



## Register-based population census methodology in Finland

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# Contents

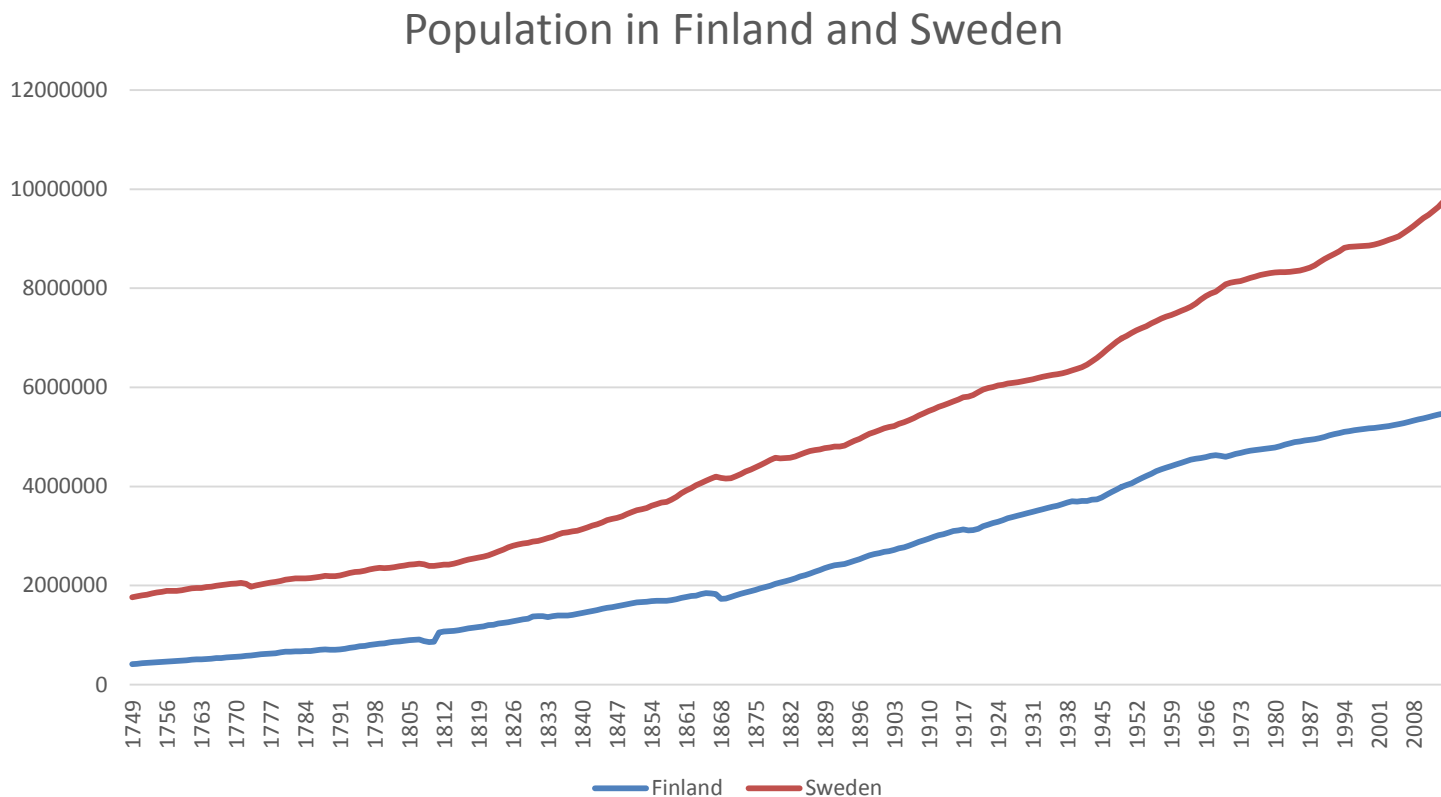
- History of Censuses in Finland
- Administrative and statistical registers
- Data sources for the Population and Housing Census
- Social Statistics Data Warehouse (Census Data Warehouse)
- New possibilities for research and statistics production

# History of Finland's Population Censuses (1)

- In Finland, population censuses and population registration have been closely tied together for centuries.
- In 16th century in Sweden-Finland the first records on population were compiled for purpose of recruitment and taxation
- In 17th century parishes were obliged to keep records on births, deaths and marriages and also migrations between parishes
- In 17th century the idea of continuously production of statistics on population
- In 1748 the Statistical Office of Sweden(-Finland) was established
- In 1749 conducted the first ever population census in the country
- Parishes and register office records were consulted to collect information: births, deaths and marriages by sex, number of population, later also social class

# History of Finland's Population Censuses (2)

- All information was not collected every year, but anyway since that the number of population have been available yearly in Finland (and of course also in Sweden)



# History of Finland's Population Censuses (3)

- Administrative sources (Church Book / records) were used already then for statistical purposes!
- 1965 Central Statistical Office was founded in Finland. => This year 150th Anniversary of Statistics Finland
- Years 1870-1930 the traditional censuses in the biggest cities
- 1938 Census Law for the conducting the first census in the whole country 1940
- Cancelled because of the war
- Traditional censuses 1950, 1960, 1970, 1975, 1980 and 1985
- First time register were used in 1970 Census
- Totally Register-based Census from 1990

# Administrative registers are generated and developed

- the first exhaustive register of persons was established by Social Insurance Institution in 1960's
- the personal identity code was introduced 1964
- earnings-related pension system began in 1960's, and in 1970 enlarged covering also self-employed => data both on employees, self-employed and pension recipients were registered
- 1969 Central Population Register was established => Population Register as a basic register on population for all authorities
- taxation register were used first time in 1970 Census
- unemployment benefit developed strongly in 1970's. Also statistics on unemployed based on register started
- data collection for the Register of Buildings and Dwellings in the connection of 1980 Census => data entered to the register owned by Population Register Centre

