

Tutorial 1 Objectives:




The main objective of this tutorial is to understand how data and business analytics framework can help solve business problem. This tutorial will cover:

0. Quick Introduction – Who are you, who are they?? – 10 mins
1. Tutorial structures, content and tools – 10 mins
2. Review: strategic data and business analytics framework – 20 mins
3. Case study: BigCosy Hotel (30 mins for analysis and solutions + 20 mins presentation and discussion)

Part 1. Tutorial Structures, Content and Tools

- There will be 2-hour tutorial every week
- Each tutorial will have two components:
 - Reviewing lecture content by asking conceptual or design questions
 - Providing hands-on experience with BA tools
- Consistent with subject goal, tutorials will teach you how to model, integrate, analyse and visualise data for organisational decision-making purposes. To do so, we will three applications (MS PBI, MS SSIS and RapidMiner) each focusing on one or two aspects of BA processes in organizations. A summary information about the tools are provided in Table 1.

Table 1: Overview of BA Tools Used in the Subject

Microsoft Power BI (PBI)	Microsoft SQL Server Integration Services (SSIS)	RapidMiner
		
<ul style="list-style-type: none"> • Model data • Visualise data 	<ul style="list-style-type: none"> • Data Integration • Extract, Transform, Load 	<ul style="list-style-type: none"> • Data analytics

Part 2. Review: strategic data and business analytics framework – 20 mins

Strategic information helps organizations make evidence-based decisions at the right time and create business value. It has five characteristics of Integrated, Data Integrity, Accessible, Credible and Timely.

Exercise 1: Define and discuss each of the five characteristics of strategic information in the context of customer data in a retail organization.

- Information that helps to make decisions on the formulation and execution of business strategies and objectives.
- Characteristics:

Integrated	<p>A single view of the firm, an Enterprise wide view of the information</p> <p>Example:</p> <ul style="list-style-type: none"> • Challenge: Customer data in an organization originally resides in various disparate systems, multiple platforms, and diverse structures.
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	<ul style="list-style-type: none"> A customer might interact with different business functions like sales, marketing and service departments. But the data in each of their operational databases might not match or be incomplete. For BA purposes, all of the data from operational source systems need to come together and be integrated into a single point of truth.
Data Integrity	<p>The values of each data item adhere to prescribed business rules.</p> <p>Example:</p> <ul style="list-style-type: none"> Definition of a customer: a customer is someone who has transacted with the company at least once or is someone who has enquired about our products Targeted marketing campaigns use sale's customer demographics to determine who will receive which treatment? A business rule could determine that customers below 25 years old are not suitable for particular products and, thus, don't receive any treatment
Accessible	<p>Easily accessible, intuitive access, responsive analysis</p> <p>Example:</p> <ul style="list-style-type: none"> Sellers can access data on customers or products through mobile phone or tablet during sales meeting Requires easy to use search functions (e.g., natural language search, comprehensible user interface)
Credible	<p>Trusted values: every data point has only one (correct) value entry at a time</p> <p>Example:</p> <ul style="list-style-type: none"> Customer data such as customer frequency, recency and monetary value are consistent across the company. No matter who analyses the data, everyone sees the same figures. In case data changes in one system (e.g., customer address in sales system), centrally stored data is updated
Timely	<p>Must be available with the correct timeliness for the decision-making scenario</p> <p>Example:</p> <ul style="list-style-type: none"> Data should be updated at a (near) real-time manner (e.g., customer order) Data for hourly, monthly, annual report needs to be available accordingly

Exercise 2: How do organizations create strategic data?

- Every organization will have a similar framework to Figure 1 to source, model, integrate, analyse and visualise data.

Exercise 3: The diagram below shows the components of business analytics framework introduced in the lectures. What is the purpose of each component and what do we, as business analytics practitioners, need to do in each stage?

