MINISTÈRE DES TRANSPORTS

An overview of OD-Surveys in Québec

GGH Travel Surveys Methods Workshop

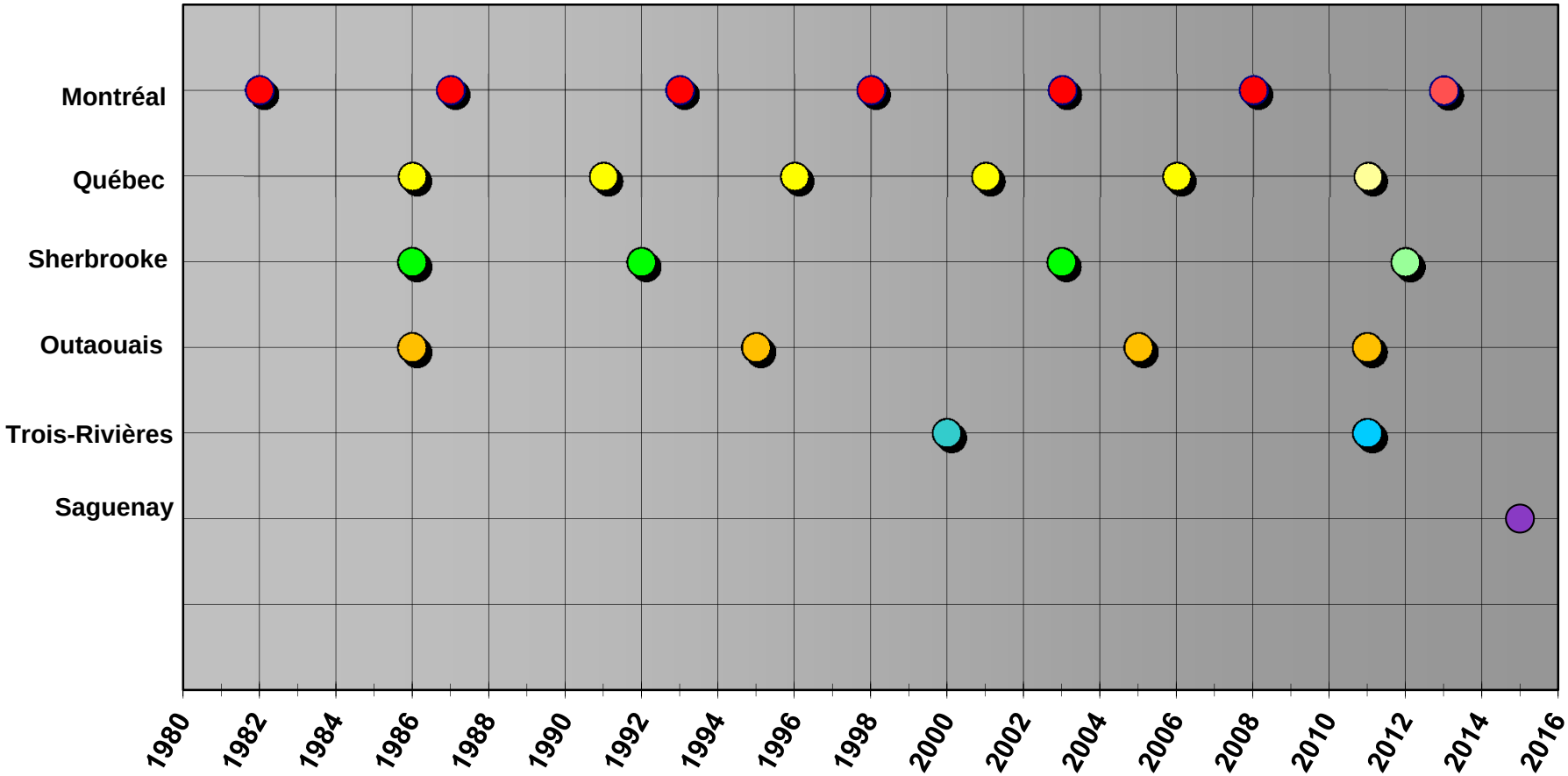
Toronto, October 3rd 2014

Pierre Tremblay, ing.

Chef du Service de la modélisation
des systèmes de transport

Québec

Regional OD-Surveys in Quebec's 6 CMAs



Transports Québec

Plan

Overview of latest surveys and experimentation :

- Trois-Rivières 2011
- Ottawa-Gatineau 2011
- Quebec 2011
- Sherbrooke 2012
- Montreal continuous survey 2009-2012
- Montreal 2013

Transports Québec

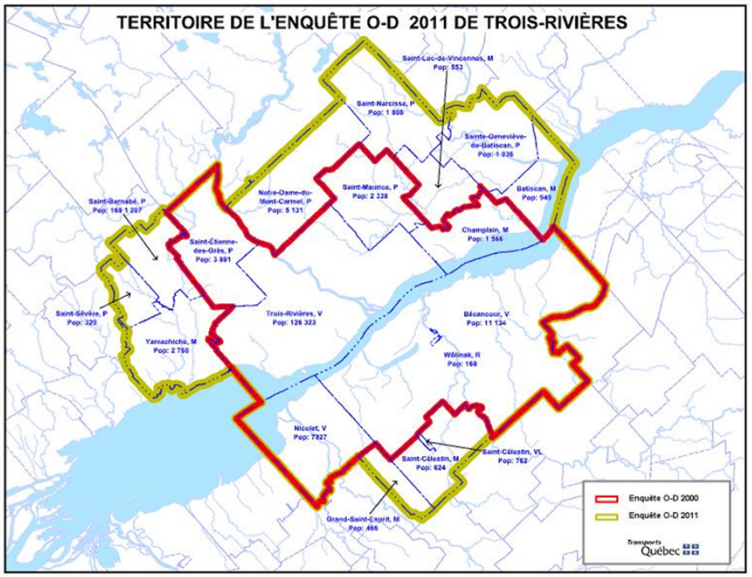
Trois-Rivières 2011 Regional Survey

Area = 18 municipalities, 2k km^2, pop 174k in 77k hslds

Executed by Genivar-Cible, using MTQ's SAQE software

Completed phone calls: 10 020 over 6 weeks (March-April) = 13 % sample .

External Cordon Survey (9 sites): road-side interview (2400) + licence plate mailing (6800 ≈ 50%).



