

The Computerisation of Agriculture: Social Power, Technology and Control



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The Computerisation of Agriculture: Social Power, Technology and Control

- 1) What is precision agriculture & who's using it?
- 2) What are the driving forces in the current agricultural revolution?
- 3) What are the issues of social power and control?
- 4) How might these insights inform food security debates?

Sociological context:



Max Weber's Rationalisation Thesis:

- Rooted in religious forces (esp. Calvinism)
- Increasing bureaucratic control
- Standardising and dehumanising

The modern economic order is: 'bound to the technical and economic conditions of machine production which to-day determine the lives of all the individuals who are born into this mechanism...'

(Weber, 2003: 181)



Sociology:

Szabo (2013):

Automated agriculture:

‘...can induce new forms of stress due to information overload, skill- degradation, boredom, complacency and over-reliance on the system’
(18)



1. Personal Introduction

My name is James Szabo and I live in rural North Lincolnshire on the only hill in the county. I have lived in the area all my life and although, unlike most Scholars, not owning or in succession to agricultural land, I have always had a close link with those who do. At the age of 18, and around the boom period of rural broadband and simpler software accounting, I set up a business supporting the local farming community with basic computer hardware and IT literacy skills. This forced many traditional farmers into adopting new ways of managing their businesses. This led to a wide customer base which I am ashamed to admit I neglected through my time at university.



Me, James Szabo

I studied both Electronic and Electrical Engineering & Information Systems at the University of Leeds for six years, but always related my newfound knowledge and skills to agriculture - to the great annoyance of lecturers who were much more comfortable with hotel booking systems rather than mapping and simulation of disease within greenhouses. Whenever possible I focused my attentions on localisation technologies such as GNSS and radio triangulation as I knew the possibilities for agriculture were just starting to emerge.

Having left university in 2008 I entered the Precision Agriculture sector supporting a

range of products from real-time nutrient recommendations to auto steer and auto section control. It was clear that these technologies were proven, with quantifiable results. More and more research was going into the application of these technologies which, in my opinion, were not new and often duplicated; I felt that it was time for the next big push, which I believe is the automation of everyday farm applications. This is where my passion for future technology met up with a Nuffield Farming Scholarship.

In January 2012 my journey started.

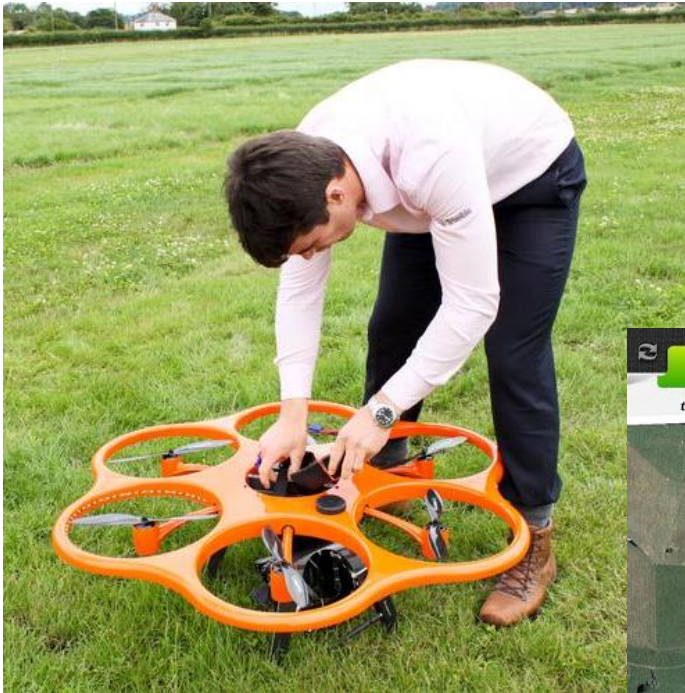
Sociology:

Q: how does precision agriculture empower or disempower farmers in England?

