

CNAM - Département Informatique

RCP216 Ingénierie de la fouille et de la visualisation de données massives  
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# Visualisation d'information (4) Interaction

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le **cnam**

## (rappel cours#1)

There are many visual design guidelines but the basic principle might be summarized as the Visual Information Seeking Mantra:

Overview first, zoom and filter, then details-on-demand  
Overview first, zoom and filter, then details-on-demand  
Overview first, zoom and filter, then details-on-demand  
Overview first, zoom and filter, then details-on-demand  
Overview first, zoom and filter, then details-on-demand  
Overview first, zoom and filter, then details-on-demand  
Overview first, zoom and filter, then details-on-demand  
Overview first, zoom and filter, then details-on-demand  
Overview first, zoom and filter, then details-on-demand  
Overview first, zoom and filter, then details-on-demand

Shneiderman "The eyes have it : a task by data type taxonomy for information visualizations"

The seven tasks are at a high level of abstraction. More tasks and refinements of these tasks would be natural next steps in expanding this table. The seven tasks are:

**Overview:** Gain an overview of the entire collection.

**Zoom :** Zoom in on items of interest

**Filter:** filter out uninteresting items.

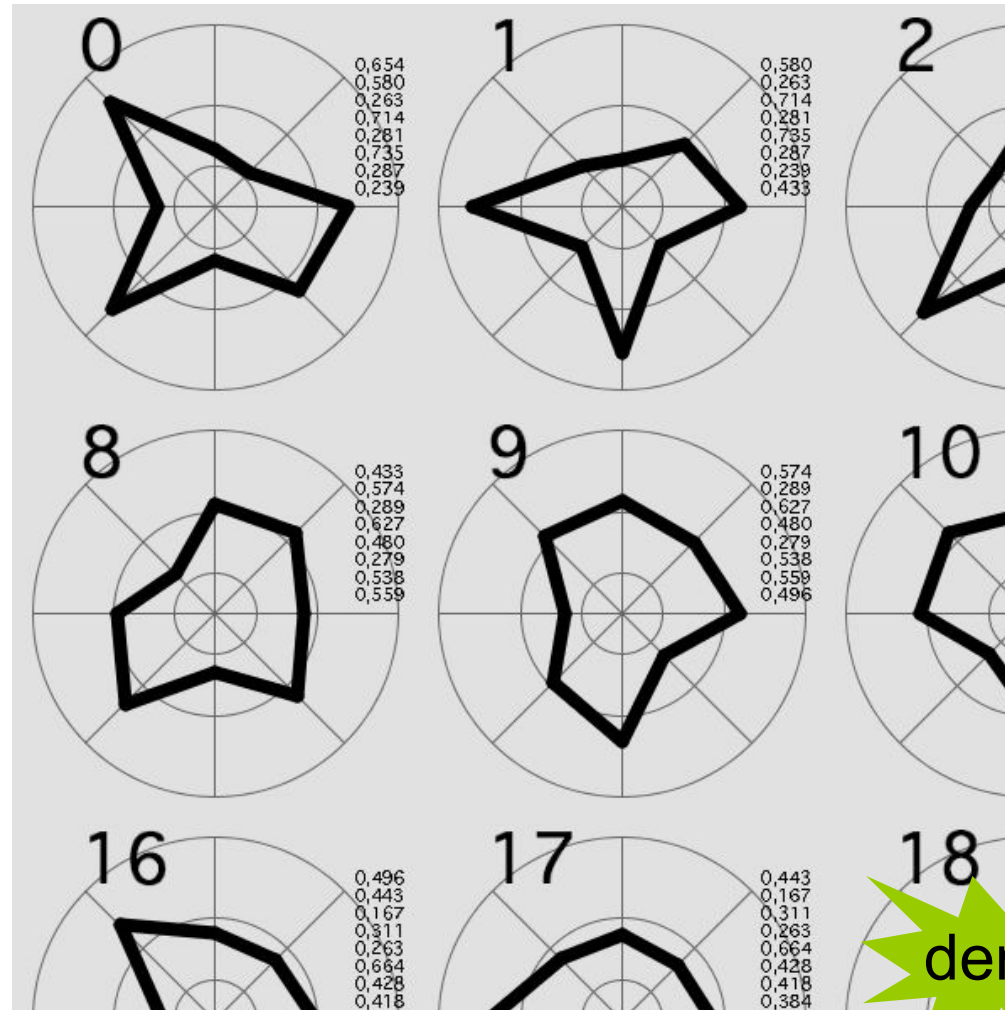
**Details-on-demand:** Select an item or group and get details when needed.

**Relate:** View relationships among items.

**History:** Keep a history of actions to support undo, replay, and progressive refinement.

**Extract:** Allow extraction of sub-collections and of the query parameters.

# Simulation du principe overview-zoom-filter

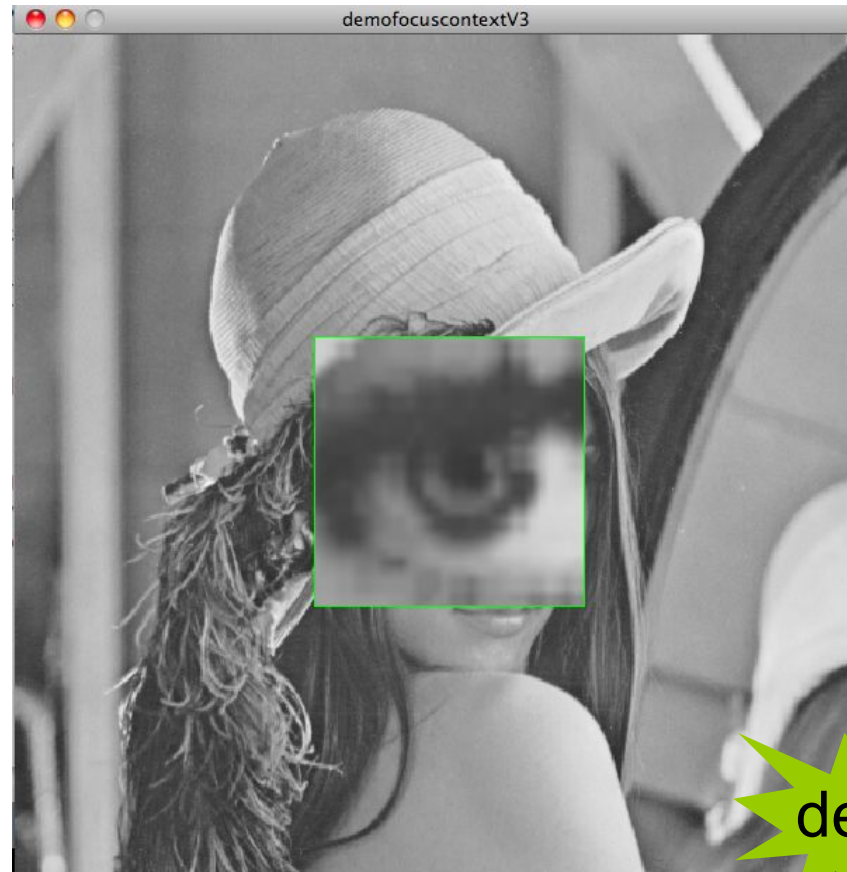


demo

## **Plan de la suite de l'exposé**

1. Vue globale et détail
2. Navigation par zoom et pan
3. Distorsion
4. Filtrage et mise en relation
5. Dispositifs d'affichage

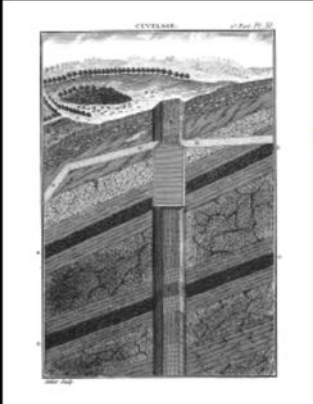
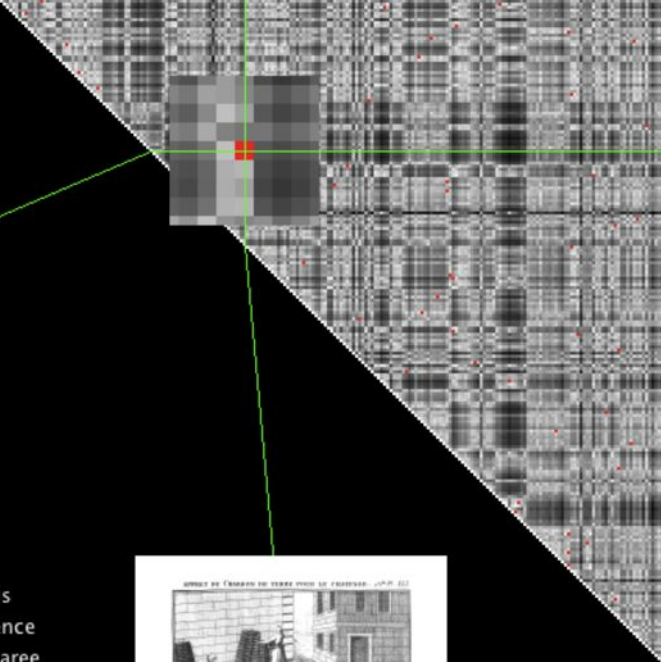
**comment faire co-exister vue globale et détail ?**



demo


```
PImage pmat;  
float ar;  
  
void setup(){  
  pmat = loadImage("lenna.gif");  
  ar = pmat.width/float(pmat.height);  
  size(int(600*ar), 600);  
}  
  
void draw(){  
  int x = mouseX;  
  int y = mouseY;  
  image(pmat, 0,0, width,height);  
  copy(x-16,y-16,32,32, x-96, y-96, 192,192);  
  stroke(0,255,0);noFill();rect(x-96, y-96, 192,192);  
}
```

# Application : explorer une matrice de similarité entre images



205:4KY58.16/0591

[7] avance [9] recule dans le corpus  
[2] avance [8] recule l'image reference  
[4] avance [6] recule l'image comparee  
[5] accepter [0] rejeter

