# A New Countryside Code?
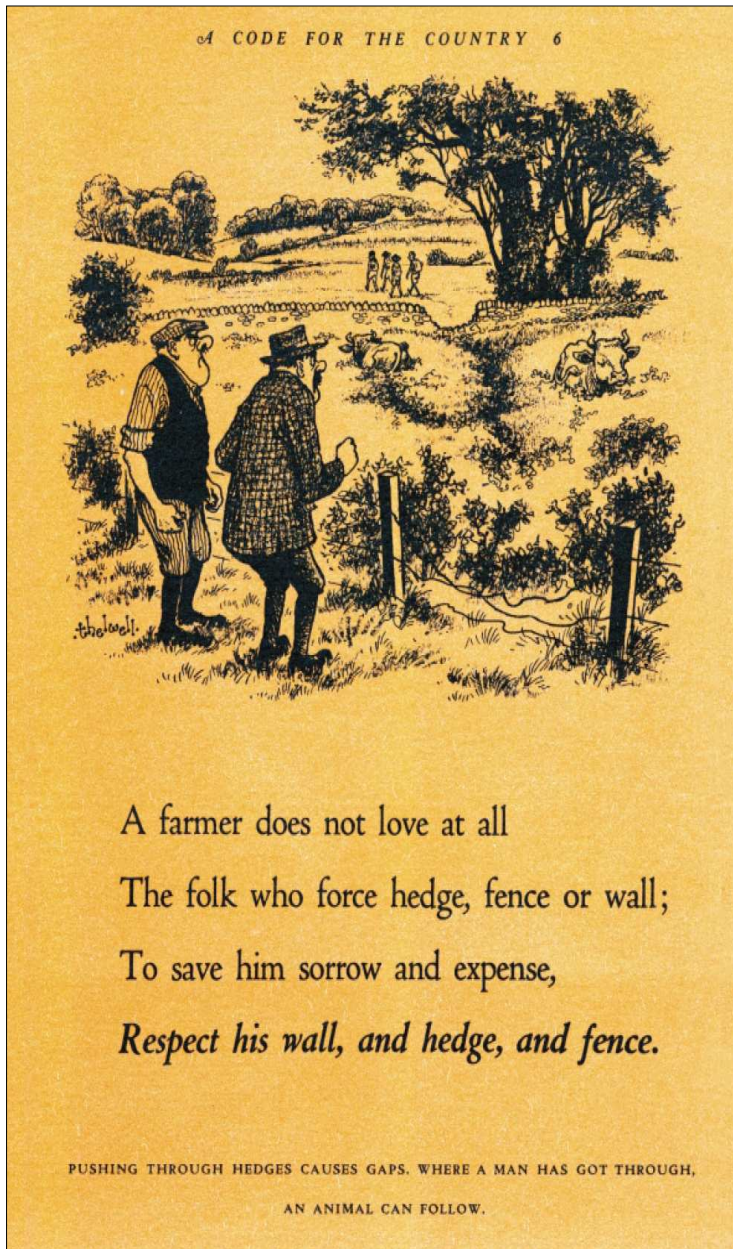## Software, Surveillance and Simulation of Rural Spaces

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# 'The' Countryside Code



A CODE FOR THE COUNTRY 6

A farmer does not love at all
The folk who force hedge, fence or wall;
To save him sorrow and expense,
Respect his wall, and hedge, and fence.

PUSHING THROUGH HEDGES CAUSES GAPS. WHERE A MAN HAS GOT THROUGH,
AN ANIMAL CAN FOLLOW.

- Be safe, plan ahead and follow any signs
- Leave gates and property as you find them
- Protect plants and animals & take your litter home
- Keep dogs under close control
- Consider other people

"Most of it is just good commonsense, as it's designed to help us all to respect, protect and enjoy our countryside. The Code … makes it clear what the responsibilities are for both the public and the people who manage the land." (www.countrysideaccess.gov.uk)
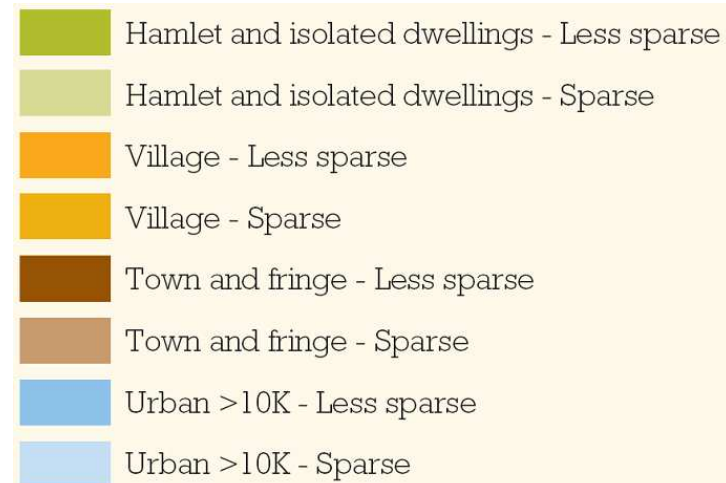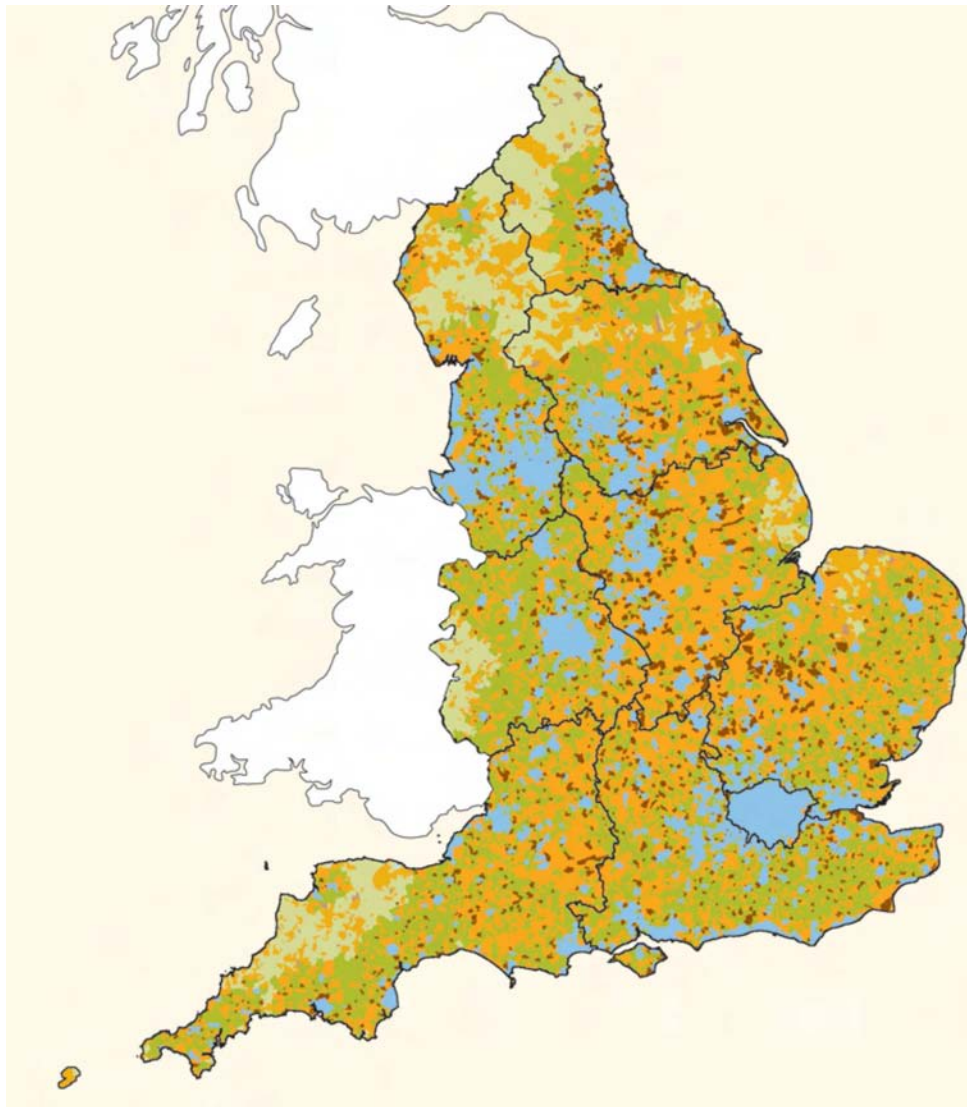
# Part 1:
## The Countryside

