

Spatial distribution and visual analysis of architectural semantic features

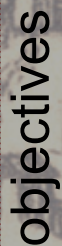
graphic exploratory tool
for visual comparative analysis
of the antique theatres

I. Dudek,
F. De Domenico,
J.Y. Blaise.



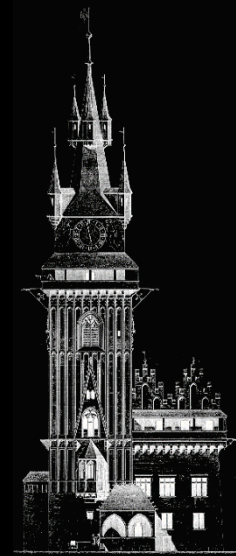
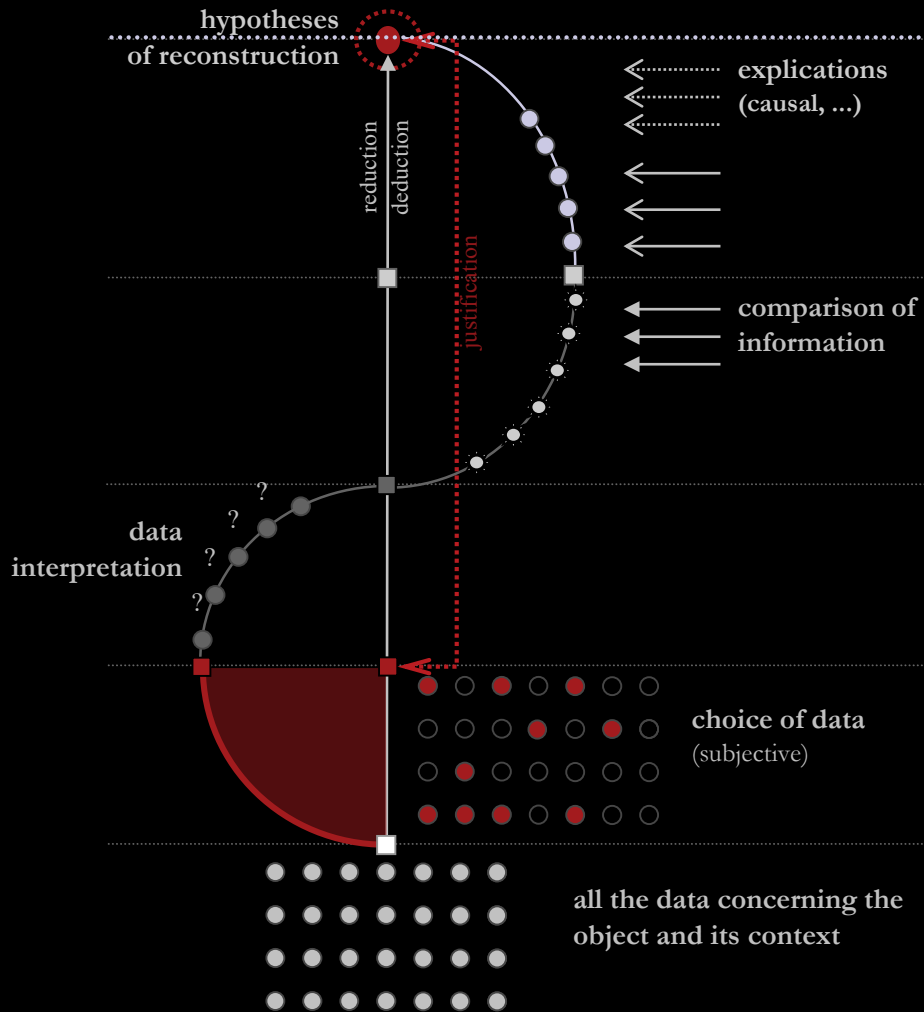
- _____ objectives
- _____ research context
- _____ methods and results
- _____ implementation
- _____ limits and perspectives
- _____ conclusions





"... food for thinking ..."
 Id of experimentation

research context



endogenous data

What has happened to an edifice **A** at the time **t** ?

exogenous facts

What happened at that period ?

- What cultural trends the edifice reflect ?
- What could be the reason of these or that change ?

Present what we really know without neither **adding** nor **loosing** information.



TAISEI/AOROC/ENS in journal CNRS
n°178



In Cartography and 3D Reconstructions of Cities,
an overview, Séminaire VLA, Marseille, avril
2003

provide tools for visual reasoning

visual methods of data analysis → reasoning based on comparisons

- What do we know on an object **A** in comparison to what we know about objects **B**, **C** and **D**?

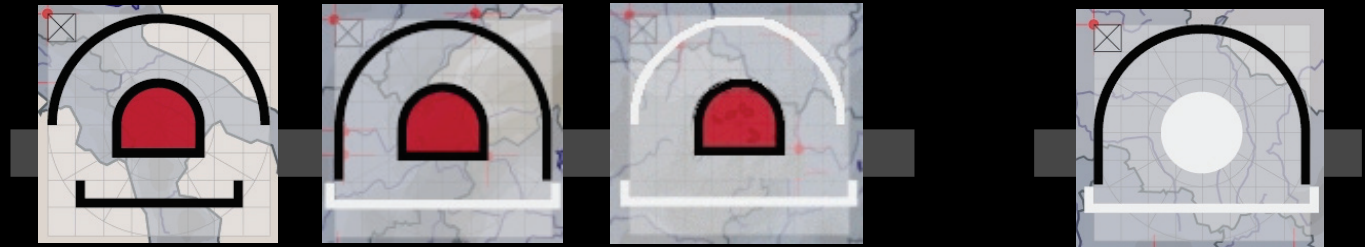


visual methods of data analysis → reasoning based on comparisons

- What do we know on an object **A** in comparison to what we know about objects **B**, **C** and **D**?



- From what we know on objects **A**, **B** and **C** can we deduce something about object **E**?



visual methods of data analysis → reasoning based on comparisons

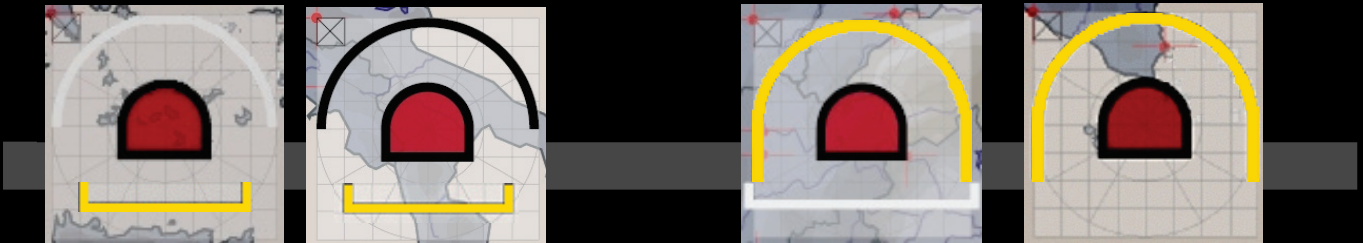
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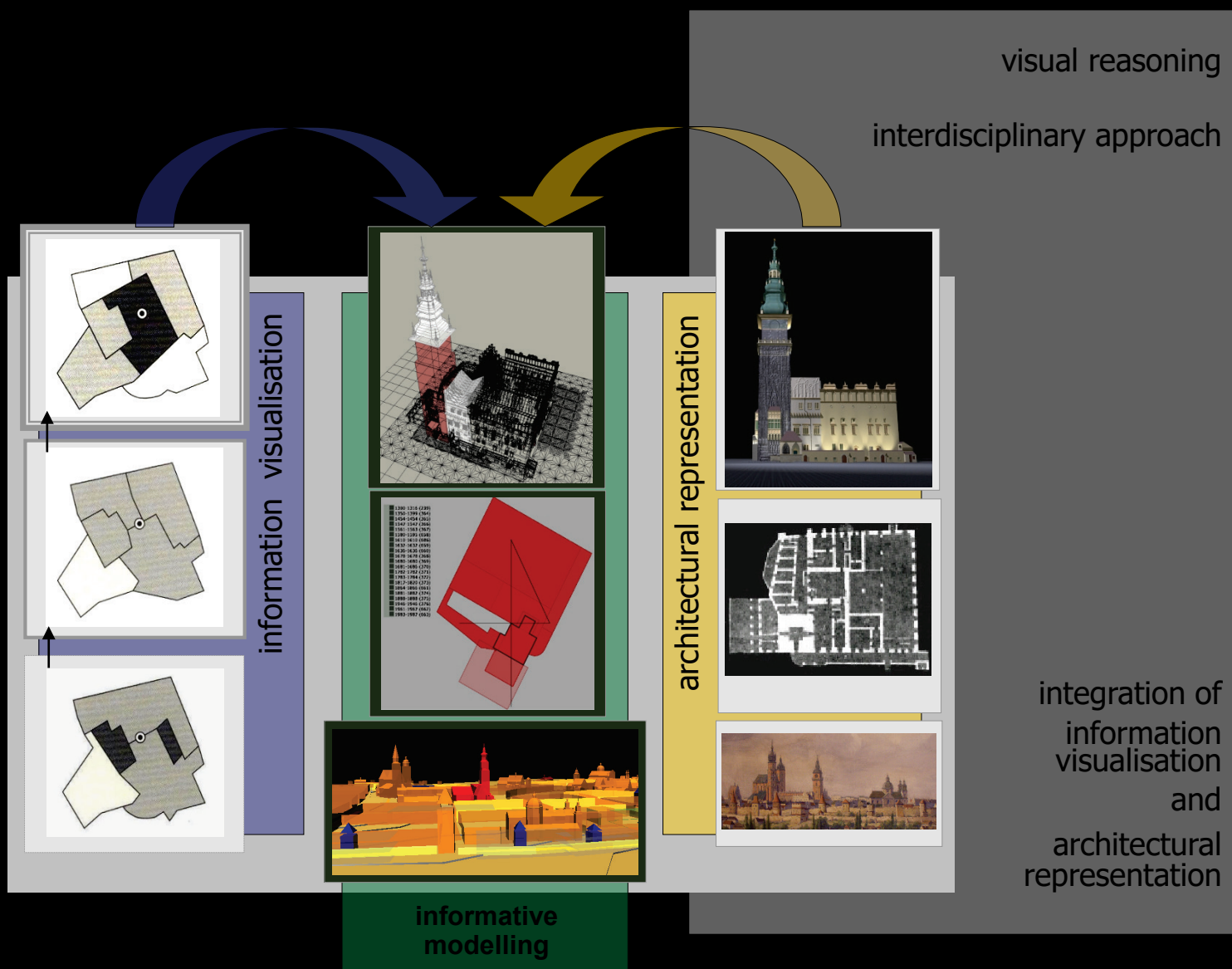


