

Responsible life science research for global health security: an update

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Background

Activities

Key messages



Background

- Inadvertently increasing the virulence of mousepox (*Journal of Virology*, 2001)
- Reconstruction of the 1918 flu virus (*Science and Nature*, 2005)
- Chemical synthesis of poliovirus cDNA (*Science*, 2002)

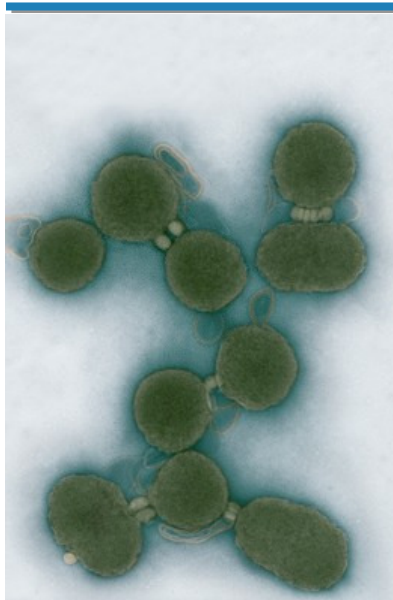
EDITORIAL

1918 Flu and Responsible Science

The influenza pandemic of 1918 is estimated to have caused 50 million deaths worldwide; 675,000 in the United States. The reconstruction of the 1918 virus by the synthesis of all eight subunits and the generation of infectious virus are described on p. 77 of this issue,* and the sequences of the final three gene segments of the virus are described in a concurrent *Nature* paper.† Predictably, but alarmingly, this virus is more lethal to mice than are other influenza strains, suggesting that this property of the 1918 virus has been recovered in the published sequence. The good news is that we now have the sequence of this virus, perhaps



Background



Scienceexpress

Research Article

Creation of a Bacterial Cell Controlled by a Chemically Synthesized Genome

Daniel G. Gibson,¹ John I. Glass,¹ Carole Lartigue,¹ Vladimir N. Noskov,¹ Ray-Yuan Chuang,¹ Mikkel A. Algire,¹ Gwynedd A. Benders,² Michael G. Montague,¹ Li Ma,¹ Monzia M. Moodie,¹ Chuck Merryman,¹ Sanjay Vashee,¹ Radha Krishnakumar,¹ Nacyra Assad-Garcia,¹ Cynthia Andrews-Pfannkoch,¹ Evgeniya A. Denisova,¹ Lei Young,¹ Zhi-Qing Qi,¹ Thomas H. Segall-Shapiro,² Christopher H. Calvey,¹ Prashanth P. Parmar,¹ Clyde A. Hutchison III,² Hamilton O. Smith,² J. Craig Venter^{1,2*}

¹The J. Craig Venter Institute, 9704 Medical Center Drive, Rockville, MD 20850, USA. ²The J. Craig Venter Institute, 10355 Science Center Drive, San Diego, CA 92121, USA.

