January, 2014

Data Visualization & Reporting for Case Management

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Introduction

In the Case Management space, one critical area for helping improve efficiencies of case workers is that of analytics and reporting. Generating and presenting case reports based on various key performance indicators (KPIs) is critical to empower the case worker to take the best possible action for resolving the case.

Through this paper we have looked at the Customer on-boarding process of the banking industry. Our focus was on Customer on-boarding requests (cases) coming in and how the back-office operations for such requests can be optimized. We selected a set of Key Performance Indicators (KPI) and looked at how these KPIs will help in Business Performance Improvement (BPI) initiatives. To achieve this, we have developed Data Visualization screens using charts, graphs and other visualizations.

Customer on-boarding

Customer on-boarding is the first real experience of the customer with the organization. It involves many important activities, these are depicted in Figure 1.
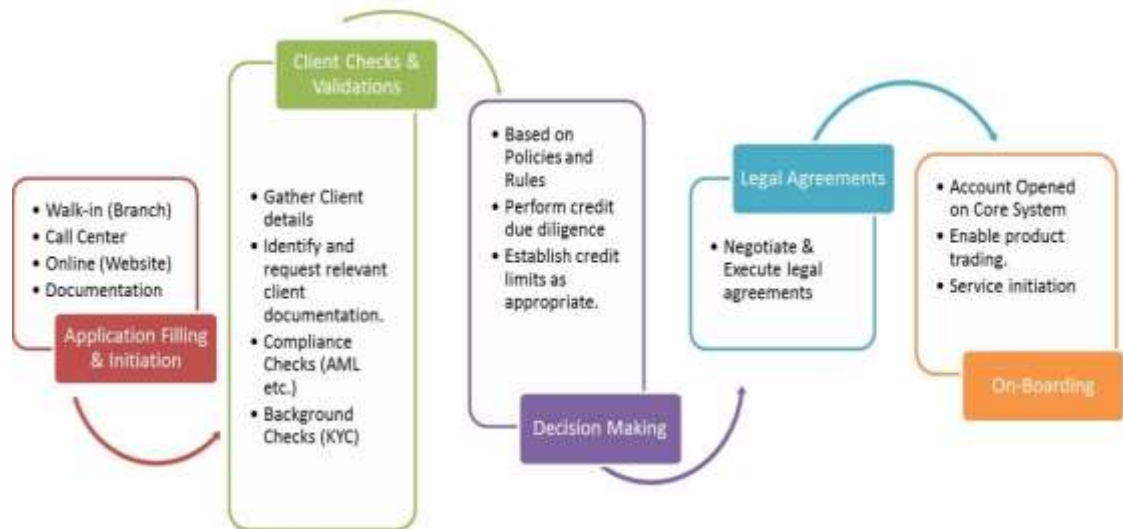

Figure 1: Customer On-Boarding Life Cycle

1. **Application Filling & Initiation**: In most of the banking organizations, the sales/marketer connects with the client through campaigns etc. and generates leads of the prospects for their different products. The client acquisition process begins with application filing & Initiation. The client can use different modes to show their interest for onboarding. They can visit the nearest branch or contact the customer care center or visit the bank website

for online application filing. The bank documents the application for the type of product they are intended for.

2. **Client checks & validation**: Next the dedicated on-boarding team (back office) takes ownership of the onboarding request and connects with other departments to process the request. They do the client checks and verification by gathering client details through various ways. These can include requesting documents for identification such as driving license, passport and checking their validation. Apart from these different compliance checks are performed depending upon the law of the land.

   One of these compliance checks could be Anti Money Laundering (AML). They are set of laws or regulations designed to cease the practice of generating income through illegal ways. In most cases money launderers conceal their actions through a series of steps that make it look like money coming from illegal or unethical sources was earned legally. In India, for instance, AML comes under Prevention of Money Laundering Act, 2002. The main purpose of this act is to prevent money-laundering as well as to provide for confiscation of property involved in money-laundering.

   Background checks are done through KYC (Know your Customer), which is a term used for the customer identification process. It involves making adequate efforts to determine true identity and beneficial ownership of accounts, the nature of customer's business, fairness of operations in the account in relation to the customer's business, source of funds, which in turn helps the banks to manage their risks effectively. The main objective of the KYC guidelines is to prevent criminal elements using banks, intentionally or unintentionally for money laundering. KYC basically has two components - Identity and Address. While the identity remains the same, there may be change in address so the banks are required to periodically update their records.