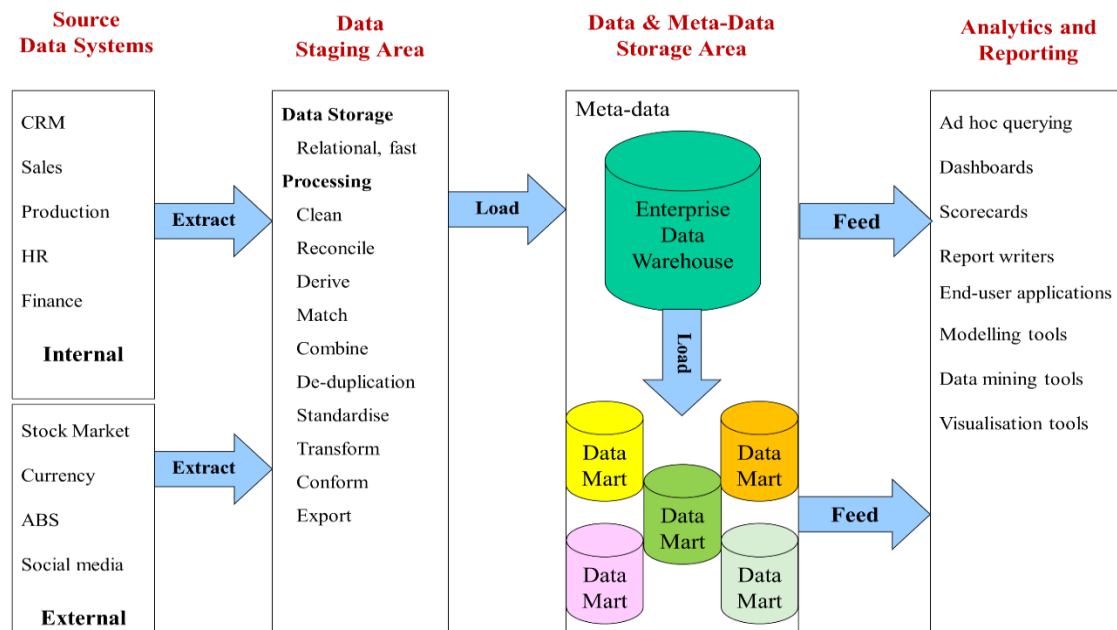


Figure 1: Business Analytics Framework

Source Data Systems	<ul style="list-style-type: none"> Internal and external data that provide the data for the data warehouse Internal data is “normalized” in operational databases that record everyday transactions Source data is not readily available for analysis External data (e.g., Tweets) could be acquired using Application Programming Interfaces (APIs)
Data Staging Area	<ul style="list-style-type: none"> This stage prepares the data for analysis and reporting It <u>extracts</u> the data from all the source systems, <u>transforms</u> them to the right format, makes them comply with business rules, remove duplicates, match records, integrates them and <u>loads</u> them into the data warehouse.
Data and Meta-Data Storage Area	<ul style="list-style-type: none"> A Data Warehouse: A central repository of data Data Marts: Subsections of the data warehouse (called Data Marts) to report on specific areas of the organisation. The Data Mart optimises metrics for the business area which it reports on Meta-Data: Information about data
Analytics and Reporting	<ul style="list-style-type: none"> Dashboarding (visualising key performance indicators to users) Analysing data using various tools to report on the past and what is currently happening and predict future.

Organizations need to diligently follow this process in order to create strategic information (integrated, data integrity, accessible, credible, timely).

Case study: BigCosy Hotel

The BigCosy hotel has been in business for the last 50 years and in that time, it has been successfully making profits. However, in the last five years, the hotel has started to lose money with an increasing rate. The hotel general manager, **Ms Cornell**, is finding it difficult to sustain the business.

About BigCosy

The hotel has three main departments (or profit areas): Rooms, Functions and Restaurants. Each of those separate departments have their own department manager responsible for the profits of their individual departments. The department managers report to the general manager of the hotel. Each

department hires their own staff which are paid by a centralised payroll (central finance team). However, wages (time sheets) for each employee are approved by their department managers.

