Business & IT KPI Control Orchestration and Collaboration

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ABSTRACT

Objective of this paper is to illustrate and exemplify smart creation and distribution of KPI reports without manual intervention from IT; collaborate bad KPIs with business helping them drill down their attention to the intended metric amongst a myriad of numbers and texts in daily reports.

Although there are products in the market for catering this service, they have their own limitations in terms of compatibility, plugins, bespoke dashboarding, tech skills, configuration and pricing.

By the end of this paper, the reader will be able to simplify the KPI orchestration, geared each other with their internal components and will be able to comprehend their mechanism in drilling down the problem area for business attention and/or further fixation.

Keywords: Key Performance Indicator, KPI, Collaboration, Confluence Update, KPI Orchestration, KPI Metrics Reporting, KPI Automation, Control Reporting

INTRODUCTION

Key Performance Indicators (KPI) tangibly measures the performance over a period of time for specific business, functional or IT objectives. They help businesses move forward strategically by aiming at the visionary targets and finding key focus areas that need improvement to achieve their goals.
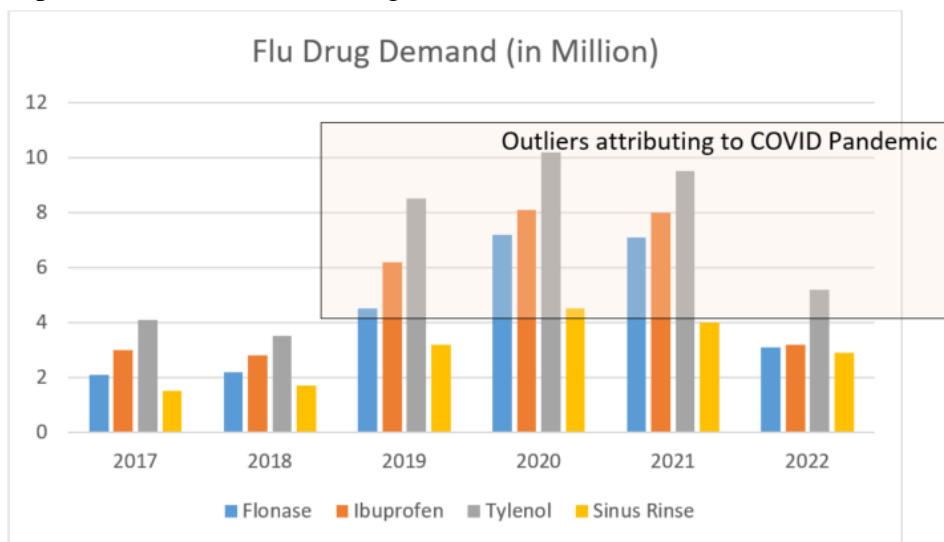

Figure – 1 Business Metrics helps enterprises identify the outliers and the underlying influencing factors

While KPIs are the targets to track, the metrics measure the daily business activities that are intended to reach the targets. KPIs keep the teams aligned for moving towards the right direction, provide real time view of business health, brings the leadership's focus on the failure points and thereby makes the teams accountable for improving their deliverables.
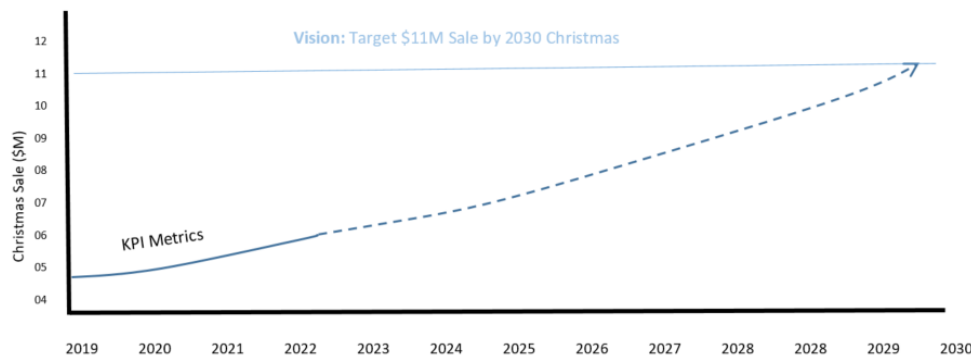
Figure – 2
Illustrates the Business vision for a market capture of $11M Christmas sale by 2030

