

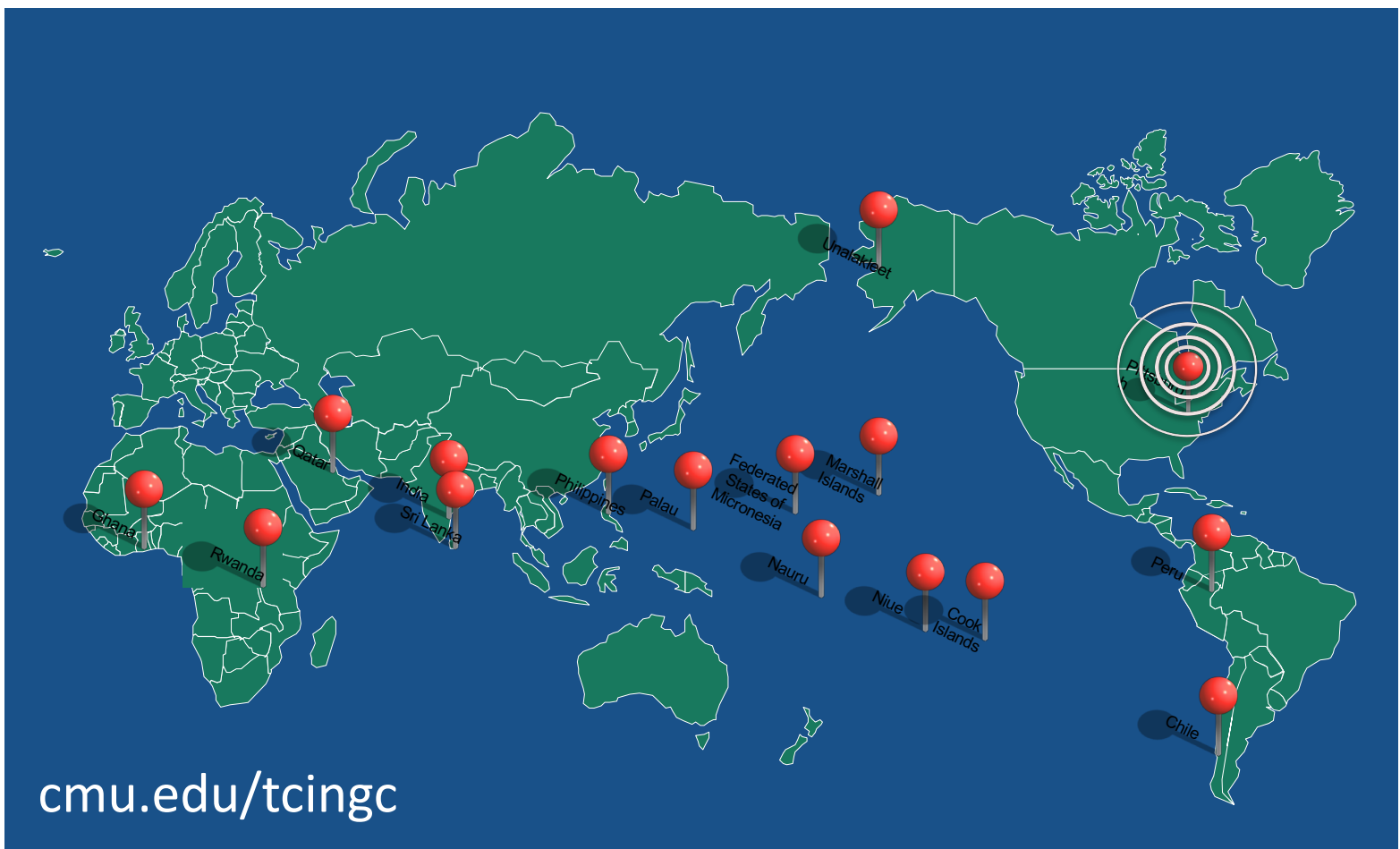
TECHNOLOGY CONSULTING

IN THE GLOBAL COMMUNITY

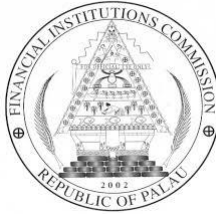
Final Consulting Report Financial Institutions Commission Republic of Palau

Yuanhan Liu
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Carnegie Mellon University



Financial Institutions Commission



Executive Summary

Student Consultant, Yuanhan Liu
Development Partner, G. Semdiu Decherong

I. About the Organization

The Financial Institutions Commission (FIC) is the organization designated for bank regulation and supervision within the Republic of Palau. The mission statement of FIC is

To establish and maintain a financial regulatory and supervisory system for the Republic of Palau, consistent with international standards, which promotes a stable banking and financial sector that facilitates economic growth and development.

Having been using Microsoft Excel spreadsheets as the databases for more than six years, the FIC is currently considering expanding its use of technology to better validate and process statistical data received from reporting financial institutions.

II. Goal 1: Improve technical capacity for the organization by adopting a new database solution

The financial statistical data received from banks is the most important information to the FIC and it monitors and regulates all banks by requiring quarterly reports, conducting risk analysis and performance evaluation to maintain a stable banking and financial sector. Though all the quantitative financial data was managed electronically, the bank examiner took almost 30 days per quarter to validate the data received from banks and enter the data into the database. This tedious work impeded the FIC's work efficiency. A new approach of managing the database to facilitate data collection and validation was needed to help the FIC have a higher productivity and less manual mistakes. Moreover, a comprehensive database system would also better serve the banks by simplifying the process of submitting quarterly reports.

The development partner and the student consultant had several meetings to discuss the alternative solutions, and both self-development and outsourcing approaches were proposed and evaluated carefully. Finally, it was decided to outsource the FIC's database to a third-party vendor in order to build a more advanced and sustainable solution and guarantee the future maintenance and upgrades. At the same time, a temporary approach to reduce Lindsay's workload during transition was realized by optimizing the current Excel database for data entry and building two new applications to facilitate

data validation. The student consultant conducted the careful investigations on data capture, collation and analysis process of the FIC and created the “Specification for Development” document according to the FIC’s work flow and daily demands of the database system. Also, several meetings were held to help the development partner understand how the database system works and develop the technical capacity for the negotiation with the vendors and future technology decisions.

After the comprehensive system is developed by the selected vendor, it is suggested to consider building dashboards in the database system to further leverage data analysis and provide predictive insights for the FIC to better regulate all banks.

III. Goal 2: Simplify the process of data entry and validation by advancing the use of technology

According to the initial talk with vendors, the implementation process will last approximately 18 months. During this transition period, it would be better to have a temporary solution to help the bank examiner with data validation and data entry work. With this solution, the bank examiner will be able to easily know where errors and material changes are, and data can be entered into the database automatically.

Two independent applications were developed to facilitate the error checking and the material changes detecting process. The macros were built using VBA to automate the data entry process. In the past, the whole process for five banks (including banks’ responsive time) took her around 30 days; it now only takes her 2 or 3 days depending on the responsiveness of the banks. After the implementation, the student consultant helped the bank examiner understand how two applications and the macros work together to facilitate her work. The student consultant also documented all the instructions on using these new tools.

This greatly increased the work efficiency of the FIC and the bank examiner would have more time to conduct risk analysis and compose reports during the transition period. Moreover, these new tools would also provide the FIC stronger bargaining power to negotiate with vendors.

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Financial Institutions Commission



Context Analysis

Student Consultant, Yuanhan Liu
Development Partner, G. Semdiu Decherong

I. About the Organization

Organization

The Financial Institutions Commission (FIC) is the organization designated for bank regulation and supervision within the Republic of Palau. The mission statement of FIC is

To establish and maintain a financial regulatory and supervisory system for the Republic of Palau, consistent with international standards, which promotes a stable banking and financial sector that facilitates economic growth and development.

The FIC provides measures to protect the interests of consumers of financial services, to prevent systemic risk to the financial system, to provide sufficient scope for market forces to operate in the field of financial services, and to protect the reputation of the Republic in the international financial community, and establishing rules for the licensing, supervision and regulation of financial institutions. At present, the FIC monitors and regulates five banks in Palau and there is one bank license application currently under review.

The FIC was established and operates as an independent agency with three employees. It is overseen by a Governing Board that functions as a policymaking body to enforce and promulgate the rules and regulations by which the Commission operates.

Having been using Microsoft Excel spreadsheets as the databases for more than six years, the FIC is currently considering expanding its use of technology to better manage all financial data and improve work efficiency with a more advanced database system and achieve its vision of having most stable financial sector among all independent Pacific Island nations.

Facilities

The FIC's office is located on the second floor of a building above a restaurant in Koror and is shared with the Financial Intelligence Unit (FIU), a government organization that investigates and monitors all financial activity in Palau.

