Mastering Mobility: Data types and data collection methods for an urban mobility diagnosis

November 2nd | 10-11:30 CET

European Commission

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
of the Federal Republic of Germany

AFD AGENCE FRANÇAISE DE DÉVELOPPEMENT

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Mobilise Your City

Welcome to this year's Mastering Mobility Series!

✓ **Learn**
✓ **Exchange**
✓ **Connect**

02.11.2021	**Data types and data collection methods for an urban mobility diagnosis**
10.11.2021	Tramways as sustainable mass-transit systems: Ex-post evaluation of Moroccan tramways
16.11.2021	Understanding air quality and its role in urban transportation
23.11.2021	Integrating air quality into sustainable mobility planning
29.11.2021	Reforming paratransit with MobiliseYourCity's newest catalogue of measures
30.11.2021	Getting to know your potential: Conduct a financial assessment of your city
07.12.2021	Reflecting about barriers and co-creating solutions for active and walkable cities

Translation French-English will be provided

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Agenda

10:00	Welcoming words to the Mastering Mobility Series 2021		11:10	Break
	Mateo Gomez		11:15	Breakout groups
10:10	Introduction to today's session			All participants
	Mateo Gomez		11:30	Short Q&A, wrap-up and participant feedback
10:15	Poll			Mateo Gomez
	Mateo Gomez			
10:20	Why mobility surveys?			
	Ferdinand Marterer			
10:25	Types of mobility surveys			
	Ferdinand Marterer			
10:45	Methods of data collection			
	Ferdinand Marterer			

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Objectives of the session

- Define an urban mobility diagnosis and understand why it's essential to do one as part of an urban mobility planning process
- Identify the requirements and steps for conducting an urban mobility diagnosis
- Define the types of data needed to conduct an urban mobility diagnosis
- Reflect on how to close data gaps in low-data environments

Mastering Mobility Series

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Mobilise Your City

Meet the speakers and facilitators of today's session

Speaker

Ferdinand Marterer

Project coordinator

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Facilitator

Mateo Gomez

Associate Mobility Expert

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Data Collection: Mobility survey design

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Data Collection: Mobility survey design

OBJECTIVES

- Develop skills related to **mobility survey design and implementation**

- **Presentation of type of surveys** and related issues

- **Methods involved and good practices**

PROGRAM

Why mobility surveys ?   10:20 - 10:25 CET

Types of mobility surveys   10:25 - 10:45 CET

Methods of data collection   10:45 - 11:10 CET

Why mobility surveys?

Why data?

Without data, you can only make assumptions, generally biased by your personal background :

- Impact on the accuracy of transport model and traffic forecast

- Impact on decision made concerning scenarios (infrastructure sizing)

- Impact on the validity of socioeconomic and financial assessment

Data is a key element to transport project planning and assessment:

- Proceed to the analysis of the current mobility situation

- Participates in scenarios definition

- Proceed to transport modelling and forecast for SUMP scenarios assessment

Why mobility surveys?

Different types of data necessary to describe a complex system

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SECONDARY DATA

INSTITUTIONAL FRAMEWORK: Governance, Financial capacities

URBAN FABRIC AND LAND USE

SOCIO-ECONOMIC CONDITIONS DATA

TRANSPORT OFFER
→ Transport modes available and their characteristics

PRIMARY DATA

TRANSPORT DEMAND
→ Traffic observed and Mobility patterns

Why mobility surveys?

Data collection process

PERFORM DATA AUDIT

CONSULT STAKEHOLDERS FOR THE COLLECTION OF EXISTING DATA
(institutional data, previous studies/surveys…)

RETRIEVE AVAILABLE DATA
Synthesize their content, identify data gaps

COLLECT ADDITIONAL DATA
To fill important gaps in data (Mobility survey with Field data collection):
- Update existing data
- Fill gaps in existing data

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Types of mobility surveys

Types of mobility surveys

Mobility surveys

A trip is defined by the answers to the following questions:

Why ? → Trip purpose (work, school, leisure…)

Where ? → Origin and destination

When ? → Time period and travel time

How ? → Transport mode, itinerary …

Mobility surveys shall allow to characterize these different issues.

Time

Periods of surveys, over months, weeks and hours

Optimal data

Space

Study area

Composition

Details on types of vehicles and characteristics

Types of mobility surveys
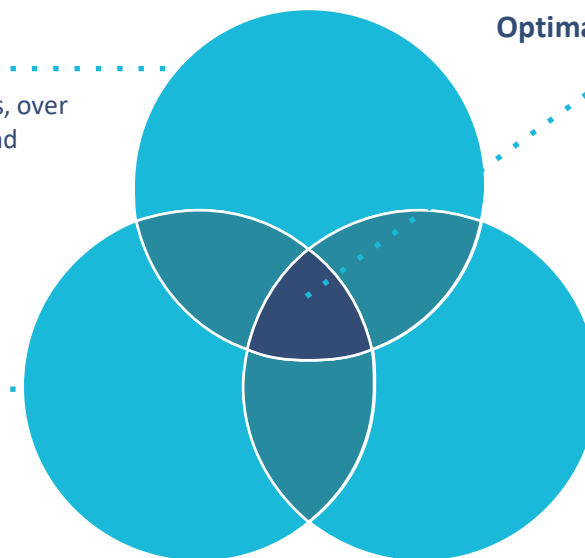
Different types of surveys for different purposes

A. Household Survey

B. Traffic Counts

- ○ Classified traffic counts
- ○ Directionnal counts at junctions

C. Surveys by Interviews

- ○ Public transport O-D interviews
- ○ Road side interviews

D. Travel time surveys

Types of mobility surveys

A. Household surveys

PURPOSES

- **Inventory of trips and mobility patterns** on the study area

- Provide a wide range of data: housing characteristics, household socioeconomic data, motorization, individual occupation, trips, mobility rates per mode/purpose, opinion about mobility and transport …

- Used for decision support, modelling, transport planning and evaluation

- Based on the relation between settlement/socioeconomic and mobility patterns

Number of vehicles per household

Trip Purpose (exclusive for 'return home')
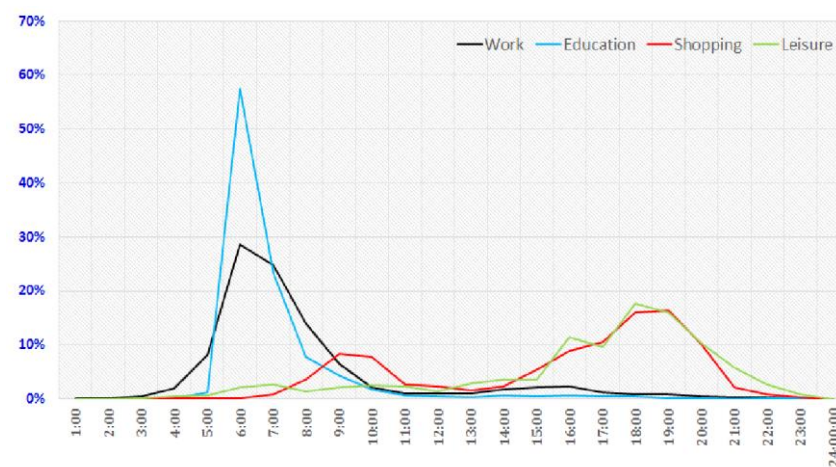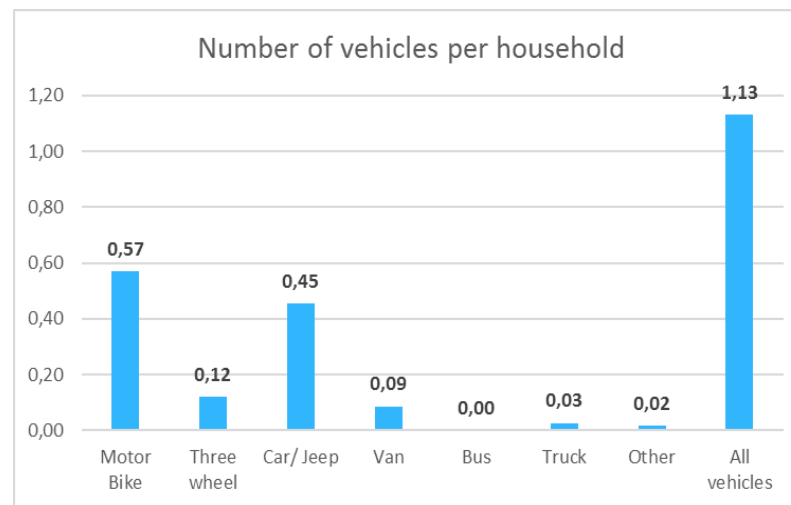
Time of Departure Profiles by Trip Purposes

