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## **Mainstreaming geographic information into information systems training programs**

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**Paper 4B.2**

# Mainstreaming geographic information into information systems training programs

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## Abstract

Geographic information management is often part of a more generic Information System (IS) supporting decision-making on a given theme: natural resources management, geomarketing, risk or impact assessment. However, its share of the global IS market remains marginal. In order to increase the use of geographic information, this paper proposes to give future managers of IT projects the geographic information “reflex”. This goal can be achieved by teaching the benefits and limits of going geo-referenced within some post-graduate curriculums dedicated to IS management. The proposed three components for such training are: (i) technology, (ii) management, and (iii) applications (to given industries). Giving a strong international background to these programs is also necessary. The long term achievements of such an approach are likely to benefit both National Mapping Organizations (NMO), whose production could thus be used in many additional contexts, and industries (public or private) that would more easily integrate the spatial dimension in their analysis and decision making processes.

## A fading frontier between GIS and IS – also in training activities?

Several authors share the idea that giving spatial information a particular status in the information society may have contributed to its marginalization. In an interview given in June 1999, J Pellici, Vice President of Oracle Corporation, claimed that “spatial is not special”. In 1991, Maguire et al. stated that “GIS technology may well have disappeared as a “free standing” activity in many organizations as its functionality becomes encompassed by business-oriented systems, such as those for market analysis, and it becomes part of wider management information systems”. Despite this increasingly shared impression, teaching geographical sciences remains largely a separate field in most of the world universities, lagging behind corporate practices that have more systematically integrated geographical sciences into their information technology framework.

This trend is probably economically-driven, and should be reflected in higher education. In France, for instance, the GIS market (including sales of software and services) represented approximately 41 million € in 1998. During that same period, the ERP<sup>1</sup> related services market reached more than 900 million € ([www.idc.fr](http://www.idc.fr)). More recent figures could not be found (for free). But 1999 projections for 2003 forecasted a 2 billion € yearly market for ERP against 60 million € for GIS activities. At some point, this economic reality should be transposed in training programs. This paper proposes one way to reach this goal.

The main objective is *in fine* to mainstream the use of geographic information in information systems, hence widening its fields of applications and contributing to the sustainability of geo-referenced information production. It is indeed expected that sensitizing IT specialists to geoinformation management and thus have them use it whenever possible will develop the

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<sup>1</sup> ERP stands for Enterprise Resource Planning and is only one application among others of Information Systems

application of geographic sciences (see box 1).

**Box 1: Press release: “New Market Structure and New Opportunities Emerge for Spatial Information Management, According to IDC”**

FRAMINGHAM, Mass., December 10, 2002 – The spatial information management (SIM) software industry is being reshaped by broad spatially enabled database management and data access capabilities that are emerging across the IT industry, according to IDC. This new market structure will present spatial information management vendors with significant opportunities to add value to information systems and to exploit new markets.

“Vendors will need to identify new opportunities for unique location-enabled solutions that will arise within existing enterprise information systems,” said Henry Morris, vice president of Applications and Information Access software research at IDC. “Open data access and spatially enabled database management also open rich opportunities for SIM vendors. Those vendors who do not take advantage of these opportunities will find themselves competing for an increasingly smaller revenue pool.”

Location-based services (LBS) and spatial information management-oriented Web services will eventually influence the spatial information management market. Before Web services can deliver benefits such as decreasing costs and speeding the process of integrating spatial technology into business applications, the IT industry will have to develop and implement a much more mature Web Services architecture.

The idea behind this paper is definitely not that in-depth technical training of geographic sciences (like GIS, geodesy, photogrammetry, remote sensing...) is obsolete, on the contrary. Since, to some authors, up to 85% of information can be georeferenced (Moloney et al. 1993), and at a time when terms such as “system cartography” or “IS urbanism” are appearing, the context could be favorable to catch such an opportunity.

**An example of training program: ENSG’s master of science in “Information Systems Management and Geographic Applications”**

In the context depicted above, the French National School of Geographical Sciences (ENSG) initiated a limited international “needs analysis” for GIS specialists. The study aimed at defining the needed competence profile for geographical information managers. It encompassed an analysis of the major existing Master programs, as well as interviews with companies around the world (large and small: Ernst & Young, DHL, Gaz de France, EADS, b-sharp, eQuesto...) and public administrations (international and French: the World Bank, the European Commission, several Ministries). The group in charge of the feasibility study proposed a competence profile that, in addition to existing training programs, would help address the issues raised. The ENSG then decided to create a Master of Science in “information systems management and geographic applications” within the ParisTech network.

The three main axes of the training program (technology, management, and applications – see box 2 for details) have been chosen to cover the major problems an IS program manager is confronted with. They have been developed by the “*Club des Maîtres d’Ouvrage des Systèmes d’Information*” (see [www.clubmoa.asso.fr](http://www.clubmoa.asso.fr)), a French professional association dedicated to supporting clients of large IS solutions.

**Box 2: One example of competence profile**

The chosen competence profile is constructed around 3 main axes (technical, management, professional applications). Language courses and training periods come in addition.

**Technology**

- Networks, telecommunication, computer programming (object oriented languages), internet related technologies
- Information Systems modeling, architecture, urbanism (mapping), security and administration, quality
- Geomatics (GIS and decision making, positioning technologies, remote sensing, spatial imagery, spatial analysis)

**Management**

- General management and leadership: change management, negotiation and communication, legal issues, accounting...
- IS project management: project management, quality of IT operations...

**Applications**

- Supply chain, ERP

Conferences covering various fields of application: transport, land planning, agriculture, environment, risks, telecommunication, networks (water, electricity, gas...), mining, demography, health, geomarketing...

The study, as expected, also pointed out the needs for a strong international component in the training program. Speaking two or more languages is not sufficient anymore and students do have to become familiar with ways to work (technically, organizationally, humanly...) in different countries.

The format chosen to develop this kind of profile is the Masters degree. These post-graduate training courses are largely recognized worldwide and are adapted to both students and professionals willing to impulse or reorient their professional career.

**Conclusions**

Today, mobile phones integrate GPS technologies for real-time positioning, alarm systems, or friends' localization. Cell phones are used as camera, PDA<sup>2</sup>, or internet browser. The famous vision of "one PC in each house" initiated by Microsoft is almost achieved in developed countries, and is being replaced by the "one PC in each pocket" concept.

The impact of new technologies on our life style will not slow down. Geographic information will all the easier take the place it deserves on the market than IS specialists will be trained to its processing. The question whether the best way to go is to adapt GIS-centered courses or IT training programs remains open.

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<sup>2</sup> Personal Digital Assistant

**Box 3: 5 reasons for NMOs to promote training of IS specialists**

- 1 It increases the use of geographical information by fostering its use in corporate and administrative Information Systems
- 2 It helps understanding their clients' needs
- 3 It represents a good way to develop partnerships in the IT world
- 4 Other than GIS sector-specific systems are today presented as IS components: ERP, Knowledge Management Systems, Human Resources Management, Customer Relationship Management (CRM), Supply chain...
- 5 It is cheap: training programs can rather quickly become self sufficient

This process may involve the understanding of “geographic information” as “anything including a spatial component” (as a complement to “metric precision data”). Yet it is now a good time to give future information systems managers the geoinformation “reflex”. This objective will not be achieved in the short term and will need a longer-term vision. The adaptation time would be used to build the needed new collaboration patterns between NMOs and users of geographic information, private or public.

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