









Cours Géovisualisation

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ECOLE D'ÉTÉ DU GDR MAGIS
 7 - 11 Septembre 2009, Aussois

PLAN


- I – Retour sur la cartographie classique
- II – Récentes évolutions
- III – « *Illuminating the Path* »
- IV – Sémantique visuelle
- V – Retour sur les chorèmes
- VI – Perspectives finales


ECOLE D'ÉTÉ DU GDR MAGIS 7 - 11 Septembre 2009, Aussois


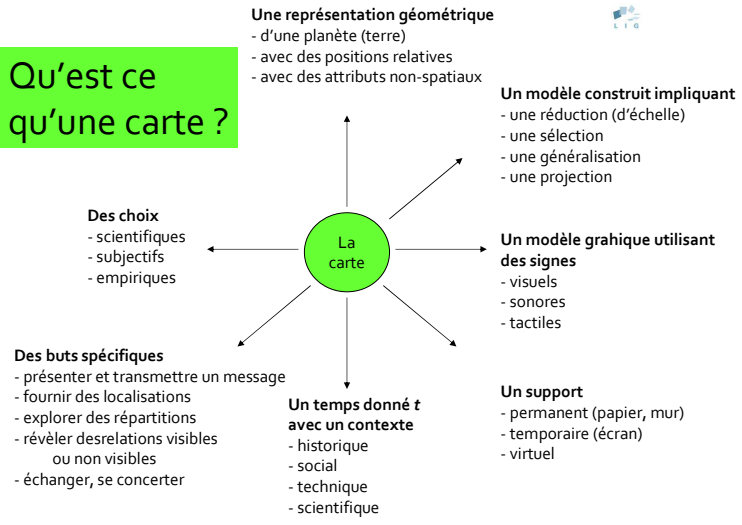
I – Retour sur la Cartographie Classique


- Passage de la Cartographie Assistée par Ordinateur (restitution à l'identique) aux BD
- Grands noms
 - Bertin
 - Itten
 - Monmonnier
 - Ben Shneidermann





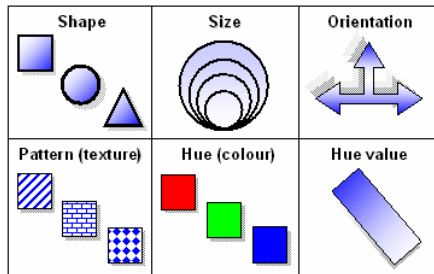
Qu'est ce qu'une carte ?





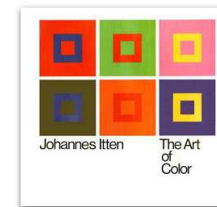
Bertin

Visual Variables



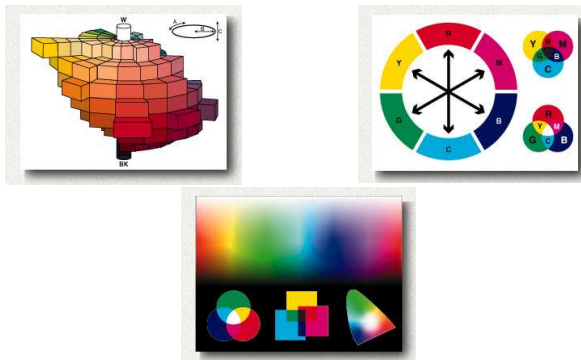
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Théorie de Johannes ITTEN