With the tolerance limits defined by Business, the key metrics help identify anomalies and thereby allow enterprises take necessary action with respect to improving performance of the applications, provision additional computing units or optimize their applications on the basis of data and log analysis.
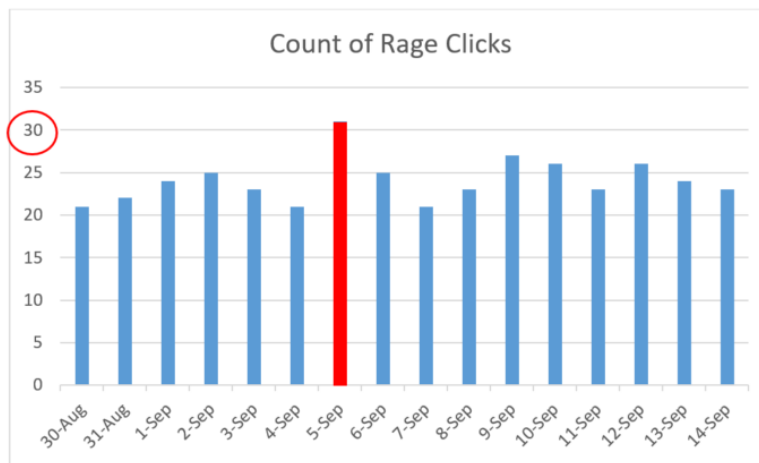

Figure – 3
Demonstrates the tolerance of 30 rage clicks per day along with the outlier that exceeds it

There can be different categories of KPIs such as Strategic, Operational and Functional depending on the vision of the enterprises.

While there are hundreds of defined KPIs by business, the key challenges faced today is to pin-point the most critical outliers in order to get the right focus from various departments. Few of these challenges can be

  a. Timely alert to right set of departments
  b. Crispy and Summarized executive reports instead of reporting a myriad of data points

METHODOLOGY

Objective of this paper focuses upon following moving parts of the KPI mechanism and methods used to facilitate them

- Calculate KPI Metrics and archive
- Systemic updates by auto-filling the collaboration tools such as Confluence, Jira etc.
- Notify stakeholders about outliers

Presumably, the reader of this research paper is familiar with the usual software skills that are needed for querying the database records that are housed in Databases such as Cosmos, SQL DB, SQL Server, Oracle, Big Data or Databricks. Hence this paper won't elaborate much upon querying methods, but focus more upon archiving them, consolidate, summarize and collaborate them for stakeholders' attention.

Calculation of KPI Metrics

Fetching the KPI Metrics involve following steps in order to establish a summarized and consolidated view in its simplistic form.

Step 1. Obtain required data sets for a given day/week/month
Step 2. Summarize by summing up the numbers for their respective category
Step 3. Append to a file that's used for notification/collaboration

It's always good to summarize the tabular reports into an executive content for stakeholders view to fit the purpose of KPI clarity as represented below.
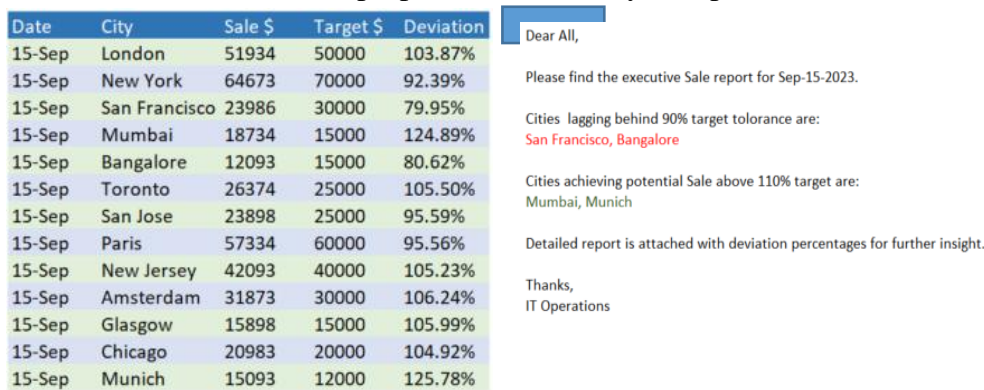

Figure – 4
Shows how a tabular view is translated into an executive communication

