

IBM Predictive Customer Intelligence  
Version 1.x

*Inject Next Best Action  
Recommendations into every  
Insurance Call Center Interaction 1.0*

**IBM**

**Note**

Before using this information and the product it supports, read the information in "Notices" on page 35.

**Product Information**

This document applies to IBM Predictive Customer Intelligence Version 1.0.1 and may also apply to subsequent releases.

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## Introduction

IBM® Predictive Customer Intelligence gives you the information and insight that you need to provide proactive service to your customers. The information can help you to develop a consistent customer contact strategy and improve your relationship with your customers.

IBM Predictive Customer Intelligence brings together, in a single solution, the ability to do the following tasks:

- Determine the best offer for a customer.
- Retain customers that are likely to churn.
- Segment your customers, for example, by family status and salary.
- Identify the most appropriate channel to deliver an offer, for example, by email, telephone call, or application.

This solution ensures that all interactions with customers are coordinated and optimized. IBM Predictive Customer Intelligence gives you the ability to sift quickly through millions of customers and know who to contact, when, and with what action.

The following steps define the process:

1. Understand the customer. Predictive modeling helps you to understand what market segments each customer falls into, what products they are interested in, and what offers they are most likely to respond to.
2. Define possible actions and the rules and models that determine which customers are eligible for which offers.
3. After the best action is identified, deliver the recommendation to the customer.

### Audience

This guide is intended to provide users with an understanding of how the IBM Predictive Customer Intelligence solution works. It is designed to help people who are planning to implement IBM Predictive Customer Intelligence know what tasks are involved.

### Finding information

To find product documentation on the web, including all translated documentation, access IBM Knowledge Center ([www.ibm.com/support/knowledgecenter/SSCJHT\\_1.1.0](http://www.ibm.com/support/knowledgecenter/SSCJHT_1.1.0)).

PDF versions of the documents are available from the Predictive Customer Intelligence version 1.1 product documentation page ([www.ibm.com/support/docview.wss?uid=swg27046802](http://www.ibm.com/support/docview.wss?uid=swg27046802)).

### Accessibility features

Accessibility features help users who have a physical disability, such as restricted mobility or limited vision, to use information technology products. Some of the components included in the IBM Predictive Customer Intelligence have accessibility features.

IBM Predictive Customer Intelligence HTML documentation has accessibility features. PDF documents are supplemental and, as such, include no added accessibility features.

### **Forward-looking statements**

This documentation describes the current functionality of the product. References to items that are not currently available may be included. No implication of any future availability should be inferred. Any such references are not a commitment, promise, or legal obligation to deliver any material, code, or functionality. The development, release, and timing of features or functionality remain at the sole discretion of IBM.

### **Samples disclaimer**

Sample files may contain fictional data manually or machine generated, factual data compiled from academic or public sources, or data used with permission of the copyright holder, for use as sample data to develop sample applications. Product names referenced may be the trademarks of their respective owners. Unauthorized duplication is prohibited.

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## Chapter 1. Inject Next Best Action Recommendations into every Insurance Call Center Interaction

By using IBM Predictive Customer Intelligence, insurers can deliver the most appropriate action to each customer during each interaction by analyzing customer data.

Insurance companies have access to large amounts of customer data, and building long term customer relationships by making use of this data is key to their success. The type of data insurers can use is customer profile data, customer policy data, customer claims data, customer complaints data and other transactions, as well as social, and web interaction data.

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### Drive cross-sell opportunities

A multi-line insurance company is facing a problem of declining new premiums from its Life Insurance line of business.

Alex, the business analyst, analyzes the year-to-date data, and identifies that this decline is attributed mainly to the fall in the sale of Term Policies. Further analysis also reveals that there is a large proportion of existing Auto and Home Insurance customers who do not own a Term Policy.

Monica is a marketing manager who is responsible for defining her company's marketing strategy. Monica decides to launch a cross-sell campaign to target existing Auto and Homeowner customers for selling Term Policies.

David, the data scientist (or data engineer), builds models by using IBM SPSS® Modeler to derive valuable insights from the customer's demographic, transactional, and behavioral data. IBM Predictive Customer Intelligence uses the real-time predictive insights, customer profile data, and current interaction data to recommend the best offer during each customer interaction. IBM Enterprise Marketing Management (IBM EMM) is integrated with the Customer Relationship Management (CRM) software to deliver the campaign offers at the Customer touchpoint.

### Customer profile

Grace Wright calls the Insurance company and requests a quotation for a new Life-term policy, with a policy tenure of 25 years. Carolyn, a call center agent, opens her Customer Relationship Management (CRM) system and looks at Grace's profile. She sees that Grace is 32 years old, and is married with one child. Grace is a homeowner, and the household has two insured cars and three policies. Carolyn can also see other information. For example, Carolyn can view complaints that Grace made about the insurance policies. Carolyn can request to see more insights about Grace. IBM Predictive Customer Intelligence uses rich predictive modeling capabilities to view the segment that Grace is in (financially sophisticated), the customer lifetime value (high) and the churn propensity (high). The churn propensity is predicted in real-time based on the latest customer data.

## Actions

Carolyn selects the type of interaction (Get Quote) and the product line (policy type of life-term).

Carolyn updates the customer interaction data, and requests a quotation for a policy tenure of 25 years and a coverage amount of \$200,000. IBM Predictive Customer Intelligence provides two offers that are based on customer profile data, predictive insights, and current interaction data:

- Standard premium regardless of health, raised from \$300000 to \$600000.
- Ultra Select Pricing.

Grace then requests a quotation for a policy tenure of 35 years. Using the new interaction data, IBM Predictive Customer Intelligence recommends an extra offer of the last two years of premium waived. Grace accepts the offer and decides to buy the policy. When the offer is accepted, the predictive data is rescored in real time. Grace's churn propensity is reduced.

---

## Define the offers to be presented to insurance customers

Monica is a marketing manager who is responsible for defining her company's marketing strategy. She determines which offers individual customers can receive based on their customer profile data and their real-time interaction data.

Monica determines which offers individual customers should receive based on the customer profile data and the real-time interaction data. This customer profile data can include the following:

- Customer claims data.
- Complaints data.
- Policies data.
- Customer demographic data.
- Predictive Insights such as a customer's segment, and likelihood of churn.
- Real-time data, for example, context of the call – Get a quote for an insurance product, complaint, and so on.

### The campaign

Monica creates a campaign that is named Cross-Sell Campaign by using IBM Campaign, part of the IBM Enterprise Marketing Management (EMM) suite. The purpose of the campaign is to cross-sell life insurance policies to existing auto insurance customers.

The Cross-Sell Campaign contains offers to be presented within the insurance call center application. The details of the offer vary based on individual customer characteristics. The results of the offer, whether accepted or rejected, are recorded in the customer's interaction history, and that information can be used for follow-up marketing offers and campaigns.

Customers are segmented into categories in real time that are based on the call center interaction point, such as the context of the call and real time scoring, and the campaign's business rules.

For example, you might have a flowchart with a decision node that assigns customers to five segments:



- High value customers.
- Loyal customers.
- High risk customers.
- Low risk customers.
- High value customers seeking long tenure.

In this example, customers are assigned to the High Value Customers segment if they have a customer lifetime value (CTLV) of high, if their customer segment is Financially Sophisticated, and if they are a home owner.

Customers are segmented based on off-line and real-time customer data, and offers are associated to customer segments.

After each offer is evaluated, there might be more offers eligible than there is time or space to present. For example, a customer is eligible for three offers, but you want to present only the top two offers. In this case, the offers would be presented based on the marketer's score values. The marketer's score can be based on a calculation of an expression by using customer and offer attributes, a real-time learning algorithm, or a combination of these methods.

### **Optimization of offers**

You can further optimize offers by using the External Callout connector.

Using the External Callout connector, you can override a single offer's score by calling an IBM SPSS Scoring Service. Also, by using the External Callout connector, you can invoke the IBM SPSS score to present eligible offers.

In the insurance case study, you can invoke the IBM SPSS Scoring Services in real time to get the latest Churn Propensity based on the most current data. The Churn Propensity score is then used as the marketer's score.

---

## **Determine the best offers for insurance customers by creating business rules**

Alex, a business analyst, uses IBM Analytical Decision Management to bring together the company's business rules and predictive models to determine the best possible offer for a customer.

