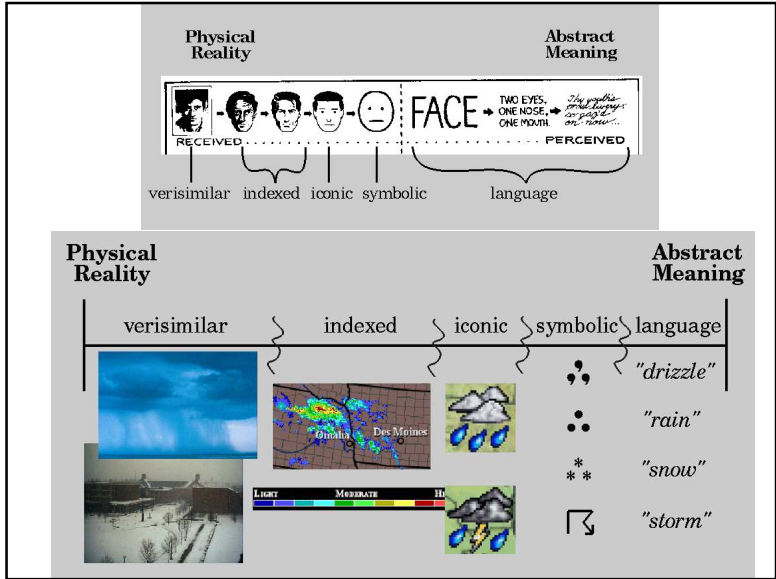


Chapter VII

Visual Access to Multimedia Databases



Visual Access to Multimedia Databases

- 7.1 – Introduction to visual languages
- 7.2 – Table Languages
- 7.3 – Graphic Languages « Query by Example »
- 7.4 – Visual Languages and GIS
- 7.5 – Global Visual Access
- 7.6 – Conclusions

7.1 – Introduction to visual languages

- “A drawing is 1000-word worth”
- “A drawing is better than a long discourse”
- Entry in IS (interrogation)
- Output of IS (visualization)
- Alphabetic language comes from visual languages

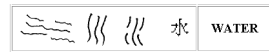
Examples for « water »

Egyptian Hieroglyph



mem

Chinese Character



shui

Maya Glyph



muluk

References

- <http://www.upenn.edu/museum/Collections/hieroglyphs.html>
- <http://logos.uoregon.edu/explore/orthography/chinese2.html>
- <http://www.criszenzo.com/jaguar/calendr.html>

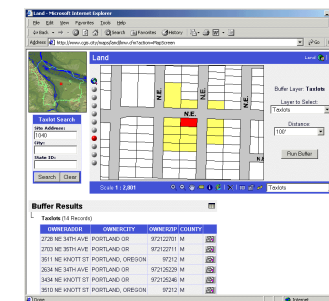
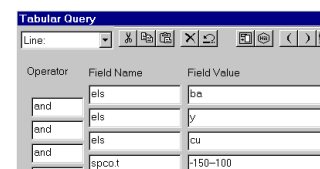
Visual Queries

- How to write queries with drawings?
- Cultural problems
- Simple / complex queries
- Expressive power of the language

7.2 – Table Languages

- Continuation of the blackboard metaphor
- Usage for relational DB

Table query



7.3 – Query by Example

- Invented by Moise ZLOOF (IBM)
- Objective: by using tables, give an example of a wanted result

