IBM Cúram Social Program Management

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# Cúram Business Intelligence and Analytics Guide

*Version 6.0.5*

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# Chapter 1. Introduction

## 1.1 Purpose

The purpose of this guide is to provide a business level overview of Cúram Business Intelligence and Analytics™. After reading this guide, the reader should have a high level knowledge of the business logic behind Cúram Business Intelligence and Analytics. In order to best understand these concepts, the guide should be read in full.

## 1.2 Audience

This guide is intended for any reader wishing to understand the business concepts of reporting within the application.

## 1.3 Chapters in this Guide

The following list describes the chapters within this guide:

**Overview of Cúram Business Intelligence and Analytics**
> This chapter gives a general overview of Cúram Business Intelligence and Analytics and a description of the business need that it serves.

**Business Intelligence Infrastructure**
> This chapter provides further insight into the elements of Cúram Business Intelligence and Analytics infrastructure.

**Using the Business Intelligence Infrastructure**
> This chapter looks at how the Business Intelligence infrastructure can be used to build a business specific data warehouse and therefore provide views onto this data via dashboards, embedded analytics or reports.

# Chapter 2. Overview of Cúram Business Intelligence and Analytics

## 2.1 Introduction

SEM agencies rely on business intelligence mechanisms to measure and monitor how agencies are performing, to detect gaps in their processes, and to analyze the issues that are occurring and why. These agencies require a business intelligence solution that will provide them with the tools to support better decision making. Cúram Business Intelligence and Analytics provides a solutions that covers the complete spectrum of reporting tools and technology that enables organizations to make valuable business decisions. This includes decision support information for front line staff (case workers), line managers and senior managers in the organization

## 2.2 Elements of Business Intelligence

### 2.2.1 Data Warehousing

A data warehouse is generalization and consolidation of transactional data, typically used to support decision making and data mining. Business specific data warehouses are available from the application, for example the Income Support data warehouse. Chapter 3 describes the infrastructure provided in support of data warehouses.

### 2.2.2 Embedded Analytics

Embedded Analytics are representations of aggregated data that can be interacted with by the user to construct alternative views/sub-groupings of the data which were not envisaged at design time. The infrastructure to construct embedded analytics is provided with Cúram Business Intelligence and Analytics and a number have been added out of the box to the application. The purpose of this is to assist front line staff and managers in decision making by integrating the online application and the data warehouse which therefore provides interactive, summarized information in context.

### 2.2.3 Ad-hoc Reporting

The Business Intelligence infrastructure uses 'Business Intelligence and Reporting Tools(BIRT)' to render the charts as it is an open sourced and low cost option for agencies that do not want an elaborate business intelligence offering. The application also supports more advanced offerings in the market such as, Actuate, which allows charts to be rendered in a format suitable for ad-hoc reporting. This provides easy access to the underlying reporting data, allowing a user to tailor the report to their specific needs.

### 2.2.4 Interactive Dashboards and Reports

This is the business specific view onto the data warehouse, for example for Income Support or Child Services. Interactive dashboards include the ability to publish graphically intuitive displays of information, including dials, gauges and traffic lights. These displays indicate the state of the performance metric, compared with a goal or target value. This data is a more in-depth view into the aggregated data in the business specific data warehouse.

Reports provide the ability to create formatted and interactive reports with highly scalable distribution and scheduling capabilities. The application provides infrastructure in support of these and business specific reports will be added to the application over time.

# Chapter 3. Business Intelligence Infrastructure

## 3.1 Introduction

This chapter gives a business overview of the infrastructure provided for building a data warehouse. The method in which this data can be made available to business user was described in the previous chapter: embedded analytics in the online application, business specific dashboards and reports. Commercial software such as Cognos could also be used to provide a view into the data warehouse.

## 3.2 Define Business Requirements

Any business intelligence solution must provide SEM agencies with the ability to define the scope of their reports. The starting point for defining this scope is identifying and prioritizing the agencies' specific business requirements. The following are common business requirements that must be scoped for reporting:

- Defining the business logic or processing required for the information that needs to be included in reports.
- Locating where that information currently 'lives'.
- Identifying the data elements to be included as part of a reporting data model.
- Logically grouping these data elements to make it easier to identify the business reason for the inclusion of data.

