Inconsistencies assumptions and design decisions tourism essay

Sport & Tourism

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The following page displays a sun model and star schema based on a conceptual travel business called " Gourmand Travel" and its documented analytical requirements. Table of Contents

Introduction

The sections below outline the process taken in order to generate a sun model and star schema based on a conceptual travel business called " Gourmand Travel" and its documented analytical requirements. Three approaches to model the business are presented, the differences between the three stem from varying assumptions taken with regards to the available data and the analytical requirements. These three approaches are used to illustrate just how diverse the models obtained can be depending on the assumptions taken.

Inconsistencies, Assumptions and Design Decisions

Below one can find a list of modelling design decisions that were required to be made. In some cases the design decision revolves around an inconsistency within the business process and thus a sample question to the client is presented as well as the assumed answer. In other cases the design decision as well as the chosen approach is presented merely to document the thought process that went into the modelling. Some other assumptions with regards to the data are also taken (that do not influence any design decisions) in order to guarantee an assumed understanding of the entire business process. Design Query: Should the client's address be broken down

into its hierarchical form? Question to Client: You mentioned that you keep track of a client's address, would you like this to be broken down into city, town and postcode if possible, so that analysis can be done using these individual components? Assumed Answer: No I would not require this, however it would still be nice to have the address available when we look up a customer, for mailing purposes for example. Design Decision: The address will be merely present as an attribute of the client, rather than be broken down into its constituent attributes. Design Query: Can a tour be an attribute of a client? Question to Client: What is the process when the same client books another tour? Assumed Answer: The same client details previously stored are used and the new tour recorded. Design Decision: A client can be associated with multiple tours and so a tour can't be an attribute of a client. Design Query: Should the individual components of a tour be included in the model. Question to Client: You mentioned that the cost and selling price of the individual tour components such as hotel bookings, rail tickets etc. are recorded. Would you like to perform any analysis based on the individual component costs? Assumed Answer: No, this is not necessary. Note: In section 5 the answer to this question will be assumed to be yes however in sections 3 and 4 it is assumed that the tour's components can be ignored. Design Query: Can staff member be an attribute of tour? Question to Client: Just to confirm, is one single staff member responsible for the whole tour or can multiple staff members work on the same tour? Assumed Answer: Only one staff member works on a particular tour. Design Decision: Staff can be treated as an attribute of a tour; if multiple staff could work on the same tour then staff would have to be modelled as a separate dimension. Also one

should note that by taking this decision there is a historic record of which office the staff member was working at when the tour was organised (caters for cases when a staff member changes office). Design Query: Can a tour be an attribute of staff. Design Decision: Ms Penguinsson makes it clear in her description that a staff member can organise multiple tours, as a result a unique tour cannot be an attribute of staff. Question to Client: Besides analysing the number of bookings done during particular parts of the year, would you also like to analyse by the actual date when the tour was scheduled to take place. Assumed Answer: No I can see no benefit in this. Design Decision: Only one date is required, that representing the date that the booking took place. Design Query: Are all restaurants dependent on a hotel? Question to Client: Can a client supply a dining experience rating for a restaurant other than one found in the hotel that is part of the tour? Assumed Answer: No, the client can only give us a dining experience rating on the hotels' restaurant/s. Design Decision: The hotels and restaurants form a hierarchy in the model whereby a restaurant is directly related on a particular hotel. Design Query: Can a hotel be an attribute of a tour? Question to Client: Just to confirm, a tour can be comprised of stays at multiple hotels, each with a restaurant that should be reviewed? Assumed Answer: Yes this is correct. Design Decision: Hotel can't be an attribute of tour, but rather needs to be modelled as a dimension on its own. Had a tour consisted of a stay at only one hotel then it could have been modelled as an attribute of tour. Design Query: Can date of booking be an attribute of a tour? Question to Client: If there are two almost identical tours, however booked on separate dates, are they still considered to be separate tours?