Reports:
http://www.mtq.gouv.qc.ca/portal/page/portal/ministere/ministere/recherche_innovation/modelisation_systemes_transport/enquetes_origine_destination/trois_rivieres/enquete_2011

Transports Québec

Trois-Rivières 2011 : Results

Between 2000 and 2011:

- + 4,4% population; + 13,8% hsld; + 17% cars
- Important aging of the population: 38 to 45 y
- Hsld size decreased from 2,45 to 2,25
- Persons making no trip : increased from 14% to 20%
- Trip rate for mobile persons (5+): ↑ from 3,4 to 3,6 per day

NOMBRE DE DÉPLACEMENTS	Territoire comparable			Territoire complet
	2011	2000	*Variation*	2011
Pointe du matin	92 055	85 070	*+ 8,2 %*	101 170
24 heures	432 165	418 910	*+ 3,2 %*	471 530

PART DE MARCHÉ POINTE DU MATIN TRANSPORT EN COMMUN	Territoire comparable	
	2011	2000
Ville de Trois-Rivières	2,8 %	3,4 %

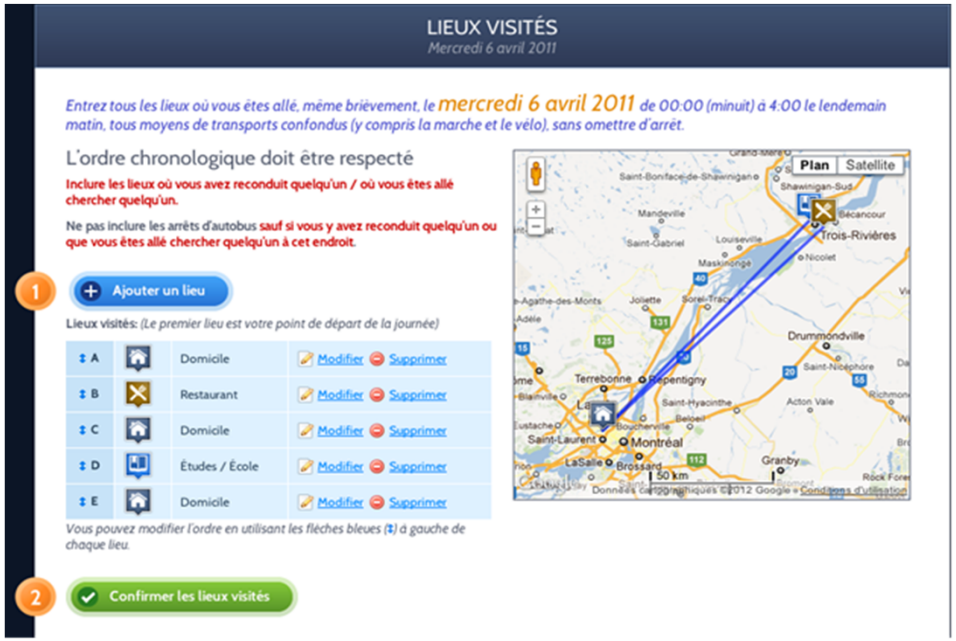
DÉPLACEMENTS POUR LE TRAVAIL SELON LE SEXE Territoire comparable	Variation 2000-2011	
	Hommes	Femmes
Pointe du matin	+ 9,1 %	+ 32,2 %
24 heures	+ 5,2 %	+ 20,7 %

Transports Québec

Trois-Rivières 2011 : Web experiment

1st MTQ's experimentation of a Web Survey instrument:

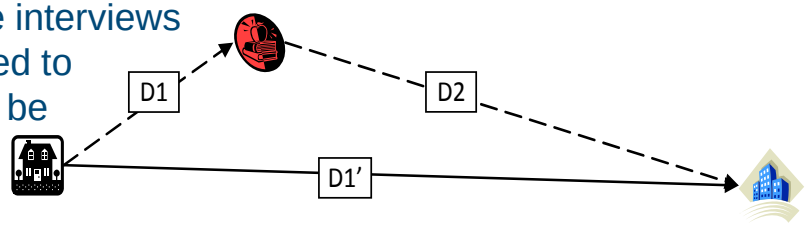
- Software developed and operated (web server) by Polytechnique-Montreal.
- Aligned on MTQ's standard telephone questionnaire, using a "visited places" approach and Google-Map.
- Aimed at individual persons, 2 samples:
  - Cellular phone list: 1640 invitations; 330 acceptations (emailing of a web link); one third connected…
  - Dedicated land-line batch: 1000 households were sent a postal invitation to fill the online survey; many undelivered, including because of a postal strike. Only 55 connected !



Transports Québec

Trois-Rivières 2011 : Web experiment

- Of about 170 individuals who connected, 86% successfully completed the survey.
- Average length = 12 minutes; very good user understanding and positive comments.
- Challenges, risks & opportunities:
  - Selection bias:
    - Low response rates for both sampling approaches, but good completion rate.
    - Web form requires skills (probable bias towards computer /object oriented people)
    - Fewer participants with “zero” mobility than in phone surveys (auto-elimination?)
  - Automatic Google-Map locations can produce “false positives”; requires validation and confirmation.
  - Shows higher trip rates than conventional telephone interviews (better reporting of discretionary trips) : could be used to “rescale” telephone surveys. Or web-surveys could be made comparable by eliminating small errands.



- See report : http://www.bv.transports.gouv.qc.ca/mono/1147822.pdf

Transports Québec

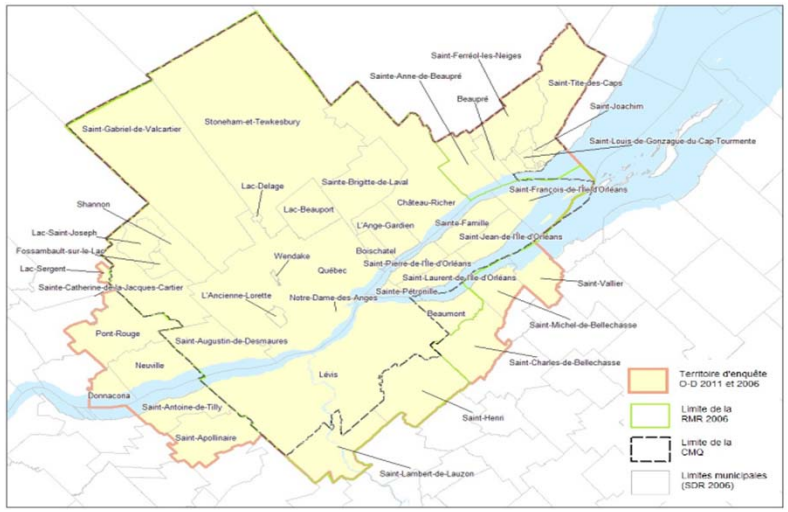
Québec 2011 Regional Survey

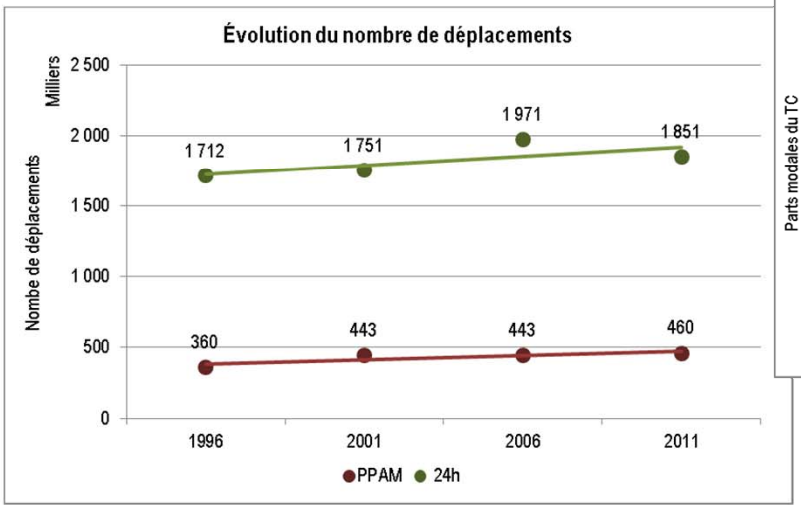
Region = 41 municipalities, 4,6k km^2,
pop = 805k in 363k households.