The insurance company has a cross-sell campaign. Alex creates rules to target offers to customers depending on which segment they fall in.

The following examples show offers that are targeted to customers in different segments:

#### **Young family with high churn propensity**

Life term insurance with free double indemnity rider

#### **Young family with browsing targeted policies**

Life term insurance

#### **Young family with high churn and browsing specific targeted policies**

Juvenile life insurance

#### **Divorced and no home ownership**

Renter's insurance

Offers are allocated so that the first offer in the list that applies is presented to the customer.

## Example of a rule in IBM Analytical Decision Management

The rule "Young family with high churn propensity" takes into consideration the following points:

- Current life stage is "Young Family".
- Product recently browsed is "Life Term".
- Insurance Policy Recommendation is "Life Term".
- Churn propensity score that is returned from a real-time model is greater than or equal to 0.7.

### Young family with high churn propensity rule

```
Lifestage Current Segment(Current Segment -) Young Family
```

```
PRODUCT_BROWSED_1 = Life term
```

```
Insurance_Policy_Recommendation(RECOMMENDATIONS -) =Life Term
```

```
Auto Churn($RRP-CHURN -Propensity) >=0.7
```

---

## Build predictive models for an insurance company

David, the data scientist (or data engineer) builds models using IBM SPSS Modeler to achieve the following results:

- Segment customers based on financial sophistication, by using financial and demographic data. In this example, financially sophisticated customers have a relatively high credit score, three types of insurance policies, a relatively high income, and are mostly home owners between 30-35 years of age.
- Predict a customer's propensity to churn, by using information about the customer, such as household and financial data, transactional data, and behavioral data.
- Predict customer lifetime value (CLTV) based on the revenue that the customer brings to the company, the cost of maintaining the policies, the cost of retention, and the likelihood of the customer surrendering the policies in the near future.
- Predict the life policies likely to be bought by customers at different life stages by using historical purchase data. Segment the customers based on their current life stage and predict the life policies most relevant to their life stage.

David uses IBM Social Media Analytics to identify life events by analyzing social media posts to detect life events with potential business value for the Insurance company. Life events such as "New baby born" can act as triggers for cross-selling life policies.

David also uses IBM SPSS Modeler Text Analytics to analyze the customer comments in real time to predict the latest customer sentiment score. IBM SPSS Modeler Text Analytics extracts negative words (sentiment) from customer comments to get a negative sentiment score.

The scores, segments, and results from these models are used as inputs within IBM Analytical Decision Management by Alex the business analyst as he creates his business rules.

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## Industry accelerator artifacts

The IBM Predictive Customer Intelligence Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator includes the following artifacts.

### IBM Cognos® Business Intelligence reports

PCI\_Ins\_CallCenter\_CognosContent.zip

PCI\_Ins\_CallCenter\_FMPProject.zip

PCI\_Images.zip

The reports are described in Chapter 4, “Industry accelerator reports,” on page 29.

### IBM Analytical Decision Management applications and templates

PCI\_Ins\_CallCenter\_App.zip

### Predictive models

PCI\_Ins\_CallCenter\_CDS\_Archive.pes

The individual stream files that are contained in the pes file are available in the Streams folder.

The following streams are included:

- Auto Churn.str
- Buying\_Propensity\_Model.str
- Campaign Response Model.str
- Churn.str
- CLTV.str
- DataProcessing Stream.str
- ExternalLearning.str
- Insurance\_Policy\_Recommendation.str
- Lifestage Current Segment.str
- Segmentation.str
- Sentiment.str
- SMA\_Text\_Analytics.str

The Predictive Models are described in “Predictive models in the Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator” on page 18.

### IBM DB2® database

PCI\_Ins\_CallCenter\_Data.zip

The insurance data model is described in “Data model” on page 25.

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## Extend the accelerator with the IBM Predictive Customer Intelligence Usage Report

Optionally, you can monitor the effectiveness of your solution by using the IBM Predictive Customer Intelligence Usage Report. The IBM Predictive Customer Intelligence Usage Report displays the number of offers that are presented to customers and can be configured to show the number of offers that are accepted and rejected.

You can download the IBM Predictive Customer Intelligence Usage Report from IBM AnalyticsZone ([www.ibm.com/analyticszone](http://www.ibm.com/analyticszone)).

---

## Chapter 2. Industry accelerator installation

The Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator is for use with IBM Predictive Customer Intelligence.

The industry accelerator package contains the following parts:

- IBM DB2 databases.
- IBM Analytical Decision Management templates and applications.
- IBM SPSS project streams, models, and rules.
- IBM Cognos Business Intelligence reports and Framework Manager models and packages.

To install the industry accelerator, you must perform the following steps:

1. Download the industry accelerator from IBM AnalyticsZone ([www.ibm.com/analyticszone](http://www.ibm.com/analyticszone)).
2. Create the sample databases on the data node computer.
3. Install the Analytical Decision Management templates and applications on the Predictive Analytics node.
4. Import the SPSS project streams, models, and rules on the Predictive Analytics node.
5. Configure the data view for SPSS models on the Predictive Analytics node.
6. Install the IBM Cognos Content on the Business Intelligence node.

---

### Industry accelerator prerequisites

Before you install the industry accelerator, you must have a fully configured environment.

You must have administration rights and have the ability to copy files between computers.

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### Download the industry accelerator

You must download the IBM Predictive Customer Intelligence accelerators from IBM AnalyticsZone.

#### Procedure

1. Go to IBM AnalyticsZone ([www.ibm.com/analyticszone](http://www.ibm.com/analyticszone)).
2. Click **Downloads**, and under **Predictive Customer Intelligence Accelerators**, click **View all PCI downloads**.
3. Click **More details** for the accelerator that you want to download.
4. If you are not signed in, click **Sign In to Download**.  
You must enter your IBM ID. If you do not have an IBM ID, you must register to create one.
5. Click **Download**.
6. Go to the directory where you downloaded the industry accelerator.
7. Decompress the file.

---

## Creating the database

To use the IBM Predictive Customer Intelligence industry accelerator, you must create a database.

You run one script to create the database, and then run another script to populate the database.

### Procedure

1. Copy the industry accelerator database content file from the computer where you downloaded them to the data node computer:  
The Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator database file is `PCI_1.0_Ins_CallCenter\Database\PCI_Ins_CallCenter_Data.zip`. A database that is named `INSURNC` is created.
2. On the data node computer, decompress the file.
3. On Microsoft Windows operating systems, do the following steps:
  - a. Log on to the data node computer as the DB2 instance owner user.
  - b. Go to the folder where you decompressed the industry accelerator content files.
  - c. In the uncompressed folder, double-click `Install_DB.bat`.
  - d. Double-click `Load_Data.bat`.
4. On Linux operating systems, do the following steps:
  - a. Log on to the data node computer as **root** user.
  - b. Open a terminal window, and go to the directory where you decompressed the industry accelerator content files.  
  
**Note:** If you copied the content files to the home directory for the **root** user, you might have to move the files to another directory that is not in the **root** home directory so that you can run the scripts.
  - c. Type the following command to change the permissions for the files:  
`chmod -R 755 *sh`
  - d. Change to the database instance owner. For example, `su db2inst1`
  - e. In the uncompressed folder, run `sh ./Install_DB.sh`.
  - f. Run `sh ./Load_Data.sh`.

### What to do next

Verify that the tables are created and the data is successfully loaded into the input tables by checking the `out.log` file.

On Microsoft Windows operating systems, the log file is in the industry accelerator name folder. On Linux operating systems, the log file is in the `db2inst1` home folder.

Search for “rows were rejected” in the log file. The value should be zero, if it is not, there are data load issues.

---

## Installing Analytical Decision Management templates and applications

The IBM Predictive Customer Intelligence industry accelerator includes IBM Analytical Decision Management templates and applications. You must copy the template and application files to the Predictive Analytics node computer.

### Procedure

1. Log on to the Predictive Analytics node computer.
2. From the computer where you downloaded the industry accelerator files, copy the Analytical Decision Management applications and templates files.
  - Application: PCI\_1.0\_Ins\_CallCenter\Analytics\Applications\PCI\_Ins\_CallCenter\_App.zip
  - Template: PCI\_1.0\_Ins\_CallCenter\Analytics\Templates\Insurance.xml

Copy the files to the Applications or Templates folder as appropriate on the Predictive Analytics node computer.

