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Geoinformation in Education: a European perspective

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Context: US situation – Prof. Sarah Bednarz (2007)

GIS growth the foundation of Geography renaissance

- GIS in 179 of 195 programmes. Proliferation of course degrees and certificate programmes.
- Issues of pedagogy mainly not addressed
- Issues of quality assurance, (college certificates)
- 'Buttonology' versus GIS Science, learning software versus learning concepts
- Not integrated within 'Geography'
- Core Publications - *Learning to Think Spatially, Body of Knowledge*
- Many school projects, case studies, educational team
- Public-private bodies involved, in and beyond education

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What is the European perspective?

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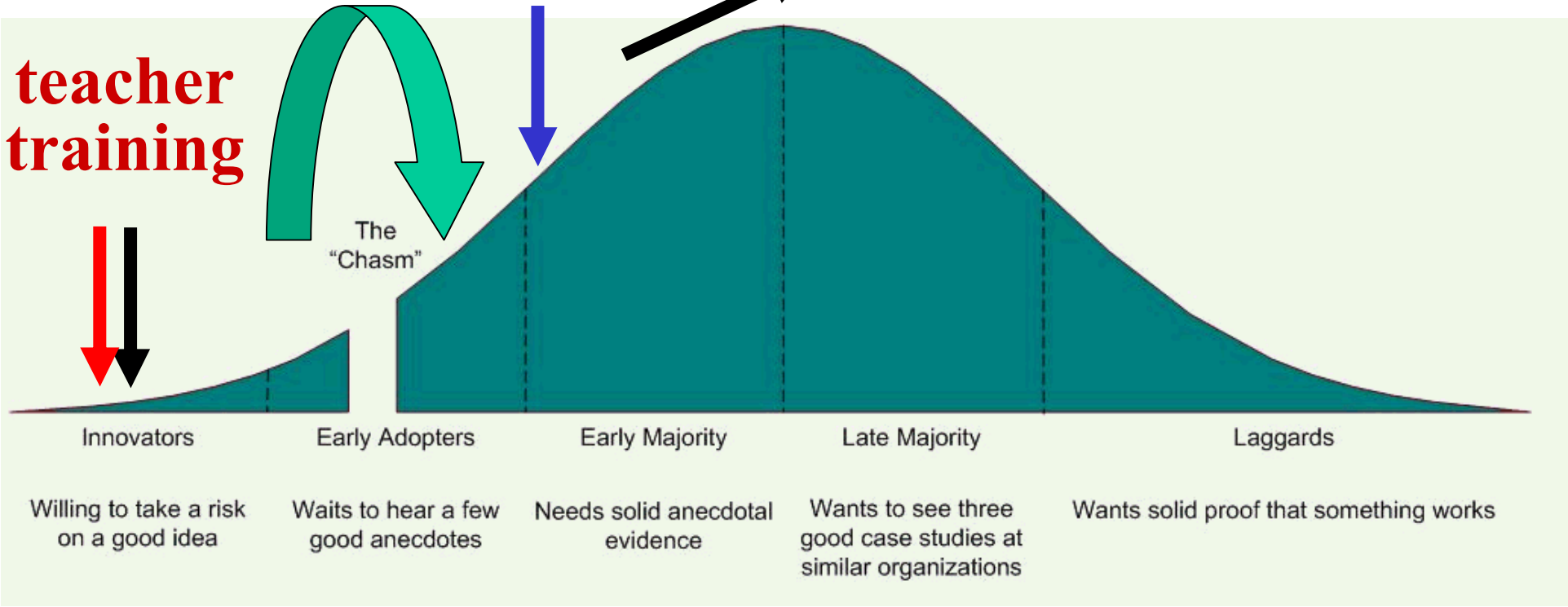
Educational Geoinformation in Europe – on the brink?

jumping the chasm

driving to maturity

teacher training



schools **universities**

after Hagerstrand (1933) and Rogers (1965)