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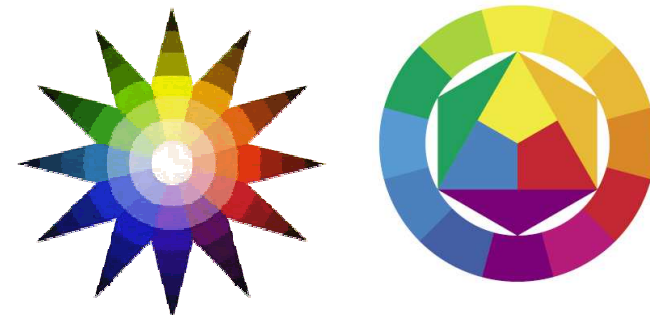
Liens entre les couleurs



http://www2.epson.fr/technologies/colorguide/COL_G/MAINMENU.HTM

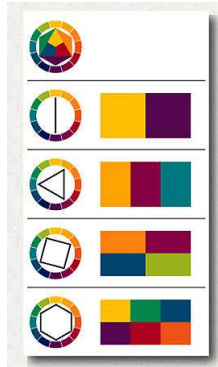
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Etoiles et cercles

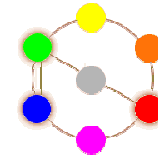


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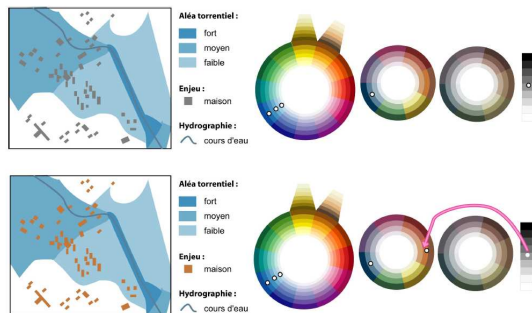
Harmonie des couleurs



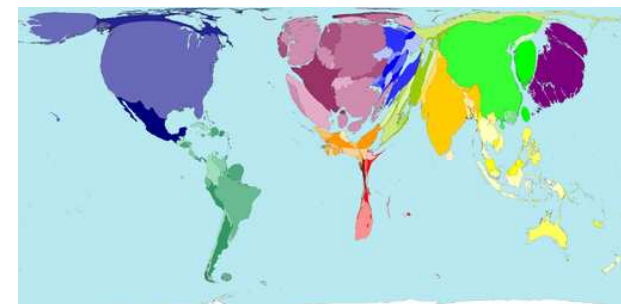
Billets en euro



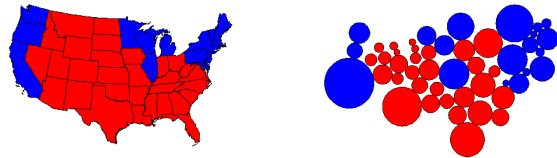
Amélioration de cartes (IGN)



Cartogramme (richesse du monde)

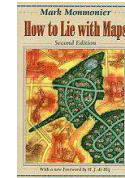
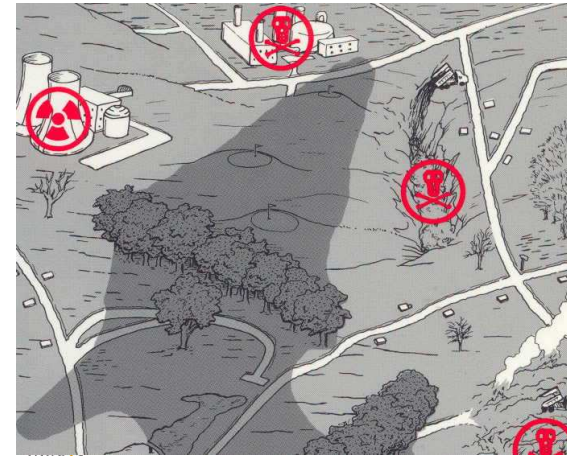


Cartogrammes de Dorling



Elections présidentielles de 2004 aux USA
Cercles proportionnels à la population

Comment mentir avec des cartes

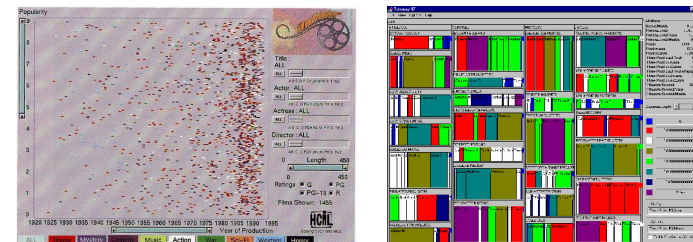


Le mantra de Ben Shneidermann

**« Overview,
Zoom and Filter,
Details on Demand »**

- STARFIELD : pour accéder à une collection unique d'objets
- SPACE-FILLING TREEMAPS : pour accéder à plusieurs collections d'objets (métaphore de la bibliothèque)

