

How can the Business Intelligence system be developed at YIT?



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The main purpose of this thesis is to improve the Business Intelligence (BI) reporting system at YIT Group. The system features, information quality and usability have been monitored in order to find improvement needs. The objective was approached by a survey and exploring the possibilities that Business Intelligence can generally offer.

The survey was carried out by a questionnaire via e-mail. The questionnaire was sent to 60 out of the 500 active system users across the Nordic countries inside YIT Group. The sample of the user group consists of financial personnel and management, who can be divided inside the user group to management users, process owners, key users and end users. 14 out of 60 users answered the survey.

The study discovered that there is room for improvements. Especially the system performance should be more efficient, a variety of reports should be available and the graphical details and lack of features in the user interface require more examination for better usability. By developing these basic features the system usage could be improved.

Despite the problems that arose, the users have set large expectations on the new reporting system in the future. According to the survey, the system is widely used at YIT and it is a key system for reporting, planning and analysing on all levels and in all sectors. Building a better system should start from setting the objectives and slowly move forward by developing the features that need improvements. In this study ideas and remarks from the users are analysed and presented to give the right direction for the system development in the future.

Key words Business Intelligence, YIT, reporting, survey, development

Tervala, Jaakko

Miten Business Intelligence -järjestelmää voidaan kehittää YIT:llä?

Vuosi 2011 Sivumäärä 40

Tämän opinnäytetyön tarkoituksena on parantaa YIT Konzernissa käytössä olevaa Business Intelligence (BI) -raportointijärjestelmää. Parannettavaa on etsitty tiedon laadun, käytettävyyden ja sisällöllisten ominaisuuksien osa-alueilta. Tavoitteeseen on pyritty YIT:n työntekijöille laaditulla kyselyllä ja tutkimalla järjestelmän mahdollisuuksia yleisesti.

Kysely toteutettiin sähköpostitse käyttäen kyselylomaketta. Kyselylomake lähetettiin 60:lle järjestelmän aktiiviselle käyttäjälle 500 aktiivisen käyttäjän kokonaismäärästä. Otanta koostui talouden ja johtotason henkilöistä, jotka jakautuvat käyttäjäryhmässä johtotason käyttäjiin, prosessin omistajiin, avainkäyttäjiin ja loppukäyttäjiin. Kyselyyn vastasi 14 käyttäjää 60:stä.

Tutkimus osoitti että järjestelmän parannuksille on tarvetta. Järjestelmän suorituskyky pitäisi olla tehokkaampi, raporttivalikoima pitäisi olla laajempi sekä graafinen ulkoasu ja käyttöliittymän yksityiskohtien puutokset vaatisivat tarkastelua paremman käytettävyyden kannalta. Näitä perusasioita kehittämällä koko järjestelmän käyttöä pystyttäisiin parantamaan.

Esille tulleista puutteista huolimatta käyttäjät odottavat paljon uudelta raportointijärjestelmältä tulevaisuudessa. Kyselyssä tuli esille, että järjestelmä on laajasti käytössä ja se on tärkeä järjestelmä raportointiin, suunnitteluun ja analysointiin kaikilla tasoilla ja toimialoilla YIT:n organisaatiossa. Paremman järjestelmän rakentaminen olisi syytä aloittaa tavoitteista ja edetä parantamalla yksityiskohtia esille tulleiden kehityskohteiden osalta. Tässä tutkimuksessa käyttäjien ideat ja huomiot on analysoitu ja esitelty antamaan kehitykselle oikea suunta tulevaisuudessa.

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1 Introduction

Important business decisions are made every day. Decisions should be good, profitable, and well argued. Systems have been developed that can help to give knowledge to the management to make good decisions. This thesis is a research to the Business Intelligence (BI) reporting system which has been developed to this type of needs.

The essential purpose for Business Intelligence is to gather the specific data from the endless databases to help decision making in business. Different variety of companies' data bases and operational sources can be used to give information to the BI's use. BI usually uses the Data Warehouse technology which makes the converging data reporting possible. Business Intelligence is a system which is not only based with a solution by one vendor. Different BI solutions are offered by many big software companies like SAP, IBM, Microsoft and several other smaller companies. (Hovi, Hervonen & Koistinen 2009; Data warehouse info 2008)

The target of this research is a BI solution offered by one of the biggest business software vendors; the SAP AG. YIT has implemented a SAP Enterprise Resource Planning (ERP) and chose the BI to belong one of its features. In YIT the Business Intelligence includes also the Integrated Planning - and it goes by the name of Business Intelligence-Integrated Planning (BI-IP). The information presented in the BI-IP is based from the information what is in the ERP. The BI-IP is used in the web-based portal; SAP NetWeaver. It is meant for monthly reporting and forecasting. (Hovi et. Al. 2009; Hartikainen 2011)

The objectives to this research are to analyse the BI-IP's current state and the direction for the development. This has been carried out by exploring the Business Intelligence theory and trends and interviewing the BI-IP users in YIT with a survey.

All of the interviewees are somehow responsible for the business outcome. They are interested in information for improving the business. In this report the core results came from the users own experiments. The answers have been summarised from the users' opinions of the direction for the Business Intelligence in YIT.

2 Business Intelligence

2.1 What is Business Intelligence?

Business Intelligence can not describe as a single product, a technology or a methodology. BI is a combination of all that. It is used to organize the key information and give the management the information that is needed to improve the business performance. (Williams, Williams 2007, 2)

2.1.1 History of Business Intelligence

Business Intelligence is all about having right information at the right time and to the right people. It is meant to give knowledge to the better decision making. These type of systems have been around as long as computers but with a little variety. History of Business Intelligence starts from the late eighties when methods and technology in decisions support systems was being described as Business Intelligence. (Hovi, Hervonen & Koistinen 2009, 73, 77)

2.1.2 The purpose of the Business Intelligence solutions

In the book "Tietovarastot ja Business Intelligence" (Hovi et al. 2009, 80-81) the purpose of Business Intelligence solutions is presented by five points. The purpose of Business Intelligence is to:

1. help organisations to speed up and improve decision making

Essential objective of the Business Intelligence is to give support to make better decisions in any level in the organization.

2. answer the users information needs in real-time

Truthful information makes a difference in business. Need for specific information queries and reports are more efficient with right BI -tools.

3. support strategy and goals in organization

This is possible in organizations which have clear strategic goals. The problem with this is that the BI solutions are often formed into separated sections. These sections do not communicate

with the upper level strategy objectives. There have been developed solutions to bring the business sections closer to each other.

4. improve users possibility to get access and share information

The relevant part of creating a BI solution is to give users access to the information. The goal is to get users to process information without the help of IT experts.

5. lowering the expenses and improve the operative effectiveness

It is difficult to price the benefits of better decisions which have been made based on information gathered with BI. In business the large benefits of the Business Intelligence solutions are lowering the expenses and improving the operative effectiveness.

2.1.3 How to use the business information with the Business Intelligence?

With the Business Intelligence the business information is used to make business analyses and through that better business decisions. Here is an example of how those can be combined together according to Williams and Williams. (2007, 3-9)

- Business Information

Business Information can be any information gathered from the company databases. This information can be for example history of the company's and customer's behaviour; orders, sales by region, sales information by product or service, forecasted and actual sales.

- Business analyses

The business information can be used to make business analyses from the company and customer's behaviour; backorder and lost sales analyses, historical sales analyses, revenue and profit analyses for product or service, market share analyses.

- Decisions based on analyses

Based on the analyses, the business actions can be; rectifying problems what caused backorders, lost sales or product or service problems, creating campaigns based on knowledge of the customer base or optimizing sales force tactics. (Williams, Williams 2007, 6-9)

2.2 BI Architecture & usage

The Business Intelligence solutions require a different technology to support its functions. In this chapter the technology behind the Business Intelligence is presented by looking into the following techniques and features.

