Statistique Canada | Statistics Canada

Marrying demand for statistical information with disclosure control: The Canadian experience in developing an automated dissemination tool in an open-data world

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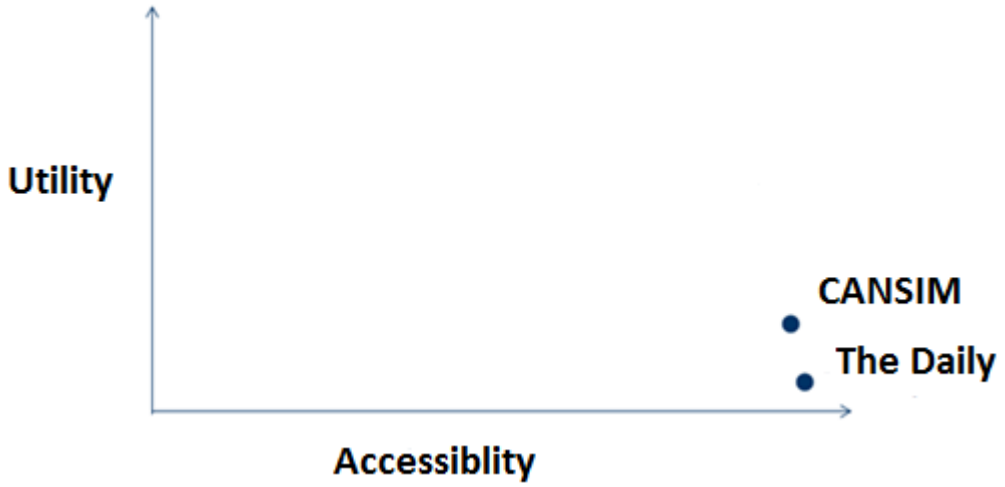
Canada

Outline

- Evolution of Data Access
- The Generalized Tabulation system (GTAB)
- Results and the current state of GTAB

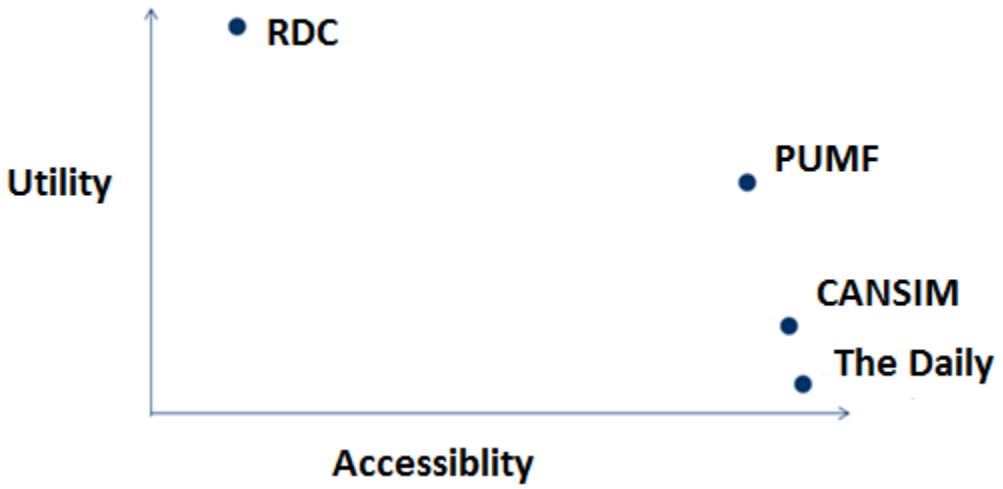
Evolution of Data Access

- Statistics Canada has a mandate to gather data and report upon the findings to all Canadians
- Main vehicles of dissemination are the Statistics Canada Daily Report (*The Daily*) and CANSIM (system for viewing official tables)
  - Published products of aggregate statistics
  - Relatively high-level overviews



