USING TABLEAU SOFTWARE AS A SAAS PROGRAM IN BUSINESS IN CLOUD

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Abstract: *Cloud computing has become a modern, almost indispensable tool for many businesses. Modern business is in a continuous technological development and online commerce is still growing, and this article provides an overview of how to develop business using BI technologies in Cloud Computing. The article also presents how to work Tableau Software program for collecting and viewing the information needed to make decisions within companies.*

Keywords: *Tableau Software, e-commerce, software as a service, Bussiness Intelligence, business in cloud*

1. Introduction

The online environment is not only used for communication, information transfer or entertainment, but is also a business environment. This factor has led to the development of an entire branch of science called E-commerce or e-commerce.

There are several types of online commerce, including the following:
- Business-to-consumer (B2C): companies or organizations that offer services or products to individual buyers or users, ie individuals (amazon.com).
- Business-To-Business (B2B): this model of e-commerce is composed only of and for organizations (rtcoffice.ro).
- Consumer-to-consumer (C2C): users who sell to other users (ebay.com, olx.ro).
- Consumer-to-business (C2B): Internet users sell the services or products of advertisers (priceline.com).
- Mobile commerce (m-commerce): is characterized by electronic commerce on mobile devices (electromagnetic).
- Government-to-business (G2B): is expressed through electronic commerce between a government institution and legal entities, through the purchase of services, goods or information.
- Government-to-consumer (G2C): Covers the relationship between citizen and government by providing information and providing public services (for example, when a user pays taxes online). [1]

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For a more objective approach to the benefits of e-commerce, three categories will be presented: companies, consumers and society. For companies, the benefits are limited to: international expansion; reducing costs for information stored on paper; product modeling on the buyer's need; lower communication costs. The benefits for consumers are: the possibility to buy 24/24 hours, 7/7 days; a wider and more diverse choice, both in terms of price and delivery; relevant and up-to-date information; the possibility to participate in virtual auctions; facilitating competition, which can lead to lower prices. For society, it can be seen how e-commerce can reduce street traffic and reduce air pollution; increases the quality and efficiency of transactions. [2]

2. Cloud computing and Bussiness Intelligence

According to the definition given by the National Institute of Standards and Technologies (NIST) of the US Department of Commerce, Cloud Computing is defined as a model that can access a common space of computer resources (which can be configured) using the Internet, which can be offered quickly by the supplier. This cloud model consists of five key features, three service models, and four deployment models.

Cloud Computing is composed of five features that are presented below:
- On-demand self-service - the customer can access on-demand computer capabilities without direct interaction with different vendors.
- Broad network access - the resources are available through the internet, without special or customized settings, but they can be used directly in the client's platform.
- Resource pooling - resources are pooled in the form of a multiple custody model, allocated according to demand. The client is not aware of the exact location of computer resources, such as processing resources, storage, virtual machines, memory, or bandwidth.
- Rapid elasticity - the computing capacity can increase or decrease rapidly and elastic, depending on the consumer's needs, which can be purchased at any time, for any quantity.
- Measured Service - the ability to measure the level of abstraction of each type of service by automated cloud systems can be monitored, reported or controlled in a transparent way for both the consumer and the provider. [3]
There are three models of cloud services (figure 1):
- Cloud Infrastructure as a Service (IaaS) - the cloud provider provides the client with storage, processing and networking resources (other basic computing capabilities may be included) in which its software can be executed or implemented (here can be including operating systems). The consumer will not be able to control the infrastructure on which his programs run, but he has total control over operating systems, applications and storage.

- Cloud Platform as a Service (PaaS) - as in IaaS, the user has no control over the infrastructure, but also over the operating systems and storage space of the cloud. However, the user can run any application, either created by him or purchased.
- Cloud Software as a Service (SaaS) - as in the case of the IaaS and PaaS model, the user will not control the infrastructure or operating systems, but his applications will not be able to run in the cloud. The user will use the provider's application in the cloud, having only the rights to configure it, but not to modify or store it.
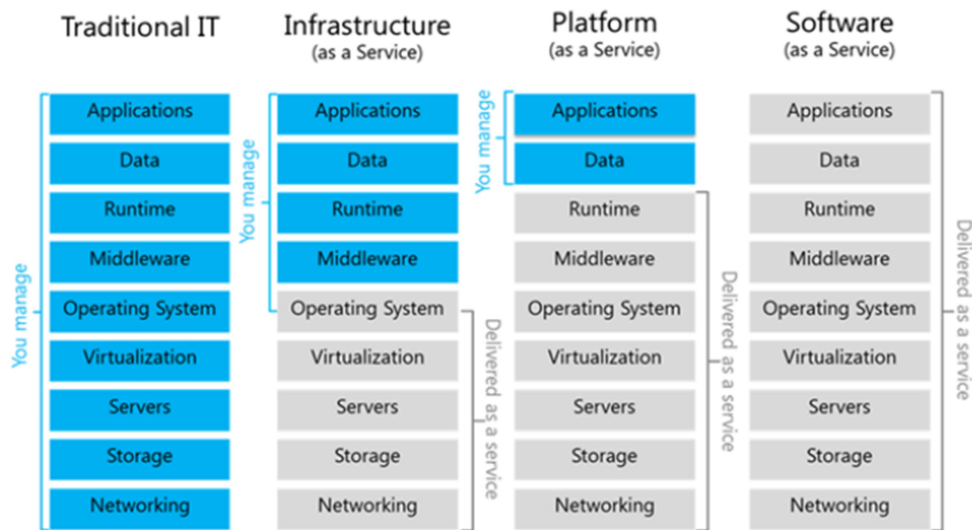
Figure 1. Cloud service models