Trips rate / person / day per mode
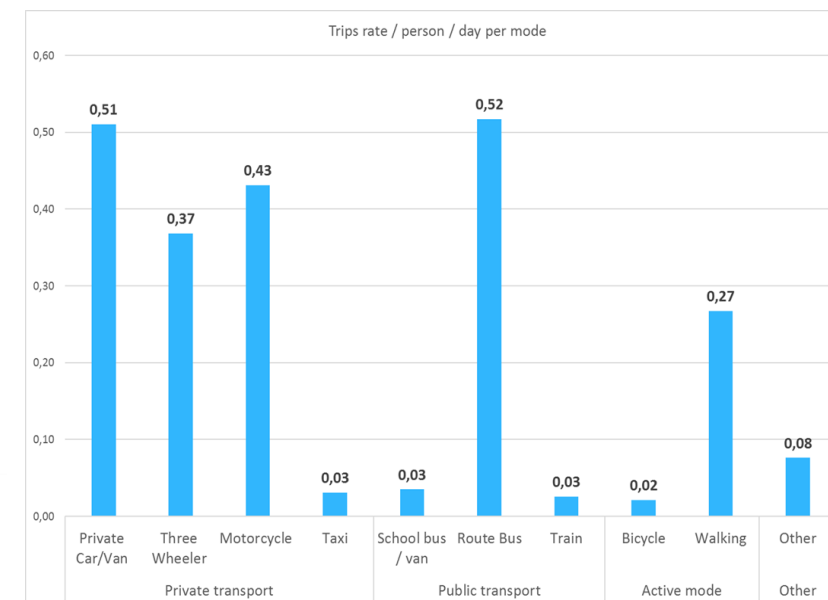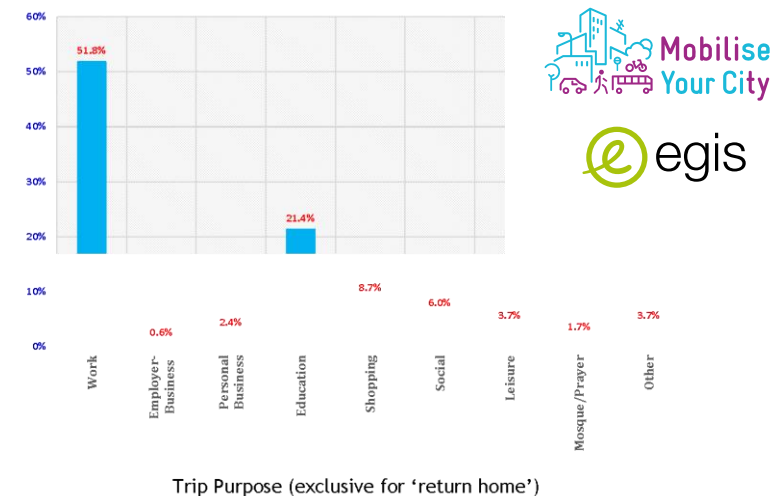
Commune d'origine / Commune de destination	1. Dixinn	2. Kaloum	3. Matam	4. Matoto	5. Ratoma	6. Coyah	7. Dubréka	8. Autre commune	Total général
1. Dixinn	37 956	14 758	20 107	21 820	30 433	2 919	2 459		130 453
2. Kaloum	18 774	51 586	24 366	33 754	28 891	2 199	1 951	494	162 013
3. Matam	20 358	24 348	61 455	62 020	38 311	4 582	3 620		214 694
4. Matoto	23 772	41 730	59 859	300 215	85 317	18 664	13 040	1 100	543 697
5. Ratoma	30 379	31 203	38 557	85 172	395 622	11 477	13 041	512	605 963
6. Coyah	2 661	2 758	5 351	19 708	13 034	109 530	9 957	1 313	164 311
7. Dubréka	2 448	2 257	2 993	10 797	12 005	7 430	46 356		84 286
8. Autre commune		247		1 313	1 131	976	132		3 798
Total général	136 347	168 887	212 687	534 798	604 744	157 777	90 556	3 419	1 909 215

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Types of mobility surveys

B. Traffic counts

What to count ?

- Vehicles
- Persons (riders)
- Trips… for all transport modes, passengers and goods
- At cross sections, at junctions
- At peak hours, daily, weekly, permanently

Counts are generally exhaustives (all vehicles are counted), with possible classification of vehicles counts allow for :

- Average annual trafic estimation
- Hourly, daily, monthly traffic evolution
- Redressment of OD interview surveys

The case of SUMP Mebidangro

MYC composition

MYC Vehicle category	Vehicle category
Private car	Private car (small, large, minivan)
Individual taxi	Individual taxi (formal)
Motorcycle	Motorcycle (personal and GOJEK/GRAB without passenger)
Motorcycle taxi	Motorcycle taxi (with passenger)
Minibus	Minibus (angkot, rental)
Bus	Bus
BRT	BRT
Very light LCV	Very light LCV (Light Commercial Vehicle), three wheel (ex: Viar)
LCV	LCV (Light Commercial Vehicle) (ex: Van)
Solo truck	Solo truck (10t max)
Articulated truck	Articulated truck (more than 10t)