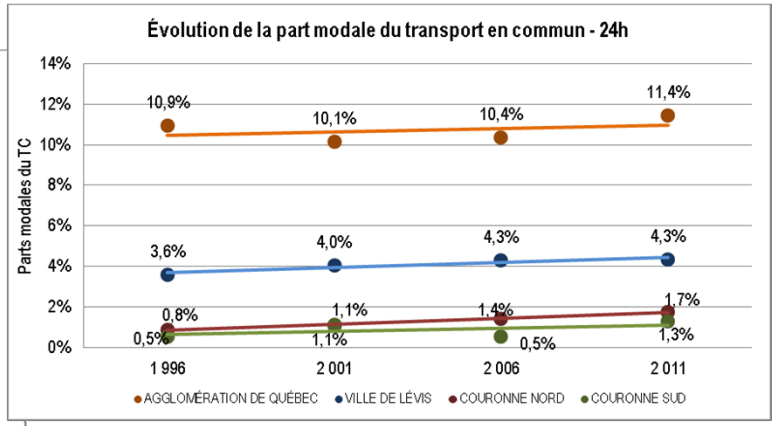
Execution by Dessau-BIP, using MTQ's SAQE software.

Completed phone calls: 26 440 weekday interviews over September-December = 7 %. Weekends also surveyed (4930 hsld).

Includes an external Cordon Survey : 4 sites licence plate mailing (7400 ≈ 40% return).







Transports Québec

Québec 2011 : Results

Between 2006 and 2011:

- + 5% population in Quebec City vs +17% around it; +5,6% cars
- Slight aging of the population: more retirees
- Hsld size continuously decreasing: now less than 2,1 in Quebec City vs 2,5 in the suburbs.
- Persons making no trip : increased from 14,9% to 16,5%, but declined in the 65+ group…
- Trip rate for mobile persons (5+): ↓ from 3,3 to 3,0 per day, dropping during off-peak periods.
- AM and PM peak periods starting earlier : growing congestion
- Less trips at lunch hour and in the evening

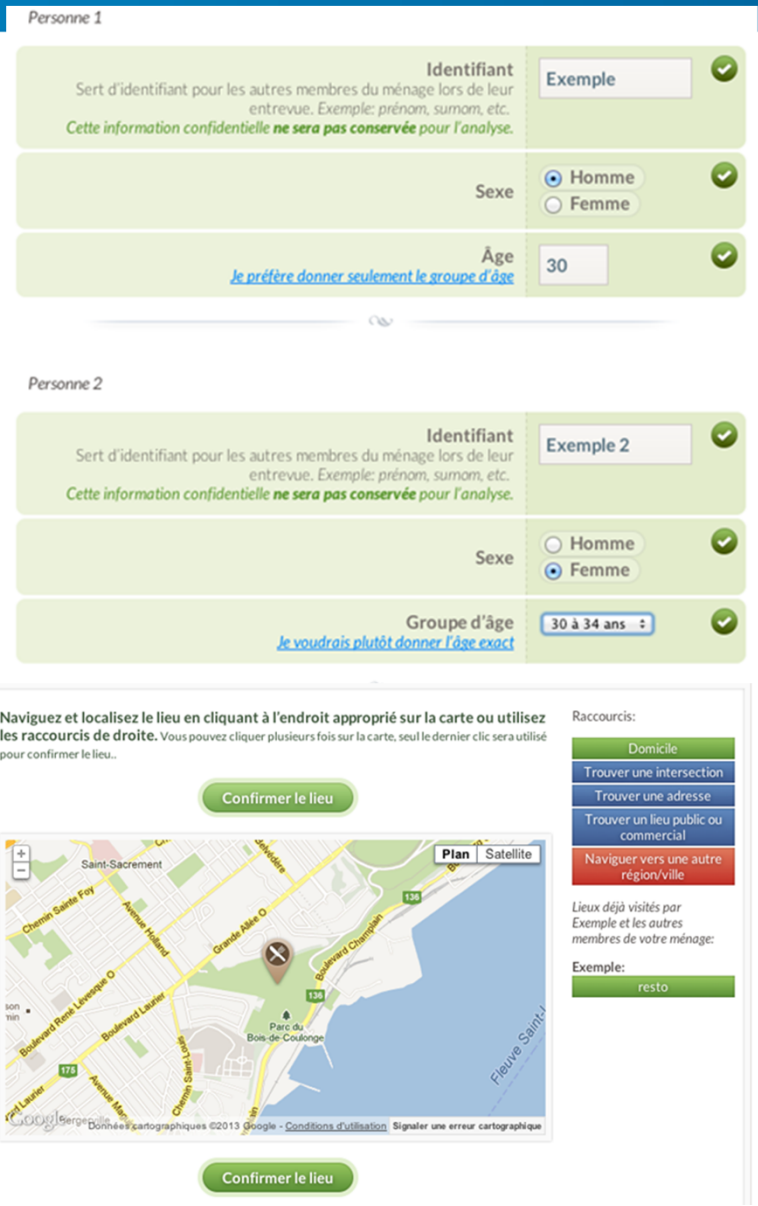
Reports:
http://www.mtq.gouv.qc.ca/portal/page/portal/ministere/ministere/recherche_innovation/modelisation_systemes_transport/enquetes_origine_destination/quebec/enquete_2011

Transports Québec

Québec 2011 : Web experiment

2nd MTQ's experimentation of a Web Survey instrument:

- Polytechnique-Montreal's software (as used for Trois-Rivières during spring) but extended for complete household coverage.
- Use of GTFS transit lines descriptions for data entry and validation.



Québec 2011 : Web experiment

- 5 sampling sources:
  - Dedicated land-line batch: 1000 households were sent a postal invitation to fill the online survey; 25% of the letters bounced back (incomplete address); 139 persons connected and 83 completed the questionnaire (±11% rate).
  - Second option for telephonic refusals: 63 invitations sent, no one connected!
  - Laval University student residences: potentially 2000 students reached; only 72 connected to the web-survey and 37 completed it $\Rightarrow$ need of strict control of the invitations and follow-ups.
  - Facebook: invitation posted on RTC's website (transit authority): only 16 completed forms.
  - Twitter: invitation posted by RTC; only 3 completed surveys.