2.2.1 Data Warehouse

Business Intelligence can be used independently without a data warehouse but it is not very typical. Data Warehouse technology is usually the base of the business intelligence solutions. Data Warehouse is the repository where the data is placed from the companies' various data sources and transformed into a common form. These data sources can be for example operational systems, ERP and public information. The data in the Data Warehouse is multidimensional and it can be used for querying and analysing. The process of the information flow is called Data Warehousing as presented in Figure 1. (Hovi et Al. 2009, 7, 14; Data Warehouse info 2008)

2.2.2 ETL

ETL stands for Extract, Transform and Load and is used for extracting the information from the various sources, transforming it to usable form and finally loading it to the data warehouse or other data repositories. The information can be read and analysed from the data warehouse. (Hovi et Al. 2009, 14; Data Warehouse info 2008)

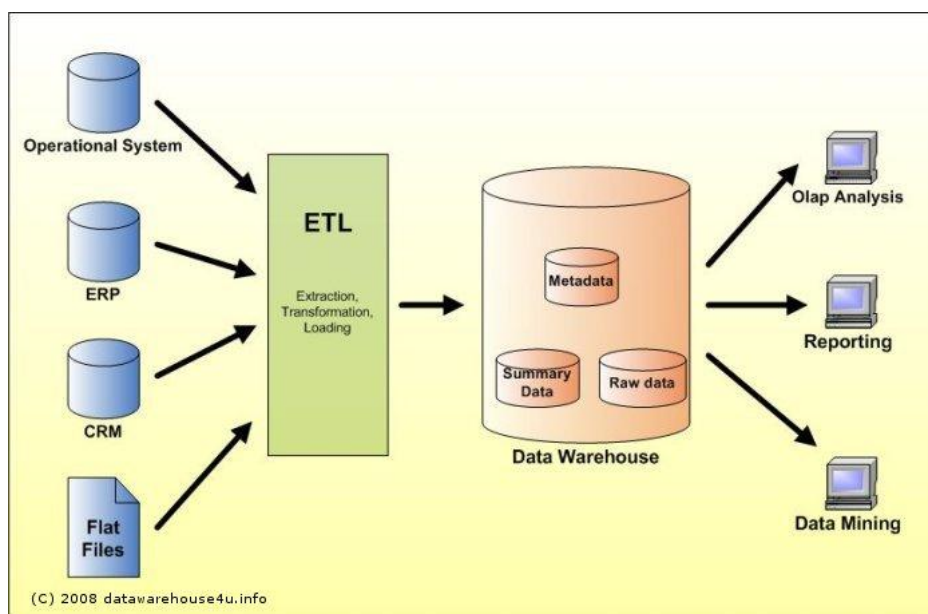


Figure 1: Data warehousing process

2.2.3 OLAP & OLTP

OLAP (On-line Analytical Processing) is a multidimensional analysing method. OLAP is one procedure of the BI- solutions that makes an opportunity to the multidimensional hierarchy of the information. It helps and speeds up information availability and presentation. OLAP is typically described in a form of a cube and it makes the "drilling" into the information possible. (Hovi et al. 2009, 91-93)

OLTP (On-Line Transactional Processing) is a method for providing the data. OLTP systems like ERP work in operative environment where the data volume is higher, it is highly available, and it is more detailed and current. (Data Warehouse info 2008; YIT 2010)

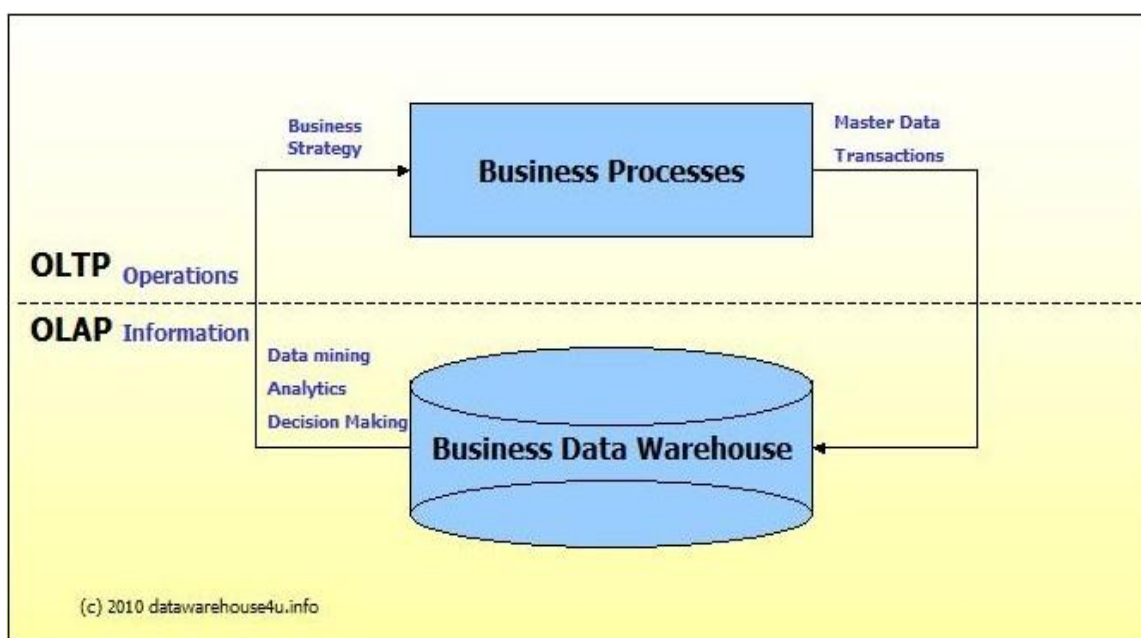


Figure 2: OLTP & OLAP

2.2.4 Data Mining

Data Mining is a data analysing technique which gives even more detailed information than the traditional Business Intelligence. Data mining analyse methods are typically statistic, mathematic and half automatic data processing. It is used to search the information that is followed by certain rules or probabilities to help to predict the business. (Hovi et al. 2009, 98-99)

2.2.5 Reporting in business with BI

Reporting is an important feature in business. That is the reason why the information must be truthful and more quickly available. Development for reporting solutions is going forward because of these demands. Today the direction for the reporting has been more to the web-based solutions for helping the accessibility. Despite the fact that the reporting tools are developing, certain tools remain. The purpose of the spreadsheet software like Microsoft Excel is still firm and an important tool in reporting. (Hovi et Al. 2009, 87)

Creating new reports requires different queries from the data warehouse databases. Good BI solution offers a clear user interface for constructing easy queries. Despite the fact that tools are available, there is a shortage of end users who make these reports. The objective for the BI is opposite - the right information should find right people faster. (Hovi et al.2009, 87)

Here are few examples of the reports in SAP NetWeaver. (YIT 2010)

