

Pega Customer Decision Hub

User Guide

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Document: Pega Customer Decision Hub User Guide

Publication date: December 09, 2020

Feedback

If you have comments for how we can improve our materials, send an email to AppDocBug@pegasystems.com.

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Preface

Pega Customer Decision Hub is a comprehensive marketing automation solution that delivers inbound offer management and outbound marketing on a single platform.

Pega Customer Decision Hub uses a combination of predictive and adaptive analytics, real time decisioning, and business process management to dynamically manage cross-channel conversations (from action design to fulfillment), drive revenue, and expand customer lifetime value.

This guide explains how to:

- Use the Pega Customer Decision Hub portal
- Create Strategies to deliver actions to customers
- Leverage Segment visualization to hone in on the ideal set of customers
- Configure constraints to optimize throughput
- Create complex cross-channel actions and group them into bundles
- Design and create compelling Treatments
- Design, deliver, and update (Apple) Passbook passes
- Deliver push notifications to configured apps on Android and iOS devices
- Configure, trigger, and respond to real-time Events and Geofences
- Create Seed Lists and utilize them for testing actions
- Define and populate Control Groups and utilize them in Strategies
- Utilize the Customer Profile to view customer details
- Assess the health of your Pega Customer Decision Hub application
- Utilize other common marketing functions

Intended Audience

This guide is intended for marketing analysts and managers with Pega Platform and Decision Strategy Manager (DSM) experience. This guide also provides various insights for administrators and implementers of Pega Customer Decision Hub applications.

Guide Organization

This guide contains the following chapters:

Chapter	Description
Pega Customer Decision Hub Overview	Provides a business overview of Pega Customer Decision Hub and explains the basics of the Pega Customer Decision Hub portal.
Next-Best-Action	Explains how to configure Next-Best-Action , the always-on brain that lets marketers model real-time inbound experiences.
Marketing Dashboard	Explains how users can utilize and customize the Dashboard to view and monitor application performance.

Chapter	Description
Segments	Provides an in-depth look into Segments, Samples, and Analysis Projects. Topics covered include designing Segments, running Segments, scheduling Segments, and Intelligent Segmentation.
Control Groups	Provides information on creating and populating Control Groups; and determining Control Group memberships via Strategies.
Strategies	Provides information on marketing-specific Strategy shapes and their usage.
Contact Policies	Provides information on managing Contact Policies, which provide a mechanism for controlling and restricting how many times a customer is contacted in accordance with corporate and/or regulatory guidelines.
Volume Constraints	Provides information on creating action and Operational Volume Constraints; and configuring constraint reset options.
Actions	Provides insights into various aspects of the action, such as creating and testing flows, and specifying action details.
Treatments	Provides information on how to create and test Email, Passbook, and SMS Treatments.
Templates	Explains how Templates can be utilized to write content to output files and database tables.
Action Bundles	Provides information on creating action bundles and designing bundle action flows and Email Treatments.
Geofences	Provides details on creating and importing Geofences; and invoking Geofence APIs.
Real-Time Events	Provides information on configuring and triggering Events.
Real-Time Containers	Provides information on configuring Real-Time Containers and the APIs available for supporting their execution.
Seed Lists	Provides information on configuring and managing Seed Lists.
Exclusion List	Provides information on the exclusion list functionality.
Email and SMS Account Configuration	Provides information on configuring Inbound SMS, Outbound SMS, and Outbound Email accounts.
Push Notifications	Provides information on configuring apps for push notifications, using actions to push notifications to customers, and invoking push notification services.
Marketing Profile	Provides details on the various elements of the Marketing Profile and guidelines on using it in custom applications.

Chapter	Description
Revision Management	Provides an overview of using Revision Management with marketing rules.
Identity Matching	Provides an overview of Identity Matching and how it is incorporated into various Pega Customer Decision Hub features.

In addition, this guide also includes the following appendices:

Appendix	Description
User Preferences	Provides an overview of marketing-specific user preferences.
Administrative Settings	Provides information for configuring various administrative facets of the application.
Passbook Settings	Provides details on uploading certificates for using the Passbook functionality.
System Health	Provides an overview of the System Health functionality.

Pega Customer Decision Hub Overview

Marketing organizations, looking to make a significant impact on the customer experience and drive effective return on marketing investment, are turning to a Next-Best-Action approach to marketing.

The Pegasystems approach to Next-Best-Action marketing uses decision management and analytics to determine what the right action is for every customer; and provides them with the right message, at the right time, in the right channel.

Built for marketers (herein referred to as the user) responsible for managing inbound and outbound customer communications and experiences, the Pega Customer Decision Hub solution (herein referred to as the system or the application) delivers on this vision through a unique combination of real-time inbound and outbound marketing capabilities that leverage predictive and adaptive analytics, real-time decisioning, and business process management. Pega Customer Decision Hub dynamically manages multi-channel conversations through the entire customer lifecycle, from action design to action fulfillment.

The solution embraces customer focus by providing measurable business benefits to marketing organizations by:

- Creating relevant experiences for every customer – Turn every interaction into a guided, relevant conversation by executing the Next-Best-Action at the moment of truth. This solution continuously learns and adapts to every customer in real time, across all channels, including social media and mobile.
- Giving users more control – Design, change, measure, and control multi-channel customer strategies with a single marketing portal that doesn't require IT involvement. Pega Customer Decision Hub is the only solution to support marketing operations with a robust business process management platform that seamlessly connects sales with customer fulfillment processes.
- Optimizing customer lifetime value - Maximize revenue with proactive cross-sell, up-sell, and retention opportunities for customers. Coordinate the experience across inbound and outbound channels. The solution provides the optimum balance between various customer needs and the specific needs of the business.

Features

Pega Customer Decision Hub features the following high level capabilities:

- Next-Best-Action marketing
 - Customer-centric approach to marketing that leverages predictive and adaptive analytics to provide real-time and batch marketing actions and treatments to drive customer lifetime value.
 - Capabilities to allow marketers to create cross-channel engagement strategies that continuously look at customer history and many different customizable attributes to determine the top action, best time, specific treatment, and best channel to interact with customers.
- Shared artifacts and components
 - Pega Customer Decision Hub includes a core set of out-of-the-box capabilities leveraged by every module of the solution that allows users to design, execute, deliver, and adapt to marketing strategies.
 - Shared components include a single portal that has customizable dashboards, action design, treatment design, channel configuration, constraints optimization, and response management.

Logging In

The following accounts are provided as out-of-the-box samples. Your administrator should provide you with the specific account(s) with which to log in to the system.

Role	Login	Password	Default Portal	Other Portals
Analyst	MarketingAnalyst	install	Pega Customer Decision Hub	Prediction Studio
Manager	MarketingManager	install	Pega Customer Decision Hub	Prediction Studio
Administrator	MarketingAdministrator	install	Dev Studio workspace in administrative mode for the Pega Customer Decision Hub portal	Prediction Studio, Pega Customer Decision Hub

Pega Customer Decision Hub Portal

The Pega Customer Decision Hub portal is specially built for the marketing user and provides the user with quick and convenient access to a wide variety of resources.

The Pega Customer Decision Hub portal comprises the following pieces:

- [Header](#)
- [App Studio Navigation Bar](#)
- [Navigation Panel](#)
- [Home Page](#)

Header

The portal header provides icons for easy access to various tools and menus. This includes the following:

Icon	Label	Purpose
	Reports	Provides access to various report-centric utilities and landing pages
	Configuration	Provides access to configuration-related landing pages
	Help	Launches Pega Customer Decision Hub Help

Reports Menu

The **Reports** menu provides access to the following landing pages and utilities:

- **Interaction History** - Launches the Interaction History (IH) landing page which provides access to IH reports.
- **Visual Business Director** - Launches Visual Business Director.
- **Customer Profile** - Launches Marketing Profile.
- **Report Browser** - Launches the Report Browser which facilitates the management of reports in the system.
- **Report Settings** - Launches the Report Settings landing page which provides access to various reporting settings. Available to the Administrator role only.

Configuration Menu

The **Configuration** menu provides access to the following landing pages and utilities:

- **Proposition Management** - Provides links to the **Proposition Management** landing page.
- **Visual Business Director** - Launches the Visual Business Director (VBD) landing page which provides access to VBD data sources, KPIs, and views.
- **Segmentation** - Provides links to the following landing pages:
 - **Segmentation Support** - Enables management of Samples and Analysis projects, which are used in intelligent segmentation.
 - **Seed Lists** - Enables management of Seed Lists in the system.
- **Settings** - Provides links to the following landing pages. Most of these pages are only available to the Administrator role.
 - **Application Settings** - Provides ability to view various settings for the application.
 - **System Health** - Initiates a health check of the marketing application.
- **Contact Policies** - Launches the Contact Policies landing page which facilitates the management of Contact Policies in the system.

App Studio Navigation Bar

The App Studio navigation bar occupies the left side of the portal and provides direct access to data types, users and settings configuration. The navigation bar is available to administrators. By default, users in the MarketingAdmins user group can access the navigation bar.

The navigation panel includes the following links:

- **Overview** - See an overview of available channel interfaces, case types, application layers, and data types.
- **Data types** - Create new data types.
- **Users** - Expandable section that includes the following pages:
 - **People** - Manage the users with access to your application. Assign each user a role.
 - **Roles** - Manage the roles in your application. Multiple users may have the same role and share a work queue.
 - **Organization** - Define and manage your organization structure.
- **Settings** - Expandable section that includes links to the following pages:
 - **Application** - Manage database and artifact configuration.

- **Channels** - Configure SMS, email, Passbook, Paid Media, and Push Notification.
- **Context dictionary** - Create new data contexts for your application.
- **(operator initials)** - Log off.

Navigation Panel

The navigation panel occupies the left side of the portal and provides direct access to salient marketing artifacts. In addition, it also includes search and access to the user's [recent items](#).

Users can collapse (and restore) the panel by clicking anywhere along its right edge. Dragging the right edge allows resizing of the panel. Additionally, the system may automatically collapse the panel for small screen sizes.

The navigation panel includes the following links:

- **Home**  - Launches the home page.
- **Dashboard**  - Launches the Dashboard which displays widgets pertaining to the performance of the Pega Customer Decision Hub application.
- **Next-Best-Action**  - Expandable section that includes the following landing pages:
 - **Designer** - Launches the Designer landing page which enables Next-Best-Action configuration and authoring.
 - **Supporting Decisions** - Enables the management of supporting decision configurations.
 - **Customer Journey** - Enables the management of customer journeys.
- **Content**  - Expandable section that includes links to the following landing pages:
 - **Actions** - Enables the management of actions.
 - **Treatments** - Enables the management of Treatments.
 - **Real-Time Artifacts** - Enables the management of Real-Time Events, Real-Time Containers, and Geofences.
 - **Image library** - Enables users to search for images in the system.
- **Intelligence**  - Expandable section that includes links to the following landing pages:
 - **Precision Studio** - Enables the management of predictive, adaptive, and text analytics. For more information, refer to [Prediction Studio overview](#).
 - **Strategies** - Enables the management of Strategies.
 - **Volume Constraints** - Enables the management of Volume Constraints.
 - **Eligibilities** - Enables the management of Proposition Filter and When Condition rules.
 - **Tables and Trees** - Enables the management of Decision Table and Decision Tree rules.
 - **Scorecards** - Enables the management of Scorecard rules.
- **Simulation Testing**  - Launches the Simulations page which provides access to simulation runs.
- **Audiences**  - Enables the management of Segments and Paid Audiences in the system.

-  **Data** - Enables the management of data, data flows, and summaries in the system. The Data page is available to users who have the DataAnalyst role in their user group.
- **Revision Management** - Launches the Revision Management landing page which provides role-based access to the Revision Management functionality. Available only to users with Revision Management role(s).

Recents pane

The **Recents** pane in the navigation panel lists the items most recently accessed by the user.

Users can click the pane header to expand (and collapse) the pane. Clicking an entry in the pane opens the corresponding artifact.

Each entry in the pane includes the artifact's name and type (e.g. action, landing page, etc.). For work objects, the work id is also displayed.

The number of items displayed in the Recents pane is governed by the MaxRecentsCount Dynamic System Setting.

Home Page

The Home page is the chief starting point for every user. It provides the user with direct access to items and actions that are relevant to them. Users can also customize the display and content of their Home page.

The default Home page contains the following widgets:

- **Define your audience** - Shortcut to create a new Segment rule to define the target audience.
- **Monitor outcomes** - Shortcut to launch Visual Business Director.
- **My Work** - Displays the user's work list. Click an entry to open the corresponding work object.

Users can include any other available widgets on their Home page. Other available marketing-centric widgets include the following:

- **Revision Management** - Displays Change Requests that are assigned to the user and lists each rule within the request. Requires user to have Revision Management role.

Customizing the Home Page

The Pega Customer Decision Hub portal Home page is a standard dashboard and can be customized in the same manner as other dashboards.

1. Click the gear icon (in the top right) to switch the dashboard to edit mode.
2. Use the **Switch template** link to select the desired template for the dashboard.
3. Add desired widgets to each slot in the template.
4. Configure options for applicable widgets. Hover over the widget to determine if it has available options. If it does, the text **Click to edit** is displayed.
5. Use the **Publish** button to apply your changes and save your customized dashboard.

Refer to official Pega Platform documentation for more details on the customization process.

 **Tip:** The default Home page configuration can be modified by users with suitable access. This access is governed by the CanPublishToDefault privilege, which is furnished to marketing managers and administrators via the PegaNBAM_FW:MarketingManager role. The PegaMarketing_FW:PortalAdministrator access role wraps this privilege and can be added to

desired access groups. Users with this requisite access can utilize the `Publish to default` option in the **Publish** button menu to update the default Home configuration.

Marketing Dashboard

The Dashboard provides marketers with a customizable set of widgets. These widgets display the application's performance across various marketing metrics.

Marketers can customize the widgets displayed in the Dashboard and configure the goals for each widget. Once configured, the Dashboard enables marketers to quickly assess how their business is doing. The marketer can also apply different filters to further refine the displayed metric data.

The Dashboard is accessible in the Pega Customer Decision Hub portal via the **Dashboard** link in the left navigation pane.

Marketing widgets displayed on the Dashboard are categorized into groups. The following table lists the available marketing widgets in each group.

Widget Group	Available Widgets
AWARENESS	• Net Promoter Score • Net Promoter Score Trend • Social Sentiment • Social Sentiment Trend
BUSINESS KPI	• Churn Rate • Churn Rate Trend • Net Revenue • Net Revenue Trend • ROMI • ROMI Trend • Retention Save Rate Trend • Retention Save Rate and Cost Trend
ENGAGEMENT	• Email Engagement • Email Engagement Trend • Web Engagement • Web Engagement Trend

Using the Dashboard

This section explains the basics of the Dashboard and provides information on the following topics:

- [Understanding the widget display](#)
- [Applying filters](#)

Understanding the Widget Display

Marketing widgets provide a great deal of information pertaining to the performance of each widget's metric(s). The Dashboard utilizes different visual paradigms to display these widgets in order to highlight relevant data points and salient performance aspects.

Insight & Action

The **Insight & Action** view of a widget displays customizable information pertaining to the performance of the widget metric against its goal. Marketers can access this view by clicking the ... icon in the widget header.

Microsite Total Visitors



Clicking this icon displays the configured message for the widget. The default message indicates whether the goal for the widget has been met. In addition, the color of the icon also indicates this information - the icon color is green when the goal is met and red otherwise.

Microsite Total Visitors



Insight & Action

The goal has been missed.

Clicking anywhere outside the view switches the widget back to its default view.

Display Types

This section highlights key features of the various displays used by marketing widgets. Each display includes the following common elements:

- Widget name
- Insight & Action icon
- Current metric value
- Target metric value (e.g. goal, benchmark, etc.)

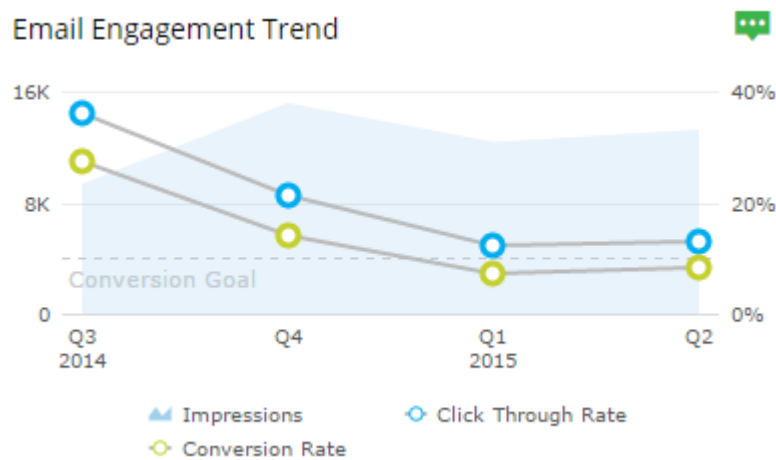
Marketing widgets can be classified into the following categories based on their data visualization:

- [Visualizing data for the current time period](#)
- [Visualizing data trends across time periods](#)

There are multiple display types within each of the above categories. Additional information presented on the widget varies based on the display type.

Current Data Display Types

Engagement Trend



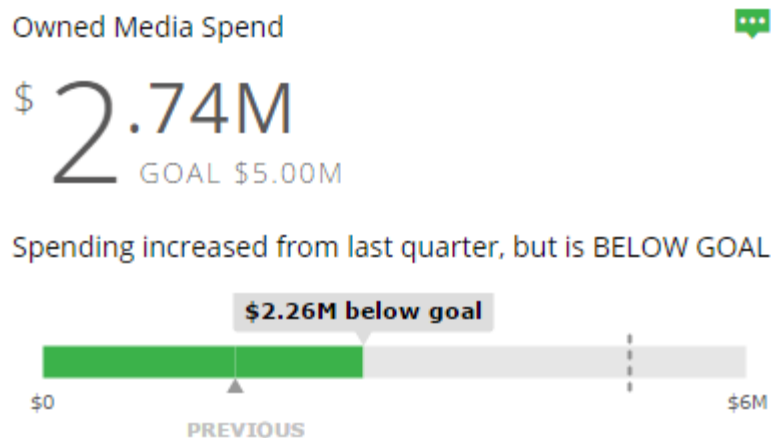
This display type is specific to engagement related widgets and includes the following additional features:

- Conversion Goal line
- Left y-axis corresponds to the area chart (Impressions)
- Right y-axis corresponds to the dual line charts (Conversion Rate, Click Through Rate)
- Hovering over a data point displays the corresponding metric value
- Clicking the metric name in the legend toggles the display of the metric's chart

This display type is utilized by the following widgets:

- Email Engagement Trend
- Web Engagement Trend

Metric Bar



This display type includes the following additional features:

- Bar color indicates whether the goal is met - green if met, red otherwise

- Bar visually denotes previous, goal, and current values
- Call-out value denotes the difference from goal value
- Sentence highlights metric value change (increase vs. decrease) against configured time period (e.g. quarter) and current performance against goal (above vs. below)

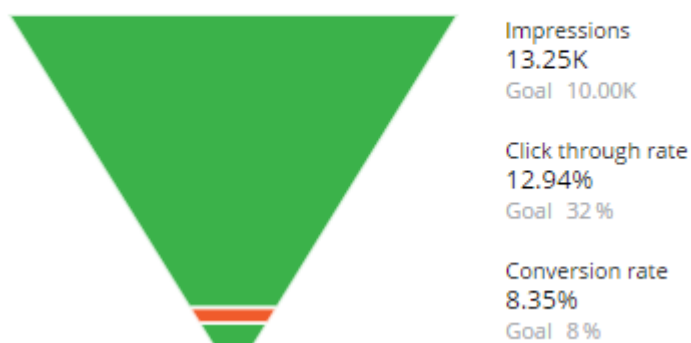
This display type is utilized by the following widgets:

- Churn Rate
- Net Revenue
- Owned Media Spend
- ROMI

Engagement Funnel

Email Engagement

Conversions across campaigns are ABOVE GOAL



This display type is specific to engagement related widgets and includes the following additional features:

- Current and goal values for each of the three metrics
- Funnel portion for each metric with portion size corresponding to metric volume
- Hovering over a funnel portion highlights the corresponding metric and its value
- Color of the funnel portion indicates whether the corresponding metric goal is met - green if met, red otherwise
- Sentence indicates performance of the conversion metric against goal

This display type is utilized by the following widgets:

- Email Engagement
- Web Engagement

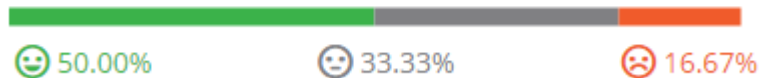
Social Sentiment

Social Sentiment



50.00%
GOAL 75.00%

Social Sentiment decreased from last quarter, and
is BELOW GOAL



This display type is specific to the Social Sentiment widget and includes the following additional features:

- Major metric value (e.g. 50.00%) denotes the score for positive social sentiment
- Sentiment bar displays percentage breakdown for each sentiment
- Sentence highlights metric value change (increase vs. decrease) against configured time period (e.g. quarter) and current performance against goal (above vs. below)

Net Promoter Score

Net Promoter Score



17
BENCHMARK 20

NPS decreased from last quarter, and is BELOW
BENCHMARK

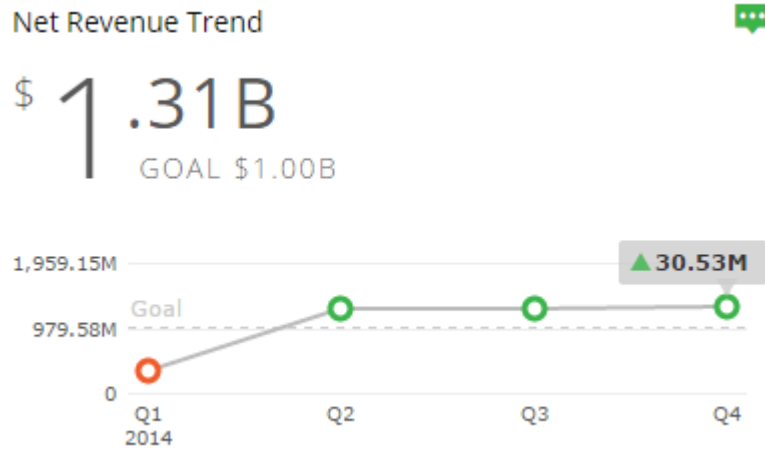
	Promoter	2	33%
	Passive	3	50%
	Detractor	1	17%

This display type is specific to the Net Promoter Score widget and includes the following additional features:

- Major metric value (e.g. 17) denotes calculated net promoter score (NPS)
- Number and percentage of individuals in each NPS grouping (promoter, passive, detractor)
- Sentence highlights metric value change (increase vs. decrease) against configured time period (e.g. quarter) and current performance against goal (above vs. below)

Trend Data Display Types

Trend Single Line

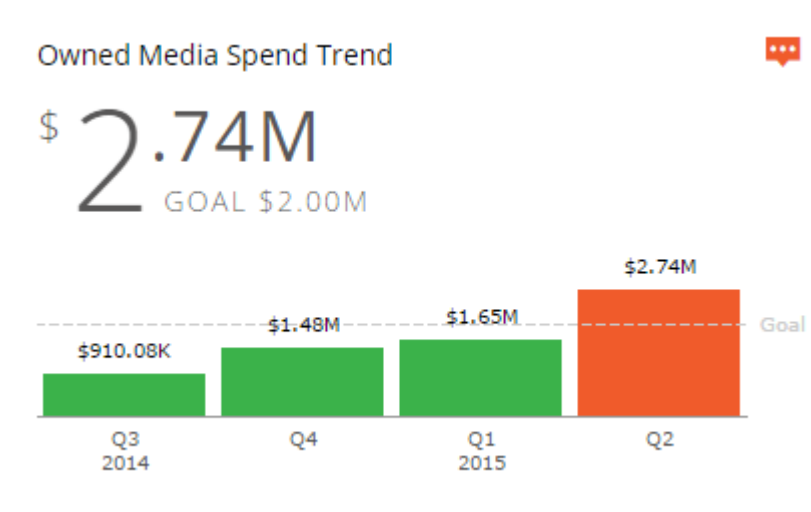


This display type includes the following additional features:

- Goal line
- Hovering over a data point displays the corresponding metric value
- Data point color indicates whether the goal is met for a time period - it is green if the goal is met, red otherwise
- Call-out value on the final data point (e.g. 30.53M above) denotes the difference in metric value from the previous period.
 - Color of the arrow (green or red) indicates whether the change in value is towards the betterment of the metric
 - Direction of the arrow (up or down) indicates whether the change is an increase or decrease from the previous value

This display type is utilized by the following widgets:

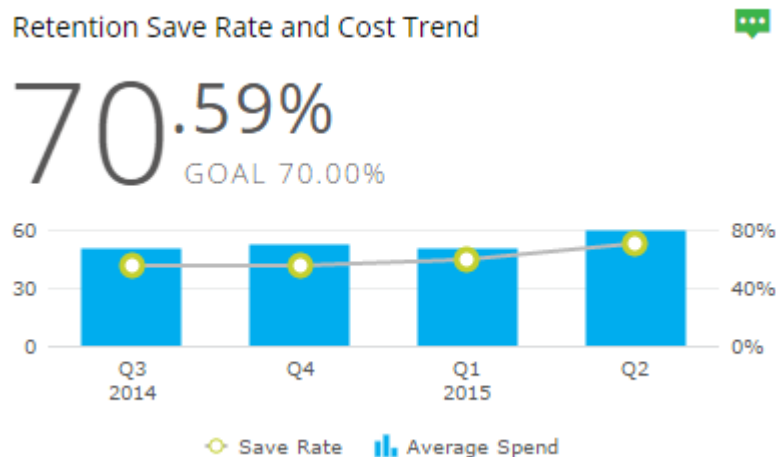
- Churn Rate Trend
- Net Promoter Score Trend
- Net Revenue Trend
- Retention Save Rate Trend
- Social Sentiment Trend

Trend Single Bar

This display type includes the following additional features:

- Goal line
- Metric values for each period
- Bar color indicates whether the goal is met for a time period - it is green if the goal is met, red otherwise

This display type is utilized by the Owned Media Spend Trend widget.

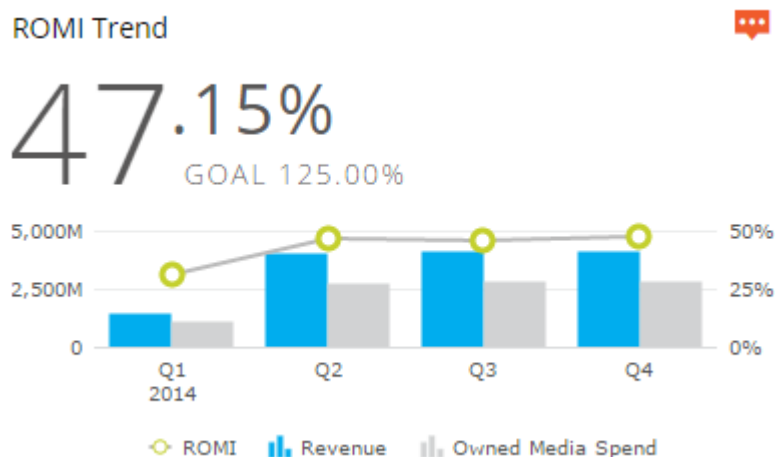
Trend Single Bar Single Line

This display type includes the following additional features:

- Left y-axis corresponds to the bar chart metric (e.g. Average Spend)
- Right y-axis corresponds to the line chart metric (e.g. Save Rate)
- Major value (e.g. 70.59%) is the value of the line chart metric for the current time period (e.g. Q2)
- Hovering over a data point or bar area displays the corresponding metric value
- Clicking the metric name in the legend toggles the display of the metric's chart

This display type is utilized by the Retention Save Rate and Cost Trend widget.

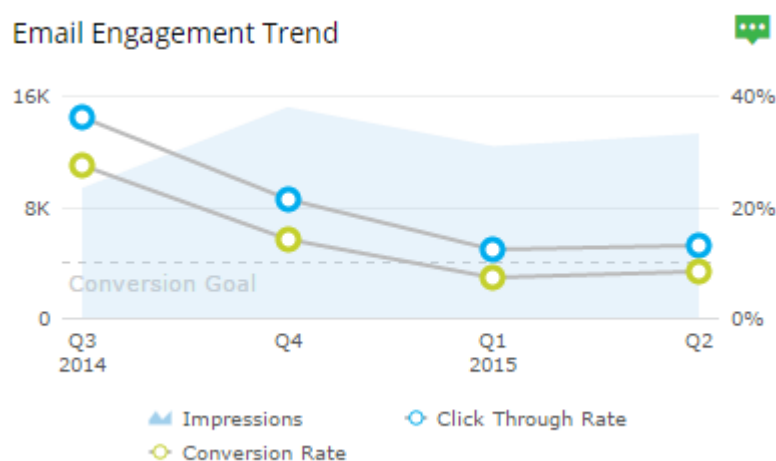
Trend Dual Bar Single Line



This display type functions similarly to the Trend Single Bar Single Line type described above. The only difference is that it supports multiple bar metrics in the left y-axis.

This display type is utilized by the ROMI Trend widget.

Engagement Trend



This display type is specific to engagement related widgets and includes the following additional features:

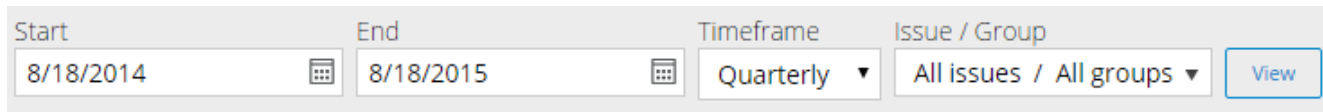
- Conversion Goal line
- Left y-axis corresponds to the area chart (Impressions)
- Right y-axis corresponds to the dual line charts (Conversion Rate, Click Through Rate)
- Hovering over a data point displays the corresponding metric value
- Clicking the metric name in the legend toggles the display of the metric's chart

This display type is utilized by the following widgets:

- Email Engagement Trend
- Web Engagement Trend

Applying Filters

Marketers can use the controls at the top of the Dashboard to set filters on the data utilized by marketing widgets.



The following filter options are available:

- **Start** - Start date for the data being fetched
- **End** - End date for the data being fetched
- **Timeframe** - Time period into which the fetched data should be grouped
- **Issue / Group** - Issue and Group for which the data should be fetched. By default, the Dashboard fetches data across all Issues and Groups.

Clicking the **View** button applies configured filter criteria and triggers the Dashboard to reload.

Customizing the Dashboard

This section explains how users can customize the Dashboard to include desired widgets and configure the options for these widgets.

To make any changes, marketers can use the gear icon in the top right to switch the Dashboard into edit mode. In edit mode, marketers can perform the following actions:

- [Manage widgets](#)
- [Configure widget options](#)

Additionally, application implementers can also perform the following:

- [Customize Insight & Action](#)
- [Customize default Dashboard](#)

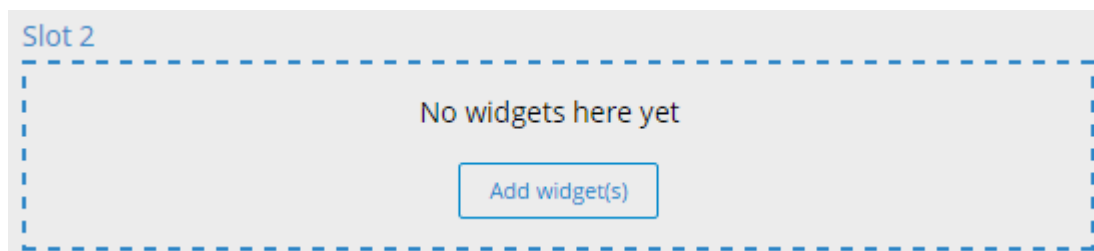
Managing Widgets

This section explains how marketers can [add](#), [remove](#), and [re-organize](#) widgets in the Dashboard.

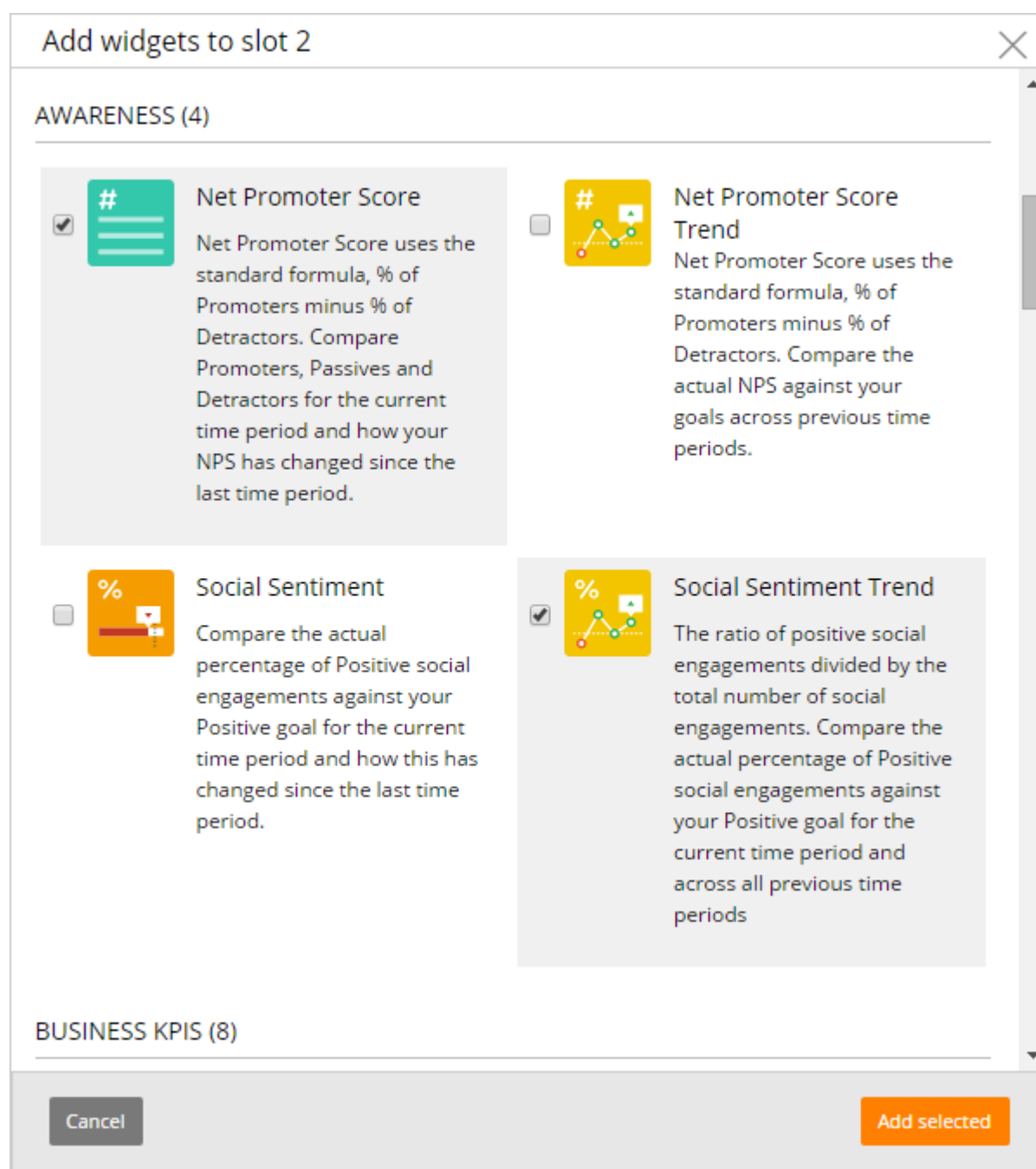
Adding a New Widget

In edit mode, users can perform the following steps to include a new widget:

1. Click **Add widget** in the desired slot.



2. In the widgets modal window, select the desired widgets to add and click **Add selected**. The modal displays widgets in their groups and includes a description for each widget.



3. Optionally, configure options for the added widgets.

4. Click **Publish** to save the customized dashboard.

Removing a Widget

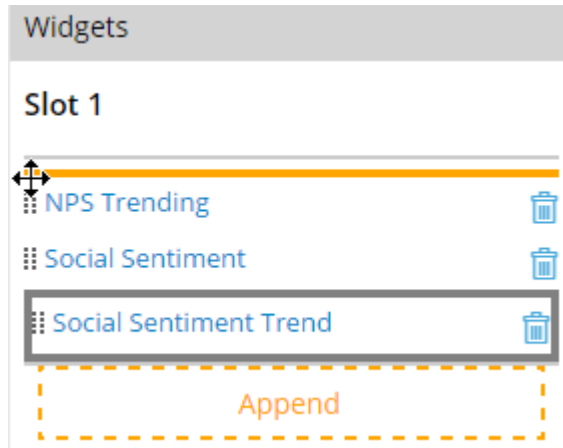
In edit mode, users can remove a widget from the dashboard by either of the following:

- Clicking the delete icon in the top right corner of the widget
- Clicking the delete icon in the row for the particular widget in the **Widgets** grid

Re-organizing Widgets

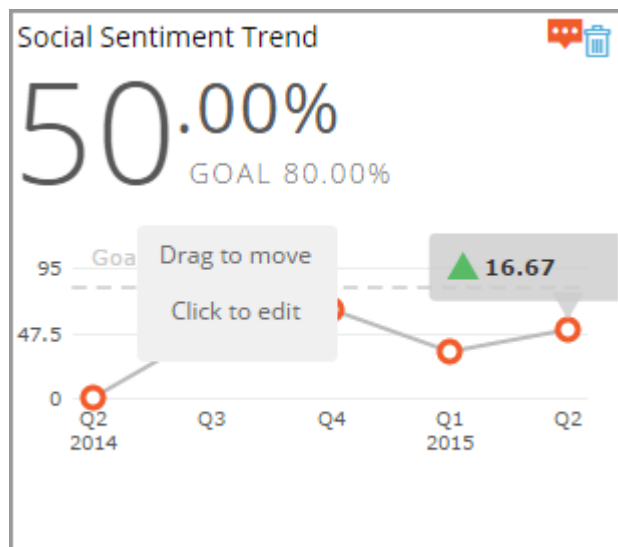
In edit mode, users can re-organize widgets within a slot and move widgets across slots by either of the following:

- Dragging the widget to the desired position in the target slot
- Using the drag icon to drag and drop the widget row to the desired position in the **Widgets** grid



Configuring Widget Options

Most marketing widgets have options that should be configured after adding the widget. If a widget has configuration options, the text **Click to edit** displays when hovering over the widget in edit mode.



To view available configuration options, users can either select the widget directly or click the link for the widget in the **Widgets** grid.

The options for the widget are displayed in the **Edit dashboard** panel.

Edit widget: Social Sentiment Trend

Sentiment goal (%)

Insight & Action [Edit](#)

[Cancel](#) [Preview](#) [Save](#)

Users can click **Preview** to view the impact of their changes on the widget. Clicking **Save** saves the configuration options and applies them to the widget.



Note: Changes to configuration options are not final until the user publishes these changes via the **Publish** button. Users may use the **Discard** button to revert to the previous configuration of the Dashboard .

All widgets related to marketing metrics have a configurable goal option. The name and type of this option varies based on the metric. For example, the goal for the Return on Marketing Investment (ROMI) metric is a percentage, while the goal for the Net Revenue metric is a number. However, there are two deviations from the single goal option.

- **Multiple goals** - The Email Engagement and Web Engagement widgets have three configurable goals.
 - Impressions (number)
 - Click through rate (percentage)
 - Conversation rate (percentage)
- **Retention Issue** - Retention related marketing widgets include an additional option to specify the retention issue. Once specified, the widget only includes those data points associated with the configured retention issue.

Edit widget: Retention Save Rate Trend

Retention Issue

Retention goal (%)

Insight & Action [Edit](#)

[Cancel](#) [Preview](#) [Save](#)

Customizing Insight & Action

Individuals configuring the marketing application can perform the following steps to customize the Insight & Action messages for each widget.

1. Switch the Dashboard into edit mode by clicking the gear icon.
2. Select a widget to configure.
3. In the **Edit dashboard** panel, click **Edit** in the **Insight & Action** field.

Edit widget: Microsite Total Visitors Trend

Total visitor goal per quarter (#)

Insight & Action

[Edit](#)

4. This will open the backing Decision Table rule for the widget. The Decision Table rule has two outcomes - Met and Missed. These outcomes are mapped to messages using Field Value rules. Switch to the **Results** tab and expand the **Additional Allowed Results** section to view the name of the corresponding Field Value for each outcome.

▼ **Additional Allowed Results.** When selected, each target property will be assigned the value specified. For each result, the target property will be assigned the value specified.

Result	Target property	Value
Met	.InsightAndActionMessage	IHMicrositeEngagement
	.InsightAndActionColor	"Met"
	+	
Missed	.InsightAndActionMessage	ositeEngagement missed
	.InsightAndActionColor	"Missed"

5. To customize the message for a widget outcome, take over the corresponding Field Value rule in your implementation layer and update it to include the desired message.

Marketers will now see the customized message when they review the insight information for this widget.

Microsite Total Visitors

Insight & Action

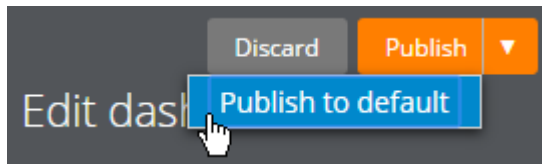
The goal has been missed. Use social marketing to direct more traffic to your Microsites.

Customizing the Default Dashboard

The default Dashboard configuration can be modified by users with suitable access. This access is governed by the CanPublishToDefault Privilege, which is furnished to marketing managers and administrators via the PegaNBAM_FW:MarketingManager role. The

PegaMarketing_FW:PortalAdministrator Access Role wraps this privilege and can be added to desired Access Groups.

Users with this requisite access can utilize the **Publish to default** option in the **Publish** button menu to update the default Dashboard configuration.



Next-Best-Action

Next-Best-Action provides automated decisions based on predictive analytics, adaptive analytics, and traditional business rules such as contact policies. You can define Next-Best-Action decisions and requirements which apply to the whole organization, or to specific business issues or groups.

Next-Best-Action Designer is organized according to the high-level workflow which is needed to fully configure next best action for your organization. Follow the workflow to define the business structure for your organization, implement channel limits and constraints, define the rules that control which actions you offer to which customers, configure how actions are prioritized, and finally specify when and where you want to trigger Next-Best-Action. As you define various aspects of Next-Best-Action, Pega Customer Decision Hub builds an underlying Next-Best-Action Strategy framework based on your criteria. If later you want to modify this strategy, you can do that from Next-Best-Action Designer's intuitive, transparent interface, instead of by editing the strategy canvas directly.

**Important:**

This document describes Next-Best-Action Designer version 2, introduced in Pega Customer Decision Hub 8.3. If you previously defined Next-Best-Action using version 1 of Next-Best-Action Designer, you can continue to use the legacy configuration. However, to fully benefit from the new features, update your Next-Best-Action configuration as described in the *Pega Customer Decision Hub Upgrade Guide* on the [Pega Customer Decision Hub product page](#).

For information about the legacy version of Next-Best-Action Designer, see the *Pega Customer Decision Hub 8.2 User Guide*.

You can configure Next-Best-Action settings manually, or quickly import them by using a predefined template.

Configuring Next-Best-Action settings manually

You can tweak each relevant part of Next-Best-Action settings to match the requirements of your organization. For more information, see the following topics:

- [Defining the structure of business issues and groups](#)
- [Setting constraints, contact policy limits, and controls](#)
- [Defining engagement policies for business groups](#)
- [AI behaviors and controls](#)
- [Enabling channels](#)
- [Testing Next-Best-Action configuration](#)

Importing Next-Best-Action settings from a template

To speed up and simplify the process of implementing Next-Best-Action, Pega provides predefined templates that contain Next-Best-Action settings commonly used by organizations in the Communications and Financial Services industries. For more information, see [Importing Next-Best-Action settings from a template](#).

Defining the structure of business issues and groups

Use the Next-Best-Action Designer to build the structure of business issues and groups in your organization.

Business issues are different areas of focus for your business. A business issue is the purpose behind the actions you offer to your customers. For example, actions which started with the purpose of retaining

existing customers should be grouped under the business issue of Retention. Actions started with the purpose of acquiring new customers belong to the business issue of Acquisition.

Business groups organize customer actions into categories. For example, as part of the business issue of Acquisition, you can create groups for products like Credit Cards, Mortgages, or Personal Loans, with the intention of offering these to potential new customers.

Together, business issues and groups form the organizing structure for your customer interactions. Each action you prepare for your customers is associated with a business issue and a group.

1. Log in as an operator whose user group has the `CanManageNBA` privilege.
By default, this privilege is granted to managers and administrators through the `PegaNBAM_FW:MarketingManager` role.
2. In the Pega Customer Decision Hub portal, click **Next-Best-Action > Designer > Taxonomy**.
3. Click **Edit**.
4. To add an issue, click **Configure issues**.
5. Enable issues for Next-Best-Action by performing the following tasks:
 - To enable an existing issue to use Next-Best-Action, click on it in the **Configure Business Issues** window.
 - To add a new issue, click **+ Create** in the **Configure Business Issues** window.
6. Click **Apply**.
Pega Customer Decision Hub adds the group to the business structure.
7. **Optional:** If you want the business structure to display the issue description in the Description column, click **More > Edit issue**, and then fill out the **Short description** field.
8. Click **More > Configure groups**.
9. Enable groups for Next-Best-Action by performing the following tasks:
 - To enable an existing group to use Next-Best-Action, click on it in the **Configure Business Groups** window.
 - To add a new group, click **+ Create** in the **Configure Business Groups** window.
10. Click **Apply** to save your changes.
Pega Customer Decision Hub adds the group to the business structure.
11. **Optional:** If you want the business structure to display the group description in the Description column, click **More > Edit group** by the name of the group, and then fill out the **Short description** field.
12. Define an alias for the actions that belong to this group. By default, Pega Customer Decision Hub uses the term actions to refer to the engagement messages. If needed, you can change this to a more appropriate term, such as Promotions or Nudges.
 - a. Click **More > Edit group** by the name of the group.
 - b. In the **Action naming (singular)** field, enter the name of actions from this group, for example, `Promotions`.



Tip: You can use different terms for actions based on the business issue and group to which the product belongs. For example, if your business structure includes a Loans group within the Retention issue, you can rename actions related to that issue and group to `Loan Loyalty Program`. For other issues and groups, you may use other, group-specific terms, or keep the default name.
13. Click **Submit**.

14. Click **Save**.

Setting constraints, contact policy limits, and controls

You can restrict the number of contacts a customer receives in a given period of time, or configure an automatic pause for actions after a specific number of outcomes.

Too many contact attempts over a short period of time can have a negative impact on a customer's willingness to further interact with your actions. They can also be non-compliant with corporate or regulatory guidelines. To prevent that, you can specify the following constraints for contacting your customers:

- **Customer contact limits** - Limit the number of interactions which a customer can receive over a given period of time on a specific channel. For example, you can decide that you do not want your customers to receive more than two emails per week.
- **Contact policy library** - Define suppressions, that is, automatically put an action on hold after a specific number of outcomes are recorded for some or all channels. For example, a contact policy can suppress an action for a particular customer after the customer has seen an ad for that action for five times. Suppressing or pausing an action prevents oversaturation by limiting the number of times that a customer is exposed to the same action.

1. In the Pega Customer Decision Hub portal, click **Next-Best-Action > Designer > Constraints**.

2. Click **Edit**.

3. **Optional:** To set the customer contact limit, in the **Customer contact limits** section, click **Edit customer contact policy**.



Note: Pega Customer Decision Hub has a predefined Customer Contact Policy which sets the customer contact limits to one email and one SMS per week. Edit the policy to configure the channels, contact limits, duration, and the policy start and end date. For more information, see [Contact Policies](#).

4. **Optional:** To specify action suppressions, in the **Contact policy library** section, click **+ Add contact policy**.

5. **Optional:** Enter the policy name.

6. In the **Scope** section, select the type of outcome which is tracked by the policy. For example, if the suppression should activate after a specific number of negative responses, select **Track Rejects**.

7. Specify whether to track responses individually for each action or for all actions in the group.



Note: If you track outcomes for all actions in the group, then all of these actions are paused once the suppression criteria are met.

8. Select the time period over to track the responses.

By default, Pega Customer Decision Hub tracks responses over a period of 7 or 30 days. To add more tracking periods:

- a. In Dev Studio, click **Configure > Decisioning > Decisions > Data Sources > Interaction Histories**, and then
- b. Edit the Interaction History rule *Action Outcomes for the past 7 Days* or *Action Outcomes for the past 30 Days*.
- c. Save a copy of the rule into your data set and adjust the time period as required.

9. Click **Submit**.

The suppression configuration appears in the **Contact policy library** section.

10. Enter the number of responses required to fulfill the suppression criteria, for example, 30.

11. Select the channel for which you want to track the responses, for example, **All**.
12. Enter the number of days for which an action should be paused after the suppression criteria are met, for example, 5.
For example: An example suppression is If there are 30 Rejects for All treatments, suppress the action for 5 days.
13. **Optional:** To add more suppression conditions, click **+ Add suppression**.
 **Note:** Suppression conditions defined under the same contact policy track the same outcomes over the same period of time. They can, however, monitor different channels and have different outcome limits for each channel.
14. **Optional:** To track different metrics over different periods of time, click **+ Add contact policy**.
15. Click **Save**.
16. To apply a contact policy to your Next-Best-Action Strategy, select it in the **Engagement policy** tab of Next-Best-Action Designer:
 - a. In the Pega Customer Decision Hub portal, click **Next-Best-Action > Designer > Engagement policy**.
 - b. Click the name of a group.
 - c. Click **Edit**.
 - d. In the **Contact policy** section, click the **Configure** icon.
 - e. In the **Configure contact policy** window, select your new contact policy and click **Add**.
 - f. Click **Apply**.
 - g. Click **Save**.

Defining engagement policies for business groups

Edit each group and define eligibility, relevancy, and suitability conditions for actions associated with this group.

Engagement policies specify the conditions under which an action or group of actions is eligible for a customer. For more information, see [Condition types for engagement policies](#).

1. In the Pega Customer Decision Hub portal, click **Next-Best-Action > Designer > Engagement policy**.
2. On the **Engagement policy** tab, click the name of a group, or click **All groups** to define an engagement policy that applies across all groups in your business structure.
3. Click **Edit**.
4. Expand the **Eligibility, Applicability** or **Suitability** section.
5. In the first column, select a field, a strategy, or a when condition from the list.
 **Note:** To make a property, To make a property, when rule, or strategy available for use as an eligibility condition, define it as a Relevant Record for your primary context class, which by default is your Customer class, or for its the parent or child classes.
6. In the second column, select a comparator from the list. For strategies, the comparator is always **has results for**.
7. In the third column, select as needed:

- For field conditions, enter a value in the field or select a field by clicking **Select values**. The system compares the value of this field to the value of the corresponding field or condition in the first column. For example, `Status work is equal to Done`.
 - For strategies, select the required component. The system determines whether there exist strategy results for that component.
 - When conditions do not have a third column, because their comparator can only be **true** or **false**.
- To specify additional conditions and define the relationships between them, do the following steps:
 - Click **Add a row** and add as many conditions as required.
 - Use the drop-down lists between each pair of conditions to specify how these conditions relate to each other. You can group conditions with **AND** or **OR** operators.
 - Use the drop-down list in the upper right corner to specify how condition groupings should be evaluated.
 - **Group ANDs** - Select this option if you want conditions linked with the AND operator to be evaluated as a group, and conditions linked with the OR operator to be evaluated individually. With this grouping, the grouping of condition 1 AND condition 2 OR condition 3 OR condition 4 is evaluated as `(1 AND 2) OR 3 OR 4`. That is, either conditions 1 and 2 must both be true, or either one of conditions 3 and 4 must be true.
 - **Group ORs** - Select this option if you want conditions linked with the OR operator to be evaluated as a group, and conditions linked with the AND operator to be evaluated individually. With this grouping, the grouping of condition 1 AND condition 2 OR condition 3 OR condition 4 is evaluated as `1 AND (2 OR 3 OR 4)`. That is, both condition 1 and one of conditions 2, 3, and 4 must be true.
 - **Use advanced logic** - Select this option if you want to define a mix of grouping by the AND and OR operator. Use the **Logic string** field to specify the condition grouping.
If you change a condition that uses advanced logic back to Group ANDs or Group ORs, all the groupings that you previously defined are reset.
 - To save the condition for future reuse, click **Actions > Save to library**.
The **Save to library** option is not available if the conditions include either Strategy rules or When conditions with parameters. The option is also disabled for eligibility conditions which include default criteria created with the **Use advanced logic** option.
 - Click **Save**.
 - To test the behavior of each component of the engagement policy, you can run audience simulations and persona tests. For more information, see [Testing Next-Best-Action configuration](#).

What to do next: The **Actions** section displays all currently available actions from this group. If any actions have additional engagement policies, these policies are also shown in this section.



Tip: To quickly create new actions for this group, you can click the **More** icon and then click **Create actions**.

Condition types for engagement policies

You can define the following condition types as part of your engagement policies:

Eligibility

Specify the conditions that the customer must fulfill in order to qualify for the action. For example,

an action may only be available for customers over a specific age or living in a specific geographic location.

Applicability

Specify the conditions for the action to be relevant at this point in time. For example, a discount on a specific phone model may not be relevant for a customer who already owns a phone of this type.

Suitability

Specify the conditions for the action to be appropriate for a customer. For example, a new credit card offer may not be appropriate for a customer who is likely to default on payments.

Contact policy

Select one or more policies which determine when and for how long an action or a group of actions should be suppressed. For example, you can suppress an action after a specific number of promotional messages have been sent to customers.

AI behaviors and controls

On the **Arbitration** tab of the Next-Best-Action Designer, you can define the AI controls used to decision on the Next-Best-Action for each customer. The customer data and insights help provide proactive contextual actions according to the customer's propensity, context, and other factors.

The following controls can be used by Pega Customer Decision Hub to select the Next-Best-Action for a customer. Each control can be toggled on and off. If you toggle a control off, it is no longer used to arbitrate Next-Best-Actions.

Propensity

Propensity is the likelihood of a customer responding positively to an action. The propensity can be calculated separately for every treatment. For example, if a customer is most likely to interact with a push notification, an action which has a push notification treatment is most suitable for that customer. It is also possible to apply propensity calculated to the action as a whole.