On Microsoft Windows operating systems, the default locations are C:\Program Files\IBM\SPSS\Deployment\6.0\Server\components\decision-management\Applications and C:\Program Files\IBM\SPSS\Deployment\6.0\Server\components\decision-management\Templates.

On Linux operating systems, the default locations are /opt/IBM/SPSS/Deployment/6.0/Server/components/decision-management/Applications and /opt/IBM/SPSS/Deployment/6.0/Server/components/decision-management/Templates.

3. Decompress the files in the Applications folder.
4. In a browser, go to the IBM Analytical Decision Management launch page: [http://analytics\\_node\\_name:port\\_number/DM](http://analytics_node_name:port_number/DM)  
If you used the default values, the *port\_number* is 9080.
5. Enter the log in credentials.
6. Click **Add application**, and select **Insurance**.
7. Click **Save**.

---

## Importing IBM SPSS project streams, models, and rules

IBM SPSS project streams, models, rules, and other artifacts are contained in a repository export file (.pes) for the IBM Predictive Customer Intelligence industry accelerator. If you want to modify or view these artifacts, you must copy the export file to the computer where IBM SPSS Collaboration and Deployment Services Deployment Manager is installed, and open the file.

### Procedure

1. From the computer where you downloaded the industry accelerator, copy the .pes file to the computer where IBM SPSS Collaboration and Deployment Services Deployment Manager is installed.

The Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator file is PCI\_1.0\_Ins\_CallCenter\Analytics\PCI\_Ins\_CallCenter\_CDS\_Archive.pes.

2. In IBM SPSS Collaboration and Deployment Service Deployment Manager, right-click **Content Repository**, and click **Import**.
3. Browse to the .pes file.
4. Select the following options:
  - **Resolve conflicts globally**

- Add new version of target item or rename source item, Use labels from source.
- Continue import even if some objects cannot be imported due to locking conflicts.
- Resolve Invalid Version Conflicts, Import.
- Resource Definitions, Recommended - Import if there are no Duplicate ID conflicts or Duplicate Name conflicts.

5. Click OK.

## Results

Content folders and resource definitions are added to the repository alongside any existing content.

---

## Configuring the data view for IBM SPSS models

To configure the data view, IBM SPSS Modeler must be connected to the IBM Predictive Customer Intelligence industry accelerator database through an ODBC data source connection.

If your IBM Predictive Customer Intelligence environment uses the IBM SPSS Modeler client logged in to a Modeler server, perform the steps on the Predictive Analytics node computer (where IBM SPSS Modeler Server is installed).

If your IBM Predictive Customer Intelligence environment uses the IBM SPSS Modeler Client in a stand-alone environment, perform the steps on the client computer where IBM SPSS Modeler client is installed.

The Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator uses the Analytic Data View and JDBC source connections for accessing IBM Analytical Decision Manager. When the industry accelerator files are imported through IBM SPSS Collaboration and Deployment Services Deployment Manager, a new version of the Enterprise View is created that contains the tables for the industry accelerator.

## Procedure

1. Catalog the database on the client computer.
  - a. Click **Start > IBM DB2 > DB2COPY1 (Default) > DB2 Command Window - Administrator**.
  - b. Enter the following command to catalog the database node:  
`db2 catalog tcpip node NODE_NAME remote data_node_name server PORT_NUMBER  
NODE_NAME can be any value. PORT_NUMBER is 50000 by default.`
  - c. Enter the following command to catalog the PCI database:  
`db2 catalog database INSURNC at node NODE_NAME authentication server`  
 You must use the same *node\_name* that you used in the **db2 catalog database** command.
2. Create an ODBC DSN to point to the industry accelerator database. The database account that is provided in the ODBC connection must be the same user that was used for creating the tables.

**Tip:** On Microsoft Windows operating systems, in the Windows Control Panel, select **Administrative Tools** and click **Data Sources**. Click the **System DSN** tab.



3. In the Deployment Manager client, under **Resource Definitions, Credentials**, open the **db2admin** credentials and update the user ID and password to the DB2 administrator account of the data node computer.
4. In **Resource Definitions, Data Sources**, open INSURANCE\_JDBC, and update the IP address and port number to point to the IBM Predictive Customer Intelligence data node computer. The default DB2 port number is 50000.
5. Open the data source, INSURANCE\_ODBC, and verify that the data source name corresponds to the ODBC name created for the industry accelerator. For example, INSURNC.
6. Verify that the Application View and the Data Provider Definition are working properly.
  - a. Open INSURANCE\_DPD.
  - b. Click **Validate**.
7. To retrieve a previous version of the Enterprise View, right-click **Enterprise View** in Deployment Manager and click **Open Version**.
8. To create a single view that combines the solution tables with any tables that existed previously, right-click **Enterprise View** in Deployment Manager and click **Merge Versions**.

## Configuring ODBC for IBM SPSS Modeler Server on Linux operating systems

To use an ODBC data source with IBM SPSS Modeler Server on a Linux operating system, you must configure the environment.

### Procedure

1. Stop the IBM SPSS Modeler Server.
2. Go to the /root/SDAP71 directory.
3. Run the setodbcpath.sh script to update the ODBC path in the scripts.
4. Edit the odbc.sh script to add the definition for ODBCINI to the bottom of the script. For example:

```
ODBCINI=/usr/spss/odbc/odbc.ini; export ODBCINI
```

ODBCINI must point to the full file path of the odbc.ini file for IBM SPSS Modeler. The odbc.ini file lists the ODBC data sources that you want to connect to. A default odbc.ini file is installed with the drivers.

5. In the odbc.ini file, add the data source and specify the driver in the [ODBC Data Sources] section of the file.

For example, add the data source as:

```
[ODBC Data Sources]
INSURNC=IBM DB2 ODBC Driver
```

6. In the odbc.ini file, create an ODBC data source connection for the industry accelerator database.

For example, include the following content:

```
[INSURNC]
Driver=/opt/ibm/db2/V10.1/lib64/libdb2o.so
DriverUnicodeType=1
Description=IBM DB2 ODBC Driver
ApplicationUsingThreads=1
AuthenticationMethod=0
BulkBinaryThreshold=32
BulkCharacterThreshold=-1
```

```

BulkLoadBatchSize=1024
CharsetFor65535=0
#Database applies to DB2 UDB only
Database=INSURNC
DefaultIsolationLevel=1
DynamicSections=200
EnableBulkLoad=0
EncryptionMethod=0
FailoverGranularity=0
FailoverMode=0
FailoverPreconnect=0
GrantAuthid=PUBLIC
GrantExecute=1
GSSClient=native
HostNameInCertificate=
IpAddress=IP_Address_of_DB_server
KeyPassword=
KeyStore=
KeyStorePassword=
LoadBalanceTimeout=0
LoadBalancing=0
LogonID=db2inst1
MaxPoolSize=100
MinPoolSize=0
Password=password
PackageCollection=NULLID
PackageNamePrefix=DD
PackageOwner=
Pooling=0
ProgramID=
QueryTimeout=0
ReportCodePageConversionErrors=0
TcpPort=50000
TrustStore=
TrustStorePassword=
UseCurrentSchema=0
ValidateServerCertificate=1
WithHold=1
XMLDescribeType=-10

```

**Note:** You must use the driver library `libdb2o.so` with IBM SPSS Modeler. Ensure that you set `DriverUnicodeType=1` to avoid buffer overflow errors when you connect to the database.

7. If you are using the 64-bit version of IBM SPSS Modeler Server, define and export `LD_LIBRARY_PATH_64` in the `odbc.sh` script:

```

if [ "$LD_LIBRARY_PATH_64" = "" ]; then
LD_LIBRARY_PATH_64=<library_path>
else
LD_LIBRARY_PATH_64=<library_path>:$LD_LIBRARY_PATH_64
fi
export LD_LIBRARY_PATH_64

```

Where `<library_path>` is the same as for the `LD_LIBRARY_PATH` definition in the script that was initialized with the installation path. For example, `/usr/spss/odbc/lib`.