## 3.3 How It Works

Data warehousing is the process of collecting data which is gathered and organized in such a way so that it can easily be analyzed, extracted, reported on, and otherwise used for the purposes of further understanding the data.

The data warehousing process consists of the extraction of data from one or many source databases. The data is then transformed or cleaned up to remove all anomalies and brought into a central repository, the data warehouse. The data is taken from the data warehouse into datamarts which are specialized versions of the data warehouse and which have been designed to suit the needs of the customer/target audience. The data can then be viewed in the form of graphs or charts, etc.

Business intelligence refers to the set of software tools that enable an organization to analyze and report on the measurable aspects of their business. The data warehouse can be thought of as the back office while business intelligence can be considered as the entire business including the back office.

Application provides the infrastructure to build data warehouses and provides business specific datamarts in solutions areas such as Income Support and Child Services as well as embedded analytics in the out of the box application. Application integrates with BIRT as the out of the box viewer and also supports more advanced viewers such as Actuate. Alternatively, customers can instead use Cognos software as the reporting tool/viewer. The Cúram Business Intelligence and Analytics solution encompasses the data warehousing and BI techniques described above which provide a number of options to organizations for accessing and viewing the data to support effective management of their business.

## 3.4 Business Intelligence Components

There are three main components of the business intelligence infrastructure. They are the reporting schema, the set of extractions processes, and the embedded analytics, all of which come OOTB with the application. Business Intelligence dashboards are provided focusing on specific business areas such as Income Support and Child Services.

### 3.4.1 Reporting Schema

The Cúram Business Intelligence and Analytics infrastructure creates a domain knowledgeable Reporting schema which models the business processes of interest to business intelligence users. The Reporting schema for the application is comprised of Staging, Central, and Datamart schemas. The application database is considered the source database or the operational database from which data is extracted.

### 3.4.2 Extraction Processes

A set of extraction processes to populate the application centric warehouse and datamarts is provided in the business intelligence infrastructure. These Extract Transform and Load (ETL) process are needed to move the data from the application to the Staging database. From here, it is moved to the Central Data Warehouse (CDW), and finally is pushed out to the datamarts. Once the datamarts are populated the viewing mechanisms (dashboards, reports etc) can be used to access this data and provide it to business users in graphical or report format.

**Staging Area:** The Staging ETLs are run and they pull the information through from source through to staging.

**Central Data Warehouse:** Once staging is populated with data, the Central ETLs are run. These ETLs pull data into the Central Data Warehouse changing data where necessary and applying any business logic required.

**Datamarts:** This is the final stage of the reporting repository. Data is transformed into dimensional format, and de-normalized to ensure ease of query, and to ensure cube builders/report builders find the data easier to model.

**Viewer:** The user can then view this data in readable graph like formats (reports, dashboards, cubes) in a number of ways. The application integrates with BIRT which is used to show the embedded charts in the application. Actuate is also supported by the business intelligence infrastructure, which offers additional features over BIRT such as ad-hoc reporting. Or customers would instead use a reporting tool such as Cognos, which takes the data only from the Datamart.

#### 3.4.2.1 ETL Explained

ETL is short for Extract, Transform and Load: these three functions are combined to pull data from a source and place it in a destination database.

- **Extract:** the process of reading data from a source.
- **Transform:** the process of converting the extracted data from its previous form into the form it needs to be in so that it can be placed into another database. Transformation occurs by using business rules or lookup tables or by combining the data with other data.
- **Load:** the process of writing the data into the target database.

Cúram Business Intelligence and Analytics uses ETLs to move and transform data from the On-Line Transaction Processing (OLTP) data source to the Cúram Business Intelligence data sources. As explained previously, data is moved from application to the staging data storage, on to the Central Data Warehouse (CDW), and then is pushed out to the data marts where it is used for viewing\reporting purposes.

