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**A graduate from a Geography  
Degree in the mid-1970s asks  
'what is GIS?' : coming to GIS by a  
circuitous route**

**Nigel Walford**

*Department of Geography and Geology*

**Kingston University** London



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# Outline

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- In the beginning ...
- Geography degrees in 1970s
- Spatial analysis in 1970s
- Doctoral research
- Data - let's map them
- Business of GIS
- GIS everywhere



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# In the beginning ...

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- 1962 Canada Land and Geographic Information System
- Developed to address a problem: how to manage and monitor land-based resources
- Technological assemblage
  - Computer Aided Design
  - Computer mapping
  - Database management systems
- Not necessarily part of Geography as a discipline



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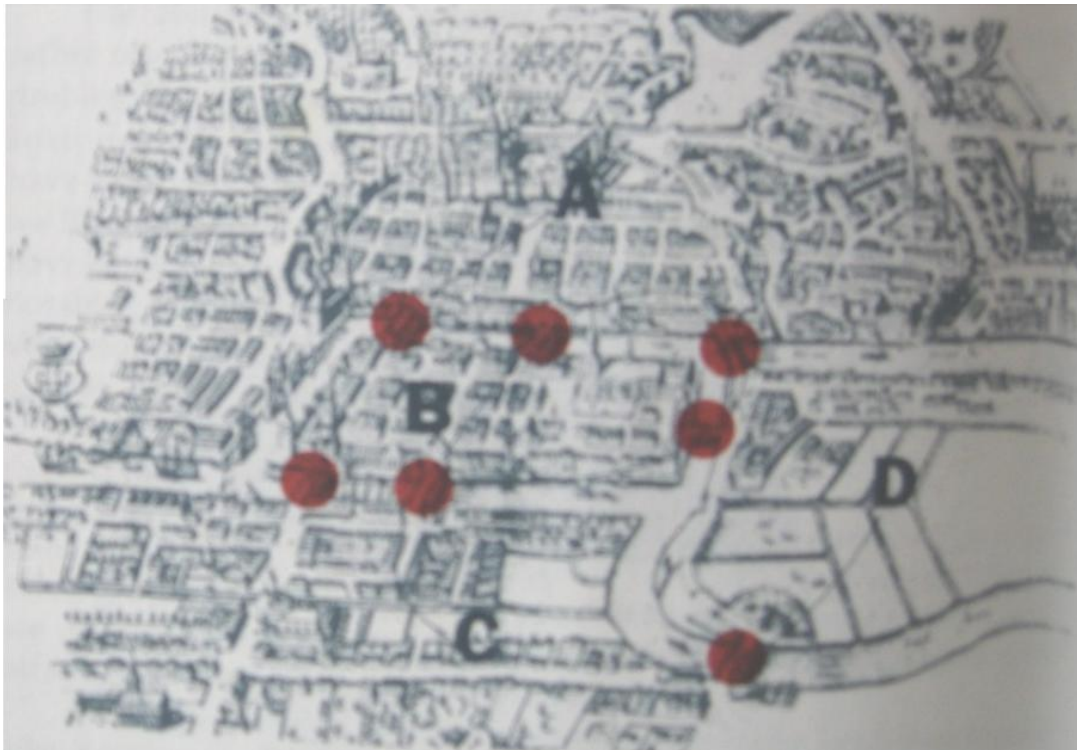
# Geography degrees in 1970s

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- Geography degrees in British universities
  - Quantification and statistics
  - Systematic geography in, regional geography out
  - So many “ ’isms and ’ologies”: positivism, modernism, Marxism, behaviouralism, phenomenology, ...
- Where was GIS?
  - Spatial analysis
  - Spatial laws (normative)
- Quantification and statistics

