

Use Case Descriptions

General Template

Use Case Description Template

- **Business Case:**
- **Goals:**
- **Data Task:**

Business and Data Understanding Template

- **Application Environment:**
- **Business Perspectives:**
- **BI Views:**
- **Analytical Goals**
- **Assessment of Data**

EBMC² – Use case (1)

The EBMC² Project: Description

- **Business Case:** The Evidence-based Medical Compliance Cluster project (EBMC²) (see <http://ebmc2.univie.ac.at/>) aims at the analysis of skin cancer treatment processes. The project has been conducted as joint funding and effort between the Medical University of Vienna and the University of Vienna, more precisely, the Department of Dermatology, the Center of Medical Statistics, Informatics, and Intelligent Systems, and the research groups Data Analytics and Computing, Knowledge Engineering, and Workflow Systems and Technology.
- **Goals:** Analysis goals refer to the treatment of patients as well as to the performance of the institution (hospital). With respect to the treatment of patients the following KPIs are of interest:
 - Survival time of patients
 - Compliance of patients with preventive medical check-upsFor performance of the institution we will consider the following KPIs:
 - Compliance of the institution with the international melanoma guidelines
 - Organization of internal work processes
- **Data Task:** The data sources are data repositories at the local department, the Austrian Cancer Registry, and data from the Austrian Social Insurance System. Data are different with respect to temporal granularity, the quality of information and its completeness as well as its structure (structured and semi-structured data). Hence, we need a flexible data model which allows the integration (i.e. linking of data) according to the analysis goals of interest. Such linking also allows additional quality considerations.

EBMC² – Use case (2)

EBMC² Use Case: Business and Data Understanding

- **Application Environment:** With respect to size, we look at a certain department of a hospital and a specific illness (melanoma) over a longer period of time. This involves many different activities by the hospital and different reactions of the patients. The reference to the global environment is of utmost importance such as the international comparison of comparable institutions and their embedding into the public health care system. In this case the BI scenario is mainly monitoring the strategy performance of the department.
- **Business Perspective:** Corresponding to the different goals we consider all business perspectives. The process owners are the Department of Dermatology, the process subjects are patients, and the process actors are defined by the staff of the hospital.
- **BI-Views:** All three BI views are used depending on the analytical goals. For measuring the effectiveness of the check-up and the treatment we use the cross-sectional view, for issues of survival time the state view and for the process oriented analytical goals the event view.
- **Analytical Goals:** Corresponding to the initial formulation of KPIs a number of analytical goals can be formulated.
 - Effectiveness of preventive medical check-ups
 - Regression model for survival time of patients
 - Compliance analysis for the treatment process
 - Organizational mining for hospital staff
- **Assessment of Data:** Each analytical goal needs a specific data excerpt, which is obtained by data integration and transformations of the data, for example, cross-sectional summaries of the event view. Data description has to be done for each data excerpt and data quality has to be checked as well. Important issues are completing missing information and improving temporal resolution.

Pre-eclampsia - Use Case (1)

Pre-eclampsia Use case: Description

- **Business Case:** Pre-eclampsia is a complication in pregnancy caused by multiple factors. In order to detect pre-eclampsia, weight, blood pressure and proteinuria of women is monitored during pregnancy.
- **Goals:** In this use case we consider the following goals
 - Representation of the monitoring process by quantitative measures
 - Rules for deciding about the need for hospitalization of a persons.
- **Data Task:** This use case was mainly considered for evaluating the *DPA^{TimeSeries}* methodology as presented in [10] for decision point analysis. Time series of measurements for weight, systolic and diastolic blood pressure, and proteinuria were generated for 300 cases containing 8% of cases with pre-eclampsia.

Pre-eclampsia - Use Case (2)

Pre-eclampsia Use case: Business and Data Understanding

- **Application Environment:** This application is general without reference to a specific business environment. The scope of the process is rather simple and defined by six types of events: Proteinuria Check, Blood Pressure Check, Weight Check, Hospitalize Patient, Homecare, Giving Birth. The checks are repeated from the 20th week of pregnancy onwards. The BI-scenario is BI separated of strategy performance, but the results of the analysis can be used later on for defining new business strategies for monitoring pregnancy.
- **Business Perspective:** The perspective in this use case is on the customer who is owner of the process and process subject. Furthermore, medical practitioner are passive actors who decide about hospitalization.
- **BI View:** This is a typical example of data in the state view, i.e. we have time series about the medical parameters.
- **Analytical Goal:** The KPI is defined by hospitalization in dependence on the temporal behavior of the medical parameters. Correspondingly the analytical goals are descriptive goals (reporting) and predictive goals (classification rules allowing a decision about hospitalization)
- **Assessment of Data:** Due to the control through simulation, the data is complete allowing the evaluation of algorithms. For reporting purposes, summaries for the instances are calculated.