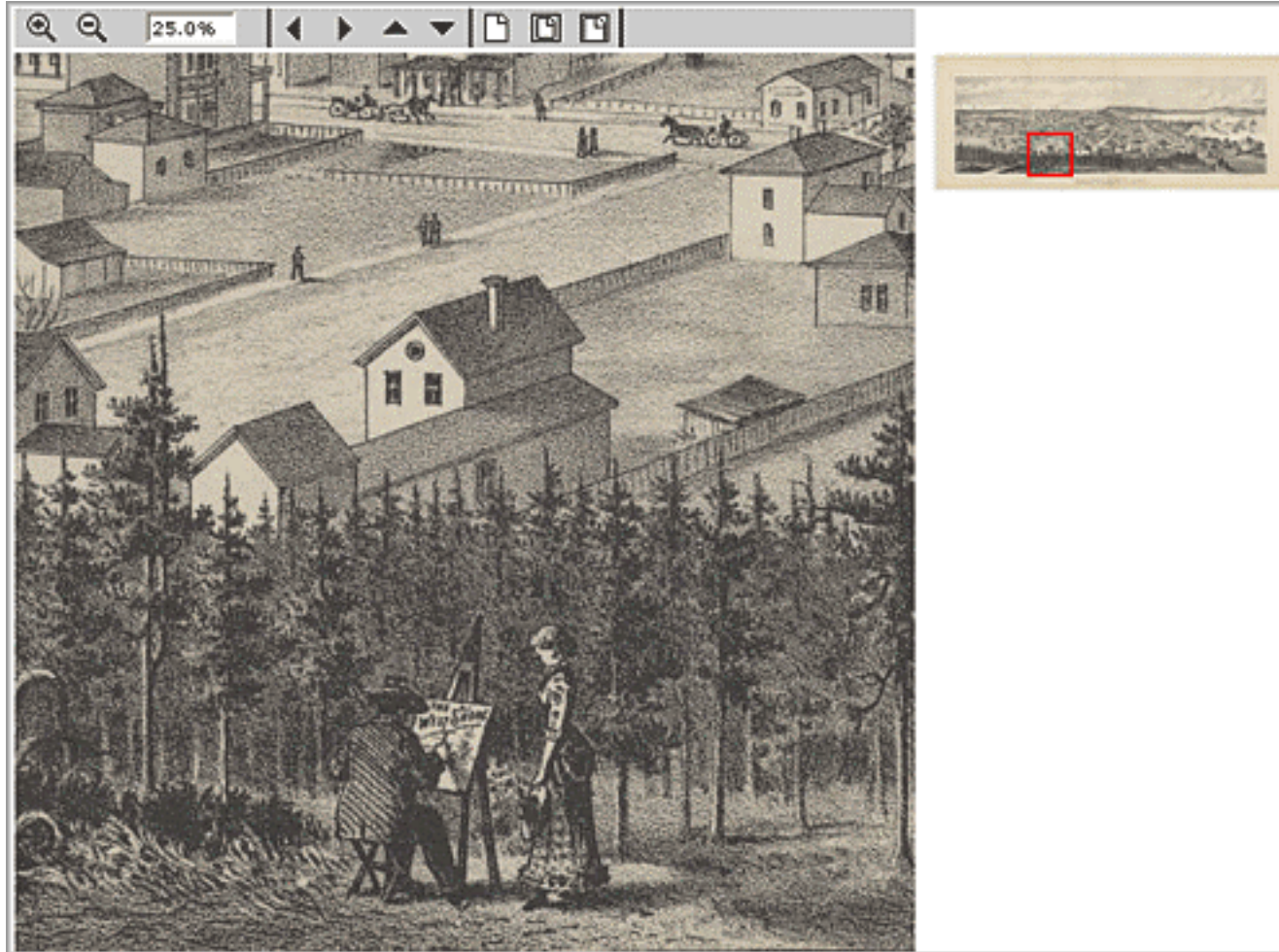


235:4KY58.17/0711 distance: 2.1449

demo



# La vignette (et le chemin de fer)



<http://www.oclc.org/americalatina/es/contentdm/about/displaying/seattlemap2.gif>

## Exercice

Citer 5 logiciels qui emploient cette technique :

#1 : acrobat reader (page courante + miniatures sur le côté)

#2 :

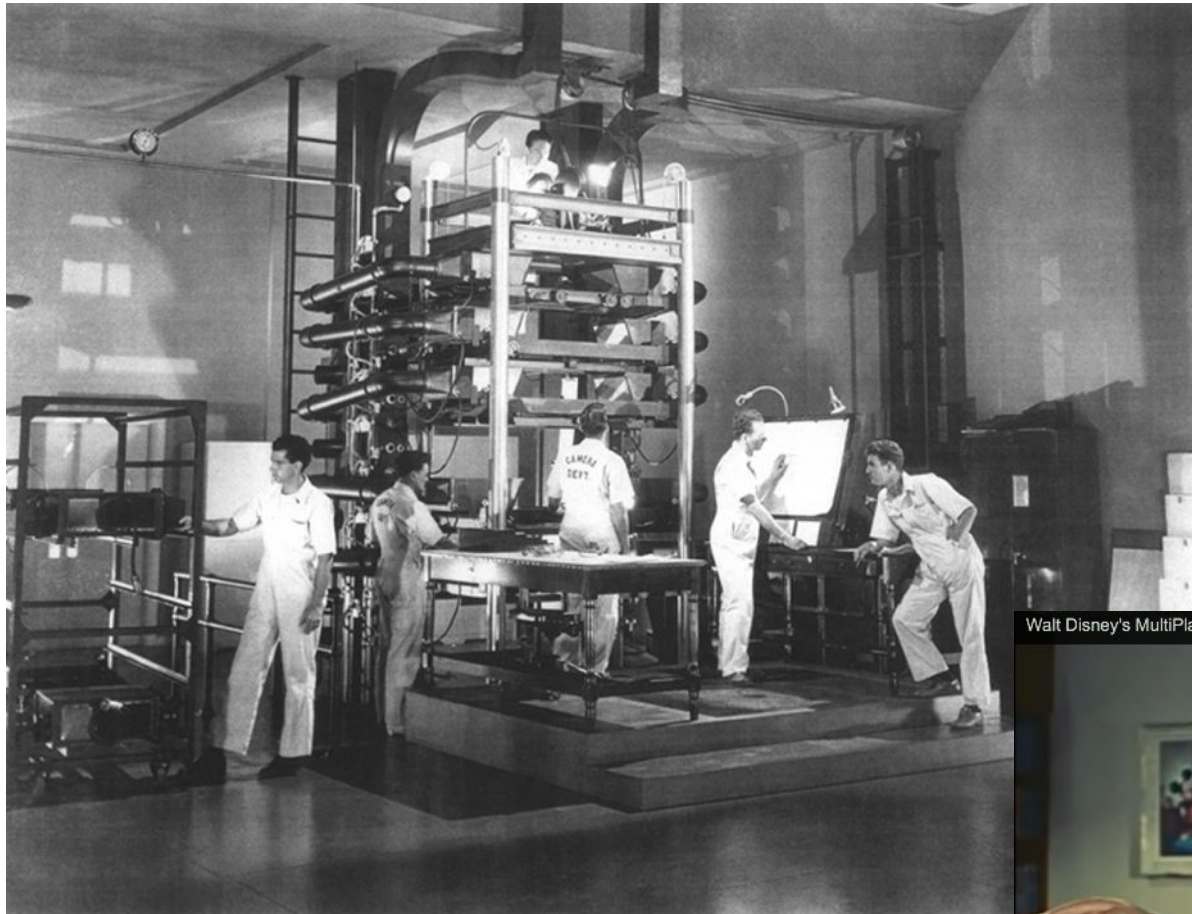
#3 :

#4 :

#5 :

## 2. zoom (et pan)

# La caméra multi-plans de Disney (1937)



<http://www.waltdisney.org/content/multiplane-camera>

<http://community.digitalmediaacademy.org/tag/walt-disney-multiplane-camera>



# DAC-1 (1959 et suiv.) General Motors et IBM

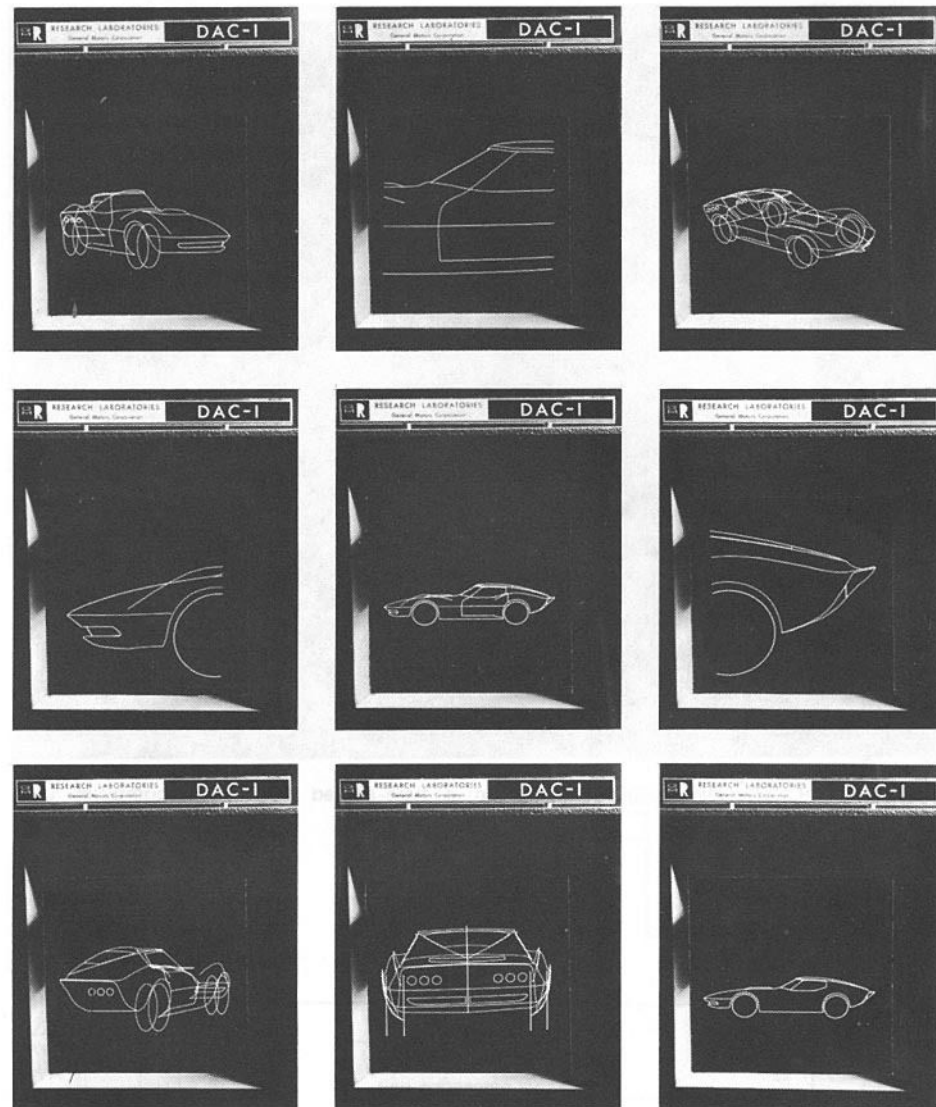
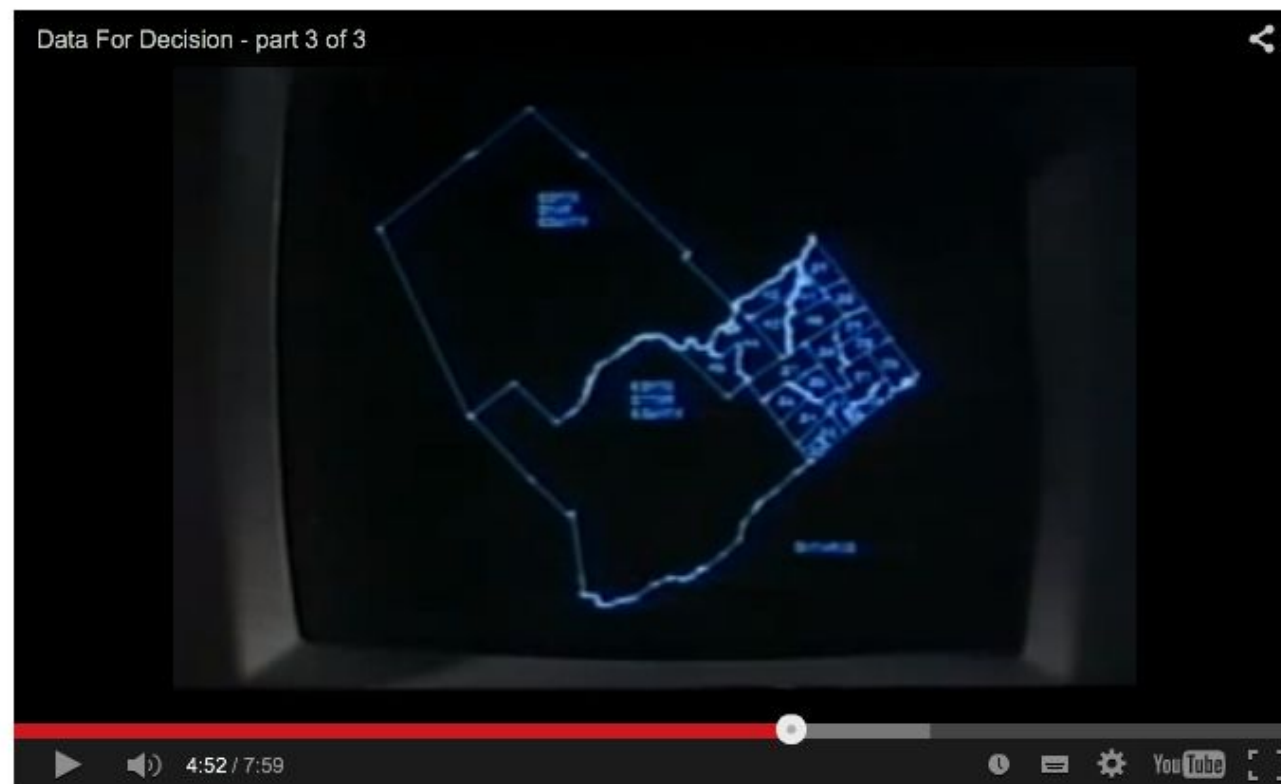