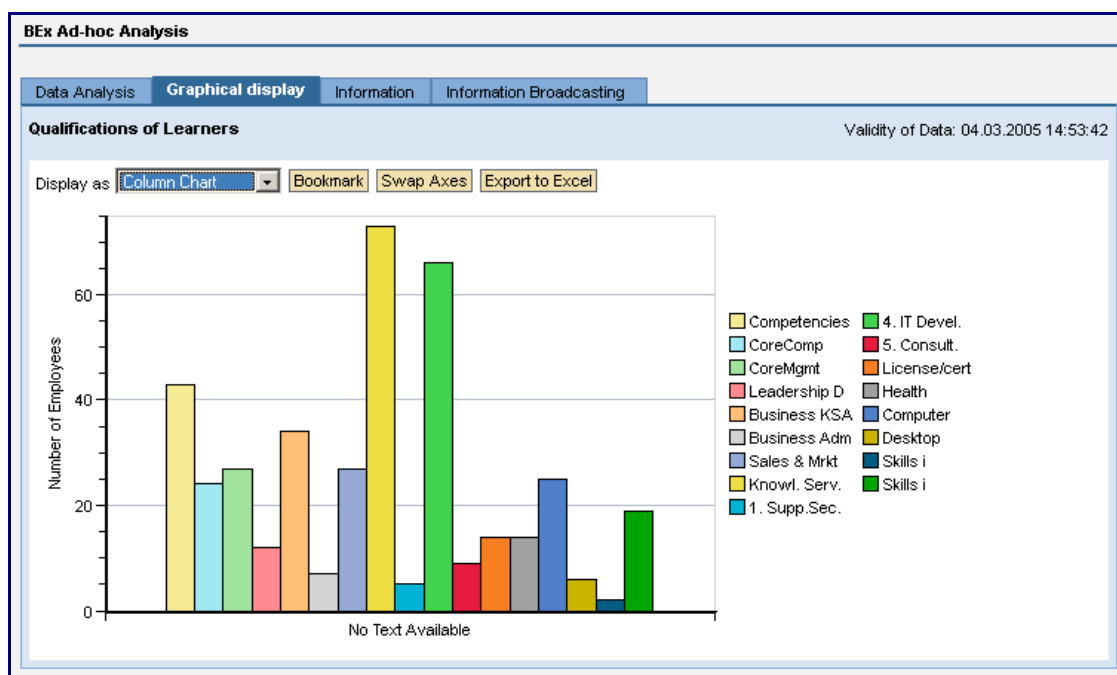


Figure 3: Example 1 of SAP NetWeaver BI report

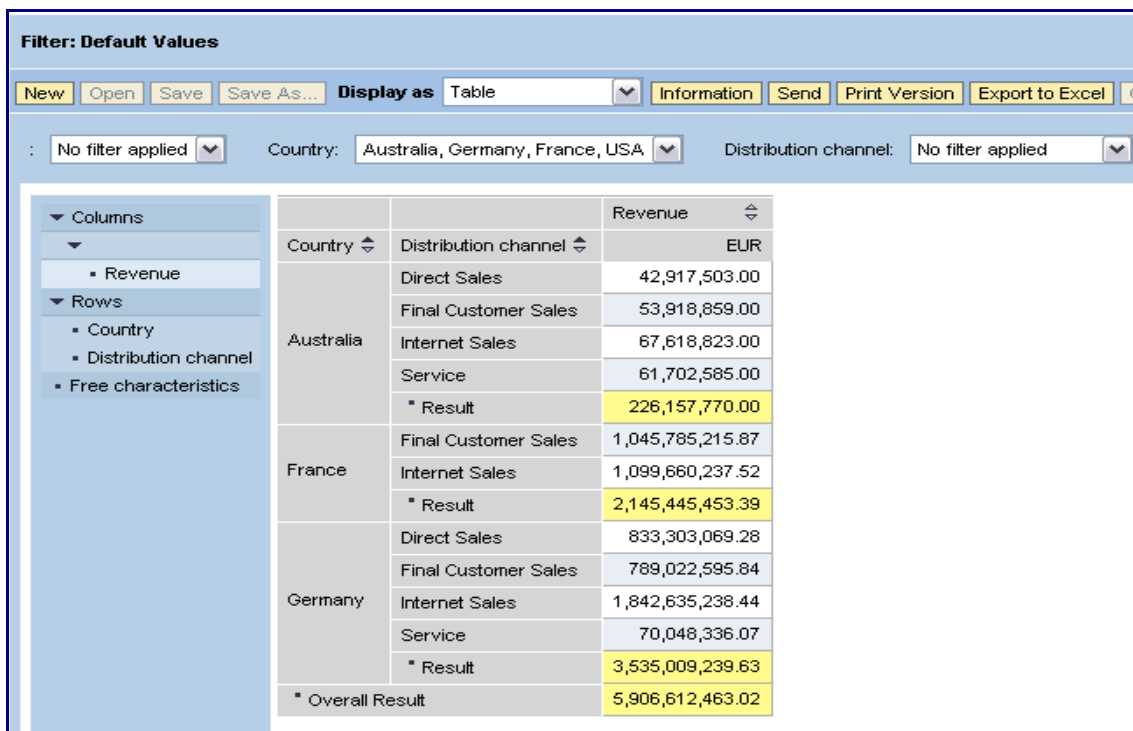


Figure 4: Example 2 of SAP NetWeaver BI report

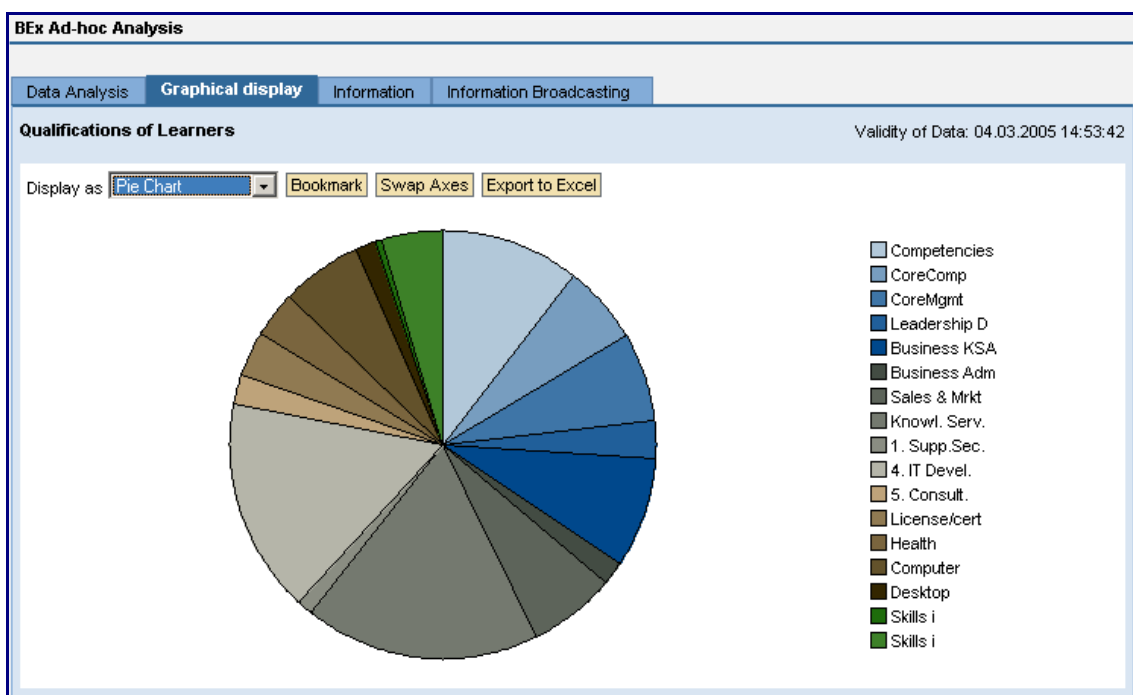


Figure 5: Example 3 of SAP NetWeaver BI report

2.2.6 SAP Business Information Warehouse and SAP NetWeaver

SAP Business Information Warehouse (SAP BW) is a package included with data warehousing, business intelligence platform and business intelligence tools suite. Business information can be imported from SAP applications or external sources. SAP BW is a component of the SAP NetWeaver. SAP NetWeaver is a web-based platform for SAP applications. It can be customised and the information can be imported from number of different sources. Its advantages are the accessibility and integration with other systems. (SAP Library 2011; SAP 2011)

3 Future visions & possibilities

3.1 BI 2.0

With the latest methods and trends the BI solutions are going forward. The next generation BI is going deeper on the information. It is meant to create visions and automatic conclusions like forecasts based in the information. It should work in real-time and service oriented service through the web. There are few examples in the following chapters according to Hovi et al. (2009)

3.1.1 Dashboards

Companies' objectives are monitored with different indicators. The Key Performance Indicators (KPI's) are the metrics of strategic objectives. The Business Intelligence enables the possibility to follow the metrics by different visual views. Dashboards, Business Activity Monitoring (BAM), Scorecards, and Strategy Maps are different types of techniques which the performance can be monitored and measured.

