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ESS GUIDELINES FOR THE IMPLEMENTATION OF THE ESS QUALITY AND PERFORMANCE INDICATORS 2010

These indicators were last reviewed by the
Eurostat Expert Group on Quality Indicators in 2010

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**ESS GUIDELINES FOR THE IMPLEMENTATION OF THE
ESS QUALITY AND PERFORMANCE INDICATORS 2010**

Name:	R1. Data completeness - rate
Definition:	The ratio of the number of data cells (entities to be specified by the Eurostat domain manager) provided to the number of data cells required by Eurostat or relevant. The ratio is computed for a chosen dataset and a given period.
Applicability:	<p>The rate of available data is applicable:</p> <ul style="list-style-type: none"> - to all statistical processes (including use of administrative sources); - to users and producers (different focus and formulas) <p>Computed only by Eurostat but recommended also for inclusion in national quality reports.</p>
Calculation formulae:	<p style="text-align: center;"><u>For a specific key variable:</u></p> <p><u>For producers:</u></p> $R1_{PDR} = \frac{\# A_D^{rqd}}{\# D^{rqd}}$ <p>D^{rqd} in the denominator is the set of data cells required (i.e. excl. derogations/confidentiality) and $\# A_D^{rqd}$ in the numerator is the corresponding subset of <u>available/provided</u> data cells. The notation $\# D$ means the number of elements in the set D (the cardinality).</p> <p><u>For users</u></p> $R1_U = \frac{\# A_D^{rel}}{\# D^{rel}}$ <p>D^{rel} in the denominator is the set of relevant data cells (full coverage, i.e. excl. only those entities for which the data wouldn't be relevant like e.g. fishing fleet in Hungary) and A_D^{rel} in the numerator is the corresponding subset of <u>available/provided</u> data cells. The notation $\# D$ means the number of elements in the set D (the cardinality).</p> <p>The main difference between the two formulas lies in the selection of the denominators' datasets.</p> <p>Regarding the first formula, for producers, this set comprises the required data cells excluding derogations/confidentiality, since producers are interested in assessing the level of compliance with the requirements.</p> <p>On the other hand, for users, the formula gives the rate of provided data cells to the ones that are theoretically relevant, meaning that missing cells due to derogations/confidentiality or any other reason for missing data are included here, leaving out only those cells for</p>

	which data wouldn't be relevant like e.g. fishing fleet in Hungary.
Target value:	The target value for this indicator is 1 meaning that 100% of the required or relevant data cells are available.
Aggregation levels and principles:	<p>The calculation is done, for a meaningful choice by the domain manager, at subject matter domain level. Aggregations are recommended at EU level for the user-oriented indicator.</p> <p>The number of data cells provided and the number of data cells required/relevant are aggregated separately, from which a ratio is then computed.</p>
Interpretation:	<p>The indicator shows to what extent statistics are available compared to what should be available.</p> <p><u>For producers:</u> It can be used to evaluate the degree of compliance by a given Member State for a given dataset and period to be specified by the domain manager.</p> <p><u>For users:</u> At EU level, it can be used to</p> <ul style="list-style-type: none"> ▪ identify whether important variables are missing for some individual Member State or alternatively ▪ give users an overall measurement (aggregate across countries and/or key variables) of the availability of statistics.
Specific guidance:	<p>The indicator should be accompanied by information about which variable are missing and the reasons for incompleteness as well as, where relevant, the impact of the missing data on the EU aggregate and plans for improving completeness in the future.</p> <p>Calculation would need intervention by the Eurostat domain manager at the initial stage (to define the key variables and the period to be monitored). Later on, the indicators should be calculated automatically.</p> <p>Both formulas are to be computed per key variable, nevertheless an aggregate for all variables can be calculated.</p> <p><u>For producers:</u> This indicator forms part of Eurostat compliance monitoring, thus for producers it should be computed per Member State.</p> <p><u>For users:</u> If certain relevant variables are not reported, the statistics are incomplete. This can be due to data not being collected or data being of low quality or confidential. For users an aggregate across countries for all the key variables could suffice.</p>
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat). ▪ ISO/IEC FDIS 11179-1 "Information technology – Metadata registries – Part 1: Framework", March 2004 (according to the SDMX Metadata Common Vocabulary draft Febr. 2008).

Name:	A1. Sampling error - indicators
Definition:	<p>The sampling error can be expressed:</p> <ul style="list-style-type: none"> a) in relative terms, in which case the relative standard error or, synonymously, the coefficient of variation (CV) is used. (The standard error of the estimator $\hat{\theta}$ is the square root of its variance $\sqrt{V(\hat{\theta})}$.) The estimated relative standard error (the estimated CV) is the estimated standard error of the estimator divided by the estimated value of the parameter, see calculation formulae below. b) in terms of confidence intervals, i.e. an interval that includes with a given level of confidence the true value of a parameter θ. The width of the interval is related to the standard error. <p>The estimator should take into account the sampling design and should further integrate the effect on precision of adjustments for non-response, corrections for misclassifications, use of auxiliary information through calibration methods etc.</p>
Applicability:	<p>Sampling errors indicator are applicable:</p> <ul style="list-style-type: none"> - to statistical processes based on probability samples or other sampling procedures allowing computation of such information. - to users and producers.
Calculation formulae:	<p>Coefficient of variation:</p> $CV_e(\hat{\theta}) = \frac{\sqrt{\hat{V}(\hat{\theta})}}{\hat{\theta}}$ <p>Remark: The subscript "e" stands for estimate.</p> <p>Confidence interval, symmetric:</p> $[\hat{\theta} - d; \hat{\theta} + d] \text{ or } \hat{\theta} \pm d$ <p>The length of the interval, which is $2 \cdot d$, depends on the confidence level (e.g. 95%), the assumptions concerning the distribution of the estimator of the parameter, and the sampling error. In many cases d has the form below, where t depends on the distribution and the confidence level.</p> $d = t \times \sqrt{\hat{V}(\hat{\theta})}$ <p>In case of totals, means and ratios, formulas for aggregation of coefficients of variation at EU level can be found in the third reference below.</p> <p>The calculation formulae depend on the sampling design, the</p>