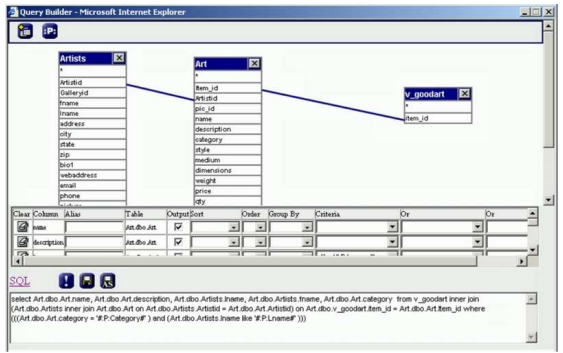
QBE

Paradox Query

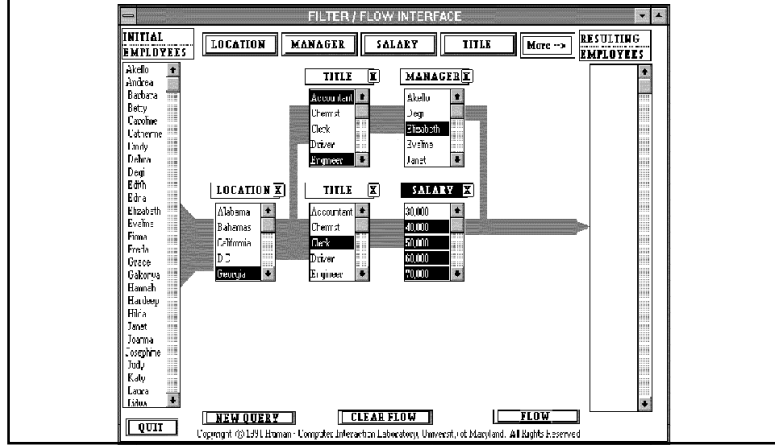
RECEIPT								
Receipt#	Date	Total Receipt	Cash Received	Check Received	Check Bank#	Credit Card Received	MasterCard or Visa	Sales Person#
✓	✓ = 2/1/81	✓						✓ pars

EMPLOYEE				
Sales Person#	Last Name	First Name	Middle Initial	Hire Date
✓ pars	✓	✓		

Query Builder



Boolean Query

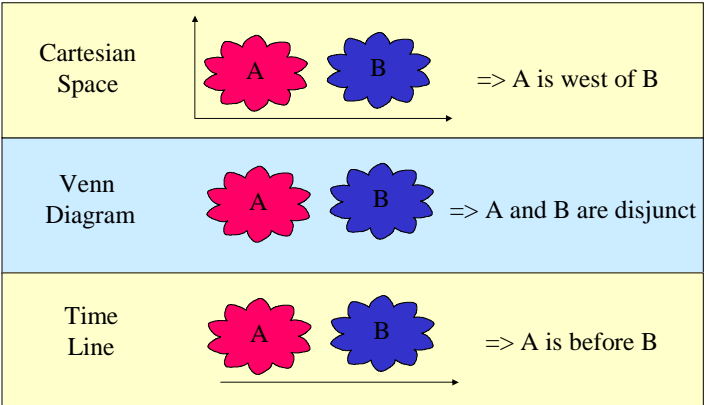


7.4 – Visual Languages and GIS

- Structuring Metaphors
- Light Tables
- Map Algebra
- Geographer desk



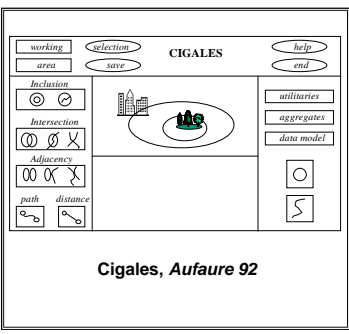
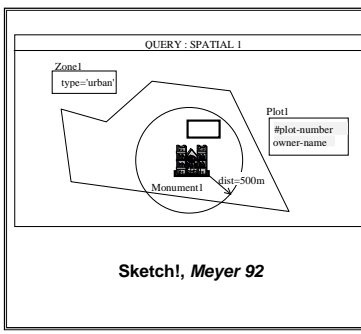
Working spaces



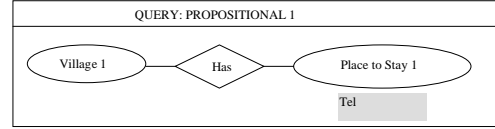
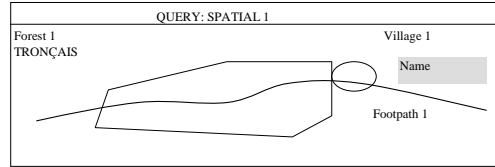
Two approaches

Blackboard metaphor

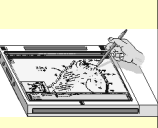

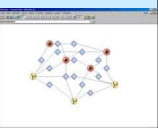
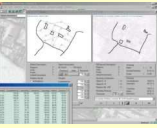
Selection of icons





Queries with SKETCH!



Sketch!