FIG. 1-8 Scale expansion, rotation, and partial views in a DAC-1 design exercise.

<https://design.osu.edu/carlson/history/lesson3.html>

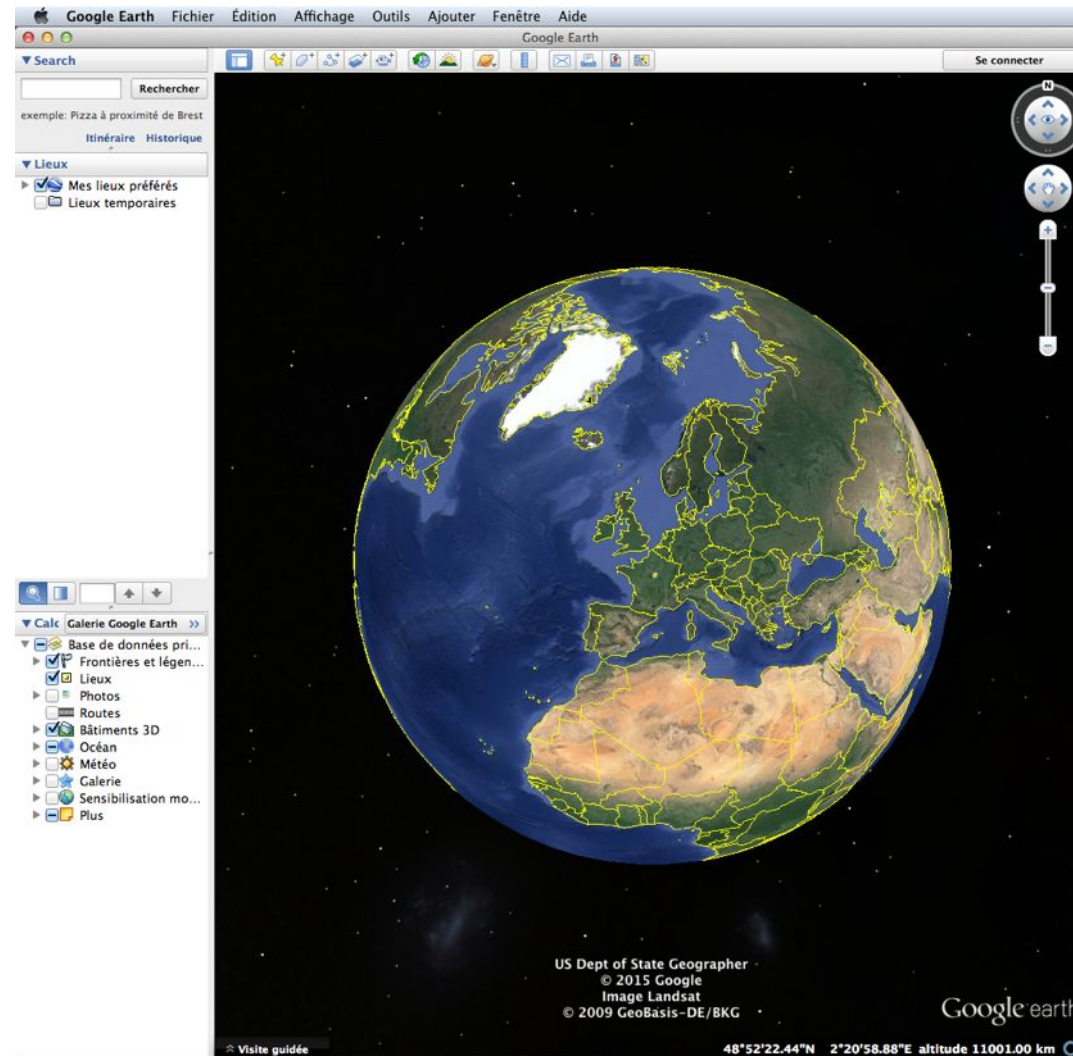
Les premiers SIG (uk : GIS)