3. **Decision Making**: The decision to purchase / clear a financial product is usually driven by many factors. However, in difficult economic times, it's important to understand the risks involved in the commercial product portfolio. After the authenticity of the customer has been established, decision is taken based on the bank's policies, rules and regulations regarding its different products. The decision may include establishing credit limit for the customer after performing credit due diligence

4. **Legal Agreements**: Once the decision is made to sell/ offer the product to the client, all the legal formalities should be completed. These include negotiating legal term, executing legal agreements and completing legal due diligence. These agreements vary as per the requirement of legal system of the country.

5. **On-boarding**: Thereafter, the account is opened in the bank's core system with the intimation to the customer through welcome pack or calls. The customer can start utilizing the service and begin the product trading.

Case Management

Case Management is the handling of unstructured ad-hoc and unpredictable processes. It involves human participants and relies on user decisions, actions, events, and policies. Case Management can be used to model and address any back-office operations scenario. For this paper, we have considered a customer on-boarding request as a case that needs to be handled. An on-boarding request is typically for a particular product; request types can therefore be modeled as per product types.

The customer On-boarding process involves different interdependent processes, with unique aspects for each request (product) type. Case Management allows better coordination of on-boarding activities involving human intervention, resulting in improved efficiencies. Case Data Visualization and Reporting is critical to assist decision making for case workers during the on-boarding operations activities.

Case Type Identification

The major product types in a bank include accounts, cards and loan. With each product type there can be multiple products, for example, product type card can include products such as credit card, debit card, travel card etc. In case management, we will have a different case type for the on-boarding process for each product as depicted in the Figure 2 below.
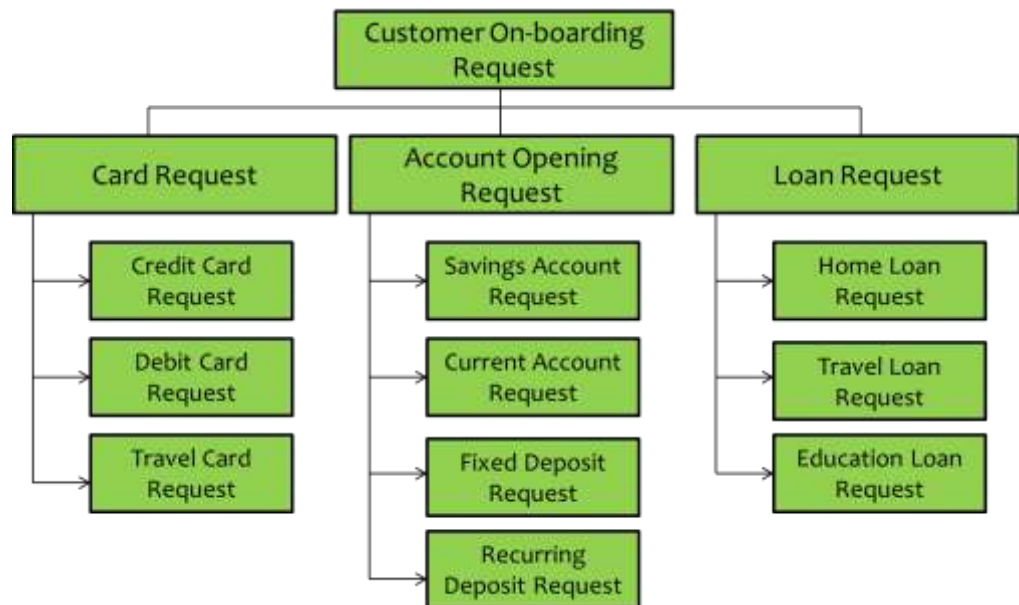

Figure 2: Case Types

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Key Performance Indicators

We have identified the below 4 KPIs as most relevant in capturing the performance of the customer on-boarding process:

KPI	Description	Business Impact
Volume Forecast	Number of customers and volume of requests forecasted for the next period	Helps in better managing the resources required and predicting future revenues
Request Withdrawal Rate	Percentage of customer requests which were withdrawn by the customers	Identifies the efficiency of the onboarding process in terms of lost customers
Process Cycle Time	Time elapsed from the point the request is submitted to the point the customer is on-boarded	Helps in identifying the bottleneck in the entire on-boarding process
Number of customers on-boarded	Percentage of customers successfully on-boarded	Identifies the type of product adding the most number of customers and may help indicating issues in an on-boarding process

Visualization Types

Data Visualization

The main purpose of data visualization is to simplify the given data values, promote the understanding of them, and communicate important concepts and ideas using the visual medium. Visualizations help our brains to receive and interpret large amounts of information in an easy way.