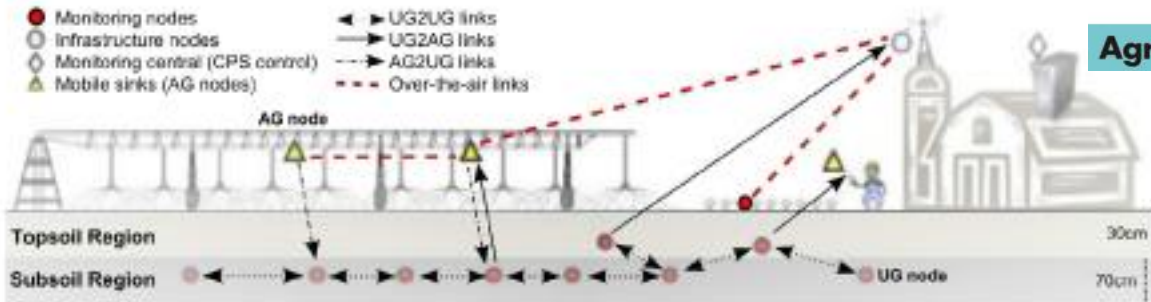
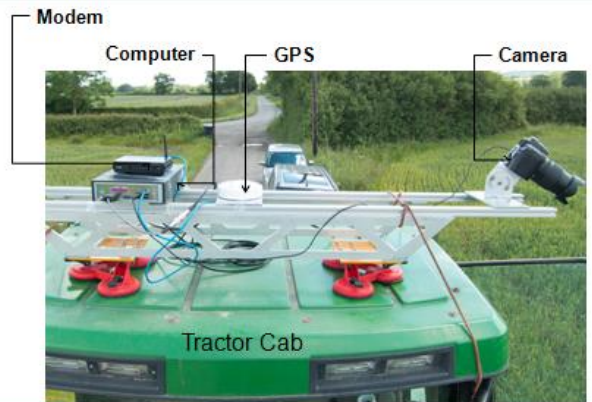
2) What is precision agriculture?



The 'use of digital geographically referenced data in farming operation'
(Wood and Wolf, 1997: in abstract)



Current Hardware Configuration



Agrii

Connecting agri-science with farming

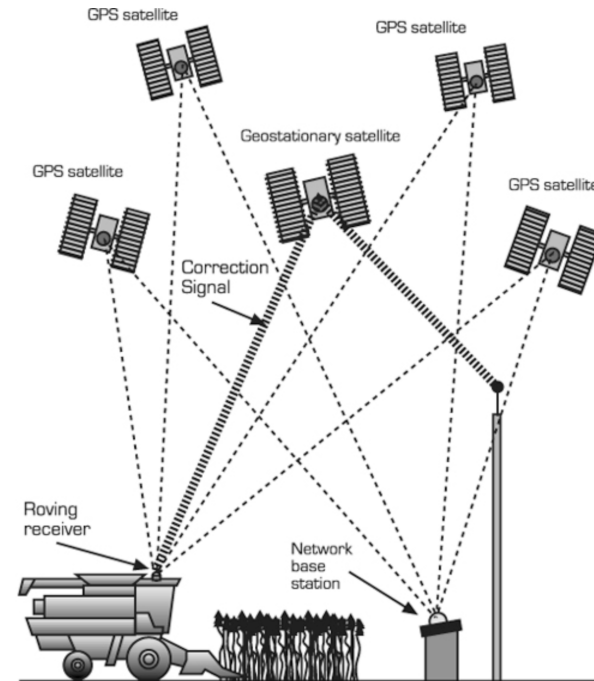


Precision Agriculture:

1) Remote Sensing

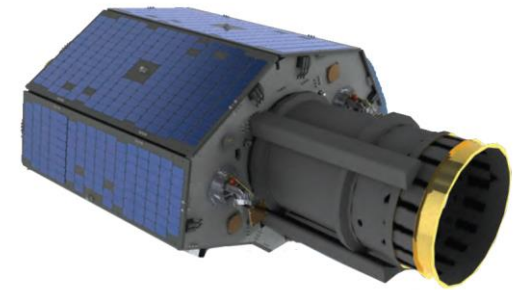


2) Remote Control



Remote Sensing:

Multispectral lenses



- Soil texture
- Soil depth
- Stone content
- Plant Vigor: leaf area and greenness
- Chlorophyll and nitrogen correlations
- And much more...



