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**ESSnet on Consistency of  
Concepts and Applied Methods  
of Business and Trade Statistics.  
Work Package 3 (WP3):  
Characteristics and  
Definitions. Main Results and  
Countries Comparisons**

*Roberto Gismondi, Fabiana Rocci*



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Word Package 3 (WP3): Characteristics and Definitions. Main results and Countries  
Comparisons.**

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# ESSnet on Consistency of Concepts and Applied Methods of Business and Trade Statistics. Work Package 3 (WP3): Characteristics and Definitions. Main Results and Countries Comparisons

Roberto Gismondi, Fabiana Rocci

## Sommario

*L'ISTAT ha preso parte, tra il 2011 ed il 2013, al progetto europeo ESSnet Consistency. Il progetto si è articolato in 3 Work Packages (WPs), finalizzati ad approfondire diversi aspetti connessi ai rischi di non perfetta comparabilità tra i principali indicatori statistici a carattere economico prodotti correntemente dagli istituti nazionali di statistica. In questo contesto sono presentati e commentati i principali risultati ottenuti nel WP3, riferito all'analisi delle possibili inconsistenze derivate da problemi definatori relativi a 17 indicatori, 9 di carattere economico e 8 inerenti al mercato del lavoro. Le inconsistenze sono state valutate sulla base di un questionario compilato da esperti di 32 stati europei, in cui il concetto di inconsistenza è stato sviluppato secondo due profili: l'inconsistenza "verticale" (divergenza tra definizione teorica di un indicatore e l'indicatore effettivamente calcolato) e quella "orizzontale" (divergenza tra le diverse definizioni sulla cui base lo stesso indicatore è calcolato e diffuso da fonti statistiche diverse). Elaborazioni originali hanno riguardato le modalità di presentazione dei risultati ed elaborazioni specifiche per particolari raggruppamenti di stati.*

**Parole chiave:** Comparabilità, Consistenza, Criteri di valutazione, Definizioni, Statistica ufficiale, Unione Europea

## Abstract

*ISTAT took part to the European Project ESSnet Consistency, developed between 2011 and 2013. It was articulated into 3 Work Packages (WPs), aimed at analyzing risks of not perfect comparability among the main statistical economic indicators currently produced by national statistical institutes. In this framework, the main WP3 results are presented and commented: they concern the analysis of potential inconsistencies due to definition problems related to 17 characteristics, 9 economic and 8 related to labour market. Inconsistencies have been evaluated on the basis of a questionnaire filled in by experts from 32 European countries. The inconsistency concept has been split into two profiles: "vertical" inconsistency (difference between theoretical definition of characteristics and how they are calculated in practice) and "horizontal" inconsistency (divergence between different definitions on the basis of which the same characteristic is calculated by different statistical sources). Original elaborations concern the presentation of main results and specific elaborations carried out for particular subgroups of countries.*

**Keywords:** Comparability, Consistency, Definitions, European Union, Evaluation Criteria, Official Statistics.

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### 1. Foreword

The MEETS programme is aimed at the Modernisation of European Enterprise and Trade Statistics (Decision No 1297/2008/EC of the European Parliament and the Council of 16 December 2008). The ESSnet about consistency falls under objective 2 of the MEETS-programme, which aims at the "achievement of a streamlined framework for business-related statistics". Action 2.1 foresees the "integration of concepts and methods within the legal framework".

The European Statistical System has gradually evolved over the past decades, with a considerable increase in content and coverage taking place in the past 10 -15 years. This has been accompanied by a similar increase in European statistical legislation where the requirements of the single statistical domains are defined as well as the duties of the Member States in order to provide the respective data. It is thus not surprising that concepts, definitions and methodologies as well as practices vary to some degree over the different statistical domains. This leads to a situation where the statistical outputs of these various domains cannot be compared because the application of definitions, concepts and methodologies is partially or even totally different. This can result in a lack of (full) "coherence".

Further problems can be represented by the implementation by the Member States, that can result in lack of consistency towards the Legal Act requirements or towards the related domains. This is especially the case when the data requirements are not fully specified or are ambiguous, and the Member States have a certain degree of freedom about the concepts or definitions they might use. This can also be observed in cases where the European concepts are less or insufficiently elaborated and are not based on given and agreed standards.

The aim of the overall ESSnet Consistency was to study specific aspects of consistency and/or coherency in related domains of statistics on 'business and trade-related statistics', each of those driven by a set of European legal acts. Identifying related domains means that we are dealing with statistics which already exist as European statistics with a legal basis of their own, for which it should be possible to combine the results because they have the same object or they use a similar terminology.

Consistency is a multi-dimensional concept related to the comparison between data from different sources with many aspects. In this view, the different work packages of the ESSnet Consistency

have analyzed several aspects of consistency and its determinants:

- same statistical unit (analyzed in WP1);
- same target population (analyzed in WP2);
- same survey frame (analyzed in WP2);
- same classification(s) and comparable aggregation levels (analyzed in WP2);
- same (or comparable) reference period(s) (analyzed in WP2);
- same (or comparable) characteristics and definitions (analyzed in WP3).

ISTAT was one of the eight EU countries which took part to the EU Project “ESSnet Consistency” - Work Package 3 (WP3): characteristics and definitions, started in March 2012 and ended in December 2013<sup>1</sup>.

As a matter of fact, the specific goal of WP3 was the elaboration of proposals aimed at reducing inconsistencies regarding characteristics and their definitions within the area of business and trade-related statistics. The WP3 moved from all the previous deliverables of WPs and from the proposals from the ESSnet on the use of Administrative and Accounts Data for Business Statistics (ESSnet Admin Data<sup>2</sup>), in particular Work Package 7 on Statistics and Accounting standards.

Its purpose was the identification and evaluation of inconsistencies in the definition and characteristics of variables across different statistical areas and in different Member States. Furthermore, proposals of necessary adjustments have been made on the basis of the assessment of the results of the identification and evaluation phase.

The first step of the project was to investigate the ‘as-is’ situation which involved an examination of the regulations and manuals which refer to common characteristics. This had been undertaken in the Interim Inventory Report (ESSnet Consistency WP3, 2012), which reviewed an external study (Eurostat, 2010) that collated legal requirements in need of review.

It has been decided to take Structural Business Statistics (SBS) as the “core” of the system of business and trade-related statistics. SBS variables of common module (Annex 1 of the SBS Regulation<sup>3</sup>) have been further analyzed and looked upon as the “Core Variables” and they were taken as a reference point for the work of WP3.

Afterwards, the project pointed out at measuring across the member states the presence of inconsistencies. To this aim, a comprehensive and detailed questionnaire has been designed and surveyed among the 32 countries<sup>4</sup>, that has focused on how each domain applied the correspondent regulation. It has been surveyed whether there were any inconsistencies in applying what required by the legal acts, in the case of declared inconsistencies it has also been asked which was the kind and the reason of. The questionnaire’s data have been uploaded into a dedicated database, which allowed the evaluation and assessment phase of the project to begin.

Evaluation criteria were set up in order to resume the main questionnaire’s results, to point out most common inconsistencies, to analyze their features in terms of kind and reasons, and hence to identify possible areas of intervention to find a common solution. The analysis has been based on the definition of the variable/characteristics, i.e. the name, constituents and methods.

Other activities were undertaken, as study visit to the Netherlands (finding best practices), a comparison on commodity *vs* activity oriented domains and an evaluation of the recommendations from ESSnet Admin Data project on economic variables. Furthermore, an inventory of the National Accounts needs, as main user of business statistics, was made and proposed adjustments to the WP3 variables/characteristics to fulfil ESA requirements were elaborated.

In this view, it is worthwhile to resume the breakdown of working days spent during the project by task and by country, as detailed in the following table 1.

<sup>1</sup> The other seven countries were Sweden (Project leader), Germany, Ireland, Estonia, Slovenia, Greece and Switzerland.

<sup>2</sup> [Http://essnet.admindata.eu/](http://essnet.admindata.eu/).

<sup>3</sup> European Union, 2008.

<sup>4</sup> All the 28 EU countries plus Iceland, Norway, Switzerland and Turkey.

**Table 1: Number of project working days by task and country**

<i>Work package</i> <i>Participants/co-beneficiaries</i>	Task 1 Project ma- nagement	Task 2 Core economic variables	Task 3 Em- ployment variables	Task 4 Dissemina- tion	TOTAL per partner
Statistics Sweden (SCB)	150	100	150	30	430
Statistics Estonia (SE)					200
Statistisches Bundesamt (DESTATIS)		560		30	590
Hellenic Statistical Authority (ELSTAT)		50	50		100
Central Statistical Office (CSO)			150		150
Statistical Office Republic Slovenia (SORS)		189	65		254
Swiss Federal Statistical Office			250		250
Italian National Statistical Institute (ISTAT)	10	110	50	10	180
<b>TOTAL</b>	<b>160</b>	<b>1.009</b>	<b>715</b>	<b>70</b>	<b>2.154</b>

This paper resumes the main WP3 results, through the selection of a subset of statistical tables derived from the above mentioned database, further *ad hoc* elaborations and the additional break-down of main outcomes by groups of countries<sup>5</sup>, as commented in section.

Section 2 specifies the field of analysis and section 3 the main concepts adopted as regards kind and reasons of inconsistency; section 4 deals with the questionnaire, while section 5 describes the evaluation criteria adopted for analyzing the questionnaire's results (task managed by Italy). The main results as regards both vertical and horizontal inconsistencies have been resumed in section 6. An overall strategy for improving consistency taking into account the WP3 outcomes has been dealt with in section 7, while some perspective conclusions have been drawn in section 8.

## 2. Field of analysis: domains and variables

Related domains can be defined as areas of statistics which either refer to the same target population, to the same kinds of statistical units but which have a different analytical orientation (the same 'object' but a different aim), use the same (or related) characteristics in a different context, or refer to different domains (the same terminology in different legal acts).

Within the 'related domains' coherency and consistency play an important role because they are essential for combining the results of different statistical sources in a meaningful manner. The combination of statistical results of related domains is possible because they use the same or 'related' characteristics.

The External Study (ES; Eurostat. 2010)) analyzed more than 160 legal acts or manuals, to provide an inventory of the legal requirements and methodologies in business and trade statistics with particular focus on cross-cutting issues. Hence, the WP3 inventory report started focusing on the legal aspects where consistency or inconsistency is determined or allowed because of differences or deficits in the definition of characteristics in the legal texts, according to different perspectives:

- the user needs: which variables should be comparable, under which circumstances it is possible and under which it is not. In the latter case, it was to be evaluated how important it was and whether it was possible to redefine characteristics, definitions and observation units to improve comparability;
- the production process of statistics: which definitions have to be checked, whether variables with the same designation were really comparable or whether they were only seemingly comparable. In this case either terminology should be changed or characteristics should be redefined if comparability plays an important role.

<sup>5</sup> Confidentiality reasons led to the decision to not analyze single countries data.



In the later stage, the project moved to a second source of inconsistencies or incoherencies, namely the implementation of the delivery program in the national statistical systems of the Member States. From the analytical orientation, the main distinction has been done between:

- short term (or business cycle) analysis with a periodicity of less than one year;
- structural analysis with a periodicity of one or more years.

The first should deliver comparable indicators about the present state of the market economy in the business cycle; the second should give comparable information about the basic economic structures in the Member States and in the EU. Coherence under this perspective means that both pictures should fit together using similar characteristics to describe the economy.

The Structural Business Statistics (SBS) could be looked upon as the 'core' of the system of business and trade-related statistics. They play a central role in assessing the structural development of the economy, gathering annually and in longer time intervals a detailed overview over important business characteristics in the different domains.

