Bridging the gap between complex data and decision makers: an example of innovative interactive tool

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ÉCOLE POLYTECHNIQUE MONTRÉAL

Timing Assembling Layering Views Animation

Overview

Context

Some examples

The MIL – interactive XLS

Relevance

Beauty

Perspective

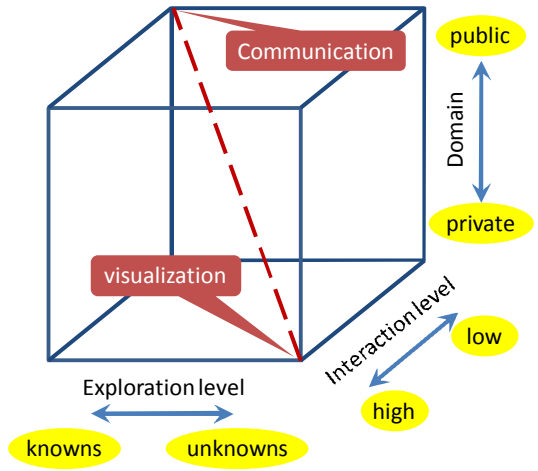
Filtering

Transformation

Context, in the transportation field

- ↑ data gathering, processing and modelling tools
- ↑ free and generic tools → microdata and spatio-temporal analysis → GIS
- Automatic data acquisition systems (GPS or smart card for instance) → more data available + increased expectations + more complex models
- Harder to collect classical data (surveys) → even more important to illustrate the relevance of outputted data
- visualization = potential in all stages of the data gathering and transportation planning processes

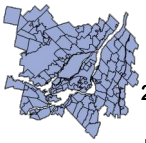
The MacEachren's "Cube" → visualization



FROM:
visualization as a **PRIVATE** tool for the exploration of **UNKNOWNS** phenomena and relations using **HIGH** level of interaction

TO:
visualization as a **PUBLIC** communication tool for the dissemination of **KNOWN** facts using **LOW** level of interaction

