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by
(Ngoumkam, Marie-Noelle Amélie)

Analysis, Conceptual design and Implementation of an early warning system for B2B Sales by KSB

Presented on

JURY
PRESIDENT: Isabelle Wattiau
MEMBERS: Jacky Akoka, Cédric Du Mouza

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CONSERVATOIRE NATIONAL DES ARTS ET METIERS
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MEMOIRE
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par

(Ngoumkam, Marie-Noelle Amélie)

Analyse, Conception et mise en œuvre d’un système d’alerte précoce pour les ventes par
le commerce électronique chez KSB

Soutenu le

JURY
PRESIDENTE: Isabelle Wattiau
MEMBRES: Jacky Akoka, Cédric Du Mouza
DECLARATION

I hereby declare in lieu of oath that I composed this thesis independently and without inadmissible help from outside.

The sources used are quoted in full.

Gennevilliers, 05.03.2013

Signature
ACKNOWLEDGEMENTS

This thesis is the result of nine months of work whereby, I have been accompanied and supported by many people. It is a pleasure for me to take this opportunity to express my gratitude to all of them.

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# List of abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>B2B</td>
<td>Business To Business</td>
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<tr>
<td>BAPI</td>
<td>Business Application Program Interfaces</td>
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<td>BEx</td>
<td>Business Explorer</td>
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<td>BI</td>
<td>Business Intelligence</td>
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<td>BICS</td>
<td>Business Intelligence Consumer Services</td>
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<td>BO</td>
<td>Business Objects</td>
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<td>BW</td>
<td>Business Warehouse</td>
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<td>CAD</td>
<td>AutoCAD drawings</td>
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<td>CRM</td>
<td>Customer Relationship Management</td>
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<tr>
<td>EDI</td>
<td>Electronic Data Interchange</td>
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<tr>
<td>EWS</td>
<td>Early Warning System</td>
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<tr>
<td>ERP</td>
<td>Enterprise Resource Planning</td>
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<tr>
<td>ETL</td>
<td>Extract Transform Load</td>
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<tr>
<td>HOLAP</td>
<td>Hybrid Online Analytical Processing</td>
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<td>MDX</td>
<td>Multi Dimensional Expressions</td>
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<td>MOLAP</td>
<td>Multidimensional Online Analytical Processing</td>
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<td>MSC</td>
<td>Market Sector Code</td>
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<td>OI</td>
<td>Order Intake</td>
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<td>OCI</td>
<td>Open Catalog Interface</td>
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<tr>
<td>ODS</td>
<td>Operational Data Store</td>
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<tr>
<td>OEM</td>
<td>Original Equipment Manufacturer</td>
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<tr>
<td>OLAP</td>
<td>Online Analytical Processing</td>
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<tr>
<td>ROLAP</td>
<td>Relational Online Analytical Processing</td>
</tr>
<tr>
<td>SAP</td>
<td>Systems Applications Products</td>
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<tr>
<td>SID</td>
<td>Surrogate ID</td>
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<tr>
<td>SQL</td>
<td>Structure Query Language</td>
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<td>TO</td>
<td>Turnover</td>
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<tr>
<td>UNV</td>
<td>Universe</td>
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1. Introduction

This work was completed for my graduation as an Engineer in the computer science / Information Systems from EICnam, Paris.

The choice of the current topic was based on both professional and personal motivations. Since I became responsible for the administration of databases in the E-Business team, my greatest wish has been to enable our department to better perform in our different purchasing sales channels (Customer Relationship Management, Electronic Data Interchange, Open Catalog Interface, online market places) by implementing and using the advanced technologies such as Customer relationship management, Data warehousing, SAP Business Objects. The purpose has also been to gain a more competitive edge in the B2B e-Business and to keep this leading position as long as possible in the industrial field, where KSB Customers Portal excels.

The main objective of the work is firstly to analyze the customer data that is stored in the Data Warehouse. This would improve the capacity to address the Customer Management Relationship goals –enhance the processes that contributes to delivering the value to customer- through the creation of a user-profiling model. This in turn would allow one to provide a real time feedback as well as facilitating information exchange through the establishment of an early warning system -understand and predict behavior-. Therefore, conducting Customer Segmentation Analysis will be important to integrate as a marketing approach to support KSB Company in its quest to become more customer-oriented.

According to all the recent works, E-commerce is the ideal domain for customer segmentation since all the required ingredients of the success are more easily met this way. This work explores how an early warning system could be implemented. The documentation of this master’s thesis is outlined in the following way. Chapter one is the general introduction. Chapter two presents the KSB Group, its different e-Business Solutions. Chapter three describes KSB’s expectations and how they could be fulfilled. Chapter four gives a general introduction, in addition to the process of the Early warning systems. Chapter five consists of the IS analysis of the KSB Data sources. Chapter six represents the heart of this work; it consists of a statistical analysis of the keys indicators, customer segmentation, and conceptual design of the expected tool and finally its implementation. Chapter seven concludes the work and summarizes the different difficulties faced.
2. KSB Group

The KSB Group is one of the leading producers of pumps, valves and related systems. Annual sales revenue is 2000 million Euros. More than 15600 employees around the world work to maximize customer satisfaction in building services for industry and water utilities, the energy sector and mining. KSB combines innovative technology and excellent service to provide intelligent solutions. With production plants, sales offices and agents as well as service centers in more than 100 countries, KSB is always close to its customers. The Group’s strategy is to be active and goal-focused for the coming years. Being customer focused and having flexibility helps to form the organizational structure, which the Group’s strategy can be implemented responsibly and successfully. All of this is supported by the corporate culture KSB, which consists in sharing the values and behavior. This contributes to shaping collaboration, based on trust, honesty, responsibility, professionalism and appreciation. ¹

2.1. E-Business by KSB

KSB uses the e-Business to offer and to sell pumps, valves and spare parts. KSB creates added value for its clients and therefore itself. Consequently several e-Business solutions are offered (Customer Portal KSB, OCI, EDI and Marketplaces). With 10 years of experience, KSB is a leading e-Company in pumps and valves.

2.1.1. KSB Customer Portal

KSB Customer Portal is more than just about purchasing. It is divided into two shopping areas. One is the new products area and the other is the spare part area.² Both areas are similar and offer following functionalities:

- Tracking orders,
- Overview on quotations and orders,
- Finding net prices and delivery times,
- Ordering new products and spare parts,
- Saving products and configuration,
- Creating quotations for your customers.

More than 30,000 pumps and valves are available online in the New products area. A product catalogue where a complete range of available operating instructions, CAD Drawings, curves

¹ www.ksb.com
² shop.ksb.com
is offered. The product configurator, a selection software called *KSB EasySelect* is included for the configuration of pumps and valves.

The Spare parts area contains more than 1, 2 million spare parts lists available online. In this shop area, spare parts can be found and spare parts list can be viewed.

![Figure 1: Overview KSB Customer Portal](https://shop.ksb.com)

KSB Customer Portal is only available for business customers. They can only get access data under conditions and once these steps are fulfilled:

- A customer number with general information is created by KSB
- An agreement on the commercial terms (discounts) is fixed and maintained in the Enterprise Resource Planning (ERP) system SAP (System Applications Products) P14
- A KSB employee (salesman) should be named as the liaison and technical support (orders and offers) and etc.
- A hotline contact (e-Business team) for the use of the Customer Portal.

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3 [https://shop.ksb.com](https://shop.ksb.com)
2.1.2. **Open Catalog Interface**

Open Catalog Interface (OCI) is a standard for retrieving order information from e-Business solutions to internal procurement applications. It allows companies using e-Business to serve customers who require OCI functionality. Our experience in e-Business allowed the development of many interfaces in different systems. As presented in the following picture.

![Figure 2: KSB ERP SAP integration to Customer ERP](image)

2.1.3. **Electronic Data Interchange**

Electronic Data Interchange (EDI) is the structured transmission of data between organizations by electronic means. It is used to transfer electronic documents or business data from one computer system to another computer system, i.e. from one trading partner to another trading partner without human intervention. KSB exchanges these business documents (orders, orders confirmations, invoices and delivery notes) with its big dealers like Brossette, Rexel, Balitrand etc. Here are the formats that can be supported by KSB SAP ERP

---

KSB Documents, March 2005

2.2. KSB e-Business in the World

KSB is leader on the market of the online sales of pumps and valves factory. The KSB customer Portal is established as a reliable sales channel in the world. Today, 15 countries use the KSB Customer Portal for their customers and 3,400 customers are already online.

Figure 4: KSB e-Business in the world

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6 KSB Documents, October 2005
7 KSB documents, June 2012
3. **What does KSB want to achieve?**

Today, almost all KSB big companies use the powerful Enterprise Resource Planning called SAP ECC6.0 to coordinate all the resources, information and activities needed to complete their business processes. KSB group has also invested since almost ten years in the Data Warehouse from IBM to store its customer data located in disparate databases so it can be easily retrieved, interpreted and sorted by end users. It helps its executives and managers to respond faster to the markets and make more informed business decisions. In order to remain competitive, KSB needs to take advantage of information system technology.

The purpose of this work would help KSB to discover patterns and relationship in its data for making better decisions. In other words KSB expects to achieve a customer segmentation to identify firstly customers with common characteristics, and who buy and use our different e-Business solutions in the same way. Through this segmentation, we expect an establishment of an early warning system for our B2B sales systems by developing a traffic light according to our business rules.

3.1. **Project roadmap**

For my project to succeed, it is essential that the project is organized and managed according to the consistent principles. This is why a project roadmap is elaborated to organize, measure the progress, track the project tasks and finally report to the management as project manager.

Here are the different steps of the project presented in a roadmap.

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*Figure 5: Project roadmap*

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8 Own representation, March 2012
4. AS-IS ANALYSIS

4.1. KSB Data sources architecture

To support its business processes, KSB uses mainly the products of the Walldorf/Germany software developer SAP as enterprise resource planning system. Bigger KSB companies work with SAP ERP and smaller subsidiaries with SAP Business One or local ERP Systems. Following SAP systems, Customer Relationship Management System and SAP Netweaver application server ECC 6.04 are currently in use at KSB.

- **SAP Central ERP System**: Germany, France, England, Austria, Swiss, Finland, Sweden, Netherlands, South Africa, Belgium, Spain, Luxemburg, China.
  - **SAP CRM**: Customer Portal (KSB Web shop) version 5.0
  - **SAP ERP Italy**: like ERP System version 4.7
- **SAP Business one**

SAP Business One is a small sized ERP system version 2004C. The range of functions is not comparable to SAP ERP. However, it offers all necessary functions typically required by a sales company. It is currently used in more than 10 countries (Russia, Poland, Czech Republic, and Canada etc.)

- **Local ERP System**

ERP Brasilia (SYTELINE) is an ERP System comparable to SAP, common in the Americas region.

- **Update Customer Relationship Management (CRM)** is used to support rapid and flexible sales, marketing and customer service process optimization for international businesses. It is an industry-specific CRM solution that helps KSB to become successful by providing a customized solution.

For our analysis, the focus will be put on data coming from our SAP systems. Here is an outlook of the KSB IT architecture.

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9 [www.update.com](http://www.update.com)
4.1.1. SAP Customer Relationship Management

KSB uses SAP CRM only for e-Business activities and for others CRM activities, the Update CRM Software is used\(^\text{10}\). KSB deals with its business costumers on Internet via its Customer Portal. The KSB Customer Portal is a platform that offers to KSB companies, customers and service partners’ information on products, prices and delivery times. It also serves as a tool for quotations and orders as described below. SAP CRM is based on central SAP ERP System. Customers, products, pricing master data are transferred via SAP middleware from the ERP system to SAP CRM. Catalog content, login data, documentations are maintained in SAP CRM and all data displayed in customer portal are replicated from SAP CRM to Web server.

4.1.2. SAP central ERP System

This is the main system mainly used for quotations and orders processing. Moreover, the entire customer, -material master data and the prices are here stored as well as information about order intake which is then transferred to Data Warehouse for order intake statistics.

4.1.3. KSB Data warehouse IBM Cognos

\(^{10}\) [www.ksb.com](http://www.ksb.com)
\(^{11}\) [www.update.com](http://www.update.com)
The company business data that accrues in the ERP systems is used to analyze the company from different perspectives and to evaluate it if necessary. For performance reasons the analysis is not executed in the actual ERP systems, but in a separate system. The actual KSB Data Warehouse is provided by IBM COGNOS and has been considered as the primary KSB analysis tool for Controlling and Sales Departments since 1999. It is not only a reporting system, but also provides data to other KSB systems such as SAP P14, MIS Alea, Update CRM and others. Currently a big project is running by KSB to replace KSB Data Warehouse as soon as possible by SAP Business Intelligence. Here an overview of the KSB Data Warehouse.

Figure 7: Overview KSB Data Warehouse Cognos

As presented in this figure, different cubes are available and the most important is KSB Group Statistics that gives information about order intake and invoicing. Used as basis, it helps to build other cubes depending on the needs. “KSB eSales” and “KSB Groups Statistics” are the cubes on which the focus will be set. Cube is a database where all kind of data can be stored. KSB eSales cube contains user clicks for “eSales customers” either in the Pumps and Valves or in the Spare parts area. eSales customers by KSB are customers who use one of our e-Business solutions mentioned in chapter below. They are grouped under “Event” in order to help users to make some queries by needs. Event is a user action under KSB Customer Portal. Here some examples of Events:

Log in/off:

Downloads

---

12 http://vndwhp/cognos/cgi-bin/upfgi.exe?xmlcmd=<GetPage><Template>upfront.utml</Template></GetPage>&id=04da13ec7cc911dbbf8c9f6e30ca8cf6, called on 05.05. 2012
Shopping Cart

Customer master data comes from ERP System and user Event from our SAP CRM. That is how *KSB esales* and *KSB Groups statistics* cubes look like.