	estimator, and the method chosen for estimating the variance $V(\hat{\theta})$.
Target value:	The smaller the CV, the standard error, and the width of the confidence interval, the more accurate is the estimator. Survey regulations may include specifications for precision thresholds at different population levels.
Aggregation levels and principles:	<p>The calculation is done for all statistics based on probability sample surveys or equivalent. Aggregations are possible at Member State and EU levels, depending on estimators and degree of harmonisation.</p> <p>The principle for computing the coefficient of variation of an aggregate depends on the method for aggregation of the estimator belonging to that variable.</p>
Interpretation:	<p>The CV is a relative (dimensionless) measure of the precision of a statistical estimator, often expressed as a percentage. More specifically, it has the property of eliminating measurement units from precision measures and one of its roles is to make possible comparisons between precision of estimates of different indicators. However, this property has no value added in case of proportions (which are by definition dimensionless indicators).</p>
Specific guidance:	<p>There are several precision measures which can be used to estimate the random variation of an estimator due to sampling, such as coefficients of variation, standard errors and confidence intervals. The coefficient of variation is suitable for quantitative variables with large positive values. It is not robust for percentages or changes and is not usable for data estimates of negative values, where they may be substituted by absolute measures of precision (standard errors or confidence intervals).</p> <p>The confidence interval is usually the precision measure preferred by data users. It is the clearest way of understanding and interpreting the sampling variability.</p> <p>Provision of confidence intervals is voluntary.</p> <p>The CV has the advantage of being dimensionless. The standard error or a confidence interval is sometimes preferable, as discussed.</p>
Reference:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat). ▪ Variance estimation methods in the European Union, Monographs of official Statistics, 2002 edition.

Name:	A2. Over-coverage - rate
Definition:	<p>The rate of over-coverage is the proportion of units accessible via the frame that do not belong to the target population (are out-of-scope).</p> <p>The <i>target population</i> is the population for which inferences are made. The <i>frame</i> (or frames) is a device that permits access to population units. The <i>frame population</i> is the set of population units which can be accessed through the frame. The concept of a frame is traditionally used for sample surveys, but applies equally to several other statistical processes, e.g. censuses, processes using administrative sources, and processes involving multiple data sources. Coverage deficiencies may be due to delays in reporting (typical for business statistics) and to errors in unit identification, classification, coding etc. This is the case also when administrative data are used.</p> <p>The rate may be calculated either as un-weighted or as weighted to refer to the overall level (frame/population rather than sample). Duplicates are included in over-coverage. Units of unknown eligibility provide an inherent difficulty; see below.</p>
Applicability :	<p>The rate of over-coverage is applicable:</p> <ul style="list-style-type: none"> – to all statistical processes (including use of administrative sources); – to users and producers. <p>If the survey has more than one unit type, a rate may be calculated for each type.</p> <p>If there is more than one frame or if over-coverage rates vary strongly between sub-populations, rates should be separated.</p>
Calculation formulae:	<p>The over-coverage rate has three main versions written in one and the same formula as the weighted over-coverage rate OCr_w</p> $OCr_w = \frac{\sum_o w_j + (1 - \alpha) \sum_Q w_j}{\sum_o w_j + \sum_E w_j + \sum_Q w_j}$ <p>O set of out-of-scope units (over-coverage, resolved and not belonging to the target population)</p> <p>E set of in-scope units (resolved units belonging to the target population; eligible units)</p> <p>Q set of units of unknown eligibility.</p> <p>w_j weight of unit j, described below.</p> <p>α The estimated proportion of cases of unknown eligibility that are actually eligible. It should be set equal 1 unless there is</p>

	<p>strong evidence at country level for assuming otherwise.</p> <p>The three main cases are: Un-weighted rate: $w_j = 1$ Design-weighted rate: $w_j = d_j$ where basically $d_j = 1/\pi_j$, meaning that the design weight is the inverse of the selection probability. Size-weighted rate: $w_j = d_j x_j$ where x_j is the value of a variable X.</p> <p>The variable X, which is chosen subjectively, shows the size or importance of the units. The value should be known for all units. X is auxiliary information, often available in the frame. Examples are turnover for businesses and population for municipalities.</p> <p>For the over-coverage rate the un-weighted and the design-weighted alternatives are the ones mostly used, see Interpretation below.</p> <p>The design-weighted rate is mainly used for samples surveys, but it may apply also, e.g., for price index processes or processes with multiple data sources. The weight d_j is a “raising” factor when unit j represents more than itself. Otherwise d_j is equal to one. Hence, when dealing with administrative sources the un-weighted and the size-weighted versions of the rate are normally the interesting one.</p>
Target value:	The target value of this indicator is as much as possible close to 0.
Aggregation levels and principles:	<ul style="list-style-type: none"> ▪ MS: the indicator is to be calculated for frame populations where meaningful, e.g. over industries. Then separate frame populations are treated as one frame population. ▪ EU: the indicator can be aggregated across countries only where statistical production processes are fully harmonised. For the statistical processes involved, the separate frame populations are treated as one frame population. Where production processes differ across countries, lower and higher over-coverage rates can be shown to indicate the range.
Interpretation:	<p><i>Over-coverage</i>: there are units accessible via the frame, which do not belong to the target population (e.g., deceased persons still listed in a Population Register or no longer operating enterprises still in the Business Register).</p> <p>The interest of the indicator depends on the statistical process and the ways of identification of over-coverage. If administrative data are used also to define the target population, this indicator normally has little value added, except possibly duplicates, if they are found. It may provide an overall idea of the quality of the register/frame and the rate of change of the population.</p> <p>The un-weighted over-coverage rate gives the number of units that have been found not belonging to the target in proportion to the total</p>

	<p>number of observed units. The number refers to the sample, the census or the register population studied.</p> <p>The design-weighted over-coverage rate is an estimate for the frame population in comparison with the target population, based on the information at hand, usually a sample.</p> <p>The size-weighted over-coverage rate expresses the rate in terms of a chosen size variable, e.g. turnover in business statistics. (This case is less interesting for over-coverage than for non-response.)</p>
Specific guidance:	-
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat).