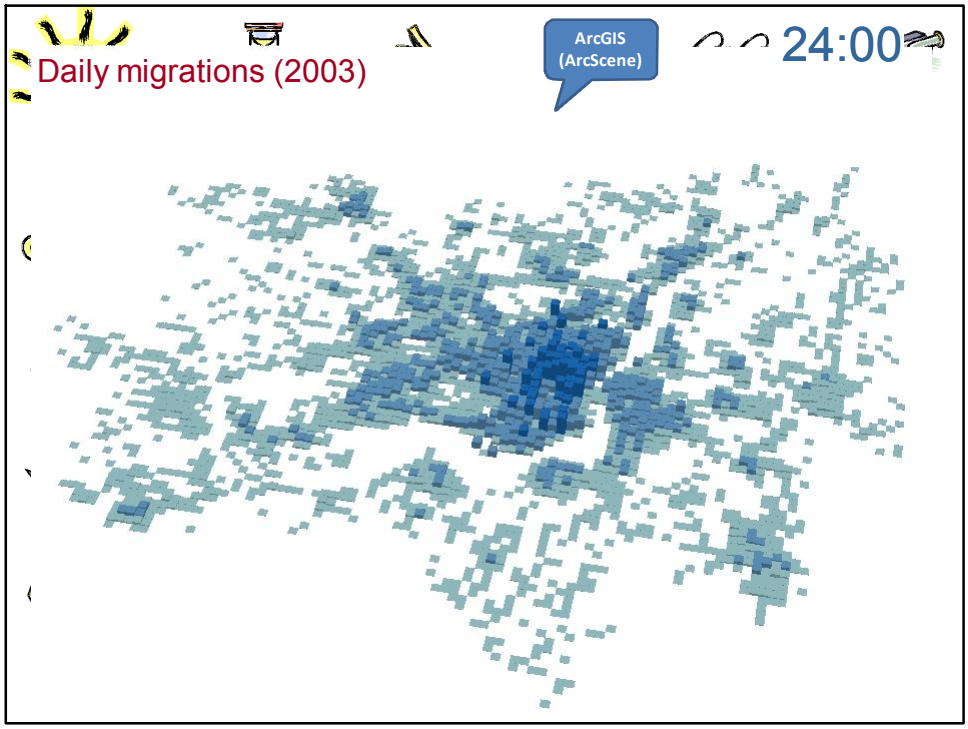
The Greater Montreal Area context

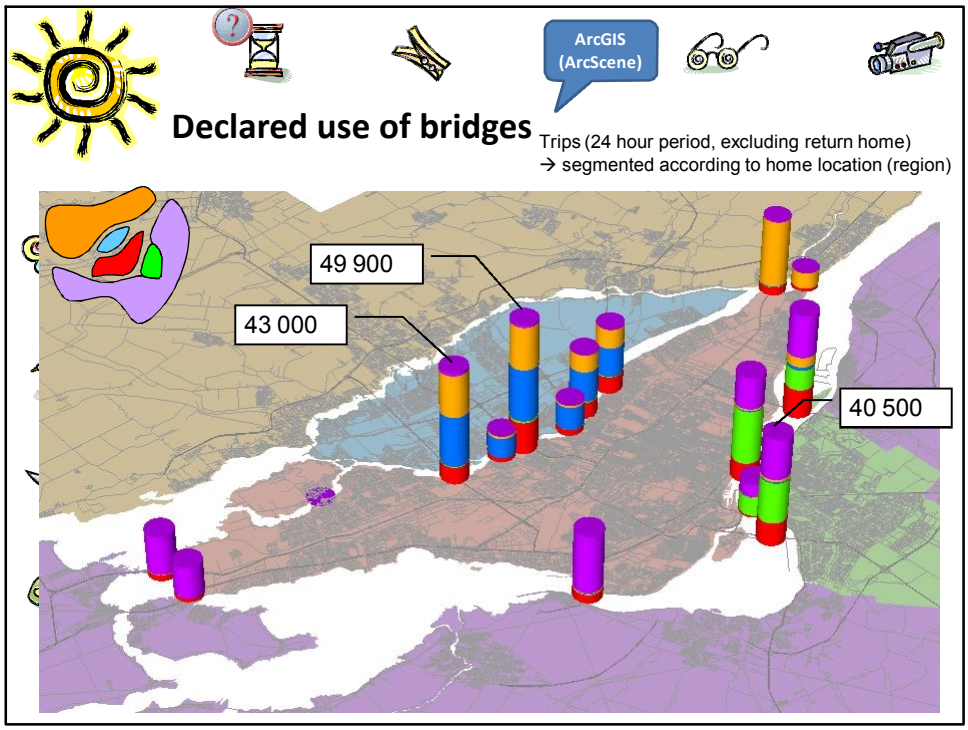


- Large-scale travel surveys since 1970 app. every 5 years → 5% sample (70 000 households in 2003)
- Data dissemination tools = part of the usual data production process for some time
- Tools developed more than 10 years ago are now used by the Ministry of Transportation for the dissemination of key facts in all the main area of the Quebec Province
- Features: interactive spreadsheets (Ms Excel)

Some visualization examples → used for public/technical dissemination of key facts from OD surveys

1. 24-hour monitoring of migrations → importance of CBD in the daily activities
2. Who uses the bridges and subway stations → political + fiscal issues
3. Who uses the parking spaces available in critical areas → demand management
4. the MIL (Municipal Interactive Leaflets) for data dissemination towards technicians and decision makers

