

## Impact of Outbound SMS notifications on Inbound IVR call volume

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### ABSTRACT

In this technology driven era, multi-channel communication has become a pivotal part of an effective customer care strategy for companies. Old ways of delivering customer service are no longer adequate. To survive tough competitive market and retain current customer base, companies are spending massively to serve customers in the manner they wish to be served. West Corporation helps their clients in designing a strategy that would provide their customers a connected inbound and outbound communication experience. The purpose of this paper is to illustrate how Data Science team at WEST has measured effect of Outbound SMS notifications in I) Reducing Inbound Interactive Voice Response (IVR) call volume II) Increasing automation III) Improving customer satisfaction, for a leading Telecom services company.

As part of seamless experience customers have an option of receiving SMS notifications at several stages while traversing inside IVR. Notifications may involve successful payment and appointment confirmations, outage updates in the area and an option of receiving text with details to reset Wi-Fi password and activate new devices. Study was performed on two groups of customers - one who opted to receive notifications vs group who did not opt in. Also, analysis was performed using SAS to understand repeat caller behaviors within both groups. The group who opted to receive SMS notifications were less likely to call back than those who did not opt in.

### INTRODUCTION

#### Interactive Voice Response (IVR) system

Interactive Voice Response (IVR) is an automated system that interacts with callers, collects information, performs specific self-service function and helps in routing calls to the appropriate agent group. IVR is often the first point of contact in the entire customer's engagement journey. Call volume on IVR platform might vary from business to business, platform might receive from 1,000 calls a day to million, depending on customer base and nature of business. Though IVR systems may not be necessarily appreciated by all callers, they are one of the most powerful mediums for organizations to reduce operating cost by limiting call transfers to live agents, hence they have been used by enterprises as effective cost savings tool for years. Customer interacts with an IVR system either through touch tone (DTMF) or voice input (ASR or NL). Common IVR self-service functions which have led to savings of millions of dollars in operating cost for one of West Corporation's leading telecom services client are shown in Figure 1:

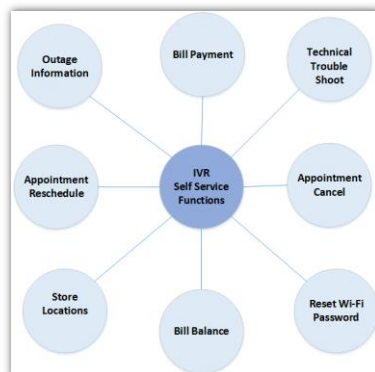


Figure 1. IVR Self Service Functions

For more information about IVR systems as well as data generated when consumers interact with IVR, see Khots, Dmitry. 2015.

## Outbound SMS Channel

The popularity of cell phones and text messaging in recent years has led to integration of SMS channel with Interactive Response Systems. Integration has helped customers receive notifications at various stages within IVR and an option to chat with live agents via SMS to resolve issues. WEST IVR platform has the ability to detect if call originates from cell phone or landline. Upon customer's acceptance to receive SMS notifications, if call is from a cellphone, IVR reads the number, verifies for customer's acceptance and sends SMS. If call originates from a landline, customers are asked to enter their cell phone number so that SMS can be sent to their cellphones. SMS notifications not only have tremendous potential to reduce call backs and transfers to agents, but it can also help reduce average handle time in the call centers. For example, sending SMS with trouble shooting instructions or a link can encourage customers to learn more about their problem, hence leading to a shorter agent call. IVR journey with integration of SMS has definitely elevated user experience to next level. Various Outbound Notifications offered to WEST Corporation's Telecom Clients are as follows:

- Outage Notification - Text notification sent out to the customers when outage is cleared.
- Resetting Wi-Fi password - Text notification with a link to reset the password.
- Payment Confirmation - Payment confirmation notification sent out to the customer after making successful payment inside IVR.
- Appointment Confirmation - Text confirmation with details after successful reschedule.
- Bill Video Link - Text notification with a link to understand bill details.
- Activations Link - Text notification with a link to guide device Activation process.
- Payment Locations - Text notification with nearest payment locations.

