

# R tools for ILOSTAT: Rilostat and SMART

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- The Department of Statistics of the International Labour Organization (ILO) is the focal point for labour statistics within the United Nations
- Its mandate:
  - ① providing relevant, timely and comparable statistics on as many labour market topics as possible;
  - ② developing international standards with a view to improving the measurement of labour issues and enhancing international comparability;
  - ③ supporting member States in developing and improving their labour statistics via trainings, capacity building and technical assistance.

To achieve these goals, the ILO Department of Statistics:

- collects, process and disseminates internationally comparable indicators through **ILOSTAT**;
- makes ILOSTAT accessible through the *bulk download facility*, *SDMX web service* and **Rilostat**;
- supports member States to strengthen their capacity for reporting labour market statistics to ILO via **SMART**.



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**Key Indicators of the Labour Market (KILM)**

|   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> <a href="#">Employment-to-population ratio*</a></li> <li><input checked="" type="checkbox"/> <a href="#">Status in employment*</a></li> <li><input checked="" type="checkbox"/> <a href="#">Employment by sector*</a></li> <li><input checked="" type="checkbox"/> <a href="#">Employment by occupation*</a></li> <li><input checked="" type="checkbox"/> <a href="#">Employment by education</a></li> <li><input checked="" type="checkbox"/> <a href="#">Hours of work</a></li> <li><input checked="" type="checkbox"/> <a href="#">Informal employment</a></li> </ul> | <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> <a href="#">Unemployment rate*</a></li> <li><input checked="" type="checkbox"/> <a href="#">Labour underutilization</a></li> <li><input checked="" type="checkbox"/> <a href="#">Youth NEET rate</a></li> <li><input checked="" type="checkbox"/> <a href="#">Time-related underemployment</a></li> <li><input checked="" type="checkbox"/> <a href="#">Monthly earnings</a></li> <li><input checked="" type="checkbox"/> <a href="#">Labour costs</a></li> <li><input checked="" type="checkbox"/> <a href="#">Labour productivity*</a></li> </ul> | <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> <a href="#">Employment by economic class*</a></li> <li><input checked="" type="checkbox"/> <a href="#">Labour dependency ratio*</a></li> <li><input checked="" type="checkbox"/> <a href="#">Industrial relations</a></li> <li><input checked="" type="checkbox"/> <a href="#">Labour market projections*</a></li> <li><input checked="" type="checkbox"/> <a href="#">Wage growth by region*</a></li> <li><input checked="" type="checkbox"/> <a href="#">Global and regional indicators*</a></li> <li><input checked="" type="checkbox"/> <a href="#">Quarterly indicators</a></li> </ul> |
|---|--|--|

\* ILO modelled estimates

**Browse Indicators by Subject**

Annual  
  Quarterly  
  Monthly

- [SDG labour market indicators](#)
- [ILO modelled estimates](#)
- [Population and labour force](#)
- [Employment](#)
  - [Employment](#)
    - by sex and age
    - by sex, age and education
    - by sex, age and rural / urban areas
    - by sex and status in employment
    - by sex and institutional sector
    - by sex and economic activity
    - by sex and occupation
    - hrs. sav. and weekly hours actually worked

**What's New**

This issue of ILOSTAT's *Spotlight on work statistics* focuses on employed people living in extreme poverty around the world, showing that for the working poor, a job is no guarantee of decent living conditions.

The fifth issue of our series *Spotlight on work statistics* uses the first ever global estimates of youth not in employment, education or training along with other youth labour market indicators to explore the situation of youth in labour markets around the world, and unveil the additional challenges they face.

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**Data Tools**

Excel Add-in



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### Employment by sex and age (Thousands) ◦