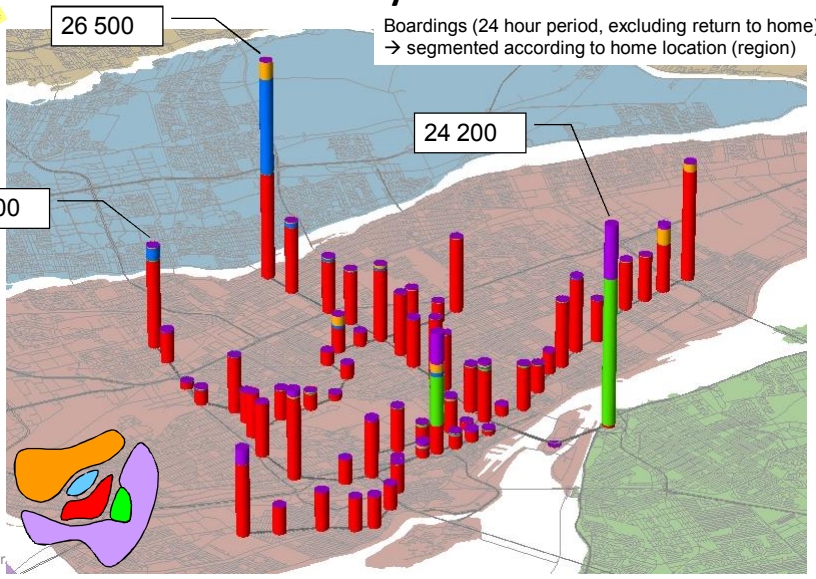

Daily migrations (2003)
ArcGIS (ArcScene)
24:00


ArcGIS (ArcScene)
Declared use of bridges
Trips (24 hour period, excluding return home)
→ segmented according to home location (region)
49 900
43 000
40 500

ArcGIS (ArcScene)

Declared use of subway stations

Boardings (24 hour period, excluding return to home)
→ segmented according to home location (region)



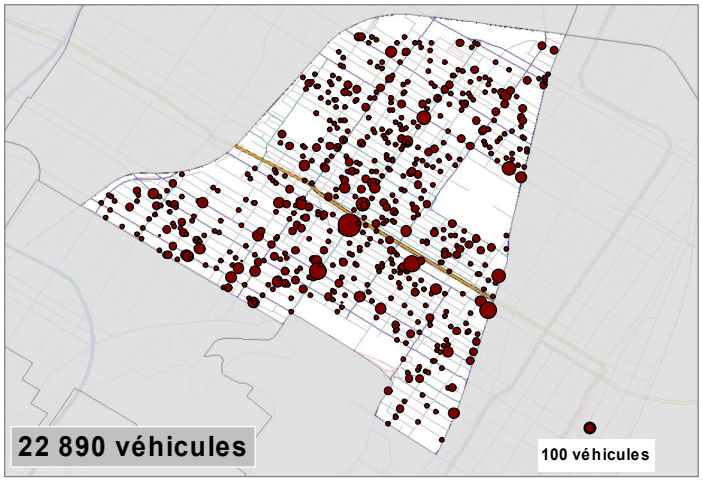
Seminar: Pr. Morency

bubble graph in XLS

Use of parkings (in a particular area)

Cars parked → on-street spaces

22:00 (2003)