## IVR SMS Integration Flow

Figure 2 shows how SMS functionality is integrated within IVR. Telecom customer calls IVR to make a payment for the services he has been using. Once the payment is made successfully inside IVR, he gets an option of receiving SMS with "payment confirmation" number. In this case, SMS integration helped the customer in receiving text confirmation of the payment he just made inside IVR. Experience eliminates the hassle of writing down confirmation number for future reference, leading to a shorter call and satisfied customer.

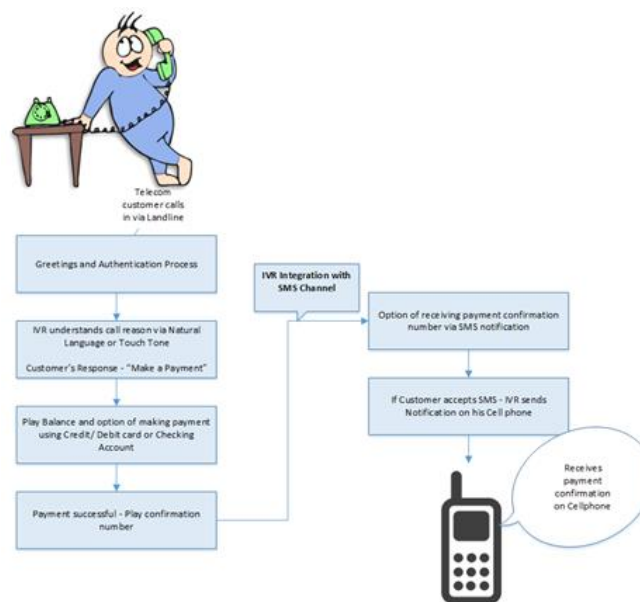


Figure 2. IVR and SMS Integration

## IVR Call Logs

In order to deliver good caller experience, it is very important to streamline and simplify IVR design. To accomplish that goal understanding and learning four key W's of IVR are important.

- Who are the callers?
- Why are they calling?
- When did they call?
- What are they doing inside IVR?

Answers to above questions can be found by mining IVR call logs. At WEST Corporation, all interactions/events between customer and IVR system are captured, logged and later fed into variety of databases. IVR logs are a very rich source of information. In Figure 2, all the steps carried between IVR and customer in order to make a successful payment are logged in IVR call logs. Information is then used by Center for Data Science (CDS) team for analysis and recommendations.

## DATA MINING STEPS

### Business Problem

The basic purpose of this paper is to understand the impact of integration of SMS channel with Inbound IVR channel. In order to measure impact, "Outage Notification" use case was selected for this study. Telecom customers frequently contact the call center during a service outage. In order to reduce these call volumes, West IVR offers the callers an explicit IVR option of receiving an Outage SMS notification, once technical outage is cleared off. The study was performed in a champion / challenger fashion, where the investigation occurred by dividing customers into two groups, one who opted to receive SMS notification during IVR journey and other who did not and then measuring the impact by examining 3 important KPIs:

- First Call Resolution
- IVR Automation Rate
- Average time in the IVR

### Data extraction Process using SAS

As an initial step of the analysis, data was ingested into SAS environment via PROC SQL facility using SAS/ACCESS TO ODBC. Joins were performed across various tables as IVR data is stored in Operational Data Store in Third Normal Form. Study was conducted for West Corporation's leading Telecom client with ~50 million subscribers that generates around 1M calls and 14 million transactional records per day. CDS team has automated a data extraction process through SAS macro. Macro helps in extracting massive transactional records on daily and hourly intervals. The following macro extracts data from 12 different tables and creates hourly datasets:

```
/* Macro to extract IVR data from Operational Data Store */

%macro import;
%do i=0 %to 23;
PROC SQL;
CONNECT TO ODBC as myODBC (NOPROMPT= "DSN=ODS");
CREATE TABLE Data_Input AS
SELECT * FROM CONNECTION TO myODBC
(
SELECT ivr.start_date, ivr.start_time, ivr.wic_ivr_key_identifier,
ivr.ani, ivr.duration as call_duration,
ca.customer_attribute_value as Account_Number,
pnc.callpath_sequence_number, node.node_name, rt.response_type, pnc.response, pnc.utterance,
pnc.duration as prompt_duration, tps.prompt_status_code,
cet.call_exit_type, ttf.transfer_number, tr.transfer_reason
from txl.Transaction_call_fact ivr
```

```

left join txl.transaction_pnc_fact pnc on (pnc.wic_ivr_key_identifier =
ivr.wic_ivr_key_identifier)
left join txl.client_customer_attribute ca on (ca.wic_ivr_key_identifier
=ivr.wic_ivr_key_identifier
and ca.customer_attribute_name='CAT_FinalAcct')
left join txl.nodename_dim node on (pnc.nodename_identifier = node.nodename_identifier)
left join ods.program_apn apn on (ivr.program_apn_identifier = apn.program_apn_identifier)
left join ods.ods_client cli on (apn.client_identifier = cli.client_identifier)
left join ods.program prg on (prg.program_identifier = apn.program_identifier)
left join txl.transaction_prompt_status tps on
(pnc.transaction_prompt_status_identifier=tps.transaction_prompt_status_identifier)
left join txl.response_type rt on (pnc.response_type_identifier=rt.response_type_identifier)
left join txl.call_exit_type cet on (ivr.call_exit_identifier = cet.call_exit_identifier)
left join txl.transaction_transfer_fact ttf on (ivr.wic_ivr_key_identifier =
ttf.wic_ivr_key_identifier)
left join txl.transfer_reason tr on
(ttf.transfer_reason_identifier=tr.transfer_reason_identifier)

where cli.client_number = 1111 and prg.program_number = 2222 and ivr.start_date >=Date1 and
ivr.start_date < Date2
and extract(hour from ivr.start_time)=&i);
QUIT;

%end;
%mend;
options mprint mlogic;
%import;

```

## Data Preparation

Once the data was available in SAS dataset format using above data extraction step, further data preparation, cleaning and analysis was carried out using a combination of SAS DATA step and PROC SQL. IVR call data was divided into 2 experimental groups based on business understanding of IVR flow.

**Experiment Group 1:** Callers accept an explicit IVR menu option for receiving Outage notifications by engaging with integrated SMS channel.

```

/* Proc SQL used for forming experiment groups */
/* Formation of Experiment Group 1 */
Proc sql;
Create table OutageSMSOffered as
Select * from Data_input where wic_ivr_key_identifier in
(Select wic_ivr_key_identifier from Data_input where node_name in('PromptName1'));
Quit;

Proc sql;
Create table Group1 as
select * from OutageSMSOffered where wic_ivr_key_identifier in
(select wic_ivr_key_identifier from OutageSMSOffered where node_name in ('PromptName2'));
Quit;

```

**Experiment Group 2:** Callers did not accept an option of receiving Outage notifications.

```

Proc sql;
Create table Group2 as
Select * from OutageSMSOffered where wic_ivr_key_identifier not in (select wic_ivr_key_identifier
from Group1);
Quit;

```

## Analysis performed by measuring Key Performance Indicators

**First Call Resolution** - Also known as Repeat Call Rate, this indicator is helpful to understand problems customers encounter either in IVR system or with Agents. Goal is to minimize Repeat Call Rate inside IVR. For this study, hypothesis was that customers are less likely to call back once they accept offer of receiving outage notifications (alerts) through SMS.

```

/* SAS data steps for analyzing repeat call rate */

/* Sort Datasets by Account Number and Start date and time of call */

Proc sort data=Repeat_KPI_Step1;
by Account_Number startdatetime;
run;

/* Calculation of time difference between two calls */

Data perm Repeat_KPI_Step2;
Set Repeat_KPI_Step1;
by Account_Number;
Time_diff = (dif( startdatetime )/60);
if first.Account_Number then
time_diff=0;
run;

/* Flagging all the repeat calls within time duration of 2 hrs */

Data Repeat_KPI_Step3;
Set Repeat_KPI_Step2;
if Time_diff <120 AND Time_diff >0 then
flag_2hr=1;
else flag_2hr=0;
run;