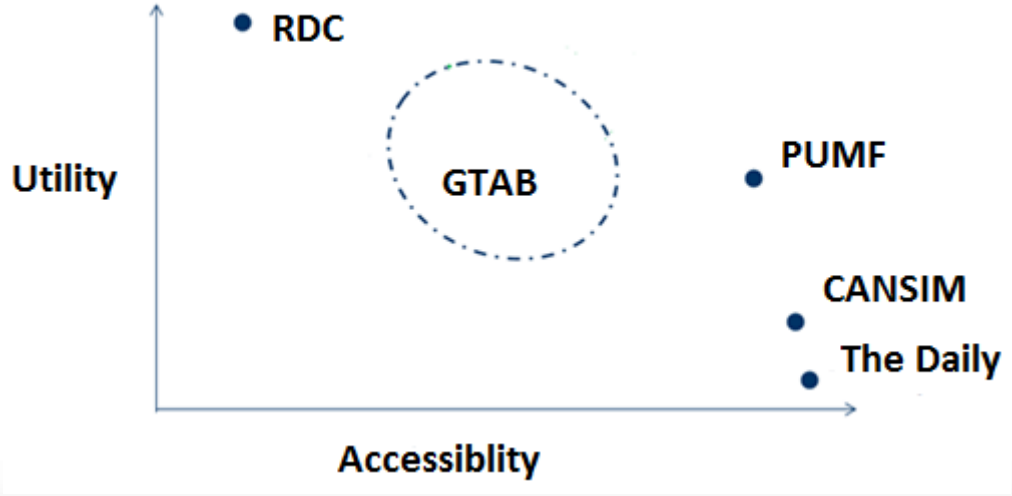
Evolution of Data Access

- Main modes of directly accessing Statistics Canada microdata by external users are Public Use Microdata Files (PUMFs) and Research Data Centres (RDCs)
- PUMFs are modified microdata files that minimise the risk of disclosure of confidential information
- RDCs give users direct access to unmodified STATCAN microdata, but require special permission to access



Creation of the Generalized Tabulation System

- Generalized Tabulation System (GTAB), was borne from new needs arising from greater demand for data access



What is the GTAB system?

- Generalized System
- Next generation tabulation and dissemination tool
- Corporate tabulation tool
  - Social, health, and labour statistics
- Direct pipeline from microdata to publishable tables

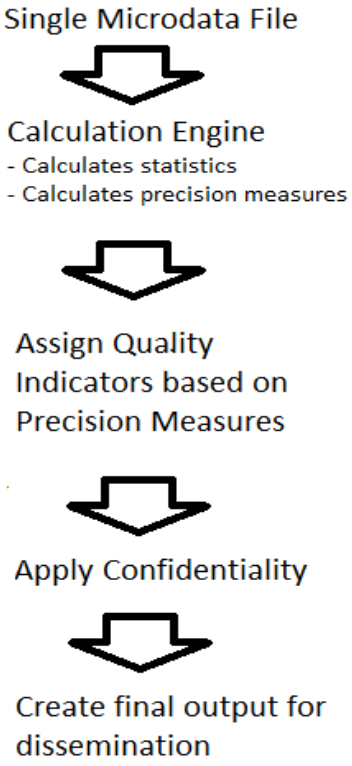
Broader vision of GTAB

- Standardization of practices within Statistics Canada
  - GTAB not a system designed to replicate all functionality of previous systems
  - Move towards more standard practices across surveys in microdata structure, estimation, dissemination, confidentiality
  - Main benefit: making published products easier to comprehend through similar structure
  - Another benefit: skills obtained through working on one survey can be easily transferred to working in other areas

Broader vision of GTAB

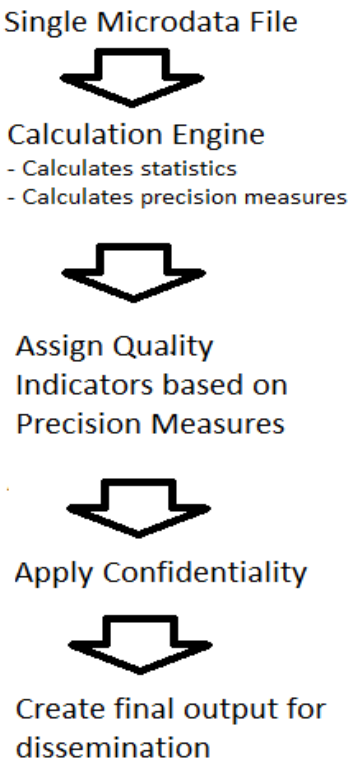
- Create an easy to use system for users without programming experience
  - Other systems used at STATCAN require experience with coding in SAS
  - GTAB needs to be accessible to users who do not have extensive coding experience
  - GUI – simple enough for most users to learn and use quickly