**Tip:** You can copy the `if` and `export` statements for `LD_LIBRARY_PATH` in the `odbc.sh` file, append them to the end of the file. Then, replace the `LD_LIBRARY_PATH` strings in the newly appended `if` and `export` statements with `LD_LIBRARY_PATH_64`. Here is an example of the `odbc.sh` file for a 64-bit IBM SPSS Modeler Server installation:

```

if [ "$LD_LIBRARY_PATH" = "" ]; then
    LD_LIBRARY_PATH=/usr/spss/odbc/lib
else
    LD_LIBRARY_PATH=/usr/spss/odbc/lib:$LD_LIBRARY_PATH
fi
export LD_LIBRARY_PATH
if [ "$LD_LIBRARY_PATH_64" = "" ]; then
    LD_LIBRARY_PATH_64=/usr/spss/odbc/lib
else
    LD_LIBRARY_PATH_64=/usr/spss/odbc/lib:$LD_LIBRARY_PATH_64
fi
export LD_LIBRARY_PATH_64
ODBCINI=/usr/spss/odbc/odbc.ini; export ODBCINI

```

Ensure that you export LD\_LIBRARY\_PATH\_64, and define it with the if loop.

8. Configure IBM SPSS Modeler Server to use the driver. Edit modelersrv.sh and add the following line immediately below the line that defines SCLEMDNAME:

```
. <odbc.sh_path>
```

Where odbc.sh\_path is the full path to the odbc.sh file.

For example: . /usr/spss/odbc/odbc.sh

Ensure that you leave a space between the first period and the file path.

9. Save modelersrv.sh.
10. Configure the IBM SPSS Modeler Server to use the ODBC wrapper named libspssodbc\_datadirect.so.
  - a. Go to the /usr/IBM/SPSS/ModelerServer/16.0/bin directory.
  - b. Remove the existing libspssodbc.so soft link by using the following command:

```
rm -fr libspssodbc.so
```
  - c. Link the new wrapper to libspssodbc.so by using the following command:

```
ln -s libspssodbc_datadirect_utf16.so libspssodbc.so
```
11. Configure the db2cli.ini file in <db2 instance home>/sql1lib/cfg/db2cli.ini to add the sections for each database.

```

[INSURNC]
Database=INSURNC
Protocol=TCPIP
DriverUnicodeType=1
Port=50000
Hostname=ip or hostname
UID=username
PWD=password

```

12. Save odbc.ini.

## What to do next

To test the connection, do the following steps:

1. Restart IBM SPSS Modeler Server.
2. Connect to IBM SPSS Modeler Server from a client.
3. Add a database source node to the canvas.
4. Open the node and verify that you can see the data source names that you defined in the odbc.ini file.

For additional information and troubleshooting tips for connecting to data sources, see the SPSS Modeler documentation ([www.ibm.com/support/knowledgecenter/SS3RA7\\_16.0.0](http://www.ibm.com/support/knowledgecenter/SS3RA7_16.0.0))

---

## Deploy the IBM Cognos content

For IBM Cognos Business Intelligence, you must catalog the database, create a data source connection, and then deploy the content files for the IBM Predictive Customer Intelligence industry accelerator.

### Moving the IBM Cognos content

You must copy the IBM Cognos content for the IBM Predictive Customer Intelligence industry accelerator to the appropriate locations in your IBM Cognos installation to be able to deploy the content.

#### Procedure

1. Copy the IBM Cognos content from the computer where you downloaded the industry accelerator to the *Cognos\_Install\_location*\Deployment folder on the Business Intelligence node computer.

The Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator IBM Cognos content file is

`PCI_1.0_Ins_CallCenter\BI\PCI_Ins_CallCenter_CognosContent.zip`

2. Decompress the IBM Cognos report image file where you downloaded the industry accelerator.

The report images file is `PCI_1.0_Ins_CallCenter\BI\PCI_Images.zip`

**Note:** If you are installing more than one accelerator, you do not have to replace the images. The `PCI_Images.zip` files contains all of the images that are used in all of the accelerator reports.

3. Copy the `PCI_Images` folder to the *Cognos\_Install\_location*\webcontent folder on the Business Intelligence node computer.

You should have *Cognos\_Install\_location*\webcontent\PCI\_Images folder that contains report image files.

4. Copy the IBM Cognos Framework Manager model files from the computer where you downloaded the industry accelerator to the computer where you installed IBM Cognos Framework Manager, and decompress the file.

The Insurance industry accelerator Framework Manager file is compressed in `PCI_1.0_Ins_CallCenter\BI\PCI_Ins_CallCenter_FMPProject.zip`

5. If you want to edit the Framework Manager models, you must catalog the industry accelerator database on the computer where you installed Framework Manager.

- a. Click **Start > IBM DB2 > DB2COPY1 (Default) > DB2 Command Window - Administrator**.

- b. Enter the following command to catalog the database node:

```
db2 catalog tcpip node NODE_NAME remote data_node_name server PORT_NUMBER
```

*NODE\_NAME* can be any value. *PORT\_NUMBER* is 50000 by default.

- c. Enter the following command to catalog the PCI database:


```
db2 catalog database INSURNC at node NODE_NAME authentication server
```

You must use the same *node\_name* that you used in the **db2 catalog database** command.

### Creating a data source connection to the industry accelerator database

You must create a data source connection to the IBM Predictive Customer Intelligence industry accelerator database.

## Procedure

1. Open a web browser.
2. Go to the IBM Cognos BI portal URL. For example, go to `http://bi_node_name/ibmcognos/`.
3. On the **Welcome** page, click **Administer IBM Cognos Content**.
4. Click the **Configuration** tab, and click **Data Source Connections**.
5. Click the **New Data Source** button .
6. In the **Name** box, type **INSURNC**, and then click **Next**.
7. In the connection page, select **IBM DB2**, ensure that **Configure JDBC connection** is selected, and click **Next**.
8. In the **DB2 database name** field, type **INSURNC**.
9. Leave **DB2 connect string** blank.
10. Under **Signons**, select both **Password** and **Create a signon that the Everyone group can use**, and then type the user ID and password for the DB2 instance owner user that you used to create the database, and click **Next**.

**Tip:** To test whether the parameters are correct, click **Test the connection**. After you test the connection, click **OK** to return to the connection page.

11. In the **Server name** box, enter the name or IP address of your data node computer.
12. In the **Port number** box, enter the DB2 port number. The default is 50000.
13. In **Database name**, type **INSURNC**.

**Tip:** To test whether the parameters are correct, click **Test the connection**. After you test the connection, click **OK** to return to the connection page.

14. Click **Finish**.

## Deploy the IBM Cognos reports

You must deploy the IBM Predictive Customer Intelligence industry accelerator reports using IBM Cognos Administration.

### Procedure

1. Open a web browser.
2. Go to the IBM Cognos BI portal URL. For example, go to `http://bi_node_name/ibmcognos/`.
3. On the **Welcome** page, click **Administer IBM Cognos Content**.
4. On the **Configuration** tab, click **Content Administration**.
5. On the toolbar, click the **New Import** button.
6. In the **Deployment Archive** pane, select deployment archive, and click **Next**. The deployment archive is named **PCI\_Ins\_CallCenter\_CognosContent**.
7. In the **Specify a name and description** pane, accept the default or enter a new name, and click **Next**.
8. In the **Select the public folders and directory content** pane, select all of the packages in the table, leave the **Options** as default, and click **Next**.

**Note:** Ensure that the **Disable after import** option is cleared.

9. In the **Specify the general options** pane, accept the defaults, and click **Next**.
10. On the **Review the summary** page, click **Next**.

11. On the **Select an action** page, select **Save and run once**, and click **Finish**.
12. On the **Run with options** page, accept the defaults, and click **Run**, and then click **OK**.
13. Select **View the details of this import after closing this dialog** and click **OK**.
14. In IBM Cognos Administration, click the **Home** button.

The content is available in **Public Folders > PCI Industry Accelerators 1.0**.

---

## Copying the industry accelerator license files to each computer

After you install the industry accelerator, you must copy the license folder to each computer on which you use the IBM Predictive Customer Intelligence industry accelerator.

**Important:** Do not rename the folders or files.

### Procedure

Copy the license folder from the folder where you decompressed the industry accelerator to each computer on which an IBM Predictive Customer Intelligence component is installed. For example, copy the folder and contents so that you have a C:\IBM\PCI\_IndustryAccelerators\1.0\license folder on Microsoft Windows operating systems or an /opt/IBM/PCI\_IndustryAccelerators/1.0/license folder on Linux operating systems on each node computer.

