

SIG/GIS: Systèmes d'Information Géographiques

Geographical Information Systems



Introduction

Specification

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- **Intitulé du Master** : Fondements et Ingénierie de l'Information et de l'Image (F3I)
- **Semestre** : 3
- **Intitulé de l'UE** : UEF1-F3ix31
- **Intitulé de la matière** : Systèmes d'information géographiques *Code SIG*
- **Crédits** : 4
- **Coefficients** : 2
- [SIG Specification Intitulé du Master.docx](#)

Volume Horaire

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- **Mardi**
 - Cours : 11 - 12.30 Lab 4
 - TP : 12.30 – 14 Lab 3

Introduction

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GIS

Geographic Information Systems

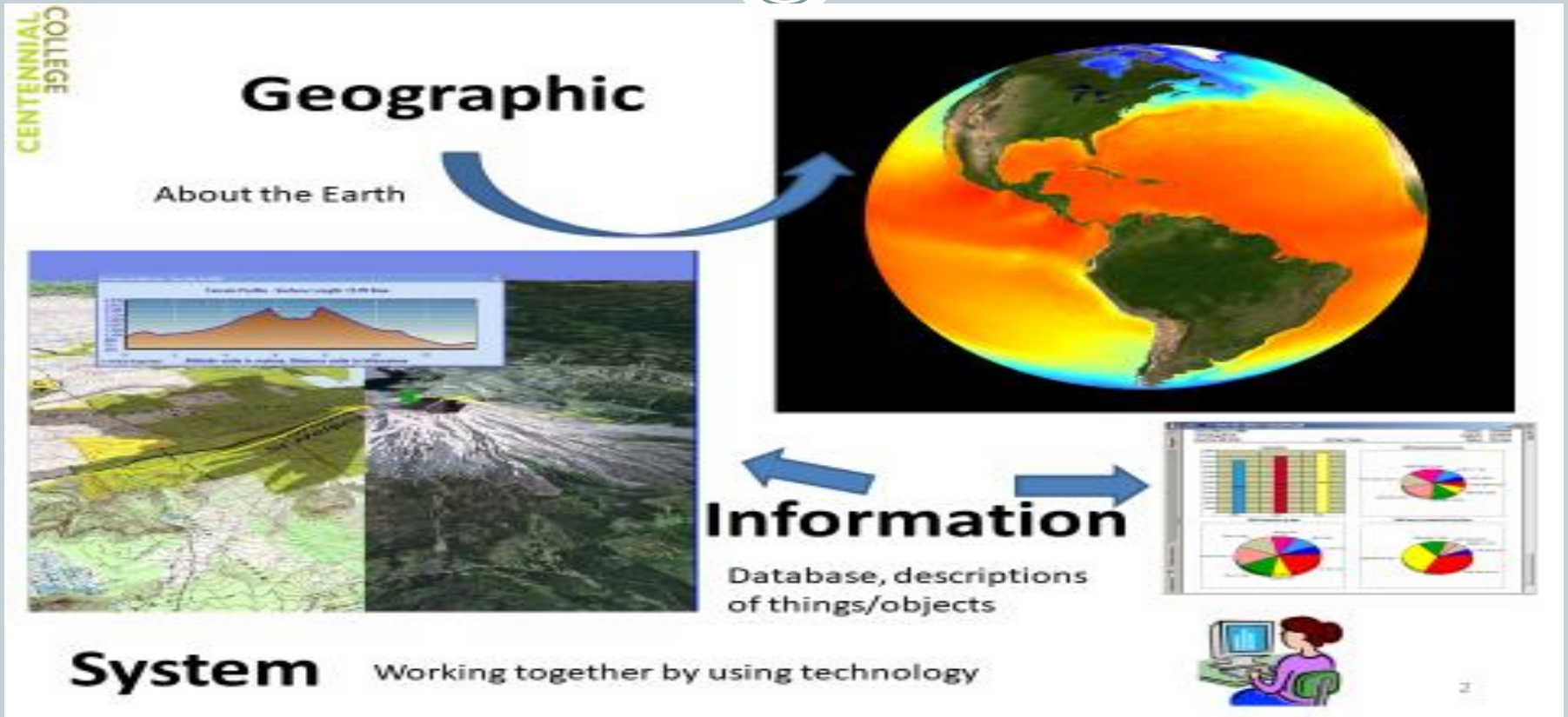
Introduction

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- Pourquoi GIS?
 - L'emplacement géographique est un attribut important des activités, des strategies, des planifications....
 - ✦ Tout événement qui survient, survient quelque part
 - ✦ Savoir ou un événement est survenu peut être une information importante et critique
 - GIS : Systèmes d'informations Géographiques :
 - ✦ Systèmes d'information spéciaux qui contiennent non seulement des informations sur des événements mais aussi des informations concernant les endroits où ces événements sont survenus.

GIS introduction

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From <http://geoworldteach.yolasite.com/lectures.php>

Introduction

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- **Problèmes géographiques (Definition)**
 - Nécessitent un aspect d'emplacement comme information utile soit pour résoudre le problem ou dans la solution elle même
- **Classes des Problèmes géographiques**
 - Echelle: niveaux des details(locale/globale)
 - But : pratiques/theoriques
 - Echelle de temps: court-terme opérationnelle/moyen-term/long-terme stratégique

Historique de GIS

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- **The Canada Geographic Information System CGIS**
 - 1960 (computerized map-measuring system)
- **DIME program**
 - 1960
 - Dual Independent Map Encoding
 - Digital records de toutes les rues des USA
- **ODYSSEY GIS Software**
 - 1970
 - Harvard University
- **Des besoins communs sont reconnus dans des domaines d'applications différents**

Historique de GIS

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- **ECU Experimental Cartography Unit**
 - 1973. UK
 - Première carte digitale du monde
 - Education
- **1995**
 - Carte complete de l'Angletere
 - Sous forme de base de données
- **GPS, Global Positioning System**
 - Apparition des satellites
 - Traitement des images par ordinateur
 - Reconnaissance des formes
 - Besoins militaires (guerre froide)

GIS Anatomy

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- **People**

people must develop the procedures and define the task the GIS will perform

- **Data**

Availability and accuracy of data affects the results of queries and analysis

- **Hardware**

Hardware capabilities affect processing speed, ease of use and type of available output.

