

## Chapitre VI

### Visualisation d'informations

## Visualisation d'information

- 6.1 – Introduction
- 6.2 – Points de vue
- 6.3 – Grands graphes
- 6.4 – Exemples
- 6.5 – Conclusions

## 6.1 - Introduction

- Pourquoi représenter visuellement ?
- Comment concevoir un bon système de visualisation ?
- Comment représenter les grands réseaux ?
- Visual data mining

## Ecrans et grands écrans



## Salle de la NASA



## Autre exemple



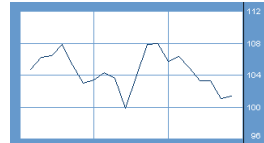
Photography by Peter A. Sellar / KLIK



Photography by Peter A. Sellar / KLIK

## Nécessité de visualiser pour comprendre

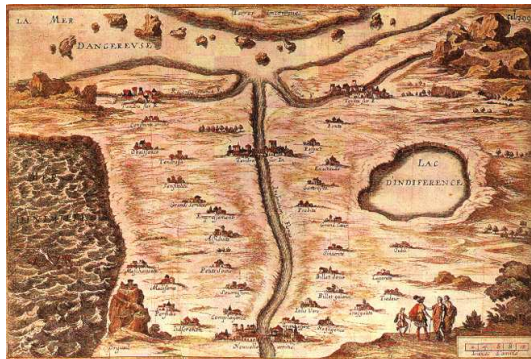
Date	Price	Date	Price
8/1	104 3/4	8/18	104
8/4	106 1/4	8/19	107 15/16
8/5	106 1/2	8/20	108
8/6	107 7/8	8/21	105 3/4
8/8	105 1/4	8/22	106 3/8
8/11	103	8/25	105
8/12	103 7/16	8/26	103 5/16
8/13	104 3/8	8/27	103 5/16
8/14	103 5/8	8/28	101 1/8
8/15	99 15/16	8/29	101 3/8



## Exemple : données d'une centrale nucléaire

- Plusieurs milliers à la seconde/Minute
- Comment avoir une vision d'ensemble
- Comment avoir une idée de l'évolution

## Carte du Tendre



## Autres cartes du Tendre

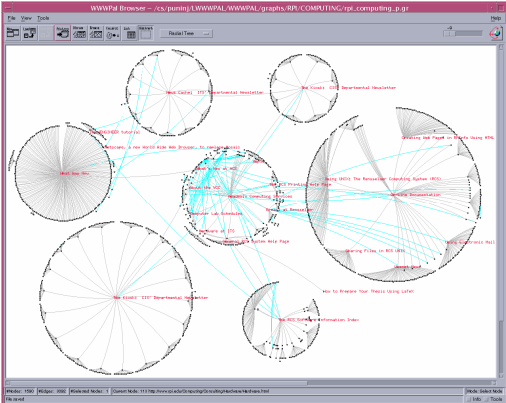


<http://televanta.com/art/pintores/autores/mabrese/mabrese.html>



### Autre exemple

<http://www.cs.rpi.edu/~puninj/RGML/EXTREME/TALK/rgml/all.html>



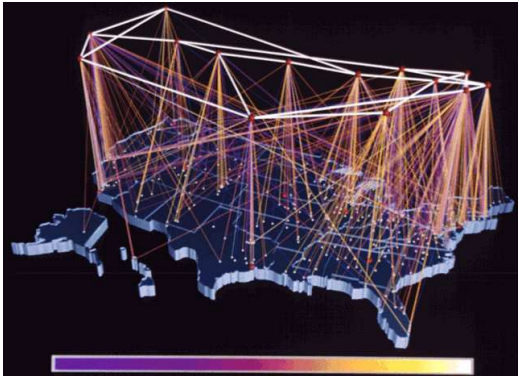
### inxight

<http://www.inxight.com/products/vizserver/demos.php>

**VizServer Online Demos**  
Preview some creative and interesting VizServer examples:

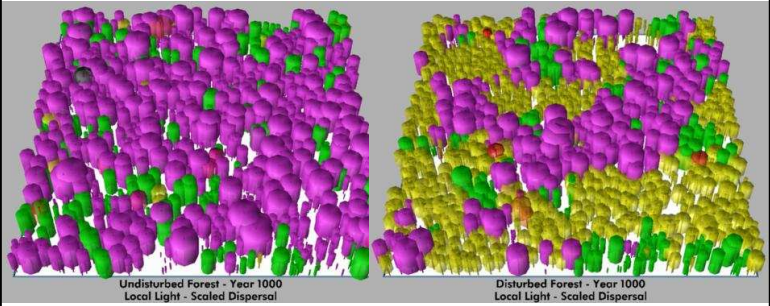
 <p><b>Gene Relationships</b> This Star Tree shows how gene strands relate to each other with relationship to Brain Cancer. Line lengths can be varied based on data values.</p>	 <p><b>Org Chart</b> This is a sample company org chart showing how a relationship tree is used for Star Tree. Compare this with the level-based tree in the "Cereals" example.</p>
 <p><b>Early 2001 Housing Market</b> A great way to present Table Lens to others is by including some points of interest for beginning navigation.  Table Lens shows you the California Housing Market at its peak in the year Early 2001.</p>	 <p><b>Nasa History</b> A great way to present Star Trees to others is by using this Nasa History example.</p>

### Visualisation du trafic



<http://archive.ncsa.uiuc.edu/SCMS/DigLib/text/technology/Visualization-Study-NSFNET-Cox.html>

