

# **eSCAD: Data Collection and Dashboard in Abu Dhabi**

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### **Abstract:**

Like all statistical organisations, Statistics Centre – Abu Dhabi (SCAD) relies on efficient collection of administrative data for the production of timely statistics. SCAD also has a strategic vision to provide advanced and innovative dissemination tools.

In 2015, SCAD embarked on an ambitious project to develop two systems to address these statistical processes. The project was called eSCAD.

The first eSCAD system automates and streamlines the administrative data collection process from 56 Abu Dhabi government entities. The system links the agencies to SCAD through a secure network (B2B). The received data are automatically validated and quality checked. Some datasets have predefined calculation procedures applied to them to directly produce statistics, while others are loaded as databases, available for further analysis by subject matter experts.

The second component of eSCAD was the development of suite of statistical dashboards. Dashboards provide an 'at-a-glance' view of a situation. SCAD has found that official statistics are well suited to the dashboard concept. The first suite of dashboards were released in May 2015. To date, 11 datasets with 36 related dashboards have been deployed.

Topics covered in the paper will include: benefits of SCAD's administrative data collection system; benefits of statistical dashboards; development and technology considerations; lessons learned; and outcomes.

**Key words:** eSCAD, administrative datasets, dashboard, data visualization, innovation.

## 1. Introduction

### 1.1 Abu Dhabi

Abu Dhabi is the federal capital of the United Arab Emirates (UAE) and the largest of the seven emirates. Geographically, Abu Dhabi lies on the borders with the Kingdom of Saudi Arabia, the Sultanate of Oman, and the Arabian Gulf. Over the past 40 years, Abu Dhabi has experienced significant population growth and economic development.

To manage the growth and prosperity of the Emirate, the Government of Abu Dhabi required an official agency that could provide statistics for decision-making and policy setting.

### 1.2 Statistics Centre – Abu Dhabi

Statistics Centre – Abu Dhabi (SCAD) was established in accordance with Law #7 (2008). SCAD is responsible for the collection, classification, storage, analysis and dissemination of official statistics covering social, demographic, economic, environmental and cultural indicators.

### 1.3 eSCAD Project

SCAD is motivated by innovation. In particular, SCAD seeks to apply innovative techniques to administrative data collection process and the dissemination of statistics. To meet this dual obligation, the eSCAD project was created.

## 2. eSCAD: Administrative Data Collection

As a young organisation, SCAD has sought to advantage of existing databases within other government entities as a source for the production of official statistical indicators. To achieve this, SCAD needed to develop an integrated electronic data capture and storage system.

### 2.1 Internal Stakeholders

By determining the needs of the senior management, the Board of Directors, and technical departments, the following objectives were set:

- Create a single, comprehensive, easily accessible statistical database
- Automate the downloading of data as well as all the related procedures and processes, in order to produce a broader range of indicators at a faster frequency and lower cost
- Provide regular time series for all statistics

### 2.2 External Stakeholders

The growing demand for statistics by the Executive Council and government entities in the Emirate increase the expectations placed upon SCAD. More than 40 ~~Several~~ meetings with government entities were conducted to identify their statistical and technological needs. Following this

stakeholder consultation, some of the goals for the eSCAD Administrative Data Collection project included:

- Eliminate inconsistencies in the figures issued by government agencies
- Adopt international best practices in the compilation of statistical indicators
- Apply best computing methods in the integration editing, processing, analysis, dissemination and protection of data
- Enable other government entities to load data directly into SCAD's database
- Facilitate access to information provided by SCAD

### **2.3 Conceptual Design**

Knowledge from the stakeholder meetings and an official visit to Statistics Korea determined the technical policies of the project. The conceptual design (see Figure 1) included the use of:

- Oracle as the database
- automated methods in the extraction, transfer and loading of administrative records
- service-oriented engineering to control the life-cycle management
- data quality engines
- analytical engines to extract and store indicators in the main data warehouse

### **2.4 Project Planning**

A project of this size is a complex undertaking. A 14 phase roadmap was prepared with operational targets for each strategic objective. Action plans and timelines were also prepared for the implementation of each of the project phases as illustrated in Figure 2.