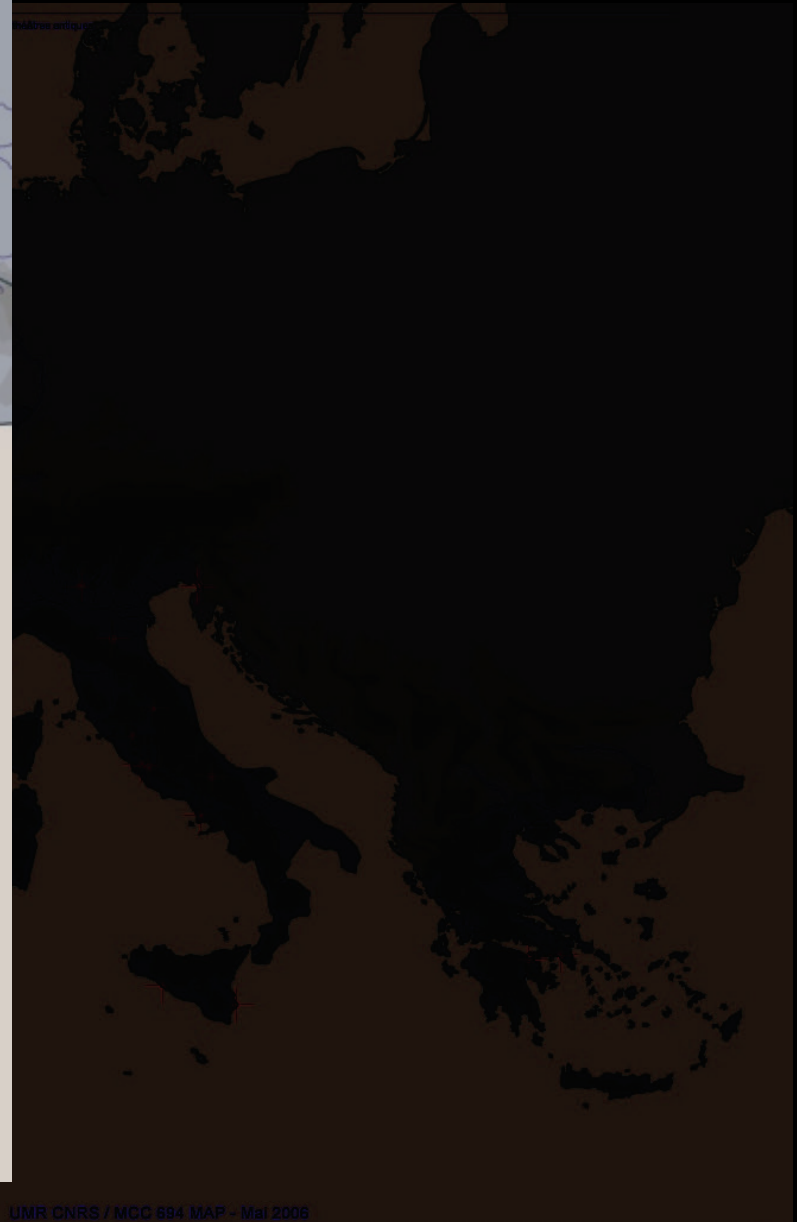
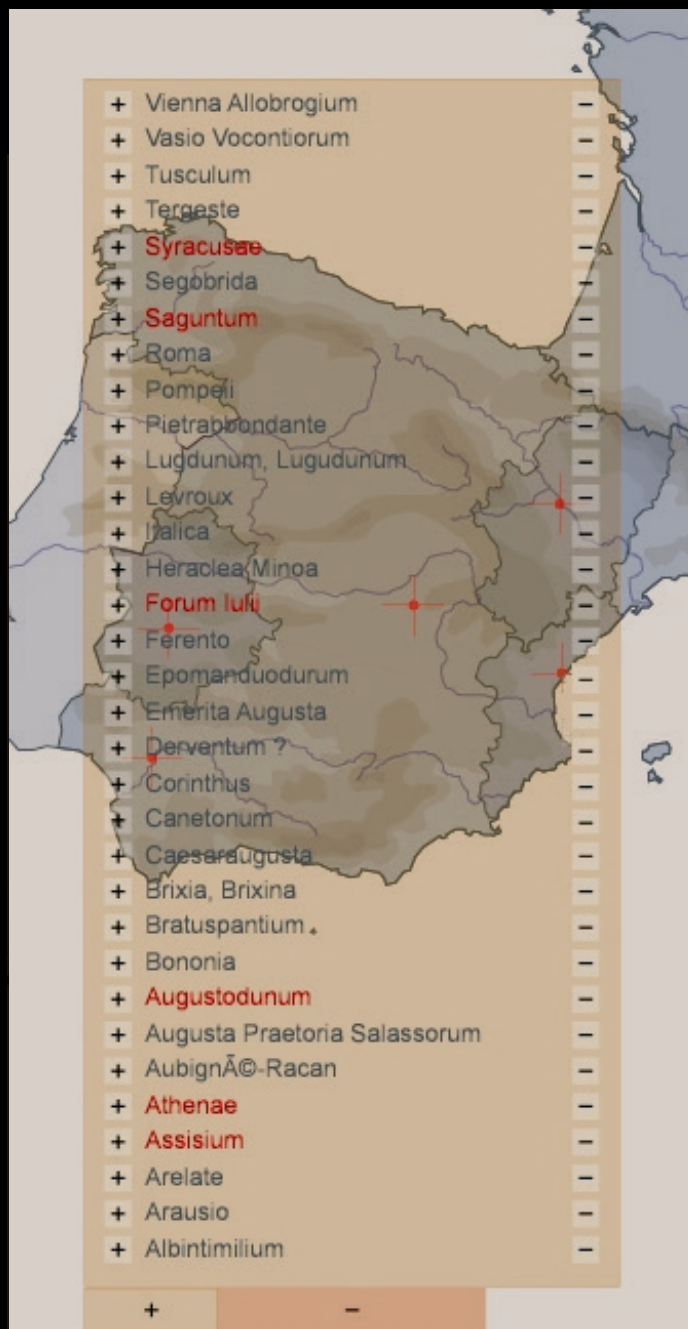
- What do we learn about the evolution of the [**A**, **B**, **C**, **D**] typological family by observing for instance that :



A and **D** have an additional feature φ ,

C and **B** have an additional feature ζ ?







