TO: Dr. Gove Allen

FROM: Joseph Murphy

DATE: 16 April 2015

SUBJECT: **MBA 6144 – Term Project Write-up**

Executive Summary

This project is for a client company Northrop Grumman Corporation (NGC), and specifically for a division site located at Hill AFB, UT. Northrop Grumman is an aerospace engineering defense contractor with major military programs such as the F-35 Lightning II Joint Strike Fighter, the B-2 Spirit stealth bomber, and the Minuteman III Intercontinental Ballistic Missile (ICBM).

NGC's Hill AFB site manages operations for ICBM-related activities at seven main locations throughout the nation. These locations include engineering offices, testing sites, and military grounds.

This particular division of NGC wanted improve the visibility of receiving shipments of orders / purchases. NGC purchases that are shipped to the sites have a lot of variation; they can be highly technical, expensive pieces of equipment ordered by engineers, or they can be low-cost commodity items such as printer cartridges ordered by facilities management.

Currently employees at the different sites use a clipboard and paper records to track expected incoming shipments and whether shipments arrive or are lost in transit. Information such as delivery courier, tracking number, sender, receiver, dates, location, receiving personnel are recorded for accountability and tracking.

The sponsor of the project wanted a centralized repository for this information, rather than multiple documents for each company site, so that there's better tracking of whether their expected shipments are actually arriving.

The solution that I created is an Excel document to be used with a user form interface to be used as a shipment receiving log. This log sheet also is able to, with the click of a button, launch the courier's tracking website to check the status of the shipment. This file can be posted on NGC's SharePoint drive, so that purchasers can input their purchases and warehouse receiving personnel can expect and track the shipments' arrival.

This unification of information is critical for the division because they have had a history of delayed shipments, lost-in-transit shipments, and instances where the sender claimed to send the product but did not and NGC was charged for the purchase. Because there has not been a singular communication channel, these cases existed.
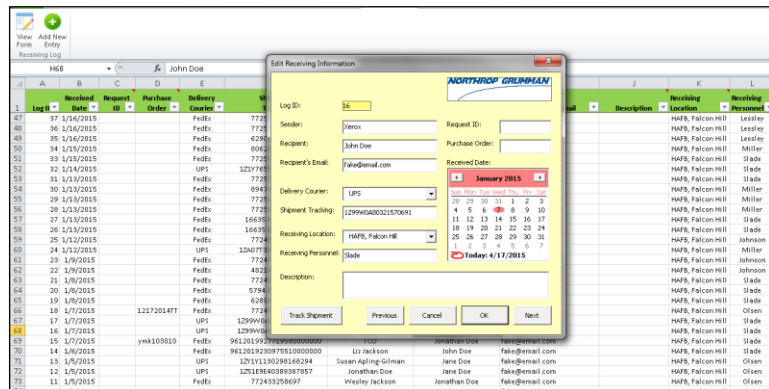

Figure 1: Overview of shipment receiving log and user form

Implementation Documentation
Specifications and Tracking

The first step was to understand what information the client thought was pertinent to keep track of and how it should be presented to the end user. A summary of the information tracked is found below in Table 1.

Table 1: Receiving Log Information Requirements

Tracked Information	Description
Log ID	Unique identifier for shipment log records
Sender	Person/entity sending the shipment
Recipient	Person whom the shipment is to be delivered
Recipient's Email	Optional: recipient's email to be notified of shipment's delivery
Request ID	Dept. purchase request number (i.e., Direct Charge or Indirect PR#)
Purchase Order #	SAP purchase order number
Delivery Courier	Company delivery the shipment
Shipment Tracking #	Number provided by courier to track shipment
Date Received	Date of delivery to NGC site
Receiving Location	NGC site that accepts the delivery from the courier
Receiving Personnel	Employee that signs for delivery and updates log
Product Description	Notes about shipment or update on activity

I input the information that had been collected by the warehouse and receiving department since the beginning of 2015 formatted a spreadsheet database (as seen in Figure 2). As a user, I personally would prefer updating and adding records directly in the spreadsheet columns and rows because I like seeing the big picture. But the client wanted a user form so that the warehouse employees would not be intimidated by the file and would use it often to keep records up-to-date.

Figure 2: Consolidated receiving log

NOTE: I found it interesting that despite the specific request for purchasers to input the request ID, purchase order number, and a shipment description, very rarely did employees do this. From a change management perspective, employees must have some sort of barriers to doing this. If I had more time and resources, I would try to talk with employees to understand better where that information came from and if there was a better way to automate that.

User Form and Data Entry
To fulfill the request of my client, I created a user form that displays all the requested information in a clean, appealing manner. The form presents information spatially and groups them by function. Figure 3 shows the form and the different groupings of information.

- **Red** – Basic details of the purchased shipment—sender, buyer, and their associated documentation
- **Green** – Details pertaining to shipment (should be input by the purchaser to give advance notice to receiving)
- **Blue** – Receiving details of who, where, when the shipment arrived
- **Orange** – Navigation buttons to display different records
- **Purple** – Uses the courier details to open courier website and display shipment tracking status

Figure 3: User form and grouped tools

Figure 4: Combo boxes

For the delivery courier and the delivery location, I chose to use combo boxes instead of text boxes, because of the limited amount of reasonable possibilities (a handful of approved couriers such as USPS, UPS, FedEx, and DHL) but with numerable variations in spelling the data if left up to the end user (Federal Express, FedEx, USPS, Postal Service, etc.). These combo boxes can be seen in Figure 4.