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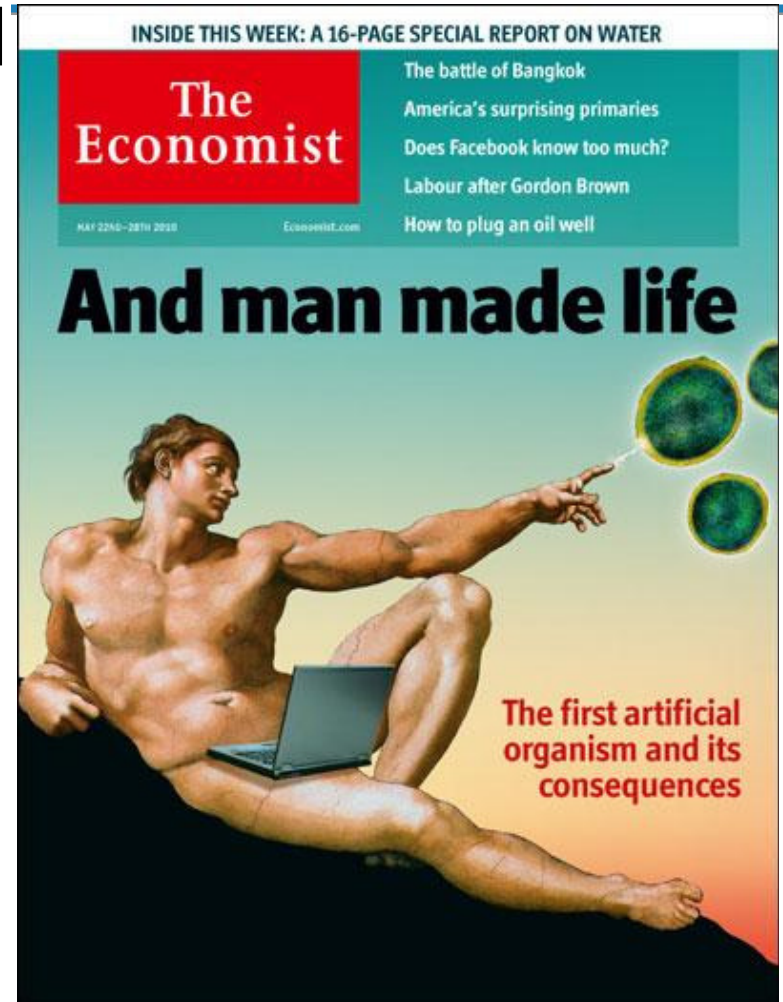
Editorial

Vertiges de la biologie synthétique

LE MONDE | 22.05.10 | 12h47 • Mis à jour le 22.05.10 | 12h47

Introduire un génome artificiel dans une bactérie pour en prendre les commandes, en réorienter le destin, en modifier à jamais la descendance. C'est l'exploit réalisé par le généticien américain Craig Venter et son équipe, au terme de quinze ans d'efforts et de 40 millions de dollars d'investissement. On ne saurait trop en souligner la portée, même si les étapes précédentes, à chaque fois largement médiatisées, avaient rendu cette issue moins inattendue.

En 2007 déjà, Craig Venter avait qualifié de "pas philosophique important dans l'histoire de notre espèce" la création par son laboratoire d'un chromosome synthétique. L'homme n'a jamais boudé la publicité et le scandale : c'est lui, pionnier du séquençage de masse aux National Institutes of Health, qui avait fait polémique en brevetant des gènes à tour de bras, dans les années 1990. C'est lui encore qui, passé au privé, avait défié la recherche publique dans la course au séquençage du génome humain - il a même poussé la malice jusqu'à choisir son propre patrimoine génétique comme matière première -, avant d'opter pour un finish ex aequo, en 2001, honorable pour les deux camps.