le CGIS et Roger Tomlinson :  
film "data for decision" de 1967



<http://gisandscience.com/2009/01/25/data-for-decision-42-years-later/>

# Google Earth (2005, ex "earth viewer" de Keyhole)

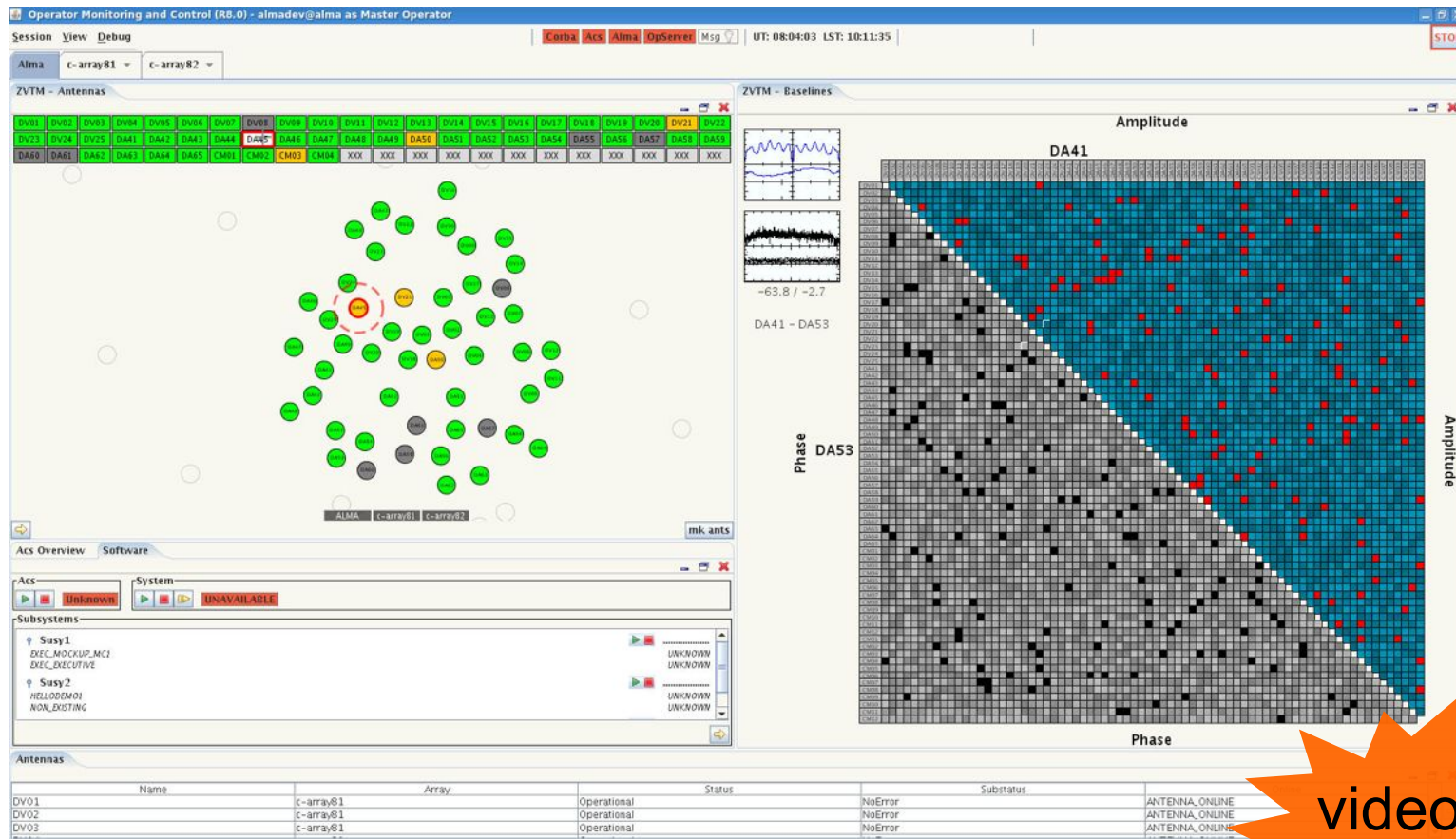




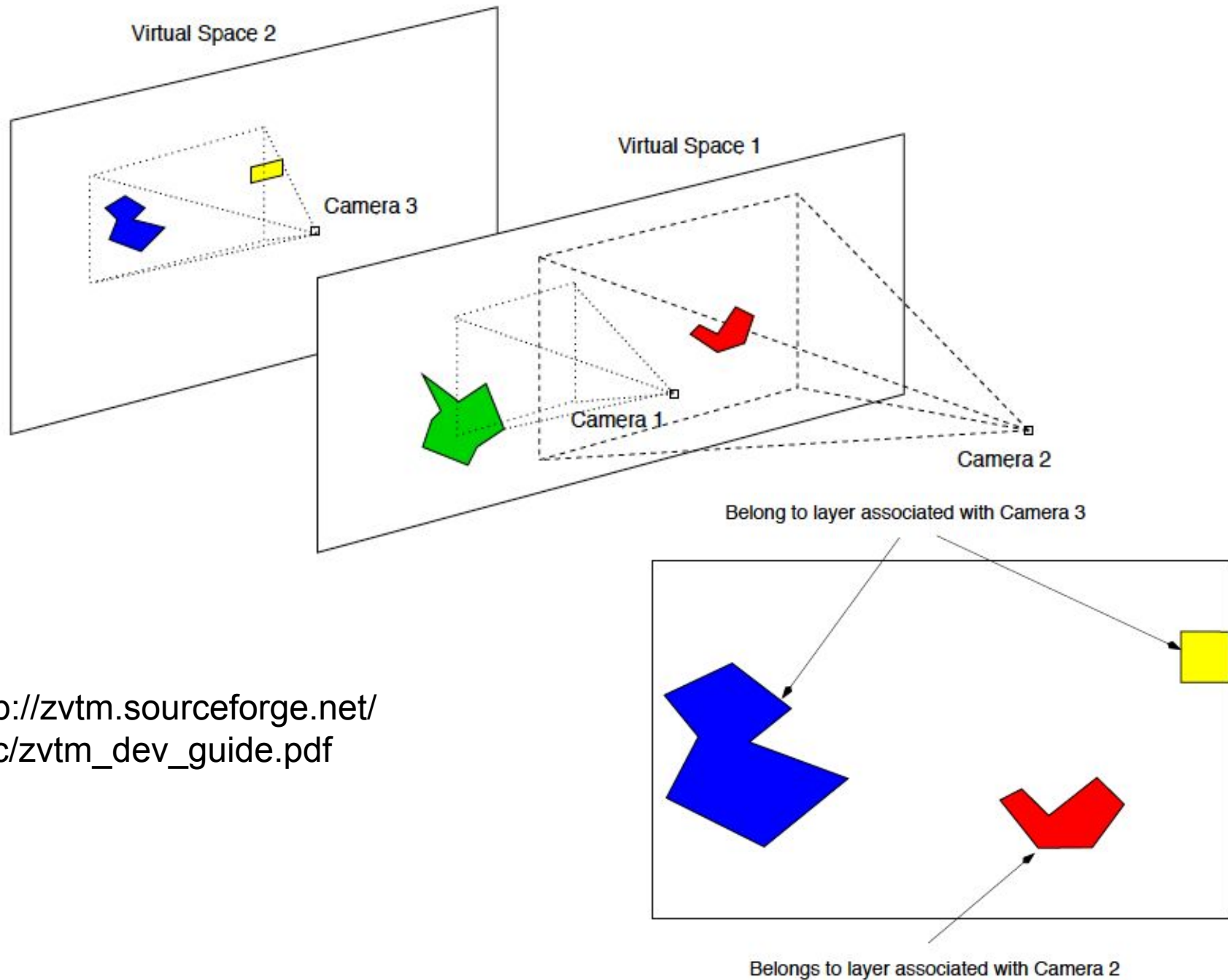


un autre plus récent : ZVTM (E. Pietriga et al., INRIA)

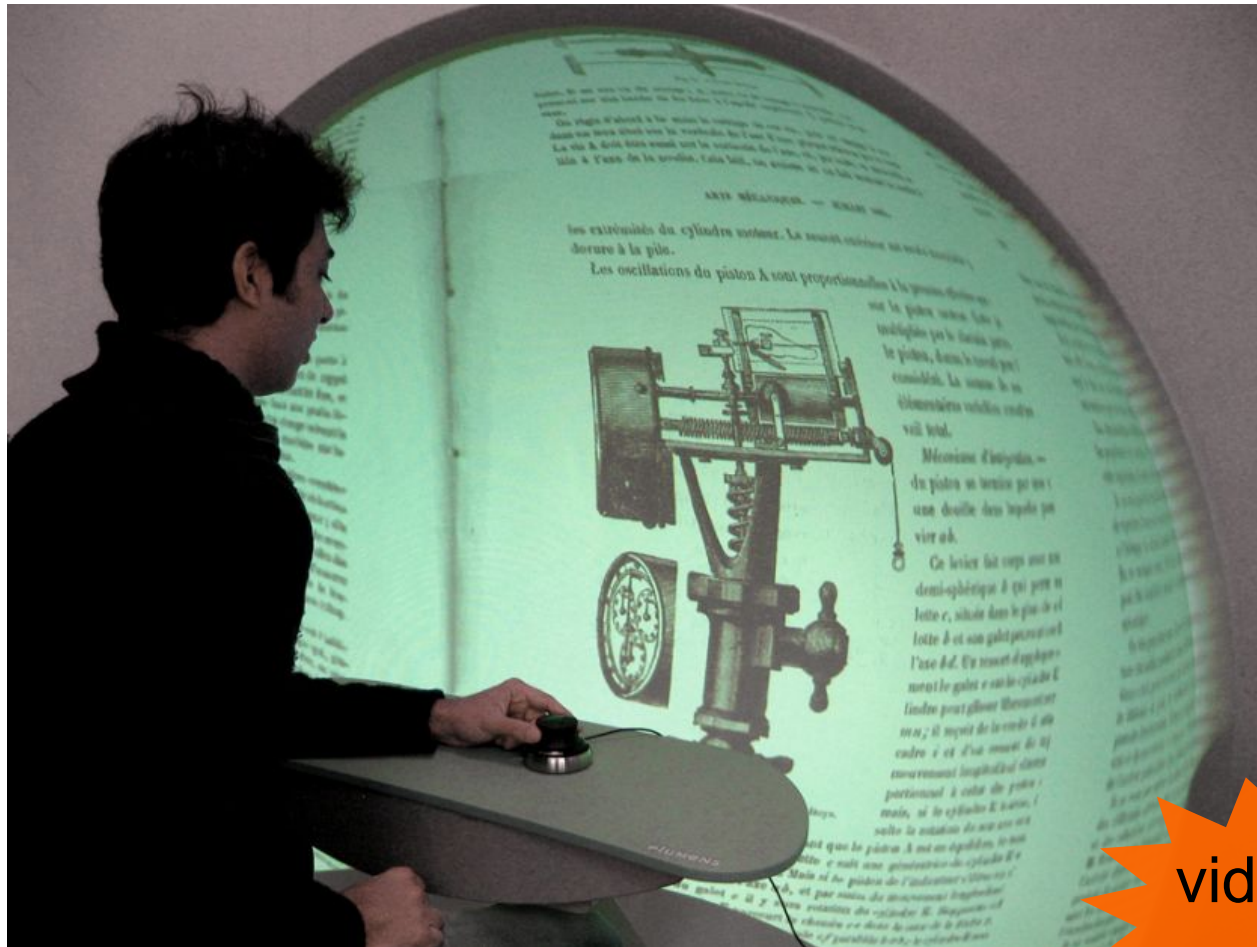
<http://zvtm.sourceforge.net/>



utilisation pour le radio-télescope Alma

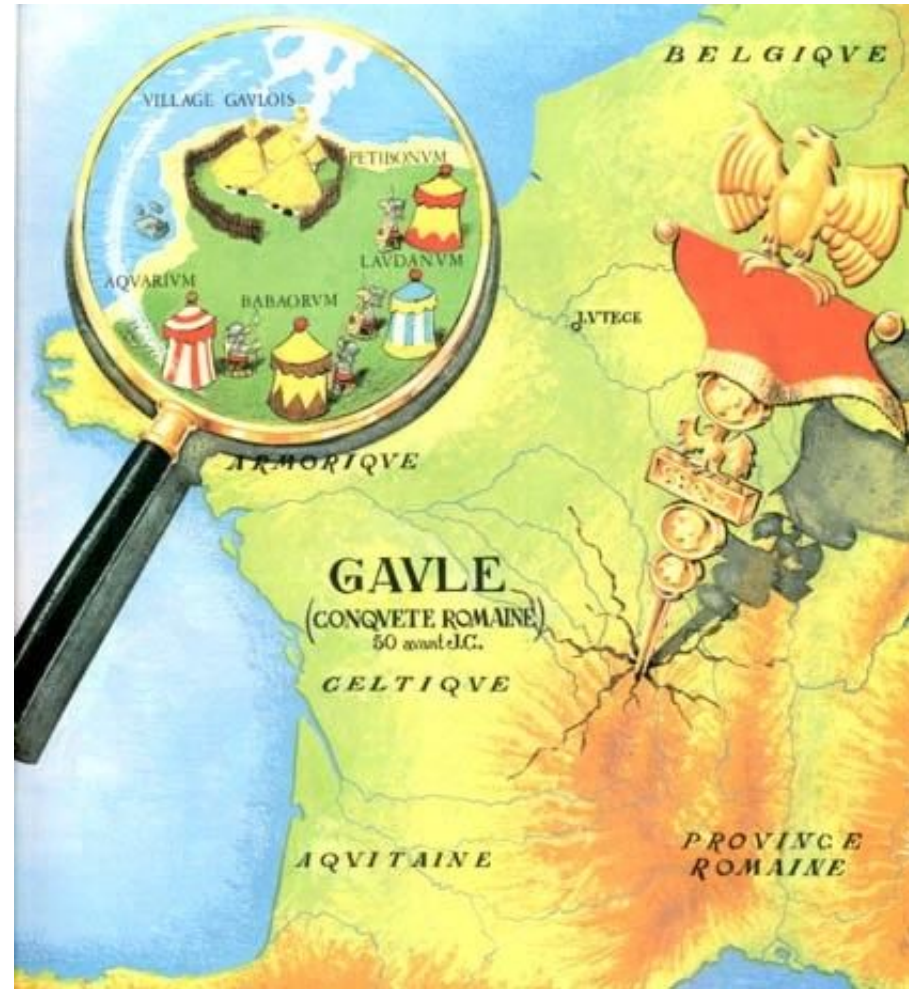


[http://zvtm.sourceforge.net/doc/zvtm\\_dev\\_guide.pdf](http://zvtm.sourceforge.net/doc/zvtm_dev_guide.pdf)



mur d'images (500 Mpix)  
CNAM/CEDRIC - projet FUI "Demat-Factory" 2009-11

# 3. Distorsion

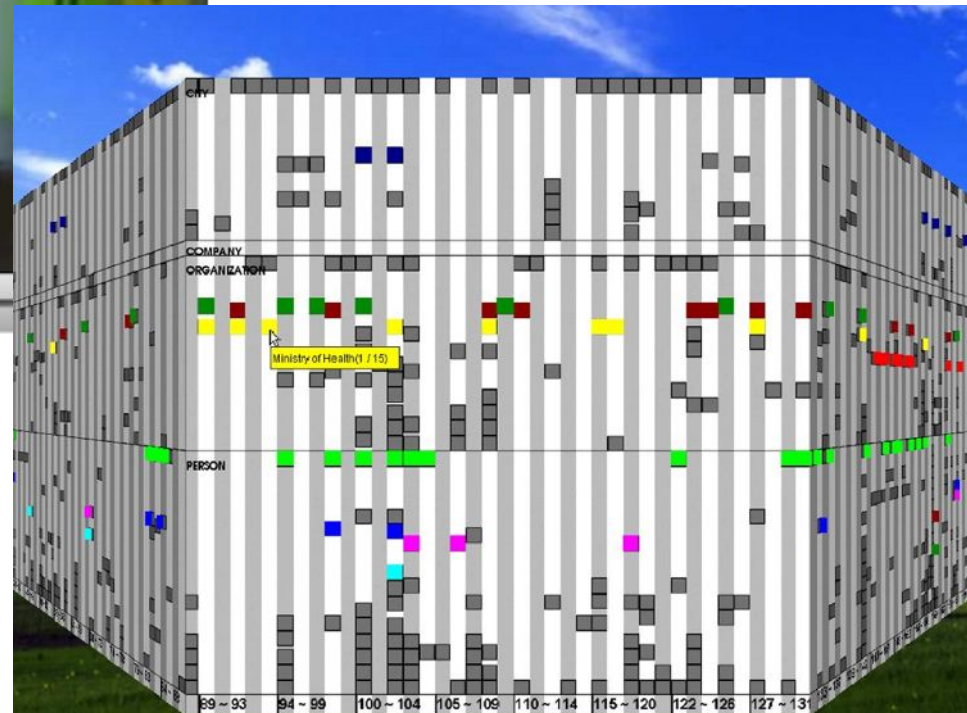








Bifocal display  
(Spence et al., 1980-2)



Perspective wall (Mackinlay et al. 1991)