Customize Download

| Reference Area | Source | Sex    | Age   | Latest | Years |      |      |      |      |      |      |      |      |      |      |  |
|----------------|--------|--------|-------|--------|-------|------|------|------|------|------|------|------|------|------|------|--|
|                |        |        |       |        | 2009  | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |      |  |
| Afghanistan ◦  | HIES ◦ | Total  | 15-24 | 2017   | 79    |      |      |      | 1922 |      |      |      |      |      | 1838 |  |
| Afghanistan ◦  | HIES ◦ | Total  | 15-84 | 2017   | 43    |      |      |      | 6287 |      |      |      |      |      | 6250 |  |
| Afghanistan ◦  | HIES ◦ | Total  | 15+   | 2017   | 67    |      |      |      | 6420 |      |      |      |      |      | 6307 |  |
| Afghanistan ◦  | HIES ◦ | Total  | 25+   | 2017   | 08    |      |      |      | 4488 |      |      |      |      |      | 4559 |  |
| Afghanistan ◦  | HIES ◦ | Male   | 15-24 | 2017   | 09    |      |      |      | 1556 |      |      |      |      |      | 1398 |  |
| Afghanistan ◦  | HIES ◦ | Male   | 15-84 | 2017   | 83    |      |      |      | 6216 |      |      |      |      |      | 4881 |  |
| Afghanistan ◦  | HIES ◦ | Male   | 15+   | 2017   | 85    |      |      |      | 6358 |      |      |      |      |      | 5016 |  |
| Afghanistan ◦  | HIES ◦ | Male   | 25+   | 2017   | 26    |      |      |      | 3803 |      |      |      |      |      | 3622 |  |
| Afghanistan ◦  | HIES ◦ | Female | 15-24 | 2017   | 69    |      |      |      | 366  |      |      |      |      |      | 442  |  |
| Afghanistan ◦  | HIES ◦ | Female | 15-84 | 2017   | 10    |      |      |      | 1052 |      |      |      |      |      | 1369 |  |
| Afghanistan ◦  | HIES ◦ | Female | 15+   | 2017   | 51    |      |      |      | 1061 |      |      |      |      |      | 1378 |  |
| Afghanistan ◦  | HIES ◦ | Female | 25+   | 2017   | 82    |      |      |      | 695  |      |      |      |      |      | 937  |  |
| Albania ◦      | LFS ◦  | Total  | 15-24 | 2017   | 24    | 156  | 141  | 179  | 125  | 99   | 88   | 92   |      |      | 98   |  |
| Albania ◦      | LFS ◦  | Total  | 15-84 | 2017   | 83    | 1146 | 1153 | 1126 | 1091 | 990  | 1006 | 1056 | 1120 |      | 1160 |  |
| Albania ◦      | LFS ◦  | Total  | 15+   | 2017   | 23    | 1161 | 1187 | 1159 | 1134 | 1024 | 1037 | 1087 | 1157 |      | 1195 |  |
| Albania ◦      | LFS ◦  | Total  | 25+   | 2017   | 99    | 1004 | 1028 | 981  | 1008 | 925  | 950  | 995  |      |      | 1099 |  |
| Albania ◦      | LFS ◦  | Male   | 15-24 | 2017   | 70    | 88   | 88   | 105  | 79   | 61   | 64   | 61   |      |      | 60   |  |
| Albania ◦      | LFS ◦  | Male   | 15-84 | 2017   | 06    | 654  | 659  | 627  | 606  | 540  | 585  | 600  |      |      | 650  |  |
| Albania ◦      | LFS ◦  | Male   | 15+   | 2017   | 23    | 663  | 670  | 648  | 633  | 563  | 586  | 621  |      |      | 679  |  |
| Albania ◦      | LFS ◦  | Male   | 25+   | 2017   | 53    | 577  | 584  | 543  | 554  | 502  | 532  | 560  |      |      | 619  |  |
| Albania ◦      | LFS ◦  | Female | 15-24 | 2017   | 55    | 70   | 55   | 74   | 46   | 39   | 34   | 31   |      |      | 35   |  |
| Albania ◦      | LFS ◦  | Female | 15-84 | 2017   | 55    | 494  | 494  | 499  | 485  | 450  | 441  | 456  |      |      | 500  |  |
| Albania ◦      | LFS ◦  | Female | 15+   | 2017   | 00    | 497  | 497  | 511  | 500  | 461  | 451  | 466  |      |      | 516  |  |
| Albania ◦      | LFS ◦  | Female | 25+   | 2017   | 45    | 427  | 442  | 438  | 454  | 422  | 417  | 435  |      |      | 481  |  |

