Shaping a UK strategy for agri-tech: response form

The Department may, in accordance with the Code of Practice on Access to Government Information, make available, on public request, individual responses.

All comments are welcome but we particularly encourage submission of evidence from institutions, organisations and representative bodies with an interest in this topic.

The closing date for this call for evidence is Thursday 22 November 2012 by 14.00 hours.

Please return this completed form to:

Email: lsas@bis.gsi.gov.uk

Postal Address:

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Please describe the organisation that you represent and outline your reasons for responding to this call for evidence

Please tick the box from the below list that best describes you.

	Business representative organisation/trade body
	Central government
X	Charity or social enterprise
	Individual
	Large business (over 250 staff)
	Legal representative
	Local Government
	Medium business (50 to 250 staff)
	Micro business (up to 9 staff)
	Small business (10 to 49 staff)
	Trade union or staff association
	Other (please describe

Please write here your name/ the name of your organisation and contact details if you wish to. This would help us to contact you if we have further questions.

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1. The aims and objectives of the Agri-Tech strategy are outlined above in the introduction to this call. Please give your views on:

   a. The need for and potential benefits of having such a strategy.

The overarching need for an Agri-Tech Strategy is because the UK has the opportunity to benefit from making a leading and distinctive contribution to solutions in crop production in tackling problems posed by the *'Perfect Storm'*.[1]

We would draw particular attention to the imperatives of:

- Changing the culture and perceptions embedded in Government, consumers, and food processors and retailers with respect to technological developments to allow the production of more and better quality food, fuel and fibre, more sustainably.[2]
- Avoiding the issues posed to individuals and societies (*eg* civil unrest) caused by lack of food, obesity and under nourishment.[3]
- Enhancing the UK's ability to nurture research ideas and inventions through stages of development to commercialisation and successful implementation in practice.[4]
- Reversing the decline in the UK's competences and capabilities in agri-tech in education, in the academic and industry science-bases, and in extension services.
- Reviving the UK's once world class standing in the fertilizer and crop protection sectors. In particular, resistance to herbicides, fungicides and insecticides on the one hand and a dearth of truly innovative new active substances on the other poses a critical threat to crop productivity worldwide.[5]
- Aligning agri-tech knowledge 'supply and demand' and ensuring its coherent exchange between the UK, EU and ROW.

[1] Foresight. The future of food and farming (2011). Final project report. Government Office for Science, London

[2] The topic of *Sustainable Intensification* in cropping systems was explored at a recent SCI conference (October 2012). Papers can be found here: http://www.soci.org/News/BioResources-Sustainable-Intensification-Past-Conference-Papers.aspx

[3] Speakers at SCI's conference *Biofortified and functional food: a healthy future?* (May 2011) highlighted issues and opportunities in food quality with respect to nutrition and health: http://www.soci.org/News/BioResources-Biofortified-Foods-May-2011.aspx

[4] An SCI conference in 2011 pointed out issues in agriscience new ventures, including the 'valley of death' funding gap: *Funding Agri-Innovation: New ventures in food security and biorenewables* (March 2011) http://www.soci.org/News/BioResources-Funding-Agri-Innovation.aspx

[5] Future problems facing fertilizers and crop protection chemicals, highlighting resistance issues, were addressed in the SCI conference *Scanning the agricultural horizon to 2050* (December 2010): http://www.soci.org/News/BioResources-Scanning-the-Agricultural-Horizon-to-2050-2010-Papers.aspx

b. The appropriateness of the objectives proposed.

The objectives are broadly appropriate, although some distillation into finer detail and making them 'SMART' would be highly desirable in future iterations.

c. Desired outcomes and indicators of success of the strategy, and the role for Government in enabling delivery of these.