# Audience Questions

1. Who lives in the countryside?

2. Who would like to live in the countryside?

3. Who has worked in farming?

4. Who would like to be a farmer?

# The importance of the countryside



- Long running decline in economic and labour value, but
- Some 80% of land area of England classed as rural
- Socially significant – home to around 9.5 million people
- Resources – food, energy, water, recreation
- Large public subsidies to agriculture, £3.7b in 2005/6

| | |
|---|---|
| 🟩 | Hamlet and isolated dwellings - Less sparse |
| 🟩 | Hamlet and isolated dwellings - Sparse |
| 🟧 | Village - Less sparse |
| 🟧 | Village - Sparse |
| 🟫 | Town and fringe - Less sparse |
| 🟫 | Town and fringe - Sparse |
| 🟦 | Urban >10K - Less sparse |
| 🟦 | Urban >10K - Sparse |

# Rural idyll or agro-industrial landscape



The Cornfield, John Constable, 1826

- Social construction of the 'rural' in popular imagination of Englishness
- Appears as opposite of the urban and the modern
- Natural, peaceful & quiet, free

- Yet, little or nothing of 'nature' in the English countryside
- Materiality results from political economy – fields, land-ownership animals present/not present, etc
- Range of distinct social problems and dangers. A fearful place, perhaps, if you are 'out of place'
- Highly surveilled and governed

Last Updated: Wednesday, 14 November 2007, 21:21 GMT

✉ E-mail this to a friend          🖨 Printable version

## More culls in bird flu outbreak

About 22,000 turkeys on four premises are being culled as a precaution, after the virulent H5N1 strain of bird flu was found in turkeys on a Suffolk farm.

Officials said it was not yet known if the birds had contracted the virus.

The farm prepared birds for the Christmas market

A cull of 6,500 birds is also nearing completion at Redgrave Park farm, near Diss, where the infection was discovered on Sunday.
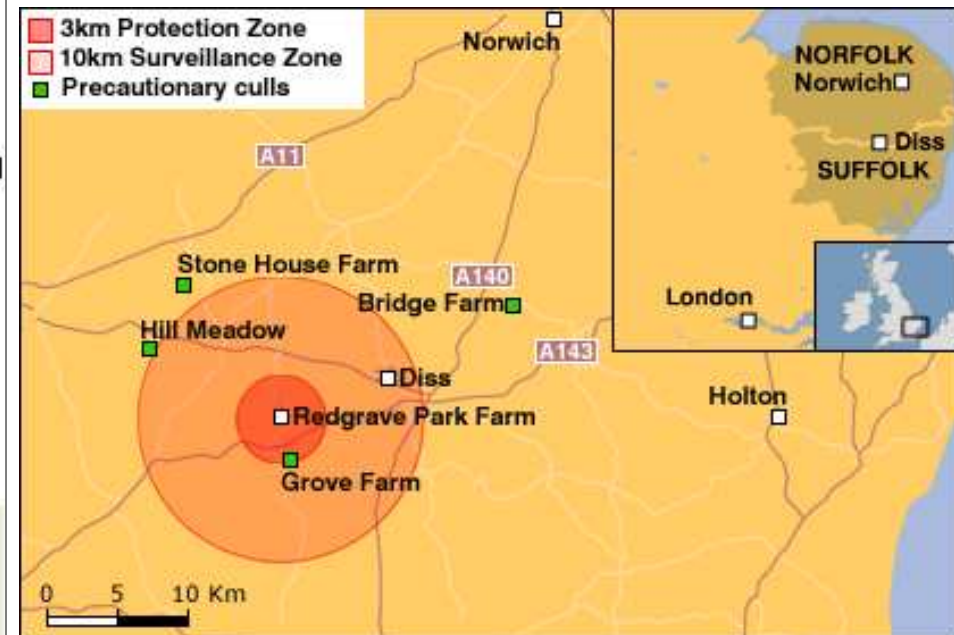
Gressingham Foods' subsidiary Redgrave Poultry, which runs all five sites, said they shared the same farm staff.

A "direct link" had thus been established between them, it said.

A 3km (1.9 mile) protection zone and a 10km (6.2 mile) surveillance zone, where movement of birds is restricted and poultry must be isolated from wild birds, is in place around Redgrave Park.

One of the four sites is within the protection zone and the other three lie within the wider restricted zone, covering much

66 This is a precautionary measure taken to prevent any potential spread of the disease

GETTY IMAGES





3km Protection Zone
10km Surveillance Zone
Precautionary culls

Norwich
NORFOLK
Norwich
Diss
SUFFOLK
A11
Stone House Farm  A140
Bridge Farm      London
Hill Meadow      A143
Diss             Holton
Redgrave Park Farm
Grove Farm

0   5   10 Km

# Hybrid countryside(s)

- Murdoch (2003: 274) "The countryside is hybrid... it is defined by networks in which heterogeneous entities are aligned in a variety of ways"

- Woods (2007: 495), "it is made (and constantly remade) through the entanglement and interaction of the social and the natural, the human and the non-human, the rural and the non-rural, and the local and the global."

- The question for me is in what ways is pervasive computing, sensors/id tags, databases and software simulations becoming entangled in this

- What difference does *code* make in the countryside, particularly in farming practices and rural landscape

# Code in the Countryside – not there or overlooked ?

- *"The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it."* (Mark Weiser, 1991)

- Socio-technological analysis and the stories told of everyday computing are urban, even if not explicitly so (including my own research)
- Little in pervasive computing literature on rural contexts
  - Except odd 'techno-hype' pieces about distributed sensor nets on farms and bio-instrumentation of livestock
- Why is the countryside seen to be devoid of code? Green and pleasant landscape rather than obvious technological infrastructures and grey concrete. Appearance of unmediated fields, trees, ordinary farm animals and uncoded natures
- But beginning to dig out empirical evidence of software in the 'wild', particularly to ensure the 'safely living' of the outputs and activities from the agricultural industry

# Part 2:

## Code – some analytical concepts

- Matthew Fuller: defining 'software studies'

- "Software Studies uses and develops cultural and theoretical approaches to make critical and speculative accounts of the objects and processes of computer science."
  - http://lab.softwarestudies.com/2008/07/software-studies-book-series-mit-press.html

- "propose that software can be seen as an object of study and an area of practice for kinds of thinking and areas of work that have not historically "owned" software, or indeed often had much of use to say about it." (2)
  - Fuller M, (2008) *Software Studies: A Lexicon* (MIT Press, Cambridge, MA)

- Nigel Thrift: 'automatic production of space'; 'technological unconscious'