*R* users can access ILOSTAT via the ILOSTAT *R* package, *Rilostat*

- *Rilostat* enables customized data search, download, formatting and visualization
- Its source code is largely based on the algorithm and documentation developed for accessing the Eurostat open database (Eurostat *R* package, Lahti et al (2017))

# Rilostat: Getting started

- 1 The installation of the CRAN release version of *Rilostat* is standard:

```
install.packages("Rilostat")  
library(Rilostat)
```

- 2 The package works with an “imports” directive that loads the necessary packages. All the functions part of the package are listed as a data frame by running

```
as.data.frame(ls("package:Rilostat"))
```

- Just like the *bulk download facility*, Rilostat gives access to ILOSTAT datasets through two different directories, organized by **indicator** (and *frequency*) or by **ref\_area** (and *frequency*)
  - **indicator** refers to the title of each specific table, including the represented variable and the eventual disaggregations used for it (e.g. *labour force by sex and age, unemployment rate by sex, age and rural/urban areas*)
  - **ref\_area** refers to the geographic areas for which data are available (countries, regions or the world)
  - *frequency* refers to whether the various data points are annual, quarterly or monthly

⇒ get the code of **indicator** or **ref\_area**



## Rilostat: Searching for data (cont.)

`get_ilstat_toc()` gives access to the table of contents of all available indicators in ILOSTAT by **indicator** (default).

For narrower search data can be filtered by reference segment and key term. For instance:

```
(1) toc_une <- get_ilstat_toc(search = 'Unemployment')
```

| id                      | indicator           | indicator.label  |
|-------------------------|---------------------|--|
| 1 UNE_2UNE_SEX_AGE_NB_A | UNE_2UNE_SEX_AGE_NB | Unemployment by sex and age -- ILO modelled estimates..  |
| 2 UNE_2EAP_SEX_AGE_RT_A | UNE_2EAP_SEX_AGE_RT | Unemployment rate by sex and age -- ILO modelled esti... |
| 3 SDG_0852_SEX_AGE_RT_A | SDG_0852_SEX_AGE_RT | [8.5.2] Unemployment rate (%)                            |

```
(2) toc_cou <- get_ilstat_toc(segment = 'ref_area',  
search =c('Philippines|Thailand'), fixed = FALSE)
```

# Rilostat: Data download and filtering

`get_ilstat( )` explores ILOSTAT and returns single or multiple datasets using the code obtained at the identification step.

`label_ilstat( )` assigns human readable labels:

```
(1) dat_une <- get_ilstat(id = 'UNE_DEAP_SEX_AGE_RT_A',  
segment = 'indicator')
```

| collection | ref_area | source | indicator | sex                 | classif1 | time               | obs_value | obs_status | note_classif | note_indicator | note_source |
|------------|----------|--------|-----------|---------------------|----------|--------------------|-----------|------------|--------------|----------------|-------------|
| 1          | YI       | ABW    | BA:829    | UNE_DEAP_SEX_AGE_RT | SEX_T    | AGE_YTHADULT_YGE15 | 1994      | 6.45       | N/A          | N/A            | S3:21       |
| 2          | YI       | ABW    | BA:829    | UNE_DEAP_SEX_AGE_RT | SEX_M    | AGE_YTHADULT_YGE15 | 1994      | 5.36       | N/A          | N/A            | S3:21       |
| 3          | YI       | ABW    | BA:829    | UNE_DEAP_SEX_AGE_RT | SEX_F    | AGE_YTHADULT_YGE15 | 1994      | 7.95       | N/A          | N/A            | S3:21       |

```
(2) dat_une_lab <- label_ilstat(dat_une)
```

| collection.label | ref_area.label    | source.label | indicator.label                 | sex.label                            | classif1.label | time     | obs_value |      |
|------------------|-------------------|--------------|---------------------------------|--------------------------------------|----------------|----------|-----------|------|
| 1                | Yearly indicators | Aruba        | ABW - LFS - Labour force survey | Unemployment rate by sex and age (%) | Sex: Total     | Age: 15+ | 1994      | 6.45 |