Name:	A3. Unit non-response - rate
Definition:	The ratio of the number of units with no information or not usable information (non-response, etc.) to the total number of in-scope (eligible) units. The ratio can be weighted or un-weighted.
Applicability:	<p>The unit non-response rate is applicable:</p> <ul style="list-style-type: none"> - to all statistical processes (including direct data collection and administrative data; the terminology varies between statistical processes, but the basic principle is the same; it may in some cases be difficult to distinguish between unit non-response and under-coverage, especially for administrative data sources (in the former case units are known to exist but data are missing, e.g. due to very late reporting or so low quality that the information is useless – in the latter case the units are not known at the frame construction); - to users and producers.
Calculation formulae:	<p>The non-response rate has three main versions written in one and the same formula as the weighted unit non-response rate NRr_w</p> $NRr_w = 1 - \frac{\sum_R w_j}{\sum_R w_j + \sum_{NR} w_j + \alpha \sum_Q w_j}$ <p>R the set of responding eligible units NR the set of non-responding eligible units Q the set of selected units with unknown eligibility (un-resolved selected units) w_j weight of unit j, described below α The estimated proportion of cases of unknown eligibility that are actually eligible. It should be set equal 1 unless there is strong evidence at country level for assuming otherwise.</p> <p>The three main cases are: Un-weighted rate: $w_j = 1$ Design-weighted rate: $w_j = d_j$ where basically $d_j = 1/\pi_j$, meaning that the design weight is the inverse of the selection probability. Size-weighted rate: $w_j = d_j x_j$ where x_j is the value of a variable X.</p> <p>The variable X, which is chosen subjectively, shows the size or importance of the units. The value should be known for all units. X is auxiliary information, often available in the frame. Examples are turnover for businesses and population for municipalities.</p> <p>For the unit non-response rate all three alternatives are frequently used, see Interpretation below.</p>

	<p>The design-weighted rate is mainly used for samples surveys, but it may apply also, e.g., for price index processes or processes with multiple data sources. The weight d_j is a “raising” factor when unit j represents more than itself. Otherwise d_j is equal to one. Hence, when dealing with administrative sources the un-weighted and the size-weighted versions of the rate are normally the interesting one.</p>
Target value:	The target value for this indicator is as close to 0 as possible.
Aggregation levels and principles:	<ul style="list-style-type: none"> ▪ MS: the indicator is to be calculated at statistical process level ▪ EU: rather than aggregating this indicator over countries or to calculate a mean, lower and higher unit non-response rates can be shown by Eurostat for a given variable at statistical process level.
Interpretation:	<p>Unit non-response occurs when no data about an eligible unit are recorded (or data are so few or so low in quality that they are deleted).</p> <p>The un-weighted unit non-response rate shows the result of the data collection in the sample (the units included), rather than an indirect measure of the potential bias associated with non-response. If $\alpha=1$, it assumes that all the units with unknown eligibility are eligible, so it provides a conservative estimate of A4 with regard to other choices of α.</p> <p>The design-weighted unit non-response rate shows how well the data collection worked considering the population of interest.</p> <p>The size-weighted unit non-response rate would represent an indirect indicator of potential bias caused by non-response prior to any calibration adjustments.</p> <p>Note overall that the bias may be low even if the non-response rate is high, depending on the pattern of the non-responses and the possibilities to adjust successfully for non-response.</p>
Specific guidance:	<p>Non-response is a source of errors in survey statistics mainly for two reasons:</p> <ul style="list-style-type: none"> - it reduces the number of responses and therefore the precision of the estimates (this may be particularly relevant when samples are used); - it might introduce bias. The size of bias depends on the non-response rate but also on the differences between the respondents and the non-respondents with respect to the variable of interest; furthermore on the strength of auxiliary information.
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat). ▪ U.S. Census Bureau Statistical Quality Standards, Reissued 2010.

	<ul style="list-style-type: none"> ▪ Trépanier, Julien, and Kovar. “Reporting Response Rates when Survey and Administrative Data are Combined.” <i>Proceedings of the Federal Committee on Statistical Methodology Research Conference 2005</i>.
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Name:	A4. Item non-response - rate
Definition:	The item non-response rate for a given variable is defined as the (weighted) ratio between in-scope units that have not responded and in-scope units that are required to respond to the particular item.
Applicability :	<p>The item non-response rate is applicable:</p> <ul style="list-style-type: none"> - to all statistical processes (including direct data collection and administrative data; the terminology varies between statistical processes, but the basic principle is the same; - to users and producers (for selected key variables or for variables with very high item non-response rates).
Calculation formulae:	<p>The item non-response rate has three main versions written in one and the same formula as the weighted item non-response rate $NR_Y r_w$, which is calculated as follows:</p> $NR_Y r_w^{REQ} = 1 - \frac{\sum_{R_Y} w_j}{\sum_{R_Y} w_j + \sum_{NR_Y} w_j}$ <p> R_Y the set of eligible units responding to item Y (as required) NR_Y the set of eligible units not responding to item Y although this item is required. – The denominator corresponds to the set of units for which item Y is required. (Other units do not get this item because their answers to earlier items gave them a skip past this item; they were “filtered away”.) w_j weight of unit j, described below </p> <p>The three main cases are: Un-weighted rate: $w_j = 1$ Design-weighted rate: $w_j = d_j$ where basically $d_j = 1/\pi_j$, meaning that the design weight is the inverse of the selection probability. Size-weighted rate: $w_j = d_j x_j$ where x_j is the value of a variable X.</p> <p>The variable X, which is chosen subjectively, shows the size or importance of the units. The value should be known for all units. X is auxiliary information, often available in the frame. Examples are turnover for businesses and population for municipalities.</p> <p>For the item non-response rate all three alternatives are frequently used, see Interpretation below.</p> <p>The design-weighted rate is mainly used for samples surveys, but it may apply also, e.g., for price index processes or processes with multiple data sources. The weight d_j is a “raising” factor when unit j represents more than itself. Otherwise d_j is equal to one. Hence, when dealing</p>

	with administrative sources the un-weighted and the size-weighted versions of the rate are normally the interesting one.
Target value:	The target value for this indicator is as close to 0 as possible.
Aggregation levels and principles:	<ul style="list-style-type: none"> ▪ MS: the indicator is to be calculated at statistical process level for key variables and variables with low rates. ▪ EU: rather than to aggregate this indicator over countries or to calculate a mean, lower and higher item non-response rates can be shown by Eurostat for a given variable at statistical process level.
Interpretation:	<p>A high item non-response rate indicates difficulties in providing information, e.g. a sensitive question or unclear wording for social statistics or information not available in the accounting system for business statistics.</p> <p>The indicator is a proxy indicator of the possible bias caused by item non-response. In spite of the low item response rate, the bias may still be low, depending on causes, response pattern, and auxiliary information to adjust/impute.</p>
Specific guidance	The un-weighted item non-response rate should be calculated before the data editing and imputation in order to measure the impact of item non-response for the key variables.
References	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat). ▪ U.S. Census Bureau Statistical Quality Standards, Reissued 2010. ▪ Trépanier, Julien, and Kovar. “Reporting Response Rates when Survey and Administrative Data are Combined.” <i>Proceedings of the Federal Committee on Statistical Methodology Research Conference 2005</i>.

