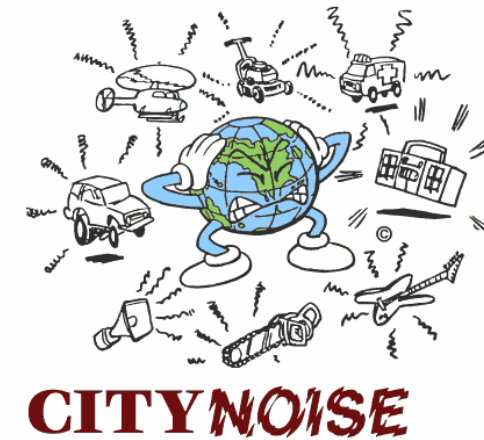


A PROTOTYPE OF AN INFORMATION SYSTEM FOR URBAN SOUNDSCAPE

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France



A PROTOTYPE OF AN INFORMATION SYSTEM FOR URBAN SOUNDSCAPE

- 1 - Introduction
- 2 - Auditory Urban Data Modeling
- 3 - Structure of the Information System
- 4 - Conclusions and Perspectives

1 - Introduction

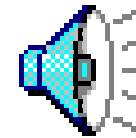
- From noises to sounds
- Noises as nuisances, pollution
- Auditory urban information
- How to limit auditory nuisances ?
- Psychological phenomena linked to sounds
- Embarrassment when no noise

Sounds in cities

- Traffic noise (cars, bus, lorries)
- Trains, boats, airplanes
- Birds, dogs, etc.
- Markets, schools, pedestrians precincts
- Industries, public works
- Firemen, ambulances, police
- Shops, discotheques, sports

Sounds as identity

- Each city ward has its own sounds
- Sounds appear as a sign of identity
- ==> **Urban Auditory Environment**
- ==> **Urban Soundscape**



Acoustics basics

- Quantitative measures of sounds

– equivalent level

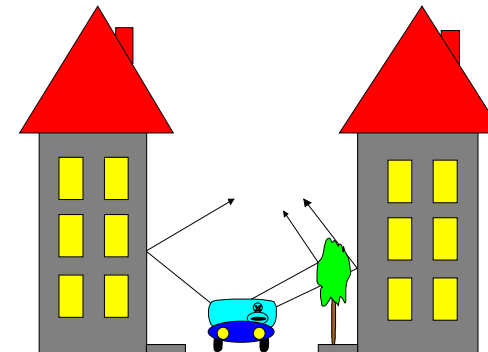
$$Leq = 10 \log \frac{1}{T} \int_0^T 10^{\frac{L(t)}{10}} dt$$

– other statistical levels:

- Qualitative classification of sounds:

- continuous
- impulsive
- bearing some information
- fluctuant
- intermittent
- with pure sounds

Reflections of noise in streets

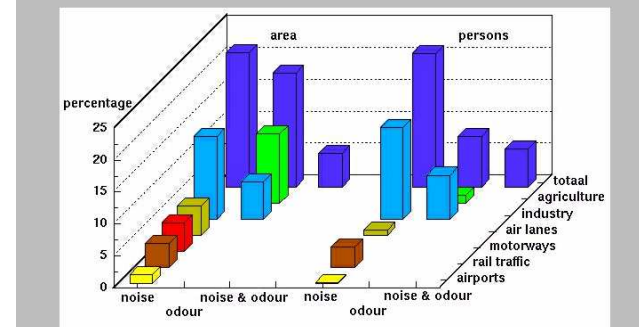


Abstract Sound Variables

- Location (sources)
- Loudness (magnitude)
- Pitch (frequency)
- Register
- Timbre (quality of sound)
- Duration
- Rate of Change
- Order
- Attack/decay

People and noise

Disturbed area and people potentially annoyed by noise and/or odour



Embarrassment due to noise

- Causes
 - objective: intensity, spectrum, duration..
 - subjective: physiology, psychology, sociology..
- Evaluation
 - construction of noise index
 - using Leq

Diseases due to noise

- Hearing damage
- Hypertension
- Heart disease
- Annoyance
- Awakening and sleep problems
- etc.