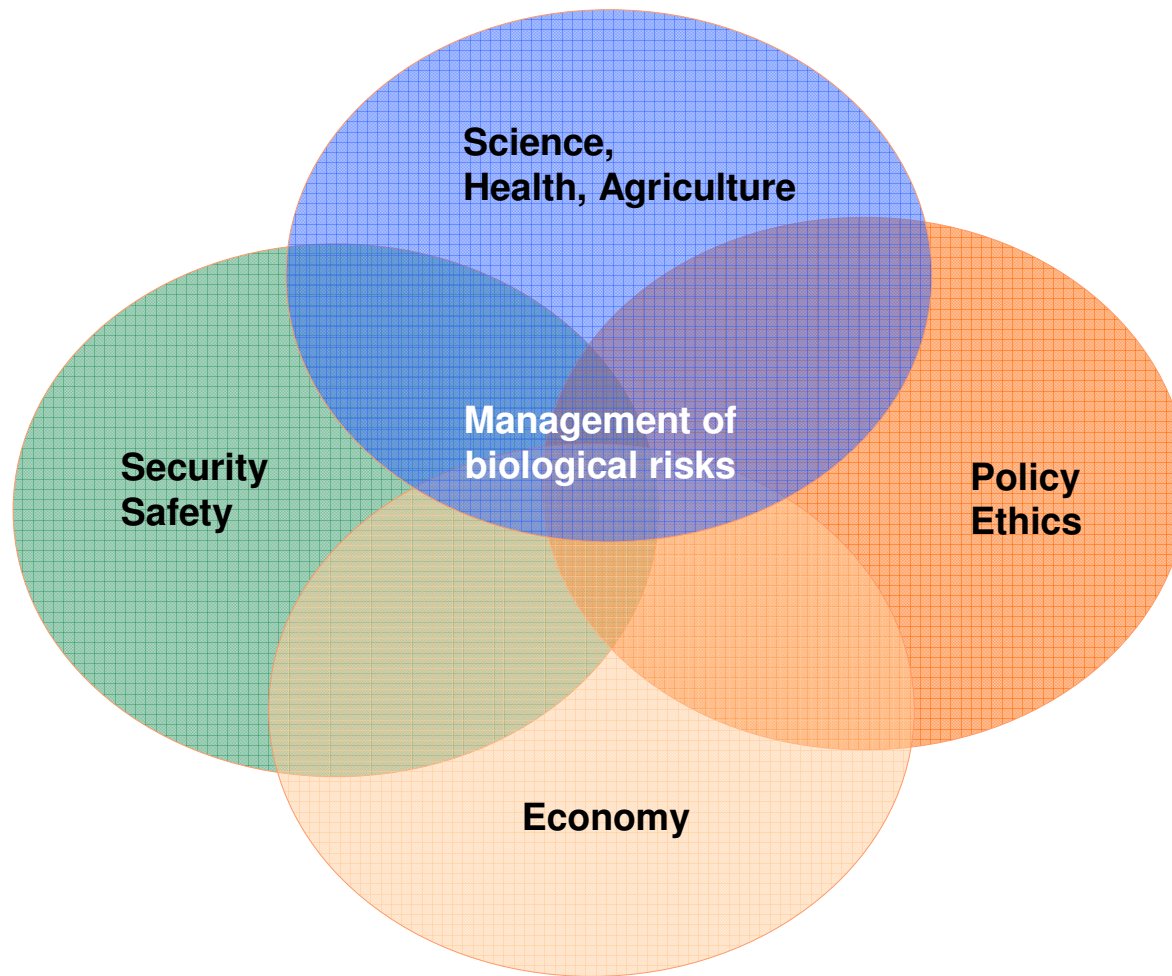


Why does it matter for public health?

- Impact on public health
- Public confidence in science
- Information vary among Member States



A multi-stakeholder issue



Research Public Progress
 Risk management **Innovation** Tools
Public health
 vision Network Actors **Security** perception
Governance **Life science** funding
 synthetic biology Building Dual use practical good
capacity resources good support well
 accountability implementing integrated address including
 encourage integrated alert and response ensure developing guidance providing
 Laboratory biosafety confidence **history** computer tailored strengthen technology specific
 biological drugs development legislation **Convention** information **international**

ethics
 Biosecurity
 support
 Serendipity professional
 prevent stakeholders
 Governments
 dna including
 genetics **Safety**
 codes new trust
 and internet building
 people legislation

