AN IMPROVED APPROACH TOWARDS BUSINESS INTELLIGENCE DASHBOARDS THROUGH AUTOMATED REPORTING

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ABSTRACT

The field of Business Intelligence (BI), with the tools and techniques available, has become much more pre-emptive. User-friendly dashboards no longer have to be interactive as this function can now become automated in order to achieve the required output for a client specific design model. The added value for this process of working is saving time, as the calculation of dashboards are usually very tedious and often wasteful of resources.

The procedure of transforming raw system data, in order to gain insightful information for analysis purposes, has been found to be common in various ways. A number of important components are essential when approaching a data processing exercise; the dataset (from which the interchangeable dimensions are created), key information (which will enable the data to make sense), and information processing sheets (yielding Key Performance Indicator recordings for ranking purposes, and being the foundation for all visual representations in the model).

A generic template can now be constructed, usually attributed with a one-point variable that will alter the entire dashboards’ inputs in such a way it will alter and record periodically. Reports are then produced automatically with a specific filename and date-stamp for the appropriate viewership.
1 INTRODUCTION

Business Intelligence (BI) has become a necessity for major corporations to drive their competitive advantage in its respective industries. It starts off with a company’s raw system data; whether it may be transactional, financial or based on process activities there have been found that almost all datasets can be approached in a common way to gain insightful information, which transforms into specific knowledge as illustrated in the figure below:

![Figure 1: Data Transformation Procedure](image)

A vast number of basic Business Intelligence product offerings are available nowadays; organisations often invest a great deal of time and capital in obtaining as well as implementing such programmes. Although some software packages do have a lot of impressive features and capabilities, usually it requires specific resources and training in order for the end-user to navigate the program comfortably. Not to mention issues arising from problems with accessibility; as most functional BI tools are web-based, it attempts to translate huge centralised datasets into sensible information and knowledge, usually in the form of visual dashboards and tables.

The definition for a dashboard was obtained from an article by Stephen Few; Rich Data, Poor Data: Designing Dashboards to Inform [1]: “A dashboard is a visual display of the most important information needed to achieve one or more objectives; consolidated and arranged on a single screen so the information can be monitored at a glance.”

The understanding that specific information, required by an appropriate viewership, is universal by structure but varying in numeric entities has been widely acknowledged in practice. If data gets gathered on its most detailed level, and becomes inter-changeable by certain dimensional elements (as well as combined); it can serve as the underlay for a pre-structured Business Intelligence dashboard. This detailed data can also be consolidated by a dynamic assignment attribute such as date(s), region(s), manager(s) responsible, or any other user-specific input.

The aim of this paper is to demonstrate that it is possible to have fixed parameters, prescribed by the user’s required outputs, and subsequently generate the Business Intelligence dashboards pre-emptively and periodically for a set number of variables in the design model.

This innovation allows for automated reporting which will save an enormous amount of manual computing time as the activity can now be assigned to a dedicated workstation; remotely accessed from anywhere in the world with the proper internet connection. At the same time the resource person responsible for the development and maintenance of this procedure can now be applied to other areas of productivity.

2 DATA TRANSFORMATION PROCEDURE

This section of the paper breaks the Data Transformation Procedure down into sub-headings as per Figure 1 in order to identify what happens at each step of the procedure. The concept should not be confused with the working practice of Extract, Transform & Load (ETL); this refers to raw source data being collected, altered and uploaded onto another data warehouse. No added value is given to the data during such a process and, in some instances; the type of information (which is refreshed much more frequently) is usually isolated as new, adjusted or deleted line items [4].
The Data Transformation Procedure requests a fixed dataset which normally varies periodically (i.e. weekly/monthly) and, as it is plugged into the structured design model it gains value-adding insights through calculated information - presented clearly as well as visually by the Business Intelligence dashboard.