GIS Anatomy

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- **Software**

Include GIS software, database, drawing, images and other software programs

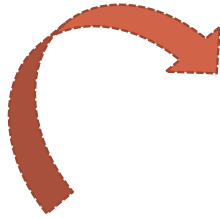
- **Procedures**

GIS analysis requires well-defined and consistent method to produce correct results

- **Network**

The five precedent components communicate and collaborate *via* networks

Start Next project



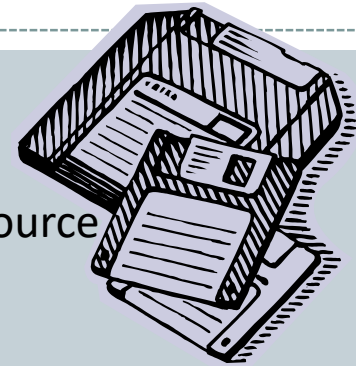
Real World



Data Collection



Take Action



Data Source

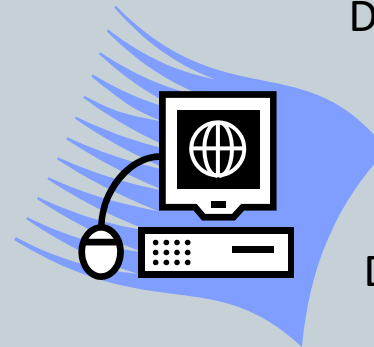


Information For
Decision making

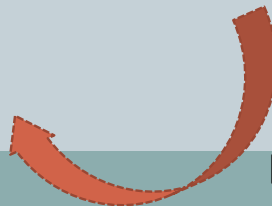


Analysis

Data Input



Data Management



Data Retrieval and Analysis

GIS: Definition

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- The ***common ground*** between information processing and the many fields using spatial analysis techniques. (Tomlinson, 1972)
- A powerful ***set of tools*** for collecting, storing, retrieving, transforming, and displaying spatial data from the real world. (Burroughs, 1986)

GIS: Definition

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- A computerized *database management system* for the capture, storage, retrieval, analysis and display of spatial (locationally defined) data. (NCGIA, 1987)
- A *decision support system* involving the *integration* of spatially referenced data in a problem solving environment. (Cowen, 1988)

GIS: Definition

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- *GIS are useful tools helping everyone from scientists to citizens to solve geographic problems . (Longley 2011)*

A gallery of applications

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- GIS is used to improve many of our day-to-day working and living arrangements
- To answer the question
 - **Where?**

Why GIS?

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- Wider availability of GIS through the Internet, as well as through organization-wide local area networks (LANs).
- Reductions in the price of GIS hardware and software, because economies of scale are realized by a fast-growing market.
- Greater awareness that decision making has a geographic dimension.
- Greater ease of user interaction, using standard windowing environments.

Why GIS?

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- Better technology to support applications, specifically in terms of visualization, data management and analysis, and linkage to other software.
- The proliferation of geographically referenced digital data, such as those generated using Global Positioning System (GPS) technology or supplied by value-added resellers (VARs) of data.

Why GIS?

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- Availability of packaged applications, which are available commercially off-the-shelf or ready to run ‘out of the box’.
- The accumulated experience of applications that *work*.

GIS application areas

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- GIS is fundamentally about solving real-world problems.
- **The five Ms of GIS application are**
 - mapping,
 - measurement,
 - monitoring,
 - modeling,
 - and management.

GIS application areas

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- Government and Public Service
- Business and Service Planning
- Logistics and Transportations
- Environment

Government and Public Service

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- First to discover the value of GIS (CGIS)
- Used to support in decision making
- As GIS becomes cheaper, it is used in all levels
 - Inventory resources and infrastructures
 - Plan transportation routing
 - Improve public service delivery
 - Manage land development
 - Generate revenue by increasing economic activities
 -**search for other applications**
 - **Case Study 1: Tax Assessment**

Business and Service Planning

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- *Geodemographics* is a shorthand term for composite indicators of consumer behavior that are available at the small-area level
- Cluster analysis is used to identify similarities in patterning of population characteristics
 - Summarize population characteristics attributes (subgroups)

Business and Service Planning

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- *market area analysis*
 - activity of assessing the distribution of retail outlets relative to the greatest concentrations of potential customers.
- The approach is increasingly being adapted to improving public service planning, in areas such as health, education, and law enforcement
- **Case Study 2: Hierarchical Diffusion and Convenience Shopping**

Logistics and Transportations

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- The field of logistics addresses the shipping and transportation of goods
- Static and dynamic parts
 - Fixed infrastructures
 - Vehicles, goods and people
- Can track the goods as they move
- GPS, emergency incidents
- Optimization methods
- **Case Study 3: Planning for emergency evacuation**

Environment

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- Purpose of the first GIS
- Use of land
 - How much land is being lost to agriculture through urban development
 - ✦ Impact???
 - Loss of tropical forest (Amazon Basin)
- Simulated land-use patterns
 - Dynamic simulation models
 - Prediction
- **Case Study 4: Deforestation on Sibuyan Island, the Philippines**

Home Work 1

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- Study the Case studies(1, 2, 3, 4)
- Make a little report with a brief presentation