![Figure 8: KSB Esales Cubes in the Data warehouse](image)

![Figure 9: KSB OI in the Data Warehouse](image)

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13 KSB Data Warehouse IBM Cognos, May 2012
14 KSB Data Warehouse IBM Cognos, May 2012
5. TO-BE-ANALYSIS: Early Warning System (monitoring) for B2B Sales

5.1. Definition of Early Warning System

The Early Warning System (EWS) is an integral management system consisting of methods, organization and IT supports with the goal of understanding, monitoring and managing critical risks. It allows you to search for exceptional situations and helps in early detection of undesirable situations. Nowadays the early warning systems are implemented in all the information systems. Searching on the Internet for “early warning systems” brings up incalculable activities for which they are used. Early warning systems are part of a company’s capacity to react to a perceived threat, in order to adapt, to mitigate or prevent harm. Here are some key questions about EWSs that should be answered during this section. How early is early (this relates to the timing of the warning)? What constitutes a warning (monitoring, trend extrapolation, and prediction)? What is meant by a system (formal, informal, quantitative, qualitative or anecdotal)? What are to be its official functions? What else might it do, besides monitor the environment and warn society of harm (educate, prepare societal responses)? What are the levels of warning (outlook, watch, warning, and alert)?

5.1. Overview

Early warning system is based on key figures of data warehouse. It enables detecting and rectifying potential problems at an early stage. With the monitoring systems, some requirements can be defined:

- **Threshold value**
  A threshold value can be defined for example for customers pro role (kind of activities) whose order intake are greater than 5000€.

- **Trend**
  Customers with a negative trend evolution in sales are highlighted with the advantage that developments can be recognized early, leaving enough time for a reaction.

- **Planned/actual comparison**
  Here a plan realization for incoming orders of less or greater than 80%. With the help of arithmetic operators (>,, <, = etc.), the weak areas between planned and actual data can be checked and pinpointed.
  An exception can take different forms. Combining exceptions into exception groups can check complex data.

- **Standard analysis**
In standard analysis, the exceptions are highlighted using colors. These colors help to navigate selectively within the standard analyses.

- **Exception analysis**

  The exception analysis is like a filter; only exceptional situations are displayed and highlighted in also different colors.

- **Periodic analysis**

  The frequency of the search is without restraint definable (hourly, daily, weekly, and monthly). It can be posted by mail or by workflow, if an exceptional situation occurs.

  Periodic analysis can be described in two ways:

  - As an event-driven analysis
  - As a system-driven analysis

The dataset chosen is checked for exceptional situations.

### 5.2. Types of early warning systems

There exist an uncountable numbers of early warning systems. All the domains and activities are concerned. Forecasts, trends and projections can be considered as types of early warning systems and monitoring as well. Monitoring is the routine tracking of priority information about a program, its progress, its activities and its outcomes. Monitoring usually includes the tracking of inputs and outputs through recordkeeping and regular reporting systems as well as observation and surveys. In order to develop and implement a monitoring tool, some process steps need to be followed.

### 5.3. Software lifecycle

Software lifecycle designs all the process steps for the development of software, from birth up to the implementation. The purpose of such sequence of activities is to set intermediate milestones of the validation of software development. There are hundreds of different lifecycle models to choose such as waterfall, V-model, spiral, unified process etc. but many are minor variations on a smaller number of basic models. Here are the main activities executed during a software lifecycle even if there are mandatory phases for each model:

- Project planning
- Requirements definition

---


- Architecture design
- Implementation/Development
- Integration and testing
- Acceptance and deployment
- Maintenance

It is also important to note that lifecycle models can be sometimes combined and changed. Between all the Systems Development Life Cycle (SDLC), the most suitable model to our case is the V-shaped.

**Why this model is applicable to our project?**

a) User and software requirements are clearly defined and known
b) Software development technologies and tools are well known
c) Our system requires a high reliability
d) The risk level of the project is not high.

**Advantages**

- Simple and easy to use
- Each phase has specific deliverables.
- Higher chance of success over the waterfall model due to the development of test plans early on during the life cycle.
- Works well for where requirements are easily understood

**Disadvantages**

- Very inflexible is like the waterfall model.
- Little flexibility and adjusting scope is difficult and expensive.
- Software is developed during the implementation phase, so no early prototypes of the software are produced.
- Model doesn’t provide a clear path for problems found during testing phases.
5.3.1. Specification of the requirements

5.3.1.1. Interest of a monitoring tool

Nowadays, information systems became key elements for companies. They become more and more complex, bigger and important, that is really demanding in terms of time for management and maintenance. Therefore a monitoring tool is necessary to

- Accompany administrators and users in order to simplify their tasks.
- Anticipate problems and react quickly

To be effective and efficient, the basic need of a monitoring tool is to use information such as indicators. Indicator is a sign of change. The choice of indicators is often seen as one of the most crucial steps. Indicators are usually most effective when using both qualitative and quantitative measures. Indicators like objectives should be specific, measurable, achievable, relevant and time-bound otherwise SMART.
It is a big challenge to establish a performing monitoring system but once it is done perfectly; your project can take advantage of it.

5.3.1.2. Requirement of the tool

This phase consists of collecting and analyzing the needs of the users. Talking about strengths and weaknesses is necessary to improve the quality of the sales channel. Here are some requirements that should be fit by the system and how the system has to perform:

5.3.1.3. Requested system functions

❖ Main function 1:

The monitoring tool should be complete.

❖ Only one tool for the monitoring all the activities

❖ Main function 2:

Tool should be very simple that means user friendly, easy to use and read

❖ The goal of an application programming interface is to provide a suitable abstraction which is both simple enough for expressing complex application specification.

❖ Main function 3:

Check the customer’s behavior during a define period according to user and management requirements

❖ Main function 4:

The tool should represent the level of warning at the first sight

❖ Identify the level of warning by using the color code (red, yellow and green)

---

• The status of customer should be sorted in the way that customer in a bad evolution trend should be first presented, then followed by customer in a medium evolution trend and finally by customers in a good shape.

5.3.1.4. System’s attribute

The system should be:

- Reliable
- Available
- Secured
- Maintainable
- Portable
- Dynamic

5.3.1.5. Constraints

- Time
- Go Live of the software, that will support the monitoring tool
- Training

5.3.1.6. Conceptual design

5.3.1.6.1. Where Monitoring tool for B2B Sales should be located?

Here are some questions that need to be first answered:

- In which system should our tool be located?
- Can we connect it to the existing architecture?
- Do we need an interface?

5.3.1.6.2. Presentation of the different possibilities

For the implementation of the tool, three possibilities were deeply examined. Here are the description of each choice and the reasons why they have not been selected.

5.3.1.6.2.1. Excel

The idea was to use Excel as a monitoring tool. That means key figures would have been extracted once a month from the Data Warehouse, and then transferred in a preprogrammed Excel file where some required calculations like average by month for week or average by week for month would have been already fixed. So the requirements would have been expressed thank to formula and conditional formatting.

Problem:
Key figures should be extracted and transferred to excel each month or quarter.
The calculations are not dynamic and have to be updated
Managers’ requirements (groups’ segmentation) could not be respected
Columns in the file would be difficult to manage because of the number
A very high risk of errors exists by manipulating the data
Time consuming

**Conclusion:**
These reasons contribute to the non-selection of excel as a monitoring tool, therefore it has been avoided.

5.3.1.6.2.2. Development of a program in an interface

The aim of this project is to create a tool that enables the monitoring of customers using our different e-Business solutions. The program should retrieve the needed information from different systems SAP P17 (only used for e-Business activities), P14 (central system only used to manage order intake) and IBM Cognos Data Warehouse (used for statistics). To enable the communication between all the systems, an interface should be created.

**Problem:**
- Development of an interface to make all the systems communicate is quite expensive
- All the needed resources are already involved in existing big projects
- The information is not stored in one single system

**Conclusion**
In the first time, this option has been presented as the only reliable solution despite all the inconvenient and the generated costs.

As we have decided to take the development of a program for the monitoring of our customers as a serious option, the Board Management had planned the implementation of a new statistical tool to replace the existing one till the end of the year. Once this project has been officially revealed and released, we were wondering how this tool presented as more powerful than the existing one could be helpful to achieve our goal.

With this announcement, we could dream about another option. Powerful, robust and user friendly are the adjectives used to describe the new statistical tool, where it could be possible to access a separate interface for querying, analyzing and reporting. In addition, all the complex operations that could not be done today in the existing tool would be feasible.

By taking part of the implementation of the new statistical tool “SAP Business Objects” at some levels and having the opportunity to test it, it became as evidence that this software
could be the key to our problem and this could avoid costs for our department and consequently the programming of a new tool.

This new fact came out and participated to the redefinition of our work and especially the word “tool” and changed completely our way of thinking.

At the beginning of this work, tool was considered only as a technical object such as application program or a piece of software that carries out particular functions like creates, modifies or analyzes another program. But throughout the evolution of this work and the official announcement of the implementation of SAP Business Objects 4.0, our vision of the word “tool” turned into concept, reports used to perform and this is the reason, a serious thinking was conducted to explore the SAP Business Objects and analyze the benefits of using it for our purpose.

5.3.1.6.3. Recommendation for the tool’s location

After taking part in some projects steps and having the opportunity to test SAP business Objects in an advanced level. It was clear that this software fulfills our expectations, therefore my recommendation to the e-Business department has been to implement the monitoring tool inside the SAP Business Objects since the different key figures like order intake, turnover, pumps and valves and spare parts login etc. are stored inside and the list of advantages is quite important:

- All the statistics are available inside
- Real time information
- Data presentation
- Flexible visualization
- Advanced analysis and calculations
- Conditional formatting
- Internal sales organization
- Easy view of customers’ hierarchies

The lists of advantages, the quick access to the key figures and the possibility to program (write a program code) inside have contributed a lot in making the decision to implement the monitoring tool in SAP Business Objects, this in accordance to the already existing SAP architecture by KSB.

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5.3.1.7. Implementation of the SAP Business warehouse

SAP Netweaver Business Warehouse (SAP NetWeaver BW) is the name of the Business Intelligence (BI), analytical, reporting and Data Warehousing solution produced by SAP AG. The following graphic shows where SAP BW is positioned within SAP NetWeaver. Furthermore, those subareas that incorporate SAP BW are listed and the relative objects are described in detail below.

![BI in SAP NetWeaver](http://help.sap.com/erp2005_ehp_06/helpdata/en/b2/e50138fede083de10000009b38f8cf/frameset.htm)

**Figure 12: BI in SAP NetWeaver**

5.3.1.7.1. Info Providers

Generic term for BI objects where data is loaded or that display views of data. There are two types of InfoProviders. One type includes objects that contain physical data. — These are known as data targets such as InfoCubes and InfoObjects (characteristics with attributes, texts, or hierarchies) — and the other type includes objects that display no physical data storage, such as InfoSets, RemoteCubes, SAP RemoteCubes, and MultiProviders.

5.3.1.7.1.1. InfoCube

An InfoCube is a set of relational tables arranged according to the star schema: a large fact table in the middle surrounded by several dimension tables. InfoCubes are filled with data from one or more InfoSources or other InfoProviders and data is stored physically in an

---

InfoCube. An InfoCube is a central data store for reports and evaluations that enables multidimensional analysis. It refers to how data is structured within BW tables. Each InfoCube consists of several InfoObjects, which create the dimensions and characteristics of the cube.

5.3.1.7.1.2. Info Objects

An InfoObject is the basic unit of information in the BW environment. It is a generic term for business evaluation objects such as customer, product, region, revenue, and so on. An InfoObject represents a unit of metadata in the BW repository, containing both technical information and business logic. An InfoObject can have attributes, each of which in itself is an InfoObject as well.

5.3.1.7.2. Architecture of KSB SAP Business warehouse

This chapter is about the data flow from the operational systems into the Data warehouse up to the end-users’ access tools. KSB SAP BW is based on the system SAP P19 and its architecture has major components which are Operational Data Sources; Operational Data Store (ODS), Load Manager, Warehouse Manager, Query Manager and End-User access tools.

How does the data flow between the systems up to SAP BO WEBI?

- Operational data sources

Without source system, there would be no data. It concerns data held for example in network databases, file systems, Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) and etc.

- Extract Transform Load (ETL)

Performs all the operations associated with the extraction and loading of data into the warehouse. These operations include simple transformations of the data to prepare the data for entry into the warehouse.

a) Data is retrieved from SAP ERP System (Data extraction), and then prepared for entry into the SAP Business Warehouse info cube where all sales information is stored.

- Operational Data Store (ODS)

ODS is a repository of current and integrated operational data used for analysis. It is often structured and supplied with data in the same way as the data warehouse, but may in fact simply act as a staging area for data to be moved into the warehouse

- Warehouse Manager

Performs all the operations associated with the management of the data in the warehouse. Generates query profiles to determine which indexes and aggregations are appropriate.
Query Manager
Performs all the operations associated with the management of user queries. It is constructed using vendor end-user access tools, data warehousing monitoring tools, database facilities and custom built programs. Query manager complexity depends on the end-user access tools and database.

b) Afterward the data is read via Business Intelligence Consumer Services (BICS) with Business Objects 4.0, we have 3 different options to connect to (Business Explorer) Bex queries and create reports on top of that. These are:

- BAPI connection (OLAP Universe UNV), which was the traditional method.
- Relational Connection through Data Federator, which allows BW cubes to be integrated and joined with other Structure Query Language (SQL) like databases (Oracle, MS SQL etc.)
- BICS connection, which SAP has introduced with BO 4.0 release.

SAP has introduced a new concept to connect BW, BI Consumer Services aka BICS with the release of BO 4.0. SAP recommends connecting BW through this connection. No universe needed for this type of connection to be consumed with. Web Intelligence can connect directly to BEx queries, so SQL query is not shown and the universe is created on the fly. Hierarchies are supported with this kind. Instead of connecting through Multi-Dimensional Expressions (MDX) or SQL approach, this is direct client connection that performs better and faster than the other two connections.

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![Figure 13: SAP BusinessObjects4.0](http://scn.sap.com/community/businessobjects-web-intelligence/blog/2012/07/19/bics-vs-bapi-vs-df-relational-connection), called on 14.11.2012
End-user Access Tools

Users interact with the warehouse using end-user access tools. They can be categorized into five main groups: Data reporting and query tools, Application development tools, Executive Information System, Online Analytical Processing (OLAP) and Data mining tools.

c) The report type and BI Platform are selected and via Web browser, characteristics and key figures are selected for a specific report to SAP BO WEBI.