Name:	A5. Imputation - rate
Definition:	<p>Imputation is the process used to assign replacement values for missing, invalid or inconsistent data that have failed edits. This excludes follow-up with respondents and manual review and correction (if applicable). Thus, imputation as defined above occurs after data collection, no matter from which source or mix of sources the data have been obtained, including administrative data. After imputation, the data file should normally only contain plausible and internally consistent data records.</p> <p>This indicator is influenced both by the item non-response and the editing process. It measures both the relative amount of imputed values and the relative influence on the final estimates from the imputation procedures.</p> <p>The un-weighted imputation rate for a variable is the ratio of the number of imputed values to the total number of values requested for the variable.</p> <p>The weighted rate shows the relative contribution to a statistic from imputed values; typically a total for a quantitative variable. For a qualitative variable, the relative contribution is based on the number of units with an imputed value for the qualitative item.</p>
Applicability :	<p>The imputation rate is applicable</p> <ul style="list-style-type: none"> – to all statistical processes (with micro data; hence, e.g., direct data collection and administrative data); – to users and producers
Calculation formulae:	<p>The imputation rate has three main versions written in one and the same formula as the weighted imputation rate $IR_Y r_w$ for a variable Y</p> $IR_Y r_w = \frac{\sum_{I_Y} w_j y_j}{\sum_{I_Y} w_j y_j + \sum_{K_Y} w_j y_j}$ <p>I_Y the set of units for which variable Y is imputed K_Y the set of units for which the value of variable Y is kept w_j weight of unit j, described below</p> <p>The two sets I_Y and K_Y together (the union) are the same as R_Y and NR_Y together.</p> <p>In case of a qualitative variable, the value of $y_j = 1$ if the jth unit shows a given characteristic and 0 otherwise.</p>

	<p>When imputation is counted the following changes have to be considered:</p> <ol style="list-style-type: none"> imputation of a (non-blank) value for a missing item imputation of a (non-blank) value to correct an observed invalid (non-blank) value imputation of a blank value to correct an undue invalid (non-blank) response. <p>The three main cases for the imputation rate are:</p> <p>Un-weighted rate: $w_j = 1$</p> <p>Design-weighted rate: $w_j = d_j$ where basically $d_j = 1/\pi_j$, meaning that the design weight is the inverse of the selection probability.</p> <p>Size-weighted rate: $w_j = d_j x_j$ where x_j is the value of a variable X.</p> <p>The variable X, which is chosen subjectively, shows the size or importance of the units. The value should be known for all units. X is auxiliary information, often available in the frame. Examples are turnover for businesses and population for municipalities.</p> <p>The design weight may in the computation of final estimates be modified to correct for non-response, under-coverage etc. This design weight should be used if the rates are to apply to final estimates, e.g. a size-weighted rate.</p> <p>For the imputation rate all three alternatives are frequently used, see Interpretation below.</p> <p>The design-weighted rate is mainly used for samples surveys, but it may apply also, e.g., for price index processes or processes with multiple data sources. The weight d_j is a “raising” factor when unit j represents more than itself. Otherwise d_j is equal to one. Hence, when dealing with administrative sources the un-weighted and the size-weighted versions of the rate are normally the interesting one.</p>
Target value:	A value equal or close to zero is desirable; imputation indicates missing and invalid values.
Aggregation levels and principles:	<ul style="list-style-type: none"> ▪ MS: The calculation is done for key variables at statistical process level. ▪ EU: Aggregations can be made at the level of EU on the basis of harmonised statistical production processes across Member States, considering this as a single statistical process. Alternatively, Eurostat can report lower and higher imputation rates for a given variable at statistical process level.

Interpretation:	<p>The un-weighted rate shows, for a particular variable, the proportion of units for which a value has been imputed due to the original value being a missing, implausible, or inconsistent value in comparison with the number of units with a value for this variable. Units with imputation of a blank value to correct an undue invalid (non-blank) response (type iii) have to be included in both numerator and denominator.</p> <p>The weighted rate shows, for a particular variable, the relative contribution of imputed values to the estimate of this item/variable. Obviously this weighted indicator is meaningful when the objective of a survey is that of estimating the total amount or the average of a variable. When the objective of the estimation is that of estimating complex indices, the weighted indicator is not meaningful.</p>
Specific guidance:	-
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat). ▪ Statistics Canada Quality Guidelines, Fifth Edition – October 2009

Name:	A6. Common units - proportion
Definition:	The proportion of units covered by both the survey and the administrative sources in relation to the total number of units in the survey.
Applicability :	<p>The proportion is applicable</p> <ul style="list-style-type: none"> – to mixed statistical processes where some variables come from survey data and others from administrative source(s); – to producers and users
Calculation formulae:	$Ad = \frac{\text{No. of common units across survey data and admin. sources}}{\text{No. of unique units in survey data}}$
Target value:	-
Aggregation levels and principles::	-
Interpretation:	<p>The indicator is used when administrative data is combined with survey data in such a way that data on unit level are obtained from both the survey and one or more administrative sources (some variables come from the survey and other variables from the administrative data).</p> <p>The indicator provides an idea of completeness/coverage of the sources – to what extent units exist in both administrative data and survey data.</p> <p>This indicator does not apply if administrative data is used only to produce estimates without being combined with survey data.</p>
Specific guidance:	<p>Common units refer to those units that are included in the data stemming from an administrative source and survey data.</p> <p>For the purpose of this indicator, the “unique units in survey data” in the denominator means that if a unit exists in more than one source it should only be counted once.</p> <p>If only a survey is conducted not for all of the units in the administrative source (e.g. conducting a survey only for larger enterprises), this indicator should be calculated only for the relevant subset.</p> <p>Linking errors should be detected and resolved before this indicator is calculated.</p> <p>If there are few common units due to the design of the statistical output (e.g. a combination of survey and administrative data), this should be explained.</p>
References:	ESSNet use of administrative and accounts data in business statistics, WP6 Quality Indicators when using Administrative Data in Statistical Operations, November 2010.

