Geo-ICT and the role of location in Science, part 5: Economics

'Spatial economists use Geo-ICT intensely'

The use of Geo-ICT in economics has in recent decades experienced a gradual but steady increase. "That is to say, in specific strands of our discipline", says Piet Rietveld, Professor in Transport Economics at the Vrije Universiteit (VU), Amsterdam. Peter Nijkamp, Professor in Regional Economics at the same university and director of the Dutch Science Foundation (NWO) illustrates this with some statistics: "Out of all the journal articles and conference papers in Regional Economics and Economic Geography that were published in 2006, probably around 50% could have been written fifteen years ago. However, the other 50% would not have been possible without a large quantity of spatial information and the use of GIS-tools to integrate, analyse and visualise these data.

In his closing statement at the first GIS Summer Institute (Amsterdam, 1988), Peter Nijkamp predicted that in 10 years time no one would speak of "GIS" any longer. By that time, he argued then, GIS would have lost its status as a novelty and become, like so many other IT-products, a mere 'commodity'. Nevertheless, two years later Nijkamp and Rietveld established a first Senior Lectureship in GIS, a position that is still held by Henk Scholten.

After a promising start, a period in which regional economists published their first articles and books on GIS, the VU invested substantially in the man-power needed to further establish GIS-research and teaching in the department. Initially these research initiatives were mostly explorative in nature, driven by a curiosity for the new tool. More recently, however, Geo-ICT has been used by economists at the VU to develop new models for an issue that has fascinated scholars for centuries: the dynamics behind the use of space.

As part of this project, five PhD studies have been carried out so far, two of which have already been completed. It has also given light to dozens of international publications and workshops, the latter often in close collaboration with the Netherlands Environmental Assessment Agency (MNP, previously RIVM: National Institute for Public Health and the Environment). The software programmes that have been developed on the way are now internationally available and used for research purposes as well as policy making. This suggests that special economists have surpassed the 'exploration'- and 'explanation'-stages of our theoretical framework (see: 'In search of an explanatory model - 2') and have reached the 'decision making supportive'-stage.

Geo-ICT in education

Important steps towards a more integrated use of Geo-ICT have also been taken in the department's teaching activities. 10 years ago students in economics at the VU would only encounter GIS if they chose the specialisation track 'regional economics' and within that track for the module 'spatial informatics and distribution economics'. Students that did so were not only familiarised with some key spatial concepts, but also received some practical training in working with ArcView3. Currently, regional economics offers in the first two years of the general economics *bachelor* degree, which means that students are much earlier familiarised with spatial issues and with Geo-ICT. The effects of this shift can already be traced. Most PhD students in the regional economics department know how to work with GIS at the start of their projects, which means it is no longer a question *if* they are going to use the software, but rather *for what purposes*. While in 1996 only five PhD-

students were using the systems, this number has since increased to about 20. And this is likely to have a domino-effect: the current students will not only continue to use GIS after graduating, but also pass on their experience and expertise in teaching their own students.

Nijkamp and Rietveld believe that the developments at the VU are representative for those in other universities, both in the Netherlands and elsewhere. “The use of GIS, particularly within regional economics, is simply no longer an issue. It no longer features in paper titles, it has become generally accepted,” says Rietveld. “If we had to place the use of Geo-ICT in our discipline in one of the marketing theories on product-life cycles (see ‘In search of an explanatory model - 2’), it would probably be in the stage of maturity or even decline. It will be interesting to see which technology innovation can stimulate a move into the next s-curve.”

To what extent has the introduction of Geo-ICT led to scientific breakthroughs. Nijkamp argues that such ‘breakthroughs’ are very difficult to pin-point: “Economics is a discipline that relies on constant refinement of knowledge that is already roughly known. That is also why you hardly ever find any publications by economists in magazines like *Science* or *Nature*. Advancements in our knowledge go very gradually. In the long run the results are significant however. Spatial economists are now able to predict and explain the value of a plot of land or housing prices. 10 years ago, without GIS and geo-data, that would have been impossible.”

Explanatory research

In this sense Geo-ICT is contributing to a more general trend within the discipline. Rietveld: “We are seeing a gradual shift from explorative to explanatory studies. GIS is a valuable tool, both for data integration and for analysis. The latter is particularly the case in studies in which an object’s characteristics (internal variables) are systematically related to aspects in their natural and social environment (external variables). It is now possible to produce reliable predictions for housing prices in relation to the proximity of nature, water or other environmental factors.”

“And GIS remains a powerful visualisation tool. Whereas previously spatial patterns had to be drawn from tables and statistical analysis (SPSS), they can now be read more easily from a digital map. In this way Geo-ICT has contributed to making scientific findings more applicable to, for example, policy making: the explanatory variables can be presented visually and matched with certain policy options or measures. For example, the construction of infrastructure (a policy measure) improves the accessibility of a site (policy indicator), which in turn affects the value of a plot of land.”

Other strand of economics such as development economics and marketing only use Geo-ICT scarcely, but could benefit equally from such analyses and visualisations. Whether it is about finding a suitable location for a new franchise of a major supermarket chain or about explaining, or about universities desiring to increase their student numbers: almost all economic questions involve spatial aspects. A recent poll among first-year students at the VU indicates that, for many, ‘accessibility’ had been a major reason for choosing this University. Economists can prove this phenomenon by relating the recent increase in student numbers to improvements in the train connections with Utrecht and tram connections with Amsterdam. The VU uses these findings to emphasise its campus’ easy accessibility in marketing brochures (see *de Volkskrant*, 26 August 2006).

Fear of technology innovation

If the use of Geo-ICT indeed has so much to offer to Economists, how can we explain that its use has so far been limited, and restricted to a number of sub-disciplines? Besides a lack of awareness and training, and perhaps a certain hesitance towards using new technology, it seems to be largely a matter lacking insufficient data. Previous articles in this series (on archaeology, history, marine biology and meteorology) indicated that the use of Geo-ICT *offers* great opportunities for data integration, visualisation and spatial analyses, but also *requires* a large quantity of high-quality, geo-referenced data. Piet Rietveld argues that data-acquisition and -standardisation are indeed areas that can be much improved: "Economists are traditionally lazy when it comes to collecting data: they tend to use the updates of existing databases – such as the 'census register' – and adjust their models accordingly."

On the other hand, the opportunities that Geo-ICT offers towards the integration of spatial data could work as a stimulus. "More and more regional economists *are* working empirically and have started to collect their own data, for example on environmental characteristics. This could stimulate their colleagues in other strands of the discipline to follow their example."

To what extent could Economists, from their expertise on model-development and -analysis contribute to the further methodological development of GIS? Just like computer science and mathematics, GIS is a relatively theory-shallow discipline. Peter Nijkamp and Piet Rietveld do not expect to see much contribution from economists in this respect: "Most economists use GIS simply as a tool, not as a science, and have no ambitions even to develop it further as a technology, other than is necessary for their own research purposes."

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