In the office, there is a lobby area with a desk where Tikei the Administrative Officer works. There is also a kitchen behind the lobby where both FIC and FIU people can keep some food. Two office

rooms are dedicated for Semdiu, the Executive Commissioner and Lindsay, the Bank Examiner. Both rooms have enough lighting, adequate power outlets and air conditioners, which create a good environment for daily work. The office room where Lindsay works has a large six-person desk and it serves as the conference room where all meetings happen. The local server is also located in this room.

The front door and the door at the top of the steps will keep locked during non-work time in order to maintain office security. The staffs of the FIU and the FIC are the only people with keys. Each door in the office also has its own key and only the dedicated people have these keys.

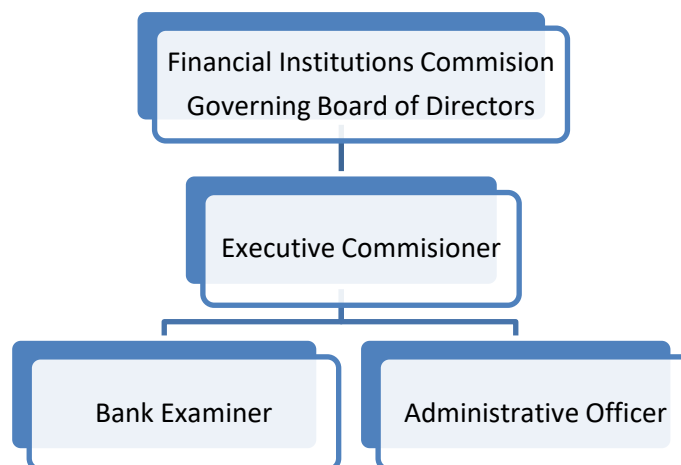
Programs

The FIC is responsible for the oversight, supervision and regulation of the Republic of Palau's financial sector. It grants the license of a bank and provides banks with relevant lessons to maintain their business. On a quarterly basis, the FIC requires banks to submit prudential financial forms using the template provided and monitors their performance by analyzing data, identifying risks and producing reports.

Currently, the FIC uses several huge Microsoft Excel spreadsheets to store all financial data and do data analysis. All the data entry work is manually-basis and there is no system to validate and extract data as needed.

Staff

The FIC is governed by a Governing Board of Commissioners. Governing Board members are appointed by the President of the Republic of Palau.



The Executive Commissioner Semdiu manages and oversees administrative tasks and operational matters and is responsible for the implementation of Governing Board policies, in particular those that pertain to the monitoring and regulation of the Republic of Palau financial sector. He uses the desktop to send and receive emails, but he does not use Excel on a regular basis.

The Bank Examiner Lindsay conducts off-site and on-site bank examinations, which include but are not limited to quarterly and annual analyses of individual bank and sector-wide financial returns and financial sector statistics. In addition to emails, she primarily uses Excel on a daily basis to validate

data in prudential return forms sent by banks, enter data into the spreadsheets database, analyze data and produce reports. She is the one who will mostly work with the student consultant in this project to find the best solution to manage the financial data.

The Administrative Officer Tikei is responsible for the maintenance of records, documentation, fulfills all clerical and related functions and other day-to-day operation of the office. She also uses email to interact with external people and uses Microsoft office such as Word and Excel to do documentation.

Technology Infrastructure

| Infrastructure Description | |
|------------------------------------|--|
| Website | Website is developed and updated by a Guam-based team M&D Web Creation |
| Internet connection | Have one Wi-Fi access point which is WPA key protected and all office rooms can use it. |
| IT hardware (laptops and desktops) | IT hardware is grant funded. Employees are assigned their desktops in the office as well laptops that they can work at home. |
| Servers | In-house with restricted access. Staff needs to login to get access to the organizational files. Staff also has their personal file folders. |
| Backup | There are two backup hard drives that will be updated manually on a regular basis |
| IT support | Provided by Conrad, the IT expert in Palau |
| Email | Available @ropfic.org domain for all staff |
| Operating system | Machines are running on Windows 10 |
| Software programs | Each desktop has the Microsoft Professional Plus 2013 Package Suite installed, i.e. Word, Excel, Access, PowerPoint, etc. It also has Internet Explorer, which is what is used by the staff to access the Internet and send emails |

Technology Management

There is no technical person responsible for technology infrastructure at the FIC. Since the need for technology infrastructure support is not high for the organization, it is currently not necessary to have someone on staff responsible for technology. When the FIC needs any IT hardware or there is any technical issue, they will contact Conrad, who is the IT guy for many government organizations in Palau, but he has a very limited time dedicated to the FIC due to his busy schedule.

Tikei is responsible for backing up all organizational data into two hard drives manually on a regular basis. Other technology issues are ad-hoc basis.

The FIC's website is developed by web masters at M&D Web Creation and if any updates or modification are needed, the FIC will contact these web masters to fix the problem.

Technology Planning

There is no regular plan or budget for technology infrastructure at the FIC. The demands for technology will be proposed by staff and be discussed during staff meetings. While Semdiu makes the recommendation for the use of technology, the final decisions should be confirmed by the board members. Though the present technology infrastructure will not change in a short period of time, it may require a new technology plan to accommodate more staff as the organization gets bigger in the future.

In terms of databases, at the end of 2012, the FIC started to use the master spreadsheets to store all financial data. Currently, its plan is to upgrade the database so that it can facilitate the process of data entry and validation and provide a more stable and secure way to keep.

Communication

All staff has emails with @ropfic.org domain to communicate internally and externally. The organization is connected to the internet and has wireless connectivity in the facility. They also use a shared drive to share files within the organization and those internal documents are stored in the in-house server. Staff needs to login using the browser to get access to the organizational files on the server. Staff also has their personal file folders which only they have the access to.

The FIC currently has no social media presence. It has its official website which contains helpful information for banks and financial institutions. Banks can find the requirement for obtaining a license and other information about the required reports.

Banks will either send the quarterly prudential return forms to the bank examiner via email or share them using a USB drive, sometimes with a paper copy of the forms. Though the data analysis is done using Excel spreadsheets, the reports Lindsay produces will be shared with other stakeholders in pdf format or only as the paper copies.

Information Management

The critical information for the FIC is the financial reports received from five banks, which will be entered manually into a FIC's Excel database by Lindsay, and the aggregated data and reports produced from the Excel spreadsheets, which will be used to evaluate banks' performance and be reported to stakeholders.

The present Excel database spreadsheets were provided by Pacific Financial Technical Assistance Centre and improved by Lindsay based on the FIC's needs. The FIC has been using this Excel database for more than six years and all data from then on is stored there. Quarterly, banks send the prudential return forms to the FIC, and Lindsay will enter those data to the "Database_FIC Prudential Return" file after she finishes the data validation process. The spreadsheets will automatically compute the data in "Database_FIC Output Ratios and Indicators" and "BE Analysis_Remittances". Lindsay will then analyze those aggregated data and produce diagram reports. Sem will take outcomes from the diagrams and report them to the board members. Those aggregated data and reports will also be submitted to the International Monetary Fund (IMF) and the Asian Development Bank (ADB).

Business Systems

Since the FIC's all financial activities are governed by the Ministry of Finance, it has no its own business system. All accounting process including budgeting will be the government's responsibility. If the FIC has any expenditure, Tikei will call the Ministry of Finance to request for the amount. In addition, the government will provide the FIC with the monthly accounting report and the FIC can also ask for it at any time.

II. Goal 1: Improve technical capacity for the organization by adopting a new database solution

Motivation

The FIC has been using Microsoft Excel spreadsheets as the database for more than six years and all data management and analysis work were finished manually. The data validation and data entry were the most time-consuming part. It took Lindsay at least two days to validate the prudential return form, including checking missing data, data inconsistency and material changes. Though all the quantitative financial data was managed electronically, Lindsay had to use the paper copies to check the material changes. Also, it took another half an hour to enter data of each bank into the database. Considering there were other tasks to do, Lindsay spent almost 30 days dealing with data and produce reports.

Moreover, as the Excel spreadsheet gets bigger, it would get slower to finish computation and generate reports. This would increase the risk of losing data.

Another concern the development partner proposed was that banks have to manually input data into the required prudential return forms, although the data has already been stored in their systems. It would be better to have a technology tool to extract data directly from banks' system to the FIC's database without requiring someone to input it manually.

Therefore, a new approach of managing the database to facilitate data collection and validation was needed. Not only would this help the FIC enhance the work efficiency, but a comprehensive database system would also better serve the banks by simplifying the process of submitting quarterly reports.