Although the dashboards in graphical user interfaces (GUI) are available the reliability of the data must be in order before considering these kinds of solutions. Without the good data warehouse architecture and data integration it is useless to have a fancy graphical user interface (GUI).



Figure 6: SAP Xcelsius dashboard

3.1.2 Location intelligence

By combining the Business Intelligence with the Geographic Information Systems (GIS) the analysing possibilities can be unique. Location information is about widening the basic information to the map. Information often includes addresses, areas, postcodes etc. Different analyses can be visualized using the geographic information.

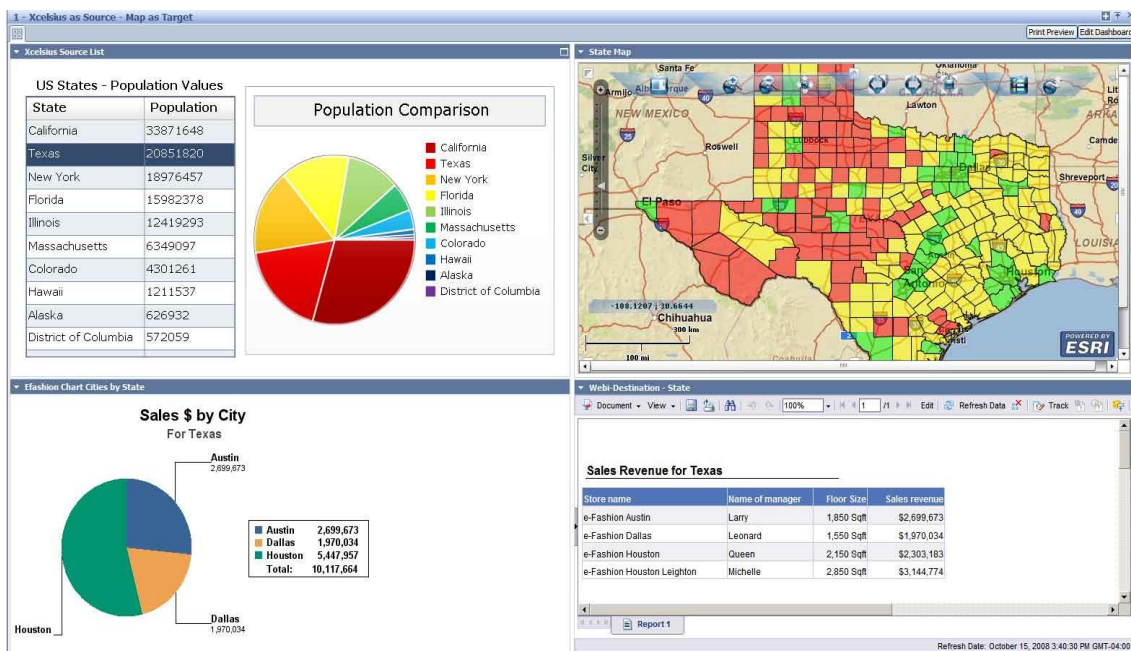


Figure 7: View of Location Intelligence by the APOS

3.1.3 Interactive visualisation

The purpose for the interactive visualization is to gain wider user groups by simplifying the usage and the user interfaces. Too complex user interfaces frightens the possible users. Only the necessary functionality should be presented simply and efficiency. Traditional presentation of information is changing to more visual in BI. Interaction between different software will be supported.

3.1.4 In-Memory Analysis

In-Memory Analysis is one of the new ways of handling the information like the ETL-process. The information is loaded directly to memory of the server without using multidimensional cubes or information summing like in OLAP. When the server architecture is going forwards to 64 bit environment and the price of memory is dropping this fast and efficient technique will be serious alternative for some solutions.

3.1.5 Search engines

Search engines are common feature in today's world. The search feature will be a part of BI-solutions as well. Information can be searched with BI from various data sources. Search queries can combine the company information and the public information to present all the information available from the query.

3.1.6 BI Competency Centers (BICC)

BI-solutions are efficient and easier to control if there is a common line between the different business units. To control wider user environments the competency centers offer an answer. The main idea is to centralize the actions that concern information distribution, development and handling. It is an interpreter between IT and the business. It helps to consider the technical and the business needs.

4 Target of the research: Business Intelligence in YIT

4.1 YIT

"At YIT we build, develop and maintain a good living environment for people" (YIT 2011). YIT is offering services from the fields of technical building systems, construction and industry services. YIT has three business segments which are Building and Industrial Services, Construction Services Finland and International Construction Services. YIT have approximately

26 000 employees and it is offering services in central Europe, Nordic countries, Baltic countries and Russia. (YIT 2011)

4.1.1 History behind YIT's ERP & BI

In YIT variety of reporting and planning solutions has been in use quite a while. SAP BI-IP is mainly replacing one of the former BI solution what is still partly in use; Basware Target. It has been used approximately 10 years in YIT. The implementation of the SAP ERP enabled the possibility to the new BI solution. The advantage of the SAP BI is the wide integration with the ERP and the integrity of the information access. (Hartikainen, M. 2011)

The project planning for SAP ERP implementation in YIT was started at the end of the year 2006. Reporting feature was planned to be a part of the new ERP. In 2007 the project was divided to different phases and the first was to have a new platform to the financials. This was called Financial at Control (FICO). Monthly financial reporting, forecasting and budgeting were part of the new platform. (Hartikainen, M. 2011)

The BI system build-up started in the spring of 2007. For the sake of rational reporting, data warehouse had to take place. This was SAP's own Business Warehouse. At the start the SAP project was concerning only the Building Systems in YIT but it later expanded for the other business units. FICO is now the financial platform for the whole YIT Group. (Hartikainen, M. 2011)

At the same time as the new ERP is replacing the old systems the new type of data is starting to appear. The objective for reporting is not wanted to restrict only to financial sources. The new information like project reports and service reports are expanding the business information level. The business information is coming even more to use when all sorts of data will be available from and for the business. (Hartikainen, M. 2011)

4.2 Business Intelligence-Integrated Planning (BI-IP)

The main target for this research is to examine the Business Intelligence solution in YIT. YIT uses the Data Warehouse and BI solution by the same vendor (SAP) - it is fully integrated to the company ERP. In YIT the Business Intelligence and the Integrated Planning are combined and this is called the BI-IP. The Integrated Planning is a web-based tool for planning and it is working in the same environment as the BI. (YIT 2010)

The BI-IP user interface is only in the SAP NetWeaver web-portal. The purpose has been from the beginning that the user interface is only in the portal. Its advantage is that the portal link

can for example place into the company intranet for easy access. BI-IP works also with a Microsoft Excel based tool but requires always an installation to the user's workstation. (Hartikainen, M. 2011)

At this point the BI -system is included with:

- the monthly financial reporting
- monthly forecasting
- income statement
- balance sheet
- cash flow
- budgeting two times a year

It has been a purpose to make a similar roll out to all the Building System units. This type of system build-up is used in the Building Systems in Finland, Sweden, partly in Denmark and in the near future also in Norway. (Hartikainen, M. 2011)

4.2.1 Current state of the system

Currently the system is used for monthly forecasting and reporting. The peak of the usage is at the first day of the month just when the old month is closed. That is the time when approximately 300-500 users are making forecasting and reporting at the same time. (Hartikainen, M. 2011)

In the beginning of the BI project performance problems took place. Because of the massive data the response time was too long. It was a "show stopper" for the BI system. Without the faster executing the system could not been able to take place in Sweden. The response time could be lowered by using solutions based on data warehouse technique. (Hartikainen, M. 2011)