A successful component of the project was a comprehensive communication plan. The plan included responsibilities, channels, procedures and contact persons, as well as feedback mechanisms. In addition, a quality assurance plan and a quality control system were set-up.

### **2.5 Operation**

The eSCAD Administrative Data Collection system currently links 56 data providing agencies to SCAD through a secure network (B2B). Dependent upon the nature of the administrative data, agencies are provided with data structure rules prior to uploading. The received data are automatically validated and quality checked. Some datasets have predefined calculation procedures applied to them to directly produce statistics, while others are loaded as databases, available for further analysis by subject matter experts.

## 2.6 Outcomes

The main successful outcomes from this project were:

- timeliness of data flow
- coverage of the administrative data used in the compilation of statistics
- consistency of statistical data with standard international definitions and classifications
- regular updates of administrative data
- measurement of data quality
- ability to identify data gaps in administrative records

~~To date, XX administrative datasets have been successfully loaded and validated in the eSCAD data collection system. The operational plan for the system identifies at least XX more datasets to be incorporated.~~

## 3. eSCAD: Statistical Dashboard

The second eSCAD system developed was the Statistical Dashboard. It was launched in May 2015. The dashboard tool provides an 'at-a-glance' view of statistical indicators on topics such as: population, foreign trade, hotel establishments, foreign investment, education, and more.

The project innovation is the use of standard dashboards for the dissemination of official statistics. The dashboard supports the presentation of complex data, but in an easily consumable way.

### 3.1 Key Features **f**For Users

#### 3.1.1 *Interactivity between indicators*

The eSCAD Statistical Dashboard was designed to allow interactivity between different indicators. For example, in the GDP dashboard, if a user selects an economic activity in a chart – the same activity will be automatically highlighted elsewhere in the dashboard (see Figure 3).

#### 3.1.2 *Customizing **b**By Filtering*

Since users' needs differ, the eSCAD Statistical Dashboard allows customizing by filtering. For example, data can be filtering for a specific region, school type, citizenship, etc. (see Figure 4).

#### 3.1.3 *Drill Downs*

The system allows the user to 'drill down' to further, more detailed data in two ways. Either, at single chart level - where the chart changes to another chart to present additional data, or drill to another related dashboard with different indicators and graphs (see Figure 5).

### **3.1.4 Device independence**

The eSCAD Statistical Dashboard operates on different devices platforms and operating systems, such as, PCs, tablets, and smart phones (iOS, Windows, and Android). The system also works in Flash and HTML5 formats.

### **3.1.5 Intuitive User Interface**

The system recognised by clients for its attractive, clean, and simple interface. In fact, the system requires no dedicated training. Even though the interface is simple, the eSCAD Statistical Dashboard is still able to present large amount of data in clear and cohesive manner that is not possible from standard data tables.

### **3.1.6 Metadata**

The system provides additional information boxes (metadata) when hovering on charts.

### **3.1.7 Exporting**

To implement the open data concept, eSCAD Statistical Dashboard allows the user to export the whole dashboard data or a single chart data. Export formats include: PDF, MS Excel, and CSV.

## **3.2 Key features for Developers-level key features**

### **3.2.1 No Coding Required**

The software used for developing SCAD's dashboard system is iDashboard. It was selected due to the ease with which data relationships can be applied and dashboards can be built. In fact, iDashboards does not require any coding to produce beautiful charts and graphs. All that is required is a good understanding of the underlying data and intermediate IT skills.

### **3.2.2 Source Connectivity**

A mandatory requirement for the dashboard tool was the ability to connect to several internal data sources types. The current system connects to Oracle database, MySQL, SAS, and MS Excel.

### **3.2.3 User Management and Reporting**

Within iDashboard, users are assigned to groups with specific permissions (or access rights). Users can be authenticated from credentials, or given guest user status (e.g. public access). The user management module allows tracking and reporting on dashboard usage.