Outcomes

The development partner and the student consultant had several meetings to discuss the alternative solutions, and both self-development and outsourcing approaches were proposed and considered. Three possible solutions were discussed and evaluated:

First, using Excel macros and two data validation applications. Two independent application can be developed to help Lindsay validate the data and list where the errors are. As for data entry, by linking data between different Excel workbooks and building Excel macros using Visual Basic for Application (VBA), it is possible to automate the data entry process. This approach will reduce the time Lindsay spends on data validation and data entry to a certain extent. However, such a solution can only meet the short-term needs of the FIC. It is hard to guarantee the scalability as the organization grows and to interact with banks' system for data collection.

Second, building a Microsoft Access database. Access as a database tool has a more advanced capability of data storage and retrieval, which can greatly reduce the concern of scalability. Moreover, a user interface can be built using Access VBA, which will allow Lindsay to interact with the database without having to know comprehensive database knowledge. However, though Access can greatly optimize the data storage, it might not be an effective solution considering that the priority of this project is to deal with the data entry and validation. Also, it will be even more complicated to use Access to customize reports as the existing format required by stakeholders.

Third, selecting an outsourcing vendor to develop a mature database system. The vendor should be able to provide a solution to meet all requirements of the FIC, including data validation, collection, retrieval and visualization. The major concerns are the outsourcing expenses (including development cost and future maintenance cost) and data security.

The comparison of three alternative solutions is shown in the chart below.

| | Self-development | | Outsourcing |
|------------------------------|--|--|---|
| | Advanced Excel Database | Access Database | |
| Data Validation | Creating new applications to check the missing data, data inconsistency, and material changes, the result of which will be listed into a CSV file The user can check the data validation according to the information in the CSV file | | A comprehensive and advanced solution will be provided, which will satisfy all requirements of the FIC. In addition, the user interface will be built to collect data from banks. |
| Data Entry/Collection | Allowing users to click the buttons to realize the data entry by building macros in Excel | Users import the whole spreadsheet into the database using a user interface, and the Access stores the data in its structured way | |
| Data Retrieval | Retrieving manually | Data can be easily and quickly retrieved using queries | |
| Data Visualization | More advanced data visualization; Easier to customize the output; Able to present data in a variety of professional looking charts | Unable to customize the reports easily; Unlikely to change the report format and implement more advanced capability without proficient knowledge of VBA; One workaround is using Access to manage the data and export the data to Excel for formatting and reporting | |
| Technical Capacity | Lindsay is proficient in using Excel and has the capacity of improving the Excel as needed. | Lindsay has little experience in using Access, but willing to learn it; Conrad will help maintain the Access database | The vendor will provide IT maintenance service |

After the careful evaluation and discussions with the FIC, we finally decided to outsource the FIC's database to a third-party vendor in order to build a more advanced and sustainable solution and guarantee the future maintenance and upgrades. At the same time, a temporary approach to reduce Lindsay's workload during transition was realized by optimizing the current Excel database for data entry and building two new applications to facilitate data validation (See III. Goal 2).

Since the database for most bank supervisors would be similar to a large extent, the bank supervisors of Pacific countries would get together in the mid-August and negotiate with the vendors in order to get a better price. After that, each bank supervision might request the vendor for some customization based on its specific needs. The student consultant conducted the careful investigations on data capture, collation and analysis process of the FIC and created the "Specification for Development" document (See Appendix A) according to the FIC's work flow and daily demands of the database system. This will provide the vendor with a general business requirements of the FIC's database system. Moreover, several meetings were held to help the development partner understand how the database system works and develop the technical capacity for the negotiation with the vendors and future technology decisions.

The major risks to sustainability included:

- Once the decision has been made, the success of the implementation and future maintenance will heavily rely on the vendor. Thus, selecting an experienced and reliable vendor is of great importance.
- Two types of banks may require different approaches or interfaces to submit data. This requires further discussions with both vendors and banks.

Recommendations

After the comprehensive system is developed by the vendor based on the requirements, it is suggested further implementing dashboards to advance the use of the system and help with the decision-making process. This will be a long-term technology strategy for the FIC to better achieve its mission of promoting a stable banking and financial sector.

Since the FIC collects a great amount of data each quarter from banks, building dashboards in the system to leverage data analysis will be possible to create more value for the organization. Dashboards will be able to present a holistic view of banks' performance over years in a real-time basis and provide predictive insights for the FIC to better regulate all banks. The FIC can discuss the idea of dashboard with the vendors and consider to implement it based on its budget in the future.

III. Goal 2: Simplify the process of data entry and validation by advancing the use of technology

Motivation

According to the initial talk with vendors, the implementation process will last approximately 18 months. During this transition period, it would be better to have a temporary solution to help Lindsay with data validation and data entry work. This can be easily achieved by advancing the use of Microsoft Excel.

This temporary solution greatly simplified the process of data entry and validation with low costs and risks. Lindsay could easily know where errors and material changes were, and data could be entered into the database automatically.

Though the solution would be replaced by the dvanced database system developed by the outsourcing company in the next two years, it helped the FIC save a lot of time on daily work and get prepared for the new system during the transition period.

Outcomes

Data Validation

Two approaches of data validation automation were proposed:

1. Validation After Data Entry

One approach is to add "Conditional Formatting" in the current database and this will allow the user to easily identify the errors and material changes highlighted by the special format, such as font color or fill color. The users will need to enter data into database before they can do validation.

2. Validation Before Data Entry

The other way is to build two independent applications to facilitate data validation. One is used for checking missing data and data inconsistency in Prudential Return Form. The other application is

used for checking the material changes above 5% between two files. Finally, the applications will create CSV files to list all errors or material changes. The user will use the application to validate the data before entering it into the database.

After discussions with Lindsay, it was decided to use the second approach because the previous work process was to do validation before data entry, which Lindsay felt more comfortable with. This also reduced the risk of having incorrect data stored in the database. Only after all data has been validated correctly can it be entered into the database.

Know all the requirements, Apoorva Havanur, the other student consultant who work with the FIU, helped build these two applications using Python programming language. The error reporting app will show the cells which contain errors as well as the details of the error message. The change detecting app will locate the cells which reveal above 5% changes between two files that the user selected. The app will also show the financial account names, account numbers, prior value, current value as well as the percentage difference between two values.

Several tests were finished to customize the applications based on the partners' needs. The guidance of using the apps was documented (See Appendix B). Previously, it took Lindsay at least 2 days to check errors and material changes of the return forms for each bank. Now, it would only take 5 minutes to run the applications and get the results.

Data Entry

The data entry automation was realized by using a Template as a bridge between the database and the "Prudential Return Form" and building macros using VBA to automate the work process.

The student consultant created the Template file for each bank and linked each cell in the database to the Template files. In this way, when the data in templates is changed, the value in the database will also be updated. Then, one command button with macros assigned to it was created for each bank in the database.

The macros execute the following major processes:

1. Ask the user to select the new return forms
2. Migrate the linked cells from the previous quarter to the new quarter
3. Copy the value from the return forms to the Template
4. Close the files that are opened by the macros

Several tests were finished to make sure everything works well. The possible exceptions have been handled and the backup files have also been created.

What the user needs do now is just to click the button, select a new "Prudential Return Form" and choosing the range of quarters in spreadsheets. Then the macros and the Excel itself will help the user finish the data entry work, which only takes one minute instead of half an hour as before. This also greatly reduced the manual data entry mistakes.

Capacity Building

Lindsay actively participated in the test rounds of the applications and database customizations. The student consultant helped her understand how two applications and the macros work together to facilitate her work. After several demonstrations and trials, she successfully understood how macros work. She also grasped the different ways to fix the possible problems know the ways. The student consultant illustrated how the VBA code works to her and encouraged her to learn some basic

customization skills. This allowed her to be able to modify the code when the initial addresses or names of the files need to be changed.

The instructions on using macros were also documented as well as the approaches of fixing some unexpected errors of the database to give a reference to the FIC staff members (See Appendix C).

Summary

Previously, Lindsay had to validate the return forms cell by cell, called banks to re-submit the forms every time she identified the errors and then continued the validation work until confirming that all data was reasonable. After the validation, she had to enter the data into the database manually. Currently, with two applications, she can know all errors and material changes quickly and only has to call the bank once to notify all errors. Also, the validated data can be transferred into the database by simply clicking the command button and following the instructions. In the past, the whole process for five banks (including banks' responsive time) took her around 30 days; it now only takes her 2 or 3 days depending on the responsiveness of the banks.

This greatly increased the work efficiency of the FIC and Lindsay would have more time to conduct risk analysis and compose reports during the transition period. Moreover, these new tools would also provide the FIC stronger bargaining power to negotiate with vendors.

The FIC is able to maintain the sustainability of the outcomes with technical capability Lindsay has acquired and the documents of instructions that the student consultant provided. In addition, Once the new database system has developed, the FIC will no longer need the applications and the Excel database. All data in the current database will be migrated to the new system and the vendors will be responsible for the maintenance and IT support.