Québec 2011 : Web experiment

- Of about 250 individuals who connected, only 56% successfully completed the survey for all family members.
- Median length = 13 minutes for single persons, up to 34 minutes for 4 persons hsld; quite good user understanding and mostly positive comments.
- Challenges, risks & opportunities:
  - Selection bias:
    - Low response and completion rates with postal invitations (problem with missing apartment numbers). Uncontrolled universe for social medias + bias towards transit users (in the present case).
  - Fewer participants with “zero” mobility than phone surveys (auto-elimination?)
  - Higher trip rates with web:

	Enquête	
	Téléphonique	*Web*
Taux de mobilité moyen	2.36	3.04
Taux de mobilité moyen - Hommes	2.38	3.29
Taux de mobilité moyen - Femmes	2.33	2.80
Pourcentage de non-mobiles	18.7%	17.0%
Pourcentage de non-mobiles - Hommes	16.7%	14.8%
Pourcentage de non-mobiles - Femmes	20.5%	19.0%

Report : http://www.bv.transports.gouv.qc.ca/mono/1147822.pdf

Transports Québec

Ottawa-Gatineau 2011 Regional Survey

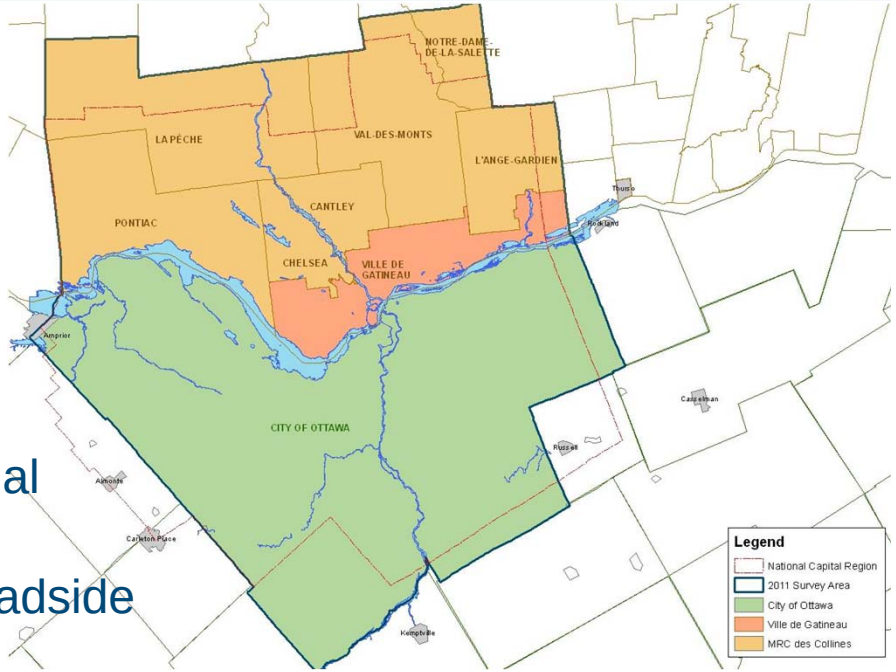
Region = 41 municipalities, 5,5k km^2, pop = 1 234k in 510k households.

Execution by Malatest (w D.Kriger), using MTQ's SAQE software.

Completed phone calls: 25 370 over September-December = 5 % hsld

Data Expansion Method: Iterative Proportional Fitting (IPF)

External Cordon Survey done in 2009: 18 roadside intercept sites + 5 licence plate mailing (26k sent ≈ 12% return).



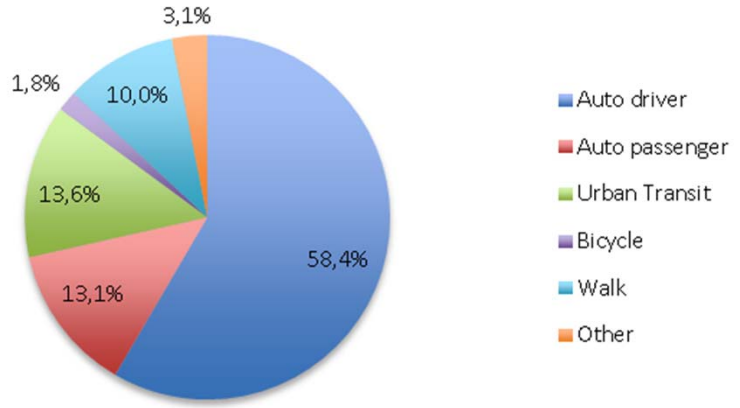
See: http://www.ncr-trans-rcn.ca/surveys/o-d-survey/o-d-survey-2011/

Transports Québec

Ottawa-Gatineau 2011 : Results

Between 2005 and 2011:

- + 7,2% population, + 9,6% households, +6,3% cars
- Hsld size still decreasing: now 2,4 compared to 2,7 in 1986
- Trip rate for all persons (11+): ↓ from 2,8 to 2,7 per day.
- Transit mode share ↑ to 13,6% daily
- Active mode share : ↓ for walk but ↑ for bike
- Increase of travel at all hours, except evening and night. Earlier start of AM peak.
- Auto occupancy ↓ to 1,22; only one fifth of ridesharing is between co-workers or co-students.



Transports Québec

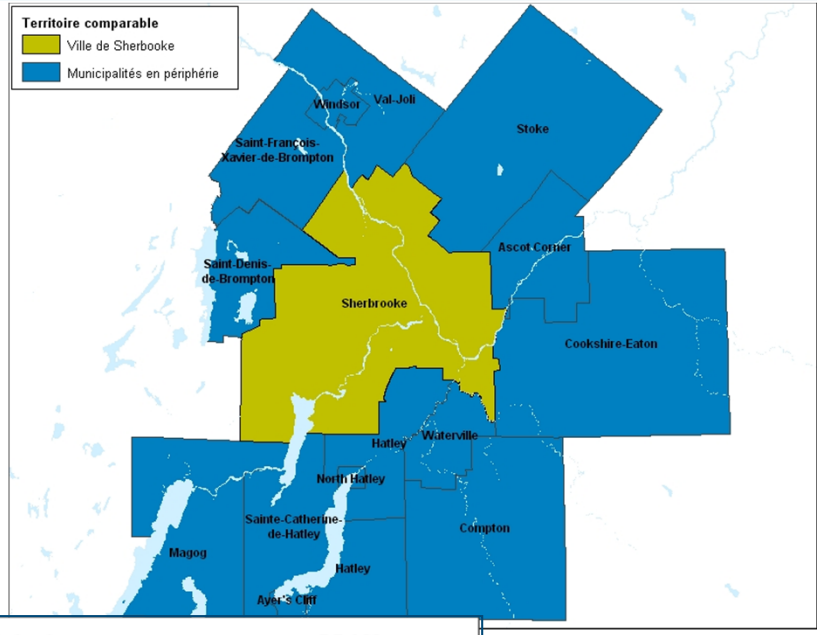
Sherbrooke 2012 Regional Survey

Region = 28 municipalities, 2k km^2,
pop = 224k in 100k households.

