Classifying VAT Legislation for Automation

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Abstract

The paper offers a framework for partitioning articles in legal documents pertaining to value added tax (VAT) into categories suitable for subsequent integration in computerized systems for automatically deriving VAT rates. The importance of an enterprise resource planning (ERP) system supporting VAT is not that it is required by a definition but because information technology in general increasingly supports everyday activities, so users expect more even from ERP systems. As an extended example, the classification of all articles of the European Council directive 2006/112/EC of 28 November 2006 on the common system of value added tax is presented. The classification of VAT articles is important in order to allow for easier VAT modeling for ERP systems. Better VAT modeling should eventually lead to lower cost of implementing changes in VAT legislature.

Keywords: enterprise resource planning (ERP) systems, value added tax, modeling

1. Introduction

Information technology as such supports an increasing number of everyday activities. Although no definition of enterprise resource planning (ERP) systems explicitly mentions that ERP systems should also support paying value added tax (VAT), companies implicitly expect all the support they can get with taxes from ERP systems. The statement that VAT (or taxes in general) is not a part of ERP system definition is based on a query (as of 29 September 2008) at the Web of Science database for the topic

"enterprise resource planning" AND tax

where none of 484 Web of Science articles mentioning the string "enterprise resource planning" in the text, contains the string "tax". This also implies that it apparently does not make sense to search for "value added tax", as the term "tax" was not found. Therefore, only the acronym of value added tax, i.e. "VAT" was included in the second query topic

"enterprise resource planning" AND vat

Again, there were no articles found. A known limitation to this investigation approach is that some of the articles in the database are available only as scanned pages, i.e. information about some

articles contains only the author(s) name, the title and the abstract, not the full text of the articles. A relevant example is (Fisher, Fisher, Kiang et al., 2004), which discusses ERP system selection criteria and mentions "international tax support" as one of the proposed criteria.

Nowadays, ERP systems, generally, support VAT but most often end-users have to be cognizant of the law and only *document* its use using their ERP system. Even in case the ERP system informs the end-user of the appropriate legal actions, it is achieved only by hard-wiring of *interpreted* VAT rules (in a form of a code or a definition file) into the ERP system.

Having a system which would advise the end-user what to do based on the full understanding of the VAT law, should optimize business processes – schedule payment of VAT or claim of VAT offset, exploit deadlines, and even improve the overall price of goods and services for customers (it might suggest that the company registers voluntarily as a VAT payer in certain countries, where it exports, in case VAT is lower in the other than in the home country).

Hard-wiring is not the best possibility in case the VAT law changes often, or in case the vendor would like to sell its ERP systems in several countries, requiring thorough localization of the hard-wiring present in the product. Another problem is that hard-wired VAT rules are often re-interpreted and only then deployed. The result is that even small changes in the law can lead to rather large changes in the ERP system code or in the definition files because even one rule, having been changed, could have been bundled with many other rules having stayed the same.

An obvious solution would be to empower law experts to input VAT rules into the system (possibly through a user-friendly front-end, not necessarily a part of an ERP system). The underlying problem is, how to set up an interface – what should it allow to model. So far, we have not found any classification of VAT rules, which could be used to set up environment, in which lawyers (or domains experts) could input VAT rules. This lack in literature was the motivation for the paper. The research question, which we hope to answer by this paper, is – What types of legal rules exist in VAT laws relevant for modeling in ERP systems? The answer to the question is the proposed framework in the third section.

A related research question is – Is the framework sufficient for classifying all VAT articles? In order to test it, we classified the European Council directive 2006/112/EC of 28 November 2006 on the common system of value added tax (The Council of the European Union, 2006) according to the framework in the fourth section. Since it has been possible to classify all the articles, we argue that the framework is sufficient. And since all the categories we used (although some only a few times), it can be concluded that all the categories in the proposed framework are necessary.

The paper is organized in the following way: the second section provides insight into VAT legislation, the third section describes the framework for classification of VAT articles, the fourth section presents the actual classification of articles in (The Council of the European Union, 2006), and the fifth section concludes our preliminary findings.

2. VAT Legislation

In this section, we describe features of the legal domain that are relevant with respect to modeling VAT rules. The description is mainly based on the European directive on the common system of value added tax (The Council of the European Union, 2006) but it is also applicable to country specific VAT acts.