The cloud reference architecture defines five main actors: the cloud consumer, cloud provider, cloud carrier, cloud auditor and cloud broker. Each actor is an entity (a person or organization) that participates in a transaction or process and / or performs tasks in the field of cloud computing. A cloud consumer can request cloud services from a cloud provider directly or through a cloud broker. A cloud auditor performs independent audits and can contact other auditors to gather the necessary information.

Security control in cloud computing is, for the most part, different from security control in any IT environment. Thus, despite the cloud service models used, the business models, and the technologies used to enable cloud services, cloud computing can present a completely different risks to an organization than the risks that come from traditional IT solutions.

The level of security of an organization is characterized by the maturity, effectiveness and completeness of the controls implemented, adjusted to security risks. These controls are implemented in one or more layers, from facilities (physical security) to network infrastructure (network security), from computer systems (system security) to information and applications (application security).

Cloud computing is very useful for many businesses, reduces costs and allows them to focus on competence instead of IT and infrastructure issues. However, cloud computing has proven to have some limitations and disadvantages, especially for smaller business operations, especially in terms of security and downtime. Technical disruptions are inevitable, they can sometimes occur when cloud service providers become overwhelmed in the process of serving customers. This can lead to the temporary suspension of the business, as the systems of this technology are based on the Internet, therefore, a person will not be able to access applications, server or data in the cloud during an interruption. [5]

According to Timo Elliott, there are four steps to a business analysis (as shown in Figure 2) to achieve the most predictable results. [6]
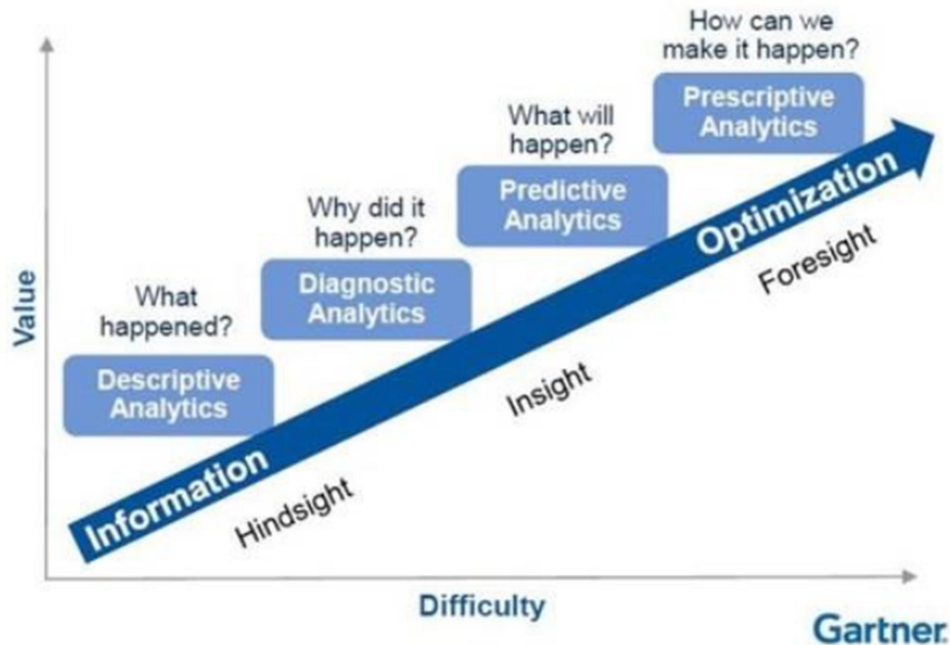
Figure 2. The steps for a business analysis

The first phase or step is the descriptive one, where the analysis of the business is focused on what happened in the past. Here the history of the data traded in the data warehouse is analyzed, in order to identify the causes of success and failure of the company. This is the most common post mortem analysis done by any company. For example, if the company's sales have fallen, it will be identified why they have fallen. Here BI technology will help identify hidden trends and relate the company's multitude of data to a declining particular sales segment. At this point, the second phase appears, that of diagnosis, where it is decided what is the reason behind what happened. The predictive phase will collaborate with various statistical tools, such as correlation and regression, to find out what will happen in the future. An example is the customer who leaves the business. But it does not

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help to identify the actions that need to be taken to prevent this. Therefore, the last phase of the BI analysis is also necessary, it is the prescriptive one. At this stage, not only the best possible actions are suggested to benefit from the forecast, but it will also show the effects of these actions on the business. This stage of business analysis is the most advantageous, in order to save time and money for business experiments and risk-taking, along with them.