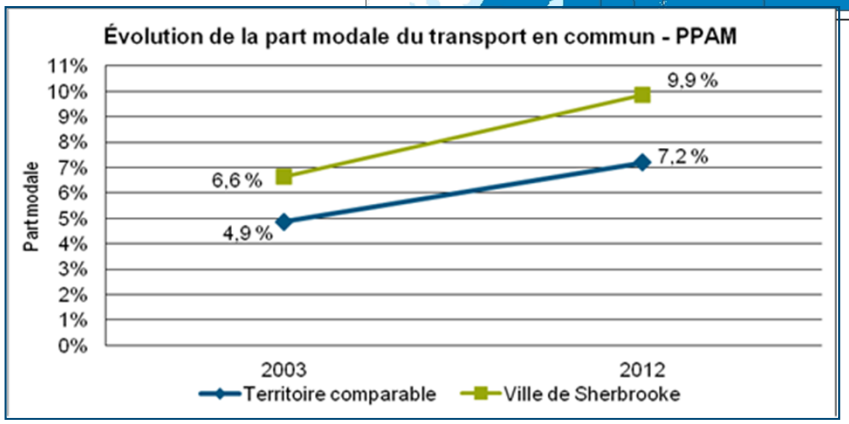
Execution by Dessau-BIP, using MTQ's SAQE software.

Completed phone calls: 11 000 interviews over September-December = 11 %.

External Cordon Survey : 9 sites road-side interview (9600) + 5 sites licence plate mailing (5600 ≈ 28%).



	Écart 2003-2012	
	Nombre	%
Travail	1 933	2,2 %
Étude	2 601	5,8 %
Magasinage	18 663	38,6 %
Loisir	4 535	9,2 %
Retour	6 777	3,2 %
Autre	117	0,2 %
Total	34 626	6,8 %



Transports Québec

Sherbrooke 2012 : Results

Between 2003 and 2012:

- + 11% population; + 17 % households; + 25 % cars
- Important aging of the population: more retirees
- Hsld size decreasing: from 2,28 to 2,17
- Persons (5y+) making no trip : increased from 14% to 17%
- Trip rate for mobile persons (5y+): ↓ from 2,75 to 2,64 per day, dropping mainly for young adults.
- AM & PM peak periods more pronounced
- Less trips at lunch hour and in the evening

Reports:
http://www.mtq.gouv.qc.ca/portal/page/portal/ministere/ministere/recherche_innovation/modelisation_systemes_transport/enquetes_origine_destination/sherbrooke/enquete_2012

Transports Québec

Sherbrooke 2012 : Web application

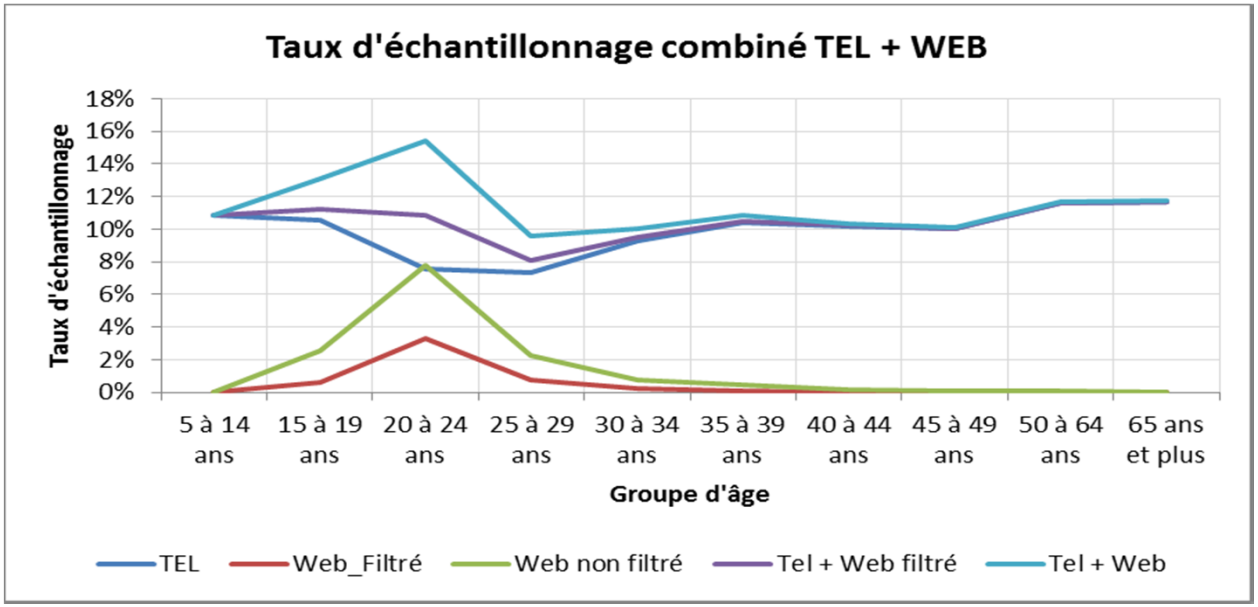
1st MTQ's formal application of a Web Survey instrument:

- Polytechnique-Montreal's software (as tested experimentally in 2011).
- Aimed specifically at students of college and university level:
- Individual persons (+ descriptive data on the rest of household)
- Controlling for students already in the sampling universe of the main household survey (e.g. land-lines).
- Data fusion with the main survey = first true implementation of the "Core-Satellite" paradigm.

Source	Enquête	Univers	Complétés	Taux de réponse global	Nombre de répondants sur le territoire OD
Séminaire de Sherbrooke	Automne 2012	500	22	4,4%	20
Université de Sherbrooke	Printemps 2013	16 187	1 838	11,4%	1 708
Collège Champlain	Printemps 2013	1 067	120	11.3%	109
Cégep de Sherbrooke	Printemps 2013	5 753	337	5,8%	315
TOTAL		**23 507**	**2 317**	**9,9%**	**2 152**