The Foreign Affiliates Statistics (FATS) serve the goal to give a view on the economic performance of statistical units which are dependent from abroad, to present figures about globalization. Turnover, value added, employment and investment of this special group of enterprises deserved special attention. Therefore FATS could be looked upon as an evaluation for a special sub-population of SBS.

The Short Term Statistics (STS) contain indicators for the current short run development of the economy and present essential information for business cycle analysis. In principle, they look at the same object as the SBS do, but according to different analytical purposes. Therefore a relation between both statistical domains should be existent but coherence requirements between both domains are difficult to define, because in SBS the focus is on absolute figures while STS focuses on change rates and indicators.

The National Accounts and Balance of Payments Statistics are internal users of statistical results and their aim is to draw consistent picture of the whole economy. It would have been advantageous if the results of both domains were consistent with each other.

As a result of the arguments mentioned above, a set of characteristics and a set of domains have been established to be relevant for analyzing the inconsistencies and their sources.

Economic Core Characteristics were<sup>6</sup>:

- 11110 Number of enterprises
- 11210 Number of local units
- 12110 Turnover
- 12120 Production Value
- 12150 Value added at factor cost
- 12170 Gross operating surplus
- 13110 Total purchases of goods and services
- 13120 Purchases of goods and services purchased for resale in the same condition as received
- 15110 Gross investment in tangible goods.

Core Employment Characteristics were:

- 13130 Payment of agency workers
- 13310 Personnel costs
- 13320 Wages and salaries
- 13330 Social security costs
- 16110 Number of persons employed

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<sup>6</sup> The numbers before the characteristics definitions are specific codes as derived by European Union (2009).

- 16130 Number of employees
- 16140 Number of employees in full-time equivalent units
- 16150 Numbers of hours worked by employees.

The different statistical domains which may produce the previous characteristics included in the analysis were:

- Structural Business Statistics (SBS)
- Short Term Statistics (STS)
- Inward FATS (FATS\_INW)
- Outward FATS (FATS\_OUTW)
- Community Innovation Survey (CIS)
- Research & Development (R\_D)
- Labour Force Survey (LFS)
- Labour Cost Survey/Structure of Earnings (SES\_LCS)
- Labour Cost Index (LCI)
- Information and Communication Technology (ICT).

Basically, the knowledge advancements on consistency achieved by the WP3 have been obtained analyzing the degree of consistency regarding the previous characteristics, as they are currently produced in one or more among the statistical domains above.

### 3. Inconsistencies: definitions, causes and reasons

Consistency is mentioned as a target in the European Statistics Code of Practice<sup>7</sup> to which the NSIs are obliged within the European Statistical System (ESS). Principle 14 of the European Statistics Code of Practice states that “European Statistics are consistent internally, over time and comparable between regions and countries; it should be possible to combine and make joint use of related data from different sources”.

Consistency is one of the quality standards for official statistics in the ESS. “The need for coherent treatment of data collected in different statistical projects is explicitly stressed in Regulation (EC) No 223/2009 of the European Parliament and of the Council of 11 March 2009 on European Statistics. Article 12 addresses the issues of ‘**comparability**’ and ‘**coherence**’ as key quality criteria which have to be met when developing, producing and disseminating European Statistics”<sup>8</sup>.

According to this article the statistical output should serve users’ needs and comply with the following quality standards:

- Relevance
- Timeliness and Punctuality
- **Coherence and Comparability**
- Accessibility and Clarity

So besides ‘consistency’ in the European Code of Practice the terms “coherence and comparability” are used.

Although the ESSnet has the title “*Consistency of concepts and applied methods of business and trade-related statistics*” unfortunately “consistency” and its relation to the terms “coherence”, “compatibility” and “comparability” is not always clear. It was however useful that all three work

<sup>7</sup> Eurostat. 2011.

<sup>8</sup> Eurostat. 2010, p.7.

packages used the terminology in the same manner and have the same understanding of the terminology. Therefore the meaning of the different terms should be clarified. The ES states that:

*“In the context of the analysis the terms ‘inconsistency’ and ‘incompatibility’ always refer to a violation of the principle of coherence - that is to the comparability of results across statistical areas.”<sup>9</sup>*

*“Whereas comparability refers to the measurement of the impact of differences in applied statistical concepts, measurement tools and procedures where statistics are compared between geographical areas, sector domains or over time, coherence describes the adequacy of the data to be reliably combined in different ways and for various uses”.<sup>10</sup>*

Hence, coherence seems to be the most important term in the context of WP3. The most obvious obstacle to consistency and coherence are different characteristics and/or differences in the definitions of the characteristics in related areas of business and trade-related statistics.

As a starting point, concerning the issue of consistency two dimensions must first be differentiated (according to the same terminology used in WP2):

- *Vertical consistency* is addressed to the issue of comparability between the sum of MS data and the European aggregate. Concepts developed for the national implementation may not be suited to derive the consistent European aggregate on such MS data. This may occur in statistical domains where the statistical objects are of cross-border nature. The issue of vertical consistency must be assessed for each single country first, as it is a “one to one” relation between every specific characteristic and the concerned definition supplied in the specific EU Regulation, which rules out the production of such characteristic. As a consequence, the same National Statistical Institute may declare vertical inconsistency for turnover in STS but not in SBS, or vice versa, or for both domains, or for none.
- *Horizontal consistency* refers to the comparability among the same characteristic as it is produced by different statistical domains. Data between statistical domains can be compared if they are elaborated using the same statistical unit, the same coverage, the same classifications, the same definitions, the same frame and the same reference time and period. This is also valid as it concerns the relationship between monthly or quarterly data and the respective annual data. The issue of horizontal consistency is a “one to many” relation between the specific characteristic dealt with (for instance, turnover in STS) and the same characteristic as produced in all the other domains concerned (turnover as produced in SBS, or in Research and Development, etc.). Let’s note that for any National Statistical Institute, a certain characteristic may be produced in the frame of  $k$  different domains (in the WP3 context  $k=1, 2, \dots, 10$ ) with no vertical inconsistency (the characteristic is produced in full compliance with the related EU definition ruling the specific domains where it is produced), but at the same time there may be several horizontal inconsistencies if the different EU regulations applied in different domains use different definitions for the same characteristic.

Next, for both types of inconsistencies (vertical and horizontal), it has been asked to indicate the kind of inconsistency observed, i.e. which factors may have produced differences between the definition according to which the data have been delivered with comparison to the legal definition<sup>11</sup>.

<sup>9</sup> Eurostat. 2010, p.13.

<sup>10</sup> Eurostat. 2010, p.258.

<sup>11</sup> Some kinds (reference time and period, coverage, observation unit) concern the reference domains covered by WP1 and WP2, they have been asked in the WP3 questionnaire deliberately, since the WPs must be intended strictly close to each other in order to take into account their potential influence on different inconsistencies.

### Kinds<sup>12</sup>

- 1) Reference time and period
- 2) Coverage
- 3) Observation unit
- 4) Name
- 5) Use of proxy
- 6) Measurement concept
- 7) Properties included: more
- 8) Properties included: less
- 9) Properties excluded: more
- 10) Properties excluded: less

For both inconsistencies (horizontal and vertical), reasons for inconsistencies have been resumed into the following list of reasons.

### Reasons

- 1) Historically grown statistics
- 2) EU legislation not consistent/unclear
- 3) Timeliness of data collection
- 4) Limited data availability
- 5) Multipurpose data collection
- 6) Reduction of external burden
- 7) Reduction of internal production costs
- 8) Lack of/limited availability of metadata
- 9) National information requirements
- 10) Use of different methods/concepts
- 11) Translation issue.

When analyzing inconsistencies of characteristics and their definitions, it is important to distinguish between two causes of differences:

- differences which occurred less consciously due to a lack in coordination (as a result of the stove-pipes in the ESS);
- differences which are taken into account deliberately due to special analytical objectives and particular user needs on the output and input side (e.g. use of administrative data).

Although it might not always be easy to distinguish between these reasons in practice, it is important to think about the reasons for existing inconsistencies in the evaluation process. Inconsistencies of the first cause are only influenced by the MS and Eurostat itself and should be removed. Those of the second cause cannot be avoided completely to keep relevance of the data and to reduce burden and costs, but they do need to be minimized where possible.

## **4. The questionnaire**

In the framework of the WP3, the MS have been asked to fill a questionnaire, through a proper Excel file. The questionnaire has been designed to be interactive and easy to be filled in. It was ad-

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<sup>12</sup> In particular: "4) Name" We mean that the national translation may introduce some discrepancies with respect to the original English wording (deliberately or not). "6) Measurement concepts" means that measurement tools, units, or procedures used differ across the statistical domains or from what is advocated by Eurostat."7) Properties included: more" must be marked whenever the output definition of the variable you are investigating mentions elements that are not cited in the compared definition. "8) Properties included: less" the compared definition mentions elements not cited in the output definition.

vised that each domain should have been completed by the relevant MS expert, in consultation with national experts for the domains concerned.

The questionnaire included three types of sheets: the first aimed at collecting information about each characteristic and domains where it was produced; the second provided the contact information (responsible for each characteristic) and the third concerned specific questions on consistency.

Detailed instructions have been provided for compilation, among which the classification of different kinds and reasons for vertical and horizontal inconsistencies. However, a certain unavoidable degree of subjectivity could not be eliminated, especially as regards horizontal inconsistency. Since the questionnaire was compiled separately by each expert responsible for each specific characteristic in different domains, it may have happened that, for instance, the responsible for turnover in STS *declared no horizontal inconsistency* with respect to turnover in SBS, but on the other hand the responsible for turnover in SBS *declared horizontal inconsistency* with respect to turnover in STS. Broadly speaking, for any characteristic the matrix produced for all countries which resumes horizontal inconsistencies between each domain and all the others may be *not symmetric*.

In order to optimize the process of collecting information asked for, every national coordinator was asked to contact experts for every statistical domain within the NSI. Each expert had to fill in the first part of the information sheet, as well as to assess vertical inconsistency. Afterwards, all experts were asked to compare their own definitions with those in the other statistical domains, as well as to assess the kind of inconsistency present and the reason for that. The need of coordination and cooperation among the different statistical domains was strongly emphasized through detailed instructions provided by the WP3 staff.

The table 1 below resumes the statistical domains where each characteristic resulted to be produced as regards the 32 countries to which the questionnaire on consistency was sent (figures range between 0 and 32). The questionnaire was fulfilled between November 2012 and February 2013.

**Table 1 – Characteristics and domains analysed in 32 countries as regards consistency**

Characteristics/Domains	SBS	STS	Inw FATS	Outw FATS	CIS	R&D	LFS	SES / LCS	LCI	ICT
Number of enterprises	31	0	28	30	30	0	0	0	0	0
Number of local units	31	0	0	0	0	0	27	0	0	0
Turnover	31	30	29	30	29	0	0	0	0	32
Production Value	31	29	29	0	0	0	0	0	0	0
Value added at factor cost	31	0	30	0	0	0	0	0	0	0
Gross operating surplus	31	0	0	0	0	0	0	0	0	0
Total purchases of goods and services	31	0	29	0	1	0	0	0	0	26
Purchases of goods and services purchased for resale in the same condition as received	30	0	29	0	0	0	0	0	0	0
Gross investment in tangible goods	31	0	27	0	0	0	0	0	0	0
Payment of agency workers	29	0	0	0	0	0	0	0	0	0
Personnel costs	31	15	29	0	0	0	0	29	30	0
Wages and salaries	31	30	0	0	0	0	0	29	28	0
Social security costs	31	11	0	0	0	0	0	30	28	0
Number of persons employed	31	27	29	24	0	30	29	0	0	31
Number of employees	31	19	26	20	0	0	27	30	0	0
Number of employees in full-time equivalent units	27	0	0	0	0	29	24	30	0	0
Number of hours worked by employees	27	28	0	0	0	0	29	29	0	0

## 5. Evaluation criteria

The logical structure of the questionnaire sent to the national Institutes of the 32 countries was founded on three main issues:

- 1) information on definition applied in the country and the type of data source(s) used;
- 2) presence of vertical inconsistency (with respect to the EU definition);
- 3) presence of horizontal inconsistency (among domains).