Types of mobility surveys

B. Traffic counts **Results examples: Link sections 1/2**
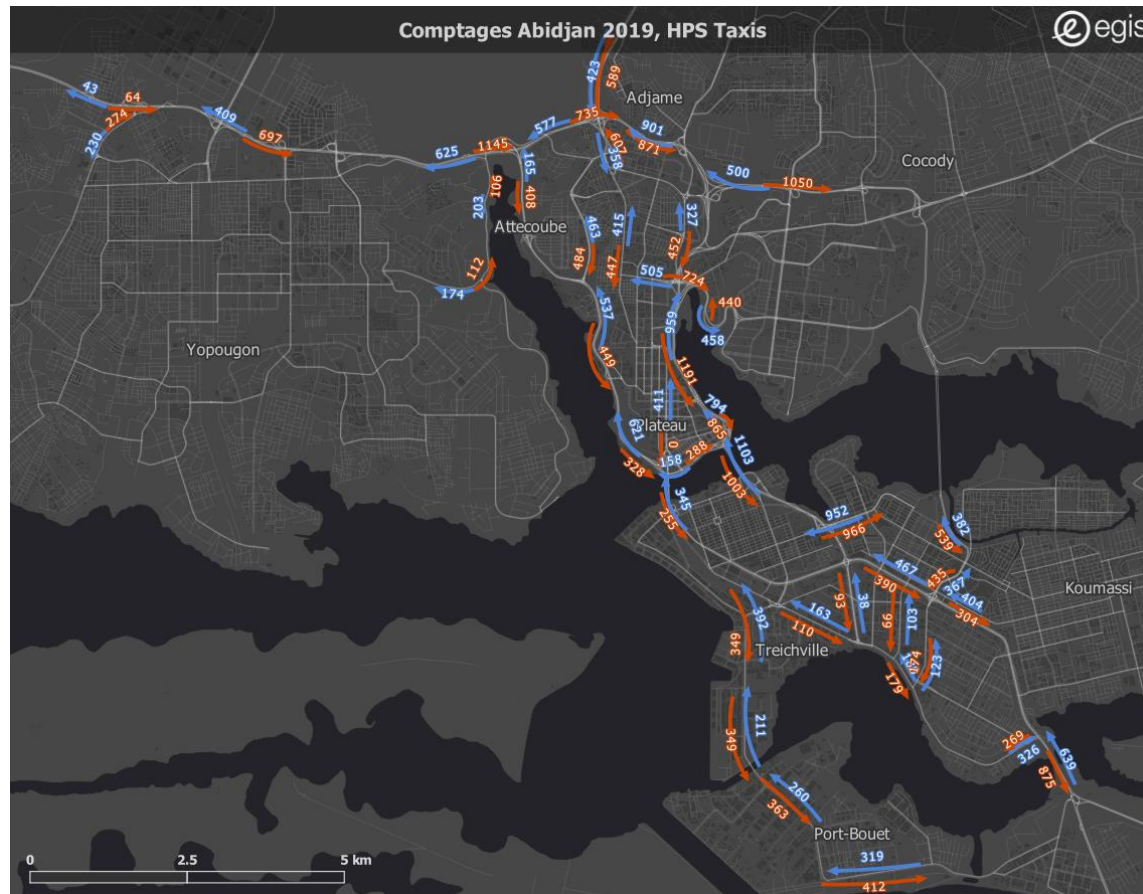
Taxis traffic at evening peak hour
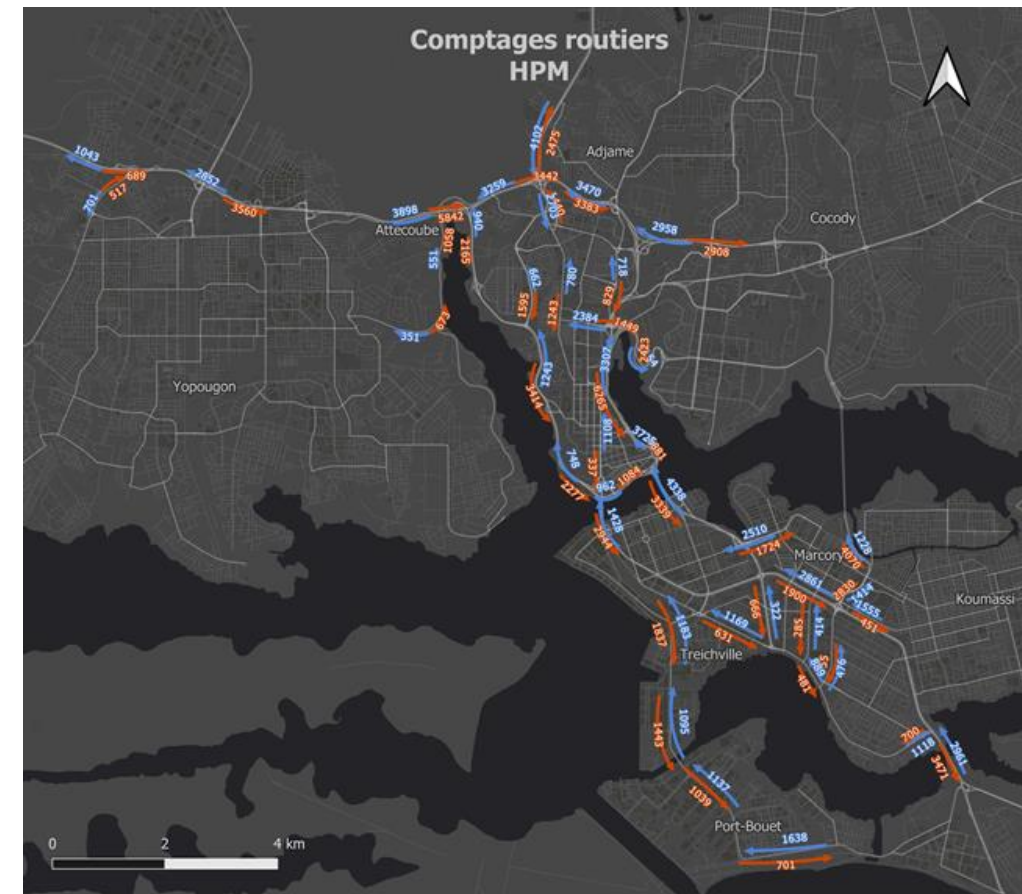
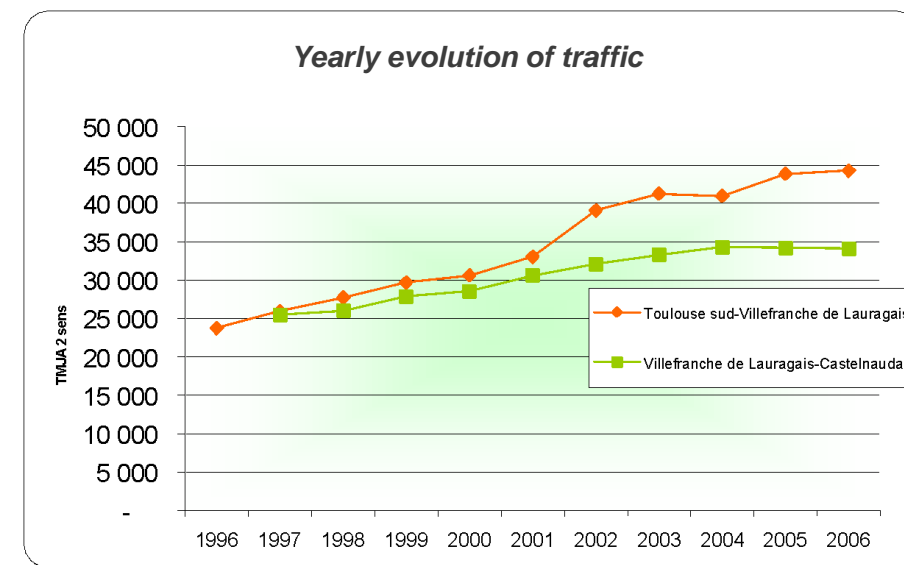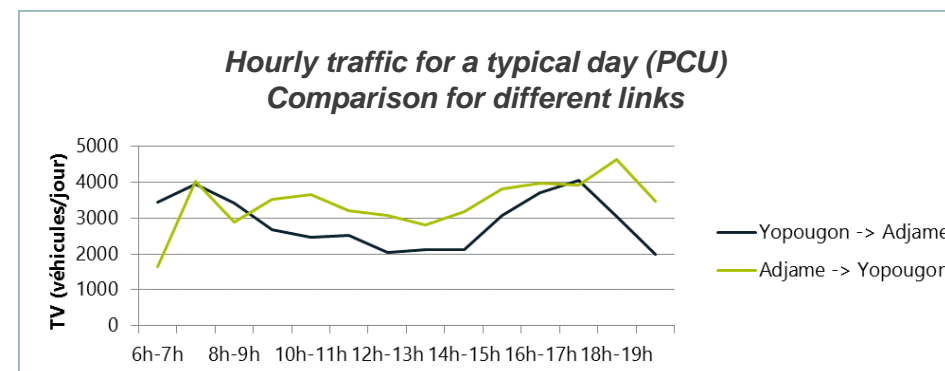*Average Annual Daily Traffic (AADT)
in Personal Car Unit (PCU)*

Types of mobility surveys

B. Traffic counts **Results examples: Link sections 2/2**
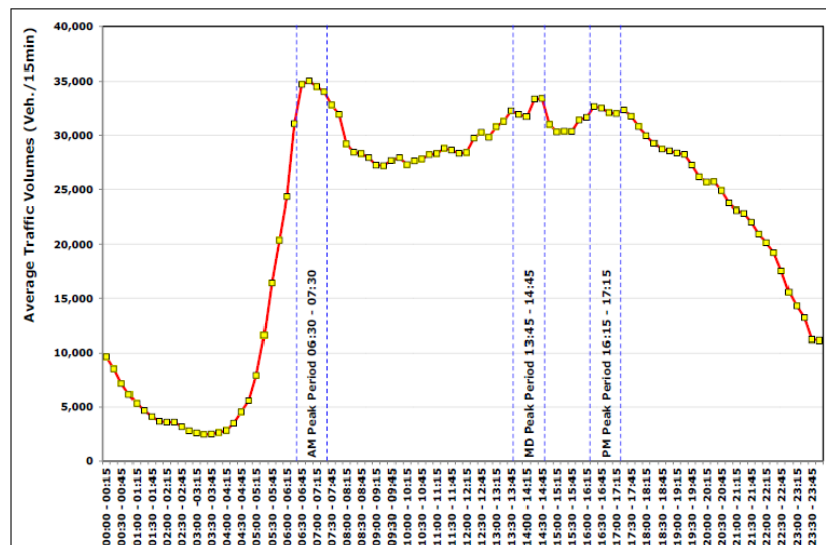
Hourly traffic for a typical weekday

Average daily traffic

Hourly traffic for a typical day (PCU)
Comparison for different links

Yearly evolution of traffic

November 2021   Data collection

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Types of mobility surveys
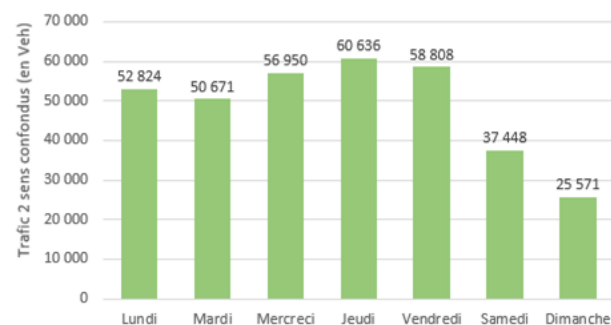
B. Traffic counts **Results examples: Junctions**

Movements per direction at junction (PCU)