3. Bussiness Intelligence in Cloud Computing

Cloud computing allows scaling up and down because the capacity is required by the company and it is gradually paid to the cloud computing service provider. [7] With the cloud-based solution there is a lower financial risk for the business, as the business only pays for what it uses and can terminate the service level agreement at any time.

Cloud Computing Business Intelligence trends for 2019 are given by a high percentage of 48% of organizations who say that cloud BI is either "critical" or "very important" for their operations in 2019. Organizations have more confidence in cloud BI than at any time, according to the results of the study. The year 2019 is facing a significant increase in cloud BI, made available by trusted providers, for accessing, analyzing and storing sensitive company data on cloud platforms running BI applications (Figure 3)
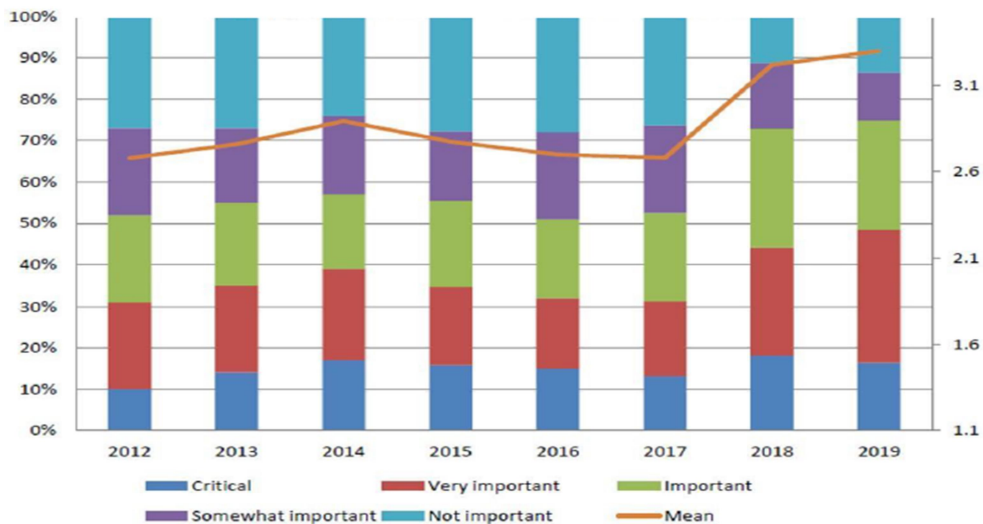

Figure 3. Cloud BI Importance 2012-2019 (according to Dresner Advisory Services)

Marketing and sales place the most importance on cloud BI technology in 2019. Business intelligence centers (BICCs) and IT departments have an above average interest in cloud BI, providing critical and very important scores, combined are over 50% (figure 4).
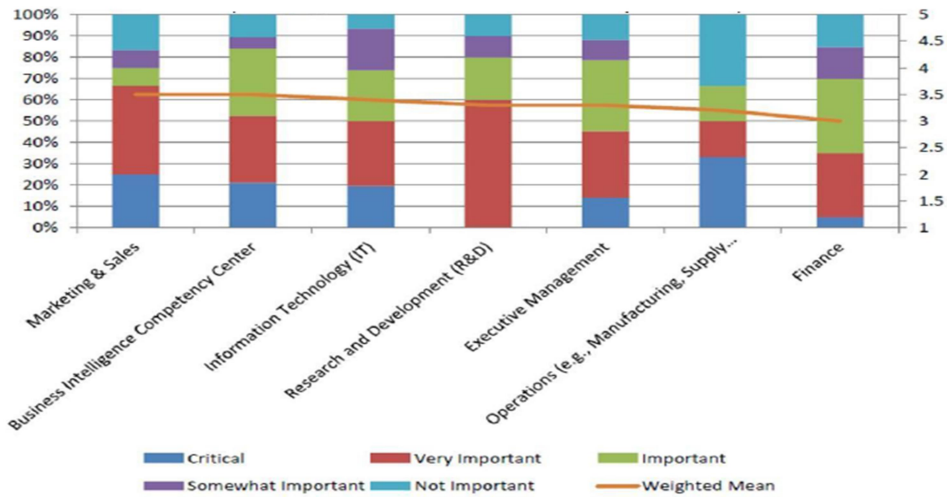
Figure 4. Cloud BI Importance by function (according to Dresner Advisory Services)