The potential risks of this temporary solution included:

- It may require splitting the database as the file gets bigger and slower.
- All the format and the names of some files should not be changed (See Appendix B, C).
- If the FIC gives licenses to the new bank, the database needs to be updated (See Appendix C).

Recommendations

Within the transition period, one suggestion is that the generation of the current diagrams for reports is also possible to be automated by building VBA macros, which will save 15 more minutes each quarter. The related resources and Excel VBA tutorials (i.e., Creating pivot table using VBA, Find the last column with VBA) can be found on Youtube.com.

Another suggestion is that the FIC can help other countries of Pacific islands to improve their technical capability by expanding the use of these new tools. This will help the FIC have a deeper understanding of the new applications and the database and build a great reputation among the Pacific countries.

About the Consultant

Yuanhan Liu is a graduate student in the Master of Information Systems Management program at Heinz College, Carnegie Mellon University. She shows a strong enthusiasm in using technology to make a difference in the community. After graduation, she wants to pursue her career as an IT consultant and keep helping organizations improve their technical capacity.

Appendix A.

Specification for Development

1. Automation of data collection

- The system should have a website/interface to enable banks to submit the quarterly data
- The interface should support two data formats
 - Being compatible with banks' system to capture data (for banks using their own systems)
 - Being able to capture data from Excel "Prudential Return Form" (for banks using Excel)

[Pre-requisite]

Require banks to provide system access to the FIC OR use their systems to process the data and submit to the FIC's system

2. Automation of data quality checks

- The system should be able to check errors (missing data, data inconsistency, etc.) of the data received. If there is any error, block the submission and point out where the error is
- The system should also check and indicate all material changes within the database (above 5% changes compared to the last quarter and the same quarter in the last year)
- ✧ (Optional) When there is a material change, the system will ask the user to decide whether to ignore it or ask banks for explanation materials (i.e. via sending the bank an email automatically)

3. Generation of Reports

- The system should be able to generate "Output Ratios and Indicators" and "Remittances Analysis" spreadsheets, which include bank-specific, insured/uninsured and industry ones
- The system should be able to have a dashboard or enable data visualization to produce "Remittance Report" (or other charts, pivot tables and graphs)
- The system should support report customization. The user should be able to customize reports by banks, forms and quarters/years, etc., as well as to customize the formats of the reports

4. Data Security

- Cloud-security
- Data encryption: All data stored needs to be encrypted in transit
- Identification and Authentication: The system should require login and verify banks' identity before they can submit data into the system
- Access control: The system should set access levels for each user. The administrator should be able to control the users' access levels to modules and functionality

5. Training and Ongoing Technical Support

- The vendor should provide sufficient trainings and documentations to allow users to understand, administrate and use the solution
- The vendor should be responsible for the ongoing maintenance and upgrade of the solution

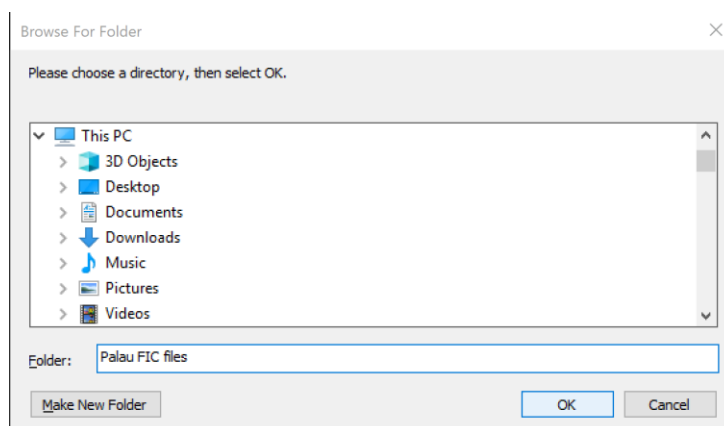
Appendix B.

Instructions on Using Apps to Facilitate Data Validation

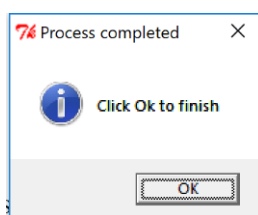
1. ErrorReport App

Step 1: Run the “errorreport.exe” app

Step 2: Select the folder that contains all return forms needed to be checked and click OK



Step 3: Click Ok to finish, and then all error report results will be produced as the new files in the same folder that the user selected. The user can open these files with Microsoft Excel or Notepad.

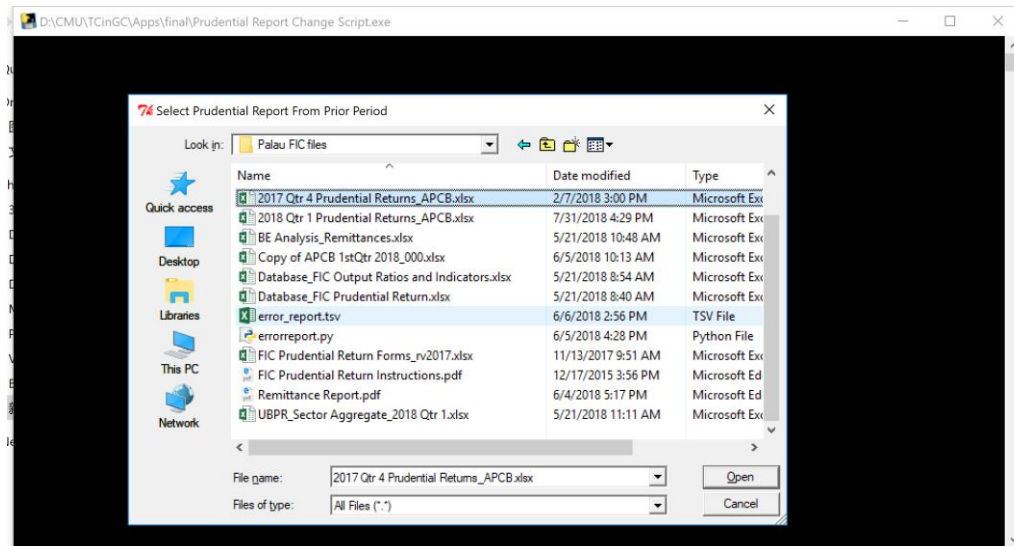


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| 2018 Qtr 1 Prudential Returns_APCB.xlsx | 5/10/2018 12:59 PM |
| 2018 Qtr 1 Prudential Returns_BOG.pdf | 5/7/2018 10:26 AM |
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| 2018.04.27 BOG_email re PR.pdf | 5/7/2018 10:27 AM |
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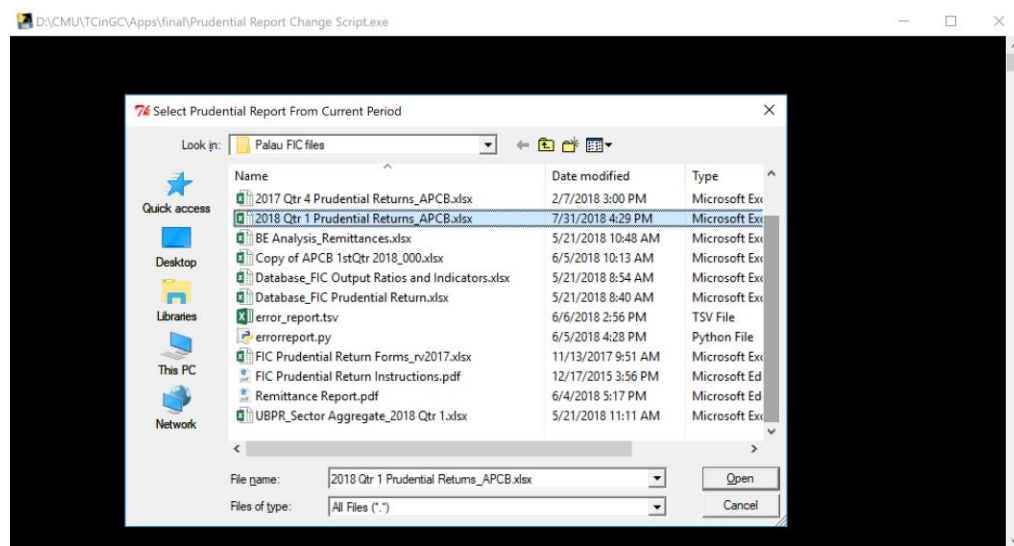
2. ChangeDetect App

Step 1: Run the “Prudential Report Change Script.exe” app

Step 2: Select Prudential Report from prior period (the file of last quarter or the same quarter of last year)



Step 3: Select Prudential Report from current period



Step 4: Click Ok to finish, and then the change report will be produced as the new file in the same folder that the user selected. The user can open the file with Microsoft Excel or Notepad.