Starfield et Treemaps





- Bilan

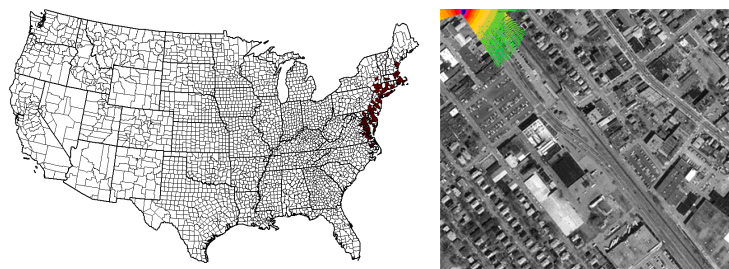
- Représentation du monde
- Vision Globale / Vision Locale

- Trouver le sens caché (ou inconnu)
- Fouille visuelle de données

II – Récentes évolutions

- Cartographie animée
- Hypercartes
- Cartographie interactive
- Cartographie avec annotations
- 3D cartographie

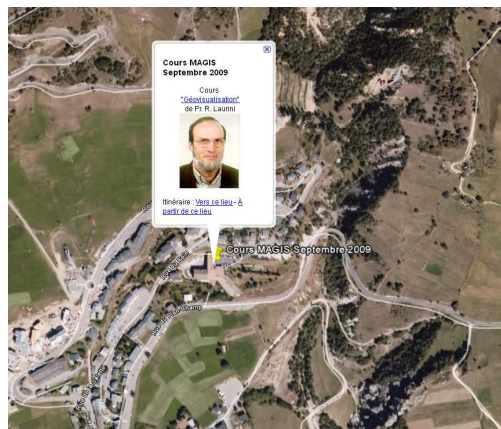
Cartographie animée



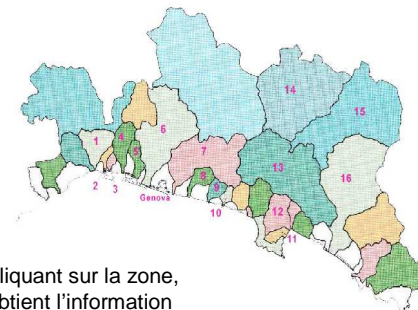
Cartographie interactive



Cartographie avec annotations

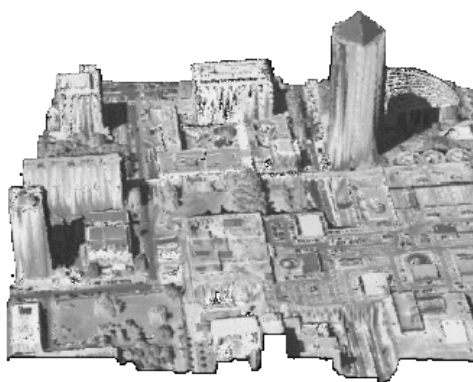


Hypercarte pour les risques à Gènes



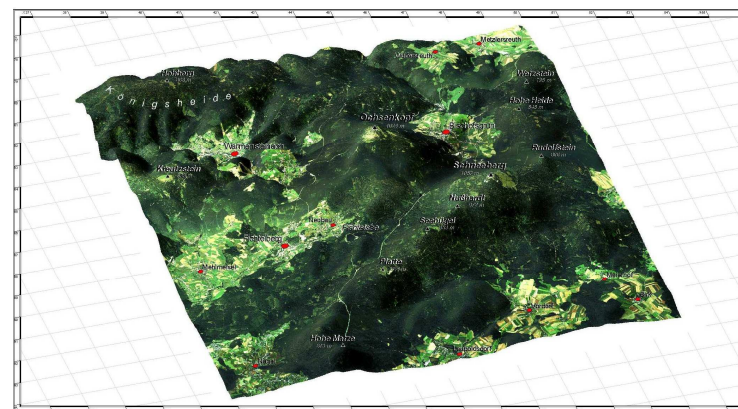
En cliquant sur la zone, on obtient l'information désirée