<u>If the Agri-Tech Strategy is successful, we will see</u>:

- More Agri-Tech SMEs and more people involved in agricultural R&D in the UK.
- More private and public investment in research and new ventures in agri-tech.
- More adoption of agri-tech innovations such as precision farming technologies, crop varieties developed from genomic and other biotechnologies, and controlled/triggered release formulations on UK farms. Similarly, the wider adoption of best practices in crop management.
- More adoption of UK agri-tech on farms worldwide resulting in return on investment and jobs back in the UK.
- More recognition of the priority of agriculture by UK universities: more courses offered in the various agricultural sciences (agronomy, plant/crop physiology, plant pathology, plant breeding, plant nutrition, agricultural microbiology, crop protection, soil science, entomology, weed science, *etc*) … and more school students interested in such courses … and more graduates going into the industry and on to post-graduate research … and the required support from grant awarding authorities.
- More interest from 'pure' science in 'applied' agri-tech problems, *eg* new catalysts and processes for more energy-efficient nitrogen fertilizer manufacturing.
- Communications and regulations based on evidence and a return to recognising risks rather than focusing on hazards.
- Yields of UK crops such as wheat rising from the plateau of the past decade as initiatives such as Rothamsted Research's 20:20 Wheat come to fruition.[6]
- UK farm incomes and profitability in all sectors increasing.

<u>To enable this the Government must</u>:

- Introduce and support measures to ensure the flow of agri-tech innovations through R&D pipelines, especially from new companies and institutes to practice, *via* funding and extension services.
- Intervene to change the negative culture amongst, *eg* the media, food companies and consumers regarding innovations in agri-tech.
- Influence EU partners to adopt more appropriate evidence and risk based policies and regulations given the predicaments facing the world.

[6] http://www.rothamsted.ac.uk/Content.php?Section=Research&Page=Wheat

d. Any potential drawbacks / unintended consequences associated with these outcomes and how these could be mitigated.

A 'total', clear, congruent, coherent approach will be essential to making significant impacts.

2. What in your view are the current strengths and weaknesses of the UK agricultural technology sector? Please provide evidence in support of your responses.

- UK universities are highly rated globally, especially in relevant areas such as the biosciences … yet the agrisciences *per se* have very severely declined.
- The UK has a few world-renowned institutes, *eg* Rothamsted Research, John Innes Centre, James Hutton Institute, Pirbright Institute … yet 25 years ago there were many, and these remaining ones in a significant part focus on research that is either some way from being close to market or rather niche.
- The UK has one remaining large crop science industry research institute (Syngenta's Jealott's Hill once part of Zeneca/ICI) now Swiss owned … 20 years ago there were several. Azoxystrobin, a fungicide with worldwide sales of $10 billion since 1996 was invented and developed at Jealott's Hill. In 2005, it saved soybean crops across Latin America and the US from devastation by a 'new' fungal pathogen.
- Any new ventures in the sector are severely constrained by the dearth of investment[4] and prohibitive regulatory hurdles and cost, not least exemplified by the new EC Regulation 1107/2009 on placing plant protection products on the market. Even though not as stringent as once feared, the implementation of an as yet incompletely defined process is causing huge confusion and concern for its impact alongside other related EC Directives.[7]

[7] http://www.pesticides.gov.uk/Resources/CRD/Migrated-Resources/Documents/R/Revised_Impact_Report_1_Dec_2008(final).pdf

3. How do you think the ability of the agri-tech sector to bring growth to the UK economy could best be facilitated or supported by Government working with the industry? Please cite/suggest appropriate mechanisms and measures to attract new revenues to the agricultural technology sector, that are feasible, value for money and effective; while paying attention to UK, EU and global finance available for agricultural science.