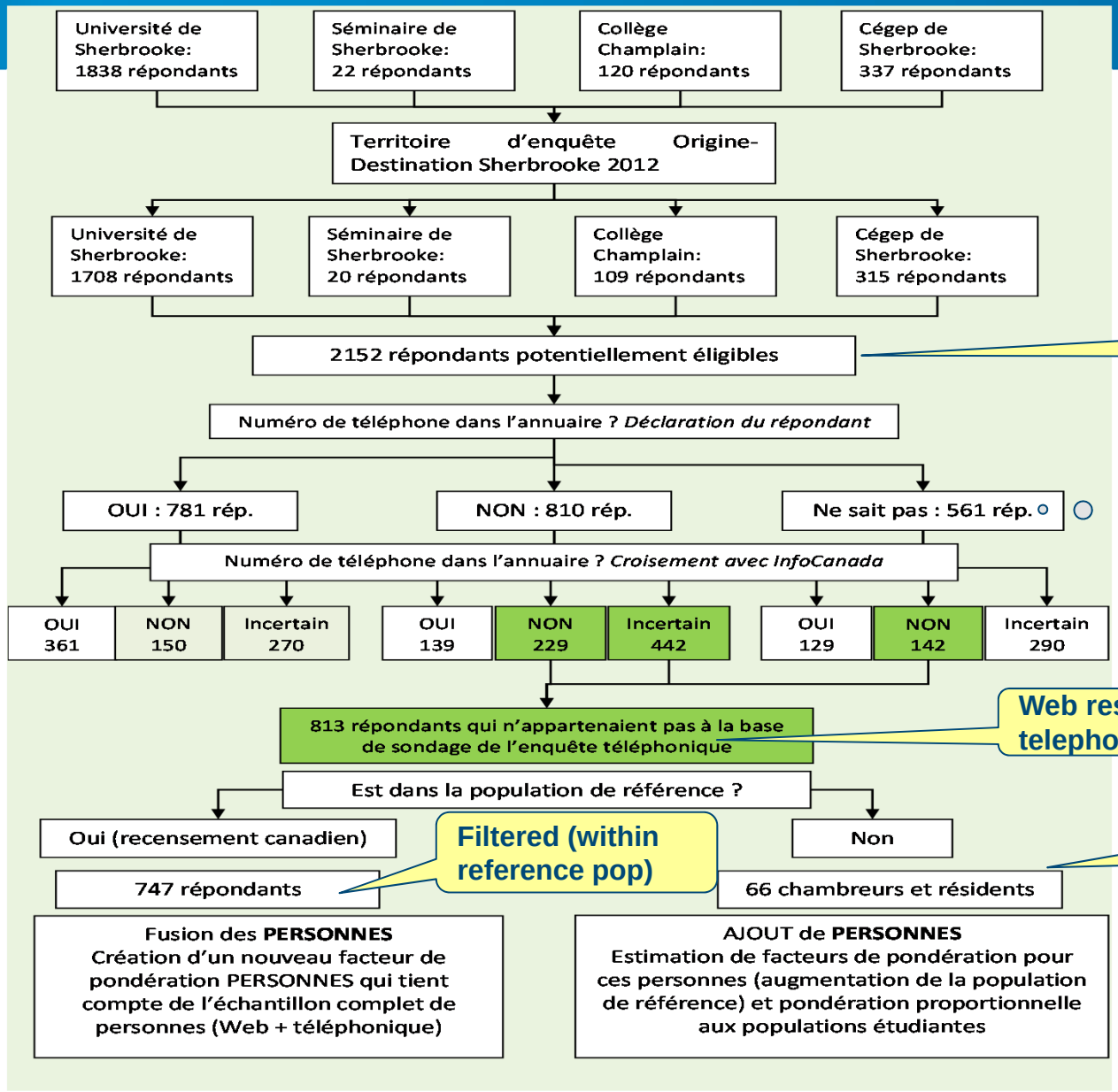
Sherbrooke 2012: Web survey sampling

- Required intensive coordination and logistics with the institutions; all different ways of reaching students, lack of control on the invitations and follow-ups.
- Lack of precision and details on the student universe; approximate numbers, no a priori knowledge on the place of residence…
- Control of the separation between the two universes (land-line survey vs web student survey) through 2 level filtering: phone sample universe and census population universe.



Transports Québec

Sherbrooke 2012: Sample filtering



Transports Québec

Sherbrooke 2012: Web survey lessons

- Survey method:
  - Need of better collaboration from the institutions (confidentiality issues, many authorizations required, many persons to motivate, complex logistics, reference data on the universe…)
  - Questionnaire: clarification needed from the interviewee on its declared place of residence at census.

- Data expansion & fusion
  - Under-reporting of Census on the number of students present (at mid-May many have already left; roomers structurally ignored in the census…)
  - But no available data source to expand the “additional web-surveyed population” (roomers);

    Decision : Fuse only the 747 web-students of the Census universe to the telephone sample ; leave roomers out at this stage.
  - Positive respondent bias observed for students (more trips for self reporting persons compared to those from the household telephone survey).

    Decision : No adjustment made at this stage.

Sherbrooke 2012: Web survey lessons

- Data expansion & fusion (cont.)
  - Over-representation of web-surveyed students within their age-group (e.g. against workers of same age).

    Decision : Adjust student weights to match Stats-Can (NHS-2011) high level data:

Students in Sherbrooke CMA

Age	Census 2001 School going	OD SHB 2003: Students	Census 2006 School going	NHS 2011 School going	OD SHB 2012 / Tel: Students	OD SHB 2012 / Tel+Web: Students
[15 à 24 ans]	67%	66%	70%	**74%**	78%	81%
[15 à 19 ans]	85%	84%	83%	**88%**	92%	92%
[20 à 24 ans]	52%	50%	59%	**62%**	62%	73%
[25 à 34ans]	18%	10%	24%	**25%**	15%	22%
[35 à 44ans]	10%	2%	12%	**10%**	7%	8%

- See research report : http://www.bv.transports.gouv.qc.ca/mono/1157129.pdf

Transports Québec

Montreal 2009-2012 : Continuous Survey

- Joint experimental project in Montreal, directed by AMT (Assumpta Cerda)
- Main objectives:
  - Develop annual and seasonal mobility pictures;
  - Produce high level indicators to monitor progress towards policies and transportation plans targets (e.g. annual reports);
  - Maintain technical & organizational knowledge / staff experience between 5 years larger scale surveys.
- Method:
  - Basic questionnaire and CATI tool same as for main surveys (Polytechnique Mtl)
  - Same sampling base = published land-line phone numbers
  - Final results expansion based on 2011 census numbers (preliminary with 2006)
  - Total sample ≈ same as regular 5y surveys
  - Call Center operated by Léger Mktg.

Résultats	Hiver	Été	Automne	Total annuel
2009	3 923	5 317	5 151	14 391
2010	5 086	5 953	5 250	16 289
2011	5 240	5 590	5 247	16 077
2012	5 759	5 814	5 114	16 687
Total par période	**20 008**	**22 674**	**20 762**	**63 444**

Transports Québec

Montreal 2009-2012 : Experiments

1. Testing of new questions

- Auto availability at individual level (additional to household level):
  - yielded good information to calibrate models
  - not kept in the “permanent” questionnaire.
- Disabled person’s mobility:
  - the incidence of subjects was too small to produce useful data;
  - too complex notions to clarify during an interview.
- Arrival time :
  - asked for the 1st respondent only;
  - yielded unreliable results (speeds) because of approximate value of declared start/end times.
- The 3 questions cost nearly one additional minute on average interview time.
- Very useful tool to test questions or run them on a temporary/rotary basis.