Auto-Confluence Updates

This case study uses Confluence collaboration wiki, which is widely used by corporates around the world for creating a remote-friendly team workspace. This is helpful for corporates for regular references while it's easy to miss important updates from countless amount of emails and chat messages. Additionally, it comes embedded with security layer that only allows certain group of people to access the information meant exclusively for them.
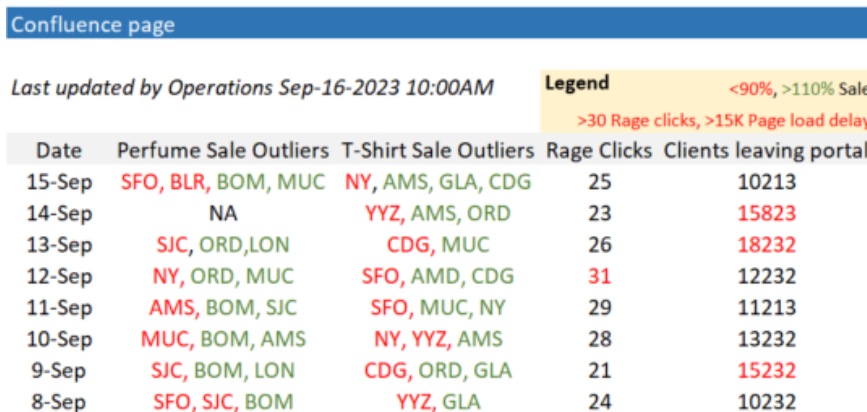

Figure – 5
A sample confluence page that has got the everyday trend of Sale outliers, Rage Clicks and the number of clients leaving the portal due to prolonged page load waiting

Notify Stakeholders about Outliers

There's a flip side in collaborating the KPI Metrics in confluence pages and not in the form of email notifications; that it gives a possibility that the figures so important in driving businesses, might skip the notice of key stakeholders and trigger no real time action from associated departments.

Whilst the automated updates reduce the human effort and nullifies the human error, it is also as important to bring them to stakeholders notice real time. Fortunately, it is also possible to trigger email notification in the event of the KPI amiss and/or regular outliers falling in a specific category.

Daily Outlier Example

An example of daily outlier email content can be as following - Refer Figure – 5 for data

Example - 1

Date: 12-Sep

Outliers that need attention are:
   a. Rage clicks exceed the tolerance of 30
   b. Perfume sale fallen below 90% target are: NY
   c. T-Shirt sale fallen below 90% target are: SFO

Trendy Outlier Example

Barring the one-off deviations, the IT and Business departments would like to address the regular occurrence of trendy failures given they are segregated from the metrics data points. The trends can be weekly, or monthly or annual depending on the type of business. Here is how the trend can be derived from the example shown in Figure – 5.

Example - 2

Month: September 2023

Trendy outliers:
   a. # of rage clicks exceeds 30: Friday & Monday
   b. Perfume sale fallen below 90% target are: SFO, NY
   c. T-Shirt sale fallen below 90% target are: SFO, NY, CDG, YYZ

MODELING AND ANALYSIS

Though there are several tools and technologies for applying the outlined recommendations, this research paper uses SQL queries, Python code and Bash shell scripts for coding and Confluence for collaborating, while trying to simplify the approach for the benefit of audience. A simplest example of sale target is used to derive the data from tables, summarize & format them, update them into confluence and communicate the executive report.

Again, this paper does not endorse any specific product; reader can chose to use any tech stack to meet the need.

Calculation of KPI Metrics

Extraction of data can have different approaches such as running a batch query in a scheduler, schedule a databricks job, schedule a python script on a regular basis etc. But the basic approach remains the same which is outlined below.

```
$ sqlcmd -s <serverName>\<instanceName> -W ^ -s "," ^   -i getSaleAmount.sql -o
saleAmount.csv
```

Here replace the server name and instance name with the database server details

Sale table skeleton view

Here is a hypothetical sale table which we will attempt to summarize in the SQL.

Table - 1

Date	City	StoreNo	SaleAmount
Sep/14/2023	BLR	BLR-023	$2505.23
…	…	…	...
Sep/15/2023	BLR	BLR-021	$1223.00
Sep/15/2023	SFO	SFO-009	$2212.09
Sep/15/2023	BOM	BOM-002	$1211.23
Sep/15/2023	SFO	SFO-010	$1290.23
Sep/15/2023	BLR	BLR-012	$1209.32
Sep/15/2023	MUC	MUC-003	$1309.32
...	...	...	...