The finance field leads everyone else in adopting private cloud BI platforms, which compete with the IT field in their lack of adoption for the public cloud. The areas of research and development are still the most likely to be based on the private cloud today. Marketing and sales are most likely to take a balanced approach to adopting the private and public cloud. (figure 5)
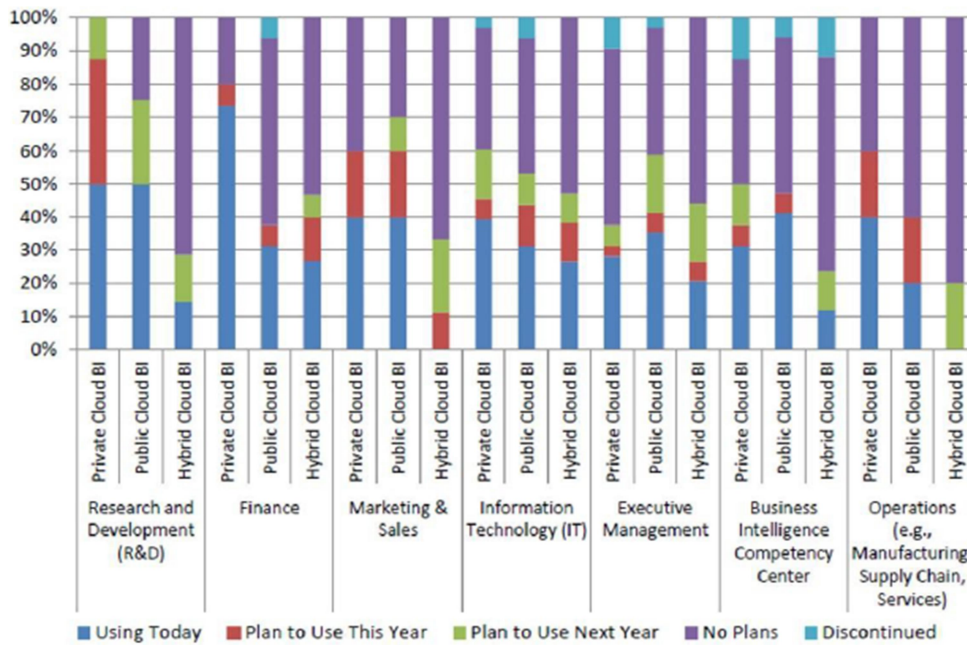

Figure 5. Plans for Cloud BI for deployment models and function (according to Dresner Advisory Services)

The BI technology used in the cloud came with the advent of the first Cloud applications, but some of the first, being pioneers of Cloud BI have disappeared from the market, for example Oco, LucidEra and PivotLink. However, Cloud BI solutions have developed a lot with the migration of corporate data online. Some of such solutions are: SAP Analytics Cloud, IBM Cognos Analytics, Microsoft Power BI, Tableau.

4. Tableau Online software - an example of Saas program

Tableau Software is an interactive data visualization software company founded in January 2003 by Christian Chabot, Pat Hanrahan and Chris Stolte in Mountain View, California. With Tableau, data analysis is very fast, and the views created are in the form of dashboards and worksheets. Data created using Tableau can be understood by professionals at any level in an organization. It even allows a non-technical user to create a custom dashboard. The most used tools in the Tableau suite are: Tableau Desktop, Tableau Public, Tableau Online, Tableau Server and Tableau Reader.

The data analyzed in Tableau Software can be classified into two categories:
▪ Developer tools: such as dashboard creation, charts, report generation and visualization are part of this category. Tableau products in this category are Tableau Desktop and Tableau Public.
▪ Distribution tools help to share views, reports, dashboards that have been created using development tools. The products that belong to this category are Tableau Online, Server and Reader.

Once the user has access to the Tableau Software program (after creating an account), the first thing they need to do is create a project or upload a project already done in the Tableau Desktop application. Separate pages (workbooks) can also be made, but working with projects offers a better organization of the data.