enable visual comparisons



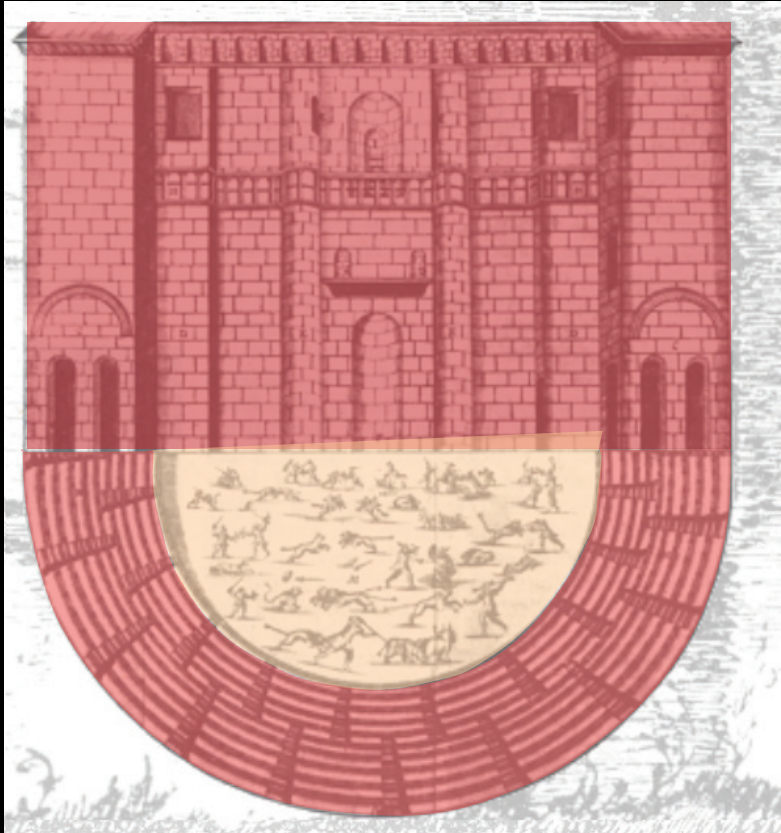
delineate specific parameters

I : formal analysis

II : spatial distribution

III : visual tools

I : formal analysis



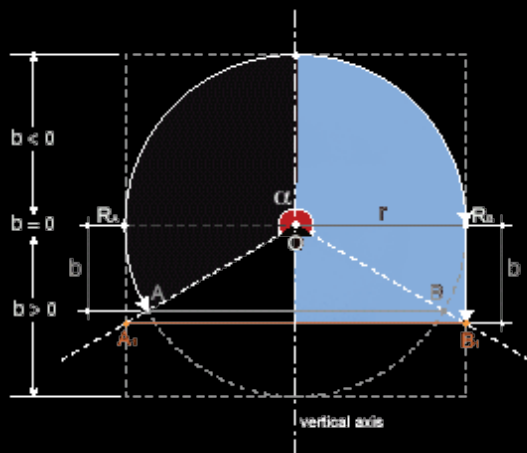
An antique theatre is composed from three basic elements :

- scena
- orchestra
- cavea

analyse of the elements
of variation

define the parameters
of comparison

[R. Alleau *Guide de la Provence mystérieuse*, Éditions Princesse, collection *Les guides noirs*, 1982]



O = geometrical centre at the orchestra's construction

A, B = the points of orchestra's delimitation

R_A, R_B = diameter markers

r = radius

α = angle $\widehat{AOB}$

$\overline{AB}$ = distance between the points A and B

b = vertical distance between the orchestra delimitation points (A, B) and the diameter markers (R_A, R_B)

I : formal analysis

variations of orchestra

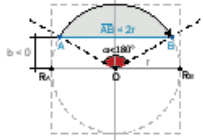
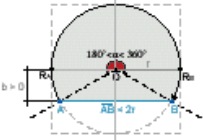
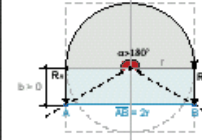
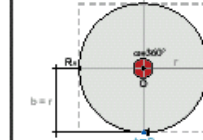
Or = $\boxed{?}$ difficulties with an interpretation of the archeological remains

Or = $\boxed{T}$ only textual descriptions

Parameters, set III

Parameters, set II

Parameters, set I

	1	2	3	4	5
Parameters, set I					
r	r	r	r	r	r
α	$0 < \alpha < 180^\circ$	$\alpha = 180^\circ$	$180^\circ < \alpha < 360^\circ$	$\alpha > 180^\circ$	$\alpha = 360^\circ$
$\overline{AB}$	$\overline{AB} < 2r$	$\overline{AB} = 2r$	$\overline{AB} < 2r$	$\overline{AB} = 2r$	$\overline{AB} = 0$
b	$b < 0$	$b = 0$	$b > 0$	$b > 0$	$b = r$

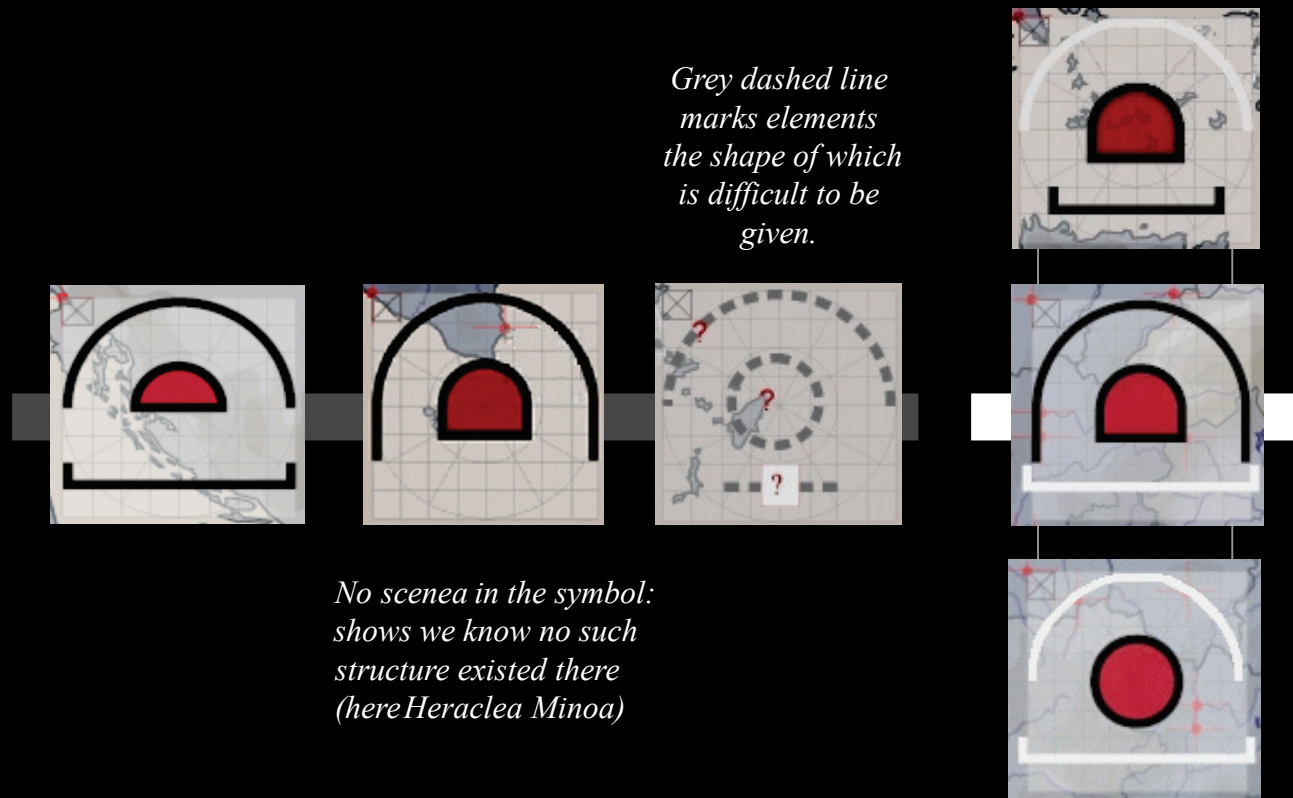
Typo-plan	1	2	3	4	5	6	7
	Or < 180°	Or = 180°	Or > 180° Ou	Or > 180° Pr	Or = 360°	Or = $\boxed{?}$	Or = $\boxed{T}$

Symbol	1	2	3	4	5	6	7

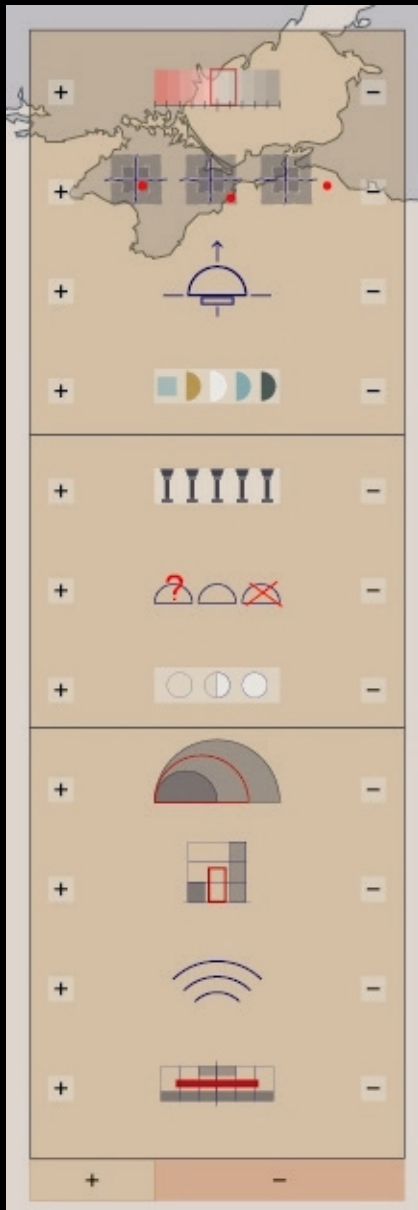
I : formal analysis

credibility of information

- ▶ each of the three components of a theatre can be described
- ▶ the visual sign that identifies the object's typology can be dynamically produced