Assumed Answer: Yes they are considered to be completely unique tours. Design Decision: The date of booking can be modelled as an attribute of a tour and not as a separate dimension. Also, since the date of booking is the only date that the client finds important, we will not be saving any space by placing it in a separate shared dimension. Design Query: Can " Tour Type" (Gourmet, Modern etc.) and " Travel Category" (Plane, Train, Bus etc.) be modelled as dimensions on their own. Design Decision: Each tour can only be associated with one type of tour and one travel category, and so they should be modelled as attributes of the tour itself. Design Query: Can " Party Size" (1 person, 2 people etc.) be modelled as dimensions on its own. Design Decision: Each tour can only be associated with one party (i. e. it can't contain several independent parties) and so should be modelled as an attribute of the tour itself. Design Query: How are staff members with the same name going to be uniquely identified within an office? Question to Client: Do all staff have an ID that can be used to uniquely identify them? Assumed Answer: Yes. Design Decision: The staff id will be used to uniquely identify to staff members with the same name in the same office. Design Query: Can the cost associated with staff time directly be obtained from the staff cost value? Question to Client: Are all staff organising tours paid at the same fixed rate? Assumed Answer: Yes. Design Decision: The staff cost associated with a tour's organisation can be obtained from the staff time value. Assumption: The tour party size will not be aggregated in anyway, and will only be used to dissect other measure values; as a result the party size can be stored as an attribute of a tour rather than as a measure. Assumption: The client who is booking the tour is also going to be part of the

actual tour. In other words, if the details of a client are recorded then he/she is definitely going to be one of the members of the tour. As was stated in the introduction, three business processes will be modelled in the sections below. The second and third business processes are almost identical and so the third can be ignored for now, the difference between these two will be explained in greater detail in section 5. The following assumptions are used in order to form a divide between the business process modelled in section 3 (approach 1) and that modelled in section 4 (approach 2). On one hand, in the first approach the tour is treated as a whole indivisible unit sold to a single client without any regard to the fact that a tour can be comprised of multiple party members. On the other hand, in the second approach the details of every party member are known as well as how much each party member is paying for the whole tour. Below " Assumed Answer 1" refers to the answer that describes the first business process (approach1), whereas " Assumed Answer 2" refers to the answer that describes the second business process (approach 2). Design Query: How is the profit per person going to be computed? Question to Client: How would you like the profit per party member to be calculated? Assumed Answer 1: The tour is sold as a whole unit, and not subdivided between party members, so if you divide the total profit by the number of people that should be good enough. Design Decision 1: The profit per person if required can be obtained by dividing the net profit by the party size. Assumed Answer 2: From the appropriate tour cost and selling price for each party member. Design Decision 2: The profit per party member is calculated from the tour cost and selling price per party member. Design Query: Can a client be an attribute of a tour? Question to Client: For a

given tour do you record the details of just one client or of all the people in the party? Assumed Answer 1: Only the details of the one client are recorded. Design Decision 1: A client should be an attribute of a unique tour. Assumed Answer 2: Since we record the selling price and cost price for each person, we also record their details. Design Decision 2: A client cannot be an attribute of tour. Design Query: What will the level of granularity for the dining experience ratings be? Question to Client: Are reviews recorded for every person in the tour, or just for the main client who the tour was organised with? Assumed Answer 1: Only the main client provides a review for every hotel's restaurant/s visited in the tour. Design Decision 1: The level of granularity for hotel restaurant ratings is one rating for each hotel's restaurant/s in a tour. Assumed Answer 2: Anyone in the tour is encouraged to give a rating for all the restaurants. Design Decision 2: The level of granularity for hotel restaurant ratings is one rating for each hotel's restaurant/s in a tour for every person in the party.

Business Process Approach 1

As a point of reference listed below are the design decisions that differentiate this business process from that modelled in the second approach: The profit per person, if required, can be obtained by dividing the total profit by the party size. A client should be an attribute of tour. The level of granularity for hotel restaurant ratings is one rating for each hotel's restaurant/s in a tour.

Sun Models Approach 1

In this approach 2 separate sun models are required to model the business analytical requirements.

General Tour Sun Model 1

Tour Total Selling PriceTour Total Cost PriceTour Total ProfitStaff TimeBookingDayCalendarWeekBusinessWeekAddressDOBUnique TourBusinessYearBusinessQuarterBusinessMonthClientGenderStaffNameCalendarMonthTourTypeCalendarYearMaritalStatusTourParty SizeTravelClassificationStaffNumberOfficeTourThe above sun model has a granularity of one row for each unique tour. The client, the staff member and the date of booking can all be represented as attributes of the tour dimension based on the assumptions taken in section 2. In the above, the tour is sold as a package, and the details of the individual party members are not stored, nor is it recorded as to how much each part party member pays for his/her part of the tour, or how much that part costs. The measures in the above sun model are as follows:" Tour Total Selling Price": this is the total selling price for the unique tour. Dividing this value by the party size gives the average selling price per party member." Tour Total Cost Price": this is the total cost price for the unique tour, which also includes the staff costs in organising the tour (as was specified in the business description). These costs are obtained from the " Staff Time" measure value multiplied by the appropriate fixed wage value for the staff (assumed in section 2). Dividing the " Tour Total Cost Price" measure value by the party size gives the average tour cost price per party member." Tour Total Profit": this is the total profit made for the unique tour. This value can be obtained by