Complaints regarding sounds

- Each day, cities receive a lot of complaints regarding sounds
- Impossible to use only those complaints to struggle the problem
- **Biased distribution of complaints**

Biased distribution of complaints

- **No complaints**
 - along motorways
 - during very noisy public works
 - in industrial areas
- **Many complaints**
 - in very quiet residential zones
 - near recreational areas

Objectives of an AUIS

- Compared noise levels
- Having a sound basis to compare sounds
- Reduce noise pollution
- Increase auditory knowledge
- Simulation of new urban projects

Partners of the project

- French National Institute for Urban Engineering
- French research group on GIS (CASSINI)
- Collaboration France and South Korea
- University of La Rochelle, France
- Grenoble School of Architecture (CRESSON)
- Research Center in Acoustics (CSTB)

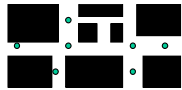
Input information

- Measurement of noise along street
- Recording of sounds (typically 1 to 2 mn)
- Auditory itinerary
- Noise sensors
- Recording tapes

Output information

- Comparing urban areas
- Visualization of sound levels
- Real time comparisons
- Simulation of new projects

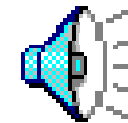
Objective of the project



- Starting from measures
- ==> quantitative and qualitative characteristics of zones
- ==> global visualization of auditory information

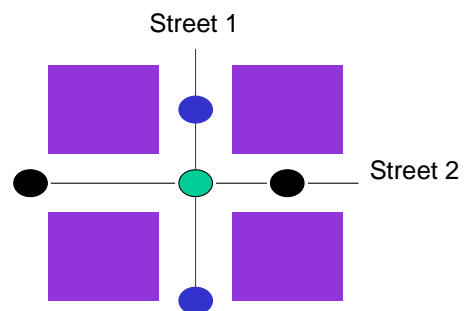
2 - Modeling

- Conceptual modeling of input information
- Interpolation techniques
- Visualization / Graphic semiology

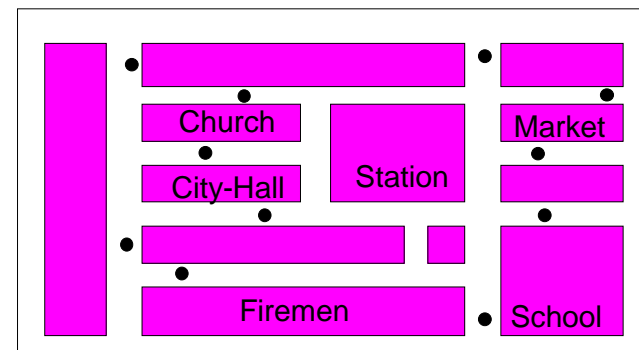


Interpolation method (3/3)

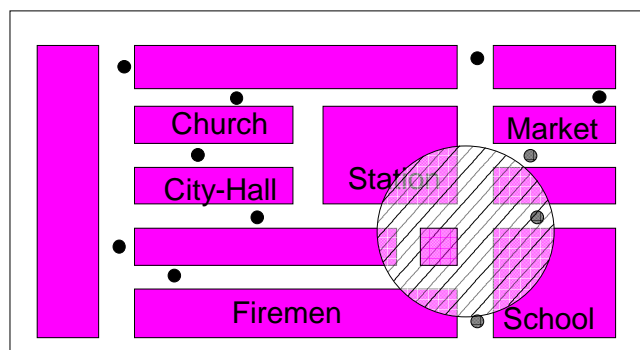
3 - Determination of sounds level at each crossroads (max)



Example of a city with its auditory sample points



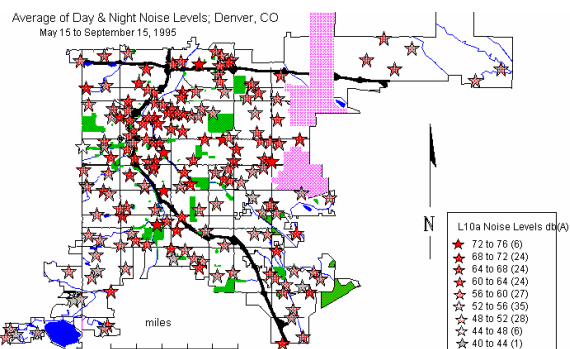
What is the mean level of noise in this area?