White element in symbol: shows lacking information in DB



dates of construction

urban context

orientation

classification

conservation

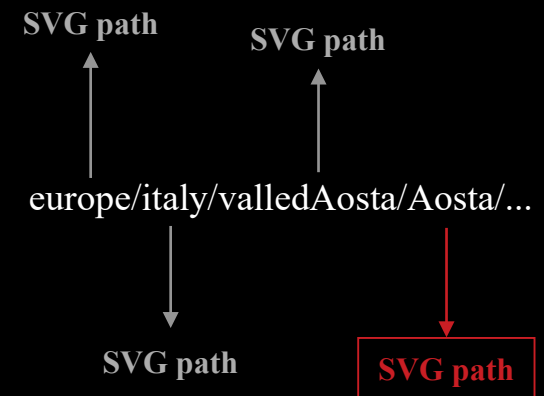
destruction

interventions

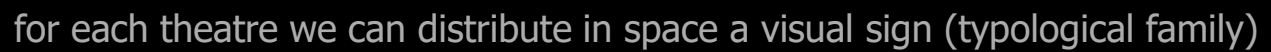
...

toponimical hierarchy

II : spatial distribution



methods and results



	1	2	3	4	5
Parameters set					
r	r	r	r	r	r
α	$0 < \alpha < 180^\circ$	$\alpha = 180^\circ$	$180^\circ < \alpha < 360^\circ$	$\alpha > 180^\circ$	$\alpha = 360^\circ$
AB	$AB < 2r$	$AB = 2r$	$AB < 2r$	$AB = 2r$	$AB = 0$
b	$b < 0$	$b = 0$	$b > 0$	$b > 0$	$b = r$
Type-plate	1	2	3	4	5
	Or $< 180^\circ$	Or $= 180^\circ$	Or $> 180^\circ$ Ou	Or $> 180^\circ$ Pr	Or $= 360^\circ$
	Or $= \square$				Or $= \square$
Symbol					

