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Documentation of pilots

Business Intelligence and Analytics, AAU

Spring 2020

Introduction

This document contain the documentation of [pilot, period – one document for each pilot]. The document contains a description of the settings and the motivation of the case, as well as an overview of the key performance indicators (KPIs) for the pilot. The execution and documentation of pilots are part of larger process, named Educational Framework, aimed at transforming educational programmes for future Industry 4.0 capabilities. The case/pilot is chosen based on two initial analysis, respectively focused at industry and the institution. For further information regarding the overall process, please see the document 'Educational Framework'.

Contents

- Description of pilot (summary)

- KPIs and how they are measured

- Implementation of the Educational Framework

- Results (KPIs) and evaluation
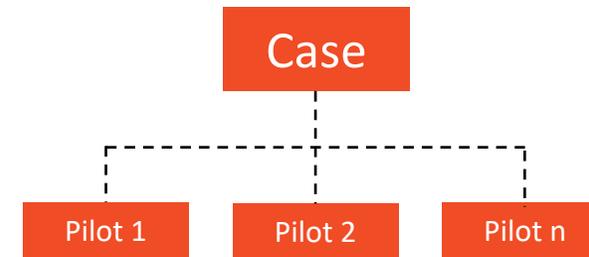
Case

Pilot 1   Pilot 2   Pilot n

Fig. 1. The figure shows the relationship between the two terms: *case* and *pilot*.

Description of the pilot (summary)

This case addresses the course Business Intelligence and Analytics (BI) at Aalborg University, which is taught in the two master programmes Operations and Supply Chain Management second semester, Operations and Innovation Management second semester, Master in Production third semester. This course is taught jointly for all three programs. All three programs are industry focused master programs with different angles to operations management. This specific course enables the students to learn about various aspects of BI, and thus has clear links to Industry 4.0

The Bi course has a workload og 5 ECTS and aims at teaching the students about BI technology, but also why and when to apply different BI principles to support the business in a company. The course currently covers the following areas: 1) introduction to BI principles, tool and technologies, 2) Data warehousing and multi dimensional cubes, 3) Business performance Management, 4) Sensors for capturing manufacturing data, 5) Knowledge based systems, 6) data mining, including classification and A priori algorithms.

The course currently focuses on more traditional applications of business intelligence and analytics, i.e. analysis and decision support based on traditional data sources, such as ERP system data. However, there is a clear potential in addressing the opportunities in also utilizing increasing volumes of other data sources such as sensor data, MES data, as well as looking into application of artificial intelligence for BI applications

The aim of this pilot is to introduce new teaching approaches into the course to reduce the gap between what is taught theoretically and what can be applied in real world problems by the students.

The success criteria are:

- Students increase their skills and competences related to determining when and why to apply BI&A tools

- Students increase their skills related to applying entry level BI&A tools

- New learning methods are tested in the course

Description of the pilot (summary)

KNOWLEDGE

- Account for Business Intelligence (BI) concepts, theories and methods including:
    - Creation of knowledge from either people/employees/"experts" or from analysing existing data
    - Knowledge representation
    - Traditional BI handling systems such as expert systems, knowledge base systems, decision support systems and executive information systems.

SKILLS

- Make decisions about the optimal use of the BI concepts, theories, methods and selected systems for identification of needs, development of alternative solutions, evaluation selection and implementation
- Use BI in disciplines such as enterprise engineering/modelling, business analytics, data mining, etc.

COMPETENCES

- Apply knowledge and skills in relation to business intelligence development projects and thereby apply the knowledge handling activities: knowledge acquisition, knowledge verification, knowledge representation and knowledge engineering.

KPIs and how they are measured

- The students ability to determine when and why to apply various BI&A tools
  - This is measured by aggregating the exam results which will directly test this ability

- The students ability to apply entry level BI&A tools
  - As this is difficult to measure directly, this is assessed qualitatively by observing students through the exercises.

- Number of new learning methods tested in the course
  - Measured by compiling a list of new learning approaches at the end of the course

Implementation of the Educational Framework

Teaching in this course is done by various approaches, depending on the topic taught. Some lectures are traditional lectures with 2x45 minutes lecture followed by exercises, some lectures are structured as workshops with a short introduction, some lectures are self-study lectures with guided exercises, some lecture include lab work.

The course focuses on various elements from Business Intelligence and Analytics, and is thus inherently relevant to Industry 4.0. However what has been the issue with this course previously is the students ability to bridge theory and practice, and get to the point where they can meaningfully apply the tools introduced in the course. This pilot applies the following experiments to address this:

- Increased use of mixed media – using both textbooks, articles, video, and tutorials to communicate knowledge.

- Video supported guidance of students – as some BI&A tools are difficult to get started with, course specific video guides are introduced

- In lecture exercises – in order to get students started quicker familiar with specific tools, they are tutored in class prior to doing self guided exercises

- Increased use of Real life industry data – in to increase students motivation in relation to applicability, real (obfuscated) data from industry is used, so it can easily be transferred to e.g. semester projects.

- Case assignments only specifying real life problems are introduced in relation to exercises on specific BI&A tools, letting students work on how to specifically apply what is learned rather than providing a recipe (ill-defined problem as per authentic task design)

Results and Evaluation

[A description of the results (KPIs) and an overall evaluation of the pilot. This is filled in after the pilot is executed]

The pilot was executed in the spring 2020. After a few lectures in the course COVID 19 struck, and imposed news boundary conditions for executing the teaching.

The KPI "The students' ability to determine when and why to apply various BI&A tools" waws measured though the exam results. Generally, the exam results were better than the year before, indicating the learning outcome of the course had improved. The causality however could be questioned, as many other factors may also have influenced the learning, and exam results.

Originally, the evaluation plan for this pilot in terms of the KPI "The students' ability to apply entry level BI&A tools" was to observe students doing exercises. As the students were working from home, this was not possible, and instead of this, input from formal evaluation meetings as well as direct interaction with the students helping with exercises was used. In general, the students expressed satisfaction with the mixed form of recorded lectures and direct interaction, highlighting that if something was not immediately understood, they could navigate the videos and re-watch certain parts. Some of the course focuses on being able to use specific tools, and in those parts, the students found it useful to also do exercises along the way as they watched the lectures. There was a difference between lectures in terms of the mix between lectures recorded by the teacher, publicly available videos from e.g. Youtube, and direct interaction. The students generally preferred to have videos recorded by the teacher and some video interaction, rather than generic videos from e.g. Youtube.

Related to the KPI "Number of new learning methods tested in the course", all of the learning methods outlined in the previous page were applied and tested. All methods seemed to have a positive effect on the learning outcome, especially the ones related to using real life problems and real data for exercises. The effect on learning outcome could also be observed in the following semester, where more students would apply the tools in project compared to previous years.

Concluding on the overall impressions of the qualitative findings and exam results, it appears that the students had a greater learning outcome after applying the new measures, despite the fact that the COVID-19 restrictions prevented parts of the changes and thus also evaluating the full outcome.