2.1 Data Mining & Cleansing

The first and most important component when starting off with a proposed design model is the data; most of the time the dataset that gets extracted is raw system records and not of very high quality. The data might be captured manually in some instances which will compromise the integrity of the dataset; extensive data cleansing/scrubbing protocols will have to be put in place to isolate invalid matches that do not accommodate the model.

Once the dataset is of such a standard that it will compute well with a toolkit (i.e. the developer’s preference choice of software); it can be used to create a user-defined design model or be imported into an existing structure. This is usually performed by a resource person that knows the business/industry well or the developer is assisted by such a person.

Another vital part that adds success to the design model is the key information required to enable the dataset to make sense; as it may consist out of an enormous amount of line items often referring to a singular process activity, resource or even financial unit. This metadata, which is defined as a set of data that describes and gives information about other data, gets cross-referenced with the dataset and thereby extracts the necessary end-user output.

2.1.1 Matrix Indexing

Quite often, a model has to deal with a vast number of key line items. The best way to recall information like this is to use matrix indexing. The requirement for this approach is an array/matrix as well as row and column identifiers illustrated in the diagram below:

```
KEY_Matrix

<table>
<thead>
<tr>
<th>KEY_RowID1</th>
<th>KEY_RowID2</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;&gt;&gt; KEY_Column_ID &gt;&gt;&gt;</td>
<td>&gt;&gt;&gt; KEY_Column_ID &gt;&gt;&gt;</td>
</tr>
</tbody>
</table>
```

Figure 2: Matrix Indexing Approach

The matrix indexing method is used to locate certain information in set reference sheets by matching the required output dimensions with multiple drivers; such as key row, column, sheet and workbook identifiers or locations. This is usually a cross-reference between an input variable and distinctive attribute(s), which produces the required output information.

An additional helpful feature would be to introduce group sequencing into the said key information sheet; this allows the regular update of varying information without having to go through extensive data cleansing and sorting needs. The one-point variable of the model alters this sequence list in a dynamic way; the information then gets isolated, compacted and listed as per the given input.

This function is also useful when presenting group lists that consist out of different dimensions; dynamically filtering it down to the level of detail that the user has defined, then isolating the key one-point variable that drives the entire model and visual dashboards.
2.2 Information Conversion

This step in the Data Transformation Procedure conveys how the data is interpreted; it serves as the calculation unit for the one-point variable that filters a certain number of further model drivers. It also aids as the structured dashboard’s visual underlay; in essence it is all the processed numerical values condensed onto a singular user-interface template.

The following diagram shows an example of how a typical dashboard is generally constructed along with all the necessary identifying information beneficial to the user:

<table>
<thead>
<tr>
<th>Business Intelligence Dashboard Name / Title of the Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisational Branding or Company Logo and the Model’s One-Point Variable</td>
</tr>
<tr>
<td>Some information in the form of tables, filled with figures, may be allocated to a specific area on the dashboard; it represents the visual graph’s information - i.e. if an exact number needs to be evaluated.</td>
</tr>
</tbody>
</table>

It is important to mention that the dashboard structure is only developed once and this “master template” gets populated repeatedly with the relevant information - driven by the model’s one-point variable. In this manner the user knows how to navigate the Business Intelligence interface tool, but investigates it per the varying input selection.

Currently, the general way of working with dashboards has been as such, in revision: data drives the dashboards graphical representations which alter according to what the user has manually indicated and then the said person evaluates the outputs.

This method of working is, as mentioned before, tedious and very wasteful of computing resources. Inevitably, all the user will be doing is altering the input variables one-by-one; this process can be easily automated. Dashboards can now be calculated, named, published then saved (in that sequence) with a much smaller file format; being accessed quickly and with more efficiency. This proposed process of working is illustrated in the flow chart below:

**Figure 3: Business Intelligence Dashboard Structure/Design (Example)**

**Figure 4: Automated Reporting Process**
2.3 Knowledge & Value

The next step will be to instruct the user (executive/management/operations) on how to navigate and interpret the designated information presented by the Business Intelligence dashboard. The necessary accessibility platforms will have to be created and implemented. This function can be done through a number of external service offerings such as:

- **Web-based platforms** (this is a popular form of availability as the reports can be viewed/saved immediately by the user and the capability exists for administrators to track user activity in order to audit the persons not enabling the toolset);
- **Mobile devices** (the latest device technologies, such as smartphones and tablets, can also be utilised for this purpose; these applications allow the viewer to access the reports at the very operation or away from the workstation/office);
- **Email** (the option of regulated outbound emails also exist; setting up a mailing list that allocates specific attachments to a number of recipients sending automatically).