Approximately 1,800 information sheets have been created across all participating countries: each characteristic is defined in one or more statistical domains (except for ‘Gross Operating Surplus’ and ‘Payment for Agency Workers’), this corresponds all in all to about 60 definitions that could be found in the different statistical domains, for 32 countries. On the basis of the survey results, all the data have been stocked into the dedicated database. In this way, information about the consistency of the predefined set of core economics and employment variables, with regard to their characteristics and definitions, has been fully structured to be analyzed.

The main difficulty lied in the multidimensional profile of the database, which took into account information at the level of single countries (32), characteristics (17), domains (12), kinds (11) and reasons (11) for inconsistencies, as well as the “one-to-many” feature of horizontal inconsistency.

The “Evaluation criteria” are the logical framework – founded on tables and statistical indicators concerned – to be used for analyzing the main results. Evaluation criteria have been developed to assess, among all the potential statistical tables, which direction of analysis could be useful in order to identify the inconsistencies as well as to compile information on their importance. It should be noted that the issue of inconsistency in characteristics and definitions is not about exact numbers, but about the size and the effect of these inconsistencies on the final EU aggregates. The following re-classification of main causes has been adopted:

**Table 2 – Groups of causes of inconsistency**

<b>GROUP</b>	<b>CAUSES OF INCONSISTENCY</b>
<b>Name</b>	Denomination
<b>Constituents</b>	Elements included more Elements included less Elements excluded more Elements excluded less
<b>Methods</b>	Use of proxy Measurement concept
<b>Indirect causes</b>	Reference time and period Coverage Observation unit

Indeed, by arranging the causes of inconsistency into groups, it is much more obvious in which part of the definition the inconsistencies are located and where the proposals for reduction of inconsistency should start. The indirect causes are mainly related to other ESSnet work packages.

The EU aggregate level was the main target to be studied, hence the single country data were not analyzed in depth. Moreover, it was agreed to not apply “weights” to the single countries data in the phase of aggregation at the EU level. Weights may reflect the “importance” of the country in terms, for instance, of value added, evaluated as percentage on the total EU level. This decision allowed to assess how many countries declared specific inconsistencies, no matter their size. On the other hand, this strategy assigned the same implicit weight to each country without considering its economic importance in the EU, with the consequent risk to underestimate the real inconsistency level for some characteristics and domains.

For this reason, in addition to the original WP3 elaborations, in this framework a further breakdown of results has been elaborated and presented, on the basis of the single country size in terms

of value added percent share on the overall valued added summed up for the 32 countries concerned. The 32 countries have been broken down in two groups<sup>13</sup>:

1. countries with a share on the whole valued added (year 2013) larger than 7% (Germany, France, United Kingdom, Italy and Spain); they represent the 63,7% of the whole valued added (Group 1);
2. all the remaining 27 countries (Group 2).

Moreover, specific analyses for Italy have been developed, in order to evaluate the profile of Italy within the previous mentioned Group 1.

The main overall results are presented in the following section 6. It is worthwhile to underline that, among all characteristics and domains analyzed over the 32 countries (from now “EU” countries, even though 4 of them do not actually belong to the EU), the characteristics are produced using a direct survey in the 41,1% of cases, through the combination of direct surveys and secondary (administrative) data in the 32,1% of cases, using only secondary data in the 13,3% of cases and through derivation from another variable in the remaining 13,5% of cases. On one side, direct surveys are used mainly for “Number of hours worked by employees” (65,4%) and “Gross operating surplus” (62,1%), on the other one characteristics as “Turnover” and “Wages and salaries” are produced using exclusively direct surveys only in the 12,1% and 9,7% of cases, respectively. Overall, the use of direct surveys only characterizes more employment characteristic (40,8%) than the economic ones (33,3%).

**Table 3 – Kind of sources used for producing each variable (% by rows)**

Characteristic	Kind of source				
	Total	Derived variable	Direct survey	Use of secondary data	Direct survey and use of secondary data
Number of enterprises	100,0	8,8	43,0	19,3	28,9
Number of local units	100,0	10,9	43,7	10,9	34,6
Turnover	100,0	41,4	12,1	13,8	32,7
Production Value	100,0	16,1	26,7	12,5	44,6
Value added at factor cost	100,0	7,0	42,1	16,6	34,2
Gross operating surplus	100,0	3,4	62,1	0,0	34,5
Total purchases of goods and services	100,0	5,2	41,2	14,3	39,4
Purchases of goods/services for resale.....	100,0	13,4	40,2	13,4	33,0
Gross investment in tangible goods	100,0	9,1	36,4	16,4	38,2
<b>Economic characteristics</b>	<b>100,0</b>	<b>17,4</b>	<b>33,3</b>	<b>14,2</b>	<b>35,1</b>
Payment of agency workers	100,0	17,1	26,8	18,7	37,4
Personnel Costs	100,0	32,6	26,7	10,5	30,2
Wages and salaries	100,0	41,9	9,7	0,0	48,4
Social security costs	100,0	22,0	20,7	15,8	41,5
Number of persons employed	100,0	6,3	49,2	16,2	28,3
Number of employees	100,0	4,9	52,4	14,5	28,3
Number of employees in full-time equivalent units	100,0	23,1	56,5	4,6	15,8
Number of hours worked by employees	100,0	10,3	65,4	4,7	19,7
<b>Employment characteristics</b>	<b>100,0</b>	<b>18,5</b>	<b>40,8</b>	<b>10,5</b>	<b>30,2</b>
<b>TOTAL</b>	<b>100,0</b>	<b>13,5</b>	<b>41,1</b>	<b>13,3</b>	<b>32,1</b>

Source: Elaboration on ESSnet WP3 Consistency data.

<sup>13</sup> The 7% threshold was adopted on the basis of the empirical distribution of valued added among countries.

## 6. Main results

### 6.1 Vertical and horizontal inconsistency

Presence of vertical inconsistency has been evaluated in terms of percent incidence (“% Inc.” in the table 4) on the number of cases (“Cases”) for which a certain characteristic is produced (domains by countries). If in a country a characteristic is produced by a specific domain it counts for “1” in the column “EU-Cases” of the table. If vertical inconsistency has been stated, cases of inconsistencies taken into account in the column “% Inc.” have been counted only once, no matter how many reasons of inconsistencies have been declared for that specific case. Overall, on 1.701 cases<sup>14</sup> for which a certain characteristic is produced by a given domain in a country (which is the largest potential amount of vertical inconsistencies and is given by the product among number of countries, number of characteristics and number of domains producing each characteristic), vertical inconsistencies have been counted for in the 27,3% of cases. The % incidence ranges from 19,0% of Number of employees to 37,3% of Personnel costs; it is almost equal as regards economic characteristics (27,6%) and the employment (27,0%). It is worthwhile to remark that the Group 1 countries are characterized by a larger average vertical inconsistency incidence than the Group 2’s average, since the percentages are 36,2% and 21,2% respectively. As a consequence, the decision to not apply country weights in the calculations at the aggregate level may have produced underestimation of the vertical inconsistency incidence on the EU economic figures. Italy shows small incidence as regards vertical inconsistency (10,6% on average), e.g. in 5 cases on 47.

**Table 4 – Cases and % incidence of vertical inconsistencies by characteristic and countries**

Characteristic	EU		Group 1		Group 2		Italy	
	Cases	% Inc.	Cases	% Inc.	Cases	% Inc.	Cases	% Inc.
Number of enterprises	119	32,8	48	39,6	71	28,2	4	0,0
Number of local units	58	31,0	24	37,5	34	26,5	1	100,0
Turnover	181	26,5	73	35,6	108	20,4	6	0,0
Production Value	89	29,2	38	44,7	51	17,6	3	33,3
Value added at factor cost	61	23,0	25	40,0	36	11,1	2	0,0
Gross operating surplus	31	22,6	13	38,5	18	11,1	1	0,0
Total purchases of goods and services	87	26,4	34	41,2	53	17,0	3	0,0
Purchases of goods/services for resale.....	59	27,1	23	39,1	36	19,4	1	0,0
Gross investment in tangible goods	58	24,1	24	37,5	34	14,7	2	0,0
<b>Economic characteristics</b>	<b>743</b>	<b>27,6</b>	<b>302</b>	<b>39,1</b>	<b>441</b>	<b>19,7</b>	<b>23</b>	<b>8,7</b>
Payment of agency workers	29	31,0	11	36,4	18	27,8	1	0,0
Personnel Costs	134	37,3	54	38,9	80	36,3	4	25,0
Wages and salaries	118	34,7	47	40,4	71	31,0	3	33,3
Social security costs	100	34,0	41	43,9	59	27,1	3	33,3
Number of persons employed	201	22,9	80	32,5	121	16,5	5	0,0
Number of employees	153	19,0	62	29,0	91	12,1	3	0,0
Number of employees in full-time equivalent units	110	24,5	47	29,8	63	20,6	3	0,0
Number of hours worked by employees	113	20,4	44	25,0	69	17,4	2	0,0
<b>Employment characteristics</b>	<b>958</b>	<b>27,0</b>	<b>386</b>	<b>33,9</b>	<b>572</b>	<b>22,4</b>	<b>24</b>	<b>12,5</b>
<b>TOTAL</b>	<b>1.701</b>	<b>27,3</b>	<b>688</b>	<b>36,2</b>	<b>1.013</b>	<b>21,2</b>	<b>47</b>	<b>10,6</b>

Source: Elaboration on ESSnet WP3 Consistency data.

Information and communication technology sector (ICT) is the domain most affected by vertical inconsistency (47,7% of cases), followed by Short-term statistics (STS, 36,0%), even though the 28,9% of cases which characterizes Structural business statistics (SBS) is the most relevant as re-

<sup>14</sup> 1.701 is also the sum of figures in the table 1.



gards the overall number of vertical inconsistencies (149 cases). LFS is the domain less affected by vertical inconsistency (14,7%)

**Table 5 – Cases and % incidence of vertical inconsistencies by domain and countries**

Domain	EU		Group 1		Group 2	
	Cases	% Inc.	Cases	% Inc.	Cases	% Inc.
SBS	516	28,9	214	42,5	302	19,2
STS	189	36,0	76	43,4	113	31,0
FATS_INW	285	19,3	111	28,8	174	13,2
FATS_OUTW	104	31,7	42	42,9	62	24,2
CIS	60	15,0	23	17,4	37	13,5
R_D	59	20,3	24	16,7	35	22,9
LFS	136	14,7	58	24,1	78	7,7
SES_LCS	177	33,9	70	35,7	107	32,7
LCI	89	19,1	36	27,8	53	13,2
ICT	86	47,7	34	52,9	52	44,2
<b>TOTAL</b>	<b>1.701</b>	<b>27,3</b>	<b>688</b>	<b>36,2</b>	<b>1.013</b>	<b>21,2</b>

Source: Elaboration on ESSnet WP3 Consistency data.