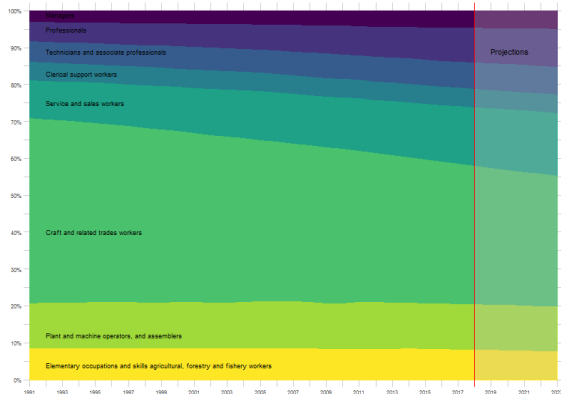
## Rilostat: Data download and filtering (cont.)

```
(3) dat_att <- get_ilstat(id = c('AFG_A', 'TTO_A'),  
  segment = 'ref_area')
```

Filters can be imposed w.r.t. variables codes, and vectors of predefined disaggregation. An extensive list of these disaggregations (dictionary files) can be accessed through `get_ilstat_dic()`

```
(4) dat_une_col <- get_ilstat(id = 'UNE_DEAP_SEX_AGE_RT_A',  
  segment = 'indicator', filters = list(ref_area = 'COL',  
  sex = 'SEX_F'))
```

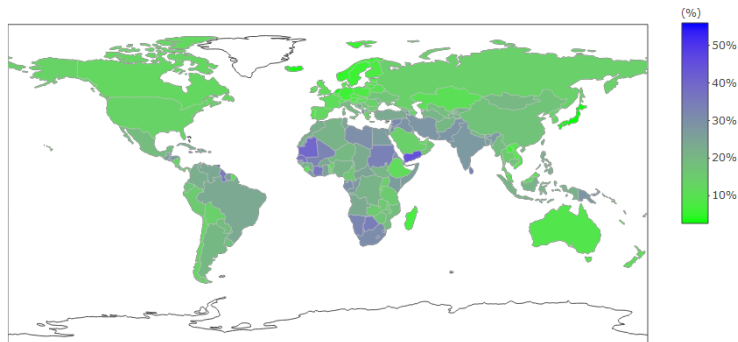
# Rilostat: Data visualization 1



Evolution of the global employment distribution by occupation, 1991-2023 (ILO modelled estimates, November 2018)

■ packages: *viridis*, *scales*, *hrbrthemes* and *stringr*

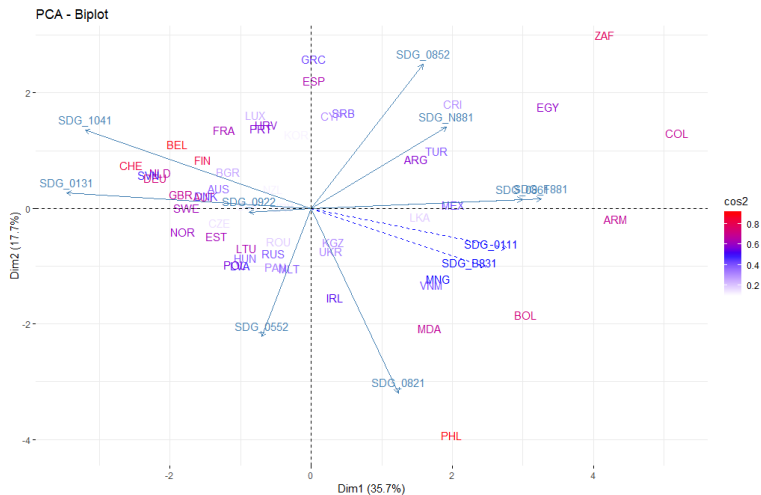
## Rilostat: Data visualization 2



Share of youth not in employment, education or training (NEET), 2017  
(ILO modelled estimates, November 2018)