Data visualization gives the business users the ability to use information in a simple way without deep technical expertise. Data visualization helps to communicate information clearly and effectively through various graphical means.

Types of Visualizations

One important aspect in the visualizations is to identify the right type of visualization, which in turn shall help in interpreting the data in an easy way. The various type of visualizations followed in the report are as follows:

1. **Pie chart**

   A pie chart is also known as a circle graph. This is divided into sectors, illustrating numerical proportion. In a pie chart, the arc length of each sector is proportional to the quantity it represents.

   One disadvantage of pie charts is that it is difficult to compare different sections of a given pie chart, or to compare data across different pie charts. Pie charts may sometime be replaced by other plots, for example, Bar Chart.

2. **Column chart or Bar chart**

   A column chart, also known as a bar chart, is usually represented with rectangular bars of lengths usually proportional to the magnitudes or frequencies of what they represent. The bars can be either horizontally or vertically oriented.

   The column chart can be further represented in single or multi series with respect to the data model and the visualization purpose.

3. **Line chart**

   A chart which displays information as a series of data points which is usually connected by straight line segments to form a line chart or a line graph. It is a basic type of chart common in many fields.

   A line chart is often used to visualize a trend in data over intervals of time, known as a *time series.* Thus, line charts are often drawn chronologically.

4. **Tree map**

   Tree mapping is a method for displaying hierarchical data by using nested rectangles. Each branch of the tree is given a rectangle, which is then tiled with smaller rectangles representing sub-branches. A leaf node's rectangle has an area proportional to a specified dimension on the data. Often the leaf nodes are colored to show a separate dimension of the data.

When the color and size dimensions are correlated in some way with the tree structure, one can often easily see patterns that would be difficult to spot in other ways, such as if a certain color is particularly relevant. A second advantage of tree maps is that, by construction, they make efficient use of space. As a result, they can legibly display thousands of items on the screen simultaneously.

5. **Scatter chart**

In a Scatter chart the data is predominantly displayed as a collection of points. Each point may indicate the value of one variable. This variable may in turn determine the position on the vertical or horizontal axis.

From a Scatter chart, correlations between variables can be inferred. A famous example would the height and weight plotted on x and y axis respectively.

Usually, any Correlation may be positive, negative, or null. In a positive correlation, the pattern of dots is plotted from lower left to upper right. And in a negative correlation it is the reverse order.

6. **Network Graph**

Network graph visualization is generally used to plot the directed and the undirected graph structures. The graph allows networks to be compared. Also the relationship between entities can be captured in network graph.
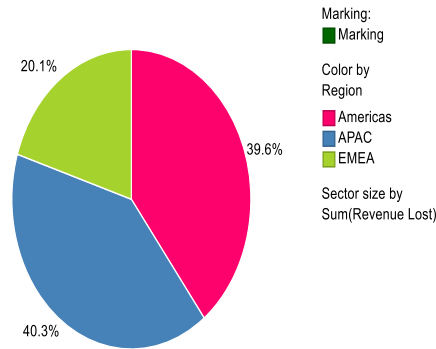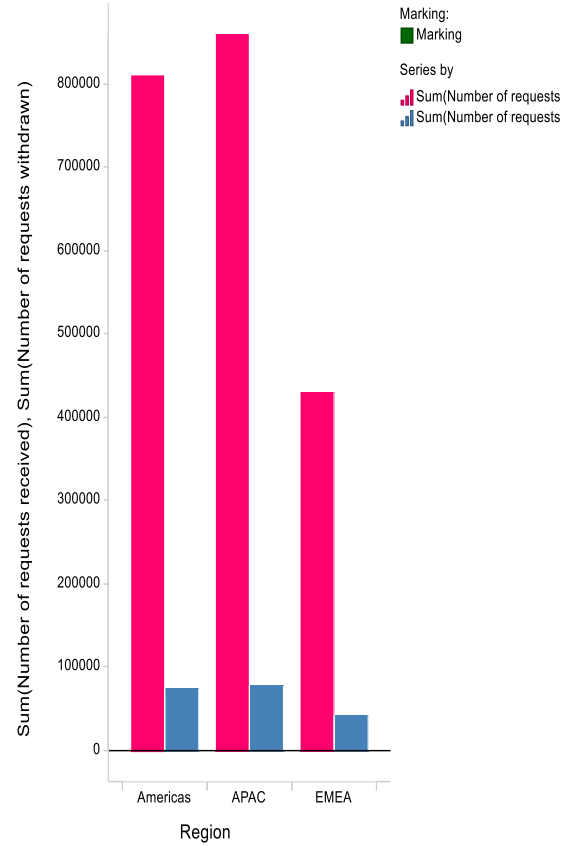
Visualization Examples