Horizontal inconsistencies have been summarized in table 6.<sup>15</sup> As already remarked, while vertical inconsistency can be counted through the binary variable equal to one if there is inconsistency (with respect to the specific definition concerned), horizontal inconsistency – for each country, characteristic and domain – may be present with respect to *one or more* different domains producing the same characteristic. For this reason, we have introduced the incidence indicator “Inc.”, which is given, for each characteristic, by the ratio between the number of domains respect to which horizontal inconsistency has been declared (numerator) and the overall number of domains producing that characteristic (denominator). At the EU level the formula used for the calculation of the indicator  $Inc_h$  referred to the characteristic  $h$  ( $h=1,2,\dots,17$ ) is given by<sup>16</sup>:

$$Inc_h = \frac{\sum_{c=1}^{32} \sum_{d=1}^{10} \sum_{D=1}^{10} \hat{I}_{h,c,d/D}}{\sum_{c=1}^{32} \sum_{d=1}^{10} I_{h,c,d}} \quad (1)$$

where  $h$  is a characteristic;  $c$  is a country;  $d$  and  $D$  are labels referred to domains;  $I_{h,c,d}$  is the binary variable equal to one if the characteristic  $h$  is produced in the country  $c$  using the domain  $d$  and equal to zero otherwise;  $\hat{I}_{h,c,d/D}$  is the binary variable equal to one if the characteristic  $h$  is produced in the country  $c$  using both domains  $d$  and  $D$  and  $d$  is horizontally inconsistent with  $D$ , and it is equal to zero otherwise. It follows that the indicator (1) may be larger than one<sup>17</sup>.

<sup>15</sup> Gross operating surplus and Payment of agency workers were excluded from the analysis since these characteristics are produced within one domain only in each country (SBS). For this reason the number of cases counted in table 6 (1.641) is lower than the overall number of cases analyzed as regards vertical inconsistency (1.701).

<sup>16</sup> Formulas for groups 1 and 2 and any specific country follow straightforwardly.

<sup>17</sup> Formula (1) has been implemented counting only once horizontal inconsistency between domains  $d$  and  $D$ : if  $d$  is not consistent with  $D$  and also  $D$  has been declared not consistent with  $d$ , afterwards in the numerator of formula (1) only one figure “1” has been added in the sum.

At the whole EU level (table 6), on average each characteristic produced in a given domain is horizontally not consistent with 1,36 other domains producing the same characteristics. There are two basic differences with respect to vertical inconsistency (table 4):

- vertical inconsistency affects economic and employment characteristics at the same levels (27,6% and 27,3% respectively), while horizontal inconsistency is more than twice higher for the employment characteristics ( $Inc=1,77$ ) rather than for the economic ones (0,84);
- vertical inconsistency affects more the Group 1 countries (36,2%) than the Group 2 ones (21,2%); on the contrary horizontal inconsistency is more relevant in Group 2 ( $Inc=1,60$ ) rather than in Group 1 ( $Inc=1,01$ ), in particular as regards employment characteristics. Let's note that Italy – even though belonging to Group 1 – presents horizontal inconsistency levels quite similar to those of Group 2 ( $Inc=1,64$ ).

Moreover, horizontal inconsistency is more heterogeneous than vertical inconsistency depending on the specific characteristic concerned, since the *Inc* indicator ranges from 0,16 (Value added at factor costs, Gross investment in tangible goods) to 2,36 (Number of persons employed). Moreover, the coefficient of variation by characteristic is equal to 18,9 as regards vertical inconsistency and to 61,8 as regards horizontal inconsistency.

**Table 6 – Cases of horizontal inconsistencies by characteristic and countries**

Characteristic	EU		Group 1		Group 2		Italy	
	Cases	Inc.	Cases	Inc.	Cases	Inc.	Cases	Inc.
Number of enterprises	119	0,94	48	0,71	71	1,10	4	0,25
Number of local units	58	0,48	24	0,42	34	0,53	1	0,00
Turnover	181	1,66	73	1,32	108	1,89	6	1,67
Production Value	89	0,94	38	0,76	51	1,08	3	1,67
Value added at factor cost	61	0,16	25	0,16	36	0,17	2	0,50
Total purchases of goods and services	87	0,48	34	0,38	53	0,55	3	1,00
Purchases of goods/services purchased for resale.....	59	0,17	23	0,13	36	0,19	1	1,00
Gross investment in tangible goods	58	0,16	24	0,13	34	0,18	2	0,50
<b>Economic characteristics</b>	<b>712</b>	<b>0,84</b>	<b>289</b>	<b>0,67</b>	<b>423</b>	<b>0,95</b>	<b>22</b>	<b>1,00</b>
Personnel Costs	134	1,78	54	1,09	80	2,25	4	2,50
Wages and salaries	118	1,50	47	1,02	71	1,82	3	2,33
Social security costs	100	1,12	41	0,88	59	1,29	3	2,00
Number of persons employed	201	2,36	80	1,58	121	2,88	5	2,00
Number of employees	153	2,01	62	1,58	91	2,30	3	3,33
Number of employees in full-time equivalent units	110	1,37	47	1,26	63	1,46	3	1,67
Number of hours worked by employees	113	1,60	44	1,25	69	1,83	2	3,50
<b>Employment characteristics</b>	<b>929</b>	<b>1,77</b>	<b>375</b>	<b>1,28</b>	<b>554</b>	<b>2,10</b>	<b>23</b>	<b>2,39</b>
<b>TOTAL</b>	<b>1.641</b>	<b>1,36</b>	<b>664</b>	<b>1,01</b>	<b>977</b>	<b>1,60</b>	<b>47</b>	<b>1,64</b>

Source: Elaboration on ESSnet WP3 Consistency data.

According to table 7, the Labour force survey (LFS) is the most horizontally inconsistent domain ( $Inc=2,10$ ) overall and in both groups, even though in Group 1 Research and development (R\_D) has the same horizontal inconsistency level (1,54 against 1,53). On the contrary, at the EU level the two domains which produce the largest number of characteristics (SBS: 456; FATS\_INW: 285) are those more horizontally consistent (*Inc* is equal to 1,01 and 0,87 respectively), and this outcome contributed to limit the overall EU relevance of horizontal inconsistency.

The explanation of the different inconsistency features between the two groups of countries may be as follows. Group 1 countries are less horizontally inconsistent than the Group 2 ones because they coordinate the various data sources each other, for instance because they have already implemented the use of specific and efficient tools for reducing the so called “stove pipe approach”. On the other hand, the larger integration among domains in the Group 1 countries may be paid through larger vertical inconsistency, because using more similar definitions in different domains is done at the cost of not implementing exactly the related EU Regulation definition, at least in some regards.

**Table 7 – Cases of horizontal inconsistencies by domain and countries**

Domain	EU		Group 1		Group 2	
	Cases	Inc.	Cases	Inc.	Cases	Inc.
SBS	456	1,01	190	0,79	266	1,16
STS	189	1,86	76	1,45	113	2,14
FATS_INW	285	0,87	111	0,68	174	0,99
FATS_OUTW	104	1,59	42	0,95	62	2,02
CIS	60	1,15	23	0,65	37	1,46
R_D	59	1,86	24	1,54	35	2,09
LFS	136	2,10	58	1,53	78	2,53
SES_LCS	177	1,69	70	1,36	107	1,91
LCI	89	1,34	36	0,83	53	1,68
ICT	86	1,49	34	0,91	52	1,87
<b>TOTAL</b>	<b>1.641</b>	<b>1,36</b>	<b>664</b>	<b>1,01</b>	<b>977</b>	<b>1,60</b>

Source: Elaboration on ESSnet WP3 Consistency data.

Anyway, actually it would not be possible to assess if certain levels of inconsistency are high or not, since there is not yet any acknowledged benchmark beyond which inconsistency may be considered dangerous.

Additional details regarding horizontal inconsistency have been provided in table 8, where each domain is analyzed on the basis of its inconsistencies with the others (for the whole set of characteristics). That is another reading key of the outcomes derived from the questionnaire on inconsistency: for instance, from the figures in the line “Total” at the EU level we can assess that SBS is the domain more frequently not horizontally consistent with the others (21,2% of the inconsistencies), followed by STS (17,2%), and that is true for both groups 1 and 2. Of course these outcomes also depend on the huge number of cases for which a characteristic is produced using SBS: for this reason the indicator *Inc* has been introduced just for neutralizing the “size” effect which characterizes each domain (as already seen, for SBS *Inc*=1,01, which is relatively small with respect to the average, equal to 1,36).

Table 8 – Horizontal inconsistencies domain to domain, rows %, by countries

DOMAIN	SBS	STS	FATS_INW	FATS_OUTW	CIS	R_D	LFS	SES_LCS	LCI	ICT	TOTAL
<b>EU</b>											
SBS	0,0	24,3	11,3	7,2	4,3	4,1	15,9	17,8	9,3	5,7	100,0
STS	29,8	0,0	14,5	7,1	3,4	3,1	13,1	15,6	6,3	7,1	100,0
FATS_INW	16,1	25,0	0,0	13,3	6,9	3,6	10,1	9,7	5,2	10,1	100,0
FATS_OUTW	21,8	15,2	21,2	0,0	11,5	5,5	12,1	3,6	0,0	9,1	100,0
CIS	31,9	15,9	21,7	20,3	0,0	0,0	0,0	0,0	0,0	10,1	100,0
R_D	19,1	12,7	9,1	9,1	0,0	0,0	28,2	12,7	0,0	9,1	100,0
LFS	30,8	17,8	10,1	7,0	0,0	9,4	0,0	18,5	0,0	6,3	100,0
SES_LCS	31,8	19,7	7,0	1,7	0,0	3,7	18,7	0,0	17,4	0,0	100,0
LCI	32,0	20,3	10,9	0,0	0,0	0,0	0,0	36,7	0,0	0,0	100,0
ICT	21,0	20,2	17,6	9,2	7,6	8,4	16,0	0,0	0,0	0,0	100,0
<b>TOTAL</b>	<b>21,2</b>	<b>17,2</b>	<b>11,1</b>	<b>6,8</b>	<b>3,4</b>	<b>4,3</b>	<b>12,1</b>	<b>12,6</b>	<b>5,8</b>	<b>5,6</b>	<b>100,0</b>
<b>GROUP 1</b>											
SBS	0,0	30,5	12,6	8,6	4,0	6,0	13,9	12,6	5,3	6,6	100,0
STS	35,5	0,0	15,5	6,4	3,6	2,7	12,7	13,6	3,6	6,4	100,0
FATS_INW	12,0	26,7	0,0	21,3	8,0	5,3	8,0	4,0	2,7	12,0	100,0
FATS_OUTW	27,5	5,0	35,0	0,0	10,0	7,5	5,0	2,5	0,0	7,5	100,0
CIS	33,3	13,3	20,0	20,0	0,0	0,0	0,0	0,0	0,0	13,3	100,0
R_D	18,9	8,1	10,8	10,8	0,0	0,0	27,0	13,5	0,0	10,8	100,0
LFS	31,5	15,7	6,7	5,6	0,0	9,0	0,0	25,8	0,0	5,6	100,0
SES_LCS	32,6	22,1	2,1	0,0	0,0	2,1	22,1	0,0	18,9	0,0	100,0
LCI	25,8	19,4	6,5	0,0	0,0	0,0	0,0	48,4	0,0	0,0	100,0
ICT	30,0	20,0	13,3	3,3	6,7	13,3	13,3	0,0	0,0	0,0	100,0
<b>TOTAL</b>	<b>21,8</b>	<b>17,8</b>	<b>10,5</b>	<b>7,3</b>	<b>3,3</b>	<b>4,9</b>	<b>11,6</b>	<b>12,0</b>	<b>4,8</b>	<b>5,9</b>	<b>100,0</b>
<b>GROUP 2</b>											
SBS	0,0	21,4	10,7	6,5	4,5	3,2	16,8	20,4	11,3	5,2	100,0
STS	27,3	0,0	14,0	7,4	3,3	3,3	13,2	16,5	7,4	7,4	100,0
FATS_INW	17,9	24,3	0,0	9,8	6,4	2,9	11,0	12,1	6,4	9,2	100,0
FATS_OUTW	20,0	18,4	16,8	0,0	12,0	4,8	14,4	4,0	0,0	9,6	100,0
CIS	31,5	16,7	22,2	20,4	0,0	0,0	0,0	0,0	0,0	9,3	100,0
R_D	19,2	15,1	8,2	8,2	0,0	0,0	28,8	12,3	0,0	8,2	100,0
LFS	30,5	18,8	11,7	7,6	0,0	9,6	0,0	15,2	0,0	6,6	100,0
SES_LCS	31,4	18,6	9,3	2,5	0,0	4,4	17,2	0,0	16,7	0,0	100,0
LCI	34,0	20,6	12,4	0,0	0,0	0,0	0,0	33,0	0,0	0,0	100,0
ICT	18,0	20,2	19,1	11,2	7,9	6,7	16,9	0,0	0,0	0,0	100,0
<b>TOTAL</b>	<b>20,9</b>	<b>16,9</b>	<b>11,3</b>	<b>6,5</b>	<b>3,5</b>	<b>4,0</b>	<b>12,3</b>	<b>12,8</b>	<b>6,3</b>	<b>5,5</b>	<b>100,0</b>

Source: Elaboration on ESSnet WP3 Consistency data.