Concept		Visual Query	
Formal View		Query Result	

Light tables

Map algebra

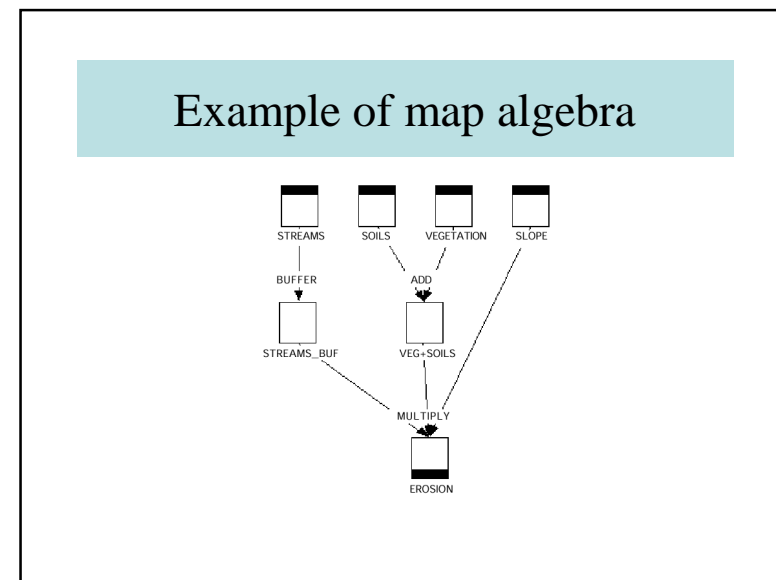
Map Algebra [X] [↶] [↷] [✓]

New Layer	Operation	Function	First Layer
veg+soil.grd	= local	sum	of veg.grd

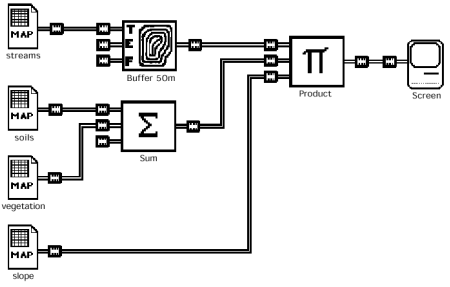
Next Layer(s)			
and soils.grd	=	slope.grd soils.grd streams.grd veg.grd	

Map Algebra Statement

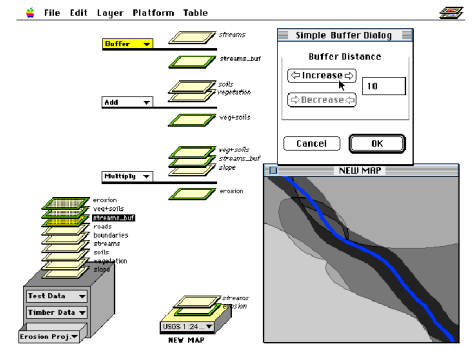
veg+soil.grd = LocalSum of veg.grd and soils.grd