KPI # 1: Request Withdrawal Rate

Request Withdrawal Rate compares number of requests withdrawn vis-à-vis the number of requests received. Visualizations below shows region-wise lost revenue on account of requests withdrawn and indicates monthly trends of Request Withdrawal Rate.

Sum(Revenue Lost) per Region

Marking:
Marking

Color by
Region
Americas
APAC
EMEA

Sector size by
Sum(Revenue Lost)

20.1%

39.6%

40.3%

Requests Received vs Requests Withdrawn

Marking:
Marking

Series by
Sum(Number of requests
Sum(Number of requests

Request Withdrawal Rate - Monthly Trends

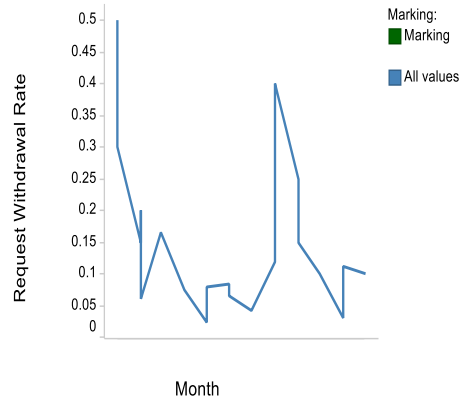Marking:
Marking

All values

Figure 3: KPI - Request Withdrawal Rate

KPI # 2: Number of customers on-boarded

This KPI presents hierarchical view of number of customers successfully on-boarded for each product type. The tree-map below shows the classification of each product type into several products, for example, the account product type is classified into saving account, fixed deposit, current account, salary account and recurring deposit account. The size for each product type in the tree-map is determined by the number of customers successfully on-boarded for that product type.
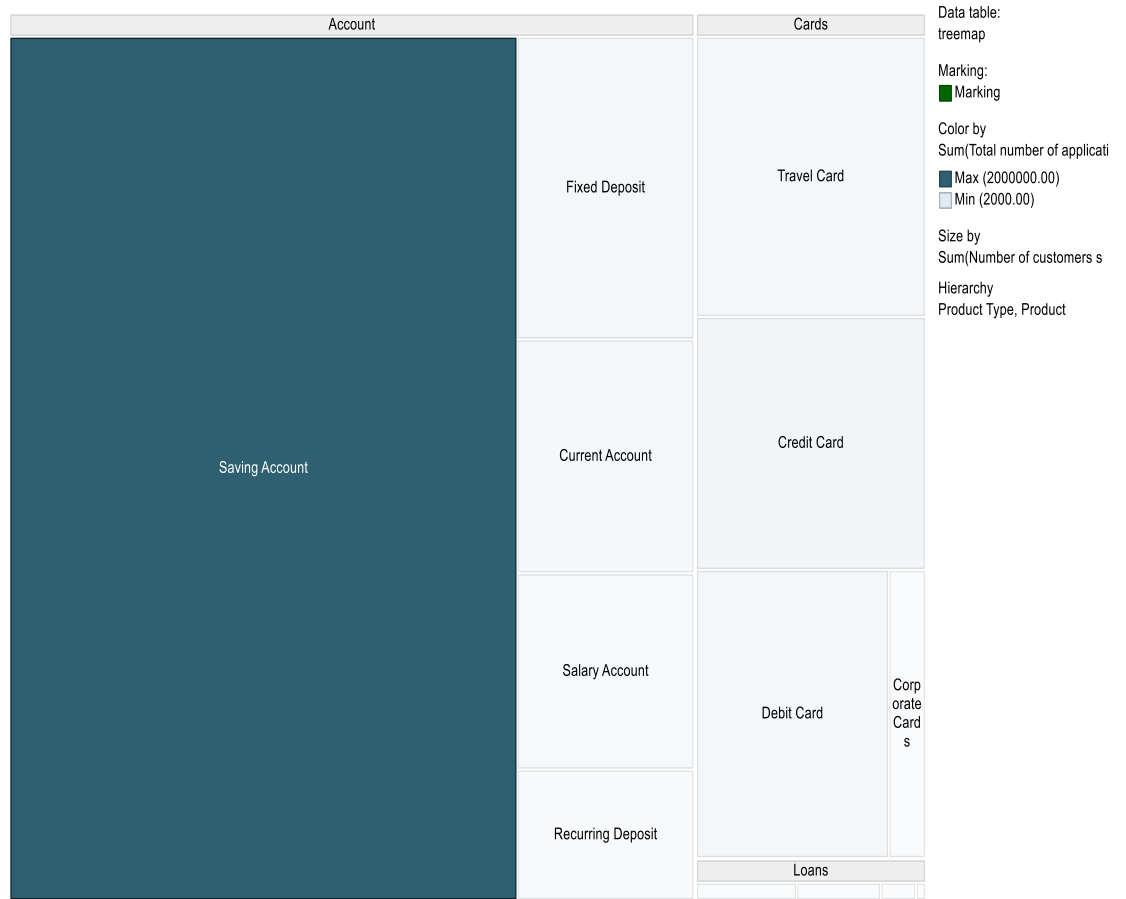