Form the SQL Query

getSaleAmount.sql

SQL> select date, city, sum(saleAmount) from sale where Date=DATE(NOW())group by city;

In above query, we disregard the store numbers of the city and summarize the sales figures across all the stores in a given city. This should give results such as below

saleAmount.rpt

```
date,city,Sum(saleAmount)
09-15-2023,LON,51934
09-15-2023,NY,64673
09-15-2023,SFO,23986
09-15-2023,BOM,18734
09-15-2023,BLR,12093
09-15-2023,YYZ,26374
09-15-2023,SJC,23898
09-15-2023,CDG,57334
09-15-2023,NJ,42093
09-15-2023,AMS,31873
09-15-2023,GLA,15898
09-15-2023,ORD,20983
09-15-2023,MUC,15093
```

Now we want to follow the translation to executive report (as mentioned in Figure – 4 and Figure - 5), for not making business understand and deciper the above raw data, but translating them to executive report. This translation of data is further explained in next section.

Auto Collaboration Update

There are many collaboration or knowledge management software products in market such as Axero, Confluence, Guru, Zoho, Document 360, Live Agent and so on that can be used. This case study has picked Confluence software from Atlassian whose python plugins are leveraged for executive report.

As illustrated in Figure – 5, the business won't be interested in learning the sales figures that each store or city could achieve on a given day; but would want to know if any city did extremely bad or extremely good below or above their defined thresholds.

```
summarize.sh

#!/bin/bash
TOKEN=<give your confluence access token here>
PAGEID=<give your confluence page ID here>
…
LondonTarget=50000
saleKPI=
executiondate=$(date –date=”1 day ago” +%m/%d/%Y)
#getting current data from confluence page
curl       -s       -k       -X       GET       --header       "Authorization:       Basic
$TOKEN}'"https://myResearchPortal.com/Confluence'$PAGEID'?expand=body.storage' | /bin/python -
mjson.tool > CurrentData.txt
sqlcmd -s <serverName>\<instanceName> -W ^ -s “,” ^ -i getSaleAmount.sql -o saleAmount.csv
# check if saleAmount.csv is created
if [[ -s saleAmount.csv ]];then
LondonSale=`grep LON saleAmount.csv | awk -F”,” ‘{print $3}’`
Lpercent=`echo ”$LondonSale*100/$LondonTarget” | bc`
saleKPI+=`if [ $Lpercent -lt 90 ];then echo “<font color=red>LON</font>;elif [ $Lpercent -gt 110
];then echo “<font color=green>LON</font>”;else echo “”`
…
#Apply similar logic for all the cities or run through a loop if cities are more
…
python3 Confluence_Update.py currentData.txt
#If any control has outliers, email to stakeholders
if [ -s KPI_outliers.txt ];then
while read line
do
        echo -e "<h3>${line}/</h3>">> out.html
done < KPI_outliers.txt
export MAILTO="stakeholderDL@myResearchPortal.com"
export SUBJECT="KPI Control Issue Report for Due Attention"
{
echo "To: $MAILTO"
echo "From: me@myReasearchPortal.com"
echo "Subject: $SUBJECT"
echo "MIME-Version: 1.0"
echo "Content-Type: multipart/related: boundary=xxRANDOMSTRINGxxx"
echo "--RANDOMSTRINGxxx"
echo "Content-Type: text/html"
echo
cat out.html
echo
) | user/sbin/sendmail -t
fi
```

Above snippet extracts the current (past days') confluence page info so as to append yesterday's sales outliers to the page. The PAGEID and Access TOKENs are obtainable from your corporate confluence specific. Use the references for further details on how to obtain them.

In order to translate an output like shown in Figure – 5, above code looks whether London Sales exceeded 110% of the London Target ($50k) or falls below 90% and accordingly it colors the city code for report generation.

Now for updating the confluence page, python libraries can be used as shown below as well as page beautification can be achieved by using the beautifulSoap library.

