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**PAPER****Handling complex entities in the Business Register - supported by adequate IT-tools**

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**Abstract**

Recalling the beginning of the new century, many Statistical Business Registers consisted of collections of legal units and local units and found it hard enough to regularly update these two populations as well as the links between units of the two kinds. Today many Business Registers added two more unit types – the enterprise<sup>1</sup> and the enterprise group. As both are units with challenging definition and structure, the Business Registers had to develop and implement elaborated procedures and tools to handle the creation and maintenance of enterprises and enterprise groups. Thus the Business Registers became better equipped than ever by concepts, information technology and data sources.

At the same time it became clear that Business Register maintenance requires more resources and moreover that there are limits of giving the work to algorithms and automation. This holds especially for the more complex the units in the register. Maintenance is more laborious, sources of information are sometimes tricky. The most important units in the Business Register have to be quality-checked and worked on manually by highly experienced staff like profilers and analysts of enterprise group structures.

The German Business Register has developed tailor-made IT tools that assist staff in handling information on units and relations between units. The same necessities we experience in our contribution in the maintenance of the EuroGroups Register (EGR) which is managed by Eurostat and which makes necessary collaborative work of staff in statistical offices of different countries and, at the same time, requires better communication and easier data exchange between different registers and their IT tools.

In this paper, we share some findings, which we hold essential for efficient Business Register maintenance and give a glimpse into the IT tools which we use and which we also take part to develop at European Union level.

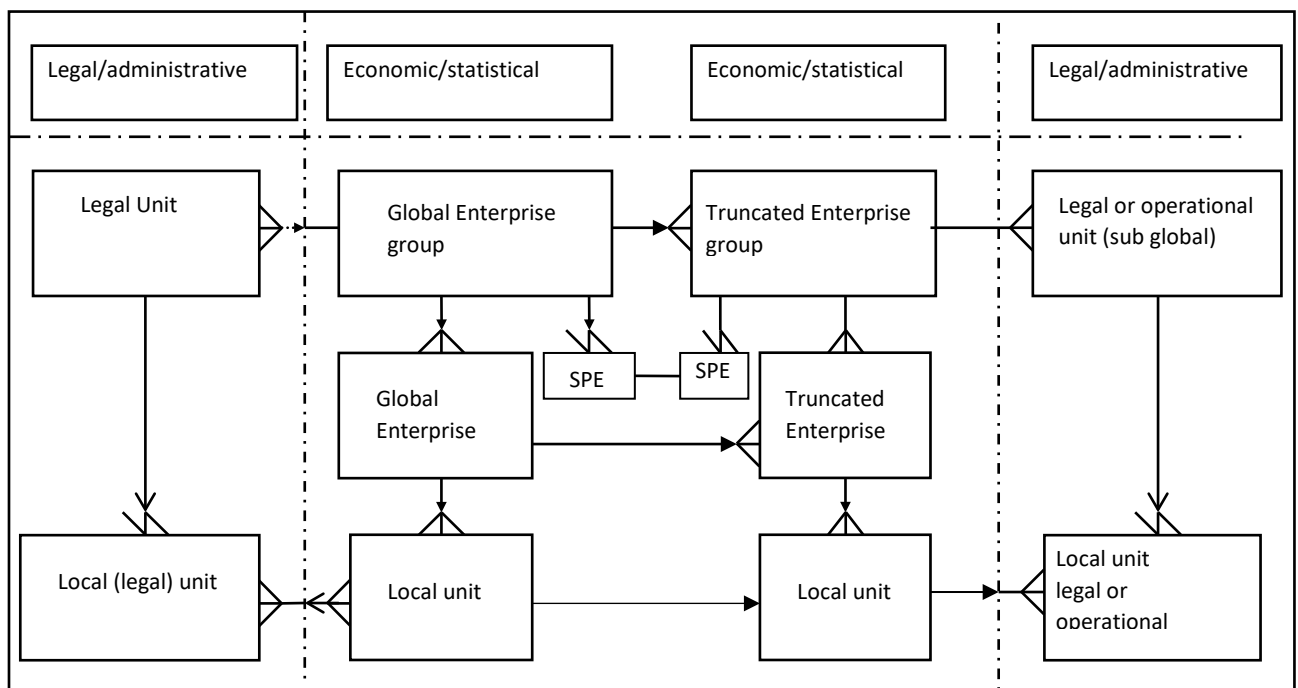
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<sup>1</sup> In this paper we use the term ‚enterprise‘ for the enterprise as defined in [1]. Outside the EU other terms may be used instead to name this unit.