# Principe

## A Review and Taxonomy of Distortion-Oriented Presentation Techniques

Y. K. LEUNG  
Swinburne University of Technology  
and  
M. D. APPERLEY  
Massey University

One of the common problems associated with large computer-based information systems is the relatively small window through which an information space can be viewed. Increasing interest

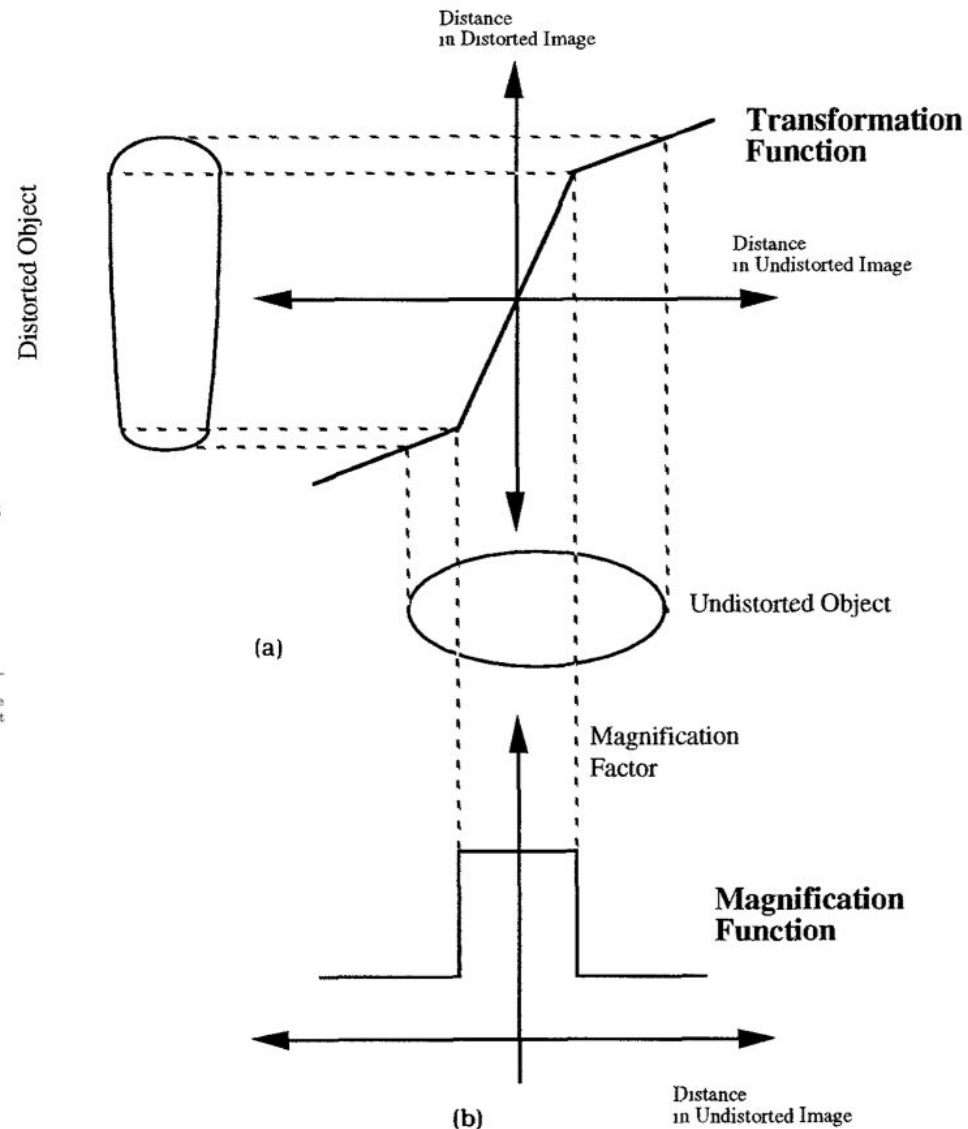


Fig. 3. (a) The transformation of an elliptic object by applying the transformation function of a Bifocal Display in one dimension; (b) the corresponding magnification function of the Bifocal Display.



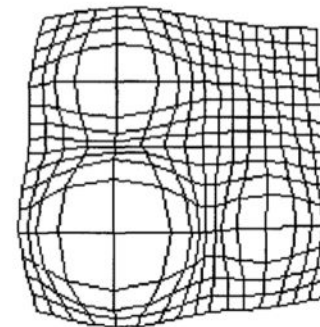
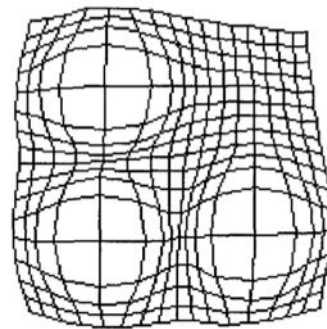
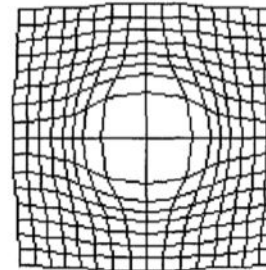
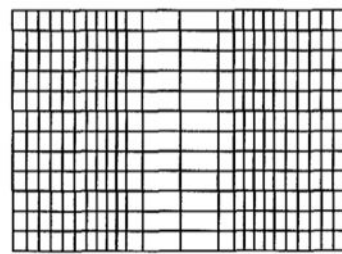
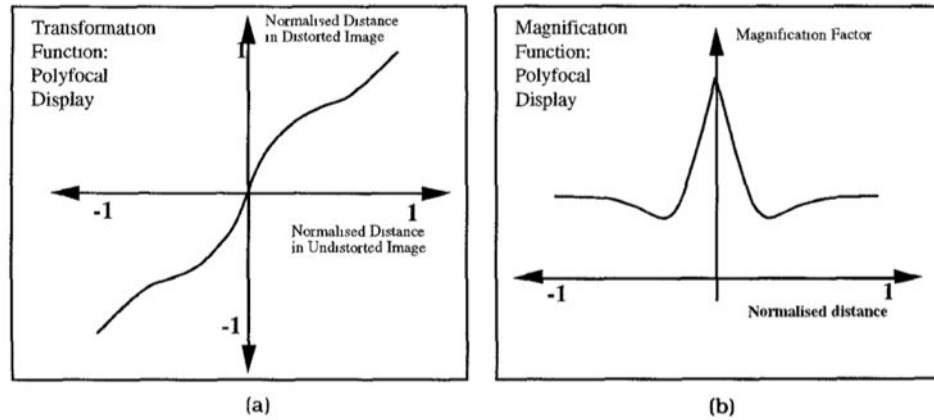


Fig. 5. The polyfocal projection: (a) a typical transformation function of a polyfocal projection; (b) the corresponding magnification function; (c) the application of the projection in one dimension; (d) the application of the projection in two dimensions; (e) a multiple-foci view of the projection using the same parameters for each focus point; (f) a multiple-foci view using different parameters.

# Application aux dessins de graphes

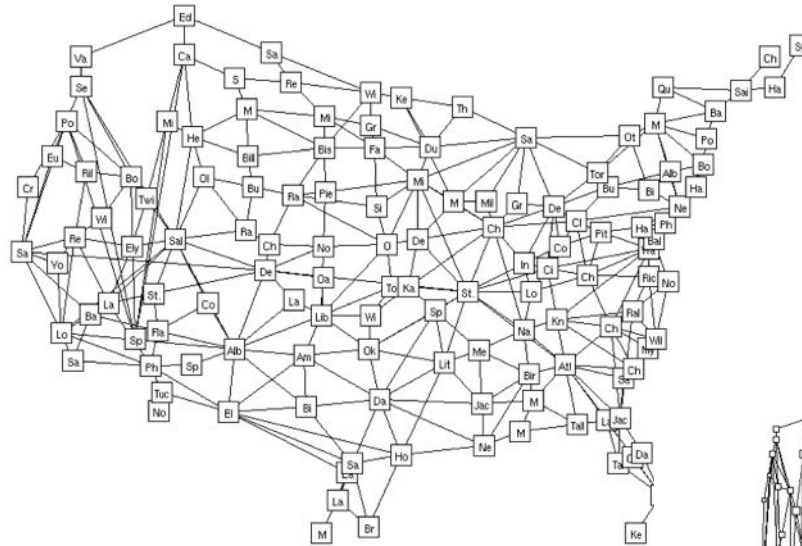


Figure 1: A graph with 134 vertices and 338 edges. The vertices in the United States, and the edges represent paths between neighboring cities. The edges would be annotated with the distance and driving time. The *a priori importance* value assigned to each vertex is proportional to the population of the corresponding city. Fisheye views of this graph

## Graphical Fisheye Views

Manojit Sarkar and Marc H. Brown

Department of Computer Science  
Brown University  
Providence, Rhode Island 02912

