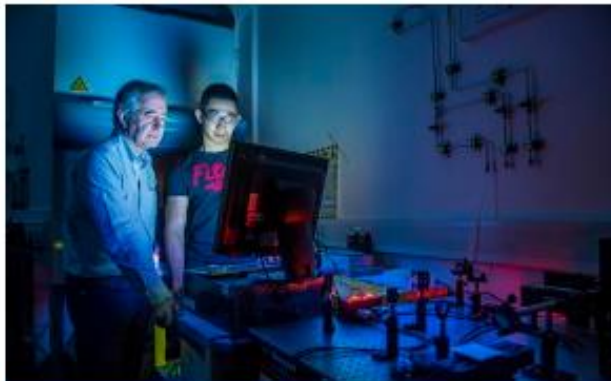
Behaviour in the wider world

Behaviour, landscape and environment influence the relationship between animal and human health



Pharmacology and Therapeutics

We need to consider how to achieve impact in the wider world



Sensing and diagnostics

Diagnosis and correct antibiotic treatment can help prevent serious antibiotic resistance



Clean water, sewage and waste

New technologies to produce clean water and treat waste, preventing the spread of infection

This shows the web page of NAMRIP research topics: and if you click on 'Behaviour in the wider world' you get the web page shown on the next slide....

Behaviour in the wider world



PRIMIT

a simple internet programme to encourage handwashing reduces the risk of infection



Farm environments

We must adjust the way we treat farm animals to reduce infection



Disease risk

Diseases can transmit from livestock to humans



AMR is an ethical problem

Such problems must be addressed as part of a successful policy response to emerging drug resistance



Designing interventions for easy uptake

A key part of NAMRIP's philosophy is designing solutions with the end user in mind.



Fighting superbugs on the home front

Understanding the domestic contribution to the rise of Antimicrobial Resistance in the environment

<http://www.southampton.ac.uk/namrip/research/homepage-behaviour-in-the-wider-world.page>

Strategy: NAMRIP and Global-NAMRIP

- **Problem solvers rather than solution sellers** – talk to the end users, understand them, and work with them;
- **Aim for game-changing, not incremental research** - look at the whole picture (interlinking technology, society, health, environment, behaviour, culture etc.) using inspired multidisciplinary collaborations often working outside of comfort zones;
- **Drive forward an impact plan** - partner with impact facilitators (manufacturers, NGOs etc.) from an early stage, and work on the levers that will drive significant impact.

Year 1: Grown to 200 members from academia, industry, publics, UK gov, overseas.

£10k → £7M (includes £5M for single projects) + 7 studentships

Innovation and Knowledge Centre for Biofilms: Accelerating translation and commercialisation of biofilm research and technology (BBSRC and Innovate UK)

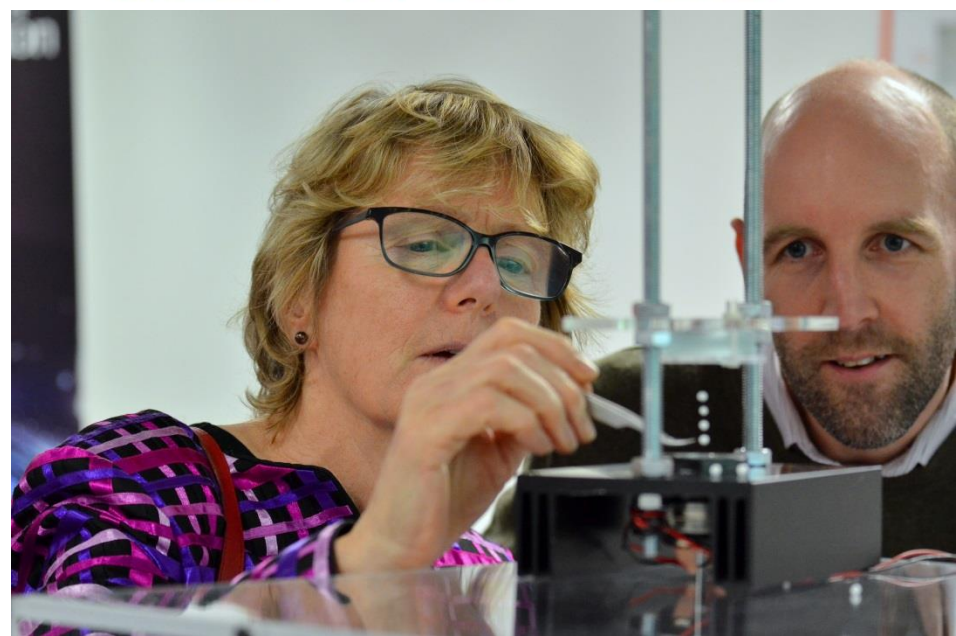
Major public engagement

News

Projects

Partners sponsoring projects:





Global NAMRIP



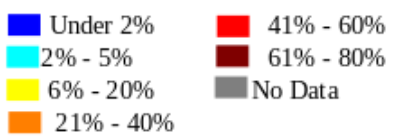
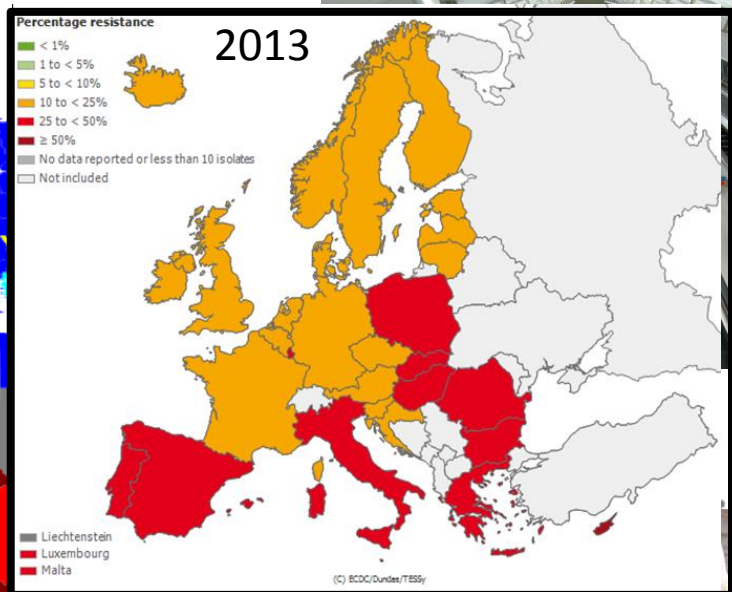
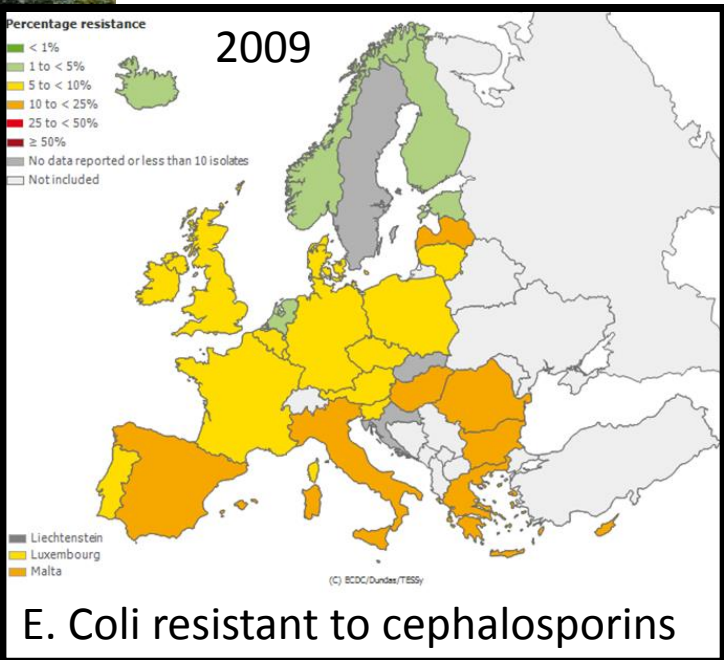
Round 6 was for Global-NAMRIP
Round 7 will be open (last round)



Are we too optimistic about the apocalypse?

We don't have 35 years.

- ★ Behaviour, economics and social science are as important as STEM subjects... so which Research Council and Government Dept will adopt it? This is not a healthcare issue.
- ★ Superbugs evolve faster than do humans, technology, medicine, leadership, economies, infrastructure and will. It is crazy to put in place artificial barriers between them for AMR.



Food retail affects AMR
AMR will affect food retail

Percentage of population living on less than \$1.25 per day (2009)