■ package:*plotly*

# Rilostat: A PCA Application to the SDGs collection



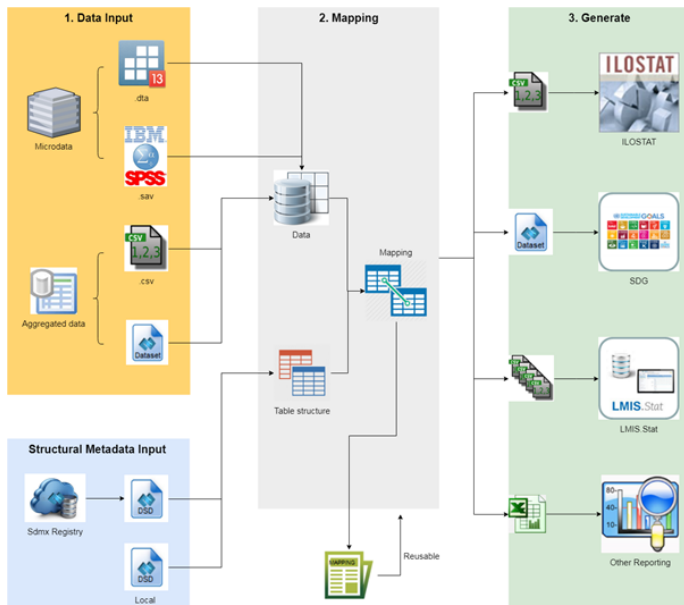
To support member States to strengthen their capacity for reporting labour market statistics to ILO: **SMART**

**S**tatistics **M**etadata-driven **A**nalysis and **R**eporting **T**ool. Toolkit that facilitates the production of tables to report labour statistics to ILOSTAT.

- Windows desktop application
- GUI in .NET on top of R processor
- Input files: SPSS, Stata, CSV, and SDMX-ML
- Aggregation and trans-coding
- Output files: Excel, SDMX-ML, SDMX-Json, .Stat-CSV

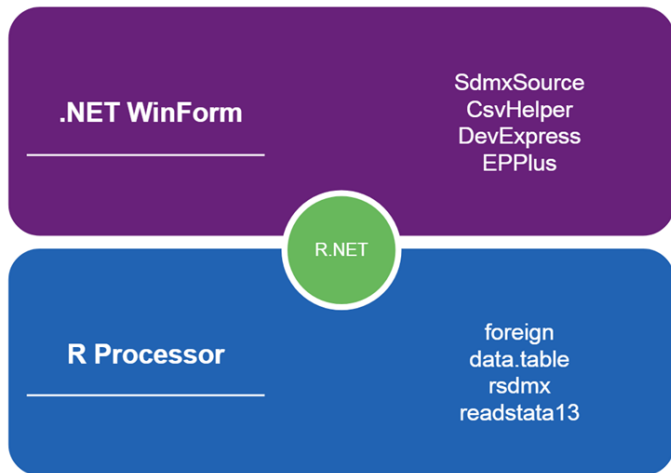
<https://www.ilo.org/ilostat/tools/smart>

# SMART: Concept map





# SMART: Architecture Design



- By the SDG 2030 agenda, all UN member States have to report progress on 232 indicators.
- To enhance international data exchange, NSOs are encouraged to use the SDMX format.
- Whenever the SDMX format is not yet supported by national platforms, **SMART** helps converting SDG data from, say, Excel into SDMX format.
- To do so, the IAEG-SDGs has defined a pilot SDG dataflow (DSD/Dataflow)

# SMART: example - SDG reporting (mapping)

- map variables from input data into *Dimensions*, *Attributes* and *Primary Measure* in DSD.
- Recode mismatched items.

The screenshot displays the SMART software interface, titled "Statistical Metadata-driven Analysis & Reporting Tool (SMART v1.1)". The main window is divided into several panes:

- Data Structures:** Shows the mapping of input data to DSD dimensions and attributes. The "Data Structures" pane lists "Tables (DSDs)" with columns for ID, Label, and Primary Measure. The "Dimensions" pane lists various dimensions with their labels and checkboxes for selection. The "Attributes" pane lists various attributes with their labels and checkboxes for selection.
- Variables:** A table with columns for ID, Label, and Primary Measure. It lists various variables such as "Service Code", "Series Name", "Indicator Reference Number", etc.
- Messages:** A log window at the bottom showing system messages, including a message about the CSV dataset "1.3.1 INHC INDICATORS.csv" being updated and a message about the table "Variables" containing the variables (data columns) from uploaded data.