### Evolution de forêt

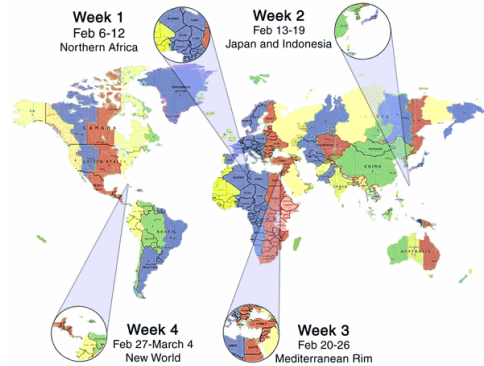




## Point de vue spatial

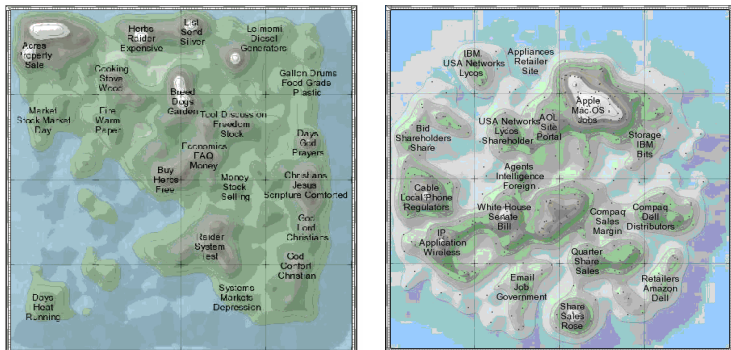
- Usage des propriétés spatiales des données
  - cartes (de géographie)
  - métaphore de la carte
  - treemaps
  - cartes auto-organisationnelles
  - cartes reliefs, 3D, etc.

## Carte avec annotations



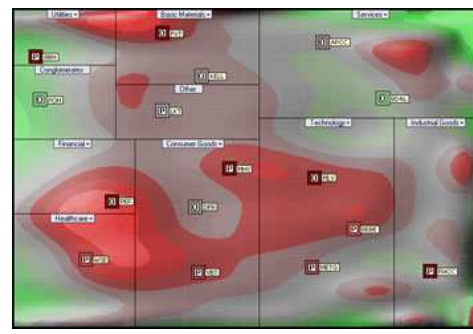
<http://www.sit.wisc.edu/~wudci/international.html>

## Themescape



<http://www.searchtools.com/info/meetings/searchenginesmtg/cartia-themescape-news.gif>

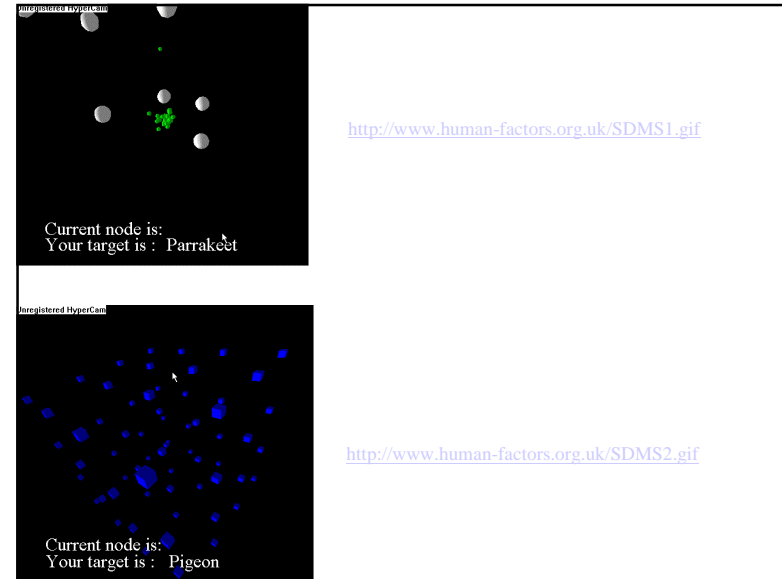
## WebMap



<http://www.webmap.com/trademapdemo.html>

## Point de vue temporel

- Usage des propriétés temporelles des données : animation
  - prévision météo
  - évolutions diverses
  - etc.
- Temps réel, temps accéléré, temps ralenti



## Napoléon

*The Terrible Fate of Napoleon's Grand Army in Russia: 1812*

DATE: 624



Adapted from the Statistical Graph of Charles Minard (1861).  
by Aaron Walburg and Stephen Hartzog (1996)

<http://www.math.yorku.ca/SCS/Gallery/minard/march-animated.gif>

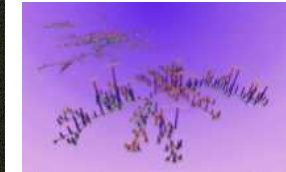
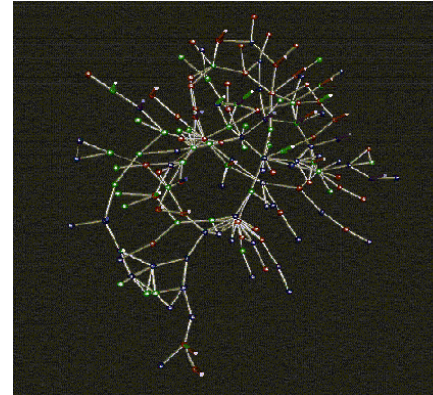
## Webbook



## Point de vue sémantique

- Représentation de la sémantique cachée des données
  - visualisation des points saillants

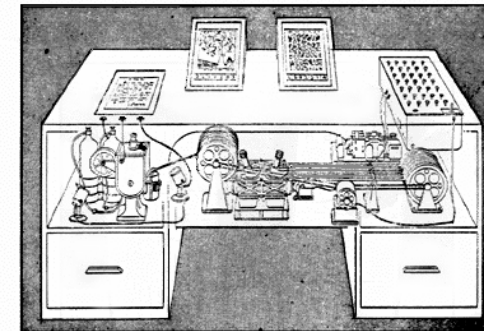
## Visualisation de documents C. Chen



## Point de vue comportemental

- Comportement de l'utilisateur dans la visualisation des informations
- Système Memex de Vannevar Bush
  - annotations de microfilms
  - jamais implémenté

## Memex de Vannevar Bush



Memex in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting translucent viewing screens magnify supermicrofilm filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference (*LIFE* 19(11), p. 123).