Confluence_Update.py

```
import json
from bs4 import BeautifulSoup
from atlassian import Confluence
from pathlib import path

table_row_data = []
with open(data_folder / 'sale.csv',r) as file:
for line in file:
        data = line.strip()
table_row_data.append(data)

with open(sys.argv[1]) as f:
data = json.loads(f.read))
content=data/["body"]["storage"]["value"]

soup = BeautifulSoup)(content, "html.parser")

table = soup.find("table")

row_head = table.find_all("th")

for row in row_head:
row["style"]="font-wright: bold; text-align: center;"

first_row = table.find_all('tr')[1]

new_row_htnml    =    f'<tr>{"""".join([f"<td>{cell_data}</td>"    for    cell_data    in
table_row_data])}</tr>'

new_row = BeautifulSoup(new_row_html,'html.parser')
first_row.insert_aftetr(new_row)
rows = table.find_all("tr")

for i, row in enumerate(row);
if i == 1;
        row["style"] = "color:white; font-wright: bold; background-color: #80080; text-align:
```

```
center;"
else:
        if i % 2 == 0:
          row["style"] = "background-color: #ADD8E6; text-align: center;"
        else:
          row["style"] = "background-color: #33ccff; text-align: center;"

updated_content = str(soup)
confluence            =            Confluence(url="https://myResearchPortal.com/confluence",
username=<username>, password="password>", verify_ssl=False)
confluence.update_page(page_id=<pageid>, title="KPI Case Study", body=updated_content)
```

Trend Analysis Report

Further to this daily update, a monthly or quarterly report can be sent to the executive leadership as shown in Example – 2 above. It is recommended to use similar python and bash scripts to extract confluence data every month or quarter, perform the required calculation and automatically generate emails to the executives.

RESULTS AND DISCUSSION

Over a period of 6 months, the benefit of automating the Metrics collaborating has shown a remarkable set of benefits over the following key challenges:

   a. Measurement - Real time accuracy of data sets with areas highlighted for attention
   b. Communication - Communicate to the right set of stakeholders for next steps
   c. KPI Selection - Cherry-pick the right KPI Metrics & Prioritize the areas of improvement

Measurement

Before applying automation in metrics reporting, the reporting faced below challenges

   i.   Delay in manual calculation and reporting
   ii.   Human errors
   iii. Miss out the days when the reporter is off-duty
   iv.   Huge tabular values
   v.   Inconsistency in reporting format, style and communication

Above problems were addressed after the automated KPI metrics reports and updates were in timely fashion, with consistent formatting, highlighting critical threshold anomalies with no miss-outs including weekends and holidays.

Communication

Business was extremely satisfied with the compactness, summarization quality of executive communication. Extremely important failure anomalies alerted the command centers to timely engage appropriate departments to stabilize the system thereby putting a floodgate to avoid further damage in loss of transaction.

The confluence page was daily updated in its automated way, enabling businesses to take appropriate actions without involving operations by engaging right stakeholders to address the gaps.

The subsequent outliers were reported to selective stakeholders with crispy contents, considering the coloring legends to gain right attention.

KPI Selection

Leveraging the timely reporting of the metrics and summarized communication, business was able to

i. Identify the critical anomalies amongst the myriad of data points
ii. Prioritize their next actions with minimal governance
iii. Analyze trendy failures and thereby identify dependent KPIs that needed adjustment

It became possible for the business to literally cherry pick the "key" performance indicators and not fall into the trap of countless metric data reported randomly in multiple channels.

CONCLUSION

The pivotal lever in this whole exercise was to "Translate to Transform"; which essentially suggests *translating* the critical attributes and data points to executive summary that would help *Transforming* the business on a longer run.

It would stop the business leadership fall victim of inappropriate KPIs by helping them focus upon key aspects of business & IT performance aiming towards its strategic vision. This research work proves the norm that not all metrics can be KPIs, but only the chosen set that falls behind threshold.

Most importantly, this research addresses the pitfall of automation by setting up alerts for chosen deviations from defined thresholds and engaging appropriate departments almost instantly.

RECOMMENDATION

It's advisable for the IT departments and Business stakeholders to closely collaborate for initial identification of KPIs along with their associated weightage in each one of them. KPI identifications are attributed to

a. Mapping to long term vision
b. Criticality to weigh upon the business impact
c. Thresholds/Tolerance limit of each control
d. Associated department responsible to control them

Once above are defined, it's the responsibility of IT Operations to orchestrate the metrics reporting as suggested in the modelling section of this paper in order to

i. Robotize the daily metrics calculation
ii. Archive them for trend analysis
iii. Update summarized data points in collaboration channels (*such as Confluence*)
iv. Communicate executive reports to leadership

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