Context weighting

Pega Customer Decision Hub uses context weighting to consider the situational context for each action. For example, if a customer contacts the call center to cancel their service package due to concerns about the quality of their mobile service, the Retention issue should take priority for that customer. In this example, the context weighting can be defined as:

- **Keys - Intent**
- **Value** - Cancellation
- **Issue / Group - Retention / Mobile**
- **Weighting (+/-)** - 100 %

Action value

Action value assigns a financial value for each action and prioritizes high over low value. The base value is calculated with the **Calculate Business Value** strategy. The strategy uses a static **business value** property which you can enter on the Details tab of each action. The static values are used as input for the **CalculateValueExtension** strategy. By default, the **CalculateValueExtension** strategy does not have any calculation logic, and simply passes the static Value property directly to strategy results. To implement a custom logic for Value calculation, edit the **CalculateValueExtension** strategy.

Business levers > Action weighting

For each individual action, you can specify a static **business weight (+/-)** property on the Details tab

of the action. Actions with a higher weight are prioritized over those with a lower weight. If you do not want to consider action weighting when deciding on Next-Best-Action, set this toggle to off.

Business levers > Business purpose weighting

You can specify a static **Weighting (+/-)** property for actions associated with a specific issue and group. Actions associated with higher-weight issues and groups are prioritized over those with a lower weight. If you do not want to consider business purpose weighting when deciding on Next-Best-Action, set this toggle to off.

Enabling channels and defining triggers

Select the channels which you use to communicate with your customers, as well as the triggers that cause Pega Customer Decision Hub to decision on Next-Best-Actions.

Enabling channels

Use the on/off toggles to indicate which inbound and outbound channels are active and should be considered for Next-Best-Action.

1. In the **Channels** tab of the Next-Best-Action Designer, in the **Channels** section, review the active toggles.
2. If you want to disable a channel for Next-Best-Action, set the related toggle to OFF.
If a channel is toggled off, its status is stored in a Decision decision data rule (DDR) and the related part of the strategy framework is turned off. Setting the toggle to on reactivates the related part of the strategy framework.

Defining real-time container triggers

Real-time containers manage content in real-time channels, for example, on web pages. When a container is loaded, for example, when an individual views an ad for an action in a predefined placement on the web channel, it triggers Next-Best-Action. For more information, see [Real-Time Containers](#).

1. Define a real-time container. For more information, see [Real-Time Containers](#).
2. In the **Channels** tab of the Next-Best-Action Designer, in the **Triggered by > Real-time containers** section, click **Configure**.
3. Select the container that you created.
4. In the **Business structure level** list, select the business issue and group with which the container is associated.
5. Click **Submit**.
6. Click **Save**.

Defining real-time event triggers

Define real-time events to respond to real-time marketing opportunities triggered by an external event. For example, you can define a real-time event which triggers a campaign after an individual signs up for a loyalty card with your retail store. For more information, see [Real-Time Events](#).

1. Define a real-time event. For more information, see [Real-Time Events](#).
2. In the **Channels** tab of the Next-Best-Action Designer, in the **Triggered by > Events** section, click **Configure**.
3. Select the event that you created.

4. In the **Business structure level** list, select the business issue and group with which the event is associated.
5. Click **Submit**.
6. Click **Save**.

Defining triggers for paid media

For consistent results across owned and paid channels, you can use Next-Best-Action to drive your marketing on external media platforms such as Facebook Ads and Google Ads. Using Next-Best-Action with paid media ensures that each individual in an audience is targeted with the optimal offers at the right priority and maximum bid amount.

Before you begin: To push Next-Best-Actions to paid channels:

- Enable Paid Media Manager.
- Configure the connection with one or more supported advertising platforms.

For more information, see [Paid Media Manager](#).

1. To select the media strategy, in the **Paid media > Media strategy** section, click **Configure**.

A media strategy works on a set of actions that a customer is eligible for. It prioritizes actions by how much you want to pay for that customer for that specific action. The prioritization can use the Omni-channel propensity for an action, and additional destination-specific considerations, for example, on the customer's propensity to click an ad and accept an action.

Use the Strategy Builder to quickly design and edit your media strategies. For more information, see [Paid Media Manager](#).

2. In the **Paid media > Paid destinations** section, click **Configure** to select one or more paid destinations.
3. **Optional:** For Google Ads and Facebook Ads destinations, you can select the **Lookalike Audience** check box that appears after you select a destination. This creates an audience of customers who share the traits of your existing customers. For more information, see [Paid Media Manager](#).
4. Click **Save**.
5. **Optional:** As a best practice, you should use a single, primary paid configuration to manage all paid actions. However, if required, you can define additional paid configurations, for example, to use different paid strategies for different levels of your business hierarchy:
 - a. In the **Channels** tab of the Next-Best-Action Designer, click **Actions > Add paid configuration**.
 - b. In the new **Additional paid configuration** section, in the **Issue / Group** list, select the issue and group or groups to which the schedule applies.
 - c. Select the paid strategy, triggers and destinations for this hierarchy level, as described in steps 1-3.

Defining outbound schedules

Configure a recurring schedule for running Next-Best-Action. The outbound schedule is a multi-level campaign which initiates any outbound actions, for example, campaigns or audience updates on external advertising platforms.



Note: This schedule applies across all issues and groups in your business hierarchy. If you want to define a schedule specific to a particular issue or group, see step 8.

1. In the **Channels** tab of the Next-Best-Action Designer, in the **Primary schedule > Recurrence** section, set up a recurring schedule, start date, and end date for outbound Next-Best-Action.
2. To select the starting population, in the **Outbound schedule > Starting population** section, click **Configure**.



Note: The starting population for Next-Best-Action is based on the primary customer context. For more information about configuring segments, see [Segments](#). In the current version of Pega Customer Decision Hub, prospect segments cannot be used as starting populations for Next-Best-Action.

3. To specify the number of times that an action can be offered to a group of customers, in the **Volume constraint** section, click **Configure**. For more information about volume constraints, see [Volume Constraints](#).
4. Click **Save**.
The outbound schedule configuration is created in Draft mode.
5. To review and adjust the outbound schedule, click **Actions > Open outbound schedule**. This opens the underlying multi-channel campaign strategy.
6. To launch the outbound schedule, click **Actions > Run**.
The Run action is only available after you configure the schedule.
7. To suspend an active outbound schedule, click **Actions > Suspend**.
8. **Optional:** As a best practice, you should use a single, primary outbound schedule to launch all outbound actions. However, if required, you can define additional outbound schedules to run your marketing operations at different times for different levels of your business hierarchy:
 - a. In the **Channels** tab of the Next-Best-Action Designer, click **Actions > Add schedule**.
 - b. In the new **Additional schedule** section, in the **Issue / Group** list, select the issue and group or groups to which the schedule applies.
 - c. Select the starting population and optionally also the volume constraint, as described in steps 2 and 3.

After an outbound run is launched, you can click the **Run details** link to view details about the campaign data flow. If any errors occurred in the data flow, they are displayed on top of the **Run details** section. For easier troubleshooting, the **Run details** section also contains a link to the data flow work object. To open the data flow, click the flow ID in the **Data flow run** field, and then open the data flow from the data flow work object harness.

Importing Next-Best-Action settings from a template

To speed up and simplify the process of implementing Next-Best-Action, use predefined templates that contain Next-Best-Action settings.

Pega provides industry-specific templates with the recommended business structure, engagement policy, arbitration, and channel settings for the Communications and Financial Services industries. You can import these templates to quickly set up the basic settings for your organization. In addition to the predefined templates, you can save your own Next-Best-Action settings as a template and then import the template into a different Pega Customer Decision Hub instance, for example, to transfer the settings from a stage to a production environment.

1. In the Pega Customer Decision Hub portal, click **Next-Best-Action > Designer**.
2. Do one of the following actions:

- If you did not already configure Next-Best-Action settings, select a template from the list on the Next-Best-Action Designer landing page.

The list shows the templates available on [Pega Marketplace](#), including the out-of-the-box Communications and Financial Services templates, as well as any additional templates shared by Pega users.

 **Tip:** Templates developed for a specific industry may require certain artifacts to exist in your application. For example, a template created for Pega Customer Decision Hub for Financial Services assumes that your primary context class is *PegaCRM-Data-Customer-FS* rather than *PegaMKT-Data-Customer*. Ensure that you use templates applicable to your industry, or import the relevant artifacts into your application before you select the Next-Best-Action template.

- If you previously configured or imported Next-Best-Action settings, you can change the template by clicking **Taxonomy > Actions > Switch template**.

 **Important:** The template change overwrites any settings that you previously configured.

3. Review the imported settings and adjust them manually as needed.
4. **Optional:** To save your template settings to a local file, for example, to import them into a production environment after staging tests, click **Taxonomy > Actions > Save template**.

Testing Next-Best-Action configuration

To ensure that Next-Best-Action Designer configuration is correct, configure and run persona tests and simulation counts. With persona tests, you can check that you are getting the expected results for a specific user persona, and in this way validate your engagement policies and arbitration settings. After using a persona test to ensure that your engagement policies and arbitration are correct and give the expected results, run a simulation count to understand how many customers meet your specific engagement policies.

In addition to manually running these tests, Pega Customer Decision Hub automatically adds all persona tests to a suite of tests, which you can use to manage regression testing for your application.

Testing Next-Best-Action configuration with persona testing

You can design persona-based tests to verify that the Next-Best-Action Strategy gives the expected results. For example, design a customer test persona, and then run a test to verify that the customer receives a specific action with high propensity.

1. On the **Engagement policy** tab, click the name of any group, or click **All groups** to run the simulation for all issues and groups in your business structure.
2. Click **Actions > Persona testing**.
3. If you did not previously configure a persona test, click **Create test**.
4. In the **Create test** window, configure the conditions for the test to pass.
For example: Select the action and treatment that you expect the test persona to receive according to your Next-Best-Action Strategy.
5. In the **Persona (Data transform)** field, select the persona against which you want to test the strategy. For more information, see "Configuring persona tests" in the *Pega Customer Decision Hub Implementation Guide* on the [Pega Customer Decision Hub product page](#).
6. In the **Next-Best-Action scope** section, select whether the test should only check engagement policy configuration, or also include additional elements, like constraints and arbitration.
7. Click **Create**.

8. Select the test and click the **Run selected tests** icon.
9. After the persona test finishes, analyze the results to see whether the result matches the expected outcome.

Configuring persona tests

Persona-based tests use customer personas with specific characteristics to evaluate your Next-Best-Action strategy results. You can design these personas according to your requirements and the strategy that you are testing. For example, to verify that a Retention action is prioritized for a customer who are at risk of terminating their contract, you can design a customer persona with specific characteristics and check which action the Next-Best-Action strategy selects for them.

1. On the **Engagement policy** tab, click the name of any group, or click **All groups** to run the simulation for all issues and groups in your business structure.
2. Click **Actions > Persona testing**.
3. If you did not previously configure a persona test, click **Create test**.
4. In the **Persona (Data transform)** field, enter the name for the customer persona, for example, *Retention Customer*, and click the **Open** icon.
5. On the **Definition** tab of the data transform, specify the characteristics of the persona.
The persona characteristics are defined as properties of the customer, their journey, and other related data. For example, if you have a specific test customer contact that you want to use as a test persona, enter their ID in the **Set .ContactId equal to** row. You can add new properties by right-clicking on a row and selecting **Add child**.
6. Click **Create**.
7. In Next-Best-Action Designer, continue with the persona test configuration, as described in [Testing Next-Best-Action configuration with persona testing](#).

Testing Next-Best-Action configuration with audience simulations

You can improve the performance of your Next-Best-Action Strategy by testing the configuration of engagement policies against simulated audiences. In this way, you can check how many potential actions are filtered out by each component of the policy, and discover if a particular criterion is too broad or too narrow for your requirements.

1. On the **Engagement policy** tab, click the name of any group, or click **All groups** to run the simulation for all issues and groups in your business structure.
2. Click **Actions > Audience simulation**.
3. In the **Audience simulation** section, select or create a simulation with which you want to test the proposition filter:
 - To use an existing simulation, select the simulation in the **Simulation** list.
 - To create a new simulation, click **Create simulation**, and then select the audience to use for the simulation.
4. After the simulation test finishes, analyze the results to see what percentage of the audience would receive each action according to the current engagement policies.
For each component of the engagement policy, the simulation test shows numerical or percentage values that indicate the population of the selected audience that receives the proposition based on the current criteria. For example, if the result for a criterion that checks if the proposition is active returns 100.00%, the component did not filter out any audience members.

Segments

Segments identify a group of customer entities to use as audience in scheduled Next-Best-Action processing. You can also use Segments on the decision strategy canvas to filter actions based on a Segment or audience.

The following types of Segments are supported:

- [Creating a Criteria Segment](#)
- [Creating List Segments](#)

Creating a Criteria Segment

With Criteria Segments, marketers can define one or more conditions that must be true before a customer can be part of audience.

Historically, the assembly of criteria to describe a Segment has been an area in which the marketer had to rely on intuition, prior complex analysis, or guess work. Pega Customer Decision Hub solves this issue through the use of intelligent segmentation. Intelligent segmentation uses statistical analysis to discover predictors within the customer data that contribute positively towards a targeted outcome, for example, the purchase of a product. For more information about intelligent segmentation, see [Intelligent Segmentation](#).

1. Click **Audiences > Segments**.
2. Click **Create**.
3. Enter a **Description** for the new Segment.
4. In the **Context** section, select a customer context.

By default, the primary context, or customer entity, is Customer, mapped to the PegaMKT-Data-Customer class. You can use the Context Dictionary to review or update the default context, configure a different primary context, or add an additional customer context. For example, you can configure Account or Subscriber as additional customer entities. For more information about configuring additional customer entities, see [Configuring the context for your customer class in the Pega Customer Decision Hub Implementation Guide](#) on the [Pega Customer Decision Hub product page](#).

5. In the **Type** section, select **Criteria**.
6. Optional: If you have an Analysis Project which you want to use in this Segment, select it from the **Analysis Project** drop-down list. For more information, see [Configuring Analysis Projects](#).
7. Click **Create and Open**.
8. Add criteria groups to your Segment. For more information, see [Designing Criteria Segments](#).
9. Click **Save**. The Criteria Segment is saved and checked in.
10. Click **Run** to populate the Segment with the current set of customers.
You can click **Stop** to stop the Segment execution, or continue with other work while the Segment populates. After Pega Customer Decision Hub finishes populating the Segment, the total number of customers in this Segment is displayed in the **Population count** field.
11. **Optional:** To automatically refresh your Segment, configure a schedule. For more information, see [Optional: Configuring Criteria Segment Runs](#).

What to do next: Once a Segment is created, you can view it in the Segments landing page. For more information, see [Managing Segments](#).

Designing Criteria Segments

This section describes the default method of designing Criteria Segments. If required, you can also build a Criteria Segment by using a legacy non-visual rule form. For more information, see [Designing Criteria Segments by using a rule form \(deprecated\)](#).

To design a Criteria Segment, add one or more criteria groups. A group is a container for multiple criteria that can be combined together to represent a desired logical grouping of the population. These groups are evaluated from top to bottom and can be organized into sets.

1. In the **Design** tab of a Criteria Segment, click **Add group**.
2. Click **Add criteria**.
3. Provide values in the fields on the following tabs:
 - **Analysis project** - Lists all the predictors available in the Analysis Project. This is only available when you associate an Analysis Project with the Segment and run the Analysis Project at least once.
 - **Recommendations** - Lists the best performing predictors from the modeled analysis for the selected Analysis Project. That is, it shows the predictors which are the most effective at predicting the required outcome.
 - **Modeled fields** - Lists all the predictors available in the Analysis Project that have been assembled during the execution of the modeled analysis. By default, the predictors are sorted by the **Performance** column. The predictors which are the most effective at predicting the required outcome are displayed on top of the list.
 - **Static fields** - Lists the set of static attributes from the Analysis Project which have been processed as part of static analysis execution. The **Group** column displays the number of groupings for the predictor. The **Count** column displays the number of items across all groupings for the predictor.

For more information about Analysis Projects, see [Configuring Analysis Projects](#).

- **Data fields** - This tab allows you to select the customer data fields which you want to use as criteria in your Segment. Use the **Search** box to look for specific data fields, or scroll through the list of available fields. The following types of data fields are available in this tab:
 - **Customer** - data fields for customer properties, for example **CustomerType** or **Customer Lifetime Value**.
 - **Customer > History** - data fields for customer history, for example the **Outcome** of an interaction with the customer.
 - You can also configure other associated data entities which should be available in this tab, for example **Customer > Address**. To configure additional data entities, click **Settings** in the App Studio navigation bar, then click **Context Dictionary**.
- **History fields** - This tab allows you to select the criteria related to treatment and action responses. For example, you can use the **Received action via channel during a time period** to look for customers who were sent an email with an action within the last two weeks.
- **Segments** - This tab allows you to select other Segments as criteria within this Segment. For example, you can select which existing customer Segment should be excluded from this Segment by selecting the existing Segment as a criterion and then clicking **Exclude**. Selecting a Segment criterion automatically includes or excludes all customers in that Segment.

4. Click any criteria to add them to the criteria group.

For example, if you want the Segment to include only customers above a specific Customer Lifetime Value, add the Customer Lifetime Value criterion and then enter a **Greater than** value. Depending on the criteria type, you may need to specify additional settings. For more information, see [Criteria Types](#).

You can add up to 26 criteria to a criteria group. By default, the criteria are applied with an AND logic. For example, you can look for customers with Customer Lifetime Value greater than 100 000 AND located in the United States.

5. If you want to change the relationship between some criteria to OR, edit the value in the **Logic string** field. For example, you can configure the criteria group to look for customers who match both criterion A AND criterion B, OR criterion C.

▼ **Group 1**

A **Customer Lifetime Value** greater than '1000000'

B **Country Code** contains 'US'

C **CustomerType** exactly 'Gold Customer'

Logic string
 (A AND B) OR C

+ Add criteria

6. **Optional:** To remove a criterion from the logic string and the Segment, click the **Delete** icon .

7. Click **Add group** to add another criteria group, if needed. You can add multiple criteria groups and combine them by using the following actions:

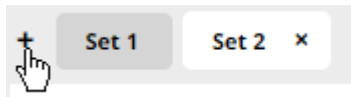
- **Start with** – Selects customers in the top group to be combined with the actions of the other criteria groups.
- **Intersect** – Includes customers that meet the group's criteria in the Segment population. This action is available for groups other than the first.
- **Exclude** – Removes customers that meet the group's criteria. This action is available for all groups.
- **Merge** – Adds customers matching the criteria to the Segment. These customers do not have to meet the criteria that is specified in the preceding groups. The Merge action removes the duplicate customers that would be added to the Segment. The Merge action is available for groups other than the top group.

The WATERFALL COUNT field reflects the flow of customers through Segment criteria groups.

8. **Optional:** To rename a criteria group, double-click on the group name.

9. **Optional:** To remove a criteria group, click **Actions > Remove**.

10. You can also organize criteria groups into separate sets for easier viewing. Click the + icon to add a new criteria set.



11. **Optional:** To rename a set, double-click on the set name.
12. **Optional:** To remove a set, click **X** by the set name.

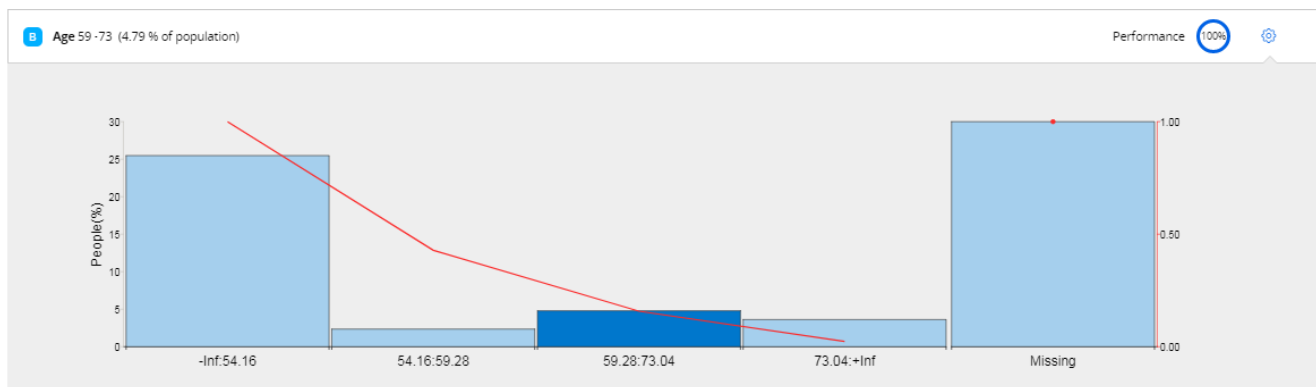
Criteria Types

The configuration options for a criterion depend on the criteria type. The following criteria types are supported:

- **Analysis project > Modeled fields**
 - [Histograms](#)
 - [Categoricals](#)
 - [Long Categoricals](#)
- **Analysis project > Static fields**
 - [Categoricals](#)
 - [Long Categoricals](#)
- **Data fields**
 - [Strings](#)
 - [Numbers](#)
 - [Dates and Times](#)

Histograms

A histogram displays a numerical property which produced meaningful analysis information during modeled analysis execution.



The following information is available in a histogram:

- **Performance** - The predictive power of this criterion.

- The grouping of the analyzed data, displayed as individual columns of the histogram. Ranges for the groupings are displayed as labels on the horizontal axis.
- The percentage of the overall population within the group, represented by the height of each column. Percentage values are displayed as labels on the left vertical axis.
- The propensity of individual groups, represented by the red performance line. Propensity is the ratio of the number of positive responses to the total number of responses. The propensity values are displayed as labels on the right vertical axis.

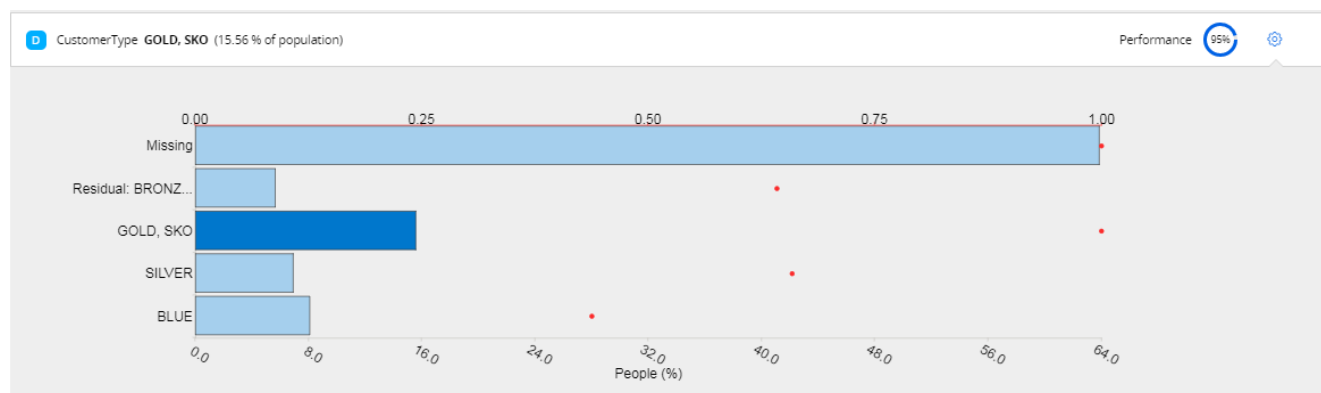
Click on a column to select or deselect groupings. You can select multiple groupings for the criterion. The system selects the column with the highest propensity by default.

Pega Customer Decision Hub uses the range values associated with each group to compose queries against the customer source. It treats the left edge of a range as **greater than or equal to** ($\geq$) and the right edge as **less than** ($<$) in its queries.

Categoricals

The categorical criteria editor is used for the following criteria types when they have no more than eight groupings:

- Symbolic modeled analysis criteria
- Numeric and symbolic static analysis criteria



The following information is available:

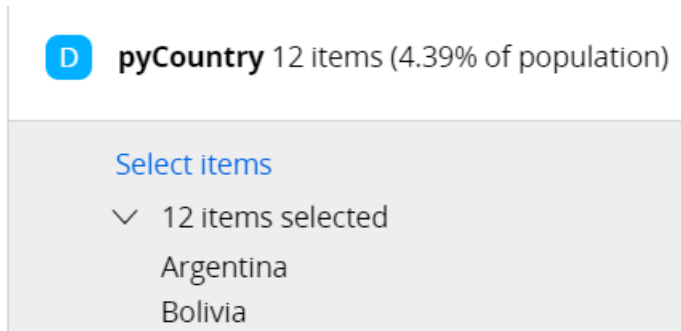
- **Performance** - The predictive power of this criterion.
- The percentage of the population within the group, represented by the length of each bar. Percentage values are displayed as labels on the bottom horizontal axis.
- The propensity of individual groups, represented by the red dots. Propensity is the ratio of the number of positive responses to the total number of responses. The propensity values are mapped to the top horizontal axis. This information is only available for modeled analysis criteria.
- **Range** - Symbols in this group. To see this information, move your mouse over a bar or a propensity dot. The information is displayed as a tool tip.
- **People (%)** - Percentage of population (based on Sample data) in this group. To see this information, move your mouse over a column. The information is displayed as a tool tip.
- The predictive power of this group. To see this information, move your mouse over a propensity dot.

Click on a bar to select or deselect groupings. You can select multiple groupings, including **Missing**. For modeled analysis criteria, the system selects the bar with the highest propensity by default.

Pega Customer Decision Hub uses the symbols associated with each group to compose suitable queries for this criterion. When multiple symbols exist in a group, the system will query for all present symbols. For the **Missing** group, the system translates the query to search for where the criterion value is null.

Long Categoricals

If the number of elements for a categorical criterion is greater than eight, it becomes impractical to visualize this criterion as a bar chart. Instead, the criterion is displayed as a long categorical.



Click **Select items** to open a pop-up window with a list of groupings for the criterion. You can select one or more groupings.

The following information is available:

- **Name** - Name of the grouping
- **Count** - Number of items in the grouping
- **Percent** - Percentage of items (based on Sample data) in the grouping.

Strings

The string criteria editor is used for text criteria available on the **Data fields** tab.

The following operators are available for string criteria:

- **Contains**
- **Starts with**
- **Ends with**
- **Exactly**



Note: You can specify more than one value for the **Equal to** operator. Use a comma to separate the values, for example, *Ready, Waiting*. If you specify multiple values for the operator, customers who match at least one of the values are added to the Segment.

- **Is null**
- **Count** - For more information, see [Aggregating Data](#)
- **In list** - For more information, see [Selecting Criteria Values from a List](#)

The following additional options are available:

- **Exclude** – Negate the current condition
- **Include missing values** – Include results that do not have a value specified for the selected criterion
- **Ignore case** – Perform a case-insensitive search

Numbers

The number criteria editor is used for numerical criteria available on the **Data fields** tab.

The following operators are available for number criteria:

- **Between**
- **Greater than**
- **Greater than or equal to**
- **Less than**
- **Less than or equal to**
- **Equal to**



Note: You can specify more than one value for the **Equal to** operator. Use a comma to separate the values, for example, 2000, 100. If you specify multiple values for the operator, customers who match at least one of the values are added to the Segment.

- **Missing value**
- **Count** - For more information, see [Aggregating Data](#)
- **In list** - For more information, see [Selecting Criteria Values from a List](#)

The following additional options are available:

- **Exclude** – Negate the current condition
- **Include missing values** – Include results that do not have a value specified for the selected criterion

Dates and Times

The date and time criteria editor is used for date and time criteria available on the **Data fields** tab. Use it to configure criteria for a range of dates and times or perform standard comparison tests against date and time values.

The following options are available for date and time criteria:

- **Date** - Configure only dates for this criterion
- **Date & Time** - Configure both dates and times for this criterion.
- **Time** - Configure only times for this criterion.
- **Missing value** - Search for instances where this criterion value is null.
- **Relative date** - Search for instances of this criterion value using date operators relative to the current date. The following operators are available for relative date comparison:
 - **More than** - Use this option to search for instances where this criterion is strictly more than X days before today (i.e. X + 1 days before or earlier).
 - **At least** - Use this option to search for instances where this criterion is at least X days before today.
 - **In exactly** - Use this option to search for instances where this criterion is exactly X days after today. To search for days before today, specify a negative value for **Days**. For example, use -X days with this option to search for instances where this criterion is exactly X days before today.
 - **In more than** - Use this option to search for instances where this criterion is at least X days after today.
 - **In at least** - Use this option to search for instances where this criterion is strictly more than X days after today (i.e. X + 1 days after and later).
 - **In last** - Use this option to search for instances where this criterion is within the last X days.
 - **In next** - Use this option to search for instances where this criterion is within the next X days.

- **Occurrences** - For more information, see [Aggregating Data](#).

The following additional options are available:

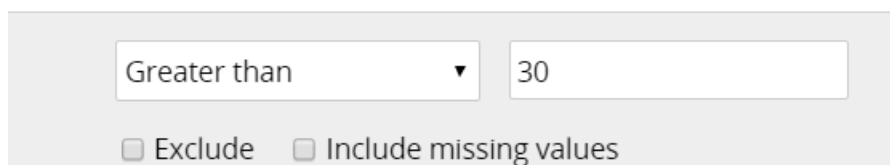
- **Exclude** – Negate the current condition
- **Include missing values** – Include results that do not have a value specified for the selected criterion

Aggregating Data

For string, number, and date and time criteria fields that belong to a repeating structure (such as a list of purchases), you can select the **Occurrences** search operator to aggregate the criteria values.

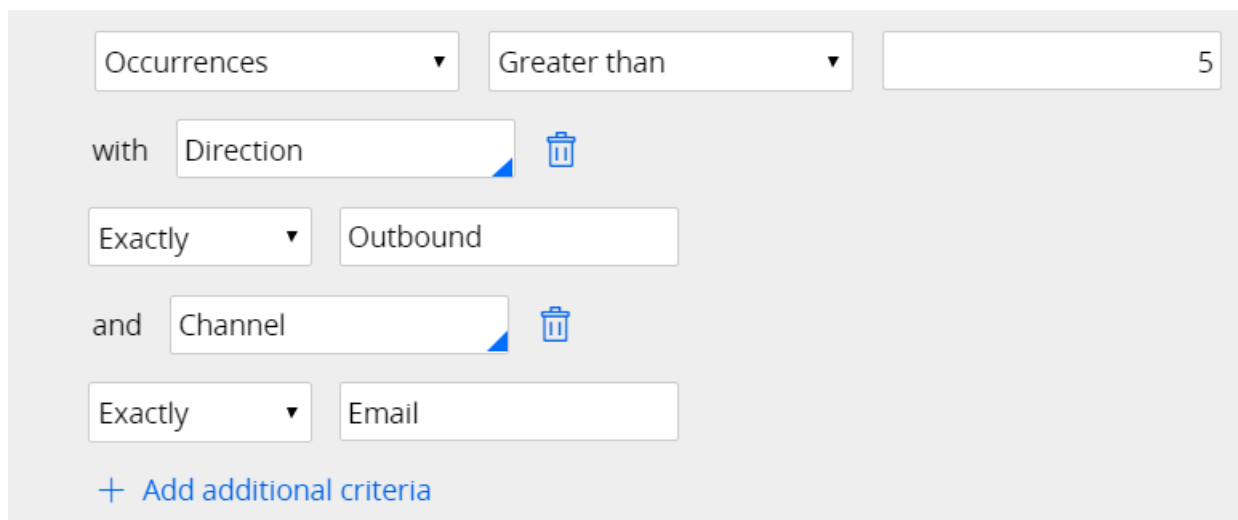
1. Select the **Occurrences** search operator to display input fields for the comparison operator and the comparison value. The following example criteria targets all customers that have more than thirty Interaction History records.

D Interaction identifier greater than '30'



2. Click **Add additional criteria** to specify additional criteria for the aggregation. Each additional criterion must be on the same parent entity as the original criteria being aggregated.
3. After selecting the additional criteria, fields relevant to the criteria type are displayed. Use these fields to configure the additional criteria.

The additional criteria are combined using AND logic. The following example targets all customers that have had more than five outbound email communications.




Note: Aggregation using the Occurrences operator is only available for first-level entities, that is, those entities that are directly associated with the customer class and not nested under other associated entities.

Selecting Criteria Values from a List

For string and number criteria available on the **Data fields** tab, you can select the **In list** search operator to view, search for, and select filter values for the criterion from a list of possible values.

The items grid in the criteria editor lists the values that are currently selected for the criterion.



Note: For best performance, optimize the properties which you want to use as Segment criteria. For more information, see the Pega Customer Decision Hub Implementation Guide on the [Pega Customer Decision Hub product page](#).

1. Select the **In list** search operator, and then click **Select items** to open the **Select items** dialog box.
2. Pick one or more values from a list of existing values for the criterion.
3. To find specific values, enter the search text in the **Search** field, and then click the search icon.
4. To add or remove individual items, select or clear the check box next to an item. You can select or clear multiple items.
5. To add or remove all items, click **Select all** or **Deselect all**.
6. To exclude customers from the results who have any of the selected values as their value for the criterion, select **Exclude**.
7. To include customers that do not have a value specified for the selected criterion, select **Include missing values**.
8. Click **Apply**.

Designing Criteria Segments by using a rule form (deprecated)

In this approach, you provide a series of criteria by identifying the appropriate column, the relationship type, and the value for which to search. These criteria are then combined in the **Filter conditions** field to allow the user to describe the logic for applying the various criteria.



Note: This approach to designing Criteria Segments is deprecated. If possible, design all Segments using the standard approach. For more information, see [Designing Criteria Segments](#).

1. On the **Design** tab of a Criteria Segment, click the rule form icon .
2. In the rule form, click **Add filter**.
3. In the **Column source** field, enter or select the property which you want to use as a criterion.
4. In the **Relationship** list, select the operation that evaluates the property and value.
5. In the **Value** field, enter the required value of the property.
6. Use the gear icon to add filter options, such as **Ignore case** and **Use null if empty**.
7. In the **Filter conditions to apply** field, define the relationship between the criteria. By default, the criteria are applied with an AND logic. If needed, you can change the relationship between some criteria to OR.

Filter conditions to apply

A AND (B OR C)

Condition	Caption	Column source	Relationship	Value	
A	Age	.Age	Greater than	18	Select values
B	US	.pyCountry	Is equal	USA	Select values
C	Canada	.pyCountry	Is equal	Canada	Select values

8. **Optional:** Select other Segments as criteria within this Segment. Selecting a Segment criterion automatically includes or excludes all customers in that Segment.
 - a. In the **Segments** section, click **Add Segment**.
 - b. Select the Segment from the **SEGMENT NAME** list.
 - c. In the **IN / NOT IN** list, select whether the new Segment evaluates customers who are **in** or **not in** the existing Segment.
 - d. In the **Filter Segments** field, define the relationship between the Segments.

Segments

Filter Segments

A AND B

Condition	IN / NOT IN*	SEGMENT NAME		
A	in	HighValueCustomers		
B	Not In	EarlyAdopters		

Add Segment

9. Click **Save**.

Optional: Configuring Criteria Segment Runs

In the **Options and Schedule** tab of the Segment, you can configure various options for the Segment and schedule its execution. All settings in this section are optional and can be configured according to your needs.

1. In the **Data Options** section, configure how data in the Segment is refreshed at run time. The following options are available:
 - **Enable Transactional Refresh** - Select this option for Segments that are used for exclusion lists or transactional notifications to customers. Transactional refresh is more resource-heavy than the default mode, but it ensures correct Segment population in the case of concurrent refreshes.
 - **Refreshable Segment** - Segments which refer to this Segment as part of their criteria can automatically refresh this Segment when they are run.

- **Refresh Child Segments** - The Segment can automatically refresh data in its child segments, so long as they are marked as refreshable.

If the refreshable option is not enabled, then the Segment's contents will remain untouched and used as is in the criteria evaluation of the parent, and any child Segment beneath the non-refreshable Segments are also not refreshed.



Note: Top-level Segments in a dependency chain are always refreshed. Normally, Segments lower down in a dependency chain should also be marked as refreshable, as this ensures that any parent Segment is set up in the most accurate way. However, as a best practice, disable the refreshable option for all Segments that are too costly (in terms of time and processing resources) to refresh every time a parent Segment is refreshed.

2. In the **Sampled Segments Options** section, select a sample of criteria results. For more information, see [Control Groups](#).
 3. In the **Control Group Options** section, designate Segment results as a control group. For more information, see [Control Groups](#).
 4. In the **Scheduling Options** section, select the **Enable Schedule** check box to control when the segment runs.
-  **CAUTION:** You must check in the Segment. Segment scheduling or the removal of any prior schedule only takes place after the Segment is checked in.
5. In the **Delivery Options** panel, configure the Pega Customer Decision Hub to send email notifications for scheduled runs and refreshes. You can customize the email by using the provided fields. The email recipient must be an operator in the system.

Intelligent Segmentation

Intelligent segmentation assembles recommended criteria from statistical analysis of various input sources and ranks them according to how well they do at predicting certain outcomes. This helps the marketer to identify groups of customers, form Segments, and use them without the need for guess work.

Intelligent segmentation is supported by Analysis Projects, which create a set of predictors based on samples of the main customer data. Intelligent segmentation also uses sampling strategies to optimize the processing involved in discovering these predictors.

Configuring a Sample

Use a Sample to define a sample of the overall customer population. An Analysis Project takes a Sample and performs a range of statistical analysis activities to determine which data fields have predictive power or influence when measured against a goal, for example the purchase of a product or service.

1. Click **Configuration > Segmentation > Segmentation Support**.
2. In the **Sample populations** tab, click **Create**.
3. Enter the Sample name.
4. **Optional:** Enter the Issue and Group to classify the Sample.
5. Click **Create and open**.
6. On the **Design** tab, in the **About This Sample Population** section, configure the following information according to your requirements:
 - a. **Sample Source** - Describes the location of the sample data.
 - b. **Anticipated Sample Size** - Describes the required size in terms of an absolute number (**Fixed**) or a percentage (for example, 10%).

- c. **Sample Strategy** - Describes various sampling strategies. For **Ascending** and **Descending**, use the **Ordered On** field to identify the field in the data set on which to order.
7. In the **Sample Fields** section, clear any check boxes corresponding to fields which are not useful in analysis. As a general rule, fields that are system-related (for example partition key) or unique for individual customers (for example their customer id or their full name) typically have no value from an analysis perspective.
8. Click **Save**.
9. Run the Sample.
 - To run the Sample manually:
 - a. Click **Run**. The **Run Sample** pop-up window is launched.
 - b. Click **Confirm** to populate the Sample. The **Sample size** field is updated to reflect the number of rows in the Sample.
 - c. Click **Preview** to preview the contents of the Sample and its associated customer data.
 - To run the Sample automatically, schedule the sample execution in the **Schedule** tab. Sample scheduling works in the same way as Segment scheduling. For more information, see [Optional: Configuring Criteria Segment Runs](#).
10. **Optional:** Click the **History** tab to see details of the Sample population.

Sample Statistics

[Refresh Activity History](#)

Last Run	Reason	Execution Time(ms)	Row Count
Nov 4, 2015 4:01:14 PM	Populate Sample	65	501

Configuring Analysis Projects

Analysis Projects analyze Sample data to assemble a set of predictors that have influence on the nominated outcome, or to conduct distribution analysis on a data set.

1. Click **Configuration > Segmentation > Segmentation Support > Analysis Projects**.
2. Click **Create**.
3. On the **Create Analysis Project** form, enter the following information:
 - Analysis Project name
 - Sample – Select a Sample from the list.
4. Click **Create and open**.
5. Configure the analysis type for the Analysis Project. The following analysis types are supported:
 - [Configuring Static Analysis](#) provides a convenient way to understand what the groups of data look like for a specific property and how many occurrences exist within each group.
 - [Configuring Modeled Analysis](#) provides a statistical assessment of the significance of the individual properties and their influence or power in predicting the targeted outcome.
6. Click **Save**.
7. Run the Analysis Project.
 - To run the Analysis Project manually, click the **Results** tab, and then click **Run**.

- For Static Analysis, the **Run** button is in the **Static Results** section. If the **Run** button is inactive, check out the Analysis Project.
 - For Modeled Analysis, the **Run** button is in the **Modeled Results** section. If the **Run** button is inactive, check out the Analysis Project.
 - To run the Analysis Project automatically, schedule the Analysis Project execution in the **Schedule** tab. Analysis Project scheduling works in the same way as Segment scheduling. For more information, see [Optional: Configuring Criteria Segment Runs](#).
8. Click the **Results** tab to review the results of manual and scheduled analysis runs.
 9. **Optional:** Click the **History** tab to see the analysis execution statistics.

Configuring Static Analysis

You can configure the Analysis Project to use static Data Distribution analysis. This provides a convenient way to understand what the groups of data look like for a specific property and how many occurrences exist within each group.

Static Analysis is useful as a first pass to describe how the data in our data source is organized and may give some insight as to where to focus any criteria construction in Segments.

1. Click the **Static Analysis** tab of an Analysis Project.
2. Review the available properties which have been retrieved from the supporting sample.
3. Describe which grouping type is required for each property.
 - **Distinct Count** - This property will be processed during the execution phase and a distinct count of the grouping will be performed. Apply this grouping to properties which have a limited set of values and where knowing how many customers are in each group would be very valuable.
 - **No Grouping** - This property will be ignored. However, it may still be used as part of the modeled analysis. Apply this grouping type to properties which are likely to be a continuous value with a large number of groups and which are less useful from a grouping and distribution analysis perspective.
4. If the Sample fields changed since this Analysis Project was created, click **Refresh**.

Configuring Modeled Analysis

You can configure your Analysis Project to use modeled analysis. This approach uses statistical analysis to identify properties that have a high influence on the targeted outcome, completely removing the need for guess work or intuition when assembling criteria in a Segment.

A key aspect of this analysis approach is the use of a closed loop feedback mechanism. Sample data is used to train or drive the creation of modeled analysis predictors. The sample data brings with it details of previous interactions and responses to actions made. While we are creating modeled analysis predictors that have predictive power over various outcomes, they are based on positive and negative responses to previous actions.

1. Click the **Modeled Analysis** tab of an Analysis Project.
2. In the **Select action** section, you can train the analysis on specific instances of responses to previously delivered actions. You can train the analysis using responses to previous actions for the same product or product group. Alternatively, for a new product offering, you can use similar products or product groups to assemble likely predictors that will help illustrate the type of customers who are likely to buy the new product.
 - a. Select the **Issue**, **Group**, or **Action** on which you want to focus.
 - b. Leave any of these values blank to bring through all entries for the parent category. For example, if you select the **Sales** Issue and the **Handsets** Group, and leave the action field blank, the analysis will consider the responses to all actions that belong under Sales or Handsets.

3. In the **Interaction Details** section, you can train the analysis on specific interaction details, in a similar way as with responses to actions. Select the **Direction**, **Treatment**, and **Channel** on which you want to focus. Use the **Offered After** field to restrict the analysis only to responses to those actions that were offered after a specified date and time.
4. In the **Select Predictors** section, remove or add properties from the base Sample which will be used as predictors for the analysis. Predictors which have no predictive value in modeled analysis should be removed from this section.
5. In the **Define Behaviors** section, select positive and negative outcomes for the modeled analysis based on the set of responses received so far.

Review each response type in the **Available Behaviors** section and mark it as a positive, negative, or ignored behavior for the analysis. To reload the list of available behaviors, click **Refresh**. Marking as **Positive** or **Negative** moves the response type into the corresponding response category (**Positive Behavior** or **Negative Behavior**).

Define Behaviors

Select available behaviors and classify them as positives and negatives

Refresh

Available Behaviors	Count	Set As
Accepted	592	Positive ▾
Clicked	602	Positive ▾
NoResponse	237	Ignore ▾
Rejected	350	Negative ▾

Positive Behavior

Accepted
Clicked

Negative Behavior

Rejected

Associating Analysis Projects with Segments

You can associate a Segment with an Analysis Project so that you can reuse static and modeled analysis predictors during criteria assembly. For more information about associating an Analysis Project with a Segment at Segment creation, see [Creating a Criteria Segment](#).

You can also associate Analysis Projects with existing Criteria Segments.

1. Click **Audiences > Segments**.
2. Open the Criteria Segment which you want to associate with an Analysis Project.
3. Click **Check out**.
4. On the **Design** tab, click **More**.
5. In the **Analysis Project** list, select an Analysis Project which is relevant to your Segment. If the Criteria Segment was already associated with an Analysis Project, selecting a new Analysis Project will clear any existing criteria for this Segment.

6. Click **OK** to proceed or **Cancel** to cancel the change.
7. Optional: To view or modify the Analysis Project configuration, click the **Open** icon next to the **Analysis Project** list.
8. Click **Save**.

Creating List Segments

You can use a List Segment to quickly convert a list of customers into a Segment that Pega Customer Decision Hub can use as the audience in scheduled Next-Best-Action execution.

Advanced users can use the customer list to update existing customer data. You can also manually edit the list of customers included in the Segment.

1. Click **Audiences > Segments > Create**.
2. Enter a **Description** for the new Segment.
3. From the **Type** list, select **List**.
4. Click **Create and Open**.
5. Add customers to your Segment. There are two ways of adding customers to List Segments:
 - [Importing Customers](#)
 - [Manually Adding Customers to a List Segment](#)
6. Populate the segment.
 - If you have **Check in / out** enabled, click **Check in**.
 - Otherwise, click **Save**.

Pega Customer Decision Hub automatically starts to populate the Segment with the current customer list. The total number of customers in this Segment is displayed in the **Population count** field.
7. After you create a Segment, you can view it in the Segments landing page. For more information, see [Managing Segments](#).

Importing Customers

You can use a comma-separated values (CSV) file to import customer data into your application. By adding or updating customer records in bulk, you can quickly update the Segment. You can import customer data at any time.

1. On the **Customers list** tab of the Segment, click **Import**.

 **Note:** The import process uses the Data Management functionality of Pega Platform. For details on this process, click the help icon in the wizard to launch the Pega Platform help topic.
2. Click **Choose file**, and then upload the CSV file with your customer data.
3. In the **Purpose** list, select one of the following options:
 - **Add or update** - Creates customer records for entries in the import file that do not exist in the customer table, updates existing customer records, and adds all valid customers to the List Segment.
 - **Add only** - Creates customer records for entries in the import file that do not exist in the customer table, ignores existing customers, and adds all valid customers to the List Segment.
 - **Populate Segment Only** - Adds existing customers from the import file to the List Segment, but does not modify the customer table.

4. Click **Next**.
5. In the **Match existing records by** field, select the data field from your import file which will be used to match existing customer records. For example, select `CustomerID`. The field used to match records must be unique.
6. For each **Source field** in the import file, specify the **Target field** mapping. If you previously saved a field mapping template, you can select it from the **Template type** list.
7. **Optional:** If you selected the **Add or update** import purpose, you can use the **Update type** list to control which fields are updated for existing customers. To set different conditions for different fields, clear the **Update all fields** check box and set the conditions in the **Update type** column.

Match existing records by ☐ Update all fields

ID

☐ Case insensitive matching

[View custom defaults](#)

Source field (CSV)	Target field (Pega)		Field type	Default value	Update type	Mapping options
✓ FullName	pyFullName	Select	Text		Update if source is not blank ▼	⚙️
✓ Email	pyEmail1	Select	Text		Update if source is not blank ▼	⚙️
✓ ID	AccountID		Text		Record identifier	

8. Click **Next**.
9. **Optional:** To save a field mapping template, select the **Save import settings as a template** check box.
10. Click **Start validation**.

 **Tip:** If the validation reports any invalid rows, click the **See more** link to download a CSV file containing the records which failed to import. The last column in this file contains a description of the error that occurred. Resolve the errors before you proceed.

11. Click **Continue import**.

When importing large files, the import progress can take some time. You can close the import window and continue with other activities. The system displays the status of the import at the top of the customer grid. Once the import completes, the system displays the number of instances that were added or updated by the import. If there were errors during the import, the number of erroneous records is also shown.

12. Click **Finish**.

Manually Adding Customers to a List Segment

You can manually add existing customer records to your Segment.

1. On the **Customers list** tab of the List Segment, click **Add**.
2. Enter a part of the customer name, email, or ID into search box, and then click the search icon.

3. Select one or more customers to add to the List Segment, and then click **Add**.
4. **Optional:** Repeat the above steps to add more customer records to the Segment.
5. Click **Done**.

Managing Segments

You can view and manage List and Criteria Segments by using the Segments landing page.

1. In the Pega Customer Decision Hub portal, click **Audiences > Segments**.
2. For each Segment, review the following information:
 - Image associated with the Segment
 - Description
 - Rule name of the underlying Segment rule
 - Number of customer entities in the Segment
 - Percentage of the total population represented by the Segment
 - When the Segment population was last refreshed
 - Segment type
 - When the Segment rule was last updated

Audiences

Create

Help

Issue / Group

Type

Name

All issues / All groups

All types

Search...

View

20 of 213 items

New Renters

NewRenters

12 (2%)

Refreshed 39 minutes ago

List

Edited 39 minutes ago

AllCustomers

AllCustomers

704 (100%)

Refreshed 4 hours ago

Criteria

Edited 4 hours ago



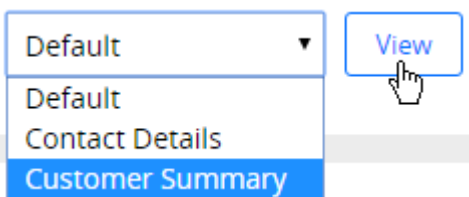
Tip: The landing page lists the twenty most recently updated Segments in the system. To load the next twenty results, click the **View more results** link at the end of the list.

3. To search for Segments by Issue / Group, Type, and Name, use the filters at the top of the page.
4. Click the link in the Segment description to open the Segment.

Exporting Customers in a Segment

After you populate a Segment, you can export a list of its unique customers.

1. Use the customer grid to view the customers in the Segment.
 - For Criteria Segments, click the **Show customers** link in the Segment header panel. This launches a pop-up grid listing the customers in the Segment.
 - For List Segments, the same customer grid is available directly on the **Customer list** tab of the Segment.
2. The customer grid displays the built-in `Default` customer view. If your implementation team defined other views for the customer grid, you can switch to them by selecting the view in the list and clicking **View**.



Tip: To define a custom data view, create a Report Definition in the Customer- class that has a custom field named **DataManagement** and value `Views`.

3. Export the data view to a CSV file.
 - For Criteria Segments, click **Export** in the pop-up window which displays the customer grid.
 - For List Segments, ensure that the Segment is checked in, and then click **Export** on the **Customer list** tab of the Segment.

Removing Customers from a List Segment

You can manually remove one or more customer record from a List Segment.

1. Check out the List Segment.
2. Use the columns in the grid to sort and filter for the customers you want to remove from the Segment.

243	test@pam.com	David English	
162	gadram@servemail.net	Swat Katt	
KAT11	rbhawan@newserver.in	Rajesh Bhawan	
...	...	...	

3. Click the **Delete** icon in the customer's row in the customer grid.



Note: For Criteria Segments, this option is not available. To change which customers are included in a Criteria Segment, adjust the selection criteria instead. For more information, see [Designing Criteria Segments](#).

Repopulating a Segment

After you make changes, such as adding customers or adjusting criteria, to a Segment, repopulate it to apply your changes.

1. Check out the Segment and edit it as needed.
2. Click **Save**.
3. Check in the Segment.

- For List Segments, checking in the Segment repopulates it automatically.
- For Criteria Segments, click **Run** after checking in the Segment. Running a Criteria Segment repopulates it.

Reviewing Segment History Information

The **History** tab provides a historical view of the Segment, its updates and its population.

1. Click **Audiences > Segments**, and then click the name of a Segment.
2. Click the **History** tab.
3. For Criteria Segments, review statistics about the current segment run in the Current run section, and about previous Segment runs in the Segment Statistics section.
4. For List Segments, review details about previous uploads of files with customer data records in the Import History section.

Control Groups

In an experiment, a Control Group is a group, separated from the rest of the experiment, which is isolated from the variable being tested. In marketing, Control Groups can be used to assess the performance of marketing initiatives.

Pega Customer Decision Hub provides support for defining and populating Control Groups. In addition, the Strategy rule also provides support for assessing whether a customer is in a Control Group. This allows the user to treat Control Group members differently. For example, Control Groups members might not receive a particular action.

Pega Customer Decision Hub uses Interaction History (IH) to maintain Control Group memberships. This allows Control Groups to be used in both batch and real-time strategies.

Creating a Control Group

In the marketing application, Control Groups are specially configured Segment rules.

Control Group segments cannot be configured as virtual segments.

1. Create a new Segment rule.

Alternately, an existing Segment rule can also be converted to a Control Group.

2. Configure the **Design** tab of the Segment rule as desired. Specify the criteria fields to use and select the intersections that represent the Control Group.
3. On the **Options and Schedule** tab, enable the Control Group checkbox and, optionally, specify a validity period for the Control Group.

Control Group Options

☒ Mark segment results as a control group

Mark the control as valid from To

4. **Optional:** Select whether the Control Group should be a random sampling of the selected Segment criteria results by enabling or clearing the **Select a portion...** checkbox on the **Options and Schedule** tab.

If selected, specify the maximum sample size or the percentage of the criteria results to be used for the Control Group. If this option is not selected, the entire set returned by the Segment criteria will be used as the Control Group.

The Sample option can also be used independently on a Segment (without the Control Group option) to create a Segment with a random sampling of the selected criteria's results.

Sampled Segment Options

☒ Select a portion (sample) of criteria results

Only make a portion of the customers that meet the criteria conditions part of this segment

- ☐ Select a maximum of of the results
- ☒ Select approximately percent of the results

5. Save the Segment.

Populating a Control Group

Like normal Segments, Control Groups can be populated manually or automatically.

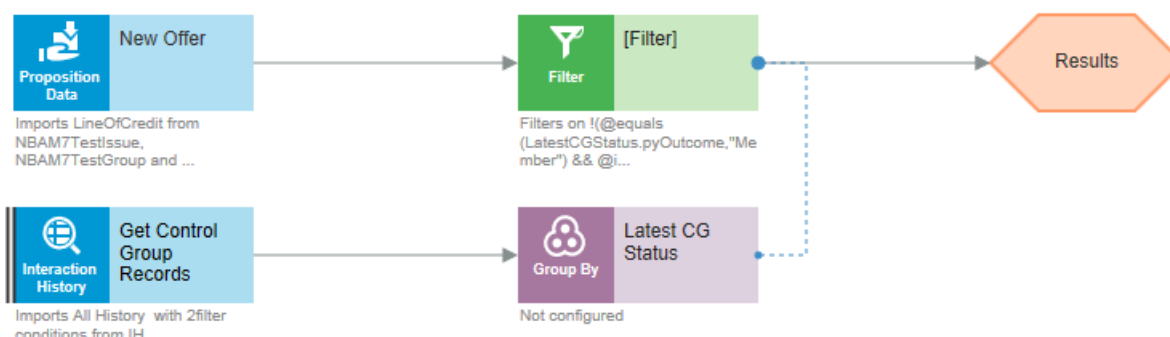
- To populate a Control Group manually, on the **Segment** rule form, click the **Run** button.
- To populate a Control Group automatically, specify a schedule on the **Options and Schedule** tab.