## 6.2 Relationship between vertical and horizontal inconsistency

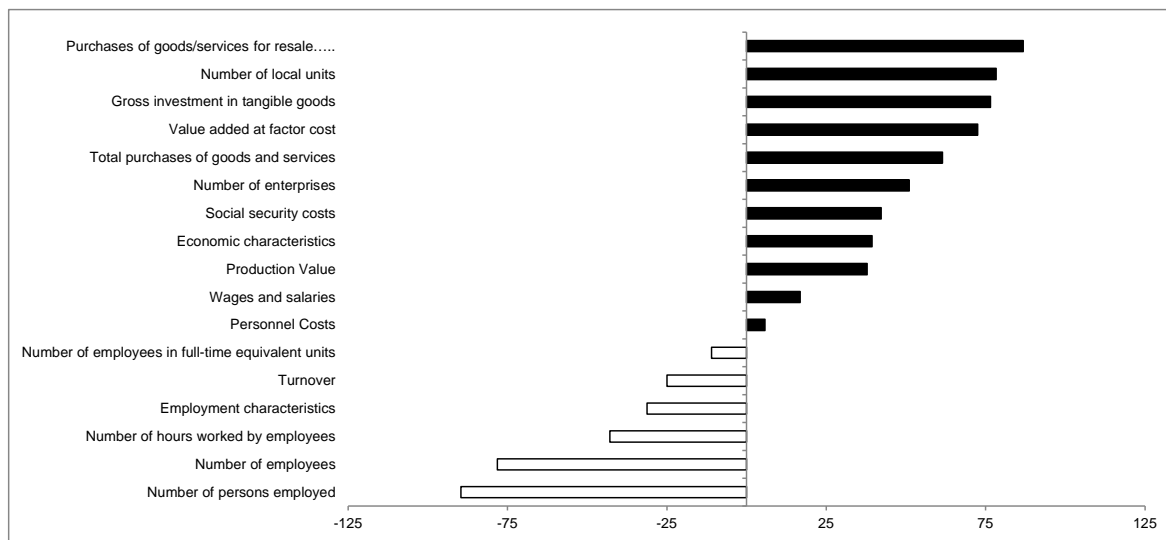
A deeper analysis of the relationship between the two kind of inconsistencies can be done through the comparison with respect to the average inconsistency at the EU level. The indicators “Inc.%” and “Inc.” are characterized by different average levels, hence it is necessary to normalize them through the simple transformation into index numbers, whose reference level “100” is the average EU level. Afterwards we can calculate – for each characteristic of for each domain – the difference between the two normalized values of “Inc.%” and “Inc.”. These differences have been reported in figure 1 (by characteristic) and figure 2 (by domain). Positive values indicate cases for which vertical inconsistency is relatively larger the horizontal inconsistency, and vice versa<sup>18</sup>.

<sup>18</sup> The use of standardization instead of normalization would lead to almost completely similar results.

Provided that variability of differences is larger for characteristics than for domains, for two characteristics on three vertical inconsistency is relatively larger than horizontal, while the opposite happens for number of employees in full-time equivalents, turnover, number of hours worked, number of employees, number of persons employed and the employment characteristics as a whole.

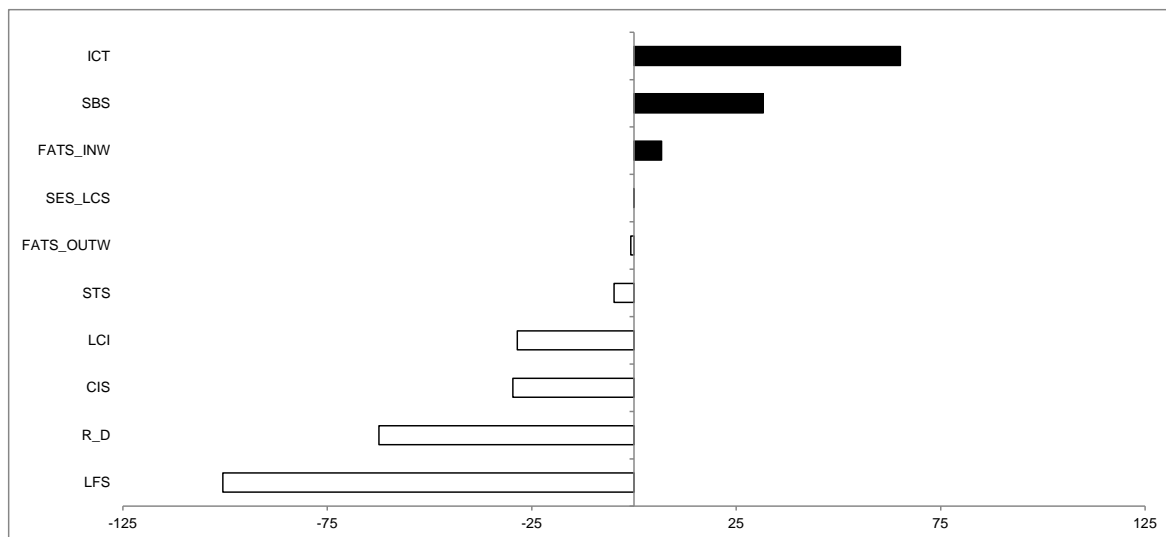
On the other hand, vertical inconsistency is relatively larger than horizontal only for three domains, which are ICT, SBS and FATS\_INW.

**Figure 1 – Difference between vertical and horizontal inconsistency (normalized values) by characteristic**



Source: Elaboration on ESSnet WP3 Consistency data.

**Figure 2 – Difference between vertical and horizontal inconsistency (normalized values) by domain**



Source: Elaboration on ESSnet WP3 Consistency data.

This exercise should be replied using as benchmark to which index numbers refer to *normal* levels of vertical and horizontal inconsistencies instead of the EU average level. Normal levels should be defined according to specific criteria agreed at the EU level, whose identification can be considered one of the future challenges after the ESSnet Consistency conclusion. In this regards, it has to be assessed whether there is an ‘acceptance’ minimum level of inconsistency – not avoidable – which can be used as reference benchmark.

### 6.3 Kind and reasons of vertical and horizontal inconsistency

In the vertical and in the horizontal perspective over all domains and all variables, most inconsistencies were caused by the so-called “indirect causes” observation unit, coverage and reference time and period (table 9<sup>19</sup>). “Indirect” in these context means that these causes cannot directly be influenced by the definition of the variable itself. In details, on average indirect causes explain the 55,0% of vertical inconsistencies and the 71,4% of horizontal inconsistencies, and these incidences are even higher as regards economic characteristics. The incidence of indirect causes as regards kind of inconsistencies is relevant for Payment of agency workers (76,9%), Number of local units (73,9%) and Number of enterprises (73,3%). The last two characteristics are also those for which indirect causes explain the most part of horizontal inconsistencies (79,1% and 84,5% respectively).

**Table 9 – Kind of vertical and horizontal inconsistencies, % incidence by characteristic**

Characteristics	Kind of vertical (total = 100%)				Kind of horizontal (total = 100%)			
	Name	Consti- tuens	Me- thods	Indirect causes	Name	Consti- tuens	Me- thods	Indirect causes
Number of enterprises	8,9	6,7	11,1	73,3	2,5	1,9	11,2	84,5
Number of local units	8,7	4,3	13,0	73,9	3,0	0,0	17,9	79,1
Turnover	1,4	28,2	21,1	49,3	1,9	4,1	18,1	75,9
Production Value	4,9	17,1	29,3	48,8	1,8	5,9	34,7	57,6
Value added at factor cost	0,0	12,5	25,0	62,5	0,0	0,0	50,0	50,0
Gross operating surplus	0,0	21,4	21,4	57,1	-	-	-	-
Total purchases of goods and services	0,0	17,2	34,5	48,3	0,0	7,4	31,5	61,1
Purchases of goods and services for resale.....	16,7	16,7	12,5	54,2	0,0	10,0	40,0	50,0
Gross investment in tangible goods	0,0	35,0	10,0	55,0	0,0	0,0	22,2	77,8
<b>Economic characteristics</b>	<b>4,7</b>	<b>17,6</b>	<b>19,9</b>	<b>57,8</b>	<b>1,8</b>	<b>3,9</b>	<b>21,0</b>	<b>73,2</b>
Payment of agency workers	0,0	7,7	15,4	76,9	-	-	-	-
Personnel Costs	10,9	25,0	14,1	50,0	7,5	17,8	9,6	65,2
Wages and salaries	3,2	40,3	8,1	48,4	1,8	16,6	8,1	73,5
Social security costs	8,9	22,2	13,3	55,6	2,1	13,6	9,8	74,5
Number of persons employed	4,8	21,0	22,6	51,6	2,0	9,5	17,4	71,2
Number of employees	2,2	17,4	19,6	60,9	1,6	10,2	15,5	72,7
Number of employees in full-time equivalent units	14,3	7,1	32,1	46,4	7,6	6,3	22,7	63,4
Number of hours worked by employees	6,1	18,2	21,2	54,5	2,0	6,3	16,0	75,7
<b>Employment characteristics</b>	<b>6,9</b>	<b>22,4</b>	<b>17,7</b>	<b>52,9</b>	<b>3,2</b>	<b>11,2</b>	<b>14,7</b>	<b>70,8</b>
<b>TOTAL</b>	<b>5,6</b>	<b>20,8</b>	<b>18,6</b>	<b>55,0</b>	<b>2,9</b>	<b>9,6</b>	<b>16,1</b>	<b>71,4</b>

Source: Elaboration on ESSnet WP3 Consistency data.

Regarding reasons in the vertical perspective (table 10), most inconsistencies are the results of reduction of external burden (29,0%) and limited data availability (24,5%). These reasons are particularly important as regards Payment of agency workers and Value added at factor costs. This could be the effect of several national constraints. Also the use of different methods or concepts may be a significant reason for vertical inconsistency (9,8%, achieving to 12,8% as regards employment characteristics), while less important reasons are timeliness of data collection, limited access to metadata and translation issues. Basically, the effect of different EU legislation has an impact on vertical inconsistencies lower than expected (7,0%).

From the horizontal point of view (table 11), the use of different methods or concepts (47,7%) and the timeliness of data-collection (19,6%) are the main reasons for inconsistencies. This can be seen as the result of the actually existing stove-pipe approach. As a matter of fact, the two main reasons explaining horizontal inconsistencies are completely different with respect to those which

<sup>19</sup> In the tables 9, 10 and 11 the overall 100% is given by the sum of cases for which vertical or horizontal inconsistencies have been declared.

turned out to be the most relevant as regards vertical inconsistency, and they have a quite larger weight (67,3% with respect to 53,5%). Moreover, they are more concerned with the specific requirements of the correspondent EU regulations in terms of contents and timeliness, while the main reasons for vertical inconsistencies depend more on issues related to the context in each country.