# Spatial analysis in 1970s

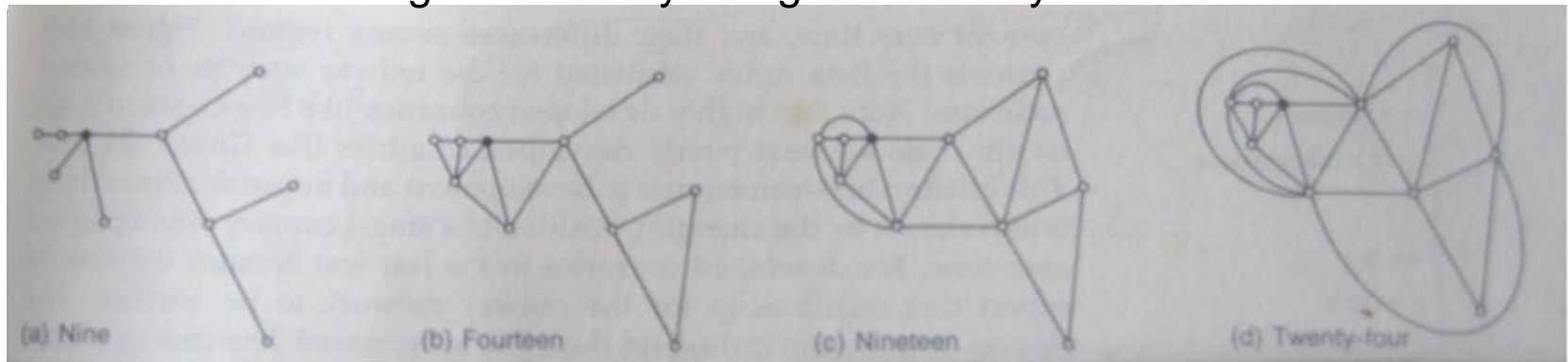
- Based on earlier work by mathematicians and statisticians
- Mathematician Leonhard Euler showed four areas of Königsberg (A, B, C and D) could not be visited by crossing all bridges without re-crossing at least one of them



Reproduced in Haggett, P. 1972 *Geography: A Modern Synthesis*. Harper Row: London.

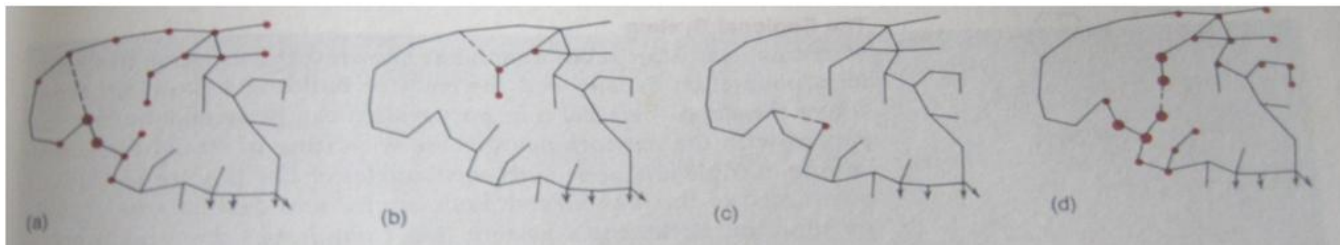
# Spatial analysis in 1970s

- Analysis of networks based on graph theory
  - Connectivity increases with a fixed number of nodes from minimum (9) to maximum (24)
  - Calculating connectivity using connectivity matrix



Haggett, P. 1972 *Geography: A Modern Synthesis*. Harper Row: London.

- Applying techniques to assess impact of adding links to a transport network



After: Burton, I. 1963 *Accessibility in Northern Ontario*. In Haggett, P. 1972.