USB input

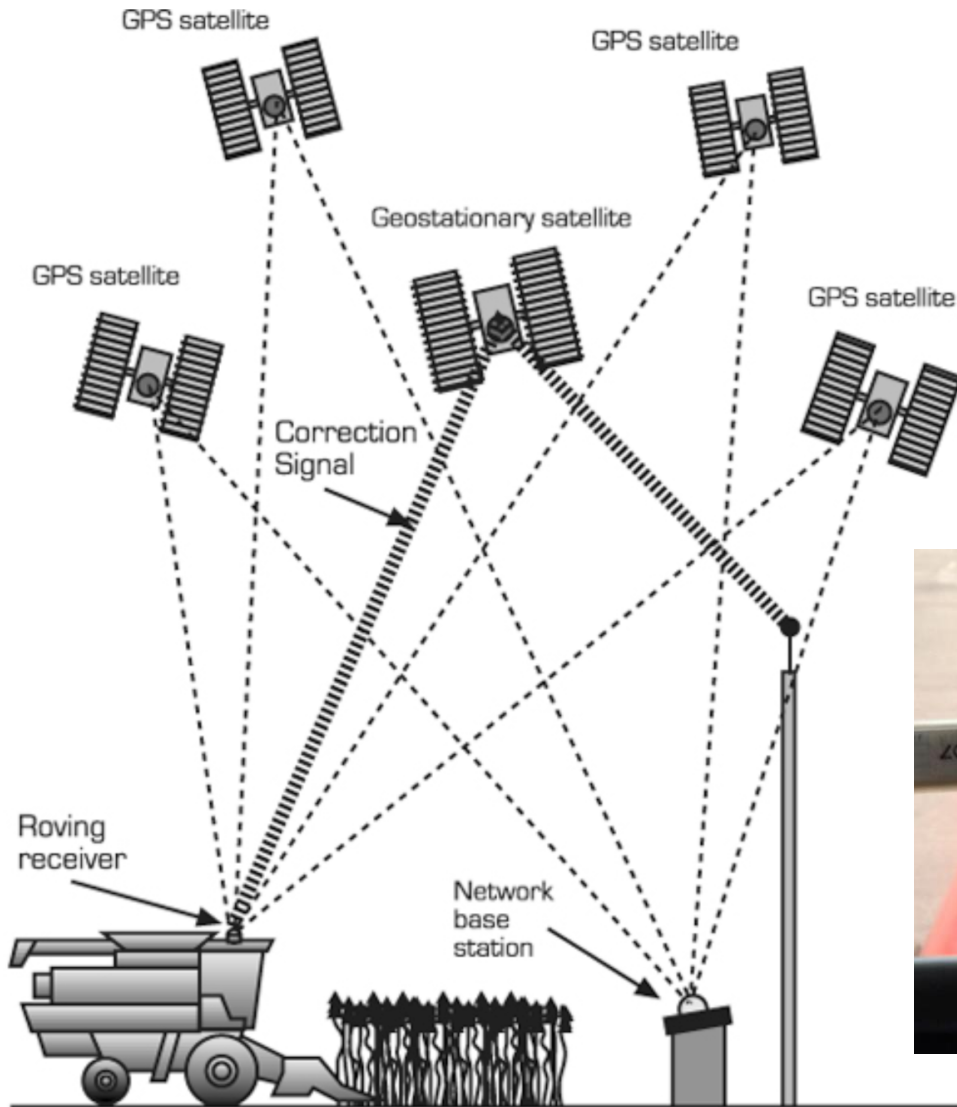


GPS-ready fertiliser spreader



In-Cab display unity

Remote Control:



Remote Control:

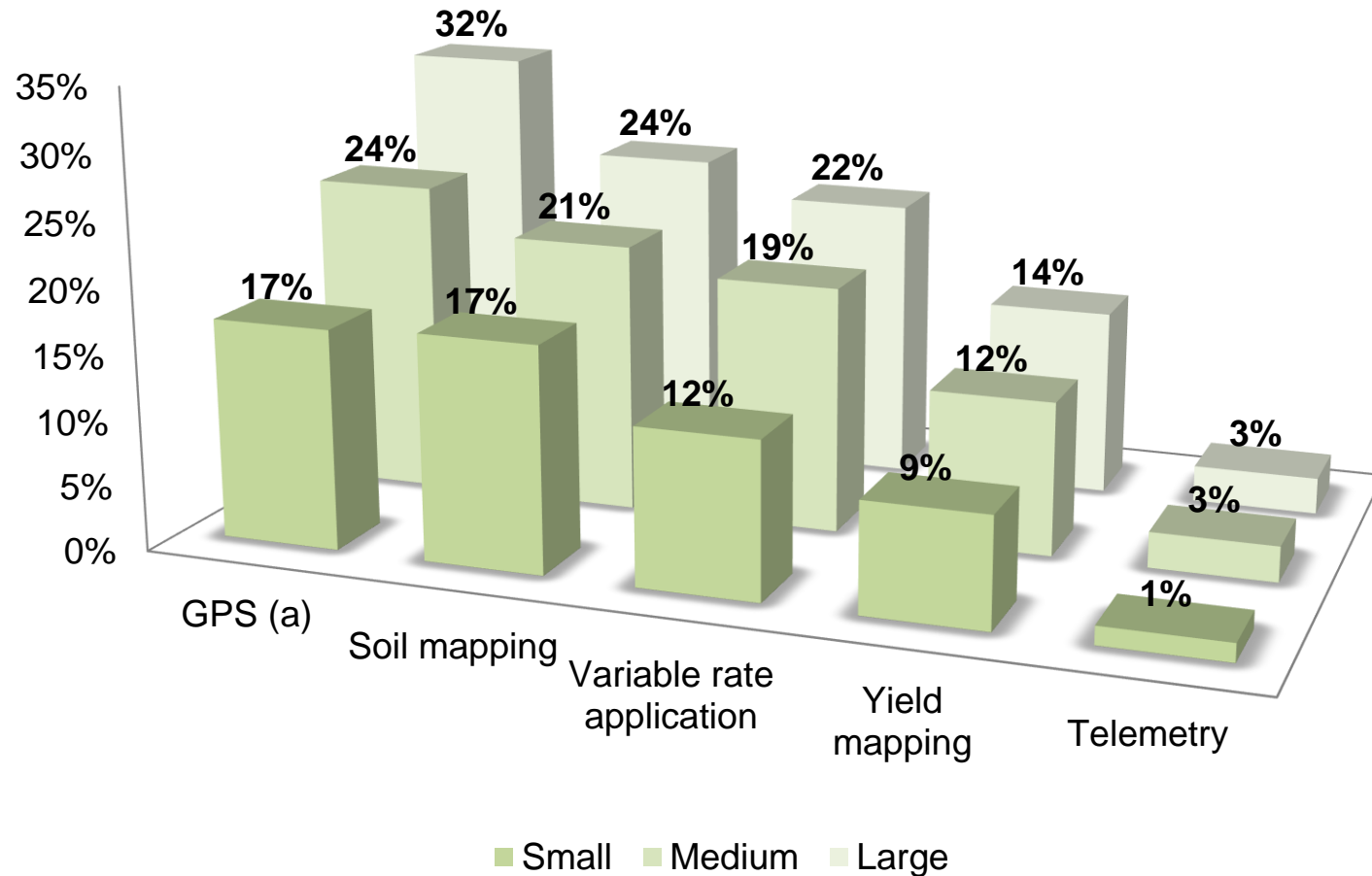


“Auto Steer” on Youtube: <http://www.youtube.com/watch?v=Qg4Ju1I75mc>



Straight GPS lines in potatoes field, Norfolk 2014

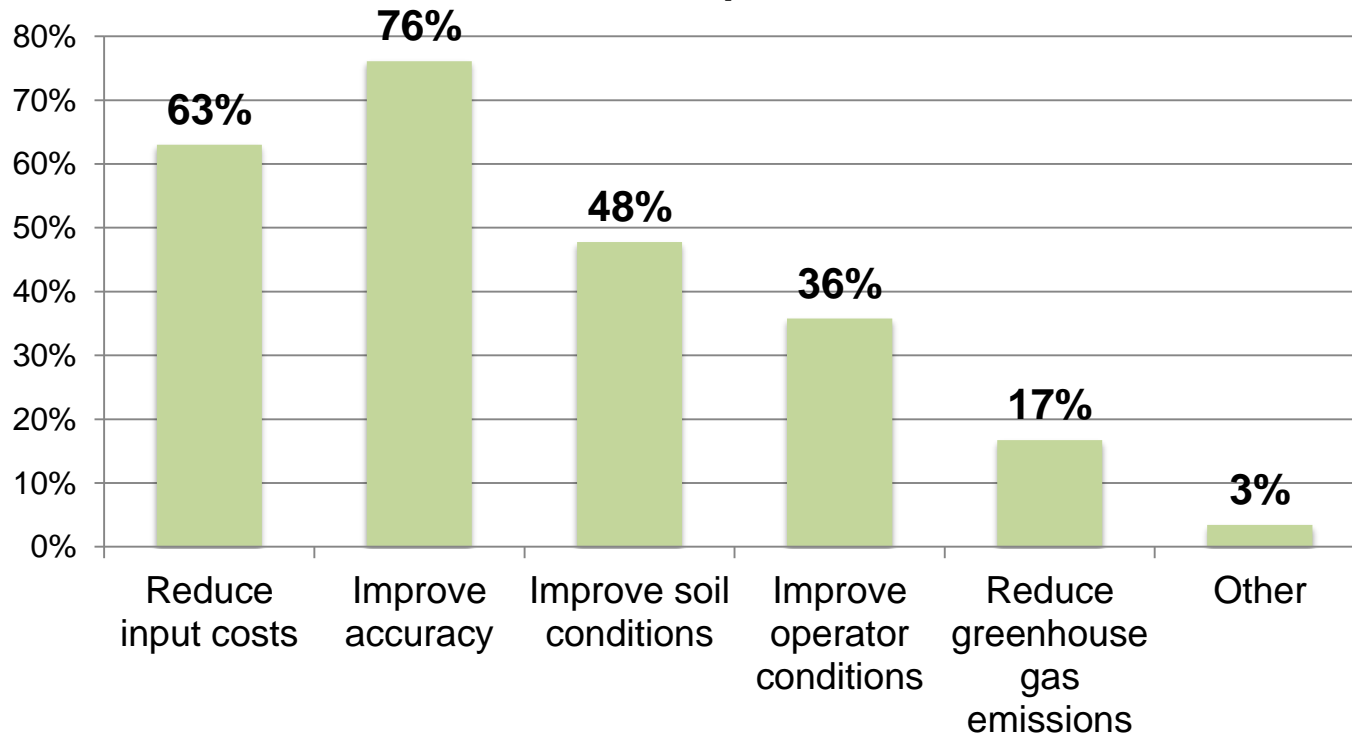
3) Who is using precision farming technologies?