- "More and more of the spaces of everyday life come loaded up with software, lines of code that are installing a new kind of automatically reproduced background and whose nature is only now starting to become clear." (309)

- Emergent properties of code: "somewhere between the artificial and a new kind of natural, the dead and a new kind of living"; has a "presence as 'local intelligence'" (310)

- Thrift N, French S, (2002) "The automatic production of space" *Transactions of the Institute of British Geographers* NS 27 309-335

- Martin Dodge & Rob Kitchin: 'code/space'

- Software beckons new spatial formations into existence – in three related ways:

  (i) *Code/spaces* are spaces <u>dependent</u> on software

  (ii) *Coded space* is a spatial transduction that is mediated by coded processes, but whose relationship is not dyadic

  (iii) *Background coded space* is where code has the potential to mediate a solution if activated

- Dodge M, Kitchin R, 2005, "Code and the transduction of space" *Annals of the Association of American Geographers* 95(1) 162-180

- **Steve Graham: 'software sorting'**
- "techniques now being widely applied in efforts to try to separate privileged and marginalized groups and places" (562)
- highlights the "central role of computerised code in shaping the social and geographical politics of inequality in advanced societies." (562)
- hidden and automatic discriminatory action, "because most processes of software-sorting are actually invisible from the point of the users, these prioritizations are often not evident either to the favoured groups or places or to the marginalized ones." (566)

- Graham S D N, (2005) "Software-sorted geographies", *Progress in Human Geography* 29(5) 562-580

- Pete Adey: 'software-simulated space' 'anticipatory governance'

- "simulation models enable predictions to be made about uncertain futures and allow users to run 'what if' scenarios ... As [these] move into the public domain their inherent uncertainties and qualifications may be forgotten and the public seduced into accepting their 'crystal ball' like assumptions" (8)

- "software simulations make the future present and actionable-upon by alerting the users to future possibilities" (25)

- Budd L, Adey P, (2009) "The software-simulated airworld: anticipatory code and affective aero mobilities", *Environment and Planning A*, forthcoming

# Part 3:
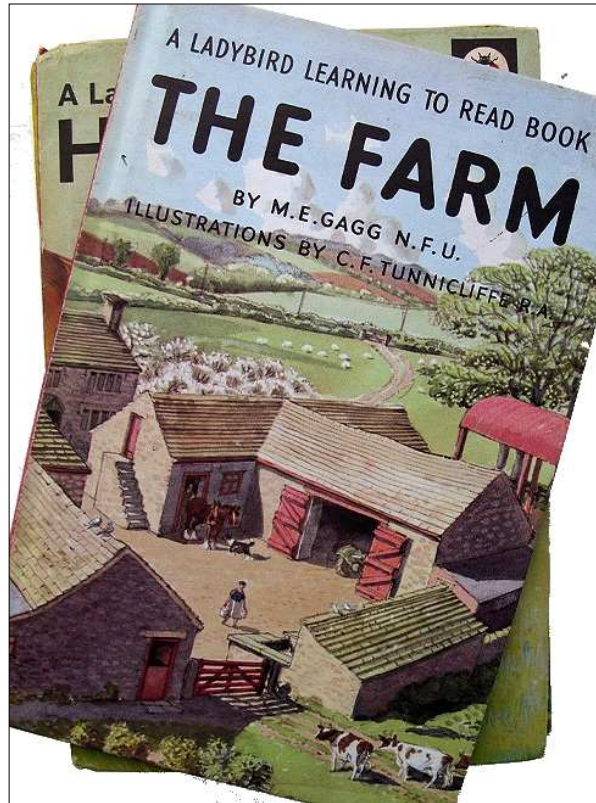


## 'Coding the farm'

# Making farming more knowable and safer(in new ways?)

(i)   regulating safety in the food supply chain by coding livestock (and subsequently parts of livestock) so they are traceable from 'farm-to-fork'

(ii)  producing ethical standard requires new depth of information on the nature of whole production process available direct to consumer

(iii) enhancing automation of farm labour by taking 'precision farming' to the animal. Stockperson become screen-worker

# (i)Safe food by abstracting animals



Crown logo
Country code
Herdmark
UK
666666
500046
Individual animal number
Check digit



Ear tag
Tag plust
UK123456789012
British Cattle
Electronic Id
id electronig
Breed / Brid: HOLSTEIN
Sex / Rhyw: FEMALE
Born / Ganwyd: 01 01 2001
Genetic Dam / Mam Enetig: UKAB1234 00001
Issue / Version:
Cyhoeddiad / Fersiwn: 02 01 2001/ 01
Re-Issue / Version:
Ailgyhoeddiad / Fersiwn: 01 02 2001/ 02
UK123456789012
Animal Details
Manylion yr Anifail
Page 1
SAMPLE

Animal eartag
Animal details: Breed, Sex, Date of Birth and Genetic Dam
Date the passport was issued and re-issued

- Safety with life cycle traceability
- Made machine-readable

- Cattle tracking service
  - check which animals are present on a holding
  - check where an animal has been during its life
  - trace animals exposed to a disease risk
  - give assurances to buyers about an animal's life history, and so
  - strengthen consumer confidence in beef

# (ii) Ethical Eating – 'google your grub' as consumer empowerment

# Where did my egg come from?
# Looking-up the FarmID

- "While extremists undoubtedly already have their networks for finding their targets, the release of the information on the list would, in the Commissioner's opinion, certainly make it much easier for such organisations to establish their locations. The Commissioner recognises the strong public interest in the origin of food but, in all the circumstances of the case, he considers that, given the real risk to the health and safety of those producers (and their staff) included in the list, the public interest is, on balance, better served by maintaining the exemption so as to withhold the information in question."

- Source: Freedom of Information Act 2000, Decision Notice (ref FS50089403), 20 December 2006. Information Commissioner's Office

# (iii) Taking automation to the next level

- sowing with software – coding field knowledge with precision agriculture has been around for a decade or more

- "When my uncle drove his little red tractor, he perched on a metal-pan seat, protected from the sun by a straw hat. Times have changed. The modern farmer sits in an air-conditioned cab with an audio system, an air suspension seat, and a beverage cooler …. The tractor is equipped with a GPS receiver…. An on-board computer uses the geographic information to dispense pesticides or fertilizers according to the needs of each small section of the field." (Hayes 2005: 119)

# Cow shed as Code/Space?

- Automatic milking systems
- Huge capital investment
- Code changes practices for cows (on-demand, recognised individually) and stockperson
- Controversial as it appears so 'unnatural'
- No-grazing systems mean cows 'disappear' from the countryside

# You have full control



1. A touch screen gives you easy control during milking. You have real-time access to all the monitoring information you need such as cow ID, quarter flow rate, volume and cleaning status of the milking process. You can pilot the DeLaval online cell counter OCC during milking to view the SCC right from the touch screen.

2. DeLaval VMS features true quarter milking with four optical milk meters monitoring milk yields, flow rates, time, conductivity and blood levels.

3. The system´s integrated cleaning unit reduces cleaning time by 40 percent, which increases milking capacity. The entire cleaning process is controlled by the system and reported in the management software to give you optimal hygiene control.