From a top-level perspective, legal documents are structured collections of uniquely identifiable pieces of natural language text written in legal vernacular. Here, we describe the structure as it occurs in (The Council of the European Union, 2006). Our description shall take the notion of an *article* as its starting point. Articles in the directive are uniquely identifiable (sequentially numbered from 1) and are grouped using the following constructions: *title, chapter, section,* and *subsection.*

The grouping constructions are used for two related purposes. One is to be able to reference a

collection of articles, namely, the ones having a given grouping construction as an ancestor, while the second is to group articles in a meaningful way (for people). Because of the latter, grouping constructions carry headlines (short descriptions), not only identification numbers. But while articles are uniquely numbered on a directive-wide basis, grouping constructions are numbered sequentially from 1 within their enclosing construction, e.g. there can be a chapter 2 of title 1 as well as a chapter 2 of title 2 etc.

Hierarchical structure can also be imposed within individual articles. The intra article grouping constructions are enumerated in a fashion similar to chapters, sections etc. and serve the same purposes (referencing and grouping of related legal statements).

Being able to reference (collections of) articles is important since the provisions of (a part of) one article is often subject to the content of another. Similar to many other situations, e.g. file systems, references can be absolute or relative. Absolute references begin with either a title or an article number while relative references are relative to the place in which they occur. An example for relative referencing is Article 2 of (The Council of the European Union, 2006). It consists of three paragraphs, each of which has several schedules and points. In paragraph 2 schedule (a), a reference is given as follows: "For the purposes of point (ii) of paragraph 1(b),...".

Another issue related to structure and references is the common separation of (main) rules and their exceptions. The separation comes about because of the way in which legal documents evolve over time due to the fact that legislators cannot foresee all possible future usages, see (Prakken, 1997) for an elaborate discussion.

3. A framework for partitioning legal articles pertaining to VAT

Not all the content of a VAT law is relevant for explicit modeling in an ERP system, the foremost example being rules specifying procedures for updating the legislation such as Article 8 of (The Council of the European Union, 2006). Our goal is to model rules that are relevant in an ERP setting. In order to do this we need to identify the (different kinds of) relevant rules and to develop a modeling methodology. In order to facilitate these two tasks we have undertaken an enquiry into the nature of legal statements based on (The Council of the European Union, 2006), which has resulted in the following classification scheme for rules:

Definitions are legal statements introducing new concepts, which can be used in rules. Definitions can be either explicit, such as the definition of *taxable person*:

> 'Taxable person' shall mean any person who, independently, carries out in any place any economic activity, whatever the purpose or results of that activity. Any activity of producers, traders or persons supplying services, including mining and agricultural activities and activities of the professions, shall be regarded as economic activity. The exploitation of tangible or intangible property for the purposes of obtaining income therefrom on a continuing basis shall in particular be regarded as an economic activity.
>
> <div align="right">[Article 9, paragraph 1] (The Council of the European Union, 2006)</div>

or implicit in which case a concept is used in a rule without any prior (or trailing) explicit definition.

Classifications are legal statements relating concepts and legal statements (through references) to each other. Classifications can state rules that *may* be followed as well as rules that *must* be followed. Often classifications take the form *X should/shall be treated as Y*, which is the case e.g. in paragraph 1 of article 15 in (The Council of the European Union, 2006) which reads:

> Electricity, gas, heat, refrigeration and the like shall be treated as tangible property.
>
> <div align="right">[Article 15, paragraph 1] (The Council of the European Union, 2006)</div>

Classifications can also be implicit. This can happen in the situation where common sense

determines how concepts are related to each other. An example is that the concepts *vehicle* and *vessel* are assumed to be non-overlapping.

Workflows are legal statements describing relative or absolute timing of events. They can be seen as a subcategory of classifications but they deserve special attention because we believe they will be more challenging to model than non workflow classifications. An example is paragraph 3 of article 17 in (The Council of the European Union, 2006) which reads:

> If one of the conditions governing eligibility under paragraph 2 is no longer met, the goods shall be regarded as having been transferred to another Member State. In such cases, the transfer shall be deemed to take place at the time when that condition ceases to be met.