The GTAB Framework

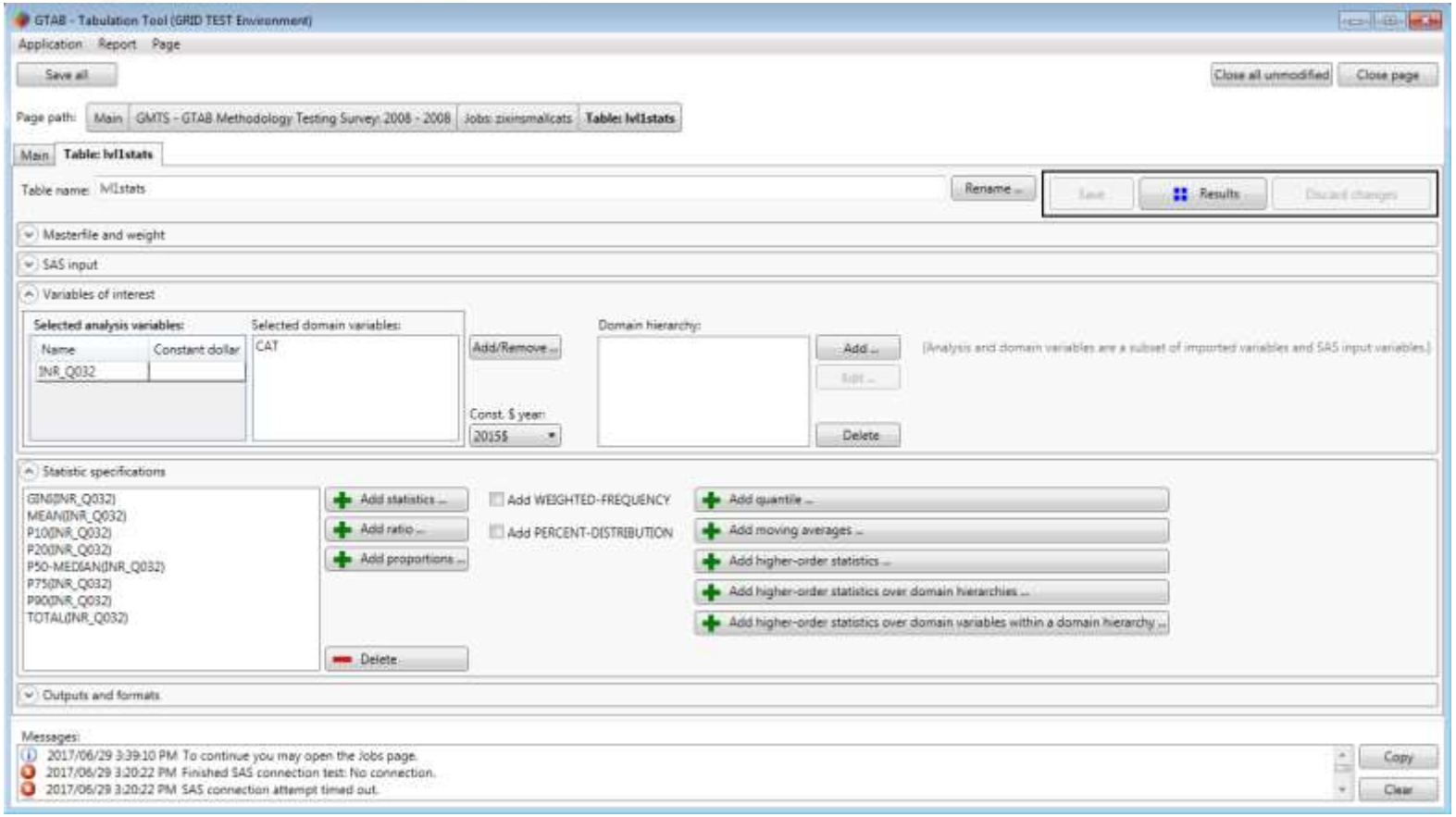


- Generalized process to dissemination
- Streamlined pipeline from microdata to publishable tables
  - Takes final microdata files as input (with survey weights and replicate weights)
  - Create table specifications
    - i.e. Select domain variables to cross, statistics to be calculated
  - Outputs can directly be disseminated

The GTAB Framework



- GTAB will automatically
  - Calculate precision measures using replicate weights (Rao-Wu-Yue bootstrap weights)
  - Assign standardized quality indicators based on coefficient of variation
  - Apply confidentiality rules
- Data flow is linear, we do not pass information back to previous steps
- Cannot combine multiple files for calculation within GTAB