4. The fast and gentle hydraulic multi-purpose robotic arm takes care of preparing the teats before milking (including optional pre-spray), attaches the teat cups, re-attaches if needed, aligns the milk tube and sprays the teats after milking.
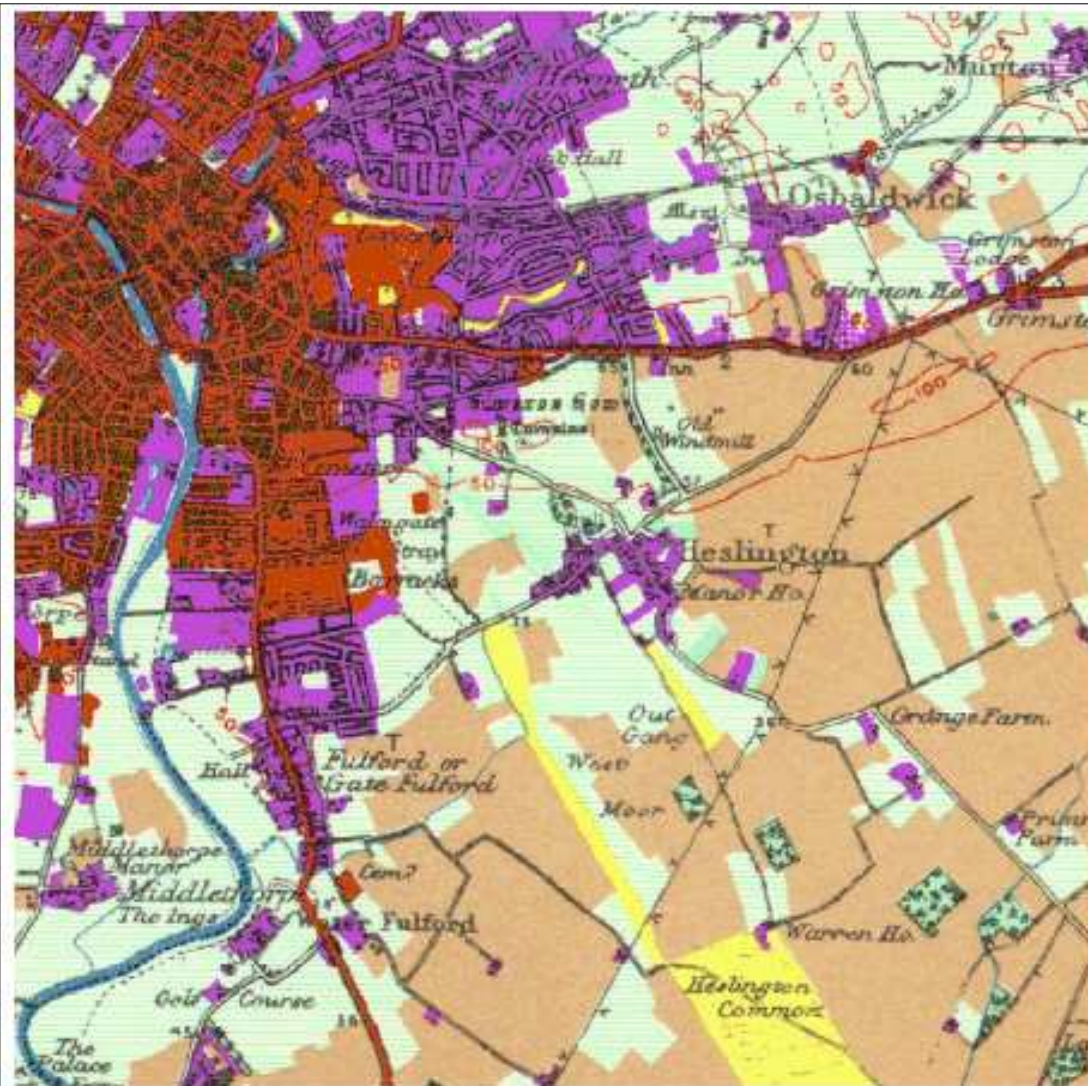
# Part 4:

# Surveilling and Simulating Rural Spaces

# Rural surveillance



| | CROPS AND GRASS | Statute Acres | | LIVE STOCK on holding on 4th June, including any sent for sale on that or previous day | | | Number (in figures) |
|---|---|---|---|---|---|---|---|
| 1 | Wheat | 5½ | 43 | Cows and Heifers in milk | | | 6 |
| 2 | Barley | | 44 | Cows in Calf, but not in milk | | | 1 |
| 3 | Oats | 1½ | 45 | Heifers in Calf, with first Calf | | | 1 |
| 4 | Mixed Corn with Wheat in mixture | | 46 | Bulls being used for service | | | |
| 5 | Mixed Corn without Wheat in mixture | | 47 | Bulls (including Bull Calves) being reared for service | | | |
| 6 | Rye | | 48 | | 2 years old and above | Male | |
| 7 | Beans, winter or spring, for stock feeding | | 49 | | | Female | |
| 8 | Peas, for stock feeding, not for human consumption | | 50 | OTHER CATTLE | 1 year old and under 2 | Male | 6 |
| 9 | Potatoes, first earlies | | 51 | | | Female | 6 |
| 10 | Potatoes, main crop and second earlies | 1 | 52 | | Under 1 year old:— (a) For rearing (excluding Bull Calves being reared for service) | | 7 |
| 11 | Turnips and Swedes, for fodder | | | | | | |
| 12 | Mangolds | 1½ | 53 | | (b) Intended for slaughter as Calves | | |
| 13 | Sugar Beet | | 54 | TOTAL CATTLE and CALVES | | | 27 |
| 14 | Kale, for fodder | | 55 | Steers and Heifers over 1 year old being fattened for slaughter before 30th November, 1941 | | | |
| 15 | Rape (or Cole) | | 56 | | Ewes kept for further breeding (excluding two-tooth Ewes) | | 22 |
| 16 | Cabbage, Savoys, and Kohl Rabi, for fodder | ½ | 57 | SHEEP OVER 1 YEAR OLD | Rams kept for service | | 1 |
| 17 | Vetches or Tares | | 58 | | Two-tooth Ewes (Shearling Ewes or Gimmers) to be put to the ram in 1941 | | |
| 18 | Lucerne | | 59 | | Other Sheep over 1 year old | | |
| 19 | Mustard, for seed | | 60 | | Ewe Lambs to be put to the ram in 1941 | | |
| 20 | Mustard, for fodder or ploughing in | | 61 | SHEEP UNDER 1 YEAR OLD | Ram Lambs for service in 1941 | | |
| 21 | Flax, for fibre or linseed | | 62 | | Other Sheep and Lambs under 1 year old | | 25 |
| 22 | Hops, Statute Acres, not Hop Acres | | 63 | TOTAL SHEEP and LAMBS | | | 48 |
| 23 | Orchards, with crops, fallow, or grass below the trees | | 64 | Sows in Pig | | | |
| 24 | Orchards, with small fruit below the trees | | 65 | Gilts in Pig | | | |
| 25 | Small Fruit, not under orchard trees | | 66 | Other Sows kept for breeding | | | |
| 26 | Vegetables for human consumption (excluding Potatoes), Flowers and Crops under Glass | | 67 | Barren Sows for fattening | | | |
| 27 | All Other Crops not specified elsewhere on this return or grown on patches of less than ¼ acre | | 68 | Boars being used for service | | | |
| 28 | Bare Fallow | | | | | | |

Fill in both Forms 39d/S.S. (Green) and C 47/S.S.Y. (Blue)

**MINISTRY OF AGRICULTURE AND FISHERIES.**
THE DEFENCE REGULATIONS, 1939, AND THE AGRICULTURAL RETURNS ORDER, 1939.
**RETURN WITH RESPECT TO AGRICULTURAL LAND ON 4th JUNE, 1941.**

ARABLE LAND—Including fallow, rotation grass and market gardens - - -

MEADOWLAND AND PERMANENT GRASS

Grassland in parks - - - - - -

NOTE.—Land available for grazing, such as sports grounds and some golf courses, has been included here.
The distinction between low-lying meadows and ordinary pasture can be made by reference to the contours.

