

# AVIS - APPLIED VISA INFORMATION SYSTEM

## *Case Study for the Embassy of the Gabonese Republic in China*

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**Abstract:** Nowadays, the handwriting workbook has been a valuable tool that is disappearing into a computer keyboard typing. Since the establishment of Sino-Gabonese diplomatic relations in 1974, using the book filling procedure of visa application, the Gabonese republic embassy to china has accumulated a very large amount of paperwork data and using this data efficiently becomes a major problem to solve. A computerized data management application that manages new visa applications and record existing paper archives into electronic data for effective knowledge of visa demands and analysis was proposed. In this paper, the Applied Visa Information System is developed, a system that consists in data storage and data view modules. Development process and implementation of the AVIS and the methods for goals procedures to operate the system are detailed. The system works with a database that contains all applicants' information and resulting visa decisions such as accepted or denied.

## 1 INTRODUCTION

AVIS stand for "Applied Visa Information System". Because the Gabon embassy in Beijing to China was this case study working place, GRAVIS is the name that represents its AVIS. Because of using the old handwriting visa procedure, managing its data and overcoming the huge amount of paperwork become necessary as well as using the technique of building a prototype AVIS for the Gabonese republic embassy. The focus of this work was on saving the paper data of visa application into and electronic data in a database by processing it into useful information for later usage and the AVIS can help making it possible to record, retrieve and view those data.

To respond to the serious concern of the global security due to the growing movement of population worldwide, controlling all entries at their borders for each country's safety, Sandrin (2008, p6) argues, "The establishment of effective visa management procedure appear to be one-step further towards the liberalization of visa regime". This is verified by Oz and Jones (2008, p9) when arguing, "People require information for many reasons and in varied ways." In addition, Haag, Cummings and Cubbrey (2005, p5), defines the "Information Age as a time when knowledge is power", moreover, Oz and Jones

(2008, p10) argues, "The Information Age was supposed to reduce the amount of paper that offices use." with a system for managing all the information (MIS).

Because the only key factor to meet the world standard development's requirement is all about using of information technology; Stoneburner, Goguen, Feringa (2001, p1) argues, "Organizations use automated information technology (IT) systems to process their information for better support of their missions" also "reading the data as it is being the reference of a new beginning" (Kranenburg, 2008, p.44),

## 2 BACKGROUND

This research was conducted in Beijing at the Gabonese Republic embassy to China, where implementing an AVIS became crucial as they lacked a visa processing efficiency. For example, the humidity and the moisture penetration in the embassy are big issues to consider, especially where the stacks of visa application paper remain unpacked as illustrated in Figure 1.



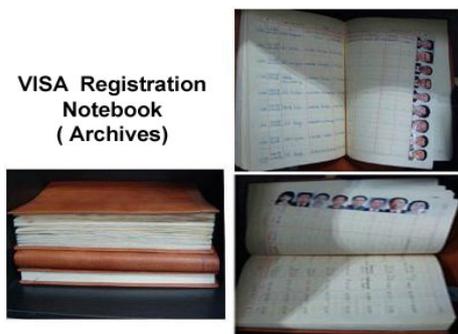
Figure 1: Application forms Stack unpacked.

The other problem is that we may never know from which application form, a picture was detached as shown in Figure 2. This is how AVIS could help the user to save a very important time.



Figure 2: Picture detached from application.

Adeya (2002, p19), when arguing that until today, “IT is still reinforcing for the poor the idea that machines knows more than they do”, she means developing countries, but considering the spread of information technology worldwide, Hagg et al. (2005, p4) argues, “The simple reality is that you cannot escape technology”.



VISA Registration Notebook ( Archives)

Figure 3: Notebooks with all records.

In addition, referring to Figure 3 and considering the data recorded in notebooks over the past 35 years, and stack unpacked , It was obviously impossible to get any statistic regarding, applicants’ sex, age nor to get weekly, monthly, yearly reports.