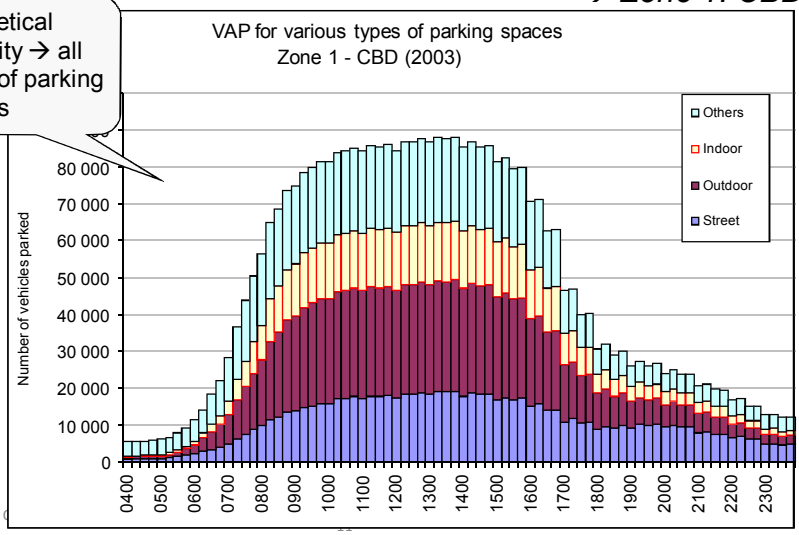
Seminar: Pr. Catherine Morency

Histogram in XLS

VAP: Vehicle accumulation profiles

→ *Zone 1: CBD*

Theoretical capacity → all types of parking spaces



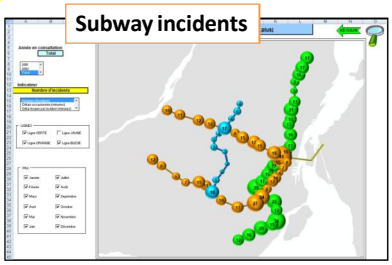
Seminar: Pr. C
Morency

Innovative interactive tool: MIL

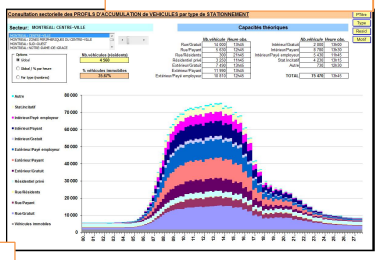
- Metropolitan Agency of Transportation → tool to assist local decision makers understand the main features of their area (socio-demography and travel behaviors)
- Processing of data from Census and Travel surveys + GIS-transport + trip assignment model
- High level of interactivity + pre-processed statistics for multiple data combinations
- Well-known platform ... unrecognizable! Interactive Ms Excel → typical approach in Montreal

Innovative use of XLS → Many examples in GMA

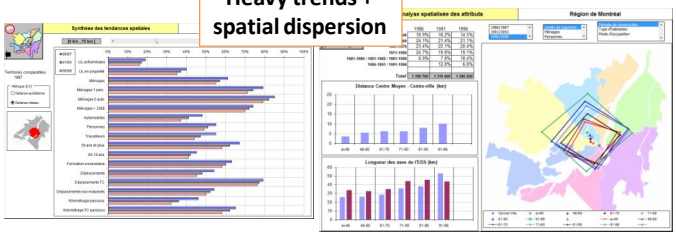
Subway incidents



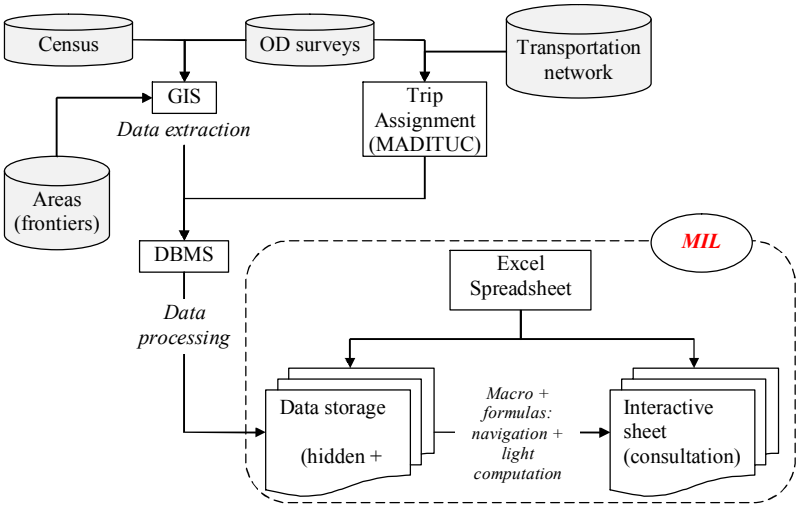
Car Accumulation Profile



Heavy trends + spatial dispersion



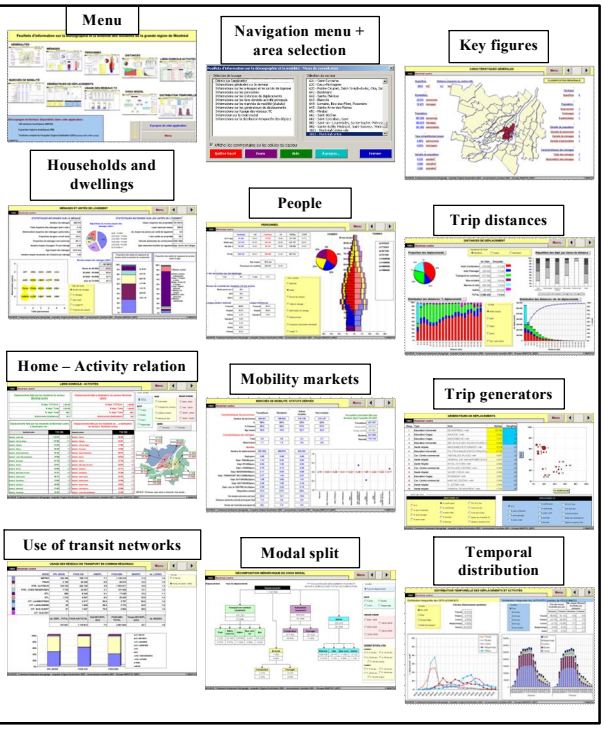
The MILs - framework



The MILs

Data + processes + visualization tools

1 menu sheet + navigation window + 10 interactive interfaces including: shapes, push buttons, database functions, charts, filtering tools, …