Figure 4: KPI - Number of Customers per Product Type

KPI # 3: Process cycle time

This KPI measures the total time taken for the entire customer on-boarding process. To depict process cycle time for each product we have used stacked graph showing time taken for each sub part of the on-boarding process. Also, to compare bank's process cycle time with the industry's we have used side-by-side bar graph for different products offered by the bank.
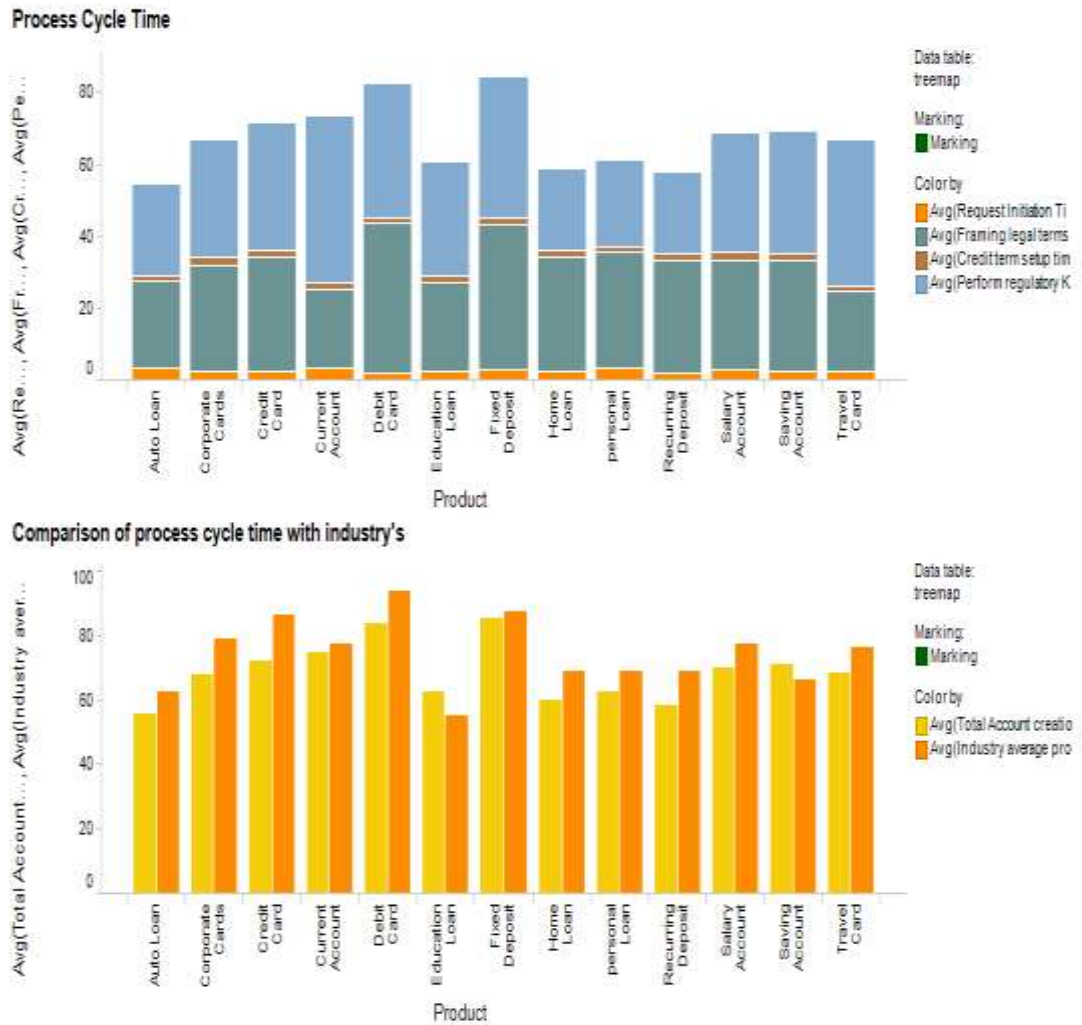