**Table 10 – Reasons of vertical inconsistencies, % incidence by characteristic**

Characteristic	Reasons of vertical inconsistencies (total by row = 100%) (1)										
	1	2	3	4	5	6	7	8	9	10	11
Number of enterprises	6,0	4,0	2,0	34,0	12,0	16,0	6,0	0,0	4,0	12,0	4,0
Number of local units	15,8	0,0	5,3	42,1	5,3	15,8	10,5	0,0	0,0	5,3	0,0
Turnover	8,8	2,5	3,8	20,0	12,5	28,8	3,8	1,3	13,8	5,0	0,0
Production Value	12,5	16,7	0,0	20,8	6,3	31,3	8,3	0,0	0,0	4,2	0,0
Value added at factor cost	0,0	14,8	0,0	22,2	11,1	40,7	3,7	0,0	0,0	7,4	0,0
Gross operating surplus	14,3	14,3	0,0	21,4	7,1	35,7	0,0	0,0	0,0	7,1	0,0
Total purchases of goods and services	11,1	16,7	2,8	19,4	8,3	25,0	5,6	0,0	2,8	8,3	0,0
Purchases of goods and services for resale.....	3,3	16,7	0,0	30,0	6,7	30,0	3,3	6,7	0,0	3,3	0,0
Gross investment in tangible goods	5,6	0,0	0,0	27,8	11,1	33,3	5,6	0,0	11,1	5,6	0,0
<b>Economic characteristics</b>	<b>8,5</b>	<b>8,1</b>	<b>2,0</b>	<b>26,2</b>	<b>9,7</b>	<b>26,6</b>	<b>5,5</b>	<b>0,8</b>	<b>5,1</b>	<b>6,8</b>	<b>0,7</b>
Payment of agency workers	0,0	9,1	0,0	36,4	0,0	45,5	0,0	0,0	9,1	0,0	0,0
Personnel Costs	8,5	4,2	1,4	28,2	2,8	31,0	7,0	0,0	5,6	8,5	2,8
Wages and salaries	8,6	3,4	1,7	22,4	3,4	27,6	12,1	0,0	12,1	8,6	0,0
Social security costs	4,9	12,2	0,0	22,0	2,4	36,6	4,9	2,4	7,3	7,3	0,0
Number of persons employed	6,7	1,7	0,0	25,0	11,7	28,3	3,3	0,0	3,3	20,0	0,0
Number of employees	4,9	4,9	0,0	17,1	12,2	29,3	2,4	2,4	7,3	19,5	0,0
Number of employees in full-time equivalent units	5,7	5,7	2,9	17,1	5,7	28,6	2,9	0,0	11,4	20,0	0,0
Number of hours worked by employees	5,9	5,9	0,0	29,4	2,9	26,5	8,8	2,9	5,9	11,8	0,0
<b>Employment characteristics</b>	<b>6,5</b>	<b>5,2</b>	<b>0,8</b>	<b>23,9</b>	<b>5,7</b>	<b>30,4</b>	<b>5,8</b>	<b>0,8</b>	<b>7,4</b>	<b>12,8</b>	<b>0,6</b>
<b>TOTAL</b>	<b>7,4</b>	<b>7,0</b>	<b>1,3</b>	<b>24,5</b>	<b>7,6</b>	<b>29,0</b>	<b>5,6</b>	<b>0,9</b>	<b>6,2</b>	<b>9,8</b>	<b>0,6</b>

Source: Elaboration on ESSnet WP3 Consistency data.

(1) 1: Historically grown statistics; 2: Legislation not consistent; 3: Timeliness of data collection; 4: Limited data availability; 5: Multipurpose data collection; 6: Reduction of external burden; 7: Reduction of internal costs; 8: Lack of / limited metadata; 9: National information requirement; 10: Use of different methods/concepts; 11: Translation issue.

**Table 11 – Reasons of horizontal inconsistencies, % incidence by characteristic**

Characteristic	Reasons of horizontal inconsistencies (total by row = 100%) (1)										
	1	2	3	4	5	6	7	8	9	10	11
Number of enterprises	0,0	6,9	10,4	11,1	4,9	14,6	10,4	0,0	0,0	38,9	2,8
Number of local units	0,0	6,7	23,3	6,7	0,0	0,0	0,0	0,0	0,0	63,3	0,0
Turnover	2,3	5,8	21,0	7,6	7,3	7,8	5,3	0,8	3,0	39,1	0,0
Production Value	7,6	3,4	27,7	10,9	0,0	8,4	2,5	0,0	0,0	39,5	0,0
Value added at factor cost	0,0	0,0	0,0	25,0	0,0	16,7	16,7	0,0	0,0	41,7	0,0
Total purchases of goods and services	3,4	12,1	10,3	12,1	6,9	3,4	3,4	0,0	0,0	48,3	0,0
Purchases of goods and services for resale.....	0,0	0,0	0,0	16,7	0,0	16,7	16,7	8,3	0,0	41,7	0,0
Gross investment in tangible goods	0,0	0,0	0,0	18,2	0,0	18,2	18,2	0,0	0,0	45,5	0,0
<b>Economic characteristics</b>	<b>2,5</b>	<b>5,9</b>	<b>18,3</b>	<b>9,6</b>	<b>5,1</b>	<b>8,9</b>	<b>6,1</b>	<b>0,5</b>	<b>1,5</b>	<b>41,1</b>	<b>0,5</b>
Personnel Costs	4,1	5,1	22,7	6,1	4,1	10,5	4,1	0,0	2,4	41,0	0,0
Wages and salaries	6,7	8,8	21,3	4,2	3,8	9,2	3,3	0,0	3,3	39,3	0,0
Social security costs	3,4	8,8	25,2	6,1	2,0	12,2	1,4	0,0	1,4	39,5	0,0
Number of persons employed	1,2	7,4	16,7	5,7	3,1	7,6	4,8	0,2	2,6	50,8	0,0
Number of employees	1,1	5,6	19,0	3,1	2,2	5,0	2,0	1,4	3,1	57,4	0,0
Number of employees in full-time equivalent units	1,3	5,7	19,7	1,9	0,6	2,5	0,0	0,0	0,0	68,2	0,0
Number of hours worked by employees	2,1	4,2	22,4	4,2	3,0	4,2	2,5	0,0	1,7	55,7	0,0
<b>Employment characteristics</b>	<b>2,5</b>	<b>6,5</b>	<b>20,0</b>	<b>4,6</b>	<b>2,8</b>	<b>7,2</b>	<b>3,1</b>	<b>0,3</b>	<b>2,3</b>	<b>50,7</b>	<b>0,0</b>
<b>TOTAL</b>	<b>2,5</b>	<b>6,3</b>	<b>19,6</b>	<b>6,0</b>	<b>3,5</b>	<b>7,8</b>	<b>3,9</b>	<b>0,4</b>	<b>2,1</b>	<b>47,7</b>	<b>0,1</b>

Source: Elaboration on ESSnet WP3 Consistency data.

(1) See note (1) under table 10.

At first glance, the results show that the challenges with horizontal inconsistencies are significantly higher than with the vertical ones. That corresponds to the expectations, as each domain could define their variables more or less independently.

The following detailed analysis (table 12) shows the most frequent cases<sup>20</sup> for which couples of domains are characterized by horizontal inconsistencies. For instance, the most frequent case concerns the couple of domains SBS and STS and the characteristic Production value ( $N=36$  cases overall); the main reasons for that are the use of different methods/concepts (38,9%) and timeliness of data collection (27,8%). It is worthwhile to note that these two reasons are quite always the most important for explaining the series of horizontal inconsistencies.

**Table 12 – The most relevant cases of horizontal inconsistencies by number of reasons (N), by characteristics, domains and reasons**

Characteristics	Domain	To domain	N	Reasons of horizontal inconsistencies % (1)				
				10	3	6	4	Others
Production Value	SBS	STS	36	38,9	27,8	5,6	13,9	13,9
Turnover	SBS	STS	35	25,7	28,6	5,7	14,3	25,7
Turnover	STS	SBS	34	26,5	29,4	8,8	8,8	26,5
Personnel Costs	SES/LCS	LCI	32	25,0	15,6	12,5	15,6	31,3
Production Value	FATS_INW	STS	28	42,9	32,1	7,1	7,1	10,7
Turnover	FATS_INW	STS	28	28,6	35,7	7,1	10,7	17,9
Number of employees	SES/LCS	LFS	27	59,3	14,8	7,4	7,4	11,1
Number of employees	LFS	SBS	26	69,2	11,5	7,7	0,0	11,5
Number of employees	SBS	LFS	26	65,4	15,4	7,7	0,0	11,5
Personnel Costs	LCI	SES/LCS	26	23,1	23,1	23,1	3,8	26,9
Number of persons employed	SBS	STS	26	30,8	26,9	15,4	7,7	19,2
Wages and salaries	SES/LCS	SBS	25	32,0	16,0	16,0	4,0	32,0
Number of hours worked by employees	LFS	SES/LCS	25	76,0	20,0	0,0	0,0	4,0
Production Value	STS	SBS	25	36,0	28,0	8,0	12,0	16,0
Number of hours worked by employees	STS	LFS	25	56,0	24,0	0,0	4,0	16,0
Number of hours worked by employees	SES/LCS	LFS	24	75,0	16,7	0,0	0,0	8,3
Number of persons employed	STS	SBS	24	25,0	16,7	12,5	8,3	37,5
Wages and salaries	LCI	SES/LCS	24	25,0	33,3	20,8	4,2	16,7
Number of persons employed	FATS_INW	STS	24	25,0	25,0	16,7	8,3	25,0
Wages and salaries	SES/LCS	LCI	24	25,0	29,2	16,7	8,3	20,8
Number of hours worked by employees	STS	SBS	24	29,2	20,8	16,7	8,3	25,0
Personnel Costs	SES/LCS	SBS	23	39,1	17,4	13,0	0,0	30,4
Number of hours worked by employees	LFS	STS	23	65,2	17,4	0,0	0,0	17,4
Number of employees	LFS	SES/LCS	23	60,9	21,7	4,3	4,3	8,7
Social security costs	SES/LCS	LCI	23	26,1	26,1	17,4	8,7	21,7
Number of persons employed	LFS	SBS	22	77,3	13,6	0,0	4,5	4,5
Number of persons employed	LFS	STS	22	63,6	18,2	0,0	4,5	13,6
Wages and salaries	SES/LCS	STS	22	40,9	22,7	4,5	9,1	22,7
Number of persons employed	STS	ICT	22	40,9	18,2	9,1	4,5	27,3
Personnel Costs	SBS	SES/LCS	21	52,4	9,5	14,3	0,0	23,8
Personnel Costs	LCI	SBS	21	33,3	28,6	9,5	9,5	19,0
Personnel Costs	SBS	LCI	21	47,6	19,0	14,3	4,8	14,3
Number of hours worked by employees	SES/LCS	STS	21	38,1	23,8	9,5	4,8	23,8
Wages and salaries	STS	SES/LCS	21	42,9	23,8	0,0	0,0	33,3
Wages and salaries	LCI	SBS	21	38,1	23,8	14,3	4,8	19,0
Number of persons employed	STS	FATS_INW	21	23,8	23,8	19,0	4,8	28,6
Number of employees in full-time equiv...	SES/LCS	LFS	20	70,0	15,0	5,0	0,0	10,0
Number of persons employed	SBS	LFS	20	70,0	20,0	0,0	0,0	10,0
Social security costs	LCI	SES/LCS	20	30,0	35,0	15,0	5,0	15,0

Source: Elaboration on ESSnet WP3 Consistency data.

(1) 3: Timeliness of data collection; 4: Limited data availability; 6: Reduction of external burden; 10: Use of different methods/concepts.

<sup>20</sup> The list includes horizontal inconsistencies declared in at least 20 cases.



