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Improvement of the compilation process of the Italian income certifications: a methodology based on the evaluation of the information content (Part 1)

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Abstract

In recent years the Italian tax system has been affected by significant changes. Important legislative reforms have revolutionized the relationship between citizens and public administration. These changes tried to simplify the relationship between citizens and public administration, reducing the burden of bureaucracy on the lives of citizens and businesses. To simplify the completion of income statement taxpayers, the Italian Revenue Agency started to use precompiled statement from 2015. However, many manual actions are still necessary to correct or complete the statement. This paper focuses on the improvement of compilation and control of income certifications in order to reduce non-compliance poured into precompiled statements. The proposed method aims to improve the process by introducing a robust procedure based on Axiomatic Design that is able to quantify the information content of a software project by measuring the information content through the Function Point technique. The developed approach will be able to prevent the generation of non-compliances. In this way, to identify possible critical situations in a proactive way and to avoid classes of non-conformities, it will be possible to optimize the data compilation process to verify compliance with the technical specifications of the Italian Revenue Agency. The goal of the proposed approach is to simplify the collection of fiscal data and create a clearer path for taxpayers.

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1. Background

The process of computerization in the Italian public administration is progressively reducing the gap between citizens and public administration. This improvement is particularly noticeable in the field of taxation. In 2015, with the “Stability Law”, the Italian Government has already introduced pre-filled tax returns, which are made available by the Revenue Agency to taxpayers with an income from employment and pensions [1]. This is a historic breakthrough for the Italian Revenue Agency: from a fiscal system where taxpayers were obliged to submit an annual tax return form (based on the income received during the previous year and certified by their employer), it now has switched to a system where the Revenue Agency provides taxpayers with a pre-filled form. The Italian Revenue Agency acquires information about the citizens’ income, the deductible expenses, and those

expenses that can be deducted directly by the employers. Moreover, on April 15, Tax Authorities are releasing a pre-populated form over the internet using the information received. Taxpayers will be able to access their form using a personal PIN code, which will also allow access to the services provided by the Agency. Taxpayers can accept the pre-filled statement, thus avoiding any subsequent tax audit. The Revenue Agency will forward the debt or credit payment schedule to the employers, who will act as “withholding agents”. If taxpayers contest the pre-populated form, they will be able to change it online or seek for advice at any chartered office for tax assistance.

2. Introduction

This article focuses on improving the process for preparation and control of income tax certifications in order to

reduce non-conformities, which still persist and prevent the full automation of the entire system. For this reason, we propose the adoption of a software design methodology that leverages a decomposition approach of functional requirements based on the Axiomatic Design. This paper pays particular attention to the application of the axiom of information that is usually a critical issue in the development of industrial products [2-6] and transactional processes [7] but which is often overlooked by software designers [8]. This use is facilitated by adopting the estimate in function points of the information content of the decomposition to be evaluated. Thus, the designer may also select the solution, among the different functional substantial decompositions, requiring the least effort in terms of resources and development time. This approach is the same as choosing the functional decomposition with the lowest information content, meeting the same functional requirements at the same time. The present article describes the theoretical aspects of the proposed approach. A second article (Part II), on the other hand, illustrates the application of this approach on a real case example.

3. Operational environment

Despite progress in recent years, there are still some areas of inefficiency, mainly due to an incomplete computerization process in some sectors. Very often, the existing computer systems have already been designed to fulfill tax obligations other than those provided for by recent standards. Therefore, the reconversion of IT procedures faces a certain rigidity as well as operational limits, which need to be taken into account. Redesigning the management procedures of service delivery to citizens (salary transfers, pensions, insurance benefit management, etc.) is extremely onerous and therefore inapplicable. Thus, the most viable solution to the problem consists in implementing the system of compilation of income certifications in a contextualized management, in its operational environment. This contextualization results in producing income certifications that must meet the requirements as per the instructions of tax compilation produced by the Revenue Agency, taking into account, at the same time, the intrinsic characteristics of the operating environment. These intrinsic characteristics are formalized in this paper in clusters of non-conformities and design constraints. In this way, the process of compilation of income certifications can prevent spreading problems related to a particular operating environment, proceeding towards the precompiled tax declaration that is produced for the citizens by the Revenue Agency. Therefore, the production system of income certifications may not be a simple Data Entry provided by the conferring procedures. A design must be set for the compilation process of these certifications, so that it might have a proactive function of non-conformity resolution for those management procedures that may be generated, since they were designed according to tax rules that are no longer in force. For this purpose, the present article aims at presenting a methodology for implementation and maintenance of tax information systems, which can eliminate the non-conformity historical process and ensure conformity with the time

constraints of data transmission to the Revenue Agency; on the other hand, it allows meeting the Agency's compilation rules. For this reason, we propose the adoption of a design methodology that makes use of a decomposition approach of functional requirements based on the verification of the axioms of independence and information. In this case, the functional requirements for the compilation process are defined taking into account both the instructions for certifications and the operating environment's context features, by assessing its overall consistency.

4. General outline of development

In this article, we will refer to the Axiomatic Design of Object-oriented Software Systems (ADo-oSS) methodology [9]. This methodology allows the integration in a simplified manner of AD design with the implementation of software systems adopting the Object-Oriented Programming (OOP). AD is a top-down type of design approach. It narrows down starting from the general down to the particular. The Functional Requirements of the project (FR) are defined starting from the Customer Attributes (CA). At this stage, the Design Parameters (DP) are identified. If the level of analysis is too abstract, we proceed with a decomposition activity (FR). At this point, the corresponding (DP)s are identified. The process continues down to the level of detail needed for design purposes [9, 10]. The last stage of AD designing is actually the identification of a decomposition between FR and DP, which corresponds to the conceptual design of the system to be implemented. Therefore, the output of the AD design stage is the input for the system programmers. In fact, the OOP programming is Bottom Up: starting from the particular, it proceeds upwards to the general. The logic drawing of the system is the first phase of the software's life cycle.

5. Building a robust process

Axiomatic Design is based on the verifications of the axioms of independence and information. The axiom of independence guarantees that consistent design solutions are those whose relationships between FR and DP are uncoupled or decoupled. On the contrary, the information axiom allows us to select, if various different substantial solutions are present, the most robust solution - which corresponds to the project with the lower information value. The concept of information is also understood as more likely to meet the Functional Requirements (FR) via the Design Parameters (DP). However, in the software design field, Axiomatic Design is often applied using only the verification of the axiom of independence. The solutions that are thus identified are consistent from a designing point of view, but are not robust in more conceptual sense. Scientific literature on this subject often justifies the non-application of the axiom of information by stating the difficulty in quantifying the information content of a software project [9]. This paper suggests an application method for the axiom of information by measuring the information content between FR and DP relations through the Function Point technique [11-13]. Thus, the design process of populating a system of income tax

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