Hereunder the description of this Data flow process resumed in the following picture.

![Figure 14: KSB SAP BO Web Intelligence Dataflow](image)

5.3.1.7.2.1. OnLine Analytical Processing taxonomy

OLAP tools enable users to analyze and visualize multidimensional data interactively from multiple perspectives. OLAP consists of three basic analytical operations: consolidation (roll-up), drill down and slicing and dicing. They can be divided into categories using the following taxonomy: multidimensional (MOLAP), relational (ROLAP) and hybrid (HOLAP). KSB SAP Business Warehouse is implemented on the Multidimensional Online Analytical Processing (MOLAP) storage technique.

5.3.1.7.2.2. Multidimensional OLAP (MOLAP)

MOLAP stands for Multidimensional Online Analytical Processing. This is the more traditional way of OLAP analysis, data indexes directly into a multidimensional database.

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22 KSB structure reporting environment
Cubes are built for fast data retrieval and are optimal for slicing and dicing operations. Moreover they can also perform complex calculations. In spite of many advantages, MOLAP structure is limited in the amount of data it can handle. Because all calculations are performed when the cube is built, it is not possible to include a large amount of data in the cube itself. In addition, it requires an additional investment. Since cube technology are often proprietary and do not already exist in the organization.

OLAP does not provide any formal or standard technique to be modeled. Each vendor defines his/her own approach regarding the needs of his/her respective end users. However, there is a general model used on Data Warehouses called Star schema but it cannot model all the appropriate conceptual issues and problems like information loss is very often.

5.3.1.7.2.3. Data modeling

In the multidimensional modeling, there are many ways to design a data warehouse environment (conceptual, logical and physical modeling). The logical modeling is more conceptual and abstract than the physical design. By beginning with the logical design, we focus on the information requirements without getting bogged down immediately with implementation detail. The logical data model used for KSB SAP Business Warehouse is the star schema. The star schema is the simplest data warehouse schema. It is called a star schema because the diagram of a star schema resembles a star, with points radiating from a center. The center of the star consists of one or more fact tables and the points of the star are the dimension tables shown in figure 18 and 44. A fact is an event that is counted or measured, such as a sale or login.

5.3.1.7.2.3.1. Universes and objects

SAP Business Objects universe is defined as the semantic layer that maps objects and classes to data in a database. Using a universe, the interested data can be retrieved by dragging and dropping the desired objects. A universe designer, using the universe design tool, creates universes. Within each universe, appropriated objects can be selected to build queries and retrieve data from database. Universes are made up of classes and objects.

Classes are logical groupings of objects. There are three different types of objects:

- Dimensions
Dimensions are objects that retrieve the data that provides the basis for analysis in a report. Dimension objects retrieve typically character-type data for example customer names, numbers and dates. It represented in the Query panel with a blue, four-sided figure.

- Details
Details provide descriptive data about a dimension. A detail is always attached to the dimension for which it provides additional information. For example customer key.
A detail is the same as an Attribute.
Details are represented with a blue, four-sided figure symbol in a Query Panel.

- Measures
Measures retrieve numeric data that is the result of calculations on data in the database. For example, order intake is all orders that were legally concluded during the respective accounting period under review and have also come into effect.
A measure is represented an orange rectangle in the Query Panel

5.3.1.7.2.3.1.1. Connecting Master tables to Info cubes via SID tables

In order to cover the re-alignment of master data attributes, the master data tables in a BI Data model are not linked directly to Info Cubes (but connected via Surrogate Keys ) as the following, simplified, picture below explains:

Figure 15: Connecting Master Tables to InfoCubes via SID Tables

---

As you can see, pointer or translation tables called SID (Surrogate-ID) tables are used in the BI data model to link the master tables of the BI data model to Info Cubes. The above graphic shows a simplified version of what types of SID tables exist. SID tables play an important role in linking the data warehouse information structures to the InfoCubes and Data Store Objects. All these SID tables are automatically maintained during master data load. SID tables are also maintained during InfoCube load if no referential integrity check is enforced (InfoPackage). But in case of Line Item Dimension, the SID table acts as a Dimension Tables that means NO Dimension table is created for this.  

5.3.1.7.2.3.1.2. Info Cube E-Sales

InfoCube E-Sales is the central data store for all the e-Business events. B2B scenarios in SAP CRM e-Business contain a set of predefined business events. Events characterize all the specific actions such as Login, Logout, Documents, Products, Search, and My Account, catalogs executed by a customer on the KSB Product Catalogs and the Customer Portals Pumps/Valves and Spare Parts. As explained in the previous chapter, KSB uses SAP CRM - based on central SAP ERP System for its e-Business activities. This data is imported into SAP Business Objects (Info Cube E-Sales) via a data flow process.

5.3.1.7.2.3.1.2.1. Data Flow process

Events can be identified and recorded, then captured in SAP e-commerce CRM and sent to our own implementation server in SAP CRM/P17 via Backend-Event-Capturer. This Server replaces the tealeaf server and has the same properties of the Tealeaf server. Tealeaf server is a software which records and analyses customer interactions on a website and any mobile channels. Information is recorded in tables in SAP CRM/P17 and then business event information is extracted and transformed into a flat file text format like CSV-format via a report. This flat file format already corresponds to the data structure that is predefined in SAP BO, so data can be easily imported to SAP BO (SAP P19) in the respective Info cube once per day for advance analysis. Because of these massive synchronizations and other benefits named in chapter 5.3.1.6.3, I recommend the integration of the monitoring tool directly in SAP Business Objects and this could be presented as followed in the picture below.

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5.3.1.7.2.3.1.2.2. Star schema

InfoCube *E-Sales* contains dimensions and a fact table. Dimensions for this cube are Sessions, Documents, Search, Customer, Products, and Catalogs. Each dimension contains attributes (descriptive data about dimensions) and a primary key (a key that uniquely defines the characteristics of each record). This primary key will be a part of the composite primary key of the fact table. Fact table is composed of primary keys of each dimension tables (Session Event ID, Customer Number, Document ID, Search String, and Category) and the measures (Event Count and Quantity) and navigation attributes are like any other master data attribute except that we can navigate (filter, drill down and selection) in reports on these characteristics (Account group, Business partner, Country, Branch category, Customer market etc.).

Navigation attributes belong to one dimension. They are rather used than dimensions because they keep the small amount of data, because they do not have to be saved for every fact set. As a consequence, they are not represented in the star schema however they will be used as dimensions to build the reports. All the navigation attributes are not used but only the one marked with a check box on “ON”. Hereunder you find the simplified version of the star schema for the Info Cube *Esales* followed by the description of the dimensions.

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26 Own representation on July 2012
Figure 17: Dimensions, Attributes and Navigation attributes Info Cube Esales

27 KSB SAP Business Objects, November, 2012
Figure 18: Star schema InfoCube E-Sales

Own representation, December 2012
i. Description of the used dimensions in the Info Cube

Esales

As described in the star schema, it exists for the Info Cube *Esales* many dimensions. Unfortunately all these dimensions cannot be used for our monitoring tool. Therefore only useful dimensions will be deeply explained and presented.

- **Customer Number**
  A customer number and a name identify each customer. Customer number is a key that is represented with nine characters. It is a unique identification and belongs to 1:1 relation.

- **Country**
  Country is a qualitative categorical variable, representing the different countries where e-Business customers are present. Here is the distribution of customers by countries.

![Image: Distribution of customers by countries](image)

*Figure 19: Distribution of customers by countries*[^29]

Germany (DE) covers more than half of the company’s customers with 53.7%; followed by France (FR) 19.87%, Netherlands (NL) 5.51%, Switzerland (CH) 4.82%, Great Britain (GB) with 2.81% and the rest. This is explained by the fact that these countries have been the pioneers in the field of e-commerce by KSB and the rest of countries grouped under the variable (Rest) with 5.91% contain customers roughly in equal proportions.

- **Role**
  Role by KSB reflects the core business of the customer. It is defined by specific needs and depending on the products knowledge level of the customers as well. It allows access to a range of KSB products and favorable commercial terms for some customers.

[^29]: Own representation, May 2012
attention will be paid on this variable because it will contribute to the establishment of the monitoring tool. KSB distinguishes 17 types of customers.

This variable is qualitative categorical and here are the attribute and the distribution in form of a figure

![Distribution of Customers by roles](image)

*Figure 20: Distribution of Customers by roles*

Here are definitions of some main Roles:
- **Operator**
  They are responsible for the maintenance of equipments.
- **Engineering planner/consultant**
  As service provider, they provide strategic manufacturing knowledge to help the plant manager operate efficiently, effectively and safely. They are also responsible for planning, designing, specifying, installing, modifying and maintaining plant facilities, systems and equipment.
- **Original equipment manufacturer (OEM)**
  OEM is used to refer to the company that acquires a product or component and reuses or incorporates it into a new product with its own brand name.
- **KSB Service Partner**
  KSB Service supports customers from all fields of application, whether it is industrial or municipal plant and power station operators.

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30 Own representation, May 2012
This role represents the companies which belong to the group KSB either totally or to a percentage share and whose turnover falls in the total balance sheet of the group.

- Installation contractor

They are responsible for buying and installing the equipments according to the drawings and technical description of the products provided by the engineering planner.

- Wholesaler distributor

Wholesaler buy large quantity of products. High volume purchase orders is one of their big characteristic. They belong to a big sales network and have a big platform distribution.

- Dealer

Dealers frequently have a business relationship with manufactures that they represent. Many distributors maintain exclusive buying agreements that limit the number of participants or enables distributors to cover a certain territory.

As conclusion, the majority of KSB customers are Operator, KSB service Partner and Plant engineering contractor.

- Market sector

This variable represents the business line of the customers. The inputs of this variable are construction, water supply and sewerage, energy supply, manufacturing, mining, transport, chemical and petrochemical

It appears that the majority of KSB customers using the KSB e-Business solutions run their businesses in sectors like construction, manufacturing and water supply. Other sectors are less representative because of their unequal proportions.

![Figure 21: Distribution in applications](image)

---

33 Own representation, May 2012
Date
This dimension represents the date on which the customer has logged in either on the KSB Customer Portal or on market places. It could be presented in days, months, quarters, and months in intervals or years.
  o Year/Month
For example: 01/2012
  o Year/Quarter/Month/Day
For example: 2012/1

Event name
This dimension contains all the events in terms of actions executed by the customers on the KSB Customer Portal. These events can be Login, Logout, Download, Errors, Configurator, and Catalogs.

Salesman
This is the person who sells the products in a designated region. He is responsible for the customers and presents the KSB e-Business solutions such as Customer Portal. Depending on the company’s size, some more e-Business solutions (EDI, OCI or market places) can be implemented with the support of the e-Business team. Each KSB sales agency has an objective in Internet Sales orders. At the same time, the turnover and order intake for each salesman are displayed in the statistical tool.

ii. Description of the used measures in the Info Cube \textit{Esales}
As you can see, only one measure will be used in the info Cube \textit{Esales} for our purpose. Event count is the measure that represents the total amount of login connections for a customer during a defined period.

iii. Customer segmentation
Performing Customer Segmentation analysis and dividing your customer base into different segments based on different criteria is a great exercise for discovering profitable segments and alternatives for growth in those segments. That means customers behaving in a similar way or having similar needs are grouped in segments. Developing effective customer segmentation by KSB will be useful to measure the market performance for each customer. We expect by taking advantages of this segmentation to improve our pricing, distribution decisions, product development and more effective promotional actions. Consumer segmentation, in particular the behavioral segmentation (activities or core business) has been used to constitute the groups according to the dimension role. After analyzing the different roles and based on
experience and on experts’ criteria, it has been decided to divide our population into three groups for the event name Login.

**Group1** is composed of Wholesalers, Dealers, KSB Companies and KSB Service Partners. With 522, this group concerns customers with big capacities of warehousing. There are 146 customers belonging to the group 1 in Germany, 219 in France and 157 in other countries.

**Group2** is composed of only engineering planners (242). This type of customer requests our KSB Customer Portal only for consultation in case of projects and that corresponds to a lower level of use of the portal. There are 188 customers in Germany, 11 in France and 43 in other countries.

**Group3** is composed of the rest of the roles (977) with a medium level of use of the KSB Customer portal. There are 601 customers in Germany, 116 in France and 260 in other countries.

Here is the representation of the segmentation in percent.

![Distribution of groups by role](image)

### Figure 22: Distribution of groups by role

As conclusion, Germany and France have over 70% of KSB customers. This can be explained by the fact that KSB is a German company with headquarters in Frankenthal (Germany) and KSB SAS France was the first KSB Company. Customer segmentation concerns the existing and the new customers. In order to classify each customer into the right group defined by the experts, we needed to fix some rules for the classification. The field ROLE stored in customer general data in SAP P14 determines the membership to a group. This variable is really decisive (please find the description of each role in the previous sections). With the help of an algorithm, the classification will be automatically done. Hereunder is presented the content of the algorithm and its draw in form of decision tree.

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34 Own representation, May 2012
Figure 23: Classification of customers according to ROLE for the InfoCube Esales\textsuperscript{35}

When a new customer is created in Update CRM and transferred to SAP P14, the field ROLE is checked by the algorithm.

1. If the role is equal 4 or 5 or 9 or 17, then the customer belongs to Group1.
2. If the role is equal 6, then the customer belongs to Group2.
3. And finally if the role is equal 1 or 2 or 3 or 7 or 8 or 10 or 11 or 12 or 13 or 14 or 15 or 16 then the customer belongs to Group3.

In order to have the description of the role, please refer to the description of the dimension role in the previous section.

5.3.1.7.2.3.1.2.3. Reports with SAP Business Objects
Web Intelligence (WEBI)

SAP Business Objects business intelligence (BI) solutions access, analyze and explore data by helping business users making their decision by providing fact based and quality information.\textsuperscript{36} This platform stores two applications: Analysis edition for Online Analytical Processing OLAP and Web Intelligence Application. Web Intelligence offers many

\textsuperscript{35} Own representation, May 2012
\textsuperscript{36} \url{http://www.sap.com/belux/solutions/sapbusinessobjects/large/business-intelligence/index.epx}, called on 03.0912
possibilities especially a user-friendly interface that enables powerful analytical capabilities such as time calculations (simple, custom and dynamic) that are needed for our monitoring tool. Users can access Web Intelligence as a stand-alone application on the desktop or as a web application within the SAP Business Objects Business Intelligence platform portal, called BI launch pad. The BI launch pad collects and consolidates KSB’s BI information and presents it in a secure, focused and personalized view to users. Hereunder, a view of KSB SAP Business Objects applications is illustrated.