GIS in Europe

- in Europe, the first extensive, in-depth study was undertaken in 1993
- they proposed a **subject-centred approach** to GIS course curriculum (Kemp and Frank, 1996)
- **need an in-depth analysis of what we should teach, when and how** to meet the needs of society (de Bakker, Goldsborough and Meyles, 2002)
- can then design an appropriate curriculum to fit the varied needs (Thurston, 2001)

Barriers to using GIS

(Donert, 2007)

Higher Education

- cost of **software**: start-up packages
- cost of **hardware**: Network-based solutions and site licences
- cost of **maintenance**: Network support and IT help and maintenance contracts are costly
- **few academics educated** in the use of GIS. Most departments have just one or two members
- **absence of** European, national and regional **training and support systems** for professional development of university teachers

Survey of 67 HERODOT members from 27 countries in 2005.

Barriers to using GIS

(Donert, 2007)

Barriers for teacher training

- time for students to learn
- time to develop in courses
- not in curriculum
- not relevant
- costs (as before)
- few teacher trainers able to use GIS
- absence of training and support for teacher training

Survey of 67 HERODOT members from 27 countries in 2005.

Barriers to using GIS
(Donert, 2007)

Barriers for schools

- awareness and understanding
- time for teachers to learn
- time to develop relevant courses
- not in curriculum
- not perceived as relevant
- few teacher role models able to use GIS
- absence of training and support

Survey of 67 HERODOT members from 27 countries in 2005.

Where is GI in Europe?

Higher Education

- few universities offer undergraduate degree programmes based on GIS, GIScience or geo-spatial technologies
- GIS in course(s) in Geography, Earth Sciences, Environmental Science, Forestry, Natural Resources, Planning or Land Management with a specialisation in GIS, Geodesy, Cartography or related topics

Where is GI in Europe?

Higher Education

- growth in university GIS modules
- perceived as specialities or highly ‘technical’
- rarely used as a teaching technology
- rarely used in teacher training (of new teachers or in professional development of existing teachers)

Where is GIS in Europe?

Schools

- GIS very slow to diffuse (Green, 2000)

largely due to

- an absence of institutional support
- little or no training
- few professional incentives
- not in curriculum

Where is GI in Europe?

Schools

- much evidence that this situation is changing
- Norway, Denmark, UK, Finland – compulsory curriculum
- Ireland, Netherlands, France, Spain – hidden but there
- Italy, Portugal – enquiries at Ministry level
- other countries – interested enthusiasts

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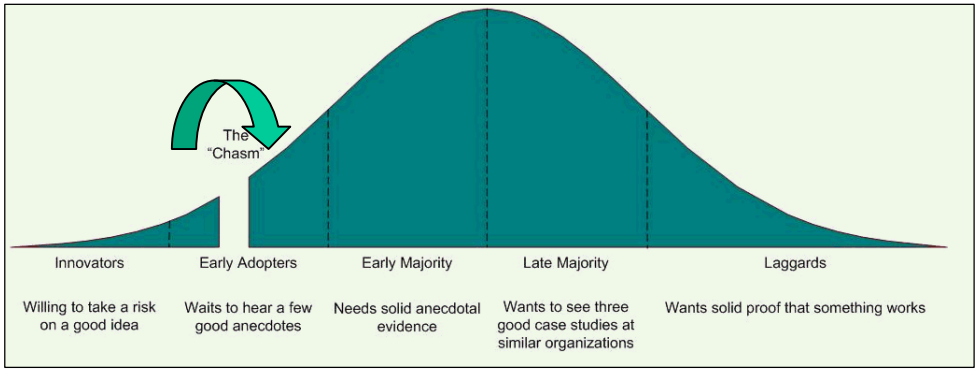
GI Futures

GI Futures

The Importance of Visionaries

- **Large-scale GI adoption = clear vision**
- **Visionaries have critical role in innovation diffusion**
- **Establish <u>active adoption</u> characteristics**



Visions and Visionaries

- **Few visions and visionaries**
- **Even fewer GI educational visions**
- **Visionary research published outside education**
- In business Chan and Williamson (2000) identify five patterns
  - Dormant
  - Opportunistic
  - Systematic
  - Infrastructure
  - Business
- **Education?**