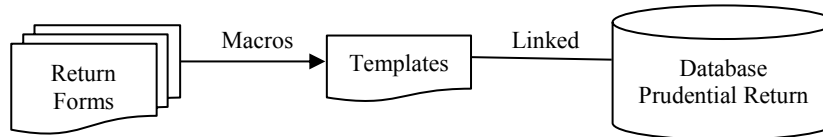
Note:

- 1) The format of the prudential forms should not be changed
- 2) The file trackcells.csv includes all cells that need to be compared between two files. It should always be in the same folder as the changedetect.exe. When users want more cells to be checked in the future, they can easily add those cells in the trackcells file.

Appendix C.

Instructions on Using Macros in FIC Database

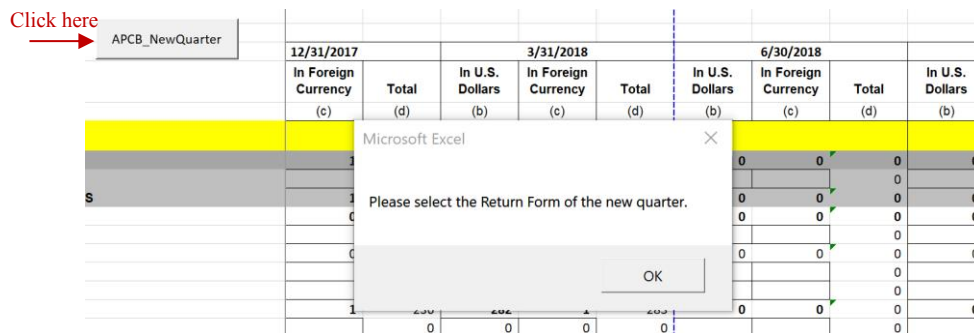
1. How It Works



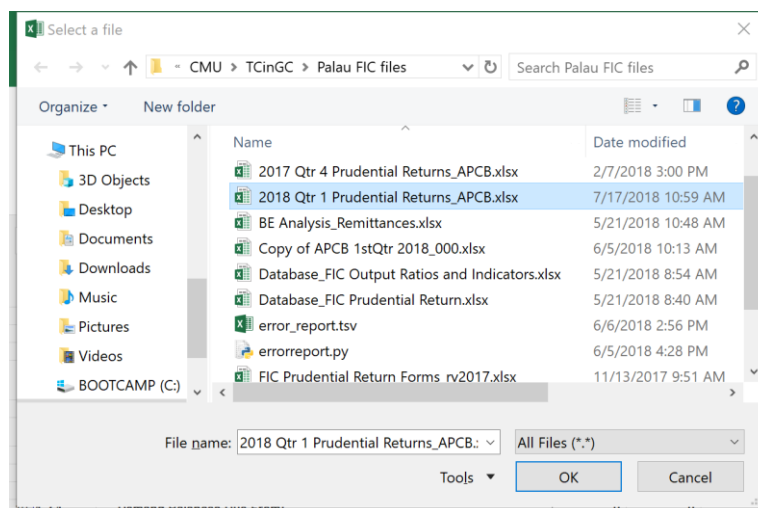
- 1) Copy the data with linked formula from the columns of the last quarter to the new quarter
- 2) Delete all the formula and only keep data value in the last quarter
(Now, the template will be only linked to columns of the new quarter)
- 3) Open both the template and the new return form the user selected
- 4) Replace the data of the template with the data of the new quarter
- 5) Data of the new quarter in the database will be updated since the template is linked to the database
- 6) Close the template and the return form.

2. How to use it

Step 1: Click the “NewQuarter” button in the database and it will ask you to select the file



Step 2: Select the Return Form of the new quarter and click “OK”



Step 3: [IMPORTANT!] Confirm the file you selected

If the name of the file is correct, click “Yes”; if not, click no, then repeat the step 1 and 2.

[illegible]

Step 4: Select the column range of the last quarter. For example, in this case, March is the last quarter. Therefore, click any place between the column title BN and BP, the Excel will fill the range into the input box, or you can choose to input the range by yourself.

Click here

| | BN | BO | BP | BQ | BR | BS | BT |
|-----------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|
| APCB_NewQuarter | | | | | | | |
| | 3/31/2018 | | | 6/30/2018 | | | |
| | In U.S. Dollars (b) | In Foreign Currency (c) | Total (d) | In U.S. Dollars (b) | In Foreign Currency (c) | Total (d) | In U.S. Dollars (b) |
| | | | | | | | |
| DNS | | | | | | | |
| d | | | | | | | |
| d | | | | | | | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 283 | 1 | 283 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | | | | |
| | 283 | 1 | 283 | | | | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | | | | |

Input ? X

Please select the column range of the last quarter

\$BN:\$BP

OK Cancel

NOTE: The range should always be the range with the formula linked to the templates. Otherwise, please refer to “Exception Handling” section to fix the database before continuing to use it.

Step 5: Select the column range of the new quarter. You can choose either to select the range or input it.

The screenshot shows an Excel spreadsheet with columns labeled BN, BO, BP, BQ, BR, BS, BT. A red dashed box highlights the range BQ:BS, with a red arrow pointing to it from the text "Click here". Below the spreadsheet, there is a yellow highlighted row and a grey highlighted row. An "Input" dialog box is open, displaying the message "Please select the column range of the new quarter". The input field contains the text "\$BQ:\$BS", which is also highlighted by a red arrow. The dialog box has "OK" and "Cancel" buttons.

Step 6: [IMPORTANT!] Confirm the ranges you selected

If the name of the file is correct, click “Yes”, then the Excel macros will run and migrate the data; if not, click no, then the Excel will show “You cancelled the action.” Then repeat the step 1 to 5 to select the correct data.

[illegible]

Step 7: Click the “Update” to allow the Template to get new data when it opens by the macros.

For the Calendar Quarter Ending:

| | | | |
|---------------|-------|---------|--------|
| Special Bank | 31 | Mar | 2018 |
| (institution) | (day) | (month) | (year) |

Production Date/Time: 3/13/2009 18:03

ASSETS

| Balance Sheet | Risk Weight | Risk Weighted |
|---------------|-------------|---------------|
| Amount | Factor | Assets |
| (b) | (c) | (d) |
| Less Year | | |

Microsoft Excel

⌵

⚠ This workbook contains links to one or more external sources that could be unsafe.

If you trust the links, update them to get the latest data. Otherwise, you can keep working with the data you have.

Update Don't Update Help

| | | |
|---|------|---|
| - | 100% | 0 |
| - | 100% | 0 |
| - | 0% | 0 |
| - | 0% | 0 |

Step 8: Wait for several seconds to let the macros migrate the data. Then you should find that the data has been entered into the database successfully.

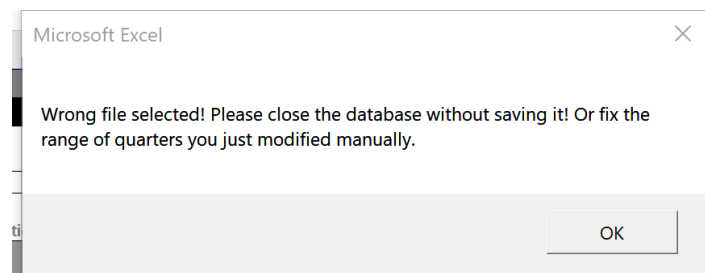
Step 9: Finally, be sure to enter the “Total Number of ATMs” for each bank manually

3. Exception Handling

1) Wrong File Selected

Case 1: The format of the selected file is **different** to which of the Return Form

The Excel will show the error message. However, all linked formula has been migrated from the last quarter to the new quarter.



Case 2: **[Be careful]** The format of the selected file is same as which of the Return Form (eg. You select the return form of previous quarters/other banks/invalidated file)
The Excel itself cannot recognize this error, so it won't show the error message. However, all linked formula has still been migrated from the last quarter to the new quarter.

There are two approaches to solve the above errors.

1. **[Recommended]** Close the database without saving it. Also, close the template and the return form without saving them, if necessary.
2. Fix the columns manually as following instructions.

Error Example:

I wanted to add new data to Quarter 1 in 2018 but incorrectly selected the previous file of Quarter 4 in 2017. Now, we can find that all formula is in Q1 and there is only data value rather than formula in Q4. Therefore, the previous data should not be changed anymore. We can use future columns to help solve the problem.