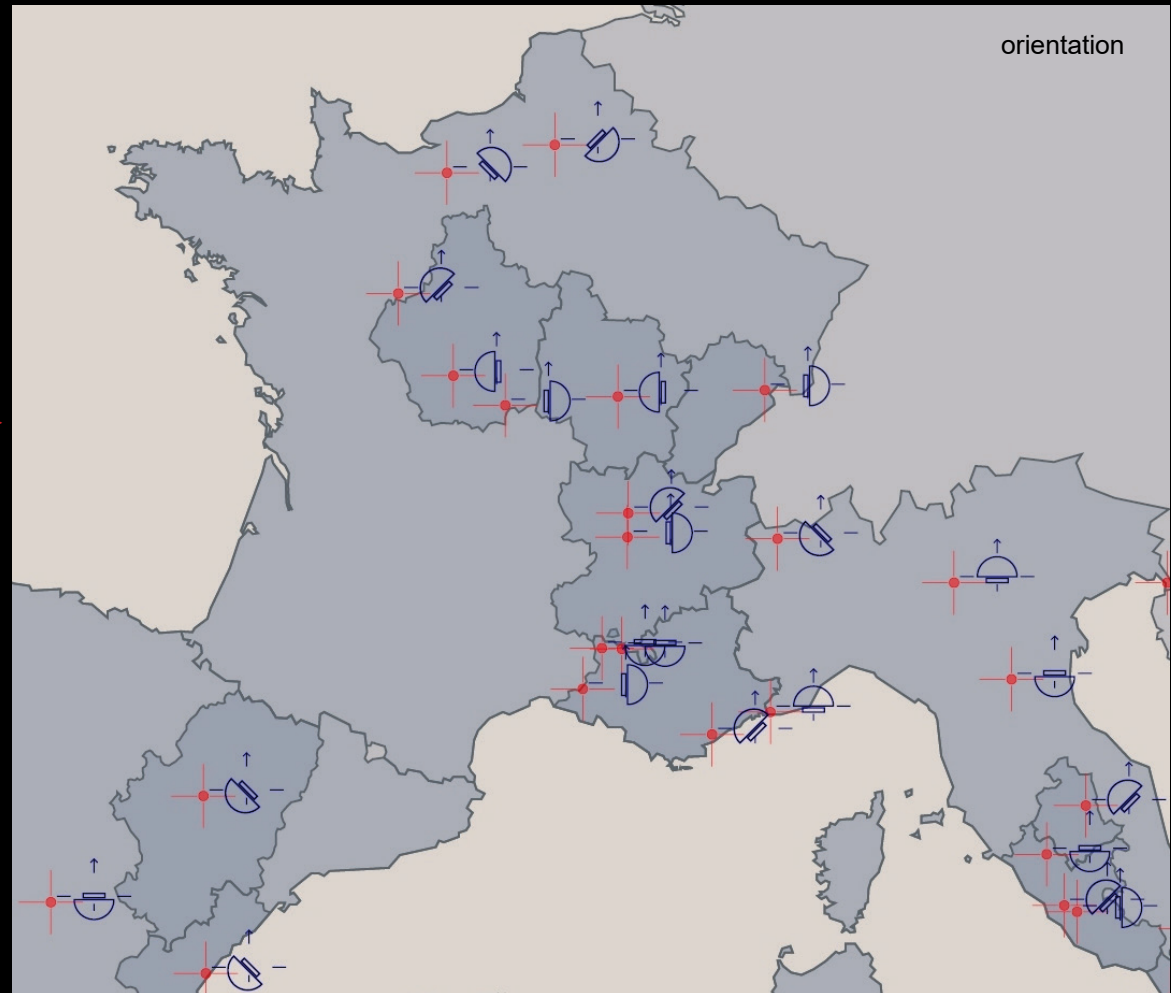
parameters defined

spatial distribution

→ implement 3rd step

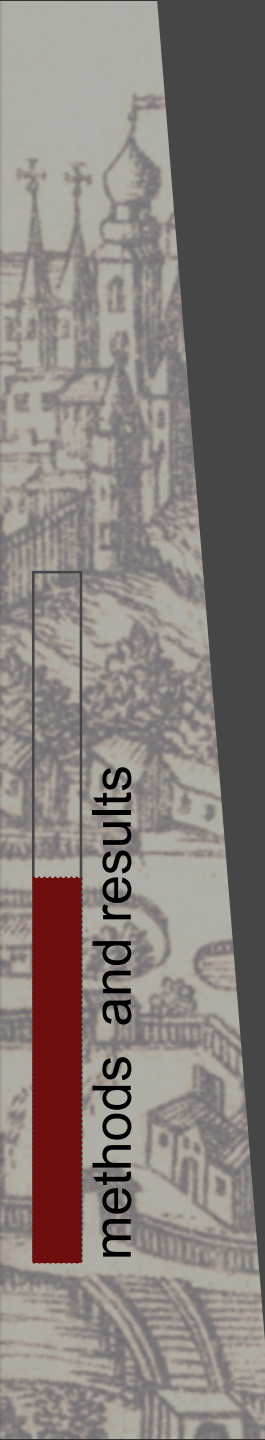
III : visual tools

visual comparisons

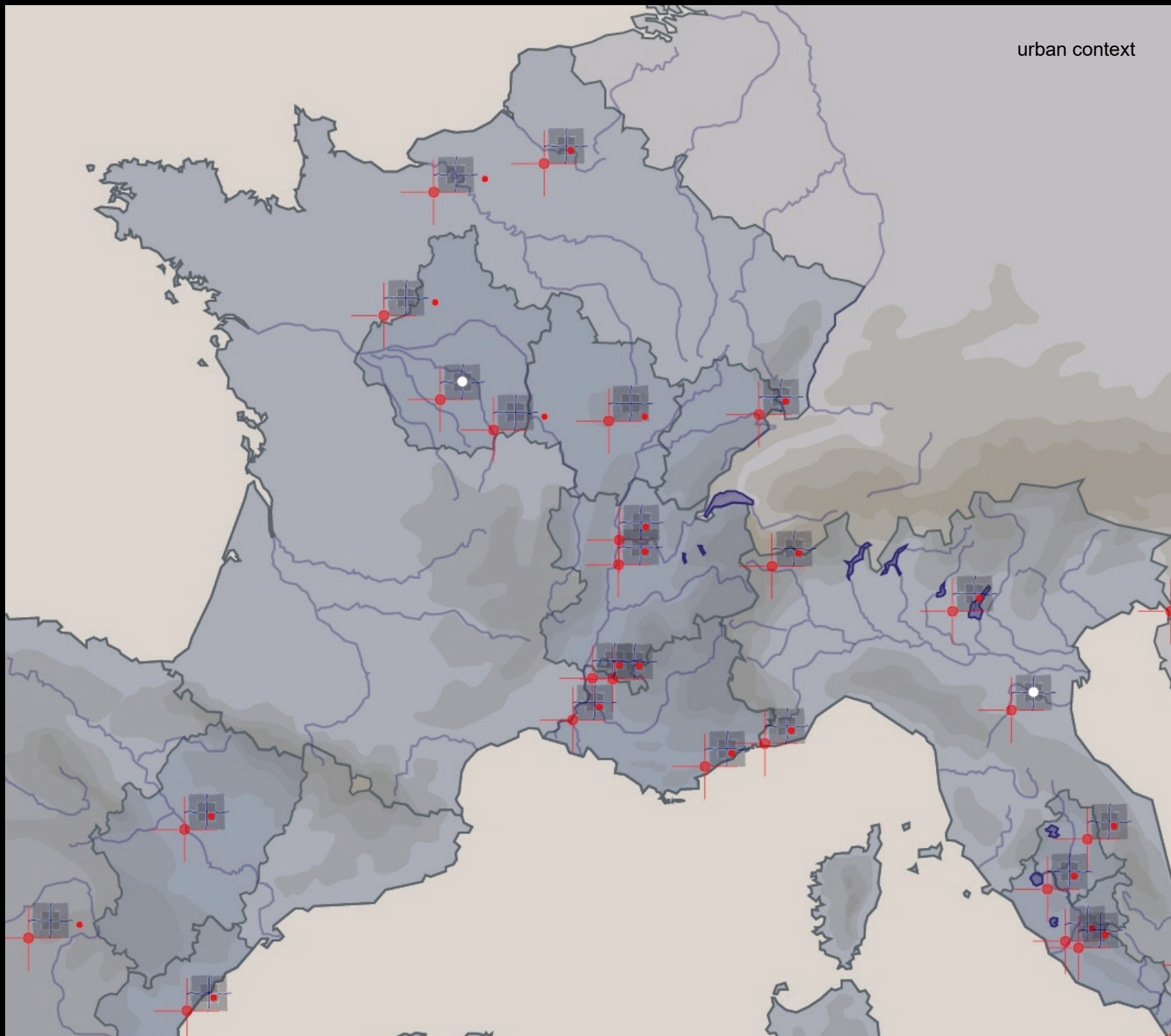


orientation

methods and results

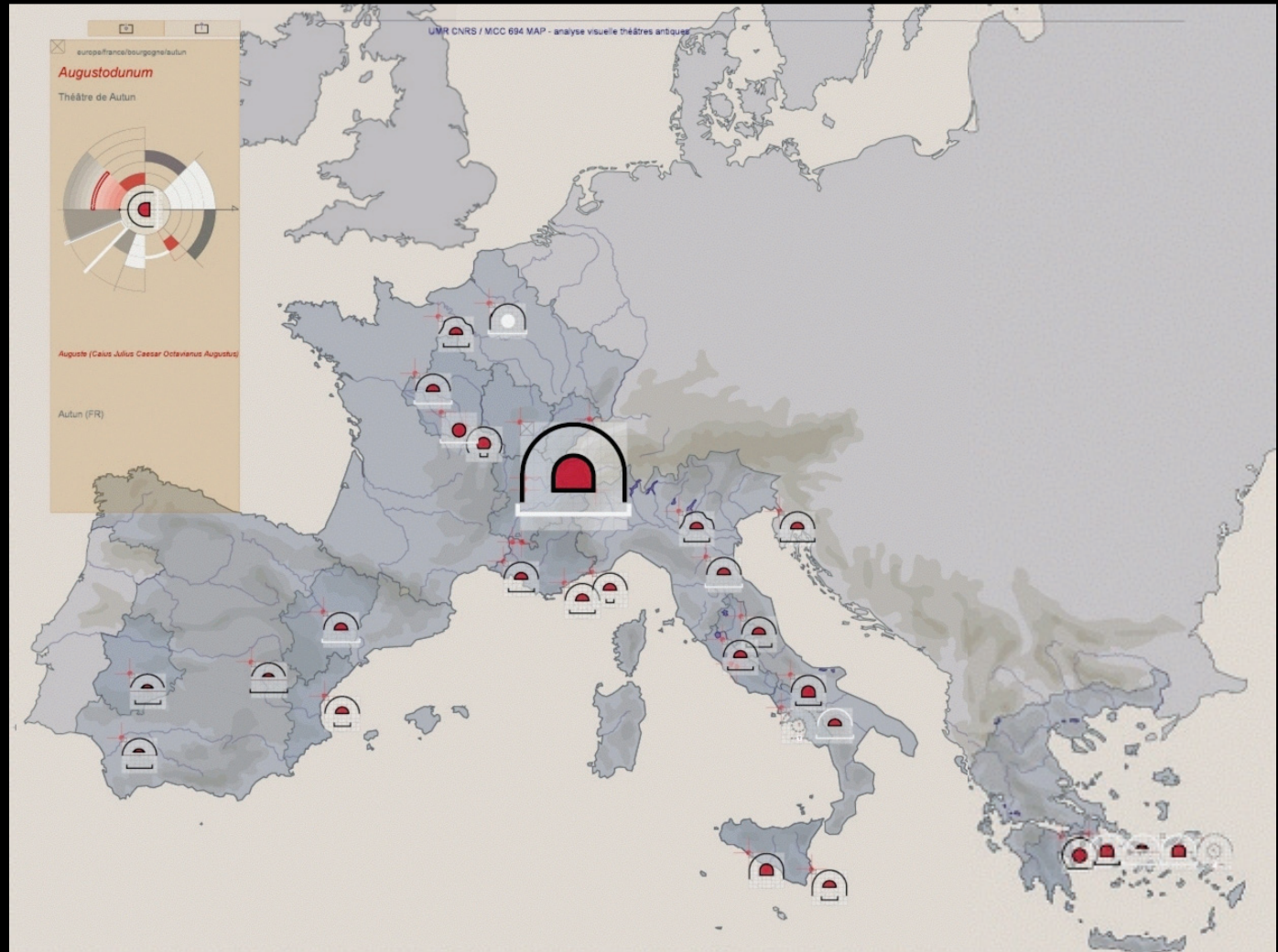


methods and results



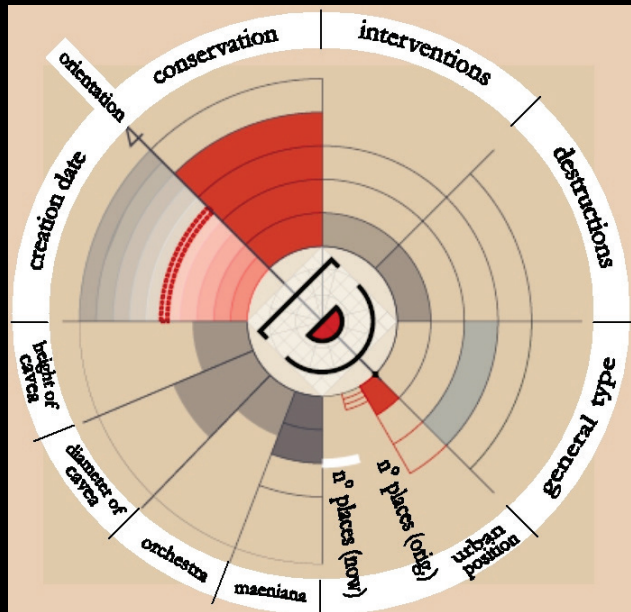
III : visual tools

visual signature

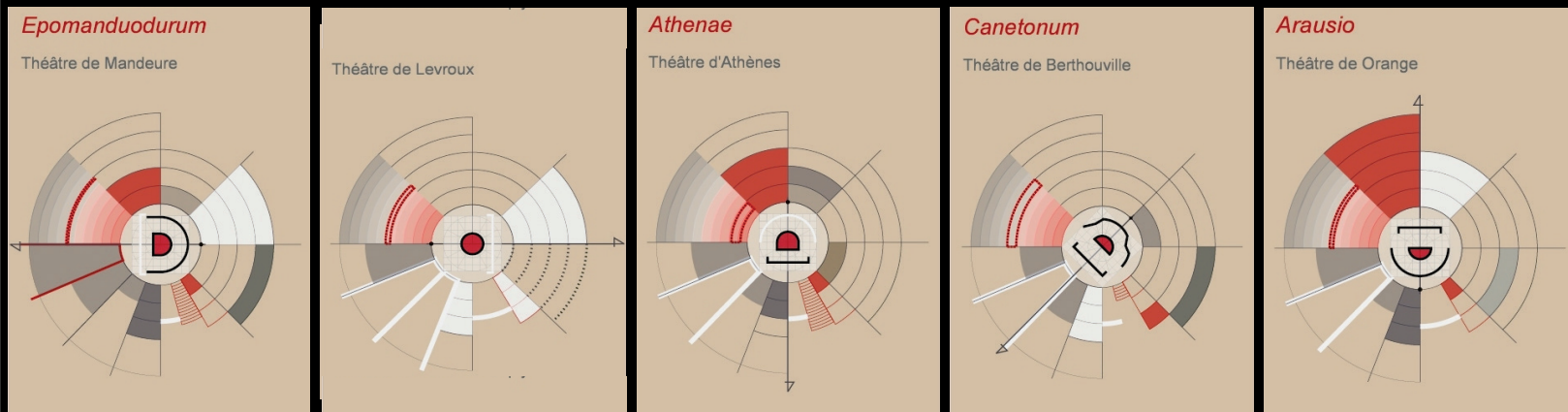


methods and results

III : visual tools visual signature



Each theatre is described by a “*visual signature*” - summarises the information that we have about a theatre and not a vision of a physical objet itself.