Source: The Farm Practices Survey (2012a)

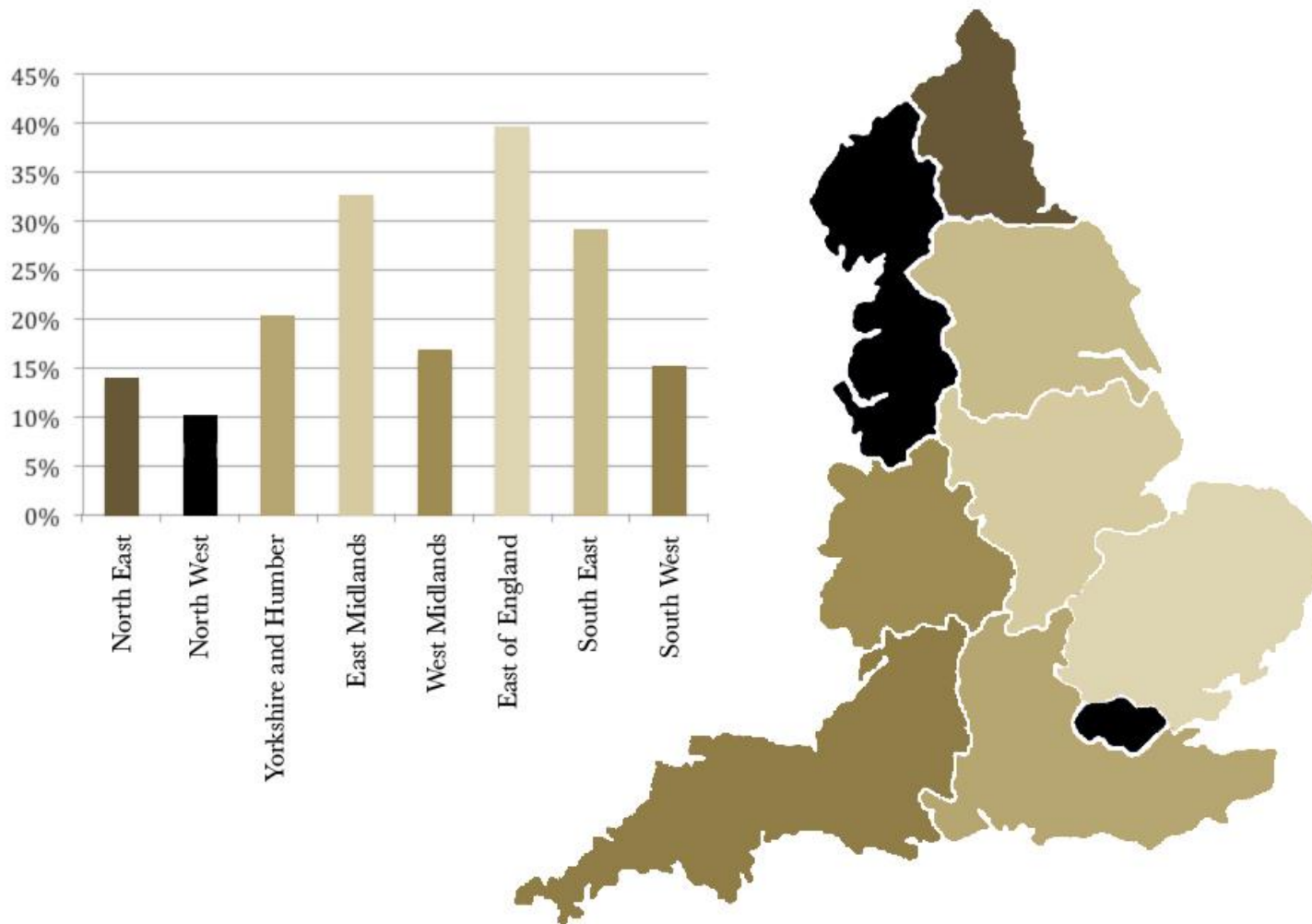
3) Who is using precision farming technologies?