GTAB - Tabulation Tool (GRID TEST Environment)
Application Report Page
Save all
Close all unmodified
Close page
Page path: Main GMTS - GTAB Methodology Testing Survey: 2008 - 2008 Jobs: zixinsmalicats Table: lvl1stats
Main
Table: lvl1stats
Table name: lvl1stats
Rename ...
Save
Results
Discard changes
Masterfile and weight
SAS input
Variables of interest
Selected analysis variables:
Name
Constant dollar
INR_Q032
Selected domain variables:
CAT
Add/Remove ...
Domain hierarchy:
Add ...
Edit ...
Delete
Const. $ year:
2015$
(Analysis and domain variables are a subset of imported variables and SAS input variables.)
Statistic specifications
GINI(INR_Q032)
MEAN(INR_Q032)
P10(INR_Q032)
P20(INR_Q032)
P50-MEDIAN(INR_Q032)
P75(INR_Q032)
P90(INR_Q032)
TOTAL(INR_Q032)
Add statistics ...
Add ratio ...
Add proportions ...
Delete
Add WEIGHTED-FREQUENCY
Add PERCENT-DISTRIBUTION
Add quantile ...
Add moving averages ...
Add higher-order statistics ...
Add higher-order statistics over domain hierarchies ...
Add higher-order statistics over domain variables within a domain hierarchy ...
Outputs and formats
Messages:
2017/06/29 3:39:10 PM To continue you may open the Jobs page.
2017/06/29 3:20:22 PM Finished SAS connection test: No connection.
2017/06/29 3:20:22 PM SAS connection attempt timed out.
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Clear

GTAB Functionality Development Process

- Data providers (clients) approach GTAB team for dissemination
- Demand VS supply assessment: Clients' needs VS GTAB's functionalities
- Standardization: Significant business case must be made before turning yet-unfulfilled needs into new system specifications

GTAB Functionality

- Statistics that GTAB can currently calculate
  - Level 1 statistics: Mean, percentiles, median, total, weighted frequency
  - Level 2 statistics: Gini coefficient
  - Level 3 statistics: Proportions and ratios
  - Level 4 statistics: Moving averages over time
  - Level 5 statistics: Level change, percentage change, significance tests (Global, base value, sequential, sequential over time)
  - Quantiles, both as domain variables and as bound statistics
  - All calculated statistics use survey weights
- Precision measures
  - Variance, standard error, coefficients of variation, confidence interval bounds

GTAB Functionality

- Confidentiality rules
  - Each statistic currently available in GTAB has its own set of confidentiality rules
  - Rules are applied equally, regardless of subject matter
  - Tested through simulation studies on fake and real data, vetted by experts, and approved through management
  - ACRound, suppression based on minimum counts, rounding of final outputs
  - Parameter-driven
  - Rules are automatically applied to outputs when requested

Current state of GTAB

- GTAB can calculate ~90% of statistics found in published tables for social, health, and labour statistics
- Numerous surveys are transitioning their dissemination to GTAB, such as Canadian Community Health Survey, Education Surveys, Tourism and Travel surveys, and Labour Force Survey
- Census moving dissemination to GTAB
- New functionality in constant development to meet new business requirements

Advantages to using GTAB

- Dissemination becoming more standardized
  - Tables from many surveys now use standard confidentiality rules, standard quality indicators, and standard methods for calculating statistics and precision measures
  - Skills obtained when disseminating for one survey are now useful for many different surveys
  - Users of published STATCAN data on CANSIM now have information presented in a more uniform fashion, increases usability of data
- Promotion of improved methods for reporting quality of estimates, such as publication of confidence intervals
- Promotes better practices internally when creating pre-dissemination files

Advantages to using GTAB

- Provides precision estimates for a variety of statistics using replicate methods (bootstrapping)
- Increased timeliness for custom tabulations
- Engine used in GTAB system is also being used to power other systems for automated dissemination

Conclusion

- Demands from users of Statistics Canada data drove need to develop new system for dissemination and confidentiality
- Developed GTAB as an easy-to-use tabulation system
  - Automated calculation of statistics, application of confidentiality rules, and creation of quality indicators
  - Rigorous approved methods for standardization
- Adoption of GTAB has resulted in more standardization in disseminated products and practices within STATCAN

Future Developments

- Modernization initiative
- Open-data initiative
- Cloud-based storage

Thank you for attending!
Merci de votre attention!

Questions?

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