### **3.2.4 Security**

For security purposes, the application, system administration database, and data are located in different environments.

### 3.3 Dashboard Layout

#### 3.3.1 Home page layout (see Figure 6)

- Header – place holder for main title and logos.
- Navigation Panel – icons located to right side of the screen. These include: language, help, user manual, user satisfaction, and contact us.
- Body – large icons of the six statistical themes with sub-themes listed and linked
- Footer – icons as symbolic indicators values that can give ‘at-a-glance’ value and used as short cuts for important detailed dashboards.

#### 3.3.2 Dashboards layout (see Figure 7)

- Header - contains the dashboard title and specific dashboard filters.
- Navigation Panel – icons located to right side of the screen. These include: home, language, and any associated drill down dashboards
- Body - contains all charts and tables that form the dashboard. Usually a dashboard contains seven charts at maximum to ensure good visibility.

### 3.4 Lessons Learned

#### 3.4.1 Consider Visual Perception

The design of a dashboard should support visual perception rules. For example, the flow of information should run from left-to-right, or charts should progress from simple to more complex. The challenge in creating dashboards is to engage the user by creating a ‘story’ with the data. The story should flow - as Stephen Few states “*structure is a navigation mechanism for the user perception and experience*”<sup>[1]</sup>.

#### 3.4.2 The Importance of Analysis

Time spent upfront in analysing data and designing is never wasted. The dashboard development phase will be smoother when the data are understood and the best designs have been deliberated.

#### 3.4.3 Best Chart for the Job

Within data, there are various statistical relationships – magnitude, change over time, distribution, part-to-whole, correlation, ranking, etc. Some charts better present these relationships than others. For example, for magnitude, a bar chart may be best choice.

#### 3.4.4 The Importance of colours

An important consideration in designing a dashboard is the use of colour. When used well, colour selection can assist a user to quickly identify trends, or spot outliers. Used incorrectly, and colours can confound and mislead users. In eSCAD, dashboards within statistical themes have the same

colour scheme. This gives the user confidence that they know what data they working with. Additionally, using a white background in dashboards assists the visual perception of the charts.

### **3.4.5 Stand Alone Charts**

While it is important to keep charts clean, there is a duty to the user that the details about the data, that give it meaning, are made available. That is, the chart should be able to 'stand alone' and still be interpretable. Consider the geographic reference, the temporal reference, axis titles, measurement units, etc.

## **4. Conclusion**

This is a case study of two successful systems developed by SCAD. The eSCAD Data Collection tool has been deployed to 56 agencies and is continuously available for data downloads and storage.

The eSCAD Statistical Dashboard has been a major success with our clients. Since release over XX,XXX users have accessed the public system via the SCAD website. An additional XX government users have been registered and actively use the system. SCAD would recommend all statistical organisations consider the use of dashboards for the dissemination of official statistics.

## 5. References

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Pervasive Hurdles to |Effective Dashboard Design, Stephen Few, Visual Business Intelligence Newsletter, January 2007.