Cartographie par laser



3D modeling
City of Lyon

Drapage sur MNT



III – “Illuminating the Path R&D Agenda for Visual Analytics”



- Edited by J.J. Thomas and K.A. Cook
- 2005
- National Visualization and Analytics Center (NVAC)
- US Dept of Homeland Security

- <http://nvac.pnl.gov/agenda.stm>

Visual Analytics

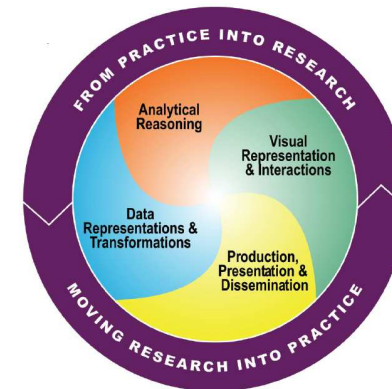


- VA is the science of analytical reasoning by interactive visual interfaces
- Multidisciplinary field
 - Analytical reasoning techniques
 - Visual representation and interaction techniques
 - Data representations and transformations
 - Techniques to support
 - Production
 - Presentation
 - Dissemination

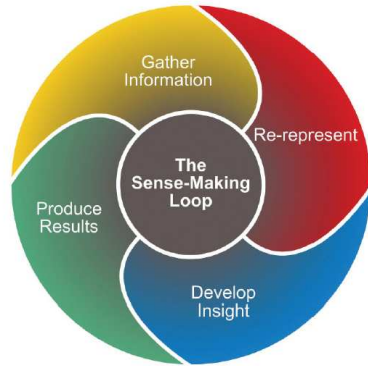


Visual analytics research and development facilitate threat identification, prevention, and response.

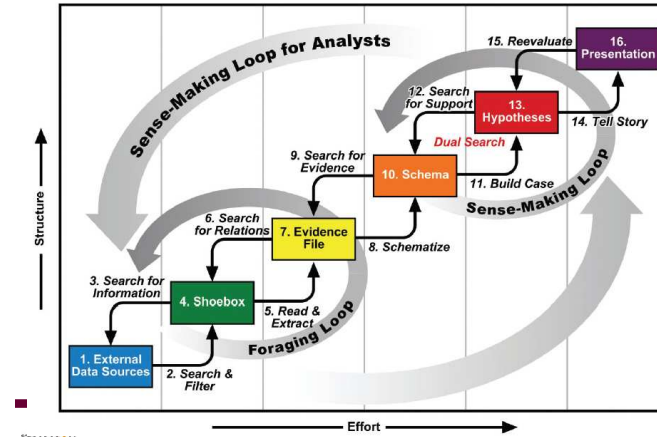
Interrelated research areas



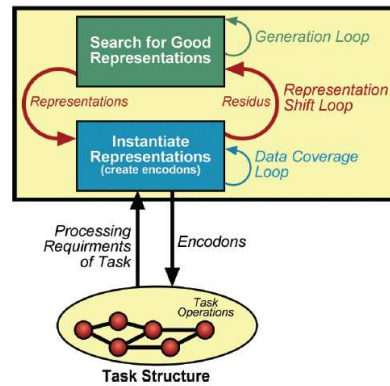
The analytical reasoning process



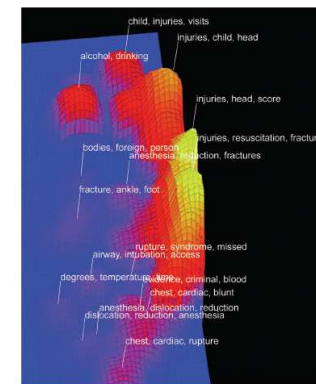
Nominal sense-making loop for some types of intelligence analysts