### Point de vue cognitif

- Tests psycho-cognitifs des utilisateurs de leur capacité à comprendre les visualisations
- Généralement études empiriques

### Point de vue perceptif

- Utilisation de la dimension perception humaine dans la conception
  - usage des couleurs, des textures, etc.
  - sémiologie graphique

### Point de vue social

- Question : unique mode de représentation ou plusieurs ?

### Point de vue écologique

- Rôle de la visualisation dans un sens large
  - information foraging

## Point de vue technologique

- Evolution des périphériques
  - écran graphique
  - vidéo-projecteurs
  - hologrammes
  - etc.

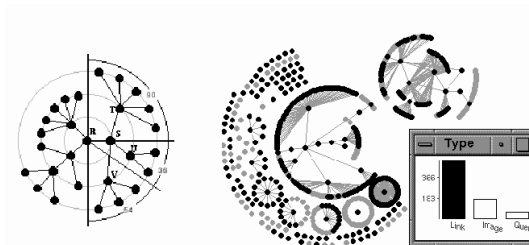
## 6.3 – Visualisation de graphes

- Comment visualiser les grands graphes
  - Repérer les structures saillantes
- Comment visualiser un nœud et son environnement proche ?
- Vision globale / vision locale

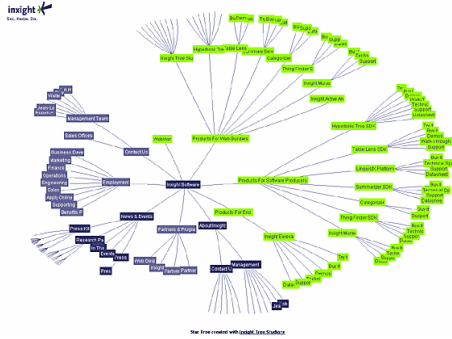
## Approches

- Indentation
- Emboîtement de contenu
- Groupement (galaxies)
- Cartographique
- Diagrammes noeuds/arcs

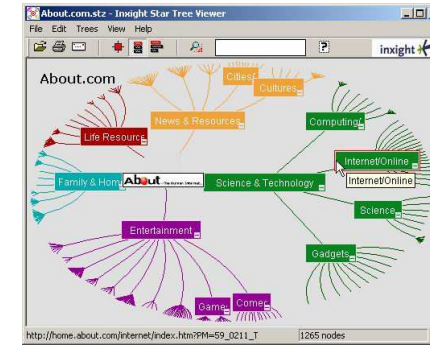
## Visualisation des grands graphes



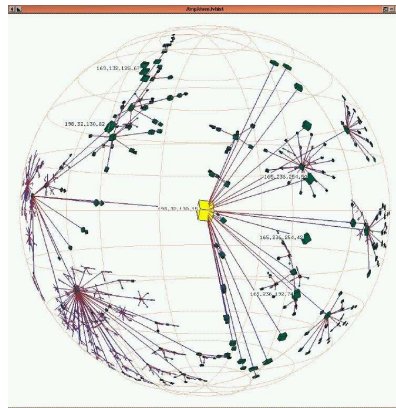
## Présentation hyperbolique



## Présentation hyperbolique

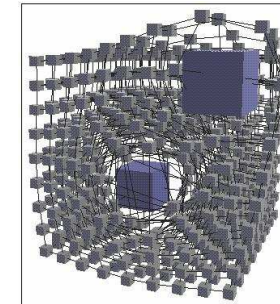


## Arbre hyperbolique 3D



<http://www.imv.is.ocha.ac.jp:8080/~rika2/iv/12.htm>

## Réseau avec distortion

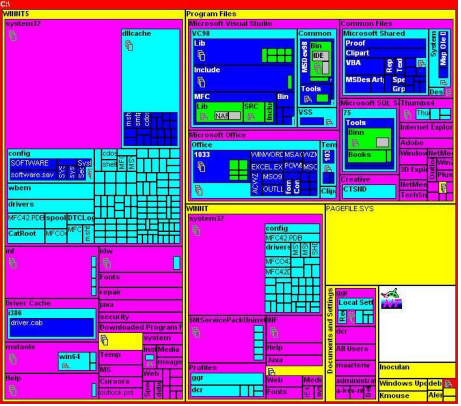


<http://www.acm.org/sigchi/chi96/proceedings/shortpap/Cowperthwaite/djc.htm>

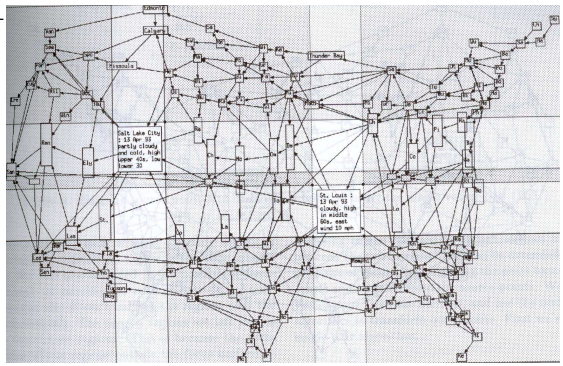


## TreeMap - 1991

- Johnson & Shneiderman, U. Maryland, Vis'91
- Space filling
- ~3000 objets
- MicroLogic's DiskMapper