challenges
 cooperation

**What can we learn from what has
happened and;
what can be done from a public health
perspective?**

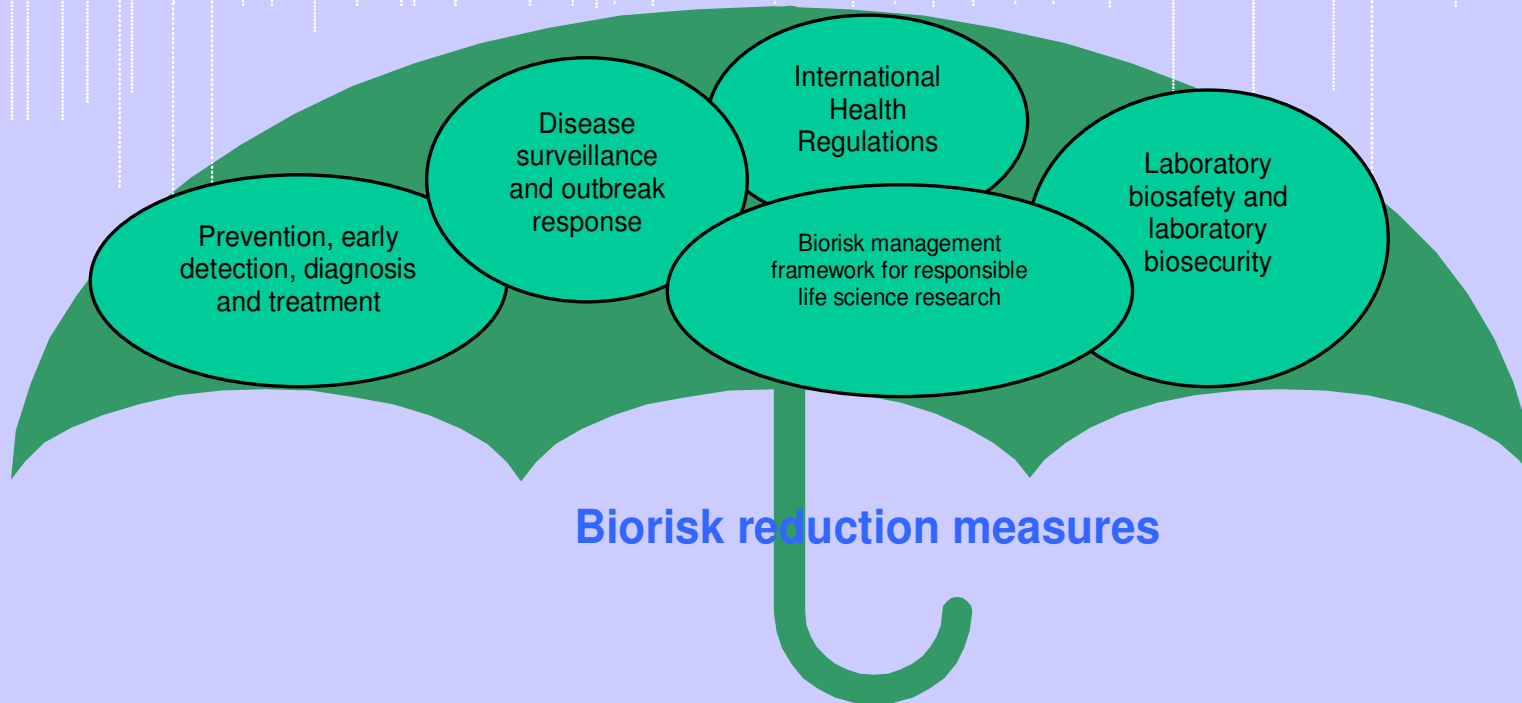


Biorisk spectrum

Natural occurrence

Accidents

Deliberate misuse

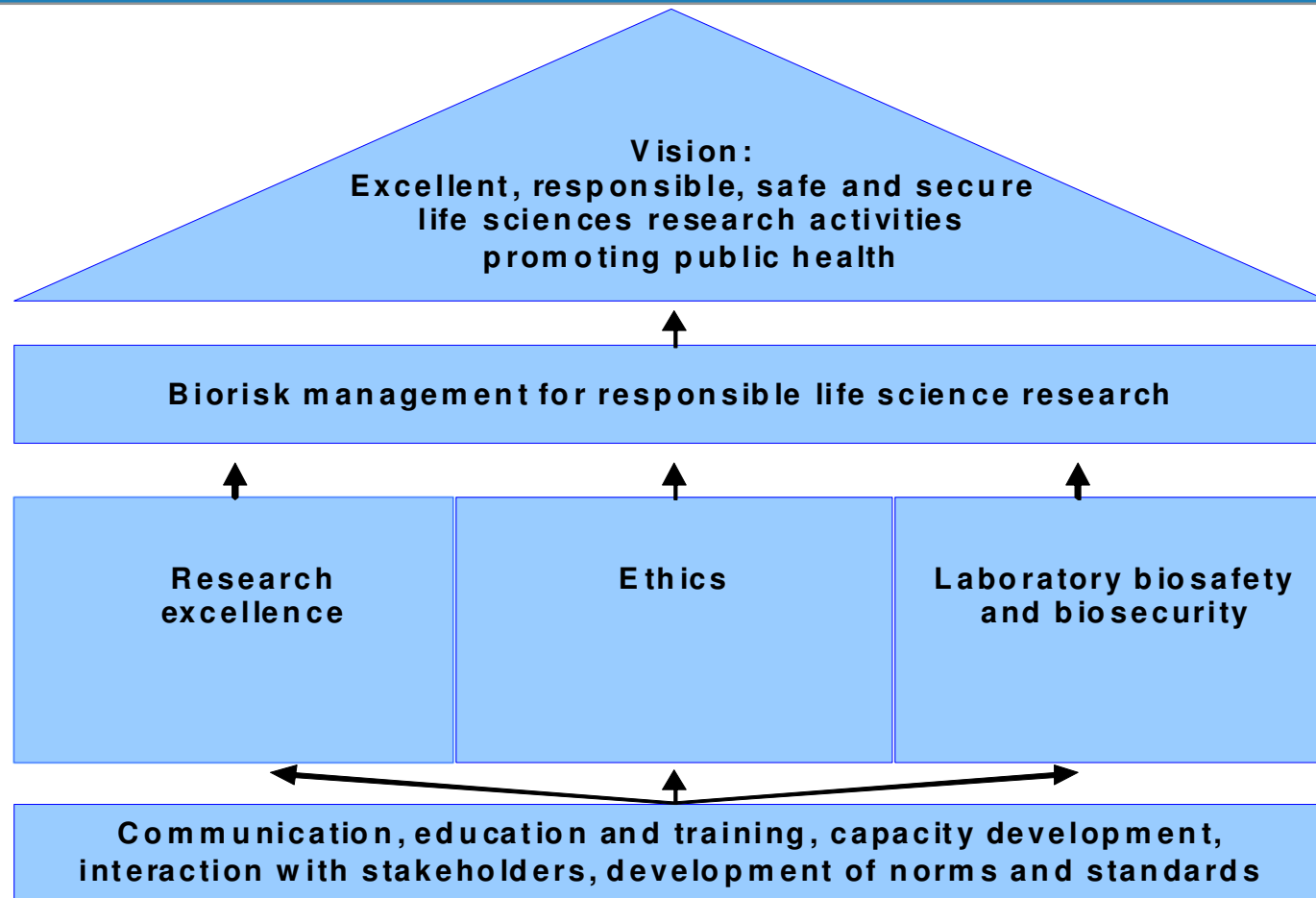


Responsible life science research: key messages

- Culture of scientific integrity and excellence are the best protection against accidents and potential misuse of life science research, and the best guarantees of progress and development
- Responsible management of life science research goes with increasing capacities in three areas: research; ethics and laboratory biosafety and laboratory biosecurity.
- No single solution or system will suit all countries or laboratories. Self-assessment questionnaire has been developed to identify and build on respective strengths and weaknesses in each of these three above areas