18

Types of mobility surveys
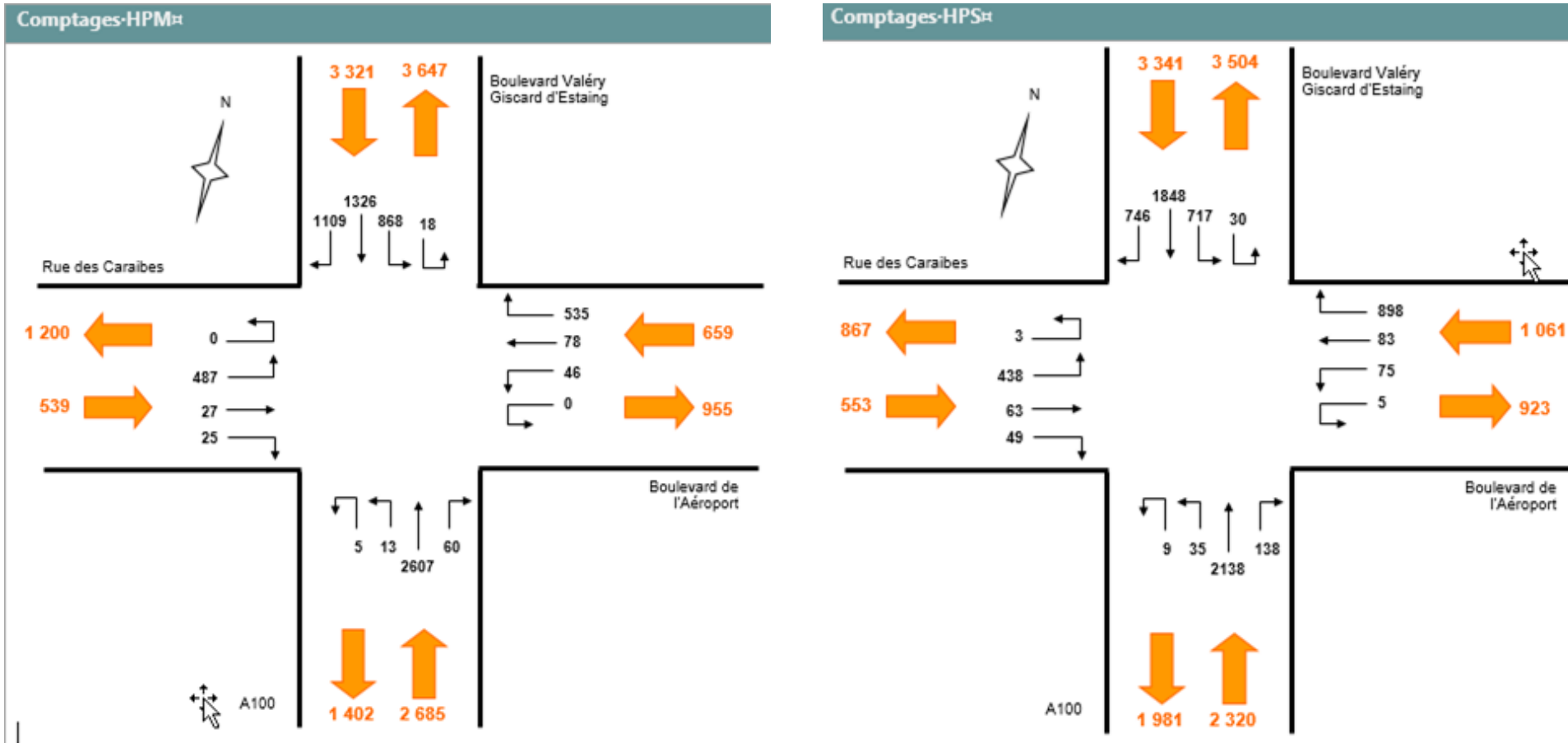
C. Survey by interviews

Central element of traffic studies is the construction of the demand matrix, with origins and destinations.

OD interviews allow to estimate mobility patterns through a sample of the existing traffic

- Collect information about :
  - Origin, destination, purpose, travel time, trip frequency
  - Vehicle type, vehicule occupancy (private transport)
  - Access and egress mode, transport cost (public transport)
- Related to the transport mode
  - Road Side Interviews: Necessary to intercept/stop road traffic
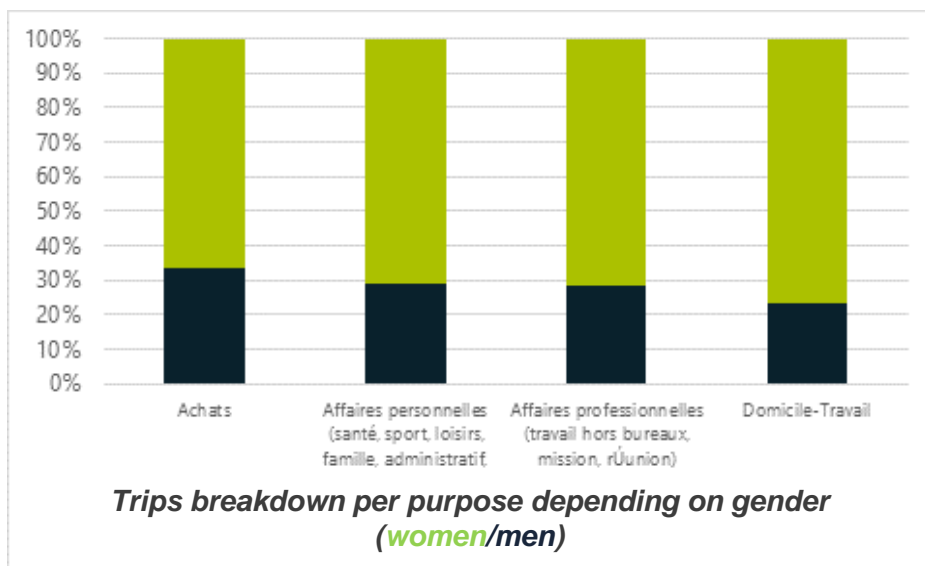 - Public transport surveys: Intercep public transport riders either on-board or at station

Types of mobility surveys

C. Survey by interviews **Road side interviews examples**

OD - VL - HPS	Poste n°1	Poste n°2	Poste n°3	Poste n°4	Poste n°5	Poste n°6	Poste n°7	Poste n°8	Poste n°9	Poste n°10	Poste n°11	Poste n°12	Total général
Abobo	4,6%	5,5%	2,5%	3,7%	2,0%	0,3%	0,0%	2,7%	1,2%	3,6%	1,9%	12,2%	**3,9%**
Adjame	4,1%	4,2%	5,6%	4,3%	1,2%	1,7%	1,3%	4,2%	2,2%	5,1%	3,1%	13,7%	**5,0%**
Anyama	2,3%	2,6%	0,8%	0,4%	0,3%	0,6%	0,3%	1,3%	0,4%	0,5%	0,2%	1,0%	**0,8%**
Attecoube	0,5%	6,1%	7,2%	1,6%	0,0%	0,7%	0,4%	0,0%	1,1%	0,0%	0,8%	1,0%	**1,3%**
Bingerville	1,4%	0,3%	0,4%	0,2%	0,9%	0,0%	0,8%	2,3%	0,5%	1,6%	2,8%	1,6%	**1,5%**
Cocody	13,4%	4,0%	2,7%	9,4%	8,9%	6,5%	6,8%	11,7%	11,9%	21,0%	34,1%	21,1%	**17,4%**
Dabou	1,1%	0,7%	0,0%	0,0%	0,0%	0,0%	0,3%	0,0%	0,6%	0,0%	0,3%	0,8%	**0,3%**
Grand-Bassam	0,6%	1,1%	0,3%	1,1%	2,7%	3,4%	4,4%	12,2%	6,4%	2,5%	0,7%	1,6%	**2,9%**
Jacqueville	0,3%	0,4%	0,0%	0,0%	0,3%	0,0%	0,0%	0,5%	0,7%	0,2%	0,3%	0,2%	**0,3%**
Koumassi	2,5%	2,1%	2,1%	2,6%	2,6%	0,6%	5,8%	8,6%	11,1%	3,7%	2,5%	1,9%	**3,8%**
Marcory	3,4%	8,7%	5,9%	2,7%	2,6%	2,2%	36,9%	10,2%	12,7%	14,2%	6,2%	5,3%	**8,1%**
Plateau	4,1%	13,6%	26,9%	13,7%	2,7%	6,2%	3,7%	2,6%	7,6%	11,9%	26,7%	3,7%	**12,5%**
Port-Bouet	0,8%	4,1%	2,0%	6,6%	22,8%	46,2%	7,3%	37,1%	8,3%	4,6%	0,8%	3,5%	**8,8%**
Songon	1,9%	0,7%	0,1%	0,5%	0,0%	0,0%	0,0%	0,0%	0,2%	0,0%	0,0%	0,4%	**0,3%**
Treichville	5,9%	8,0%	8,6%	36,9%	44,5%	23,8%	28,7%	3,2%	29,1%	24,6%	15,1%	4,0%	**16,0%**
Yopougon	52,6%	36,9%	34,6%	16,4%	7,9%	7,2%	2,7%	2,8%	5,9%	6,7%	4,4%	26,8%	**16,6%**
Autres	0,3%	1,1%	0,4%	0,0%	0,7%	0,3%	0,6%	0,7%	0,2%	0,0%	0,2%	1,5%	**0,5%**
Total général	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	**100%**