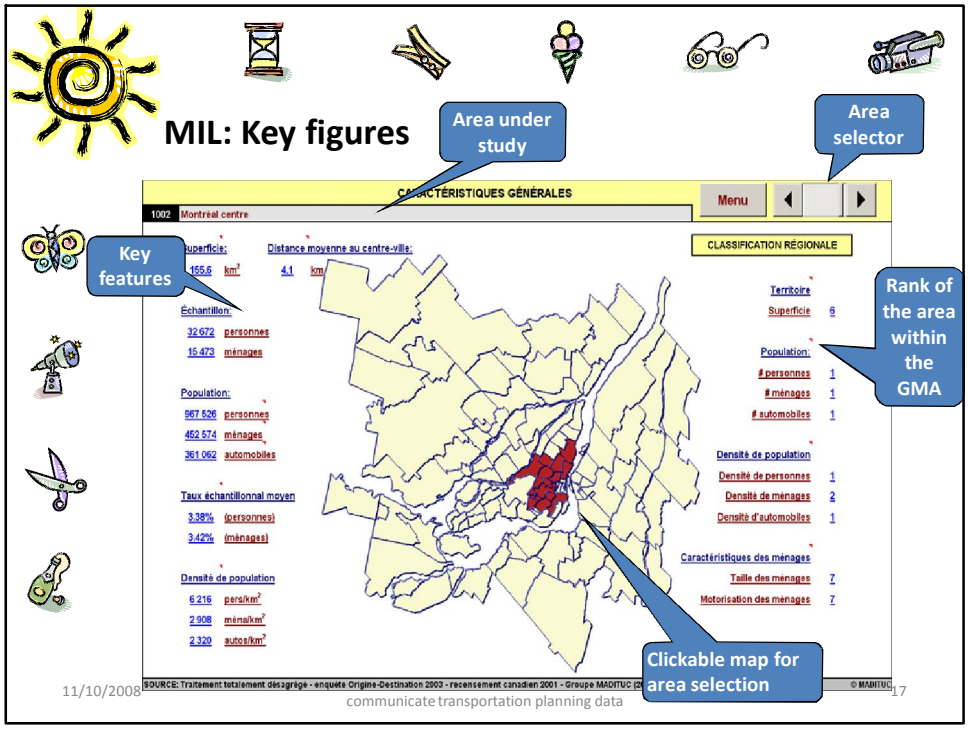


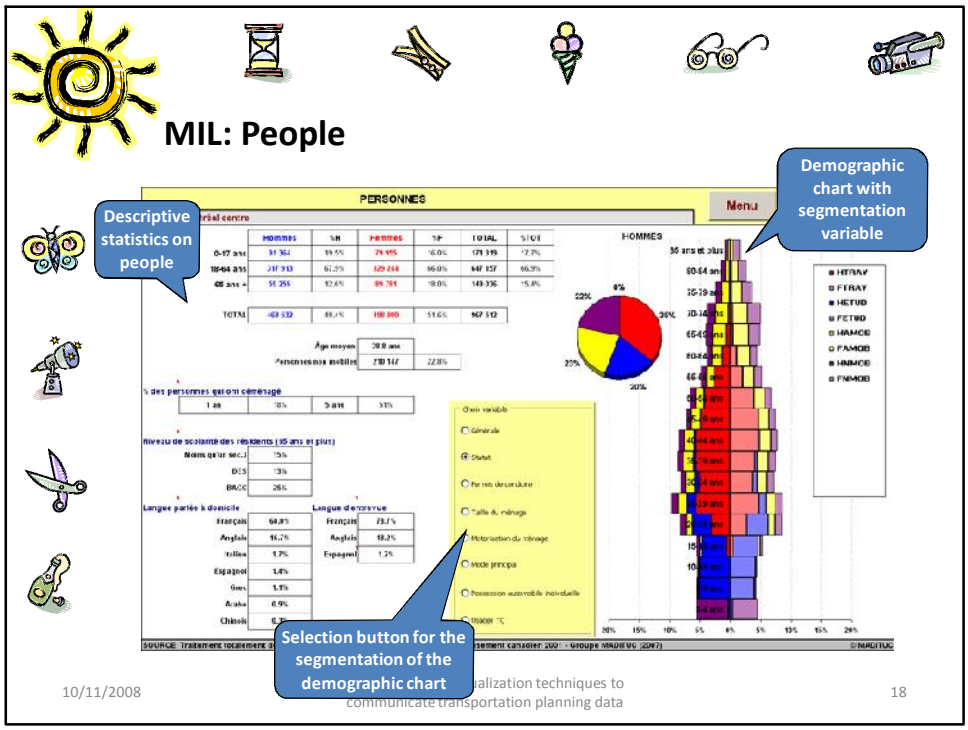
Some MIL'S screens