4.2.2 Users

There are approximately 500 active users of BI-IP. The number of users is increasing continuously and the whole number of user is about 750. The users have one common feature; they all are responsible of the result in some way. User group of BI-IP in YIT consists of financial personnel and management like controllers, unit management, financial managers, chief financial officers and chief executive officers. (Hartikainen, M. 2011)

4.2.3 User Interface

The user interface of the BI-IP is in a web-portal (SAP NetWeaver). At the moment the report views are quite typical for the reporting and similar to others. The different kinds of user interface solutions are possible by the vendor when the organization data is in the reliable level. These kinds of solutions are for example: variety of desktop solutions, visual reporting and simulation possibilities. All of these features require reliable base information in the ERP. (Hartikainen M, 2011)

4.2.4 Information accuracy

Information is transferred every night into the data warehouse from the ERP. The information is not in real-time but however it is only one day old. A possibility for the real-time information exists but it is not needed at the moment. The current information is available in the ERP. For example accounts ledger is better to do from the ERP because the information is real-time. (Hartikainen M, 2011)

4.2.5 Development

System development requires an own process. Development is controlled by a "template group" which consists of representatives from every aspect of the business. They present development ideas or bring out the downsides of the system. In the group they will decide which developments are needed and must be done and which are not so relevant. The group can decide low cost ideas but the larger investments must go through the management. (Hartikainen M, 2011)

Feedback has been received from different business sectors which are using the BI-IP. At this time there are not enough resources to develop the system. Because the BI-IP is still in the "project mode" it is difficult to maintain the development at the same time. (Hartikainen M, 2011)

4.2.6 Guidelines

Responsibility for the end user guidelines for the system usage comes from inside the business unit. The administrative user from the specific business unit has responsibility to create the instructions and educate end users. (Hartikainen M, 2011)

5 Research methodology

The challenge of this research was to follow a certain method. Because of the requirements which were given from the YIT, remaining in the frame of the only one method seemed to scatter. The research method for this study is mainly qualitative, but the elements from the quantitative methods have also been used. The methods used in this study are not following the basic elements in qualitative or quantitative research methods.

5.1 Qualitative survey

Qualitative research methods can be for example theme interviews, observer impressions and group interviews. Material gathered from the BI-IP survey was processed using the inductive analysis which is typical to the qualitative research. With inductive analysis single observations are generalized to wider purpose. (Hirsjärvi et al. 2003, 155, 248)

The core of this research is a survey pointed to the user group of the BI system. Because of the practical limitations the survey was executed via e-mail with a covering letter attached to the message (Appendix: 5). According to Hirsjärvi et al. (2003, 130) material gathered by a survey is usually analysed with quantitative methods. In this case the qualitative method seemed to offer a better outcome even for the sake of the methods being merged. The purpose was to concentrate to the quality of the information rather than have number of statistic facts and other features that are typical to the quantitative research methods. (Hirsjärvi et al. 2003, 130, 155)

In a survey research method, designing a questionnaire is the most important part of the research project. Questionnaire should be tested and the required changes should be fixed afterwards. When executing the survey, attached covering letter is very important part of the whole questionnaire for the sake of successful survey. Usually the answering rate is low in the first round of the sent questionnaire, and the reminding letters are typical. With the reminding letter the answering rate is usually increased. The answers can be coded and modified with the different measures and afterwards analysed with the most suitable analysing method. (Yhteiskuntatieteellinen tietoaarkisto, 2010)

5.2 Sample of the user group

The sample of the user group was 60 active BI-IP users from different business layers and companies inside YIT. The sample was taken by the BI-IP team with their consideration. The BI-IP team considered which users could give the best and relevant information of the system usage and pointed them to take a part to the survey.

The questionnaire was sent to those 60 users in YIT. From 750 users approximately 500 can be described as active users. The sample of the BI-IP user group is 12 % from the whole 500 active users mainly from Finland but also from Sweden, Norway and Denmark. User group consists of users from different companies inside the whole YIT organization.

The sample of the BI-IP users consists of:

- 9 users of the management (financial management, IT-managers, chief financial officers, chief executive officer)
- 2 process owners (business controllers)
- 12 key users (business controllers, financial managers)
- 37 end users (controllers, business controllers, account managers, unit management)

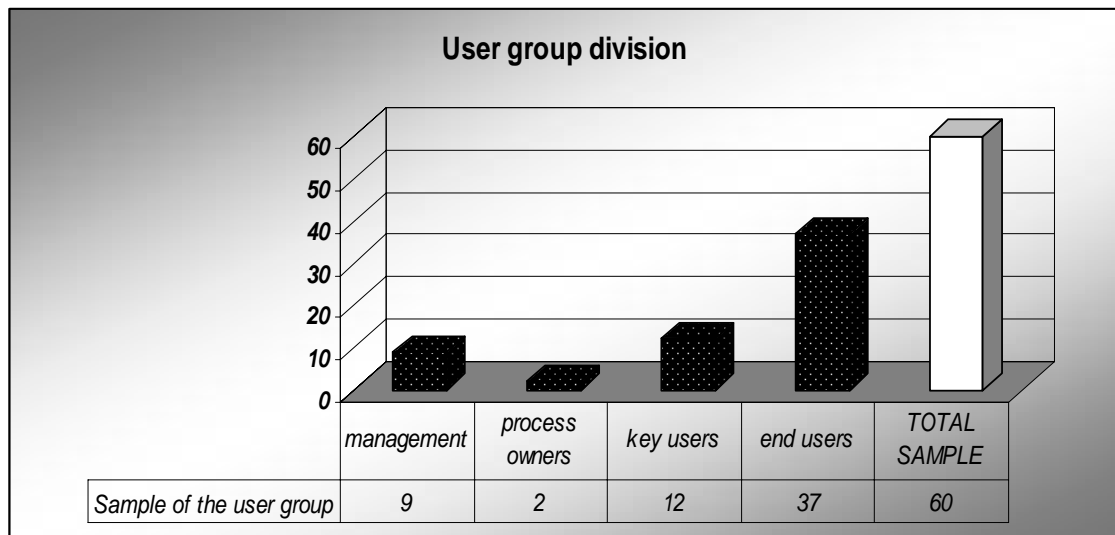


Figure 8: User group division

6 Survey

6.1 Objectives

The main objective for the research survey was to gain knowledge from the BI-IP users and use that knowledge to develop the system. The big questions behind the actual survey questions are following:

- Is the BI-IP even actually used?
- Is the business gaining the advantage that the BI-IP could offer?
- Is the system working properly?

- Which way to go in the future?

6.1.1 Questionnaire & question structure

The questionnaire was constructed with Microsoft Excel. The questions were considered carefully with System specialist Matti Hartikainen from the YIT. The questionnaire was constructed to lead all the questions to the main question; how the BI-IP could be developed better? The questionnaire included 17 questions for larger group of the users and two extra questions only for the management. The time limit was a challenge for the survey. It disabled the possibility to test the questionnaire.

The questionnaire included primary themes. The themes were in important role to combine the whole systems core attributes together. The themes were formed from the need of information of all these sectors.

The questionnaire included following themes:

- Performance
- Usability
- Features
- Information quality
- Future expectations

The questionnaire was divided to two separate sections; present and future. In the present section the questions concerned the current state of the system. In the future part the questions were concerning the future expectations. (Appendix: 1-4)

6.1.2 Questions

1. Are you satisfied with the system at the moment or do you experience that there is room for improvements?
2. Do you think that the information gathered from the BI-IP system is at truthful level and does it match with the information in the basic system (ERP)?
3. Is the system easy enough to use or is there appeared troubles with the usage?
4. How would you describe the usability of the system?