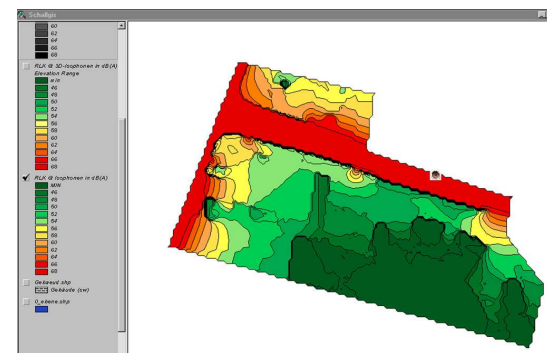
Visualization

- Static cartography of sounds
 - quantitative: mean, pick levels
 - qualitative: classification of areas
- Animated cartography
 - daily evolution (hour-based)
 - week evolution (day-based)
 - year evolution (month-based)

Example of a noise map



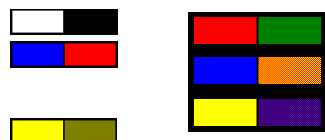
Example in Germany (isophon)



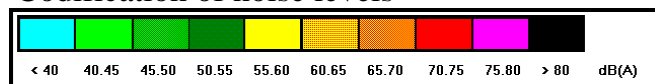
Theory of Colors

- Color contrasts

- light/obscure
- hot/cold
- complementary
- quality



- Codification of noise levels



Graphical representation

- Isophons



- Proportional circles



- Proportional lines



- Colors and Textures

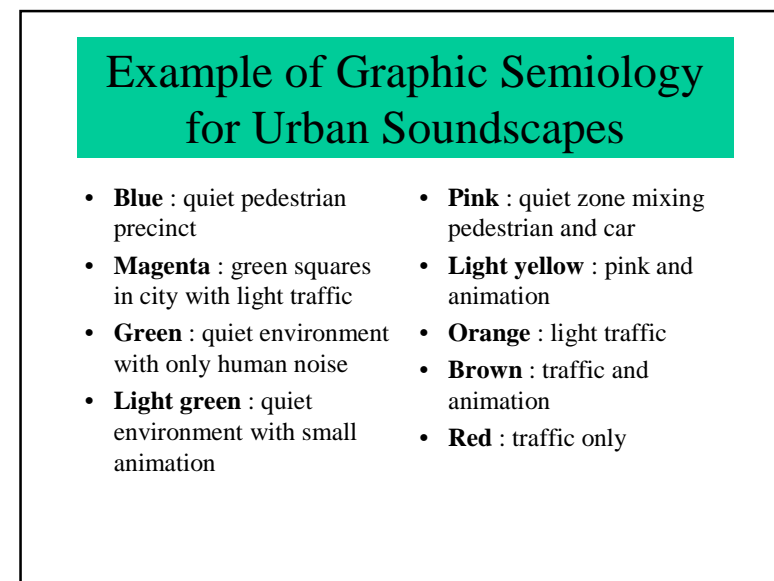
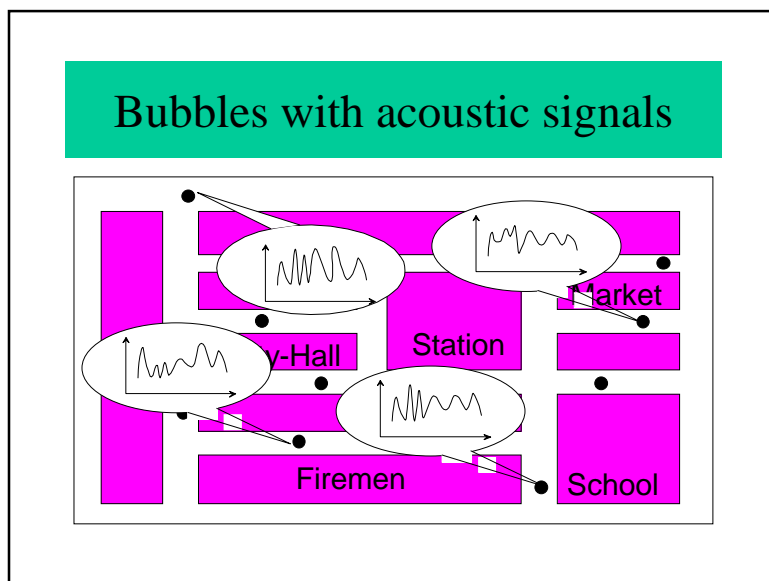
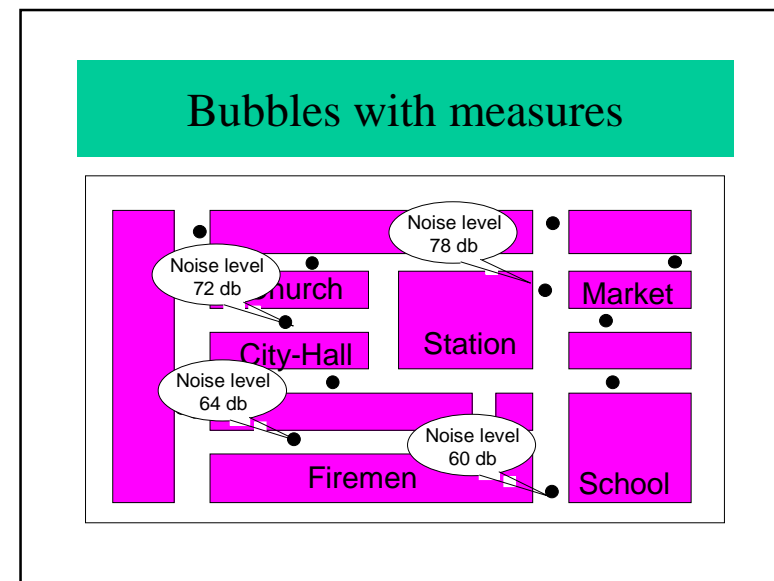
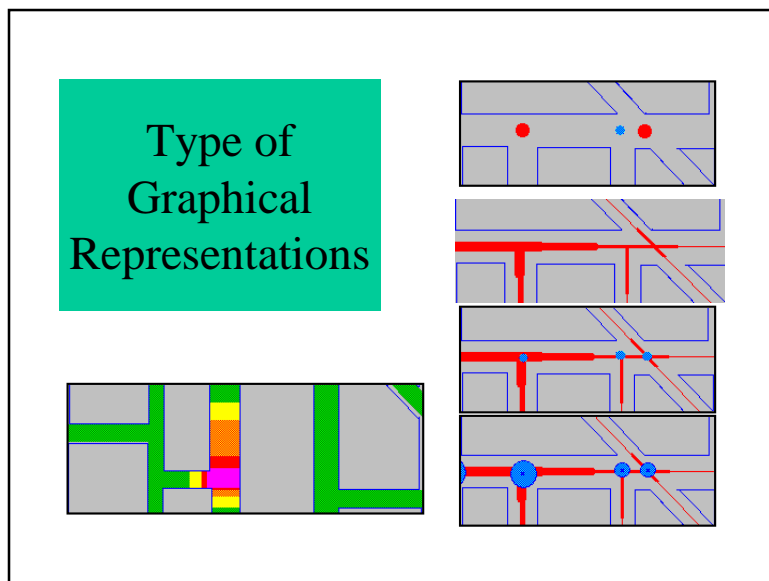