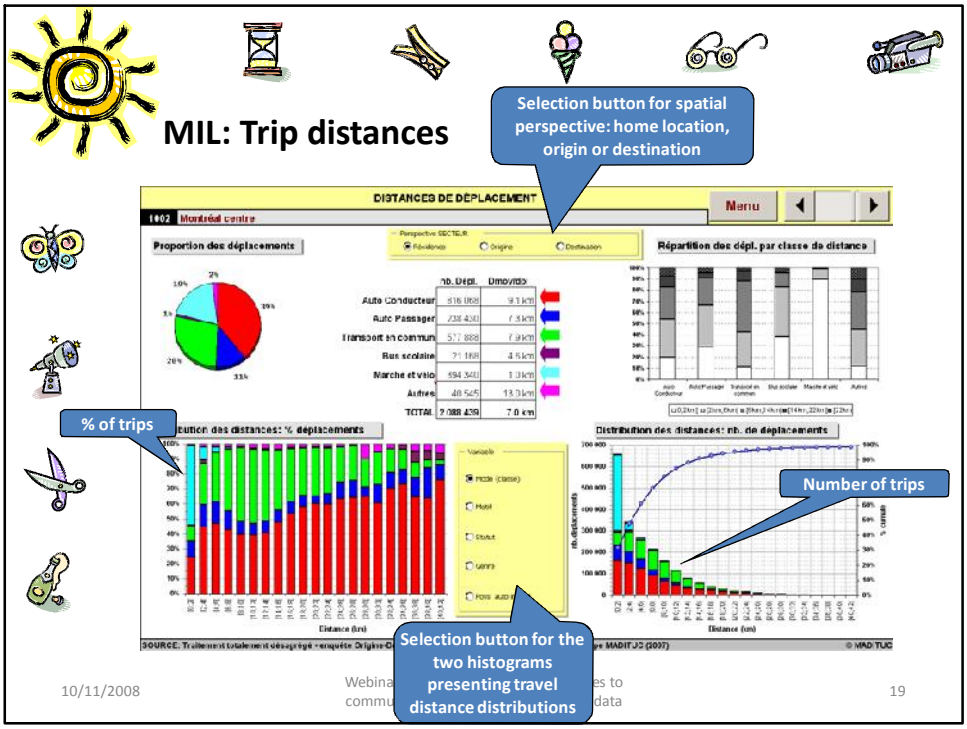
- Key figures
- People
- Trip distances
- Trip generators
- Modal split
- Temporal distribution