5. Is the way of the information presentation clear? Is there need for improvements?
6. Are you satisfied for the functionality of the web portal (NetWeaver)?
7. Is the information available quick and easy enough?
8. Data runs every night from the basic system (ERP); do you think one-day-old information is good enough to use?
9. Are the user instructions at good level? What could be improved?
10. How the new system differs from the old system? Are the differences good or bad?
11. Do you use the information provided by the system in business? How?
12. What kind of reports would you like to see from the system?
13. Is there a lack of features in the system? What could it be?
14. What expectations do you have from the BI system from the future?
15. How the BI-IP system could offer even more advantages to the business?
16. How the BI -reporting system could be developed better from your own point of view?
17. Free development suggestion or problem you have encounter in the BI-IP system.
18. Is the target for the system clear at the moment?
19. Does the system answer its original expectations?

6.2 Results

From the entire 60 persons to whom the questionnaire was sent only 14 answered. After the first sent questionnaire, only 9 people answered. With the reminding letter the answering rate was increased to 14. The low answering rate can be explained for example as follows:

- The questionnaire conducted via e-mail is easy to leave without notice
- User group sample personnel busyness (management, financial personnel)

- Holiday season during the survey

Answers were divided among the user levels as following (Figure 9):

- From 37 end users 6 answered
- From 12 key users 6 answered
- From 2 process owners 1 answered
- From 9 users from management 1 answered

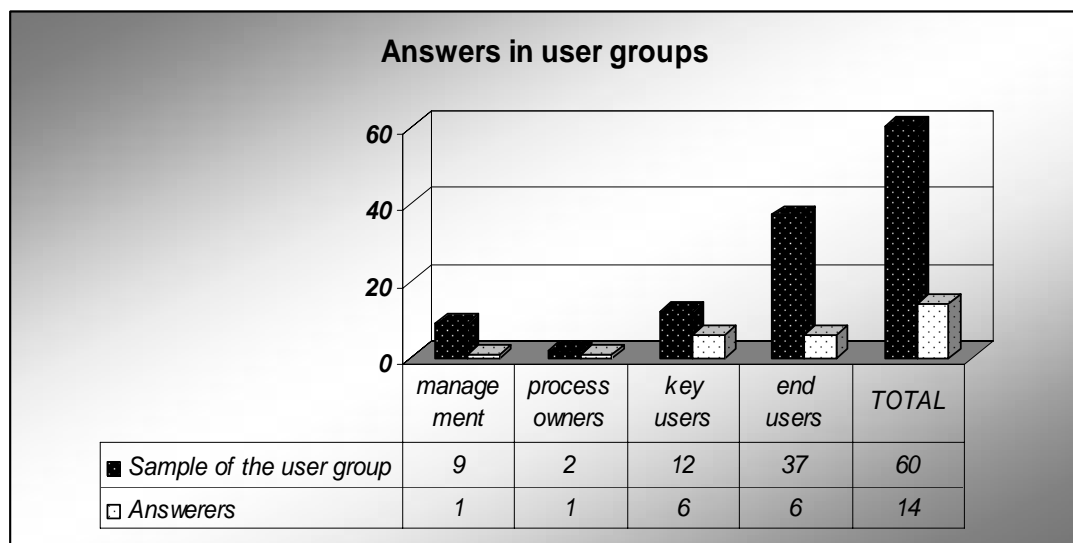


Figure 9: Answers in user groups

Although there was a challenge to get enough information from the users, survey was a good step for the development. The whole idea of the survey was to have knowledge what the users feel and expect from the system. That was achieved.

The questionnaire was constructed by considering the key issues regarding the system. The questionnaire included themes. Themes that were used in the questionnaire are divided and presented here in order of the importance in a summary of the survey answers:

6.2.1 Performance

Key points in order of the importance:

1. Slow to use
2. Too often failures in the usage
3. Not a stable environment yet

4. More speed needed for better usage

Figure 10: Performance

According to the users there is room for improvements. Majority of the answerers feel that the performance is not in the wanted level. The performance is affecting the overall usage. The system slowness is a disadvantage for the normal tasks and it needs to be improved. The satisfaction of the web portal divides the users in half. Some of the users feel that the web portal is not a stable environment. There are too often failures in the usage. Other users feel it is working without problems. Compatibility to different browsers is not guaranteed and it is causing a problem.

6.2.2 Features

Key points in order of the importance:
1. More variety beside the standard reports are needed
2. Reports should be ready to use without the need for exporting
3. Too much post-editing when exporting
4. Data imports from other systems

Figure 11: Features

Need for different reports are obvious. Especially the improvements are needed in the project and service business. Different types of reports that users would need: project and service business reports, customer reports, human resources reports, utility rate reports, weekly billing reports, productive hours reports and different report combinations. Some of these reports are already in use but not available to all of the users.

There is too much post-editing when exporting spreadsheets. Possibility to run reports from multiple levels at the same time is needed. In future it is important to import data from the different sources to have full variety of reports.

6.2.3 Usability

Key points in order of the importance:
1. Needs practising to understand the logic
2. Difficult features to understand
3. No tooltips or quick advisors

4. Lack of error handling
5. Printing the reports require too many steps
6. Font size should be increased

Figure 12: Usability

11 out of 14 answerers feel that the system is easy to use. However users feel commonly that there are also problems with the usage. The logic is not simple. The usage of the system is felt complicated. The system is not helping the user and tooltips or quick advisors are wanted. Understanding the system logic needs practising and some of the features are difficult to learn. The reports should be more ready to use without the need for exporting to Excel.

In comparison to the old reporting system Basware Target the BI-IP has good and bad sides in the usability. Report editing possibilities are standing out. "Drag and drop" features and report exporting is working well. Need for post-editing is greater than before.

6.2.4 Information quality

Key points in order of the importance:
1. More graphics and visualization needed
2. Better readability needed in reports
3. Sum levels should be in different font or separated for better display
4. Lines and columns are not standing out from each other
5. Easy-to-read reports but plain report appearance
6. No possibility to run reports from multiple levels at the same time
7. Too small fonts
8. Compatibility to different browsers

Figure 13: Information quality

Information presentation is commonly felt clear enough but there is room for some improvements in details. More graphics and visualisation would be welcomed. Reports look plain caused by a lack of visualisation. Lines and columns should stand from each other to make the reading easier. Font size should be increased and the sum levels should be in a different font or separated for the better display.

Fundamentally the users feel the information is at a truthful level. Exceptions have occurred in project and service business but the direction for the common information is improved.

Information is easily available but there is room for improvements in the response time. At the moment the one-day-old information is enough. It is known that the real-time information is in the ERP if it is needed. More information updates in the end and the beginning of the month is necessary.

Main responsibility regarding the user instructions is inside the business units. The instructions have served the users good enough but the need for the wider user support is always relevant.

6.2.5 Future expectations

Key points in order of the importance:
1. Improved performance
2. Variety of reports
3. Stable environment
4. Visualisation
5. Different report combinations
6. Report packages
7. More usage and users
8. Standardising reports in the whole organization
9. Faster development
10. Business sectors have to get interested in opportunities BI can offer
11. The need for development must come from the business
12. More courage to use the system

Figure 14: Future expectations

Users are expecting improved performance, advanced reports, and stable environment above all. The needs are growing with more usage and experience. The advantages that the system can offer should be known and the user count should increase. When the number of users is increasing performance should not go slower.

The development is slow at the time. To make it faster it is important the business sectors learn about the BI-IP's possibilities. The system can give useful information for different level of users in the business. The usage would be improved if the reports could be converging for all business sectors.

Visualisation and readability is a shortage. It is not satisfying in screen or in the paper. Printing the reports requires too many steps and readability is bad. There should be able to

use Excel type of tools to gain better display of the whole report. The report packages which can include several reports from different units are also wanted.

6.2.6 Summary

According to the users there are number of details in the BI-IP system that needs examination. Performance, usability and information quality are the primary matters where the problems appear. The objective for the system is not clear and it does not answer yet its original expectations.