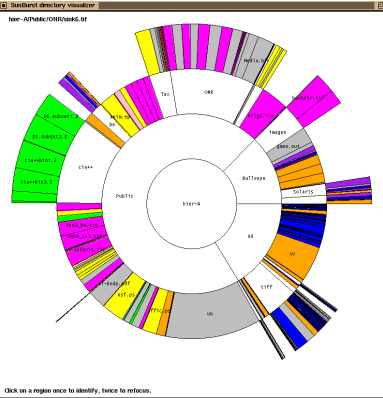


## Graph Rubber Sheetting

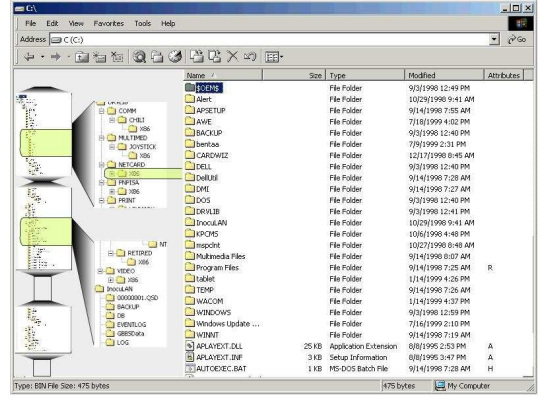


## Sunburst - 2000

- Stasko & Zhang, Georgia Tech, InfoVis 2000
- Radial space-filling
- Techniques for viewing more detail

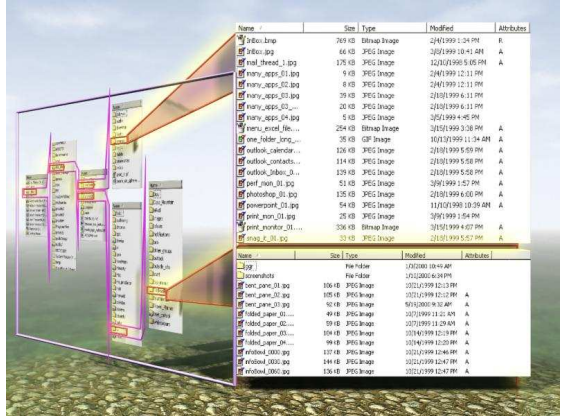


## Folding Paper - proposal

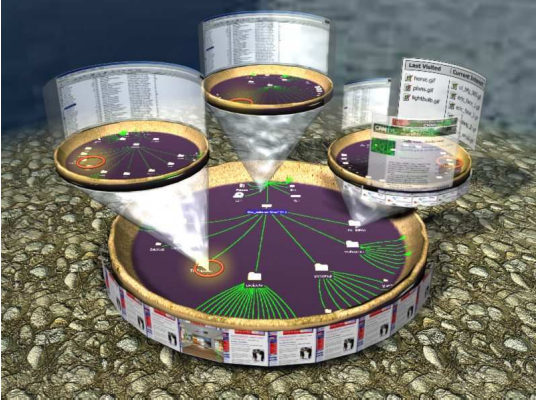




### Multiple Focus in 3D - proposal



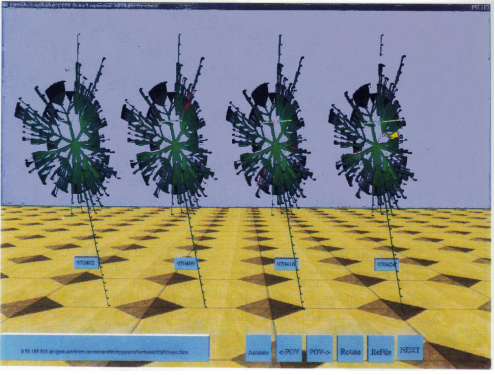
### InfoBowl - proposal



### Hierarchies multiples

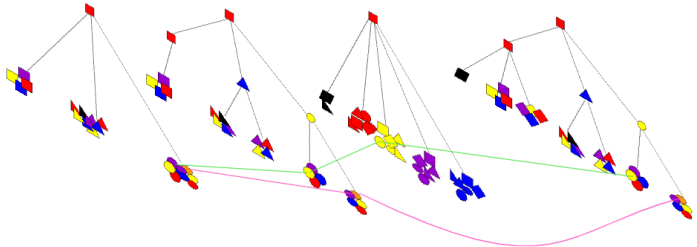
- Représentation de "forêts"