Main roads shown in red.

Inland water shown in blue.

GARDENS, Etc.

Houses with gardens sufficiently large to be productive of fruit, vegetables, flowers, etc. - - - - -

New housing areas, nurseries, and allotments -

Orchards - - - - - -

FOREST AND WOODLAND

Deciduous - - - - - -

Coniferous - - - - -

Mixed - - - - - -

New plantations - - - -

NOTE.—Woodland cut down and not replanted is shown by the black symbols of woodlands in the colour of the present utilisation, generally yellow (heathland).

HEATH AND MOORLAND

Heath, Moorland, Commons and rough pasture - - - -

Rough marsh pasture - - -

NOTE.—In this category have been included:—
(1) Areas formerly improved but which have been allowed to revert to rough pasture or heathland.
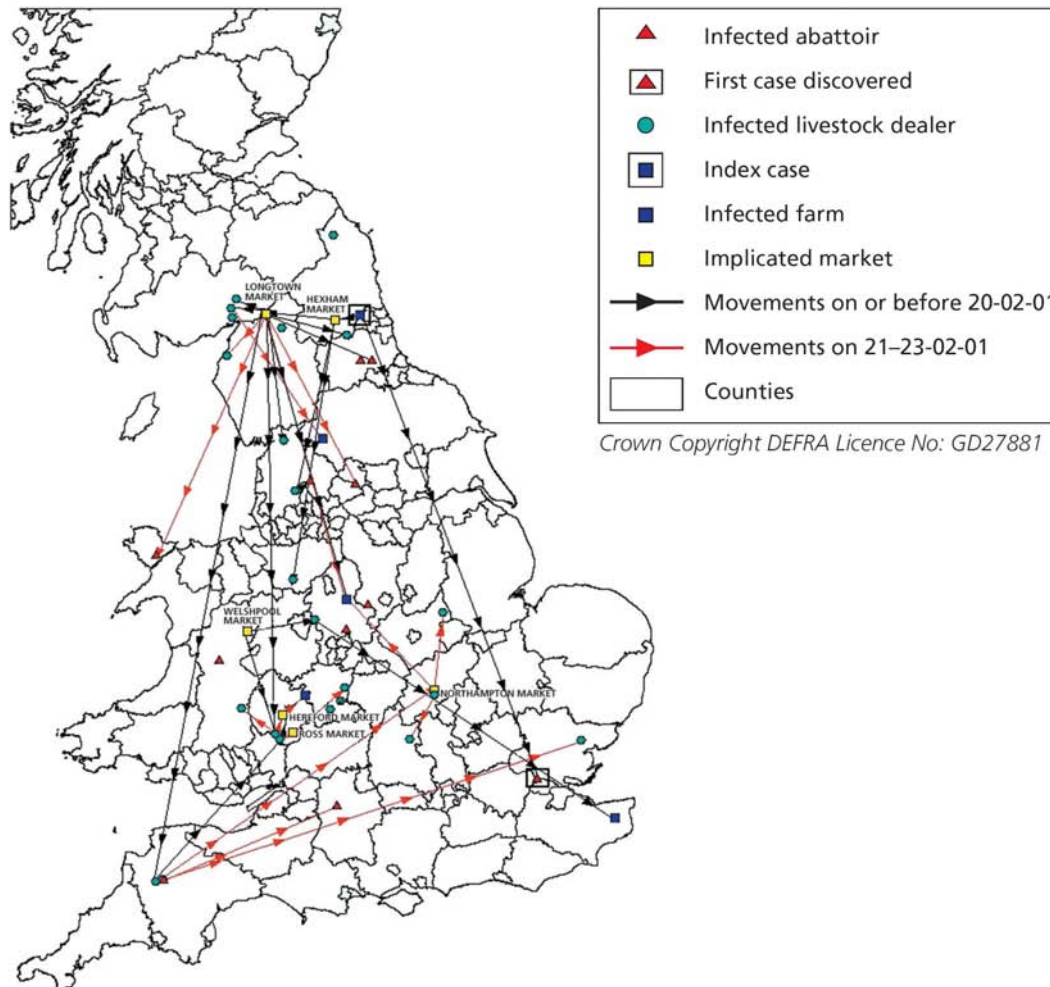(2) Old tipheaps, etc., which have become overgrown with grass and other vegetation.

LAND AGRICULTURALLY UNPRODUCTIVE

Land so closely covered with houses and other buildings or industrial works as to be agriculturally unproductive

Yards, cemeteries, pits, quarries, tip heaps, new industrial works, etc. - - - - - - - -

# Veterinary surveillance

Figure 3.6. Movement of FMD-infected animals before 23 February 2001, and locations of implicated markets, abattoirs and dealers.



Legend:
- ▲ Infected abattoir
- ▲ (boxed) First case discovered
- ● Infected livestock dealer
- ■ (boxed) Index case
- ■ Infected farm
- ■ (yellow) Implicated market
- → Movements on or before 20-02-01
- → (red) Movements on 21–23-02-01
- ▭ Counties

Crown Copyright DEFRA Licence No: GD27881

## 2    RESULTS



**Density of Poultry (GB Poultry Register)**

Absolute Scale: 1:4,000,000

Legend
Poultry density (per km²)
- 0
- 1 - 50
- 51 - 250
- 251 - 500
- 501 - 1,000
- 1,001 - 2,000
- 2,001 - 4,000
- 4,001 - 8,000
- Greater than 8,000

Crown Copyright ©: 100018880                    Absolute Scale: 1: 4,250,000

CREATOR: SZEID, Defra            PUBLISHER: SZEID, Defra
DATE CREATED: 2006-09-11         DATA SOURCE: GB Poultry Register
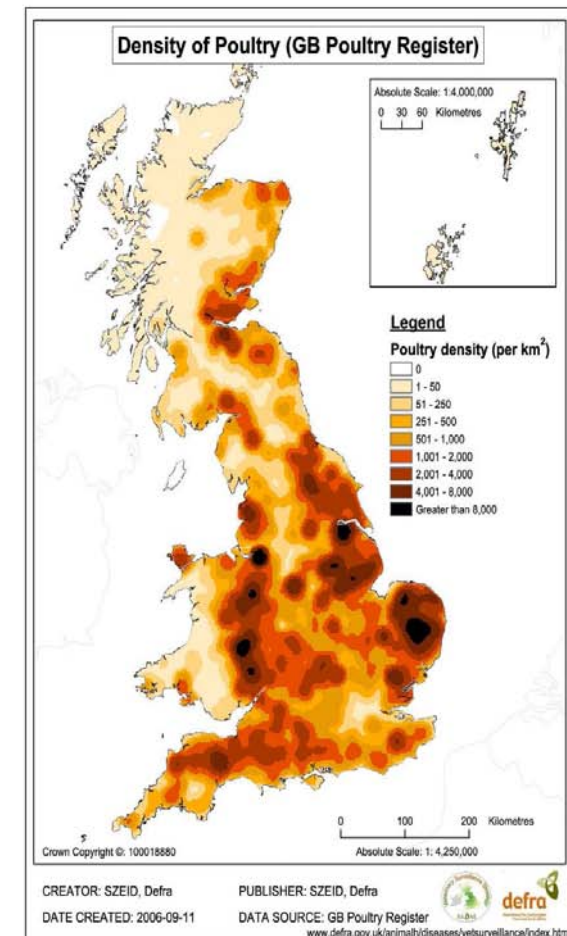                                 www.defra.gov.uk/animalh/diseases/vetsurveillance/index.htm

Figure 1. Density map of poultry population.