Once the Control Group has been populated, the number of customers in the Control Group is shown in the Segment toolbar. The "Show Customers" button can be used to view the customers in the Control Group.



Determining Control Group Membership

The Strategy rule can be used to determine whether a particular customer is in a specified Control Group. A sample Strategy demonstrating this use is shown below.



At a high level, this Strategy pushes out a selected action to customers that are not in a selected Control Group. The salient shapes in this Strategy are explained below.

1. Interaction History shape

The Interaction History shape is used to fetch the Control Group membership records for the customer. To do so, the following conditions are specified on the shape:

- MktType - This must be set to "ControlGroup"
- MktValue - This should be set to the name of the Control Group

In addition, the "last days" value is cleared in order to include all IH records.

Interaction History Auto-Run

Fetch Interaction History for the last days

FETCH WHEN THE CONDITIONS BELOW ARE MET

+ Add Item ✕ Delete

	PROPERTY		VALUE
when	MktType	is equal to	ControlGroup
and when	MktValue	is equal to	HighValueControlGroup

To minimize the number of fields being retrieved, the "Manually select properties..." checkbox is enabled.

☒ Manually select properties to retrieve from interaction history

The following image shows the properties that should be selected:

+ Add Item **x Delete**

PROPERTIES	
...	MktType
...	MktValue
...	ControlGroupValidityStart
...	ControlGroupValidityEnd
...	pyOutcome

2. Group By shape

The IH shape fetches all records that meet the specified criteria ordered in reverse chronological order (latest entry first). The latest IH entry (if one exists) depicts the current membership status in the specified Control Group. To get at this entry, the Group By shape can be used to select the first entry. No additional grouping/aggregation criteria need to be specified.

For remaining properties

Select First

3. Filter shape

The Filter shape specifies the criteria to output the input action. The filter expression must inspect the status of the last membership record. This value is stored in the "pyOutcome" field of the record. There are three possible values for this field:

- Member - Customer is currently IN the specified Control Group
- NonMember - Customer is currently NOT IN the specified Control Group, but has previously been a member of this group.
- (Missing) - Customer is currently not and has never been in the specified Control Group.

The filter expression must also account for Control Group validity dates, if they have been specified.

The following represents a sample filter expression that takes the above factors into account:

```
@if(@equals(LatestCGStatus.ControlGroupValidityStart,""), true, @ (Pega-
RULES:DateTime).CompareDates(@ (Pega-RULES:DateTime).CurrentDateTime(),
LatestCGStatus.ControlGroupValidityStart)) && @if(@equals(LatestCGStatus.ControlGroupValidityEnd,""),
true, @ (Pega-RULES:DateTime).CompareDates (@ (Pega-RULES:DateTime).CurrentDateTime(),
LatestCGStatus.ControlGroupValidityEnd))
```

Strategies

Strategies match the actions to the customer entities in the target Segment and ensure that each customer is targeted with the most suitable action. To match actions to customers, Strategies apply business goals and prioritization criteria.

Creating Strategies

You can create new Strategies from the Strategies landing page in the Pega Customer Decision Hub portal.

1. Click **Intelligence > Strategies**.
2. Click **Create**.
3. Select the Strategy creation mode:
 - If you want Pega Customer Decision Hub to guide you through the Strategy creation, select **Guide me through it**. For more information, see [Using the Strategy Builder](#). The Strategy Builder allows you to create Strategies for the primary customer context in your application.
 - If you want to create the Strategy manually, select **Start with new canvas**. For more information, see [Creating Strategies Manually](#). Manual Strategy creation allows you to create Strategies for all customer contexts in your application.

Using the Strategy Builder

The Strategy Builder walks you through the process of designing your marketing Strategies.

1. To create a new Strategy with the Strategy Builder, click **Create > Guide me through it** on the Strategies landing page.
2. Enter the Strategy name. The system automatically generates an identifier for the Strategy based on the specified name. To change the identifier, use the pencil icon.
3. Enter the Strategy description.
4. In the Purpose section, click **Configure**.
5. In the Configure Objective window, select a Strategy objective, and then click **Apply**. For more information about using this window, see the [Using a Configuration Modal Window](#) appendix. A new configuration section for the selected objective appears under the Purpose section. The contents of the configuration section depend on the objective which you selected.
6. Configure the selected objective. For more information, see [Configuring the Objective](#).
7. Click **Save**. Any configuration errors are displayed on top of the page. You must resolve them before the Strategy is generated.
8. Click **Actions > Open canvas** to review the generated Strategy.
9. **Optional:** Manually configure the Strategy.
 - For general information about Strategy configuration in Pega Platform, see [About Strategy rules](#).
 - For information about Strategy configuration specific to Pega Customer Decision Hub, see [Configuring Pega Customer Decision Hub Strategies](#).
10. **Optional:** To delete the Strategy Builder configuration for this Strategy, click **Delete**. This does not remove the generated Strategy, only the ability to edit it in the Strategy Builder.



Note: You can also use the Strategy Builder to edit existing Strategies. To access the Strategy Builder for an existing Strategy, find the Strategy on the Strategies landing page and click **Actions > Open Strategy Builder**. If you make any manual changes to your Strategy, and then edit the Strategy using the Strategy Builder, your manual changes will be overwritten.

Configuring the Objective

An objective is a business goal that the Strategy should achieve. You must configure one objective for each Strategy.

The following objectives are available:

- [Calculate Customer Lifetime Value](#)
- [Fixed or dynamic action bundle](#)
- [Action prioritization strategy](#)
- [Action targeting using Audiences and AI](#)
- [Action Targeting using paid optimization](#)

Configuring the Calculate Customer Lifetime Value Objective

The Calculate Customer Lifetime Value objective allows you to define how Customer Lifetime Value is calculated. Customer Lifetime Value is an estimation of the net profit predicted for the entire future relationship with a customer.

1. In the **Method** section, click **Configure**.
2. In the Configure Calculation Method for CLV window, click a calculation method to select it, and then click **Add**.

The window lists the available calculation methods and displays the expression used by each calculation method. By default, Basic Calculation is available.

3. Click **Apply**. Additional configuration settings for the selected calculation method appear. For the default Basic Calculation method, the following settings are available:

- **Acquisition cost** - The cost of acquiring the customer.
- **Annual profit** - The yearly profit from the customer, excluding acquisition costs.
- **Retention rate** - The annual rate of retention of your customer base.

For example, enter the following constant values for the default Basic Calculation method:

- **Acquisition cost** = 50
- **Annual profit** = 1400
- **Retention rate** = 80%

The Basic Calculation method applies the following calculation expression for the Customer Lifetime Value:

(Annual profit * YearsACustomer) - Acquisition cost

where YearsACustomer = $1/(1 - \text{Retention rate as a decimal value})$. So, the calculated Customer Lifetime Value in this example is:

$$\{1400 * [1/(1-0.8)]\} - 50 = [1400 * (1/0.2)] - 50 = (1400 * 5) - 50 = 6950$$

4. Configure the values for the available fields. You can select the following types of values for each field:
 - **Constant** - Enter a number which represents the value.
 - **Property** - Select a property from the customer class that contains the value.

- **Strategy** - Configure a Strategy that returns this value. After selecting a Strategy, select the strategy result property that contains the value.

5. Click **Save**.

Configuring the Fixed or Dynamic Action Bundle Objective

The Fixed or dynamic action bundle objective creates an action bundle with a Bundle Parent and one or more Bundle Members for each targeting approach. You can use audiences or analytics to determine the best mix of Bundle Members.

1. Select the business issue that is addressed by this objective.
2. Select one or more business groups from the selected business issue. The business groups will be used in the generated strategy. After you select the business groups, the Targeting approach section appears.
3. In the **Targeting approach** section, click **+Add targeting approach**, and then select one of the following options:
 - **Audience driven** - Select this approach if you have an audience that you want to target with a specific action. An audience is made up of a starting segment, and can then be split into sub-segments.
 - **Analytics driven** - Select this approach if you want to use predictive or adaptive analytics to score and rank actions. Using analytics for targeting allows you to consider a larger set of actions.
4. Click **Apply**.
5. Configure the selected targeting approach.
 - For audience driven approaches, see [Configuring Audience Driven Targeting](#).
 - For analytics driven approaches, see [Configuring Analytics Driven Targeting](#).
6. Configure the Bundle Parent.
 - a. In the **Bundle** section, click **Configure**.
 - b. Select an action that you want to use as Bundle Parent. For more information about action bundles, see [Action Bundles](#).

Note: Only actions with the attribute Bundle Parent appear in this section. For more information, see [Using the Details Tab on the Action Rule Form](#).
 - c. Click **Apply**.
 - d. **Optional:**
Optional: Edit the name and type of the bundle. Any changes to the name and type of the bundle are only applied in the generated Strategy, not in the original action used as Bundle Parent.
7. **Optional:** Repeat steps 3-6 to configure more targeting approaches.
8. **Optional:** If you added multiple targeting approaches, specify how you want to arbitrate between them. For more information, see [Arbitrating over Targeting Approaches](#).
9. **Optional:** If you added multiple targeting approaches, use the **Overall prioritization** section to specify how you want to prioritize across your targeting selections. This prioritization determines the order in which actions are made to a customer. For more information about configuring prioritization, see [Configuring Overall Prioritization](#).
10. Click **Save**.

Configuring Audience Driven Targeting

To configure audience driven targeting, select one or more Segments to represent the starting audience targets, then configure how each Segment should be used by the Strategy that you are creating.

1. In the **Targeting approach > Audience** section, click **Configure**.
2. In the Configure Audience window, click a Segment which you want to use as audience for this targeting approach, then click **Apply**. For more information about the window, see the [Using a Configuration Modal Window](#) appendix.
3. Click **Assign actions**.
4. In the Configure actions window, click the action or actions that you want to apply to customer entities in the selected Segment, and then click **Apply**. For more information about the window, see the [Using a Configuration Modal Window](#) appendix.



Note: The list only shows actions from the same business groups that you selected for the objective. For more information, see [Configuring the Fixed or Dynamic Action Bundle Objective](#) or [Configuring the Paid Optimization Objective](#).

5. **Optional:** Assign different actions to customer entities from your starting Segment, based on other Segments that the customer entities also belong to. For example, you can start with a large Segment called *Strategy Audience*, split that Segment into *Business Customers* and *Individuals*, and then assign different actions to each under the same Strategy.
 - a. Click **Actions > Split by segment** by the name of a Segment that you selected in step 2. The **Configure Audience** pop-up window appears. For more information about the window, see the [Using a Configuration Modal Window](#) appendix.
 - b. Select one or more Segments and then click **Apply**. The selected Segments appear as new rows under the Segment that you selected in step 2.
 - c. For each of the selected Segments, click **Assign actions**, select the action or actions that you want to apply to customer entities in the selected Segment, and then click **Apply**.
6. **Optional:** To remove a Segment from the targeting approach, click **Actions > Remove** by the name of a Segment.
7. **Optional:** Repeat steps 1-5 to add more Segments to the targeting approach.

Configuring Analytics Driven Targeting

To configure Analytics driven targeting, select the business groups to include in the approach, and then configure how each business group should be used by the Strategy you are creating.

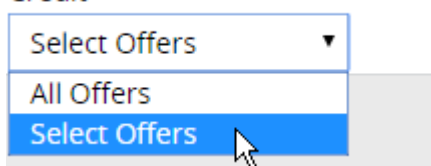
1. In the **Targeting approach > Analytics driven** section, click **Configure**.
2. In the Add groups window, select one or more business groups, and then click **Apply**.



Note: The window only shows the business groups that you selected for the objective. For more information, see [Configuring the Fixed or Dynamic Action Bundle Objective](#) or [Configuring the Paid Optimization Objective](#).

3. **Optional:** By default, the Strategy uses all actions for the selected business groups. If you want to select specific actions instead, click **All actions > Select actions**, and then click **Configure**.

Credit



4. **Optional:** To view all actions in a group, click **Actions > View all actions**.

5. **Optional:** To remove a group from the targeting approach, click **Actions** > **Remove** by the name of the group.
6. **Optional:** Specify eligibility criteria for the selected actions. For more information, see [Configuring Eligibilities](#).
7. Specify how the selected actions should be prioritized. For more information, see [Configuring Prioritization](#).

Configuring Eligibilities

When configuring analytics-driven targeting approaches for Strategies, or business issue nodes in Next-Best-Action Designer, you can use Proposition Filter rules to specify eligibility criteria for the selected actions.

The eligibility conditions you specify in Next-Best-Action Designer are applied to the targeting approach. They can be overridden on the Eligibility tab for individual actions.

In the **Eligibilities** section, select one of the following options:

- Click **Add criteria** to define new eligibility conditions by using a condition builder. After you save the configuration, Pega Customer Decision Hub generates When rules and Proposition Filters according to the specified criteria. For more information, see [Configuring Action Eligibilities](#).
- Click **Actions** > **Add action-specific eligibilities** to add an action to the list that does not currently have eligibility conditions. After you add an action, you can open it and add specific eligibilities. For more information, see [Configuring Action Eligibilities](#).
- Click **Actions** > **Use existing eligibilities** to add an existing Proposition Filter.

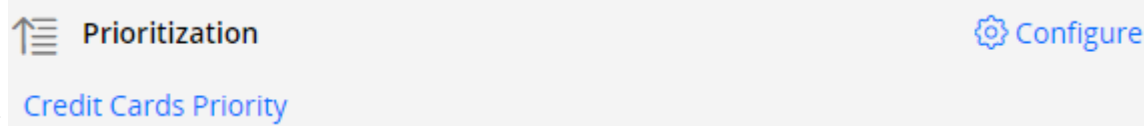
What to do next:

Refer to Pega Platform documentation for more details on Proposition Filter rules.

Configuring Prioritization

When configuring analytics-driven targeting approaches for Strategies, or business issue nodes in Next-Best-Action Designer, you must specify how the selected actions should be prioritized. A prioritization Strategy determines the relative priority of actions in the group and ranks them so that the customer is always presented with the right action.

1. In the **Prioritization** section, click **Configure**.
2. In the Configure Prioritization window, select the prioritization Strategy, and then click **Apply**.
For more information about the window, see the [Using a Configuration Modal Window](#)



Note: The list only shows the Strategies that have the NBACategory custom field set to PRIORITIZATION. New rules created from this window automatically have this custom field set.

Arbitrating over Targeting Approaches

If you add multiple targeting approaches, specify how the system should arbitrate over these approaches. Each targeting approach is assigned a label (A, B, and so on). The following arbitration methods are available:

- **A/B Testing** - Specify the percentage frequency when each targeting approach should be applied. A value must be specified for each approach and the values must add up to 100%.
- **Conditional** - Specify a conditional expression to arbitrate between targeting approaches. Drag and drop rows corresponding to targeting approaches to reorder them. The expression can use data from actions and customer entities. To access customer entities data, enter `Primary.[customer property]`, for example, `Primary.Age`.

The screenshot shows the 'Conditional' arbitration configuration. At the top, there is a radio button labeled 'Conditional' with a help icon. Below it, the section is titled 'Conditions'. There are two rows of conditions. The first row is labeled 'If' and contains a text box with the expression 'Primary.Age > 40', followed by a gear icon and the text 'then select' with a blue button labeled 'A'. The second row is labeled 'Else if' and contains a text box with the expression 'true', followed by a gear icon and the text 'then select' with a blue button labeled 'B'. At the bottom, there is a text label 'Otherwise no action will be taken'.

Configuring Overall Prioritization

The overall prioritization configuration of a Strategy determines the order in which actions are made to a customer. You must specify the overall prioritization if you configured multiple targeting approaches or if an analytics-driven approach includes more than one business group.

- You can configure overall prioritization in the same way as a group or issue-level prioritization. For more information, see [Configuring Prioritization](#).

Configuring the Action Prioritization Strategy Objective

The Action Prioritization Strategy objective creates a reusable Strategy that uses analytical models to determine the action priority. The Strategy uses an external input and can be applied to any set of actions.

Strategies generated for this objective have built-in propensity smoothing. This allows new actions to compete with existing actions. You can increase or decrease priority by assigning weights to results.

1. In the Prioritization section, specify how actions should be prioritized. Select one of the following options:

- **Analytical model** - Select this option to use a predictive or adaptive model to determine action priority.
 - a. Click **Configure**. The **Configure Analytical Model** pop-up window appears. The window lists the adaptive and predictive models in the system. For more information about the window, see the [Using a Configuration Modal Window](#) appendix.
 - b. Select an analytical model, and then click **Apply**.
- **Property** - Select this option to use a property as the driver for prioritization. Use the smart prompt to select the property.

2. **Optional:** In the **Prioritization calculation** section, assign weights to prioritization results. Use this option to increase or decrease priority of specific results.
 - a. In the **Weighting** section, click **Configure**.
 - b. In the Configure Weighting window, select the Decision Table that you want to use to assign weights to prioritization results, and then click **Apply**. For more information about the window, see the [Using a Configuration Modal Window](#) appendix.
3. **Optional:** In the **Prioritization calculation** section, customize the expression used to calculate the priority.
 - a. In the **Priority** section, click **Configure**. The **Configure Priority** pop-up window appears. The window lists the Field Value rules for the **PriorityCalculation** field in the Embed-PegaMKT-NBAComponent-PriorityCalculation class. For more information about the window, see the [Using a Configuration Modal Window](#) appendix.
 - b. Select the field value which you want to use to determine priority, and then click **Apply**.
4. **Optional:** In the **Prioritization threshold** section, specify a threshold to apply to the prioritization results. If a threshold is specified, results that do not meet the threshold criteria are ignored by the prioritization Strategy.
 - a. Select **Threshold**.
 - b. Select an operator from the **Condition** drop-down list.
 - c. Enter a comparison value in the **Value** field. You can specify a static threshold value or a strategy result property as the comparison value.

Prioritization threshold

Is there a minimum priority threshold?

Threshold ▼	
Condition	Value
>= ▼	.MinimumPriority 

5. **Optional:** In the **Prioritization output** section, specify how the Strategy results should be ranked and how many results the Strategy should return.
 - a. Select the order in which the results should be ranked by clicking either the **Ascending** or **Descending** radio button.
 - b. Specify how many results the Strategy should return. You can choose to retrieve all results, or a specific number of the top results.

Prioritization output

How should priority be ranked?

- ☐ Ascending
☒ Descending

How many results will this strategy return?

- ☒ Top
☐ All

Configuring the Action Targeting Using Audiences and AI Objective

The Audiences and AI objective creates a Strategy to rank one or more actions by priority, using various targeting approaches. You can use Segments, Eligibility rules, and Prioritization rules to achieve the desired results.

1. Select the business issue which is addressed by this objective.
2. Select one or more business groups from the selected business issue. The business groups will be used in the generated strategy. After you select the business groups, the **Targeting approach** section appears.
3. In the **Targeting approach** section, click **+Add targeting approach**, and then select one of the following options:
 - **Audience driven** - Select this approach if you have an audience that you want to target with a specific action. An audience is made up of a starting segment, and can then be split into sub-segments.
 - **Analytics driven** - Select this approach if you want to use predictive or adaptive analytics to score and rank actions. Using analytics for targeting allows you to consider a larger set of actions.
4. Click **Apply**.
5. Configure the selected targeting approach.
 - For audience driven approaches, see [Configuring Audience Driven Targeting](#).
 - For analytics driven approaches, see [Configuring Analytics Driven Targeting](#).
6. **Optional:** Repeat steps 3-5 to configure more targeting approaches.
7. **Optional:** If you added multiple targeting approaches, specify how you want to arbitrate between them. For more information, see [Arbitrating over Targeting Approaches](#).
8. **Optional:** If you added multiple targeting approaches, use the Overall prioritization section to specify how you want to prioritize across your targeting selections. This prioritization determines the order in which actions are made to a customer. For more information about configuring prioritization, see [Configuring Overall Prioritization](#).
9. Click **Save**.

Configuring the Paid Optimization Objective

The Paid Optimization objective creates a Strategy for paid channels, for example, Facebook Ads or Google Ads, to optimize bidding based on action priority. To use this option, Paid Media Manager must be enabled in your environment. For more information, see [Paid Media Manager](#).

Creating Strategies Manually

Manual Strategy creation allows you to create Strategies for all customer contexts in your application. To manually create a new Strategy, click **Create > Start with new canvas** on the Strategies landing page.

1. Enter a short description of the Strategy. The Strategy identifier is created automatically.
2. Select the Strategy Result class, or define a custom Strategy Result class instead. For more information about customizing Strategy Result classes, see the Pega Customer Decision Hub Implementation Guide on the [Pega Customer Decision Hub product page](#).
3. Select the starting decision context, which will add an embedded strategy to the canvas. The embedded strategy will be configured with the data that is defined in the Context Dictionary. For more information about the Context Dictionary, see the Pega Customer Decision Hub Implementation Guide on the [Pega Customer Decision Hub product page](#).
4. Click **Create and open**.

5. In the Strategy canvas, configure the Strategy.
 - For general information about Strategy configuration in Pega Platform, see [About Strategy rules](#).
 - For information about Strategy configuration specific to Pega Customer Decision Hub, see [Configuring Pega Customer Decision Hub Strategies](#).
6. Click **Save**.

Configuring Pega Customer Decision Hub Strategies

Strategies in Pega Customer Decision Hub are configured in a similar way as in the Pega Platform. For more information, see [About Strategy rules](#). However, Pega Customer Decision Hub provides some additional options.

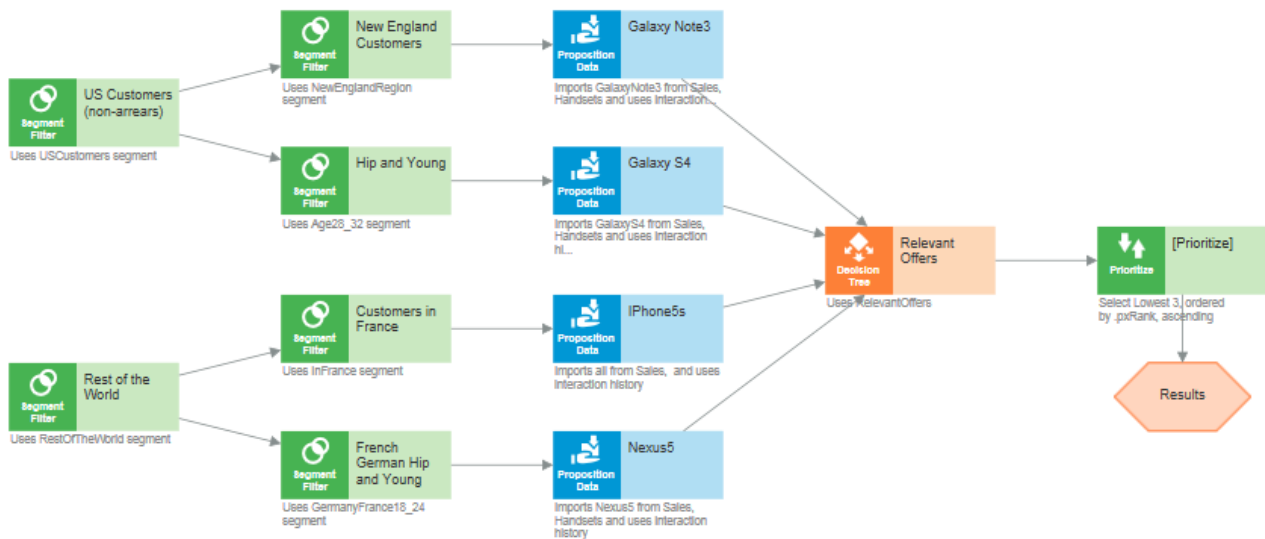
The following Strategy configuration options are specific to Pega Customer Decision Hub:

- [Using Segments in Strategies](#)
- [Using Contact Policies in Strategies](#)
- [Using Geofences in Strategies](#)
- [Using a Strategy to stop Active Actions](#)
- [Configuring Outcome Optimization Strategies](#)

Using Segments in Strategies

Pega Customer Decision Hub Strategies can use Segments to filter results directly in the Strategy itself. To do this, add a Segment Filter shape to the Strategy canvas and configure its properties to reference a Segment you created. For more information about Segments, see [Segments](#).

1. To add a Segment Filter shape, in the Strategy canvas, right-click anywhere in the canvas, and then click **Arbitration > Segment Filter**.
2. Right-click the Segment Filter shape, and then click **Properties**.
3. In the Segment Filter Properties window, in the **Filter Condition > Segment rule** field, select a Segment which you want to use to filter Strategy results.
4. Click **Submit**.
5. Connect the Segment Filter shape to other shapes as appropriate. For example, the following Strategy uses Segment Filter shapes to provide data to a Decision Tree shape:



Using Contact Policies in Strategies

Pega Customer Decision Hub Strategies can use Contact Policies to restrict the Strategy output based on channel limitations that are specified in the Contact Policy rule. To do this, add a Contact Policy shape to the Strategy canvas and configure its properties to reference a Contact Policy that you created. For more information about Contact Policies, see [Contact Policies](#).

Before you begin:

Before adding a Contact Policy shape to the Strategy, make sure that the following prerequisites are met:

- The Strategy must include a Proposition Data shape. The Proposition Data shape imports actions which the Contact Policy shape uses as input.
 - Note:** For Strategies that include an action bundle, only the action marked as Bundle Parent must be imported as input. For more information, see [Contact Policies and Action Bundles](#).
- Set the **pyDirection** property on each action where Contact Policies should apply to “Outbound”. Contact Policies only apply to actions on outbound channels.
- Set the **pyChannel** property on each action where Contact Policies should apply to one of the channel names in the referenced Contact Policy rule. Contact Policies only apply to actions on channels that are restricted in the referenced Contact Policy rule.
- Mark the referenced Contact Policy rule as available.
- Make sure that the Contact Policy is currently valid, that is, its start date is not in the future and its end date is not in the past.

If the prerequisites are not met, Contact Policy limits are ignored, except for settings in the **Contact Policy > Output** section. The Contact Policy will always limit the number of actions to the value specified in the Output section, even if other limits are ignored. For more information, see step 4 below.

- To add a Contact Policy shape, in the Strategy canvas, right-click anywhere in the canvas, and then click **Arbitration > Contact Policy**.
- Right-click the Contact Policy shape, and then click **Properties**.

3. In the Contact Policy Properties window, in the **Contact Policy** > **Context** field, select a Contact Policy that you want to use to restrict Strategy results.
4. **Optional:** In the **Contact Policy** > **Output** section, specify the number of actions that are allowed by the Contact Policy shape. Select one of the following options:

- **First** – This option restricts the output of the Contact Policy shape to a specific number of actions. For example, if you enter 5 as the number of allowed actions, the Contact Policy shape filters out all actions after the first five that satisfy the Contact Policy criteria. The default number of allowed actions is 1.



Note: Ensure that actions are prioritized before the Contact Policy shape so that Contact Policy can restrict the output to the highest-priority actions.

- **All** – This option does not filter out any actions that satisfy the Contact Policy criteria.

5. Click **Submit**.

6. **Optional:** Add more Contact Policy shapes to the canvas.

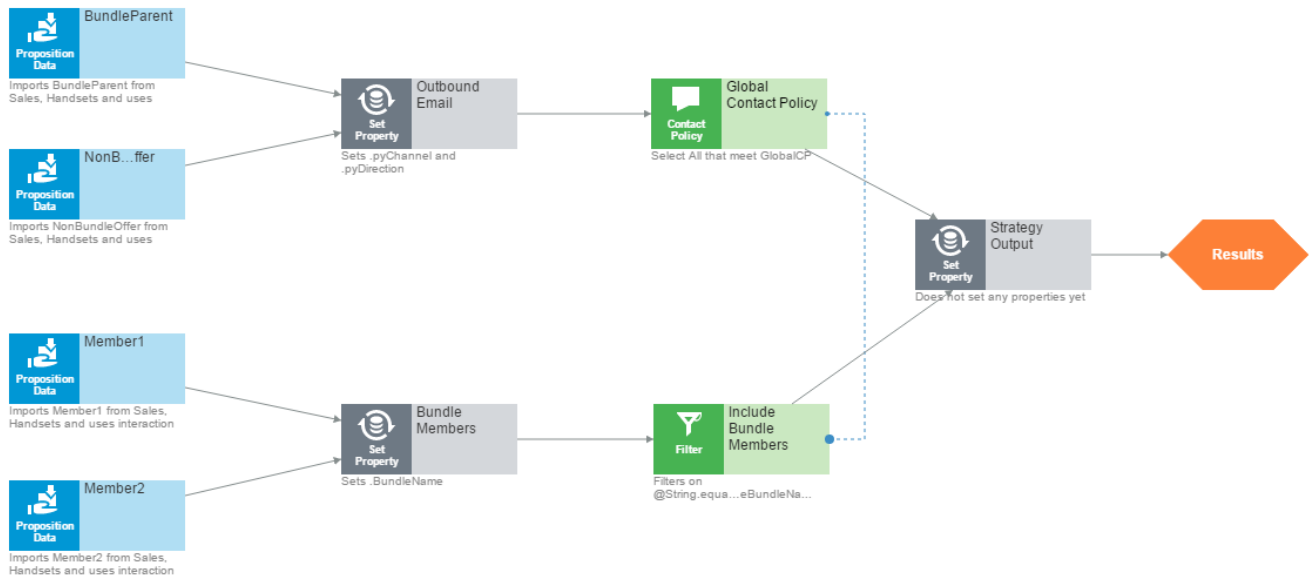
For example, you can link a Contact Policy shape which sets the daily limit of actions on the Email channel to a Contact Policy shape which sets the weekly limit on the same channel. In this way, you can ensure that both daily and weekly channel limits are satisfied.



Contact Policies and Action Bundles

For Strategies that include an action Bundle, only the action marked as Bundle Parent must be imported as input. If the Contact Policy shape allows the Bundle Parent to be included in the Strategy results, actions marked as Bundle Members should be added to the Strategy output.

For example, the following Strategy uses the **Include Bundle Members** Filter shape to add the Bundle Member actions only if the Contact Policy shape allows the Bundle Parent action as output. To achieve this, set the Filter condition to `@String.equals(GlobalContactPolicy.BundleName, "SampleBundleName")`.

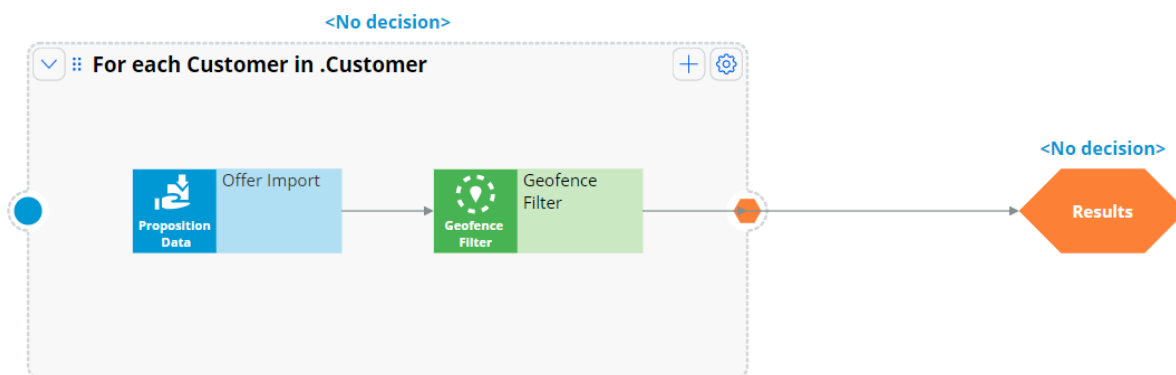


Using Geofences in Strategies

Pega Customer Decision Hub Strategies can use Geofences to filter action inputs, or as a driver preceding proposition import. To do this, add a Geofence Filter shape to the Strategy canvas and configure its properties to reference a Geofence you created. For more information about Geofences, see [Geofences](#).

1. To add a Geofence Filter shape, in the Strategy canvas, right-click anywhere in the canvas, and then click **Arbitration > Geofence Filter**.
2. Right-click the Geofence Filter shape, and then click **Properties**.
3. In the Geofence Filter Properties dialog box, in the **Geofences > Select Geofences to check against customer location** section, specify whether you want to add Geofences one at a time, or in bulk. The following options are available:
 - **Select Geofences one at a time**
 - **Select multiple Geofences**
4. Select one or more Geofences that you want to use to filter action inputs. When the Strategy runs, each Geofence rule is evaluated until a Geofence is satisfied, that is, the Customer location is within the Geofence. The Geofence rules are evaluated from the top to the bottom of the list. Reorder the list if you want to give priority to specific Geofences.

5. In the **Options > Select the shape behavior when customer location data is unavailable** section, specify how the Geofence shape should behave when the Customer location is not available. Select one of the following options:
 - **Exclude source component results**
 - **Pass through source component results**
6. **Optional:** In the **Options > Select Customer location properties** section, configure the properties that are used to determine the latitude and longitude of the Customer location. The default location properties are set by the application administrator. For more information, see [Administrative Settings](#). To change the location properties, select one of the following options:
 - Location data from the Customer profile – Prefix the property with `Primary.`, for example, `Primary.Latitude`
 - Location data from the action data – Prefix the property with a period, for example, `.Latitude`
 - Calculated fields – Prefix the property with the name of a Strategy shape
7. **Optional:** In the **Options > Select Customer location properties** section, select the **Use Customer location from Real-Time Event if available** check box to use location data from a triggered Event. If location data is not available for the Event, the customer location fields specified in step 6 will be used. For more information about Events, see [Real-Time Events](#).
8. Click **Submit**.
9. Connect the Geofence Filter shape to other shapes as appropriate.



Configuring Outcome Optimization Strategies

Outcome optimization in the Next-Best-Action Designer allows you to identify key business objectives, prioritize actions by optimizing the relevant metrics, and monitor the effectiveness of the analytics. You can use outcome optimization to focus on key business outcomes across different issues, groups, and channels.

1. Configure the Next-Best-Action business issues and business groups. For more information, see [Defining the structure of business issues and groups](#).

2. Select a business issue metric to optimize. The metric will be used to prioritize actions in each of the associated business groups. Only rate metrics can be optimized.
 - a. Click **Next-Best-Action > Designer**.
 - b. Edit the business issue for which you want to configure an optimization Strategy.
 - c. In the **Business outcomes** section, click **Configure**.
 - d. In the **Configure Metrics** pop-up window, select one or more metrics to monitor, and then click **Apply**.
 - e. From the monitored metrics, select the radio button for the rate metric that you want to optimize and use to prioritize actions.
3. Configure the outcome optimization Strategy.
 - a. Pega Customer Decision Hub created a default optimization Strategy for the rate metric you selected. In the **Outcome optimization** section, click the name of the Strategy to configure it for your needs.
 - b. In the **Measure effectiveness** section, select a source from the **Control group source** list. The control group receives actions that are randomly selected rather than ranked by using analytics. The outcomes of the control group are then compared to the outcomes of the target group to measure the effectiveness of the analytics. Select one of the following source types:
 - **Percentage** – Select this option to split the customers by percentage. By default, 2% of the customers are randomly assigned to the control group and 98% to the target group. Update the control group percentage to assign a larger or smaller percentage of the customers to the control group.

 **Note:** The percentage rates specified here are an approximation. It is possible for the control group to be slightly higher or lower than specified.
 - **Property** – Select a property and a property value to indicate that a customer belongs to the control group. For example, you can create the property `.ControlGroup` and configure the expression to look for customers where the value of the property equals "Yes".

Measure effectiveness

How do you want to measure the effectiveness of this optimization? 

 **Control group source**

Property  

Which property and value indicate the control group?

.ControlGroup 

Equal to 

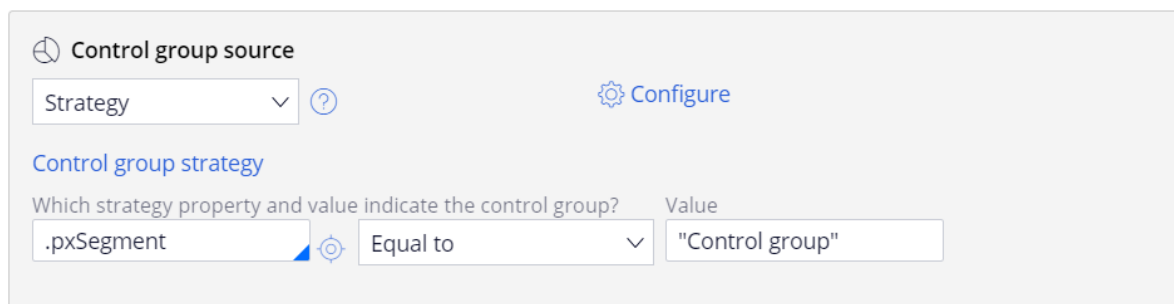
Value

"Yes"

- **Strategy** – Click **Configure** to select a custom control group Strategy, and then select a property and a property value to indicate that a customer belongs to the control group. The property must be a result property from the selected control group Strategy, and it must belong to the SR class.

Measure effectiveness

How do you want to measure the effectiveness of this optimization? 



Control group source

Strategy   Configure

Control group strategy

Which strategy property and value indicate the control group? Value

.pxSegment  Equal to  "Control group"

- c. In the **Outcome stages** section, configure up to three stages for which you want to track and optimize the outcomes. For example, you can track and optimize the click through rate, and then the accept rate.
 1. The final stage is already defined. It uses the metric that you selected for optimization in the Next-Best-Action Designer, for example, Accept rate. If you want to add more stages before the final stage, click **+Insert outcome stage**.
 2. In the **Metrics** section, select the metric that you want to optimize for this stage, for example, Click Through Rate.
 3. In the **Response waiting time** section, specify when the stage should time out. For example, a stage can time out if a customer does not open an email or click a banner ad within a specific amount of time. When the stage uses an adaptive model, if the customer does not respond before the specified time, a negative response is recorded.
 4. In the **Predict outcome** section, configure the analytics for the optimization Strategy. Select one of the following options:
 - **Generate analytical model** – Automatically generates an adaptive model when you save the optimization Strategy configuration. To define the possible response and timeout response, which correspond to the positive and negative outcomes on the adaptive model rule form, click **Responses**.
 - **Use existing analytical model** – To select an existing adaptive or predictive model, click **Configure** . For predictive models, you must also select the outcome field, which represents the calculated propensity for the outcome to occur.
 - **Use strategy** – To select a custom prediction Strategy, click **Configure**, and then specify the Strategy result property, which represents the propensity for the outcome to occur.
 - **Use property** – Specify a decimal property from the customer class, which represents the propensity for the outcome to occur.
- d. Click **Save**. The optimization Strategy and its artifacts are generated.

 **Note:** The optimization strategy is regenerated each time you edit and save its configuration.
- e. Close the optimization Strategy configuration.
- f. **Optional:**
Optional: To configure a separate optimization Strategy for a selected channel, click **+Add channel specialization**, select the channel for which you want to define a separate optimization Strategy,

and then repeat steps 1-5 for the new Strategy. For example, you can prioritize email actions differently than web ad actions.

- g. To save the Business Issue configuration, click **Save**. If you configured separate optimization strategies for different channels, saving the Business Issue configuration regenerates the channel arbitration strategy that is used to switch between the default and the channel-specific strategies.
4. Apply the optimization Strategy to strategies on the Business Group level. By default, if you optimize a metric at the Business Issue level, the strategy for all the associated Business Groups is set to Use outcome optimization. For greater flexibility, you can choose not to optimize a specific Business Group.
 - a. Click **Next-Best-Action > Designer**.
 - b. Edit the Business Group for which you want to configure an optimization Strategy.
 - c. **Optional:**
Optional: In the **Strategy** section, to change the type of Strategy method used for this business group, click **Configure**.
 - d. **Optional:**
Optional: In the **Targeting approach** section, adjust the targeting approach, eligibilities, and prioritization.
 Note: In the Outcome driven targeting approach, the prioritization Strategy uses the channel arbitration Strategy, which is generated when you save the Business Issue configuration with one or more outcome optimization Strategies.
 - e. Click **Save**. The Business Group-level Strategy is generated.

Configuring ethical bias checks

You can test your strategies for unwanted bias by creating an ethical bias policy. For example, you can test whether your strategies generate biased results by sending more actions to male rather than female customers, as well as check how big the bias is. Perform the following procedure to configure the fields that you want to use to measure bias, and to define the thresholds for detecting bias.

Before you begin: Assign the *pzBiasPolicyConfiguration* privilege to your access group. For more information, see "Optional: Granting access to configuring ethical bias policies" in the *Pega Customer Decision Hub Implementation Guide* on the [Pega Customer Decision Hub product page](#).

1. In the Pega Customer Decision Hub portal, click **Configuration > Ethical Bias Policy**
2. On the **Bias fields** tab, click **Add bias field**.
 Tip: Any properties that are related to your main customer class, such as gender, age, and ethnicity-related properties, are good candidates for bias testing, even if your strategies or AI models do not directly reference these properties. This is because indirect bias can still occur.
3. If the property that you select has a number value, in the **Add bias field** window, specify whether you want Pega Platform to interpret the value as a category (for example, gender or ethnicity), or as an ordinal number (for example, for age).
 Note: If there are many categorical values, the system only checks the 20 most frequent values for bias. In most cases, numerical values should not be classified as a category. However, if the property is not truly an ordinal number, you may want to treat it as a category, for example, you can use a postal code to test for location-related bias.
4. On the **Bias fields** tab, review and configure the bias threshold settings for each issue in your business structure.

The bias threshold measurement depends on the type of field that you select:

- **Rate ratio** - Rate ratio is used to calculate bias for categorical fields by comparing the number of customers who were selected for an action to those not selected for an action, and then correlating the result to the selected bias field. For example, the rate ratio represented in the following table indicates that actions are sent more often to male rather than female customers:

	Female customers	Male customers
selected for the action	500	1000
not selected for the action	20000	18000
rate ratio	0.46	2.16

A rate ratio of 1 represents no shifts in the distribution. You can select a warning range with a threshold between **0** (send a warning if any bias is detected), and **0.7** (send a warning only if very high bias is detected). You can also choose to ignore this bias field for a particular issue in your business structure.

- **Gini coefficient** - The Gini inequality coefficient is used to calculate bias for numerical fields. For example, it detects whether the distribution of age is different for customers who receive an action. A Gini coefficient of 0 represents no shifts in the distribution. You can select a warning threshold between **0** (send a warning if any bias is detected) and **0.50 - 2.00** (send a warning only if very high bias is detected). You can also choose to ignore this bias field for a particular issue in your business structure.



Tip: For issues such as credit risk, set the value of the threshold lower than for marketing issues such as upsell, to better detect the variations.

5. Click **Save**.

6. To use the bias policy to test the behavior of your strategies:

a. In the Pega Customer Decision Hub portal, click **Simulation Testing**.

b. Create a new simulation test with the purpose **Ethical bias**.

For more information, see [Running a decision strategy simulation on sampled production data](#).

Contact Policies

Contact Policies provide a mechanism for controlling and restricting how many times a customer is contacted in accordance with corporate and/or regulatory guidelines. A single policy can contain the contact limits for multiple channels of communication. Each contact limit is applicable over a specified time period (e.g. weekly, yearly, etc.). Furthermore, the contact policy, as a whole, can be disabled, enabled only for a specified date range, or always enabled.

Contact Policies are accessible in the Pega Customer Decision Hub via **Configuration > Contact Policies**.

Name	Description	Start Date	End Date	Available?	Action
▶ EnrolledUsersDailyLimits	Enrolled Users Daily Limits	12/5/14		No	Edit
▶ EnrolledUsersMonthlyLimits	Enrolled Users Monthly Limits	12/5/14		Yes	Edit
▶ EnrolledUsersYearlyLimits	Enrolled Users Yearly Limits	1/1/14	12/31/14	Yes	Edit

The **Contact Policies** landing page provides a quick overview of the various Contact Policies configured in the application. The landing page displays the start and end date of each policy along with its availability. Details about the limits specified for a particular policy are visible by expanding the row for the individual policy (via the arrow on the left side), as shown below:

Channel	Contact(s) per customer	Duration
CallCenter	12	Yearly
DirectMail	10	Yearly
Email	50	Yearly

Contact Policy Management

This section explains the various actions that can be performed on a Contact Policy.

Creating a new Contact Policy

You create a new Contact Policy from the **Contact Policies** landing page.

A new Contact Policy rule resembles the following:

Edit Contact Policy: [Sample Contact Policy](#) [Available]CL [PegaMKT-Data-Customer](#) ID [SampleContactPolicy](#)RS [PegaNBAM-Artifacts:07-11-01](#)

Save



Actions ▾

General

History

Policy
Starts:

2/4/2017

Policy
Ends:☒ Available

Please specify the maximum number of times a customer can be contacted per channel.

Channel	Contact(s) per customer	Duration	
No items			



The Contact Policy rule has the following tabs:

- **General** - Configure the Contact Policy's availability and per-channel contact limits.
 - **History** - Specify the Description and Usage information for this Event.
1. Click the **New** button on the **Contact Policies** landing page.
 2. Enter a unique Contact Policy name in the **Short description** field.
 3. Click **Create and open**.

Specifying Contact Policy Availability

The following configuration options are available.

Contact Policy restrictions are only applied when the policy is marked as being available and any date restrictions (if specified) are currently applicable. In all other cases, the contact limits specified in the policy are ignored. Refer to the Using Contact Policies section in the Strategies chapter for details on how to use Contact Policies.

1. In the **Policy Starts** field, specify the start date for the policy to be applicable. If this value is not specified, the policy is deemed to be always applicable.
2. In the **Policy Ends** field, specify the end date for the policy to be applicable. Using this value requires that a valid policy start date is also specified.
3. In the **Available** field, specify whether the policy is available.

Specifying Contact Policy Channel Limits

Specify the per-channel limits for the Contact Policy in the channel restrictions grid.

At least one channel limit must be specified in the Contact Policy. Additionally, each channel can only be specified once in a Contact Policy. For each row, set the following options.

1. From the **Channel** list, select the channel or channels on which to restrict outbound communication.

2. In the **Contact(s) per customer** field, specify the maximum number of contacts allowed per customer.
3. From the **Duration** list, select the duration over which the channel restrictions are applicable:
 - **Daily**
 - **Weekly**
 - **Semimonthly**
 - **Monthly**
 - **Quarterly**
 - **Yearly**

New weeks start on Sunday.

Semimonthly periods are: from the 1st to the 15th of a month; and from the 16th to the end of the month.

New quarters start on the first day of January, April, July, and October.

Deleting a Contact Policy

Existing Contact Policies can be deleted directly from the Contact Policy rule form.

Volume Constraints

A Volume Constraint limits the number of actions that are delivered to customers.

You can define the following constraint types:

- **Per channel** - Limits the number of actions delivered on a specific channel. For example, you can set a constraint that limits the number of emails sent per day.
- **Per action** - Limits the number of times a specific action is offered to customers. For example, you can set a constraint that limits the number of times that a specific Credit Card offer is presented to customers.
- **Per action property** - Limits the number of times a group of actions is offered to customers. The actions are grouped based on a specific property or properties. For example, you can limit the number of actions which belong to a specific business issue.

Channel constraints can be combined with action or action property constraints. For example, you can specify that no more than 1000 Credit Card offer emails can be sent in a given time period.

You can configure the constraint to require a minimum as well as a maximum number of actions. For example, you can specify that the campaign requires at least 50000 call center interactions.

To apply these constraints, the Volume Constraint rule should be associated with an outbound run in the Next-Best-Action Designer.

For more information, see [Setting constraints, contact policy limits, and controls](#).

To view all Volume Constraint rules configured in your system, in the Pega Customer Decision Hub portal, click **Intelligence > Volume Constraints**.

Managing Multiple Actions per Customer

In situations where a customer is eligible for multiple actions, you may specify whether volume constraints should be applied to the actions as a group, or whether each action should be evaluated separately. Evaluating actions as a group allows Pega Customer Decision Hub to display all eligible actions, for example to a customer service representative, who should be able to see all the actions they can make to the customer.

The two options available are:

- **Constrain each action individually** - Select this option to check each action or action bundle for the customer separately against applicable channel and action constraints. In this way, the highest priority action or actions for a customer may pass constraint checks, while lower priority actions may be rejected, for example due to volume constraints.



Note: If the marketing Strategy pushes out multiple actions for a customer, these actions should be prioritized in the Strategy since the highest priority action (based on the pxPriority field) will be made to the customer.

- **Constrain as a group for the customer (output all actions)** - Select this option to use the highest priority action to apply constraints on the channels and actions, without removing the other actions for a customer. If the highest priority action is allowed to pass the constraint, all lower priority actions for this customer are also allowed without applying separate constraint checks. In this way, all eligible actions for a customer can be displayed.



Note: You can automatically apply the setting **Constrain as a group for the customer (output all actions)** to all volume constraints in your application. To do this, edit the Dynamic System Setting MKTConstraintAsGroup and set its value to `true`. If the value of the setting is set to

`true`, the two customer volume constraint options are no longer displayed when you edit a volume constraint.

Using Volume Constraints with Action Bundles

You can use Volume Constraints together with action bundles. If the parent action of a bundle passes the Volume Constraint, all child actions for the bundle are also passed to the action processing stage. If the parent action does not pass the Volume Constraint, all child actions for the bundle are also rejected.

Child actions are not processed as individual items during volume constraints. This applies to all bundle types. For more information about action bundles, see [Action Bundles](#).

Configuring Constraint Reset Options

Both action and channel constraints tend to apply over a specific period of time (e.g. 100 instances of the action (product) are available every week, 50000 action emails can be delivered every day, etc.). As a constraint is applied, the actual count (of actions sent) is updated to keep track against the constraint's limit. Once the constraint limit is reached, any action for which the constraint is applicable will not be made until the actual values are reset. This is done by configuring the reset options for the constraints in a Volume Constraint rule.

The user must decide whether to specify the reset policy for each constraint in the Volume Constraint rule individually or globally.

The two options available are:

- **Individually** - In this mode, the reset option is specified individually for each (action and channel) constraint along with its limits.
- **All at once** - In this mode, the reset option is specified globally for all (action and channel) constraints. The global reset options are presented as a separate row when this option is selected.

Reset constraint counts

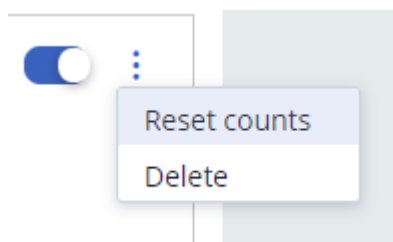
☐ Individually
☒ All at once

Manually ▼
Reset

Whether constraint limits are reset globally or individually, the following reset frequency options are available:

- **Manually**: Select this option to manually reset constraint counts via the provided reset button(s). The Volume Constraint rule must be checked in for the reset button(s) to be enabled.

When limits are reset individually, select **Reset counts** from the Actions menu:



When limits are reset globally, use the **Reset** button(s) for the appropriate (action or channel) constraint(s):

Reset constraint counts

☐ Individually

☒ All at once

Manually



Reset

- **Each time it is accessed:** System will reset constraint limits each time the Volume Constraint rule is applied.
- **Daily:** System will reset the constraint limits the first time they are applied on a particular day.
- **Weekly:** System will reset constraint limits the first time they are applied in a particular week (first day of week = Sunday).
- **Semi-Monthly:** System will reset constraint limits the first time they are applied in a particular semi-monthly period (semi-monthly periods begin on the first and sixteenth days of each month).
- **Monthly:** System will reset constraint limits the first time they are applied in a particular month.
- **Quarterly:** System will reset constraint limits the first time they are applied in a particular quarter (quarters begin on the first day of January, April, July, and October of each year).
- **Yearly:** System will reset constraint limits the first time they are applied in a particular year.

Specifying Constraints

Click **Add definition** to create a new constraint. Once volume constraint can contain multiple definitions. For example, you can add constraints for multiple channels to the same volume constraint.

The following configuration options are available:

Minimum volume

Enter the desired minimum volume for this action.

Maximum volume

Enter the desired maximum volume for this action.

Reset Interval

Select the reset policy for this constraint. This field is only available if you chose to specify constraint limits individually.

Enabled?

Set the toggle to Off to disable this definition.

Channel

Select the delivery channel to constrain. In order for the constraint optimization engine to properly apply Channel constraints, in your strategy, set the value of the `pyChannel` property exactly to the channel you wish to constrain (for example, Email or SMS). The value is case-sensitive.

Action

Select the name of the action to constrain. The auto-complete presents a list of actions categorized by their Issue and Group.

Property

Click **Add Property** to define a constraint based on one or more properties of an action. For example, to limit the number of actions from a particular group, select Group from the **Property** drop-down list.



Note: For String property values consisting of more than one word, for example `VIP customer`, enter the value without quotes or other delimiters.

Value

After you select a property in the **Property** field, specify the value of the property used to define the constraint. For example, to limit the number of actions for the Credit Cards group, enter `Credit Card` into the **Value** field.

Remaining

This field is read-only and represents the remaining volume for this action interval.

 **Note:** Each action is backed by a Decisioning proposition. The system automatically manages this relationship by creating, deploying, and deleting the proposition instance as needed. Since an action is closely tied to a proposition, it must always be created in the context of an Issue and a Group.

For each listed action, the landing page displays the following information:

- A newly created action starts out with the Start and End shapes, as shown below.

Edit Action: [Sample Action](#) [Available]
Retention • Cards • SampleAction TestCoPM-Artifacts:01-01-01

Details Engagement policy Treatments **Flow** Checklists Test History

Draft off | + ⚙️ 🖱️ 🤝 | ✂️ 📄 📄 🗑️ | 🌿 🏠 | 📊 📋 | 👁️ %



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Tab Name	Purpose
Diagram	Create the Flow. Refer to the Creating the Flow section.
Details	Specify the details about the offering. Refer to the Specifying Action Details section.
Test Action	Test the Flow. Refer to the Testing the Flow section.
History	Specify the Description and Usage information for this action.