## 2.1 AVIS Model

The improvement begins with the proper knowledge of what exist, and Table 1, derives through the analytical and practical exploration of all collected paperwork document and results from interviewing two consular officers by following Haag et al. (2005)’s methods.

Table 1: Material use at Gabon embassy for Visa Purpose.

Category	Items
Office Supplies	Pens, white paper A4 format, Notebooks, Calendar, Fax, Glue, Clipboard, Sticker,
Electronics	Copier, Phone, Fax

AVIS has been drafted, on the paper model of the application form, it is a prototype database application in the particular scenario of visa application management, which consists, in data storage and data view modules, allowing the users to gain a direct experience with the electronic interface without been frustrated, and improving their productivity. In addition, the functional workflow of the visa procedure at the Gabon embassy involves four different levels as illustrated in Figure 4: Applicant Level, Secretary Level, Consul Level, Ambassador Level and height 8 procedure steps as described bellow:

- Step 1- The Applicant: Submission of the Visa Application Form with all required documents;
- Step2- The Secretary: Collect and checks all provided documents, to avoid incompletes application files;
- Step 3- The Consul: Collect a no refundable visa fee (RMB 415 Y) prior to deliver a home edited invoice ;
- Step 4- In Ambassador’s Office: The Secretary sends all documents to DGDI-GABON by FAX;
- Step 5: Application files are stored in a pending documents box, prior to the final decision;
- Step 6: The Final Decision from: DGDI-GABON: YES / NO; goes backward to the Ambassador, the consul, the secretary and finally to the applicant;
- Step7: Applicant’s files are stored accordingly in boxes with the labels ACCEPTED or REFUSED and if the decision in step 6 is: “YES”: Applicant’s name is recorded in a notebook with his picture stacked aside it
- Step8: Passport return to the Applicant with or without the visa (as shown in appendix) based of step 6’s decision and the procedure life cycle end here.

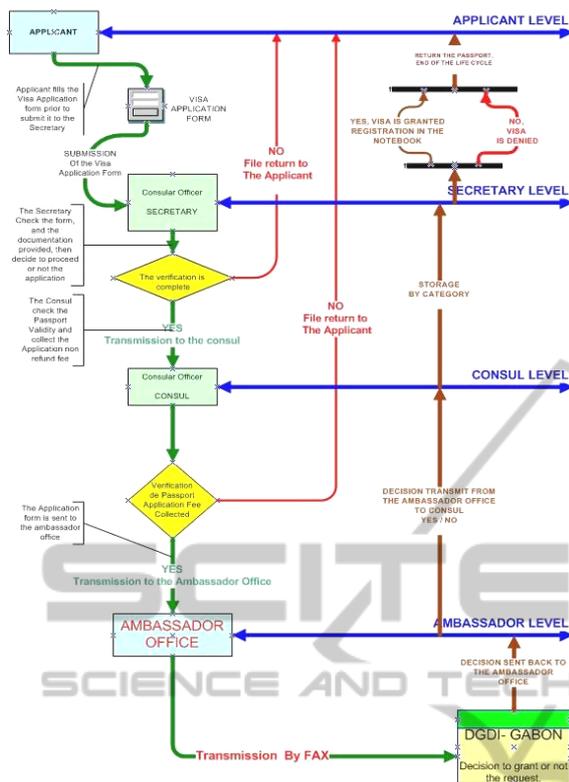


Figure 4: GRAVIS functional workflow.

In additions, the targeted audience is specific especially to embassy staff; Adeya (2002, p41) considers that “the impact of the system depends on users’ attitudes and expectation”.

Moreover, the above detailed workflow may still work properly until now, but some crucial parts shows its lake of efficiency

- None cannot tell if the applicant have been considered to be a risky for the country, no possibility to have a hit” on his/her name
- None at the embassy can give an exact statistical report on visa applications.