### 1 Unit types in the Statistical Business Register

Recalling the beginning of the new century, many Business Registers consisted of collections of legal units and local units and found it hard enough to regularly update these two populations as well as the links between units of the two kinds. In 2008, Eurostat undertook to revise the regulation on Business Registers in order to establish the enterprise group in Statistical Business Registers in the Member States of the EU. This pathed the way to build up a multinational register of multinational enterprise groups – the EuroGroups Register, maintained and updated collaboratively by Eurostat and the Business Register departments of the statistical offices and the central banks of the Member States. Like the EuroGroups Register, today many Business Registers contain several unit types – the legal unit, the enterprise and the enterprise group. In national context, the local unit is of great importance still. As enterprises and enterprise groups both are units with challenging definitions and structure, the Business Registers had to develop and implement elaborated procedures and tools to handle the creation and maintenance of enterprises and enterprise groups. Since the maintenance of Business registers relies in many countries on administrative sources like tax or labour administration, the Statistical Business Registers have to adapt the information received – based on administrative concepts – to the statistical concepts, laid down in the European Union in the regulation on statistical units.

Figure 1: A Business Register unit model (taken from EssNet Profiling 2014)



### 2 Tasks (or roles) of statistical and other units

Before diving into the practicalities of Business Register maintenance, it is worthwhile to recall that statisticians have to distinguish clearly three tasks of units:

- Reporting unit: respondent, unit providing information to the data collector.
- Observation unit: unit about which information is collected.
- Statistical unit: unit a statistical output refers to.

Statistical work and register maintenance would be easiest if all three aspects would coincide in the same unit type: We would ask subjects (respondents, reporting units) about some of their features (as observation units) and would produce statistical figures about the quantitative or qualitative dimensions of these features referring to these subjects (as statistical units). Unfortunately, this way of working often cannot be applied with regard to enterprises and enterprise groups.

### 3 Challenging complex unit types: Enterprises and enterprise groups

Not all enterprises are complex and not all enterprise groups are worthwhile putting much effort in their maintenance in the Business Register. But the top of the Business Register population are very big players in the economy and the appropriate picture of these is of decisive importance for statistical results of the statistical domain departments and National Accounts. This has driven the establishment of “Large Cases Units” – departments in statistical offices dealing specially with only the big players. Base of their work is the picture of enterprise groups in the Statistical Business Register. Structural business statisticians have realised the practical relevance of the enterprise concept to understand the economic reality. Base of their work is the picture of enterprises in the Statistical Business Register.

In order to capture economic reality domain statisticians must ask the relevant variables about the appropriate observation units and they must approach the reporting units which are in possession of this information. This is ambitious – but the Business Register information as a base infrastructure is at hand meanwhile to provide

- different types of units
- relations between different types of units
- basic features about the units and the relations.

By relating these three aspects domain statisticians can explore a wider set of data sources compared to earlier days and they can ask more specific aspects in their surveys. They can produce and provide a much wider variety of statistical output. They can react with more flexibility to changes in the questions posed and make use of the different opportunities which are inherent the different types of units.

**Enterprise groups:** Commonly they are seen to be the most relevant actors in the globalised economy. At the same time basic concepts for units, such as continuity rules, are not satisfactory existing and/or implemented. Moreover, data about the unit enterprise group as an entity is one thing, data about their activities – especially cross-border-activities – is a different story. The latter is something various statistical domains are interested in, e.g. International Trade or Balance of Payments. It is far from trivial to draw the whole picture of a big international economic player. National administrative data are of limited help to see the global picture. Surveying global kind of data and making sure to interpret the figures appropriately has become necessary but is a tricky business. Often statisticians need help and therefore contact the enterprise group for explanations. It has proven possible to do this, e.g. by the Large Cases Units. The Business Register can help to provide the best contact partners within the enterprise groups: Legal Units with the roles of Group Head, Decision Centre or (Highest) consolidating unit.