Creating the Flow

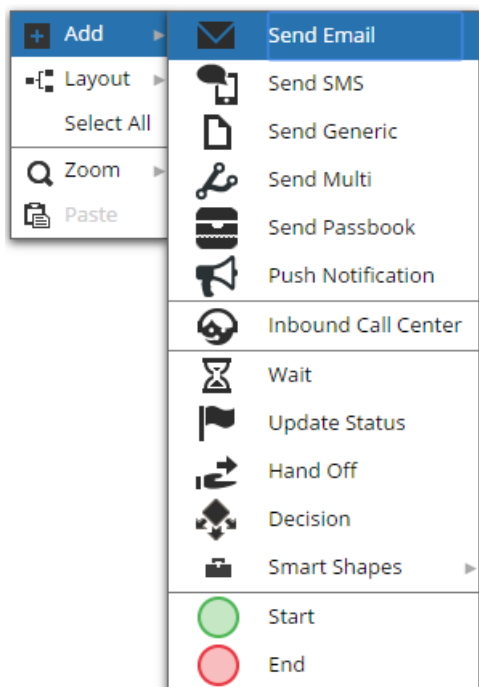
The Flow contains the exact sequence of actions to be performed in the lifecycle of a particular action. A Flow consists of a variety of shapes and the connectors which connect these shapes.

The Flow editor provides the user with an intuitive drag-and-drop mechanism for designing their offerings. Users can configure the details of each step directly on the step's shape using the shape's Properties panel.

To apply a template, click the icon by the **Dynamic template** field, and then select the action which you want to use as template. The action diagram is updated to display the flow from the action selected as template.

Adding Flow Shapes

The Shapes Palette lists all the shapes that can be added to a Flow. It can be accessed via the **Flow Shapes** button  or via the right-click **Add** sub-menu.



The following shapes are available in the Shapes Palette:

Shape Name	Icon	Purpose
Send Email		Configure and send an Email.
Send SMS		Configure and send an SMS message.
Send Generic		Configure and send a Generic treatment.
Send Multiple Treatments		Dynamically determine which channel (Email, SMS, or Passbook) to use for communication and send out the appropriate treatment on that channel.
Send Passbook		Configure and send a Passbook treatment.
Push Notification		Configure and send a notification to an app running on a device. Refer to the "Configuring Push Notifications"

Shape Name	Icon	Purpose
		in Actions” section of the “Push Notifications” chapter.
Inbound		Specify the Section rule to be returned for a request from an inbound application.
Wait		Specify a wait time in the flow execution.
Update Status		Update the action's status and record response information to History (Interaction Services).
Hand Off		Spinoff a new work object/ process (such as Fulfillment).
Decision		Use various PRPC decision structures to determine branch conditions in the flow.
Schedule Appointment		Schedule and configure an appointment for follow-up work to be performed. This shape is available in the “Smart Shapes” sub-menu.
Start		Denote the starting point of the flow.
End		Denote the ending point of the flow.

Each of these shapes is detailed in the subsequent sections.

Send Email

The Send Email shape enables the user to configure an email message for delivery.

The following General Configuration options are available for this shape:

Name	Purpose
Treatment Name	The property which holds the name of the Email Treatment to send. In the case of Online Delivery, the Treatment Name specified must be backed by an existing Email Treatment rule since this is used as the content of the email to be sent.
Key Code	Marketing code used to identify the treatment. This value can be output in the sent email and/or the output file/db, and can be used to track the performance of different treatments. If a key

Name	Purpose
	code value is specified on the Email Treatment being referenced, it will be populated into this field upon selecting the treatment.

Delivery Options

Emails can be delivered in various ways - they can be sent by the system (Online mode) or they can be written to a data warehouse for processing by other systems (File and DB modes). Users can enable one or more of these modes at the same time.

The following Delivery Configuration options are available for this shape:

Name	Purpose
Deliver Online	Determines whether an actual email should be sent using the content in the specified Treatment Name.
Use Subject From Treatment (Online mode)	Denotes that this shape should directly use the Email subject specified in the referenced Email Treatment. This subject is shown as read-only in the "Email Subject" field.
Specify Subject(Online mode)	Denotes that this shape should use the specified "Email Subject".
Email Subject (Online mode)	Subject of the email to be sent.
Write To File	Determines whether a record should be written to an output file.
Write To DB	Determines whether a record should be written to an output database table.
Select Template (File/DB modes)	File/DB Template rule which contains the specifics of what should be output to the file/table. This includes the file/table name, location, header information, and the specific data fields that need to be output. Refer to the Templates chapter for more information.

Configuring Email Subject

The **Email Subject** field supports the following three formats:

1. Plain text – If the subject contains plain text (with no quoted words); simply enter the text in the input field. The system will wrap the entire text around quotes.
2. Quoted text – If the subject needs to include text in double quotes (e.g. The brand new "ProductName" is here!), then the entire subject must be in quotes with the desired quotes being escaped with a backslash. The example above should be entered as: "The brand new \"Product Name\" is here!"
3. Property references – If the subject needs to contain property references (such as the customer name), then the property reference needs to be concatenated to the remaining subject by the **plus (+)**

symbol. Each block of text that is not a property reference should be wrapped in double quotes. This is exemplified below:

- Desired Subject: Hi <Customer's Name>, a new "Product" awaits you!
- Entered Subject: "Hi " + .Customer.pyFullName + ", a new \"Product\" awaits you!"

If an email subject doesn't meet the supported formats, the following error is displayed to the user:

Invalid value specified for Email Subject. Value doesn't adhere to the Validate: BalancedQuotationMarks.

Wait After Sending

Users can determine whether they would like to wait after sending an email. It is typical to enable this wait when customer response is expected for an email (such as accepting or rejecting an action). In other cases, the user might simply want to send an email and move on to the next step in the Flow. In such cases, waiting should be disabled on the Send Email shape. The wait options available are the same for all wait-based shapes and are described in the section on the [Wait shape](#).

Email Account

Users also have the option to specify the Outbound Email account to use for sending the email message. These accounts are typically configured by the administrator. Refer to the [Email and SMS Account Configuration](#) chapter for more details.

The following options are available in the **Email Account** sub-section under the **Advanced** section of the Send Email Properties modal:

Name	Purpose
Use Default Email Account	Determines whether the Default Email account should be used for sending this email.
Specify Email Account	Determines whether a user-specified Email account should be used for sending the email.
Account	Name of the Outbound Email account to use for sending the email.
From/Reply To:Use Email Account Settings	Denotes that the sender's name (from) and reply-to address in the email being sent should be taken from the values specified on the Email account.
From/Reply To:Use Operator Settings	Denotes that the name and email address of the operator that initiates this email should be used for the sender's name and reply-to address.
From/Reply To:Override Settings	Denotes that user-specified values should be used for the sender's name (from) and reply-to address in the email being sent.
From	Name that will be used as the sender's name in the email being sent.

Name	Purpose
Reply To	Email address that will be set as the reply-to address in the email being sent.

Testing the Send Email shape

The Send Email shape provides an easy mechanism to test its outcome. Users can employ this test mechanism to test the online delivery of the Email Treatment. This can be beneficial in verifying both the content of the email being delivered and any email configurations that were applied (such as the subject, sender's name, and reply-to address). Finally, this also enables the user to verify any data references (both Action Data and Customer) in the Email Treatment that were used to personalize the email message.

The **Test Message** section lists the options available for configuring the test email message. This includes the following:

- **To** – Recipients of the test email. Select either **Test Recipients** or **Seed List**.
 - **Test Recipients** - Enter list of recipients. Each entry can either be the Operator ID of an existing user in the system or a valid email address. If the operator ID is entered, operator information such as the name and email is populated as the customer data and the test email is sent to the operator's email address.
 - **Seed List** - Select a predefined Seed List as the intended recipients of the test email. The data for each seed is populated as the customer data and is visible (if referenced) in the test email. In this case, the Email1 column in the Seed List (**.pyEmail1 property**) specifies the email address to which the test email is sent. Refer to the *Seed Lists* chapter for information on configuring a Seed List.
- **Subject** – Subject of the test email. This value is pre-populated with the subject specified in the Treatment tab. The user can choose to specify a different subject by selecting the **Override subject** option. Refer to the *Configuring Email Subject* section above for options available for this field.

After the test message has been configured, it can be sent via the **Send Test Message** button.

 **Test Message**
Send out a test message to check your formatting

To:

☒ Test Recipients ☐ Seed List







☒ Use subject from Treatment tab ☐ Override subject

Email Subject **"Your Order for" + .OfferData.Proposition +"is now received"**

Send Test Message

Send SMS

The Send SMS shape enables the user to configure an SMS message for delivery.

The following General Configuration options are available for this shape:

Name	Purpose
Treatment Name	The property which holds the name of the SMS Treatment to be sent.
Key Code	Marketing code used to identify the treatment. This value can be output in the sent SMS message and/or the output file/db, and can be used to track the performance of different treatments. If a key code value is specified on the SMS Treatment being referenced, it will be populated into this field upon selecting the treatment.

Delivery Options

SMS treatments can be delivered in various ways - they can be sent by the system (Online mode) or they can be written to a data warehouse for processing by other systems (File and DB modes). Users can enable one or more of these modes at the same time.

The following Delivery Configuration options are available for this shape:

Name	Purpose
Deliver Online	Determines whether an actual SMS message should be sent using the content in the specified Treatment Name.
Use Existing SMS (Online mode)	Determines whether an existing treatment, specified by the Treatment Name property, should be used to get the content of the SMS message.
Quick Create SMS(Online mode)	Determines whether to use the text specified in the Write Message box as the content of the SMS message.
Write Message(Online mode)	Content of the message to be sent in Quick Create SMS mode.
Write To File	Determines whether a record should be written to an output file.
Write To DB	Determines whether a record should be written to an output database table.
Select Template (File/DB modes)	File/DB Template rule which contains the specifics of what should be output to the file/table. This includes the file/table name, location, header information, and the specific data fields that need to be output. Refer to the Templates chapter for more information.

Wait After Sending

Users can determine whether they would like to wait after sending an SMS message or proceed directly to the next step in the Flow. The wait options available are the same for all wait-based shapes and are described in the section on the [Wait shape](#).

SMS Account

Users also have the option to specify the SMS account to use for sending the SMS message. These accounts are typically configured by the system administrator. Refer to the *Email and SMS Account Configuration* chapter for more details.

The following Account Configuration options are available in the **SMS Account** sub-section under the **Advanced** section of the Send SMS Properties modal:

Name	Purpose
Use Default SMS Account	Determines whether the Default SMS account should be used for sending this SMS message.
Specify SMS Account	Determines whether a user-specified SMS account should be used for sending the SMS message.
Account	Name of the Outbound SMS account to use for sending the SMS message.

Testing the Send SMS shape

The Send SMS shape provides an easy mechanism to test its outcome. Users can employ this test mechanism to test the online delivery of the SMS Treatment. This can be beneficial in verifying the content of the SMS being delivered. This also enables the user to verify any data references (both Action Data and Customer) in the SMS Treatment that were used to personalize the SMS message.

The **Test Message** tab lists the options available for configuring the test SMS message. This includes the following:

- **To** – Recipients of the test message. Select **Test Recipients** or **Seed List**.
 - **Test Recipients** - Enter list of recipients. Each entry can either be the Operator ID of an existing user in the system or a valid mobile phone number. If the operator ID is entered, operator information such as the name and phone is populated as the customer data and the test SMS message is sent to the operator's phone number.
 - **Seed List** - Select a predefined Seed List as the intended recipients of the test SMS message. The data for each seed is populated as the customer data and is visible (if referenced) in the test message. In this case, the Mobile Phone column in the Seed List (**.pyMobilePhone property**) specifies the phone number to which the test SMS message is sent. Refer to the "Seed Lists" chapter for information on configuring a Seed List.
- **Test SMS Account Options** – These settings specify the SMS account (Default or custom) used to send the test SMS message.

After the test message has been configured, it can be sent via the **Send Test Message** button.



Test Message

Send out a test message to check your formatting

To:

☐ Test Recipients ☒ Seed List

Seed List:

[View All Seed Lists](#)

SMS Account

☐ Use Default SMS Account ☒ Specify SMS Account

Test Account:★

[Send Test Message](#)

Once configured, the test message can also be directly sent via the “Test this SMS” right-click menu item on the Send SMS shape. Upon sending a test message, the status of the test is displayed. Any errors in the test delivery are displayed in case of a failure. These can be corrected and the test SMS can be resubmitted for delivery.

Send Generic

Use the Send Generic shape to configure and send a Generic treatment.

This shape provides a hook to process actions via outbound delivery mechanisms, other than the ones currently provided by the system (such as email or SMS). Use this shape to output relevant data to an output file or database table for processing by legacy systems.

The following General Configuration options are available for this shape:

Name	Purpose
Treatment Name	Name of the treatment. This can be used to track and organize the output data.
Key Code	Marketing code used to identify the treatment. This value can be output in the output file or table and can be used to track the performance of different treatments.

Delivery Options

Generic treatments can be written to a data warehouse (file or database table) for processing by other systems. Users can enable one or more of these modes at the same time.

The following Delivery Configuration options are available for this shape:

Name	Purpose
Write To File	Determines whether a record should be written to an output file.
Write To DB	Determines whether a record should be written to an output database table.
Select Template	File or Database Template rule which contains the specifics of what should be output to the file or table. This includes the file or table

Name	Purpose
(File/DB modes)	name, location, header information, and the specific data fields that need to be output. Refer to the Templates chapter for more information.

Wait After Sending

Users can determine whether they would like to wait after sending a generic treatment or proceed directly to the next step in the Flow. The wait options available are the same for all wait-based shapes and are described in the section on the [Wait shape](#).

Content Details

The **Content Details** section allows the user to upload related content for this shape.

Both links and files can be uploaded using this section. The user can also enter a description for each item. Once the file or link is added, it displays in the content grid at the bottom of this section.


Content Details
Include additional content

☐ Add File
 ☒ Add Link

Description

Name	Description	
 http://ourserver.com/i...	Template for the file written by this shape	x
 UnsubscribeListTempl...	unsubscribe list template	x

Send Multiple Treatments

The Send Multiple Treatments shape enables the user to configure treatments to be delivered across different channels (currently Email, SMS, or Passbook). The user also specifies the logic which determines the channel to be used for delivery. When the Flow executes, the correct delivery channel is determined and the treatment specified for this channel is delivered.

Treatment Specification

The following configurations options are available for specifying the treatments and channels for this shape:

- **Treatment Origin** – This setting determines how the channel for delivery is determined. The two options are:
 - **Strategy/Action** – In this scenario, the channel value determined by strategy execution (as part of a run) is used as the delivery channel. The user can alternately set the channel value (**.OfferData.pyChannel property**) directly in the Flow prior to this shape.
 - **Decision Rule** – In this scenario, the channel value is determined by executing a decision rule. The user must also specify the Decision Type (decision table or decision tree) and the name of the Decision Rule.

- **Treatments** – This group of settings is used to specify the treatments for delivery. The user can select the channels available for delivery by enabling the Outbound Email, Outbound SMS, and Passbook check boxes. The configuration options available for each channel are similar to those present on the channel-specific delivery shapes. Refer to the descriptions provided for each of these shapes for more details:
 - **Outbound Email** – [Send Email](#) shape
 - **Outbound SMS** – [Send SMS](#) shape
 - **Passbook** – [Send Passbook](#) shape
- **Default Treatment** – This setting determines the default channel value to use in case the channel returned by the Treatment Origin setting is either undefined or not currently supported. The values available for this setting are predicated by the channels that are enabled in the **Treatments** group.

Wait After Sending

Users can determine whether they would like to wait after the processing of this shape or proceed directly to the next step in the Flow. The wait options available are the same for all wait-based shapes and are described in the section on the [Wait shape](#).

Delivery Options

Emails and SMS messages can be delivered in various ways - they can be sent by the system (**Online mode**) or they can be written to a data warehouse for processing by other systems (**File and DB modes**). Users can enable one or more of these modes at the same time.

The configuration options available are similar to the ones available for the Send Email and Send SMS shapes. These options are situated in the following areas of the Send Multiple Treatments shape:

- **Write to File/DB options** – In the **Output** section
- **Email Account options** – In the **Advanced** section
- **SMS Account options** – In the **Advanced** section

Send Passbook

The Send Passbook shape enables the user to configure a Passbook Treatment for delivery.

The following general configuration options are available for this shape:

Name	Purpose
Passbook Style	Style of the Passbook Treatment to send. Currently available options are Coupon and Generic .
Passbook Treatment	Name of the Passbook Treatment (pass) to send. Refer to the <i>Passbook Treatments</i> section in the <i>Treatments</i> chapter for details on creating and configuring Passbook Treatments.
Key Code	Marketing code used to identify the treatment. This value can be output in the sent email and/or the generated pass, and can be used to track the performance of different treatments. If a key code value is specified on the Passbook Treatment being referenced, it will be auto-populated into this field upon selecting the treatment.

Name	Purpose
------	---------

Email Treatment	Name of the Email Treatment to use to deliver new passes and updates to existing passes. The pass is delivered as an attachment to the email message.
-----------------	---

Delivery Options

New passes are delivered as attachments to emails. On iOS devices, the customer can open the attached pass and can add it to their Passbook.

The following delivery configuration options are available for this shape:

Name	Purpose
------	---------

Email Subject	Subject of the email containing the new/updated pass. Refer to Configuring Email Subject for more details.
---------------	--

On Update

Users have multiple options for updating passes that have previously been sent. When the same Passbook Treatment is used in multiple shapes in the same flow, the first delivery is treated as a new pass. Subsequent deliveries (shapes) are treated as updates to the existing pass. Furthermore, if the Passbook Treatment is configured as a global treatment ("**Keep updating the pass...**" option is enabled on the treatment's Advanced tab), even the first passbook shape will result in an update scenario if the pass has already been sent to the customer previously (via a different action).

The following configuration options are available for updating passes:

Name	Purpose
------	---------

Push Notification	Select this option to utilize the Apple Push Notification service (APNs) to signal the device that an update is available for the pass. The device will then make a web service call to get the latest pass.
-------------------	--

Email Notification	Select this option to send the updated pass as an attachment to the email (specified in the Email Treatment field).
--------------------	---



Note: If neither notification option (Push or Email) is enabled, the system will generate and store the updated pass internally. This updated pass will be available to pass holders (customers) when they attempt to manually update the pass.

Wait After Sending

Users can determine whether they would like to wait after sending a pass. The wait options available are the same for all wait-based shapes and are described in the section on the [Wait shape](#).

Email Account

Users also have the option to specify the Outbound Email account to use for sending the message. These configuration options are available in the **Advanced** tab of the Send Passbook shape and are described in the [Email Account](#) sub-section of the **Send Email** shape.

Testing the Send Passbook shape

The Send Passbook shape provides an easy mechanism to test its outcome. Users can employ this test mechanism to test the online delivery of the email with the pass attachment. Refer to [Testing the Send Email shape](#) for details on configuration options for the test message.

The test email will be sent with the selected pass as an attachment. Refer to the *Reviewing the Test Pass* sub-section in the *Treatments* chapter for details on reviewing and adding the test pass.

Inbound Call Center

The Inbound shape provides a means to specify the content that should be returned when an inbound application, such as Next-Best-Action Advisor (NBAA), requests this action to display within their application.

The following configuration options are available for this shape:

Name	Purpose
Section	Name of the Section rule to use. The content of this section is returned when an inbound application (such as NBAA) requests action content from the system.
Channel	Inbound channel for the Treatment (Default value for this shape is CallCenter).
Work Status	Status of the action after executing this step in the flow.



Note: There should be only one Inbound shape in a flow. Having multiple Inbound shapes in the same flow could cause non-deterministic behavior in resolving the content that should be returned to the inbound application.

The Inbound shape, by itself, simply serves as a determining point for the content to be returned for external requests. However, this shape can be (and typically is) combined with the InboundTicket ticketing mechanism to provide a branch of flow execution for processing an inbound request. Refer to [Adding Inbound Channel Support](#) for more details.

Wait

The Wait shape enables the user to pause the flow execution for a specified duration. This shape can be used when an unconditional wait is required in the flow. When the specified wait duration has lapsed, flow execution automatically resumes with the next shape in the flow.

This shape supports the following modes for specifying the wait duration:

- **Offset** - Use this mode to set the wait time to a specified duration from when this shape is executed. Use the Days, Hours, Minutes, and Seconds fields to specify the offset. Optionally, enable the Business Days check box to apply the specified offset only using business days.
- **Date/Time** - Use this mode to set the wait expiration time to a specified future date and time. Specify the desired date and time.

Settings

☐ Offset ☒ Date/Time ☐ Property

4/30/2016 12:00 AM

- **Property** - Use this mode to set the wait expiration time using the value of a date time property or expression. Select the desired property or specify the desired expression.

Settings

☐ Offset ☐ Date/Time ☒ Property

.OfferData.DefWaitTime



Note: Ensure that the specified property (or expression) will have a valid date and time value during action runtime.

Users can also enable a wait in flow execution on wait-based delivery shapes. This includes the Send Email, Send SMS, Send Passbook, Send Generic, Send Multiple Treatments, and Push Notifications shapes. To enable the wait and configure the wait options (listed above), enable the **Wait after sending** check box on these shapes.

Update Status

The Update Status shape is used to specify the status of the action as it works its way through various stages of the Flow.

This status can be used to group actions for reporting and other aggregations. This status can also be used to determine the appropriate path to be taken down a subsequent branch in the Flow execution. The Update Status shape also enables the user to record Behavior and Response information for the action into Interaction History.

The following Configuration options are available for the Update Status shape:

Name	Purpose
Work Status	Status of the action. The out-of-the-box values for the action status include: • New • OfferSent • Resolved-OfferAccepted • Resolved-OfferExpired • Resolved-OfferRejected
Behavior	Denotes the behavior of the customer to the particular action. This information gets recorded in History. The out-of-the-box values for Behavior include:

Name	Purpose
	- Negative - Neutral - Positive
Response	Denotes the response of the customer to the particular action. This information gets recorded in History. The out-of-the-box values for Response include: - Accepted - NoResponse - Pending - Rejected

Hand Off

Use the Hand Off shape to launch other processes (in the background) from the Flow. This serves as a launching point for external processes which can be triggered at the appropriate time in the action execution. For example, use the Hand Off shape to initiate a Fulfillment process when a customer accepts an action.



Note: Initial processing of the handed-off work object is sequential with the Flow execution until the new work object reaches a stopping point (such as an Assignment). At this point, Flow execution resumes and the handed-off work object lives and executes separately on its own.

The following Configuration options are available for the Hand Off shape:

Name	Purpose
Work Class Name	Name of the class which contains the process (Work Object flow) to be started.
Work Flow Name	Name of the process (flow) to be started.
Work Status(Status section)	Status of the action after the new process has been initiated.

As part of the Hand Off shape, the entire contents of the action work object (including action details) are initially made available to the newly created work object. This information is stored in the top level OfferWorkPage clipboard page. This information is available whilst the new work object shares the execution with the action work object (see Note at the beginning of this section). If the new work object requires any of this data for its processing, it is recommended to copy relevant data from the OfferWorkPage onto appropriate locations on the new work object. This could be done via the use of the default Data Transform rule (pyDefault) or by other mechanisms in the work process flow before it enters a waiting point (such as an Assignment).

In a similar vein, a reference to the newly handed-off work object is stored on the original action work object. This is made available under the pyReferencedInsKeys construct. This information can be used

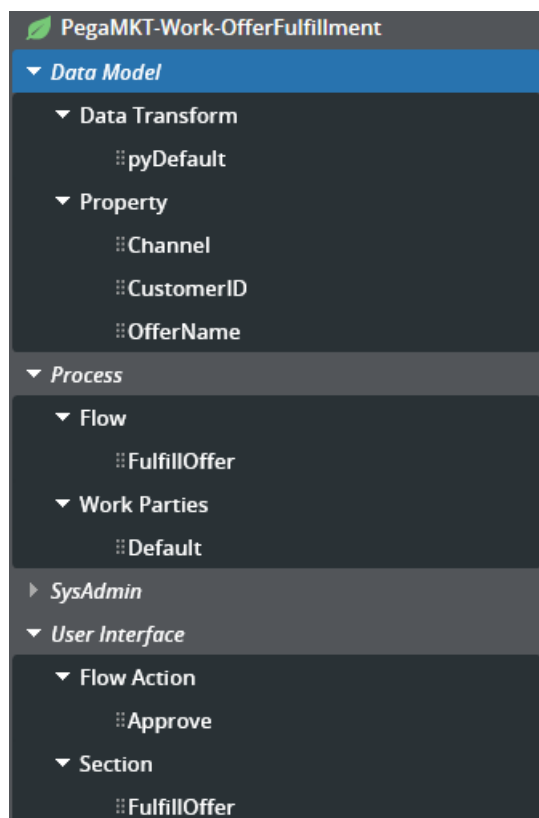
to provide a reference code to the customer in an email or for any other cross-referencing purposes, as deemed fit by the user.



Note: In order for the system to successfully create and launch the handed-off work object, all necessary rules (such as Flow, Data Transform, Work Parties, etc.) should be properly configured for the desired work object.

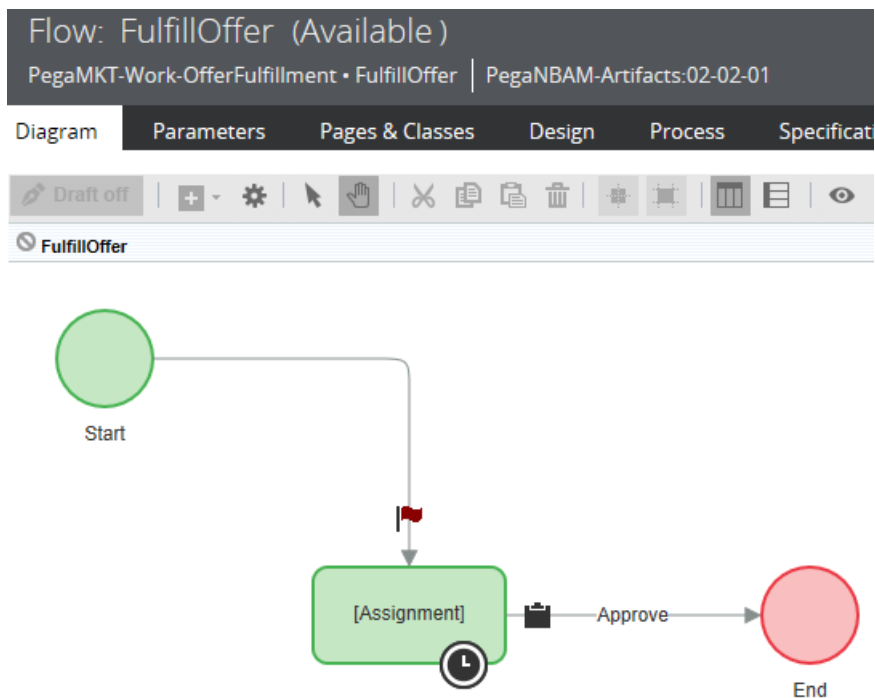
Hand Off Example

Some of the salient pieces involved in a handed-off work object are demonstrated in the following OfferFulfillment example:



- Data Transform:
 - pyDefault
- Properties:
 - Channel
 - CustomerID
 - OfferName
- Flow:
 - FulfillOffer
- Work Parties:
 - Default
- Flow Action:
 - Approve
- Section:
 - FulfillOffer

This work object involves a minimal process flow where the object is placed in a workbasket and is resolved upon approval. The FulfillOffer Flow rule is shown below:



The above flow is configured to create a new work object since we expect it to have its own lifecycle and want it to be actionable after it is stored in the workbasket. For simpler flows with straight through processing (no assignment shapes), the flow can be configured with the temporary object setting in the Process tab.

As mentioned previously, both customer and action data are available to this flow until it hits the first assignment. After this assignment, only data that has been saved onto the work object will be available.

The following (pyDefault) Data Transform demonstrates the copying of (both action and customer) data from the action page onto the work object, upon its initial creation:

Data Transform: pyDefault (Available)

PegaMKT-Work-OfferFulfillment • pyDefault | PegaNBAM-Artifacts:02-02-01

Definition Parameters Pages & Classes History

ACTION	TARGET	RELATION	SOURCE
Set	.Channel	equal to	OfferWorkPage.OfferData.pyChannel
Set	.CustomerID	equal to	OfferWorkPage.CustomerID
Set	.OfferName	equal to	OfferWorkPage.OfferName
Set	.pyWorkIDPrefix	equal to	"OF-"
Set	.pyWorkParty(Customer)	equal to	OfferWorkPage.Customer

In the above Data Transform, the Customer object is added as the Customer work party on the new object.

A sample Work Parties rule for this work object is shown below:

Work Parties: Default (Available)

Check out

PegaMKT-Work-OfferFulfillment • Default

PegaNBAM-Artifacts:02-02-01

Valid Parties

History

LIST OF VALID PARTIES

	PARTY LABEL	ROLE	PARTY CLASS	PARTY PROMPT	DATA TR
1	Customer	Customer	PegaMKT-Data-Customer		

The sample Flow Action and Section use basic PRPC concepts to display some of the copied over data and present an action to resolve the work object. This is demonstrated by the following instance of a handed-off Offer Fulfillment work object:

PegaMKT-Work-OfferFulfillment (OF-4)

Review

Save

Where Am I

Audit

Print

Follow

Tags

Case ID

OF-4

Urgency

10

Status

Pending-Approval

Created

3 months ago

Goal

Last Update

2 months, 21 days ago

Created by

Test Marketing Administrator

Deadline

Last Updated By

Test Marketing Administrator

Approve this selection

Other Actions

Has the following offer been fulfilled?

Name

TestHandOff

Customer ID

MFM

Channel

Submit

Notes

+ Add

Advanced...

No items

Decision

The decision shape enables the user to execute a variety of different decision constructs (such as decision trees, decision tables, etc.) to provide a basis for branching in the execution of the Flow.

The following Decision types are currently supported:

- Boolean Expression
- Decision Table
- Decision Tree
- Fork
- Map Value
- Predictive Model
- Scorecard Model

More information on the various options for configuring each of the decision types (listed above) can be found in Pega Platform documentation.

Schedule Appointment

The Schedule Appointment smart shape enables the user to schedule and configure follow-up work to be performed at a particular point in the flow lifecycle.

The user can utilize the “Instructions” field to specify any instructions to aid in processing the scheduled appointment.

Select Assignee

The user can choose from the following options:

- **Current Operator** – Routes the appointment to the operator that initiates this action.
- **Specify Operator** – Routes the appointment to the operator specified in the **Operator** field.
- **Workbasket** – Routes the appointment to the workbasket specified in the **Workbasket** field.

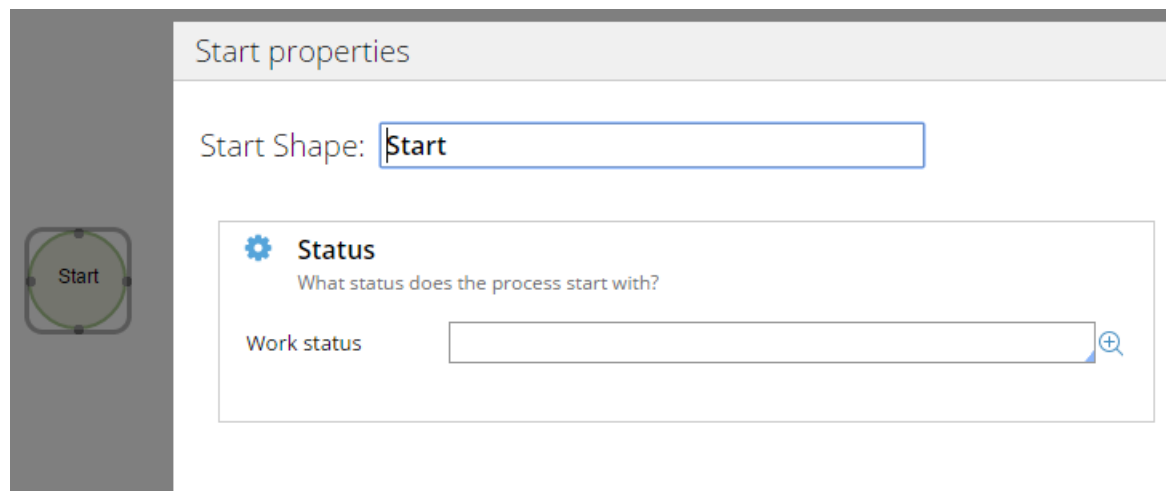
Schedule Options

The user can choose from the following options:

- **Relative Date** - Sets the appointment time relative to the time when this shape is processed in the action. The user must specify the relative number of days, the appointment time, and the time zone. The user can also enable the **Business Days?** checkbox to denote that the relative number of days should be applied using only business days.
- **Specify Date** – Sets the appointment time to the specified date and time.

Start

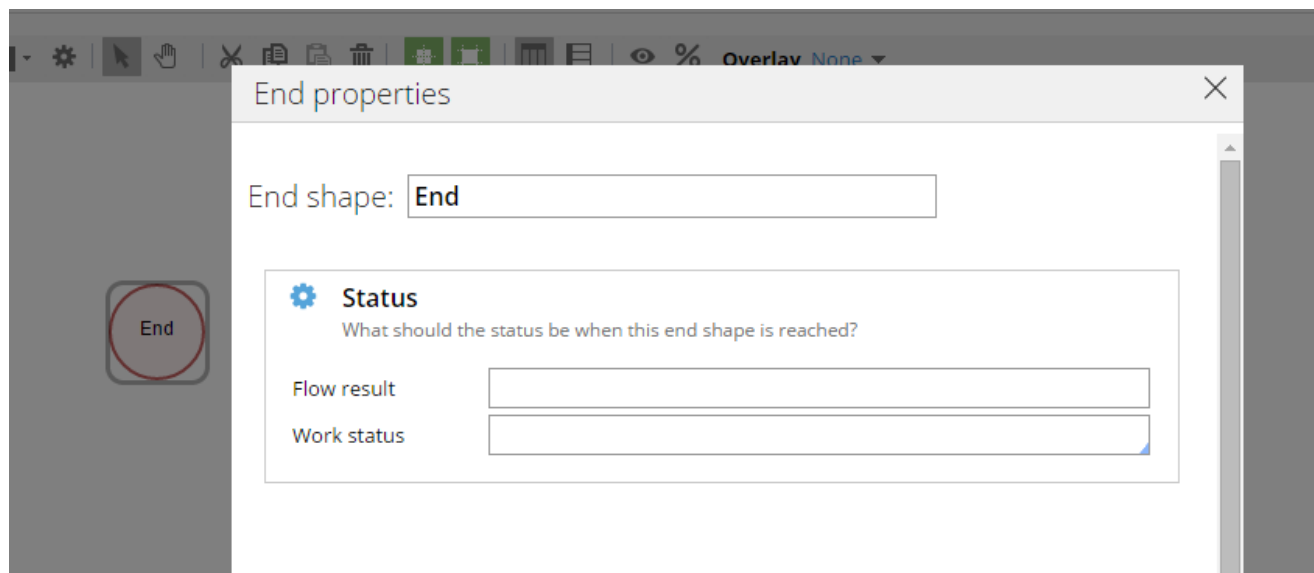
The Start shape denotes the beginning of the Flow. Each Flow must have one and only one Start shape.



The screenshot shows the 'Start properties' panel for a 'Start' shape. On the left is a vertical toolbar with a 'Start' shape icon. The main panel has a title bar 'Start properties'. Below it, 'Start Shape:' is followed by a text box containing 'Start'. Further down, there is a 'Status' section with a gear icon and the text 'What status does the process start with?'. Below this is a 'Work status' label and a text box with a magnifying glass icon.

End

The End shape denotes the termination point of the Flow execution. Each Flow can have one or more End shapes.



More information on the options for configuring the Start and End shapes can be found in Pega Platform documentation.

Connecting Two Shapes

The various shapes outlined in the prior sections can all be connected to one another. Each connector connects one shape to another. A shape can have multiple connectors emanating from it and/or terminating at it. The various connectors represent possible paths of Flow execution.

Connectors can be categorized into the following types:

- [Simple Connectors](#)
- [Decision Connectors](#)
- [Wait Connectors](#)
- [Response Received Connector](#)

Simple Connectors

These connectors simply connect one shape to another. There is no logic path determination behind these connectors.

The following shapes have simple connectors emanating from them:

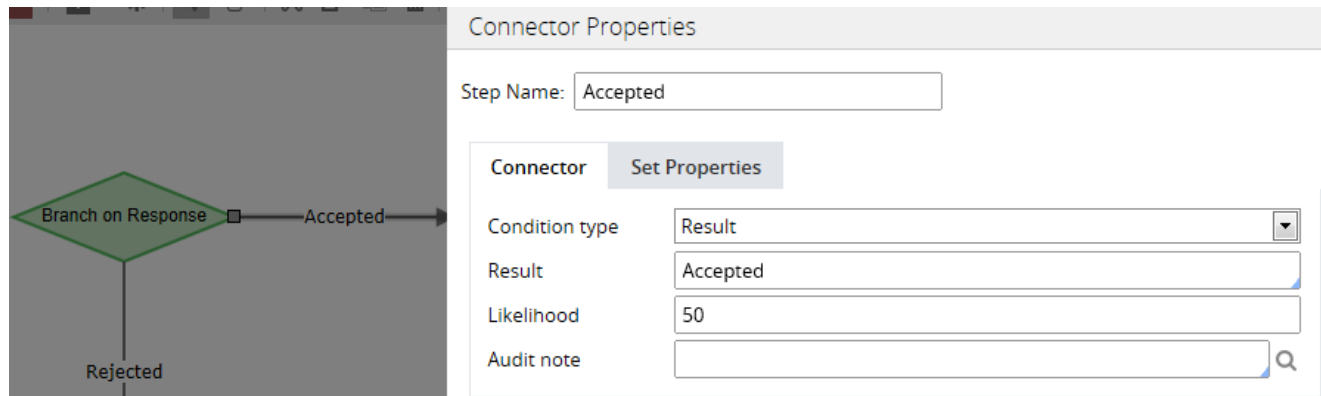
- Inbound
- Update Status
- Hand Off
- Start

Decision Connectors

These connectors emanate from the Decision shape. Decision connectors can be sub-categorized based on the condition type – Result, Always, When, and Else.

Result Condition Type

This condition type is used to represent the result of executing the Decision rule specified in the Decision shape. The system automatically analyzes the Decision rule and populates the Result drop-down with the possible set of outcomes from the decision.



Always Condition Type

This condition type represents a connector that is always taken.

When Condition Type

This condition type represents a connector that is taken when the expression/condition specified in the When input box evaluates to true.

Percentage Condition Type

Use the Percentage condition type to specify the percentage (relative amount) of time that the Flow should take this path during its execution.

Else Condition Type

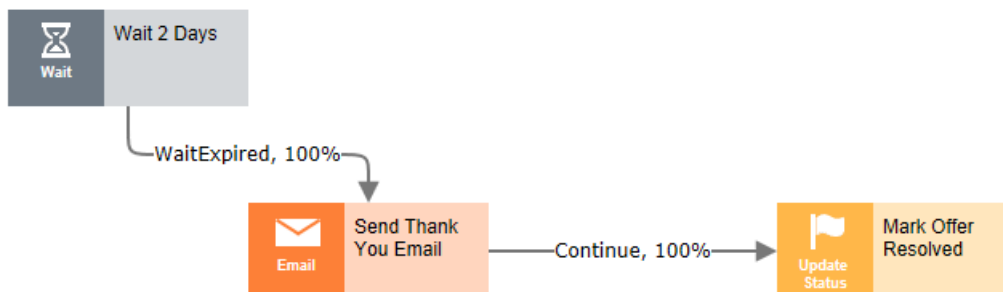
The Else condition type serves as the catch-all connector and is taken when none of the other connectors originating from the Decision shape can be taken. It is a best practice to have an else path whenever the other execution paths aren't collectively exhaustive (e.g. with percentage and when condition types).

Wait Connectors

The wait connector emanates from shapes that have a waiting mechanism tied to them (wait-based shapes). This includes the following shapes:

- Send Email
- Send SMS
- Send Generic
- Send Passbook
- Send Multiple Treatments
- Push Notification
- Wait

There are two types of the Wait connector – Continue and Wait Expired. Only one Wait connector can originate from a wait-based shape. If waiting is enabled for the shape, the Wait Expired connector is used; otherwise, the Continue connector is used. The appropriate Wait connector (Continue vs. Wait Expired) is automatically generated when you connect a wait-based shape to another shape.

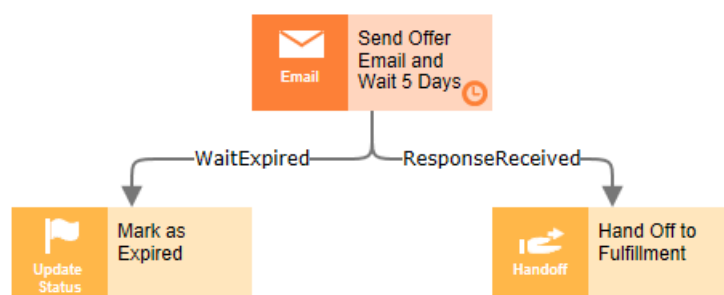


Note: Since the system manages the Wait connectors, these should not be changed manually. If you wish to update the type of Wait connector originating from a shape, toggle the Wait field on the shape. If you delete the Wait connector by accident, simply draw a new connector coming out of the shape and the appropriate Wait connector will be recreated for you.

Response Received Connector

Use the Response Received connector to denote the Flow path to take when a response is received for a particular action. This is typically used as a connector originating from a Send Email or Send SMS shape after an action email or SMS is sent to a customer.

This connector should be used in tandem with the Wait Expired connector, as shown below:



In the Flow depicted above, the System puts the action in a wait state for the duration specified (5 days). If no response is received within this wait duration, Flow execution will resume along the Wait Expired path. However, if a response is received before the wait duration has expired; the action will instantly get out of the wait state and go down the Response Received path.



Note: The ability of the system to go down the Response Received path is tied to the built-in response mechanism for Email and SMS treatments. Refer to Embedding a Response Link in the Treatments chapter for adding this mechanism to Email treatments. For SMS treatments, this mechanism is handled via the configuration of Inbound SMS accounts. For more details, refer to Configuring an Inbound SMS Account in the Email and SMS Accounts Configuration chapter.

To add a Response Received connector to a Send Email or Send SMS shape:

1. Enable Wait on the shape and configure the wait duration. Then, draw a connector from the shape to the backing shape for your Wait Expired action. The system will automatically create the Wait Expired connector for you.
2. Draw a second connector from the shape to the backing shape for the Response Received path. Open this connector's properties panel and select **ResponseReceived** as the value for the Flow Action smart prompt and provide a suitable Name for the connector (e.g. Response Received).

Connector Properties

Step Name:

Connector

Set Properties

Flow action
Likelihood
Audit note

Flow Validation

When the action is saved, the system validates multiple aspects of the action and presents the user with any violations that are found. These violations are reported as warnings when the Flow is in Draft mode and the action can still be saved. When Draft mode is disabled, these violations are reported as errors and must be corrected in order for the action to be saved.

These errors and warnings are displayed underneath the action header.

This record has 1 Error in 1 place
All the shapes in the flow: *The specified Email treatment was not found.*

This record has 1 unreviewed warning [\(review/edit\)](#)

Diagram

Details

Checklists

Best Practice: Informational
Key code has not been provided for SampleOffer.
[Add Justification](#)

If a shape has any errors associated to it, an error icon is also displayed on the shape. The tooltip on the error icon displays the associated error message.



Some examples of these violations include the following:

- Missing required fields
- Invalid rule references – e.g. Treatment, Template, Decision, Email Account, etc.
- Missing key codes (warning only)



Note: Being able to successfully save an action with Draft mode disabled is an excellent gauge for ensuring successful flow execution. It is strongly recommended that any actions that are live (can be potentially sent to customers) should be validated by saving them with Draft mode disabled.

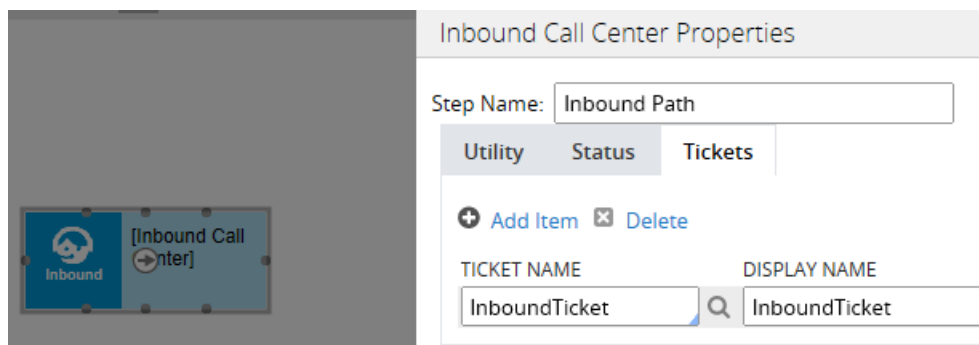
Adding Inbound Channel Support

The system enables the use of the same action rule for both inbound and outbound channels. You can build distinct paths of flow execution based on the channel. This functionality facilitates the use of the system by inbound applications (such as NBAA) to process their customer offerings.

The system enables this inbound channel support functionality in the following two ways:

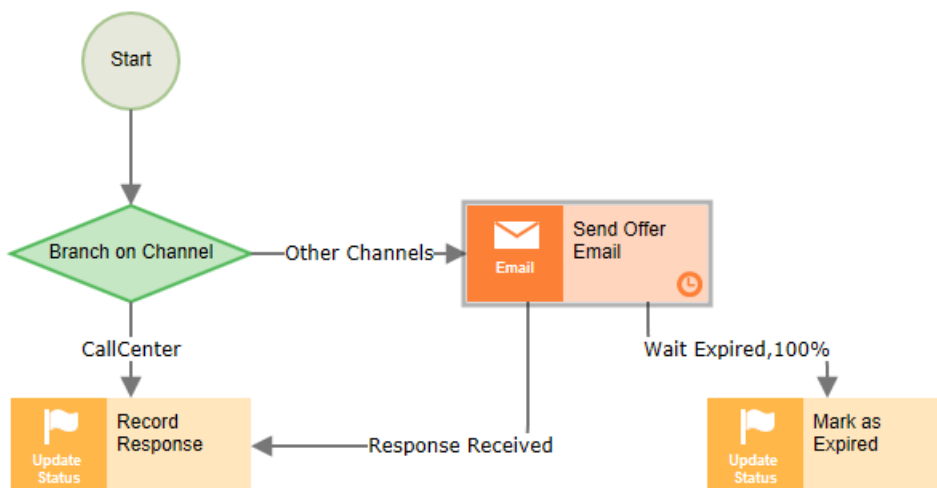
1. When an inbound request is received (for a specific action and customer), the system first determines whether the specified action is already in flight for the specified customer. If so, the particular action is loaded and flow execution is forced down the Inbound path. This is done by the use of the InboundTicket construct. The InboundTicket can be associated with most flow shapes (with the exception of the Start shape and the Wait shape). This ticket denotes the place in the flow where processing should jump (switch to) when an inbound request is received for an in-flight action.

The InboundTicket is enabled by specifying it as the value for the **Ticket Name** in the **Tickets** section (under **Advanced**) of the appropriate flow shape, as shown below.



Note: To avoid ambiguity in flow execution, the InboundTicket should be specified on only one shape in a flow.

2. On the other hand, if the specified action is not currently in-flight for the specified customer, the system creates a new action object and starts executing the flow on it, in the context of the channel that was part of the inbound request. If there's a need to have separate processing paths for different channels (say Inbound vs. Outbound, or Call Center vs. ATM), this can be achieved by branching the flow on Channel at the appropriate place.



In the flow snippet above, the flow execution is initially branched based on the channel. If the channel on the input request is Call Center, the flow goes down the Record Response route – in this case, the customer is responding to the action in the Call Center, and there is no need to send them the action email. For all other channels, we send the action email and wait for either the customer to respond or the wait duration to expire.

Both the scenarios, outlined above, should be handled in an action if it needs to support requests on an inbound channel. Thus, such an action should have both:

- A shape designated as the resumption point for inbound requests by having the InboundTicket set on it

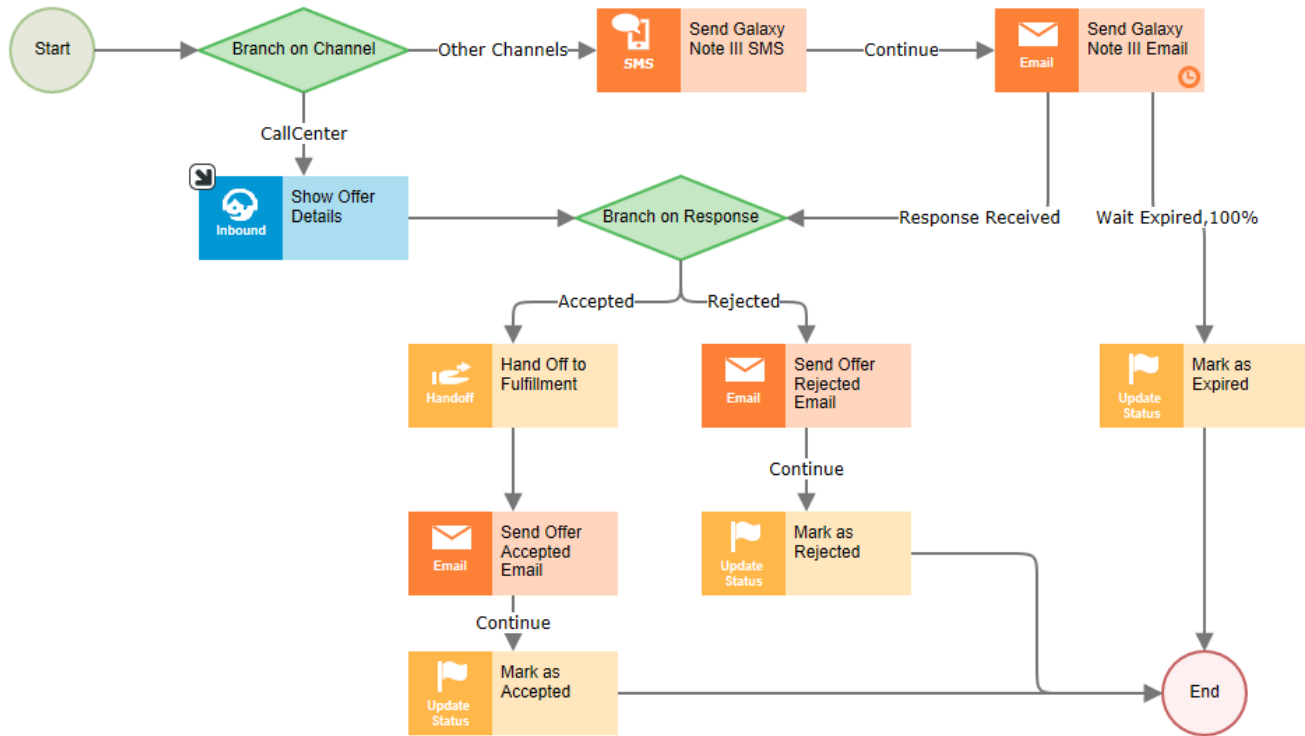
- A branch in flow execution for channel-specific paths (as needed)



Note: When integrating with an inbound application (such as NBAA), it is typical to use the [Inbound shape](#) to hold the InboundTicket.

Sample Flow

The following sample Flow assimilates the concepts that have been outlined in the previous sections:



Significant points in this flow include:

- Initial branching on Channel – Contact Center (CC) vs. Outbound
- Specifying the InboundTicket on the Inbound shape
- Specifying the Inbound Treatment on the Inbound shape
- Waiting for a response after sending out the action email
- Branching on the type of response received – Accepted vs. Rejected
- Handing off to a Fulfillment mechanism upon acceptance
- Marking action status as appropriate and recording this information to History

Specifying Action Details

Various details about the action can be specified on the **Details** tab of the action rule. These details can be used in Strategies for making decisions. They can also be included in treatments.



Note: Each of the data fields listed in the following sections is part of the proposition associated with the action. To utilize a particular field in a different part of the application, reference the associated property using the OfferData page under the action class.

Action details are classified into the following groups:

- [Basic Action Attributes](#)
- [Bundle Attributes](#)
- [Custom Attributes](#)

Basic Action Attributes

Basic action attributes are available for every action and are categorized into the following sections:

- [Details](#)
- [Availability](#)
- [Financials](#)
- [Expected Outcomes](#)

Details

The following table describes the data fields contained in the **Details** section:

Input Field	OfferData Property	Description / Purpose
Key code	KeyCode	Marketing identifier for this action. Users can output this value in treatments and/or use it internally to track action performance.
Variant	Variant	Variation in a set of actions (e.g. size, color, etc.). This property is used in action bundling for Advisor. Variants for the same action will be grouped and selectable during bundling.
Category	Category	Classification of the action. This property is used in the Advisor Negotiation use case.
Description	ShortDescription	Brief description of the action. This property is used in the Advisor Assessment and Negotiation use cases.
Benefits	Benefits	Benefits associated with the action

Input Field	OfferData Property	Description / Purpose
Image URL	ImageURL	Use this field to provide a link to an image to display for this action when it is rendered as part of a Real-Time Container.
Click through URL	ClickThroughURL	Use this field to provide a link to a web page or a file that provides more details on this action. When this action is included in a Real-Time Container, clicking this action in the Container will re-direct to the URL specified in this field.  Note: For proper re-direction, this URL should begin with the protocol prefix - such as http:// or https://
Thumbnail image	pyImage	Use this field to reference an image (Binary File rule) which represents this action. This image displays in the details side bar, and in the Actions landing page.
Starting Evidence	StartingEvidence	Number of action responses required before a model is reliable. This field is used in conjunction with Starting Propensity in the adaptive model propensity smoothing formula.
Starting Propensity	StartingPropensity	Default propensity for the action before the model is reliable. This field is used in conjunction with Starting Evidence in the adaptive model propensity smoothing formula.

Availability

The following table describes the data fields contained in the **Availability** section:

Input Field	OfferData Property	Description / Purpose
Start Date	StartDate	Date the action becomes active
End Date	EndDate	Date the action is no longer valid

Input Field	OfferData Property	Description / Purpose
Relevant description	WhyRelevant	Description of the circumstances under which this action is relevant for a customer
Eligibility description	EligibilityDescription	Description of the circumstances under which this action is eligible for a customer

Financials

The following table describes the data fields contained in the **Financials** section:

Input Field	OfferData Property	Description / Purpose
Original cost	OfferValue	MSRP or the full cost of this action
Marketing cost	BudgetedCost	Costs associated with the marketing of this action
Internal cost	InternalCost	Costs to the organization when a customer accepts this action. This amount is reflected in the Retention Negotiation budget.
Customer cost	Cost	Actual cost to the customer for this action
Agent compensation	AgentCompensation	Compensation amount for the agent if a customer accepts this action
Price description	Pricing	Description of the customer cost of this action (e.g. \$45 per month)

Expected Outcomes

The following table describes the data fields contained in the **Expected outcomes** section:

Input Field	OfferData Property	Description / Purpose
Expected response rate	ExpectedResponseRate	Expected rate of customer response to this action
Expected revenue	Expected revenue	Expected earnings from this action

Bundle Attributes

Bundles attributes are used to specify the bundling settings for the action. Refer to the [Action Bundles chapter](#) for more details.