## 2.2 Related Work

According to Nicholas Carr (2008, p2, para5), “The only real constraints on a universal computing machine are the size of its memory and the speed with which it can carry out its calculations and transmit the results”. In fact the possibility to improve learning from what is been done, gives bits of other methods seen in the systems introduced in bellows’ subsection when reviewing our literature.

The USA visa system, the SID system and the N-VIS are all proprieties of different and specifics governments. They all are internet-based systems;

all include cryptography techniques and biometric data with fingerprint records, comparing to the AVIS, which is proper to the entity of Gabon embassy to Beijing, with no complex technology.

In fact, each country has defined their own technology, the investments are also different due to the geographical consideration and the project perspectives, the similarities are about the database registration; And this is verified by Kranenburg (2008, p44) when arguing that “every new set of techniques brings forth is own literacy”.

### 2.2.1 The USA Visa System

The (ANSI, 2005, p4) American National Standards Institute reported, “All individuals who apply for a United States entry or re-entry visa would be screen before issuing the visa, regardless of nationality”. Comparing with the Gabon Visa application form with three languages French, Chinese, English and combined on it, the USA visa system offers two different applications form, DS-156, each on in English and one in Chinese.

The difference between this system and the AVIS are technical’s ones, but many similarities in the visa application procedure and upon approval, visas will generally be issued.

If high-level technologies present some issues, The United States Government Accountability Office (GAO, 2005, p7) reveals the impact of the USA visa security operations that is limited by many factors including a lack of comprehensive data on the (VSOs) Visa Security Operations’ activities and results in Riyadh and Jeddah (Saudi Arabia) to demonstrate the program’s overall impact at these posts.

### 2.2.2 The Russian SID System

The (SID system) Seafarer’s Identity Document system (GazIntech, 2008), was revealed by Rosmorrechflot, the Russian Transport Ministry’s federal agency for sea and river transport.

The Figure 5 shows that the system is to issue new identity documents that contains digital signature, and biometric data of their owners , referring to the International Labour Organization (2007, p8) (ILO) and convention No. 185, that Doumbia (2010) concluded to be effective and fair. Comparing to the AVIS that has only basic ones, the SID includes many equipment like:

- Biometric data registration; Biometric booth;
- SID print Station; Other stations; Servers;
- SID issuing and control station;

- Cryptographic and Telecommunication;



Figure 5: Biometric data used in SID system.

### 2.2.3 The Former Yugoslav Republic of Macedonia N-VIS System

According to Stojanovska (2008, p1), the N-VIS “would make statistical analysis of visa applications easier, detect abuses, and facilitate strategic guidance of the country’s visa policy”, through a databases. The Figure 6 illustrates N-VIS system.

The system is an internet-based, with €750.000, Euro allocated for designing it. and an estimation of 120.000 visas per year with a maximum of 200 users at any time, which is not to compare with the presented GRAVIS system that will cost only a single server of about € 1100.

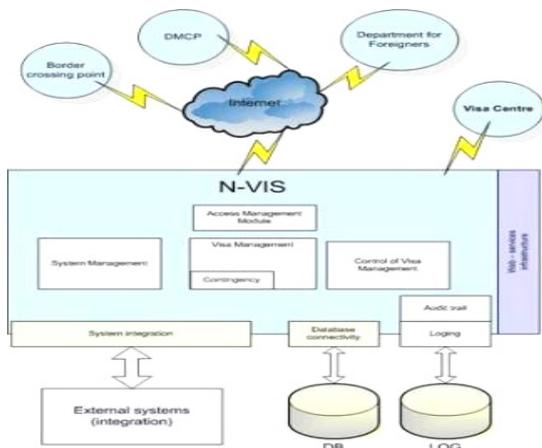


Figure 6: N-VIS visa system.

### 2.3 Feasibility Study

A feasibility study is an analysis of the viability of an idea. When making diagnostic of the different aspects to be taken under consideration in the acceptability of the AVIS. In our particular case, it is a good business practice to give an Individual tracking Application.