Origin breakdown per interview location

Occupancy rate per type of vehicle

Types of mobility surveys
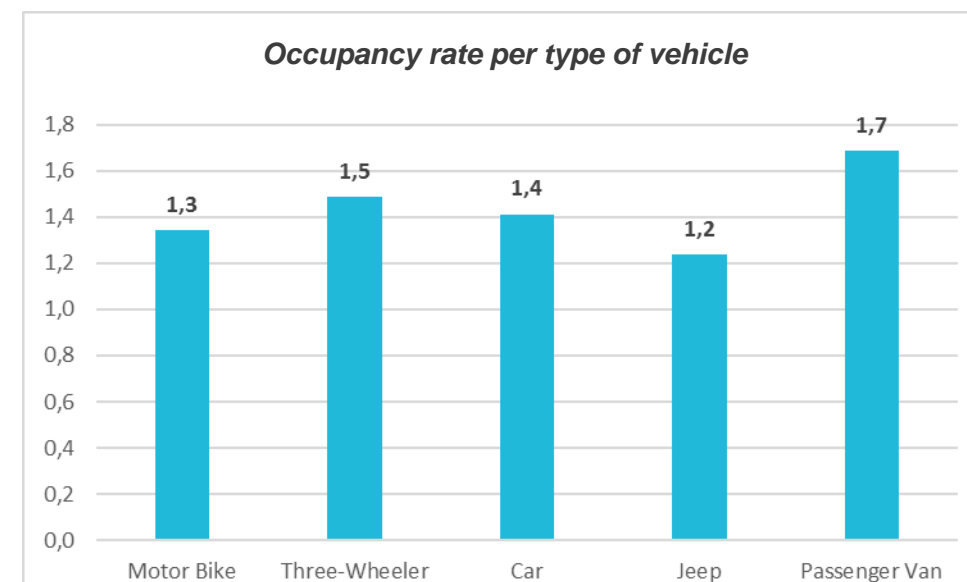
C. Survey by interviews **Results examples: PT surveys**

Trips breakdown per purpose depending on gender (women/men)

Average total travel time

Access and Egress modes

Trip cost

November 2021   Data collection

Types of mobility surveys
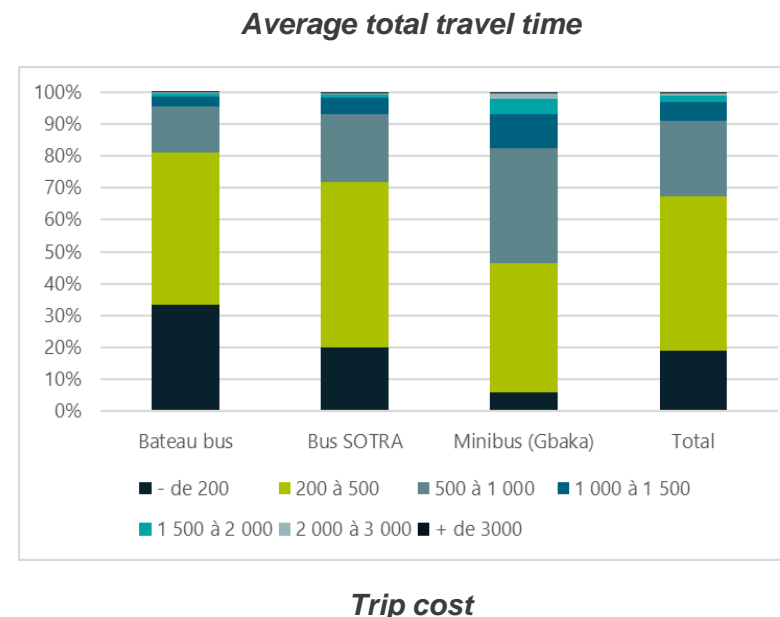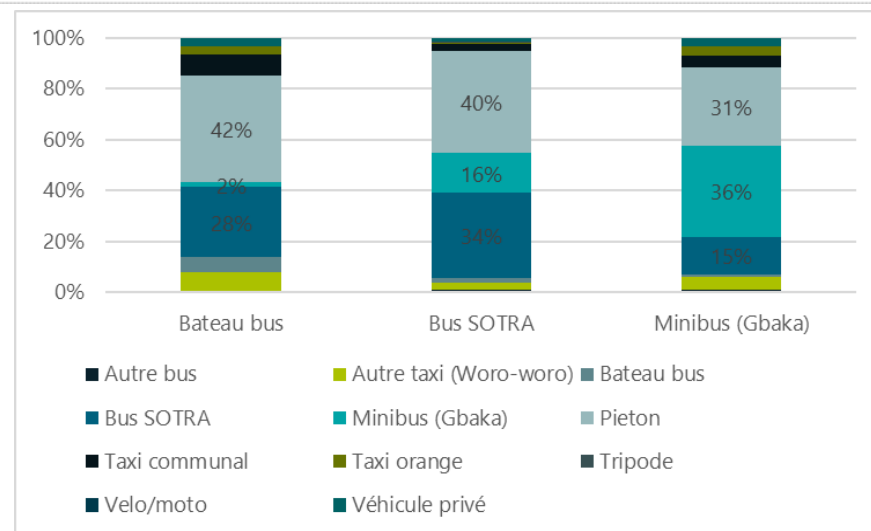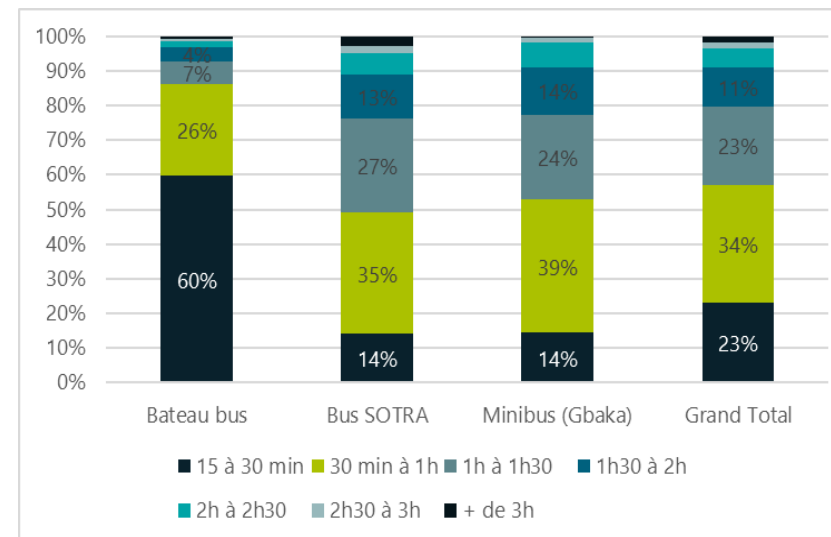
D. Travel time surveys

Why perform travel time surveys ?

- Travel time is an important parameter for **mode choice and itinerary choice**
  (as well as travel cost – related to individual socio-economic parameters – and attractiveness)

- Necessary to check a model calibration, not only for traffic loads, but also for its ability to restitute reliable travel times after traffic assignement

- Potentiel travel time saving is part of transport project / policy assessment (value of time)

How to perform travel time surveys ?

- **Floating car**: on each itinerary surveyed, several measures per direction and time period

- **Use of big data** :
  - Usual sources : GPS, Google, mobile phone providers …
  - Possible to retrieve real time data or historic data
  - Sample quality ?

Types of mobility surveys

D. Travel time surveys **Results examples 1/2**

Examples of results:

Etat du trafic sur le réseau routier pendant la journée
(pourcentage des 500km du réseau routier surveillé)