Figure 3: Reasons for using precision farming techniques



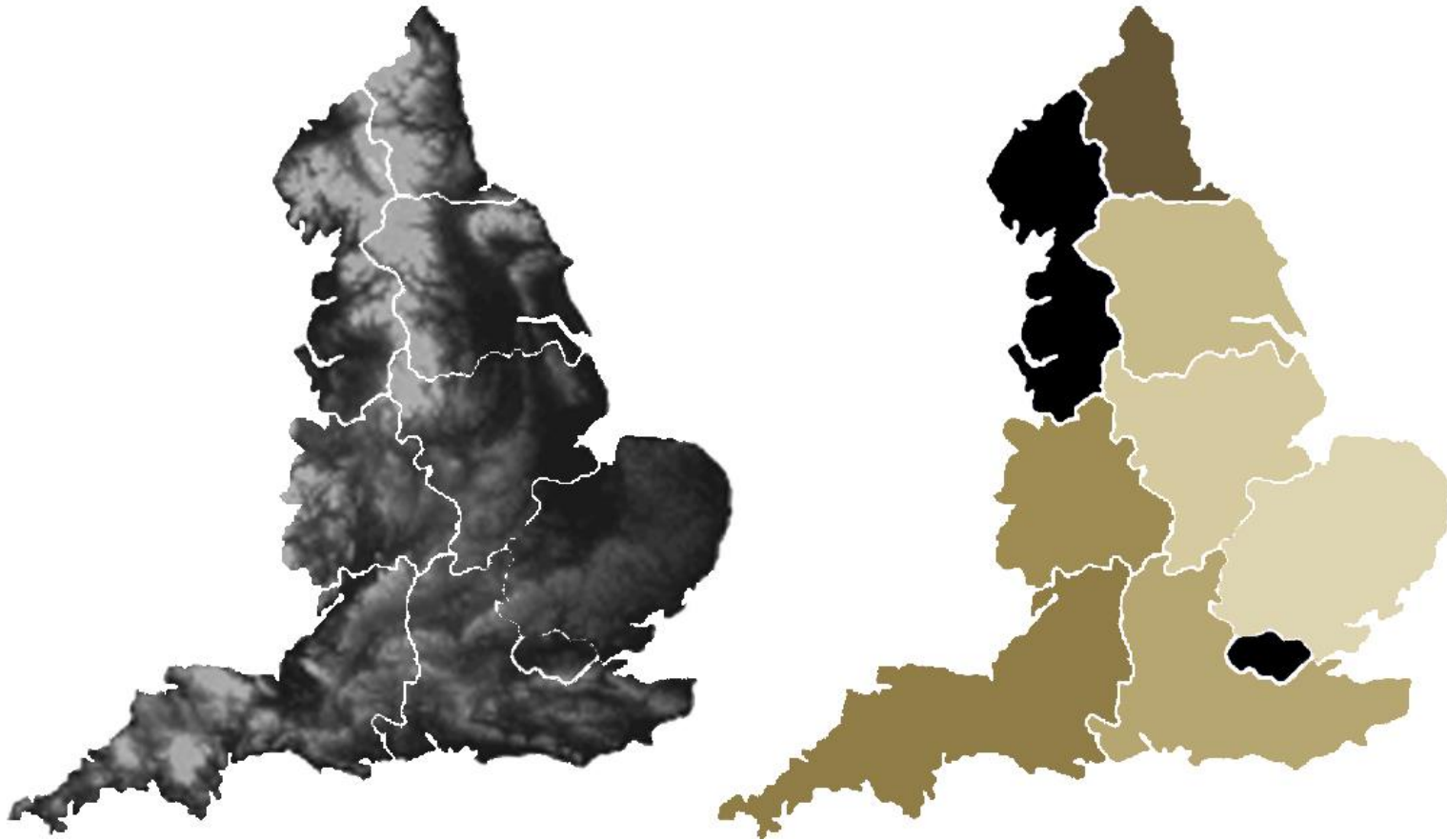
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3) Who is using precision farming technologies?