Figure 5: KPI - On-Boarding Process Cycle Time

KPI # 4: Volume Forecast

This KPI helps in predicting the volume of requests and thereby enabling better utilization of resources. In visualizations we have captured comparison of the forecasted requests with the actual requests and shown the region wise forecast error for each month.

Figure 6: Volume Forecast

Correlation between KPIs

Using the scatter plot we were able to find positive correlation between the time taken for on-boarding and request withdrawal rate. This means that if a product had a higher process cycle time, the request withdrawal rate would have been higher. This implies that the number of requests withdrawn without being fulfilled by a bank is proportional to the time taken by it to process the requests. Hence, if a bank is able to reduce the process cycle time, it will able to retain more customers.
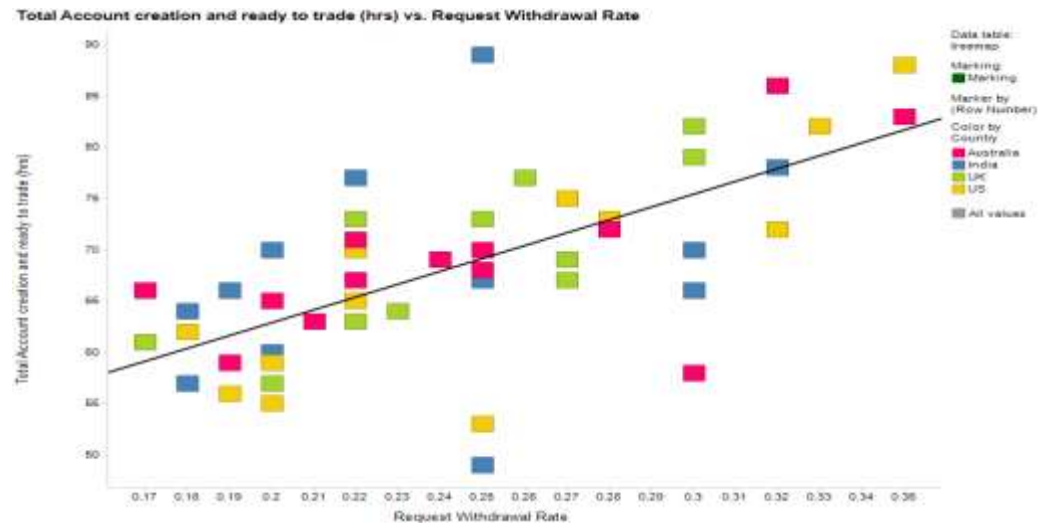

Figure 7: Negative impact (higher withdrawals) of longer on-boarding

Conclusion

A picture is worth a thousand words. Similarly, the value in data can truly be unlocked when it can be visualized well.

In summary, case visualization can result in the following benefits:

1. Visualizations enable comparison between variables over time, we could see variances between forecasted and actual requests using a side by side bar chart.

2. Visualizations help in viewing changing trends, for instance depicting request withdrawal rate on a line chart over a time period gives an idea of how it has changed.

3. Vast quantities of data can be looked more quickly as it is more representative than data tables, for example using a tree map we could depict the most popular products i.e. resulting in the most on-boarding requests.

4. Visualizations help achieve more insight into the nature of a problem, we had represented time consumed by different parts of on-boarding process using a stacked bar chart and were able to see which process took most time.

5. Visualizations help in discovering correlation between variables by using visualizations such as Scatter Plot which showed how request withdrawal rate increases for products with higher process cycle time

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10. http://www.banktech.com/: this website is useful to understand different banking terms and concepts
11. http://www.ibm.com
12. http://www.investopedia.com/

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