### 3.4.3 Embedded Analytics

These are charts integrated into the online application that offer front end business users a view into the aggregated data in the data warehouse, to support them in decisions they make as part of day to day business.

In the application, Income Support and Child Services business areas come with data warehouses and therefore these solutions offer online charts that integrate with the data warehouse in question.

BIRT charts have been added to some areas of the application to provide a graphical view of data to users.For example, the Employer homepage contains a BIRT chart showing the number of permanent and the number of casual workers. Also the BIRT chart contained within a Payment Correction case gives a visual indication of the balance; how much is written off, how much is paid and how much is outstanding

### 3.4.4 Dashboards and Cubes

Dashboards help measure business performance and quickly communicate complex information to business users in compelling visual formats, so they have a clear picture of how the business is doing. These are available in the application in each business specific area, e.g. Income Support and Child Services.

# Chapter 4. Using the Business Intelligence Infrastructure

## 4.1 Introduction

This chapter looks at how the Business Intelligence infrastructure can be used to build a business specific data warehouse and therefore provide views onto this data via dashboards, embedded analytics or reports.

## 4.2 Defining Business Requirements for Reports

The recommended first step is to define the reporting business requirements. SEM agencies can determine the necessary information that needs to be defined and can use their own formulas for success. For each report, there is an expected outcome, the input data required, and the current location of the data. One of the requirements can be to specify whether the data must be available from the online application, e.g. to caseworkers, and therefore whether embedded analytics is required.

## 4.3 Modeling Reporting Data from Business Requirements

The design process starts with a report or business requirement and works back creating or adding to data models. Once that is complete, the ETL (extract, transform, load) processes are designed. The ETL processes specify how the data is moved through the system from OLTP (online transaction processing) to end report.

A business requirement for reporting is formalized by drawing a logical user model. For example, a logical model depicting the cube representation of client ages could be drawn to illustrate the outcome of this reporting requirement. A user model captures the end user's model or view of the data required.

User models help to determine the structure of the data marts. Drawing the user model involves picking out the measures or facts from the reporting requirement and the dimensions that the measure is sliced by. The user model should also identify the level of granularity required. The granularity is very important, as it determines what and how much data is captured.

## 4.4 Generating an Initial Report

This section briefly describes the steps required to populate a report from the application. ETL is the process used to extract the data from the application database and bring it through to the datamart schema. For each schema, the data is extracted from the previous database, the data is transformed, i.e., inconsistencies are removed, etc., and the data is loaded in the new schema. Once the datamart is populated, the information can used in user friendly graphs and reports.

## 4.5 Change Data Capture

Data needs to be extracted periodically from the source system(s) and transformed to the data warehouse. This process is commonly referred to as refreshing the data warehouse. The most efficient refresh method is to extract and transform only the data that has changed since the last extraction.

The Change Data Capture technique in the Cúram Business Intelligence and Analytics infrastructure identifies and processes only the data that has changed in each of the tables in a database and makes the changed data available to the data warehouse. Cúram Business Intelligence and Analytics infrastructure has been designed with the intention that the refresh will take place on a nightly basis. However, the implementation is flexible and it is possible to run the refresh at a different frequency.

Change Data Capture include using a control table which stores a last written date for each table that is being populated. When an ETL runs, the last written field for that table is also updated. The next time the ETL runs, it first reads from this control table and then extracts the data that has been updated since the previous ETL run.

It is important to note that for change data capture to work, all the last written fields must be populated in the source tables that the Business Intelligence infrastructure extracts data from. As already stated, a row in the ETL Control table is updated before and after every ETL run for the table which is being updated. This works having the ETLs call a pre-mapping transformation to read the previous last written date and setting the extract time. After the ETL has run, a post-mapping transformation is called which updates the last written date to the current date.

After the ETL Control table has been initially populated with data, the last written date is reset to a start date to ensure that the ETLs extract all data updated after this date. It is possible to manually set the last written date for all tables in that database to the 1st of January, 1934.

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