subtracting the measure value " Tour Total Cost Price" from " Tour Total Selling Price". Dividing this value by the party size gives the average profit per party member. In the business description it was made clear that the cost price recorded should include the staff costs involved, and so as a result the profit will also take this in to account which is clear from the description of the " Tour Total Cost Price" measure." Staff Time": This represents the amount of time that a member of staff has dedicated to the organisation of this specific tour; it can be stored as a value in minutes, hours or days etc. The fixed wage value used in the computation of the staff costs needs to be selected accordingly depending on how this measure is stored. In the above model there is only one dimension " Tour" modelled, this is possible due to the design decisions taken in section 2. The attributes of this dimension are plentiful and can be grouped into 4 categories: The client attributes made up of: Client: e. g. " John Smith", " Mary Brown" Address: e. g. " University of Dundee, Nethergate, Dundee, DD1 4HN, Scotland, UK". DOB: e. g. 05/09/1989 etc. From this value the age of the client can be calculated. Marital Status: e. g. Single, Married, Divorced etc. Gender: e. g. Male, Female etc. The Tour attributes made up of: Tour Type: e. g. gourmet, modern etc. Travel Classification: e. g. plane tour, boat tour etc. Party Size: e. g. 4 members, 3 members etc. The Date attributes made up of:" Booking Day": e. g. 12/03/2012" Calendar Week": Aggregated directly from " Booking day", e. g.: Week 1" Calendar Month": Aggregated directly from " Booking day", e. g.: September 2012" Calendar Year": Aggregated directly from " Calendar Month", e. g.: Year 2012" Business Year" (e. g. Year 2012) aggregated from " Business Quarter" (e. g. Q1, Q2) aggregated from " Business Month" (e. g.

Month 1 2012) aggregated from " Business Week" (e. g. week 50) aggregated from " Booking Day". The Staff attributes made up of: Staff Number: e. g. 123, 232 etc. Office: e. g. " Swindon Office", " Neasdon Office" etc. aggregated from the staff numbers. Staff Member: e. g. " John Brown" The CEO of the travel agency also requires the ability to analyse the ratings given to the hotels' restaurant/s included in a tour. Due to the fact that a tour can contain multiple restaurants, adding the " Hotel Restaurant" dimension to the above sun model would lower the level of granularity and thus all the measures would need to be broken down based on the number of hotel restaurants visited. There is no logical way in which these measures can be broken down. For example, if in a tour there are 3 hotel restaurants which need to be reviewed then the cost price of the tour would need to be split up into 3. There is no way that this can be done realistically, since the cost of the hotel is not the only cost involved, there are other elements like excursions, train costs etc. that all add up to the total cost. Thus the restaurants' reviews need to be modelled in a second sun model " Dining Experience Sun Model 1".

Dining Experience Sun Model 1

As was already described above this second sun model is required since adding the " Hotel Restaurant" dimension to the initial sun model would reduce the granularity of the data such that dividing the measure values logically would be impossible. Note that in this model (shown below) the " Tour" dimension was also added (identical to that in the first model), allowing analysis based on the particular client which supplied the rating (modelled as attributes of the tour), and any other attribute of the tour itself.

RestaurantTourHotel RestaurantDining Experience RatingHotelNote that In order to avoid overcomplicating the model, the attributes of the " Tour" dimension where left out in this model, as they are identical to those found in " General Tour Sun Model 1". In the above model one row corresponds to the dining experience rating given by the main client to a restaurant for a particular hotel in the tour. Thus if a tour has 3 hotels each with one restaurant, there will be 3 rows with a dining experience for each hotel's restaurant. The measures in the above sun model are as follows:" Dining Experience Rating": The rating in which ever format is required by the agency such as 4 (out of a possible 5 stars). The dimensions in the above sun model are as follows: The " Tour" dimension in this sun model is identical to that used in the sun model " General Tour Sun Model 1". A second dimension was added entitled " Hotel Restaurant" which has the attributes " Restaurant", which contains the name of the restaurant in question as well as " Hotel" which has the name of the hotel to which the particular restaurant belongs. Thus there exists a hierarchy between the restaurant and the hotel. The restaurant is directly dependent on the hotel in question. In order to associate an element of time with the review, if required a time stamp can be added to the measures of the above model recording the date when the review was made. In the event that analysis based on reviews by date is required then a separate " Date" dimension would be required. Since the client only expressed the desire to carry out analysis by client this was not added to the above model.