- Symbols

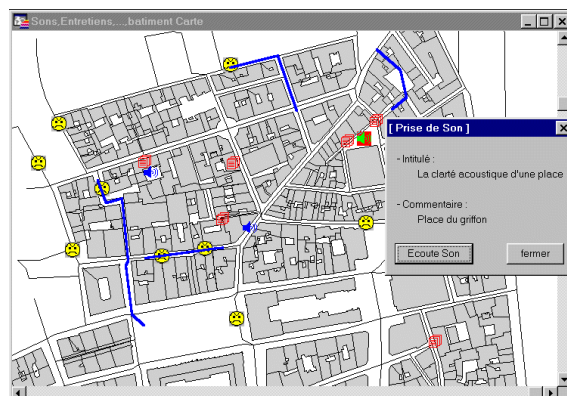


- Bubbl

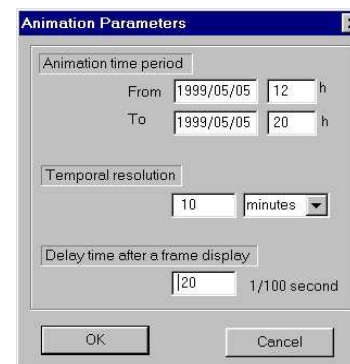
niv bruit fond: 50 dB
niv bruit pointe: 75 dB
Leq: 65 dB
Date mesure: 25/12/95