# Statistical registers are generated

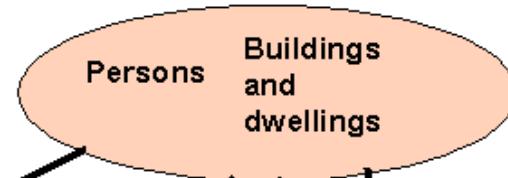
- Business Register was founded at the end of 1960's
  - since 1999 the scope of the register has also extended to the public sector, i.e. central and local government units
- Register of Completed Education and Degrees was established in the connection of Census 1970
- Register of Educational Institutions was established in the beginning of 1970's
- Register of Students was established at the end of 1990's
  - Updates yearly by educational institutes

# Data sources for the Population and Housing Census

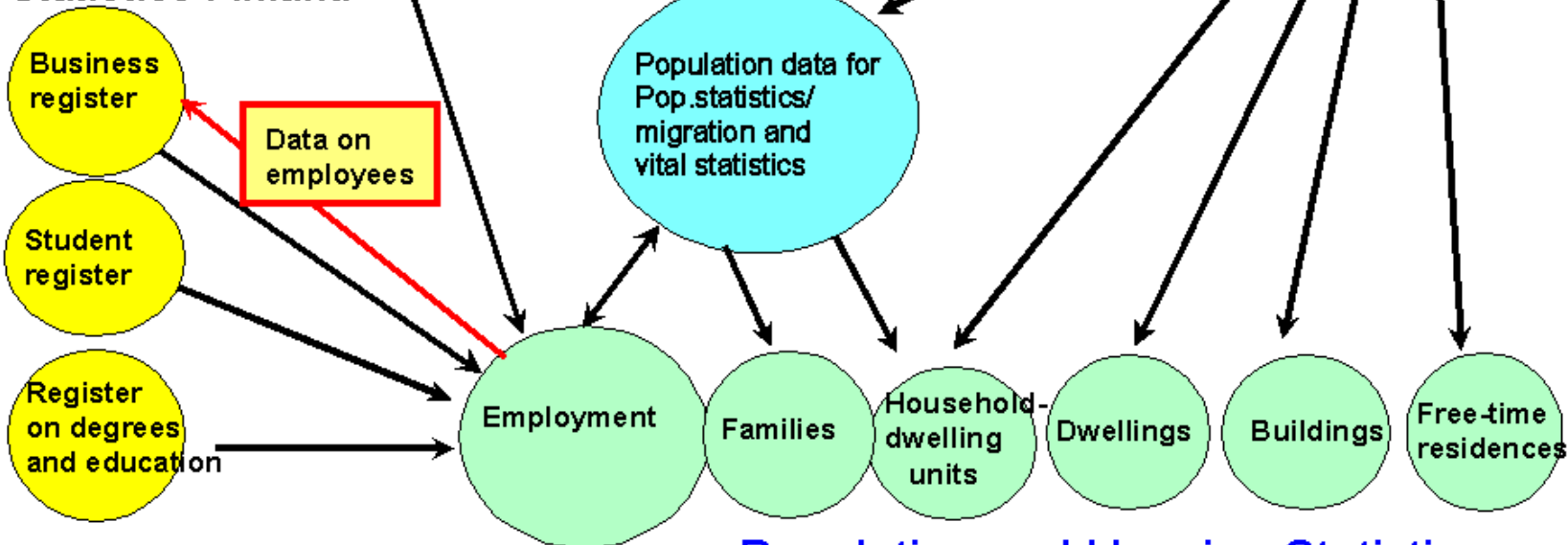
## Administrative registers



## Population Information System of the Population Register Centre



## Statistics Finland

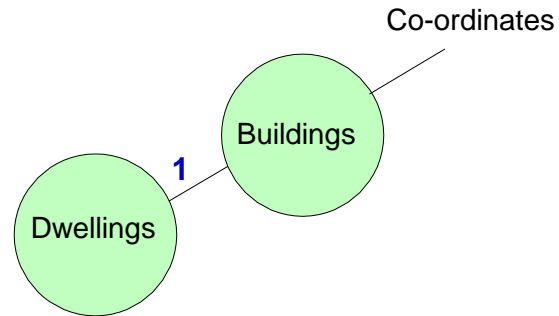


## Population and Housing Statistics



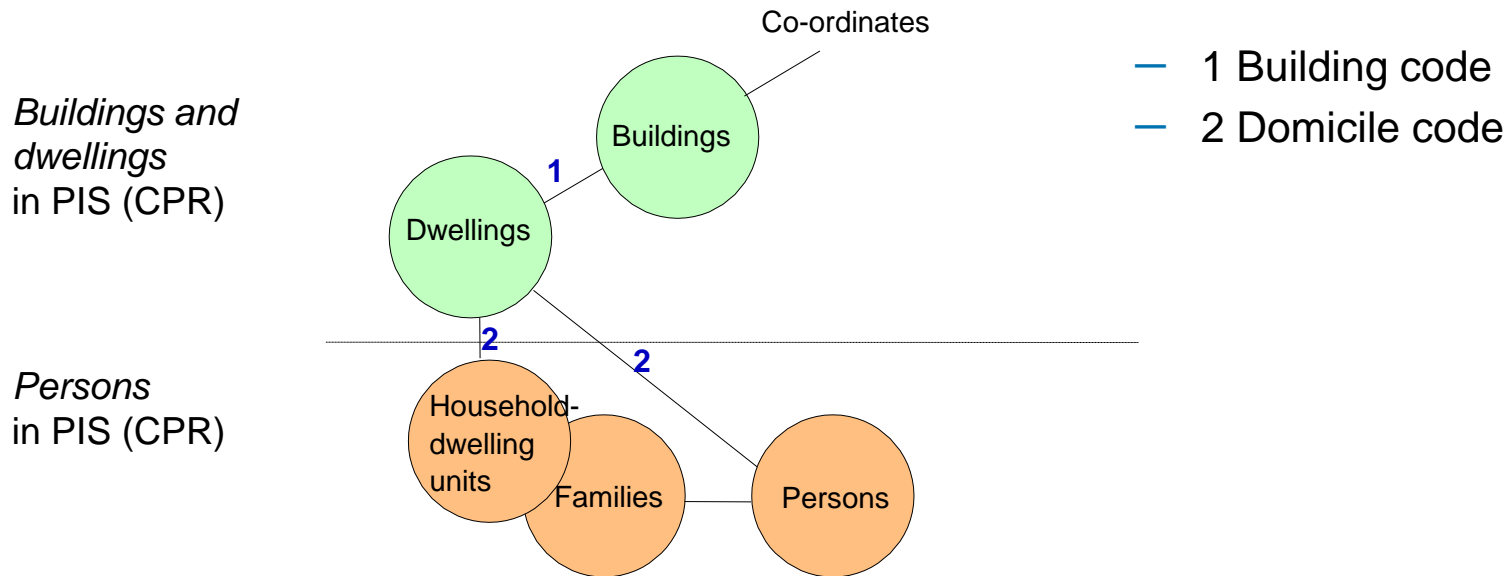
# The basic units of the register-based census in Finland - and links between them