### Time Tube - 1998



### Taxonomy Visualization - 2000

- Graham et al., Napier Univ. IHCS 2000



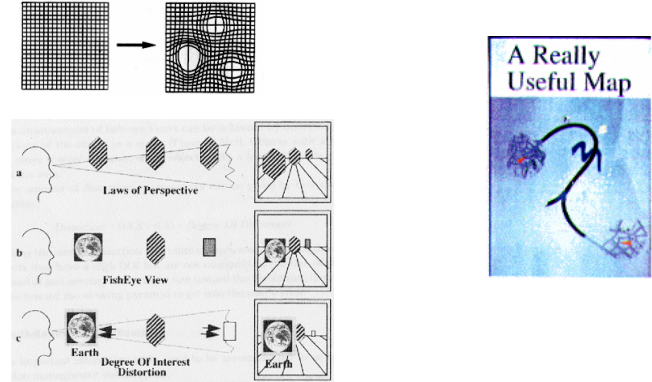
### 6.4 - Exemples

- Balayages d'espaces
- Métaphores cartographiques
- Autres

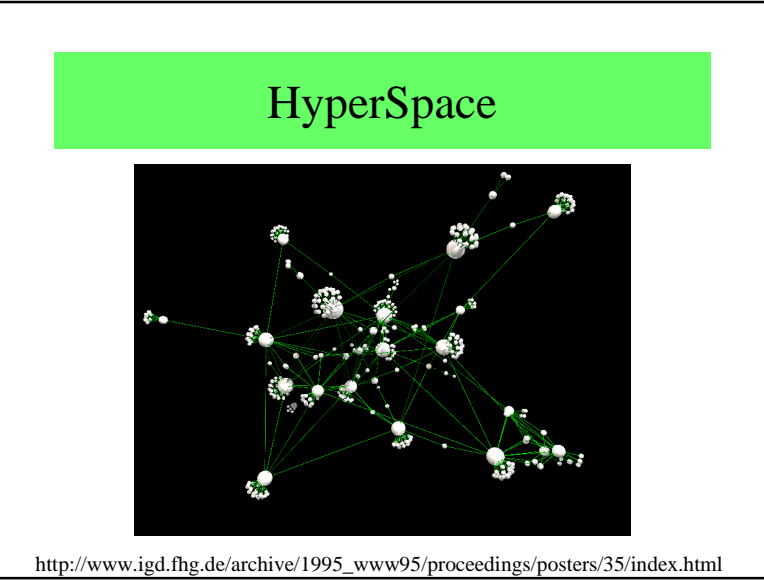
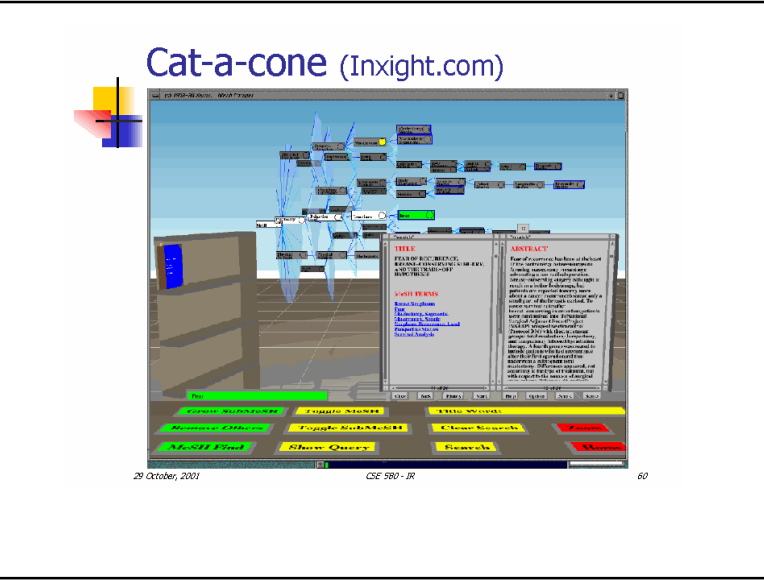
### Balayages d'espaces

- Comment visualiser le contenu d'espace pluridimensionnel ?
- Comment l'explorer ?

### Loupes multiples







[http://www.igd.fhg.de/archive/1995\\_www95/proceedings/posters/35/index.html](http://www.igd.fhg.de/archive/1995_www95/proceedings/posters/35/index.html)

## Métaphores cartographiques

- Reprendre l'idée de la carte du tendre
- Distance entre les objets = ressemblance
- Vision globale / vision locale

## Exemple de site web

<http://www.ils.unc.edu/~geisg/info/infovis/sitemap1.gif>



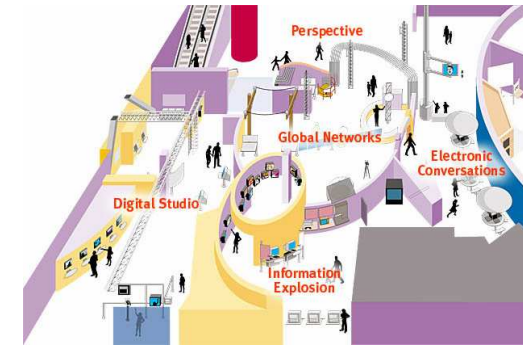


## Autres exemples

- Usage d'autres metaphores

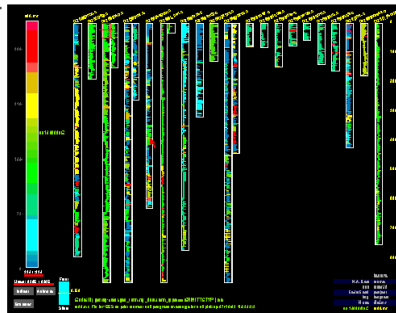
## Communication Gallery Map

[http://www.thetech.org/exhibits\\_events/communication/c\\_map.html](http://www.thetech.org/exhibits_events/communication/c_map.html)