Star Schemas Approach 1

One star schema will be built for each of the 2 sun models depicted above.

General Tour Star Schema 1

TourDimensionTableTourKeyDateCalendarWeekCalendarMonthCalendarYear BusinessWeekBusinessMonthBusinessQuarterBusinessYearTourNameTourTy peTravelClassificationTourPartySizeStaffNumberStaffNameOfficeNameMarital StatusDOBPersonAddressGenderGeneralTourFactTableTourKeyTourTotalSelli ngPriceTourTotalCostPriceTourTotalProfitStaffTimeThe star schema above is comprised of one dimension table " TourDimensionTable" corresponding to the " Tour" dimension in the " General Tour Sun Model 1" and one fact table " GeneralTourFactTable". The only primary key in the fact table is " TourKey"; this is because each row corresponds to a single unique tour, identifiable by a single unique key. This primary key is a foreign key to the corresponding entry in the " TourDimensionTable" containing all the necessary information with regards to the tour in question.

Dining Experience Star Schema 1

TourDimensionTableTourKeyDate

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HotelRestaurantDimensionTableDiningExperienceFactTableHotelRestaurantK eyHotelRestaurantTourKeyHotelRestaurantKeyDiningExperienceRatingNote that the " TourDimensionTable" above is identical to that in the " General Tour Star Schema 1" the remaining columns where left of for simplicity's sake. Another dimension table " HotelRestaurantDimensionTable" corresponding to the " Hotel Restaurant" dimension in the " Dining

Experience Sun Model 1" was also added. The primary key in the fact table " DiningExperienceFactTable" is comprised of two columns " TourKey" and " HotelRestaurantKey" this is because each row represents a review for a specific restaurant in a hotel stayed in while on a unique tour. Thus there cannot be two entries for the same restaurant for the same tour. However there can be two entries for the same tour for two restaurants within the same hotel for example." TourKey" and " HotelRestaurantKey" are foreign keys to the " TourDimensionTable" and " HotelRestaurantDimensionTable" respectively.

Business Process Approach 2

As a point of reference listed below are the design decisions that differentiate this business process from that modelled in the first approach: The profit per party member is calculated from the tour cost and selling price per party member. A client cannot be an attribute of tour. The level of granularity for hotel restaurant ratings is one rating for each hotel's restaurant/s in a tour for every person in the party. In essence the largest difference between the business process depicted below and the first business process, is that in this process every party member is considered to be a client, whose details are stored, may have a different tour cost and selling price and is required to provide a restaurant rating.

Sun Models Approach 2

In this approach 2 separate sun models are also required to model the business analytical requirements.

General Tour Sun Model 2

MaritalStatusGenderDOBClientAddressTour Selling PriceTour Cost PriceTour ProfitStaff TimeClientUnique TourBusinessMonthBusinessQuarterBusinessWeekCalendarWeekBookingDay TravelClassificationBusinessYearStaffNameCalendarMonthTourParty SizeStaffNumberCalendarYearTourTypeOfficeTourThe above sun model has a granularity of one row for each party member attending a unique tour. Thus the total profits, cost and selling price of the tour, are computed by aggregating the measure values of the individual party members. The staff member and the date of booking can both be represented as attributes of the tour dimension based on the assumptions taken in section 2, however the clients' attributes cannot be modelled as attributes of the tour, due to the fact that in this business process the details for all members of a unique tour are recorded and mapped to the tour in question. Also the amount that the party member's portion of the tour cost and was sold for is recorded. In this manner the profit per person can be accurately computed from the values of " Tour Selling Price" and " Tour Cost Price". With regards to the staff time, there are two approaches with regards to how it can be stored: The total staff time that a member of staff dedicated to a tour can be divided by the party size, and each party member is assigned that value. The main client (the one that organised the tour with the staff member) is assigned all the staff time and the rest of the clients are assigned a staff time of 0. Both approaches are logically sound and valid, as when the values are aggregated together the correct total time that the staff member would have dedicated to the tour can be obtained. By adopting the second approach of assigning