Additionally, in order to limit the variation in inputting dates, I used the monthview tool that creates a calendar in the form. The user selects the date of the shipment delivery, and the date is uniformly input into the appropriate cell in the spreadsheet.

Shipping Tracking Tool
A key way that I was able to save time for the user of the form is creating a sub routine that takes the courier and the tracking number from the form and, with the click of a button, launches Internet Explorer to the courier's website and inputs the tracking number to provide the shipping status.

This was accomplished by using the courier's unique website URL and attaching the inputted tracking number to the URL (as seen in Table 2).

Table 2: Courier Tracking URLs

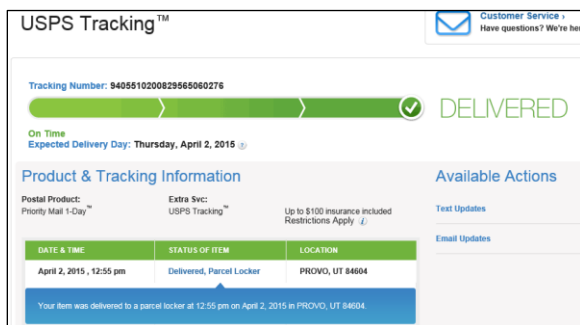| Courier	Tracking URL
DHL	http://track.dhl-usa.com/TrackByNbr.asp?ShipmentNumber=XXXXXXXXXXXXXXXX
FedEx	http://www.fedex.com/Tracking?action=track&tracknumbers=XXXXXXXXXXXXXXXX
UPS	http://wwwapps.ups.com/WebTracking/track?track=yes&trackNums=1ZXXXXXXXXXXXXXXXX
USPS	https://tools.usps.com/go/TrackConfirmAction_input?qtc_tLabels1=XXXXXXXXXXXXXXXX

Figure 6: USPS tracking website
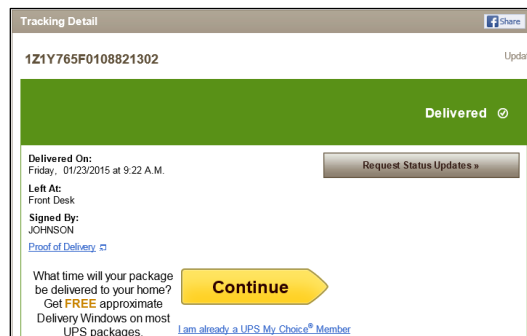
Figure 5: UPS tracking website

Ribbon
I also added ribbon buttons so that the users do not need to handle any VBA Editor or macros. The "View Form" button displays the user form populated with the information from the active cell row. From there, the user can use the navigation buttons within the form to view other log entries.
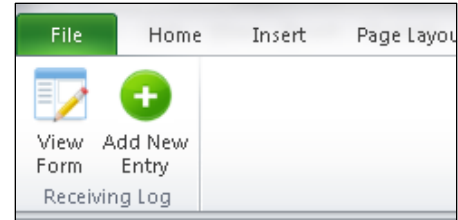

Figure 7: Ribbon buttons for displaying form and adding new record

The "Add New Entry" button displays a blank user form which the user can fill out and save and add a new record. The back-end code creates a new row within the spreadsheet and then populates the row according to the information provided within the form.

Lessons Learned and Difficulties
Email Notification
A main struggle that I encountered was trying to create a button that the warehouse user could click, after updating the form when a delivery occurred, that would notify the shipment recipient of the delivery. I tried using Dr. Allen's class example but because his example was for Gmail and NGC's email is through Outlook, I had a struggle with figuring out how to make this work. I feel like this would be a good added feature given more time and resources that would help make communications more efficient and should be automated.

Adding / Deleting Row
When creating a new log entry, I found it rather easy to record a macro to insert a new row in the spreadsheet back-end. Something that I had not paid initial attention to was that if the user canceled the action of creating a new record, the spreadsheet would then need to delete the newly created row. The key takeaway that I gained from this is that most of the functions that I create when automating activities need to be reversible (in this case, deleting a row after inserting one). This was not something that I considered until after working with the project.

The Devil's in the Details
When designing the user form, I became painfully aware of how the minor things affect the user experience. Small things such as text box alignment really add or detract from the overall look and refinement of the form. As I experimented with my form, things like tab order of the text boxes—something that I always took for granted—needed to be thought out so that it's intuitive for the end user.

Tracking Number Format
Unlike UPS' and USPS' alpha-numeric tracking numbers, FedEx tracking number are solely numeric. And when the form saved the very long tracking numbers into the spreadsheet, the spreadsheet would want to overwrite the formatting of the cell to scientific notation. This was clearly a problem and I had to figure out how to pre-emptively format the cell as a string.

Assistance
I utilized as many resources as I could—namely, the help of the teaching assistants, classmates, and internet resources. The TAs were helpful in helping me think through my logic. Internet sites were helpful in showing examples of formatting cells.