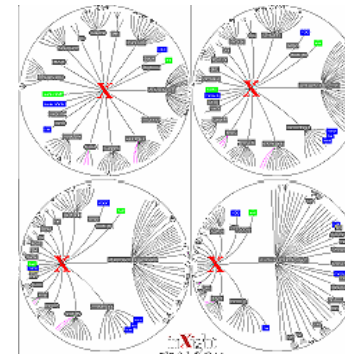
## 1D Text Representation

Code in SeeSoft

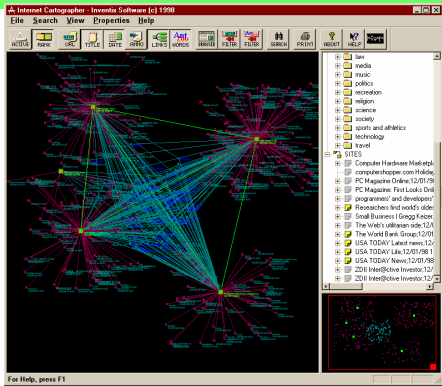


Showing code age. The newest code is in red and the oldest in blue

## Browser hyperbolique (Inxight)

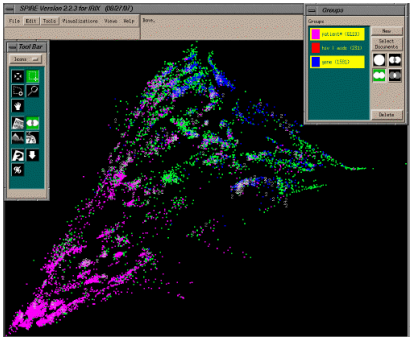


# Internet Cartographer



<http://www.inventix.com/>

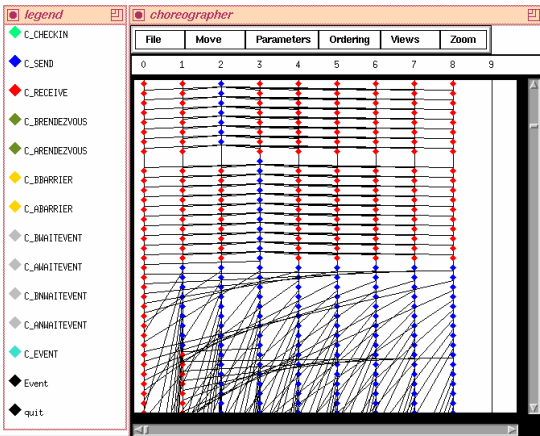
# Galaxie de 12 000 documents



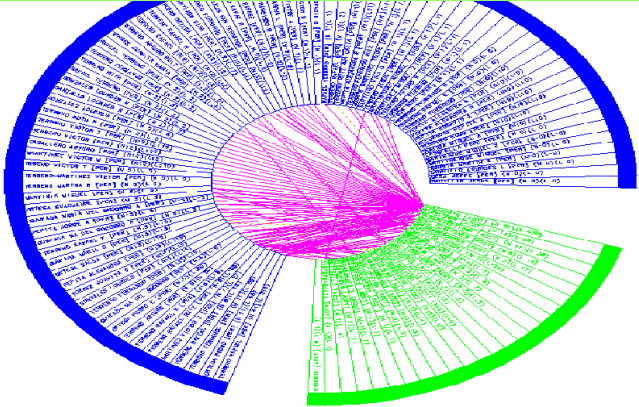
<http://www.pnl.gov/infoviz/sigchi98/index.html>