Custom Attributes

The **Custom Attributes** section lists other proposition fields defined for use by implementers of the application. The following sets of attributes display in this section:

- All top level custom attributes
- All Issue level custom attributes belonging to the Issue for this action
- All Group level custom attributes belonging to the Group for this action

If the action belongs to a versioned Group, implementers can customize the display of attributes. In such a case, this section will utilize the customized form for specification of these attributes. Refer to Pega Platform documentation for guidelines on creating custom forms for Decision Data rules.

Creating a New Attribute

In order to specify a new action detail, the backing proposition attribute must first be created.

To add a new custom attribute:

1. Go to the Proposition Management landing page. This page is accessible in the Pega Customer Decision Hub portal via: **Configuration > Decision Management > Proposition Management**.
2. Use the controls in the **Hierarchy** tab to perform the desired action, as described in the following table.

To	Do
Create a top level attribute	Ensure Top Level is selected under the Business issues & groups tree. Click the New Property... button to launch the New form.
Create an issue or group level attribute	Select the appropriate issue and/or group in the Business issues & groups tree. Click the New Property... button to launch the New form.

3. Specify the **Name** and **Type** of the new attribute in the **Create Property** form and click **Create**.

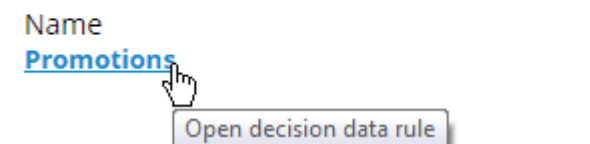
The next steps vary based on whether the application utilizes Decision Data rules to version propositions.

- Application doesn't version propositions - No further action is needed.
- Application versions propositions - The new attribute must be added to the Decision Data rule of each group where it needs to be utilized. This process is described below.

Adding an Attribute to a Group's Decision Data Rule

1. Open the Decision Data rule for the group. This rule can be opened by clicking the link in the **Decision data records** grid after selecting a group in the Hierarchy tab of the Proposition Management landing page.

Decision data records



2. Check out the Decision Data rule.
3. Switch to the **Form** tab.
 - a. If the Decision Data rule uses a custom form, add the new attribute to the desired location in the custom form following Pega Platform development practices.
 - b. If the Decision Data rule uses the standard form, click **Add field** in the **Form fields** section. In the new row, find and select the newly created attribute in the **Identifier** column.
4. Save the Decision Data rule and check it in.

Configuring Action Eligibilities

Define eligibility, relevancy, and suitability conditions for your actions. Engagement policies allow you to specify the conditions under which an action or group of actions is eligible for a customer.

You can define the following condition types as part of your engagement policies:

Eligibility

Specify the conditions that the customer must fulfill in order to qualify for the action. For example, an action may only be available for customers in a specific geographic location.

Relevancy

Specify the conditions for the action to be relevant at this point in time. For example, a discount on a specific phone model may not be relevant for a customer who already owns a phone of this type.

Suitability

Specify the conditions for the action to be appropriate for a customer. For example, a new credit card offer may not be appropriate for a customer who is likely to default on payments.

If you want to define eligibility conditions for multiple actions at the same time, edit the Business Group configuration on **Engagement policy** tab of the Next-Best-Action Designer. Any conditions defined at the Business Group level are displayed on top of the page, in the Group Eligibility section. You can toggle the **Apply** check box to allow or disallow them for this action. To view the Business Group configuration in the Next-Best-Action Designer, click the Business Group name in **Inherited from** *<Business Group>*.

1. **Optional:** To remove all previously added criteria, click **Actions > Clear all criteria**.
2. On the **Engagement policy** tab, expand the **Eligibility**, **Relevancy**, or **Suitability** section.
3. In the first column, select a field, a Strategy, or a When condition from the list.



Note: To make a property available for use as an eligibility condition, define it as a Relevant Record for your primary context class, which by default is your Customer class. For more information, see *Adding Relevant Records to the Customer class* in the *Pega Customer Decision Hub Upgrade Guide* on the [Pega Customer Decision Hub product page](#).

4. In the second column, select a comparator from the list. For Strategies, the comparator is always **has results for**.

5. In the third column, select as needed:

- For field conditions, enter a value in the field or select a field by clicking **Select values**. The system compares the value of this field to the value of the corresponding field or condition in the first column. For example, *Status work is equal to Done*.
- For Strategies, select the required component. The system determines whether there exist Strategy results for that component.
- When conditions do not have a third column, because their comparator can only be **true** or **false**.

6. **Optional:** Specify additional conditions and define the relationships between them.

- Click the **Plus** icon and add as many conditions as required.
- Use the drop-down lists between each pair of conditions to specify how these conditions relate to each other. You can group conditions with **AND** or **OR** operators.
- Use the drop-down list in the upper right corner to specify how condition groupings should be evaluated.
 - **Group ANDs** - Select this option if you want conditions linked with the **AND** operator to be evaluated as a group, and conditions linked with the **OR** operator to be evaluated individually. With this grouping, the grouping of condition 1 **AND** condition 2 **OR** condition 3 **OR** condition 4 is evaluated as (1 AND 2) OR 3 OR 4. That is, either conditions 1 and 2 must both be true, or either one of conditions 3 and 4 must be true.
 - **Group ORs** - Select this option if you want conditions linked with the **OR** operator to be evaluated as a group, and conditions linked with the **AND** operator to be evaluated individually. With this grouping, the grouping of condition 1 **AND** condition 2 **OR** condition 3 **OR** condition 4 is evaluated as 1 AND (2 OR 3 OR 4). That is, both condition 1 and one of conditions 2, 3, and 4 must be true.
 - **Use advanced logic** - Select this option if you want to define a mix of grouping by the **AND** and **OR** operator. Use the Logic string field to specify the condition grouping.

If you change a condition that uses advanced logic back to **Group ANDs** or **Group ORs**, all the groupings that you previously defined are reset.

7. **Optional:** To save the condition for future reuse, click **Actions > Save to library**.

The conditions are saved to a new when rule in the top level class of the eligibility condition. The when rule is automatically registered as a relevant record for use in the condition builder.



Note: The **Save to library** option is not available if the conditions include either Strategy rules or when conditions with parameters. The option is also disabled for eligibility conditions which include default criteria created with the **Use advanced logic** option.

8. **Optional:** In the **Contact policy** section, select one or more contact policies to associate with this action.

A contact policy limits the number of times customers can be contacted on a particular communication channel over a certain period of time. For more information, see [Contact Policies](#).

9. **Optional:** Do steps 1 to 7 again to configure another type of engagement conditions.

You can define any combination of Eligibility, Relevancy, and Suitability conditions for an action.

Conditions that are evaluated as a group are displayed on a single block of gray background, so you can identify them more easily.

Testing the Flow

Once the Flow has been created and configured, it can be tested against seed customers to ensure the various paths of Flow execution are working as expected. The **Test action** tab lists the various configuration options for setting up the action test.

Diagram
Details
Checklists
Test Offer
History

Simulate running this offer using a Seed List. Recipients will receive treatments and will be able to simulate offer responses. Customer data will not be changed as a result of your test. The Offer will be saved before the test is run.

Test Offer

Select Recipients

Select a seed list with recipients for messages sent by your offer.

Seed List: [View All Seed Lists](#)

Select a Starting Point

Choose the shape from which to start your test.

Starting Point:

Select a Channel and Direction

Select your test's default channel and direction.

Channel:
Direction: ☐ Inbound ☐ Outbound

Track Results

Track recent and currently running tests [Refresh](#)

TEST DATE ▼	RECIPIENT	STARTING POINT	CHANNEL	DIRECTION	LAST COMPLETED	STATUS
No items						

This includes the following options:

- **Select Recipients** – Select a Seed List for executing the action test. The action test will be executed for each seed in the Seed List. All the data associated with the seed will be available as customer data in the action test execution and will be used (if referenced) in the various Flow shapes. Refer to the *Seed Lists* chapter for information on configuring a Seed List.
- **Select Starting Point** – Select a Flow shape from where the action test should begin. All shapes present in the Flow (with the exception of the End shape) are listed in the Starting Point drop-down and can be selected as the starting shape.
- **Select Channel and Direction** – Specify the channel and direction of communication for the action test. These values are particularly useful in testing different branches of Flow execution which are dependent on the channel or direction.

Once the action test settings have been configured, the action can be tested via the **Test action** button. At this point, the action is first saved. If the action can be successfully saved, the test is submitted for execution. If the test path includes correspondence, this will be sent to the entries in the specified Seed List. Any response links that are present in the communication will be active and visible to the recipients.

Recipients can click these links to test the response handling paths of flow execution. Information will not be captured for these responses in History.

Any errors in the test are reported at the top of the Test action tab. Once these are corrected, the test can be re-executed.



Offer Save Failed. Either switch to draft mode or modify your offer to address the errors given above.

A success status is displayed upon successful commencement of the action test.



Offer test started successfully

The **Track Results** section lists the progress of recently executed and currently running tests.

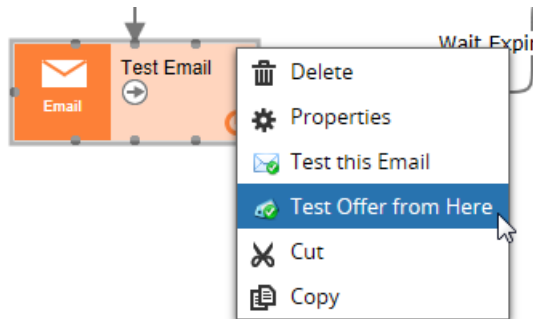
Track Results

Track recent and currently running tests

Refresh

TEST DATE ▼	RECIPIENT	STARTING POINT	CHANNEL	DIRECTION	LAST COMPLETED	STATUS
12/30/13 1:00 PM	JR	Test Email	Email	Outbound	Test Email	In progress
12/30/13 1:00 PM	MA	Test Email	Email	Outbound	Test Email	In progress
12/30/13 12:54 PM	AR	Start	CallCenter			Success!

After configuring the Test action tab, the test process can also be initiated directly from a shape in the Flow by utilizing the **Test action from here** right-click menu item. This will trigger the action test using the settings specified on the Test action tab, with the starting point set to the triggering shape.



Importing Actions

In addition to creating actions manually, you can also import actions created outside of Pega Customer Decision Hub by uploading a .csv file with the action data.

1. Prepare a valid .csv file with the list of actions that you want to import. The .csv file must contain the name and status (.pyIsPropositionActive) value of the action. Possible values for the .pyIsPropositionActive are Always, Never, and the expiration date of the action.



Note: To easily create a valid .csv file, export a template for the Issue and Group where you want to create the actions. For more information, see [Exporting Actions](#).

2. In the Actions landing page, click **Create > Create actions from file**.
3. Click **Choose File** and select a valid .csv file.

The .csv file must contain the name and status (.pysPropositionActive) value of the action. Possible values for the .pysPropositionActive are Always, Never, and the expiration date of the action.

4. Select the Issue and Group for the actions in the import file.
5. In the **Template Type** section, select whether Pega Customer Decision Hub should apply an flow template to the imported actions.
 - **None** - Actions are imported with a default flow. The default flow consists of a Start and an End shape.
 - **Reference flow from another action** - For each action in the .csv file, you can specify an existing action to be used as template for the imported action. The imported action is created with the same flow as the template action. If the template action is not found, the new action is imported with a default flow. The default flow consists of a Start and an End shape.
 - **Copy flow from another action** - If your .csv file does not specify individual templates for each action, you can select one action to use as template for all actions in the .csv file. The imported actions are created with the same flow as the template action.
6. **Optional:** If you want to completely overwrite existing actions with actions from the .csv file, select **Delete existing actions that are not in the file**.
This will delete any action which is not included in the .csv file you are importing.
7. Click **Import**.
The pop-up window displays the import summary, including the number of actions imported, the number of actions deleted, and the number of errors. If there are any errors in the .csv file, download the error report and resolve each error before you continue.

Exporting Actions

You can export actions created in Pega Customer Decision Hub to a .csv file with the action data. You can also use the Export function to quickly create a valid import template for actions created outside of Pega Customer Decision Hub. For more information, see [Importing Actions](#).

1. In the **Issue / Group** filter, select a Business Issue and Group.
2. Click **Apply**.
3. Click **View**. The **Export CSV file** link in the top right corner of the action list is now active.
4. Click **Export CSV file**.

Reviewing Action Metrics

The side bar on the right side of the **Details** tab displays information pertaining to the performance of the action. In addition to the action image, the side bar contains the **Performance** and **Key Predictors** sections.

Performance

This section provides an overview of how the action is performing across the following three metrics:

- **Volume** - Total number of times this action has been made
- **Impression rate** - Ratio (expressed as a percentage) of the number of times this action has been opened (i.e. impressions) to the volume of the action
- **Conversion rate** - Ratio (expressed as a percentage) of the number of times this action has been accepted to the volume of the action

A sample performance summary is shown below.

PERFORMANCE	
Volume	240.6K
Impression rate	61%
Conversion rate	39%

Key Predictors

This section provides information on Adaptive Models that include this action. Each model is listed separately and the first model is expanded by default. The information presented for each model provides a quick profile of a customer that is likely to respond to this action.

The following information is presented for each model:

- Model name - Click to open the behavior report associated with the model.
- Overall performance of the model
- Direction and channel for the corresponding predictor information
- Active predictors for the model. For each predictor, the group with the highest propensity is shown. Hover over the green circle to see this propensity value.

A sample predictors summary is shown below.

KEY PREDICTORS	
AdaptiveLearning 62%	
Outbound, Email	
 Age	[56.28, 1001.0] ●
Arrears_Propensity	[53.28, 67.04>] ●
Gender	F ●
Less details ^	
StandardConfiguration 61%	
No direction, No channel	
More details v	

Frequently asked questions about actions

See the following topics for additional information, tips and tricks, and best practices.

When adding new actions, for which there are no models yet, how does Pega Customer Decision Hub ensure that customers receive actions that are relevant?

For newly introduced actions, AI models may not yet know which customers to target. To help ensure that customers receive actions that are relevant to them, Pega Customer Decision Hub uses the following mechanisms:

Propensity smoothing

Pega Customer Decision Hub uses propensity smoothing to boost the propensities for new models

by doing a weighted average between a high initial fixed propensity value, and the propensity value returned by the model. As the model gathers more feedback, the effect of the initial propensity is dampened. Propensity smoothing is applied to both inbound and outbound actions.

This method does not introduce any randomization, so when arbitrating between two totally new actions, the same one will always win. This approach works well for inbound. For outbound, where there can be many new actions for a while (until the first responses come in), Pega Customer Decision Hub applies Thompson Sampling before applying propensity smoothing.

Thompson Sampling and model maturity

Starting in Pega Customer Decision Hub 8.4, Thompson Sampling and model maturity are used to improve the targeting for newly added outbound actions. To minimize the possibility of customers receiving actions that are not relevant, only 2% of the customer population are initially targeted with new actions. As the model collects the resulting learnings and matures, the targeted percentage increases until it reaches 100% for fully mature models. A model is considered mature after it has received 200 or more positive responses.

To prevent multiple new actions from having the same starting propensity, Pega Customer Decision Hub uses Thompson Sampling for outbound actions. The propensity is initially set to a random value between 0 and 1. As the model matures, this quickly converges to the model propensity.

Outbound model propensities are first re-adjusted by Thompson Sampling, and then by propensity smoothing. Thompson Sampling is not applied to inbound actions.

Random control group

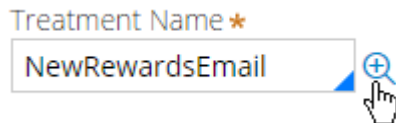
This method always assigns a random propensity to a small percentage of the customers. This ensures that the models are exposed to responses to actions that they would not have offered without the randomization element. In this way, models keep learning and evolving. Unlike Thompson Sampling, this randomization continues to happen, even if the models are already considered mature.

In addition, this mechanism provides an easy way to report on the lift of the models. In the out-of-the-box implementation, the assignment of customers to either the model or a random control group is consistent across channels but rotates every month.

Treatments

A treatment is the definition of the content that is delivered to a customer as part of an action over a specific communication channel. The system provides support for four kinds of treatments – [Email](#), [Passbook](#), [Section](#), and [SMS](#). Each of these types is further explored in subsequent sections.

Treatment rules are primarily accessed from and created in the context of actions. When designing the action, users can use the property panel of appropriate action shapes (e.g. Send Email, Send SMS, etc.) to review existing treatments of the corresponding type. To create a new treatment, the user simply needs to type in the desired name and click the magnifying glass to launch the Create form for the treatment.



Treatments can be defined at the top level or can be categorized into issues and groups. The system automatically selects the issue and group in the Create form using the corresponding values from the action rule. Users can change these selections to store the new treatment at a different hierarchical level.

Email Treatments

A newly created Email Treatment starts out with input fields - for Subject and Key Code - and a blank canvas to compose the email content, as shown below.

The Email Treatment rule includes the following tabs:

Tab Name	Purpose
Treatment	Create the contents of the Treatment. Refer to Configuring the Email Treatment .
Test Message	Test the content and format of this Treatment by sending it. Refer to Testing the Email Treatment .
History	Specify the Description and Usage information for this Treatment.

Configuring the Email Treatment

The **Subject** field allows the user to specify the subject for the email. The email subject can be static text, a property reference, or an expression which combines both static text and property references.

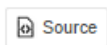
The user can also utilize the **Key Code** field to specify a code for the Email Treatment. This code can be used by downstream functionality, such as the Send Email shape in the action canvas.

When the **Track Email Open Rate** checkbox is enabled, the system automatically captures email opens (impressions) in Interaction History. This setting is enabled by default in a new Email Treatment.

The Email Treatment Editor enables the user to design high quality treatments to send to customers. This editor supports two modes of editing:

- **Design** – This is the default editing mode. In this mode, users can enter free-form content and use a wide array of editing tools to format this content. To apply formatting to content; select the content first and then, use the formatting icons to update the content's format.
- **Source** – This mode is for advanced users and provides direct access to the source HTML for this treatment. In this mode, the formatting icons are disabled.

Users can switch between the two modes above by toggling the **Source** button:



The editor also includes an array of buttons to insert content (such as links, images, properties, etc.) into the treatment:



Two of the buttons in this array are essential in designing effective customer-focused treatments. These are further outlined below.

Embedding Relevant Data

Relevant data can be embedded into the treatment via the Insert Property button:



Examples of this data include customer information, action details, etc.

Upon clicking this button, the **Property Parameters** dialog can be configured to embed the necessary data field. In addition to specifying the name of the field to be embedded, users can also specify:

- **Format** – Reference to a Format rule that determines how this field should be formatted.
- **When** – Reference to a When rule that determines whether this field should be displayed or not.

Property Parameters

Name	.OfferData.SalesPrice	⊕
Format	CurrenctAmount	⊕
When	IsHighValueCustomer	⊕

Save
Cancel



Note: When an SMS message contains embedded fields, the character count is an approximation of the message length. Each embedded field counts as 15 characters towards the character count for the message.

Embedding a Response Link

Response links can be embedded into an Email Treatment via the Insert Button button:



Clicking this button opens the **Button Parameters** dialog. This dialog presents the user with a variety of options for configuring the response mechanism for the treatment. The type of response link is determined by the value selected in the **Function** drop-down. The following options are available:

- **Accept action** - This option embeds a link for the customer to accept the action. The user must select whether to direct the customer to a response screen or to an external URL.
- **Decline action** - This option embeds a link for the customer to decline the action. The user must select whether to direct the customer to a response screen or to an external URL.
- **Open internal page** – This option embeds a link to launch an internal page. The user must specify the name of the response screen (internal page).
 Note: This page cannot be customized with customer or action data, because internal pages do not support referencing this type of data. Use the **Open external URL** option instead.
- **Open external URL** – This option embeds a link to launch an external URL. The user must specify the external URL to open.

Tracking Click Rate

For each of the above functions, the user can enable the **Track click rate** option. The system automatically tracks clicks (in Interaction History) for any response links that are generated with this option enabled. This setting is enabled by default.

Redirecting to a Response Screen

This option is available for the Accept Offer, Decline Offer, and Open Internal Page links. The user can configure a response screen to be displayed when the customer clicks on a response link in the action email. This response screen is an internal page in the application and is typically configured using a Section rule.

- For Accept Offer and Decline Offer, the response screen value is defaulted to the value configured by the application administrator. In these cases, a typical response screen should represent a confirmation for the action taken by the customer (accept or decline) and any other information that needs to be presented.
- For Open Internal Page, the response screen can be considered as a page to provide more information on the action. This page can contain appropriately configured action buttons (such as accept and decline) that the customer can use to respond to the action.



Note: This page cannot be customized with customer or action data, because internal pages do not support referencing this type of data. Use the **Open external URL** option instead.

If the value for the response screen is not set, the out-of-the-box default response screen (DefaultEmailResponse) will be used. Both customer and action data are available to be referenced when building and configuring a custom response screen.



Note: Response screens must be created in the PegaMKT-Work-Offer class.

Redirecting to an External URL

This option is available for the Accept Offer, Decline Offer, and Open External URL links. The user can further choose whether relevant Offer Data should be included while re-directing to the external URL. If selected, these values are passed as URL parameters to the external URL being launched. The following parameters are furnished:

- C – Customer ID
- R – Customer response
- I – Issue of the action
- G – Group of the action
- O – Name of the action
- T – Name of the Email Treatment

Adding Style Options

The following style options can be specified for the response link:

- **Button text** – The text that is displayed to the user as the link
- **Button image URL** – Reference to an image that is displayed alongside the link
- **Custom style** – CSS formatting style that should be applied to the link

Style Options

Button Text	Yes, I want this offer!
Button Image	
Custom Style	color:blue; font-weight:bold;

Previewing Included Sections

The **Show the preview of included section** checkbox (at the bottom of the Email Treatment editor) enables users to preview sections inline in the editor.

Testing the Email Treatment

The **Test Message** tab on the Email Treatment provides an easy way to test the look and feel of the Email Treatment when it is actually delivered.

The following options are available for configuring the test message:

- **To** – Recipients of the test email. Select either Test Recipients or Seed List.
 - **Test Recipients** - Enter list of recipients. Each entry can either be the Operator ID of an existing user in the system or a valid email address. If the operator ID is entered, operator information such as the name and email is populated as the customer data and the test email is sent to the operator's email address.

To:

☒ Test Recipients
 ☐ Seed List

- **Seed List** - Select a predefined Seed List as the intended recipients of the test email. The data for each seed is populated as the customer data and is visible (if referenced) in the test email. In this case, the **Email 1** column in the Seed List (.pyEmail1 property) specifies the email address to which the test email is sent. Refer to the Seed Lists chapter for information on configuring a Seed List.

To:
☐ Test Recipients ☒ Seed List

Seed List:

[View All Seed Lists](#)

- **Subject** – Enter the subject for test email.

Subject:

- **Test Account Settings** – Specify Email Account settings for the test email.
 - **Use Default Email Account** - Select this option to use the Default outbound Email Account.
 - ☒ Use Default Email Account ☐ Specify Email Account
 - **Specify Email Account** - Select this option to specify the outbound Email Account to use for delivering the test email. Specify the account name in the **Account** field.
 - ☐ Use Default Email Account ☒ Specify Email Account

Account: ★
 - **From/Reply To: Use Email Account Settings** - Select this option to use the sender's name and reply-to address that is configured on the Email Account being used.

From/Reply To

 - ☒ Use Email Account Settings
 - **From/Reply To: Use Operator Settings** - Select this option to use the name and email address of the current operator for these values.
 - **From/Reply To: Override Account Settings** - Select this option to specify the sender's name and reply-to address for the test email. Specify these values in the **From** and **Reply To** fields.
 - ☒ Override Account Settings

From: ★

Reply To: ★

After the test message has been configured, it can be sent via the **Send Test Message** button.

Send out a test message to check your formatting. [Send Test Message](#) 

Upon clicking this button, the Email Treatment is saved and the test email is sent to the specified recipients. The status of the test is displayed.

Test Message - Results

All messages sent successfully!

Any errors in the test delivery are displayed in case of a failure. These can be corrected and the test email can be resubmitted for delivery.

Test Message - Results

One or more messages did not send successfully. Please update your sending options and try again.

Recipient	Status	Message
jranalyst	✓ Success!	The message has been submitted for delivery.
45455@\$@	⚠ Failed!	Illegal character in domain

Close

Passbook Treatments

Passbook is an application available on iOS devices (such as iPhone or iPod touch) that can be used to store things (termed passes) such as boarding passes, tickets, and coupons. These passes can be used to perform appropriate tasks, such as checking in to a flight or redeeming a coupon.

A Passbook Treatment enables marketing users to design the contents of a pass using interactive tools and a preview pane that displays a rendering of the pass based on the user's configurations. Users can configure each element of a pass, preview the impact of their changes, and test the generated pass by sending it as an email attachment.

Each pass is associated with a pass style. This style determines the overall visual appearance of the pass and impacts the placement of different fields on the pass. Currently, the system supports the following Passbook Styles:

- Coupon – Appropriate for coupons, discounts, and special offers
- Generic – Appropriate for all other uses

Users must select the Passbook Style for the pass as part of creating a new Passbook Treatment. Users can't change the style of a Passbook Treatment while copying.

A newly created Generic Passbook Treatment starts out as shown below.

Edit Passbook Treatment: Sample Generic Pass [Available]
Save
Actions
Close

Sales • SampleGenericPass • Generic
PegaNBAM-Artifacts:07-11-01

Passbook Details
Advanced
Test Message
History

Use the tabs below to configure and preview different elements of this pass.

General
Pass Header
Primary
Secondary
Auxiliary
Barcode
Relevance
Back

Key Code

Enter a marketing key code for this pass.

Key Code

Description

Enter a short description which will be used by the accessibility technologies on the device.

Accessibility Description*
Generic

Visual Elements

Configure the visual elements of the pass, such as the pass icon and other images.

What **pass icon** should be shown in emails and on the lock screen?

webwb/pxcirclelogo.png

What image should be used as the **high-res (or 2x) pass icon**?

What should be used as the **thumbnail image** on the pass?

webwb/PegaPBThumbnail.png

The Passbook Treatment rule includes the following tabs:

Tab Name	Purpose
Passbook Details	Configure the contents of the pass and preview how the pass will be rendered. Refer to Configuring Pass Elements .
Advanced	Configure how pass updates should be handled. Refer to Configuring Advanced Passbook Options .
Test Message	Test the content and format of this Treatment by sending it. Refer to Testing the Passbook Treatment .

Tab Name	Purpose
History	Specify the Description and Usage information for this Treatment.

For more details on Passbook, refer to Apple's Passbook Programming Guide, available at: https://developer.apple.com/library/ios/documentation/userexperience/conceptual/PassKit_PG/Chapters/Introduction.html

Configuring Pass Elements

The various mini-tabs in the **Passbook Details** tab allow users to configure and preview different elements of the pass. The system automatically updates the preview pane as the configuration settings in the tabs are changed.

General tab

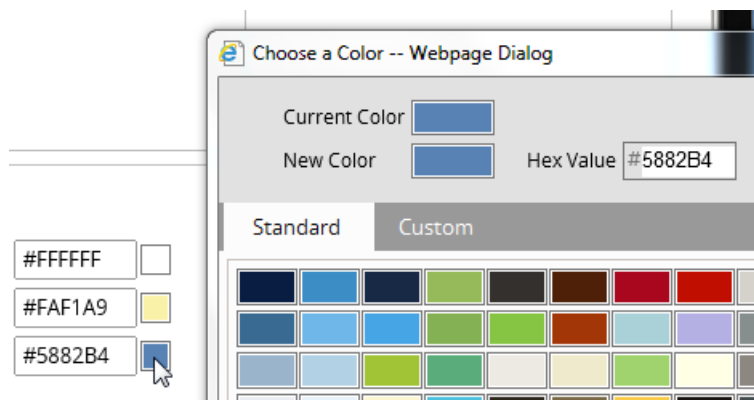
Use this tab to configure the following general settings for the pass:

Category	Name	Purpose
Key Code	Key Code	Marketing key code for the pass. This can be displayed on the pass and/or can be used internally for tracking purposes.
Description	Accessibility Description	Description that the device will use for accessibility to differentiate this pass from other passes
Visual Elements	Pass icon	Icon that the Apple device shows with the pass on the lock screen and in iOS apps (such as Mail) when representing this pass. A preview of the selected icon is shown next to the field.
Visual Elements	High-res (or 2x) pass icon	High-res version of the pass icon (used in Retina displays)
Visual Elements	Strip image(Coupons only)	Image that displays behind the Primary fields
Visual Elements	Thumbnail image(Generic passes only)	Image that displays to the right of the Primary fields
Colors	Large text elements	Color used for the values of the fields shown on the front of the pass
Colors	Label text elements	Color used for the labels of the fields shown on the front of the pass

Category	Name	Purpose
Colors	Background of the passbook	Color used for the background of the front and back of the pass

For images, users can use the gear icon to launch the **Image Catalog**, which can be used to search and select the desired image.

For specifying colors, users can either directly enter the hex code for the color or click the color square (next to the input box) to launch the color picker. The Standard tab provides commonly used standard colors while the Custom tab provides multiple ways to select the desired color.



Pass Header tab

Use this tab to configure the pass header. This tab is split into the following two sections:

- Header Visual Appearance
- Header Fields

Header Visual Appearance

Use the following settings to configure the header logo:

Name	Purpose
Main logo	Logo image that displays at the top left corner of the pass
High-res (or 2x) logo	High-res version of the logo icon (used in Retina displays)
Logo text	Optional text that displays next to the logo icon

For images, users can use the gear icon to launch the **Image Catalog**, which can be used to search and select the desired image.

Header Fields

Use this section to add fields to be displayed in the pass header. Users can configure a maximum of three fields for the header. Header fields are the only fields that are visible when the pass is stacked with other passes in the Passbook app. They should be used sparingly to show only the most vital pass information.

Refer to [Configuring Pass Fields](#) for details on configuration options for pass fields.

Primary tab

Use this tab to configure the primary field for the pass. The primary field typically contains the most important pass information and is displayed prominently.

Refer to [Configuring Pass Fields](#) for details on configuration options for pass fields.

Secondary tab

Use this tab to configure the secondary fields for the pass. Users can configure a maximum of four secondary fields. Secondary fields are less prominent than the primary field and are typically shown in a smaller font size. Users should specify secondary fields in the order of their importance.

Refer to [Configuring Pass Fields](#) for details on configuration options for pass fields.

Auxiliary tab

Use this tab to configure additional fields to display on the pass. Users can configure a maximum of four auxiliary fields. If secondary fields are present, they will take precedence over auxiliary fields.

Refer to [Configuring Pass Fields](#) for details on configuration options for pass fields.



Note: In most cases, coupons and generic passes can have a maximum of four secondary and auxiliary fields, combined.

Barcode tab

Use this tab to specify the barcode configuration for the pass. Users can include a barcode in the pass and configure the data contained in the barcode. Users can also choose to display a text message beneath the barcode. The barcode inclusion in a pass is optional and users can choose to create a pass without a barcode.

The system provides support for the following barcode formats:

- Aztec
- Quick Response (QR) code
- Portable Data file (PDF) 417

After selecting the barcode format, users need to select what should happen when the barcode is scanned. The system provides support for the following two options:

- **Register a positive response when a barcode is scanned**

Select this option to have the system record a positive response for the action through which this pass is delivered. In this scenario, the system injects a callback link with pertinent details. When the pass's barcode is scanned, the injected link invokes appropriate the service on the system and the positive response is captured.

- **Customize the barcode data**

Select this option to specify the data to be stored in the barcode. The barcode format determines the amount of data that the barcode can contain. Refer to the official documentation for each of these formats for more details on their data limits. In this scenario, no response is captured as part of scanning the barcode. Response capture (if needed) must be handled in a different part of the process.

Users can also choose to specify a text message that will display with the barcode. This field can be used to display human-readable information (such as coupon codes or membership numbers). This is particularly useful if the pass can be used at places where a barcode scanner might not be available.

Finally, some barcode scanners require the data encapsulated in the barcode to be encoded. Users can specify the encoding to use or use the default encoding (ISO 8859-1).

Relevance tab

Use this tab to configure locations at which this pass will be relevant. Users can specify up to ten locations. When a holder of this pass is at (or within) one of the specified locations, the specified notification message is displayed on the holder's device. For each location, the user can specify:

- **Location information** - Users can either select a Geofence rule or directly specify the latitude and longitude of the location. Refer to the Geofences chapter for more details on the Geofence rule.
- **Notification message** - Users can specify the message to display on the pass holder's device when the holder is at or within the specified location.

Back tab

Use this tab to configure fields to display on the back of the pass. Users can specify up to twenty fields for the back of the pass. Users can use back fields to specify fields that are too long for the front of the pass (e.g. terms and conditions) or any other additional information that may be helpful for pass holders. If the contents of the back exceed what can be displayed on the screen at once, pass holders are able to scroll through the contents.

Refer to [Configuring Pass Fields](#) for details on configuration options for pass fields.

Configuring Pass Fields

Users can add and remove fields from the various tabs by using the appropriate links displayed over the grid, as shown below:

 Add Item  Delete

For each field, users must specify the following:

- **Type** - Type of the field. Choose from a wide variety of supported types, such as String, Number, Date, and Currency. For back fields, the type is String and can't be changed. For Date, DateTime, and Time, use the corresponding Dynamic option if the value is a property reference.
- **Label** - Label of the field. In most cases, the field label is displayed above the field value. However, for coupons, the primary field's label is displayed below (and less prominently than) the field value. The label can be static, a property reference, or an expression. Users can use the magnifying glass icon to open a referenced property and the gear icon to launch the expression builder.
- **Value** - Value of the field. The value can be static, a property reference, or an expression. Users can use the magnifying glass icon to open a referenced property and the gear icon to launch the expression builder.
- **Format** - Format used to display the field. Users can specify formats for all field types with the exception of String. The list of available formats depends on the type of field. Since back fields are of type String, the Format option is not available for back fields.
- **Alignment** - Alignment of the field text. Users can select the desired alignment for all fields with the exception of primary fields in coupons using one of the alignment buttons.

Alignment:    



Note: For specific details on the various elements involved in pass creation (such as images, fields, and barcodes), refer to the *Pass Design and Creation* chapter of Apple's Passbook Programming Guide, available at: https://developer.apple.com/library/ios/documentation/userexperience/conceptual/PassKit_PG/Chapters/Creating.html

Configuring Advanced Passbook Options

The **Advanced** tab in the Passbook Treatment rule form enables the user to configure how updates to passes should be handled. The system provides support for two options when the same pass is sent multiple times to a customer (pass holder):

- **Send a new pass every time a new action or program uses this treatment**

In this option, the system will send out a new pass each time this Passbook Treatment is used in a new action.

- **Keep updating the pass even if different actions use this treatment**

Testing the Passbook Treatment

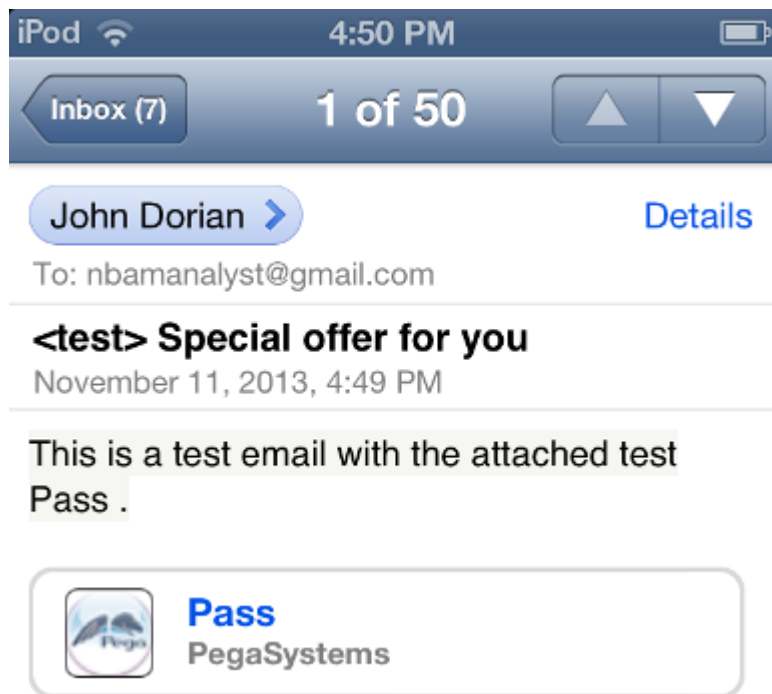
The **Test Message** tab on the Passbook Treatment provides an easy way to test the look and feel of the Passbook Treatment when it is actually delivered. Users can test the look and feel of the email containing the pass and the actual pass itself (by opening the attached pass).

Configuring and Sending the Test Email

The configuration options available in this section are identical to those available for [testing Email Treatments](#).

Reviewing the Test Pass

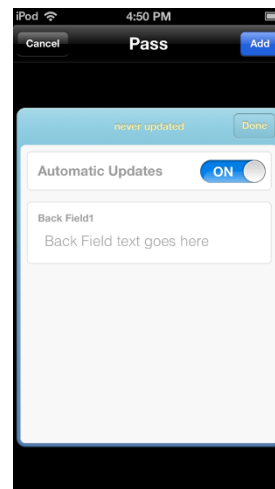
When the test email is opened on an iOS device (such as an iPhone or iPod touch), the attached pass is shown with the selected pass icon and the organization name.



Click the pass to open it – the front of the pass is displayed. Click the  icon to view the back of the pass. Use the Done button to return to the front of the pass. Use the Add button to add the pass to your passbook.



Front of the test pass



Back of the test pass

Sections

A newly created Section starts out as shown below.

Edit Section: Sample Section [Available] Save Actions Close

CL PegaMKT-Work-Offer-Sales | ID SampleSection | RS PegaNBAM-Artifacts:07-11-01

Design Parameters Pages & Classes HTML History

+ Layout ▾
 + Basic ▾
 + Advanced ▾

Dynamic Layout (Default) - 1

<Drop any number of properties, sections, UI elements, and other dynamic layouts>

For more information about creating Sections, refer to the Pega Platform documentation.



Note: Unlike other marketing artifacts, a Section rule does not show Issue and Group drop-downs in the Create form. However, these are still correctly set using the values from the action rule. The **Apply To** setting of the Section rule is automatically set to correspond to the issues and group class under PegaMKT-Work-Offer.

SMS Treatments

A newly created SMS Treatment starts out with an input field for the key code and a blank canvas to compose the SMS message, as shown below.

Edit SMS Treatment: Sample SMS [Available] Save Actions Close

Sales • SampleSMS • SMS | PegaNBAM-Artifacts:07-11-01

Message Test Message History

Key Code

ABC 160 Characters Remaining i

The SMS Treatment rule includes the following tabs:

Tab Name	Purpose
Message	Create the contents of the Treatment. Refer to Using the SMS Treatment Editor .
Test Message	Test the content and format of this Treatment by sending it. Refer to Testing the SMS Treatment .
History	Specify the Description and Usage information for this Treatment.

Using the SMS Treatment Editor

The SMS Treatment editor enables the user to specify the contents of the SMS message. Users can simply type the content of the message into the editor.

The SMS editor provides the following features:

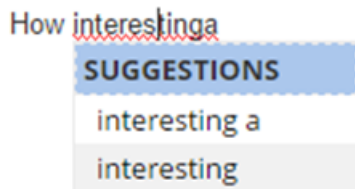
- Character count - As a user types the message content, the editor displays the number of characters in the message. Once the content goes past the length of one SMS message (160 characters), the editor also displays the message number along with an informational note to the user about SMS message lengths.

41 Characters Remaining for Message 3 i

- Spell check – Users can use perform a spell check via the Check Spelling icon:



Spelling errors are underlined in red. Clicking an incorrectly spelled word provides a list of possible corrections. Selecting one of these corrections replaces the incorrect word with the selected suggestion.



Embedding Relevant Data

Relevant data (such as customer information, action details, etc.) can be embedded into an SMS

Treatment via the Insert Property  icon.

Upon clicking this icon, the **Property Parameters** dialog can be configured to embed the necessary data field. In addition to specifying the name of the field to be embedded, users can also specify:

- **Format** – Reference to a Format rule that determines how this field should be formatted.
- **When** – Reference to a When rule that determines whether this field should be displayed or not.

 A screenshot of the "Property Parameters" dialog box. It has three rows: "Name" with the value ".OfferData.SalesPrice", "Format" with the value "CurrencyAmount", and "When" with the value "IsHighValueCustomer". Each row has a magnifying glass icon to its right. At the bottom, there are two buttons: "Save" (orange) and "Cancel" (blue).

When an SMS message contains embedded fields, the character count is an approximation of the message length. Each embedded field counts as 15 characters towards the character count for the message.

Testing the SMS Treatment

The **Test Message** tab on the SMS Treatment provides an easy way to test the content of the SMS Treatment when it is actually delivered.

The following options are available for configuring the test message:

- **To** – Recipients of the test message. Select either Test Recipients or Seed List.
 - **Test Recipients** - Enter list of recipients. Each entry can either be the Operator ID of an existing user in the system or a valid mobile phone number. If the operator ID is entered, operator information such as the name and phone number is populated as the customer data and the test message is sent to the operator's phone number.

 A screenshot of the "To:" configuration section. It shows two radio buttons: "Test Recipients" (selected) and "Seed List". Below the radio buttons are two input fields. The first field contains the text "jranalyst" and the second field contains the text "1234567890". Each input field has a magnifying glass icon to its right. At the bottom left, there is a plus sign icon in a circle.

- **Seed List** - Select a predefined Seed List as the intended recipients of the test SMS message. The data for each seed is populated as the customer data and is visible (if referenced) in the message. In this case, the **Mobile Phone** column in the Seed List (.pyMobilePhone property) specifies the phone number to which the test SMS message is sent. Refer to the Seed Lists chapter for information on configuring a Seed List.

To:

☐ Test Recipients ☒ Seed List
Seed List: [View All Seed Lists](#)

- **Test Account Settings** – Specify SMS Account settings for sending the test SMS message.
 - **Use Default SMS Account** - Select this option to use the Default outbound SMS Account.

Test Account Settings
☒ Use Default SMS Account ☐ Specify SMS Account

- **Specify SMS Account** - Select this option to specify the outbound SMS Account to use for delivering the test message. Specify the account name in the **Test Account** field.

☐ Use Default SMS Account ☒ Specify SMS Account
Test Account:★

After the test message has been configured, it can be sent via the **Send Test Message** button.

Send out a test message to check your formatting. [Send Test Message](#)

Upon clicking this button, the SMS Treatment is saved and the test SMS message is sent to the specified recipients. The status of the test is displayed. Any errors in the test delivery are displayed in case of a failure. These can be corrected and the test message resubmitted for delivery.

Test Message - Results ×

One or more messages did not send successfully. Please update your sending options and try again.

Recipient	Status	Message
1234567890	 Failed!	Failed to open SMS account.

Close

Web Treatments

A Web Treatment represents the visual message you want to communicate to your customer on the web channel. It typically consists of an image or HTML fragment and text which is rendered in a specific location on a web page. If a user clicks on this image or HTML, Pega tracks the click event and redirects the user to a specified web page. This redirection is specified through the click-through URL.

Web Treatments are placed on web pages and contain a link which takes a Customer to a target page when clicked. To create a Web Treatment:

1. On the **Treatments** landing page, click **Create** > **Create web**.

2. Enter a unique name and a description for the Treatment.

3. Specify when the Treatment is active.

The following options are available:

- **Always**
- **Never**
- **Within a defined time period**

4. In the **Content URL** field, provide a link to an image or HTML fragment to display for this Treatment. For example, this can be the URL of an image hosted in a content repository.

After you populate the **Content URL** field, a preview of the content is displayed on the bottom of the page. For image content, the **Dimensions** field shows the image dimensions in pixels.

5. In the **Click-through URL** field, provide a link to a web page or a file that provides more details on the action for which you created the Treatment. Clicking this link will re-direct to the URL specified in this field.

6. In the **Format** field, specify whether the Treatment content is a plain image or an HTML fragment.

7. In the **Placement type** field, select the intended location and style of the treatment design. For example, the Treatment can appear as a large central banner, as a rotating strip of images, or as a footer.

The following options are available:

- **Carousel**
- **Feature band**
- **Footer bar**
- **Hero**
- **Page takeover**
- **Tile**

8. In the **Language** field, select the language of the treatment.

Specifying the treatment language allows Pega Customer Decision Hub to pick the right treatment based on the Customer's preferred language.

9. Click **Create**.

The Treatment you created is now available for use in actions.

What to do next: If you want to use adaptive analytics for Next-Best-Treatment selection, save the *Web_Click_Through_Rate* adaptive model into your *Artifacts* ruleset and add the relevant Customer property predictors. The predictors allow the adaptive model to learn and produce the desired results.

Customer Journey

A customer journey is the stages and steps customers go through as they engage with a brand for a specific outcome, such as applying for a credit card or adding a new mobile device.

It is important for marketers to understand how customers are engaging with their brand, on which channels, and the messages that are resonating or need attention. Because customer journeys show an aggregation of customers that are in any stage or life cycle for a particular outcome, you can use them to see the paths and volumes that customers are following. You can also drill down to see more details about the actions and the characteristics of customers that respond to these actions.

You can define stages for each unique scenario in a customer journey, and specify the conditions in which customers move between them. For example, customers may become aware that they need or want a new mobile phone. They consider different phones, compare features and pricing, and make a decision to purchase the product that best meets their needs. To capture this process, you can define a customer journey with phases such as Awareness, Consideration, Decision, and Purchase. Each stage has defined entry criteria, and can be further divided into steps. Each customer journey step can be linked to an action.

Pega Customer Decision Hub automatically selects relevant customer journeys based on entry criteria you define. A customer may participate in multiple journeys at the same time. Customers progress through these journeys in two ways:

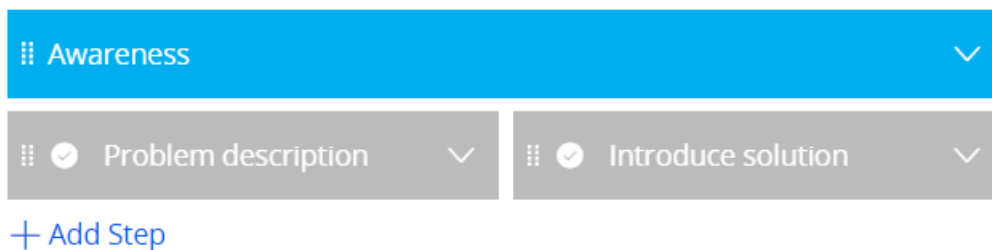
- When customers respond to an action associated with a specific journey stage and step, they progress to that stage and step in the journey.
- When data from data streams such as web analytics or event streams indicates that a customer entered, progressed, or completed a specific journey. Pega Customer Decision Hub compares the available data to the entry criteria you define and moves the customer to the relevant stage of the journey.

Defining Customer Journeys

To better understand how your customers engage with your brand and which actions are the most effective, define customer journeys with stages and steps that describe your customers' engagement. You can define new customer journeys manually, or use predefined templates.

1. In the Pega Customer Decision Hub portal, click **Next-Best-Action > Customer Journey**.
2. Click **Create**.
3. In the **Journey details** section, enter the following information:
 - **Name and Description**
 - **Issue and Group (Present content from)** - Specify an Issue or Group if you want to assign actions to journey steps. Specifying an Issue or Group filters the list of actions according to the Issue or Group you select.
 - **Maximum journey length** - Specify the expected number of days it takes the customer to complete this journey. After this time, the customer will no longer be eligible for this journey.
 - **Journey rank** - Specify the priority of this journey, relative to other journeys in your application.
4. In the **Entry Criteria** section, click the gear icon  to define proposition filters, which are similar to action eligibilities. For more information, see [Configuring Eligibilities](#).
5. In the **Select how you want to configure your journey** section, select if you want to create the journey using a predefined template, or define all stages and steps manually.

- To create the journey from a template, click **Start with a template**, and then select a predefined template from the list.
 - To manually add journey stages, click **Create new**.
- Define the stages that make up the customer journey. For example, a sales journey can consist of Awareness, Consideration and Decision, after which the journey is considered complete.
 - To add a new journey stage, click **Add Stage**.
 - To remove a stage, click the down arrow  by the name of the stage, and then click **Delete stage**.
 - Define the entrance criteria for each stage in the customer journey. This helps ensure that the customer's progress from stage to stage is tracked. For more information, see [Configuring Eligibilities](#).
 - Click the name of the stage.
 - Click the gear icon in the **ENTRY CRITERIA** section.
 - Define the steps which make up the journey stages.
 - To add a step to a stage, click **Add Step**.



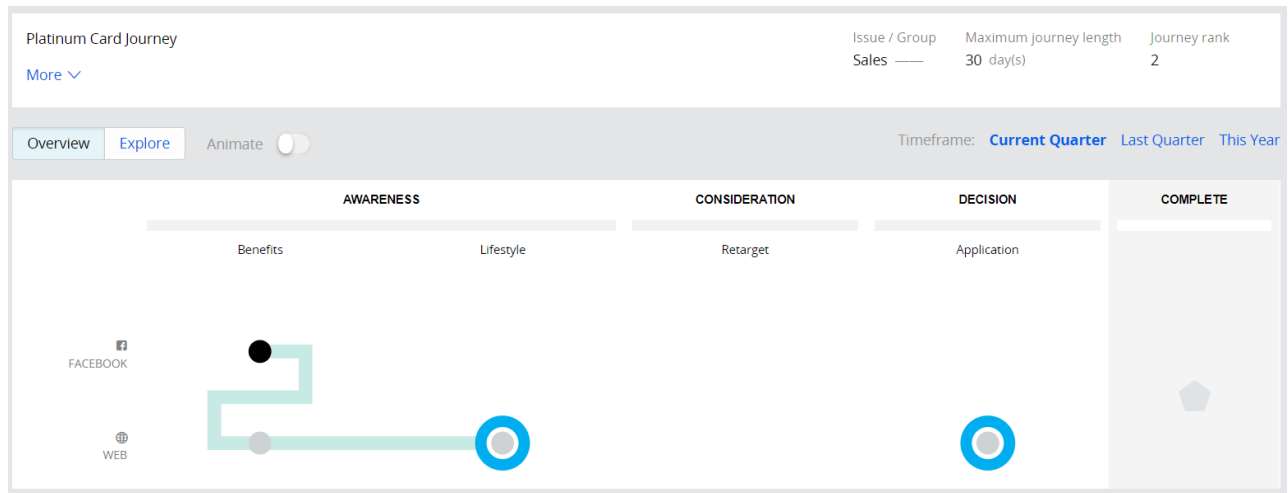
- For each step, you can specify the entry criteria to define when a customer is eligible for this step. Click the name of the step, then click the gear icon in the **ENTRY CRITERIA** section. For more information, see [Configuring Eligibilities](#).
 - Optional: You can also link selected steps with actions that should be extended to a customer at this step of the journey. To associate a step with one or more actions, click the name of the step, then click the gear icon in the **CONTENT** section. For more information, see [Actions](#).
- Click **Save**.
 - Click **Activate** to activate the customer journey.

Managing Customer Journeys

You can view all customer journeys in your system by using the Customer Journey landing page.

Use the Customer Journey landing page to examine the effectiveness of each message at each step of an active customer journey. With the Journey Overview, you can see which channels and messages provide the best success rates, and discover where you may want to focus your marketing efforts.

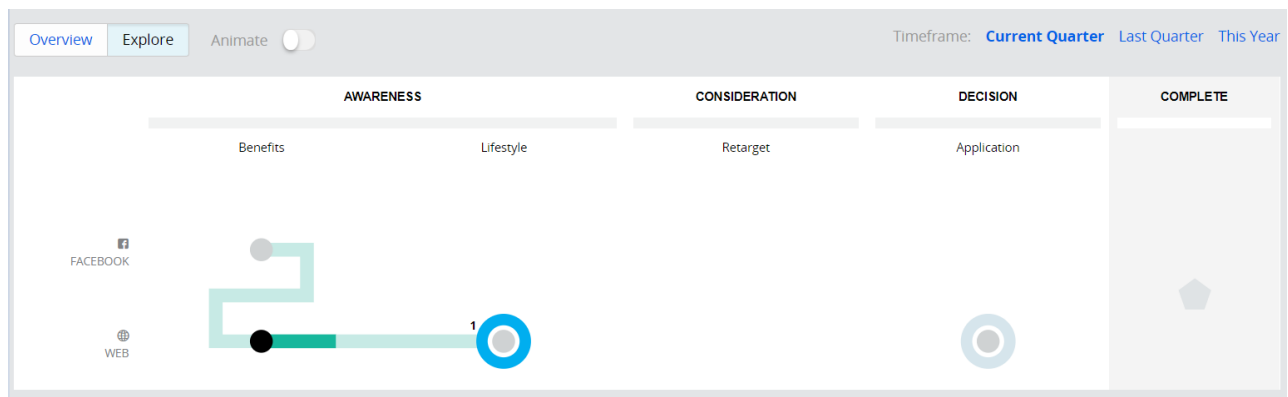
- In the Pega Customer Decision Hub portal, click **Next-Best-Action > Customer Journey**.
- Click a customer journey to review its stages and steps. An **Overview** of the journey is displayed.



3. For each step in the journey, review the messages and communications on different channels, displayed as nodes on the journey graph. Click a node to examine the performance of specific messages for a specific journey step.

For example, you can compare the number of customers who progressed to the next journey step to the number of customers who declined the action at this step. You can also view the top grouping for each active predictor from the adaptive model in the Customer Predictors section. If the step is associated with multiple actions, you can compare volume, impression and click-through statistics for each action.

4. Optional: To change the timeframe from the current quarter, select **Last Quarter** or **This Year** in the **Timeframe** section.
5. Optional: To view an animated version of the journey progress, click **Explore**, and then click a journey node. The number of customers who progressed through this step is displayed.



6. Create a template from the customer journey, so that other marketers can reuse it. To save a customer journey as a template, click **Actions** > **Save as template**.

7. To activate or deactivate a customer journey, click **Activate** or **Deactivate**.



Note: To activate a customer journey, first make sure that you defined entry criteria for all journey stages. For more information, see [Defining Customer Journeys](#).

8. To edit a customer journey, deactivate it, then click **Edit**. You cannot edit a customer journey while it is active.