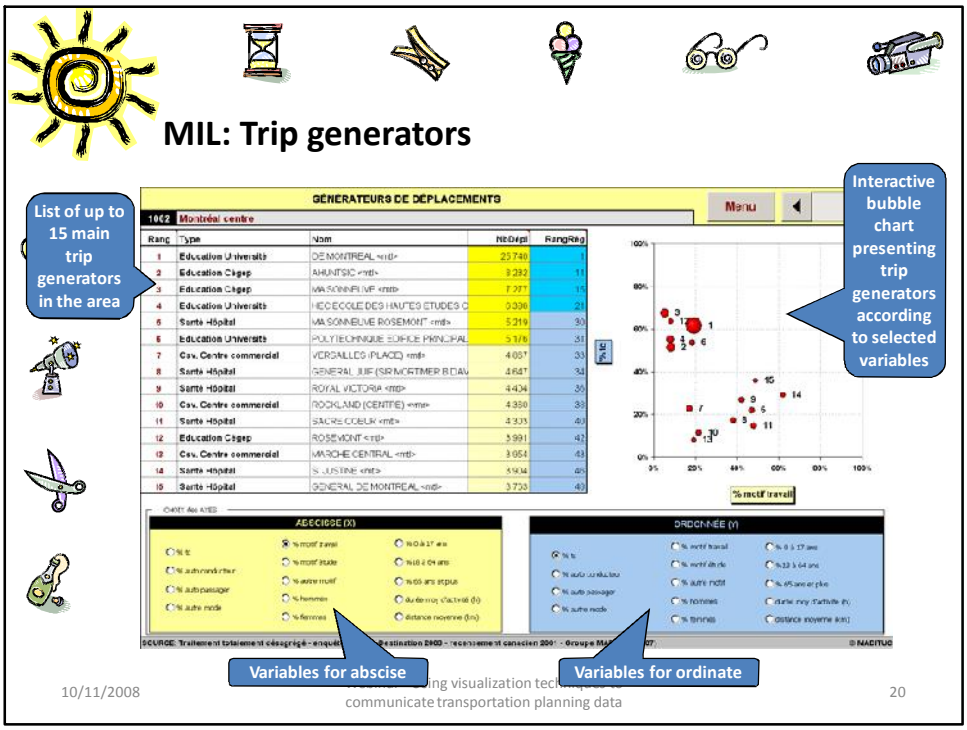
Statistics available for various areas:
100 analysis areas
8 larges regions
Municipalities

Multiple variable combinations in each screen
All values are pre-compiled

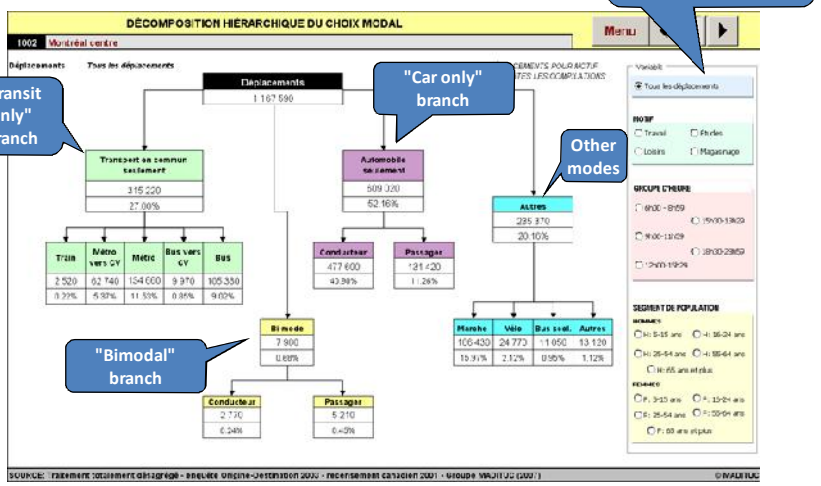

MIL: Key figures
Area under study
Area selector
Key features
Rank of the area within the GMA
Clickable map for area selection
CARACTÉRISTIQUES GÉNÉRALES
Menu
1002 Montréal centre
CLASSIFICATION RÉGIONALE
Superficie:
155.6 km²
Distance moyenne au centre-ville:
4.1 km
Échantillon:
32 672 personnes
15 473 ménages
Population:
967 526 personnes
452 574 ménages
361 062 automobiles
Taux échantillonnal moyen
3.38% (personnes)
3.42% (ménages)
Densité de population
6 216 pers/km²
2 908 ména/km²
2 320 autos/km²
Territoire
Superficie 6
Population:
personnes 1
ménages 1
automobiles 1
Densité de population
Densité de personnes 1
Densité de ménages 2
Densité d'automobiles 1
Caractéristiques des ménages
Taille des ménages 7
Motorisation des ménages 7
11/10/2008
communicate transportation planning data
17