Step 1: Make sure the columns where all formula is. (Now it is in Q1)

st\[Template_APCB.xlsx]Form 1 Bal Sheet!\$C\$14

Formula is in Q1 now, not in Q4 any more

| BK | BL | BM | BN | BO | BP | BQ | BR | BS |
|-----------------|---------------------|-------|-----------------|---------------------|-------|-----------------|---------------------|-------|
| | | | | | | | | |
| 12/31/2017 | | | 3/31/2018 | | | 6/30/2018 | | |
| In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total |
| (b) | (c) | (d) | (b) | (c) | (d) | (b) | (c) | (d) |
| 1,204 | 1 | 1,205 | 1,204 | 1 | 1,205 | 0 | 0 | 0 |
| 13 | 0 | 13 | 13 | 0 | 13 | 0 | 0 | 0 |
| 338 | 1 | 339 | 338 | 1 | 339 | 0 | 0 | 0 |
| 103 | 0 | 103 | 103 | 0 | 103 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 103 | 0 | 103 | 103 | 0 | 103 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 103 | 0 | 103 | 103 | 0 | 103 | 0 | 0 | 0 |
| 235 | 1 | 236 | 235 | 1 | 236 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |


Step 2: Repeat the same data entry process to add the correct data of Q1 to Q2 temporarily.
Now, the correct data of Q1 with the formula is in the Q2

Formula is in Q2 now, as well as the correct data of Q1

est\[Template_APCB.xlsx]Form 1 Bal Sheet!\$C\$14


| BK | BL | BM | BN | BO | BP | BQ | BR | BS |
|-----------------|---------------------|-------|-----------------|---------------------|-------|-----------------|---------------------|-------|
| | | | | | | | | |
| 12/31/2017 | | | 3/31/2018 | | | 6/30/2018 | | |
| In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total |
| (b) | (c) | (d) | (b) | (c) | (d) | (b) | (c) | (d) |
| 1,204 | 1 | 1,205 | 1,204 | 1 | 1,205 | 1,204 | 1 | 1,205 |
| 13 | 0 | 13 | 13 | 0 | 13 | 14 | 0 | 14 |
| 338 | 1 | 339 | 338 | 1 | 339 | 368 | 1 | 369 |
| 103 | 0 | 103 | 103 | 0 | 103 | 86 | 0 | 86 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 103 | 0 | 103 | 103 | 0 | 103 | 86 | 0 | 86 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 103 | 0 | 103 | 103 | 0 | 103 | 86 | 0 | 86 |
| 235 | 1 | 236 | 235 | 1 | 236 | 282 | 1 | 283 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Step 3: Copy all three columns of Q2 (BQ:BS) to Q1 (BN:BP).
Now, the new data has been entered in the correct place.



| BK | BL | BM | BN | BO | BP | BQ | BR | BS | BT | BU | BV |
|-----------------|---------------------|-------|-----------------|---------------------|-------|-----------------|---------------------|-------|-----------------|---------------------|-------|
| | | | | | | | | | | | |
| 12/31/2017 | | | 3/31/2018 | | | 6/30/2018 | | | 9/30/2018 | | |
| In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total |
| (b) | (c) | (d) | (b) | (c) | (d) | (b) | (c) | (d) | (b) | (c) | (d) |
| 1,204 | 1 | 1,205 | 1,204 | 1 | 1,205 | 1,204 | 1 | 1,205 | 0 | 0 | 0 |
| 13 | 0 | 13 | 13 | 0 | 13 | 14 | 0 | 14 | | | 0 |
| 338 | 1 | 339 | 338 | 1 | 339 | 368 | 1 | 369 | 0 | 0 | 0 |
| 103 | 0 | 103 | 103 | 0 | 103 | 86 | 0 | 86 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 |
| 103 | 0 | 103 | 103 | 0 | 103 | 86 | 0 | 86 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 |
| 103 | 0 | 103 | 103 | 0 | 103 | 86 | 0 | 86 | | | 0 |
| 235 | 1 | 236 | 235 | 1 | 236 | 282 | 1 | 283 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 |

Step 4: Clear the data of Q2. The simplest way to that is to copy any three columns of future quarters (eg. BT:BV) to Q2 (BQ:BS)



| BK | BL | BM | BN | BO | BP | BQ | BR | BS | BT | BU | BV |
|-----------------|---------------------|-------|-----------------|---------------------|-------|-----------------|---------------------|-------|-----------------|---------------------|-------|
| | | | | | | | | | | | |
| 12/31/2017 | | | 3/31/2018 | | | 6/30/2018 | | | 9/30/2018 | | |
| In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total |
| (b) | (c) | (d) | (b) | (c) | (d) | (b) | (c) | (d) | (b) | (c) | (d) |
| 1,204 | 1 | 1,205 | 1,204 | 1 | 1,205 | 1,204 | 1 | 1,205 | 0 | 0 | 0 |
| 13 | 0 | 13 | 14 | 0 | 14 | 14 | 0 | 14 | | | 0 |
| 338 | 1 | 339 | 368 | 1 | 369 | 368 | 1 | 369 | 0 | 0 | 0 |
| 103 | 0 | 103 | 86 | 0 | 86 | 86 | 0 | 86 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 |
| 103 | 0 | 103 | 86 | 0 | 86 | 86 | 0 | 86 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 |
| 103 | 0 | 103 | 86 | 0 | 86 | 86 | 0 | 86 | | | 0 |
| 235 | 1 | 236 | 282 | 1 | 283 | 282 | 1 | 283 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 |

Congratulation! You have successfully fixed the problem! See below how the correct database looks like now.

| BK | BL | BM | BN | BO | BP | BQ | BR | BS | BT | BU | BV |
|-----------------|---------------------|-------|-----------------|---------------------|-------|-----------------|---------------------|-------|-----------------|---------------------|-------|
| | | | | | | | | | | | |
| 12/31/2017 | | | 3/31/2018 | | | 6/30/2018 | | | 9/30/2018 | | |
| In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total | In U.S. Dollars | In Foreign Currency | Total |
| (b) | (c) | (d) | (b) | (c) | (d) | (b) | (c) | (d) | (b) | (c) | (d) |
| 1,204 | 1 | 1,205 | 1,204 | 1 | 1,205 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 13 | 14 | 0 | 14 | | | | | | 0 |
| 338 | 1 | 339 | 368 | 1 | 369 | 0 | 0 | 0 | 0 | 0 | 0 |
| 103 | 0 | 103 | 86 | 0 | 86 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| 103 | 0 | 103 | 86 | 0 | 86 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| 103 | 0 | 103 | 86 | 0 | 86 | | | | | | 0 |
| 235 | 1 | 236 | 282 | 1 | 283 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |

2) Formula Messed Up

If the formula in the database has been messed up accidentally, you can either use the formula of other banks to replace it or the formula of the single backup database.

Step 1: Copy three columns of data with correct formula (either the other banks' or the backup file) to the columns with messed formula

Step 2: Select all columns that you just put the correct formula in and replace ONLY the file address or name in the formula editing area with the correct one by selecting “replace” button and inputting the address/name

For example, I copied the three correct columns from PCB and pasted it to BQ:BS of APCB, so replace the “Template_PCB” with “Template_APCB”. You can also use the original single database backup (see Backup Files) to copy columns from as long as making sure the template address and name is correct.

4. Backup Files

The user should back up all files each quarter, including the database and all templates. Backup files can be used under such circumstances:

- 1) Replace the database when the formula or the database itself is messed up
- 2) Replace the templates if necessary

5. Other Important Points

- All templates must be **at the initial address and in the same folder as the database**. The initial address is: [\\192.168.1.200\fic\FIC E-FILING SYSTEM\BANKS\Bank Qtly Financial Returns\Off Site Reporting\Offsite Monitoring_WORKING FILES\FileName.xlsx](#) *(See 6 if you have to change it)
- The names of the templates cannot be changed. The initial names are: *Template_APCB.xlsx*, *Template_BOG.xlsx*, *Template_BOH.xlsx*, *Template_BP.xlsx*, *Template_PCB.xlsx*
- The format of both templates and Prudential Return Form cannot be changed, including the worksheets names. The initial worksheets names are: *Form 1 Bal Sheet*, *Schedule 1 Loans & Advance*, *Sch 2 Interest Rates*, *Sch 3 - Related Parties*, *Sch 4 FX Exposure*, *Sch 4.1 Remittances*, *Sch 5 - Maturity GAP*, *Sch 6 - Large Depositors*, *Sch 7 - Large Borrowers*, *Sch 8 - Rate Sensitivity*, *Form 2 - Consolidated P&L*, *Form 3 - Risk Based Capital*.