*Buildings and  
dwellings  
in PIS (CPR)*

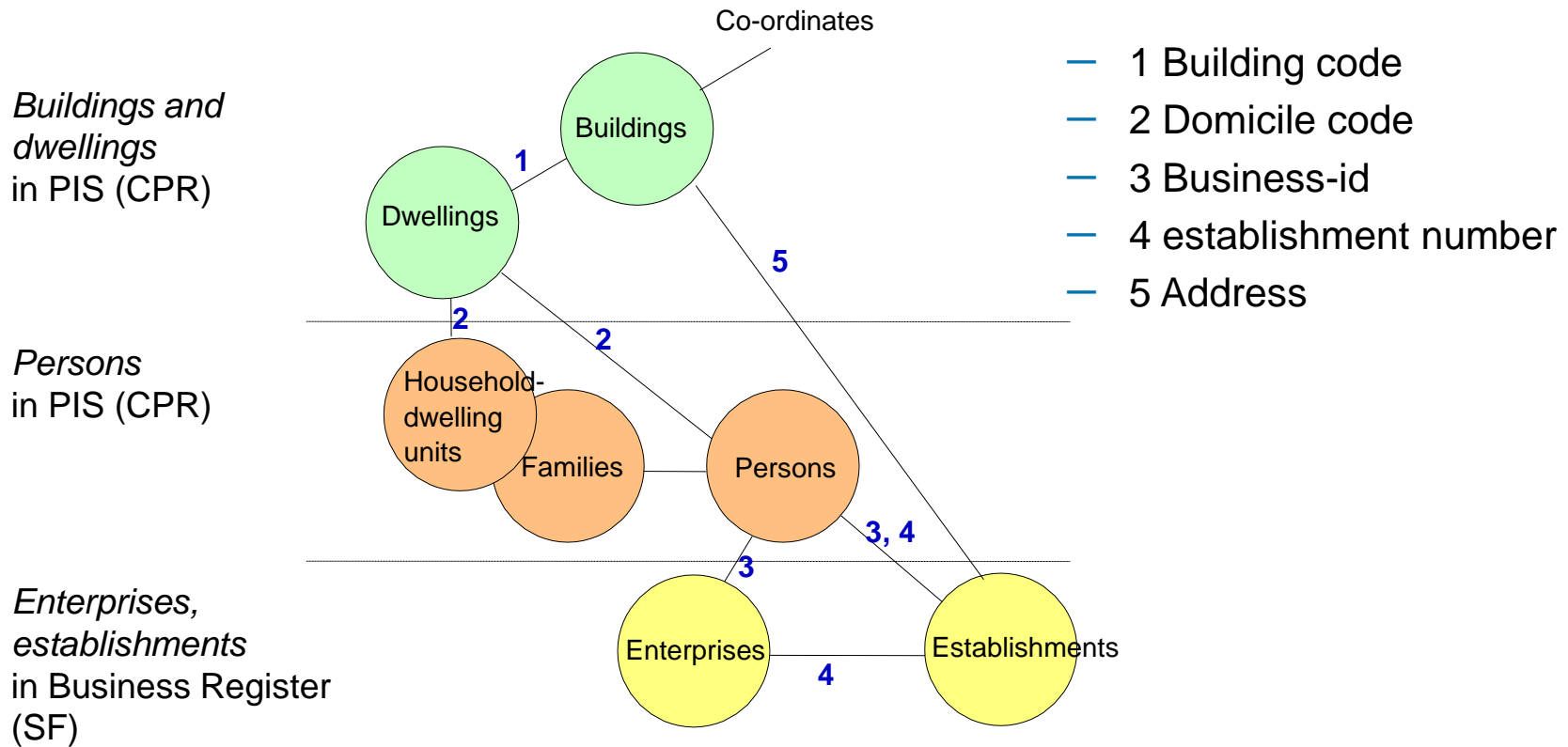


— 1 Building code

# The basic units of the register-based census in Finland - and links between them



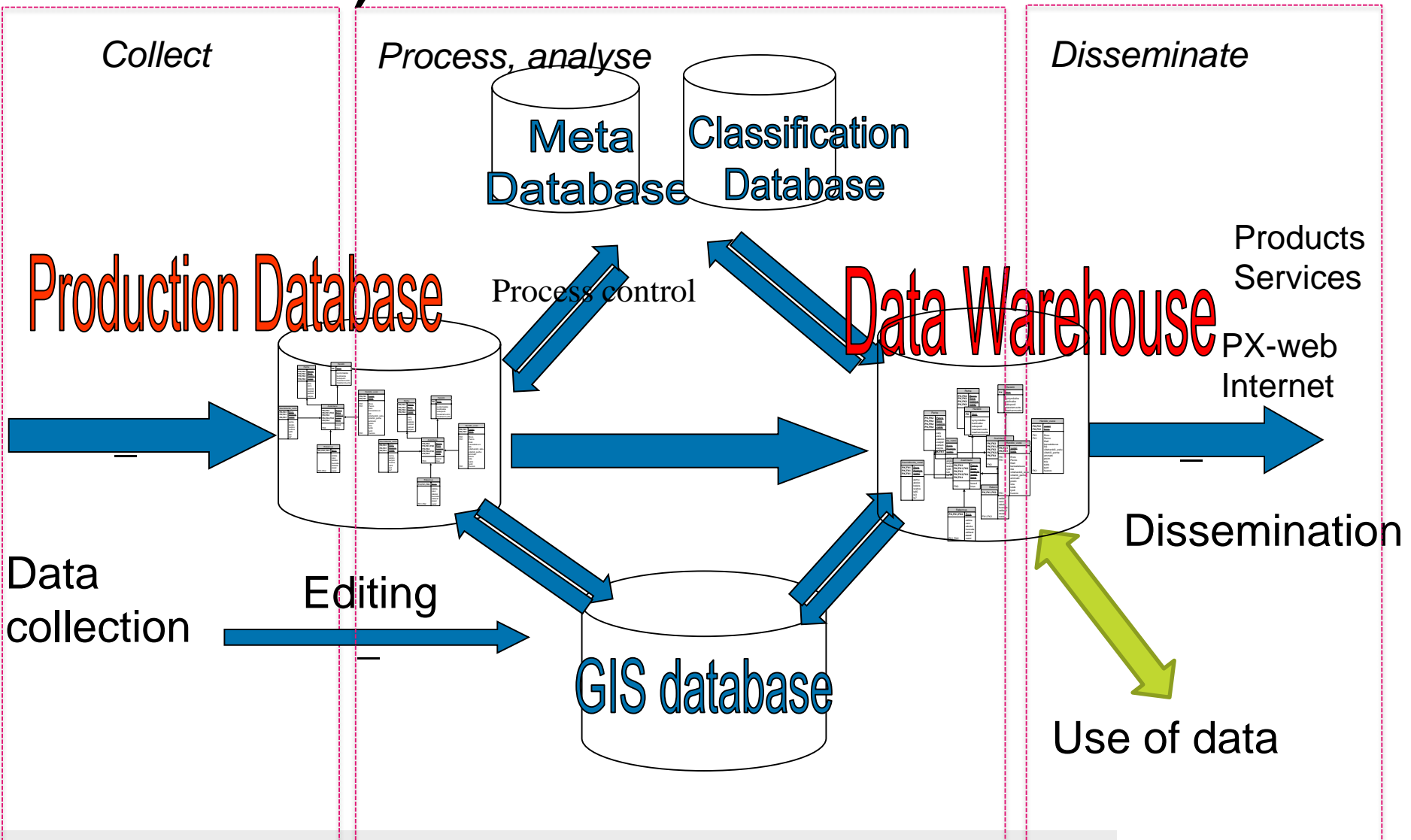
# The basic units of the register-based census in Finland - and links between them



# Some factors facilitating the increased use of administrative registers in Finland

- Use of uniform identification numbers
- Administrations own interest in building nation-wide databases
  - Reduction of response burden
  - Reduction of costs of statistics
  - To have total populations
- Legal basis: The Finnish Statistics act:
  - It is compulsory to use existing data (if suitable).
  - State government and social security institutions are obliged to deliver the data they have to Statistics Finland
- Acceptance of the population