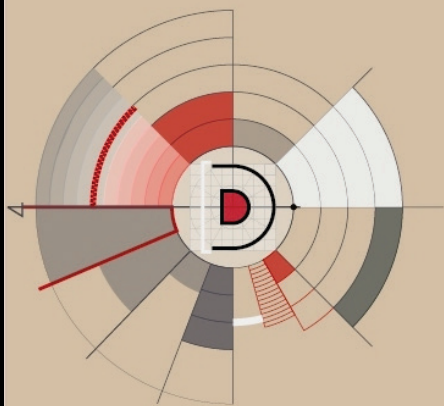


orientation / creation period / general type

III : visual tools

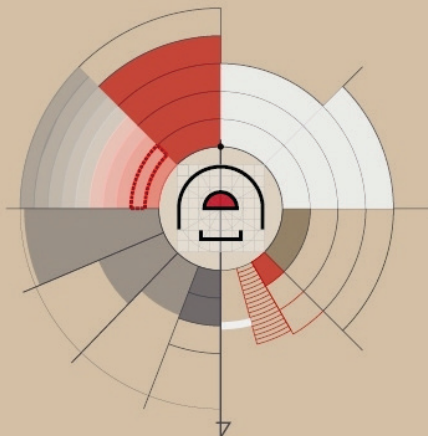
Epomanduodurum

Théâtre de Mandeure



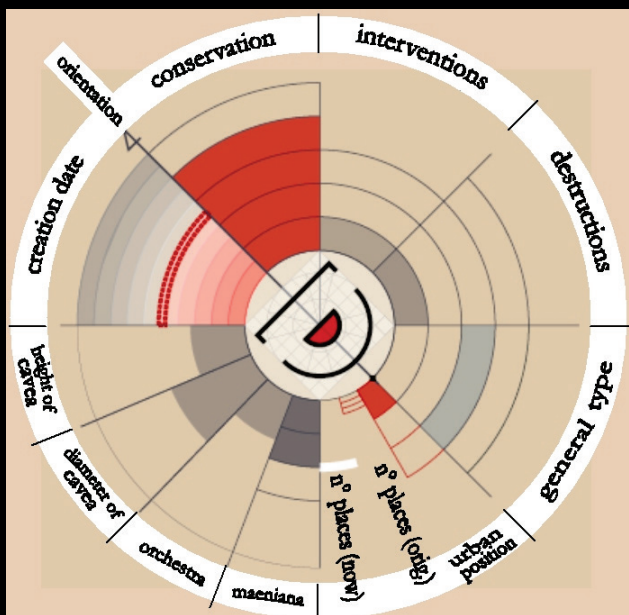
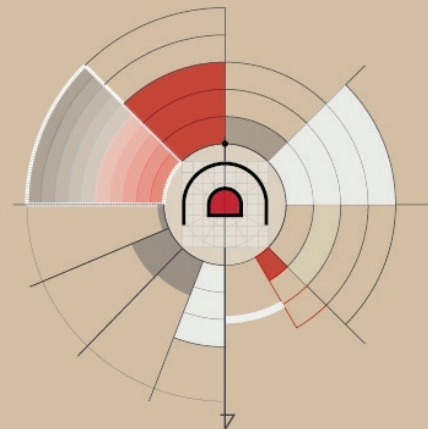
Syracusae