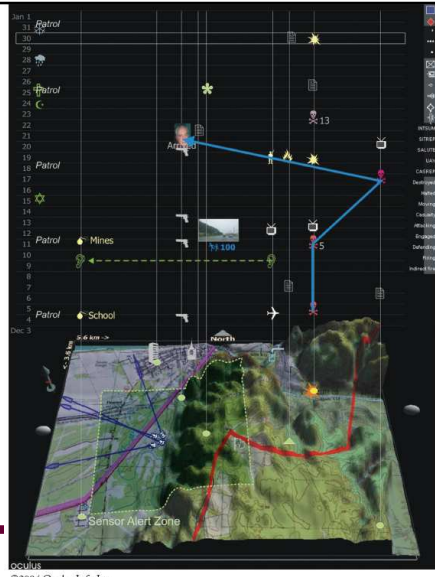
Learning Loop Complex Theory of Sense-making



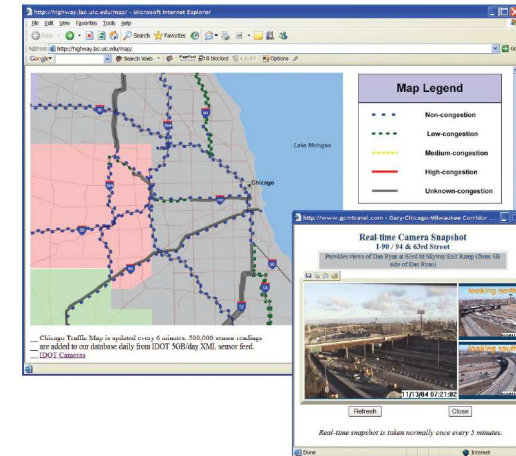
Links between documents



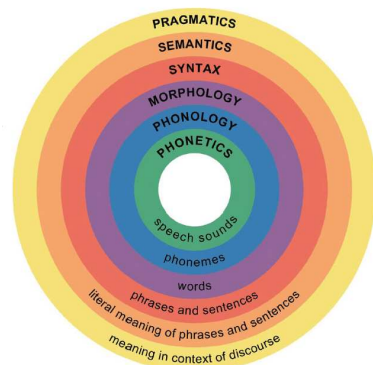
GeoTime provides an integrated view for analysis of a combination of temporal and geospatial data.



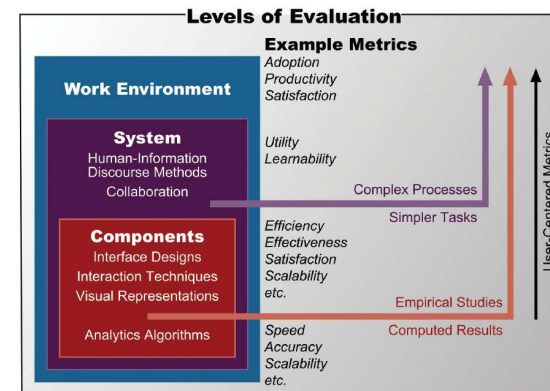
Real-time view of Chicago traffic flows



Major levels of linguistic structure



The three levels of evaluation and example metrics



Recommendations



- Build upon **theoretical foundations** of reasoning, sense-making, cognition, and perception to create visually enabled tools to support collaborative analytic reasoning about complex and dynamic problems.
- Conduct research to address the challenges and seize the opportunities posed by the scale of the analytic problem. The issues of scale are manifested in many ways, including the **complexity and urgency** of the analytical task, the massive volume of diverse and dynamic data involved in the analysis, and challenges of collaborating among groups of people involved in analysis, prevention, and response efforts.