# Social Statistics Data Warehouse (Census Data Warehouse)



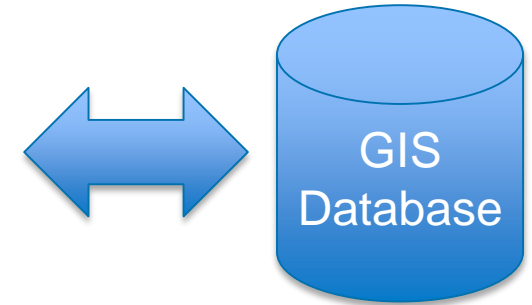
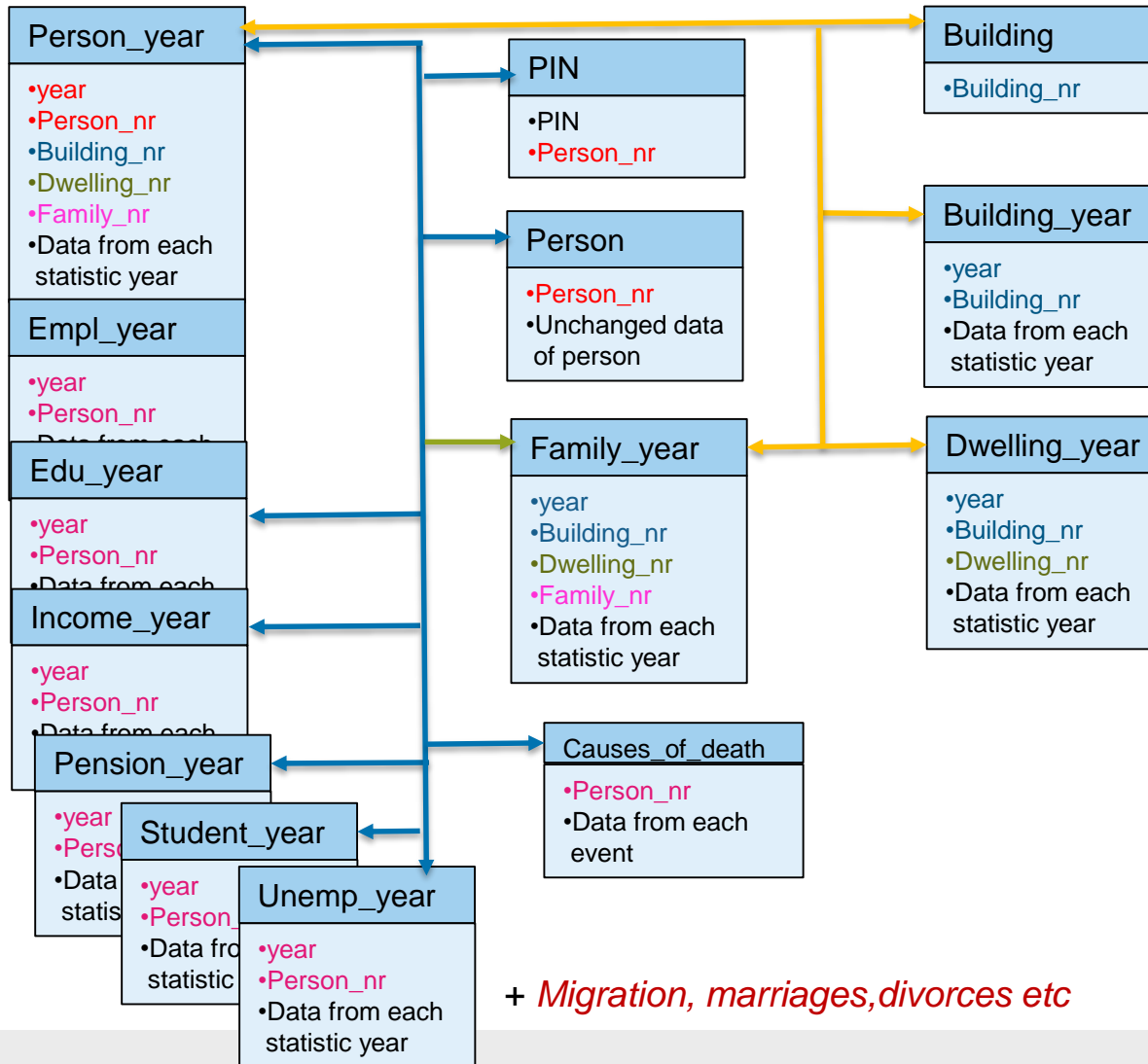
# Structure of the Social Statistics Data Warehouse (Census Data Warehouse)

- Database in SQL Server contains all persons having person id code in Statistic Finland's data files (years 1970-2014)
- Persons have a unchanging person number (in addition to person id code in PIS)
- Personal data is divided in two different tables: basic information and yearly data
- Building table contains all buildings and coordinates
- Areal information (GIS) integrated to database (link building number)
- Families and household-dwelling units constructed in database
- Building number is updated to all establishments in Business Register (based on address of establishment)

# Structure of the Social Statistics Data Warehouse

- Basic tables (all units) :Person and Building (Person ID)
- Annual data (published final data): Official Statistics of Finland (OSF)
  - Person\_year, Building\_year, Dwelling\_year, Family\_year etc.
- Relations between persons
  - Children
  - Marriages
- Periodical data
  - Employment (all) periods, unemployment, conscripts, pension recipients
- Events
  - migration, completed educations and degrees, births, deaths
- GIS
- Extension of DW still going on

# Structure of the Social Statistics Data Warehouse





# New possibilities for research and statistics production (1)

- Statistics usually provide cross-sectional information on a variable at a given point in time, such as population number or the number of people in gainful employment;
- on this basis we can see to what extent these figures have changed.
- The register system offers the added advantage of allowing us to identify the individuals behind these changes: who has got a job, who has completed a degree.
- Changes can be monitored by linking unit data from consecutive years

# New possibilities for research and statistics production (2)

- Traditionally, the most important regional unit in statistics has been the administrative area.
- However, administration is dynamic and keeps changing => may occur difficulties to keep up these changes
- The building-based code system with its coordinates has provided a solid foundation for reliable and flexible statistical areas.
- Despite major changes in administrative areas, it is still possible to produce time series for different regions.
- The adoption of map coordinates for buildings has also paved the way to more flexible determination of statistical areas.