**Enterprises:** In the European Union structural business statistics endeavour to apply the enterprise concept from reference year 2018<sup>2</sup> onwards. Great investments have been made building up

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<sup>2</sup> For older reference years, some Member States of the EU already applied the EU definition of the enterprise, but many Member States used the legal unit as proxy for enterprise.

profiling capacities in order to identify whether and which legal units form complex enterprises. The degree of autonomy which is attributed to them distinguishes between enterprises and enterprise groups. The EU Statistical Unit Regulation defines and describes the enterprise concept regardless of geographical borders. There is good reasoning that in today's globalised economy the postulated "sufficient" degree of autonomy for *enterprises* is found in sub-units of enterprise groups which are not limited by national borders. In other words: Statisticians would find global (meaning: multinational) enterprises if they would be looking for such.

But this alone would not help national domain statisticians and National Accountants who want to secure the quality of national figures. Why is this? Because global enterprises act globally and this global acting would only be adequately captured in figures that are global themselves. So everybody who calls for using a concept of global enterprises in order to capture globalisation must at the same time call for splitting the figures about these global enterprises artificially in national parts in order to describe the effect of globalisation on national statistical figures. In other words – interpreting and applying the enterprise concept globally is adequate to capture globalisation in proper statistical figures, but it will produce global statistical figures, not national ones.

Since the EU statistical programme aims for national figures of the Member States the appropriately shaped enterprises for EU structural enterprise statistics are units in national perimeter. Using this means agreeing on a special convention to the application of the enterprise concept. Besides this practical profiling is confronted with the issue of splitting legal units within an enterprise group to several of the "*national border- enterprises*" of the enterprise group. Profilers may detect some indications for the necessity to split legal units but it would still need an appropriate data collection in the structural business statistics to find out about the reliable and adequate enterprise figures on micro level.

#### **4 Handling and using complex statistical unit types**

Applying the definitions of the statistical units "enterprise group", and "enterprise" may imply for domain statisticians to put efforts in distinguishing between reporting and observation units (for data collection) and statistical units (for data compilation and publication). Whereas legal units will further be needed as respondents, statisticians will have to be explicit in their survey about which observation unit they request information on. And to explain about this, they will have to derive the appropriate observation units from the statistical units about which they want to present data in the end.

- Step 1: What do we want to describe? → choose appropriate statistical unit
- Step 2: For which units is it the data we need available/observable → choose observation unit
- Step 3: Which unit can be approached to deliver us the desired data → choose reporting unit

These three steps have to be done by domain statisticians. Business Register maintenance should keep these user needs in mind. Business Register users need the Business Registers to provide not only different types of units but also the relations between different types of units in order to choose the reporting units which can give data about observation units which allow to calculate data about the desired statistical units. The Business Register may have to invest more to provide units and relations between units that are required for today's appropriate statistics. Business Registers moreover should identify special roles of legal units within the more complex enterprises and enterprise groups like

group heads, decision units and consolidating units. In order to fulfil these tasks Business Registers have to make sure to allocate their resources according to user needs. Therefore clarification is necessary about the users' needs concerning the relevant aspects of the units. Based on this the Business Register can shape adequate updating and maintenance:

- Applying the relevant concepts
- Choosing the relevant information sources
- Working with appropriate procedures: automated and "manual" case handling
- Using efficient IT tools

## 5 Treatment of complex statistical unit types in practical Business Register work

The maintenance of Statistical Business Registers is always a combination of automated, semi-automated and manual procedures. Automated processes can treat available data, merge it, check its plausibility and make it available to users. However, quality control and the validation of different, sometimes incoherent information must always be carried out in addition in manual processes of treatment and decision-making. Coordination between different users processing the data must also be possible. All manual processes can be supported by IT-tools, so that both the effort and the quality of these manual processes should be optimised.

The important difference between the complex units and the "classic" units described above (legal unit, local unit) is the need for a top-down view. Especially in the case of economically large enterprises and enterprise groups, the relationships between all units in this complex construct must be checked and analysed in detail. An assignment of legal and local units to the complex units can only be made if all relationships and economic interactions are analysed and assessed in the common context of the whole global enterprise group.

This analysis can of course be rule-based or automated with learning algorithms, but these algorithms reach their limits for the large and important units. Due to the content analysis, which often needs to collect, understand and evaluate semantic content in order to subsequently compare these findings with the existing quantitative information, the added value of manual treatment tends to increase with the size and complexity of the units. The automated processes for smaller units can also benefit with the knowledge gained from the manual treatments.