Integrated approach: biorisk management



Project design: 3 key axes

Integrated approach

Working in partnerships

AID: Assess, Identify, Deliver

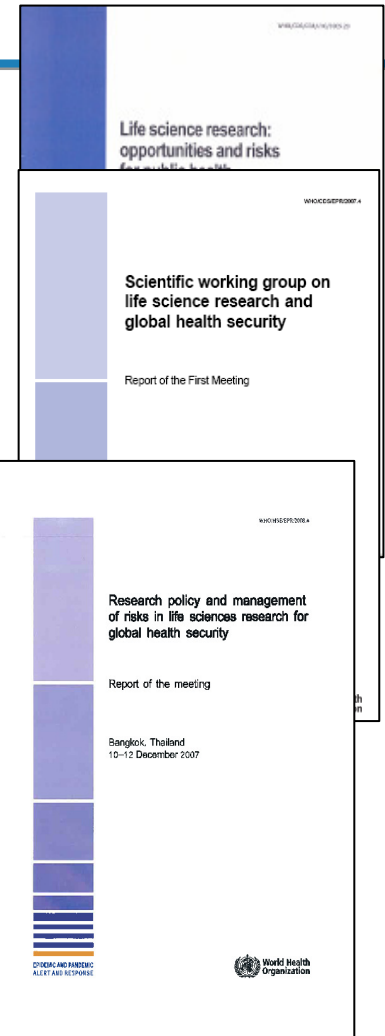


Integrated approach

Raising awareness and discussion platform

- Scientific working group meeting (2006)
- Guidelines review group (2009)
- 3 reports published (2005, 2006 and 2008)
- Online consultation (June – September 2007)
- Outreach activities (ongoing)
- Regional workshop (Thailand, December 2007)
- Established an international network

Providing guidance and capacity building: developing guidance and training materials (ongoing)



Integrated approach: activities

- Research policy and management of risks in life science research for global health security, Bangkok, Thailand, 10-12 Dec 2007
- Laboratory biosafety and laboratory biosecurity awareness raising regional workshops
 - Iran (2006, 22 countries)
 - Kenya (2007, 21 countries, English-speaking)
 - India (2008, 7 countries)
 - Malaysia (2008, 8 countries)
 - Kenya (2008, 24 countries, French-speaking)
 - Brazil (2009, 10 countries, Portuguese-speaking)
- NIH National Science Advisory Board for Biosecurity
 - International meeting, 30 March 2006 (with WHO co-sponsorship)
 - International meeting, > 40 countries, 5-6 November 2008 (with WHO co-sponsorship)
- World conference on bioethics (2007); X Annual Swedish Symposium on Biomedicine, Ethics and Society (2008); "Promoting dual use ethics" (Australia, Jan 2010); 10th World Congress of Bioethics, Singapore (July 2010)



Working in partnerships

Collaborative effort of 3 WHO departments/programmes and their expert networks:

- **Ethics, Equity, Trade and Human Rights**
- **Research Policy and Cooperation**
- **IHR Coordination (Programme on laboratory biosafety and laboratory biosecurity)**