The amount of horizontal inconsistencies demonstrate the variety of characteristics and domains with the need of modification, which will be necessary in future in order to reach an acceptable grade of consistency in business and trade-related statistics. This problem is more crucial as regards labour market, since 33 couples on the overall 39 reported in the table concern employment characteristics.

However, to reduce these inconsistencies may also be difficult due the data availability in the EU member states. Moreover, we must remind that some horizontal inconsistencies strictly depend on the adoption of different definitions for the same characteristics as requested in specific EU Regulations – so that their reduction will imply changes in EU legislation – and that some of them have been put deliberately and consciously, since different statistical domain should satisfy different users' needs.

## 7. Final proposals: system and definition

### 7.1 Systematic approach

The WP3 proposal is part of a more comprehensive systematic approach in order to design a system of variables, which is thought to be an important prerequisite for the implementation of the Integrated European Statistical System.

The implementation of the MEETS program is connected with the changeover from a domain oriented (stove-pipe) to an integrated or systematic approach in business statistics, which always has the whole system in mind when changes are planned. The changeover affects the whole production system of official statistics and the European system of business statistics. It requires a different way of management and communication and therefore a better structured information system (systematic approach).

In general a system is more than a pure collection of elements, indeed it also consists of a description of relations between the elements. On the national level this should be valid for the results of the different domains of business statistics and on the European level it means that the results for the same domains of the different countries should also have this quality. The analysis of this quality component require a systematic description of the system of business statistics consisting of different parts or sub-systems.

In this regards, an important WP3 result is to have underlined how important is to use a common terminology and not to leave any ambiguous part into the definition, in order to be able to measure where and how the definition can be comparable or not. To improve consistency, it is necessary to develop a system of variables over all domains of business statistics, with a common standardized structure. In this context, metadata play an important role as they contain all information which is necessary to understand and use statistical results correctly and to assess the quality of the results.

Therefore, WP3 proposes to use a standardized description for the output of business statistics consisting of fixed building blocks, which all together form the metadata system.

They cover

- technical and methodological metadata,
- process and quality metadata,
- reference metadata.

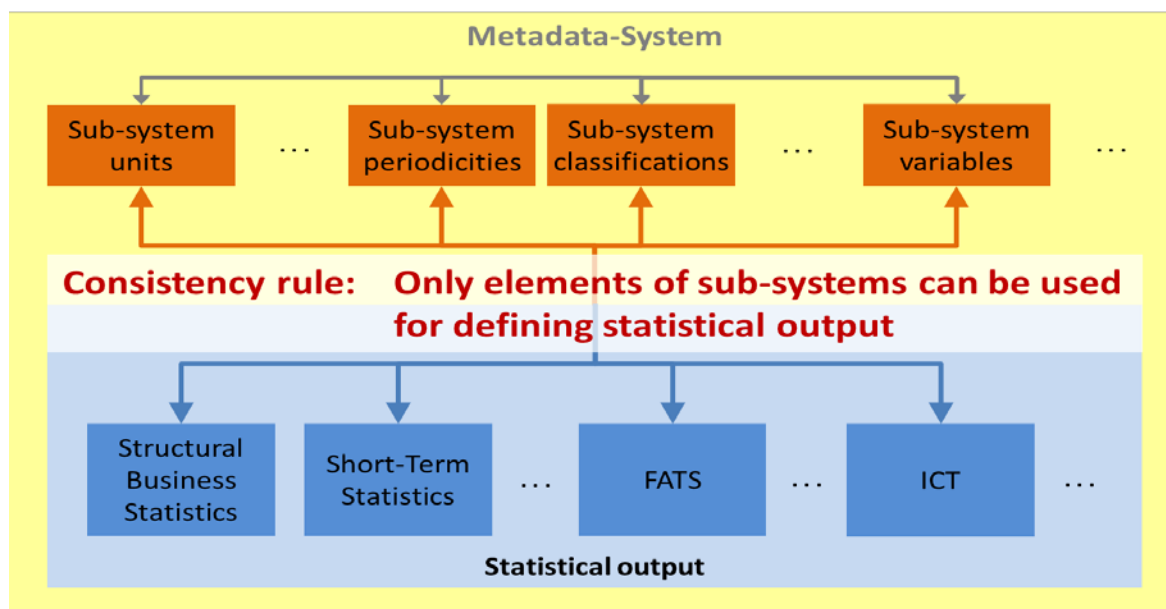
For the definition of variables the reference metadata are relevant. A reference metadata system consists of different parts or sub-systems which broadly correspond to the above mentioned aspects of comparability. This means that a consistent description of a system of business statistics requires a set of sub-systems, e.g.:

- a sub-system of statistical units,
- a sub-system of periodicities,
- a sub-system of classifications and

- a sub-system of variables.

Each of the sub-systems defines the elements in the respective area and the relations between the elements.

**Figure 3 – Reference metadata within a Metadata-System**



For the definitions of the output of business statistics only elements of these sub-systems are allowed. This alleviates the comparison between different systems of business statistics or different parts within one system.

## 7.2 (Sub)System of variables: structured definition

In this section the focus is on one special metadata sub-system, the sub-system of variables, which is of special relevance for the definition of the variables.

A system of variables should consist of different parts which all fit together and supplement each other:

- Constituent part of such a system is a list of all variables used in business statistics including the standardized definitions of these variables and the description of relations to other variables.
- A consistent and unique terminology has to be used over all domains of business statistics. If variables have the same name it means that they have the same content. Already slight differences in content must lead to a different name.
- Standardized definitions. The definitions should all follow the same pattern consisting of the following parts:
  - unique code of the variable: There should be a unique identifier for each variable at least, better still would be a unique system of coding (classification) for all variables in business statistics. If the definition (the contents) between two variables varies even slightly (for example value added at factor costs and value added at basic prices) there should be two different IDs.
  - Unique name of the variable: If the definition (the contents) between two variables varies even slightly (for example value added at factor costs and value added at basic prices) there should be two different names should exist.
  - Objective of the variable: Which phenomenon is the variable ideally intending to mirror

(“What should be measured?”).

- Definition of the variable itself (how is it measured):
  - verbal description of the content of the variable;
  - all inclusions and exclusions;
  - methodological details directly connected with the definition (e.g. value at the end of the reference period or average value).
- Relations of the variable:
  - Link to company accounts
  - Link to other variables
  - Link to National Accounts

The description of the content of variables must be described entirely, but as simply as possible with a special focus on the constituents (inclusions and exclusions).

Since the data sources in the different countries are not the same (e.g. different tax laws when using admin data) it is not sufficient to have a list of inclusions and exclusions. Every variable should have an objective in which a short description of the purpose of the variable is given. This could help the statisticians in the different countries to decide on special cases. Relations between variables need to be made explicit. The proposal is to make a special chapter with the link between variables (as for example current SBS regulation on definition which has special heading Link to other variables). In addition there should be links to company accounts (as already in current SBS regulation on definition) and links to National Accounts, where applicable. Finally, special consistency issues regarding the variable should be mentioned explicitly (e.g. at what point in time ‘number of persons employed’ should be measured exactly – first day, last day or an average across the reference period).

Every inconsistency to the proposed definition should be assessed, explained and quantified. This should be part of the standardized quality reports produced by each MS.

Such a systematic approach could, however, only ensure consistency on a formal level and is focused mainly on the reduction of the horizontal inconsistencies. Nevertheless, it improves the transparency of business statistics considerably. The implementation of such a system could lead to the identification of inconsistencies as MS face different constraints, use different methodologies for data collection and have at their disposal different data sources. It is therefore necessary to solve those problems with the help of guidelines, handbooks etc. that could help to transform data from existing sources into the variables required by the European statistical laws. Such handbooks and guidelines will have to be developed combining all the results and proposals of the different ESSnets.

There are several practical impacts of using a systematic approach.

First of all it should be emphasized that it refers to output definitions which are used for the presentation of the results of business statistics. This has to be distinguished from the variables that are collected from the different sources (input definitions). Input definitions should be clear for the respondent and adapted to the data source which is used. When input definitions deviate from output definitions the NSIs will have to implement a transition process that transforms the input variables into the output variables.

Another impact of this approach is that the different domains of business statistics can no longer act independently from each other. Regarding the system of variables it is necessary to maintain it centrally. Whenever a new statistic is designed, the responsible unit has to use existing variables and their definitions as far as possible. This requires an intensive amount of communication between the different units of a NSI and the implementation of a monitoring procedure. New variables have to be justified and they have to be integrated into the system of variables. From the study visit in CBS Netherlands it became clear that this is not an easy task and it has to be monitored by straightforward management.

### 7.3 Resuming prospect

Main results achieved though the questionnaire have been deeply analyzed, in order to assess

the need to propose changes in some definitions for certain characteristics and domains

In order to achieve to a more integrated European Statistical System, the issue of defining a structure of consistent definitions has been underlined as being essential to achieve such a result. In this view, the WP3 made proposals for each variable, according to its structure. In the list of proposals, all the domains have been taken into consideration (except LFS); each proposed adjustment has been integrated with the results from the Admin Data ESSnet, in order to find a coordinated solution to any operative problem the NSI could have in implementing what the legal acts require.

The following table 13 contains, for each variable, a synthetic description of the conclusions as regards the proposal and/or the open issues left, to be tackled in next future. This deep analysis lead to propose several types of changes. In some cases a new definition has been provided; in some other cases direct links to administrative data have been addressed.

As regards “Turnover”, the new definition is a combination of the ones currently in use for the SBS and the STS domains; it effects specific elements (excise duties and subsidies of products) whose inclusion/exclusion may lead to relevant differences among the several domains and the possibility to be sued by NA as it is. This change would affect “Gross operating surplus”, so that its definition would remain as difference between turnover and personnel costs.

Also “Wages and salaries” has been defined through a combination of the definition of STS and SBS and the link to company accounts has been clarified.

At last, in some cases definitions have not been touched at all, but suggestions for the definition of a new variable which is a “component” of the main variable concerned have been proposed (for example: “Personnel costs”).

The definition of “Production value” remains basically the same, but additional explanations about the “Other incomes” are recommended, to avoid any possible misunderstanding.