For manual treatment of enterprise groups and enterprises, German Business Register developed a separate IT-Tool, the "*integrated Profiling Analysis Tool – iProfAnT*".<sup>3</sup>

The iProfAnT contains a module for the treatment of enterprise groups and a module for the treatment of enterprises. Modularisation also allows the two editing processes to be done separately from each other. With the result display module, the results are checked and imported back into the Business Register database via an interface.

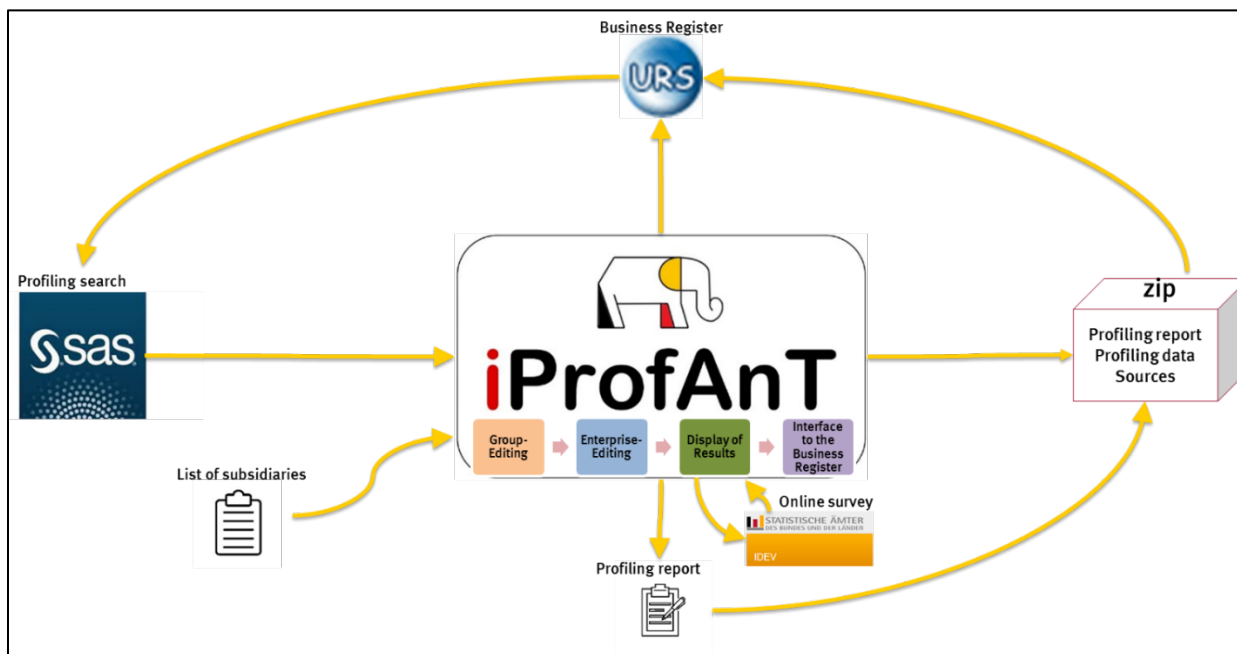
The iProfAnT takes the German Business Register data of an enterprise group from the actual reference year as input data. For the quality-checking and treatment of an enterprise group, the iProfAnT supports the matching of legal units already stored with further lists of subsidiaries, e.g. from annual reports of the enterprise groups, the editor supplements this with further research and information and correctly defines the perimeter of the enterprise group. For the delineation of enterprises, the tool supports with a user-friendly interface that simplifies the assignment and documentation of

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<sup>3</sup> Rommelspacher (2021).

decisions made by the profilers. For the handling of complex units in large enterprise groups, it is important to have an overview and to have the results "at a glance". The results display module in iProfAnT guarantees this. At this point, there is also the possibility of directly contacting the units with an online survey and having the results directly verified. The following figure illustrates the architecture of the iProfAnT in the context of the German Business Register System:

Figure 2: IT-Architecture of the iProfAnT in German Business Register System

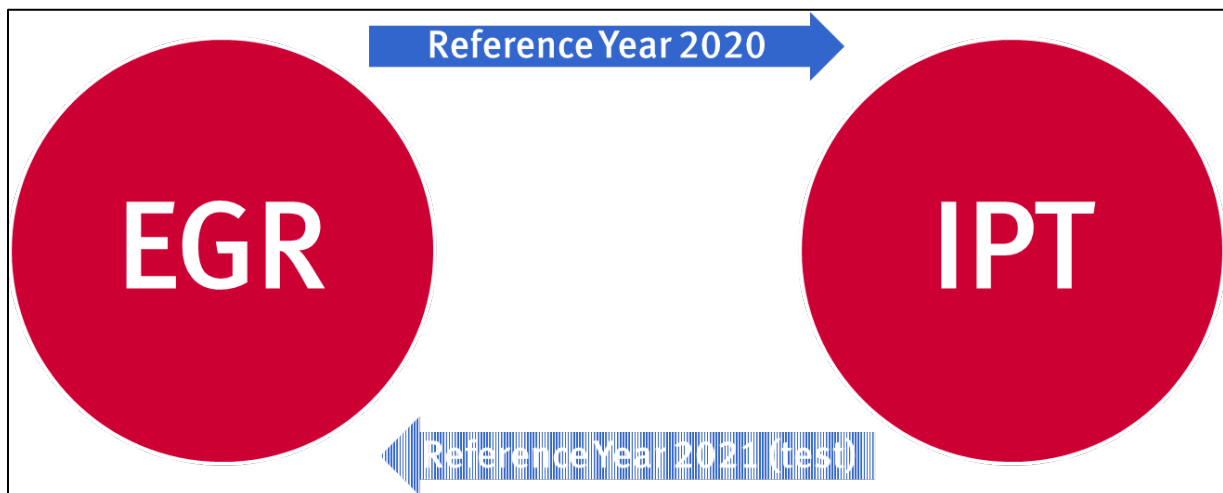


In the presentation at the meeting of experts, we will show the IT application iProfAnT in practice.

At the European level, there is the EuroGroups Register (EGR), which contains all multinational enterprise groups that are active in EU and EFTA states.<sup>4</sup> Both in the delivery of this information by the Member States and in the possible manual processing in the EGR Interactive Module, however, the approach is largely bottom-up, so that individual control relationships are edited rather than the entire global enterprise group within a framework of a top-down approach.

In addition, there is the Interactive Profiling Tool (IPT), hosted by Eurostat, which is used to check and process the structure of enterprise groups and to profile and delineate enterprises, both at the global and national level. The IPT takes the EGR data from the previous reference year as input data for the production of the picture of the actual reference year. In the IPT, changes can then be made to the composition of the enterprise group, but a structured treatment at global and national level is not supported currently. This means that it is not possible to make comparisons with external sources such as the national business registers, the list of subsidiaries from the annual report or other sources, nor can units be relocated between two groups. The flow back of the information we have in IPT for an enterprise group and their enterprises into the EGR is just being tested and is planned to run for the first time for the reference year 2022.

<sup>4</sup> Eurostat (2022), p. 2.

*Figure 3: Interaction between EGR and IPT*

The Business Statistics Directors Group set up the 'Task Force Future EGR' at European level since 2021. The mandate of this Task Force is to enhance the quality of information in the EGR for the future, especially for the largest enterprise groups and for the measurement of globalisation effects of these important enterprise groups. Manual treatment is to be done for the most important enterprise groups. As the analysis here is also multinational, the size and complexity of these units is even greater than at the national level in Germany. Both this treatment process and the necessary cooperation between many Member States and Eurostat must be supported in the best possible way by an IT tool.

One possibility to support this process for the treatment of enterprise groups would be the modularisation and expansion of the functionalities in IPT, so that modular processing would be possible there, just as in the iProfAnT described above. The precondition for this is a good interface between IPT and EGR and good coordination with the processes in the EGR so that duplication of work and data inconsistency can be avoided.

In this way, the complex units enterprises and enterprise groups could be treated manually in a focused way (according to agreed criteria) and, together with the improved automated processes, a high quality of the information and data in the EGR could be ensured. The better functionality and quality control that can be performed by the IT tool, combined with a high level of user-friendliness and flexibility, would allow that the manual treatment can be done in a large number of cases and thus the best quality increase would result.

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