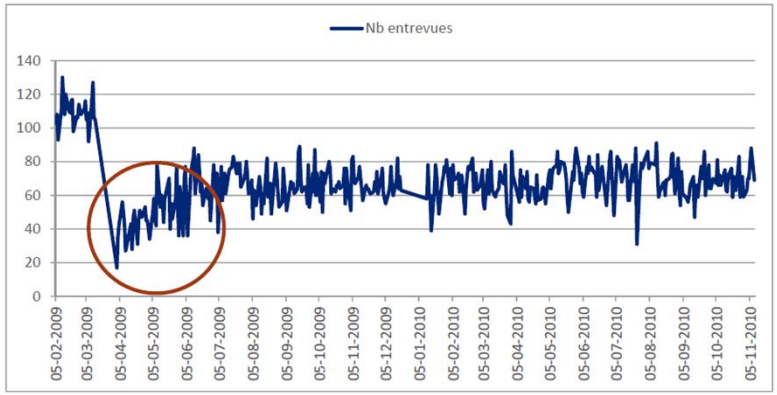
Montreal 2009-2012 : Experiments

2. Sampling Base *[in 2013, 60% of 18-34y hh had no land-line]*

- Cellular phone numbers : 464 completed.
  - Validated cell list : 4$ per number, good productivity = 16% completed surveys.
  - Random cell dialing : 8¢ per number, but very low productivity = 0,7% (90% of reached households also had a land-line).
  - Cell only household are younger and more frequently 1-person than in the usual sampling frame; more are «lower income - no car - no kids»…Different mobility patterns (more transit users, less driving others)…
  - Recommendation: use validated cell lists to supplement the land-line lists in future surveys.
- Postal addresses as the sampling base : combined with Polytechnique's Web-Survey tool.
  - Address list provided by "*Directeur général des Élections du Québec*": very thorough
  - Pre-filtering against listed phone numbers already in the sample base : 64% match excluded
  - 2000 random postal invitations sent, only 135 (7%) completed (reminders were sent)…
  - Only 24% of them indicated having no land-line…
  - No apparent difference in socio-demographic and travel behavior profile between those and the "listed" households.

Montreal 2009-2012 : Process improvement

- Management of the Call Centre
  - Learning curve :
    - 2 months to get to 3 completed interview per hour
    - Period also needed to fine tune software tools…
    - Decision : build a 3 weeks warming-up period in main 5y surveys.
  - Training: continuous activity managed by the firm
  - Staff turnover: minimised by incentives/rewards

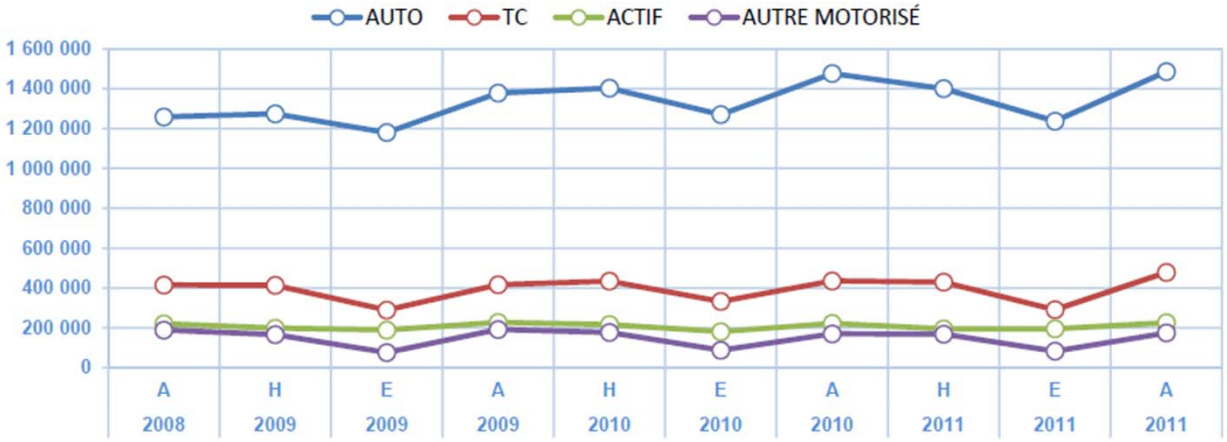


- Survey tools
  - Questionnaire : continuously improved: introduction messages, formulation of questions and answers, arguments used by interviewers to interact with interviewees (interviewers provided feedbacks and participated in development/optimization).
  - Monitoring tools: optimization of indicators and dashboards (Excel): invoiced man-hours, quality control, productivity control, sample control and injection (spatial uniformity), alerts on individual interviewer's behavior, etc.

Transports Québec

Montreal 2009-2012 : Process improvement

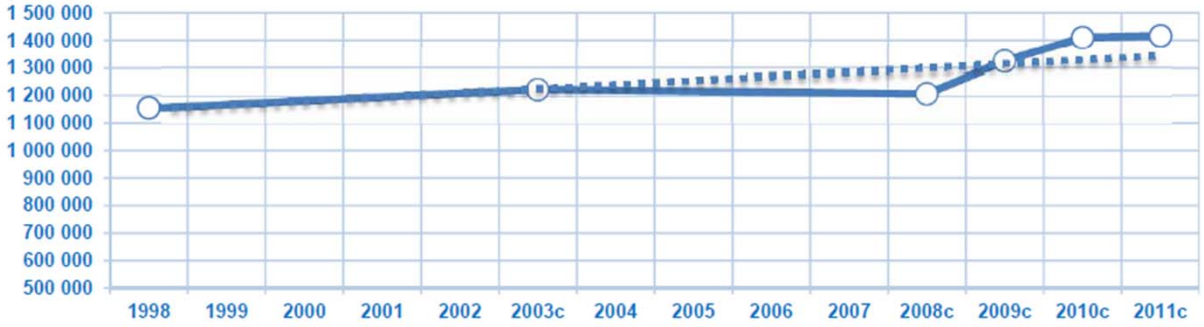
- Data Processing
  - Automatic geocoding and verification of sample
  - Immediate reject of invalid interviews
  - Automated data imputation (missing values) and expansion
  - Expansion factors: not yet adjusted annually, but under investigation, using ISQ annual population estimates : can't wait the next Census to make interpolations…
- Reporting
  - Standardised / automated calculations on yearly base.



Transports Québec

Montreal 2009-2012 : Conclusion

- Annual Fall results: seem difficult to fit in the existing 5 years trends…



- The 2013 full scale survey will help understand and confirm the 2009-2012 results validity.
- Seasonal results : too thin to be published with reliability; will be used to develop internal adjustment factors/models.
- Fall sample was too thin to measure significant annual variations at sub-district level / sub-category of users.
- Recommendation for future: doing an annual Fall survey of larger scale (e.g. ¼ of the quinquennial survey each year between).