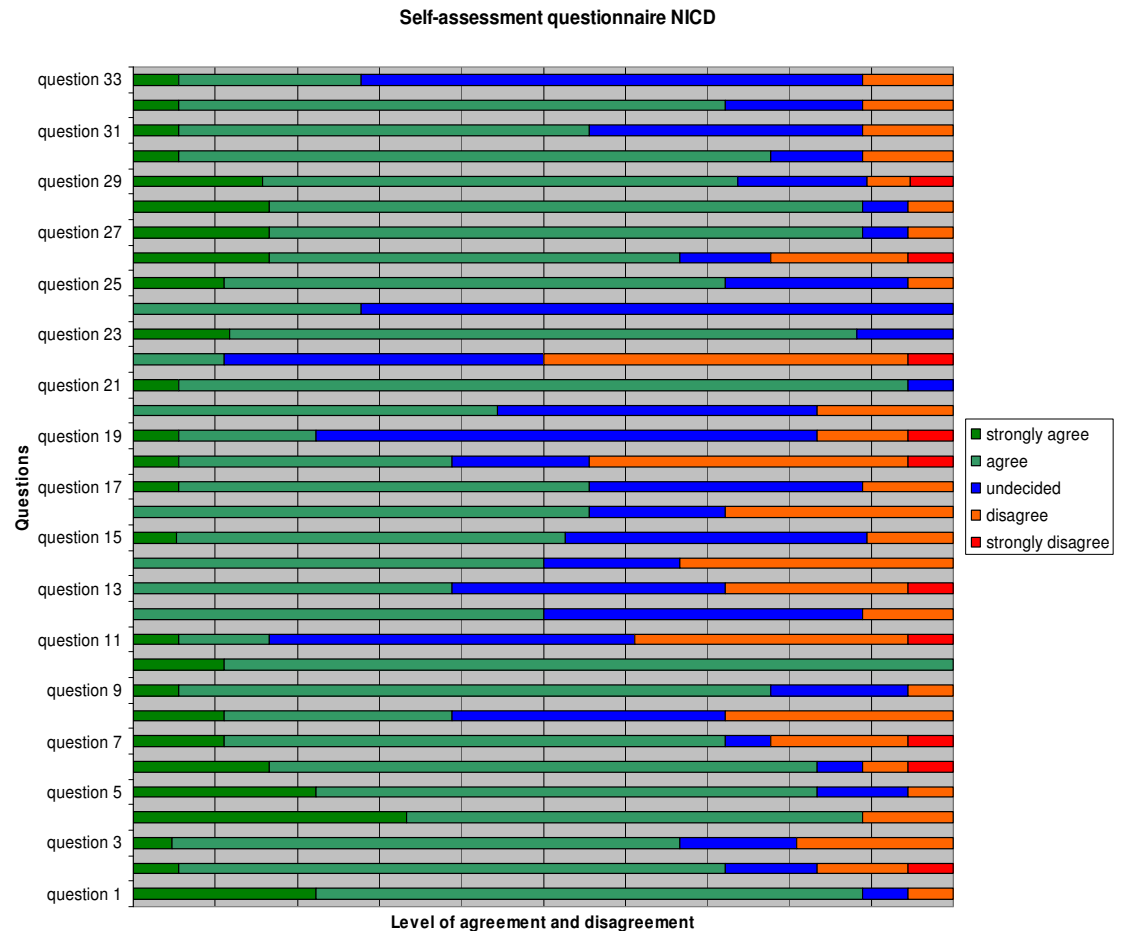
External stakeholders



AID: Assess, Identify, Deliver

Pilot with National Institute of Communicable Diseases (NICD) (October 2009, South Africa)

Kenya: proposal for using the self-assessment tool at the national level (June 2010)



One way forward

Identification of strengths and weaknesses



Follow-up activities



Sharing of technical skills and knowledge through web-based platform, training, identification of best practices and regional expertise



Background

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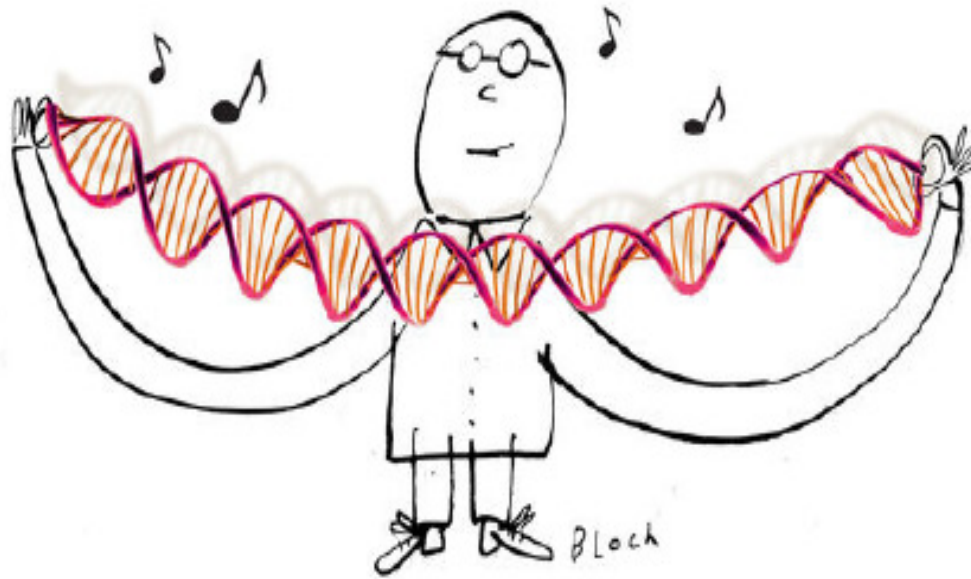


Key messages

- 3 key messages:
 - Culture of scientific integrity and excellence
 - Strengthen capacities in 3 pillars: research, ethics and laboratory biosafety and biosecurity
 - No single way
- 3 axes of the project
 - An **integrated approach** that aims at **working in partnerships to assess, identify and deliver (AID)**



Thank you



Serge Bloch

The New York Times, International Herald Tribune, 31 May 2010