The onus now rests on the people responsible for the day-to-day operations of the company to make tactical choices, and in some instances higher level strategic decisions, that will improve the operating resource (assets/productivities), by business division or as a whole.

The problem with monitoring individual dashboards one-by-one is that the users now builds a mental arsenal (with limited capacity); that attempts to remember Key Performance Indicators and patterns about this domain of knowledge [1].

Fortunately this human interaction with the Business Intelligence model can also be automated through simply applying the same action of “remembering” the important indicators by “saving” it to a designated information page.

Evaluating the ‘as-is’ business position can be done by building a recording mechanism into the same programming code that generates the Business Intelligence model. This will enable a “copy” protocol that allows the capturing of calculated performance indicators to a nominated statistics sheet. This very insightful and unique piece of information allows the model to rank the line item recordings; sorted from best to worst or vice versa in accordance to the measurement and dimension of user requirements.

2.4 Business Intelligence

Currently, the thinking of Business Intelligence models is “nice-to-have” for companies are changing to functional toolsets that evaluates processes/resources and consolidates as a snapshot of the business [6]. To have visibility over the entire organisation, and by accessing this instantaneous information very quickly/effortlessly, will add enormous benefit to the persons responsible for making operational, tactical and strategic decisions.

Business Intelligence techniques are useful when applied in the correct context. The data, time-frame, primary users and business focus integrates with operational, tactical and strategic objectives of the organisation. This decision matrix then outlines the appropriate course of action that, if taken in enterprise accordance, will often result in the most beneficial options for growth and prosperity [5].

The approach towards this part of the procedure is to create a paradigm shift from the ‘as-is’ situation to an improved ‘to-be’ ideal, according to the enterprise workings. This can be achieved through ‘what-if’ simulation models as well as proposed business case studies [7].

2.4.1 Benchmarking

The principle of Benchmarking also needs to be incorporated into the development stages of the design model as performance has to be evaluated against standards to produce accurate business understandings. If the designed Business Intelligence toolkit only provided direct information about organisational entities, without asserting if it is under- or over performing, it will not be of much insight or value to the user [2].
2.5 Competitive Advantage

This type of toolkit is a very attractive feature for current/prospective clients during a tender process and can be included in the service level agreement as a Key Performance Indicator requirement. The option to give customers direct access to models such as these can be incorporated into the relationship management document and will possibly assist them with matters such as demand planning and resource scheduling.

Business Intelligence modules can also be incorporated into supply chain management, where relevant partners share liability, and require the immediate indication or reporting of certain measures to enable the efficient planning and execution of operations.

3 CONCLUSION

By correctly applying this paper’s concept has proved that it can assist any organisation to develop business specific intelligence tools (visual dashboards with graphical representations of information); to improve tactical operations, achieve strategic objectives and possibly redefine systems with the appropriate change management.

Implemented Business Intelligence design models and dashboards can help to sort out operational inefficiencies by identifying the current problems; as cases are sorted from worst to least affected areas. Therefore, giving attention to the biggest value-at-stake resource entities or processes will allow the effective management thereof to produce the desired results. The model also rewards exceptional performers as they are ranked on the opposite side of the spectrum; adapting to this new standard becomes the principle of continuous improvement practices.

4 REFERENCES

[3] Ranjan, V. 2009. “A Comparative Study between ETL (Extract-Transform-Load) and ELT (Extract-Load-Transform) approach for loading data into a Data Warehouse”.