all the staff time to the main client, the main client that was responsible for setting up the tour can be identified by checking if he/she has a non-zero value associated with the staff time measure. If the approach where the staff time is divided by the party size is taken, then the main client can be identified by adding a Boolean value to the measures indicating whether the client row represents the main client or not. In summary the measures in the above sun model are as follows:" Tour Selling Price": this is the selling price for the unique tour for a particular party member (Client). Summing the tour selling price values for all party members will give the value for " Total Tour Selling Price"." Tour Cost Price": this is the cost price for the unique tour for a particular party member (Client). Summing the tour cost price values for all party members will give the value for " Total Tour Cost Price". Note that the " Total Tour Cost Price" is required to include the total staff costs associated with setting up the tour. This can be done by firstly computing the total staff cost from the " Total Staff Time" value for the tour and the fixed wage value (assumed in section 2). Once the total staff cost is obtained it can then be dealt with in the same manner that " Staff Time" is handled: Either divided by the party size and added to the tour costs of each member accordingly. Or added to the main party member's costs. This party member can be identified by checking the value of the Boolean flag (if present) or checking if a non-zero value is found in the " Staff Time" measure." Tour Profit": this is the profit made for the unique tour for the particular party member. This value can be obtained from deducting " Tour Cost Price" measure from the " Tour Selling Price" measure. Summing the tour profit values for all party members will give the value for " Total Tour Profit"." Staff Time": This

represents the amount of time that a member of staff has dedicated to the organisation of this specific tour for a particular party member, it can be stored as a value in minutes, hours or days etc.. This value can either be obtained by dividing the total staff time dedicated to a particular tour by the party size, or by assigning the total time to the main client in the party and setting the remainder of the staff time values to 0. In the above model there are two dimensions modelled: " Tour" and " Client". When compared to the model in section 3. 1. 1 the only difference is that the client related attributes have now been extracted from the " Tour" dimension and moved into the " Client" dimension; apart from this no changes were made to the actual meaning of the attributes themselves. In this business process similar to the first business process, the analysis of hotel restaurant reviews cannot be modelled in the same sun model, due to the same granularity issues that were present in the first approach. As a result a separate sun model " Dining Experience Sun Model 2" is required.

Dining Experience Sun Model 2

In the model below the " Client" dimension is present to enable analysis based on a particular client; however the " Tour" dimension was also added to allow analysis by any of the other attributes of the tour. ClientDining Experience RatingGeneral Tour Star SchemaGeneral Tour Star SchemaRestaurantHotelTourHotel RestaurantNote that In order to avoid overcomplicating the model, the attributes of the " Tour" and " Client" dimensions where left, as they are identical to those found in " General Tour Sun Model 2". In the above model one row is present for each hotels' restaurants' dining experience rating, assigned by a party member (client)

for a tour. Thus if a tour with a party size of 3 has 3 hotels, each with a restaurant; there will be 9 rows with a dining experience for the restaurants; 3 ratings for each of the 3 party members. The average dining experience for a particular restaurant can be obtained totalling the results and dividing the rating by the number of ratings for that restaurant, thus with this model not every party member is required to provide a rating. The measures in the above sun model are as follows:" Dining Experience Rating": The rating in which ever format is required by the agency such as 4 (out of a possible 5 stars), given by a party member, for a restaurant in the tour. The dimensions in the above sun model are as follows: The " Tour" and " Client" dimensions in this sun model are identical to those used in the sun model " General Tour Sun Model 2". A third dimension was added entitled " Hotel Restaurant" which is identical to the dimension found in the model in section 3. 1. 2 " Dining Experience Sun Model 1".

Star Schemas Approach 2

One star schema will be provided for each of the 2 sun models depicted in section 4. 1 above.