# New possibilities for research and statistics production (3)

For instance:

- Calculation of accessibility (workplaces, services)
  - Distance to work, school, voting place
- Flow statistics
  - employment flows
  - student flows
- Longitudinal researches
  - Data from 1970, 1975, 1980 and 1985 Censuses and annually data from year 1987 in the Census Data Warehouse
  - Data over 7 million persons (Population of Finland 5,4 million in 2015)



# Examples

# Commuting distance and time for employed

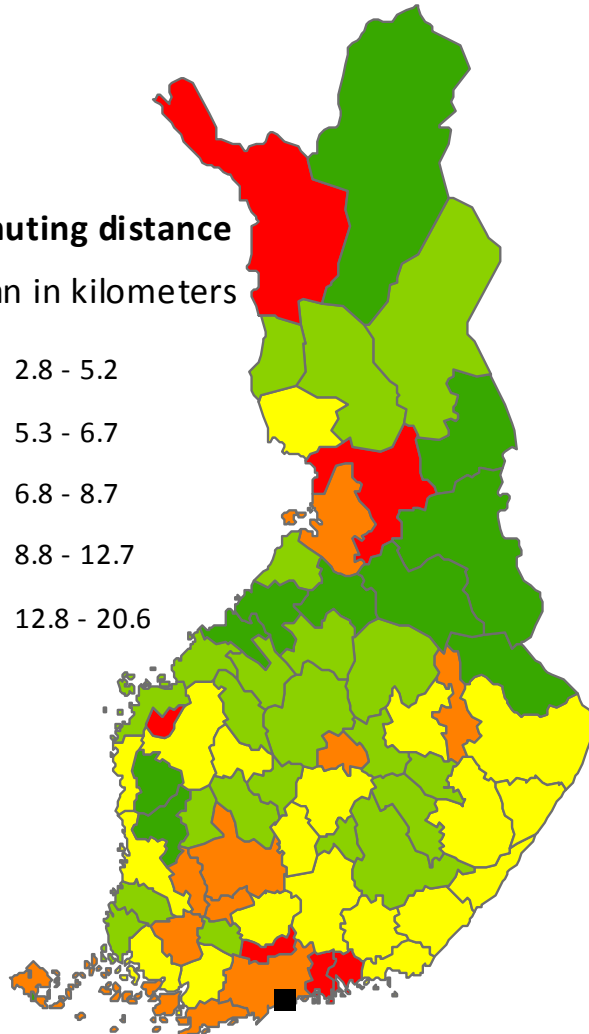
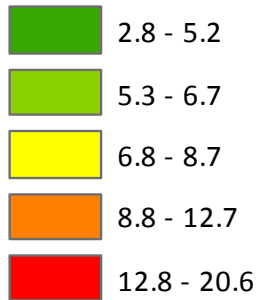
- Commuting Distance
  - General annual update for the Census Statistics Data Warehouse
- Commuting time
  - Enriching with traffic sensor data
- Digiroad, National Road Database of Finnish Transport Agency
  - Accurate data on location of all roads and streets in Finland
- Census Data Warehouse
  - Dwelling coordinates and work place coordinates
  - Coordinate coverage
    - for the place of living of population around 99 %
    - for the workplace of all employed around 91 %

# Commuting distance and time for employed

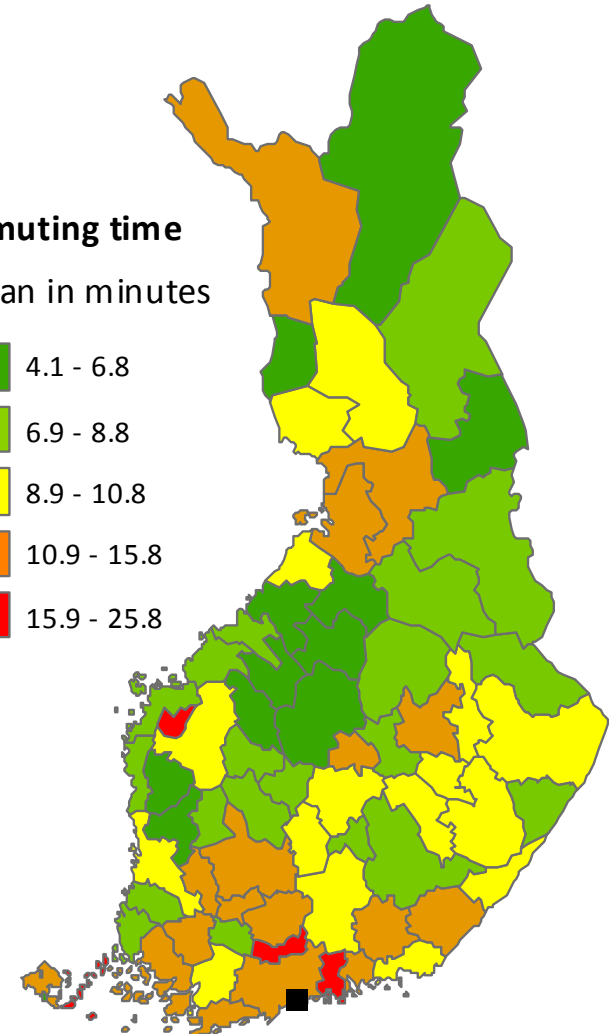
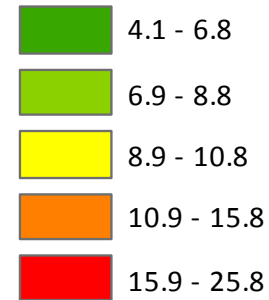
- Traffic sensor data of FTA
  - Currently 437 stations (vehicle detection loops) giving information for speed, direction, length and class of a passing vehicle.
  - Open data services available as well (Digitraffic)
  
- Read more: [Pasi Piela. Commuting time for every employed: combining traffic sensors and many other data sources for population statistics](#) in European forum for geography and statistics, Krakow 2014