CS-93-40  
September 1993

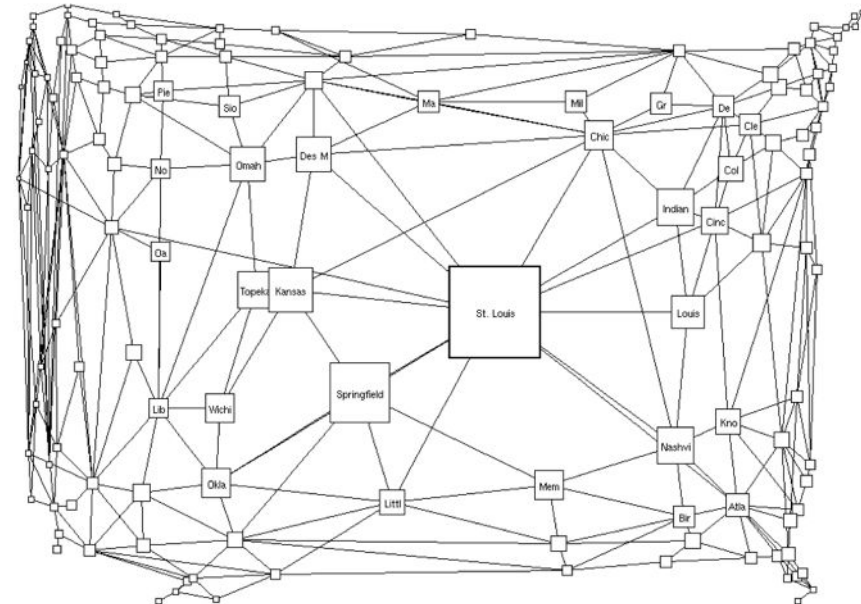
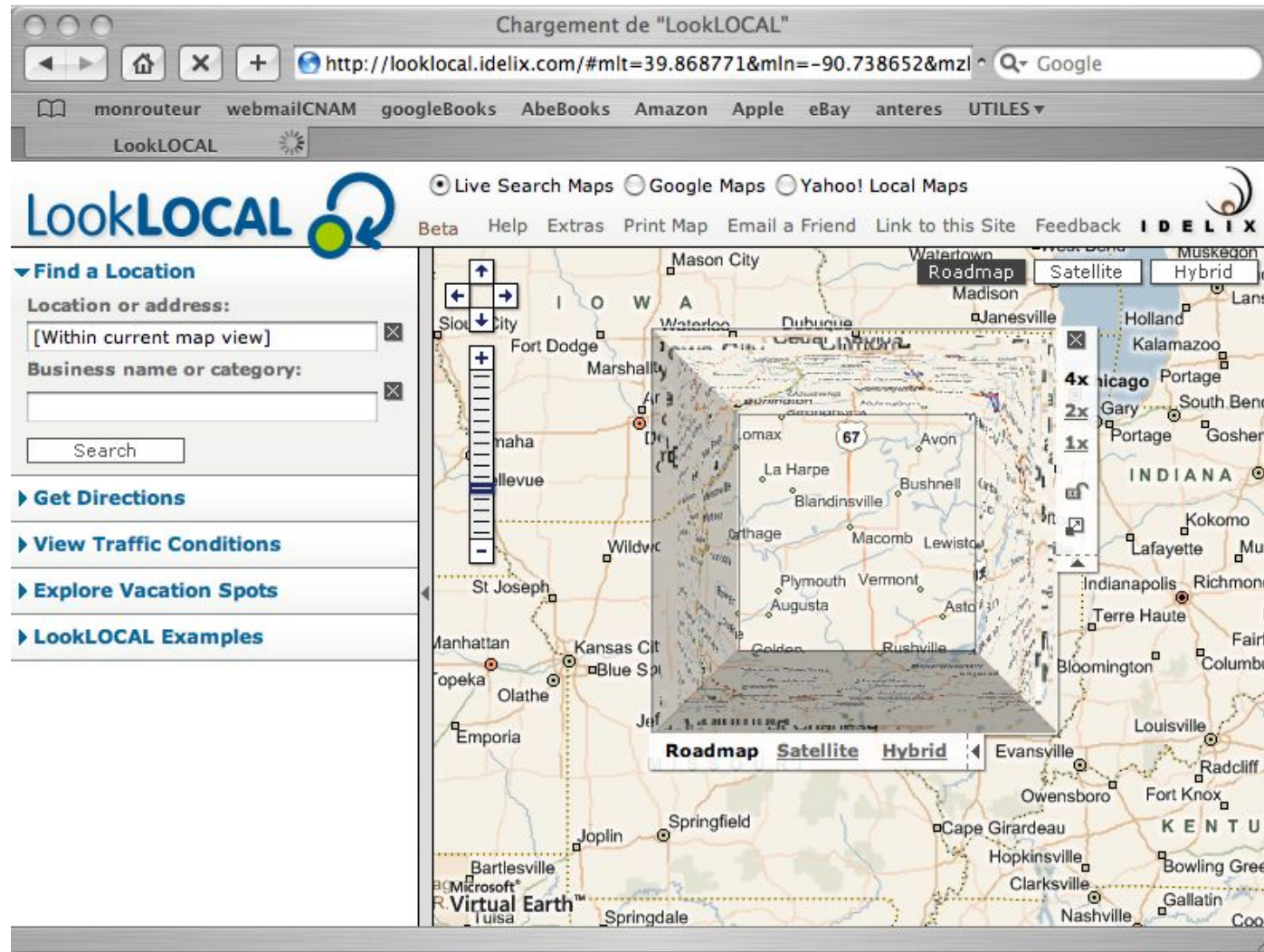


Figure 2: A fisheye view of the graph in Figure 1. The focus is on St. Louis. (The values of the fisheye parameters are  $d = 5$ ,  $c = 0$ ,  $e = 0$ ,  $VW_{cutoff} = 0$ ; the meanings of these parameters are explained in Sections 4 and 6.)

# Application aux cartes



IDELIX : Application de cartographie sur le web (ou PDA)





(a)



(b)



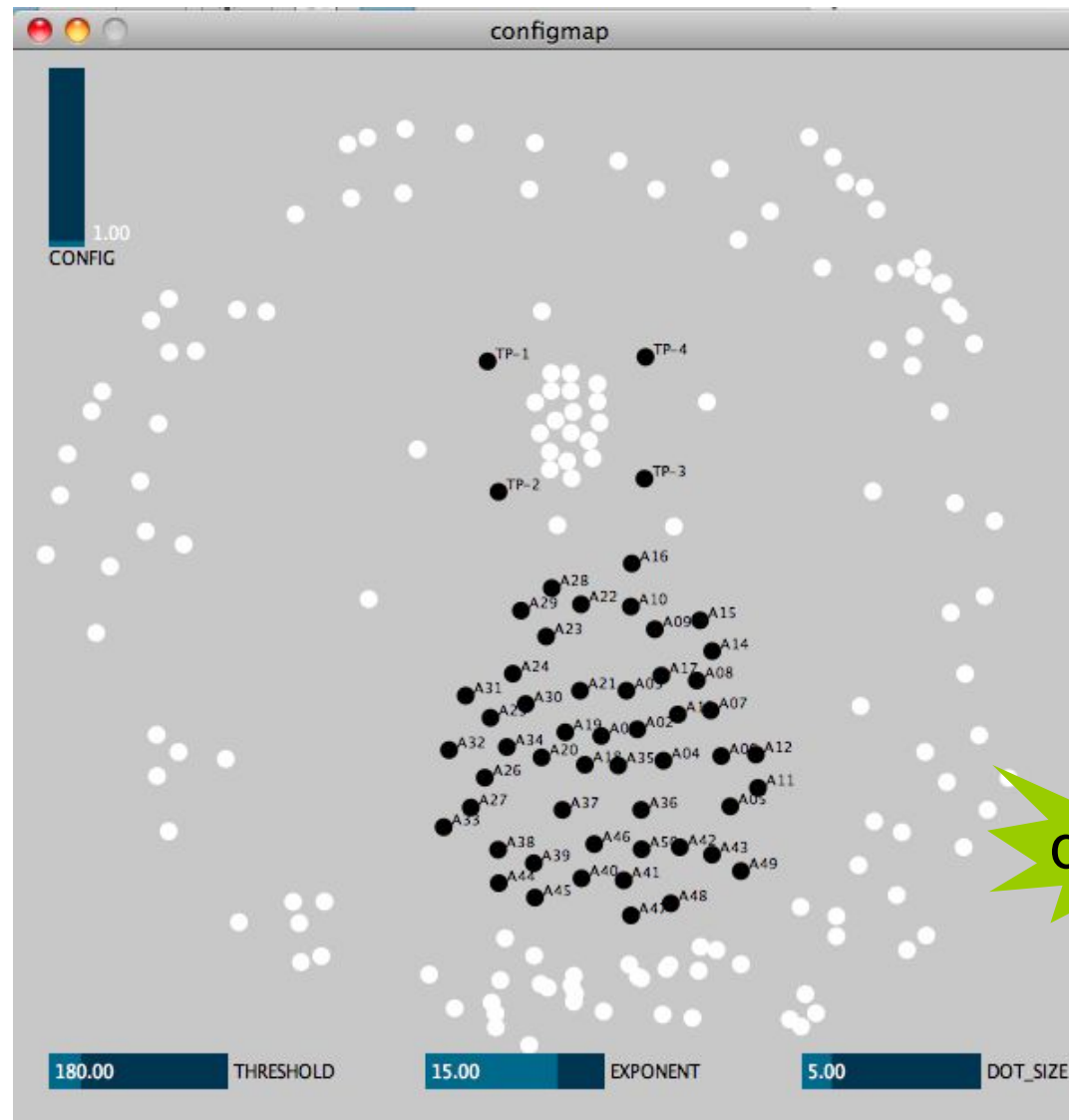
(c)



(d)

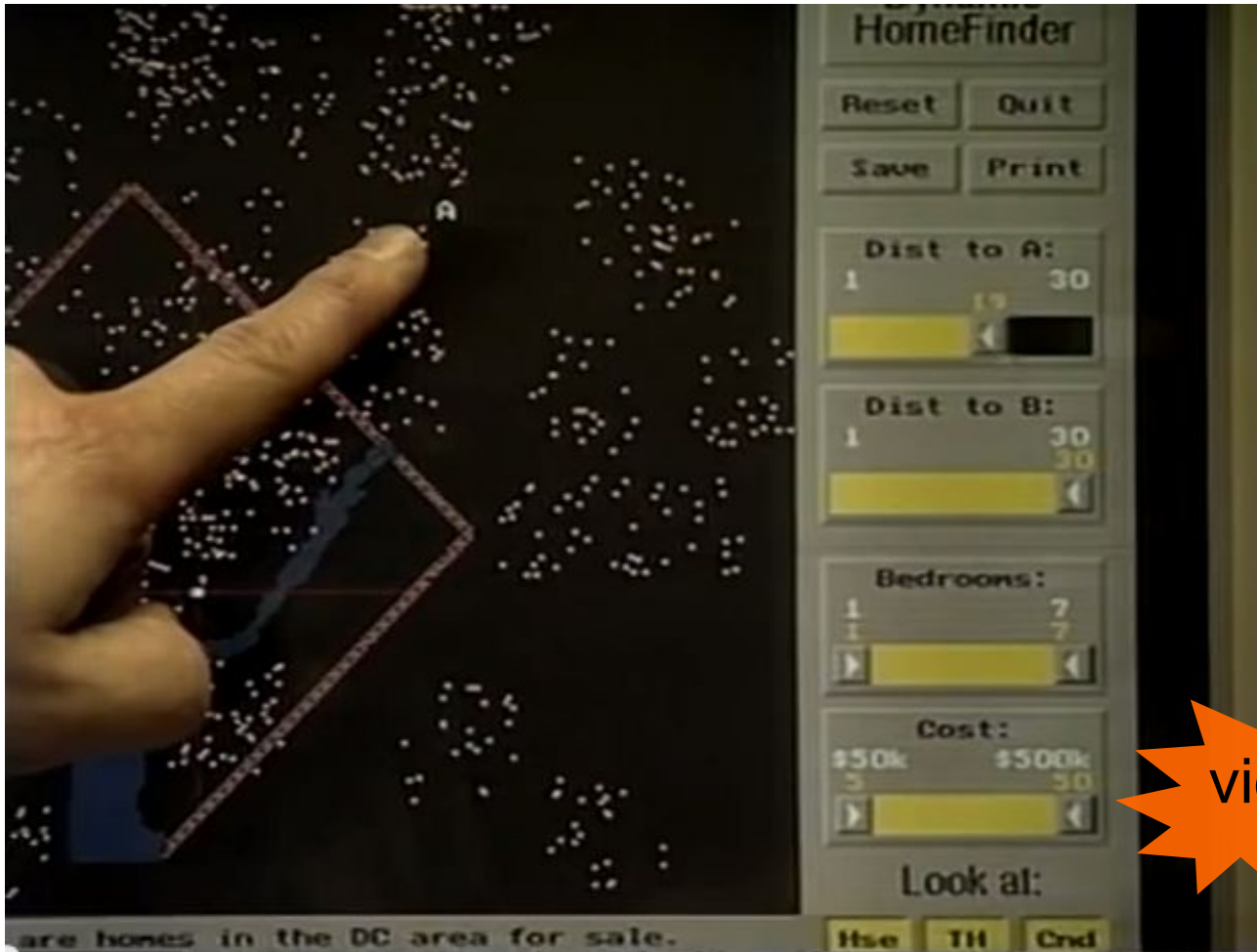
E. Pietriga et C. Appert "Sigma Lenses: Focus-Context Transitions Combining Space, Time and Translucence" ACM CHI'2008