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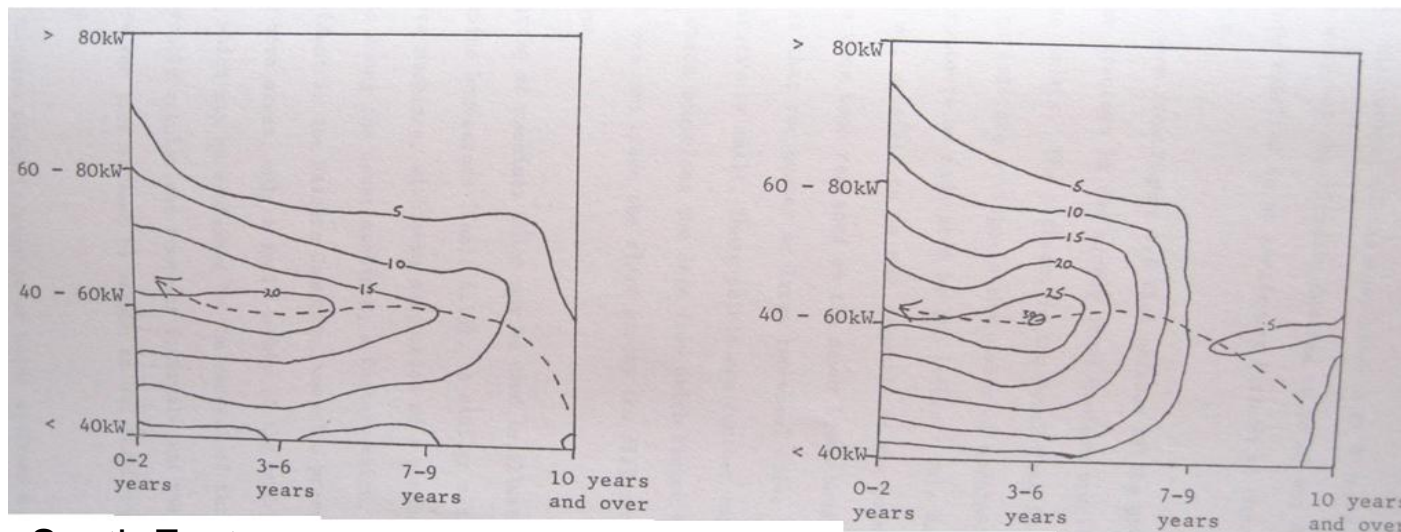
# Spatial analysis in 1970s

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- But we (Geography undergraduates) in British university in 1974 used:
  - Calculators that plugged into the mains to calculate statistics
  - Pen and paper to work out network connectivity
- Although fellow undergraduate students on a Biology degree learnt how to program in Basic

# Doctoral research

- Doctoral research combining agricultural geography and farm management
- Linear Programming used to determine optimal cropping solutions by modelling resource constraints - LP subsequently linked to GIS to gather data for input to model and to visualise solutions
- Using interpolation techniques on non-spatial data (age and power rating of tractors) – isolines represent number of tractors



South East

East Anglia





# Data - let's map them

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- Population census and associated digital boundary data 'burst onto the scene' early 1980s
- Central and local government, public agencies, commercial organisations, academic researchers and Geography students start mapping on computers using GIMMS, MAPICS, SYMAP, ODYSSEY, etc.
- Census atlases produced using the newly available digital boundary and statistical census data became popular outputs from Geography Departments in British universities and Planning Departments in local government



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# Business of GIS

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- Chorley Report in mid-1980s recognised importance of *Handling Geographic Information* by commercial organisations (business), notably by
  - utility companies during era of privatisation
  - retail sector with expansion of out of town shopping
  - civil engineering for planning and developing road transport infrastructure
  - environmental managers for monitoring and assessing changes