# Simulating risks, predicting outputs



Thin green lines = low risk but low certainty

Wide red lines = high risk and high certainty

Legend

Fine sediment risk

- > 2.83 Std. Dev.
- 2.50 - 2.83 Std. Dev.
- 2.17 - 2.50 Std. Dev.
- 1.83 - 2.17 Std. Dev.
- 1.50 - 1.83 Std. Dev.
- 1.17 - 1.50 Std. Dev.
- 0.83 - 1.17 Std. Dev.
- 0.50 - 0.83 Std. Dev.
- 0.17 - 0.50 Std. Dev.
- -0.17 - 0.17 Std. Dev.
- -0.50 - -0.17 Std. Dev.
- -0.83 - -0.50 Std. Dev.
- -1.17 - -0.83 Std. Dev.
- < -1.17 Std. Dev.
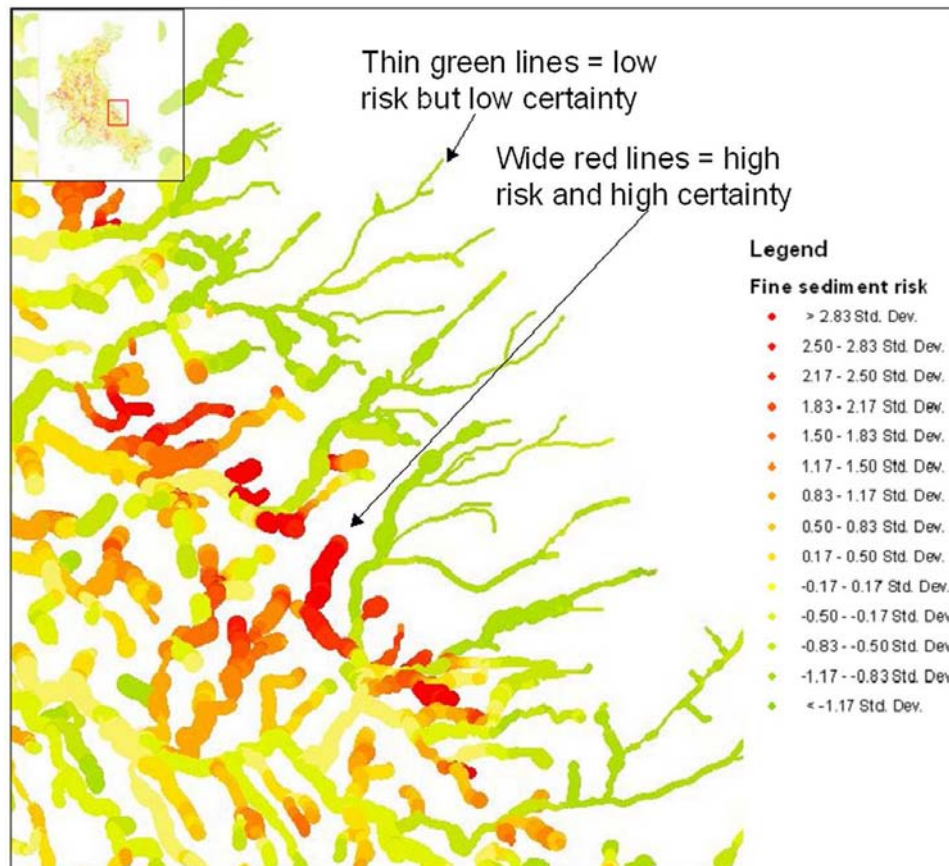
- Stuart Lane et al, (2006) surveillant science

- "The science is based on coupled mathematical modelling and remote sensing, applied at very high resolution (20 m) but very large spatial scales (>1000 km2), to identify where land management measures are required to protect the aquatic environment. Taking modelling and remote sensing together, this science makes statements about which locations in the landscape are likely to be the causes of diffuse pollution, without the need to visit those locations." (240)

## Calculation of a Fine Sediment Risk Map
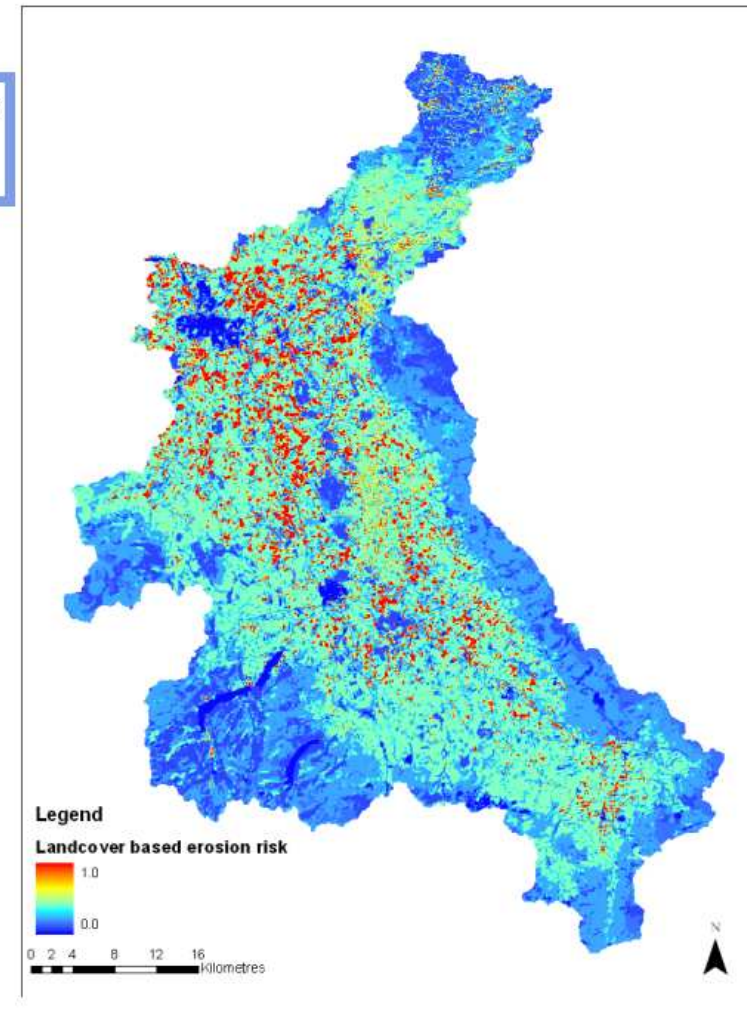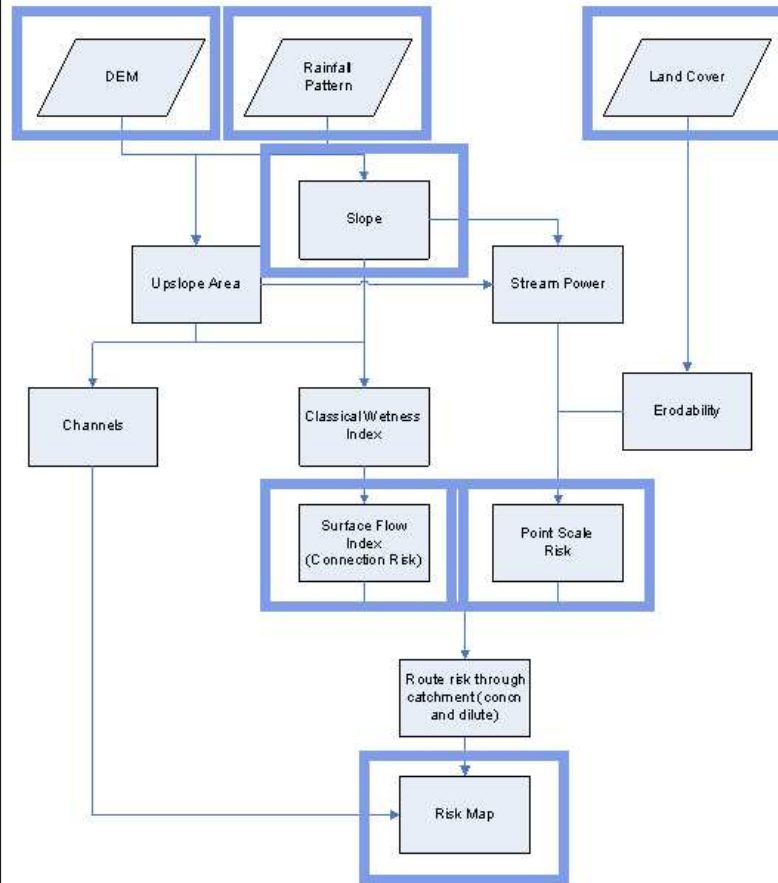
- "These models are truly surveillant, as the data needed to drive them can be obtained without any knowledge of those to whom the data pertain." (253)
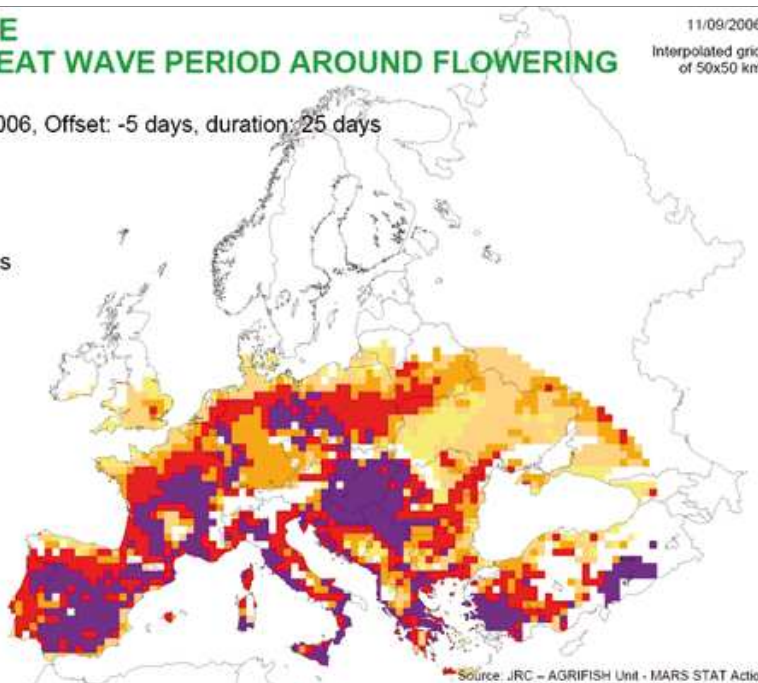
**GRAIN MAIZE**
**LONGEST HEAT WAVE PERIOD AROUND FLOWERING**