> [Article 17, paragraph 3] (The Council of the European Union, 2006)

Clarifications are legal statements clarifying the meaning of definitions and classifications. An example could be article 25 in (The Council of the European Union, 2006) which reads:

> A supply of services may consist, inter alia, in one of the following transactions:

> (a) of a document establishing title;

> (b) the obligation to refrain from an act, or to tolerate an act or situation;

> (c) the performance of services in pursuance of an order made by or in the name of a public authority or in pursuance of the law.

> [Article 25] (The Council of the European Union, 2006)

Legal statements that fall outside these categories can be classified as well but they are not interesting with respect to our modeling. Examples of such category are rules governing *necessary measures and regulatory behavior, Intention and applicability*, and *change of directive*. Amongst others this category contains articles 19, 23 and 34.4[1] of (The Council of the European Union, 2006).

Each article can belong to one or more categories. For example, classifications may include implicit definitions. Since both are manifested in the same sentence, it is not possible to split them in any reasonable way. When an article includes a classification and a workflow, it is usually possible to split them because they are addressed in separate paragraphs of the article.

It is possible to classify legal statements in other ways as well. We have arrived at the scheme above through an analysis of (The Council of the European Union, 2006), where we had formal modeling in mind.

4. Classification EU Directive 2006/112/EC

The classification of (The Council of the European Union, 2006), which is presented in Table 1, may be considered as a test of the proposed classification framework.

Class	Form	Description	Articles
1	Definitions of concepts	Introduce *concepts* such as *Community, Member State* and *Taxable Person.*	A5, A9, A12.2, A14.1, A17.1, A20, A24, A30, A31, A37.1, A37.2, A38, A48, A60, A62, A72, A78, A86.2, A154, A217, A241, A295, A311.1, A312, A344.1, A358, A405
2	Classifications (x should be treated as y)	Add content (information) to concepts and relate	A2, A6, A7, A11, A12.1, A13, 14.2, 14.3, A15, A16, A17.1, A17.2, A17.3, A18, A20, A21, A26.1, A27, A28, A29, A31, A32, A34.2, A36, A40, A43,

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[1] Article 34.4 is a shorthand notation for paragraph 4 of Article 34.

		concepts to each other (rules).	A44, A45, A46, A47, A49, A50, A51, A52, A54, A56.1, A58, A61, A63, A68, A70, A71, A73, A74, A75, A76, A77, A78, A79, A83, A84.2, A85, A86.1, A87, A91, A93, A94, A168, A170, A171, A172.1, A173.1, A174.1, A175, A178, A179, A184, A185, A187, A188, A193, A195, A196, A197, A198, A200, A201, A202, A203, A206, A213, A216, A219, A220, A223, A224.1, A226, A230, A232, A233.1, A236, A242, A243, A244, A245.1, A246, A249, A250.1, A251, A262, A264.1, A265.1, A274, A275, A276, A277, A278, A279, A282, A283.1, A288, A289, A290, A291, A298, A299, A300, A301, A302, A303.1, A303.2, A306.2, A307, A308, A309, A310, A311.3, A313.2, A314, A315, A317, A319, A320, A321, A322, A323, A324, A325, A327, A328, A329, A330, A331, A332, A334, A335, A336, A337, A338, A339, A340, A344.3, A354, A355, A360, A361, A364, A365, A366, A367, A368, A369, A393.2, A407, A408, A409
		Extention to rule	A39, A41, A59, A64, A65, A169
		Exceptions	A3, A19, A22, A33, A34.1, A35, A42, A53, A55, A57.1, A66, A174.2, A410
		Extention to exception	A4
3	Intention and applicability	Describes the intention with certain articles, sections, chapters, etc.	A1
4	Workflows	Describe absolute and relative timing.	A17.3, A56.3, A57.2, A67, A69, A167, A252.1, A263.1, A264.2, A265.2, A357
5	Necessary measures & Regulatory behaviour	Describe obligations to ensure a certain behavior.	A7.2, A11, A19, A20, A23, A26.2, A34.4, A80, A81, A82, A84.1, A88, A89, A90, A92, A95, A96, A97, A98, A99, A102, A103, A104, A105, A108, A109, A110, A111, A113, A114, A115, A116, A117, A118, A119, A120, A121, A122, A123, A124, A125, A126, A127, A128, A129, A130, A131, A132, A133, A134, A135, A136, A137, A138, A139, A140, A141, A142, A143, A144, A145, A146, A147, A148, A149, A150.2, A151, A152, A153, A155, A156, A157, A158, A159, A160, A161, A162, A163, A164, A165, A172.2, A173.2, A174.1, A174.3, 175.2, A176, A177, A179, A180, A181, A182, A183, A185.2, A186, A187.1, A188.2, A189, A190, A191, A192, A194, A199, A204, A205, A207, A208, A209, A210, A211, A212, A213.1, A214, A215, A218, A221, A222, A224.2, A224.3, A225, A227, A228, A229, A231, A233.2, A233.3, A234, A235, A238, A239, A240, A245.2, A247, A248, A250.2, A252, A253, A254, A255, A256, A257, A258, A259, A260, A261, A263.2, A264.2, A266, A267, A268, A270,