![Figure 24: KSB SAP BO Applications](image)

### i. Introduction Web Intelligence

Web Intelligence is a tool for querying, reporting and analyzing your organization’s business information with a set of new functions and operators. It provides access to the information that you need through the SAP Business Objects semantic layer.

KSB has chosen to use Web Intelligence to query its Databases report, report, analyze and share key data to make business decisions. Simple and very complex queries or calculations can be created with WEBI for example:

- Simple calculation is the addition, subtraction or division between two figures.
- Custom calculation is the personalized calculation. Here many functions are available and formulas can be introduced.
- Dynamic calculation concerns specific calculations such as moving value (minimum or maximum), moving average, accumulative sum and rank number etc.

As mentioned above, WEBI will be used for the required calculations in an advanced level so that the classification of customers’ in good, medium or bad status could be possible.

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37 KSB SAP Business Objects, July 2012
ii. Architecture Design

End users would like to check the current status of customers immediately after calling the reports. For this purpose, specific rules for each group according to their core business have been defined as described in previous chapter. To develop a tool which meets users’ requests and expert’s criteria at the same time, calculations must be first defined; secondly the detailed requirements should be transformed into complete detailed systems design document, so that the current situation of a customer can be easily read. In other words, project features and operations are described in detail to include technical specifications; thirdly the query’s overall structure and its nuances should be defined in terms of the technology, the data structure design, layout, characteristics, key figures etc. This step focuses also on how to deliver the required functionality by using for example process diagrams and flowcharts (refer to figure 25 or 36).

As a result, an algorithm has been defined for each defined group, since each group is composed of different kind of core businesses. That means concretely, that rules have been established and presented as followed: three special rules according to the classification of customers grouped by roles for the Event name Login. In the same way, two special rules have been developed for customers grouped by roles for the measure Order Intake.

5.3.1.7.2.3.1.2.4. Group1

As described above, Group1 is formed by Wholesales distributor, Dealer, KSB Service Partner and KSB Company. They belong together because of their similar behavior and mainly their big capacity of warehousing. To analyze this group, three new variables will be introduced to enable the establishment of the monitoring tool. They are either existing (Login per month) or new (Average by week for month and Average by week for month n-1) and as consequence they should be created with help of complex calculations. How to calculate them is presented in following section. According to the logic, a customer, who belongs to group1, must login at least once in the week for either replenishment or warehousing. Besides the logic, an algorithm is drawn to check automatically the status of each customer whether he is in a bad, medium or good situation. According to the algorithm, the average by week for month in the current year should first be calculated, and then if it is less than one per month, the status of the customer is set in red. Otherwise, the average by week for the same month in the previous year is then calculated and both are compared. So if the average by week for a
month in the current year is less than the average by week for the same month in the previous year, then the status turn into yellow and in the contrary case the status is green. Hereunder you will find the mathematical expression of this rule and the associated algorithm in the form of a decision tree. So you can note that to better evaluate the performance, data is always compared between the same periods for all the cases.

Mathematical expression

If \( \text{Average by week for } \text{month}_n < 1 \) then red

\[
\begin{align*}
\text{If} \quad \text{Average by week for } \text{month}_n < \text{average by week } \text{month}_{n-1} \quad \text{then yellow} \\
\text{Else} \quad \text{(green)}
\end{align*}
\]

Here is the algorithm developed according to the figure 23.

\[\text{Month}_n = \text{current month} \]
\[\text{Month}_{n-1} = \text{same month as current month but in the previous year} \]

\[\text{Figure 25: Algorithm for Group1}^{38}\]
i. Web Intelligence core Functionality

Web Intelligence is a single tool for querying, reporting and analyzing. This represents the core functions of Web Intelligence that enables to understand how the company benefits from using the applications. Web Intelligence allows authorized users to make:

- Simple calculation
- Custom calculation
- Dynamic calculation

In view of the various benefits and its powerful analytical capabilities, Web Intelligence is the tool used for our monitoring.

ii. Querying with Web Intelligence

To query the database with Web intelligence, we need a special language called the Structure Query Language (SQL). The query is sent by the user to the database to retrieve the data mapped to the objects selected. Then the database returns rows of data to the Web Intelligence server, which populates the data as a micro cube called a data provider. Afterwards, this information is then formatted and displayed in a Web Intelligence report as a simple table or even a complex chart ready for our analysis. This process is described with this schema.

![Diagram](image)

**Figure 26: The Query process from a business User’s Perspective**

So, to collect the required data, we need to create a web Intelligence document with following steps:

- Select the appropriate data source

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39 SAP BusinessObjects Web intelligence: Advanced Report Design
**Figure 27: Create a new document**

*KVI_KVIM0005_Q0002* is the BEX query used as data source because Event names and Counts such as Login, Search and Download etc. are inside stored.

**Figure 28: Selection of the appropriate source Pumps/valves (new business) (PV)**

To add and organize the objects from the universe by using the Web Intelligence Query panel

The default display of the *Query Panel* consists of separate panels:

- **The Data Outline panel**
  
  Data outline shows or hides the data outline that contains the master perspectives and the display by navigation path views.

- **The Result Objects panel**
  
  This panel is where the data is retrieved for the query.

---

40 KSB SAP Business Objects, July 2012
41 KSB SAP Business Objects, July 2012
**Table I : Available objects in the report for Login**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Details</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer – Key</td>
<td>Customer – Country</td>
<td>Event Count</td>
</tr>
<tr>
<td>KSB Country</td>
<td>(Text)</td>
<td></td>
</tr>
<tr>
<td>Salesman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSC-NACE-Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year/Month</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

❖ **The Query Filters panel**

This panel allows you to run a sub query to restrict the data returned by the query. Restricting the query ensures:

- Only the requested data is retrieved.
- Minimize the quantity of data returned to the document to optimize performance.

The dimension Role is restricted to Dealer, Wholesale/distributor, KSB Company and KSB Service Partner as agreed for the group1, as well as the dimension Event Name restricted to LOGIN.

- Four types of query can be used in WEBI:
  - Predefined Query filters
  - Single and multi-value filters
  - Prompted filters
  - Complex filters

❖ **The Data Preview panel**

This panel gives a direct visibility of the data and preview the result sets.

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42 Own representation, July 2012
iii. Reporting

a. Designing Web Intelligence Documents

How to present the retrieved information from the database in Web Intelligence reports is the purpose of this section.

- The left panel provides different views of the current document. Here data that can be used are displayed in the reports.
- Toolboxes, tabs and toolbars for interacting with data in the report are available depending on the application mode used.
- Report panel gives a quick access.

---

KSB SAP Business Objects July 2012

KSB SAP Business Objects, Query panel, July 2012
WEBI reports can be accessed in three different application modes according to the level of authorization:

- **Data mode** provides access to the data access toolbox with features that allow the creation of a new document and variable. Edit, purge and refresh an existing document.
- **Reading mode** allows viewing and performing some analysis tasks on reports.
- **Design mode** gives access to the features available in Data and Reading modes and additional analysis and formatting features.

As a report designer, the Design mode will be the most used.

*Figure 31: Applications mode*

### b. Calculating Data with Formulas and Variables

How to use formulas to display information or calculate data from the existing objects in the universe are described in this section. Formula consists of data objects, functions, operators and calculations contexts. As reports consumers, we want our reports to perform specific calculations tailored to our needs. Therefore the powerfulness of the WEBI application will be very helpful to create complex calculations. Based on formulas, a variable can be saved with a name and act as an object in the document and displayed in the *Available Objects pane* with the benefit that variable can be used, modified or deleted in any report within the document.

New variables could be implemented in WEBI for our tool purpose and the way of writing these calculations in the *Formula Editor* is totally different from the mathematical expressions. The creation of some variables requested the use of functions and the imbrications of clauses.

- **New variables as dimensions**
  - Customer-Nr

  $Customer − Nr = Right (Customer − Key; 9)$

  - Year/Month

  Dimension Year/month is presented as followed: MM/ YYYY. So it describe the Year and the Month chosen

  - Month

  An example of month is given so that each user can select the month of his choice by using the format number.

---

45 KSB SAP Business Objects, July 2012
Month = 10

- Month as number

This dimension represents the month not in format date but in format number

\[
Month\ as\ Number = ToNumber\left(Right\left(\frac{Year}{Month}\right);\ 4\right) * 100 + ToNumber\left(Left\left(\frac{Year}{Month}\right);\ 2\right)
\]

- MonthYear

This dimension represents the possibility for the users to choose a year and a month

\[
MonthYear = [Year] * 100 + [Month]
\]

- MonthYear-1

This dimension is based on the dimension MonthYear. It represents the same month but in the previous Year.

\[
MonthYear - 1 = [MonthYear] - 100
\]

- Year

An example of year is given so that each user can select the year of his choice by using the format number.

Year = 2012

- New variables as measures

- Average by week for month

This calculation is based on the login pro month for the Group1. The month is divided by four. Four represents the number of weeks in a month. It will be used too to compare the performance of the customers compared to the previous year for specific groups’ segmentation.

\[
Average\ by\ Week\ for\ month = \frac{Event\ Count\ month}{4}
\]

- Average by week for month n-1

This measure represents the average by week for the same month as the current month but in the previous year divided by four.

\[
Average\ by\ Week\ for\ month \ n-1 = \frac{Event\ Count\ month\ n-1}{4}
\]

Here a screenshot of the calculation in the report.
Test logic is the measure that enables to test the customer’s performance according to the defined values.

\[
\text{TestLogic} = \begin{cases} 
1 & \text{if } \sum([\text{Average by week for month}]) < 1; \\
\text{else if } [\text{Average by week for month}] < [\text{Average by week for month-1}]; \\
\text{else if } [\text{Average by week for month}] > [\text{Average by week for month-1}]; \\
1 & \text{else}
\end{cases}
\]

Test Logic

For our monitoring tool, a color code has been chosen to enable the users to have a quick look on the current situation of the customer. A color code is a system used for displaying information in different colors. Three colors (red, yellow and green) will serve to describe the different alert levels in the system and the current status of the customer. These colors announce a dysfunction that needs to be fixed with a punctual or strategic action from the e-Business team or the sales employee. Web Intelligence offers extensive reporting features in a single interface to adapt reports as required. Calculations serve to structure the data in the reports so that the reports can be easily read and interpreted. Presented in a cross table format to provide a clear data structure. Cross table looks similar to a spreadsheet and displays data

---

46 KSB SAP Business Objects, Report, July 2012
in tree axes. The top or horizontal axis represented with key figures Year/Month, Status and the left or vertical axis display values for dimensions such as Customer – Key, Customer – Name and the body axis displays the values of a measure that correspond to the cross-section of the dimensions. For our query, the measure Event Count and the content of new measure called “Status” are displayed. This new measure called “Status” represents the positive, stabile or negative evolution of a client comparing to the previous year in the same month.

An ascending sorting on the measure status has been applied, so that customers with red status are first displayed, then followed by yellow customers and finally by customers with green.

To highlight data that meets specific requirements by creating and applying conditional formatting with formatting rule, a color code system is used. A formatting rule contains five elements a name, an object or cell contents, an operator, operand values and the conditional formatting. Under the tab “Analysis”, the rule can be set. Therefore new measures have been required.

Green

GREEN means everything is OK. Nothing to worry about but only an eye should be kept on customers. This color is coded with number 2.

Red

RED means danger. It characterizes customers whose current situation requires a particular attention. All the actions must be launched in order to keep the customer. As we know, it is always harder to regain a customer. This color can also hide some behaviors like the disagreement towards KSB in maybe delivery times, response time and especially wrong prices or wrong commercial terms (discounts) on the KSB Customer Portal etc. That is why this alert should be taken seriously and concrete and proactive strategies such as visiting the customer or assisting via a technical support should be done by the e-Business team or the responsible sales. This color is coded with the number 0.

Yellow

YELLOW doesn’t mean danger but doesn’t mean safety or everything is OK as well. It should be taken with precaution because it stays as an alarm and it could be considered as a good or a bad signal. This color is coded with the number 1. Hereunder an example of the conditional formatting rule
Users could also limit the display of data shown in the report by using filters. As presented in the Query panel, different kinds of filters can be applied on data:

- Filter data by using query filters
- Filter data by using prompts
- Filter data by using input controls
- Filter data by using sub queries

Filter data by using the input controls means when you select values in the input control, you filter the values in the associated report elements by the values you selected. In contrary to other filters, input controls authorize on one hand end-users to see the inputs controls that can be applied to the report and on other hand they are accessible for the end-users in the reading mode. Some are defined as constant values and other as checkboxes or list boxes etc.

As input controls, dimensions Year, Month, Customer-Nr, Customer-Text, Role, MSC-Nace-Code, Salesman and KSB Country have been set. Following figures give an overview of the inputs controls applied and the display of the report for the group1.

---

47 KSB SAP Business Objects, Conditional formatting, July 2012
Group 2 is the group composed exclusively of engineering planner. This type of customer requests our KSB Customer Portal only for consultation in case of projects, this because their activities are only related to projects. That is the reason why it has been decided to take care of them separately from other. According to the logic and the algorithm, a customer, who

---

KSB SAP Business Objects, Inputs controls, July 2012
KSB SAP Business Objects, Inputs controls, July 2012
belongs to group2, must login at least once in the quarter for consultations about projects and it becomes critical when the login pro quarter in the current year is less than the login pro quarter in the previous year. Besides the logic, an algorithm is drawn to check automatically the status of each customer whether he is in a bad, medium or good situation. If the Event Count (Login Quarter \( n \)) by quarter is less than one per quarter, then the status of the customer is set in red. Otherwise the Event Count (Login Quarter \( n \)) by quarter in the current year is compared to the Event Count (Login Quarter \( n-1 \)) by the same quarter as in the current year however in the previous year. If the Event Count (Login) by quarter in the current year is less than Event Count (Login Quarter \( n-1 \)) for the same but in the previous year, then the status turn into yellow and in the contrary case the status is green. Hereunder you will find the mathematical expression of this rule and the associated algorithm in the form of a decision tree.