The folder contains the license files. The folder should exist on each server and client node computer.

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## Chapter 3. Predictive models

Use IBM Predictive Customer Intelligence models to predict what is likely to happen in the future, based on patterns from past data.

For example, models can predict the following situations:

- How likely it is that a customer will churn in the next quarter.
- Whether a customer will be a promoter of a service, or a detractor
- How valuable the customer is in terms of future revenue

Models can be used in the same way as business rules. However, while rules might be based on corporate policies, business logic, or other assumptions, models are built on actual observations of past results, and can discover patterns that might not otherwise be apparent. While business rules bring common business logic to applications, models lend insight and predictive power. The ability to combine models and rules is a powerful feature.

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### Model data sources

You or the administrator need to specify the data sources to use in the IBM Predictive Customer Intelligence solution for modeling, analysis, simulation and testing, and scoring.

Use IBM Analytical Decision Management to plan the model and to decide which data sources to use. You need the following types of data in the modeling process:

#### Historical or analytical data

To build the model, you need information about what to predict. For example, if you want to predict churn, you need information about customers such as their complaints history, number of months since they upgraded their plan, sentiment score, demographic history, and estimated income. This is often referred to as historical data or analytical data, and it must contain some or all of the fields in the project data model, plus an additional field that records the outcome or result that you want to predict. This extra field is used as the target for modeling.

#### Operational or scoring data

To use the model to predict future results, you need data about the group or population in which you are interested. This is often referred to as operational data or scoring data. The project data model is typically based on this data.

You can use the following types of data sources:

- A database that supports ODBC, such as IBM DB2.
- An Enterprise View that is defined in IBM SPSS Collaboration and Deployment Services.
- A file that is used by IBM SPSS Statistics, such as a text file (txt), or a comma separated file (csv).

When you add a new data source, map all of its fields to ensure compatibility with the project data model. For example, if the project data model requires a field named purchase with values Yes and No for the measurement level flag, then any

data source that you use must have a compatible field. If the field names are not identical, they can be mapped accordingly. Note that the input and associated mapped field must have the same data type.

You can characterize the information that each data field represents. Define a measurement level to determine how a given field is used in business rules, models, or other applications.

You can derive additional fields or attributes for the application by using the expression manager. For example, if you use banking data, you may want to create an expression that shows the ratio between a customer's income and the number of loan accounts that the customer has. Expressions are always numeric with a measurement of Continuous; this cannot be changed.

To enforce corporate-wide policies, use global selections to choose the records to include or exclude from processing by the application. Global selections can be particularly effective when used in combination with shared rules. Shared rules are saved as separate objects that can be used by multiple applications. If the shared rule changes, all applications that use the rule can then be updated.

Data mining that uses IBM SPSS Modeler focuses on the process of running data through a series of nodes. This is referred to as a stream. This series of nodes represents operations to be performed on the data, while links between the nodes indicate the direction of data flow. Typically, you use a data stream to read data into IBM SPSS Modeler, run it through a series of manipulations, and then send it to a destination, such as a table or a viewer.

For example, to open a data source, you add a new field, select records based on values in the new field, and then display the results in a table. In this example, your data stream would consist of the following nodes:

- Variable File node, which reads the data from the data source
- Derive node, which adds the new calculated field to the data set
- Select node, which uses the selection criteria to exclude records from the data stream
- Table node, which displays the results of your manipulations on screen

For more information about these features, see the IBM SPSS Modeler Help ([www.ibm.com/support/knowledgecenter/SS3RA7\\_16.0.0/com.ibm.spss.modeler.help/clementine/entities/clem\\_family\\_overview.htm](http://www.ibm.com/support/knowledgecenter/SS3RA7_16.0.0/com.ibm.spss.modeler.help/clementine/entities/clem_family_overview.htm)).

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## **Predictive models in the Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator**

A number of predictive models are used in the IBM Predictive Customer Intelligence Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator.

The following models are provided:

### **Segmentation model**

In the Segmentation model (`Segmentation.str`) customers are segmented based on their financial sophistication. This model enables the insurer to sell insurance policies that are appropriate to the customer.



**Churn Prediction model**

Churn.str predicts a customer's propensity to churn by using information about the customer such as household and financial data, transactional data, and behavioral data.

**Customer Lifetime Value model (CLTV)**

CLTV.str predicts customer lifetime value. CLTV is based on the revenue that the customer brings in to the company, the cost of maintaining the policies, the cost of retention, and the likelihood of the customer surrendering the policies soon.

**Campaign Response model**

Campaign Response Model.str predicts the probability that customers will respond to targeted offers so that you send out offers only to the customers whose propensity to respond is above a particular threshold.

**Auto Churn model**

Auto Churn.str predicts the customers likely to churn from the current list of active customers. This model considers the Auto policy customers only.

**Life Stage Segment model**

Lifestage Current Segment.str groups customers based on their current life stage, which would help in recommending the right insurance policy to the customer based on their current life stage segment.

**Buying Propensity model**

Buying\_Propensity\_Model.str identifies the life policies that are mostly bought by customers belonging to each life stage segment as defined in the life stage segment model.

**Data Processing Stream**

DataProcessing Stream.str transforms and aggregates data that is obtained from the customer's visit to the insurer's website so that it can be used to define rules for recommending the right insurance policy to each customer.

**Insurance Policy Recommendation model**

Insurance\_Policy\_Recommendation.str recommends the correct insurance policy by considering information such as the customer's web activity data and also the life insurance policy buying propensity for the given customer's life stage segment, based on historical data.

**Social Media Analytics (SMA) model**

SMA\_Text\_Analytics.str extracts customer life stage event information from customers social media posts.

**Sentiment Scoring model**

Sentiment.str extracts the sentiment score from customer comments that are captured while recording customer complaints.

**External Learning model**

The External Learning Model (ExternalLearning.str) predicts the likelihood that a customer will accept a particular offer. It bases that likelihood on the past responses for customers with similar characteristics.

## Data used in the Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator

In the IBM Predictive Customer Intelligence Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator, the Insurance company runs a multi-line business.

The following types of data are used.

### Customer master data

This includes customer's demographic data, employment and income data, and information about the household as well. POLICYHOLDER and HOUSEHOLD tables capture most of this data. Typically, Master Data Management systems are the source of customer master data.

### Customer policy data

This includes aggregated customer information, such as the number and types of policies that are owned by the customer, total premium that is paid by the customer, average claim amount, tenure of the customer, number of complaints, number of claims, and customer sentiment data. POLICYHOLDER\_FACT and POLICY\_FACT tables capture most of this data.

### Customer transaction data

This includes data about all the customer transactions such as the policies purchased, their inception and maturity/renewal date, data related to all of the complaints made by the customer in the past, and also data that is related to all of the claims that have been made by the customer. POLICIES, CLAIMS, COMPLAINTS, COMPLAINT\_DETAILS tables contain this data.

### Customer Social Media Data

Apart from the customer data that is available within the enterprise, insurance organizations might also want to get insights from external sources of data. For example, the social media channels where customers post comments about their experiences with their insurers, as well as about their needs and life-events that can potentially lead to an opportunity to sell appropriate insurance products. SMA\_DATA and SMA\_DATA\_ANALYSIS tables captures such external data, as well as the summarized analysis of this social media data.

**Note:** The fetching of social media data is outside the scope of this solution.

### Customer web browsing data

Many insurance organizations today allow their customers to buy or explore their insurance products online through their websites. Technology makes it possible to track customers' activities on their websites, giving them vital insights about the customers' current interest in specific insurance products. Web Analytics tools can be used to analyze customers' website activities and use this information along with other customer data to make the right recommendations to the customers at the right time. ACTIVITY\_FEED\_DATA, ONLINE\_BROWSING\_HISTORY, and ONLINE\_BROWSING\_SUMMARY tables contain customers web activity data.

## Define customer segments

When you define customer segments, you profile the customers into groups that have similar demand characteristics. In the IBM Predictive Customer Intelligence

Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator, customers are profiled based on their financial sophistication.

Customers are segmented into financially sophisticated, and novice categories. This means that insurers can target each segment with cross-selling insurance policies that are appropriate to increase the effectiveness of cross-sell campaigns.

The example stream for defining customer segments is named `Segmentation.str`.

The model that is used is a `TwoStep` cluster.