# Exemple : Carte des antennes Alma



## 4. Filter - Relate

# Dynamic Queries (1993 University of Maryland UIS Broadcast)



<https://www.youtube.com/watch?v=5X8XY9430fM>



# Table lens (Rao, Card CHI'1994)

|     | Year | Quarter | Product       | Channel      | Region    | Saleperson   | Units | Revenue     | Profits |
|-----|------|---------|---------------|--------------|-----------|--------------|-------|-------------|---------|
| 126 | 1993 | 2       | ForeCode Pro  | Direct Sales | Southwest | Kevin Polen  | 1029  | 439898      | 171561  |
| 444 | 1993 | 4       | ForeCode Pro  | VAR          | West      | Tom Tuttle   | 302   | 122310      | 51371   |
| 445 | 1993 | 4       | ForeCode Pro  | VAR          | West      | Ann Thomas   | 302   | 122310      | 51371   |
| 446 | 1993 | 3       | ForeMost S... | Direct Sales | Midwest   | Sal Vitatone | 301   | 2.8595e+006 | 929338  |
| 447 | 1993 | 3       | ForeMost S... | VAR          | South     | Gary Copper  | 301   | 2.709e+006  | 948150  |

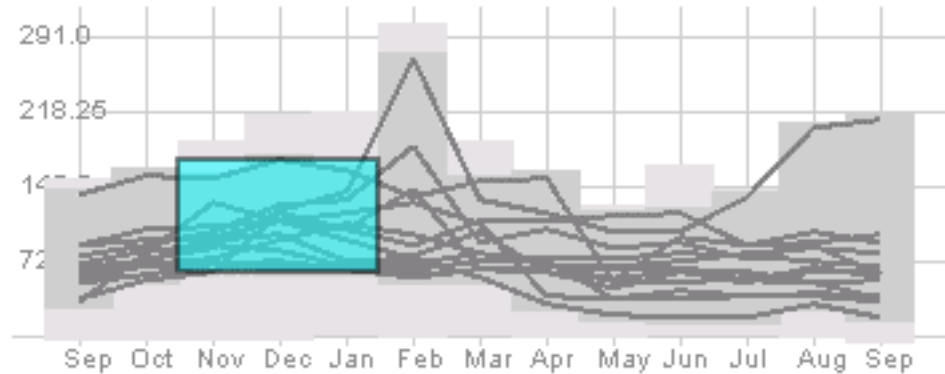
289 Key: 1992 Col: Profits Median: 30813.0000 Row: 1967, Col: 9

video

<https://www.youtube.com/watch?v=qWqTrRAC52U>



# exemple de TimeSearcher (HCIL, 2001-7)

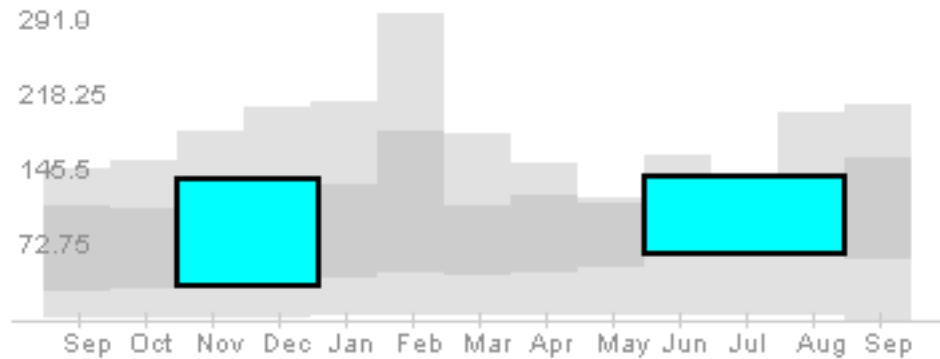


"brushing" : le changement d'un item impacte sur la vis. d'un autre

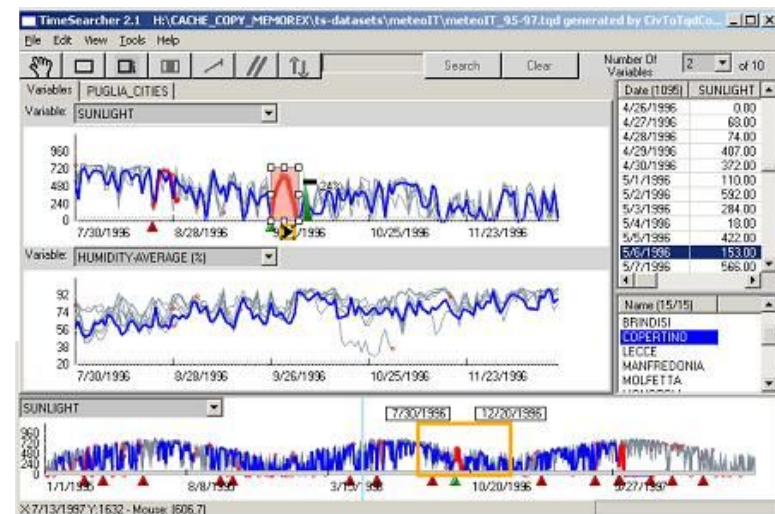
13/224 records displayed



RAW



<http://www.cs.umd.edu/hcil/timesearcher/>



## Suppression (filtrage)

Furnas : generalized  
fish-eye views (CHI'86)

Degree of interest (DOI) =  
Fonction de

- a priori importance (API)
- distance au focus courant (D)

Saul STEINBERG

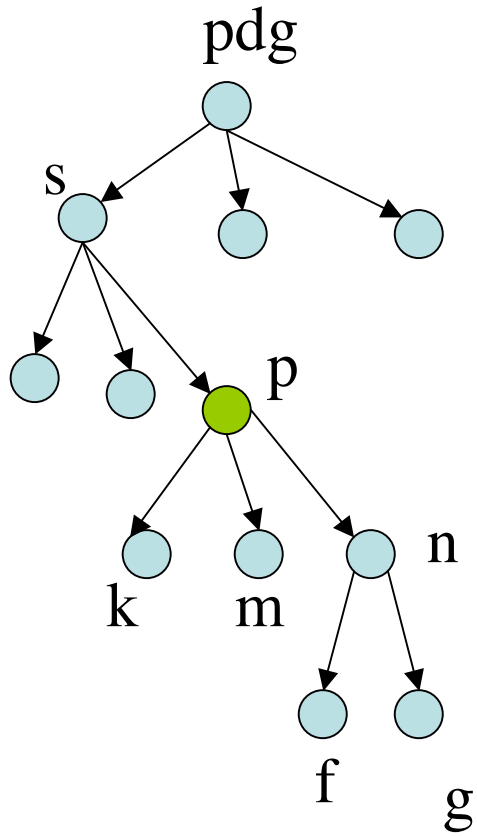
View of the World from 9th Avenue, 1976.

Ink, pencil, colored pencil, and watercolor on paper, 28 x 19".  
Cover drawing for The New Yorker, March 29, 1976.

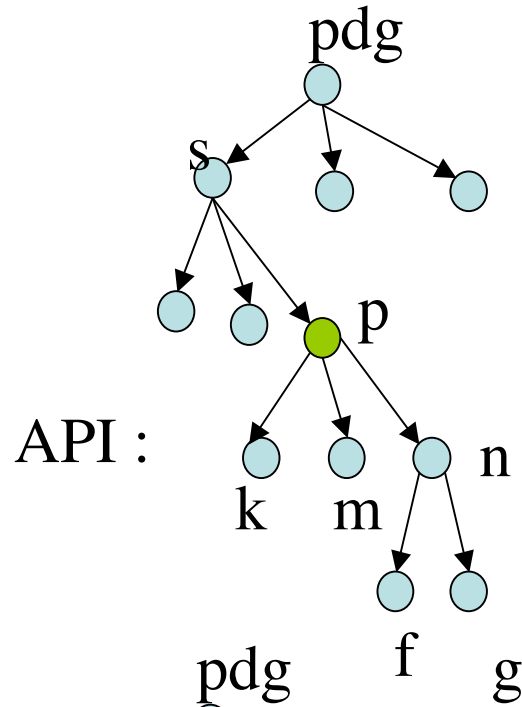
[http://www.saulsteinbergfoundation.org/  
gallery\\_24\\_viewofworld.html](http://www.saulsteinbergfoundation.org/gallery_24_viewofworld.html)



Exemple sur un arbre

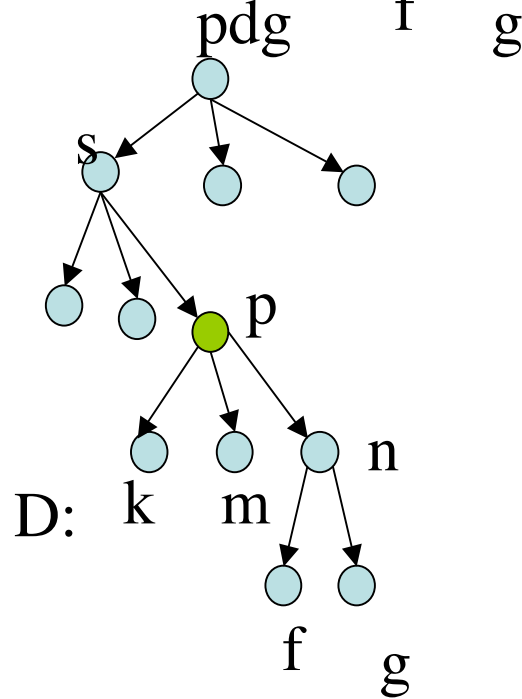


Focus en p



API :

API-D = ?



D:

## 5. Dispositifs d'affichage (afficher en grand)

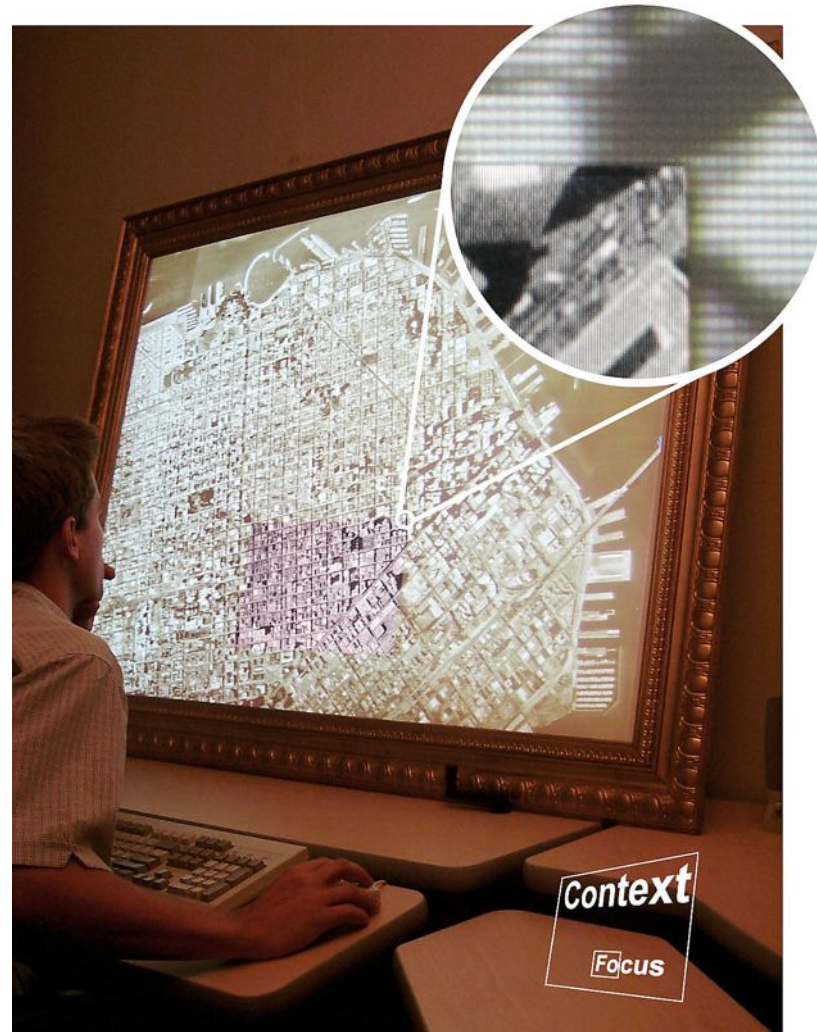
## CAVE (U. Illinois, 1996)