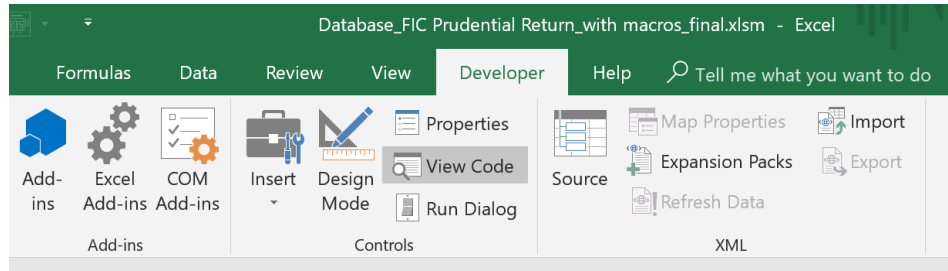
6. Editing Code to Make the Database More Flexible

1) Change the name/address of files

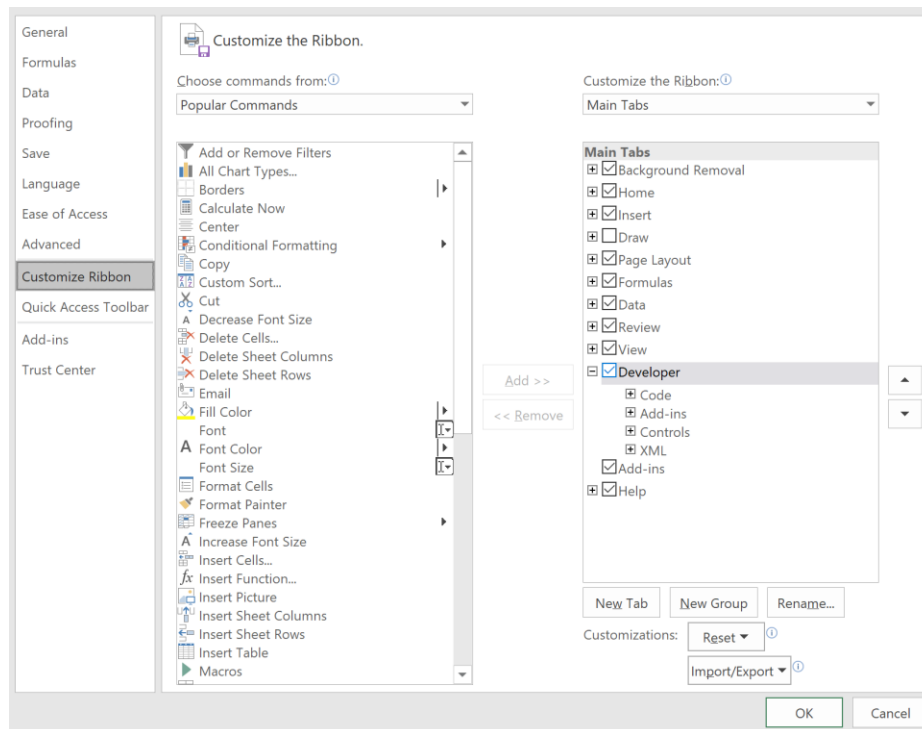
When you have to move the database or the templates, or when you want to change the name of the templates and the name of worksheets in it, editing VBA code can help you do these.

The instructions are shown below.

Step 1: Find and click “View Code” under “Developer” Tab.

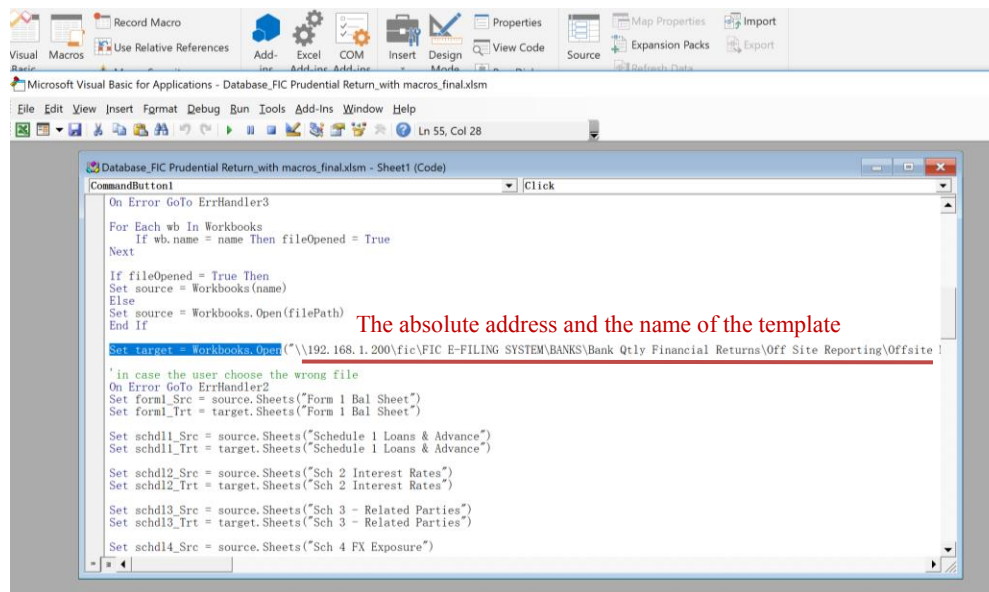


If the “Developer” Tab doesn’t show up. You can click File --> Options --> Customize Ribbon, under the Main Tabs, tick the “Developer”, then it will show up.

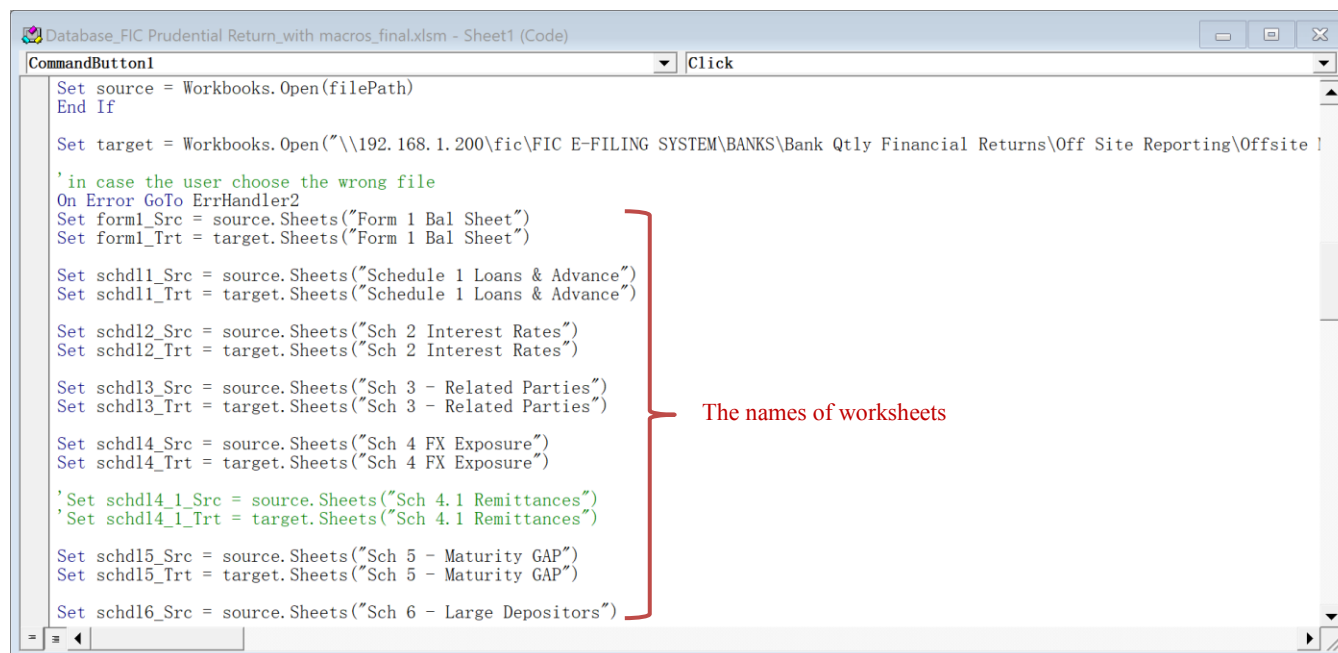


Step 2: Edit code as needed

Scroll down the code and find the “Set target = Workbooks.Open” line. In the parentheses and double quotes is the absolute address of the template and its name. You can edit it to where the template file is or what the name of it is as needed.