The machinery details software and all tools coming into play include hardware like Server DELL Power Edge 840 and Power Conversion UPS System and evaluate at \$1500US. In addition, considering the overall computers running Microsoft office 2003 including Access 2003 under Windows XP, the developer providing, visual Studio 2005 as development tools, reduces then the development cost to Zero (\$ 0 US). Above all, the maximum was \$1500 USD, thus considered as a reasonable investment, and the low cost and technological simplicity, with the feasibility results the authors conclude that building our prototype AVIS makes economic sense

## 3 DESIGN & IMPLEMENTATION

The implementation of this prototype gives the outline of how it operates and the understanding his overall technique

### 3.1 Information Technology

Hardware and software are the key development tools to realize our prototype. The choice of a legacy system Microsoft ACCESS database 2003, out of many others databases in the market like Oracle Database 10g (Ziauddin & al., 2003, p5) or MySQL (Cummins, Stephen, Alexander, 2010, p54) is justify by a technical feasibility. Microsoft ACCESS 2003 does not require any extra license. The system’s data can be search and formatted in multiple ways and Ziauddin & al. (2003, p5) argues, “Development effort and focus were puts into making the database self-managing”.

To ensure a proper system to the user, the modeling of data appears easier using the UML method as Bell (2003) described it, and Clauss (2001, Section 2 Para 1) argues, “The UML is designed to model single software systems”.

A Visa Applicant is a person, applying for a visa at the embassy, and who must bear a passport, also the relation between these three entities, Applicant, Passport and Visa is expound in Table 2, giving the multiplicity Values of the relationship between entities types.

Moreover, according to Clauss (2001, Section 3 para 2), the type of relationship to use depends on the identified kind of the relation between features. According to Gomik (2003), “The flexibility of Entity Relationship (ER) modeling relational database makes it suitable for the analysis and design of our information-based system”. In

addition, Halpin (2001) says that Entity-Relationship (ER) modeling is providing another conceptual approach, as its models are useful only after finishing the process design. Moreover, Xiuzhen Feng (2003), argues modelling is the most important connection that links information system management and information technology.

Table 2: Gravis Multiplicity Values.

Values	Definitions
1-1*	One Applicant is owner of one or more Passport
1-1	One Passport is owned by only one applicant
1-1*	One Applicant apply for one or more visa
1-1	One visa is granted to only one applicant
1*-1	One or more Applicant lives in one address

Considering the existing visa process with the modelling of data by Bell (2003) and the relationship between system entities by Gomik (2003), Figure 7 illustrates the completed GRAVIS UML entity class diagram using the graphical notation.

According to David Chappell, Chappell & Associates (2007), “The goal in application development is about creating the best possible software in the least amount of time”. In addition to Nicholas Carr (2008, p2, para6) “The modern corporate data center, with all its complex and expensive stacks of machinery, is on the path to obsolescence”.

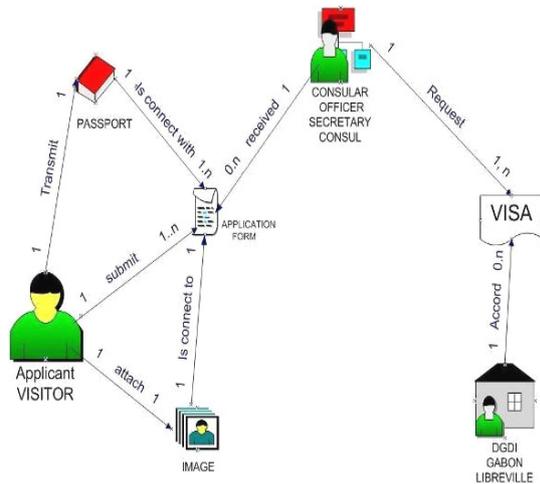


Figure 7: GRAVIS UML Entity Class Diagram.