**Mathematical expression**

If (Login Quarter \( n \) <1 then red

If (Login Quarter \( n \) < Login Quarter \( n-1 \) then yellow

Else (green)

\)

![Diagram](image)

**Figure 36: Algorithm for Group2**

50 Own representation, June 2012
The report for the group 2 is developed in the same way as the report for the group 1.

i. Querying with Web Intelligence

The data source remains the same as the data source for the Group 1 (see figure 26 and 27).

❖ The Result Objects panel

The dimensions, details and the measures remain also the same. Only the detail Date Year/Quarter/Month/Day has replaced the Year/Month.

❖ The Query Filters panel

The dimensions Role is restricted to Engineering planner as agreed for the group 1, as well as the dimension Event Name restricted to LOGIN.

❖ The Data Preview panel

This panel gives a direct visibility of the data and preview the result sets.

ii. Reporting

a. Calculating Data with Formulas and Variables

For the Group 2, we needed also to create new variables with the help of formulas and functions.

❖ New variables as dimensions

Customer-Nr

\[ \text{Customer} – \text{Nr} = \text{Right} (\text{Customer} – \text{Key}; 9) \]

51 KSB SAP Business Objects, Query Panel, August 2012
Quarter

An example of quarter is given so that each user can select the quarter of his choice by using the format number.

\[ \text{Quarter} = 20123 \]

Quarter as number

This dimension represents the quarter not in format date but in format number.

\[ \text{Quarter as Number} = \text{ToNumber}((\text{Year}/\text{Quarter})/\text{Month})/\text{Day} \]

Quarter-1

This dimension is based on the dimension Quarter. It represents the same quarter in the previous Year.

\[ \text{Quarter} - 1 = \text{[Quarter]} - 10 \]

New variables as measures

Quarter N

This measure represents the total amount of login in the current quarter.

\[ \text{Quarter N} = \text{If}([\text{Quarter as Number}]) = \text{[Quarter]} \text{ Then } [\text{Event Count}] \text{ Else 0} \]

Quarter N-1

This measure represents the total amount of login for the same quarter in the previous year.

\[ \text{Quarter N-1} = \text{If}([\text{Quarter as Number}]) = \text{[Quarter-1]} \text{ Then } [\text{Event Count}] \text{ Else 0} \]

Testlogic

Test logic is the measure that enables to test the customer according to the defined values.

\[ \text{Testlogic} = \text{If } \sum([\text{Quarter N}]) < 1; 0 \]

\[ \text{Elseif} [\text{Quarter N}] < [\text{Quarter N-1}]; 1 \]

\[ \text{Else 2} \]

b. Improve the presentation of Data in Documents

The result is presented in a cross table with the dimensions Customer Number and Name in the vertical axis and the horizontal axis with the posting Year/Quarter and the status is sorted in an ascending way in the same way as the Report Login for Group1.
5.3.1.7.2.3.1.2.6. Group 3

Group 3 is the group composed of operator, investor, plant engineering contractor, consultant, installation contractor, public authorities, Representative / agent, exporter, cooperation partner, other service and repair companies, service provider and OEM. This group represents all kind of customers with no particular needs. According to the algorithm, a customer, who belongs to group3, must login at least once in the month. Besides the mathematical expression, an algorithm is drawn. If the Event Count (Login\_Month $n$) by month is less than one per month, then the status of the customer is set in red. Otherwise, the average by month for a quarter (Average by month for Quarter $n$) for the current and the previous year are calculated. Afterwards, the Event Count (Login\_Month) by month is compared to the average by month for the same quarter in the previous year (Average by month for Quarter $n$-1) and if the average by month for quarter in the previous year is less than the Event Count (Login\_Month) in the current year, then the status is green else yellow. Hereunder you will find the mathematical expression of this rule and the associated algorithm in the form of a decision tree.

Mathematical expression

If (login\_month $n$ < 1) then red

---

52 KSB SAP Business Objects Reports, August 2012
Figure 39: Algorithm for Group3

If \( \text{login}_{\text{month}} < \text{Average by}_{\text{month for Quarter}} \) then yellow
Else (green)  

The data source remains the same as the data source for the Group 1 and 2. The detail Date Year/ Quarter/ Month/ Day has replaced the Year/ Month is still used in addition to the detail Sevent Month (this detail gives information about the month when customer has logged in). Sevent Month is presented as followed: YYYY/M. The detail Year/ Month could have been used too if it had not belonged to the same dimension as Year/Quarter/ Month/ Day.

i. Querying with Web Intelligence

The query filters panel

The dimensions Role is restricted to as agreed for the group 3, as well as the dimension Event Name restricted to LOGIN.

The data preview panel

This panel gives a direct visibility of the data and preview the result sets.
ii. Reporting

a. Calculating Data with Formulas and Variables

For the Group3, we needed also to create new variables with the help of formulas and functions.

❖ New variables as dimensions

Here the new dimensions month and quarter for groups 1 and 2 are used.

❖ New variables as measures

Quarter N

This measure represents the total amount of login in the current quarter

\[
\text{Quarter N}= \text{If (\{[\text{Quarter as Number}]\} = \text{[Quarter]} \text{ Then} \text{[Event Count]} \text{ Else 0}}
\]

Quarter N-1

This measure represents the total amount of login for the same quarter in the previous year

\[
\text{Quarter N-1}= \text{If (\{[\text{Quarter as Number}]\} = \text{[Quarter-1]} \text{ Then} \text{[Event Count]} \text{ Else 0}}
\]

Average by month for quarter \(n\)

This calculation is based on the sum pro quarter. This sum is divided by three. Three represents the number of months in a quarter.

Average\(Q\) \(n\)

\[
\text{AverageQ N}=\sum(\{\text{CurrentQuater}\}/3)
\]

Average\(Q\) \(n-1\)

\[
\text{AverageQuarter}_{n-1}
\]

\(^{54}\) KSB SAP Business Objects , Query Panel, August 2012
This calculation is based on the sum for the same quarter in the previous year. This sum is divided by three. Three represents the number of months in a quarter.

\[ \text{AverageQ N-1} = \frac{\sum([\text{CurrentQuarter N-1}])}{3} \]

This measure corresponds to the sum of the login in a month

\[ \text{CurrentMonth N} = \text{If [Month as Number] = [MonthYear] Then [Event Count] Else 0} \]

This measure corresponds to the sum of the login for the same month but in the previous year

\[ \text{CurrentMonth N-1} = \text{If [Month as Number] = [MonthYear N-1] Then [Event Count] Else 0} \]

This measure corresponds to the sum of the login in a quarter

\[ \text{CurrentQuarter N} = \text{If [Quarter as Number] = [Quarter] Then [Event Count] Else 0} \]

This measure corresponds to the sum of the login for the same quarter in the previous year

\[ \text{CurrentQuarter N-1} = \text{If [Quarter as Number] = [Quarter-1] Then [Event Count] Else 0} \]

Test logic is the measure that enables to test customers according to the defined values.

\[ \text{Testlogic} = \text{If} \sum([\text{CurrentMonth N}]) < 1 \text{ Then 0} \]
\[ \quad \text{Elseif} \sum([\text{CurrentMonth N}]) \leq \sum([\text{AverageQ N-1}]) \text{ Then 1} \]
\[ \quad \text{Else 2} \]

b. Improve the presentation of Data in Documents

The result is presented too in a cross table with the dimensions Customer Number and Name in the vertical axis and the horizontal axis is particularly interesting since the presence of the dimensions related to date like posting year/month and Posting year/quarter are needed.
The Filter Input controls remain the same as for the two first reports except that end users should pay a special attention by giving the month and the corresponding quarter in order to have the exact result. In other words, end user should know the different months that belong to a quarter (Q). Each year has four quarters which are listed as followed: Q1, Q2, Q3 and Q4. For example, Q1 contains January, February and March, which correspond respectively to month 01, 02 and 03. Q2 contains April, May and June, which corresponds respectively to month 04, 05 and 06 and etc. So according to the rule, the Login of a chosen month in the current year is compared to the average by month for the same quarter of the current month but in the previous year.

---

55 KSB SAP Business Objects, Reports, August 2012
56 KSB SAP Business Objects, Inputs Controls, August 2012
5.3.1.7.2.3.1.3. Info Cube Order Intake/TurnOver

5.3.1.7.2.3.1.3.1. Star Schema

InfoCube *OI/TO SAP P14* contains dimensions, attributes, navigation attributes and measures. On one hand we have dimensions Data package, Time, Unit, Organization, Date, Customer, Billing document, Document information, Material, Customer attributes, Quotation-/ Order number, KVIC00039, KZZVBEVLV, Sales document and Item text as dimensions and on the other hand, measures Exchange rate, Gross values, Cargo, Tax amount, variable cost, Trade, Quantity, Net value and Pricing. Consequently, we can notice that this info Cube has more dimensions and measures than the *Esales* Info Cube. Although, many dimensions, navigation attributes and measures are available, only a few numbers could be used for the different reports. Hereunder you find the simplified version of the star schema of the Info Cube *OI/TO*. The focus will be paid only on dimensions, measures and navigation attributes which are necessary for our monitoring issue.
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Sold to party</td>
<td>ISSLD_TO</td>
<td>CHAR</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>BCUSTOMER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer number (sales view)</td>
<td>OCUST_SALES</td>
<td>CHAR</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BCUSTOMER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ship-To Party</td>
<td>ISSHP_TO</td>
<td>CHAR</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
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<td>CHAR</td>
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</tr>
<tr>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Customer country</td>
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<td>CHAR</td>
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<td></td>
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<td>BCUSTOMER</td>
<td></td>
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</tr>
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<td>Partner / Personal Number</td>
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</tr>
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<td>Customer Classification</td>
<td>KUNIT_CLASS</td>
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<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td>BCUSTOMER</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Billing document**: BILLNUM

  - **Document information**: KDOCINFO

    - **Order type**: KORDTYPE
    - **Customer name**: KUNITNAME
    - **Name of person who created the order**: KCREATEDBY
    - **Order currency**: KUNITCUR
    - **Price level code**: KPRICLEVEL
    - **Number of samples**: KSMP
    - **Number of lines**: KSLL

  - **Order status**: KORDERSTAT
  - **Flag Consolidation**: KFLCONS
  - **Margin indicator**: KSMargin
  - **Invoicing terms**: KINVOICE
  - **Payment Terms**: KZTERM
  - **Data sending system**: KSOURC

  - **Material**: KMAT

  - **Material pricing group**: KMPG
  - **Product type**: KPRODUCT
  - **Product category**: KPRODUCTC
  - **Sales document**: KORD
  - **Customer attribute**: KACATR

  - **Order line**: KORDITEM
  - **Document number of the reference item**: KDOCITEM
  - **Code of the reference item**: KCODEITEM
  - **Sales document item**: KORDITEM

  - **Item**: KITEM

  - **Billing address**: KUNITADD
  - **Ship-to address**: KSHIPPADD
  - **Contact person**: KCONTACT

  - **Reference for Customer Code**: KCTMM
  - **Contact person**: KCONTPER

- **Other information**

  - **Customer Account Group**: KACCTG
  - **Customer Account Group Name**: KACCTGN
  - **Customer Account Group Code**: KACCTGC
  - **Customer Account Group Code (OA)**: KACCTGC
  - **Account Number**: KACCTRACK

  - **Account Number (OA)**: KACCTRACK
  - **Customer number**: KCUCLNT

  - **Country of delivery**: KBRGR

  - **Branch category**: KBRNGR

  - **Product code**: KPRODUCT

  - **Product type**: KPRODUCTTYP

- **Reference Information**

  - **Reference for Customer Code**: KCTMM

Marie-Noelle Ngoumka
Figure 43: Dimensions, Attributes, Navigations attributes Info Cube OI/TO

---

KSB SAP Business Objects, November 2012
Figure 44: Simplified version of Star schema
Info Cube OI/TO SAP P14

Change Run ID
Calendar year
Company code
Order type
Material ID
Item Number Sales Order
Sold-To party
Short text for sales order item
Item Number Sales Order
Sales document
Billing document
Posting date in the document

Date
Posting date in the document
Planned delivery date
Planned billing date
Document date
Date on which the record was created
Last changed on

Material
Material ID
Material Pricing Group
Product sector
Product family
Main product
Product segment

Order-Item
Item Number in Sales Order
Document number of the reference
Preceding document category
Billing item
Item number of the reference item
Sales document item
KZZPOSNV

Billing document

Customer attributes
Sales document
Sales document

KVIC0003A
KZZVBE LV

Customer
Sold-to party
Customer number (Sales view)
Ship-To party
Market segment code - Nace code
Customer role
Customer country
Destination country
Customer profile
Cross company indicator
Partner: Personnel number
Supporting unit
Customer Classification
Department in charge
Attribute 1

Organisation
Company code
Sales Organization
Division
Distribution Channel
Salesman
Cost unit DWH (6 digits)
Sales group
Plant
Producing company
Source System DWH
Sales Office
Application
Cost unit DWH (3 digits)
Profit Center
Controlling area
Processing unit
Internal order number
Business unit
Plan position
Location
KSB view
KSB Region
Sub organization
Application: Process
Organisation: Process
Part organization: Process
KSB Region DC
KSB View DC

Quotation-/ Order number
Item Number in Sales Order
Document number of the reference
Preceding document category
Billing item
Item number of the reference item
Sales document item
KZZPOSNV

Order type
Customer unload point
Name of person who created the order
Incoterm part 1
Credit or invoice
Sales document type
Record type
Order status
Flag Consolidation
Margin indicator
Time
Data sending system

Unit
Currency Key for Group Currency
Document currency
Local currency

Item text
Short text for sales order item
Sypro number
Market segment
Consolidation level 1
Consolidation level 2
Consolidation level 3
Consolidation level 4
Profit Center
KVI VERS

Data Package
Change Run ID
Record type
Request ID

Time
Calendar year
Calendar year/quarter
Calendar year/month
Calendar year/week
Calendar day

Document information
Order type
Customer unload point
Name of person who created the order
Incoterm part 1
Credit or invoice
Sales document type
Record type
Order status
Flag Consolidation
Margin indicator
Time
Data sending system

58 Own representation, December 2012
i. Description of the dimensions used in the Info Cube OI/TO for the reports

Please note that the dimensions already used in the chapter above, will not be described here anymore.