Name:	A7. Data revision - average size																																										
Definition:	<p>The average over a time period of the revisions of a key indicator. The “revision” is defined as the difference between a later and an earlier estimate of the key item.</p> <p>The number of releases (K) of a key item (number of times it is published) is fixed and specified in the revision policy. Usually, revisions involve a time series: when publishing an estimate of the key indicator referring to time t, it is a common practice to release the revised version of the indicator referring to a set of previous periods.</p> <p>In the following table this situation is illustrated for a revision analysis where the policy has K revisions and n reference periods are included in the analysis.</p> <table><tr><td></td><td colspan="5">Reference periods</td></tr><tr><td>Releases</td><td>1</td><td>...</td><td>t</td><td>...</td><td>n</td></tr><tr><td>1st release</td><td>X_{11}</td><td>...</td><td>X_{1t}</td><td>...</td><td>X_{1n}</td></tr><tr><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td></tr><tr><td>kth release</td><td>X_{k1}</td><td>...</td><td>X_{kt}</td><td>...</td><td>X_{kn}</td></tr><tr><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td></tr><tr><td>Kth and final release</td><td>X_{K1}</td><td>...</td><td>X_{Kt}</td><td>...</td><td>X_{Kn}</td></tr></table> <p>Different indicators can be derived by different ways of averaging the revisions for a time series (revisions can be averaged in absolute value or not, the indicator can be absolute or relative).</p>		Reference periods					Releases	1	...	t	...	n	1 st release	X_{11}	...	X_{1t}	...	X_{1n}	k th release	X_{k1}	...	X_{kt}	...	X_{kn}	K th and final release	X_{K1}	...	X_{Kt}	...	X_{Kn}
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K th and final release	X_{K1}	...	X_{Kt}	...	X_{Kn}																																						
Applicability:	<p>The average size of revisions is applicable:</p> <ul style="list-style-type: none">- to statistical processes where initial and subsequent (revised) estimates are published according to a revision policy (quarterly national accounts, short term statistics);- to users and producers																																										
Calculation formulae:	<p>With the reference to the two-dimensional situation described in the definition there are several strategies to compute indicators: with or without sign, absolute or relative values, for specific pairs of revisions over time or over a sequence of revisions etc. The main suggestion here is to consider an average for a given revision step over a set of n reference periods.</p> <p>MAR (Mean Absolute Revision):</p> $MAR = \frac{1}{n} \sum_{t=1}^n X_{Lt} - X_{Pt} $																																										

	<p>where:</p> <p>X_{L_t} “later” estimate, L^{th} release of the item at time reference t;</p> <p>X_{P_t} “earlier” estimate, P^{th} release of the item at time reference t;</p> <p>n = No. of estimates (reference periods) in the time series taken into account. $n \geq 20$ is recommended for quarterly estimates while $n \geq 30$ is recommended for monthly estimates. The indicator is not recommended for annual estimates.</p> <p>MAR provides an idea of the average size of a given revision step.</p> <p>This indicator can alternatively be expressed in relative terms:</p> <p>RMAR: Relative Mean Absolute Revision</p> $RMAR = \sum_{t=1}^n \left[\frac{ X_{L_t} - X_{P_t} }{ X_{L_t} } \frac{ X_{L_t} }{\sum_{t=1}^n X_{L_t} } \right] = \frac{\sum_{t=1}^n X_{L_t} - X_{P_t} }{\sum_{t=1}^n X_{L_t} }$ <p>In addition – at the level of Eurostat – and where the sign is interesting, there is the mean revision from Release P to Release L over the n reference periods:</p> <p>MR (Mean Revision):</p> $MR = \frac{1}{n} \sum_{t=1}^n (X_{L_t} - X_{P_t})$ <p>Different combinations of P and L can be considered. For instance OECD suggests to compare the following releases:</p> <table><tr><th colspan="2"><u>Monthly data</u></th><th colspan="2"><u>Quarterly data</u></th></tr><tr><th><u>Release L</u></th><th><u>Release P</u></th><th><u>Release L</u></th><th><u>Release P</u></th></tr><tr><td>After 2 Months</td><td>First</td><td>After 5 Months</td><td>First</td></tr><tr><td>After 3 Months</td><td>First</td><td>After 1 Year</td><td>After 5 Months</td></tr><tr><td>After 3 Months</td><td>After 2 Months</td><td>After 1 Year</td><td>First</td></tr><tr><td>After 1 Year</td><td>First</td><td>After 2 Years</td><td>First</td></tr><tr><td>After 2 Years</td><td>First</td><td>Latest available</td><td>First</td></tr><tr><td>Latest available</td><td>First</td><td>After 2 Years</td><td>After 1 Year</td></tr><tr><td>After 2 Years</td><td>After 1 Year</td><td></td><td></td></tr></table>	<u>Monthly data</u>		<u>Quarterly data</u>		<u>Release L</u>	<u>Release P</u>	<u>Release L</u>	<u>Release P</u>	After 2 Months	First	After 5 Months	First	After 3 Months	First	After 1 Year	After 5 Months	After 3 Months	After 2 Months	After 1 Year	First	After 1 Year	First	After 2 Years	First	After 2 Years	First	Latest available	First	Latest available	First	After 2 Years	After 1 Year	After 2 Years	After 1 Year		
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Target value:	-																																				
Aggregation levels and principles:	<ul style="list-style-type: none">MS: the indicator is to be calculated at statistical process level.EU: the indicator is calculated on the revisions made on the EU aggregate/indicator.																																				

Interpretation:	<p>MAR provides an idea of the average size of a given revision step for a key item step over the time.</p> <p>The RMAR indicator normalises the MAR measure using the final estimates. It facilitates international comparisons and comparisons over time periods. When estimating growth rates this measure corrects the MAR for the size of growth and, so, takes account of the fact that revisions might be expected to be larger in periods of high growth than in periods of slow growth.</p> <p>Both MAR and RMAR indicators provide information on the stability of the estimates. They do not provide information on the direction of revisions, since the absolute values of revisions are considered. Such information is provided by MR. A positive sign means upwards revision (underestimation), and a negative sign indicates overestimation in the first case. MR sometimes is referred to as ‘average bias’, but a nonzero MR is not sufficient to establish whether the size of revisions is systematically biased in a given direction. To ascertain the presence of bias it has to be assessed whether MR is statistically different from zero (given no changes in definitions, methodologies, etc.).</p>
Specific guidance:	<p>Either MAR or RMAR should be presented under this indicator. In addition MR could also be calculated at EU-level.</p>
References:	<ul style="list-style-type: none"> ▪ OECD: http://stats.oecd.org/mei/default.asp?rev=1