Example in Lyon



Interface for the definition of animation parameters

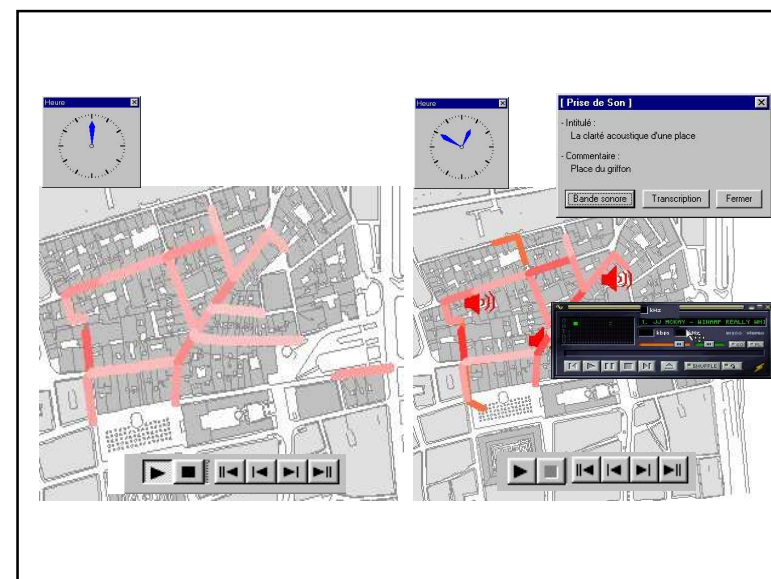


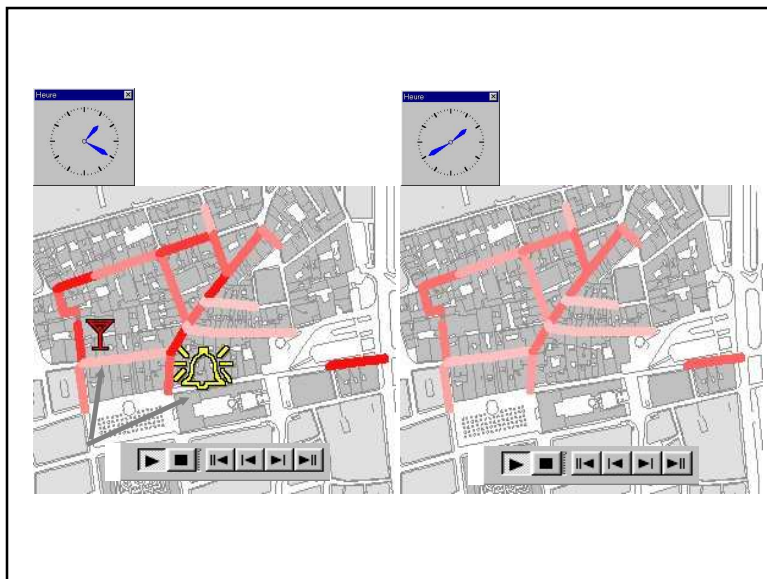
- Temporal Resolution
: method of estimation
- Graphic Semiology
: colors, shape, texture, etc.

Widget for controlling the animation

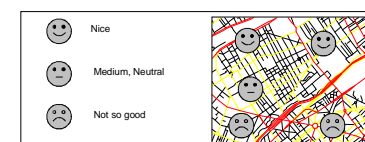


- Functions for animation (Visual Basic)
- Read, Stop, Forward, etc.
- Links with a GIS (MapInfo)
- Using multimedia objects

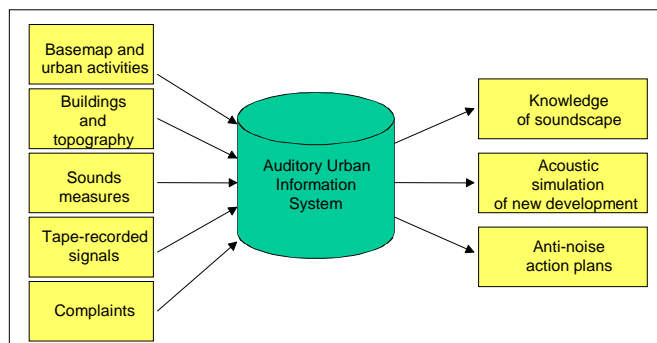




Software for noise contour map



4 - Structure of the Information System



5 - Conclusions and perspectives

- Sounds as multimedia field
- Importance of auditory environment
- Physiological and psychological aspects
- Modeling

Conclusions and perspectives

- Very huge database
- Visualization, animated simulation
- Prototype to achieve
- Pyramidal accelerator

Thanks for your attention!

“Information Systems for Urban Planning:
A Hypermedia Co-operative Approach”

<http://lisi.insa-lyon.fr/~laurini>