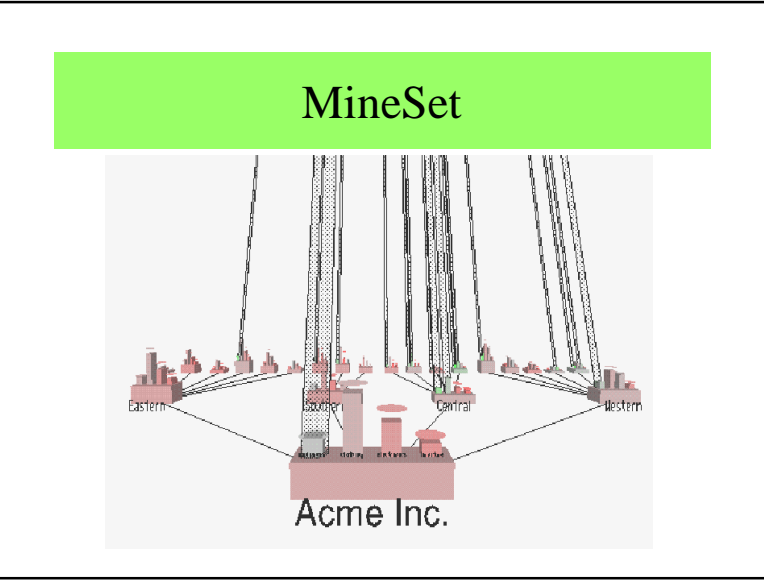
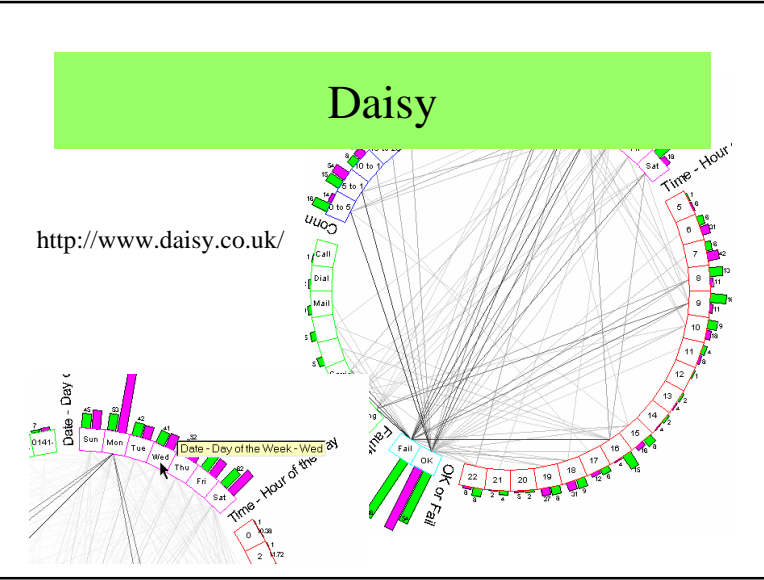
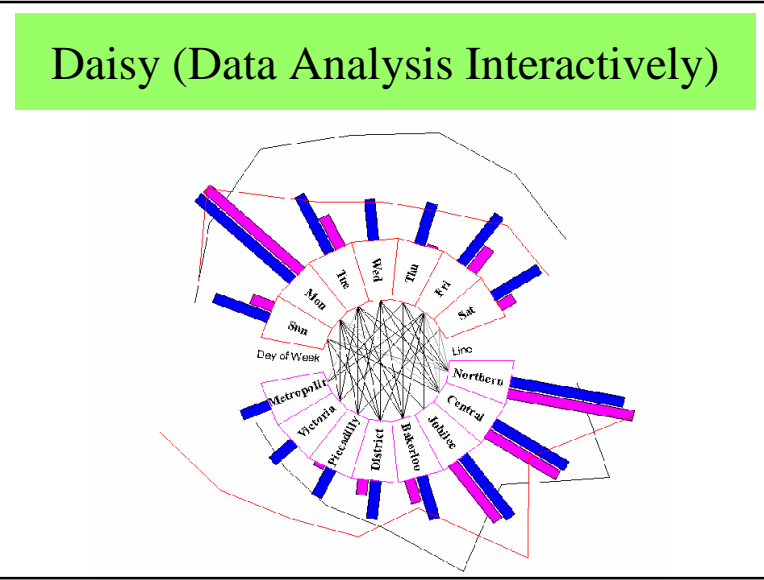
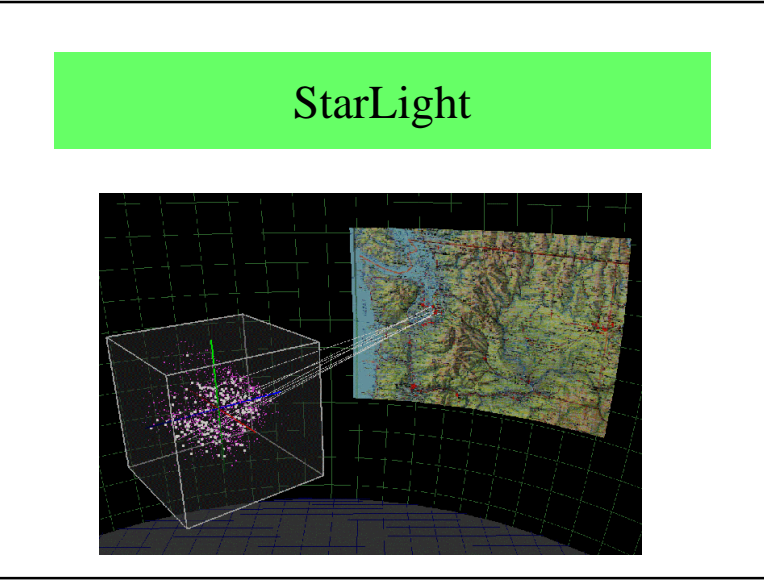
# Animation choreographer