Name:	T1. Time lag - first results
Definition:	<p><i>General definition:</i> The timeliness of statistical outputs is the length of time between the end of the event or phenomenon they describe and their availability.</p> <p><i>Specific definition:</i> The number of days (or weeks or months) from the last day of the reference period to the day of publication of first results.</p>
Applicability :	<p>This indicator is applicable:</p> <ul style="list-style-type: none"> - to all statistical processes with preliminary data releases; - to users and producers. <p>T1 is not applicable for statistical processes with only one, directly final, set of results/statistics – then only T2 is used.</p>
Calculation formulae:	$T_1 = d_{first} - d_{refp}$ <p>d_{first} ... Release date of first results; d_{refp} ... Last day (date) of the reference period of the statistics</p> <p><i>Measurement units:</i> datum format (calendar days; if the number of days is large, it may be converted into weeks or months) Instead of a period, the reference can also be a time point.</p>
Target value:	The target values usually are fixed by legislation or gentlemen's agreement. Nevertheless, smaller values denote higher timeliness.
Aggregation levels and principles:	The calculation is done, for a meaningful choice, at subject matter domain level. It could refer to the current production round or be an average over a time period. Aggregations are possible at EU and domain (e.g. social statistics, business statistics) level.
Interpretation:	<p>This indicator quantifies the gap between the release date of first results and the date of reference for the data.</p> <p>Comparisons could be made among statistical processes with the same periodicity.</p>
Specific guidance	<p>The reasons for possible long production times should be explained and efforts to improve the situation should be described.</p> <p>For annual statistics or where timeliness is measured in years rather than in days a sentence stating timeliness would be sufficient.</p>
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat).

Name:	T2. Time lag - final results
Definition:	<p><i>General definition:</i> The timeliness of statistical outputs is the length of time between the end of the event or phenomenon they describe and their availability.</p> <p><i>Specific definition:</i> The number of days (or weeks or months) from the last day of the reference period to the day of publication of complete and final results.</p>
Applicability :	<p>This indicator is applicable:</p> <ul style="list-style-type: none"> - to all statistical processes; - to users and producers.
Calculation formulae:	<p>$T_2 = d_{finl} - d_{refp}$</p> <p>$d_{finl}$... Release date of final results ; d_{refp} ... Last day (date) of the reference period of the statistics</p> <p><i>Measurement units:</i> datum format (calendar days; if the number of days is large, it may be converted into weeks or months) Instead of a period, the reference can also be a time point.</p>
Target value:	<p>The target values usually are fixed by legislation or gentlemen's agreement. Nevertheless, smaller values denote higher timeliness.</p>
Aggregation levels and principles:	<p>The calculation is done, for a meaningful choice, at subject matter domain level. It could refer to the current production round or be an average over a time period. Aggregations are possible at EU and domain (e.g. social statistics, business statistics) level.</p>
Interpretation:	<p>This indicator quantifies the gap between the release date of the final results and the end of the reference period. Comparisons could be made among statistical processes with the same periodicity</p>
Specific guidance	<p>The reasons for possible long production times should be explained and efforts to improve the situation should be described. To be further defined by subject matter domain, taking the revisions' policy into account, what could be considered by "final results". For annual statistics or where timeliness is measured in years rather than in days a sentence stating timeliness would be sufficient.</p>
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat).

Name:	T3. Punctuality - delivery and publication
Definition:	Punctuality is the time lag between the delivery/release date of data and the target date for delivery/release as agreed for delivery or announced in an official release calendar, laid down by Regulations or previously agreed among partners.
Applicability :	<p>The punctuality of publication is applicable:</p> <ul style="list-style-type: none"> - to all statistical processes with fixed/pre-announced release dates, - to users and producers (different aspects and formulas) <p>Computed only by Eurostat but recommended also for inclusion in national quality reports.</p>
Calculation formulae:	<p><u>For producers:</u></p> <p>Punctuality of data delivery P3</p> $P_3 = d_{act} - d_{sch}$ <p>d_{act} .. Actual date of the effective provision of the statistics d_{sch}... Scheduled date of the effective provision of the statistics</p> <p><i>Measurement units:</i> datum format (calendar days)</p> <p><u>For users:</u></p> <p>Rate of punctuality of data publication P3_R Relevant for a group of statistics/results</p> <p><u>P3_R</u> is the rate of datasets that have met the release calendar date in a group of datasets.</p> $P_{3R} = \frac{m_{pc}}{m_{pc} + m_{up}}$ <p>m_{pc}... Number of statistics/results that have been published on the date announced in the calendar or have been released earlier (punctual) m_{up}... Number of statistics/results that have not met the date announced in the calendar (unpunctual)</p>
Target value:	<p>The target value for P3 is 0 meaning that there is no delay on the delivery/transmission of data.</p> <p>For P3_R the target value is 1 meaning that 100% of the items were published on the pre-fixed calendar date.</p>
Aggregation levels and principles:	<p>There are two aspects:</p> <ul style="list-style-type: none"> - National data deliveries to Eurostat (producer-oriented), - Publication/release by Eurostat (user oriented),

	The calculation is done at statistical process level. Aggregations are to be made at EU-level over countries and over domains.
Interpretation:	<p>The indicator Punctuality of data delivery quantifies the difference (time lag) between actual and target date. This should be interpreted according to the periodicity of the statistical process.</p> <p>The indicator Rate of punctuality of release ($P3_R$) evaluates the punctuality of release of a group of particular datasets.</p>
Specific guidance	<p><u>For producers:</u> For compliance monitoring purposes Eurostat domain managers should monitor this indicator for individual countries. This information can be pre-filled by Eurostat as it is known when data are received from the MS. Formula P3 should be applied in this case. This indicator can be presented in table format for the different MS. The reasons for late or non-punctual delivery should be stated along with their effect on the statistical product, meaning that because of late data deliveries the quality assurance procedures for the whole product/series might not be completed.</p> <p><u>For users:</u> Enough to compile this indicator as an aggregate at ESTAT level. Formula $P3_R$ should be applied in this case. Some explanations should be given to users concerning non-punctual publication.</p>
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat).