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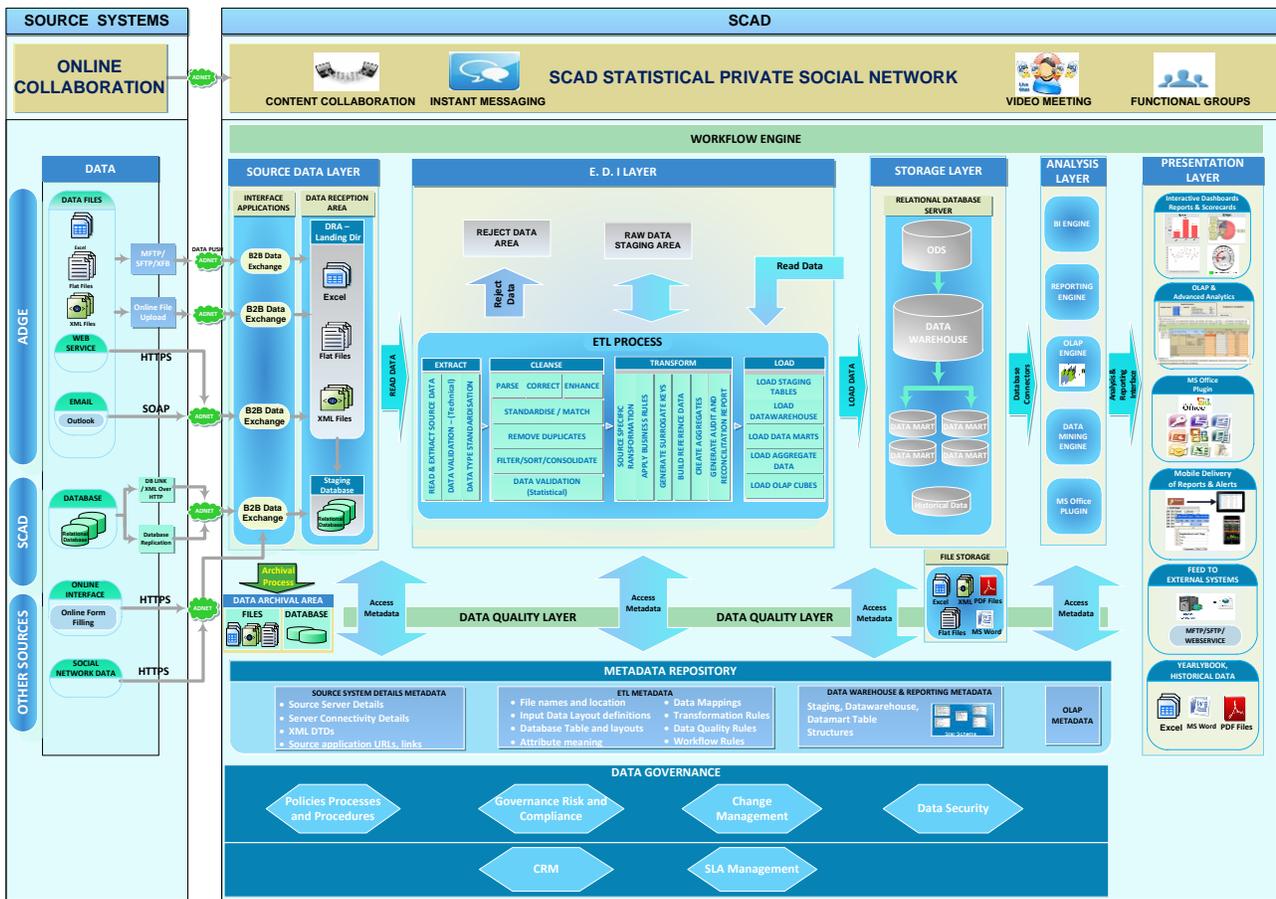
[9] <http://www.oracle.com/us/products/middleware/soa/overview/index.html>

[10] <http://www1.unece.org/stat/platform/display/motis/The+Generic+Statistical+Business+Process+Model>