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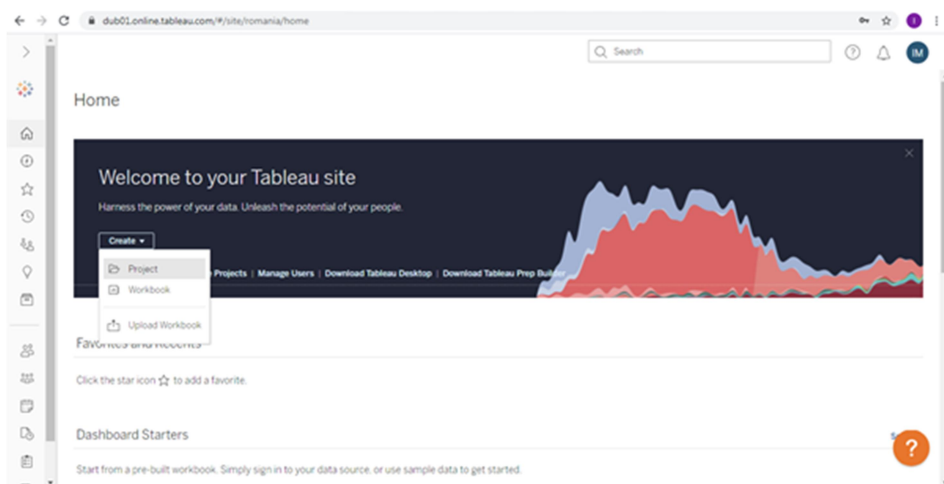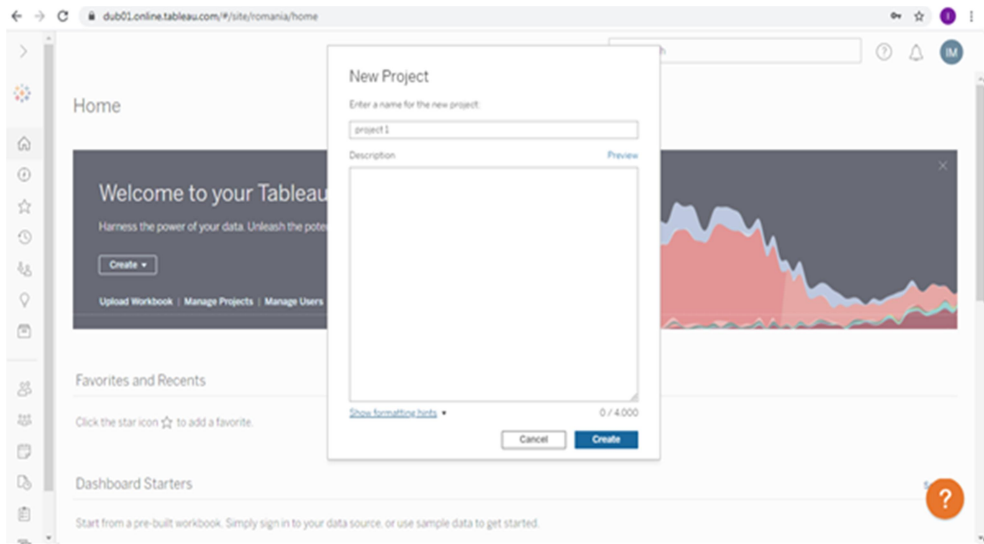
After completing the project, the user proceeds to the next stage - uploading data to the program. It can also load data from an Excel file or enter data from the keyboard. Next we chose to enter the data from an Excel file from the computer.
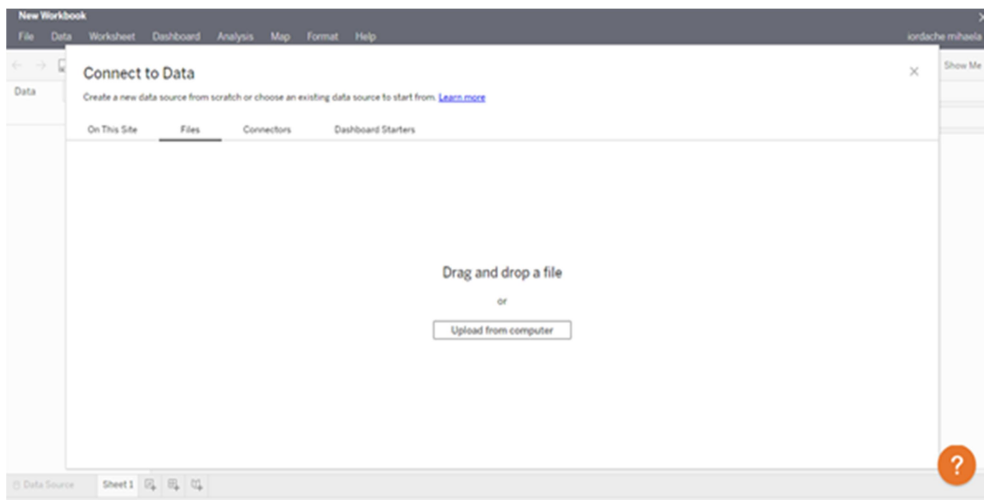