Name:	AC1. Metadata - consultations¹
Definition:	<p>Number of metadata consultations (ESMS) within a statistical domain for a given time period.</p> <p>By "number of consultations" it is meant the number of times a metadata file is viewed.</p> <p>Some information is available through the monthly Monitoring report on Eurostat Electronic Dissemination and its excel files with detailed figures.</p>
Applicability	<p>This indicator is applicable:</p> <ul style="list-style-type: none"> - to all statistical processes; - to producers (Eurostat domain managers) and users <p>Computed only by Eurostat.</p>
Calculation formulae:	<p>$AC1 = \#ESMS$</p> <p>where $\#ESMS$ denotes the absolute number of elements in the set ESMS (this is also called cardinality of the set). In this case the set ESMS represents the ESMS files consulted for a specific subject-matter domain for a given time period.</p> <p>Remark: internal page views will be excluded.</p>
Target value:	There is no immediate interpretation of low and high values of this indicator, and there is no particular target.
Aggregation levels and principles:	<p>The calculation is done at statistical process level. Aggregation is possible at the following levels:</p> <ul style="list-style-type: none"> ▪ Domains specific ESMS files. ▪ Annual aggregation. <p>The principle is to calculate the number of consultations of ESMS files by subject matter domains.</p>
Interpretation:	<p>The indicator contributes to the assessment of users' demand of metadata (level of interest), for the assessment of the relevance of subject-matter domains.</p> <p>A ratio can be computed to give insight to the proportion of consultation of the ESMS files in question in comparison to the total number of consultations for all the domains.</p>
Specific guidance	<p>An informative and straightforward way to represent the output of this indicator is by plotting the figures over time in a graph. In particular, it would be a graph where the horizontal (x) axis would represent months and the vertical (y) axis would represent the number of ESMS files consulted. It would be possible to monitor the interest of users for each ESMS file at the domain specific level.</p> <p>A graph of both the number of consultations of data tables (indicator AC2) and metadata (ESMS) files with a correspondence, with the</p>

¹ The indicator must be collected in collaboration with Unit D4 - Dissemination.

	appropriate tuning, would be interesting to display, over time.
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat).

Name:	AC2. Data tables – consultations ²
Definition:	<p>Number of consultations of data tables within a statistical domain for a given time period.</p> <p>By "number of consultations" it is meant number of data tables views, where multiples views in a single session count only once. Some information available through the monthly Monitoring report on Eurostat Electronic Dissemination and its excel files with detailed figures.</p>
Applicability:	<p>The number of consultations of data tables is applicable:</p> <ul style="list-style-type: none"> - to all statistical processes using on-line data tables for dissemination of statistics; - to producers (Eurostat domain managers) and users <p>Computed only by Eurostat but recommended also for inclusion in national quality reports.</p>
Calculation formulae:	<p>$AC2 = \#CONS$</p> <p>where $\#CONS$ denotes the absolute number of elements in the set CONS (this is also called cardinality of the set). In this case CONS represents the consultations of a data table for specific subject-matter domain.</p> <p>The frequency of collection of the figures for this indicator should be monthly.</p> <p>Remark: internal page views will be excluded.</p>
Target value:	There is no immediate interpretation of low and high values of this indicator, and there is no particular target.
Aggregation levels and principles:	<p>The calculation is done at statistical process level. Aggregation is possible at the following level:</p> <ul style="list-style-type: none"> ▪ Domains specific data tables. ▪ Annual aggregation. <p>The principle is to calculate the number of consultations of data tables by subject matter.</p>
Interpretation:	<p>This indicator should be carefully analysed and combined with other information that will complement the analysis.</p> <p>The indicator contributes to the assessment of users' demand of data (level of interest), for the assessment of the relevance of subject-matter domains.</p> <p>A ratio can be computed to give insight to the proportion of consultation of the ESMS files in question in comparison to the total number of consultations for all the domains.</p>
Specific guidance:	<p>An informative and straightforward way to represent the output of this indicator is by plotting the figures over time in a graph. In particular, it would be a graph where the horizontal (x) axis would represent months and the vertical (y) axis would represent the number of datasets consulted. It would be possible to monitor the</p>

² The indicator must be collected in collaboration with Unit D4 - Dissemination.

	<p>interest of users for each dataset at the domain specific level.</p> <p>A graph of both the number of consultations of data tables and ESMS files (AC1), with the appropriate tuning, would be interesting to display.</p>
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat).

Name:	AC3. Metadata completeness - rate³
Definition:	The ratio of the number of metadata elements provided to the total number of metadata elements applicable.
Applicability:	<p>The rate of completeness of metadata is applicable:</p> <ul style="list-style-type: none"> - to all statistical processes; - to producers (Eurostat domain managers) and users; <p>Computed only by Eurostat but recommended also for inclusion in national quality reports.</p>
Calculation formulae:	$AC\ 3_c = \frac{\sum \# M_L}{\sum \# L}$ <p><i>L</i> in the denominator is the set of <u>applicable</u> metadata elements under consideration and <i>M_L</i> in the numerator is the subset of <i>L</i> of <u>available</u> metadata elements. The notation <i>#L</i> means the number of elements in the set <i>L</i> (the cardinality). Letter C in the left-hand side of the formula stands for both EU and EFTA countries.</p> <p>The set <i>L</i> is obtained by calculation for a group of metadata elements as explained below over a geographical entity (MS or the EU+EFTA), a statistical domain, etc.</p> <p>There are three groups of metadata, described below together with a categorisation using the current EURO-SDMX concepts (only the main concepts are included in the following breakdown).</p> <ol style="list-style-type: none"> 1. Metadata about statistical outputs; concepts 3, 4, 5, 8.1, 9, 10; 2. Metadata about statistical processes; concepts 11, 20.1, 20.2, 20.3, 20.4, 20.5, 20.6; 3. Metadata about quality: concepts 12-19 <p>Computations are made separately for each of the three groups and for each of the combinations (group of metadata, EU level, etc.)</p>
Target value:	The target value is 1 meaning that 100% of metadata is available from what is required/applicable to the statistical process, or aggregate, in question.
Aggregation levels and principles:	<p>The calculation is done at the level of ESMS files. Aggregations are possible at MS, EU, and Domain (e.g. social statistics, business statistics) level.</p> <p>The principle is to calculate the indicators as an un-weighted rate at the level of MS and EU for a statistical domain (social statistics,</p>

³ Check with B6 if this can be calculated centrally

	business statistics etc.).
Interpretation:	<p>Each indicator shows to what extent metadata of a specific type is available compared to what should be available.</p> <p>This indicator should be carefully analysed since this rate only reflects the existing amount of metadata for a certain statistical process but not the quality of that information.</p>
Specific guidance:	<p>All the information is to be retrieved from ESMS files.</p> <p>In case the ESMS is empty for the different categories specified previously no calculation is needed but a descriptive text should be replaced.</p> <p>Concerning Eurostat, it is possible to have direct access to those files through Eurostat's website whereas for MS it will be possible to have access to ESMS files, in the near future, through the National RME tool.</p> <p>It should be taken into account what availability of metadata actually means.</p>
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat). ▪ Euro SDMX Metadata Structure, version March 2009.