❖ **Sold-to party**

Sold –to party is actually the customer number associated to the system source where it has been created. For example: P14/300074400; P14 is the system SAP P14

❖ **Flag consolidation**

This dimension is related to the dimension Order Intake. It provides important figures to the board management by regions and countries. Turnovers are split into four categories, on which business developers should focus to elaborate a business strategy.

Turnover can be grouped by:

- **External end-customer**: that means turnover made only by KSB customers.
- **Internal customers**: that is turnover made between KSB companies and service companies which are integrated in same sales organization (for example KSB SAS and Service France)
- **NON P14 KSB Consolidation Group** means KSB companies doing business with KSB AG (Germany) without having SAP P14 but consolidated in KSB Group figures
- **NON P14 KSB non-Consolidation** means KSB companies without SAP P14 and are not consolidated in KSB Group figures.
- **P14 KSB Consolidation Group** means that the companies having SAP P14 and are counted in the total KSB Group overall result.
- **P14 KSB non Consolidation Group** means that the companies are not counted in the total KSB Group overall result even they are integrated in SAP P14

❖ **Distribution channel**

As we described in chapter 2, KSB deals with customers’ trough two different channels either the new installation business (01) and or the Spare parts business (02). Channel 01 is used to purchase new pumps and valves, and accessories while channel 02 is used for purchasing spare part related to a pump or valves. Depending on the channel selected, the order is routed to either the eSales responsible for new product or to the eSales responsible for spare parts.

❖ **Order type**

Order type is the way chosen by end customers and KSB service partners and companies to send orders.
KSB differentiates the traditional (fax, telephone, e-mail) and the electronically way of sending orders to KSB. Electronically ways for KSB means by machine. It is what is called e-commerce or e-Business. E-commerce is grouped in Internet sales (ISA), Electronically Data Interchange (EDI), Business On Behalf (BOB) and Market Places (MAP).

- **Company code**

Company code helps to know under which sales organization the customer is related to. For example KSB AG (Germany) belongs to Sales organization 1000, KSB SAS (France) to 1010 and KSB Limited (Great Britain) to 1020.

- **Description of used details in the Info Cube OI/TO**

- **Sold-to Party -Key**

A customer number identifies each customer. Customer number is a key that is represented with nine characters. It is a unique identification and belongs to 1:1 relation.

- **Customer role key**

Customer role key is the key code used for the dimension role. It could be for example: 17 for KSB companies and 05 for Dealers

- **Order Intake in global currency**

Order intake is defined as the total value of all orders received during the respective accounting period.

- **Customer segmentation**

This Info Cube helps to know the situation of the company through key figures such as turnover and order Intake. Turnover and order Intake are totally dependent of the customers’ business core, hence the function of the dimension Role. In other words, the amount of other intake in a period varies according to the order requirement; order on demand or order stock for refilling that is defined in the dimension Role. Experts have decided to classify customers according to their behaviors in groups and define rules to check their performances in the same way as the Info Cube Esales, in order to analyze the order intake of the Esales customers, meaning customers who use the Customer Portal, EDI or market places. Two groups are formed: Group 1 composed of KSB Service Partner and KSB Company, service Provider, cooperation partner, investor etc. apart from planner/consultant and consultant - who place orders by using only the traditional way (Fax, Telephone or email etc.); thereby their order intake is equal null - while Group 2 is formed by Dealer and Wholesaler.
distributor. Diagrams below show the classification of customers by groups and the classification in form of a decision tree.

![Diagram showing classification of customers by groups](image)

**Figure 45: Classification and distribution of customers by groups**

NEW GROUPS SEGMENTATION FOR ORDER INTAKE

ROLE

1, 2, 3, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

GROUP1

4, 5

GROUP2

**Figure 46: New groups segmentation according to order intake**

This new segmentation adds in consideration not only the warehousing but also the purchase’s frequency.

---

59 Own representation, June 2012
60 Own representation, June 2012
5.3.1.7.2.3.1.3.2. Reports with SAP Business Objects Web Intelligence

5.3.1.7.2.3.1.3.3. Group 1

Group 1 is represented with customers with a very high need for procurement on one hand and on other hand customers who can order every day in small, medium or big amounts. As announced above, rules have been also defined to check out the performance of e-Business customers. Therefore, it has been decided to take a threshold as a key indicator. Three thresholds have been fixed: -5%, -6% and -10% and the logic and the color code system to test are quite similar to the Info Cube Esales. Order intake is compared between two years at the same period (months or quarters). Here are described the steps of the algorithm followed by the algorithm itself in forms of a decision tree.

a) The program should consider only customers belonging to the group.
b) Check the order intake
c) Compare the order intake for the month in the current year to the order intake for the same month but in the previous year,
d) If the OI for month in the current year is less than the OI for the same month in the previous year,
e) The program should calculate the ratio OI for month in the current year divided by OI for the same month in the previous year minus 1(obviously if the conditions for the division are fulfilled). This ratio is expressed in percentage in order to allow the comparison to the fixed threshold (-5%, -6% and -10%).

Mathematical expression of the ratio OI:

\[
\text{Ratio OI} = \left( \frac{\text{Order Intake Month } n}{\text{Order Intake Month } n-1} - 1 \right) \times 100
\]

f) If the ratio is between 0 to -5% then the customer’s status is green
g) And if ratio is between – 6% to -9% then the customer’s status is yellow
h) And if ratio is equal or bigger than -10% then the customer’s status is red

Mathematical expression

If \((\text{OI}_{\text{month } n} < \text{OI}_{\text{month } n-1})\) then \(((\text{OI}_{\text{month } n}/\text{OI}_{\text{month } n-1} -1);\) then
- If \(((\text{OI}_{\text{month } n}/\text{OI}_{\text{month } n-1} -1); \leq -5\%)\); green
- Else if \(((\text{OI}_{\text{month } n}/\text{OI}_{\text{month } n-1} -1); \geq -6\%)\); yellow
- Else if \(((\text{OI}_{\text{month } n}/\text{OI}_{\text{month } n-1} -1); \geq -10\%)\); red

Here is the algorithm developed according to the figure 47.
i. Querying with Web Intelligence

So, to collect the required data, we need to create a web Intelligence document with following steps:

- Select the appropriate data source

*KVI_KVIM0005_Q0013* is the BEX query used as data source. Sales information such as Order Intake and Turnover are inside stored.
To add and organize the objects from the universe by using the Web Intelligence Query panel.

The default display of the Query Panel consists of separate panels:

- **The Data Outline panel** (see chapter Info cube *Esales*)
- **The Result Objects panel**

  This panel is where the data is retrieved for the query.

**Table II: Available objects for Reports OI Group**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Details</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sold-to party</td>
<td>Sold-to party-Key</td>
<td>OI Gross GC</td>
</tr>
<tr>
<td>Salesman</td>
<td>Salesman-Text</td>
<td></td>
</tr>
<tr>
<td>MSC-NACE-Code</td>
<td>Customer role – Key</td>
<td></td>
</tr>
<tr>
<td>Customer role</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year/Month</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flag consolidation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **The Data Preview panel**

  This panel gives a direct visibility of the data and preview the result sets.

---

62 KSB SAP Business Objects, September 2012
63 Own representation, September 2012
ii. Reporting

a. Designing Web Intelligence Documents

See chapter on Info Cube Esales

b. Calculating Data with Formulas and Variables

- New variables as dimensions

  Sold-to Party

Sold-to party is actually the customer number associated to the system source where it has been created. For example: P14/300074400; P14 is the system SAP P14

  Month

An example of month is given so that each user can select the month of his choice by using the format number. \( \text{Month} = 10 \)

  Month as number

This dimension represents the month not in format date but in format number

\[
\text{Month as Number} = \text{ToNumber} \left( \frac{\text{Right} \left( \left[ \frac{\text{Year}}{\text{Month}} \right]; 4 \right)}{4} \times 100 + \text{ToNumber} \left( \text{Left} \left( \left[ \frac{\text{Year}}{\text{Month}} \right]; 2 \right) \right) \right)
\]

  MonthYear

This dimension gives the possibility to the users to choose a year and a month

---

64 KSB SAP Business Objects Query Panel, September 2012
\[ MonthYear = \lfloor Year \rfloor \times 100 + \lfloor Month \rfloor \]

- MonthYear-1

This dimension is based on the dimension MonthYear. It represents the same month but in the previous year.

\[ MonthYear - 1 = [MonthYear] - 100 \]

- Year

An example of year is given so that each user can select the year of his choice by using the format number.

\[ Year = 2012 \]

- New variables as measures

- CurrentMonth

This measure is used to display the order intake on the chosen current month.

\[ CurrentMonth = if[Month asNumber] = [MonthYear]Then [OI Gross GC]Else 0 \]

- CurrentMonth-1

This measure is used to display the order intake for the same month but in the previous year.

\[ CurrentMonth - 1 = if[Month asNumber] = [MonthYear - 1]Then [OI Gross GC]Else 0 \]

- CurrentMonth/CurrentMonth-1

This variable is the formula used to calculate the constant, negative or the positive evolution of customers.

=If (\( \Sigma([\text{CurrentMonth-1}]) \not= 0 \)) Then (\( \Sigma([\text{CurrentMonth}]) / \Sigma([\text{CurrentMonth-1}]) - 1 \))

ElseIf (\( \Sigma([\text{CurrentMonth-1}]) < 0 \)) And (\( \Sigma([\text{CurrentMonth}]) = 0 \))

Then (-\( \Sigma([\text{CurrentMonth}]) + \Sigma([\text{CurrentMonth-1}]) / \Sigma([\text{CurrentMonth}]) \))

ElseIf((\( \Sigma([\text{CurrentMonth-1}]) < 0 \)) And (\( \Sigma([\text{CurrentMonth}]) = 0 \))

Then (\( \Sigma([\text{CurrentMonth}]) + \Sigma([\text{CurrentMonth-1}]) / \Sigma([\text{CurrentMonth}]) \))

ElseIf((\( \Sigma([\text{CurrentMonth-1}]) = 0 \)) And (\( \Sigma([\text{CurrentMonth}]) > 0 \))

Then (\( \Sigma([\text{CurrentMonth}]) + \Sigma([\text{CurrentMonth-1}]) / \Sigma([\text{CurrentMonth}]) \))

- Testlogic

Test logic is used to check out the status.

\[ Testlogic = if (\Sigma([\text{CurrentMonth}]) > (\Sigma([\text{CurrentMonth} - 1]))Then 0 \]

Elseif (\( \lfloor \text{CurrentMonth} \rfloor / \text{CurrentMonth} - 1 \) \* 100 > -5 Then 0

Elseif (\( \lfloor \text{CurrentMonth} \rfloor / \text{CurrentMonth} - 1 \) \* 100 \leq -10 Then 2

Else 1
c. Improve the presentation of Data in Documents

To highlight data that meets specific requirements by creating and applying conditional formatting with formatting rule, the same color system has been used; however the color codification has changed.

- **Green**
  This variable is used to delight the status of the customer. Green is coded with 0 meaning good customers

- **Yellow**
  Yellow is the status for medium customers and is coded with 1

- **Red**
  Red is the status used for bad customers who need support and coded 2. To enhance the lecture of the reports, filters like Input Controls are set up. Input controls are applied so that End user could restrict the data shown by hiding the data that are not interesting. As input controls, end users decide for almost all the reports to have the dimensions Year, Quarter, Month, Sold-to party, Salesman, flag consolidation, customer role, Nace code.

![Figure 50: Display Report OI Group 1](image)

---

65 KSB SAP Business Objects, Reports, September 2012
5.3.1.7.2.3.1.3.4. Group 2

Group 2 represents those kinds of customers with a particular purchase’s frequency. They get a big capacity of warehousing, so they used to make bulk purchase of big amount in precise periods. The algorithm for this group is quite similar to the algorithm for the group 1 except the time period chosen for the comparison instead of month at the step (c), the quarter is rather taken.

a) Check if the customer belongs to the group
b) Check the order intake
c) Compare the order intake of the quarter in the current year to the same quarter in the previous year.
d) If the OI for quarter of the current year is less than the OI for the same quarter in the previous year, then calculate the ratio OI for quarter in the current year divided by OI for the same quarter in the previous year minus 1 (obviously if the conditions for the division are fulfilled). This ratio allows comparing the order intake of customers by each quarter in terms of percentage from the current year to the previous year. This ratio is expressed in percentage in order to allow the comparison to the fixed threshold (-5%, -6% and -10%).

Mathematical expression of the Ratio OI

\[ Ratio\ OI_{Quarter} = \frac{Order\ intake\ Quarter\ n}{Order\ intake\ Quarter\ n-1 - 1} \times \% \]

e) If the ratio is between 0 to -5% then the customer is green
f) And if ratio is between – 6% to -9% then the customer is yellow
g) And if ratio is equal or bigger than -10% then the customer is red

Mathematical expression:

If \((OI\ Quarter\ n < OI\ Quarter\ n-1)\) then
\((OI\ Quarter\ n-1 - OI\ Quarter\ n)-1;\) then

If \((OI\ Quarter\ n-1 - OI\ Quarter\ n)-1<= - 5\%);\ green
Else if \((\( (OI\ Quarter\ n-1 - OI\ Quarter\ n)-1>= -6\%);\ yellow\)
Else if \((\( (OI\ Quarter\ n-1 - OI\ Quarter\ n) >= - 10\%));\ red\)
iii. Querying with Web Intelligence

So, to collect the required data, we need to create a web Intelligence document with following steps:

- Data source remains the same.

To add and organize the objects from the universe by using the Web Intelligence Query panel

The default display of the Query Panel consists of separate panels:

- **The Data Outline panel** (see chapter Info cube Esales)
The Result Objects panel
This panel is where the data is retrieved for the query.