[11] <http://sis.scad.ae/dashboards/index.html>

## 6. Figures

Figure 1: eSCAD Data Collection - Conceptual Design Schema



**Figure 2: eSCAD Data Collection - Implementation Roadmap**

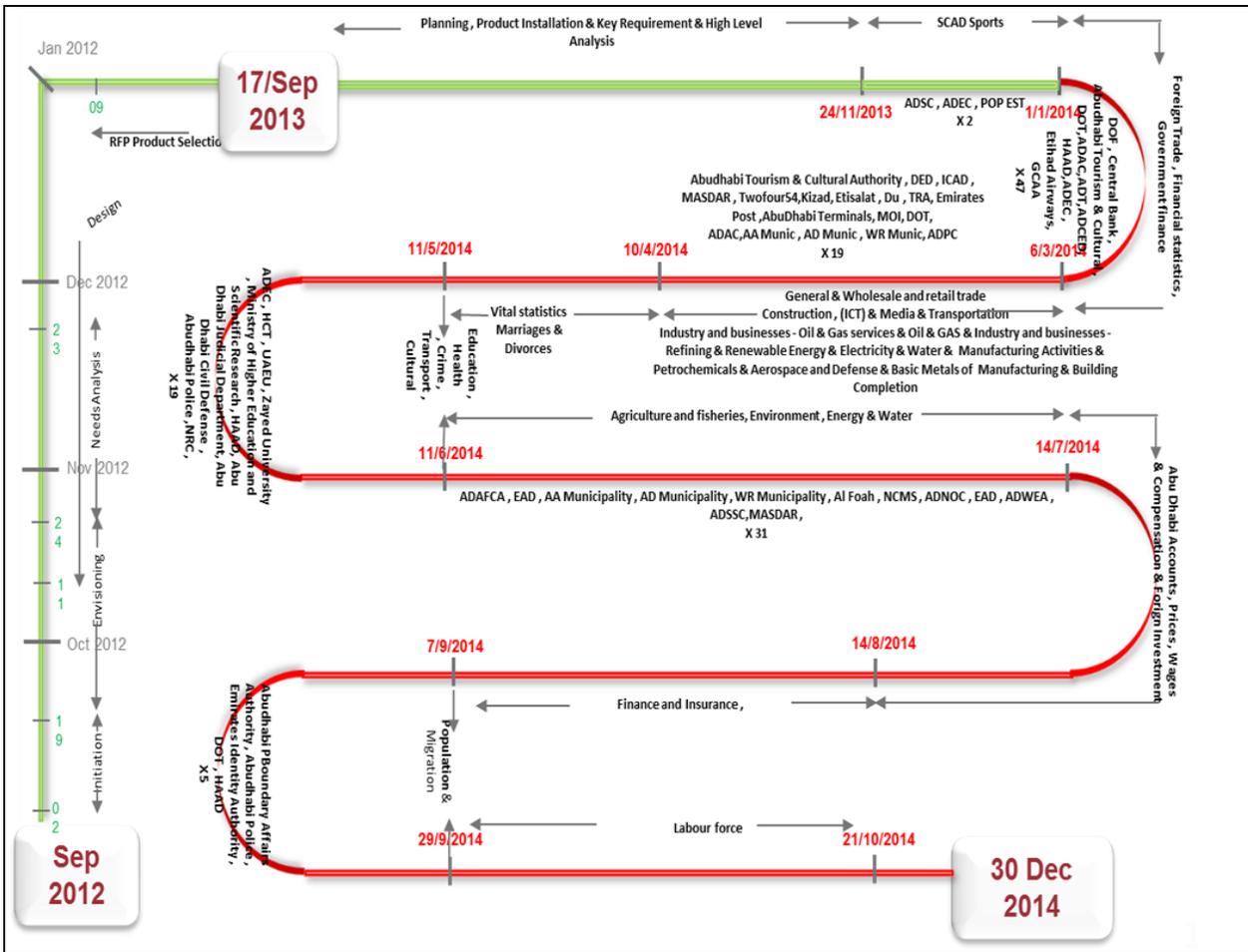