The inputs for the example `Segmentation` model are customer master data and customer policy data, specifically:

- Demographic data: age, gender, marital status, and employment status.
- Insurance policy-related data: insurance lines, policies, premiums, tenure, and insurance score.
- Financial data: income, retirement plans, home ownership status, vehicle ownership.

These inputs are aggregated. As each record is read, based on a distance criterion, the `TwoStep` cluster algorithm decides whether it should be merged with an existing cluster, or used to start a new cluster. If the number of clusters becomes too large (you can set the maximum number), then the distance criterion is increased, and clusters whose distance is now less than the modified distance criterion are merged. In this way, the records are clustered into a preliminary set of clusters in a single pass of the data.

## **Predict churn in the Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator**

The Churn prediction model predicts a customer's propensity to churn by using information about the customer such as household and financial data, transactional data, and behavioral data.

The inputs for the Churn prediction model are customer demographic data, insurance policies, premiums, tenure, claims, complaints, and the sentiment score from past surveys.

The example stream for predicting churn is named `Churn.str`.

Data preparation for churn prediction starts with aggregating all available information about the customer. The data that is obtained for predicting the churn is classified in the following categories:

- Demographic data, such as age, gender, education, marital status, employment status, income, home ownership status, and retirement plan.
- Policy-related data, such as insurance lines, number of policies in the household, household tenure, premium, disposable income, and insured cars.
- Claims, such as claim settlement duration, number of claims that are filed and denied.
- Complaints, such as number of open and closed complaints.
- Survey sentiment data. Sentiment scores from past surveys are captured in the latest, and average note attitude score fields. The note attitude score is derived

from customer negative feedback only. If the note attitude is zero, the customer is more satisfied while as the number increases, satisfaction level decreases.

A CHAID algorithm is used to predict churn. The CHAID (Chi-squared Automatic Interaction Detection) is a classification method that builds decision trees by using chi-square statistics to work out the best places to make the splits in the decision tree. The CHAID model output is decision rules/tree and a predictor importance plot. This output shows you which the most important predictors are for whether a customer is likely to churn or not. For example, the most important predictors might be HOUSEHOLD\_TENURE, LATEST\_NOTE\_ATTITUDE, and NUMBER\_OF\_POLICIES\_IN\_HOUSEHOLD.

## Understand Customer Lifetime Value (CLTV)

The IBM Predictive Customer Intelligence Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator uses Customer Lifetime Value (CLTV) to understand customer profitability.

CLTV is a commonly used approach to determine how much each customer is worth in monetary terms. It helps insurers to determine how much money must be spent to acquire or retain a customer. CLTV is defined as the expected net profit a customer will contribute to the business over time. Advanced analytics provide new insights on how customer lifetime value can be calculated.

The example stream is named CLTV.str.

The inputs for this model are customer demographic data, policies, premiums, tenure, policy maintenance cost, complaints, and customer survey sentiment.

CLTV is determined by the margin amount that the customer contributes each month and the probability that the customer might churn in any month. Customers with higher margin amount and a lower probability to churn have a high CLTV.

CLTV is derived by the following formula:

$$\sum_{i=0}^N \frac{NetProfit * C_i}{(1+d)^t}$$

$C_i$  = probability for customer  $i$  to generate revenue in time  $t$

$N$  = total number of periods

$d$  = monthly discount rate

$t$  = time of cash flow

The probability  $C_i$  can be estimated by using Cox regression. Cox regression is a method for investigating the effect of several variables upon the time a specified event takes to happen. In the context of an outcome such as churn, this is known as Cox regression for survival analysis.

CLTV is calculated by considering the following:

- When the Cox model is scored, the customer's past survival time is considered, and the churn probability is predicted for one to five years.
- The NetProfit value is derived by using following expression.

$$\text{NET\_PROFIT} = (\text{TOTAL\_PREMIUM} - \text{MAINTENANCE\_COST}) * 12$$

- The customer lifetime value is derived as follows:

$$\begin{aligned} \text{CLTV} = & (\text{NET\_PROFIT} * C_1 / (1 + 0.12)) \\ & + (\text{NET\_PROFIT} * C_2 / (1 + 0.11) ** 2) \\ & + (\text{NET\_PROFIT} * C_3 / (1 + 0.1) ** 3) \\ & + (\text{NET\_PROFIT} * C_4 / (1 + 0.09) ** 4) \\ & + (\text{NET\_PROFIT} * C_5 / (1 + 0.08) ** 5) \\ & + (\text{NET\_PROFIT} * \text{POLICYHOLDER\_TENURE}) \end{aligned}$$

Where  $C_{i=(1,2,3,4,5)}$  is the renewal probability, which is the future value that a customer can bring. The last item is the historical/current value of one customer.

- The CLTV values are further classified into Low, Medium, and High categories by using the following calculations:

```
CLTV_CAT =
  if CLTV <= 30083.625 then 'LOW'
  elseif CLTV > 30083.625 and CLTV <= 46488.000000000007 then 'MEDIUM'
  elseif CLTV > 46488.000000000007 then 'HIGH'
  else 'LOW'
endif
```

## Predict customer response to a campaign

Targeting offers to the correct customers is an important part of promotion planning and campaign design. The IBM Predictive Customer Intelligence Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator uses the Campaign Response model to predict the probability that the customer will respond to targeted offers.

The Campaign Response model helps in sending out offers only to the customers whose propensity to respond is above a particular threshold.

The example stream for predicting customer response to a campaign is named Campaign Response Model.str.

The customer's previous offer response data is the input for the model, and the model is trained based on that data.

The Decision List algorithm is used to identify the characteristics of customers who are most likely to respond favorably based on previous campaigns. The model generates rules that indicate a higher or lower likelihood of a binary (1 or 0) outcome. The Campaign Response model considers only those customers who are currently with the insurance company, and not those customers who churned.

## Predict churn for auto policy holders

The IBM Predictive Customer Intelligence Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator uses the Auto Churn prediction model to predict the customers that are likely to churn from the current list of active customers that hold auto policies.

The example stream for predicting the customers likely to churn is named Auto Churn.str.

The CHAID decision tree algorithm is used to predict churn. This model is similar to the Churn model, except that this model considers only auto policy data for

predicting churn. For more information, see “Predict churn in the Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator” on page 21.

In this industry accelerator, the most important predictors of churn are the last survey sentiment score (LATEST\_NOTE\_ATTITUDE) and CLAIM\_SETTLEMENT\_DURATION.

## **Group customers based on their current life stage**

The Insurance sample uses the Lifestage Segment model to group customers based on their current life stage.

The example stream for grouping customers into their current life stage is named `Lifestage Current Segment.str`.

The model uses simple rules to get the current life stage segment of customer. Some examples of defined segments are:

- Newly married
- Young family
- Young and affluent
- Single
- Divorced

## **Identify the life policies bought by life stage segments**

The Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator categorizes customer buying propensity for life policies into life stage segments using the Apriori model.

The example stream is named `Buying_Propensity_Model.str`.

The Apriori model is an association algorithm that extracts association rules from data. The algorithm uses the past insurance policy purchase data and provides the buying propensity score for each policy at customer life stage segment level. The output is processed further into a summary format, which is then used by IBM Analytical Decision Management to deliver appropriate offers to customers.

## **Recommend the correct insurance policy**

The IBM Predictive Customer Intelligence Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator uses the Insurance Policy Recommendation model to recommend the correct insurance policy for customers.

The example stream is `Insurance_Policy_Recommendation.str`.

The Insurance Policy Recommendation model compares insurance policies that are browsed by the customer with the list of insurance policies that have a higher buying propensity for the customer's life stage segment. The model recommends the correct insurance policy according to this data.

## **Transform and aggregate customer data**

The IBM Predictive Customer Intelligence Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator uses the `DataProcessing Stream.str` to transform and aggregate data about customer activity on the insurer's web site.

To obtain the online browsing behavior data, deploy a web analytics solution.

The stream pre-processes the activity feed data from a web analytics tool and loads it into tables in a format that makes it easy for analysis. The transformed data is stored in the `ONLINE_BROWSING_HISTORY` table.

## Extract life stage event information from social media posts

You can use social media to get valuable insights about customers. The IBM Predictive Customer Intelligence Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator uses the `SMA_Text_Analytics.str` to extract information from social media posts.

**Important:** IBM Predictive Customer Intelligence does not retrieve social media data; this solution assumes that social media data is available.