Higher Education - Use Case (1)

HEP Use Case: Description

- **Business Case:** As part of the Higher Education Processes project (HEP) (see <http://www.wst.univie.ac.at/communities/hep/index.php?t=main>, [16] undergraduate teaching courses at the Faculty of Computer Science, University of Vienna, were observed based on the usage of the teaching platform CeWEbs [7].
- **Goals:** The following goals are of main interest
 - Derivation of a reference process model exploiting additional compliance constraints, e.g., setting out the relation of milestones and submissions
 - Conformance between real-life teaching processes and a given reference model
 - Utilization of the forum by students and the relation of students' performance to activities in the forum
- **Data Task:** Data are collected from four distinct services, i.e., forum, submission, registration, and code evaluation on the service-oriented learning platform CeWEbs. Logs from annually offered undergraduate courses over a period of three years (course conducted every year) are available. In total there were 330 students and 18511 events. For the use case data were collected in the .csv format and anonymized.

Higher Education - Use Case (2)

HEP Use Case: Business and Data Understanding

- **Application Environment:** The business case under consideration is defined for a faculty. The scope of the processes is complex due to constraints that hold for an undergraduate teaching process. An example of a constraint with high enforcement level is “For each milestone, no upload must take place after the corresponding milestone deadline” [16]. Finally, we acquired the reference teaching process based on interviews with process participants, e.g., lecturers. The business scenario is monitoring the process and provides feedback on the business strategy of the faculty. In the long run, the results can be also used as a strategic resource for improving the teaching process.
- **Business Perspectives:** All three business perspectives occur in this use case. The process owner is the faculty and the customers and process subjects are the students. Other actors are the tutors and lecturers.
- **BI-views:** The event view will be used for the business understanding goals and the cross-sectional view for the goals in connection with student performance.
- **Analytical Goals:** Corresponding to the goals the following analytical goals can be formulated:
 - Understanding of the business process
 - Conformance Analysis for the process instances
 - Segmentation of students into groups with different utilization of the forum
- **Assessment of Data:** Data are extracted from the service-oriented blended learning environment and integrated along the analysis goals. After data purging and cleaning, data are represented in a log-oriented format. Using data transformations, additional attributes are generated in the cross-sectional view.

Logistic – Use Case (1)

Logistics Use Case: Description

- **Business Case:** The container transportation case has been adapted from a realistic process that was described and implemented in [3]. It describes the process of loading a vehicle at the origin and starting to move towards its destination. During the movement of the container temperature is constantly monitored. If the temperature exceeds a certain threshold for some time, the vehicle has to move back to its origin. Otherwise it continues to the destination where the containers are unloaded.
- **Goals:** Two main goals are identified:
 - Derivation of a model for the transportation process
 - Derivation of a decision rule on when to return the container to their origin before they were delivered.
- **Data Task:** Simulated data of the transportation process and the time series measurements of container transportation are used.

Logistic – Use Case (2)

Logistics Use Case: Business and Data Understanding

- **Application Environment:** Similar to the pre-eclampsia use case, there is no detailed specification of the business environment defined. We consider a general problem for logistics and the scope of the business only refers to a small number of activities. The application scenario is using BI separated from business strategy for a specific sub-process of a possibly larger process but results can be used later on.
- **Business Perspective:** The logistic company is the process owner, the containers are the process subjects and further actors are personnel of the company. Since the containers are understood as customers involved in the transportation process, the main perspective is the customer perspective.
- **BI View:** We use the event view for the first goal and the state view for the second goal.
- **Analytical Goals:** For achieving the goals we formulate two analytical goals: The first one is Process identification and the second one is classification of the different process instances in such way that an economically favorable decision strategy for returning to the origin can be formulated. Influential factors is the temperature of the container.
- **Assessment of Data:** Due to the fact that the data were simulated, data are already in a adequate format and are of good quality.

CRM – Use Case (1)

CRM Use Case: Description

- **Business Case:** A company with outlets in different cities offers customers a variety of services. Customers are registered by a loyalty card. In order to improve services according to customer needs and learning about the image of the company a survey was carried out. About 2300 customers participated in the survey. For each customer age, sex, duration of the business relationship and usage type (either private or business user) is known. A user profile for long term customers is defined by three indicators: a indicator for sales, an indicator for the intensity of usage, and an indicator for duration of customer relationship. Usage of the services is known from the transaction database.
- **Goals:** The following KPIs are of interest for the company
 - Sales of customers in dependence of their their usage profile
 - Usage of the different services
 - Customer profiles with respect to usage of the different services
- **Data Task:** Three data sources are used: a customer data base (loyalty card), a transactional data base and a survey data base.

CRM – Use Case (2)

CRM Use Case: Business and Data Understanding

- **Application Environment:** The use case considers a medium sized company with a large number of activities in the different services, which do not have many dependencies. The application scenario is using BI as feedback for strategy formulation (different services) and probably also as strategic resource (bundling and redefining services).
- **Business Perspective:** Corresponding to the sales orientation, main perspective is the customer perspective. The owner of the business processes is the company and the process subjects are the customers. Additionally personnel in the outlets are actors in the sales process.
- **BI Views:** All available data are cross-sectional data
- **Analytical Goals:** In that case the KPIs define the analysis goals estimation, segmentation and classification. Further analytical goals are description of customers and detecting interesting behavior.
- **Assessment of Data:** For obtaining cross-sectional data all transactional data were aggregated at different temporal resolutions (monthly, quarterly, annual). The description of the different sales variables and the identification of outliers is done as well as the description of the survey about user satisfaction.