In the analyses of the survey results the main focus has been pointed to the problems. It is important to mention that despite the problems the users have large expectations for the system in the future. It is also noticeable that the system is still quite new and the usage is barely started. The BI-IP is widely used in YIT and it is a key system for reporting, planning and analysing in all levels and sectors according to the survey.

SUMMARY OF KEY POINTS
Performance
1. Slow to use
2. Too often failures in the usage
3. Not a stabile environment yet
4. More speed needed for better usage
Features
1. More variety beside the standard reports are needed
2. Reports should be ready to use without the need for exporting
3. Too much post-editing when exporting
4. Data imports from other systems
Usability
1. Needs practising to understand the logic
2. Difficult features to understand
3. No tooltips or quick advisors
4. Lack of error handling
5. Printing the reports require too many steps
6. Font size should be increased
Information quality
1. More graphics and visualization needed
2. Better readability needed in reports
3. Sum levels should be in different font or separated for better display
4. Lines and columns are not standing out from each other

<ol style="list-style-type: none">5. Easy-to-read reports but plain report appearance6. No possibility to run reports from multiple levels at the same time7. Too small fonts8. Compatibility to different browsers
Future expectations
<ol style="list-style-type: none">1. Improved performance2. Variety of reports3. Stable environment4. Visualisation5. Different report combinations6. Report packages7. More usage and users8. Standardising reports in the whole organization9. Faster development10. Business sectors have to get interested in opportunities BI can offer11. The need for development must come from the business12. More courage to use the system

Figure 15: Summary of key points

7 Final conclusions

7.1 Conclusions of the research

Although the technology for more advanced and different BI solutions is available the basics must be in order before the technology can be taken fully advanced. It is not obvious that everybody inside the business knows about the opportunities what BI can offer. It is important to understand the possibilities and benefits what BI can give to the company. If the BI is constructed as it should be, it will help to give profits to the business.

How can the Business Intelligence system be developed in YIT? The direction for better system starts from the fragments. The most important points that give the right direction to the development that arose from the different themes in the questionnaire are following:

1. Performance problems must be fixed and system environment must be stabilised
2. Wider report selection and editing possibilities should be available and the editing possibilities should be improved
3. User interface usability should be developed for the user friendly direction and the users should be educated about the system logic and difficult features
4. Visualization and graphics are needed to help to perceive the reports in a multidimensional way
5. Information quality should be improved and examined more deeply to serve the users' needs
6. More information imports from the different data sources should be consider to attach to the system
7. Basic information should be well organized before adding technology
8. Development must be faster to answer the users' demands

Fixing the performance problems should be the first thing which to concentrate in. The performance is affecting for the overall usage and usability and it is a disadvantage for the whole development. The users expect stabile environment where the reporting is not interfered with technical problems. Improvements should be taken place also in the detailed

level in usability of the user interface. Report selection should be wider and different report combinations and packages should be available. The reports should be converging for all the sectors inside the organization. In the future it will be important to use variety of data sources to have all the available knowledge to use in the reports.

It could be an advantage to the business to follow latest trends and future possibilities that BI can offer. Every business has its own needs and those needs must be recognized before tuning the basics. It is important to hear the users' opinions of the system to achieve a user friendly environment. Although the users are an important key to the development more important is to start from the management. They should recognize the advantages to gain full support to the development. Sharing the information of the BI's opportunities and advantages to the business should be known. Management decides the need for new investments and provides the better reporting system possible in the future.

7.2 The study process

In January 2011 the BI-IP team from the YIT offered me a subject for my final thesis. The subject was to examine the Business Intelligence system at YIT. In the beginning of this study the term Business Intelligence was unfamiliar to me. As the study process went forward I started to have a sense what it actually is. After that it was easier to start finding the right research method to use in the study.

BI-IP team wanted me to interview the users of the BI -system at YIT. They wanted as much information as possible with qualitative interviews. Originally the interviews were meant to accomplish by interviewing few persons from the user group, which would have been chosen by consideration of the BI-IP team. Because of the many layers and different variables among the user group, only few interviewees were not being able to give enough useful information. The best choice was to interview as many users as possible. For the practical and time consuming reasons, the interviews decided to accomplish with a survey via e-mail. That led to problems with the research method. Interviews should be qualitative, but the sample and questionnaire was more typical to quantitative methods. It was too much of a challenge to remain inside the frame of only one method, and the research was scattered.

Quantitative questionnaire would have served the analysing process better. Because of the decision to accomplish the survey qualitatively, the methods were merged. This caused challenges to the analysing process and finishing the report properly. For the forthcoming similar researches I recommend more planning and effort used to find the right research method.

Despite the fact that the study did not follow the essence of the qualitative and quantitative methods, it was not effecting for the results. The results were given important information of the current state of the system, and the future visions of the BI -system development.

Despite the problems, this was not a research of finding the best research method for the thesis. The purpose of this thesis was to improve the Business Intelligence system.

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Appendices

Appendix 1: Questionnaire for the management in english

Questionnaire - Business Intelligence Integrated Planning -development		
There are 19 questions altogether. Answering will take approximately fifteen minutes. Please try to explain your answers as good as you can!		
Present	Future	
1. Are you satisfied with the system at the moment or do you experience there is room for improvements?	12. What kind of reports would you like to see from the system?	
2. Do you think the information gathered from the BI-IP system is at truthful level and does it match the information in the basic system (ERP)?	13. Is there a lack of features in the system? <i>What could it be?</i>	
3. Is the system easy enough to use or is there appeared troubles with the usage?	14. What expectations do you have from the BI system from the future?	
4. How would you describe the usability of the system?	15. How the BI-IP system could offer even more advantages to the business?	
5. Is the way of the information presentation clear? Is there need for improvements?	16. How the BI -reporting system could be developed better from your own point of view?	
6. Are you satisfied for the functionality of the web portal (NetWeaver)?	17. Free development suggestion or problem you have encounter in the BI-IP system.	
7. Is the information available quick and easy enough?	18. Is the target for the system clear at the moment?	
8. Data runs every night from the basic system (ERP); do you think one-day-old information is good enough to use?	19. Does the system answer its original expectations?	
9. Are the user instructions at good level? <i>What could be improved?</i>	<p>Thank you for your answers!</p> <p>Please send this questionnaire via email to the address: jaakko.tervala@yit.fi</p>	
10. How the new system differs from the old system? Are the differences good or bad?		
11. Do you use the information provided by the system in business? How?		


Appendix 2: Questionnaire for the users in english

Questionnaire - Business Intelligence Integrated Planning -development		
There are 17 questions altogether. Answering will take approximately fifteen minutes. Please try to explain your answers as good as you can!		
Present	Future	
1. Are you satisfied with the system at the moment or do you experience there is room for improvements?	12. What kind of reports would you like to see from the system?	
2. Do you think the information gathered from the BI-IP system is at truthful level and does it match the information in the basic system (ERP)?	13. Is there a lack of features in the system? <i>What could it be?</i>	
3. Is the system easy enough to use or is there appeared troubles with the usage?	14. What expectations do you have from the BI system from the future?	
4. How would you describe the usability of the system?	15. How the BI-IP system could offer even more advantages to the business?	
5. Is the way of the information presentation clear? Is there need for improvements?	16. How the BI -reporting system could be developed better from your own point of view?	
6. Are you satisfied for the functionality of the web portal (NetWeaver)?	17. Free development suggestion or problem you have encounter in the BI-IP system.	
7. Is the information available enough quick and easy?	<p>Thank you for your answers! Please send this questionnaire via email to the address: jaakko.tervala@yit.fi</p>	
8. Data runs every night from the basic system (ERP); do you think one-day-old information is enough?		
9. Are the user instructions at good level? <i>What could be improved?</i>		
10. How the new system differs from the old system? Are the differences good or bad?		
11. Do you use the information provided by the system in business? How?		