Théâtre de Syracuse



Heraclea Minoa

Théâtre de Eraclea Minoa



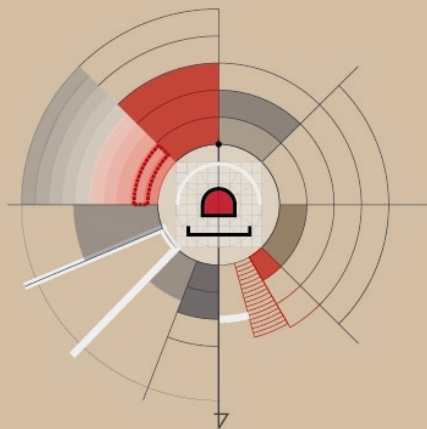
methods and results

preservation state

III : visual tools

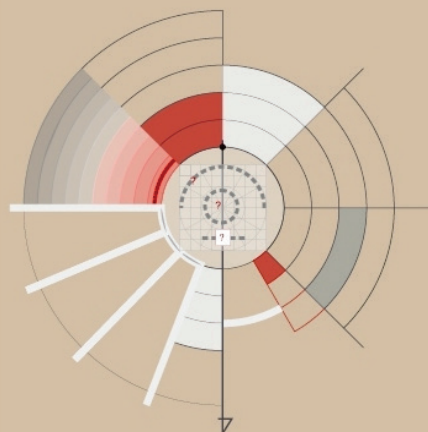
Athenae

Théâtre d'Athènes



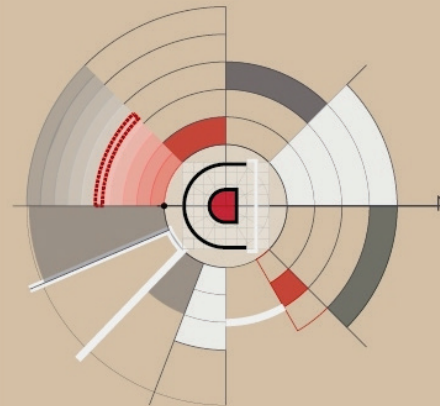
Athenae

Odéon d'Athènes



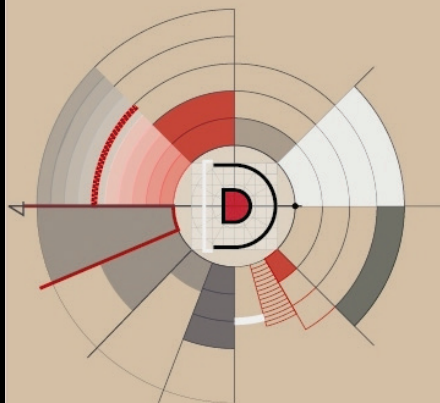
Augustodunum

Théâtre de Autun



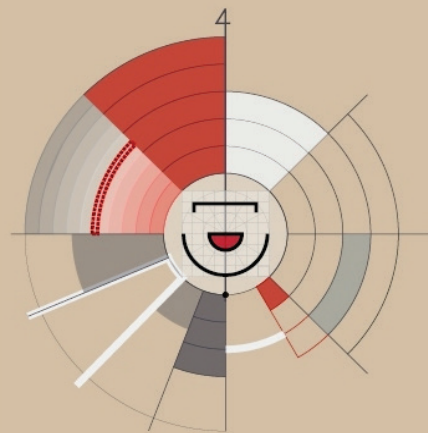
Epomanduodurum

Théâtre de Mandeure



Arausio

Théâtre de Orange



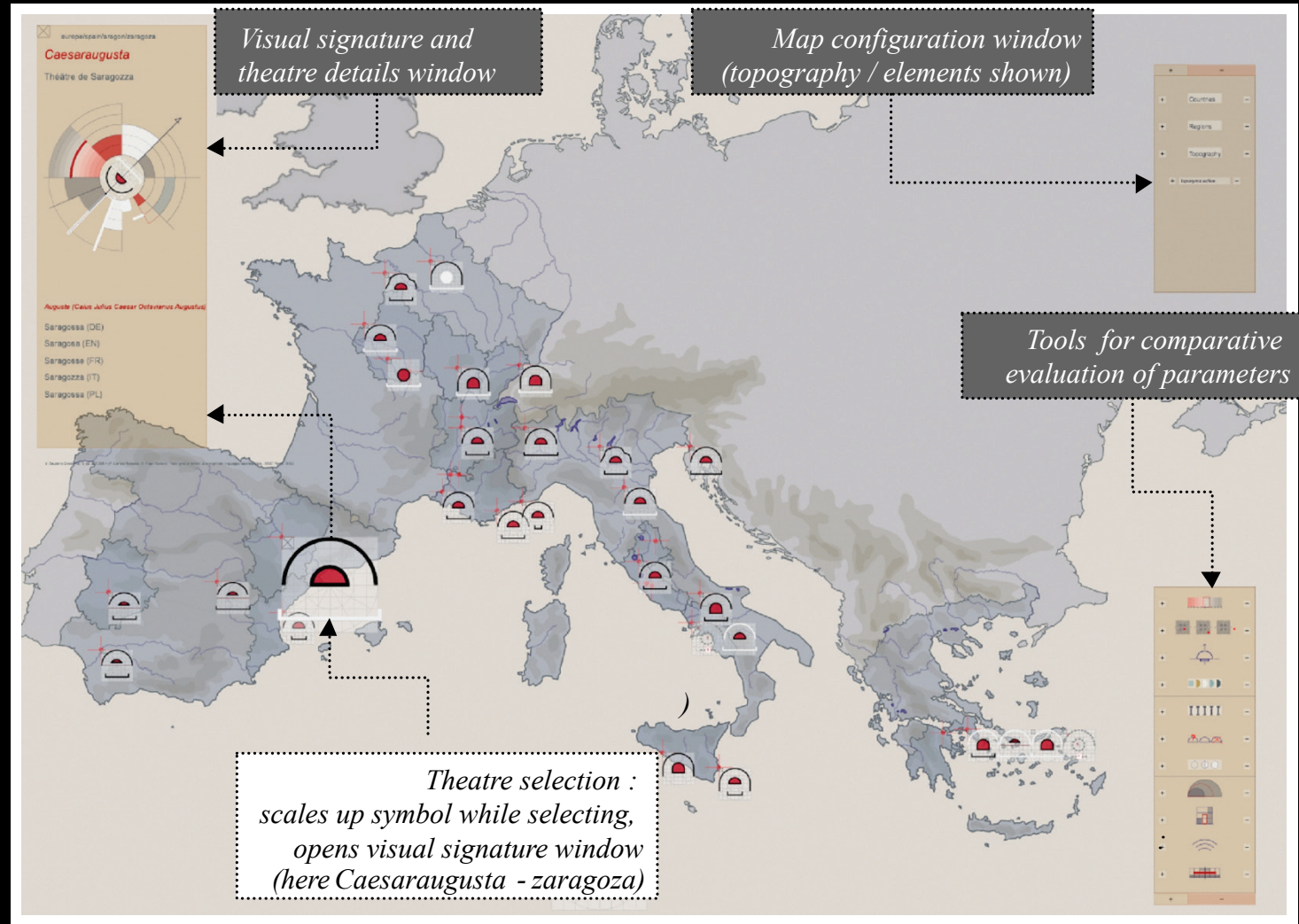
Canetonum

Théâtre de Berthouville



methods and results

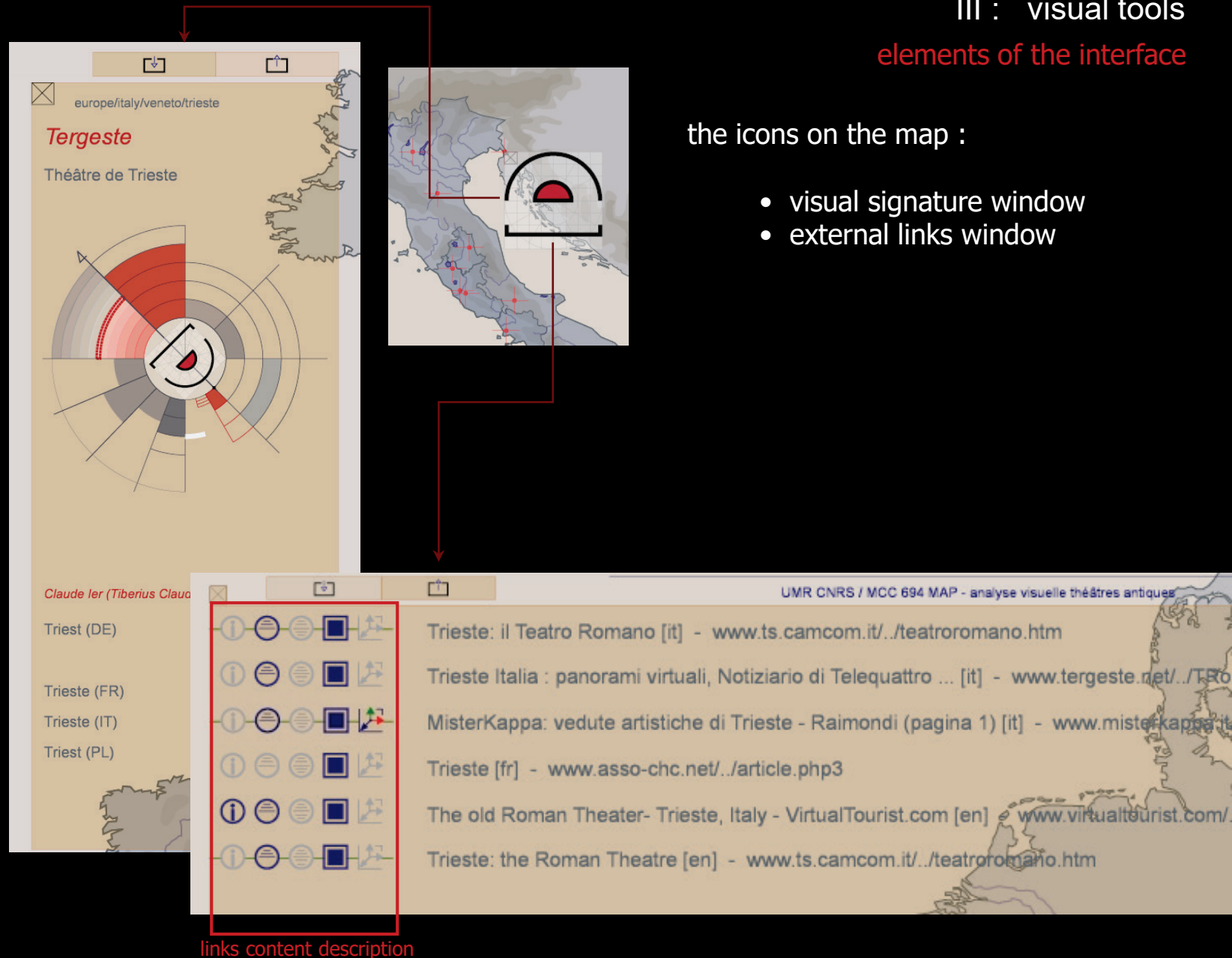
III : visual tools elements of the interface



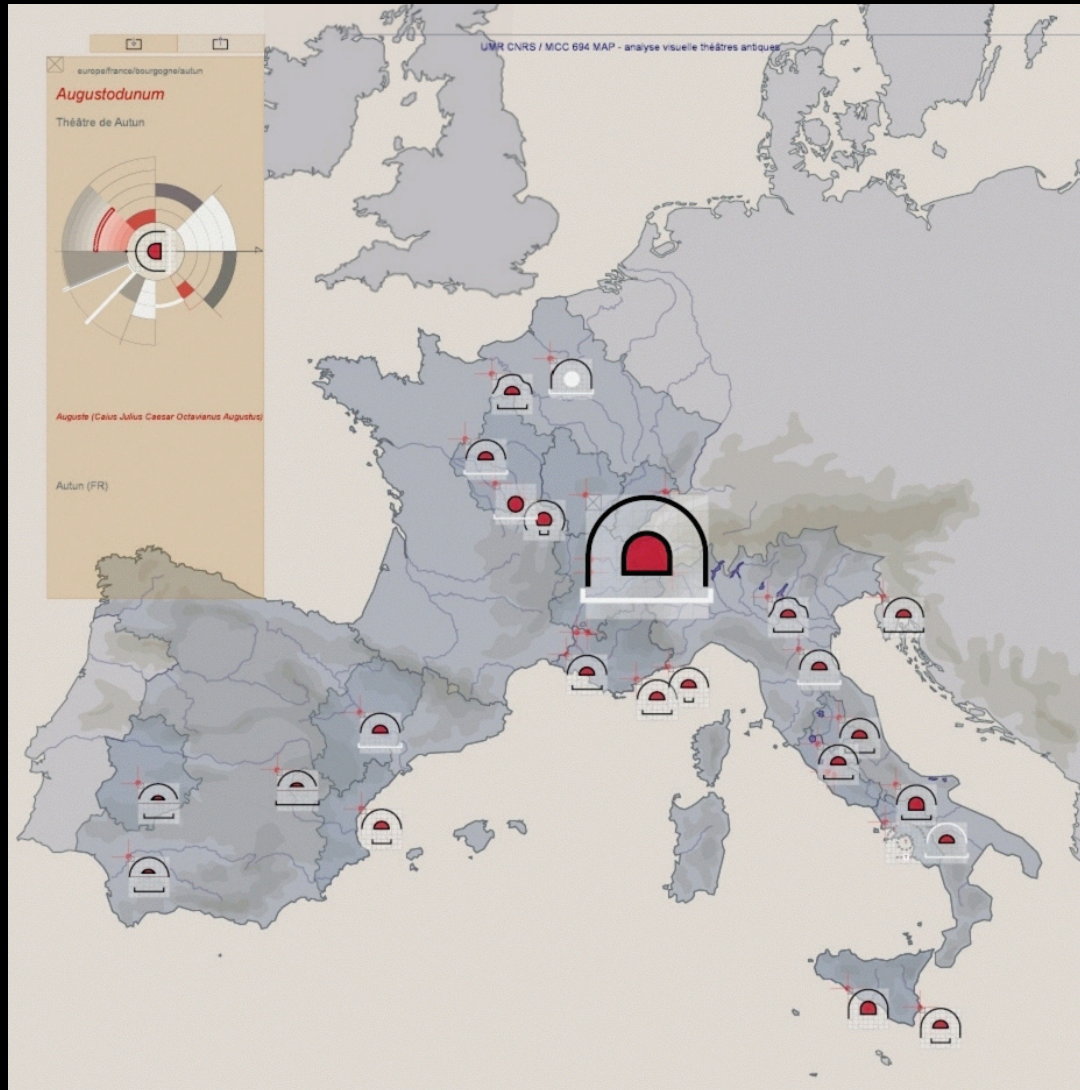
III : visual tools elements of the interface