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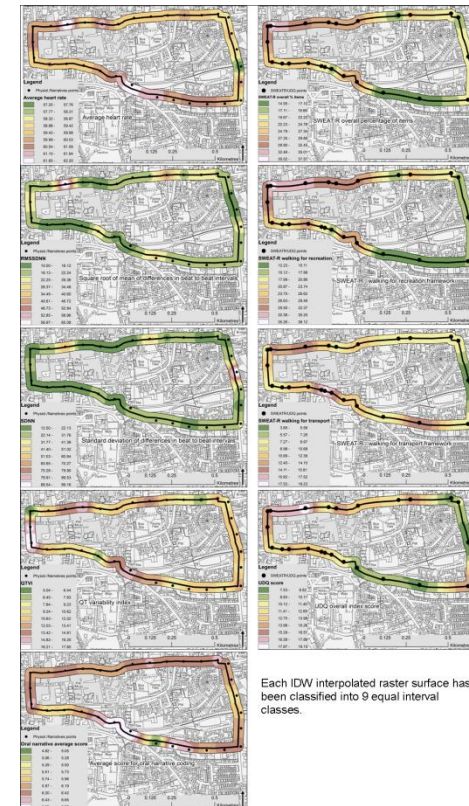
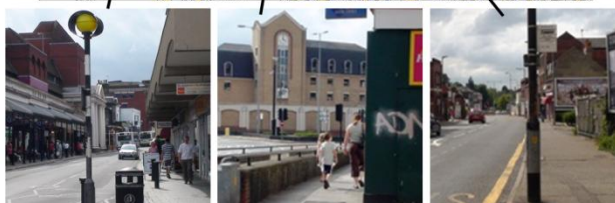
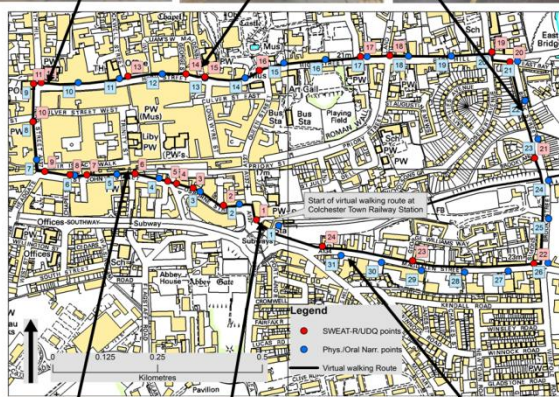
# GIS everywhere

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- By the mid-1990s was everywhere, but desk-bound not mobile
- By mid-2010s GIS is mobile everywhere for everyone

# GIS everywhere

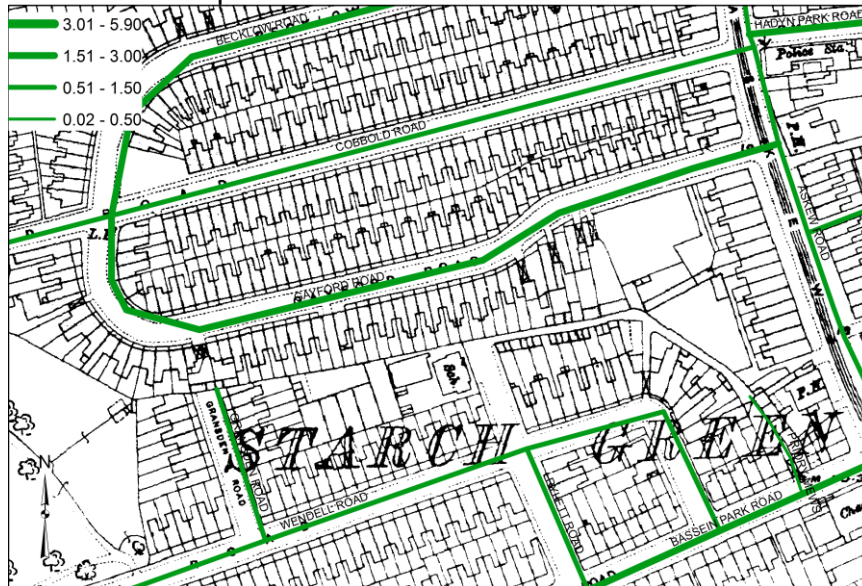
- In gerontology, psychology and planning
- Older people's experience of unfamiliar places



# GIS everywhere

- Historical population censuses: British like its never been seen before!
  - Persons per metre on early 20<sup>th</sup> century streets in Hammersmith
  - Decennial change in persons at addresses