After the data in the file have been selected (spreadsheet), the columns that are of interest in the analysis are selected from the initial data table.
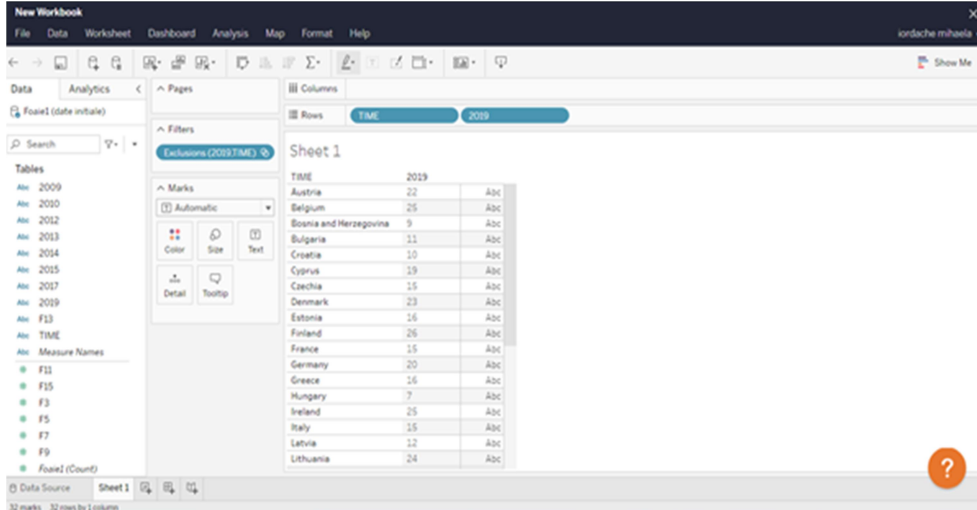
If there is an Excel file with several pages with similar data (for example a column with common data), Tableau Software allows links between its pages. For example, common data refers to the recording of the values of some indicators for the same countries, the same units of measurement and others. We cannot link pages with raw data to pages with aggregated data - such as amounts, averages, percentages, and more.
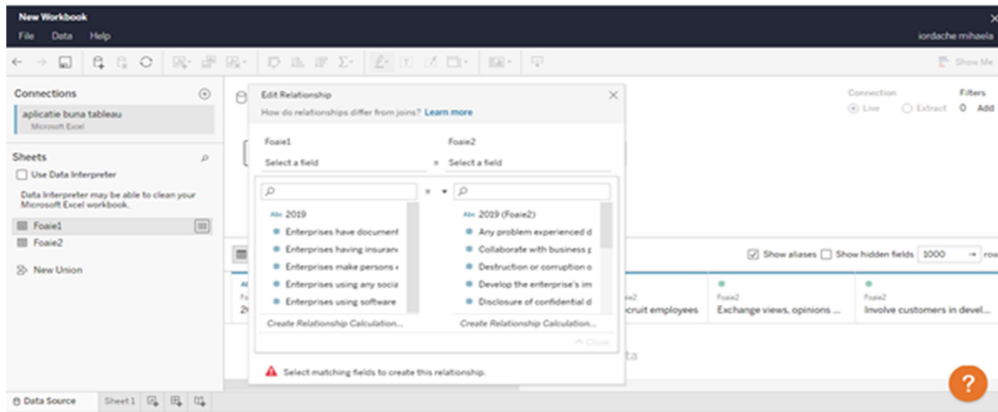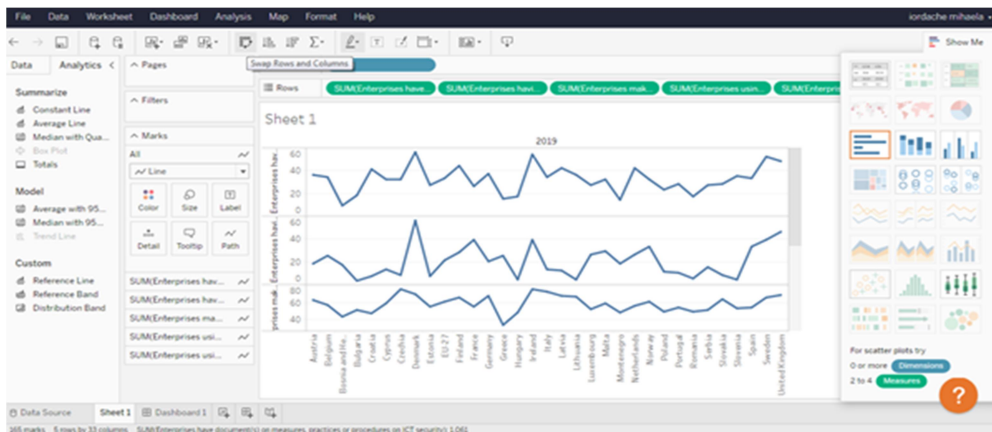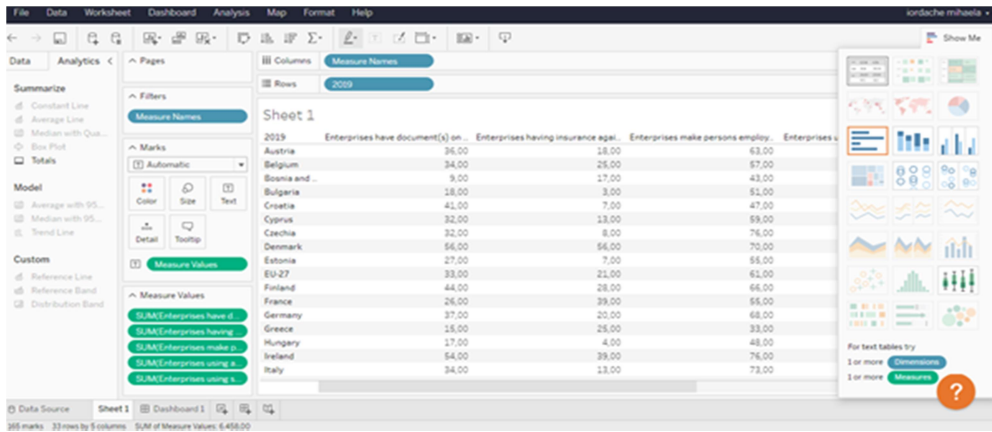