CHAN TO & WILLIAMSON IP (1996),. A model of the decision process for GIS adoption and diffusion in a government environment, Proc. URISA'96,. Salt Lake City, Utah, 244-260, http://www.geom.unimelb.edu.au/research/publications/IPW/ipw_paper30.html

GI Visions and Visionaries

- **1990** – NCGIA Core Curriculum – **automated Geography** - powerful digital environment (Goodchild and Kemp)
- **1998** – by 2010 **GI** will be **everywhere** – interoperability (Heywood, Kemp and Reeve)
- **1998+ - participative GIS** - an engaged and informed **GI-society** (Helling, McCann)

GOODCHILD MF & KEMP KK (1990), NCGIA Core Curriculum in GIS, National Center for Geographic Information and Analysis, National Center for Geographic Information and Analysis, University of California Santa Barbara
HEYWOOD DI, KEMP KK & REEVE DE (1998), Interoperable Education for Interoperable GIS, in Interoperating Geographic Information Systems, MF Goodchild and M Egenhofer (eds), Norwell, MA: Kluwer
HELLING A. (1998), Collaborative visioning: proceed with caution! Journal of the American Planning Association 64(3): 335-349
MCCANN E (2001), Collaborative visioning or urban planning as therapy? The politics of public-private policy making, The Professional Geographer 53(2), 207-217

GI Visions and Visionaries

- **1999** - GIS of the future will require "good people who know about geography, who know about more than just the mechanics of a computer, who know about GIS applications and how to create them and how to support their users." (Jack Dangermond, ESRI CEO)
- **2000** – Marble asks where these people will to come from if students are not taught about how complex spatial processes impact on society in general and on their own lives in particular (Duane Marble)
- **2006** - creation of a **Geo.Web** (ESRI)

MARBLE DF (2000), Some Thoughts on the Future of GIS Education, ESRI News, http://www.esri.com/news/arcnews/winter9900articles/gis2000/08-marble.html
ESRI (2006), The GeoWeb-A Vision for Supporting Collaboration, http://www.esri.com/news/arcuser/0206/geoweb.html

GI Visions and Visionaries

- **What about education visions? What about Europe?**
- **Educational reality remains far from bright**
- **Decision-makers don't know what to do or how to cope.**
  - education sector in Europe is still largely sceptical
  - Education remains an isolated, distant, long-lost GI relative
  - GI education remains very immature in its profile.
- **2005 - Gajos** envisages the **GI-citizen** as the way forward
- "the future is usually planned as time where changes are to make things better."
- Gajos envisaged that the terms geomarketing, GIS in health care, and GIS fun will be known to everyone.

GAJOS M (2005), Freedom of access to information, Proc. GIS Visions2025
http://gis.vsb.cz/gisvisions/2025/papers/gajos.pdf

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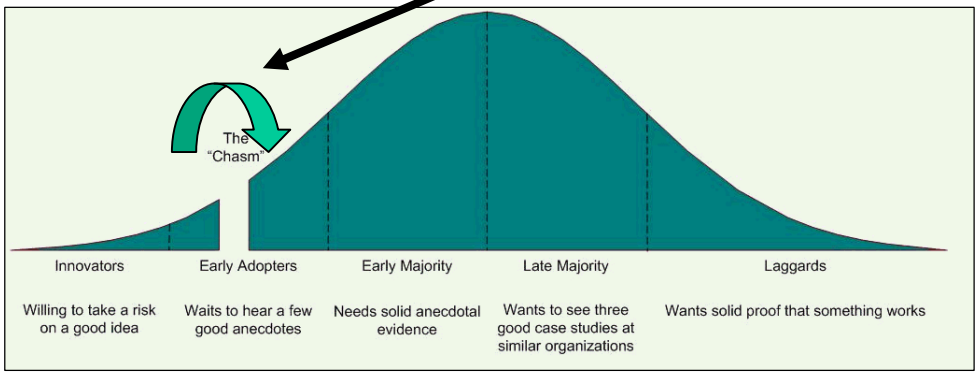
So what are your GI visions of the future?