5,7 km

Bvd De Gaulle – Vers Solibra

Travel time on a designated itinerary

November 2021   Data collection

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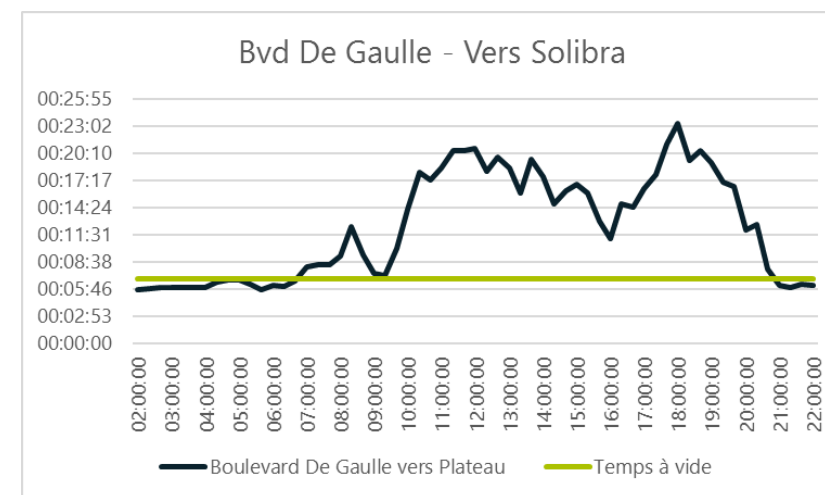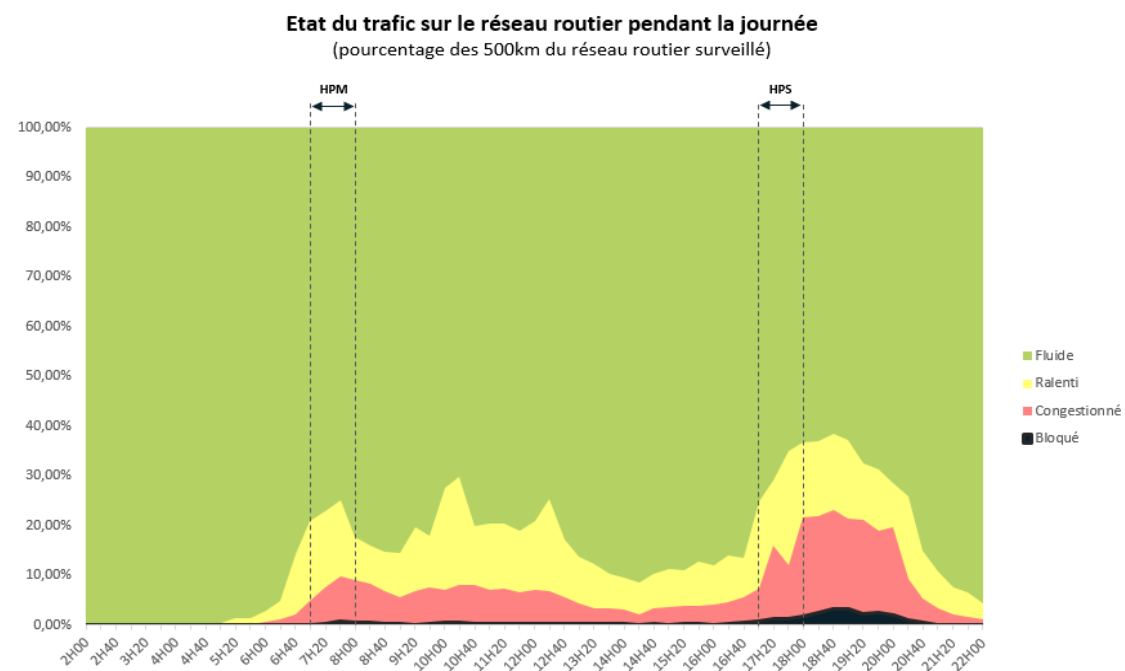
Types of mobility surveys

D. Travel time surveys **Results examples 2/2**
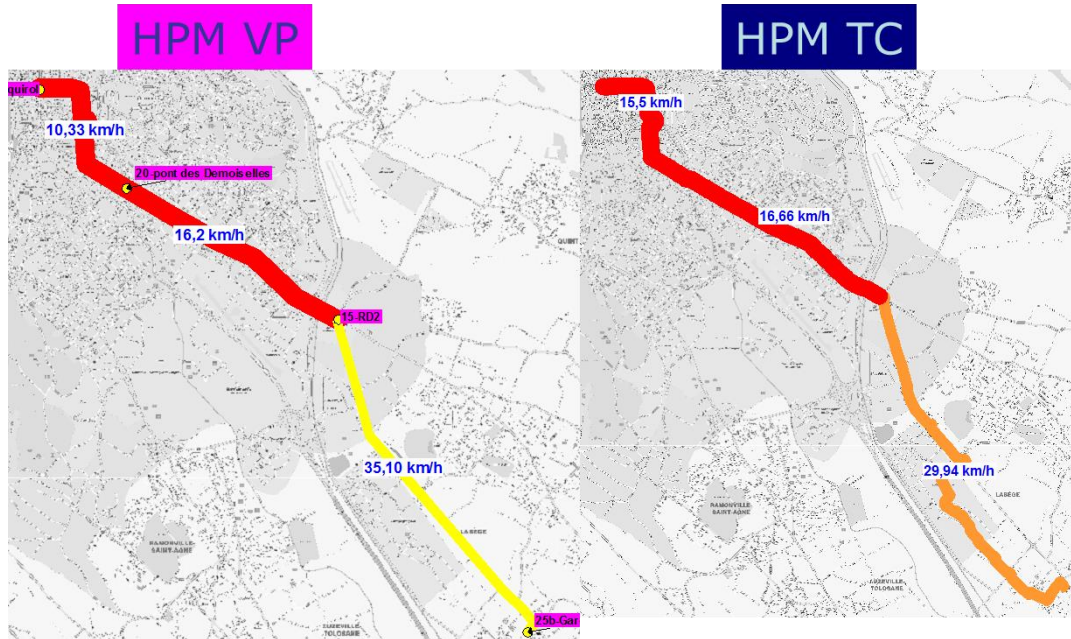
Comparison for travel speed between private car and public transport

Representation of the road congestion through Google data

Types of mobility surveys

RSI and screen lines

Complement

Road Side Interviews can complement household surveys, as a screen line to intercept exchange and transit traffic (trips with origine and/or destination not included in the HHS area)

- Number of locations limited to main axes in/out of the area
- All the possible relations are « cut » by the survey line
- RSI + HHS allow to collect a much larger range of information
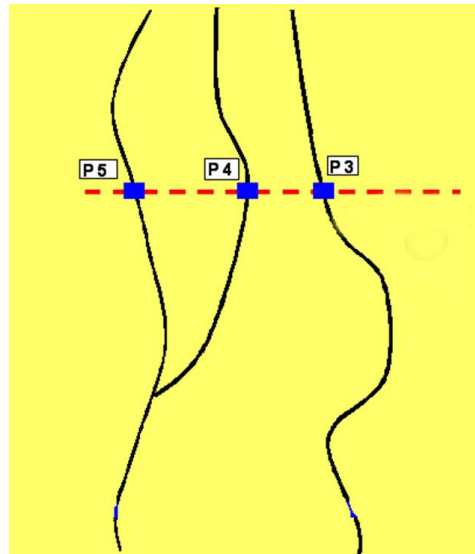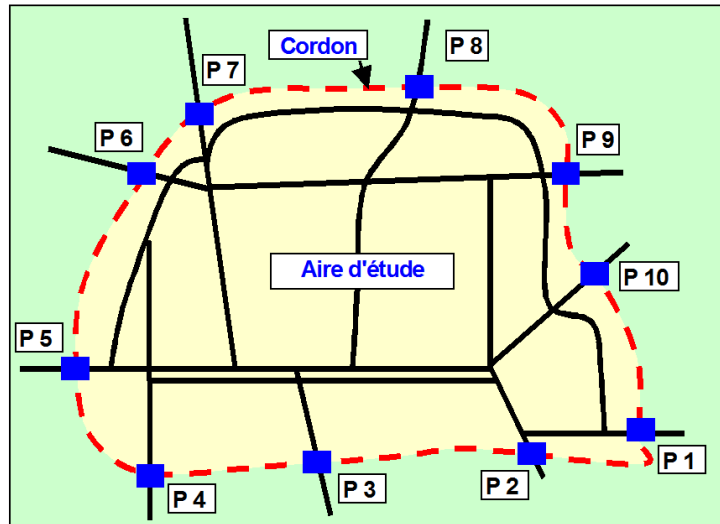
Stand-alone

RSI can constitute also a stand-alone data collection (possible to build a full demand matrix only from RSI).