Name:	CC1. Length of comparable time series
Definition:	<p>Number of reference periods in time series from last break.</p> <p><i>Comment</i></p> <p>Breaks in statistical time series may occur when there is a change in the definition of the parameter to be estimated (e.g. variable or population) or the methodology used for the estimation. Sometimes a break can be prevented, e.g. by linking.</p>
Applicability:	<p>The length of comparable time series is applicable:</p> <ul style="list-style-type: none"> - to all statistical processes producing time-series; - to users and producers <p>Computed only by Eurostat but recommended also for inclusion in national quality reports.</p>
Calculation formula:	<p>The reference periods are numbered.</p> $CC_1 = J_{last} - J_{first} + 1$ <p>J_{last} ... number of the last reference period with disseminated statistics.</p> <p>J_{first} ... number of the first reference period with comparable statistics.</p>
Target value:	A long time series may seem desirable, but it may be motivated to make changes, e.g. since reality motivates new concepts or to achieve coherence with other statistics.
Aggregation levels and principles:	<p>The calculation is done at statistical process level. Aggregations are possible at MS, EU, and Domain (e.g. social statistics, business statistics) level.</p> <p>The indicator for the EU or domain level should be calculated by Eurostat considering the time series of the EU aggregate.</p>
Interpretation:	If there has not been any break, the indicator is equal to the number of the time points in the time series.
Specific guidance:	<p>The length of the series with comparable statistics is expressed as the number of time periods (points) in this series. It is counted from the first time period with statistics after the break onwards. The result does not depend on the length of the reference period.</p> <p>Only applicable for the statistical data disseminated in the sequence of regular time periods (points).</p> <p>If more than one series exist for one statistical process the domain manager should select the appropriate ones for calculation.</p>
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat).

Name:	CC2. Asymmetry for mirror flows statistics - coefficient
Definition:	<p><i>General definition:</i> Discrepancies between data related to flows, e.g. for pairs of countries.</p> <p><i>Specific definition (a few versions are provided)</i> <i>Bilateral mirror statistics:</i> The difference or the absolute difference of inbound and outbound flows between a pair of countries divided by the average of these two values.</p> <p><i>Comment</i> Outbound and inbound flows should be considered to be any kind of flows specific to each subject matter domain (amounts of products traded, number of people visiting a country for tourism purposes, etc.)</p>
Applicability :	<p>The asymmetries for statistics mirror flows is applicable:</p> <ul style="list-style-type: none"> - to domains in which mirror statistics (flows concerning trade, migration, tourism statistics, FATS, balance of payment etc) are available - to users (to be discussed) and producers <p>Computed by Eurostat (pre-filled in quality report)</p>
Calculation formulae:	<p><u>Bilateral mirror statistics:</u> For each pair of countries, suppose: A – Country A B – Country B</p> $CC2A_B = \frac{OF_{AB} - mIF_{AB}}{OF_{AB} + mIF_{AB}} \cdot \frac{2}{2}$ $CC2B_A = \frac{OF_{BA} - mIF_{BA}}{OF_{BA} + mIF_{BA}} \cdot \frac{2}{2}$ <p>A joint measure can be obtained from the two differences in relation to an average flow (several possibilities, one is given below):</p> $CC2_{AB} = \frac{\frac{ OF_{AB} - mIF_{AB} }{OF_{AB} + mIF_{AB}} + \frac{ OF_{BA} - mIF_{BA} }{OF_{BA} + mIF_{BA}}}{2}$ <p>OF_{AB} - outbound flow going from country A to country B m IF_{AB} - mirror inbound flow IF_{BA} - mirror inbound flow to country B from country A m OF_{AB} - mirror outbound flow</p> <p><u>Multilateral mirror statistics:</u></p> <p>OF_{AiOj} - outbound flow going from country A_i to any other country O_j mIF_{AiOj} - mirror inbound flow</p>

	<p> <i>A_i</i> – country <i>A_i</i> <i>O_j</i> – Another country <i>O_j</i> <i>K</i> – the number of countries country <i>A_i</i> may have contacts with <i>C</i> – group of countries EU + EFTA </p> $CC2_c = \frac{\sum_{i=1}^C \sum_{j=1}^K OF_{AiOj} - mIF_{AiOj} }{\sum_{i=1}^C \sum_{j=1}^K \frac{OF_{AiOj} + mIF_{AiOj}}{2}}$
Target value:	<p>The value of this indicator should be as close to zero as possible, since – at least in theory – the value of inbound and outbound flows between pairs of countries should match.</p>
Aggregation levels and principles:	<ul style="list-style-type: none"> ▪ MS: The calculation is done for key variables/sub-series to be selected by the Eurostat domain manager. ▪ EU: Aggregations are possible at EU-level (see multilateral mirror statistics formulae). Alternatively, where e.g. not all information is available, lower and higher values of bilateral mirror statistics can be reported to indicate the range.
Interpretation:	<p>In domains where mirror statistics are available it is possible to assess geographical comparability measuring the discrepancies between inbound and outbound flows for pairs of countries.</p> <p>Mirror data can help checking the consistency of data reporting, of data, of the reporting process and the definitions used. Finally, they can help to estimate missing data. For the users the asymmetries indicators provide some indication of overall data credibility.</p> <p>There is perfect symmetry (outbound flows are equal to mirror inbound flows) when the coefficient is equal to zero. The more the coefficient diverges from zero, the more the asymmetry between outbound flows and mirror inbound flows becomes important.</p>
Specific guidance:	<p>CC2A_B and CC2B_A indicators can be negative or positive. Indicator CC2AB is always non-negative.</p> <p>Outbound flows from Member State A to Member State B, as reported by A, should be almost equal to inbound flows into B coming from A, as reported by B. Because some domains use a different valuation principle, inbound flows can be slightly different from outbound flows. Therefore comparisons dealing with mirror statistics have to be made cautiously and should take into account the existence of these discrepancies.</p> <p>The asymmetry coefficient CC2AB is useful because it can be monitored over time.</p> <p>Indicators CC2A_B and CC2B_A can be either positive or negative and can be used to estimate if a country is globally declaring higher or lower level of flows compared with the mirror flows declared by its partner countries.</p> <p>Indicators CC2A_B and CC2B_A should be presented in a table (example foreign trade statistics).</p>
References:	<ul style="list-style-type: none"> ▪ ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ▪ ESS Standard for Quality Reports – 2009 Edition (Eurostat).

	<ul style="list-style-type: none"> ▪ International trade in services statistics - Monitoring progress on implementation of the Manual and assessing data quality – OECD Eurostat Trade in services experts meeting 2005.
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