9. To delete a customer journey, deactivate it, then click **Delete**. You cannot delete an active customer journey.

Configuring an action flow to write information to an external system

Create Output Template rules to define the content to write to an external source as part of making an action. Pega Customer Decision Hub supports writing to both a file and a database table.

You can use data exports out of Pega Customer Decision Hub to support and extend your customer engagement efforts. For example, as part of your customer retention efforts, you may prepare an engagement message for customers whose contracts are due to expire, encouraging them to renew their contracts. After the message is emailed to the customers, you may want to follow up by sending them the required renewal forms by direct mail. To automatize this process, you can configure Pega Customer Decision Hub to automatically write the customers' names and mailing addresses to a file.

Understanding the process of using an output template

The process of writing information to an output template consists of the following stages:

1. *Configuration* - In this stage, an operator with access to the **Treatments** landing page creates an Output Template rule, configures the output contents, and specifies the finalization schedule. For more information, see the following topics:
 - [Creating file templates](#)
 - [Creating database templates](#)
 - [Configuring the contents of a file or database template](#)
 - [Configuring the finalization schedule for a file or database template](#)
2. *Runtime* - In this stage, the records are staged for writing to the target file or database table. The runtime stage for an output template starts when an action flow reaches the flow shape that references the template.
3. *Finalization* - In this stage, the target file or database table is populated with the staged records. The finalization stage can be triggered manually, automatically at the end of each run, or according to a predefined schedule. For more information, see [Configuring the finalization schedule for a file or database template](#).

You can view the list of output templates, their status, and other details on the File and Database landing pages. For more information, see [File and Database landing page details](#).

Creating file templates

To create a new template for file exports, complete the following steps:

1. In the Pega Customer Decision Hub portal, click **Content > Treatments**.
2. On the **Treatments** landing page, click **Create > File**.
3. Enter a description of the template.
4. Select the issue and group for storing the output template rule.
To create the rule at the top level of your next-best-action business structure, leave the **Issue** and **Group** fields empty. The level at which you create the template determines the attributes (action details) that are available for use within the template.
5. Click **Create and open**.
6. Provide the following information:

- a. In the **Repository name** field, enter the name of the repository where you want to store the file.
- b. In the **File path** field, enter the path on the repository where you want to store the output file, and the name of the file where you want to store the output content.

The format for the file path and name is `/folder/filename`.

For example: `actions/output/mailling-list.csv`.



Note: If you configure multiple output templates, each file must have a unique name.

7. Specify whether you want to **finalize the template at the end of each outbound run**.

By finalizing a template at the end of each run, you ensure that all data in the file is the result of a single run. That is, the final output includes all data related to the run that triggered the finalization. If you want the data from multiple campaigns to be written to the same file, leave this option unselected.

8. If you chose to finalize the template at the end of each run, select **Include run ID in the file name** if you want the file name to include the run ID for easier identification.

For example: `actions/output/mailling-list_PR1.csv`.

9. Specify whether you want to include the date and time in the file name when you finalize the template.

When the template is finalized, the name of the output file includes the date and time configured in the **MKTFileNameDateMask** dynamic system setting. By default, the format is `YYYY-MM-DD-hhmmss`

For example: `actions/output/mailling-list_PR1_2020-02-03-111609.csv`.



Tip: As a best practice, if you chose to finalize the template at the end of each run, configure the file name to include the run ID, the data and time of the template finalization, or both. This prevents the output file from being overwritten by subsequent runs,

10. In the **Delimiter type** field, select the delimiter for the output CSV file.

Use a delimiter which is recognized by the target repository for the file. Common delimiters include commas (,) and semicolons (;).

Creating database templates

To create a new template for database exports, complete the following steps:

1. On the **Treatments** landing page, click **Create > Database**.

2. Enter a description of the template.

3. Select the issue and group for storing the database template rule.

To create the rule at the top level of your next-best-action business structure, leave the **Issue** and **Group** fields empty. The level at which you create the template determines the attributes (action details) that are available for use within the template.

4. Click **Create and open**.

5. Provide the following information:

- a. In the **Database** field, specify the name of the Database rule (*Data-Admin-DB-Name*) that points to the database where the system writes output records for the output template.

- b. In the **Table** field, enter the name of the table where you want to write the output content for this template.

6. Specify whether you want to finalize the template at the end of each outbound run.

By finalizing a template at the end of each outbound run, you ensure that all actions from the run are written to the database at the same time. That is, the final output includes all data related to the run that triggered the finalization. .



Note: If you choose to finalize the template at the end of the run, all data from the run is appended to the existing data in the table.

7. If you did not choose to finalize the template at the end of each run, specify how you want to write the information to the destination database:
 - To replace the data in the destination table with new data, select the **Overwrite existing data** check box.
 - To add new data to the destination table, select the **Append to existing data** check box.

Configuring the contents of a file or database template

Configure the output content, including both data attributes and static text, for this template.

1. On the **Fields** tab of a template, click **Add** to add a new field to the template contents.
2. Enter a name for the field.



Note: The system uses this value as the name for the database table column or file column header. Do not use database reserved words such as Group for the names, as this will cause errors during the template finalization.

3. Select whether the field is a **Data Field** or **Text**.
4. In the **Content** field, select the data field to output, or type in the text.
5. For file templates, if the field that you added is a data field, select the format to apply to the field.

For example: Depending on the data field that you selected, formats can include date formatting, currency formatting, decimal separators, and others.

Configuring the finalization schedule for a file or database template

Configure the finalization schedule, notifications, and post-finalization activity for the output template.

Finalizing a template writes any pending data to the output file or table. For file templates, finalization converts the staging output template `<container name>_LOCK` table) to its proper version (without `lock` in its name). For database templates, this happens only if you select the **Overwrite existing data** writing option.

Pega Customer Decision Hub uses the standard queue processor for template finalization. If you want to use a dedicated queue processor, add a new dynamic system setting called `CDHDedicatedFileDBQueueProcessor`, and set its value to `true`.



Tip: If you configure the output template to be finalized at the end of each run, you do not need to enable scheduled finalization. As a best practice, enable scheduled finalization for templates that capture data for actions triggered by mechanisms other than outbound runs, such as real-time events or containers.

1. In the **Schedule** section, select the **Enable schedule** check box to configure when and how frequently to finalize this output template.
 -  **Tip:** As a best practice, do not schedule the template to be finalized more often than every 30 minutes. Finalizing the template too frequently can result in unexpected behavior.
2. **Optional:** In the **Delivery options** section, configure the notification that you want to send when the template is finalized.

3. **Optional:** In the **Advanced** section, configure a post-finalization activity for this output template:

- a. In the **Task name** field, enter a name for the task.
- b. In the **Task description** field, enter a description for the task.
- c. In the **Activity class** field, select the **Applies To** class of the post-finalization activity from the list.



Note: The post-finalization activity must reside in the *PegaMKT-Work-Offer* class or in one of its descendant classes.

- d. In the **Activity name**, select the post-finalization activity (*Rule-Obj-Activity*) from the list.

What to do next: After you specify the contents of an output template, you can configure the following outbound shapes in an action flow to write to the template:

- Send Email
- Send SMS
- Send Generic
- Sent Multiple Treatments

Action Bundles

In typical marketing scenarios, it is often desirable to group offerings into bundles. There may be varied reasons for doing so, such as incentives, logistics, etc. To address this marketing need, the system provides support for grouping actions into bundles.

Action Bundling Basics

Action Roles

Actions in an action bundle can be categorized into the following two roles:

- Parent action - Each bundle must have one parent action. Typically, the flow for the parent action will propagate the offering of its member actions. For example, the parent flow will send an email with details about its member actions and action links to respond to the actions.
- Member action - Each bundle can have multiple member actions.

Action Bundle Types

The system supports three modes of action bundling. These modes are henceforth referred to as bundle types.

- Fixed Bundle - This bundle type should be used when customers must purchase the bundle in its entirety (all members). In this mode, the parent flow is the only flow that is processed. All Interaction History (IH) records are recorded for the parent bundle and all of its members. Any response will progress the parent flow.
- Flexible Bundle - This bundle type should be used when customers can purchase the entire bundle or can pick individual members to purchase. In this mode, the parent flow is used as a container for distributing communication about the collection of offerings. A response to an individual offering will only start that member's flow. Any IH recording in the member flow will record information for the member action and the parent action. Responding directly to the parent bundle action will trigger all member actions that haven't been started. However, the parent flow will not progress.
- Grouped actions - This bundle type should be used when the user has a selection of actions they wish to market together to the customer. The individual actions themselves may not have any correlation to each other. In this mode, (similar to the flexible bundle mode) the parent flow is used as a container for distributing communication about the collection of offerings. A response to an individual offering will only start that member's flow. However, unlike a flexible bundle, any IH recording in the member flow will only record information for the member action. Responding directly to the parent bundle action will not start any of the member actions, but will progress the parent flow.

The differences in the behaviors of the three bundle types are summarized in the table below:

Scenario	Fixed Bundle	Flexible Bundle	Grouped Actions
Action initiation	Same behavior for all three bundle types: - Start the parent flow - Record initial IH entry for parent and all members		

Scenario	Fixed Bundle	Flexible Bundle	Grouped Actions
Respond to Email link for bundle (all members)	- Resume the parent flow	- Start all member flows that haven't been started - Parent flow does not resume	- Resume the parent flow
Respond to Email link for individual action	- Resume the parent flow	- Start or resume the member flow	- Start or resume the member flow
Update Status shape in parent action	- Record IH response for parent and all members	- Record IH response for parent and member actions that haven't been started	- Record IH response for parent and member actions that haven't been started
Update Status shape in member action	N/A (since member action is never started)	- Record IH response for member and its parent	- Record IH response for member only
Parent action completion	- Complete parent and all member actions	- Complete parent and member actions that haven't been started	- Complete parent and member actions that haven't been started
Member action completion	N/A (since member action is never started)	- Complete member action only	- Complete member action only

Specifying Action Bundle Settings

There are two ways to specify the action bundle settings for an action.

Using the Details Tab on the Action Rule Form

The **Details** tab on the action rule form contains the **Bundle Attributes** section which can be used for specifying the following bundle settings.

- Bundle Name - Specify the name of the action bundle. This name should be the same for all actions (both parent and members) in the bundle.

If this offer is to be part of a bundle, enter a bundle name.

What is the bundle name?

SampleOfferBundle

- Action Role - Specify the role this action will play in the bundle. Select **Yes** if this action is a parent action, otherwise select **No**. Also, select the bundle type for the parent action.

Is this offer the bundle parent?

- ☐ Not an offer bundle parent
☒ Yes, this is an offer bundle parent

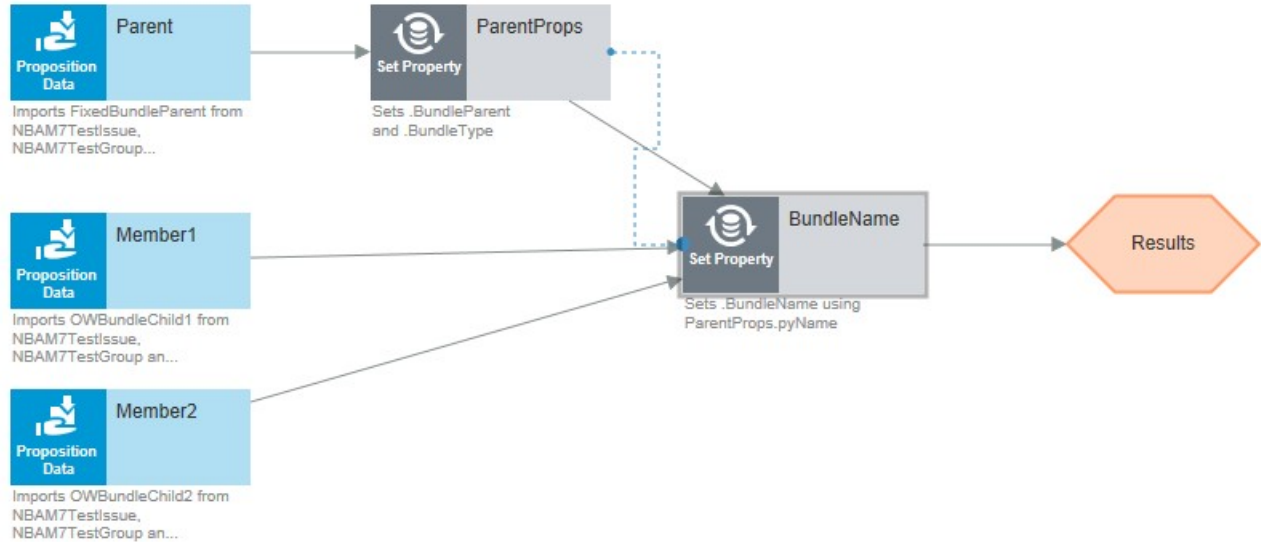
What type of bundle parent?

Fixed Bundle ▼
 Fixed Bundle
 Flexible Bundle
 Grouped Offers

Specifying Bundle Characteristics in the Strategy

Bundle characteristics for actions can also be directly specified in Strategies. Strategies can also be used to override the bundle settings specified on the action. The settings on the Details tab can be considered as defaults, which can be overridden in Strategies (if desired).

The following example illustrates setting bundle characteristics using a Strategy rule.



For the parent action, the bundle type is specified (FixedBundle, FlexibleBundle, or GroupedOffers) and the bundle parent flag is set to true.

Action	Target	Source
Set	.BundleParent	equal to true
Set	.BundleType	equal to "FixedBundle"

For all actions (parent and two members), the bundle name is specified. In the above example, the parent action's name is used as the bundle name.

Action	Target	Source
Set	.BundleName	equal to ParentProps.pyName

Designing Flows for Bundles

When designing flows for bundled items, the user must take into consideration the role of the action. For the parent action, the flow can also be tailored differently based on the bundle type.

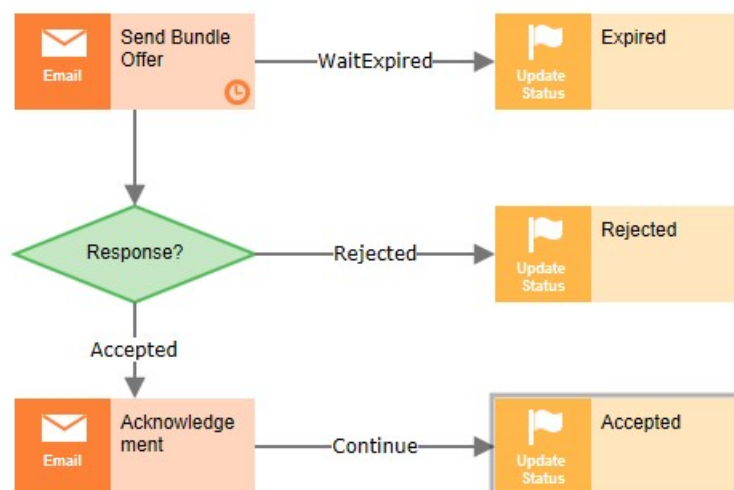
Designing the Parent Action

The parent action flow is responsible for sending out the email containing details of the bundle and its members. This email can also contain links to respond to the bundle and/or individual actions. This initial

responsibility is the same across all three bundle types. Once the email has been sent, the behavior of the parent action flow typically varies slightly based on the bundle type.

Fixed Bundle

In a fixed bundle, the parent flow is responsible for handling responses received for the bundle, as shown in the flow snippet below.



Flexible Bundle

In a flexible bundle, the parent flow is only responsible for the initial communication of the action bundle. Responses received for the bundle will not progress the parent flow. A simple parent flow is shown below.



Grouped Actions

In a grouped bundle, the parent flow is responsible for the initial communication. Typically, bundle-level response links are not provided in this mode. If a bundle-level link is made available, the parent flow will be resumed. This could be used to trigger a follow-up email with more information and/or update Interaction History records for the parent and all member actions that haven't been started.

Designing Member Actions

The flow for a bundle member action differs slightly from typical action flows since the initial communication of the action has already been made by the bundle parent action. The flow also differs based on the bundle type.

Fixed Bundle

In a fixed bundle, the member flow is never started. Thus, the member flow can simply be an empty flow.



Flexible Bundle and Grouped Actions

In both these modes, the member flow is started (or progressed) when a response is received. With the exception of the initial communication, these flows can be designed just like standard action flows.

Designing Email Treatments for Bundles

When designing Email Treatments for bundles, the user needs to consider the type of the bundle. A typical Email Treatment for an action bundle includes an overall description of the bundle and details for each of its members. Additionally, based on the bundle type, response links can be provided at the bundle and/or the member level.

The top level BundleTemplate Email Treatment is provided as an out-of-the-box sample.

This treatment includes the following salient pieces of a bundle Email Treatment:

- Bundle name - References the .OfferData.BundleName property
- Response link for bundle – Added using the Insert Button functionality
- Impression capture - References the RecordImpression section. With bundles, it is typical to include the impression capture section at the parent level.
- Member details - References the BundleTemplate section. This section uses the BundleOfferMembers page list property to display the member actions in a grid with accept and reject response links for each member.

The BundleOfferMembers property is populated at runtime to contain details of the various bundle members. This can be used in dynamic containers such as the repeating grid. Users can also make static references to member actions in this page list. For example, to display the name of the first action in the bundle, reference the .BundleOfferMembers(1).OfferData.pyName property.

Another common usage pattern is to update the grid in the BundleTemplate (or equivalent) section at the top level (PegaMKT-Work-Offer) to include a sub-section for displaying relevant action information, say MemberOfferDetails. Users can then create a top-level version of this section to serve as a base for all member actions. To customize the details for a particular issue or group, the user simply needs to override the details section in the appropriate issue or group class.

Geofences

A Geofence is a virtual boundary around a particular location. Marketing users can define Geofences in the system and then use them to trigger Events. For example, a customer entering (or nearing) a store could trigger the Geofence for that store. This could in turn trigger an Event whereby the customer is presented with an appropriate action. Users can also reference Geofences in strategies and can harness this to determine the most relevant action for a particular customer.

Geofences are accessible in the Pega Customer Decision Hub portal, via: **Content > Real-Time Artifacts > Geofences**.

Real-Time Artifacts

Refresh Help Close

Events **Geofences**

List of the geofences configured within the system. Configure these geofences to trigger events for location-based marketing opportunities.

New Import

Geofence Name	Latitude	Longitude	Street Address	City	State	Country	Postal Code	Actions
PegaBedford	42.928	-71.464	8 Commerce Drive	Bedford	New Hampshire	United States	03110	Actions ▼
PegaBengaluru	12.922	77.676		Bengaluru	Karnataka	India	560103	Actions ▼
PegaHyderabad	17.447	78.356		Hyderabad	Telangana	India	500032	Actions ▼

The Geofences landing page provides a quick overview of the various fences configured in the application. The Geofence rule can be opened by double-clicking the Geofence row.

Geofence Management

This section explains the various modes available for managing Geofences.

Creating a new Geofence

Users can use the **Create** link in the Geofences landing page to create a new Geofence.

A new Geofence rule resembles the following:

Edit Geofence: Sample Geofence [Available]
 Save Actions Close

Design
History

Search for a location

Enter an address or coordinates to find a location.

Search using

☒ Address
 ☐ Coordinates

What is the address?

Search

Geofence Details

The following details represent this geofence

Address

Street Address

City

State

Country

Postal Code

Coordinates

Latitude

Longitude

Radius

Map

The map below helps you to visualize your geofence. You may also interact with it to change the location or tune the radius of the fence.

What is the radius to monitor for this geofence? Kilometers ▼

The Geofence rule has the following tabs:

Tab Name	Purpose
Design	Specify the location details and radius of the Geofence. View other nearby fences.
History	Specify the Description and Usage information for this Geofence.

Specifying Geofence Details

The following options are available for specifying the Geofence's location:

- Address – Users can directly specify the desired address in the input box.

Search using

☒ Address ☐ Coordinates

What is the address?

8 Commence Dr, Bedford NH 03110

Search

- Coordinates – Users can specify the latitude and longitude of the desired location.

Search using

☐ Address ☒ Coordinates

What are the coordinates?

Latitude 40.0339

Longitude -75.3368

Search

After specifying the location for the Geofence, the “Search” button is used to locate the Geofence in the map. If the specified location is valid, the Map section will render the Geofence and the Details section will display available details for the Geofence.

The radius of the Geofence and the unit of measurement can be modified. Upon modification, the Map will re-render using the new radius values.

What is the radius to monitor for this geofence? 2 Miles ▼

Interacting with the Map

The rendered map is a Google map and allows for various interaction patterns, including the following:

- Zooming in and out
- Panning in all directions
- Using Street View
- Viewing satellite imagery

In addition to the above common interactions, the following Geofence-specific interactions are also available:

- Dragging the Geofence pin

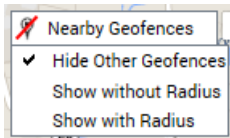


to relocate the Geofence’s location. The details section will display the new address and coordinates.

- Resizing the Geofence by dragging any of the four endpoints (north, south, east, and west). The details section will display the new radius value.

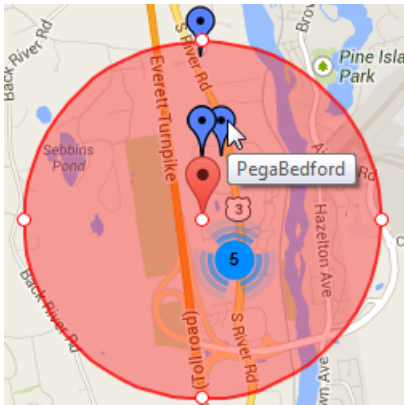
Viewing Nearby Geofences

The map on the Geofence rule form can also be used to view nearby Geofences. This is helpful in determining potential overlaps across Geofences. By default, nearby Geofences are not displayed. Use the “Nearby Geofences” menu on the map to toggle the display of nearby fences.

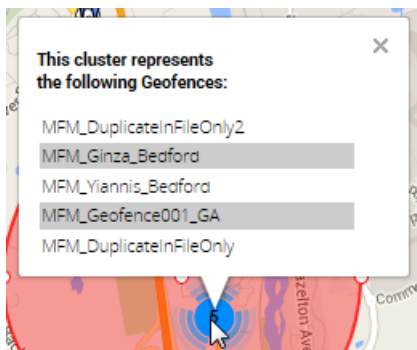


The following three options are available for nearby Geofences:

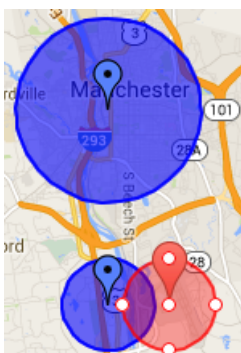
1. **Hide Other Geofences** - This is the default option. In this mode, nearby Geofences are not displayed.
2. **Show without Radius** - Select this option to view nearby Geofence locations. Each Geofence is represented by a blue pin and the radius of the Geofence is not displayed. Users can hover over the pin to view the name of the Geofence.



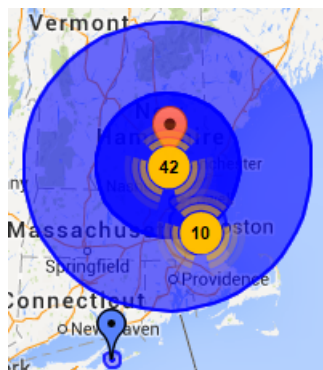
If multiple Geofences are located in too close a radius to render separately, they are represented together by a circle with the number of Geofences it contains. Users can click on the number to view a list of the contained Geofences.



3. **Show with Radius** - Select this option to view nearby Geofences along with their radii. Each neighboring Geofence is represented by a blue pin as its center and a blue circle corresponding in size to its radius.



As previously, if there is a high density of Geofences, they are represented by a circle with the number of contained Geofences. The shading of the circle also provides a visual cue to its density. Denser circles will be more opaque than less dense circles.



Viewing Associated Events

Events that have been associated to this Geofence are displayed in the “Associated Events” grid. When a customer enters this Geofence, the Events listed in the grid will be triggered. Refer to the Events chapter for details on associating Geofences with Events.

Associated Events

[Sample Event with Geofences](#)

[Signed up in store](#)

Importing Geofences

Users can also choose to bulk import Geofences into the system. Click the **Import** link on the Geofences landing page to launch the Import Geofences process. The import process has the following three stages:

Import

Use the **Choose File** button to select the comma-separated values (CSV) file containing the list of Geofences to import. After selecting the CSV file, use the “Next” button to proceed to the review stage.

New: Import Geofences
? Help

Import

Do you have many Geofences? Upload them into the system by following the steps below:

Import

Review

Summary

What file would you like to use as the source of Geofence data to import?

File * No file chosen

Notes on the import file:

- File must be in CSV format
- The entries in the CSV must be in the following order:

Geofence Name, Radius, Radius Unit, Latitude, Longitude, Street Address, City, State, Postal Code, Country

- Geofence Name must be provided
- Either location coordinates (latitude/longitude) or address (street/city/state...) must be provided for each Geofence, but not both.
- Radius unit should be either "Miles" or "Kilometers". If radius unit is not provided, it is defaulted to "Kilometers".
- If radius is not provided, it is defaulted to 1

Example Geofence entries:

- Using coordinates:

PegaBedford,2,Miles,42.928,-71.464,,,,,

- Using address fields:

PegaBedford2,2,Kilometers,,,8 Commerce Drive,Bedford,NH,03110,USA

Review

This stage enables the user to review the import process and handle any conflicts. The user is presented with total number of Geofence records, number of Geofences that will be created, number of warnings, and number of errors.

A total of 5 records were found:

■ 2 To be created ■ 1 Warning messages ■ 1 Error messages

The **Geofences to Import** grid lists each entry in the import file along with its pertinent details and its status. The grid is paginated if there are sufficient entries in the import file.

Geofences to Import

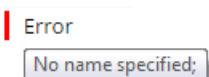
Overwrite	Name	Latitude	Longitude	Full Address	Radius	Unit
	PegaBedford	42.928	-71.464	8 Commerce Drive, Bedford, NH 03110, USA	2	Miles
	PegaBedford2	42.928	-71.464	8 Commerce Drive, Bedford, NH 03110, USA	2	Kilometers
	PegaCambridge	42.366	-71.077	1 Rogers Street, Cambridge, MA 02142, USA	1	Miles
☐	PegaBedford2	42.928	-71.464	8 Commerce Drive, Bedford, NH 03110, USA	5	Kilometers
		42.928	-71.464		1	Miles

There are three possible status values:

1. (Blank) - Geofence is valid and has no conflicts. This Geofence can be successfully created.
2. **Warning** - Geofence is valid, but has conflicts with either an existing Geofence rule in the system or another Geofence in the import file. The creation of this Geofence will depend on the conflict management option selected in the "Import Options" section. The reason for the warning is displayed as a tooltip on the status.

■ Warning
■ Error Geofence 'PegaBedford2' is duplicated in the import file;

3. **Error** - Geofence is invalid and will not be created. The reason for the error is displayed as a tooltip on the status.



If desired, users can return to the import stage via the **Back** button and re-import the file after addressing any errors.

Managing Conflicts

The system provides the following options for handling conflicts in the import process:

- **Skip conflicts and keep my existing data**

Select this option to ignore any conflicting Geofence entries and retain the original Geofence rule or the first Geofence import file entry, as appropriate.

- **Overwrite all my existing data with the new import data**

Select this option to overwrite existing Geofence rules (in the system) and/or earlier import file entries with the latest file entry.

- **Overwrite my existing data as marked above**

Select this option to pick which import file entries should overwrite existing entries. Select the Overwrite checkbox for each desired entry. Entries where the checkbox is not checked will be ignored.

Overwrite	Name
☒	PegaBedford2

After reviewing the import results and managing the conflicts, users must check the `I have reviewed...` checkbox.

☒ I have reviewed the results. Clicking on Next will finalize the import.

Finally, use the **Next** button to finalize the import of Geofences and initiate the back-end creation (or updating) of Geofence rules.

Summary

This stage provides the user with a summary of the Geofence import process.

The import process has completed with the following results:

- 2 Geofences have been created
- 0 Geofences have been updated
- 1 Geofences have been skipped
- 2 Errors skipped

After reviewing the results, use the **Done** button to exit the import process.

Geofence Services

In addition to configuring Geofence rules in Pega Customer Decision Hub, the app that wishes to detect when a Geofence is entered (tripped) must make service requests to the system to determine if a Geofence is tripped. If a Geofence is tripped, all Events associated with it will be triggered (assuming

they are currently applicable). The system provides multiple services which can be used separately or in tandem to facilitate this functionality.

Preferred Geofences Lookup

The Preferred Geofences set of services can be used to determine the most relevant set of Geofences for a particular location. For example, when a customer launches the app on their device, the app can invoke the service to determine the list of nearby Geofences to monitor. The app can then provide this list to the device's OS to monitor, thereby avoiding having to continually poll whether the current location has tripped a Geofence.

The following two variants of the service exist:

- **HandleMktPreferredFences HTTP Service**

```
http://<host>:<port>/prweb/PRHTTPService/PegaMKTGeolocation/Services/
HandleMktPreferredFences?
Key=Closest&BaseLatitude=<DeviceLatitude>&BaseLongitude=<DeviceLongitude>&ClosestCount=<N
```

- **HandleMktPreferredFences REST Service**

```
http://<host>:<port>/prweb/PRRestService/PegaMKTGeolocation/Services/
HandleMktPreferredFences/Closest?
BaseLatitude=<DeviceLatitude>&BaseLongitude=<DeviceLongitude>&ClosestCount=<NumberOfGeofen
```

Both variants expect the following inputs:

- **BaseLatitude** – Latitude of the device
- **BaseLongitude** – Longitude of the device
- **ClosestCount** – Number of closest Geofences to return for the specified location. If this value is not provided, the system returns up to ten Geofences.

The content type for the response differs between the variants:

Service Type	Response Content Type
HTTP	text/plain (content is still JSON)
REST	application/json

A sample (formatted) response is shown below:

```
{  GeolocationArray : [{      "GeofenceName" : "PegaBedford",
    "RadiusNormalized" : "1000",      "Latitude" : "42.928",      "Longitude" :
"-71.464"    }, {      "GeofenceName" : "ManchesterBRAirport",
    "RadiusNormalized" : "3218.688",      "Latitude" : "42.928",      "Longitude" :
"-71.438"    }] }
```

In error scenarios, such as when the location coordinates are not provided, an error response is returned.

```
{  ErrorsList : [{      "pyMessage" : "Error: One or more input parameters are
invalid."    }] }
```

The system provides out-of-the-box support for closest Geofence lookup ("Key" request parameter is set to "Closest" in the example URLs above). Custom implementations may extend this functionality to provide support for other lookup modes.

Detect/Trigger Geofences

The Detect/Trigger set of services are used to detect whether a customer's device has tripped a Geofence in the system and to trigger Events associated with tripped Geofences. These services support handling requests for multiple customers in a single request.

The following two variants of the service exist:

- **HandleMktGeolocations HTTP Service**

```
http://<host>:<port>/prweb/PRHTTPService/PegaMKTGeolocation/Services/
HandleMktGeolocations?
CustomerID=<CustomerID1,2,..n>&DeviceID=<DeviceID1,2,..n>&DeviceLatitude=<DeviceLatitude1,
```

When using this service for multiple customers, ensure that each of the values are comma-separated (e.g. CustomerID=A1,A2,B1) and that the length of each of the request fields (such as CustomerID, DeviceLatitude, etc.) is the same.

- **HandleMktGeolocations SOAP Service**

The following URL provides the WSDL for your this service: `http://<host>:<port>/prweb/PRSOAPServlet/SOAP/PegaMKTGeolocation/Services?WSDL`

The following is an example SOAP request for two customers:

```
<soap:Envelope xmlns:soap="http://www.w3.org/2003/05/soap-
envelope" xmlns:geol="GeolocationPayload"> <soap:Header/>
<soap:Body> <geol:GeolocationPayload> <Geolocation>
<CustomerID>JR</CustomerID> <DeviceID>ANDR1234</DeviceID>
<DeviceLatitude>41.34</DeviceLatitude> <DeviceLongitude>-71.79</
DeviceLongitude> </Geolocation> <Geolocation>
<CustomerID>RA</CustomerID> <DeviceID>IO12</DeviceID>
<DeviceLatitude>41.797</DeviceLatitude> <DeviceLongitude>-72.077</
DeviceLongitude> </Geolocation> </geol:GeolocationPayload> </
soap:Body></soap:Envelope>
```

Both variants of this service expect the following inputs:

- **CustomerID** – Customer identifier
- **DeviceID** – Device identifier
- **DeviceLatitude** – Latitude of the device
- **DeviceLongitude** – Longitude of the device

For each customer location, the system evaluates whether the location trips any of the defined Geofences. For each Geofence that is tripped, the system triggers all Events associated to that Geofence.

Real-Time Events

Events provide a mechanism for responding to real-time marketing opportunities. An Event is essentially an entry-point into the marketing application which can be initiated by internal or external systems.

Real-Time Events are listed on the **Events** tab of the Real-Time Artifacts landing page. This landing page is accessible in the Pega Customer Decision Hub portal via: **Content > Real-Time Artifacts**.

Real-Time Artifacts

RefreshHelpClose

EventsGeofences

List of the real-time events configured within the system. Configure these events to respond to real-time marketing opportunities.

New

Active?	Name ▲	Description	Valid From	Valid To	Actions
✓	AccountOpened	Account Opened	12/1/2014		Actions ▼
	BonusLevelReached	Bonus Level Reached	1/1/2014	12/31/2014	Actions ▼
✓	SignedUpInStore	Signed up in store			Actions ▼

The Events landing page provides a quick overview of the Events rules configured in the application. The landing page indicates whether an Event is active or inactive. The **Valid From** and **Valid To** values (if configured) are displayed in green if they are currently satisfied.

Event Management

This section explains the various aspects of managing Events.

Creating a new Event

Users can use the **Create** link in the Events landing page to create a new Event rule. A new Real-Time Event rule resembles the following:

Edit Real-Time Event: [Sample Event](#) [Available]
Save
▼
Actions ▼
✕

CL [PegaMKT-Work-Offer](#) ID [SampleEvent](#) RS [PegaNBAM-Artifacts:07-11-01](#)

Event Details History

About This Event

Configure the availability of this Real-Time Event.

Is this event currently active?

☒ Yes, this event will respond to requests
☐ No, this event will not respond at this time

Does this event have special validity options?

Valid From To

Available Hours To Time Zone

Associated Geofences

Configure the associations of this Event to Geofences

Associate this Event with Geofences?

☐ Yes, this Event is to be associated with Geofence rules
☒ No, this Event is not associated with Geofences

Campaigns Associated with this Event

The following campaigns will be triggered by this event. Associate campaigns to this event through the campaign's Engagement configuration.

Associated Campaigns

No Items

The Event rule has the following tabs:

Tab Name	Purpose
Event Details	Specify the availability details for the Event and associate Geofences with the Event.
History	Specify the Description and Usage information for this Event.

Specifying Event Details

The following configuration options are available:

- **Is this event currently active?**

Select **Yes** to enable the Event and have it respond to requests. Select **No** to prevent the Event from responding to requests. If an inactive Event is triggered, it will simply be ignored.

- **Does this event have special validity options?**

These settings allow for both data and time based validity restrictions to be placed on the Event. If the Event is always valid, leave these settings blank. To specify date restrictions, use the **Valid From** settings. To specify time restrictions, use the **Available Hours** settings. If the Event is triggered outside the configured date and time windows, it will simply be ignored.

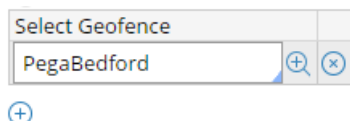
Associating Geofences with the Event

Events can be associated with Geofence rules defined in the system. When an associated Geofence is tripped, any Event associated with it will be triggered. Select **Yes** to associate this event with Geofences.

Associate this Event with Geofences?

- ☒ Yes, this Event is to be associated with Geofence rules
- ☐ No, this Event is not associated with Geofences

Use the add icon to add Geofences one at a time.



Use the **Edit multiple** button to add multiple Geofences using a list-to-list interaction.

Edit Geofence List

×

Available Geofences

PegaBengaluru

SampleGeofence

PegaBedford2

PegaCambridge

Associated Geofences

PegaBedford

PegaHyderabad

»»

»

«

««

A↓

▲

▼

A↓

Cancel

Submit

The left list contains the available Geofences while the right list contains the currently selected Geofences. Use the icons adjacent to the lists to manage Geofences between (and within) the lists.

Icon Purpose

- | | |
|----|---|
| »» | Move all available Geofences to the associated list. |
| » | Move the selected Geofence from the available to the associated list. |
| « | Move the selected Geofence from the associated to the available list. |
| «« | Move all associated Geofences back to the available list. |
| A↓ | Sort the available or associated list in ascending order. |
| z↓ | Sort the available or associated list in descending order. |
| ▲ | Move the selected Geofence up in the associated list. |
| ▼ | Move the selected Geofence down in the associated list. |

Triggering an Event

Use the out-of-the-box Event Stream service to trigger Events and respond to them immediately.

You can create real-time runs for data flows that have a data set that can be streamed in real-time as the primary input. Data flow runs that are initiated through the Data Flows landing page process the data using the checked-in instance of the Data Flow rule and the rules that are referenced by that Data Flow rule.

1. Log in to Pega Customer Decision Hub as an operator with access to Dev Studio.
2. Click **Configure > Decisioning > Decisions > Data Flows > Real-time processing**.
3. On the **Real-time processing** tab, click **New**.
4. Associate a Data Flow rule with the data flow run by doing the following steps:

- a. In the **Applies to** field, select the event class, *PegaMKT-Data-Event*.
- b. In the **Access group** field, select *PegaNBAM:Agents* as the access group context for the data flow run.
- c. In the **Data flow** field, select the *ProcessFromEventSource* Data Flow rule.
- d. In the **Service instance** name field, select *RealTime*.
5. **Optional:** Configure the number of threads for the data flow nodes.
The recommended default value is 5. The number of threads should not exceed the number of cores on the data flow nodes. Check your hardware specifications in order to determine the maximum number of possible threads to use.
6. **Optional:** To keep the run active and restarted automatically after every modification, select **Manage the run and include it in the application**, and then select the ruleset.
If you move the ruleset to a new environment, the application will move the run with the ruleset and keep it active.
7. **Optional:** Specify any activities that you want to run before the data flow starts or after the data flow run has completed.
 - a. Expand the **Advanced** section.
 - b. In the **Additional processing** section, perform the following actions:
 - Specify a preprocessing activity that you want to run before running the data flow.
 - Specify a postprocessing activity that you want to run after running the data flow.
8. **Optional:** In the **Resilience** section, specify the data flow run resilience settings for resumable or non-resumable data flow runs. You can configure the following resilience settings:

Record failure

- **Fail the run after more than x failed records** – Terminate the processing of the data flow and mark it as failed after the threshold for the allowed total number of failed records is reached or exceeded. If the threshold is not reached or exceeded, the data flow run finishes with errors. The default value is 1000 failed records.

Node failure

- **Restart the partitions on other nodes** – For non-resumable data flow runs, transfer the processing to the remaining active Data Flow service nodes. The starting point is based on the first record in the data partition. With this setting enabled, each record can be processed more than once.
- **Fail the entire run** – For non-resumable data flow runs, terminate the data flow run and mark it as failed when a Data Flow service node fails. This setting provides backward compatibility with previous versions of Pega Platform.

Snapshot management

- **Create a snapshot every x seconds** – For resumable data flow runs, specify the elapsed time for creating snapshots of the data flow runs state. The default value is 5 seconds.

9. Click **Done**.

Data flow nodes are required to start the run. If the service contains no nodes in the cluster, a message is displayed with a link to the **Services** landing page, where you can add nodes.

10. To analyze the lifecycle of the run and troubleshoot potential issues, in the **Run details** tab of the data flow run, click **View Lifecycle Events**.

In the window that opens, each event has a list of details, for example, reason, which you can analyze to better understand the event or debug an issue. You can use the **Actions** menu to export the events to a single file.



Note: By default, events from the last 10 days are displayed. You can change this value by editing the **dataflow/run/lifecycleEventsRetentionDays** dynamic data setting.

What to do next:

Pega Customer Decision Hub 8.4 includes the *CDHEventSource* data set and the related *ProcessFromEventSource* data flow which can be used to trigger real-time events. In addition, you can configure an external Kafka cluster for event processing, as described in [Configuring Kafka to process real-time events](#).

Triggering an Event with the SOAP service (deprecated)

For compatibility with earlier versions of the application, Pega Customer Decision Hub 8.4 still supports the SOAP service previously used to trigger Events. However, this service is now considered deprecated. For new developments, use the Event Stream service instead.

The following URL provides the WSDL for your application's Event handling SOAP Service: `http://<host>:<port>/prweb/PRSOAPServlet/SOAP/PegaMKTDDataMktEvent/Services?WSDL`

The following is an example request triggering the AccountOpened Event, passing in the Customer's id, their location (latitude/longitude), and information about the Event:

```
<soapenv:Envelope
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:even="EventPayload"
xmlns:urn="urn:PegaRULES:SOAP:PegaMKTDDataMktEvent:Services">
  <soapenv:Header>
    <even:EventPayload?></even:EventPayload>
  </soapenv:Header>
  <soapenv:Body>
    <urn:EventPayload>
      <CustomerID>JR</CustomerID>
      <EventName>AccountOpened</EventName>
      <EventType>Branch</EventType>
      <Latitude>42.9613</Latitude>
      <Longitude>-71.4798</Longitude>
    </urn:EventPayload>
  </soapenv:Body>
</soapenv:Envelope>
```

Integration with Event Strategy Manager

Event Strategy Manager (ESM) is a Pega Platform feature that enables users to design and execute event strategies that detect patterns in streams of customer data and react to these patterns by taking the Next Best Action for the customer.

Further, users can integrate ESM with Pega Customer Decision Hub Real-Time Events. This integration enables the triggering of a Real-Time Event in Pega Customer Decision Hub by an ESM Data Flow.

Pega Customer Decision Hub provides integration support for ESM in a variety of deployment scenarios:

1. Pega Customer Decision Hub and ESM are deployed on same instance, ESM Data Flows have access to the Pega Customer Decision Hub application.

2. Pega Customer Decision Hub and ESM are deployed on same instance, ESM Data Flows do not have access to the Pega Customer Decision Hub application.
3. Pega Customer Decision Hub and ESM are deployed on different instances.

In scenario 1, integrators can directly use a hook activity. For scenarios 2 and 3, integrators will need to use an integration ruleset.

Directly use hook activity

In this scenario, the integration steps are minimal since the two components are both available as part of the same application. To trigger a Real-Time Event from an ESM Data Flow, configure the destination of the Data Flow to be the `TriggerPegaMKTEvent` activity.

Use the parameters of this activity to specify the values necessary for triggering the Real-Time Event, such as `EventName` and `CustomerID`. The `EventType` parameter determines which Event service will be invoked. Pass in either `HTTP` or `SOAP` for this parameter based on the protocol you wish to utilize.

The `SampleCEPDF` Data Flow rule provides an example configuration that invokes the hook activity.



Use integration ruleset

In scenarios where the ESM application doesn't have access to Pega Customer Decision Hub, integrators need to first add the `PegaMKT-Integration` ruleset to their ESM application.



Note: The `PegaMKT-Integration` ruleset is provided in `PegaMarketing_Integration_0722.zip`, which is located under the `Rules` directory of your Pega Customer Decision Hub installation.

This ruleset includes the following items that enable the triggering of Pega Customer Decision Hub Events:

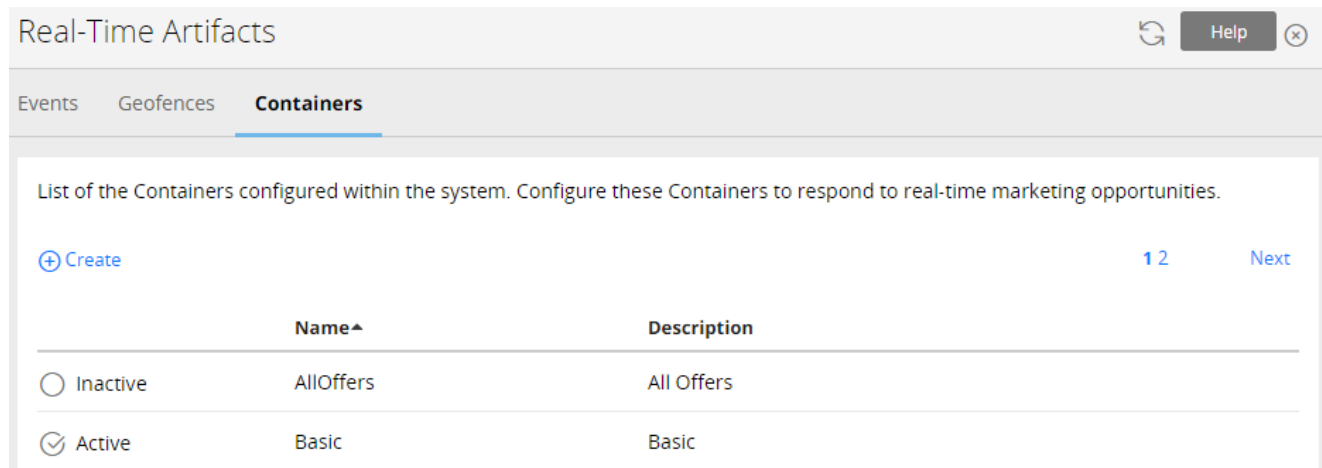
- `TriggerPegaMKTEvent` Activity rule - Use this activity (as described previously) to trigger a Real-Time Event in Pega Customer Decision Hub.
- `ConnectMKTURL` Dynamic System Setting - Update this setting to the URL where the Pega Customer Decision Hub application is deployed.
- `MKT_Integration:SysAdmins` Access Group - Update this access group to reference the application that has access to the `PegaMKT-Integration` ruleset.

Real-Time Containers

Real-Time Containers provide a way for marketers to manage content that appears in real-time channels, such as web and mobile. As an example, a marketer may define a Container to represent a region of a web page. They can then associate the Container with a Next-Best-Action in the Next-Best-Action Designer. In real-time when the Container is called (say on a web page), a Next-Best-Action is executed and the Container gets populated with results.

Pega Customer Decision Hub provides a set of APIs, which can be invoked from real-time channels, to facilitate the population of a Container and to capture customer responses.

Real-Time Containers are listed on the **Containers** tab of the Real-Time Artifacts landing page. This landing page is accessible in the Pega Customer Decision Hub portal via: **Content > Real-Time Artifacts**



The Containers landing page provides a quick overview of the Containers configured in the application.

Container Management

This section explains the various aspects of managing Real-Time Containers.

Creating a New Container

To create a new Container, use the **Create** link in the Containers landing page. Enter a unique name for the Container in the **short description** field and click **Create and open** to launch the Container rule form.

The Container rule form has the following tabs:

Tab Name	Purpose
Container Details	Specify the availability details for the Container; view Next-Best-Action configuration associated with this Container.

Tab Name	Purpose
History	Specify the Description and Usage information for this Container.

Specifying Container Details

The following configuration options are available:

- **Is this Container currently active?**

Select **Yes** to enable the Container and have it respond to requests. Select **No** to prevent the Container from responding to requests. If an inactive Container is requested, it will simply be ignored.

- **Impression Capture**

This setting governs how an impression is captured when the Container is requested. Choose between the following two options:

- **Captured on retrieval** – Select this option to have the Container processing API (Container) automatically capture an impression before rendering the Container.
- **Captured by channel** – Select this option to not capture the impression while rendering the Container. In this case, the channel will need to separately invoke the impression capture API (CaptureResponse).

- **Click through behavior**

This setting governs what happens when the channel invokes the click-through capture API (CaptureWebClickThrough). Choose between the following two options:

- **Capture click through only** – Select this option to simply record a click in Interaction History (IH).
- **Capture click through and initiate flow** – Select this option to record a click in IH and to initiate the action for the customer. If the action is already in flight for the specified customer, the particular action is loaded and Flow execution is forced down the Inbound path. If the specified action is not currently in flight for the specified customer, the system instantiates a new action and starts executing the Flow on it. This is done in the context of the Channel that was part of the inbound request. Refer to [Adding Inbound Channel Support](#) for more details.



Note: The click-through URL is configured on the Details tab of the Action rule form. This URL can also be over-ridden in the Strategy. For proper re-direction, this URL should begin with the protocol prefix - such as http:// or https://.

Viewing Associated Entities

Real-time containers can be associated both with Next-Best-Action (NBA) configurations, and Supporting Decisions.

The **Next-Best-Action Strategies associated with this Container** section displays the NBA configuration that has been associated with this Container. Refer to the Next-Best-Action chapter for details on associating Containers with NBA.

Next-Best-Action Strategies associated with this container

The following NBA Strategy is associated to this container. Associate Strategies through the Next-Best-Action Designer configuration.

Associated Strategy	Enabled	Start Date	End Date	Status
Sales	true	4/4/16 3:42 PM		Active

The **Supporting Decisions associated with this Container** section displays the Supporting Decision configuration that has been associated with this Container. Refer to the Next-Best-Action chapter for details on associating Containers with NBA.



Note: A Container can have multiple entities associated with it, as long as only one of them is active at any given point in time.

The following table lists the information that displays for each entity associated with this Container:

Column	Description
Associated NBA / Associated supporting decision	Name of the NBA configuration, or supporting decision, to which this Container is associated. Click the name to open the entity.
Enabled	Whether the associated entity currently has Container processing enabled on it
Start Date	Date and time when this Container becomes active for this entity
End Date	Date and time when this Container stops being active for this entity
Status	Current status of the associated entity

Real-Time Container APIs

This section provides information on the APIs available for use with Real-Time Containers.

When invoked, each API sets one of the following HTTP status codes in its response:

- 200 - Successful invocation
- 400 - Bad request
- 500 - Internal error

Triggering a real-time container with the Container REST service

Container is a REST service that returns the Next-Best-Action for a customer. It supports both the POST and GET HTTP method. This service allows callers to trigger a Real-Time Container. Unlike other Container services, this service supports the concept of a centralized decisioning hub, where a Pega Customer

Decision Hub application behaves as the hub for decision logic and any other Pega application can leverage Container features without being built on Pega Customer Decision Hub.



Note: This service supports identity matching for the Web and Mobile channels.

The URL pattern for this service is:

```
http://<host>:<port>/prweb/PRRestService/PegaMKTContainer/V2/Container
```

POST Service Request

For the POST request, the service expects a JSON Object with the following attributes:

- **CustomerID** – (Required, unless using identity management) Customer identifier
- **ContainerName** – (Required) Name of the Container or Containers to trigger. Can be a single value or a comma-separated list of Containers, for example, `NextBestAction, BestOffer`
- **Channel** – (Required) Channel where the Container will be rendered
- **Direction** – (Required) Direction of communication
- **Placements** – (Optional) Comma-delimited list of placement types (for example, `Tile, Hero`) that will limit the number of treatments returned to the top treatments that match the specified placement types
- **Contexts** – (Optional) Situation data from channel such as customer mood, current web page
 - **Key** – Identifier for context info
 - **Type** – Type of context data
 - **Value** – Value for the specified key

A sample request JSON Object is shown below:

```
{
  "ContainerName": "NextBestAction",
  "Channel": "CallCenter",
  "CustomerID": "CONT -1",
  "Direction": "Inbound",
  "Placements": "Hero, Tile, Tile",
  "Contexts": [{
    "Type": "Intent",
    "Value": "Refi mortgage",
    "Key": "IntentName"
  }, {
    "Type": "Intent",
    "Value": "Moderate",
    "Key": "CallVolumeIndicator"
  }]
}
```

GET Service Request

For the GET request, the service expects a JSON Object with the following attributes:

- **CustomerID** – (Required, unless using identity management) Customer identifier
- **ContainerName** – (Required) Name of the Container to trigger
- **Channel** – (Required) Channel where the Container will be rendered
- **Direction** – (Required) Direction of communication
- **ContextKey** – (Optional) Situation data from channel such as customer mood, current web page

- **ContextValue** – (Optional) Situational data value

A sample GET URL is shown below:

```
http://<HOST>:<PORT>/prweb/PRRestService/PegaMKTContainer/V2/Container?
CustomerID=1&ContainerName=AcquisitionSD&Channel=Web&Direction=Inbound&ContextKey=intent&Co
```

Service Response

For the response, the service returns a JSON Object with the following attributes:

- **Status** – OK for successful result
- **ContainerList** – The Container service can request multiple containers in a single request. This is an array of the called containers and results
 - **RankedResults** – An array containing one or more actions returned by Strategy execution. Each action in this array has the following attributes:
 - **Name** – Name of the action
 - **Issue** – Issue to which the action belongs
 - **Group** – Group to which the action belongs
 - **InteractionID** – Decision results identifier for the Container call. Decision results are stored in a Cassandra datastore (*pxDecisionResults*) as part of the Adaptive Analytics delayed learning feature. The InteractionID is required during the CaptureResponse process to match the response to the original decision result, so that adaptive models can learn from the interaction.
 - **Category** – Category to which the action belongs
 - **CustomerCost** – Cost of this product/service to the customer
 - **Label** – Business friendly description of the action
 - **Benefits** – Benefits to the customer
 - **WhyRelevant** – Why this action is relevant for the customer
 - **Direction** – Direction in which the interaction was initiated, Inbound vs Outbound
 - **ShortDescription** – Short description of the action
 - **PaidAudienceName** – Name of the paid audience
 - **Identifier** – Unique identifier for the action
 - **Pricing** – Description of the pricing
 - **Journey** – Name of the associated customer journey
 - **JourneyStage** – Name of the associated customer journey stage
 - **JourneyStep** – Name of the associated customer journey step
 - **EligibilityDescription** – Criteria for customers to be eligible for this action
 - **Propensity** – Action propensity value
 - **AgentCompensation** – Agent compensation amount if customer accepts action
 - **ClassIdentifier** – Internal class for the action results
 - **Priority** – Action priority based on Strategy configuration
 - **Channel** – Channel the interaction occurred on
 - **BundleName** – Name of the action bundle

- **ImageURL** – URL to the associated action image
- **Rank** - Action rank based on Strategy configuration
- **BundleParent** – Indicates if this action is a bundle parent
- **Variant** – Variation of the action (ie 64gb, 128gb, 256gb)
- **Treatment** – The name of the action treatment
- **InternalCost** – The internal company cost of the action
- **CampaignID** - Work ID of the active Campaign associated with this Container
- **OfferValue** – The value the customer receives from this action
- **ClickThroughURL** – URL to invoke the CaptureWebClickThrough API. The encrypted parameter in this URL contains the actual click-through URL specified as part of the action's details. Typically, this leads to a link or file that provides more details about the action.
- **DecisionTime** - The time of the decision

In case of an error, the response object instead contains the following two fields:

- **Status** – Set to ERROR
- **Message** – Description of the error

A sample response from the invocation of this service is shown below:

```
{
  "Status": "OK",
  "ContainerList": [{
    "Status": "OK",
    "ContainerName": "TopOffers",
    "RankedResults": [{
      "Group": "Mortgage",
      "Issue": "Sales",
      "InteractionID": "3944968229930172786",
      "Category": "",
      "CustomerCost": 0,
      "Label": "30 Year Mortgage No Costs",
      "Benefits": "Fixed rates are fixed until a
specific end date. At the end of the fixed term, your mortgage interest rate
reverts to the Variable Rate / Buy - to - Let Variable Rate.Call(800) 867 -
5309 ",
      "WhyRelevant": "www.uplusbank.com/mortgage-
offer",
      "Direction": "Inbound",
      "Name": "YearMortgageNoClosingCosts",
      "ShortDescription": "U+ Bank Mortgages",
      "PaidAudienceName": "",
      "Identifier": "/Sales/Mortgage/
YearMortgageNoClosingCosts",
      "Pricing": "",
      "Journey": "",
      "JourneyStage": "",
      "JourneyStep": "",
      "ServiceCaseID": "",
      "EligibilityDescription": "Purchase of a
single-family, primary residence, a credit score of 740,",
      "Propensity": 0.76,
      "AgentCompensation": 50,
      "ClassIdentifier": "Offer",
      "Priority": 0.76,
      "Channel": "CallCenter",
```

```

        "BundleName": "",
        "ImageURL": "/u/bank/ad-imgs/30yrNo.png",
        "Rank": 1,
        "BundleParent": "false",
        "Variant": "",
        "Treatment": "",
        "InternalCost": 0,
        "CampaignID": "NBA",
        "OfferValue": 0,
        "ClickThroughURL": "http://myhost:myport/
prweb/PRHTTPService/ PegaMKTContainer/Services/CaptureClickThrough?Px=%09%7Bpr
%7D11q
%2FRWFI8c9EdhfxuvoNBOTDBNM0TCxZanC0vKI9bbQgRGRniKxg0i2nyDEWgNu1o5dyYZ3t69JE"
    }
  }
}

```

Accessing Context in Strategies

Now that you have passed in Context data as part of the Container request, you will want to access this data within your decision strategies. There are two utility functions that allow you to access this data depending on your requirements.