[http://en.wikipedia.org/wiki/Cave\\_automatic\\_virtual\\_environment](http://en.wikipedia.org/wiki/Cave_automatic_virtual_environment)

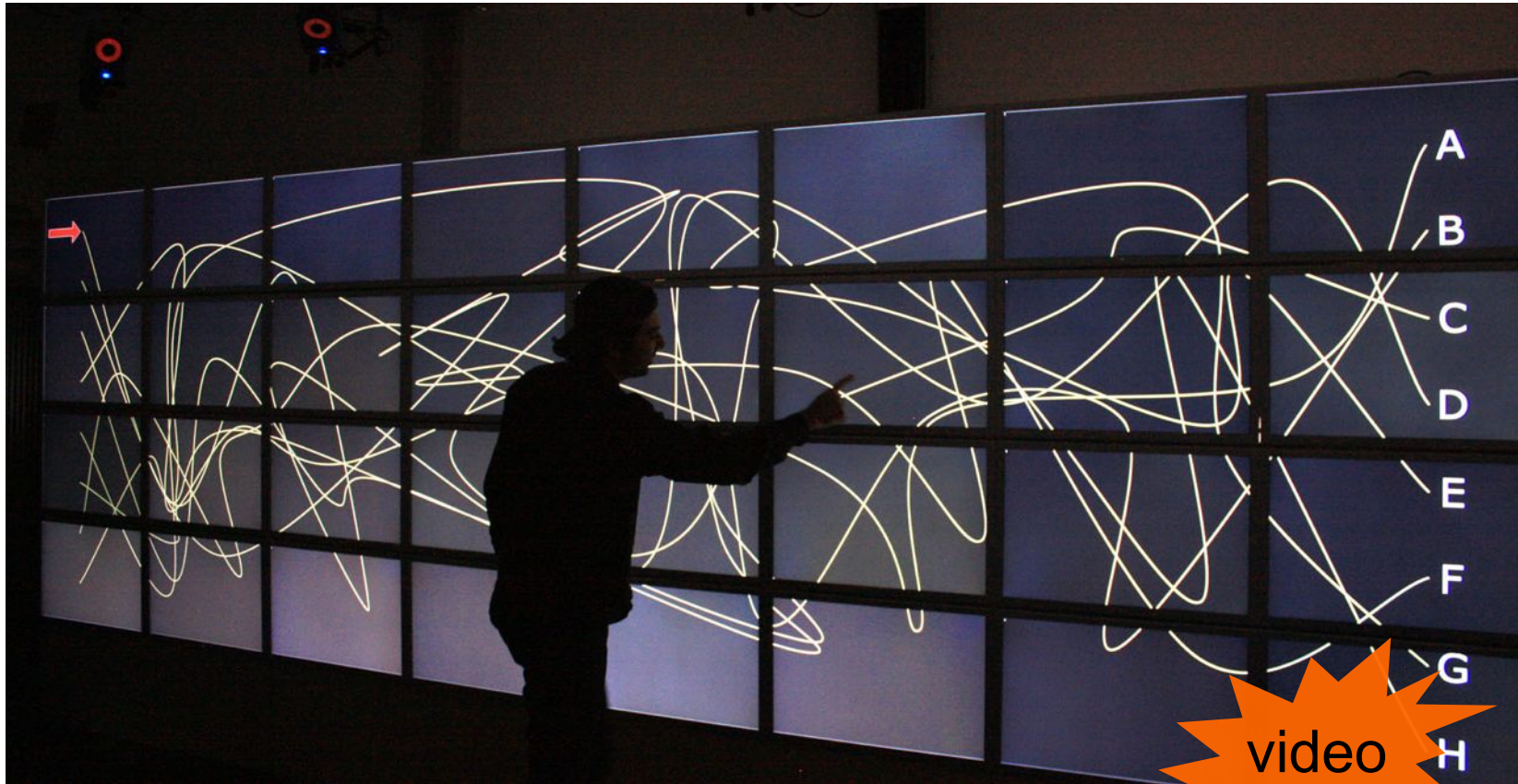


## P. Baudish - Ecran Focus-contexte (UIST'2001)



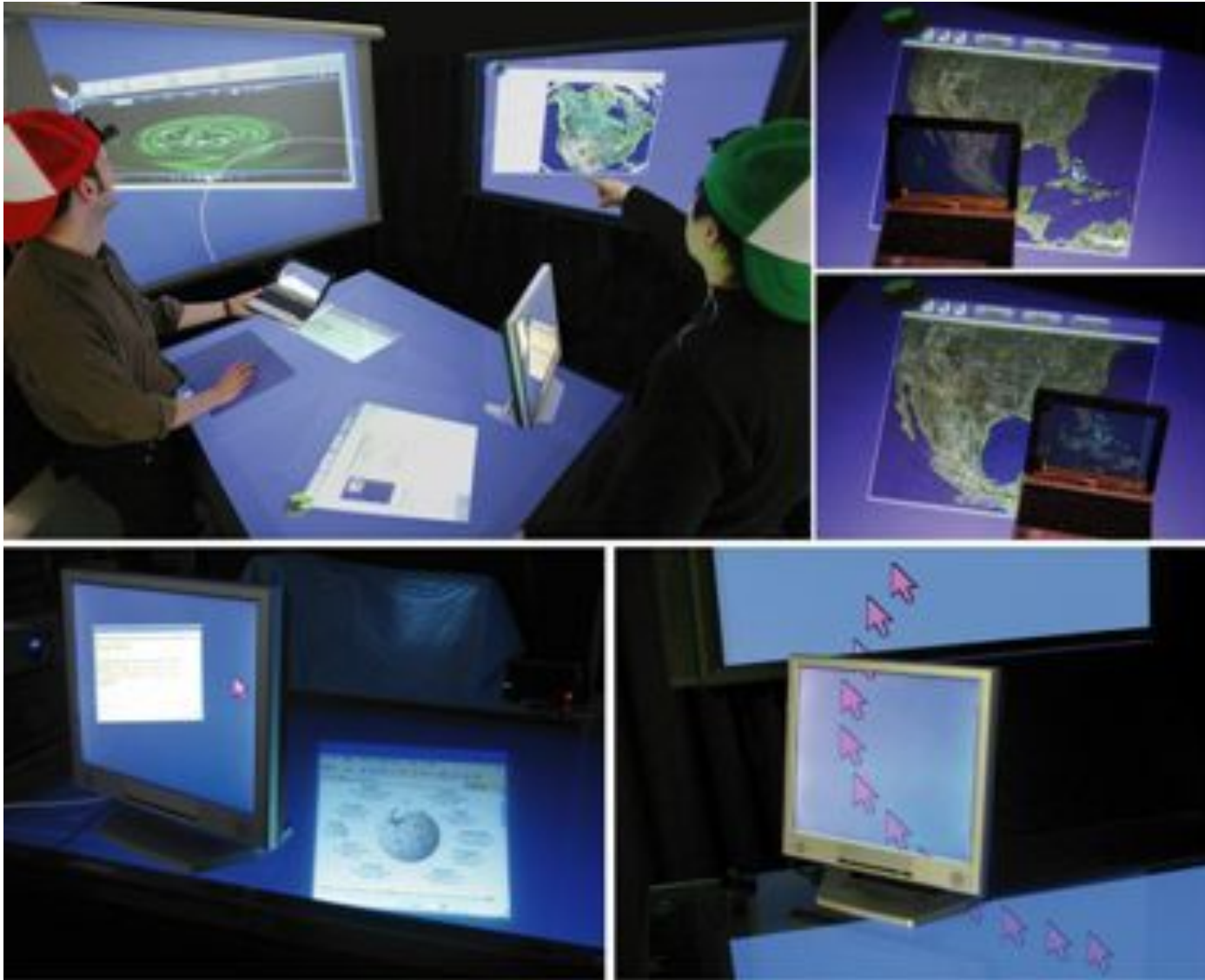
<http://www.patrickbaudisch.com/projects/focuspluscontextscreens/index.html>

## Mur d'écrans WILD (INRIA Saclay $\geq$ 2009)



- 8 x 4 = 32 écrans LCD 30"  $\Rightarrow$  5.5m x 1.8m and 131 Mpix
- cluster de 16 macpro avec 16 x 2 nvidia 8800GT
- capture mouvements video IR VICON ( $e < 1$ mm, 200 Hz)

# Synchronisation entre dispositifs d'affichage

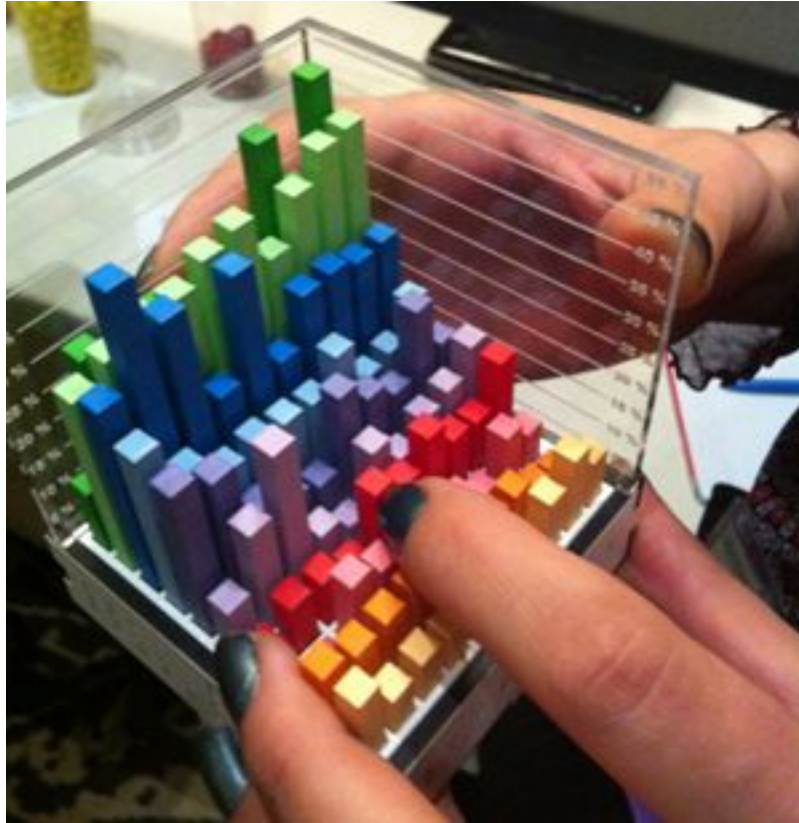


E-conic  
Nacenta  
et al.  
UIST'2007

<http://www-human.ist.osaka-u.ac.jp/CI/MDE/>



## Au-delà de l'écran ...



<http://www.aviz.fr/phys>



<http://tangible.media.mit.edu/project/relief/>



(un oubli du cours #1)



[http://en.wikipedia.org/wiki/Project\\_Cybersyn](http://en.wikipedia.org/wiki/Project_Cybersyn)