11/09/2006
Interpolated grid of 50x50 km

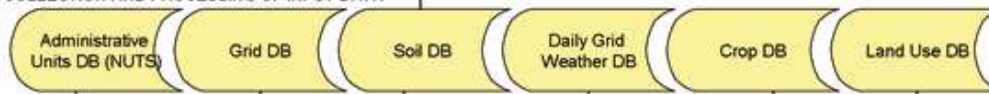Year of sowing: 2006, Offset: -5 days, duration: 25 days
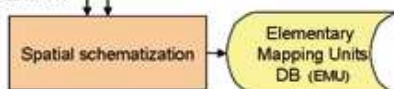
**Current year**

Units: Occurrences

- 0
- 1 - 3
- 4 - 5
- 6 - 10
- >= 11

Source: JRC – AGRIFISH Unit - MARS STAT Action

**MARS** AGROMETEOROLOGICAL

**Crop Monitoring in Europe**

Review of the 2007-2008 campaign
Situation from 1st September to 20th November

**Vol. 16, No. 6**

## Favourable season coupled with increased area leading to high production levels



Grain maize - forecasted yield 2008
Actual yield versus yield 2007
- much lower (< -20 %)
- lower (< -4 %)
- comparable to 2007
- higher (> 4 %)
- much higher (> 29 %)

Total wheat - forecasted yield 2008
Actual yield versus yield 2007
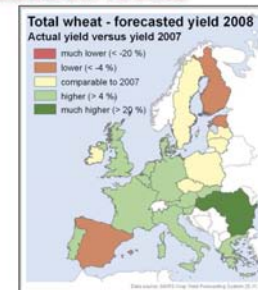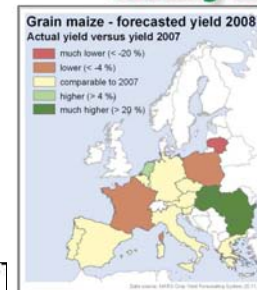- much lower (< -20 %)
- lower (< -4 %)
- comparable to 2007
- higher (> 4 %)
- much higher (> 29 %)

### A. Synthesis of the 2007-2008 campaign

#### 1. Highlights of the 2007/08 campaign

Favourable conditions throughout the 2007/08 campaign, without exceptional events impacting strongly upon the yield, determined decidedly higher yield levels than last year and clearly above the five-year average for all cereals. The EU-27 final cereal yield figure is expected at 5.04 t/ha (about + 11 % compared with 2007 and + 6.9 % compared with the five-year average).

| November 2008 CROPS | EU27 yield forecast (t/ha) from AGRI4CAST | | | | |
|---|---|---|---|---|---|
| | 2007 | 2008 | Avg 5 yrs | % 08/07 | % 08/ Avg |
| CEREALS | 4.5 | 5.0 | 4.7 | +11.1 | +6.9 |
| Soft wheat | 5.1 | 5.7 | 5.4 | +11.4 | +5.4 |
| Durum wheat | 2.9 | 3.1 | 2.8 | +8.8 | +12.9 |
| ...at | 4.8 | 5.4 | 5.0 | +11.3 | +7.0 |
| ...ey | 4.2 | 4.4 | 4.2 | +4.8 | +5.5 |
| ...ize | 5.8 | 6.9 | 6.3 | +17.8 | +8.4 |
| ...eals (1) | 3.2 | 3.5 | 3.2 | +9.3 | +6.7 |
| ...d | 2.8 | 3.0 | 3.0 | +5.5 | -1.6 |
| | 1.5 | 1.6 | 1.6 | +12.3 | +0.2 |
| | 28.8 | 28.1 | 26.9 | -2.4 | +4.5 |
| ...et | 63.7 | 62.7 | 59.5 | -1.5 | +5.4 |

...rye, maslin, oats, triticale, mixed grain other than maslin, millet, buckwheat



COLLECTION AND PROCESSING OF INPUT DATA

Administrative Units DB (NUTS) · Grid DB · Soil DB · Daily Grid Weather DB · Crop DB · Land Use DB

SPATIAL SCHEMATIZATION

Spatial schematization → Elementary Mapping Units DB (EMU)

REGIONAL CROP SIMULATION

Regional Crop Simulation → Crop Indicator DB (EMU)

SPATIAL AGGREGATION

Crop Indicator DB (GRID, NUTS) ← Aggregation to grid and administrative levels

PRODUCTION OF CROP INDICATOR MAPS

Long term average Crop Indicator DB (GRID) → Production of crop Indicator maps → Crop indicator maps

# Conclusions

- Contemporary farming practice and governance – including such issues as food safety, animal welfare, environmental protection and efficient subsidy payments – are using software

- The emergence of this 'countryside code' is predicated on algorithmic data processing which transduces farming practices, land, crops and livestock in machine-readable objects

- But how far are some farm spaces now code/space? are coming to *depend* on software and distributed information systems to function ?