MIL: People
Descriptive statistics on people
Demographic chart with segmentation variable
Selection button for the segmentation of the demographic chart
PERSONNES
Menu
HOMMES
10/11/2008
communicate transportation planning data
18

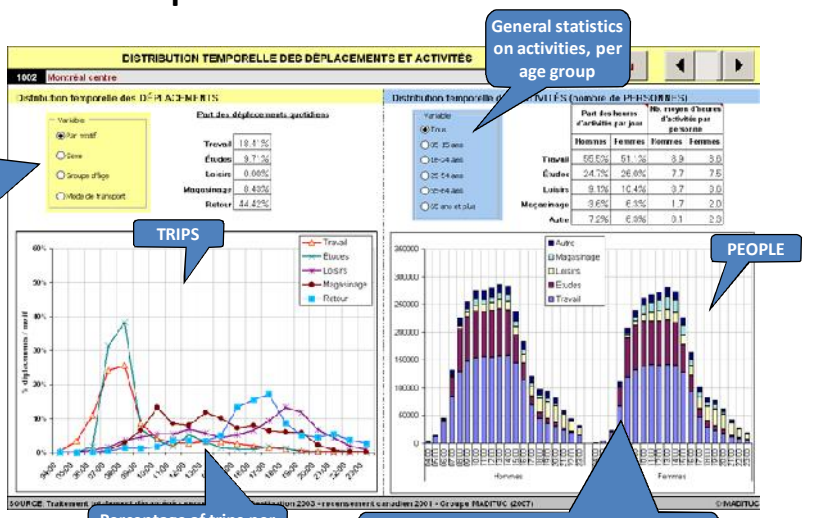

MIL: Trip distances
Selection button for spatial perspective: home location, origin or destination
DISTANCES DE DÉPLACEMENT
Menu
Proportion des déplacements
Répartition des dépl. par classe de distance
% of trips
Number of trips
Selection button for the two histograms presenting travel distance distributions
10/11/2008
19


MIL: Trip generators
List of up to 15 main trip generators in the area
GÉNÉRATEURS DE DÉPLACEMENTS
Menu
Interactive bubble chart presenting trip generators according to selected variables
Variables for abscise
Variables for ordinate
10/11/2008
20

MIL: Modal split



MIL: Temporal distribution



Potential contributions of MIL screens

	MIL screen								
Type of studies	HH & dwel.	People	Trip dist.	Home act.	Mobil. markets	Trip gen.	Use of transit	Modal split	Temp. dist.
Network operations			+				++	+	++
Network planning				++					
Demand modeling	++	++			++	+			
Financing					++		+++		
Marketing, customer relationship	+	++		++	++	+			
Road & transit interfaces (ex. commuter train)			++				+	++	

XLS +++: How is it relevant in the transportation Community?

Teaching

- "Sense" of the data
- Experiment multiple approaches + models
- Interactive + adaptative
- Easy programming + management

Exploration

- First step toward more complex models
- Interactive + adaptative
- Data processing abilities (filtering, Pivot tables, graph, GIS, ...)

Dissemination

- Well-known interface + basic functions
- Pre-structured visualization with some interaction (prevent from doing "wrong analysis")
- Access to more complex analysis → democratization of data

MIL – innovative use of XLS!

- Readily available platform + pre-structured data = Facilitate dissemination towards decision makers → increase awareness with respect to transportation problems → add value to survey data → increase potential benefiters of data → facilitate data acquisition processes (financing, support, data access)

Acknowledgments and reference

- Metropolitan Agency of Transportation: project initiator (www.amt.qc.ca)

- Morency, C., Trépanier, M., Piché, D., Chapleau, R. (2008). *Bridging the gap between complex data and decision makers: an example of innovative interactive tool*, to be presented at the 55th Annual North American Meetings of the Regional Science Association International, (November 2008, New-York)
- Chapleau, R., Morency, C., Bourgeois, M. (2008). *Simple and Interactive Spatial Mobility Analysis Tool for Data Visualization*, International Conference on Survey Methods in Transport: Harmonization and data comparability, Annecy, France.

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