The "Data Structures" pane shows the following table:

| ID  | Label   | Primary Measure |
|-----|---------|-----------------|
| SDG | SDG DSD | OBJ_VALUE       |

The "Dimensions" pane shows the following table:

| ID                      | Label                             | Measure                  |
|-------------------------|-----------------------------------|--------------------------|
| FREQ                    | Frequency                         | <input type="checkbox"/> |
| REPORTING_TYPE          | Reporting type code list          | <input type="checkbox"/> |
| SERIES                  | SDG Series code list              | <input type="checkbox"/> |
| REF_AREA                | Reference area code list          | <input type="checkbox"/> |
| SEX                     | Sex code list                     | <input type="checkbox"/> |
| AGE                     | SDG age group code list           | <input type="checkbox"/> |
| URBANIZATION            | Degree of Urbanization code list  | <input type="checkbox"/> |
| INCOME_REAL_TH_QUANTILE | Income/health quantile code list  | <input type="checkbox"/> |
| EDUCATION_LEV           | SDG Education Level code list     | <input type="checkbox"/> |
| OCCUPATION              | SDG Occupation code list          | <input type="checkbox"/> |
| CUSTOM_BREAKDOWN        | Custom Breakdown code list        | <input type="checkbox"/> |
| CONCEPT_BREAKDOWN       | SDG Composite Breakdown code list | <input type="checkbox"/> |
| DISABILITY_STATUS       | Disability status code list       | <input type="checkbox"/> |
| TIME_BREAKDOWN          |                                   | <input type="checkbox"/> |

The "Attributes" pane shows the following table:

| ID            | Label                          |
|---------------|--------------------------------|
| OBJ_STATUS    | Observation status             |
| UNIT_MULT     | Unit multiplier                |
| UNIT_MEASURE  | Unit of measure                |
| NATURE        | Nature of data points          |
| COMMENT_OBS   | Observation level footnotes    |
| TIME_COVERAGE | Time period or range (ISO8601) |
| UPPER_BOUND   | Upper bound value              |
| LOWER_BOUND   | Lower bound value              |
| BASE_PER      | Base period                    |
| TIME_DETAIL   | Time period details            |
| SOURCE_DETAIL | Source details                 |

The "Messages" pane shows the following text:

```
[Out to load dataset - depending on the size of file, this may take some time...
--04:25:11 PM--
The CSV dataset '1.3.1 INHC INDICATORS.csv' has been uploaded, and decoded as 'Data'.
[Info] 1. Click 'View Data' to observe the data.
2. Table 'Variables' contains all the variables (data columns) from uploaded data. The 'blue' printed rows indicate value labels are assigned. Right click any row in table 'Variables' to view summary statistics.
```