- Requires a large survey plan in order to cover all main road links all over the study area → Necessary to be able to catch all significant OD

- Can be complex to organize : multiple location to handle simultaneously, police support, interviews over different days, redressment of the interviews …

Methods of data collection
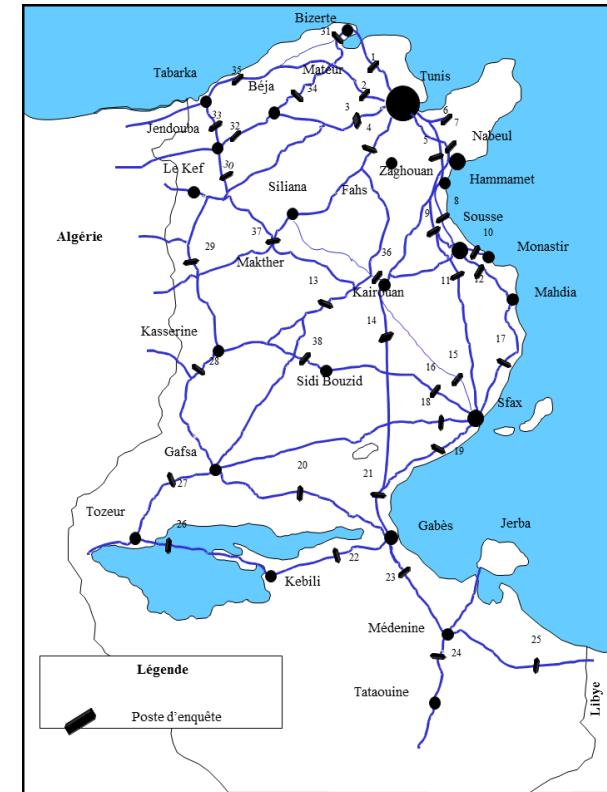
Methods of data collection

Steps for survey plan design and implementation

1 Define survey area in relation with study area

2 Define survey plan depending on the project goal, existing data, available time & budget

3 Prepare forms for each type of survey

4 Set up the logistic for the survey campaign : communication, authorizations, equipment, …

5 Hire and train surveyors

6 Implement a pilot survey

7 Implement the main survey, with adequate monitoring

8 Clean / control / process the data collected

MODELING

Methods of data collection

Household survey methodology

IMPLEMENTATION

Different ways to implement a HHS:

- Face to face interview

- Telephone interview

- Internet

$\Longrightarrow$ Pro / cons of each method

QUESTIONNAIRES

Household survey form composed generally of 4 different forms

- Household form : 1 form per household

- Individual form : 1 form per household member

- Trip form : 1 form per household member surveyed for trips (4 member max. per household)

- Opinion form : 1 form per household member surveyed for trips (4 member max. per household)

Methods of data collection

Household survey methodology **Household form**

1. HOUSEHOLD FORM

- Housing information

- Household size

- Household motorization

- Household income

Traffic and Transport Survey and Preparation of Database for Medan SUMP - 2020

Household Form (to complete during firts visit)

HHS-2

HH-ID		
Number of floors in building:		Number of dwellings in building:
Name of head of household:		
Phone:		
E-mail:	@	

	Less than 6 years old	6 years and older
1. How many people do PERMANENTLY LIVE in this household?		
2. What is the dwelling unit TENURE? (1- Owned, 2- Rented, 3- Provided, 4- Other)		
3. How many people are PRESENT during the first visit?		
4. How many MOTOR VEHICLES are available to the household for personal use?		
5. How many BICYCLES are available to the household for personal use?		

6. Please answer for each MOTOR VEHICLE:

	Type	Fuel	Owner	Type of vehicle	Fuel	Owner of vehicle
1						
2				1- Car	1- Gasoline	1- Household
3				2- Light goods vehicle	2- Diesel	2- Employer
4				3- Heavy goods vehicle	3- Electric	3- Rented
5				4- Motorcycle	9- Other (specify)	9- Other (specify)
6				9- Other (specify)		

Methods of data collection

Household survey methodology **Individual form**

2. INDIVIDUAL FORM

- Detailed household composition

- Individual characteristics

- Main occupation

- Vehicle availability

Traffic and Transport Survey and Preparation of Database for Medan SUMP - 2020												HHS-3
Person Form (to complete during firts visit)												
HH- ID			Sheet Nr:			of:						
	1	2	3	4	5	6	7	8	9	10	11	12
Person ID	Family name and given name	Household Status	Nationality	Sex M=1 F=2	Age	Disability	Person present? 1-YES 2-NO	Present main occupation	Main Occupation Pre- Covid	Driving licence	Driving License Type	Vehicle availability

Methods of data collection

Household survey methodology **Trip form**

3. TRIP FORM

- Collect all trips during a designated day (day prior to the survey)

- Trip form organized as a global « round-trip »
  For each trip :

  - Destination (taking into account that the starting point of the day is home)

  - Purpose

  - Transport mode

Methods of data collection

Household survey methodology **Opinion form**

4. OPINION FORM / MISCELLEANOUS

- Mobility needs

- Opinion about transport offer quality, safety, possible improvements …

  - Analysis by gender

  - Possibility to shift to stated preference survey

Traffic and Transport Survey and Preparation of Database for Medan SUMP - 2020						O
Household Opinion Survey						
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	I Don't Know
Person ID:						
Gender:						
(A) Road Network						
1. Roads are congested in the morning when people leave home and in the evening when people go home	1	2	3	4	5	N
2. Roads in the surrounding areas of schools are congested during 07:00 - 08:00 AM	1	2	3	4	5	N
3. Tuks-tuks traffic participates in road congestion	1	2	3	4	5	N
4. On-street parking reduces road capacity thus results in road congestion	1	2	3	4	5	N
5. Roads are congested due to U-Turning vehicle	1	2	3	4	5	N
6. Roads are congested because the road width is not sufficient	1	2	3	4	5	N
5. Roads are congested due the road width are not homogenous and creating bottle neck	1	2	3	4	5	N
6. Roads are congested due "self-initiative" contra flow	1	2	3	4	5	N
5. Roads are in poor condition and it is dangerous for driving	1	2	3	4	5	N
6. Others (Specify)	1	2	3	4	5	N

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Methods of data collection

Different methods for **link section counts**

Method	Vehicle classification	Implementation	Data management	Time period	Data accuracy	Cost
Manually (surveyors)	●●●●○ All types possible	●●●●○ Depend on the survey plan	●●●○○ Data entry, control, cleansing	●●●○○ Day time only on short time period	●●●●○ Higher details possible Possible humain error	●●●●●
Temporary pneumatic tubes	●●○○○ Light/heavy vehicles only	●●●●○ Depend on the survey plan	●●●●● Automatic processing	●●●●○ Large time period possible Security issue at night	●●●○○ Reliability of tubes can cause data loss	●●●●○
Cameras, drones	●●●●● All types possible	●●●○○ Subject to local regulation	●●●○○ Depends on video processing (manual/auto)	●●●○○ Day time only on short time period	●●●●○ Good if automatic processing	●●●○○
Specific automatic devices for pedestrians and cycles	●● ○○○ Specific to NMT	●●○○○ Heavy (generally permanent + calibration)	●●●●● Automatic processing	●●●●○ Large time period possible Security issue at night	●●●●● Good	●●○○○ Higher if permanent
Permanent counting stations	●●○○○ Light/heavy vehicles only	●●○○○ Heavy	●●●●● Automatic processing	●●●●● Permanent	●●●●● Good	●○○○○

Pneumatic tubes
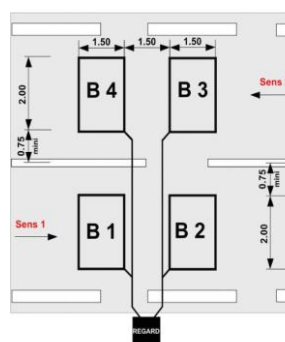
Magnetic loop

Permanent counting station

Cycle counting station

November 2021   Data co

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Methods of data collection

Different methods for **junctions counts**

Manually (surveyors)

- Direct count of movements

- Recording of plates (tape recorder or video) and processing of the data
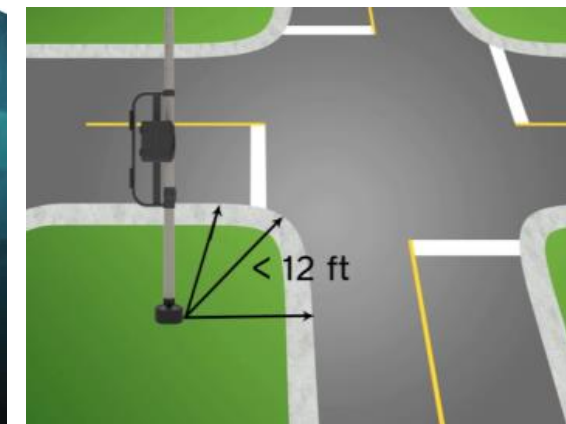
Scout camera

Automatic counts

- Video cameras with a software enable to read plates

- Drones with software following vehicles in the junction

Drones

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Methods of data collection

O-D Interviews methodology

Different methods for private vehicles OD surveys

- Driver interview

- Plate reading (only possible for screen line OD)

- Flyers (only possible for screen line OD): a flyer is distributed at each entry of the perimeter with a color code and collected at the exit

- GPS / phone data

Methods for Public Transport surveys

- Interviews at stations

- Interviews on-board

- Online surveys

- GPS / phone data

Methods of data collection

O-D Interviews methodology

Interview forms

- Necessary to be quick (especially for RSI and onboard PT surveys)

- Trip informations : origin, destination, purpose, frequency

- For road interviews : vehicle type and occupancy

- For public transport : route identification, access/egress mode, cost

Methods of data collection

O-D Interviews methodology

All interview survey data need to be redressed on the total traffic

→ The OD matrix from the interviews is expanded to fit the traffic counted

- Generally, redressment per vehicle type and time period

- Need to redress together only vehicles with similar patterns (for instance, impossible to redress light and heavy vehicles together)
  → Necessitates traffic counts per vehicle types accordingly

- Need to have minimal number of surveys per group to redress (30 surveys per group minimum, 50 surveys preferably) to ensure statistical significance
  → Better to have larger time periods to allow for bigger survey groups. The objective is to have redressment coefficients close one to another

- Estimation of AADT shall take into account traffic seasonality

Methods of data collection

Data entry: Open data kit

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How does it works?