- Create a **science of visual representations** based on cognitive and perceptual principles that can be deployed through engineered, reusable components. Visual representation principles must address all types of data, address scale and information complexity, enable knowledge discovery through information synthesis, and facilitate analytical reasoning.
- Develop a **new suite of visual paradigms** that support the analytical reasoning process.
- Develop a new **science of interactions** that supports the analytical reasoning process. This interaction science must provide a taxonomy of interaction techniques ranging from the low-level interactions to more complex interaction techniques and must address the challenge to scale across different types of display environments and tasks.

- Develop both theory and practice **for transforming data** into new scalable representations that faithfully represent the content of the underlying data.
- **Create methods to synthesize information** of different types and from different sources into a unified data representation so that analysts, first responders, and border personnel may focus on the meaning of the data.
- Develop methods and principles for **representing data quality, reliability,** and certainty measures throughout the data transformation and analysis process.
- Develop methodology and tools that enable the **capture of the analytic assessment, decision recommendations,** and first responder actions into information packages. These packages must be tailored for each intended receiver and situation and permit expansion to show supporting evidence as needed.

- Develop technologies that enable analysts to communicate what they know through the use of **appropriate visual metaphor** and accepted principles of reasoning and graphic representation. Create techniques that enable effective use of limited, mobile forms of technologies to support situation assessment by first responders. Support the need for effective public alerts with the production of a basic handbook for common methods for communicating risks.
- Create **visual analytics data structures,** intermediate representations, and outputs that support **seamless integration of tools** so that data requests and acquisition, visual analysis, note-taking, presentation composition, and dissemination all take place within a cohesive environment that supports around-the-clock operation and provides robust privacy and security control.

- Develop an infrastructure to **facilitate evaluation of new visual analytics technologies**.
- Create and use a **common security and privacy infrastructure**, with support for incorporating privacy-supporting technologies, such as data minimization and data anonymization.
- Use a common component-based software development approach for visual analytics software to facilitate evaluation of research results in integrated prototypes and deployment of promising components in diverse operational environments.
- **Identify and publicize best practices** for inserting visual analytics technologies into operational environments.
- **Form university-led centers of excellence** as well as partnerships with government, industry, national laboratories, and selected international research entities to bring together the best talents to accomplish the visual analytics R&D agenda.

IV - Sémantique visuelle



- Objets tels qu'ils sont connus
- Objets tels qu'ils sont vus
- Objets tels qu'ils sont pensés

- Faire émerger les connaissances cachées
- Faire émerger les significations cachées

- Questions de la légende ?
 - Cartographie classique : légende a priori imposée par le cartographe
 - Sémantique visuelle : légende identifiée après un raisonnement

Les objets tels qu'ils sont connus



Nebamun Garden
Thebes, 14th BC

Objets tels qu'ils sont vus



Picasso : "Je ne peins pas ce que je vois, je peins ce que je pense."



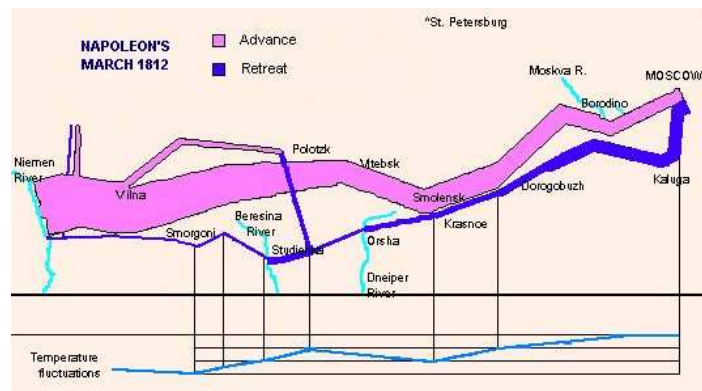
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Carte du Tendre