The presented system interface is accessing the database only through the server where we loaded gravisdb.mdb and using the client/server architecture as illustrated in Figure 8. However, it is called “a systems built on the principle of isolation” by

Nicholas Carr (2008, p4).

Bruel, Ober (2006) argues that the generalization of the client/server architecture justifies the complexity of the simplest software systems; And Turttschi, Werry, Hack, Albahari (2002, p2) argues, “The .NET platform is the foundation upon which the next generation of software will be built”.



Figure 8: GRAVIS Simplify Client/Server Architecture.

GRAVIS is a window forms application based on the Microsoft .NET 3.5 Framework (David Chappell et al, 2007), and programmed with Microsoft Visual studio 2005 in a modern object-oriented language, the (C#) C sharp (Symmonds, 2003). For Turttschi et al. (2002, p34) “C# supports interfaces in conjunction with the .NET Common Language Runtime (CLR) garbage collection” with the derived controls of the System.Windows.Forms.Control:

- Button; Data Grid; Group Box; List View;
- Tree View; Label; Date Time Picker;
- Splitter controls; Picture Box ; List Control;
- Month Calendar; Scrollable Control; Textbox;

### 3.2 Interfacing the Gravis System

After structuring Gravis, the system main board user interface finalized, the goal was to make sure that it works well, and that it is easy to use. Figure 9 gives an overview of our new elaborated system interface when Table 3, 4, and 5 gives each field generated reference code label.

Table 3: Edit New Record Panel-Entity Applicant.

Entity Applicant	Reference Code Label
ID	txtVSID.Text
FAMILY NAME	txtFNAME.Text
GIVEN NAME	txtGNAME.Text
DATE OF BIRTH	dobpicker.Text
PLACE OF BIRTH	txtPOB.Text
GENDER MALE	radMALE.Checked
GENDER FEMALE	radFEMALE.Checked
MARITAL TATUS	comboMSTATUS.Text
OCCUPATION	comboOccupation.Text

Table 4: Edit New Record Panel-Entity Passport.

Entity Passport	Reference Code Label
PP NUMBER	txtPPNUMB.Text
NATIONALITY	txtNATIONALITY.Text
TYPE	combopptype.Text
ISSUED DATE	IssuePicker.Text
EXPIRY DATE	ExpiryPicker.Text
IMAGE	pictureCP.Image
TOWN	txtADDTOWN.Text
CITY	txtADDCITY.Text
COUNTRY	txtADDCOUNTRY.Text
STREET	txtADDSTREET.Text
ZIP CODE	txtADDZIP.Text
PHONE No	txtPHONE.Text

Table 5: Edit New Record Panel-Entity Visa.

Entity Visa	Reference Code Label
PURPOSE	comboPurpose.Text
TYPE DURATION	comboduration.Text
STATUS	comboVSTATUS.Text
PRICE	txtvisaprice.Text
SUBMISSIONDATE	SubmitPicker.Text
OBSERVATION	txtObservation.Text

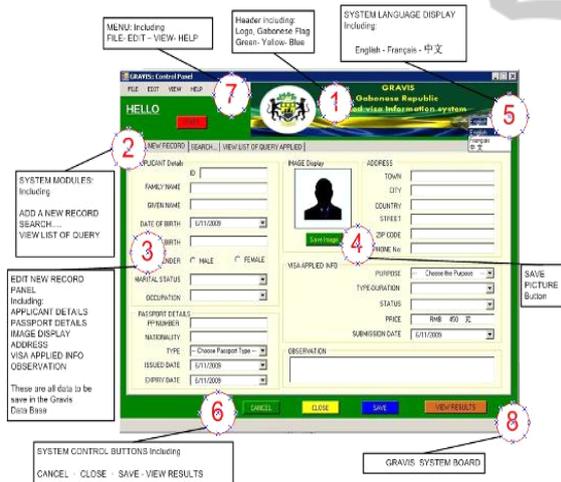


Figure 9: GRAVIS System Interface screen.