To load data from several spreadsheets in an excel file, select each spreadsheet, then click the update now button.
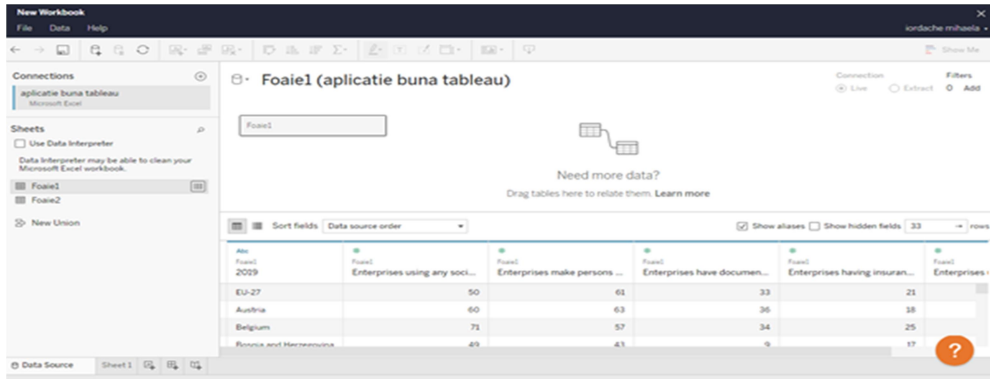
After loading the raw data from Excel files, you can move on to viewing them more easily by making graphs. Thus, the data can be viewed according to the options chosen by the user.
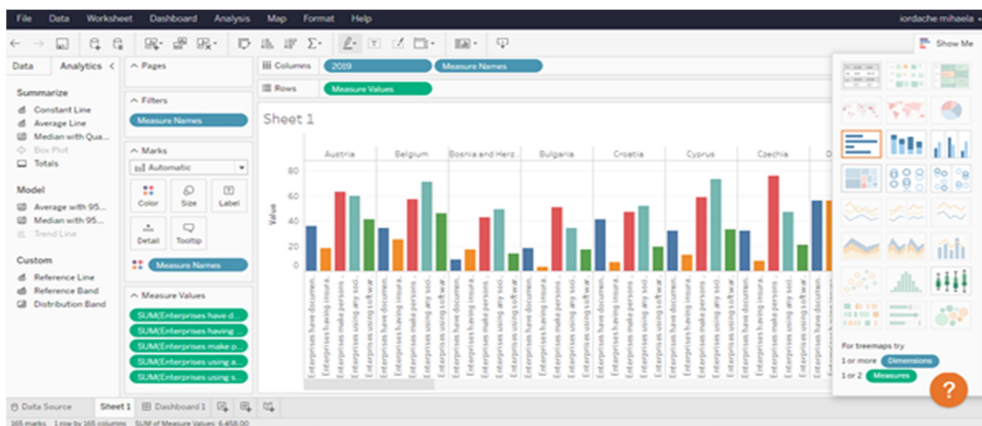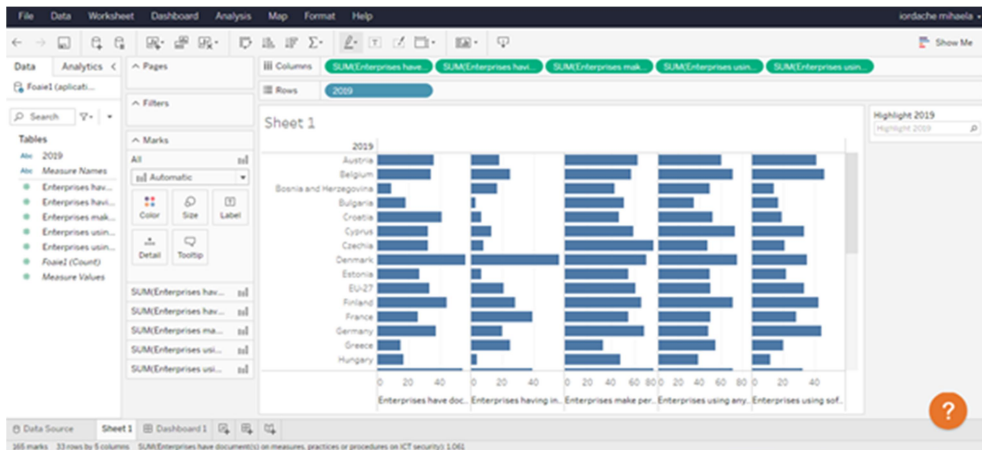
Depending on the information needs that underlie the decision-making at the managerial level, various aggregate indicators can be calculated (total grades - per row / column / total grade / and others).
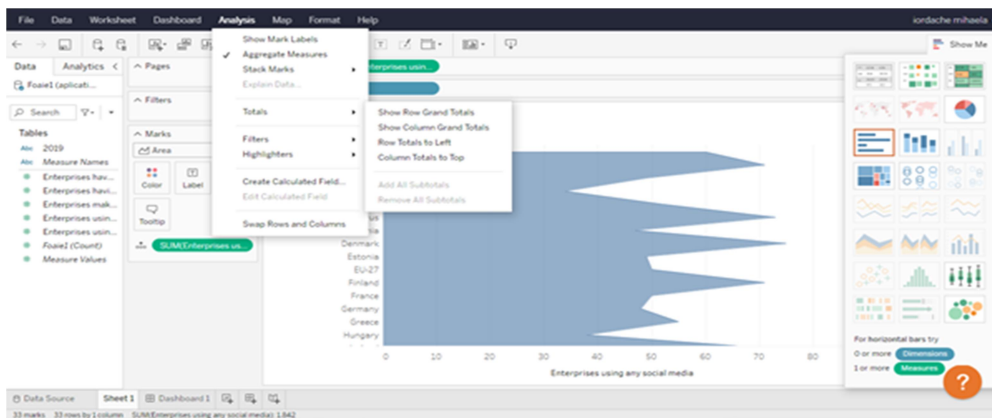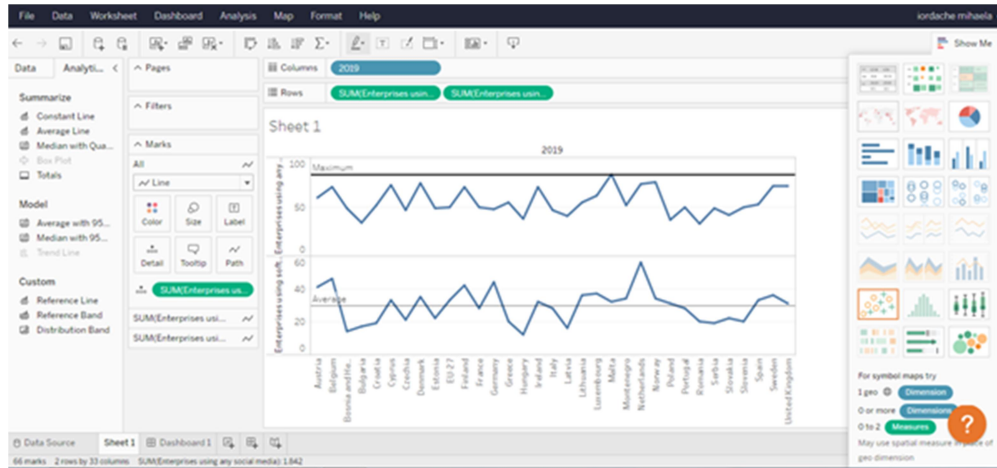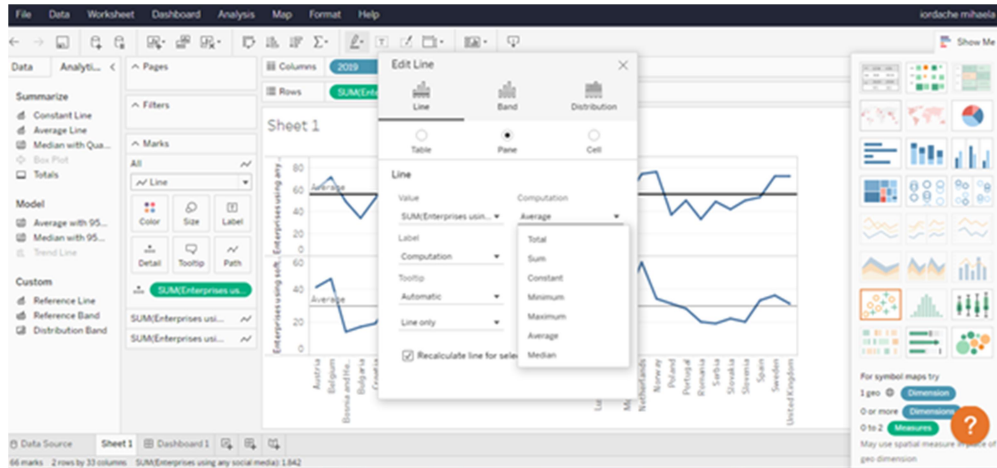
4. Conclusion

E-commerce is no longer something new for the Romanian society, as it was ten years ago, anyone can place an order online, without making a trip to the store and without this being a fad. At the same time, studies show that traditional sales are not being replaced by electronic ones, so both types of sales are important for a business. However, online sales offer an easier opportunity to study the buyer, his behavior on the site, general business trends and building sales forecasts, and in this area, Business Intelligence applications have become increasingly qualified to provide a answer as close to the truth as possible. The importance of using the Cloud for a BI tool comes at the same time as reducing the costs of implementing IT infrastructure, BI application developments and hiring qualified staff, but also with the changes in data volume, which can be unexpected and the changes at the infrastructure level, they will become more expensive and more difficult to

implement, compared to cloud services that allow scalable capabilities to be clicked, and payment is often made only for what is used in the cloud.

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