Appendix 3: Questionnaire for the management in finnish

Kysymyslomake - Business Intelligence Integrated Planning (BI-IP) -järjestelmän kehittäminen		
Kysymyksiä on yhteensä 19 ja niihin vastaaminen vie n. 15 minuuttia. Muista perustella vastauksesi mahdollisimman hyvin!		
Nykytilanne	Kehityssuunta	
1. Oletteko tyytyväinen järjestelmään tällä hetkellä vai koetteko että siinä on parannettavaa? <i>Mitö se voisi olla?</i>	12. Minkälaisia raportteja haluaisitte nähdä järjestelmästä?	
2. Onko BI-IP -järjestelmästä saatava tieto mielestänne todenmukaisella tasolla ja vastaako se perusjärjestelmän tietoja?	13. Puuttuuko järjestelmästä mielestänne joitain ominaisuuksia? <i>Mitö ne voisivat olla?</i>	
3. Onko järjestelmä tarpeeksi helppokäyttöinen vai onko käytön kanssa ilmennyt vaikeuksia?	14. Mitä toivomuksia tai odotuksia teillä on BI -järjestelmästä tulevaisuudessa?	
4. Miten kuvaisitte järjestelmän käytettävyyttä?	15. Miten järjestelmä voisi tarjota vielä lisää hyötyä liiketoiminnalle?	
5. Onko tiedon esitystapa selkeä? Onko siinä puutteita?	16. Miten BI- raportointijärjestelmää voidaan kehittää mielestänne paremmaksi omalta kannaltanne?	
6. Oletteko tyytyväinen web-portaalin toimivuuteen jossa BI-IP sijaitsee?	17. Vapaa kehitysehdotus tai ongelma johon olette kohdanneet BI-IP -järjestelmässä.	
7. Onko tieto saatavilla tarpeeksi nopeasti ja helposti? <i>Onko parantamisen varaa?</i>	18. Onko järjestelmän päämäärä selvillä?	
8. Tiedot ajetaan öisin perusjärjestelmän puolelta, riittääkö että tieto on päivän vanhaa?	19. Onko järjestelmä vastannut alkuperäisiä odotuksianne?	
9. Onko ohjeistus järjestelmän käyttöön riittävän hyvällä tasolla? <i>Mitö voisi parantaa?</i>	<p>Kiitos vastauksistasi!</p> <p>Lähetä tämä kysymyslomake sähköpostilla osoitteeseen: jaako.tervala@yit.fi</p> <p>Voit lähettää tiedoston esimerkiksi näin: <i>Tiedosto->Lähetä->Sähköpostin vastaanottaja (liitteenä)</i></p>	
10. Miten BI-IP eroaa edellisestä järjestelmästä? <i>Ovatko erot hyviä vai huonoja?</i>		
11. Hyödynnättekö järjestelmän tarjoamia tietoja liiketoiminnassa? <i>Miten?</i>		

Appendix 4: Questionnaire for the users in Finnish

Kysymyslomake - Business Intelligence Integrated Planning (BI-IP) -järjestelmän kehittäminen		
Kysymyksiä on yhteensä 17 ja niihin vastaaminen vie n. 15 minuuttia. Iluista perustella vastauksesi mahdollisimman hyvin!		
Nykytilanne	Kehityssuunta	
1. Oletteko tyytyväinen järjestelmään tällä hetkellä vai koetteko että siinä on parannettavaa? <i>Mitä se voisi olla?</i>	12. Minkälaisia raportteja haluaisitte nähdä järjestelmästä?	
2. Onko BI-IP -järjestelmästä saatava tieto mielestänne todenmukaisella tasolla ja vastaako se perusjärjestelmän tietoja?	13. Puuttuuko järjestelmästä mielestänne joitain ominaisuuksia? <i>Mitä ne voisivat olla?</i>	
3. Onko järjestelmä tarpeeksi helppokäyttöinen vai onko käytön kanssa ilmennyt vaikeuksia?	14. Mitä toivomuksia tai odotuksia teillä on BI-järjestelmältä tulevaisuudessa?	
4. Miten kuvaisitte järjestelmän käytettävyyttä?	15. Miten järjestelmä voisi tarjota vielä lisää hyötyä liiketoiminnalle?	
5. Onko tiedon esitystapa selkeä? Onko siinä puutteita?	16. Miten BI-raportointijärjestelmää voidaan kehittää mielestänne paremmaksi omalta kannaltanne?	
6. Oletteko tyytyväinen web-portaalin toimivuuteen jossa BI-IP sijaitsee?	17. Vapaa kehitysehdotus tai ongelma johon olette kohdanneet BI-IP-järjestelmässä.	
7. Onko tieto saatavilla tarpeeksi nopeasti ja helposti? <i>Onko parantamisen varaa?</i>	<p>Kiitos vastauksistasi!</p> <p>Lähetä tämä kysymyslomake sähköpostilla osoitteeseen: jaakko.tervala@yit.fi</p> <p>Voit lähettää tiedoston esimerkiksi näin: <i>Tiedosto->Läheta->Sähköpostin vastaanottaja (liitteenä)</i></p>	
8. Tiedot ajetaan öisin perusjärjestelmän puolelta, riittääkö että tieto on päivän vanhaa?		
9. Onko ohjeistus järjestelmän käyttöön riittävän hyvällä tasolla? <i>Mitä voisi parantaa?</i>		
10. Miten BI-IP eroaa edellisestä järjestelmästä? <i>Ovatko erot hyviä vai huonoja?</i>		
11. Hyödynnättekö järjestelmän tarjoamia tietoja liiketoiminnassa? <i>Miten?</i>		

Appendix 5: Survey covering letters

Hei,

Teen tutkimusta Business Intelligence (BI) -järjestelmän kehittämisestä YIT Group IT:n BI -tiimille. Tavoitteena on parantaa raportointijärjestelmää ja saada se vastaamaan käyttäjien tarpeita. Olette saaneet tämän sähköpostin, sillä kuulutte YIT:n BI-IP:n käyttäjäryhmään. Tutkimusmuotona on käyttäjille suunnattu kysely, joka toteutetaan liitteenä olevalla kyselylomakkeella.

Mielipiteenne on erittäin tärkeä tutkimuksen hyödyn kannalta. Vastaamalla liitteenä olevaan kyselyyn, voitte vaikuttaa BI-IP -järjestelmän mahdollisiin ongelmiin ja sen parantamiseen. Tutkimus on opinnäytetyöni Laurea-ammattikorkeakoulun tietojenkäsittelyn koulutusohjelmassa.

Pyydän vastaaman kyselyyn mahdollisimman nopeasti, mutta viimeistään 4.3.2011. Liitteenä olevan kyselyn voitte palauttaa sähköpostiini (jaakko.tervala@yit.fi).

Tutkimuskysymyksiin vastaaminen vie n. 15 minuuttia, toivottavasti käytätte pienen hetken aikaanne hyvään tarkoitukseen!

Kiitos jo etukäteen vastauksistanne!

Hello,

I am making a research about Business Intelligence (BI) system development for the YIT Group IT here in Finland. Our goal is to improve the reporting system from and gain it to a level to answer the user needs. You have received this email for belonging to a user group of the BI-IP system. Method for the research is a survey. Survey will be accomplished by a questionnaire attached to this email.

Your opinion is very important for the use of this research. By answering to the attached questionnaire you can affect for the BI-IP systems possible problems and its improvement. This research is my final thesis for the Business Information Technology degree programme at Laurea University of Applied Sciences.

Please answer the questionnaire as soon as possible but not later than March 4 2011. You can return the attached questionnaire directly to my e-mail (jaakko.tervala@yit.fi)

Answering the questions takes approximately 15 minutes. I hope you will take a small amount of your time for a good purpose.

Thank you in advance!