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Dessin de Minard



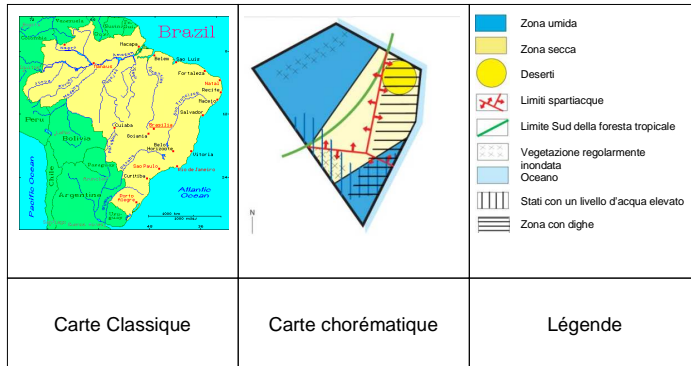
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V - Retour sur les chorèmes

- Chorème : vision schématisée d'un territoire
- Représentation visuelle des connaissances géographiques
- Résumés visuels de BD géographiques
- Nouveau système d'accès aux BDG

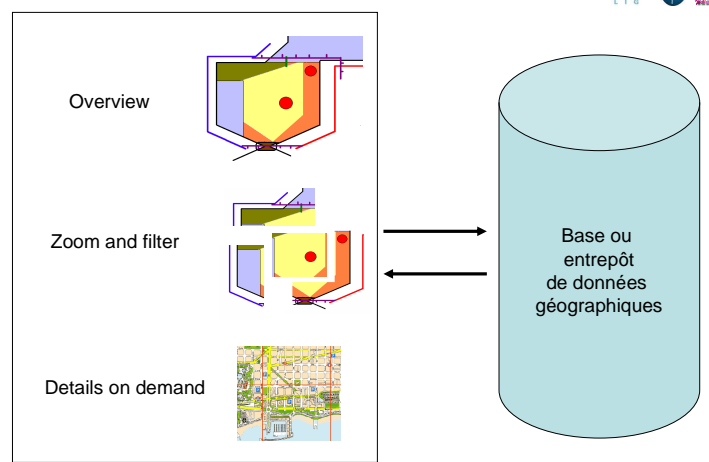
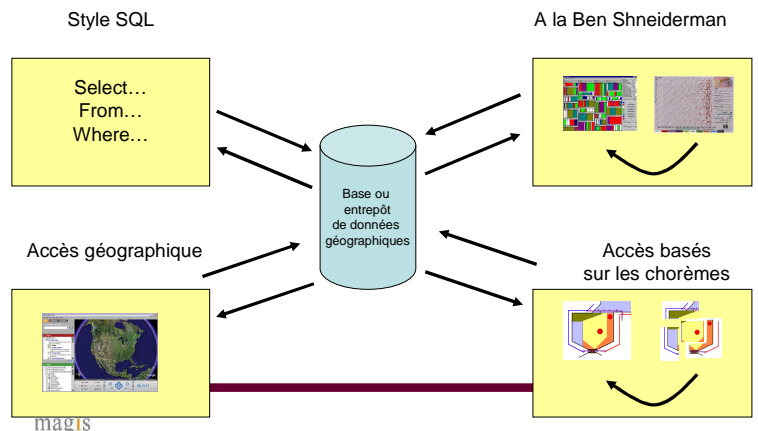
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Problème de l'eau au Brésil



Mantra de Ben Shneiderman	Base ou entrepôt de données géographiques
Overview	Chorèmes
Zoom and filter	Zoom géographique et filtrage thématiques
Details on demand	Cartographie à la demande

Différents modes d'accès à une BDG



VI - Perspectives finales

- Renouveau de la cartographie
- Passage à la géovisualisation
- La carte n'est plus un support d'information mais un outil de raisonnement spatial

- Trouver une représentation qui fasse émerger la signification
- Trouver des choses cachées ou inconnues



Code KML



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      de Pr. R. Laurini<br>
      
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