<http://www.cs.wustl.edu/~eileen/chore.html>

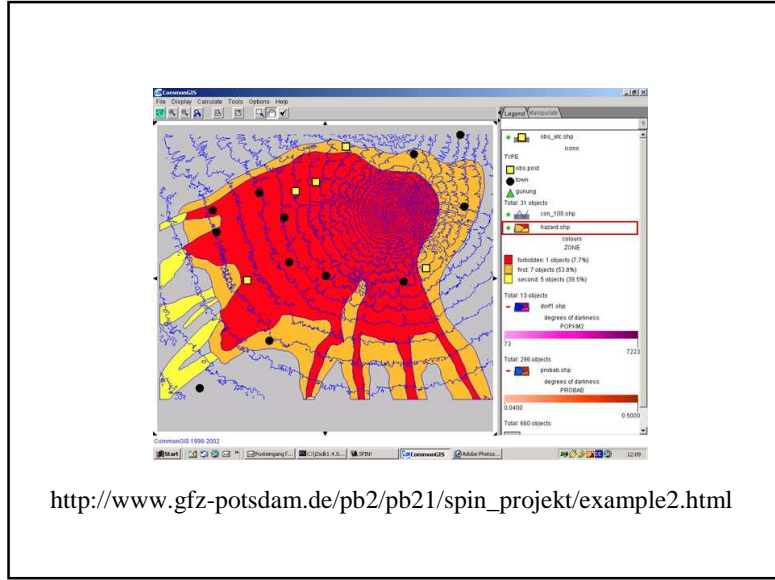
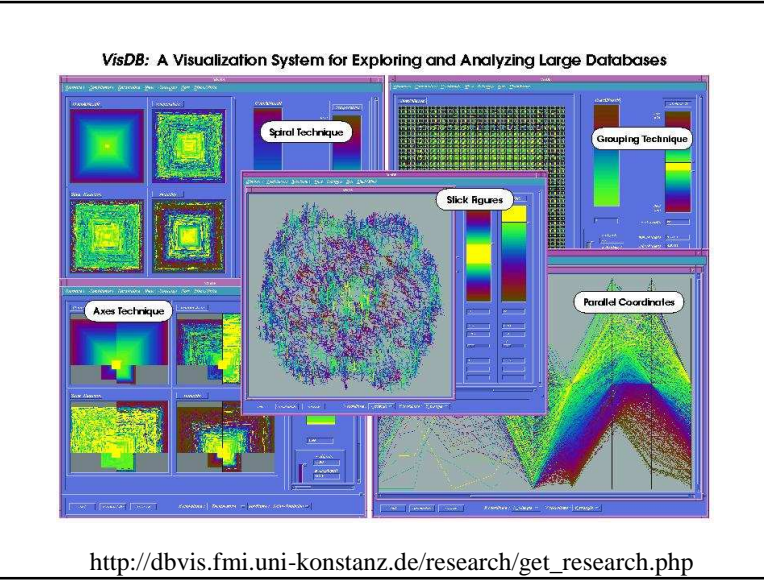
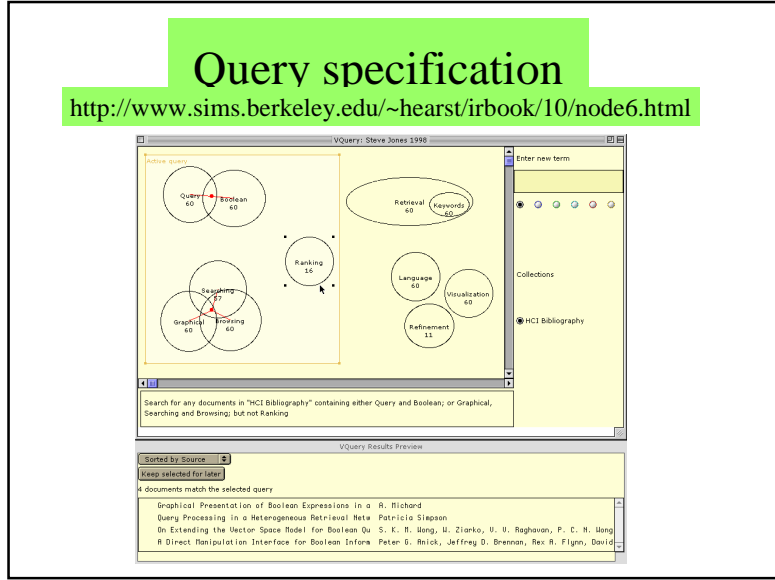
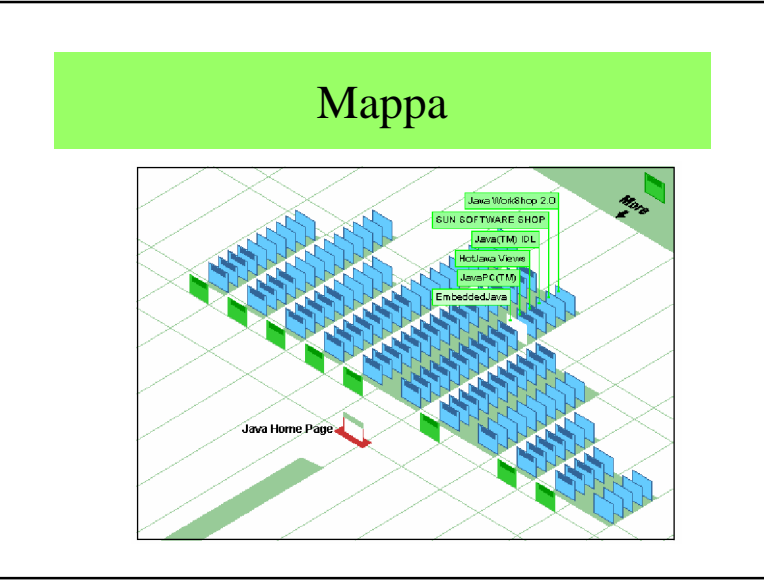


# NetMap





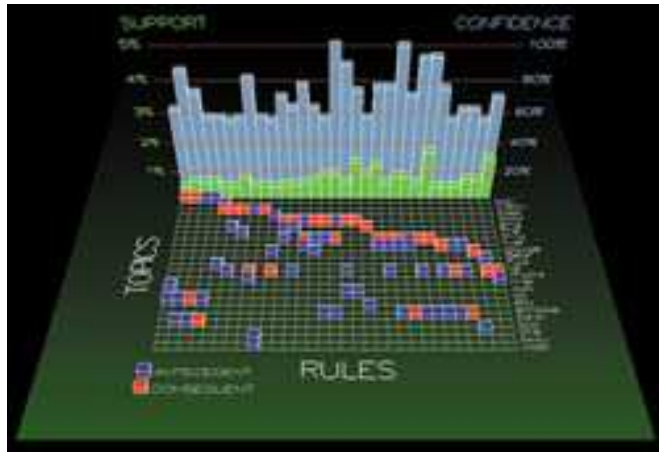




[http://dbvis.fmi.uni-konstanz.de/research/get\\_research.php](http://dbvis.fmi.uni-konstanz.de/research/get_research.php)

[http://www.gfz-potsdam.de/pb2/pb21/spin\\_projekt/example2.html](http://www.gfz-potsdam.de/pb2/pb21/spin_projekt/example2.html)





<http://www.pnl.gov/cse/computersci/datamining.htm>

## 6.5 – Conclusions

- Importance de la visualisation
- Permet
  - Vision globale de la structuration du contenu
  - Vision locale
  - Cheminement
- Usage de métaphores structurantes