General Tour Star Schema 2

TourDimensionTableTourKeyDateCalenderWeekCalenderMonthCalenderYear BusinessWeekBusinessMonthBusinessQuarterBusinessYearTourNameTourTy peTravelClassificationTourPartySizeStaffNumberStaffNameOfficeNameClient DimensionTableClientTourFactTableClientKeyMaritalStatusDOBPersonAddres sGenderTourKeyClientKeyTourSellingPriceTourCostPriceTourProfitStaffTimeT he star schema above is comprised of two dimension tables: "

TourDimensionTable" corresponding to the " Tour" dimension and " ClientDimensionTable" corresponding to the " Client" dimension in the sun model " General Tour Sun Model 2". There is also a fact table " ClientTourFactTable" which has 2 columns making up the primary key " TourKey" and " ClientKey". This is because each row corresponds to the tour measures specific to a particular party member of a unique tour. The primary key columns " TourKey" and " ClientKey" are foreign keys to appropriate entries of the " TourDimensionTable" and " ClientDimensionTable" respectively. ClientDimensionTableDining Experience Star Schema 2TourKeyDateCalenderWeekCalenderMonthCalenderYearBusinessWeekBusinessMonthBusinessQuarterBusinessYearTourNameTourTypeTravelClassificationTourPartySizeStaffMemberOfficeNameTourDimensionTableClientKeyMaritalStatusDOBPersonAddressGenderDiningExperienceFactTableTourKeyClientKeyHotelRestaurantKeyDiningExperienceRatingHotelRestaurantDimensionTableHotelRestaurantKeyHotelRestaurantBesides the " TourDimensionTable" and " ClientDimensionTable" tables, another dimension table " HotelRestaurantDimensionTable" corresponding to the " Hotel Restaurant" dimension in the " Dining Experience Sun Model 2" was also added. The primary key in the fact table " DiningExperienceFactTable" is comprised of three columns " TourKey", " ClientKey" and " HotelRestaurantKey" this is because each row represents a rating by a particular party member (client) for a specific restaurant in a hotel stayed in while on a unique tour. Thus there cannot be two entries (ratings) for the same restaurant for the same tour made by the same client. However there can be two entries by the same client for the same tour for two restaurants within the same hotel for

example." TourKey" and " ClientKey" are foreign keys to the " TourDimensionTable" and " ClientDimensionTable" respectively. " HotelRestaurantKey" is a foreign key to the corresponding entry in the " HotelRestaurantDimensionTable".

Business Process Approach 3

In the first 2 approaches it was assumed that no analysis based on the tour components would be required, in this approach this is not the case, and it is assumed that analysis based on the individual tour components is required. The remainder of the assumptions taken in this approach are identical to those taken in the second approach. In this approach 2 sun models are still required as is the case in approach 2. The second sun model " Dining Experience Sun Model" generated in this approach is identical to that in section 4. 1. 2 " Dining Experience Sun Model 2" and so as a consequence so is the corresponding star schema. However the " General Tour Sun Model" in this approach is at an even lower level of granularity, as can be seen in the sun model below. In order to be able to model the business process as shown below another design query needs to be tackled: Design Query: Can the individual tour components be further subdivided by party member. Question to Client: Are the cost and selling prices of every component recorded for each individual tour member? Assumed Answer: Yes we store the cost and selling price associated with each person for every individual tour component. Design Decision: The level of granularity for the " General Tour Sun Model" has been reduced to the measure values for every component for each individual party member of a unique tour.

General Tour Sun Model 3

Component Selling PriceComponent Cost PriceComponent ProfitStaff TimeClientTour ComponentComponent DescriptionTourNote that In order to avoid overcomplicating the model, the attributes of the " Tour" and " Client" dimensions where left out, as they are identical to those found in " General Tour Sun Model 2". In the above sun model the granularity is equivalent to one row for every component that makes up a tour for every party member (client) in that tour. The Cost, Selling price and the profit can be aggregated together and result in the total values for that client for that tour, these totals can be further aggregated to provide the totals for the entire tour (including all clients). In the previous approaches, the total cost included the staff costs involved with organising the tour. Thus in order for the values above to aggregate to the correct total values, there needs to be a " Tour Component" member related to staff costs. The measure value for " Component Cost Price" related to this component need to be populated accordingly. First the total staff cost needs to be calculated from the total staff time multiplied by the fixed wage value (assumed in section 2). This total staff cost can then be: Divided by the party size and stored in the " Component Cost Price" measure value for the staff cost component for every client, in the unique tour. Assigned as a whole value to the main client's " Component Cost Price" measure value for the staff cost component, in the unique tour. All the measure values for " Component Selling Price" related to this component (regardless of the client) will be zero, since staff time cannot be sold to the client, and as a result the measure value for " Component Selling Profit" will be the negative equivalent of the " Component Cost Price"