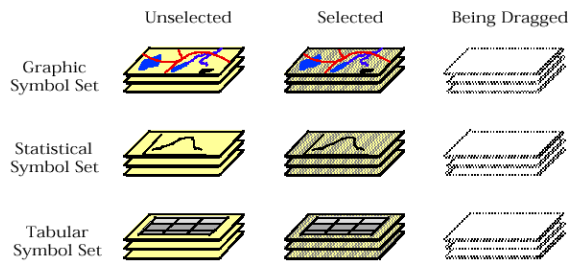
Graphic map algebra



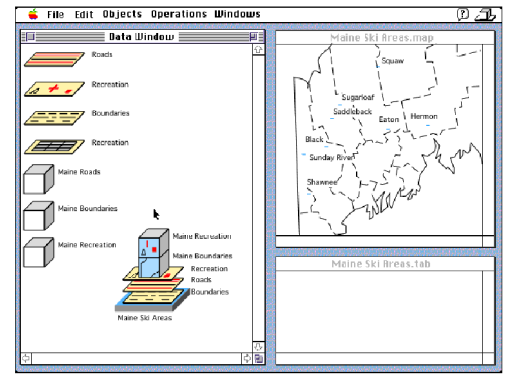
Geographer desk



Example of map overlay



Interface for map overlay



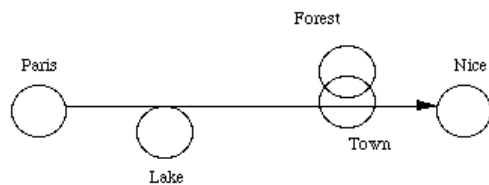
CIGALES

**CIGALES = Cartographical Interface
Generating an Adapted Language
for Extensible Systems**

Icons

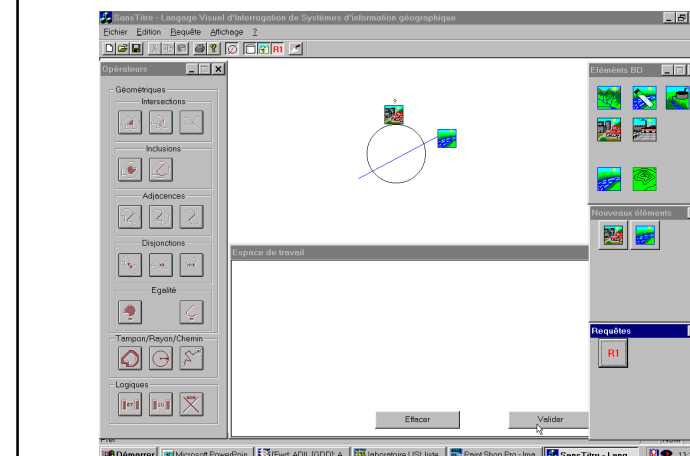
- Object icons: classes and instances
- Spatial pictograms (point, line, area)
- Operator icons
 - Boolean Combination of operators
- Query icons

Example of CIGALES query





Select *
From Forest F, Lake L, Network N, Town T
Where Adjacent (Path ("Paris", "Nice"), L.geometry)
and Intersection (Path ("Paris", "Nice"), Difference (T.geometry, F.geometry))
and Intersection (F.geometry, T.geometry)

Validation of queries
















Alphabet

- Spatial object types:
 - 2D (Polygon)  or 1D (Polyline) 
- Operators :


Operators					
Spatial		Interactive selection	Set theory	Logical	Structural
Topological	Metrical	Point	Intersection	And	Creation
Inclusion	Distance	Radius	Union	Or	Modification
Adjacency	Ray	Rectangle	Identity	Not	Deletion
Disjunction	Path	Any area	Difference		Buffer zone
Equality			Exclus. conjunction		
			Complementaries		

Icons

- Types of object classes:
 -      
- Objects: icon + identifier
 -  Lyon  NR 7
- Operators: fixed and predefined icons
 -     


Visual Queries

- Elementary queries
 - no criterion
- Simple queries:
 - only one spatial criterion
- Complex queries:
 - Several spatial criteria





Ski de fond

Select all cross-country skiing stations.



What are cities surrounded by a river?

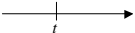
500 m

What are parcels located in urban area and less than 500 meters of a monument?

Temporal Operators

- ALLEN Relations [Allen 83]

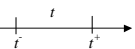
Instant



Operator

Before
Equality
Meets
Overlaps
During
Starts
Finishes

Interval



Spatio-temporal Operators

- Lifecycle operators



Creation



Division



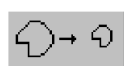
Growth



Destruction



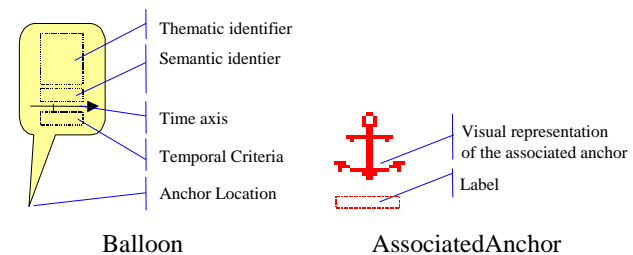
Fusion



Diminution

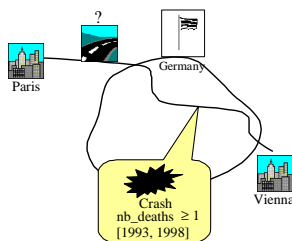
Balloons and anchors

- News metaphors for complex spatio-temporal criteria



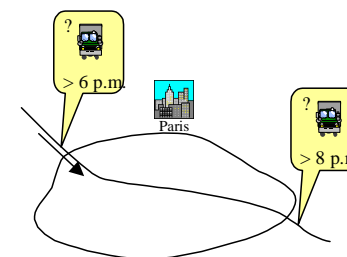
Example of spatio-temporal query

What are the dangerous roads in Germany, located between Paris and Vienna, where there were accidents between 1993 and 1998?