The SMA Text Analytics model uses text analytics to read the social media data, and to extract life stage event information. Some examples of life stage events are events such as having a baby, getting a new job, buying a house, having a birthday, and getting married. This information is used to help recommend appropriate insurance policies to customers.

## Extract sentiment scores from customer complaints

Customer interactions with call center agents can be a source of valuable data to determine customer satisfaction levels. The IBM Predictive Customer Intelligence Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator uses the Sentiment Scoring model to extract the sentiment score from customer comments that are captured while recording customer complaints.

The input is customer complaint details. The example stream for extracting the sentiment score is named `Sentiment.str`. The Text Analytics model reads the customer complaint details, and extracts meaningful words and concepts from the information. Negative concepts are used to derive the sentiment score. The sentiment score reflects the count of negative words that are used by customers while making the complaints. Example concepts are bad, not accessible, slow, and wrong.

## Data model

The historic data that is used for predictive modeling in IBM Predictive Customer Intelligence is stored in an IBM DB2 database.

A Predictive Enterprise View (PEV) of the data is created which passes data to the real time scoring service. Database Views (DB Views) are also created to be used in IBM SPSS Modeler streams. The following table describes some of the data columns that are part of the Predictive Enterprise View and the Database Views.

*Table 1. Key data columns in the Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator*

NAME	DESCRIPTION
AGE	The age of the policy holder.
CLTV	Customer Lifetime Value.
EDUCATION	The education level of the policy holder.
EMPLOYMENT_STATUS	The status of the person's employment.

Table 1. Key data columns in the Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator (continued)

NAME	DESCRIPTION
GENDER	The person's sex or gender.
INCOME	The policy holder's annual income.
MARITAL_STATUS	The marital status of the person.
MAINTENANCE_COST	The cost of maintaining this policy.
MONTHS_SINCE_POLICY_INCEPTION	The number of months since the policy holder started the policy.
MONTHS_SINCE_LAST_CLAIM	The number of months since the policy holder filed the last claim.
NUMBER_OF_CLAIMS_DENIED	The number of claims that were denied.
NUMBER_OF_CLAIMS_FILED	The number of claims that are filed.
CLAIM_SETTLEMENT_DURATION	The time, in days between the date when the claim opened and the date when the claim was closed, and the customer satisfaction confirmed, based on the status of the claim.
NUMBER_OF_COMPLAINTS	The number of complaints the policy holder has submitted.
NO_OF_CLOSED_COMPLAINTS	The number of complaints that have been closed.
NUMBER_OF_OPEN_COMPLAINTS	The number of complaints that are open.
LATEST_NOTE_ATTITUDE	The noted attitude of the last communication.
AVG_NOTE_ATTITUDE	Average communication note attitude.
NUMBER_OF_POLICIES	The number of policies that the policy holder has.
POLICYHOLDER_ID	Any value without business meaning that uniquely distinguishes each occurrence of this entity.
POLICY_ID	Any value without business meaning that uniquely distinguishes each occurrence of this entity.
POLICY_TYPE	Indicates the policy type, for example, fixed term and flexible term.
VEHICLE_OWNERSHIP	Indicates whether the policy holder owns a vehicle or not.
VEHICLE_TYPE	The vehicle type.
VEHICLE_SIZE	The vehicle size.
HOME_OWNERSHIP_STATUS	The tenancy status of residence.
INSURANCE_LINES	The number of types of insurance products held by the policy holder.
INSURANCE_SCORE	The insurance score, based on the credit score, as well as other factors such as claim filing history.
LIFE_CUSTOMER	Indicates whether a customer owns a life insurance policy.



Table 1. Key data columns in the Inject Next Best Action Recommendations into every Insurance Call Center Interaction industry accelerator (continued)

NAME	DESCRIPTION
NON_LIFE_CUSTOMER	Indicates whether a person owns a non-life insurance policy.
NUMBER_OF_CHILDREN	The number of children of the policy holder.
NUMBER_OF_INSURED_CARS	The number of cars insured with the insurance company.
POLICYHOLDER_TENURE	The number of years the policy holder has been a customer with the insurance company.
TOTAL_PREMIUM	The total premium on all the policies paid by the policyholder to the insurance company.
RETIREMENT_PLAN	The name of the retirement plan owned by the policyholder
HOUSEHOLD_NUMBER_OF_CHILDREN	The number of children in household
HOUSEHOLD_NUMBER_OF_INSURED_CARS	The number of insured cars in the household that are insured with the insurance company.
NUMBER_OF_POLICIES_IN_HOUSEHOLD	The number of policies held by the household.
HOUSEHOLD_TENURE	The number of years that a household has been classified within its customer status.
HOUSEHOLD_PREMIUM	The total premium paid by the household to the insurance company.
HOUSEHOLD_DISPOSABLE_INCOME	The amount of money that the household can spend after having paid all the fixed expenses such as rent and mortgage repayment.

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## Training predictive models

Predictive models must be trained to determine which data is useful and which data is not needed. When a model gives you accurate predictions, you are ready to use the predictive model for real-time scoring.

You use a training data set to build the predictive model and a test set of data to validate the model that was created with the training set.

Models must be retrained periodically with new data sets to adjust for changing behavior patterns. For information about using IBM SPSS Modeler, see IBM SPSS Modeler Help ([www.ibm.com/support/knowledgecenter/SS3RA7\\_16.0.0/com.ibm.spss.modeler.help/clementine/entities/clem\\_family\\_overview.htm?lang=en](http://www.ibm.com/support/knowledgecenter/SS3RA7_16.0.0/com.ibm.spss.modeler.help/clementine/entities/clem_family_overview.htm?lang=en)).

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## Scoring a model

To score a model means to apply it to some data in order to obtain a result or prediction that can be used as input to decisions.

Depending on the application, the scoring results can be written to a database table or flat file, or used as inputs to the segment, selection, and allocation rules that drive decisions in an application.

For more information, see IBM SPSS Collaboration and Deployment Services Deployment Manager User's Guide ([www.ibm.com/support/knowledgecenter/SS69YH\\_6.0.0/com.spss.mgmt.content.help/model\\_management/thick/scoring\\_configuration\\_overview.html](http://www.ibm.com/support/knowledgecenter/SS69YH_6.0.0/com.spss.mgmt.content.help/model_management/thick/scoring_configuration_overview.html)).

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## Create business rules

For IBM Predictive Customer Intelligence, you use IBM Analytical Decision Management to bring together your company's business rules, predictive models, and optimizations.

Using IBM Analytical Decision Management, the insights gained through predictive modeling can be translated to specific actions.

You can combine predictive models with rules to allocate offers in accordance with business goals. This is done by using a combination of selection and allocation rules that are based on the output from predictive models.

The steps that you take are:

**Define possible actions**

If a customer is not happy with a service, what should you do about it.

**Allocate offers**

Which types of customers are the best candidates for which offers.

**Prioritize offers**

Prioritization determines which offers a customer receives.

For more information, see the IBM Analytical Decision Management Application User's Guide ([www.ibm.com/support/knowledgecenter/SS6A3P\\_8.0.0/com.ibm.spss.dm.userguide.doc/configurableapps/dms\\_define\\_rules.htm](http://www.ibm.com/support/knowledgecenter/SS6A3P_8.0.0/com.ibm.spss.dm.userguide.doc/configurableapps/dms_define_rules.htm)).

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## Deploy an application

You can deploy the IBM Predictive Customer Intelligence application to a testing environment or to a production environment, such as a call center or a website. You can also deploy it to contribute to batch processing.

You can deploy a stream in the IBM SPSS Modeler repository. A deployed stream can be accessed by multiple users throughout the enterprise and can be automatically scored and refreshed. For example, a model can be automatically updated at regularly scheduled intervals as new data becomes available.

For more information, see IBM SPSS Collaboration and Deployment Services ([www.ibm.com/support/knowledgecenter/SS69YH\\_6.0.0/com.spss.mgmt.content.help/model\\_management/\\_entities/whatsnew\\_overview\\_thick.html?cp=SS69YH\\_6.0.0%2F5](http://www.ibm.com/support/knowledgecenter/SS69YH_6.0.0/com.spss.mgmt.content.help/model_management/_entities/whatsnew_overview_thick.html?cp=SS69YH_6.0.0%2F5)).