value. Thus when the profit and cost measures are aggregated together for each component, and in turn for each client, the correct totals are obtained (profit value takes into account the staff costs). The " Staff Time" measure is dealt with similarly to how the staff costs are handled. It is clear that only in the rows that relate to a " Tour Component" equivalent to staff costs should contain a " Staff Time" value other than 0. The " Staff Time" measure can then be stored in one of two ways: The total time dedicated to the tour is divided by the party size, and each entry dealing with the " Staff Cost" component gets assigned this value for every client. If this approach is taken, if all the values for one party member (client) are aggregated together every client would have the same staff time value. The total staff time can be assigned to the main client for the staff cost component and every other value set to 0. If this approach is taken, when all the values for one party member (client) are aggregated together one client would have the total staff time value whereas the rest would have 0 as the staff time. In either of the two approaches, aggregating the staff time together for all components and for all clients will result in the total staff time for the organisation of that specific tour. The measures in the above sun model are as follows:" Component Selling Price": this is the selling price of the specific tour's component, for the particular party member (client)." Component Cost Price": this is the cost price of the specific tour's component, for the particular party member (client)." Component Profit": This is the profit related to the particular tour's component for the specific party member (client) obtained by computing the difference between the measures " Component Selling Price" and " Component Cost Price"." Staff Time": This

represents the amount of time that a member of staff has dedicated to the organisation of this specific tour, it can be stored as a value in minutes, hours or days etc. A non-zero value is only found when the specific tour component deals with the staff cost associated with the tour. The dimensions in the above sun model are as follows: The " Tour" and " Client" dimensions in this sun model are identical to those used in the sun model " General Tour Sun Model 2". A third dimension was added entitled " Tour Component" which has one attribute: " Component description", examples of the members of this attribute are: Train Costs. Plane Costs. Staff CostsFood CostsNote that the members of the " Component Description" are not overly specific, for example the member " Flight from London to New York" should not be a member of the attribute. On the contrary all the flights should be grouped together in one component as otherwise the dimension will become overwhelming and difficult to manage. The travel agency should agree on a fixed number of components, and populate only those values. Note that in this third approach the business process was almost identical to that modelled in the second approach (except for the tour component assumption), however it could have also been based on the first approach and 2 sun models could have still been obtained. The difference in the general tour sun model would be that the level of granularity would be: one row for a particular tour component for a unique tour (which is essentially one aggregation level higher than that presented in this approach).

General Tour Star Schema 3

TourDimensionTableThe above sun model can be represented as a star schema as follows:

TourKeyClientKeyTourComponentKeyComponentSellingPriceComponentCost
PriceComponentProfitStaffTimeTourComponentFactTableClientDimensionTab
leTourKeyDateCalendarWeekCalendarMonthCalendarYearBusinessWeekBusi
nessMonthBusinessQuarterBusinessYearTourNameTourTypeTravelClassificati
onTourPartySizeStaffMemberOfficeNameClientKeyMaritalStatusDOBPersonAd
dressGenderTourComponentDimensionTableTourComponentKeyComponent
DescriptionBesides the dimension tables " TourDimensionTable" and "
ClientDimensionTable" which are identical to those in the star schema in the
section 4. 2. 1, another dimension table " TourComponentDimensionTable"
corresponding to the " Tour Component" dimension in the " General Tour Sun
Model 3" was also added. The primary key in the fact table "
TourComponentFactTable" is now comprised of three columns " TourKey", "
ClientKey" and " TourComponentKey" this is because each row represents
the measures for a unique component making up a particular tour for a
particular client. Note that this implies that there cannot be two entries in
the fact table for the same " TourKey" and " ClientKey" with the same "
TourComponentKey"." TourKey" and " ClientKey" are foreign keys to the "
TourDImensionTable" and " ClientDimensionTable" respectively. "
TourComponentKey" is a foreign key to the corresponding entry in the "
TourComponentDimensionTable".

Conclusion

The above sections presented three approaches to modelling the travel
business's analytical requirements; there is no right or wrong version, as
they all depend on assumptions taken with regards inconsistencies within
the disclosed in the business description. However if the travel agency where

my actual client and I was required to take the assumptions as was done above then I would follow the third approach as this stores all possible data (if available) allowing analysis at the lowest possible levels. After having completed this exercise, I can now truly understand just how powerful sun modelling is at diagrammatically portraying a business's analytical requirements in a way that maximum information is delivered with regards to the dependencies between the business attributes.