IsValueInContext

The IsValueInContext function checks if a value exists in the list of Contexts passed in the Container Request. It has the following parameters:

- Type – This parameter identifies the type of context.
- Key – This parameter identifies the name of context.
- Value – This parameter contains the data to be evaluated.

@PegaMKTUtilities.IsValueInContext("Intent","IntentName","CloseAccount",Primary.ContainerPayload.Contexts)

GetContextValue

The GetContextValue function returns the value for the specified Type and Key in the Container Contexts. It has the following parameters:

- Type – This parameter identifies the type of context.
- Key – This parameter identifies the name of context.
- Value – This parameter contains the data to be evaluated.

@PegaMKTUtilities.GetContextValue("Intent","IntentName",Primary.ContainerPayload.Contexts)

Container settings

You can toggle the following additional settings for Context in Strategies:

- Identity matching - Enabled by default. To disable, toggle the MKTEnableIdentityMatching dynamic system setting.
- Customer lookup - Enabled by default. To disable, toggle the MKTEnableCustomerLookup dynamic system setting.
- Customer validation - Disabled by default. To enable, toggle the MKTEnableCustomerValidation dynamic system setting.

CaptureResponse

CaptureResponse is a REST service that supports the POST HTTP method. This service allows callers to capture responses to actions triggered via Real-Time Containers.

The URL pattern for this service is:

```
http://<host>:<port>/prweb/PRRestService/PegaMKTContainer/V2/CaptureResponse
```

This service can also be used to initiate the first action in its request. To utilize this feature and include action initiation, use the following URL pattern:

```
http://<host>:<port>/prweb/PRRestService/PegaMKTContainer/V2/CaptureResponse/Initiate
```

POST Service Request

For the POST request, the service expects a JSON Object with the following attributes:

- **CustomerID** – (Required, unless using identity management) Customer identifier
- **ContainerName** – (Required) Name of the Container to trigger
- - **RankedResults** - (Required) List of actions for which you want to capture a response. Results from the Container service can be mapped into this array:
 - **Name** – (Required) Name of the action
 - **Issue** – (Required) Issue to which the action belongs
 - **Group** – (Required) Group to which the action belongs
 - **InteractionID** – (Required) The identifier of the original decision that resulted in the action being selected for the customer. All actions selected for the customer based on the same decision share the same InteractionID. The CaptureResponse process must pass back the InteractionID parameter to match the response to the original decision result, so that adaptive models can learn from the interaction. After the response is matched to the correct decision result, it is captured in Interaction History. The InteractionID as well as an identifier for the Interaction History Fact row is stored.
 - **Rank** - (Required) Action rank based on Strategy configuration
 - **Direction** – (Required) Direction in which the interaction was initiated, Inbound vs Outbound
 - **Channel** – (Required) Channel the interaction occurred on
 - **Outcome** – (Required) The customer disposition of the action
 - **Journey** – (Optional) Name of the associated customer journey
 - **JourneyStage** – (Optional) Name of the associated customer journey stage
 - **JourneyStep** – (Optional) Name of the associated customer journey step
 - **Category** – (Optional) Category to which the action belongs
 - **CustomerCost** – (Optional) Cost of this product/service to the customer
 - **Label** – (Optional) Business friendly description of the action
 - **Benefits** – (Optional) Benefits to the customer
 - **WhyRelevant** – (Optional) Why this action is relevant for the customer
 - **ShortDescription** – (Optional) Short description of the action
 - **PaidAudienceName** – (Optional) Name of the paid audience

- **Identifier** – (Optional) Unique identifier for the action
- **Pricing** – (Optional) Description of the pricing
- **EligibilityDescription** – (Optional) Criteria for customers to be eligible for this action
- **Propensity** – (Optional) Action propensity value
- **AgentCompensation** – (Optional) Agent compensation amount if customer accepts action
- **ClassIdentifier** – (Optional) Internal class for the action results
- **Priority** – (Optional) Action priority based on Strategy configuration
- **BundleName** – (Optional) Name of the action bundle
- **ImageURL** – (Optional) URL to the associated action image
- **BundleParent** – (Optional) Indicates if this action is a bundle parent
- **Variant** – (Optional) Variation of the action (ie 64gb, 128gb, 256gb)
- **Treatment** – (Optional) The name of the action treatment
- **InternalCost** – (Optional) The internal company cost of the action
- **CampaignID** – (Optional) Work ID of the active Campaign associated with this Container
- **OfferValue** – (Optional) The value the customer receives from this action
- **ClickThroughURL** – (Optional) URL to invoke the CaptureWebClickThrough API. The encrypted parameter in this URL contains the actual click-through URL specified as part of the action's details. Typically, this leads to a link or file that provides more details about the action.

A sample invocation request is shown below:

```
{
  "ContainerName": "TopOffers",
  "CustomerID": "17",
  "RankedResults": [{
    "Name": "PlatinumCardOffers",
    "Issue": "Sales",
    "Group": "CreditCards",
    "Rank": 1,
    "CampaignID": "NBA",
    "InteractionID": "-563481321460449721",
    "Outcome": "Accepted",
    "Channel": "Web",
    "Direction": "Inbound",
    "Journey": "",
    "JourneyStage": "",
    "JourneyStep": ""
  }]
}
```

Service Response

For the response, the service returns a JSON object with the following attributes:

- **Status** – OK for successful result, Error otherwise
- **Message** – Confirmation message when successful, error message in case of an error

A sample service response is shown below:

```
{
  "Status": "OK",
  "Message": "Response captured successfully"
```

```
}
```

CustomerOfferHistory

CustomerOfferHistory is a REST service that supports both GET and POST HTTP methods. This service returns the Interaction History records for a customer.

The URL pattern for this service is:

```
http://<host>:<port>/prweb/PRRestService/PegaMKTContainer/V2/
CustomerOfferHistory
```

Service Request

For the request, the service expects a JSON Object with the following attributes:

- **CustomerID** – Customer identifier (required)

A sample invocation request is shown below:

```
{ "CustomerID":
  "CONNOR", }
```

Service Response

For the response, the service returns a JSON object with the following attributes:

- **OfferHistory** – An array of History records for the customer. Each record contains the following attributes:
 - **Name** - Name of the action
 - **Issue** - Issue to which the action belongs
 - **Group** – Group to which the action belongs
 - **Channel** – Channel via which this action was communicated
 - **Direction** – Direction of communication for this action
 - **InteractionID** – Interaction History record identifier for this action
 - **ExternalID** - Associated work object identifier
 - **OutcomeTime** - Time when the outcome was captured
 - **Outcome** - Response recorded for this action (e.g. Accepted, Rejected, Impression, etc.)
 - **Behaviour** - Behavior of the specified outcome (e.g. Positive, Negative, Neutral, etc.)
 - **Identifier** - Identifier for the action



Note: For Negotiation history records, there is a nested OfferHistory element which is an array of action names.

A sample service response is shown below:

```
{
  "OfferHistory": [
    {
      "Name": "Negotiation",
      "Issue": "Negotiation",
      "Channel": "CallCenter",
      "InteractionID": "7382338912749122452",
```

```

"ExternalID": "S-13805",
"OutcomeTime": "20160225T125501.526 GMT",
"Behaviour": "Negative",
"OfferHistory": [
  { "Name": "Handsets fromGoogleNexus4" },
  { "Name": "DataPlan100Min" },
  { "Name": "MemoryCard_V2_M3" }
],
"Outcome": "Rejected",
"Identifier": "/Negotiation/Negotiation/Negotiation",
"Direction": "Inbound",
"Group": "Negotiation"
},
{
  "Name": "MI",
  "Issue": "Sales",
  "Channel": "CallCenter",
  "InteractionID": "-7714067498846096636",
  "ExternalID": "",
  "OutcomeTime": "20160224T101058.055 GMT",
  "Behaviour": "Positive",
  "Outcome": "Accepted",
  "Identifier": "/Sales/Handsets/MI",
  "Direction": "Inbound",
  "Group": "Handsets"
}]
}

```

CaptureClickThrough

CaptureClickThrough is an HTTP service that allows callers to request the handling of a click on the Container for a generic channel. This service records a click in IH before redirecting to the requested URL. Based on the Container's configuration, this service may also initiate the specified action for the customer.

To invoke this service, callers must use the ClickThroughURL that was returned for the action by the ExecuteContainer API.

The invocation URL for this service resembles the following:

```

http://<host>:<port>/prweb/PRHTTPService/PegaMKTContainer/Services/
CaptureClickThrough?

```

Sample Container Invocation Script

To facilitate the invocation of Real-Time Container APIs, Pega Customer Decision Hub includes an out-of-the-box sample JavaScript file - webwb/RealTimeContainerScript.js

This script includes a service controller object which has methods that invoke the various Container APIs.

To utilize this script, perform the following steps:

1. Download and copy the JavaScript file to your web directory.
2. Include the file in your web content. For example:

```

<script src="realtimecontainerscript.js" />

```

3. Instantiate the service controller object. For example:

```
var nbamServiceCtrl = getNBAMServiceControl();
```



Tip:

To invoke a Container with the V2 service, instantiate:

```
var nbamServiceCtrl = getNBAMServiceControl("V2");
```

To invoke multiple Containers with the V2 service, instantiate:

```
var nbamServiceCtrl = getNBAMServiceControl("V2", true);
```

4. Initialize the service controller object using one of the following mechanisms.

- a. Directly update serverHostName and serverPort in realtimecontainerscript.js, as shown in the snippet below. When using this mechanism, the instantiation of the service controller (Step 3 above) will already initialize the controller using these values.

```
var serverHostName = "localhost";var serverPort = "8080";
```

- b. Invoke the initialize method on the service controller after instantiating it. For example:

```
nbamServiceCtrl.initialize(window.location.hostname, window.location.port);
```

5. Invoke the desired API using the corresponding service controller method.

Service API	JavaScript Method	Method Parameters
Container	getOffers	customerID, containerName, channel, previousPage, currentPage, callback
V2 Container	loadOffers	jsonObj, methodType, callback
CaptureWebImpression	captureSingleWebImpression	containerID, customerID, offerID, issue, group, interactionID, callback
CaptureWebResponse	captureWebResponse	containerID, customerID, offerID, issue, group, interactionID, outcome, behavior, channel, direction, callback
CaptureResponse	captureResponse	containerID, customerID, offerID, issue, group, interactionID, outcome, behavior, channel, direction, callback
CapturePaidResponse	capturePaidClickResponse	CustomerID, ExternalAudienceId,

Service API	JavaScript Method	Method Parameters
		ReferrerUrl, Utm_medium, callback

Container Resiliency

If a Strategy execution fails due to an exception, Pega Customer Decision Hub invokes a fallback Strategy. The fallback Strategy results in a response when a service activity is executed. To configure the required action data, save the strategy `FallbackStrategy` into your implementation layer.

When your Container Service exceeds the Service Level Agreement defined for the Container Service by more than a specified number of consecutive violations, Pega Customer Decision Hub invokes a fallback service activity instead of the default service activity. The fallback service activity returns the default set of actions for every request. To change the set of actions, save the `FallBackContainerResponse` data transform into your implementation layer and configure the default Container Service response.

A sample response from the invocation of this service is shown below:

```
"ContainerList": [
  {
    "Status": "OK",
    "ContainerName": " TopOffers ",
    "RankedResults": [
      {
        "Group": "Default",
        "Issue": "Fallback",
        "InteractionID": "-8654833423861133119",
        "Category": "Category",
        "CustomerCost": "0",
        "WhyRelevant": "WhyRelevant",
        "Benefits": "Benefits",
        "Direction": "Direction",
        "Name": "FallbackOffer",
        "ShortDescription": "ShortDescription",
        "PaidAudienceName": "PaidAudienceName",
        "Identifier": "Identifier",
        "Pricing": "Pricing",
        "JourneyStage": "JourneyStage",
        "JourneyStep": "JourneyStep",
        "EligibilityDescription": "EligibilityDescription",
        "Propensity": "0",
        "AgentCompensation": "0",
        "Priority": "0",
        "ClassIdentifier": "Offer",
        "Channel": "Channel",
        "ImageURL": "ImageURL",
        "Rank": "1",
        "BundleParent": "BundleParent",
        "Variant": "Variant",
        "Treatment": "Treatment",
        "InternalCost": "0",
        "CampaignID": "CampaignID",
        "OfferValue": "0",
        "ClickThroughURL": "ClickThroughURL",
        "Journey": "Journey"
      }
    ]
  }
]
```

```
} ]
```

Seed Lists

A Seed List is a collection of artificial entities (also called “seeds”) that can be used to test, monitor, and validate various aspects of the processing infrastructure. For example, such a list can be used to test the timeliness and reliability of processes being handled by a third party.

Each seed represents a make-believe customer and all applicable customer attributes can be specified for a seed. Multiple lists, each containing their own seed data, can be created and managed within the marketing application. These lists can be used to test the following capabilities:

- Action execution
- Personalized email delivery
- Personalized SMS delivery

Seed Lists are listed under the Seed Lists landing page, which is accessible in the Pega Customer Decision Hub portal via: **Configuration > Segmentation > Seed Lists**.

Seed Lists									
 Create									
Seed List	Description	Created by	Created on	Last edited by	Last edited on	Row count			
BankingSeeds	Test banking scenarios	Sample Marketing Analyst	4/11/16 2:46 PM	Ana Lyst	4/11/16 2:51 PM	5			
EmailSeeds	Seeds to test email	Sample Marketing Analyst	4/11/16 2:35 PM	Sample Marketing Analyst	4/11/16 2:39 PM	2			
EmailSubs	Subscribes Test	Ana Lyst	4/11/16 2:53 PM	Ana Lyst	4/11/16 2:53 PM	0			

The following actions are available on the Seed Lists landing page:

- **Create** – Create a new Seed List. See [Creating a new Seed List](#).
- Refresh icon – Reload the Seed List grid
- **Help** – View context-sensitive help
- Close icon – Close the landing page

Seed List Management

This section explains the various actions that can be performed on a Seed List.

Creating a new Seed List

To create a new Seed List, click the **Create** link on the landing page. Enter a unique name for the Seed List and a helpful description of its contents.

Create Seed List

Seed List Name*

TestUsers

Seed List Description*

Sample users for testing

Cancel

Submit

Click **Submit** to create the Seed List. At this point, the backing structure of the Seed List is created. The landing page grid should refresh and display the newly created Seed List. The row count column for the new Seed List will initially be 0.

Modifying Seeds in a Seed List

Once a Seed List has been created, new seeds can be added to it and existing seeds can be modified or deleted. To do so, double click a Seed List row in the grid. This will open the Seed List editor, as show below:

TestUsers

CustomerID	pyFullName	CLV_VALUE	Age	pyEmail1	pyMobilePhone
No items					
+					

This editor displays all entries (seeds) as rows in the Seed List. The columns of the Seed List are made up of the columns from the customer table.

To..	Do...
Add a new seed	Click the add icon. Fill in all necessary fields and click anywhere outside the input row to save the record. To cancel your

To..	Do...
	changes and discard the new record, click the delete icon at the right end of the row.
Modify an existing seed	Click anywhere in the desired row. The row should toggle to editable mode. After making the desired changes, click anywhere outside the row to save your changes.
Delete an existing seed	Click the delete icon at the right end of the row.

Deleting a Seed List

Existing Seed Lists can be deleted by using the row-level delete icon in the grid on the Seed Lists landing page.

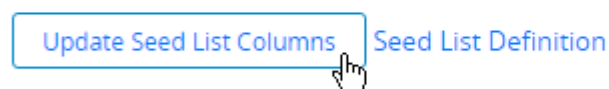
TestUsers	Sample users for testing	Ana Lyst	4/11/16 3:05 PM	Ana Lyst	4/11/16 3:05 PM	0	
-----------	--------------------------	----------	-----------------	----------	-----------------	---	---

Updating Seed List Columns

All Seed Lists share a common structure (set of columns) and this structure is derived from the columns present on the current customer class, which is in use in the application. In time, the structure of the customer class might deviate from what was initially set up for use with Seed Lists. In a situation like this, administrators can synchronize the Seed List structure to the customer class structure via the **Update Seed List Columns** button on the Manage Data Relationships tab of the Application Settings landing page.

Seed List Definition

Map the customer properties to display in the seed list.



***Updating the Seed List Columns will overwrite any manual changes**

Upon clicking this button, the backing Seed List structure will be synchronized with the customer class.

This task should typically be performed by the administrator and will impact all existing Seed Lists. This task should be performed in the following scenarios:

- Initially after a new install
- Whenever the customer class changes
- When attributes are added to (or removed from) the customer class and these changes need to be reflected in the seed data

The administrator can also use the **Seed List Definition** link to view the current Seed List structure. Clicking this link opens the SeedListPopulationRD Report Definition, which represents the structure utilized by the Seed List editor. If desired, administrators can directly modify this Report Definition to update the columns visible in the Seed List editor. However, any manual updates to this Report Definition will be overwritten when the Update Seed List Columns button is used on the landing page.

Exclusion List

Use exclusion lists to prevent Pega Customer Decision Hub from initiating outbound actions for a specific set of customer entities. For example, you can set up an exclusion list for customers who opted out of receiving notifications, customers who unsubscribed from your newsletter, or customers whose email addresses are invalid.

If you specify an exclusion list of customers, Pega Customer Decision Hub checks it during action initiation and wait expiration for outbound channels. Actions for customers on the exclusion list are not initiated or continued.

Exclusion lists are not applied to actions that are initiated through real-time containers and inbound channels.

Configuring an Exclusion List

To enable the exclusion list feature for a specific customer context, define a Segment which contains entities who should not receive actions, and then select the Segment on the Context Dictionary page.

You can enable exclusion lists separately for each customer context in your application. For more information about customer contexts, see *Setting the data context* in the *Pega Customer Decision Hub Implementation Guide* on the [Pega Customer Decision Hub product page](#).

1. Create a Segment for customer entities who should be excluded from contact.
Both Criteria and List Segments can be used as exclusion lists. For more information about Segments, see [Segments](#).
2. In App Studio, click **Settings > Context Dictionary**.
3. Click the **Configure** icon for the context where you want to enable the exclusion list.
4. In the **Exclusion list** field, select the Segment which you created in step 1.
5. If your Next-Best-Action Designer configuration includes Real-Time Events, edit the configuration and save it to regenerate the underlying data flows.

Email and SMS Account Configuration

Configure email and SMS accounts so that Pega Customer Decision Hub can send emails, as well as receive and send SMS messages.

Configuring an Outbound Email Account

Configure the predefined email accounts which Pega Customer Decision Hub uses to send out emails, including messages related to actions. Optionally, you can also set up additional email accounts for action-related emails.

1. In App Studio, click **Settings** > **Channels** > **Email**.
 2. Click the **Edit** icon by a predefined email account to configure it.
By default, Pega Customer Decision Hub includes the following outbound email accounts:
 - **Default** - This account is used to send out most types of emails, including password reset emails, Email and Passbook Treatments in actions, and other internal and external notifications.
You must provide the required connection data for both accounts to ensure that emails to customers and internal users are properly delivered.
 3. **Optional:** If you want Email, Passbook and Multi Treatments in actions to be sent from a non-default email address, click **Add new** to add a new email account.
 **Note:** After configuring the new email account, select it as the delivery account for the Send Email, Send Passbook, and Send Multi shapes in the actions where you want to use the non-default email address for correspondence.
 4. **Optional:** In the **Account Availability** section, specify delivery time frames for email related to actions. Select one of the following options:
 - **Always Available** - The account is always available to deliver messages.
 - **Specify Range** - The account only delivers messages during the specified time range. Specify the following value for the time range:
 - **From** - Start value for the time range, for example, 9.00 AM
 - **To** - End value for the time range, for example, 7.00 PM
 - **Time Zone** - Time zone for the start and end time values. By default, Pega Customer Decision Hub uses the time zone of the current user.
-  **Note:** Delivery time frames do not apply to emails which are not related to actions, for example, work object-related notification.

Configuring an Outbound SMS Account

Configure the predefined outbound SMS accounts which Pega Customer Decision Hub uses to send out SMS messages, including messages related to actions. Optionally, you can also set up additional SMS accounts for action-related messages.

1. In App Studio, click **Settings** > **Channels** > **SMS** > **Outbound**.
2. Click the **Edit** icon by the **Default** account to configure it.
3. In the **Setup** tab, fill out the required connection details:

- **Host Address** - The address of the SMS center host, for example, `my.smsc.com`.
 - **Host Port** - The port number of the SMS center host, for example, `1041`.
 - **User ID and Password** - Authentication credentials for the SMS account.
 - **Test Number** - The number which is used to receive test messages for this account.
 - **Sender's Number** - The number which is displayed as the sending number for messages sent from this account.
4. **Optional:** In the **Maximum Connections** field, enter the maximum number of connections available at the same time.
 5. **Optional:** Select **Track delivery receipt** to enable delivery receipts. For more information, see [Configuring SMS Delivery Receipts](#).
 6. **Optional:** Set **Delivery mode** to **Asynchronous** to send messages in bulk using the asynchronous option.
 7. **Optional:** In the **Account Availability** section, specify delivery time frames for SMS messages related to actions.
Select one of the following options:
 - **Always Available** - The account is always available to deliver messages.
 - **Specify Range** - The account only delivers messages during the specified time range. Specify the following value for the time range:
 - **From** - Start value for the time range, for example, `9.00 AM`
 - **To** - End value for the time range, for example, `7.00 PM`
 - **Time Zone** - Time zone for the start and end time values. By default, Pega Customer Decision Hub uses the time zone of the current user.
-  **Note:** Delivery time frames do not apply to messages which are not related to actions, for example, work object-related notification.
8. **Optional:** In the **Advanced** tab, configure advanced account settings, such as response timeout, character encoding, and reconnect options.
 9. **Optional:** In the **Additional settings** tab, specify the name and value for any additional SMPP configuration settings which are not available in the **Setup** and **Advanced** tabs.

Setup Advanced Additional settings

Optionally, configure additional SMPP properties here, by providing property name and value

Property name	Property value	
unackedQueueSize	5000	
+ Add row		

10. Click **OK** and then click **Test** to test your settings.
The test message is sent to the **Test Number** specified in step 3.
11. **Optional:** If you want SMS and Multi Treatments in actions to be sent from a non-default SMS account, click **Add connection** to add a new SMS account.



Note: After configuring the new SMS account, select it as the delivery account the Send SMS and Send Multi shapes in the actions where you want to use the non-default SMS account for messaging.

Configuring an Inbound SMS Account

Configure an inbound SMS account which Pega Customer Decision Hub uses to listen for Customer responses to actions, and then specify how to process inbound SMS messages that are received by this inbound SMS account.

When the inbound SMS account receives a message, Pega Customer Decision Hub checks the sender's phone number against the Customer table to find the Customer who sent the message. If no matching Customer is found, the message is treated as an error and moved to the `UnhandledInboundSMS` workbasket for further processing.

You can configure the inbound SMS account to parse the SMS text to determine the response, and then associate each response with a different action. In a simpler scenario, you can associate all responses to a particular account with a single action.

1. In App Studio, click **Settings > Channels > SMS > Inbound**.
2. Click **Add connection**.
3. In the **Connection Setup** tab, fill out the required connection details:
 - **Account name** - A unique name for the inbound SMS account, for example, `InboundSMSMain`. The name must contain only letters and numbers.
 - **Host address** - The address of the SMS center host, for example, `my.smsc.com`.
 - **Host port** - The port number of the SMS center host, for example, `1041`.
 - **Inbox address** - The address of the SMS inbox on which Pega Customer Decision Hub should listen for responses.
 - **IP address** - The IP address of the SMS center host.
 - **User ID and Password** - Authentication credentials for the SMS account.
4. **Optional:** In the **Additional settings** tab, specify the name and value for any additional SMPP configuration settings which are not available in the **Connection Setup** tab.

Setup **Advanced** **Additional settings**

Optionally, configure additional SMPP properties here, by providing property name and value

Property name	Property value	
unackedQueueSize	5000	

[+ Add row](#)

5. In the **Response behaviors** tab, specify how the application should process inbound SMS messages.
 - a. **Optional:**
Optional: Specify what type of messages this inbound SMS account will receive.
 The following options are available:

- **Messages and delivery receipts** - The SMS account can receive incoming messages, as well as delivery receipts for SMS messages which Pega Customer Decision Hub sends to Customers.
 - **Delivery receipts only** - The SMS account can receive only delivery receipts.
For more information, see [Configuring SMS Delivery Receipts](#).
- b. Select how Pega Customer Decision Hub should match received messages to responses:
- **One response** - Select this option to assign the same action and response value for all SMS messages received on this account.
 - **Decision table** - Select this option to select one or more decision tables which associate the received message with a positive or negative action response. Each result from the decision table can be associated with the same action or with different individual actions.
- c. Configure the necessary settings for matching received messages to responses.
- If you selected the **One response** option, in the **Responses for inbound messages** section, select an action and a response. Depending on the selected response, all incoming messages are treated as either acceptance or rejection for the selected action.
 - If you selected the **Decision table** option, in the **Manage decision tables** section, configure how the incoming messages should be matched to actions, and then select the decision table for parsing the response. For more information, see [Using Decision Tables to Manage SMS Action Responses](#).
- d. Specify how Pega Customer Decision Hub should process responses to actions which are not active for a given Customer:
- **Push it to a workbasket** - Select this option to prevent Customers from responding to actions which are not active for them. Responses to inactive actions are treated as an error and moved to the `UnhandledInboundSMS` workbasket for further processing. You can access this workbasket in the Case Manager portal.
 - **Start the action for the customer** - Select this option to initiate a new action for the Customer if they respond to an action which is not active for them.
6. Click **OK**.
7. Toggle the control in the **Running** column to start listening for incoming messages.
The **Connection status** column indicates the current status of the account.

Using Decision Tables to Manage SMS Action Responses

If you selected the **Decision table** option while configuring response behavior for your inbound SMS account, you must select one or more decision tables which associate inbound SMS messages with a positive or negative action response. Each result from the decision table can be associated with the same action or with different individual actions.

1. In Dev Studio, configure a decision table in the `PegaMKT-Work-Offer` class. Below are some considerations for accessing message and Customer data in decision tables:
 - Customer data is available through the `.Customer` page property under the action class.
 - Inbound message data is available through the `.InboundResponseData.SMS` page property under the action class. The `.InboundResponseData.SMS` page includes properties for the incoming number (`.SourceNumber`) and the message content (`.MessageBody`).
 - The below screenshot shows a predefined `InboundSMSParsingSample1` decision table, which you can use as template to create your own decision tables.

Table	Results	Parameters	Pages & Classes	Test cases	Specifications	History
Select values Show conflicts Show completeness Export Import						
Conditions				Actions		
	Message contains offer name	Message contains Yes	Message contains No	Return		
◦ if	true	true		→ Interested		
◦ else if			true	→ Not Interest		
otherwise				→ Maybe		



Note: If you want to use more than one decision table, do not specify a return value for the **otherwise** row in the decision tables. Leaving the **otherwise** row blank allows Pega Customer Decision Hub to move on to evaluating the next decision table in the list.

- In the **Manage decision tables** section of the **Response behaviors** tab, select one of the following options:
 - One action** – Select this option if all messages received on this account should be associated with a single action.
 - Individual actions** – Select this option if this account receives responses to multiple actions. In this case, specify each action name alongside the response value in the decision table grid.
- Optional:** If you selected the **One action** option, use the **Action** field to specify the action with which all incoming messages should be associated.
- Select a decision table and click **Add decision table**.
- For each decision table result, select the response value and, if applicable, an action name.

Add a decision table

[Add decision table](#)

Name	Offer	Response
InboundSMSParsingSample1		
• Interested	ProcessInboundOffers	Accept ▼
• Not Interested	ProcessInboundOffers	Reject ▼
• Maybe	ProcessInboundOffers	Reject ▼

- Optional:** Select and add another decision table.

When an inbound message arrives, Pega Customer Decision Hub evaluates the decision tables from top to bottom until it finds a matching decision result.

Configuring SMS Delivery Receipts

You can enable delivery receipts for the SMS messages that Pega Customer Decision Hub sends out.



Note: If you enable SMS delivery receipts, the receipts will be processed and included in a Customer's Interaction History.

1. In App Studio, click **Settings > Channels > SMS > Outbound**.
2. Edit or create an outbound SMS account for which you want to enable delivery receipts.
3. On the Setup tab of the SMS account, select **Track delivery receipt**.
4. Click **Settings > Channels > SMS > Inbound**.
5. Edit or create an inbound SMS account which corresponds to the outbound SMS account where you enabled delivery receipts.
The inbound account must have the same connection setup data as the outbound account.
6. On the Response behaviors tab, specify what type of messages this inbound SMS account will receive.
 - **Messages and delivery receipts** - The SMS account can receive incoming messages, as well as delivery receipts for SMS messages which Pega Customer Decision Hub sends to Customers.
 - **Delivery receipts only** - The SMS account can receive only delivery receipts.

Push Notifications

Push Notification is a mechanism by which a server sends (pushes) a message to the client. In terms of mobile apps, the push notification mechanism can be used by an app to send notification messages to its users.

Pega Customer Decision Hub currently provides support for sending push notifications to apps running on the following platforms:

- Android - Using Firebase Cloud Messaging for Android (FCM) <https://firebase.google.com/docs/cloud-messaging/>
- iOS - Apple Push Notification Service <https://developer.apple.com/library/archive/documentation/NetworkingInternet/Conceptual/RemoteNotificationsPG/APNSOverview.html>

Refer to the above links for more details on each of these services.

The following table lists the various roles involved in the push notification process along with their responsibilities:

Role	Responsibility	Scope
App Developer	• Creates mobile app, which: ◦ Registers and un-registers app users for receiving push notifications from the marketing application, via the provided REST services. See Push Notification User Registration Services for details. ◦ Receives and displays push notification messages to app users • Deploys app on app platform (e.g. App Store, Google Play, etc.) • Provides marketing administrator with key registration information for app	Outside of Pega Customer Decision Hub
Marketing Administrator	• Registers app for receiving push notification messages from Pega Customer Decision Hub. See Registering Apps for Push Notification.	In Pega Customer Decision Hub
App User	• Downloads and installs app from app store.(Behind the scenes, app registers	Outside of Pega Customer Decision Hub

Role	Responsibility	Scope
	the user for receiving push notifications)	
Marketing Analyst	Creates actions and utilizes the Push Notification flow shape to send notification messages to registered app users. See Configuring Push Notifications in Actions.	In Pega Customer Decision Hub
Marketing System	- Handles registrations of apps - Handles registrations/un-registrations of app users - Delivers notification messages to registered users for registered apps	In Pega Customer Decision Hub

Registering Apps for Push Notification

Marketing administrators can register apps for receiving push notification messages from the marketing application.

This is done from the **Applications** tab of the Push Notifications landing page. This landing page is accessible in the Pega Customer Decision Hub via: **Settings** > **Channels** > **Push Notifications**.

Configuring a New App

Use the **New** button to configure a new app for receiving push notifications. Provide the following information for the app:

Setting	Purpose
Name	Name of the app. This is how the app will be referred within the marketing application (e.g. in flows).
Description	Description of the app
Platform	Platform on which this app is available. Choose between <code>Android</code> and <code>iOS</code> .
Unique ID	Unique identifier for this app. This ID is used for validating push notification service requests, such as those for registering and un-registering app users. See Push Notification User Registration Services for details.

For Android apps, additionally provide the following information:

Setting	Purpose
Server Key	Server key for this app. This value should be provided by the app developer and is required for using the FCM service.

For iOS apps, additionally provide the following information:

Setting	Purpose
App Certificate	Apple .p12 certificate for this app. Use the Choose File button to locate the certificate.
Certificate Name	Name to use for storing the certificate in the system
Certificate Password	Password associated with the certificate. The system will validate this password and will not upload the certificate in case the password is invalid.
Certificate Type	Type of certificate. Select either <code>Production</code> or <code>Development</code> .
Monitor Apple's notification feedback service?	Apple provides a feedback service which can be used to detect failed push notification message delivery when the user has uninstalled the app from their iOS device. Pega Customer Decision Hub ships with an agent that periodically polls the APNs feedback service to detect these errors. If any delivery errors are reported by the feedback service, the system un-registers the associated device registrations (as recommended by Apple), thereby preventing future deliveries. Choose Yes to enable the system to monitor the feedback service for this app. When this option is selected, erroneous devices will automatically be un-registered from the marketing system. Alternately, choose No to monitor the feedback service via an external system or mechanism. In this case, the external mechanism should invoke the un-registration service to un-register push tokens that are no longer valid. Refer to Apple documentation for details on the APNs feedback service.

Click **Submit** to create the new app and the associated platform variant.

Create A New Application Variant



What is the name of the application?

What is the description of the application?

What Platform is this for? *

What is the unique ID for this application and platform? *

What is the value of the Server Key?

Adding a Variant to an Existing App

Typically, mobile apps are available on multiple platforms. This notion is represented in the system via App Variants. The Application entry in the Push Notifications landing page grid represents the conceptual app. The actual app instance on a particular platform is represented via an App Variant. Upon creating a new app, the associated variant is also created. Other variants can be added via the **Add Variant** action from the **Actions** menu for a particular application.

Applications with push notification enabled			
Add application			
Application Name	Description	Default?	Actions
▶ DemoApp	Demo app	✓	Actions ▾ Edit Add Variant

The configured variants for an app can be viewed via the expand pane icon, located to the left of the app name.

Applications with push notification enabled			
<button>Add application</button>			
Application Name	Description	Default?	Actions
▼ DemoApp	Demo app	✓	Actions ▾
Type	App Variant ID	Actions	
Android	Demo1	Actions ▾	
Android	Demo2	Actions ▾	

Setting the Default App

Administrators can mark one app as the default. This is beneficial in scenarios where there is only one app or where a particular app is predominantly used. The default app is the (default) target for push notification messages in flows. Marketing analysts can choose to override this by selecting a specific app. See [Configuring Push Notifications in Actions](#) for more details.

Use the **Make Default** action from the **Actions** menu to mark an application as the default.

SMS

Email

Passbook

Paid Media

Push Notification

Applications with push notification enabled

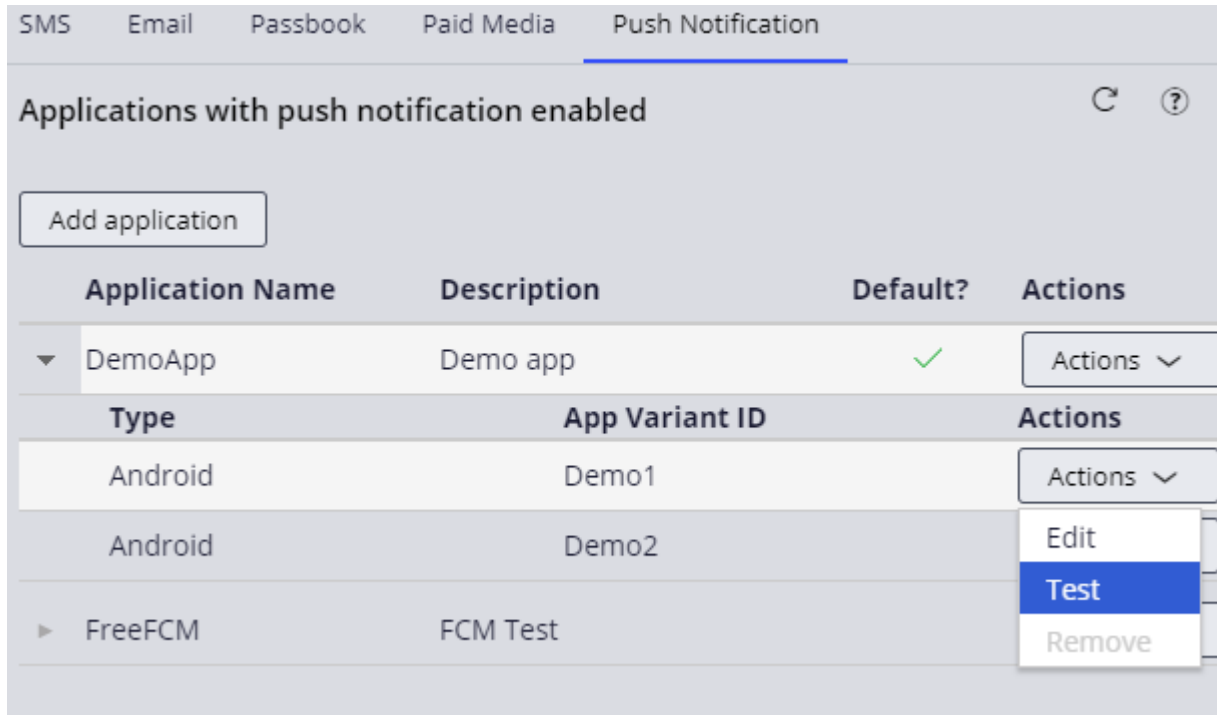
Add application

Application Name	Description	Default?	Actions
▶ DemoApp	Demo app	✓	Actions ▾
▼ FreeFCM	FCM Test		Actions ▾
Type	App Variant ID		
Android	68756	Edit Add Variant Make Default	

Testing an App Variant

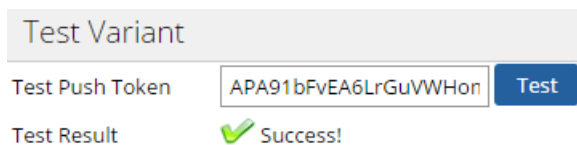
After configuring an app variant, it is recommended that the user tests the configuration of the variant to ensure that push notification messages can be delivered for the app. Testing the variant validates both the variant's configuration and the mobile app itself.

Use the **Test** action from the **Actions** menu for an app variant to launch the test variant dialog.

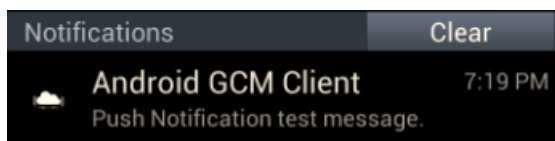


Provide a value for **Test Push Token** and click the **Test** button to send the test push notification message. A push token uniquely identifies the installation of an app on a particular device. The app developer should be able to provide you with the push token associated with the test device.

The system displays the status of the test message in the **Test Result** field.



The test message is delivered (as a push notification) to the app on the test device. The following image shows the test notification, as received for a sample app running on the Android platform:



Deleting an App Variant

Use the **Remove** action from the **Actions** menu for an app variant to delete the app variant.

Android	4355555555555554	Actions ▾
IOS	iDemo	Edit
FreeGCM	GCM Test	Test
		Remove



Note: The Remove action is disabled on a variant once app users have been registered to receive notifications for it.

Using Push Notification with Passbook

Push Notification functionality can also be used in conjunction with the Passbook functionality for pushing passbook updates. This feature is automatically enabled once Passbook settings have been configured in the system. Refer to the Passbook Settings appendix for more details.

Passbook is configured for Push Notifications.
[Click here](#) to configure Passbook settings.

Configuring Push Notifications in Actions

The Push Notification shape in the flow canvas enables the user to configure notification messages for delivery.

General Configuration

The following general configuration options are available in the **General** section of the properties panel for this shape:

Name	Purpose
Message	Notification message to push to the customer's registered device(s). This can be plain text or an expression.
Play Sound?	Associate sound with the notification message. If this setting is enabled, the message payload references the default sound. When the message is received by the device, the device-specific default sound for notifications (if enabled) is played.
Key Code	Marketing code to identify the shape. This value can be passed to the device along with the notification message (as additional values).

A sample configuration for the general settings is shown below.

Message `"Special $" + .OfferData.DiscountAmount + " in savings only today!"`☒ Play Sound?

Key Code

PushNot123

Application Configuration

The following settings are available in the **Application Configuration** section of the properties panel for this shape:

Name	Purpose
Default Application	Determines whether the notification message should be pushed for the default app.
Other Application	Determines whether the notification message should be pushed for the specified app. Select the app to notify from the drop-down of configured apps.

A sample configuration for the applications settings is shown below.

Application Configuration

Select the application where this notification should be sent

☐ Default Application ☒ Other Application

Demo app ▼

Wait After Sending

Users can determine whether they would like to wait after the notification message is pushed. The following options are available in the **Wait After Sending** section for this shape:

Name	Purpose
Wait	Determines whether flow execution should wait after pushing the notification message. When this is enabled, the user can specify the duration for the wait by setting the properties below appropriately.
Days	Number of days to wait
Business Days?	Determines whether the wait duration should be in terms of business days or regular week days.
Hours	Number of hours to wait
Minutes	Number of minutes to wait

Name Purpose

Seconds	Number of seconds to wait
----------------	---------------------------

Send Additional Values

Users can choose to include other information as part of the notification message payload. This data can be used by the app developer. Different platforms place different restrictions on the size of the overall message payload. Users should be aware of this limitation when specifying additional values. A notification message that ends up being larger than the allowed payload size may not be delivered.

Enable the **Send Additional Values?** checkbox (in the **Additional Details** section of the properties panel) to pass additional values. Use the grid controls to add fields. For each field, specify a name and value. The name must be plain text, but the value can be an expression. The key code can also be passed as an additional field (as shown in the example below).

▼ Additional Details

☒ Send Additional Values?

Additional Values

[+ Add Item](#) [× Delete](#)

	Name	Value	
⋮	Details	"Offer ends today"	⚙
⋮	DiscountAmount	.OfferData.DiscountAmou	⚙
⋮	KeyCode	.TreatmentKeyCode	⚙

Set Badge

The **Set Badge?** option (in the **Additional Details** section of the properties panel) allows users to set a numeric badge value along with the notification message. This value only has an impact if it's supported by the app platform. For example, in iOS, the badge value is shown as a number on the app's icon. The **Badge Value** field can either be a static number or a numeric expression.

☒ Set Badge? (Only if supported by OS)

Badge Value

⚙

Push Notification User Registration Services

Pega Customer Decision Hub provides two services for registering app users with the system. Push notifications (from actions) are only sent to registered customers. It is the responsibility of the app developer to code the app to invoke these services, at appropriate points in time. For example, when a customer installs the app, the app must register with the platform push notification service (e.g. APNs, FCM) and should then invoke the marketing registration service.

The services provided are:

- [Registration Service](#)
- [Un-registration Service](#)

Registration Service

The registration service is a REST service that supports the POST HTTP method. The URL for this service is:

```
http://<host>:<port>/prweb/PRRestService/PushNotification/Registration/Register
```

For the request, this service expects a JSON object having the following structure:

```
{
  "AppVariantID": "<AppVariantID>",
  "PushToken": "<PushToken>",
  "UserID": "<UserID>"}
```

The tokens included in the above request are:

- **AppVariantID** - Unique ID for the app variant configured in the system. This is specified when the app variant is created in the system and is used as a means for validating genuine requests.
- **PushToken** - Token assigned by the platform messaging service that is used for pushing notification messages for the selected app on the selected device.
- **UserID** - ID associating the app user with a customer in the system. In the out-of-the-box implementation, the expected value for this field is the CustomerID property. Custom implementations can override the mechanism by which this field is associated to a customer in the system.

For the response, this service sets the appropriate HTTP status code. In case of errors, an appropriate message is also returned as part of the error stream.

Un-registration Service

The un-registration service is a REST service that supports the POST HTTP method. The URL for this service is:

```
http://<host>:<port>/prweb/PRRestService/PushNotification/Registration/Unregister
```

For the request, this service expects a JSON object having the following structure:

```
{
  "AppVariantID": "<AppVariantID>",
  "PushToken": "<PushToken>"}
```

The tokens included in the above request are:

- **AppVariantID** - Unique ID for the app variant configured in the system. This is specified when the app variant is created in the system and is used as a means for validating genuine requests.
- **PushToken** - Token assigned by the platform messaging service that is used for pushing notification messages for the selected app on the selected device.

For the response, this service sets the appropriate HTTP status code. In case of errors, an appropriate message is also returned as part of the error stream.



Note: Un-registering a push token removes the push token registration from the system. The Data-PushNotification-Delivery-Registration.PreRegistrationDelete activity is provided as an extension point for custom implementations. This activity can be used to insert desired behavior before the registration entry is deleted. This activity can also be used to bypass the deletion process. For more details, refer to the usage guidelines specified in this activity.

Marketing Profile

Marketing Profile is a way of describing a customer categorically so that they can be grouped for marketing purposes. This includes a set of characteristics that identifies the customer and their value to the organization. This profile also includes a quick glance of the interaction between the customer and the organization.

Marketing Profile is accessible in the Pega Customer Decision Hub portal via: **Reports > Customer Profile**

When initially launched, the Marketing Profile simply contains a search box. Users can use this box to search for the desired customer either by the customer's name or ID. Upon searching, the system presents a list of matching customers. Users can select the desired customer from this list to view that customer's profile.



Marketing Profile can also be used to search for and review anonymous customers. Refer to the Identity Matching and Marketing Profile section in the Identity Matching chapter for details.

Profile Elements

This section outlines the various elements of a customer's Marketing Profile. This includes the following:

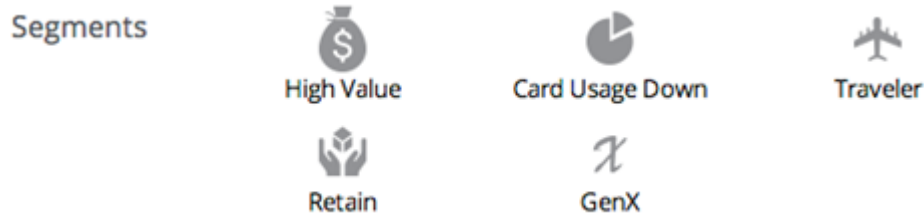
- [Customer Details](#)
- [Customer Dimensions](#)
- [Customer Demographics](#)
- [Propensity Scores](#)
- [Engagement History](#)

Customer Details

This section provides basic information about the customer such as their name, image, gender, address, and email.



In addition to basic information, this section also presents a view of the customer's segmentation, i.e. the Segments to which this customer belongs. In our example, the customer is a member of five different Segments.

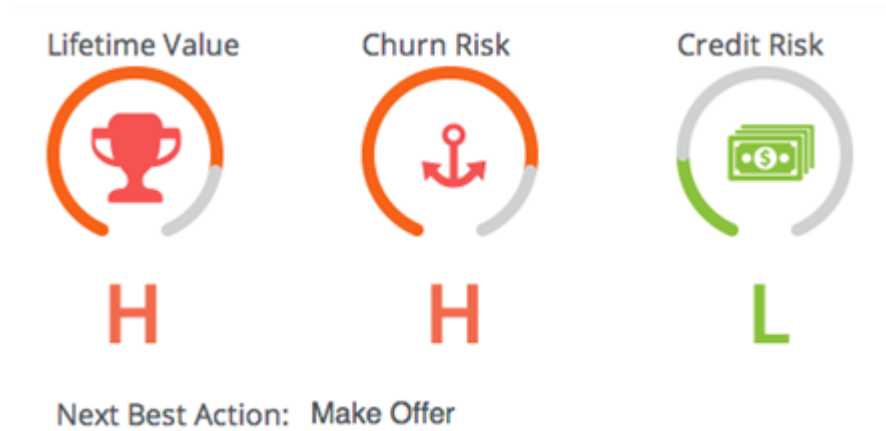


The customer segmentation view provides the user with a quick insight into the customer's categorization. This information can be useful when determining how to appeal to a particular customer.

The Segments list for a customer does not display virtual Segments.

Customer Dimensions

This section provides the user with a visual overview of the customer's performance across various dimensions including Lifetime Value, Churn Risk and Credit Risk.



The scores on each of these dimensions are visually indicated and are also classified into high (H), medium (M), and low (L).

In addition, the recommended next best action for this customer is also displayed.

Customer Demographics

This section displays basic information about the customer. This information is further categorized into:

- Communication – Customer's email address and mobile phone number
- Demographics – Customer's age, gender, and income
- Social Handles – Customer's handle on various social media outlets

▼ Customer Demographics

Communication

Email: steve.gold@e...
Mobile: 1234567890

Demographics

Age: 40
Gender: M
Income: \$78,000.00

Social Handles

f /goldsteve.21541
t @stephengold
g+ +stevegold
i /steve.gold#
s /SteveGold

Propensity Scores

This section displays the customer's propensity scores for the top three actions for the customer. Propensity is the likelihood that the customer will accept the action.

Propensity Scores

iPhone 5S



SamsungGalaxyS4



BlackberryTorch

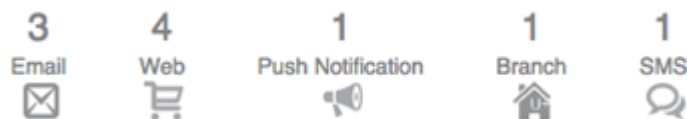


Engagement History

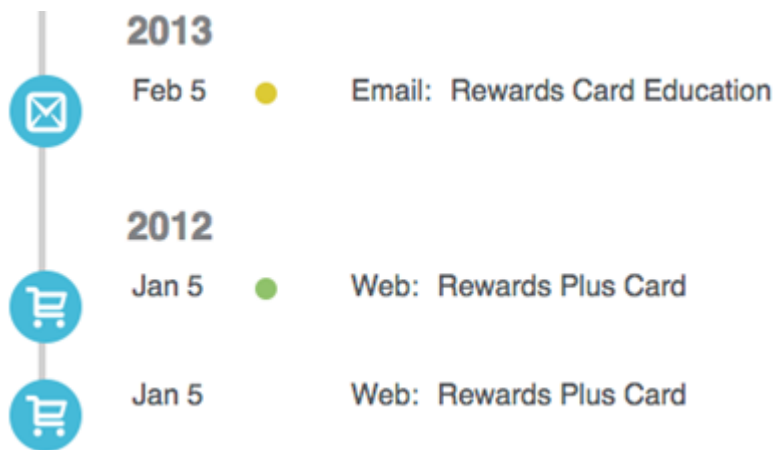
This section presents an overview of the customer's engagement with the organization. The top of this section contains a visual breakdown of this engagement, in terms of customer interactions, impressions, and the actions taken by the customer.



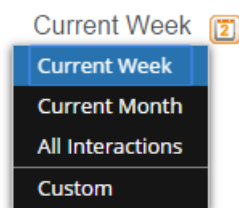
In addition, the interactions count is further broken down into the various communication channels (such as Email, Web, etc.), as shown below:



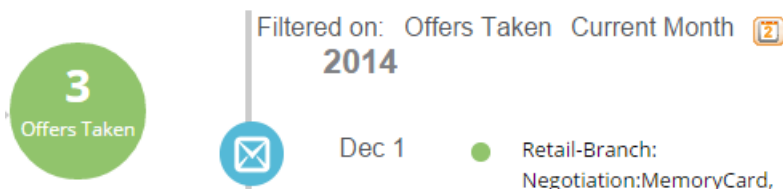
Finally, this section also presents a summary of the customer's engagement. This information is displayed in a chronological order, with the most recent engagement at the top. For each engagement, the icon on the timeline indicates the channel of communication. Additionally, if the engagement resulted in an impression or the action being taken, this is indicated via the appropriate colored dot next to the interaction date.



Users can utilize the calendar icon to specify a different time period for the timeline.



Furthermore, users can click the engagement circles to filter the timeline to the specific engagement type (e.g. Impression or Action Taken).



Marketing Profile Customization Guidelines

This section provides guidelines for customizing the Marketing Profile to work with your application. This includes the following topics:

- [Displaying Next Best Action](#)
- [Displaying Top Actions](#)
- [Displaying Customer Dimensions](#)

Displaying Next Best Action

The Marketing Profile displays the Next Best Action to take for the selected customer. This section list the steps involved for displaying the Next Best Action information in the Marketing Profile in your application.

Perform the following steps if you already have a Next-Best-Action type strategy:

1. Open the MKTProfileMainStrategy strategy rule in PegaMKT-Data-Customer
2. Save As this strategy into your implementation ruleset
3. Re-map the NextBestAction component to point to your existing Next-Best-Action strategy

Otherwise if you don't have a Next-Best-Action type strategy, perform the following:

1. Open the empty NextBestAction strategy rule located in PegaMKT-Data-Customer
2. Save As this strategy into your implementation ruleset
3. Implement your Next-Best-Action logic, arbitrating across the business issues you plan to implement (i.e. Sales, Retention, Servicing, etc.)

Displaying Top Actions

The Marketing Profile also displays the top actions (or action categories) for a customer. This section list the steps involved for displaying the top actions information in the Marketing Profile in your application.