Table III: Available objects for Reports OI Group2

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Details</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sold-to party</td>
<td>Sold-to party-Key</td>
<td>OI Gross GC</td>
</tr>
<tr>
<td>Salesman</td>
<td>Salesman-Text</td>
<td></td>
</tr>
<tr>
<td>MSC-NACE-Code</td>
<td>Customer role – Key</td>
<td></td>
</tr>
<tr>
<td>Customer role</td>
<td>Flag consolidation</td>
<td></td>
</tr>
<tr>
<td>Posting Year/Quarter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Query Filters panel (see chapter Info cube Esales)
The Data Preview panel (see chapter Info cube Esales)
This panel gives a direct visibility of the data and preview the result sets.

Figure 52: Query panel Report Order Intake Group2

iv. Reporting

   a. Designing Web Intelligence Documents

See chapter on Info Cube Esales

---

66 Own representation, November 2012
67 KSB SAP Business Objects, Query Panel, November 2012
b. Calculating Data with Formulas and Variables

❖ New variables as dimensions

Sold-to Party

This dimension represents the customer number, which is unique.

Quarter

An example of quarter is given so that each user can select the quarter of his choice by using the format number.

Quarter = 20122

Quarter as number

This dimension represents the quarter not in format date but in format number

Quarter as Number = ToNumber( (Year/Quarter)/Month)/Day)

Quarter-1

This dimension is based on the dimension Quarter. It represents the same quarter in the previous year.

Quarter - 1 = [Quarter] - 10

❖ New variables as measures

Quarter N

This measure represents the total amount of login in the current quarter

Quarter N=If( ([Quarter as Number] ) = [Quarter] Then [Event Count] Else 0

Quarter N-1

This measure represents the total amount of login for the same quarter in the previous year

Quarter N-1=If( ([Quarter as Number] ) = [Quarter-1] Then [Event Count] Else 0

CurrentQuarter/CurrentQuarter-1

The creation of this variable is conditioned by several mathematical conditions in order to avoid some errors and impossible operations and mainly to consider all the cases.

=If(∑([CurrentQuarter-1])<> 0 Then(∑([CurrentQuarter])/∑([CurrentQuarter-1]))-1 ElseIf(∑([CurrentQuarter])<0) and (∑([CurrentQuarter])∑([CurrentQuarter-1]))=0) Then (-1(∑([CurrentQuarter])+∑([CurrentQuarter-1]))/∑([CurrentQuarter])) ElseIf(∑([CurrentQuarter-1])<0 and (∑([CurrentQuarter])=0 )) Then (∑([CurrentQuarter])+∑([CurrentQuarter-1]))/∑([CurrentQuarter])) ElseIf(∑([CurrentQuarter-1])=0 and (∑([CurrentQuarter]))>0 Then (∑([CurrentQuarter]))+∑([CurrentQuarter-1]))/∑([CurrentQuarter]))

Testlogic
c. Improve the presentation of Data in Documents

Same presentation form, input controls and conditional formatting as the report OI for group 1

---

Figure 53: Display of Report OI for Group 2

---

68 KSB SAP Business Objects, Reports, November 2012
6. Implementation and Go Live in the productive SAP BO Launch Pad

The development of the monitoring tool has followed the different steps of the deployment and the Go Live of SAP BO in the KSB Group. The tool has been first developed inner the test environment of SAP BO BI then it has been deployed too in the productive environment of SAP BO BI on the 14.01.2013.

6.1. Security aspect

All the reports are accessible via WEBI application. Queries are stored in the department directory--> 300 Esales--> Logs--> OI, in SAP Business Objects, that means only users who get accesses to WEBI and who belong to the department will be able to display and view the queries. They will be protected in writing, so end users could only read, display, view, send and export queries and depending on the rights assigned, end users may be able to schedule a document. Accessing the design mode application is strictly limited to the administrator, so all the changes and modifications are under his control.

![Figure 54: Monitoring tool location in SAP business Objects Web Intelligence](image)

6.2. Program test according to the respectively algorithms

Once the code is generated, the software program testing begins. Different testing methodologies are available to unravel the bugs that were committed during the previous phases. Software testing can be stated as the process of validating and verifying that a computer program:

- meets the requirements that guided its design and development,
- works as expected,

---

69 KSB SAP Business Objects, Folders, December 2012
can be implemented with the same characteristics, and
satisfies the needs of managers.

6.2.1. Info Cube *Esales*

6.2.1.1. Report Login for Group 1

a) Test case 1: Customer with a red status

**Input controls:** Month =10.2012 and Customer Nr = 136096300

**Table IV: Dimensions and measures report Login Group1**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Nr</td>
<td>Average by week for monthN= Event Count n/4</td>
</tr>
<tr>
<td>= Right (P14/ 136096300;9) = 136096300</td>
<td>Average by week for monthN-1= Event Count n-1= 4</td>
</tr>
<tr>
<td>Year/Month = 10.2012</td>
<td>Test logic=If ∑([Average by week for month] )&lt;1;0</td>
</tr>
<tr>
<td>Month as number =</td>
<td>Elseif[Average by week for month]&lt;[Average by week for month-1];1</td>
</tr>
<tr>
<td>ToNumber(right(10.2012;4))*100+ToNumber(left(10.2012;2))</td>
<td>Elseif[Average by week for month]&gt;[Average by week for month-1];2</td>
</tr>
<tr>
<td>= 2012*100+10 = 201210</td>
<td>Else 1</td>
</tr>
<tr>
<td>MonthYear = [Year]*100+[Month]</td>
<td>Green =2 Yellow =1 Red =0</td>
</tr>
<tr>
<td>=2012*100+10=201210</td>
<td>Average by week for monthN= Event Count 201210/4= ¾=0.75</td>
</tr>
<tr>
<td>MonthYear-1= [MonthYear]-100=[201210]-10 = 201110</td>
<td>Average by week for monthN-1= Event Count 201110/4= 4/4 =1</td>
</tr>
<tr>
<td></td>
<td>Test logic =If 0.75 &lt;1; <strong>Stop: Status 0 (red)</strong></td>
</tr>
</tbody>
</table>

---

70 Own representation, December 2012
b) Test case 2: Customer with a yellow status

Input controls: Month =03, Year =2012 and KSB country =Estonia

Test logic = If ∑([Average by week for month] ) < 1; 0
Else if ([Average by week for month] < [Average by week for month-1]; 1
Else if ([Average by week for month] > [Average by week for month-1]; 2
Else 1

Average by week for monthN= Event Count 201203/4= 75/4=18.75
Average by week for monthN-1= Event Count 201110/4=132/4 =33

Test logic = if (18.75) < 1; 0
Else if (18.75 < 33) Then 1: Stop: Status 1 (Yellow)

---

71 KSB SAP Business Objects, Reports, December 2012
72 KSB SAP Business Objects, December 2012
c) Test Case 3: Customers with a green status
Input controls: Month = 02, MSC-Nace-Code = Construction, KSB Country = Greece
Test logic:
\[ \text{If } \sum([\text{Average by week for month}]) < 1; 0 \]
\[ \text{Else if } [\text{Average by week for month}] < [\text{Average by week for month-1}]; 1 \]
\[ \text{Else if } [\text{Average by week for month}] > [\text{Average by week for month-1}]; 2 \]
Else 1
Average by week for monthN= Event Count 201202/4= 273/4=68.25
Average by week for monthN-1= Event Count 201102/4= 88/4=22
Test logic=
If 68.25 < 1; 0
Elseif 68.25 < 22; 1
Elseif 68.25 > 22; 2 Stop: Status 2 (Green)

Figure 57: Test case for Report Login Group1 with green status

6.2.1.2. Report Login for Group 2
a) Test case 1: Customer with a red status
Input controls: Quarter = 20123 and Customer Nr = 132620500

Table V: Dimensions and measures report Login Group2

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Nr</td>
<td>Right (P14/1132620500;9) = 132620500</td>
</tr>
<tr>
<td>Quarter</td>
<td>20123</td>
</tr>
<tr>
<td>Quarter-1</td>
<td>[Quarter]-10</td>
</tr>
</tbody>
</table>

---

73 KSB SAP Business Objects, December 2012
74 Own representation, December 2012
Quarter, n = If [Quarter as Number] = [Quarter] Then [Event Count] else 0
If(20123)=[20123] then [Event Count] else 0
Quarter, n-1 = If [Quarter as Number] = [Quarter-1] Then [Event Count] else 0
If(20123)=[20113] then [Event Count] else 0
Testlogic=If \( \sum(\text{[Quarter N]}) < 1; 0 \)
Elseif[Quarter N]<[Quater N-1]; 1
Else 2

Quarter 20123= 0
Quarter 20113= 5
Test logic = if 0<1; **Stop: Status 0 (red)**

---

**Figure 58: Test case for Report Login Group2 with red status**

b) **Test case 2: Customer with a yellow status**

**Input controls:** Quarter =20121 and Customer Nr= 134438000

Quarter 20121 = 4
Quarter 20111 =7
Testlogic=If \( \sum(\text{[Quarter N]}) < 1; 0 \)
Elseif[Quarter N]<[Quater N-1]; 1
Else 2
If (4) < 1; 0
Else if (4) < 7; 1 **Stop: Status =1 (yellow)**

---

75 KSB SAP Business Objects, Reports, December 2012
c) Test Case 3: Customers with a green status

Input controls: Quarter = 20124 and MSC-Nace-Code = other manufacturing

Quarter 20124 = 14
Quarter 20114 = 0

Test logic = If $\sum((\text{Quarter } N) < 1; 0$

ElseIf $\text{Quarter } N < \text{Quarter } N - 1; 1$

Else 2

Test logic = If (14) < 1; 0

ElseIf (14) < 0; 1

Else 2 **Stop: Status = 2 (Green)**

6.2.1.3. Report Login Group 3

a) Test case 1: Customer with a red status

Input controls: Month = 12 and Quarter 20124

Note: Month: 12 belongs to Quarter 4

---

76 KSB SAP Business Objects, Reports, December 2012
77 KSB SAP Business Objects, Reports, December 2012
Table VI: Dimensions and measures report Login Group3

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Dimensions are equal to the dimensions for the report Login Group 1 and 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average by month for Quarter n-1 = Quarter(Month1+Month 2+Month3)/3</td>
</tr>
<tr>
<td></td>
<td>CurrentMonthn =</td>
</tr>
<tr>
<td></td>
<td>If [month as Number] = [MontYear] Then [Event Count] else 0</td>
</tr>
<tr>
<td>Measures</td>
<td>CurrentMonthn-1 =</td>
</tr>
<tr>
<td></td>
<td>If [month as Number] = [MontYear-1] Then [Event Count] else 0</td>
</tr>
<tr>
<td></td>
<td>CurrentQuartern =</td>
</tr>
<tr>
<td></td>
<td>If [Quarter as Number] = [Quarter] Then [Event Count] else 0</td>
</tr>
<tr>
<td></td>
<td>CurrentQuartern-1 =</td>
</tr>
<tr>
<td></td>
<td>If [Quarter as Number] = [Quarter-1] Then [Event Count] else 0</td>
</tr>
<tr>
<td></td>
<td>Testlogic = If Σ([CurrentMonth N]) &lt; 1 Then 0</td>
</tr>
<tr>
<td></td>
<td>Elseif Σ([CurrentMonth N]) &lt; Σ([AverageQ N - 1]) Then 1</td>
</tr>
<tr>
<td></td>
<td>Else 2</td>
</tr>
</tbody>
</table>

CurrentMonth_{201212} = 0
CurrentMonth_{201112} = 0
Average by month for Quarter 20124 = 36/3 = 12
Average by month for Quarter 20114 = 25/3 = 8.33
Test logic = If 0 < 1 then 0 Stop: Status = 0 red

![SAP Business Objects](image)

Figure 61: Test case for Report Login Group3 with red status

b) Test case 2: Customer with a yellow status

---

78 Own representation, December 2012
79 KSB SAP Business Objects, Reports, December 2012
Inputs controls: Month: 3, Quarter: 20121 and Customer Nr: 171447900

Note: Month 3 belongs to Quarter 1
Quarter20111 = 55 ; Quarter20121 = 2
Event Count Month 201103 = 9
Event Count Month 201203 = 2
AverageQ20111= Q20111/3 --→ 55/3 = 18.33
AverageQ20121 = Q20121/3--→ 2/3 = 0.67

Test logic = If 2 < 1 Then 0
Elseif 2<18.33 Then 1 Stop: Status: Yellow

Test logic = If 2 < 1 Then 0
Elseif 2<18.33 Then 1 Stop: Status: Yellow

Test logic = If 2 < 1 Then 0
Elseif 2<18.33 Then 1 Stop: Status: Yellow

Test logic = If 2 < 1 Then 0
Elseif 2<18.33 Then 1 Stop: Status: Yellow

Figure 62: Test case for Report Login Group3 with yellow status

c) Test case 3: Customer with a Green status

Inputs controls: Month: 9 and Quarter: 20123 and Role: Cooperation partner.