# Commuting distance and time for employed in subregions (LAU1) in 2012

**Commuting distance**  
Median in kilometers



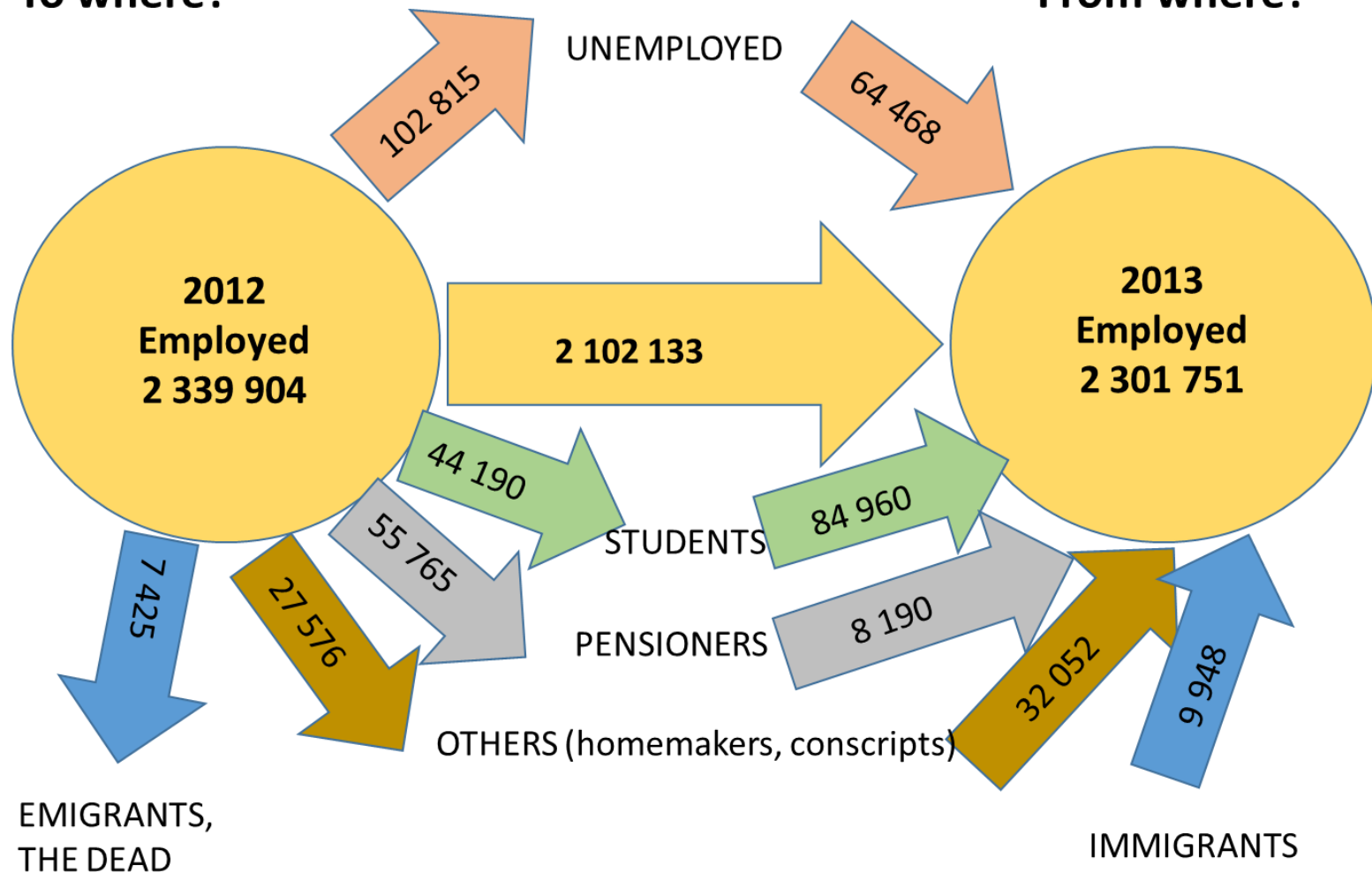
**Commuting time**  
Median in minutes



# Flows between different activity groups: Employed 2012-2013

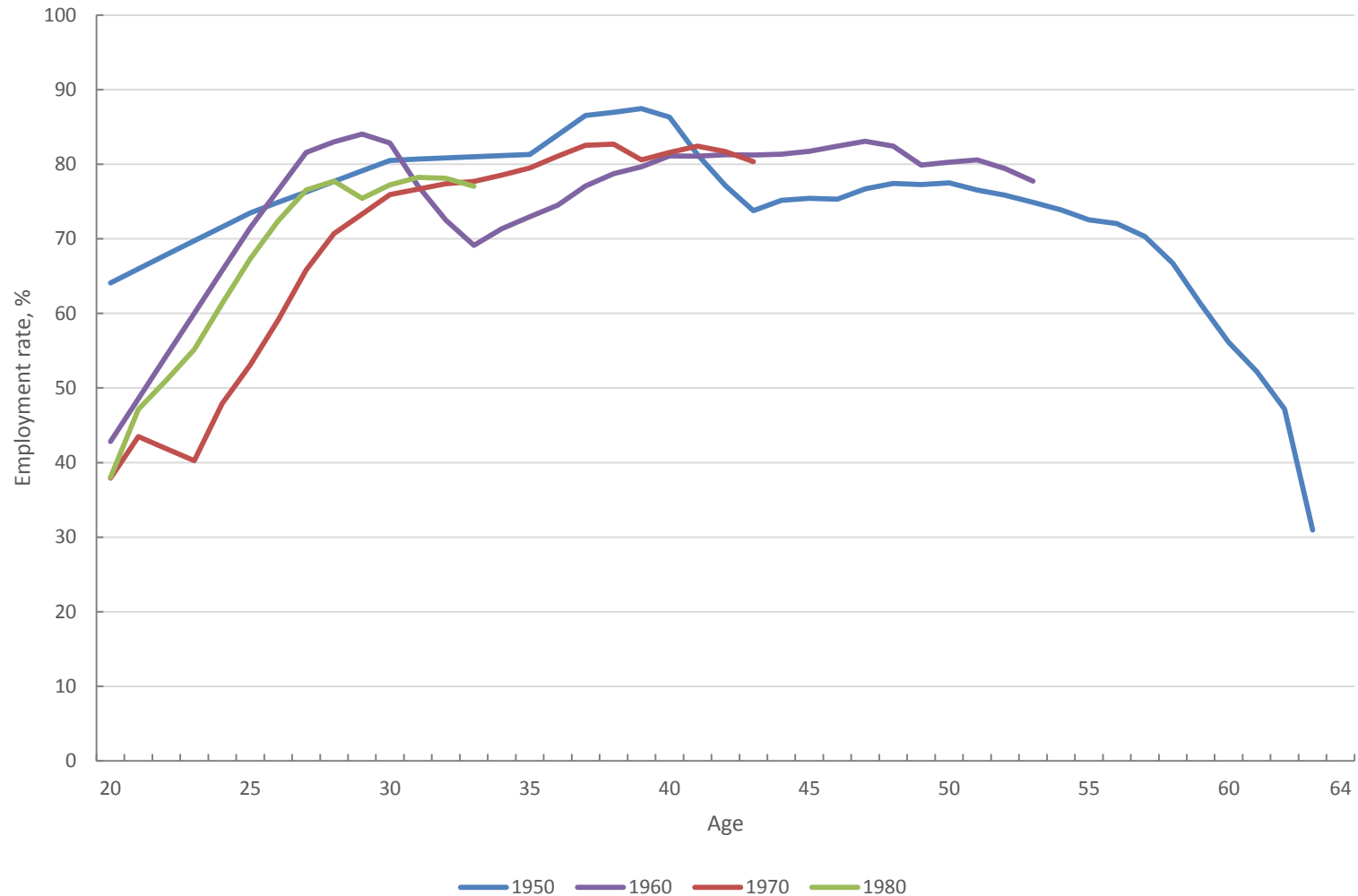
To where?