# SMART: example - SDG reporting (generate)

## ■ Write in SDMX (SMART generate module)

```
<?xml version="1.0" encoding="UTF-8"?>
<message:StructureSpecificData xmlns:xml="http://www.w3.org/XML/1998/namespace" xmlns:sd="http://www.w3.org/2001/XMLSchema-instance"
xmlns:common="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/common" xmlns:sdmx="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/message"
xmlns:ref="http://www.sdmx.org/sdms/infomodel/datastructure/DataStructure=UNSD:SDG(0.3):ObsLevelDim:TIME_PERIOD" xmlns:footer="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/message/footer"
xmlns:ss="http://www.sdmx.org/resources/sdmxml/schemas/v2_1/data/structurespecific">
  <message:Header>
    <message:ID>IDREF636937083707840305</message:ID>
    <message:Test>false</message:Test>
    <message:Prepared>2019-05-17T16:45:39</message:Prepared>
    <message:Sender>ESSTAT</message:Sender>
  </message:Header>
  <message:Structure dimensionObservation="TIME_PERIOD" namespace="urn:sdmx.org.sdmx.infomodel.datastructure.DataStructure=UNSD:SDG(0.3):ObsLevelDim:TIME_PERIOD"
structureID="UNSD_SDG_0_3">
    <common:Structure>
      <ref id="SDG" version="0.3" agencyID="UNSD"/>
    </common:Structure>
  </message:Structure>
  <message:Header>
    <message:DataSet as:structureRef="UNSD_SDG_0_3" xsi:type="ns1:DataSetType" as:dataScope="DataStructure" action="Information">
      <Series DISABILITY_STATUS="1" COMPOSITE_BREAKDOWN="1" CUST_BREAKDOWN="1" OCCUPATION="1" EDUCATION_LEV="1" INCOME_WEALTH_QUANTILE="1" URBANISATION="1" AGE="1" SEX="1"
REF_AREA="1" SERIES="SI_COV_BENEFITS" REPORTING_TYPE="C" FREQ="A">
        <Obs SOURCE_DETAIL="ILO estimates based on country data compiled through the ILO Social Security Inquiry (SSI)" TIME_DETAIL="" COMMENT_OBS="NATURE="E" UNIT_MEASURE="PERCENT"
UNIT_MULT="0" OBS_STATUS="A" OBS_VALUE="45.2" TIME_PERIOD="2016"/>
      </Series>
      <Series DISABILITY_STATUS="1" COMPOSITE_BREAKDOWN="1" CUST_BREAKDOWN="1" OCCUPATION="1" EDUCATION_LEV="1" INCOME_WEALTH_QUANTILE="1" URBANISATION="1" AGE="1" SEX="1"
REF_AREA="100" SERIES="SI_COV_BENEFITS" REPORTING_TYPE="C" FREQ="A">
        <Obs SOURCE_DETAIL="ILO Social Security Inquiry (SSI). Available at http://www.social-protection.org/gimi/guess/ShowWiki.action?id=594&tabs=3" TIME_DETAIL="" COMMENT_OBS="ILO estimates based
on country data, refers to the population effectively covered by at least one social protection cash transfer" NATURE="E" UNIT_MEASURE="PERCENT" UNIT_MULT="0" OBS_STATUS="A" OBS_VALUE="88.3"
TIME_PERIOD="2016"/>
      </Series>
      <Series DISABILITY_STATUS="1" COMPOSITE_BREAKDOWN="1" CUST_BREAKDOWN="1" OCCUPATION="1" EDUCATION_LEV="1" INCOME_WEALTH_QUANTILE="1" URBANISATION="1" AGE="1" SEX="1"
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      </Series>
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REF_AREA="120" SERIES="SI_COV_BENEFITS" REPORTING_TYPE="C" FREQ="A">
        <Obs SOURCE_DETAIL="ILO Social Security Inquiry (SSI). Available at http://www.social-protection.org/gimi/guess/ShowWiki.action?id=594&tabs=3" TIME_DETAIL="" COMMENT_OBS="ILO estimates based
on country data, refers to the population effectively covered by at least one social protection cash transfer" NATURE="E" UNIT_MEASURE="PERCENT" UNIT_MULT="0" OBS_STATUS="A" OBS_VALUE="8.2"
TIME_PERIOD="2016"/>
      </Series>
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        <Obs SOURCE_DETAIL="ILO Social Security Inquiry (SSI). Available at http://www.social-protection.org/gimi/guess/ShowWiki.action?id=594&tabs=3" TIME_DETAIL="" COMMENT_OBS="ILO estimates based
on country data, refers to the population effectively covered by at least one social protection cash transfer" NATURE="E" UNIT_MEASURE="PERCENT" UNIT_MULT="0" OBS_STATUS="A" OBS_VALUE="99.8"
TIME_PERIOD="2016"/>
      </Series>
      <Series DISABILITY_STATUS="1" COMPOSITE_BREAKDOWN="1" CUST_BREAKDOWN="1" OCCUPATION="1" EDUCATION_LEV="1" INCOME_WEALTH_QUANTILE="1" URBANISATION="1" AGE="1" SEX="1"
REF_AREA="13" SERIES="SI_COV_BENEFITS" REPORTING_TYPE="C" FREQ="A">
        <Obs SOURCE_DETAIL="ILO estimates based on country data compiled through the ILO Social Security Inquiry (SSI)" TIME_DETAIL="" COMMENT_OBS="NATURE="E" UNIT_MEASURE="PERCENT"
UNIT_MULT="0" OBS_STATUS="A" OBS_VALUE="67.2" TIME_PERIOD="2016"/>
      </Series>
    </message:DataSet>
  </message:Header>
</message:StructureSpecificData>
```

- Online data and metadata Query
- Command line utility
- Reusable mapping
- Repetitive runs
- DSD constructor

Thank you!

For more information you can contact: [ilostat@ilo.org](mailto:ilostat@ilo.org)