- Food processor and retailers, being further along the value chain, benefit most from innovations in agriculture, yet contribute little to the funding of agri-tech innovation and are quick to distance themselves from anything involving 'chemicals' or leading edge biosciences. They should contribute an R&D levy just as producers do.
- Many UK SMEs do not take advantage of funding opportunities already available, especially provided by the EU. They see the process of involvement as too complex and have a short-term approach. SMEs in other countries tend to be more ready to join consortia and network for the longer term, accepting that proposals may not get funded. A '*make your own luck*' culture needs to be developed where upside opportunities are constantly sought.[8]
- The concept of Open Innovation has been adopted by many large companies, *eg* www.syngentathoughtseeders.com. Similar approaches to publically funded research could be developed such that proposals for funding could be pitched and solutions to 'Grand Challenges' could be crowdsourced (see www.innocentive.com and www.ninesigma.com).

4. What is the potential and what should be the role of technology in addressing the needs of UK farmers, and meeting the challenges of global food security and the increasing demand for non-food bio-renewable products and resources? This would include new technologies (such as nanotechnologies, robotics, remote sensing), modern biotechnology techniques (such as genomics analysis, cloning, GM) and engineering solutions. Please provide examples where technologies may be particularly transformative in their impact, and how research skills in these may be enhanced.

- New chemical crop protection products to combat resistance in weeds, pests and diseases; replacing those falling at higher regulatory hurdles; and to protect against new biological threats to crops; together with formulation technologies

[8] Wiseman, R (2003). The luck factor. Random House: London

to target and fine-tune treatments.
- Biotechnologies to increase the genetic capacity of crop varieties to resist pests and diseases; yield more; be more robust to abiotic stress; and utilise water[9] and nutrients from soil and fertilizers more efficiently.
- Field and crop sensing and monitoring technologies to enable precision application of inputs to increase efficacy, reduce environmental impacts and waste and costs.
- Engineering technologies to enable more precise application of all crop inputs, and facilitate farm operations under sub-optimal weather conditions without damaging the soil – as may be more necessary under more frequent extreme weather.
- Also see response to Q1c.

5. What do you think are the main barriers to the achievement of the proposed strategic objectives and how do you think they might be overcome?

Important barriers include:

- Negative public perception and lack of awareness of agriculture and the true value of nutritious and healthy food.
- Negative attitude of the media and food companies to agri-tech.
- Negative attitude and behaviour of NGOs.
- Regulations over-constraining the use of chemicals and GMOs.
- Dearth of investment.
- Paucity of agriscience degree courses and career options.
- Precedence of environment and rural development over farming and agri-tech.

Potential solutions include:

- Education and out-reach, *eg* a change in university funding of agri-tech courses and research; and more awareness and course content in schools; more farm events for the public.
- Also see response to Q1c.

Please let us know if you/your organisation would like to be considered to take part in future activities that may arise as a result of the implementation of this strategy

Yes

[9] An SCI Conference *'More crop per drop – raising water use efficiency'* will take place on 29 November 2012. Papers will be available here: http://www.soci.org/Events/Past-Conference-Papers.aspx

If so, please write here your name/ the name of your organisation and your contact details

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Glossary

Genomics analysis
Genomic analysis involves looking for differences in the DNA that makes up the genes of different organisms. It enables the identification and selection through conventional breeding of genes that are associated with beneficial features of an organism e.g. disease resistance in crops or in an animal.

GM
GM normally involves the insertion of genes carrying a specific trait (eg pest resistance) from one organism into another. This introduction can be novel genes from the same species (cisgenics), or from another species (transgenics), individually or in small groups.

Cloning
The production of genetically identical organisms.

Remote sensing
The observation and analysis of agricultural land or livestock without the need for manual handling. For agricultural land this can be done from aircraft or satellite to assess and map features such as crop yield or diseases. Information from remote sensing can be used to increase farm management practices and animal welfare.

Nanotechnology
Nanotechnologies can be thought of as any technology which either incorporates or employs nanomaterials (e.g. carbon nanotubes) or involves processes performed at the nanometre scale. A nanometre is one billionth of a metre, around 80,000 times smaller than the diameter of a human hair.

Robotics
The engineering of machines to perform farming tasks automatically and autonomously e.g. GPS guided crop spraying, detection and mechanical removal of weeds or crop pests, automated milking of cows.

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