- What is the effectiveness of real-time surveillance and potency of future predicting software simulations for managing rural landscapes?

CODE/SPACE

Software, Society and Space
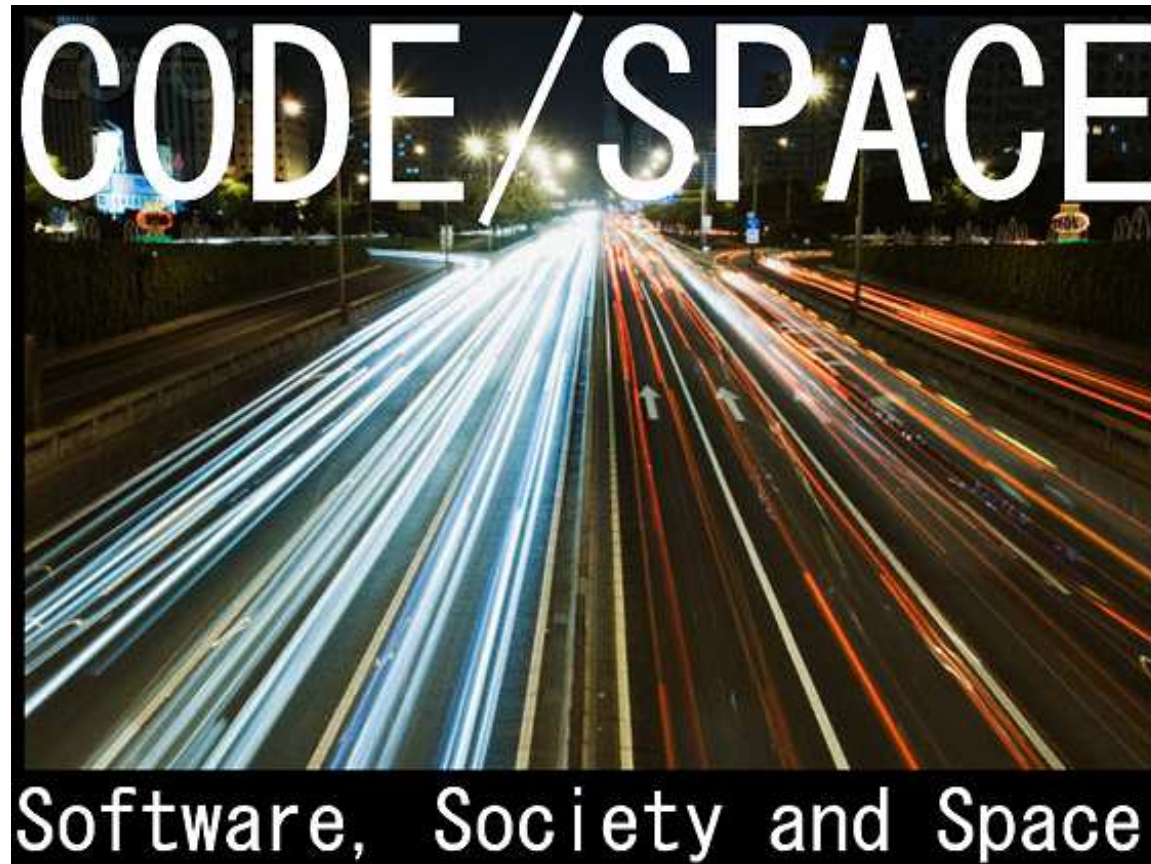
- Blog: http://cyberbadger.blogspot.com
- Code/Space project page: www.cybergeography.org/codespace/

- Kitchin R, Dodge M. (2009?) *Code/Space: Software, Space and Society* (MIT Press, Cambridge, MA)

# <u>References</u>

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# Image Sources

- Slide 1: Illustration by Robin Hursthouse, scanned from The Guardian, Field Experts, Saturday July 21 2007, <http://www.guardian.co.uk/money/2007/jul/21/careers.work>
- Slide 2: Scan from original 1950s Country Code with cartoon illustration drawn by Norman Thelwell. Source: <http://www.countrysideaccess.gov.uk/content/download/613/3747/file/thelwells_cartoons.pdf>
- Slide 5: Map from Defining Rural England Report, July 2007, page 5. Source: <http://www.ruralcommunities.gov.uk/publications/crc49definingruralengland>
- Slide 6: Constable painting. Source: <http://en.wikipedia.org/wiki/Image:John_Constable_008.jpg>
- Slide 7: Pyre of culled animals from foot and mouth disease outbreak in 2001. Photography by Michel Spinger, AP/Wide World Photos. Source: <http://www.scienceclarified.com/dispute/Vol-1/Should-the-threat-of-foot-and-mouth-disease-be-met-by-the-destruction-of-all-animals-that-might-have-been-exposed-to-the-virus.html>
- Slide 8: BBC News website. Source: <http://news.bbc.co.uk/1/hi/uk/7093806.stm>
- Slide 17: The Farm, Ladybird book cover scan. Source: <http://flickr.com/photos/37997987@N00/515875302>
- Slide 19: Cattle ear tag. Source: <http://www.defra.gov.uk/animalh/id-move/cattle/memberstates.htm#2>; Cattle passport sample. Source: <http://www.defra.gov.uk/animalh/id-move/cattle/memberstates.htm>
- Slide 20: Egg traceability System web page. Source: <http://www.lioneggfarms.co.uk/information/egg-codes/>
- Slide 22: Fieldstar precision agriculture brochure. Source: <http://www.fieldstar.com/Agco/FieldStar/FieldStarUK/FieldstarBroUS.pdf>
- Slide 23: DeLaval marketing brochure. Source: <http://www.delaval.com/NR/rdonlyres/E8455914-F039-49F0-A56D-98720E04897E/0/vms_basic_brochure_web.pdf>
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# Image Sources

- Slide 26: Enumeration form from 1941 Nation Farm Survey. Source: <http://countryside-quality-counts.org.uk/publications/1941-Farm-Survey.pdf>
- Slide 27: Map and key for Land Utilisation Survey. Source: <http://www.visionofbritain.org.uk/maps/index.jsp>
- Slide 28: FMD movement map. Source: <http://royalsociety.org/inquiry/index/idl_3to4.pdf>; Density of poultry map. Source: <http://www.defra.gov.uk/animalh/diseases/vetsurveillance/reports/pdf/poultry-registered080211.pdf>
- Slide 29: Uncertainty on risk map. Source: <http://www.dur.ac.uk/sim.reaney/scimap/reaney_bhs_2006.ppt>
- Slide 30: Flow diagram and risk map. Source: <http://www.dur.ac.uk/sim.reaney/scimap/reaney_bhs_2006.ppt>
- Slide 31: Grain maize map and flow diagram. Source: <http://www.geoinformatics.com/asp/default.asp?t=article&newsid=3175>; MARS Bulletin screenshot. Source: <http://mars.jrc.ec.europa.eu/mars/Bulletins-Publications>