```

**IVR Automation Rate** - Percentage of calls that are completed in the IVR and do not require agent assistance. This KPI is primarily used to measure the performance of an IVR. Goal is to increase automation rate. For this study, hypothesis was that customers are likely to complete their call inside IVR once they accept the offer to receive outage notifications (alerts) through SMS. PROC SQL statements were used to measure automation rate.

```
Count (distinct case when exit_type not in ('Agentxfer') then wic_ivr_key_identifier end) as
completed calls
```

**Average time in IVR** - Helps in tracking average amount of time callers spend in IVR. Goal is to decrease Average Length of Call (ALC). Hypothesis in this case is that it might lead to an increase in ALC as customer spends extra time in entering or confirming their cellphone number to receive outage notifications (alerts) through SMS.

```

/* Extract distinct call records */

Proc sql;
Create table Data_input_2 as
Select distinct
start_date,
start_time,
wic_ivr_key_identifier,
call_duration
from Data_input;
Quit;

/* Calculate Average time*/

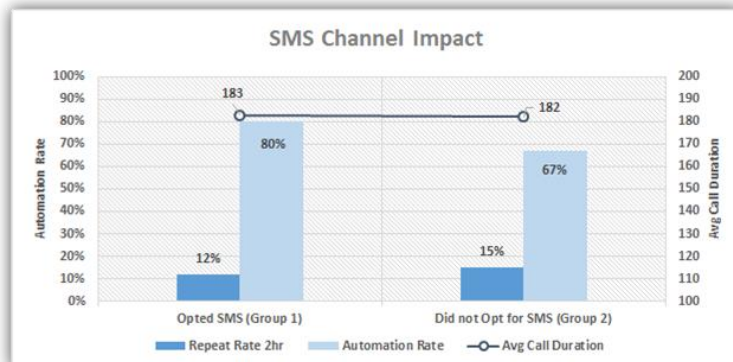
Proc sql;
Create table ALC_KPI as
Select start_date,
sum (call_duration) as Total_call_length,
avg(call_duration) as Avg_Length_Call
from Data_input_2
Group by start_date;
Quit;

```

## Review preliminary results

Study was performed on two groups of customers - one who opted to receive notifications vs group who did not opt in. Analysis was carried out using SAS to understand repeat caller behaviors, automation rate

and average duration in IVR within groups. The group who opted to receive SMS notification had positive results on 2 key metrics. Repeat call rate dropped by 3% and automation rate jumped by 13%. There was a slight increase in ALC, reason being the additional seconds required to confirm cell phone number. Statistical test was performed using two-sample T-Test between the groups to test the significance. Testing proved that positive changes in Group 1 were significant.



**Figure 3. Key Performance Indicators**

- 3% decrease in 2 Hour Repeat Rate in the group who opted for SMS
- 13% increase in Automation Rate in the group who opted for SMS
- 1 second increase in Average length in the group who opted for SMS

## CONCLUSION AND NEXT STEPS

It is imperative for organizations to quickly understand customer needs and resolve issues while minimizing customer effort in the process. Providing your customers with seamless communication experiences is key to building great customer relationships and maximizing retention. The Center for Data Science at WEST uses SAS to perform all IVR data research exercises. This research helps operational teams at WEST to design strategies that improve IVR experience across the board. After a successful integration of SMS channel, WEST is now moving towards Visual IVR. Using this new concept, customers will be presented with visual interface allowing them to easily see and touch their way through the options available on their smart phones.

## REFERENCES

Khots, Dmitriy. 2015. Unstructured Data Mining to Improve Customer Experience in Interactive Voice Response Systems. *Proceedings of the SAS Global Forum 2015*, Dallas, TX, SAS. Available at <https://support.sas.com/resources/papers/proceedings15/3141-2015.pdf>.

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