Note: Month 9 belongs to Quarter 3
Quarter20113 = 5 ; Quarter20123 = 20
AverageQ20113= Q20111/3 --→ 5/3 = 1.67
AverageQ20123 = Q20121/3--→ 20/3 = 6.67
Event Count Month 201109 = 4; Event Count Month 201209 = 10

Test logic = if 10 < 1 Then 0
Elseif 10<1.67 Then 1
Else 2 Stop: Status: Green

Figure 62: Test case for Report Login Group3 with yellow status

KSB SAP Business Objects, Reports, December 2012
6.2.2. Info Cube OI/TO

6.2.2.1. Report OI Group 1

a) Test case 1: Customer with a red status

Table VII: Dimensions and measures report OI Group1

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>2010/11</th>
<th>2011/12</th>
<th>2012/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>CurrentMonth</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Event Count</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CurrentMonth -1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Event Count -1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CurrentMonth/CurrentMonth-1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Testlogic = If Sum([CurrentMonth])>Sum([CurrentMonth-1]) Then 0
ElseIf [CurrentMonth/CurrentMonth-1]*100>=-5 Then 0
ElseIf [CurrentMonth/CurrentMonth-1]*100<=-10 Then 2

81 KSB SAP Business Objects, Reports, December 2012
82 Own representation, December 2012
Input controls: Month =5, Year=2012, Sold-to party =896961000

Login\textsubscript{201205} =27443.51€
Login\textsubscript{201105}=124935.94€

CurrentMonth\textsubscript{n-1} <> 0; CurrentMonth\textsubscript{n} /CurrentMonth\textsubscript{n-1} = (27443.51€/124935.94€)-1=0.7803

Test logic =

27443.51€>124935.94€ Then 0
Elseif -0.7803*100 >-5 Then 0
Elseif -0.7803*100<=-10 Then 2 \textbf{Stop: Status: 2--> Red}

Figure 64: Test case for Report OI Group1 with red status

b) Test case 2: Customer with a yellow status

Input controls: Month =10, Year=2012

Login\textsubscript{201210} =21160.86€
Login\textsubscript{201110}=23362.13€

CurrentMonth\textsubscript{n-1} <>0

CurrentMonth\textsubscript{n} /CurrentMonth\textsubscript{n-1} = (21160.86€/23362.13€)-1=0.094

Test logic =

21160.86€>23362.13€ Then 0
Elseif -0.094*100 >-5 Then 0

83 KSB SAP Business Objects, Reports, December 2012
Elseif -0.094*100<= -10 Then 2
Else 1  **Stop: Status: 1--> Yellow**

Figure 65: Test case for Report OI Group1 with yellow status

(c) **Test case 3: Customer with a green status**

**Input controls:** Month =10, Year=2012, Salesman = Autio

Login\textsubscript{201210} =4100.00€

Login\textsubscript{201110}=0€

CurrentMonth\textsubscript{in-1}=0, then CurrentMonth\textsubscript{in}/CurrentMonth\textsubscript{in-1} = cannot be calculated,

Test logic = 4100.00€>0€ Then 0 **Stop: Status: 0 --> Green**

Figure 66: Test case for Report OI Group1 with green status

---

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85 KSB SAP Business Objects, Reports, December 2012
6.2.2.2. Report OI Group 2

Table VIII: Dimensions and measures report OI Group 2

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Dimensions are equal the dimensions for the report Login Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CurrentQuarter&lt;sub&gt;n&lt;/sub&gt; = If [Quarter as Number] = [Quarter] Then [Event Count] else 0</td>
</tr>
<tr>
<td></td>
<td>CurrentQuarter&lt;sub&gt;n-1&lt;/sub&gt; = If [Quarter as Number] = [Quarter-1] Then [Event Count] else 0</td>
</tr>
<tr>
<td></td>
<td>CurrentQuarter&lt;sub&gt;n&lt;/sub&gt;/ CurrentQuarter&lt;sub&gt;n-1&lt;/sub&gt;</td>
</tr>
<tr>
<td></td>
<td>=If(∑([CurrentQuarter-1])&lt;&gt;0 Then (∑([CurrentQuarter])/∑([CurrentQuarter-1])-1)</td>
</tr>
<tr>
<td></td>
<td>ElseIf(∑([CurrentQuarter])&lt;0 and (∑([CurrentQuarter])/∑([CurrentQuarter-1]))&lt;0) Then (-∑([CurrentQuarter]+∑([CurrentQuarter-1])))/∑([CurrentQuarter])</td>
</tr>
<tr>
<td></td>
<td>ElseIf(∑([CurrentQuarter-1])=0 and (∑([CurrentQuarter])&gt;0) Then (∑([CurrentQuarter])+∑([CurrentQuarter-1]))/∑([CurrentQuarter])</td>
</tr>
<tr>
<td></td>
<td>Testlogic</td>
</tr>
<tr>
<td></td>
<td>=If([CurrentQuarter]&gt;∑([CurrentQuarter-1]) Then 0</td>
</tr>
<tr>
<td></td>
<td>ElseIf([CurrentQuarter]/CurrentQuarter&lt;sub&gt;-1&lt;/sub&gt;*100&gt;5 Then 0</td>
</tr>
<tr>
<td></td>
<td>ElseIf([CurrentQuarter]/CurrentQuarter&lt;sub&gt;-1&lt;/sub&gt;*100 &lt;=-10 Then 2</td>
</tr>
<tr>
<td></td>
<td>Else 1</td>
</tr>
<tr>
<td></td>
<td>Green =0 ; Yellow=1; Red=2</td>
</tr>
</tbody>
</table>

a) Test case 1: Customer with a red status

Input control: Quarter =20121, Sold-to party =124085800

LoginQ<sub>20121</sub> =2477.88€
LoginQ<sub>20111</sub> =18889.55€

CurrentQuarter<sub>n-1</sub><>0; CurrentQuarter<sub>n</sub>/CurrentQuarter<sub>n-1</sub> = (2477.88€/18889.55€)-1=-0.8688

Test logic =

2477.88€>18889.55€ Then 0
Elseif -0.8688*100 >-5 Then 0
Elseif -0.8688*100 <=-10 Then 2 Stop: Status: 2--> Red

86 Own representation, December 2012
b) **Test case 2: Customer with a yellow status**

**Input control:** Quarter = 20121, Customer role = Wholesaler, distributor

Test logic = 18767.63€ > 20783.72€ Then 0

---

87 KSB SAP Business Objects, Reports, December 2012
88 KSB SAP Business Objects, Reports, December 2012
Elseif -0.097*100 >-5 Then 0
Elseif -0.097*100<=-10 Then 2
Else 1
Stop: Status: 1 --> Yellow

c) **Test case 3: Customer with a green status**

**Input control:** Quarter = 20121, Salesman = Tackenberg, Example = Rhein-Ruhr Colin KG

End User can inform Mr. Tackenberg about the trend of all his dealers and wholesalers

LoginQ\(_{20121}\) = 74505.17€

LoginQ\(_{20111}\) = 68235.94€

\[\text{CurrentQuarter}_n < 0 \lor \text{CurrentQuarter}_n > \text{CurrentQuarter}_{n-1} = (74505.17€/68235.94€) - 1 = 0.091\]

Test logic =

74505.17€ > 68235.94€ Then 0
Stop: Status: 0 --> Green

![Figure 69: Test case for Report OI Group2 with green status](image)

6.3. **Assessment**

6.3.1. Project Assessment

The Go Live SAP BO has been several times postponed due to some technical problems that have been solved within a long period. So if those technical problems wouldn’t have been

---

89 KSB SAP Business Objects, Reports, December 2012
treated, the expected deployment and the GO LIVE of the SAP BO wouldn’t have happened and maybe our monitoring tool would have been possible. Finally waiting for SAP BO avoids the development an extra program with connections to tree different SAP systems

6.3.2. Personal assessment

Combining my daily work with my “personal” project has been a big challenge. Consequently I had a very rhythmic schedule with overtime that required rigor, motivation and discipline.

6.3.3. Problems faced

During the elaboration of this work, the list of problems that I have faced is quite long and large. It started with SAP BI BO, I had first to know about the architecture, environment and understand how the tool is used and where complex queries can be designed. Later than, I had to imagine in which way the tool could be helpful in the realization of our monitoring tool. That means: fulfill the users’ requirements by respecting the defined rules. Moreover, I had to be an expert in the design of queries by learning the query language by myself, since the deployment was still in progress and all the IT guys supposed to know more about the tool, were quite busy, but very helpful in case of precise questions. The slowness of the system, the instability, runtime, exceptions errors and sometimes the inaccessibility of SAP BO have been an obstacle for the progress of this work. Consequently, unexpected delays from my side have been caused.

6.3.4. Results

I am quite satisfied of the result of my tool and I am sure it will help the business developers to have a quickly and better view on the behavior of the customers according to criterion such as countries, regions, or business cores etc. Where to focus, who to contact, will be directly presented with the traffic light. So time consuming for matching data and crossing tables will be over. Finally I very proud because this project enabled:

- To go in deep details in the comprehension of our KSB data warehouse
- To learn and improve my technical knowledge in SAP Business Objects so I can consider myself today as a real query designer.

6.3.5. Ideas for further development of the monitoring tool

Ultimately, the value of monitoring is realized only through the use of the monitoring data. Collecting numbers even the best numbers or constructing the perfect indicators is useless unless data are reviewed and interpreted and then fed back into the decision-making process.
So, after receiving the information of the monitoring tool, following questions come up:

- What do we do with the results of the monitoring?
- How frequent the information should be presented?
- Who and where do we target?
- With what communication and other approaches and messages?
- How to improve the performance of our already existing customers in the use of our different solutions?
- How to quickly react?
- How do we attract new customers?

All these questions should be answered by the KSB e-Business team especially business developers. As this step is not a part of this work, however, some recommendations could be given in order to be able to react in different scenarios.

- The results given by the tool should be discussed internally and actions should be planned.
- Reports concerning Login for group 1 and 3 should be monthly checked and analyzed while reports for group 2 only quarterly.
- Reports regarding Order Intake for group 1 should be also checked monthly and for group 2 quarterly
- Customers with a red status must be contacted as quickly as possible in order to determine the problem or to provide any assistance in the use of all the KSB e-Business solutions. It means the sales representative should be first informed, and then the business developer could contact the customer to provide support and observe the improvement.
- Customers with a yellow status should be also contacted either by the sales representative or by the business developer to provide assistance
- Customers with a green status should be only observed in order to prevent any deviance

Mails and telephone calls are the best ways to contact customers. However these communication ways should not replace customer visits by the sales representative, supported by the e-Business develop to increase the sales of KSB products via the different sales channels.
7. Conclusion

Early warning system is an integral management system consisting of methods, organization and IT support with the goal of understanding, monitoring and managing critical risks. They can be applied in all the domains and activities since they are based on key indicators. As a part of early warning system, monitoring is essentially a process of tracking and measuring progress and change and a trigger for learning the improvement that takes place periodically in a regular manner and time.

Coming to the TO-Be part of this work, using SAP Business Object Web Intelligence for the development of the monitoring tool has been a great help despite the technical faced difficulties. As query designer, I am quite satisfied with the result and proud that the requested requirements and specifications have been totally fulfilled. Reports have been divided into two categories according to the info cubes used. On one hand we have reports based on the info cube *Esales* with key figure login and on other hand reports based on the info cube *Order Intake/Turnover* with key figure order intake. The different developed reports could track and measure the behavior (status) of each customer with respective to specific key figures and the rules defined by experts. The interesting part of this work is that, the current situation of a customer is highlighted using a color code system so that end-users could identify in one click customers with a red, yellow or green status and could decide what to do with this information.
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SAP BusinessObjects Web intelligence: Advanced Report Design
Appendix

Test Case for the different reports

<table>
<thead>
<tr>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developer Company Name</td>
</tr>
<tr>
<td>Application Name</td>
</tr>
<tr>
<td>Test case description</td>
</tr>
</tbody>
</table>

| Written by                | Marie-Noelle Ngoumkam     |
| Written Date              | 02.01.2013                |
| Last Update               | 14.01.2013                |
| Pre-conditions            | Reporting Knowledge       |

<table>
<thead>
<tr>
<th>Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountable Tester</td>
</tr>
<tr>
<td>Environment</td>
</tr>
<tr>
<td>No. of Test cases</td>
</tr>
<tr>
<td>No. of Tests passed</td>
</tr>
<tr>
<td>No. of tests failed</td>
</tr>
<tr>
<td>No. of tests that are not applicable</td>
</tr>
<tr>
<td>No. of Waivers requested</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KSB</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSB contact</td>
</tr>
</tbody>
</table>

How to use this template:

This document shall list all test cases that were conducted during internal quality assurance. This goal is to document quality assurance activities of the application developer. The test cases may be grouped into :
<table>
<thead>
<tr>
<th>Test Case</th>
<th>Name of Test Case</th>
<th>ID Test Case ID</th>
<th>Severity</th>
<th>Date: 14.01.2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Section: Test Login Group and OI

### Test Purpose

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Step Result</th>
<th>Test Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check and verify that server open the requested report after users click on it</td>
<td>When the End users click on the report, the report should appear</td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>Check and verify that the tool is easy to use and user friendly</td>
<td>Any end users should be able to understand the reports</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>Check and verify that the customer status appears correctly during the defined period and according to the rules</td>
<td>The level of warning should be represented at the right by using color code</td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>Check the reliability, availability, and maintainability of the report</td>
<td>The reports are reliable and maintainable</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Check the security aspect of the report</td>
<td>End Users should not be able to modify the reports</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Check and verify that the different filters work</td>
<td>End Users should be able to apply the filters on data</td>
<td>X</td>
</tr>
</tbody>
</table>

### Overall Result

X
Figure 70: Rules for login by groups

n: year
n-1: year-1
Q: Quarter
Av.: Average

90 Own representation, May 2012
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Analyse, conception et mise en œuvre d’un système d’alerte précoce pour les ventes par le commerce électronique chez KSB.


SUMMARY

The use of two info cubes implemented in the data warehouse SAP Business objects, has enabled the creation of three reports grouped under the info cube Esales and two reports for the info cube Order Intake to facilitate the monitoring of e-Business customers.

The modeling of reports belonging to the info cubes Esales (number of logins) concerns exclusively the business events login, dimension customer role and measure event count.

While the establishment of reports for the info cube Order Intake /TurnOver (amount of order intake) refers to the dimensions customer role, order type and the measure order intake in gross currency.

Key words: E-commerce, e-Business, business intelligence, customer relationship management, data warehouse, SAP Business Objects, web Intelligence, info provider, info cube, info object, order intake, login, customer role, early warning system, monitoring.

RESUME

L’utilisation des deux cubes stockés dans l’entrepôt de données SAP Business Objects a permis la création de rapports dont trois rapports avec comme source de données le cube Esales et deux autres avec comme source de données le cube Order Intake, pour faciliter ainsi le suivi de performance des clients de notre activité commerce électronique. La modélisation des rapports du cube Esales concerne essentiellement le nombre de connexion, la dimension type d’activité et le fait nombre de connexion pendant que la conception des rapports relatifs à la prise de commande et le chiffre d’affaires concerne les dimensions le type d’activité, le type de commande et le fait prise de commande en devise.

Mots clés: Commerce électronique, gestion de la relation client, entrepôt de données, SAP Business Objects, Web intelligence, info provider, info cube, info object, prise de commande, connexion, type d’activité, système d’alerte précoce, surveillance.