XLS FORM

XLSForm is a standard form created to help simplify the authoring of forms in Excel. Forms designed with Excel can be converted to XLForms that can be used with ODK tools.

COLLECT

GOOGLE DRIVE SPREADSHEET

ODK Collect, an Android data collection app that replaces paper-based forms, enabling faster and more reliable process of data collection process.

In this ecosystem, google spreadsheet serve as a platform that receive the real-time data sent from the data collection app (ODK Collect).

EASY TO MONITOR
Number of surveys (total, per surveyor, per day & time)

STANDARDIZED DATA
Standardized data, exportable to csv and kml

REAL-TIME RESULT
Customizable data visualization tools (charts, word clouds, numbers)

TIME SAVING
Minimize time for data recapitulation and cleaning as the result of the survey is automatically digitized

MAP VISUALIZATION
Geolocated surveys or tracking routes

COST EFFECTIVE
Minimizing budget for the overall survey as it reduce the time for data recapitulation.

Benefits on data collection

a. Eliminate hand writing process;
b. Eliminate printed material & printing cost;
c. Minimizing planning variation risk;
d. Eliminate mixed – up document risk.
e. Decrease chances of fraud (geolocalization of sample).

Benefits on data entry

a. Eliminate data input process, that can save 3.000 – 6.000 working hours (373 – 745 working days) *normal working hour is 8 hour/day
b. Increased performance monitoring with standby operator on dashboard.
c. Decrease chances of fraud (geolocalization of sample).
d. Increase quality of data (readability, etc.)

Methods of data collection

Data Collection Guidelines PM 96/2015

1. TRAFFIC VOLUME

- AADT: Annual Average Daily Traffic
- Collected every month (preferable), or at least collected 4 times in a year.
- Survey duration is 1-full-week (preferable), or at **least 2 days (minimum)**
- **15-minute survey interval**

2. TRAFFIC COMPOSITION

- **Traffic categorized by its axle type and its weight for pavement analysis and evaluation.**
- **Traffic categorized as Motorcycle, Light Vehicle, Heavy Vehicle, and NMT for road capacity analysis & evaluation.**

3. TRAFFIC VOLUME VARIATION

Understanding volume variation:
- **within a day (AM & PM peaks, off-peak)**
- **within a week (weekday and weekend pattern)**
- **within a month**
- **within a year (seasonal traffic pattern)**

4. DIRECTIONAL TRAFFIC PROPORTION

- **Balanced and unbalanced directional traffic on road segments**
- **Directional traffic proportion on junctions**
- **CTMC (Classified Turning Movement Counting)**

5. SPEED AND DELAY

- Spot Speed: Time mean speed, space mean speed
- **Travel Speed**
- **Free Flow Speed**
- Traffic delay, geometric delay

6. ROAD INVENTORY

- Traffic light
- Sign and road marking
- Road lighting
- Road safety equipment: delineator, guard rail, mirror, island, etc.
- Bus stop, bus lane, parking area, intermodal facility
- Curb, pedestrian sidewalk, bike lane, access for the disabled

Data collection requirement in order to plan, manage, and optimize the safety, mobility, and effectivity of traffic according to Ministry of Transportation guidelines for Traffic measures.

→ **Need to be standardized and adopted nationally**
→ **Related infrastructure, budgets, trainings to be dispatched**
→ **Direct influence on projects and plannings weighted for optimized guidelines**

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Methods of data collection

Risks to data collection

TYPE OF RISK	EXAMPLE OF RISK	MITIGATION
Environmental	Bad weather conditions	Reactivity to postpone/delay part of the survey
Covid-19 pandemic	• HHS non respondent • Lower traffic at counts • Modification of mobility patterns	• Surveyors training • Sanitary measures for surveyors • Communication prior to survey • Use historic data (previous surveys, phone or operator data)
Survey execution	• Surveyors security (especially during RSI) • Ability to stop traffic at RSI location • Entry data app breakdown	• Surveyors training • Security equipment • Collaboration with police • Back up plan with paper forms
Reliability of data	• Bad entry of data • Non respect of methodology	• Surveyors training • Monitoring during surveys • Automatic checks during data entry • Adaptation of survey methodology
Accuracy of data	Inconsistency in data classification between counts and interviews	Quality checks during survey design
Data management	• Different data format • Risk of data loss	• Use of international format (GTFS) • Online storage

Types of mobility surveys

Survey area

The definition of the survey area is related to the scale of the project, from a specific road project, to a metropolitan / regional transport masterplan. For a mobility plan like SUMP, the survey area:

- Shall cover all trips impacting the SUMP perimeter (internal, exchange, transit)

- Shall be declined for the different types of survey (different types of survey adressing different types of trips)

- Shall consider future urban development

ZONING

Household survey zoning refers to the sample building:

- Survey area correspond usually to the inner perimeter of the study

- Zoning of the survey area into drawing sectors :

  - Homogeneous zones in terms of urban characteristics and density

  - Maximum 30 000 inhabitants per sector

- Random selection of household in each sector :

  - At least 75 households/sector to ensure statistical reliability

  - How to ensure a random draw ?

Example of Medan
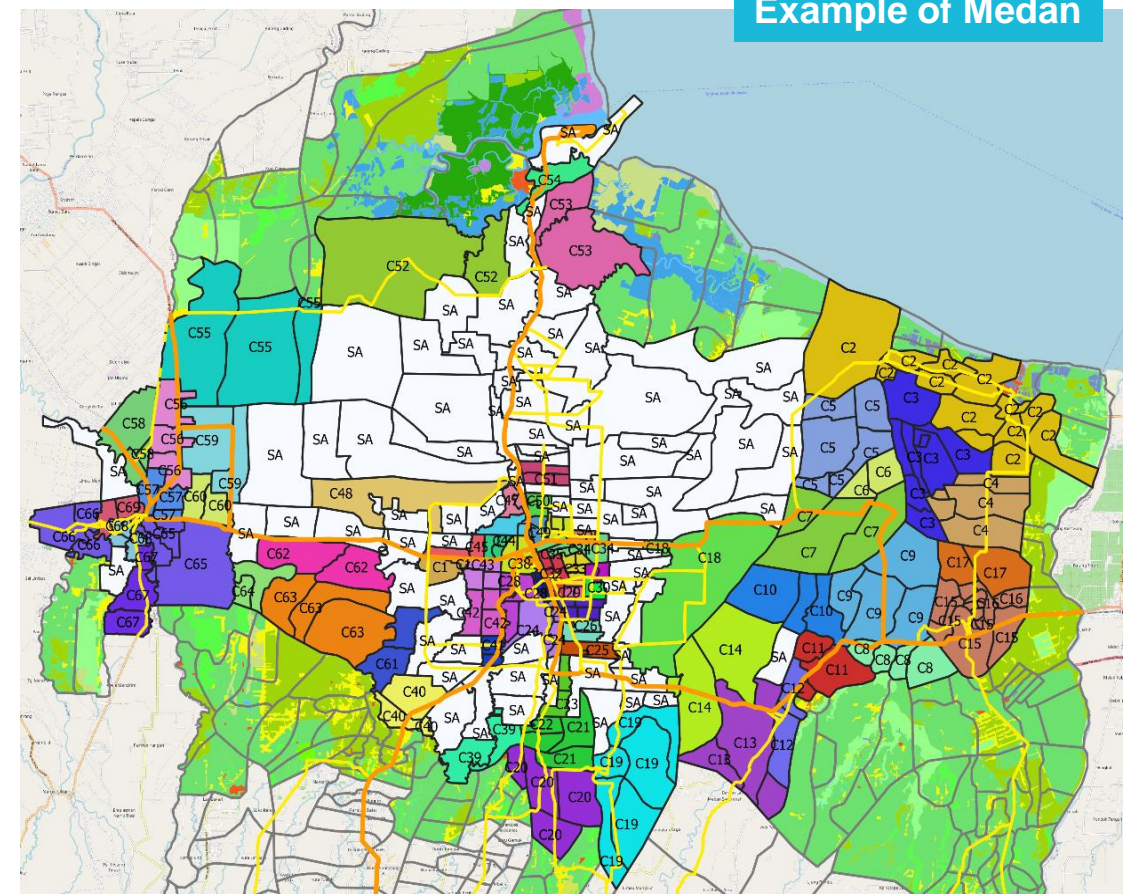
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