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## Chapter 4. Industry accelerator reports

An IBM Cognos Business Intelligence report is provided with the IBM Predictive Customer Intelligence industry accelerator.

You can customize the report by using IBM Cognos Report Studio. Report Studio is a report design and authoring tool. Report authors can use Report Studio to create, edit, and distribute a wide range of professional reports. For more information, see IBM Cognos Report Studio User Guide ([www.ibm.com/support/knowledgecenter/SSEP7J\\_10.2.1/com.ibm.swg.ba.cognos.ug\\_cr\\_rptstd.10.2.1.doc/c\\_rs\\_introduction.html](http://www.ibm.com/support/knowledgecenter/SSEP7J_10.2.1/com.ibm.swg.ba.cognos.ug_cr_rptstd.10.2.1.doc/c_rs_introduction.html)).

The metadata that the report displays comes from the package that is created in and published from IBM Cognos Framework Manager. The example Framework Manager project folder contains the compiled project file (.cpf). When you open the .cpf file, Framework Manager displays the modeled relationships of the data and the package definitions, which are made available to the reporting studios when published. You can modify the metadata for the report by using Framework Manager. For more information, see IBM Cognos Framework Manager User Guide ([www.ibm.com/support/knowledgecenter/SSEP7J\\_10.2.1/com.ibm.swg.ba.cognos.ug\\_fm.10.2.1.doc/c\\_ug\\_fm\\_introduction.html%23ug\\_fm\\_Introduction](http://www.ibm.com/support/knowledgecenter/SSEP7J_10.2.1/com.ibm.swg.ba.cognos.ug_fm.10.2.1.doc/c_ug_fm_introduction.html%23ug_fm_Introduction)).

### Available reports

The following IBM Predictive Customer Intelligence reports are available from the IBM Cognos Business Intelligence portal.

#### **CaseReportInsurance**

Shows the cases by month for the selected client.

#### **Churn and Sentiment Scores**

The Dial report shows churn propensity and sentiment score.

#### **Churn Propensity**

Shows the churn propensity ratio (the willingness of the client to leave the provider) for the selected client.

#### **ClaimsReport**

The list report shows customer claims information.

#### **Complaints**

The bar chart and list report shows customer complaints information.

#### **PolicyDetails**

The list report shows customer policy information.

#### **SMA Insight**

Shows the social media activity for the selected client.

#### **Social and Web Analytics**

The pie chart and list report show customer social media post and insurance product browsing summary information.

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## View IBM Predictive Customer Intelligence reports

You can view the IBM Predictive Customer Intelligence industry accelerator report in IBM Cognos Business Intelligence.

### Procedure

1. Open a web browser.
2. Go to the IBM Cognos BI portal URL. For example, go to `http://bi_node_name/ibmcognos/`.
3. In the **IBM Cognos Welcome** page, click **IBM Cognos content**.
4. In the **Public Folders** tab, click: **PCI Industry Accelerators 1.0**.

Use the following inputs for the report:

- CaseReportInsurance, Churn and Sentiment Scores, Churn Propensity, ClaimsReport, and PolicyDetails: 1001920.
- SMA Insight: AaronBBailey@trashymail.com
- Social and Web Analytics: 1006598

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## Modify the data model

You use IBM Cognos Framework Manager to model the meta data for the IBM Predictive Customer Intelligence industry accelerator reports.

IBM Cognos Framework Manager is a meta data modeling tool that drives query generation for IBM Cognos software. A model is a collection of meta data that includes physical information and business information for one or more data sources.

For information on modifying or creating Framework Manager models, see the *IBM Cognos Framework Manager User Guide*. This is available from IBM Knowledge Center ([www.ibm.com/support/knowledgecenter/SSEP7J\\_10.2.1/com.ibm.swg.ba.cognos.cbi.doc/welcome.html](http://www.ibm.com/support/knowledgecenter/SSEP7J_10.2.1/com.ibm.swg.ba.cognos.cbi.doc/welcome.html)).

### Procedure

1. Launch IBM Cognos Framework Manager.
2. Click **Open a Project** and browse to the location where you copied and decompressed the IBM Cognos Framework Manager model file.

The Insurance industry accelerator IBM Cognos Framework Manager file is `PCI_Ins_CallCenter_FMPProject\Insurance.cpf`

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## Appendix. Troubleshooting a problem

Troubleshooting is a systematic approach to solving a problem. The goal of troubleshooting is to determine why something does not work as expected and how to resolve the problem.

Review the following table to help you or customer support resolve a problem.

*Table 2. Troubleshooting actions and descriptions*

<b>Actions</b>	<b>Description</b>
A product fix might be available to resolve your problem.	Apply all known fix packs, or service levels, or program temporary fixes (PTF).
Look up error messages by selecting the product from the IBM Support Portal, and then typing the error message code into the <b>Search support</b> box ( <a href="http://www.ibm.com/support/entry/portal/">http://www.ibm.com/support/entry/portal/</a> ).	Error messages give important information to help you identify the component that is causing the problem.
Reproduce the problem to ensure that it is not just a simple error.	If samples are available with the product, you might try to reproduce the problem by using the sample data.
Ensure that the installation successfully finished.	The installation location must contain the appropriate file structure and the file permissions. For example, if the product requires write access to log files, ensure that the directory has the correct permission.
Review all relevant documentation, including release notes, technotes, and proven practices documentation.	Search the IBM Knowledge Center to determine whether your problem is known, has a workaround, or if it is already resolved and documented.
Review recent changes in your computing environment.	Sometimes installing new software might cause compatibility issues.

If the items in the table did not guide you to a resolution, you might need to collect diagnostic data. This data is necessary for an IBM technical-support representative to effectively troubleshoot and assist you in resolving the problem. You can also collect diagnostic data and analyze it yourself.

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## Troubleshooting resources

Troubleshooting resources are sources of information that can help you resolve a problem that you are having with an IBM product.

### Support Portal

The IBM Support Portal is a unified, centralized view of all technical support tools and information for all IBM systems, software, and services.

The IBM Support Portal lets you access all the IBM support resources from one place. You can tailor the pages to focus on the information and resources that you need for problem prevention and faster problem resolution. Familiarize yourself

with the IBM Support Portal by viewing the demo videos ([https://www.ibm.com/blogs/SPNA/entry/the\\_ibm\\_support\\_portal\\_videos](https://www.ibm.com/blogs/SPNA/entry/the_ibm_support_portal_videos)).

Find the content that you need by selecting your products from the IBM Support Portal (<http://www.ibm.com/support/entry/portal>).

Before contacting IBM Support, you will need to collect diagnostic data (system information, symptoms, log files, traces, and so on) that is required to resolve a problem. Gathering this information will help to familiarize you with the troubleshooting process and save you time.

## **Service request**

Service requests are also known as Problem Management Reports (PMRs). Several methods exist to submit diagnostic information to IBM Software Technical Support.

To open a PMR or to exchange information with technical support, view the IBM Software Support Exchanging information with Technical Support page (<http://www.ibm.com/software/support/exchangeinfo.html>).

## **Fix Central**

Fix Central provides fixes and updates for your system's software, hardware, and operating system.

Use the pull-down menu to navigate to your product fixes on Fix Central (<http://www.ibm.com/systems/support/fixes/en/fixcentral/help/getstarted.html>). You may also want to view Fix Central help.

## **IBM developerWorks**

IBM developerWorks<sup>®</sup> provides verified technical information in specific technology environments.

As a troubleshooting resource, developerWorks provides easy access to the most popular practices, in addition to videos and other information: developerWorks (<http://www.ibm.com/developerworks>).

## **IBM Redbooks**

IBM Redbooks<sup>®</sup> are developed and published by the IBM International Technical Support Organization, the ITSO.

IBM Redbooks (<http://www.redbooks.ibm.com>) provide in-depth guidance about such topics as installation and configuration and solution implementation.

## **Software support and RSS feeds**

IBM Software Support RSS feeds are a quick, easy, and lightweight format for monitoring new content added to websites.

After you download an RSS reader or browser plug-in, you can subscribe to IBM product feeds at IBM Software Support RSS feeds (<https://www.ibm.com/software/support/rss>).

## **Log files**

Log files can help you troubleshoot problems by recording the activities that take place when you work with a product.

## **Error messages**

The first indication of a problem is often an error message. Error messages contain information that can be helpful in determining the cause of a problem.





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