Persons per metre on streets in Hammersmith 1911

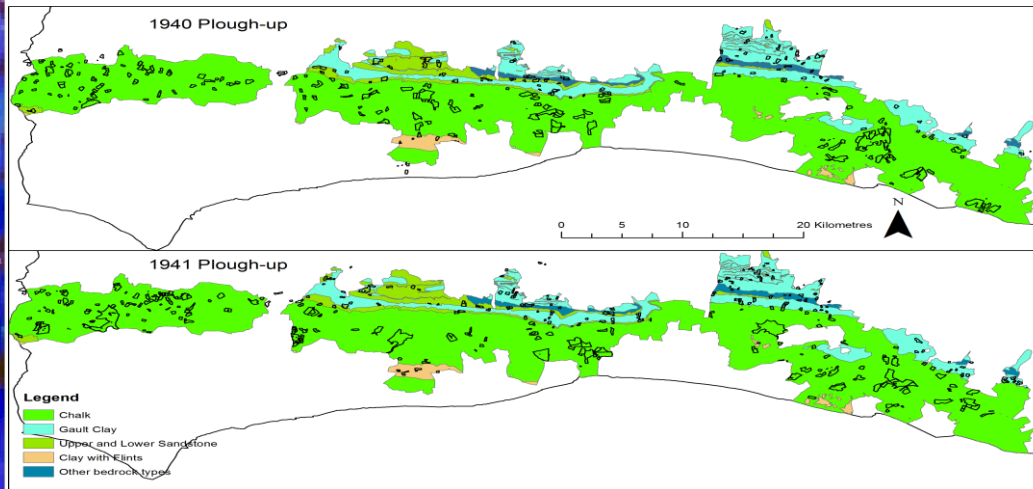


Difference in persons per address 1901 to 1911

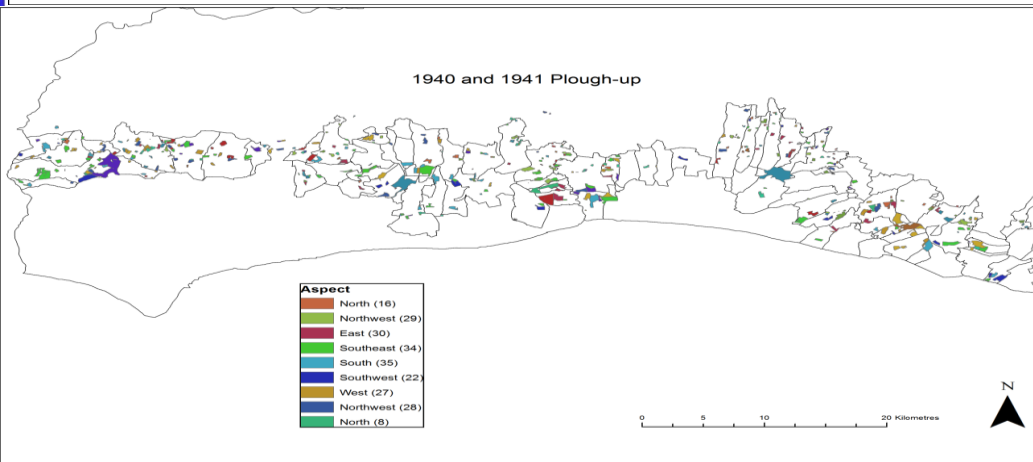


# GIS everywhere

- South Downs farms: WWII plough-up campaign land linked to bedrock geology and slope



Bedrock	South Downs farms	1940 & 1941 Plough up
Chalk	70.4%	82.2%
Mudstone and Gault Clay	18.6%	9.7%
Upper and Lower Greensand	7.6%	4.6%
Clay with flints	1.5%	1.3%
Other bedrock types	1.9%	2.8%



	SD Farms	Plough up		SD Farms	Plough up
N	3.3%	3.8%	S	10.5%	20.8%
NE	11.2%	7.0%	SW	19.2%	9.6%
E	12.9%	11.7%	W	9.2%	12.4%
SE	17.0%	17.9%	NW	11.3%	12.1%

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# In conclusion ...

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- GIS always was more than Geography and still is more, although Geographers might be reluctant to admit it
- GIS as a mediator between disciplines:
  - Those viewing space is as a context for non-spatial processes
  - Geography whose *raison d'être* is the role of space (geography) in differentiating the outcomes of such processes