Figure 3: Indicators Interactivity

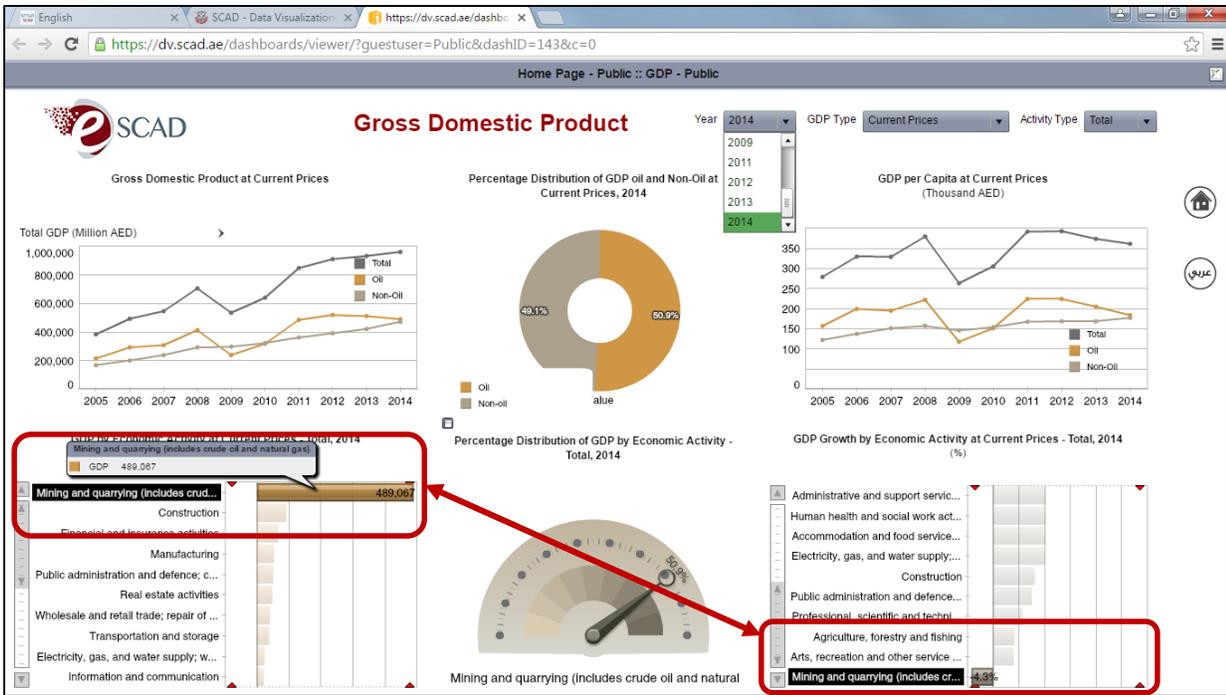


Figure 2: Filters



Figure 3: Drill Down

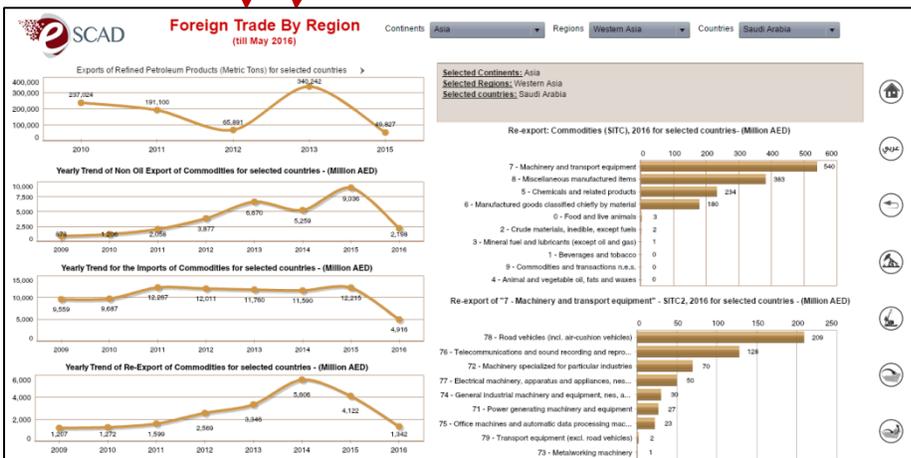
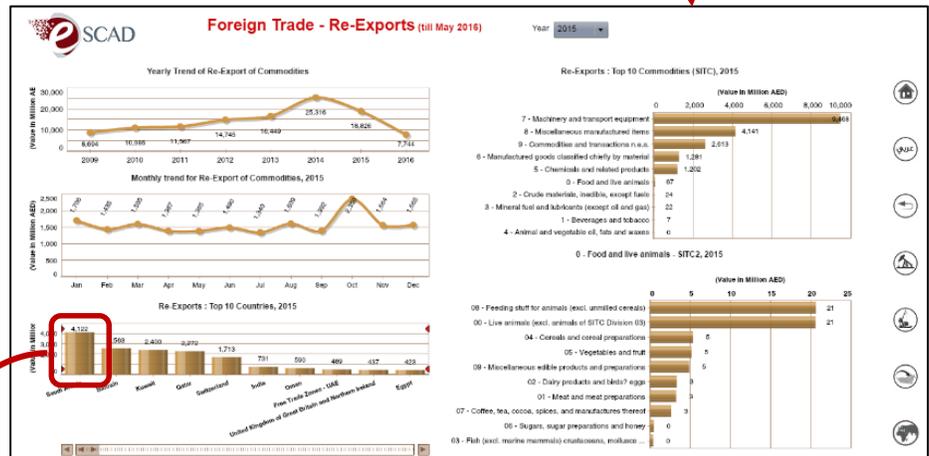