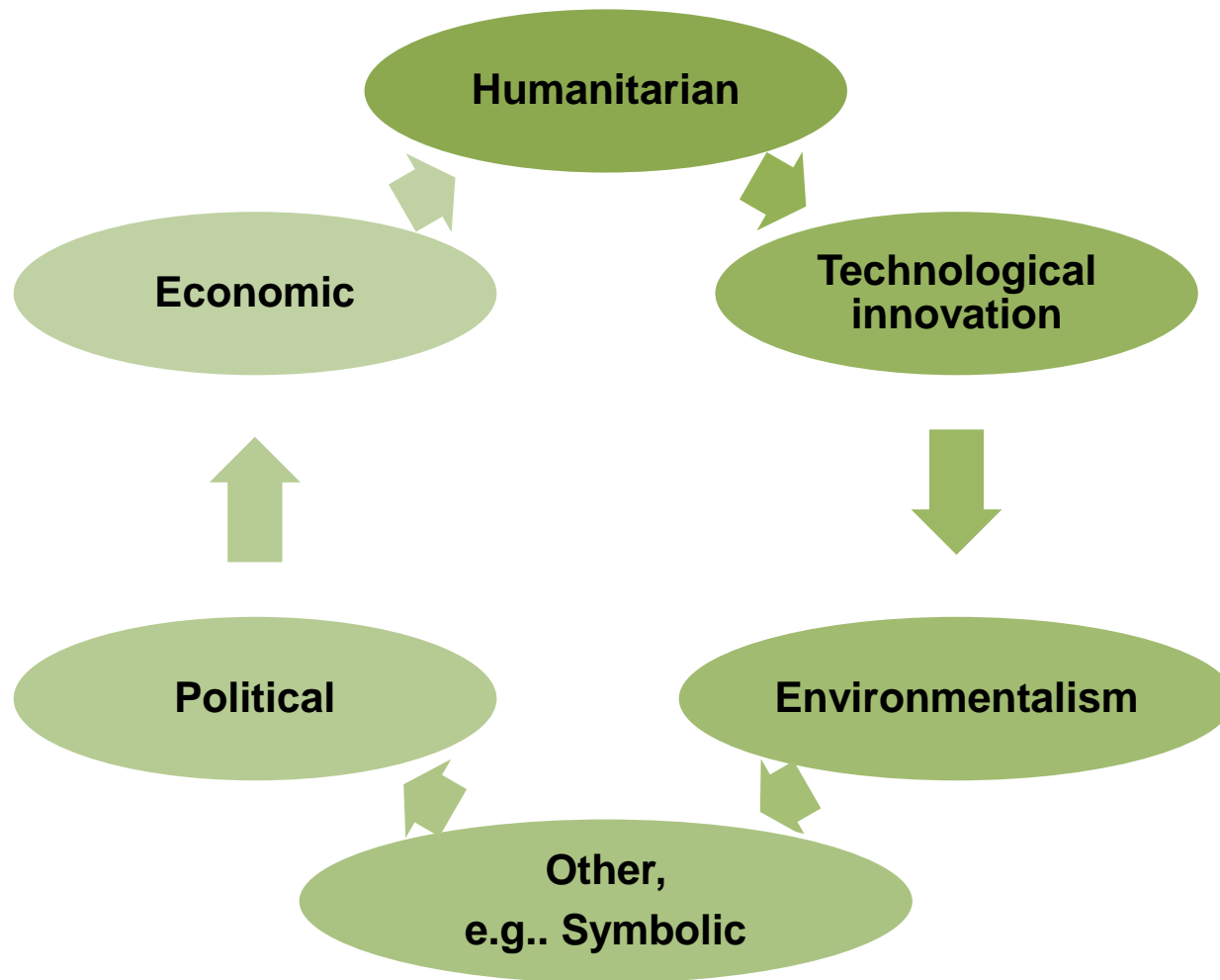
Source: The Farm Practices Survey (2012a)

3) Who is using precision farming technologies?



Source: The Farm Practices Survey (2012a)

5) What are the driving forces in this current revolution?



Courtyard Partnership yield results

General WW Yield (inc feed and milling)

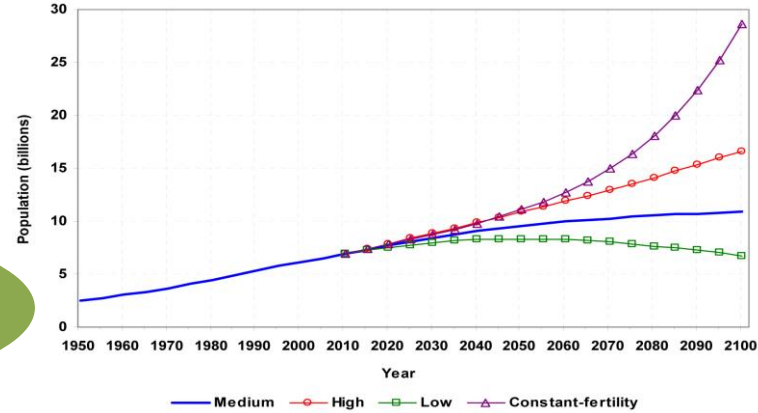
Year	National average WW yields (7.43t/ha average)	IPF average WW yields (8.8t/ha average)
2010	7.7t/ha	8.4t/ha
2011	7.8t/ha	10.2t/ha
2012	6.79t/ha	7.8t/ha

General WOSR Yield

Year	National average WOSR yields (3.5t/ha average)	IPF average WOSR yields (4.7t/ha average)
2010	3.5t/ha	5.2t/ha
2011	3.9t/ha	4.8t/ha
2012	3.3t/ha	4.1t/ha

Yields with VRA Seed Rate

	Winter Wheat	Winter Oilseed Rape
2010	10.56 t/ha	
2011	11.34 t/ha	
2012	7.91 t/ha	
Average	9.93 t/ha	