Rooms Department

The hotel offers 200 economy rooms and 50 deluxe rooms. The hotel uses a reservation system called “*Aparat*” to take bookings and create invoices for the customers. The system does not book a particular room (e.g. Room 205), rather it just reserves a spot in an available tier (e.g. economy or deluxe). Rooms are charged at a flat rate which changes every six months at the hotel owner’s discretion. The owners have a meeting to discuss performance and set the room rate according to how they think the market will respond. Due to the down turn in the hotel profits, the owners have decided to reduce the overall rate of the rooms by 10% in the hope that this will attract more customers. The owners state that the general cost of maintaining the hotel is fixed (i.e., staff and running costs are fixed) and therefore profit is directly related to occupancy. In other words: If more rooms are full, the hotel will make more money! Customers can book rooms through Booking.com or through the Hotel’s website by providing their full names, address, phone number and credit-card details.

The rooms department is responsible for the customer experience, cleaning and makeup services as well as bellboys. Bellboys also deliver room service (from the restaurant) as part of their duties, however, the restaurant gets the profit for the meal. The room’s department manager, **Mr Boom**, has had to hire more bellboys to deliver room service as there appears to be more demand for room service and there were not enough bellboys to accompany guests to their rooms when they arrive. Mr Boom has also complained that the pricing for the rooms does not meet the demand for the events that are in the city. When there is an event, he overhears the guests say that the rooms for BigCosy were so cheap, they expected something to be wrong with the hotel.

Functions Department

Ms Munchen runs the functions using “*MYOB*” (accounting software) and Excel *spreadsheets* to manage the seven functions rooms. At the end of the month, she prepares an invoice for the hotel and gets expenses invoices from the hotel for the hire of rooms.

Ms Munchen gets a discount on catering from the hotel’s restaurant and uses those facilities for all events because they offer cheaper food than any other catering company. Ms Munchen was given a bonus last year for making the highest profit margin (percent of revenue) of all three departments. Because of this, she is happy to give advice to the other managers about how they should run their departments (whether it is requested or not).

Restaurant Department

The Restaurant department is run by **Ms Brood**. There are two restaurants: Italian and Mexican. Each uses a software system called *FoodVoice* but they are run as individual installations separately for each restaurant. Each restaurant is operationally managed by the two head chefs who are also responsible for ordering food supplies and managing staff shifts. They give a 10% discount to anyone who provides their room number and 20% discount for catering for the function rooms. The general manager for the hotel thought that giving these discounts would be a good idea as the restaurant facilities could earn income in non-peak times (especially for function catering).

The discount is given directly off the invoice. When Ms Brood questions the head chefs about profit positions, they complained that they must offer so many meals at a discount. She is also concerned about the amount of food purchased, because the increases in costs do not appear to be proportionate to changes in revenue.

The General Manager

Since the downturn does not seem to be reversing, Ms Cornell (general management) has meetings with department managers on a monthly basis. The last meeting was abruptly cancelled when Ms Brood

(Restaurant) yelled at Ms Munchen (Functions) that the discounts for the functions were causing her department to lose money and if she didn't have to give them discounts, she would have got the bonus and would be making more profit. Mr Boom (Rooms) said that Ms Brood could not talk about favourable treatment because his bellboys delivered the food and his profit was down because of that. Ms Cornell is annoyed that she cannot get a straight (or consistent) answer from the department managers. When each manager talks profit, the numbers just don't add up to the hotels bottom line and she is getting worried about someone committing fraud.

Moreover, Ms Cornell's friend has just told her that she has found some negative reviews on *TripAdvisor* and the hotel rating are going down. She noticed customers are complaining about room service meals arriving late and cold. One review said that you could "walk in and get cheap food at the restaurant by saying that you are staying in the hotel".

The company accountant (who is related to one of the owners) has told Ms Cornell that she should hire business analytics consultants to help her understand the hotels position. The accountant also discussed the latest accounting trends that suggest it is cheaper to retain existing customers and create value adding activities for those customers rather than finding new ones. Alas, BigCosy does not understand its customer base at all the owners are talking about engaging a marketing company to manage customer relations. Something Ms Cornell does not think the hotel can afford.