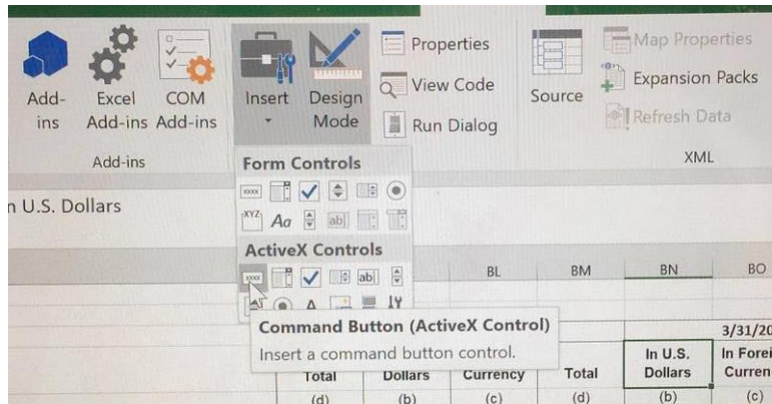
The name of the worksheets can also be customized by editing the contents in the parentheses and double quotes after “source.Sheets” or “target.Sheets”. (source refers to the return form that sent by banks; target refers to the template)



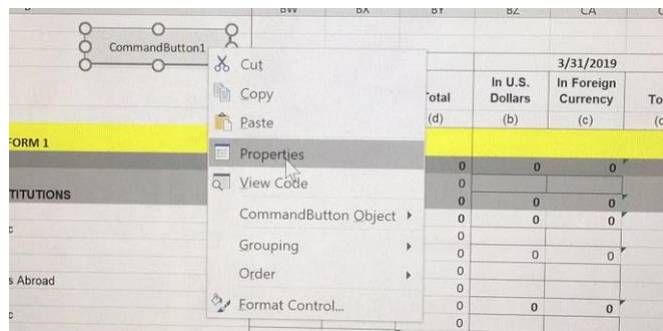
Step 3: Repeat Step 1 and 2 for the other banks to keep consistency.

2) Fixing the unexpected database problem by building a new control button

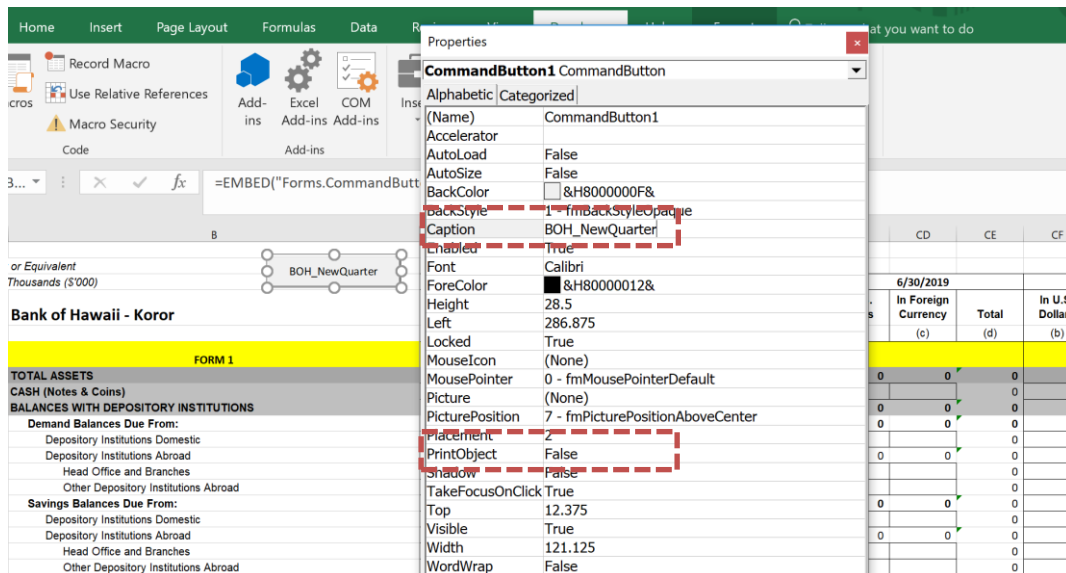
Step 1: Change to the design mode. Then Insert --> ActiveX Controls --> Button.



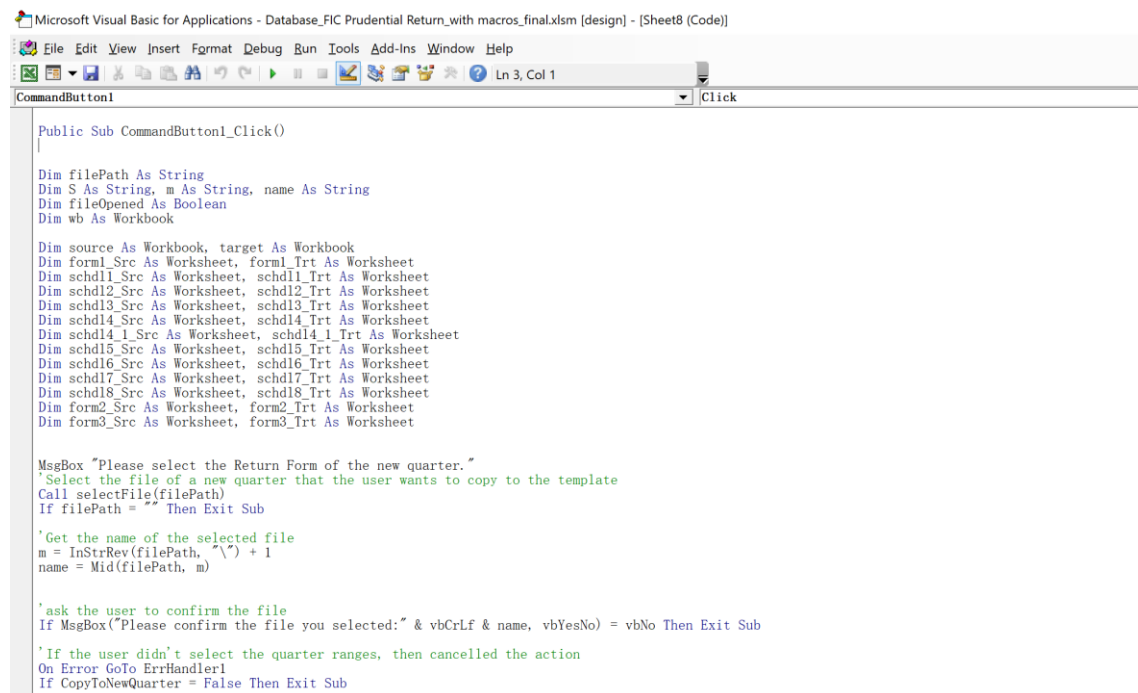
Step 2: Right-click the command button you created and choose “Properties”



Step 3: You can edit the caption as you want and be sure to change the PrintObject to “False” so that the button won’t show up when being printed.



Step 4: Right-click the button and choose “view code”. Paste all the code and change the necessary part as needed.



```

Microsoft Visual Basic for Applications - Database_FIC Prudential Return_with macros_final.xlsm [design] - [Sheet8 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Ln 3, Col 1
Click

Public Sub CommandButton1_Click()
    Dim filePath As String
    Dim S As String, m As String
    Dim fileOpened As Boolean
    Dim wb As Workbook

    Dim source As Workbook, target As Workbook
    Dim form1_Src As Worksheet, form1_Trt As Worksheet
    Dim schd11_Src As Worksheet, schd11_Trt As Worksheet
    Dim schd12_Src As Worksheet, schd12_Trt As Worksheet
    Dim schd13_Src As Worksheet, schd13_Trt As Worksheet
    Dim schd14_Src As Worksheet, schd14_Trt As Worksheet
    Dim schd14_1_Src As Worksheet, schd14_1_Trt As Worksheet
    Dim schd15_Src As Worksheet, schd15_Trt As Worksheet
    Dim schd16_Src As Worksheet, schd16_Trt As Worksheet
    Dim schd17_Src As Worksheet, schd17_Trt As Worksheet
    Dim schd18_Src As Worksheet, schd18_Trt As Worksheet
    Dim form2_Src As Worksheet, form2_Trt As Worksheet
    Dim form3_Src As Worksheet, form3_Trt As Worksheet

    MsgBox "Please select the Return Form of the new quarter."
    'Select the file of a new quarter that the user wants to copy to the template
    Call selectFile(filePath)
    If filePath = "" Then Exit Sub

    'Get the name of the selected file
    m = InStrRev(filePath, "\") + 1
    name = Mid(filePath, m)

    'ask the user to confirm the file
    If MsgBox("Please confirm the file you selected:" & vbCrLf & name, vbYesNo) = vbNo Then Exit Sub

    'If the user didn't select the quarter ranges, then cancelled the action
    On Error GoTo ErrHandler1
    If CopyToNewQuarter = False Then Exit Sub

```

Step 5: Close the VBA Panel and close the “Design Mode”

7. Creating Macros for a New Bank

Step 1: In the same folder of the database, copy and rename any of the template to make it a new template for a new bank

Step 2: In the database, create a new worksheet and copy all value/formula from the worksheet of any other bank. Clear all data but the three columns with the formula linked to the template

Step 3: Select the three columns with linked formula. Replace the template name with the new bank’s name (See Step 2 in 3. Exception Handling --> 2) Formula Messed up)

Step 4: Add the new command button and create new macros with VBA code (See 6. Editing Code --> 2) Fixing the unexpected database problem)

Step 5: Edit formulas of Insured/Uninsured/Industry worksheets as well as the “Output Ratios and Indicators” Workbook