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Analysis of the data preparation process of the structural survey of the Swiss population census

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Contents

Introduction

Swiss population Census 2010-

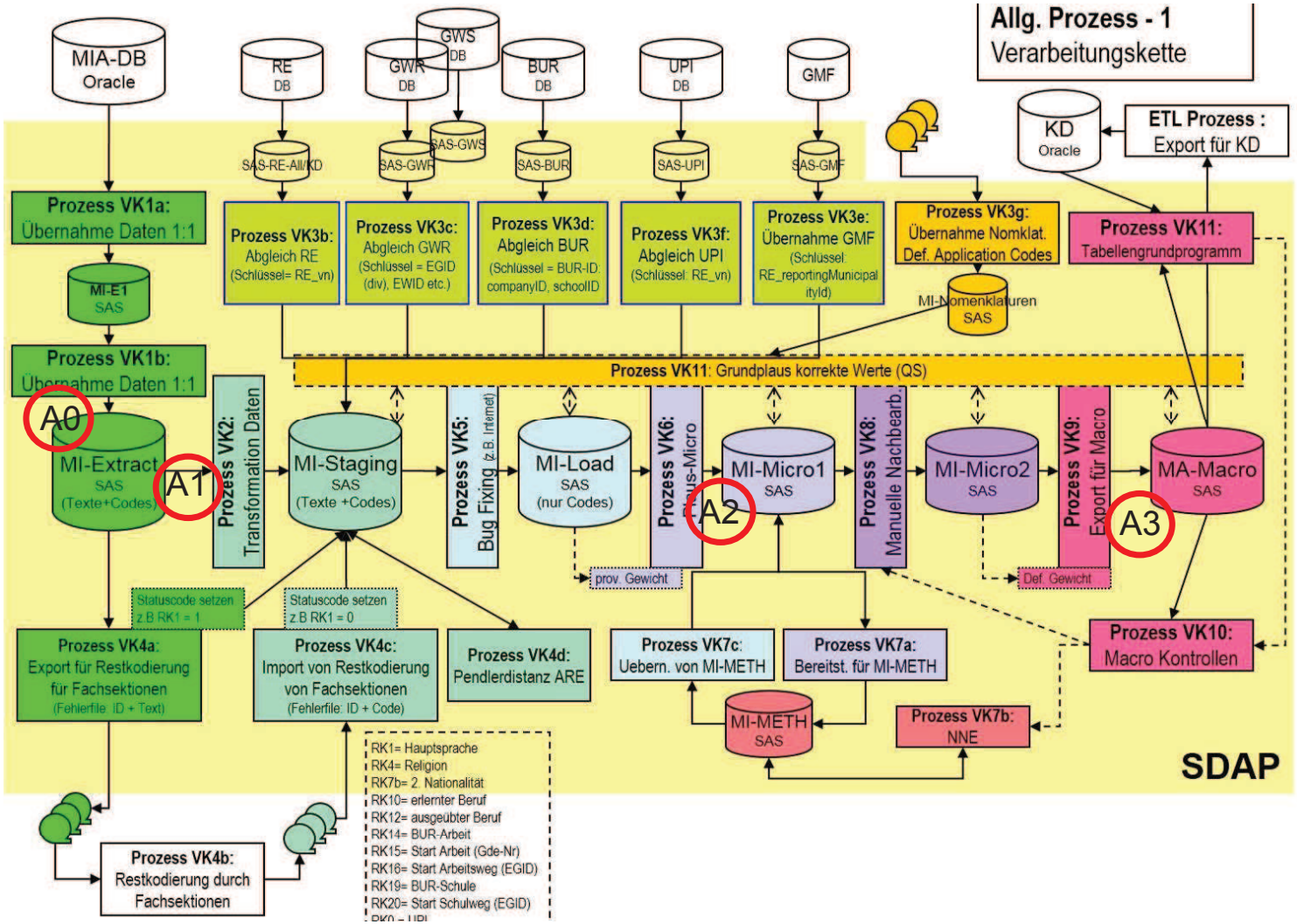
- Register based census combined with sample surveys:
  - municipalities' registers
  - federal housing and dwelling register
  - **census' structural survey (CSS)**
  - two annual sample surveys on specific themes.
- CSS, sample size 250'000 persons, covering
  - Labour market, language, religion, education, migration and commuting of persons.
  - Household composition, household member characteristics and dwelling variables.
  - Paper (75%), internet (25%).

Purpose of analysis project

- SFSO launched a project to analyse the statistical data preparation process (SDPP) of the CSS to
  - gather deeper knowledge about impact of the SDPP on results,
  - monitor the impact during the SDPP.
- Better understanding whether conceptual framework (EDIMBUS, [Luzi, O. et al.(2007)]) and process design (SFSO-SDPP) are appropriate.
- Selection of useful indicators, calculated during SDPP.

Data preparation process of the CSS

Data preparation process of the CSS



E&I methods

- Automized edit rules for missingness and inconsistencies.
- Call backs between $A_0 \rightarrow A_1$.
- Deterministic imputation rules $A_1 \rightarrow A_2$, $A_2 \rightarrow A_3$.
- Outlier detection for `rent` $A_2 \rightarrow A_3$.
- Nearest neighbour imputation based on NIM, [Bankier, M., Lachance, M. and Poirier, P.(2000)], $A_2 \rightarrow A_3$.
- Outlier detection and comparisons $A_2 \rightarrow A_3$.
- Ad-hoc analysis scripts based on indicators in [Luzi, O. et al.(2007)].

Loops only during implementation phase $\Rightarrow$ not included in the analysis.

Analysis project of the CSS-SDPP

Aims

1. Evaluation of the impact on results of individual treatments or whole phases.
2. Potential improvements to the process design.
3. Highlighting of possible questionnaire design problems.

Challenges

- Mostly categorical variables, each response category coded by a binary variable (multiple responses) $\rightarrow$ single question = group of binary variables (*response group*).
- Categ. variables not prominent on indicator lists, e.g. [Ehling, M. et al.(2007)], [Luzi, O. et al.(2007)], better in [Quality team of Eurostat(2014)] $\Rightarrow$ enhancement of use/interpretation of indicators for categorical variables.

- No baseline SDPP for comparison $\Rightarrow$ outcome of the study: baseline.
- No 'truth' available $\Rightarrow$ no indicators requiring the 'truth'.
- Development of a R-package.

Levels of indicators

1. Global indicators: for the whole data set (all observations, all variables)
2. Subset indicators: for subsets of the data (all variables)
3. Group indicators: for all observations (groups of variables)
4. Observation indicators: for single observations (all variables)
5. Variable indicators: for single variables (all observations)
6. Subset-group indicators: for subsets of the data and groups of variables

Edit rule indicators are under discussion.

Core set of indicators

Description	Global	Subset	Observation	Group	Variable
unit response rate	x	x		x	x
item response rate	x	x	x	x	x
item response ratio		x		x	x
imputation rate (responded*)	x	x	x	x	x
imputation ratio (responded*)		x			x

* Indicators for respondents only might be seen as a proxy for the impact of edit rules.

Outlook

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- Formulas and meaning will be checked by implementation.
- Indicators under discussion:
  - edit rules
  - changes in structurally missings
  - distributional.
- SDPP 'optimization'-criteria under investigation.
- Thresholds, indicating anomalies?

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