From where?

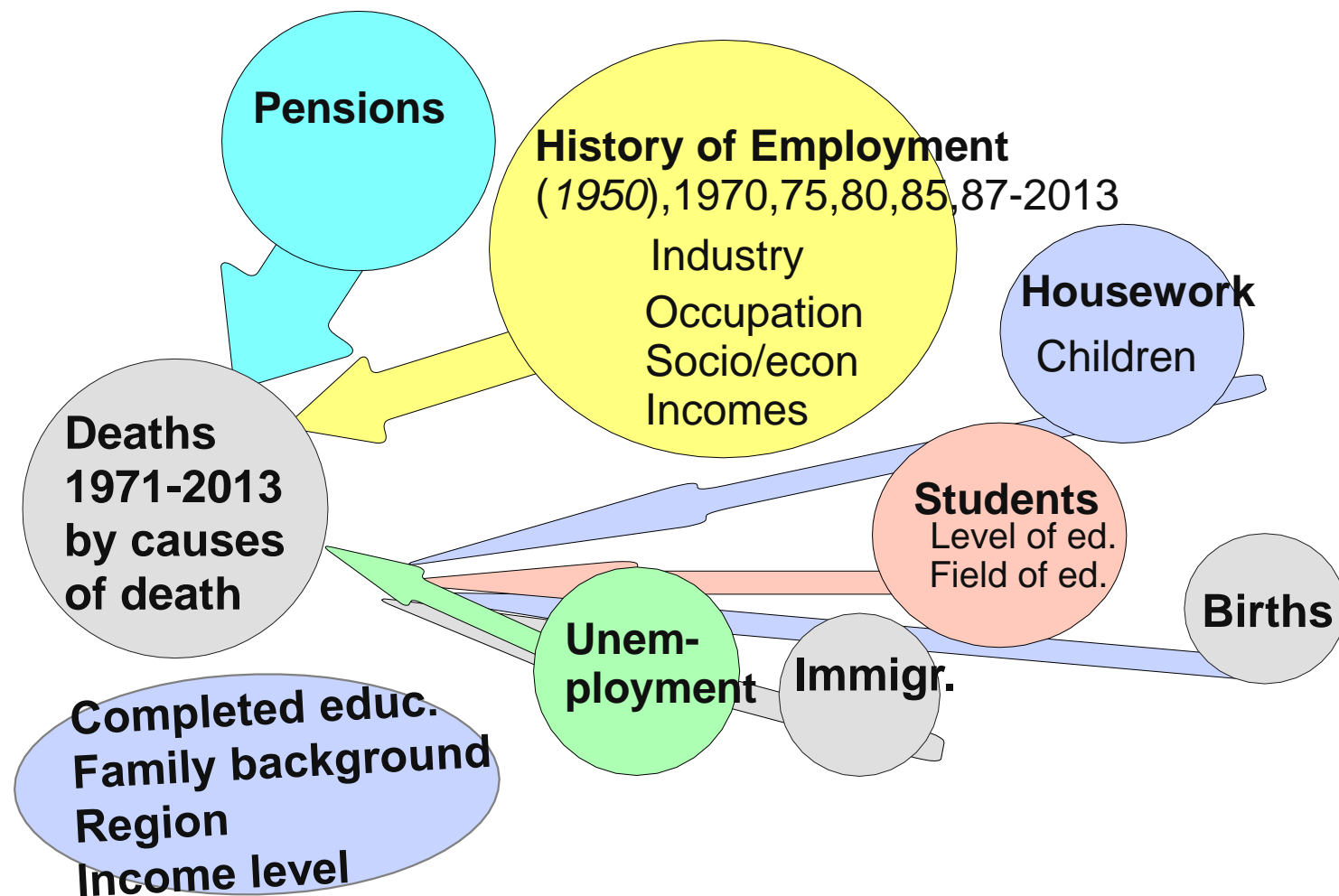




# Employment rate by birth cohorts



# Deaths and the history of different activities





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