the icons on the map :

- visual signature window
- external links window



implementation
combination of standards and freeware technologies



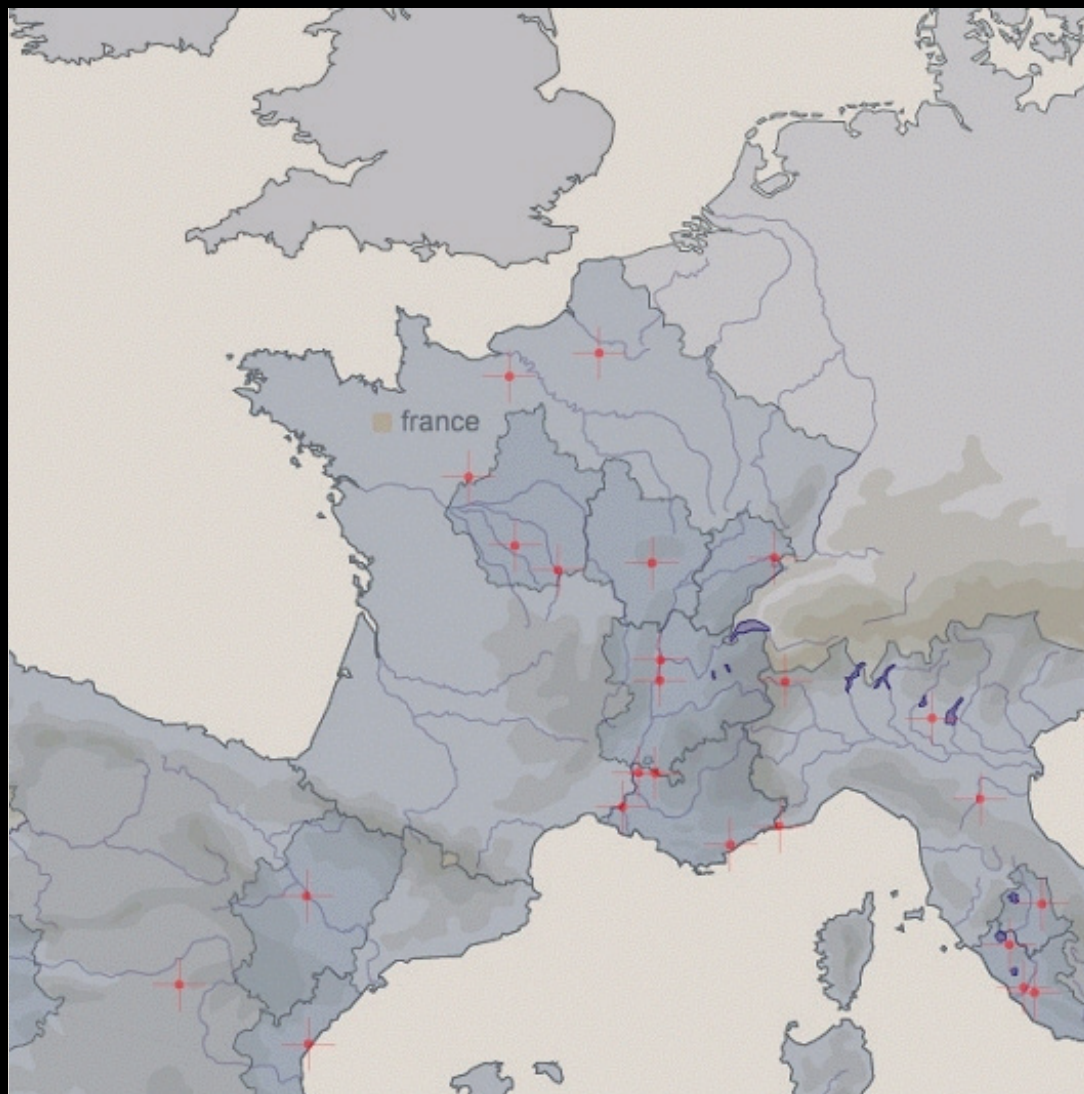
Theatre typo DB

Perl script

SVG, Javascript

implementation

combination of standards and freeware technologies



implementation

Theatre typo DB

Perl script

SVG, Javascript

Toponymy

XML / XSLT

hierarchy of Perl
classes

SVG

limits and perspectives

benefits

- visual comparisons - quantitative and qualitative information
- underline lacks of information
- gain of efficiency of graphics by the integration of architectural modelling with ideas & principles from information visualisation

lacks and perspectives

- mono-parametric comparisons - more complex, combined comparisons

a period of construction / a state of conservation

name of emperor of Rome / diameter of cavea

diameter of cavea / diameter of orchestra _ for : Roman, Greek, ... theatres

- further investigate the usability of graphics for heritage data visualisation
- further evaluate through concrete experiments the *informative modelling* methodology

conclusions

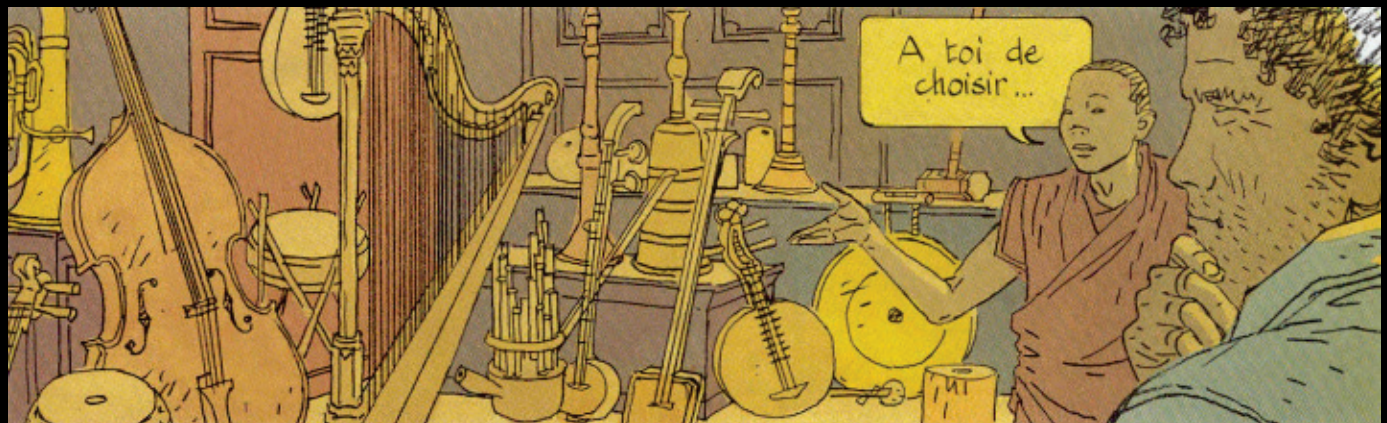
partial data set - no conclusions about antique theatres

In our application field:

benefits of developing graphic disposals as
knowledge and discovery tools

gain of insight researchers can expect from investing in
graphics that say something

usefulness of an interdisciplinary approach



[Coesey, *Celui qui mène les fleuves à la mer*, Éditions Le Lombard, 1997]

conclusions