Your Task

You are hired as business analyst consultant to help the management team resolve the situation. To start with, the general manager, has asked for a proposal with the high-level business analytics approach that should be deployed in the company. To propose your framework, work in groups of four and use the questions below to guide you through the process.

1. Identify the challenges faced by Ms Cornell (General Manager) when making factual decisions?
 - a. Multiple interpretations of data and meaning. The managers have their own (department centric) definition of what profit is and report their own metrics.
 - b. Tracking profits (profit = revenues-costs) by department (with consideration of cross-selling discounts, some department might get the revenue while another incurs the cost)
 - c. Pricing of the rooms based on time of the year, public holidays and events in the area (not on hotel centric data, such as own room booking numbers)
 - d. Identifying customers who are using multiple services at the hotel? Which rooms are claiming the discount at the restaurant? (Hotel is not tracking customers across different departments, i.e., non-guests can claim restaurant discounts)
 - e. Fair bonuses based on accurate performance data which are aligned to company objectives.
2. For what business functions does the hotel need data marts for from your perspective? What are the metrics that need to be optimized for in each of the data marts (what could be of particular interest)?
 - a. Rooms Data Mart optimizing for occupancy and price
 - i. Vacancy rate
 - ii. Average price and profit per room
 - iii. Variable (staff) costs and rates per occupied room.
 - b. Functions Data mart optimizing for occupancy and price
 - i. Function occupancy compared to city events
 - ii. Type of function
 - c. Restaurant Data Mart optimizing for orders, metrics include dollar sales and unit sales for each menu item and service.
 - d. Services Data Mart: This will be for shared services that all three departments use (such as bellboys). It will be charged at the company level and will optimize for speed (wait time) and completion rate.

3. What are the sources of information that could be used to provide data for the data warehouse?
 - a. Aparat Reservation System
 - b. FoodVoice both installations
 - c. Central finance system
 - d. Updated events calendar
 - e. MYOB and functions' Excel spreadsheets
 - f. Hotel website clickstreams
 - g. TripAdvisor
 - h. Booking.com
4. Think about what transformations would have to occur to load customer data into the data warehouse for creating strategic information?
 - a. Need to create a single version of truth about customers. For that, all customer data need to be extracted from source systems, transformed and integrated and loaded into the data warehouse.
 - b. Some transformations on customer data may include:
 - i. Assign a unique ID to each customer
 - ii. Match customer records from different databases
 - iii. Handle missing values for customers
 - iv. Remove duplicate customer data
 - c. This process will lead to a customer master data that could be shared across departments to track customers, reward certain behaviours and personalize relationships
 - d. This process will also create timely customer data.
 - i. download all data from bookings.com on a daily basis
 - ii. update the data on a daily basis
5. Think about ways in which strategic customer information can support the business operations?
 - a. How should information be delivered and to whom?
 - i. Dashboards personalised for each department managers and other various users
 - ii. Visualise room occupancy and price for Rooms and Functions department managers
 - iii. Visualise the key metrics from the three departments and services to general manager. Include metrics like revenue, costs and profits.
 - b. Model pricing of the rooms based on public events and time of the year, give alerts using the dashboard
 - c. Develop a customer loyalty program to personalize relationship with customers
 - i. Segment customers based on customer demographic information and provide them services based on their data
 - ii. Reward certain behaviours based on data (e.g. free meal for a week's long stay.
 - iii. How the organisation is proactively identifying and managing customers.
 - d. Targeted advertising and pricing for function types that have a high revenue per guest.
 - e. The restaurant can determine how price and profit is related to a service (an order) and how that order is composed.
 - i. Calculate 'average' spend for a food service
 - ii. Associate revenues with food costs
 - iii. Identify most profitable mixes of food (entrée, main, desert) and drink?