The system control segregates different categories as below detailing all items content in the system board. This is solving the technical problem of the system usability.

- 1-Header-Logo, Gabonese flag, system name
- 2- System Module: Add a new record, Search, view list of query
- 3- Edit new Record including: Applicant details, Passport details, image display; Address, visa applied info, observation
- 4- Save picture button

- 5-Switch to language dropdown list including English; Français ;( 中文)
- 6-System Control Buttons: Cancel, Close, Save, View Results
- 7-Toolbar menu : File; Edit; view; Help
- 8- Gravis system board;

### 3.2.1 The C# Programming Code

Example 1 of Gravis board control panel Program listing and commands in C# code:

```

using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Data.SqlClient;
using System.Drawing;
using System.Drawing.Imaging;
using System.Linq;
using System.Text;
using System.Windows.Forms;
using System.Collections;
using System.Data.OleDb;
using System.IO;
using System.Globalization;
using System.Threading;
namespace GravisPlatform {
public partial class ControlPanel :
Form
{ public ControlPanel()
{ InitializeComponent();
}
}
    
```

According to Nick Symmonds (2003), the information the user needs about our program has to be readily available, thus for the goal in the design is the usability of the system. Using the mouse can make screen navigation easier and the keyboard shortcuts like F1 bring us Help (Symmonds, 2003). Moreover, getting all needed information from the database without inserting any SQL query in the search field and the possibility to switch between languages (English, French and Chinese), gives some good quality to the AVIS.

### 3.3 Methods to Interact with the System

A simple and efficient method is proper to every goal and gives the possibility to the users to accomplish their tasks.

### 3.3.1 Method 1: Add a New Record

- Step 1: Wait for Application to display;
- Step 2: Press Start button to activate all editing text fields;
- Step 3: Click the Add new record panel;
- Step 4: Fill in the information;
- Step 5: Press the save image button to access the computer hard drive from where the applicant's image has to be loaded;
- Step 6: Wait for program to display the image;
- Step 7: Fill the Observation field;
- Step 8: Press Save button Return with goal accomplished;

### 3.3.2 Method 2: Search a Recorded Data

- Step 1: Press Search panel button;
- Step 2: Browse and select a category;
- Step 3: Fill the searching text field;
- Step 4: Press the find button;
- Step 5: Verify that the result is display;
- Step 6: Return with goal accomplished;

### 3.3.3 Method 3: View Results

- Step 1: Press View result button;
- Step 2: Verify that the list of records is display;
- Step 3: Return with goal accomplished;

## 3.4 Recovering from Error

The common consent in which less popup is better and less annoying is been considered for advance users. Also for GRAVIS, avoiding misunderstanding and anticipating the most common of the errors is necessary. The system will notify the users for a successful task or gives effective instructions and feedback in a popup window as shown in the Figure 10, meaning that the user will easily recover from error and get back on track as rapidly as possible.

The following Example 2 expounds the C# code of the A pop up windows Message box Information from the system.

```

    MessageBox.Show (" Record inserted
    successfully",
    "GRAVIS Tech. Support TDAL ",
    MessageBoxButtons.OK,
    MessageBoxIcon.Information);
    
```



Figure 10: A pop up windows Message box Information from the system.

## 4 CONCLUSIONS

To enhance its operational efficiency with visa operations by the Gabon Embassy to Beijing, an electronic system that can solve some of the problems of the paper-based system, a dedicated prototype AVIS is been proposed and a practical analysis has demonstrated that the proposed model was feasible with economic significance. The system's database contains all applied visas information, as the functions of the system consist of data storing and viewing and the implementation is relatively simple.

The system methods for tasks and consistency make it easy to use and it has to complete the main goal of solving about 35years of unpacked visa application forms paper. Thus making the Gabon embassy to China benefits from the improved productivity and especially enhancing service delivery

As everything is going to internet, further work of this paper would be, to developed and internet web-based application and an internet-base system.

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