**Table 13 – Final adjustment proposals for each characteristic**

SBS code	VARIABLE	DOMAIN	CONCLUSION: PROPOSALS AND OPEN ISSUE
11110	Number of enterprises	SBS/iFATS/oFATS/CIS	The proposed general definition of <i>Number of enterprises</i> maintains the same content as the current definition for the domains of SBS, Inward FATS and Outward FATS. It is simplified with a clear link to the unit regulation and does not contain any redundant information. All domains with the requirement to publish a subpopulation of “enterprises” should be obliged to define a new variable in the same clear way including mandatory a link to the general definition under a slight different name (e.g. <i>Number of innovation enterprises</i> for CIS) to ensure the consistency within the system of variables.
11210	Number of local units	SBS/LFS	The proposed general definition of <i>Number of local units</i> is basically the same as the current definition for the SBS domain. The domain LFS does not count local units but asks respondents about the location of their work. This may correspond to the local unit of the enterprise but not necessarily. Therefore, LFS needs a different definition under a new name.
12110	Turnover	SBS/STS/iFATS/oFATS/CIS/ICT	The proposed general definition of Turnover is a combination of the current definitions from SBS and STS domains. For the domains of SBS, Inward FATS, Outward FATS and ICT the change of definition is in the exclusion of deductible taxes directly linked to the turnover (excise duties). With that change turnover will come closer to the needs of NA where output is valid at basic prices, excluding all taxes on products. In addition it will be in line with the proposals of the ESSnet Admin data which states that excise duties are not part of the revenue according to the IAS/IFRS. ESSnet Admin data states that excise duties can represent a substantial amount of revenue in some sectors (manufacture of tobacco and spirits, production and distribution of fuel). The impact may therefore be quite high for those sectors. For the domain of STS the change of definition is in the exclusion of subsidies. Even if NA would prefer having a part of subsidies (subsidies on products) included in turnover, the entire exclusion looks more reasonable, because (as is currently stated in the STS regulation) of large difficulties in separating this part in practice. In addition ESSnet Admin data did not propose to include subsidies. The impact may be high in sectors such as retail trade (especially cars) and transportation services (public transport). At the meeting with the NA experts ‘merchanting’ was exposed as an item that should be included in turnover. Since there was not a consensus among countries involved in WP3 a further discussion with Eurostat and other MS should take place in
12120	Production Value	SBS/iFATS/SBS	For the domains of SBS and Inward FATS the proposed general definition of Production value is basically the same as currently valid. Only some additional explanation is given considering the Other income (as the analyse of data showed that there might be some misunderstanding of whether extraordinary income should be included or not, the term extraordinary was added). As for Turnover for this variable as well there is still an open issue of ‘merchanting’. In National Accounts this item is part of the production value and how to treat these transactions in the domains of SBS and Inward FATS should be considered. The domain of STS measures the development of value added (in terms of volume produced); so it should be reconsidered that the name would change in order to reflect better the content of this variable in STS domain. The different content is a well-known fact as STS regulation states: “(a) The common understanding of the term ‘production index’ as an index of ‘development of value added’ contradicts the definition of ‘production’ in the framework of National Accounts or structural business statistics, but nonetheless is the term traditionally used in this area of business statistics. The term ‘value added index’ is never used in practice. As the index follows the development of production at constant prices, sometimes the term ‘production volume index’ is used. The term production index is always used in this text as a quantity index, in other words at constant prices.” Nevertheless, since the definition for STS is not the same as for other domains (SBS and Inward FATS), the proposal is to alter the name in the STS domain in order to better reflect the content of this variable to “Production volume index”. As far as a definition is concerned the current STS definition allows many proxies for this variable. Data in database shows that countries use different proxies when they calculate this variable for the domain of STS. As long as different proxies are allowed and used there will be room for the inconsistency even within this one domain. There should be at least some further instructions how to recalculate different proxies into the same variable. Another option is to let the MS choose which proxy will be used to calculate this variable (e.g. using deflated turnover or hours worked as a proxy) with explanations in quality report on
12150	Value added at factor cost	SBS/iFATS	For the domains of SBS and Inward FATS the proposed definition of <i>Value added at factor cost</i> is basically the same as currently valid. Since the new proposed definition for Turnover already excludes other taxes on products which are linked to turnover but not deductible, the extraction of this item is no longer necessary and was excluded from general definition.

12170	<b>Gross operating surplus</b>	SBS	For the domain of SBS the proposed definition for Gross operating surplus is the same as currently valid. As this variable is calculated as the difference between Value added at factor cost and Personnel cost changes for those two variables will therefore affect Gross operating surplus.
13110	<b>Total purchases of goods and services</b>	SBS/iFATS/ICT	For the domains of SBS, Inward FATS and ICT the proposed definition is the same as currently valid. Only the link to company accounts is changed as proposed by the ESSnet Admin data. As for the turnover with this variable the question remains (from the discussion with National Account experts) whether or not 'merchandising' should be included in total purchases of goods and services. Additionally, it should be further elaborated whether the word "Total" in the name is really necessary for a precise description of that variable, because no other variable use this term.
13120	<b>Purchases of goods and services purchased for resale in the same condition as received</b>	SBS/iFATS	For the domains of SBS and Inward FATS the proposed definition is the same as currently valid. As for the total purchases of goods and services the question remains (from the discussion with National Accounts experts) whether or not 'merchandising' should be included in this variable. The terms "in the same condition as received" and "without further processing" should be explained more precisely to avoid different interpretation.
15110	<b>Gross investment in tangible goods</b>	SBS/iFATS	For the domain of SBS and Inward FATS the proposed general definition is the same as currently valid. The proposal from National Accounts was to exclude land from this variable and to have land as a separate variable. Since there is already a separate variable Gross investment in land (15 12 0) the extraction can be made easily and the constituents of definition of Gross investment in tangible goods (15 11 0) can remain unchanged. Also the Sales of tangible investment goods (15 21 0) is a separate variable in SBS so sales can be deducted. In the last workshop a question from National Accounts was also raised whether this variable should include intangible assets as well. Since there are already separate variables in SBS domain covering intangible assets (Gross investment in concessions, patents, licences, trade marks and similar rights – 15 42 0, Investment in purchased software – 15 44 1), members of WP3 saw no reason to change the definition of this variable.
13130	<b>Payment of agency workers</b>	SBS	For the domain of SBS the proposed definition is the same as currently valid.
13310	<b>Personnel costs</b>	SBS/STS/iFATS/SES-LCS/LCI	The proposed general definition above contains basically no change for the domains of SBS, STS and Inward FATS. The definition is more detailed. For the link to company accounts suggestions from ESSnet ADMIN DATA were followed. The domains of SES/LCS cover a broader concept of labour costs. In addition to Personnel costs (Compensation of employees (D1) + Taxes paid by the employer (D4)) Vocational training costs paid by the employer (D2) are included as well as Other expenditure paid by the employer (D3). Subsidies received by the employer (D5) are deducted in the calculation of labour costs. A different name is therefore reasonable in this case and the definition for SES/LCS should stay the same. The domain of LCI has a different definition (D1+D4-D5) and is closer to the SBS, STS and Inward FATS domains. A new name should be used for this domain or the name of Personnel costs could be used if subsidies would no longer be deducted. It should be evaluated further whether so many different variables for the same content are really necessary. Perhaps the different delimitations could be at least minimized. The concept of SES/LCS looks very good when elaborated and could become the base for all domains. There was a proposal in the last workshop that personnel cost should be changed into labour costs. Since the latter is a broader concept the same name should not be used. In addition one of the comments at the last work shop was that subsidies received by the employer are not costs. They are included in the staff cost in company accounts so from that point of view the name should be changed.
13320	<b>Wages and salaries</b>	SBS/STS/SES-LCS /LCI	The proposed new definition is a combination of definitions from SBS and STS domains. For the domain of SBS Wages and salaries which the employer continues to pay in the event of illness, occupational accident, maternity/paternity leave or short-time working may no longer be part of the wages and salaries (they should be part of social security costs). A further explanation for link to company accounts is given. Currently stock options are generally included, with a consistency remark that the data collection might be difficult. For the domain of STS only the description is different to the standardized general definition. For the domains of SES/LCS and LCI the definition can stay the same with a slightly different name. Also the link to SBS/general definition has to be corrected. As for Personnel costs it should be evaluated further whether two different variables for the same content are really necessary. Perhaps all domains could use the same delimitation. SES/LCS looks very good when elaborated and could be the base for all domains.

13330	<b>Social security costs</b>	SBS/STS/LCS/LCI	For the domain of SBS wages and salaries which the employer continues to pay in the event of illness, occupational accident, maternity/paternity leave or short-time working may no longer be part of the wages and salaries; instead they should be part of social security costs. A further explanation for link to company accounts is given. The best name for the general definition could be checked again. For the domain of STS only the description is different to the standardized general definition. Domains of LCS and LCI use a slightly different term – Employers’ social contributions. The same name should be chosen because the definitions are identical
16110	<b>Number of persons employed</b>	SBS/STS/iFATS/oFATS/R&D/LFS/ICT	The proposed definition is a combination of current SBS and STS definitions. For the domains of SBS, STS, Inward FATS, Outward FATS and ICT the definition is therefore basically the same. To achieve a certain degree of consistency for that variable an exact measurement concept has to be implemented. For the domain of R&D only R&D personnel should be measured. A new definition under a new name should be defined with a link to the general definition of Number of persons employed to ensure the consistency within the system of variables. The definition for the domain of LFS should stay the same as it refers to different units and already use a slightly different term (Number of persons working at the local unit). It should be further elaborated whether a precise definition of “short-term”, “long-term” and “indefinite” is possible, and whether the absence of persons employed should refer to the matter of payment or not.
16130	<b>Number of employees</b>	SBS/STS/iFATS/oFATS/LFS/SES-LCS	For the domains of SBS, STS, Inward FATS and Outward FATS the definition is the same as currently valid. To achieve a certain degree of consistency for that variable an exact measurement concept has to be implemented. For the domain of SES/LCS the definition should stay the same. This definition already has reference to the SBS variable 16 13 0 (Number of employees). LFS refers to other units and uses a definition in compliance with International labour organization (ILO) and therefore should stay the same.
16140	<b>Number of employees in full-time equivalent units</b>	SBS/R&D/LFS/SES-LCS	For the domain of SBS the proposed definition is the same as currently valid. For the domain of R&D only number of R&D personnel in full time equivalent should be measured. A new definition under a new name should be defined with a general link to the general definition of Number of employees in full time equivalent units to ensure the consistency within the system of variables. The domain SES/LCS has different variables of part-time and full-time employees. The names and definitions are thus separated and the definition should stay the same. SES/LCS already has a link to the SBS variable 16 14 0 (Number of employees in full-time equivalent units). LFS does the same separation but refers to other units and can also stay the same.
16150	<b>Numbers of hours worked by employees</b>	SBS/STS/LFS/SES-LCS	The proposed new definition is a combination of definitions from SBS and STS domains. For the domain of SBS the definition is unchanged. For the domain of STS the general definition excludes hours worked by self-employed. The list of inclusion and exclusion is also more detailed. For the domain SES/LCS the definition has a slightly different name – Hours actually worked. The definition should stay unchanged and it already has a link to the SBS variable 16 15 0 (Number of hours worked by employees). The domain of LFS refers to other units and should measure number of hours actually worked during the reference week in the main or in the second job. The definition for this domain should be the same.

## 8. Perspective conclusions

After the long path which led to the adoption of many sector EU regulations, Eurostat started to face the problems due to the so called “stove-pipe approach”, which characterizes many statistical production processes inside the same NSI. Some regulations impose the use of different concepts and definitions related to the same variable and evaluate the compliance of each country on the basis of how far the characteristics implemented are with respect to the theoretical definition to be adopted. As a consequence, cases of horizontal inconsistency are not rare, while vertical inconsistency occurs when it is not (completely) possible to apply the exact definition asked for.

The ESSnet Consistency project WP3 investigated the issue of consistency as regards 17 economic and labour market statistical characteristics. Both vertical and horizontal inconsistencies have been deeply analyzed through a questionnaire filled in by 32 countries.

Beyond the assessment of the actual level of inconsistency which characterizes the EU context, the WP3 proposed some changes as regards the definition of certain variables. Among them, Turnover is the most important case study, so that after the WP3 conclusion EUROSTAT launched a specific task force on the new turnover definition to be adopted both in structural and in short-term business statistics.

In this framework, it will be important to evaluate which consequences may derive from changes in definitions, since reduction of horizontal inconsistencies may be paid in terms of discontinuity of time series and reduced comparability along time. The attempt for turnover should be followed by other characteristics as well, since it will be the only way to prepare the path for the adoption of the future FRIBS Regulation.

Anyway, one of the crucial methodological aspects will concern the definition of the “normal” level of vertical and horizontal inconsistency which can be considered acceptable (or unavoidable) given the actual constraints due to the EU Regulations needs.

ISTAT has been trying to improve the coordination among business statistics through a specific working group, named: “Harmonization of business questionnaires”, according to the scheme proposed by the WP3 as regards the system of definition. The aim is to implement a common scheme of variables, to which each survey has to refer to for every specific variable, even though different statistical domains are concerned. In this context, it is under discussion a technical document (ISTAT. 2014) concerning the new system design. The starting point is the set of definitions to be adopted as regards the characteristics “Turnover” and “Number of person employed”.



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