Figure 4: Home page layout

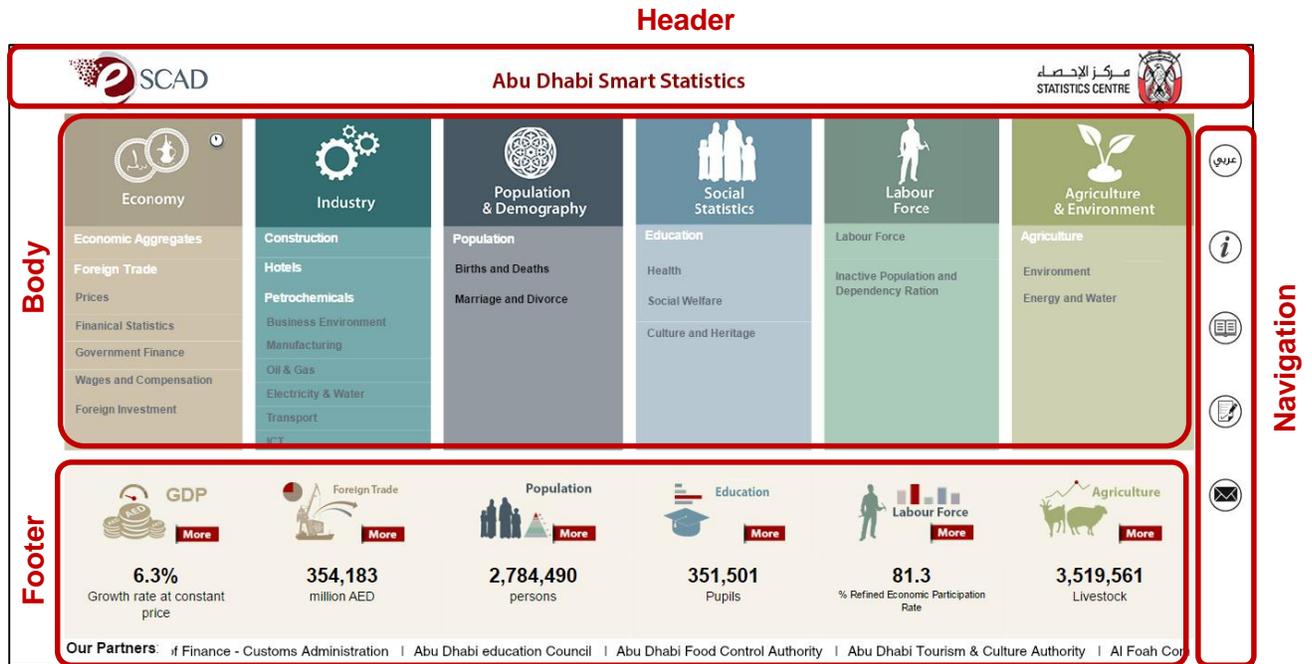


Figure 5: Dashboards layout