What dreams do you have for the future?

- Are they ……
  - Based on what you are doing today?
  - Participative?
  - Realistic?
  - Technologically determined?
  - Futuristic?
  - Weird? Strange?

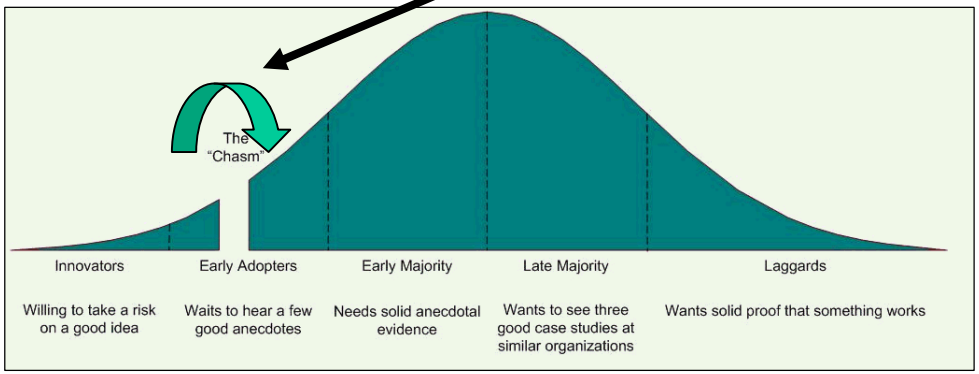
How can we bridge the 'gap'?



Another Dream?

- ***GI for all*** –an accepted **GI Educational Charter** – a minimum expectation
  - all 11 years olds will …..
  - all 14 years olds will …..
  - all 18 years olds will …..

How can we bridge the 'gap'?



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What should we do?

Blueprint for the future

- **Need to know what we want** – an education vision
- **How we can get it** –a blueprint for change
- Promotion
  - Top down – ministries, Europe
  - Bottom up – users, schools, teacher training etc.
- Identify catalysts for change – international, national and regional impact for change

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What should we do?

Blueprint for the future

1. Establish concept of geoinformation in education
2. Research on GI in education
3. Publications for GI in education
4. Guidance: applying GI in education - careers
5. Lobby to get GI into curriculum and raise profile
6. Conferences around Europe – major, smaller events
7. High profile meetings – 1 – 2 – 1 with key stakeholders, ministries, decision makers
8. Workshops and seminars on issues
9. Link to every GI and education event in Europe (Geography, Planning, Cartography, Ecology etc.)

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What should we do?

Blueprint for the future

- Awareness raising
- Build our community
- Learning from what you innovators have already done national and local projects and initiatives
- Disseminating activities and actions
- Establish Centres of Excellence – universities, schools – organisations awards
- Register of experts – gold standard (award)
- Link with existing initiatives - GIS Day, Earth Day, International Polar Year etc.

Conclusions: European GI in Education

Not really doing very well - 3/10, *could do better*

- Higher education struggling with changes brought about by the Bologna process
- Teacher education enslaved by:
  - national priorities
  - subject curriculum and territories
  - lack of understanding of relevance
- Schools and teachers mainly still ignoring educational opportunities afforded by GI

Conclusions

Need a community – now

- Like minded people – **similar interests**
- Widely dispersed initiatives - **sharing infrastructure** (Kemp, 1998)
- **networks** essential for the **adoption of innovation** and promotion of change (Murgio *et al*., 2002)
- **networking** critical to **improve quality** (EC, 2003)

Kemp, K.K. (1998), What's missing? What do we need?. http://www.ncgia.ucsb.edu/ige98/report/missing.html
Murgio LA *et al.* (2002), Satellite Technology as part of high school syllabus – an innovative educational proposal. – In: ISPRS Commission Brazil, http://www.isprs.org/commission6/proceedings02/papers/036.pdf
EC (2003), The Bologna Process – Next Stop. Berlin 2003, : http://europa.eu.int/comm/education/bologna_en.html)