			A271, A272, A273, A280, A281, A283.2, A284, A285, A286, A287, A292, A296, A297, A298, A301.1, A303.3, A304, A305, A306.1, 311.2, A313.1, A316, A318, A326, A330, A333, A341, A342, A344.2, A345, A346, A347, A348, A349, A350, A351, A352, A353, A356, A359, A362, A363, A366.1, A367, A370, A371, A372, A373, A374, A375, A376, A378, A379, A380, A381, A382, A383, A384, A385, A386, A387, A388, A389, A390, A391, A392, A394, A399, A400, A401, A406, A412
6	Clarifications (explicit statement of implied facts)	Extend other articles with details or directions on usage.	A10, A25, A56.2, A57.2, A270, A271, A311.1
7	Change of directive	Describe procedures for changing (parts of) the directive.	A8, A.34.3, A37.3, A100, A101, A106, +A107, A112, A150.1, A166, A176, A237, A269, A293, A294, A343, A393.1, A395, A396, A397, A398, A402, A403, A404, A411, A413, A414

Table 1. The classification of Council Directive 2006/112/EC on the common system of VAT.

Probably the hardest part of the process was to distinguish between explicit definitions and classifications. An example could be paragraph 1 of article 38 in (The Council of the European Union, 2006) which reads:

> In the case of the supply of gas through the natural gas distribution system, or of electricity, to a taxable dealer, the place of supply shall be deemed to be the place where that taxable dealer has established his business or has a fixed establishment for which the goods are supplied, or, in the absence of such a place of business or fixed establishment, the place where he has his permanent address or usually resides.

[Article 38, paragraph 1] (The Council of the European Union, 2006)

The problem with this paragraph is whether it should be read as "the place where that taxable dealer has established his business …" should be treated as "the place of supply" (i.e. paragraph being a classification) or "the place of supply" is "the place where that taxable dealer has established his business…" (i.e. paragraph being explicit definition of the place of supply).

Other articles, which were hard to categorize, are not relevant for modeling of VAT for ERP systems, so they will not be discussed.

5. Conclusion

We tried to answer two research questions in this article. The first was aimed at what types of legal rules there exist in VAT laws relevant for modeling in ERP systems. Since there has not been any framework available in literature, we proposed one with the following categories: definitions, classifications, workflows, clarifications, intention and applicability, necessary measures and regulatory behaviour, and change of directive. The first four categories are relevant for modeling (though it could be discussed whether the fourth one is useful for anything else than making sure that the articles belonging to the first three categories were understood correctly).

The second research question was whether the proposed framework is sufficient for classifying all VAT articles. In order to test the hypothesis, we classified the European Council directive

2006/112/EC of 28 November 2006 on the common system of value added tax (The Council of the European Union, 2006) according to the framework. Since it has been possible to classify all the articles, we argue that the framework is sufficient. And since all the categories we used (although some only a few times), it can be concluded that all the categories in the proposed framework are necessary.

The remaining challenges are to explicitly define hierarchies and whether certain terms are overlapping or non-overlapping. Future research will involve classification of national VAT acts (making a few categories redundant), and comparison of VAT acts of European Union counties to the directive. Last but not least, we plan to try to model VAT rules using the Language for Logical Modelling of Business Rules and Regulations (LLMBRR).

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