Other example

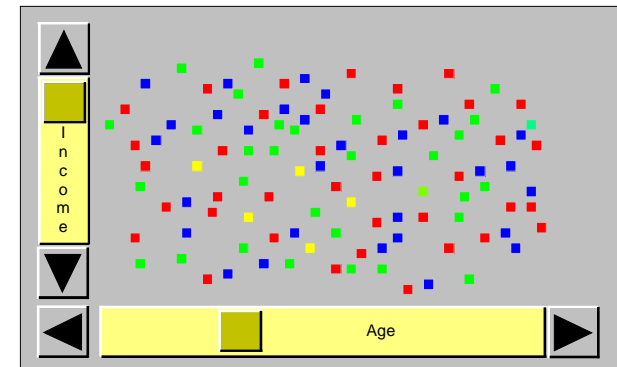
What trucks have crossed Paris entering before 6pm and exiting after 8pm ?



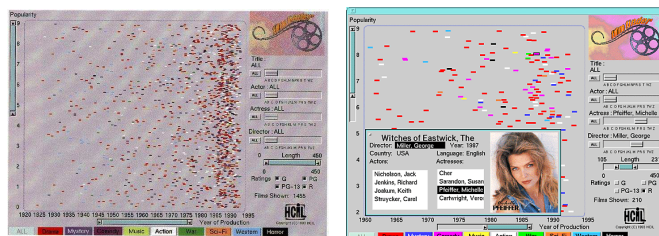
7.5 – Global Visual Access

- Ben Shneidermann Approach (mantra):
- *Overview, zoom and filter, details on demand*
- STARFIELD: to access to objects belonging to the same collection
- SPACE FILLING TREEMAPS: to access to various collections (bookshelves)

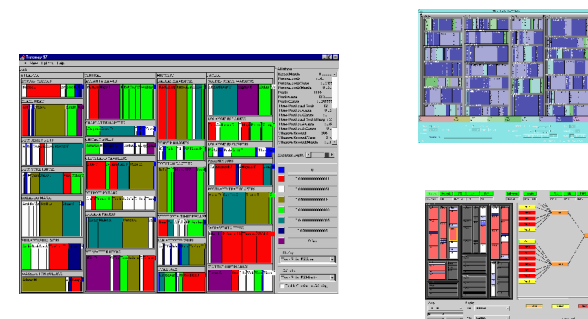
Starfield Example



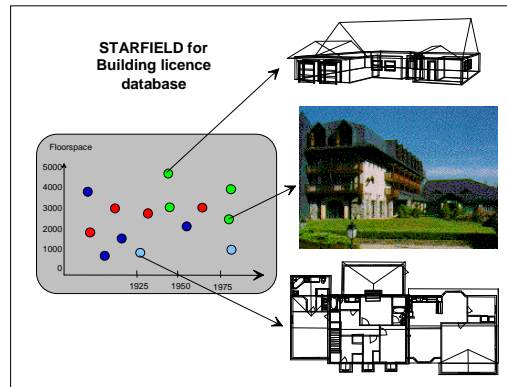
FilmFinder



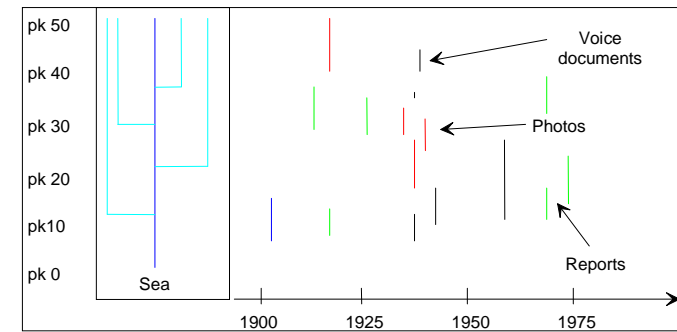
Space-filling treemap



Starfield : Building licences



Starfield for floods



7.6 – Conclusions

- Alphabetic languages come from visual languages
- Visual queries = a new way for querying databases.
- Problems of ambiguities
- Cultural and linguistic problems
- Global Access:
- « *Overview, zoom and filter, details-on-demand* »