Humanitarian

Economic

Technological innovation



Political

Environmentalism

Other, e.g.. Symbolic



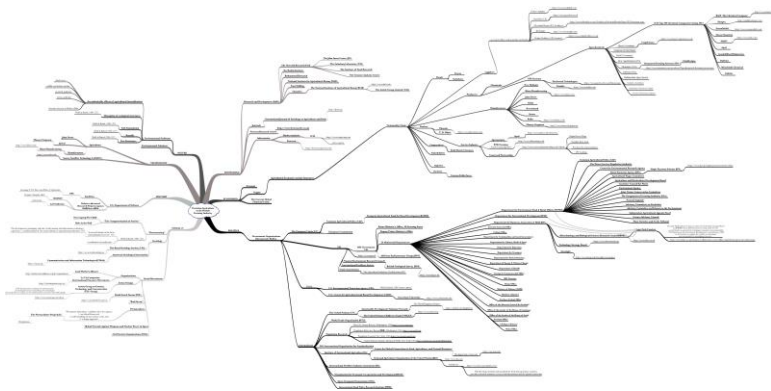
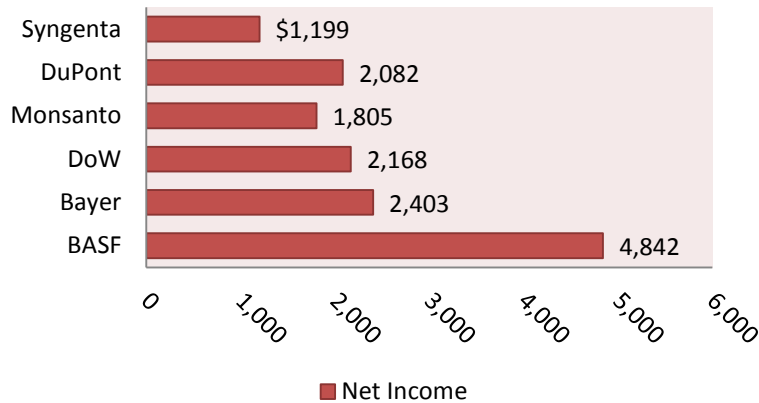
HM Government

Industrial Strategy: government and industry in partner.

A UK Strategy for Agricultural Technologies

July 2013

5) What are the issues of social power and control?



Wolf & Wood (1997): Growing trends in US agriculture over the past one hundred years:

- 1) Vertically coordinated (global) markets
- 2) Increasing expansion of large multinational companies (e.g. the Big Six)
- 3) Power and control over farmer's decisions expropriated by large multinational agribusinesses, satellite and IT companies

5) What are the issues of social power and control?



Wolf & Wood (1997):

Precision agriculture will:

1) intensify this trend

2) continue to shift power and control from "on-farm" to "off-farm" agribusinesses

3) farmer's local/lay/tacit knowledge to become commoditised as another 'production input'



6) How might these insights inform food security debates?

There is evidence to suggest that precision agriculture could:

- 1) Increase agricultural productivity to meet demands of a growing global population
- 2) Reduce harmful chemicals, fertilisers and fuel consumption
- 3) Save farmers time and money

However, it may:

- 1) Be monotonous and culturally unsustainable
- 2) Increase social power and economic inequalities
- 3) Rely on *more* industrially produced technologies
- 4) Offer a modern, global solution over local culture

Bibliography

- Blackmore S. (2003) The Role of Yield Maps in Precision Farming. *National Soil Resources Institute*. Cranfield University.
- Castells M. (1996) *The Rise of the Network Society: The Information Age: Economy, Society and Culture Vol. 1*, Oxford: Blackwell Publishers Inc.
- DEFRA. (2010) Fertiliser Manual (RB209) 8th Edition. In: TSO (The Stationery Office) (ed). <http://www.tsoshop.co.uk>: TSO (The Stationery Office),, 1-249.
- HM Government. (2013) A UK Strategy for Agricultural Technologies. *Industrial Strategy: government and industry in partnership*. London: Department for Business, Innovation and Skills.
- Jensen HG, Jacobsen LB, Pedersen SM, et al. (2012) Socioeconomic impact of widespread adoption of precision farming and controlled traffic systems in Denmark. *Precision Agriculture* 13: 661-677.
- Massey Ferguson. (2013) MF8700. http://www.masseyferguson.co.uk/documents/tractors/MF8700_EN.pdf
- Monsanto Company. (2013) Monsanto Company 2013 Annual Report. Missouri, 1-109.
- Padfield E. (2013) Data Devlivers Precision Promise. *Crop Production Magazine*. n/a: n/a, 78-79.
- Paterson O. (2014) The Rt Hon Owen Paterson MP speech on Opportunity Agriculture. In: Conference OF (ed) *Oxford Farming Conference*. Oxford, 1-7.
- Rabbinge R. (2007) Chairman's Introduction. *Ciba Foundation Symposium 210 - Precision Agriculture: Spatial and Temporal Variability of Environmental Quality*. John Wiley & Sons, Ltd., 1-4.
- Szabo J. (2013) Autonomy in Agriculture. The National Farmers Union Mutual Charitable Trust.
- The Farm Practices Survey. (2012a) 2.1: Proportion of farms using precision farming techniques. In: DEFRA (ed). <http://archive.defra.gov.uk/evidence/statistics/foodfarm/enviro/farmpractice/>: DEFRA.
- United Nations Department of Economic and Social Affairs Population Division. (2013) World Population Prospects: The