See : Assumpta Cerda, AMT, presentations at the 2014 TAC Conference:

- *« Innover dans la collecte de données transport pour des données actuelles et de meilleure qualité »*
- *« Future directions of large-scale household surveys »*

Montreal 2013 Regional Survey

Area = 141 municipalities, 9,8k km^2, pop 4 M in 1,7 M hh

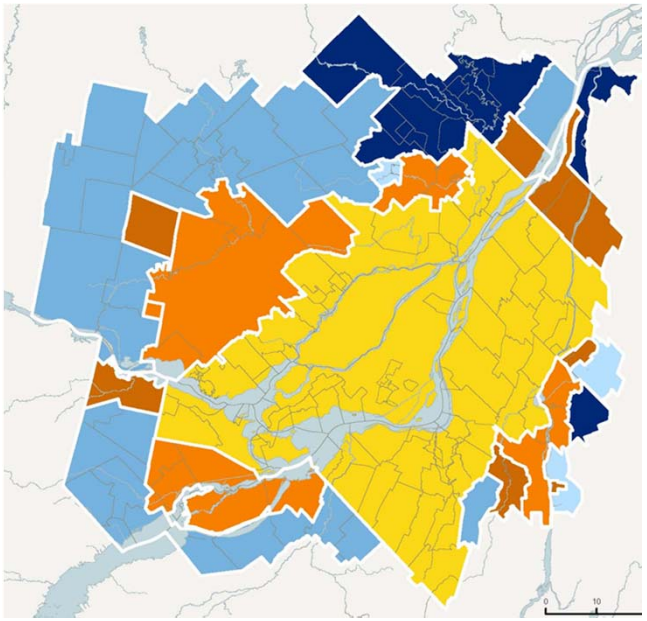
Executed by Léger Mktg, under AMT's supervision, using Polytechnique's MADQUOI software and analytical support.

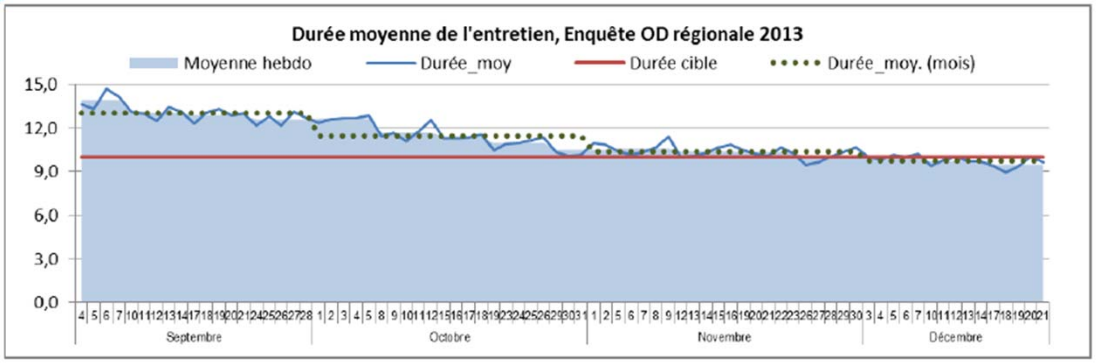
Technical/funding partnership between provincial and regional gvt + AMT + local transit authorities.

Completed phone calls: 78,7 k over 3½ months (Sept-Dec) = 4,6% sample .

Includes a "cell phone" sample: 2 680 completed interviews.

Average duration: 11 min. for 2.83 completed valid calls per interviewer-hr.



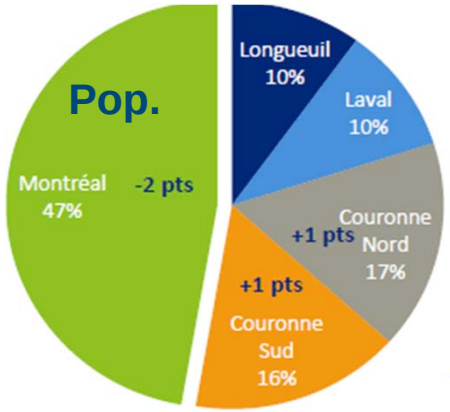


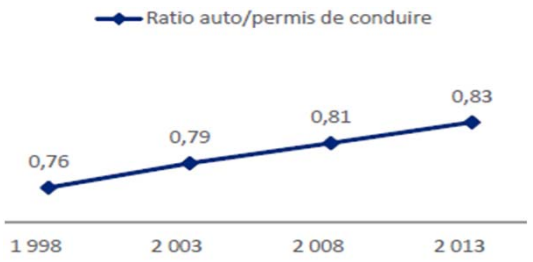
Transports Québec

Montreal 2013 : Preliminary results

Between 2008 and 2013

- + 5,3% population; + 5,9% hsld; + 12% cars
- Aging of the population: +13% persons 65+; 49% are 45+…
- Hsld size: small decrease (2,38 → 2,37) but +9% 1-person-hsld
- +13% trips daily (+11% AM peak)
  - +40% leisure
  - +45% driving/picking up (mostly students)
- Non mobile persons : 17%
- Transit modal share stable (23% AM peak)



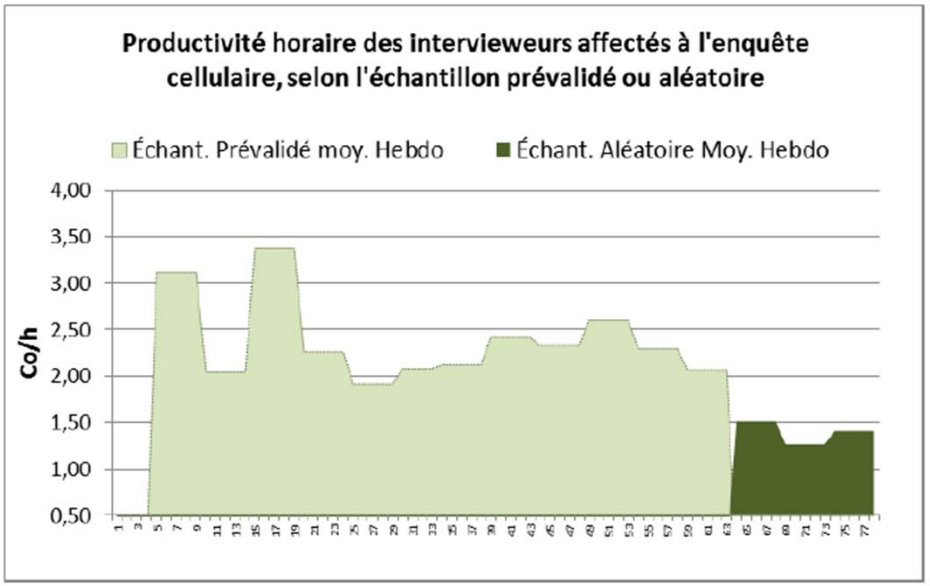


Reports:
Early 2015 at: *http://www.amt.qc.ca/enquete-od/*

Transports Québec

Montreal 2013 : Innovations

- Additional Cell phones sample:
  - 2 680 completed interviews of 12 000 dialed numbers…
  - Longer duration: 12,3 min.
  - Less overall productivity
  - Merged to the main survey



- Web-survey
  - Offered to persons refusing the phone interview; only 138 completed surveys = marginal results.
  - Soft refusals call-back in October: of 360 contacted, only 12 accepted; the strategy was abandoned.
  - Not yet merged to the main survey

Transports Québec