Perform the following steps if you already have a Next-Best-Offer type strategy:

1. Open the MKTProfileMainStrategy strategy rule in PegaMKT-Data-Customer
2. Save As this strategy into your implementation ruleset
3. Re-map the NextBestOffer component to point to your existing Next-Best-Offer strategy
4. Select the Public Component to output if there is more than one

Otherwise if you don't have a Next-Best-Offer type strategy, perform the following:

1. Open the empty NextBestOffer strategy rule located in PegaMKT-Data-Customer
2. Save As this strategy into your implementation ruleset
3. Implement your Next-Best-Offer logic, arbitrating across the various types of actions you plan to make

Displaying Customer Dimensions

The Marketing Profile also calculates and displays several values that are part of the customer dimension, such as CLV_VALUE, Credit Risk, and ChurnScore. If these properties are already part of your customer data, then you can simply map them in the customer class. On the other hand, to calculate the values of these properties in a Pega Customer Decision Hub strategy, perform one of the following series of steps.

If you already have a CLV and Risk type strategy:

1. Open the *MKTProfileMainStrategy* strategy rule in *PegaMKT-Data-Customer*.
2. Save As this strategy into your implementation ruleset.
3. Re-map the *MKTProfileDecisionResults* component to point to your existing CLV and Risk strategy.
4. Select the Public Component to output, if there is more than one.

If you don't have a CLV and Risk type strategy:

1. Open the *MKTProfileDecisionResults* strategy rule located in *PegaMKT-Data-Customer*.
2. Save As this strategy into your implementation ruleset.
3. Implement your CLV and Risk logic as per your requirements.

You can also use the Strategy Builder to generate the CLV and Risk type strategy. For more information, see [Using the Strategy Builder](#).

Data Management

Pega Customer Decision Hub enables marketers to manage customer and associated data through the Data Management landing page.

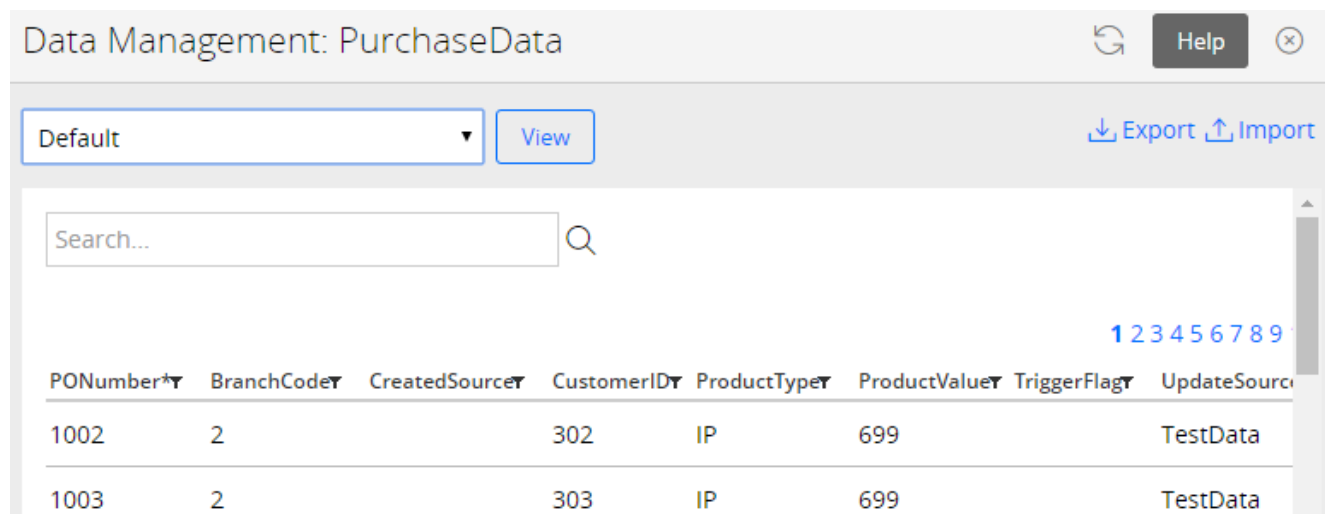
To access the Data Management landing page, log in to the Pega Customer Decision Hub portal as a user with the DataAnalyst role in your user group. In the navigation panel, click **Data > Data Management**. The Data Management page opens. Click the **Manage Data** link for a particular customer entity.

Upon clicking this link, the Data Management landing page opens in the context of the launching entity (e.g. customer). Marketers can utilize this landing page to perform the following actions:

- [View and search for instances](#)
- [Manage individual instances](#)
- [Import instances](#)
- [Export instances](#)

Viewing and Searching for Instances

The Data Management landing page displays a grid of instances of the data type, as shown below.



Data Management: PurchaseData

Default View Export Import

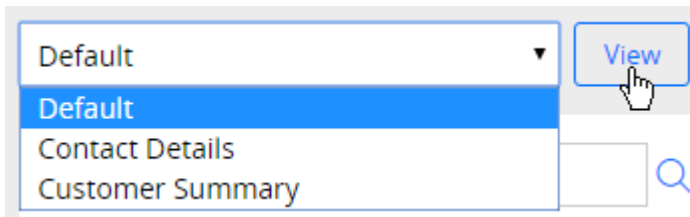
Search...

PONumber	BranchCode	CreatedSource	CustomerID	ProductType	ProductValue	TriggerFlag	UpdateSource
1002	2		302	IP	699		TestData
1003	2		303	IP	699		TestData

When the landing page initially opens, it displays the Default view. This view displays all externally mapped properties for the data type. In this view, the first column in the grid is the key property of the data type. The Default view for the customer entity has an additional feature. Marketers can click the link value in the first (key) column in the grid to open the Marketing Profile for the corresponding customer.

CustomerID ACCOL
C0000001

Implementers of the application can define other views to use with their data types. Marketers can see the list of available views in the drop-down above the header and can switch to a different view by selecting it in the drop-down and clicking the **View** button.



Note: Each view is backed by a Report Definition in the entity's data class. For a Report Definition to be available as a data view, it must have a custom field defined with the field name set to `DataManagement` and the value set to `Views`.

Marketers can also search for particular instances by specifying the desired text in the search input field above the grid and clicking the magnifying glass icon. The system performs the search across all columns in the current view and displays the results in the data grid.

Marketers can also refine grid contents by using column filters.

Managing Individual Instances

Marketers can use the instances grid on the Data Management landing page to perform the following actions:

- **Add an instance** - To add an instance, click the **Add record** link at the bottom of the grid. Fill in all necessary fields and click anywhere outside the input row. To cancel your changes and discard the new record, click the delete icon at the end of the row.
- **Modify an instance** - To modify an instance, click anywhere in the desired row. The row will toggle to editable mode. After making the desired changes, click anywhere outside the row to save the modified instance.

Note: The key value of an instance cannot be modified.

- **Delete an instance** - To delete an instance, click the delete icon at the end of the row.

Access to add, modify, or delete data instances is managed by standard Pega Platform security constructs. Administrators can utilize these constructs to grant or restrict access as needed.

Importing Instances

Marketers can utilize the import mechanism on the Data Management landing page to import multiple instances using a comma-separated-values (CSV) file.

To initiate an import, click the **Import** link above the instances grid.

Note: The Import link is disabled if a data import is already in progress for the data type.

At a high level, the import process has the following three steps:

1. Upload CSV file and select one of the following import purposes:
 - a. **Add or update** - Use this option to create new records for those instances in the import file that don't currently exist in the system, and to update records for those instances that do exist.
 - b. **Add only** - Use this option to only create new records for those instances in the import file that don't currently exist in the system. Records for existing instances will not be updated.
 - c. **Delete** - Use this option to delete matching records from the system.
2. Map fields - Select the field to use for matching records and specify the mappings for all fields to import.

3. Import records - Trigger the import process. Optionally, choose to save the specified field mappings for subsequent imports.



Note: The import process utilizes the Data Management functionality of the Pega Platform. Use the help icon in the wizard to launch the help topic for details on this process.

When importing large files, the import progress can take some time. Marketers can close the import window and continue with other activities. The system displays the status of the import at the top of the Data Management landing page. Once the import completes, the system displays the number of instances that were added or updated by the import. If there were errors during the import, the number of erroneous records is also shown.

purchaseorder.csv has been imported



1 created or updated



1 Errors [See more](#)



Click the **See more** link to download a CSV file containing the records which failed to import. The last column in this file contains a description of the error that occurred.

Exporting Instances

Click the **Export** link above the instances grid in the Data Management landing page to export a CSV file containing data instances represented by the currently selected view.

Revision Management

Revision Management is a Pega Platform feature that enables business users (such as marketers) to take ownership of parts of the enterprise application.

Revision Management is a feature that allows small incremental business led changes to be made to the enterprise applications. Business users (such as marketers) can make, test and deploy changes via a safe, controlled change management process. Revision management changes are made within the business sandbox via an application overlay which allows IT to control what types of business changes are possible.

Revision Management enables marketing users to revision, package, and import marketing artifacts. The DecisionManager:PegaMarketing role facilitates Revision Management in the Pega Customer Decision Hub portal. This role is automatically added to the RevisionManager and StrategyDesigner access groups for overlays created for Pega Customer Decision Hub applications.

Most marketing artifacts can be included and updated in revisions using the processes described in the Revision Management guide. Revision managers can start a new Revision and create Change Requests within the Revision. A Change Request can contain marketing rules and can be assigned to a marketer. The **My Work** widget (shown below) and the [Revision Management](#) widget enable marketers to view their assigned Change Requests.

My Work

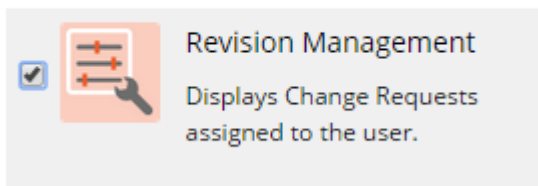


ID	Description	Category	Due ▲	Urgency	Owner	▼
CR-1	View Change Set	Change Req 01	4 days from now	70	Sample Marketer	

Revision Management Widget

Marketing users can also add the **Revision Management** widget to their Home page in the Pega Customer Decision Hub portal.

CHANGE REQUEST (1)



This widget displays Change Requests that are assigned to the user and lists each rule within the request. Users can click **Edit** to open the rule directly from the widget.

Work under Revision Management



Change Request 5 CR-7

Update microsite links

Email Treatment

SimpleEmail

Edit

Segments and Samples

Segments and Samples are handled differently in Revision Management in order to preserve data integrity between their definition and stored results.

Rules of these two types, included in the overlay, are listed in the **Segmentation** tab (under **Rules**) on the Revision Management landing page. This landing page can be accessed via the **Revision Management** link in the Pega Customer Decision Hub portal.

Rules

Business Rules Segmentation

Overview of all the segmentation rules available in this application overlay.

Name	Applies to	Type	Updated	Updated by
ABSmoke	PegaMKT-Data-Customer	Sample	27 minutes ago	Sample Marketer
Age52F	PegaMKT-Data-Customer	Segment	about a minute ago	Sample Marketer

Users can directly open these rules from the grid shown above. Unlike other rule types, these rules will need to be checked out before they can be updated. Once the rule has been updated, it should be checked back in.

These rules can be managed in the following two ways:

- Included with an existing Revision
- Packaged directly

Included with an existing Revision

If there is an active Revision, updated Segments and Samples will automatically be associated with the Revision. The Revision object displays the list of included Segments and Samples along with their current status. An **In progress** status indicates that the rule is currently checked out, while **Updated** indicates that the rule is checked in.

Segmentation rules within this Revision

Name	Type	Updated	Updated by	Status
Age52F	Segment	7 minutes ago	Sample Marketer	Updated
ABSmoke	Sample	1 hour 1 min ago	Sample Marketer	In progress

No special action is required to package these rules as they will be included in the revision package which is generated upon completion of the Revision.

Packaged directly

Even when there isn't an active Revision, users can open and modify Segments and Samples. In such a case, once all modified rules have been checked in, revision managers can utilize the **Package rules...** button to package these rules directly from the Segmentation tab in the Revision Management landing page.

Business Rules Segmentation

Overview of all the segmentation rules available in this application overlay.

Package rules...

Clicking this button automatically generates a Revision, completes it, and makes the revision package available.

Revision: Update business rules (R-2)

Revision is complete, and ready for download and distribution.

Overview Audit

Download revision package

Revision Version 01-01-03.jar [Download](#)

Importing Revision Packages

Basic revision packages can be imported following the prescribed Revision Management process. However, revision packages that contain any of the following rule types require an additional configuration during import to prevent compromising live data.

- Output Templates
- Segments
- Samples
- Volume Constraints

For such packages, the optional test phase of the import process must be skipped by enabling the **Skip test phase** checkbox in the **Review contents** stage.

Age52F	Segment	1 hour 16 mins ago	jr_marketer	View Comments
ABSmoke	Sample	6 hours ago	jr_revMgr	View Comments

☒ Skip test phase

After the import is complete, the following actions are recommended for such packages:

- Run imported Segments and Samples to apply the latest definitions.
- Review imported Volume Constraints and determine if any of the manually reset constraints should be reset.



Note: For marketing rules that support scheduling (Segments, Samples, Analysis Projects, Output Templates), the import process retains the schedule configuration (if configured) on the destination environment.

Fast-track change requests

Pega Customer Decision Hub uses the fast-track change requests feature introduced in Pega Platform. Use fast-track change requests to address high-priority or emergency rule changes without the need to disturb a revision that is in progress.

As a revision manager, you can start fast-track change requests directly on the Revision Management landing page. In addition, you can convert an approved standard change request to a fast-track change request. For more information, see [Resolving fast-track change requests](#).

Pega 1:1 Operations Manager

Pega 1:1 Operations Manager is a new module of Pega Customer Decision Hub and the Customer Decision Hub. Use Pega 1:1 Operations Manager in conjunction with Revision Management to push business-as-usual changes into production. In the early preview version available in Pega Customer Decision Hub 8.4, users are able to create and deploy new actions to production, as well as request updates to existing actions.

Pega 1:1 Operations Manager requires an overlay application and supports using multiple overlays at the same time. For more information, see the *Pega 1:1 Operations Manager Implementation Guide* on the [Pega Customer Decision Hub product page](#). The application is not intended to be deployed to production.

Understanding the relationship between Pega 1:1 Operations Manager and Revision Management

Pega 1:1 Operations Manager extends the standard Revision Management capabilities of Pega Customer Decision Hub and the Customer Decision Hub by providing a simple process where a business-as-usual

change request is triggered by a non-technical team member with the use of a transparent user interface. In this way, Pega 1:1 Operations Manager makes it possible to quickly record and process standard, high-volume change requests related to actions.

Pega 1:1 Operations Manager uses the same flows and activities as standard Revision Management. Because of that, it seamlessly integrates with Revision Management and complements normal Revision Management operations. For example, if a change request is withdrawn or rejected in Pega 1:1 Operations Manager, the status also changes in Revision Manager. If a revision is withdrawn or rejected in Revision Manager, the status change is reflected in Pega 1:1 Operations Manager.



Note: Pega 1:1 Operations Manager does not support fast-track revisions. To manage emergency high-priority or emergency rule changes, use the fast-track capacity provided by Revision Management.

Understanding the change request flow in Pega 1:1 Operations Manager

The Pega 1:1 Operations Manager change request flow consists of the following stages:

1. *Request* - In this stage, a non-technical team member in the *<your Operations Manager implementation application>*:BusinessUser access group, for example, a marketing analyst, requests an update to a marketing action, or requests that a new action is created to cover a business requirement. For more information, see [Creating a new change request in Pega 1:1 Operations Manager](#).
2. *Approve* - In this stage, a team lead in the *<your Operations Manager implementation application>*:TeamLead access group receives the change request, reviews the detail, and indicates whether or not the requested change should be implemented. For more information, see [Approving a change request](#).
3. *Plan* - In this stage, after the change request has been approved by a team lead, it is sent back to the original requester for additional grooming. For more information, see [Grooming a change request](#).
4. *Build* - In this stage, a technical team member in the *<your Operations Manager implementation application>*:NBASpecialist access group works on the tasks required to complete the request. For more information, see [Working on the change request](#).
5. *Test* - This stage is an extension point where you can implement your own testing process. In future versions of Pega Customer Decision Hub, a default testing process will be implemented.
6. *Deploy* - In this stage, a team lead reviews the implemented changes, and then submits them for deployment. For more information, see [Deploying the change request](#).

Creating a new change request in Pega 1:1 Operations Manager

Pega 1:1 Operations Manager gives non-technical teams the ability to request changes to business-as-usual operations, such as the update of an action, or the creation of a new action. As a business user, you can trigger the creation of a change request in the Pega 1:1 Operations Manager portal.

1. Log in to Pega 1:1 Operations Manager as a user with the *<your implementation application>*:BusinessUser access group.
The default portal for the *<your implementation application>*:BusinessUser user group is the 1:1 Operations Manager portal. For more information, see the *Pega 1:1 Operations Manager Implementation Guide* on the [Pega Customer Decision Hub product page](#).
2. In the left navigation bar, click **Create**.
3. In the **Create change request** window, select whether you want to create a new action, update an existing action, or whether you are unsure at this time, and then enter a description of the request.
For example: Create a new action which promotes the Platinum Credit Card to customers who are part of our loyalty program.
4. Click **Create**.

5. After you create the request, you can view it in the **My change requests** table on the Home page of the Pega 1:1 Operations Manager portal.

Pega 1:1 Operations Manager creates the change request and sends it by email to a user with the *<your implementation application>:TeamLead* user group.

Approving a change request

As a team leader, review and approve change requests to ensure that they are in line with the requirements of your organization.

1. To view all your pending change requests, log in as a user with the *<your implementation application>:TeamLead* access group.
2. In the **To do** section of the 1:1 Operations Manager Home page, click **Go** next to the request which you want to review.
3. Review the request details in the panel on the left.
4. To view the business reason specified by the user who created the request, expand the **Business reasons** menu.
5. In the **Score** field, enter a numerical value between 1 and 100.
Use the score value to prioritize actions. For example, a score of 50 can indicate medium priority and a score of 100 - critical priority.
6. Approve or reject the change request by performing one of the following actions:
 - To approve the request, click **Approve**.
 - To reject the request, click **More > Reject**.
7. **Optional:** If you chose to reject the request, specify the reason for rejection.

If the request is approved, it is moved to the Plan stage, and sent back to the user who created it.

Grooming a change request

In the Plan phase, as a business user, you define additional requirements, eligibilities, and channel details.

1. After you receive a notification email that your change request was approved, log in as a user with the *<your implementation application>:BusinessUser* access group.
2. In the **To do** section of the Pega 1:1 Operations Manager Home page, click **Go** next to the request on which you want to work.
3. Review the request details on the **Details** tab and adjust them as required, for example, to provide more information about the action.
4. In the **Eligibilities** tab, select the conditions under which the action can be offered to customers.
For example: An action can be offered only to customers who signed up for a loyalty card.
5. In the **Channels** tab, describe the treatments which you want to be associated with the action.
For example: Provide the text for the web ad or ads which you require, and describe their placement on the web page.
6. Click **Finish**.
7. In the **Rank** field, indicate the request priority by entering the rank for the change request.
8. Click **Submit**.

The request advances to the Build stage. A user who has the necessary access rights to work on the tasks required to complete the request may now start working to build the necessary changes. If needed, Pega 1:1 Operations Manager creates an application overlay and matching revision for the work.

Working on the change request

In the Build phase, a user in the *<your implementation application>:NBASpecialist* access group does the changes required to complete the change request.

1. To view all your pending change requests, log in as a user with the *<your implementation application>:NBASpecialist* access group.
2. In the **To do** section of the 1:1 Operations Manager Home page, click **Go** by the request which you want to review.
3. Review the request details and the required Build tasks.
4. Complete the required tasks.
Rules are locked as you work on them, to prevent multiple users from working on the same rule or task. As you complete each task, matching rules are generated and saved into the application overlay ruleset and revision.

The request advances to the Test stage. By default, the 1:1 Operations Manager completes the Test stage immediately, because the stage does not contain any built-in tasks. In future versions of Pega Customer Decision Hub, a default testing process will be implemented. You can also edit the Change Request case type and add additional approval logic. For more information, see the *Pega 1:1 Operations Manager Implementation Guide* on the [Pega Customer Decision Hub product page](#).

Deploying the change request

Once the changes are completed, as a team leader, review the list of changes and submit them to a revision manager, who can deploy them to production.

1. To view all your pending change requests, log in as a user with the *<your implementation application>:TeamLead* access group.
2. In the **To do** section of the 1:1 Operations Manager Home page, click **Go** by the request which you want to review.
3. Review the list of rules which were created or edited for the change request.
4. To send the revision to a revision manager, click **Submit**.

The revision with the change request can now be deployed to production according to the standard Revision Management process. The change request is resolved. To view it, click **Change requests** in the left navigation pane of 1:1 Operations Manager, and then click **Closed**.

Identity Matching

Identity matching is a feature that allows a Pega Customer Decision Hub application to identify individuals across their addressable devices. This feature also enables a seamless transition between an anonymous individual and a recognized customer.

When an individual is anonymous (e.g. not logged in), relevant information is captured during their various interactions with the application. This information can then be utilized to determine the Next-Best-Action for this individual. When the individual authenticates themselves as a customer, their anonymous interaction data is merged with their previous interaction history. This allows the marketing application to maintain a complete view of the customer journey.

Identity matching is incorporated in the following functional areas:

- [Email](#)
- [Real-Time Containers](#)

Identity matching utilizes browser cookies to store identifying information. For individuals yet to be identified, a unique id is stored in the cookie. Once an individual has been identified as a customer, their (encrypted) customer id is stored. During the individual's interactions with the application, additional data is collected and associated with the appropriate identifier (customer id or unique id). The captured associations are specific to the functional area and are listed in the corresponding section.

Identity Matching in Email

Identity matching occurs when users open and respond to marketing emails sent via the application.

The following associations are captured when a customer opens a marketing email (handled by the IMPR service):

- CustomerID to UniqueID
- CustomerID to Email Address
- CustomerID to IP Address
- UniqueID to Email Address
- UniqueID to IP Address

The following associations are captured when a user clicks on a response link in a marketing email (handled by the PORE service):

- CustomerID to UniqueID
- CustomerID to IP Address
- UniqueID to IP Address

Identity Matching in Real-Time Containers

Identity matching also allows marketers to track anonymous individuals and their interactions with Real-Time Containers. When a marketer defines a Container to represent a portion of a web page, the Container uses browser cookies to perform identity matching.

The following associations are captured during interactions with the Real-Time Container:

- CustomerID to UniqueID

- CustomerID to IP Address

Additionally, identity matching is implicitly performed by the following Real-Time Container services:

- [Container](#) - Only for the Web channel
- [ExecuteWebContainer](#)

Identity Matching and Marketing Profile

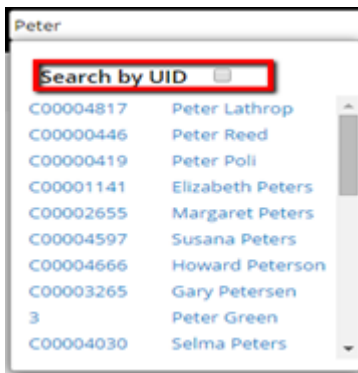
Marketers can use Marketing Profile to search for anonymous users and view their interactions with the marketing application.



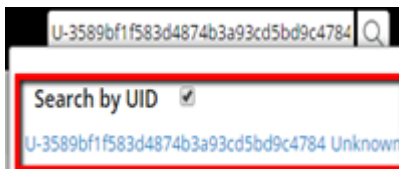
Note: To allow for the searching of anonymous users, the MKTProfileEnabled When rule must be enabled (i.e. set to true).

The Marketing Profile search functionality provides an additional **Search by UID** checkbox to allow for searching of anonymous users.

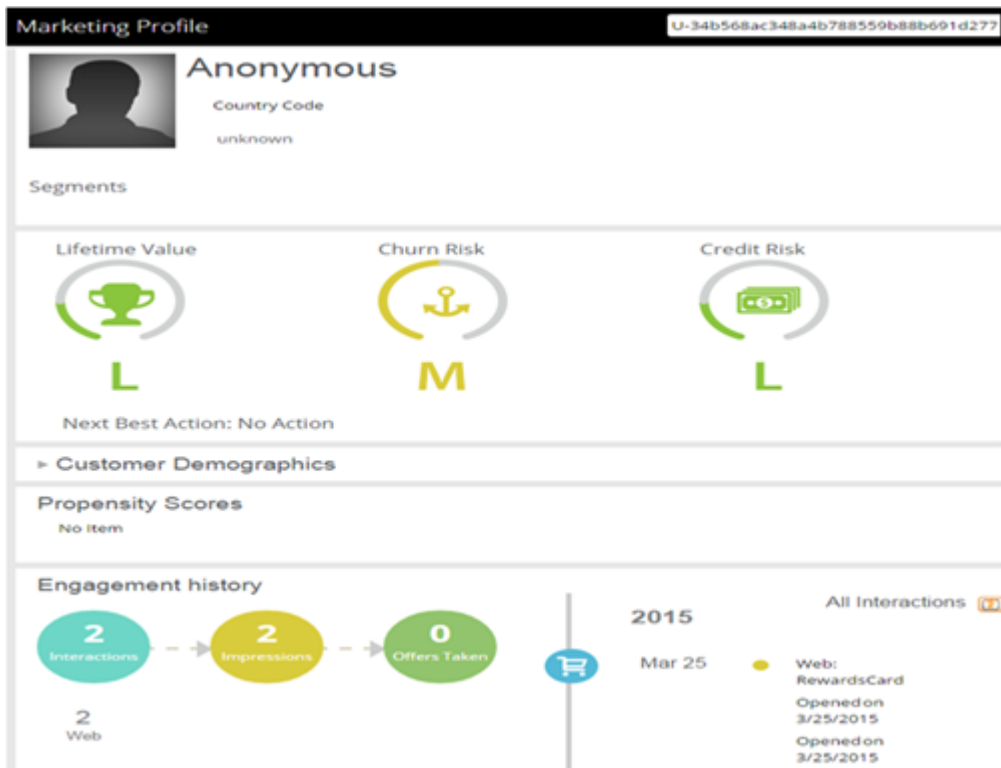
When this checkbox is unchecked, the search looks for existing customers based on their identifier and name.



When this checkbox is checked, the search looks for anonymous customers using their unique identifier.



Upon clicking the link for the anonymous customer, their interaction details are displayed.



At a later point, if the anonymous individual identifies themselves as a known customer, the anonymous interaction details are merged with the customer's interaction history. Searching for the anonymous individual (by their unique id) now reveals the identified customer in the search results.

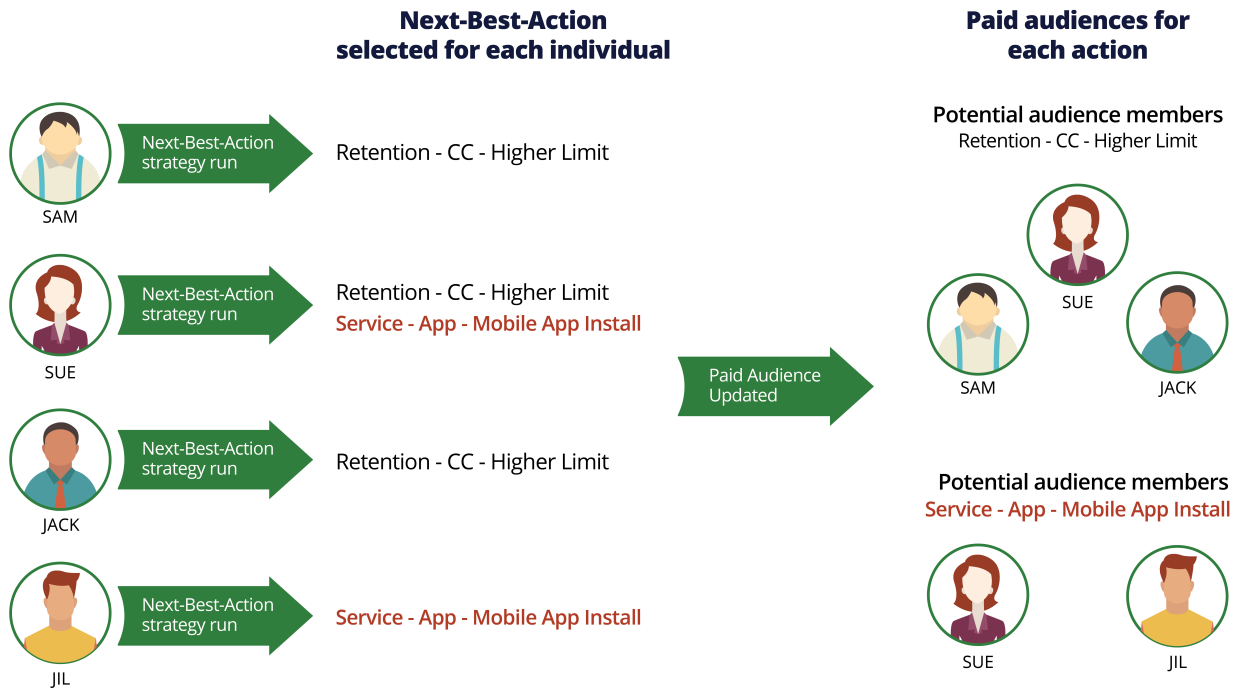


Paid Media Manager

Paid Media Manager extends Next-Best-Action to modern digital advertising platforms, such as Facebook Ads and Google Ads. Each individual's Next-Best-Action is communicated through audiences on ad platforms.

Traditional advertising campaign management tools rely on audience-based mechanisms and anonymized data segments which can be shared outside the enterprise firewall to determine what ad each individual should see. With Paid Media Manager, action, eligibility, and priority decisions are made with the full fidelity of enterprise data and intelligence within the enterprise firewall, in the same way as with other Pega Customer Decision Hub-enabled channels.

Paid Media Manager uses the latest Next-Best-Action strategy execution to place individuals into audiences and leverages these audiences on ad platforms to target the individual with the right action at the right priority. Each paid run results in the audiences being updated according to the latest next-best-action for each individual, as in the following figure:



For example, Next-Best-Action may determine that based on an interaction in the call center, an individual named Troy Murphy has a high propensity to accept a UPlusBank Travel Credit Card offer from his bank, the UPlus Bank. Paid Media Manager adds Troy to an audience, for example, UPlusBank Travel Credit Card – High Priority, on each ad platform. Within each ad platform these audiences are configured to be targeted with the appropriate advertising creative for the action. The maximum bid amount for the add click or impression can also be aligned with the priority of that action for each individual.

The result is that soon after the interaction in the call center, Troy's Next-Best-Action is updated across major ad platforms. He is targeted with Travel Credit Card advertisements across major media properties that he interacts with regularly, such as Facebook, Instagram, YouTube, and Google Search.

In this way each known individual, including customers and prospects, can be targeted with ads based on individual-level decisioning rather than audience-based rules. These decisions and the model-based learning which powers them can run on the full fidelity of enterprise data within the firewall. Only the action-based decision is communicated to the advertising platforms in the form of individual audience updates.

This chapter describes how you can use Paid Media Manager to reduce wasted ad spend, increase your return on ad spend, optimize cost per click, and prospect for new customers on paid media.

Enabling Paid Media Manager to connect to paid destinations

A paid destination holds the configuration of how an ad platform receives audiences using a specific integration mechanism. You can have multiple paid destinations for each ad platform. For example, separate Google Ads accounts may be used for Google Search and for YouTube. After a paid destination is set up, it can be configured to receive paid audiences based on Next-Best-Action Designer or intelligent segments.

Paid Media Manager supports modern people-based destinations, such as LinkedIn Ads, Facebook Ads, or Google Ads. You can also use it with legacy integration methods supported by traditional website banner advertisements. For detailed instructions about configuring the connection between Paid Media Manager and various paid destinations, refer to the [Pega Customer Decision Hub Implementation Guide](#) on the [Pega Customer Decision Hub product page](#).

Configuring the connection to a people-based destination

Paid Media Manager uses the people-based matching APIs for Facebook Ads, Google Ads, and LinkedIn Ads to synchronize paid audiences. To set up a connection, you must configure both Paid Media Manager and the paid destination to which you want to connect.

Matching individuals to their accounts in Facebook, Google or LinkedIn

Facebook Ads, Google Ads and LinkedIn Ads destinations enable you to target individuals based on their email addresses, phone numbers, device IDs, and more. Mapping these properties allows the integration to match known individuals to their accounts and target them with the right ads on the right platform.

After the connection is established, a one-way hashed PII is sent directly from Pega Customer Decision Hub to the ad platforms through a secure connection. If the one-way hashed PII matches what the ad platform knows about the individual, the audience is updated. The hashed PII values are then discarded.

After an anonymous link is established, Paid Media Manager can add and remove individuals based on the actions that have been assigned to them by Next Best Action in near real-time. Because people-based updates do not rely on website cookies, they can be triggered by scheduled runs, real-time container calls, or action responses.

For information about configuring the PII mapping, refer to the *Pega Customer Decision Hub Implementation Guide* on the [Pega Customer Decision Hub product page](#).

Updating PII Mappings and Values

People-based paid audiences are kept up to date when PII mappings are updated or an individual's PII values change. Individuals are first removed from the audiences using the old PII. They are then re-added with the updated PII.

If you update a PII mapping, each audience for the updated destination will be rebuilt with new PII values. Rebuilding audiences based on updated mappings may take a similar amount of time as an initial scheduled run. The ProcessPaidMediaReSync agent scans for changes in PII mappings. If a change is detected, it triggers a resynchronization for that destination. By default, the agent is configured to run every 5 seconds. For more information, see [Paid Media Agents](#).

For updates to individuals' PII values, the PaidCustomerResyncMaster agent periodically scans for changes. If a PII update is detected, for example, if there is a new phone number, the agent updates the information used for subsequent paid syncs across destinations which use that information. The individual is also removed from existing audiences which use the old PII and added back with the updated PII. By default, this is configured to run every 7 days. For more information, see [Paid Media Agents](#).

Web-based and DMP Targeting

In addition to modern, people-based platforms, Paid Media Manager also supports pixel-based APIs provided by advertising technology platforms, including demand-side platforms (DSPs), data management platforms (DMPs), and advertising networks. Instead of people-based APIs, these platforms generally rely on third-party cookies to build anonymous profiles and target individuals with ads. Paid Media Manager integrates with these mechanisms to deliver people-based Paid Audiences and Next-Best-Action decisions.

Typically pixel-based mechanisms target individuals with advertisements based on only the current content of the website which the individual is viewing. For example, if Troy goes to [upplusbank.com](#) and views information on a Platinum credit card, the pixel activates and targets Troy with ads for the credit card. Paid Media Manager instead bases the ad targeting decision on Next-Best-Action. This takes into account the history of Troy's interactions and the learnings derived from them in order to show him an ad for a product which he has a high propensity to buy.

Unlike with people-based APIs where audience can be updated via S2S API calls at any time, pixel-based audiences can only be updated when an individual is in a live web session and on an advertiser owned website. Many browsers also prevent access by third party cookies, which may further limit the ability to update audiences through this mechanism.

Paid Media web service

Legacy web-based ad platforms, such as demand-side platforms (DSPs), use pixels, also known as remarketing tags, to access their cookie-based profiles and target ads accordingly. These pixels are typically called when an individual visits a website, and the ads which they display are based on the individual's current website activity. Paid Media Manager allows you to include the power of Next-Best-Action decisioning in the pixel calls. You can extend the pixel call with a call to the Paid Media web service to determine ad targeting based on the enterprise decisioning and intelligence embedded in Next-Best-Action.

Next-Best-Action Targeting on DMP-based Destinations

Data Management Platforms (DMPs) provide a mechanism to update cookie-based audiences outside of a client web session. After a DMP establishes a cookie for an individual who visits an advertiser's website, subsequent updates can be made through S2S updates to the DMP. These updates can then be delivered to a separate ad platform responsible for selecting and bidding ad inventory, such as a Demand Side

Platform (DSP). Each of these media buying platforms should have a separate destination to account for differences in paid action priority for an individual across different destinations.

Paid Media Manager provides out-of-the-box support for the Adobe Audience Manager DMP. Paid Media Manager generates the appropriate traits and audiences within Adobe Audience Manager (AAM) through the AAM API. After a scheduled run completes, a file is also generated with the audience updates produced by Next Best Action. This file is delivered via S3 bucket or FTP to Adobe. Adobe Audience Manager can take up to 48 hours to propagate these updates to downstream DSPs and other third-party cookie-based platforms. In addition to Adobe Audience Manager, you can also configure paid destinations for a generic DMP.

For DMPs, updates are only made in response to scheduled runs and segments.

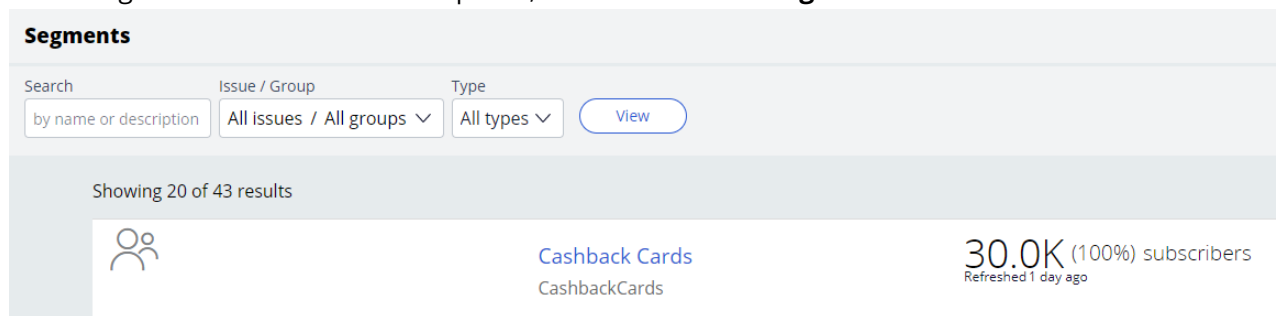
Enabling Segment Updates on Paid Destinations

After you configure the connection with a paid destination, you can use your existing marketing segments to target individuals on the ad platform. Create paid audiences that are based on existing segments by synchronizing your List or Criteria Segments with a paid destination. Since segments can be based on multiple factors, such as traits or AI analytics, they are a powerful tool to build audiences in the paid destination.

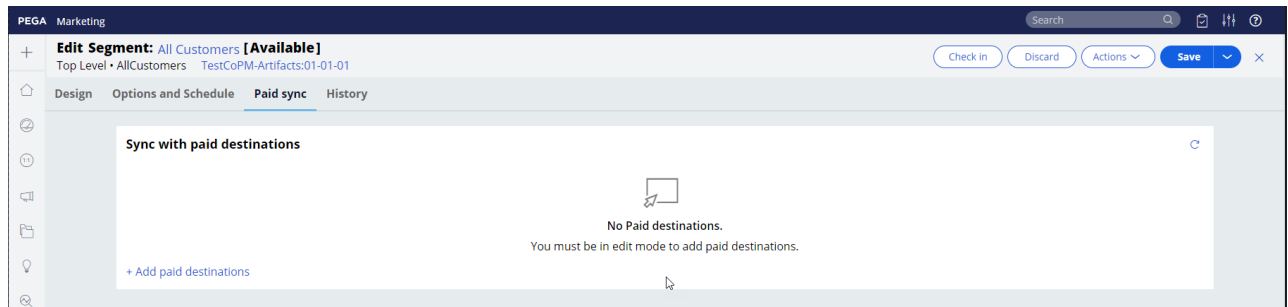
For example, UPlus Bank, which has recently implemented Pega Customer Decision Hub, wants to extend the segments to paid destinations such as Facebook. A segment which includes individuals who have agreed to receive information about new products and promotions is enabled for paid synchronization. The segment includes an individual called Troy Murphy. Since Facebook now recognizes Troy as an individual to whom UPlus Bank wants to advertise their product offers, Troy starts seeing ads from UPlus Bank in his Facebook feed.

Do the following steps for each segment which you want to use to create audiences in a paid destination:

1. In the Pega Customer Decision Hub portal, click **Audiences > Segments**.



2. Open a segment.
3. Click the **Paid sync** tab.
4. Click **Add paid destinations**.



5. Select one or more paid channels to synchronize with this segment.

For CRM S2S-based destinations, such as Facebook Ads, Google Ads, and LinkedIn Ads, each segment update triggers a corresponding audience update. For web-based destinations, the updated segment information is available when the Paid Audience Web service is called. For Data Management Platform destinations, scheduled runs trigger the updates.

You can view the synchronization status for each destination in the Status column. Click a row for more details.

Segment: Cashback Cards [Available]

Top Level • CashbackCards TestCoPM-Artifacts:01-01-01

Design Options and Schedule **Paid sync** History**Sync with paid destinations**

	Status	Destination type	Destination
>	COMPLETED	DMP	DMP Ads Dev
>	COMPLETED	Web	Web Ads Dev
>	COMPLETED	Google Ads	Google Ads Integration
>	COMPLETED	Facebook Ads	Fb corp
>	COMPLETED	LinkedIn Ads	LinkedIn Ads Dev

Errors in Paid Segment processing are recorded as Paid Notification work objects. For more information, see [Errors and Warnings](#).

If you disable Paid Sync for a Segment, audiences created from that segment are deleted from the Paid destination during the next synchronization.

Using action eligibility to reduce wasted ad spend on people-based destinations

Advertising on paid channels without a centralized Next-Best-Action strategy has the risk of wasting ad spend on ads which are not relevant to the individuals whom you want to target. For example, an individual may see an ad for a product which he or she already has, because the information is not communicated from your Pega Customer Decision Hub application to the paid destination where you are advertising. The cost of that impression is likely wasted and would be better spent on showing the ad to an individual for whom the product offer is more relevant.

Paid Media Manager addresses this issue by communicating relevant Next-Best-Action decisions to the destination platform, according to the engagement policies specified in the Eligibility section of the Next-Best-Action Designer. This means that after individuals with accounts on the destination platform are matched based on a one-way hash of their personally identifiable information (PII), such as an email address, phone number, or device ID, they are placed in audiences only for products for which they are eligible. This ensures that ad spend is not wasted by showing the individual offers which are not relevant to them.

For example, while browsing his Facebook feed, Troy may see ads from UPlusBank, but before UPlusBank enabled Paid Media Manager to communicate Next-Best-Action decision to paid channels, Troy

sometimes saw ads which were not relevant to him, for example, ads for the same type of checking account which he already had.

After UPlusBank extends their Next-Best-Best-Action to paid channels, information about each individual's Next-Best-Action is communicated to Facebook Ads. Individuals are placed into custom audiences, with each audience consisting only of individuals who are eligible for a particular offer. Each audience is associated with an ad set, which contains one or more ads for the offer. One of Troy's Next-Best-Actions is determined to be a cashback credit card offer, so he is added to the Sales-Usage-CashBack1 audience set, which is targeted with an ad set configured with associated advertisements.

Audience

Create New Audience Use Saved Audience ▼

Custom Audiences ⓘ

Customer List

Sales-Usage-CashBack1

Add a previously created Custom or Lookalike Audience

Exclude | Create New ▼

As a result, Troy now sees an ad for the cashback credit card in his Facebook feed.

The below tasks describe how to configure Paid Media Manager so that it can create audiences based on the offer eligibility data you have collected in your Pega Customer Decision Hub application.

Selecting the triggers and destinations which communicate the individual's Next-Best-Action to paid platforms

After you configure the connection to a paid destination and specify how individuals are matched to their accounts on that destination, use the Next-Best-Action Designer to enable Next-Best-Action decisions for paid channels.

The Next-Best-Action Designer allows you to define the Next-Best-Action decisions and requirements which apply to the whole organization, or to specific business issues or groups. You can use it to select the channels on which actions, such as product offers, are communicated to individuals. In addition, you can specify the triggers which cause the actions to be communicated to individuals, for example, scheduled outbound runs or real-time container updates.

To extend your Next-Best-Action to paid channels:

1. Log in to the Pega Customer Decision Hub portal as an administrator.
2. Click **Next-Best-Action > Designer > Channels**.
3. In the **Paid Media > Paid Destinations** section, click **Configure** to select one or more paid destinations.
4. Specify the trigger for the audience update:

- **Real-time containers** - You can use real-time containers to manage content which appears in real-time channels, such as web and mobile. For more information, see [Real-Time Containers](#). If you enable paid processing for real-time containers, whenever the real-time container service runs, another real-time container run is triggered with the same JSON request data except for the Channel, which is set to Paid.

For example, if a real-time container called NextBestAction is triggered for the web channel, it can generate a JSON request object with the following data:

```
{
  "ContainerName" : "NextBestAction",
  "Channel" : "Web",
  "Direction": "Inbound",
  "CustomerID": "CONT -1",
}
```

If paid processing is enabled, another request is generated with the following data:

```
{
  "ContainerName" : "NextBestAction",
  "Channel" : "Paid",
  "Direction": "Inbound",
  "CustomerID": "CONT -1",
}
```

The first request returns the Next-Best-Action results as response to the caller. The second request runs asynchronously. It triggers Next-Best-Action processing specific to the Paid channels, including the execution of a Paid Strategy if selected, and synchronizes the Next-Best-Action results with the paid destinations selected in the Next-Best-Action Designer configuration. While the real-time container runs, flow execution is halted.

- **Outbound schedule** - In order to make paid audience updates across all known individuals on a regular basis, for example, nightly, configure Paid for a business issue or group to be updated after scheduled outbound runs.

Updates to audiences on paid destinations can be triggered by outbound runs. If you enable this option, each outbound run results in an update to the action-based audiences to which an individual should belong. The paid audiences are selected based on new offer-based decisions for each individual in the starting population. For best results, configure a single paid outbound schedule at the highest applicable level of the hierarchy.

After a scheduled run starts, it generates a single data flow run for all configured paid destinations. Customer records are sent to destinations in batches and the destination information is added to customer pages. If a Media Strategy exists, it runs for each destination and updates the available list of actions. After this, the synchronization ends with either Completed or Failed status.

5. Click **Save**.

Paid Targeting for All Eligible Actions with Channel Strategies

The Global Channel Strategy targets your customers with all relevant actions, prioritized by business value and filtered by relevant channel. The Global Channel Strategy is called after Next-Best-Action and before action processing.

If you have enabled Paid channels in your application, the Global Channel Strategy allows you to make all actions identified as relevant for a customer available for Paid channels. An action that is available for a Paid channel can also be sent to any number of non-Paid channels, for example, Email or SMS.

With the Next-Best-Action Designer version 2, introduced in Pega Customer Decision Hub 8.3, the GlobalChannelStrategy is enabled by default and sends all actions returned by the Next-Best-Action strategy that are enabled for paid vs. the top actions for email or SMS.



Tip: Refer to the GlobalChannelStrategy when creating your own Channel Strategies. The GlobalChannelStrategy contains annotations which will help you define your own Strategies.

What to do next: After you apply the Global Channel Strategy for a business issue or group, enable at least some actions for Paid processing.

Enabling Actions for Paid Channels

Once you configure the paid destinations and enable it in the Next-Best-Action Designer, ensure that you have some customer actions which can be displayed in paid destinations.

1. Create or edit an action, for example, a Credit Card action. For more information, see [Actions](#).
2. On the Treatments tab of the action, select **Paid**. The action is now enabled for paid destinations.
3. In the paid destination, define the ad creative which should be displayed to individuals in your action's audience.

Account Overview									
Campaigns									
Ad Sets									
Ads									
+ Create Duplicate Edit Preview Rules View Setup Columns: Custom									
	Ad Name	Delivery	Ad Set Name	Bid Strategy	Reach	Impressions	Cost per Result		
☐	CashBack1	Not Approved	Sales-Usage-CashBack1 0 active ads	Cost cap (\$0.00... Link Clicks	---	---	---		
☐	ConsolidateYourLoans	Not Approved	Sales-Loans-ConsolidateYo... 0 active ads	Bid cap (\$0.00... Link Clicks	---	---	---		
☐	PlatinumCreditCard1	Not Approved	Sales-Cards-PlatinumCredi... 0 active ads	Bid cap (\$0.00... Link Clicks	---	---	---		
Results from 3 ads					People	Total	---		

The ad creatives are associated with ad sets or ad groups created for the action. Individuals like Troy, who belong to an audience linked to one of the ad sets, see the ads displayed, for example, while browsing their Facebook feed or watching videos on Youtube.

Streamlining Campaign Generation for Next-Best-Action Paid Audiences

To streamline the creation of advertising campaign on Facebook and Google destinations, enable the option to automatically create campaigns for each action and ad sets or groups for each paid audience.

Advertisers must configure campaigns on ad platforms to use Next-Best-Action based paid audiences. For Google Ads and Facebook Ads, this task can be streamlined.

Enabling campaign generation for Facebook Ads and Google Ads creates a campaign for each offer. If a paid strategy is used, an ad set and ad group is generated for each priority level. These priority-specific ad groups/ad sets can be configured with a max bid aligned with the priority level.

To enable this option for a specific Facebook Ads or Google Ads destination:

1. Log in to App Studio.
2. Click **Settings** > **Channels** > **Paid Media** > **Facebook Ads** or **Google Ads**.
3. Edit or create a destination.



Note: Do not use a manager account for Google Ads if you want to automatically create campaigns for this destination. Automatic campaign generation is not available for Google Ads manager accounts.

4. In the **Facebook/Google Ads assets generation** section, select **Enable campaign generation**.
5. Click **Apply**.

6. Enable the paid destination you created in the Next-Best-Action Designer.

For more information, see [Selecting the triggers and destinations which communicate the individual's Next-Best-Action to paid platforms](#).

7. Once the individual data for this destination has been synchronized, for example, after a scheduled run, log in to Facebook Business Manager or to your Google AdWords account.
8. Review the automatically generated campaigns. If needed, adjust the campaign name, objective, budget, and other settings.

Account overview			Campaigns			Ad sets		
+ Create			Duplicate			Edit		
						Rules		
☐		Campaign name			Delivery		Budget	
☐	☐	Sell-Cards-Cashback2Offer			● Inactive		Using ad set ...	
☐	☐	Sell-Cards-TravelCC			● Inactive		Using ad set ...	
☐	☐	Sell-Cards-Cashback3Offer			● Inactive		Using ad set ...	
		View Charts Edit Duplicate						
☐	☐	Sell-Cards-Cashback5Offer			● Inactive		Using ad set ...	
☐	☐	Sell-Cards-Cashback4Offer			● Inactive		Using ad set ...	
☐	☐	Sell-Cards-Cashback6Offer			● Inactive		Using ad set ...	



Note: The automatically generated ad sets or groups have the same name as the paid audience with which they are associated.

+ Create Duplicate Edit Rules					
☐		Ad set name		Delivery	Bid strategy
☐	☐	Sell-Cards-Cashback6Offer		● Inactive	Lowest cost Link clicks
☐	☐	Sell-Cards-Cashback3Offer		● Inactive	Lowest cost Link clicks
☐	☐	Sell-Cards-Cashback5Offer		● Inactive	Lowest cost Link clicks
☐	☐	Sell-Cards-Cashback4Offer		● Inactive	Lowest cost

The association between the generated paid audience and the ad set enables the individual added to the audience to be targeted with the correct action at the correct willingness to pay. Altering this association prevents this mechanism from working.

9. Finish the configuration of the automatically generated advertising campaigns in the destination platform.

Reducing wasted ad spend based on action priority

To further optimize your advertising, use a paid strategy to convey offer priority to ad platforms which can then be aligned with the willingness to pay for each individual and action as a factor in targeting individuals with actions.

Paid strategies let you place an individual in audience based on the action selection and the priority. You can then configure this action and priority-specific audience with the appropriate max bid.

Creating a priority-based strategy with the Strategy Builder

Rather than create a paid strategy from scratch, you can use the Strategy Builder to generate it based on one or more optimization methods.

The basic optimization method generates a strategy that groups individuals based on the priority of their action as determined by Next-Best-Action. The priority can be driven by the individual's omni-channel propensity and the associated value and margin for an action.

1. In the Pega Customer Decision Hub portal, click **Intelligence > Strategies**.
2. Click **Create > Guide me through it**.
3. Enter the strategy name, for example, `Priority Based Targeting`.
4. In the Purpose section, click **Configure**.
5. Select the **Paid optimization** objective.
6. Click **Apply**.
7. In the Optimization section, select the default value of **Basic optimization**.

The Strategy Builder automatically generates an optimization strategy with predefined settings for the audience, campaign and ad group or ad set names.

Bidding

Offer priority based audiences

 Bidding result: **Offer priority bidding**

 **Artifact generation** 

Audience naming convention

Priority	Score	Paid audience
Very High	1.00 - 0.81	Issue-Group-Offer-VeryHigh
High	0.80 - 0.61	Issue-Group-Offer-High
Medium	0.60 - 0.41	Issue-Group-Offer-Medium
Low	0.40 - 0.21	Issue-Group-Offer-Low
Very Low	0.20 - 0.00	Issue-Group-Offer-VeryLow

Campaign and Ad Group/Ad Set naming convention

Campaign: **'Issue-Group-Offer'**

Ad Group/Ad Set: **'Issue-Group-Offer-Priority'**

If campaign generation is enabled at the destinations, Campaign and Ad Group/ Ad Set will be generated on your destinations using naming convention above.

The prioritization is based on a **Priority lookup** decision table, which calculates the priority value based on each individual's score. Individuals are then assigned to audiences with matching priority, and ineligible individuals are filtered out.

8. To edit the default name for each audience, click **Edit naming**.
9. Select the strategy in the Next-Best-Action Designer.
 - a. In the Pega Customer Decision Hub portal, click **Next-Best-Action > Designer > Channels**.
 - b. In the Media strategy section, click **Configure**.
 - c. Select the strategy which you created.
 - d. In the Paid destinations section, for each paid destination, select the type of bidding results.

For a strategy which uses basic optimization, only the Offer priority bidding result is available for all destinations. For information about specifying different bidding results per destination, see [Reduce wasted ad spend based on the predicted value of a click](#).

When the selected strategy runs, the audiences it creates in the destination platform indicate the priority, which can then be aligned with the willingness to pay for associated ads. High-priority audiences for a specific action indicate that the action has high priority for the individuals in that audience, and therefore you may be willing to set a higher max bid for their interactions.

Account Overview

Campaigns

Ad Sets

Ads

Create

Duplicate

Edit

Rules

View Setup

Columns: Custom

☐		Ad Set Name	Delivery	Bid Strategy	Reach	Impressions	Cost per Result	Ends
☐	☐	Sales-Loans-ConsolidateYourLoans-OPB-VeryLow	Inactive	Bid cap (\$1.00 bid ... Link Clicks	—	—	—	Ongoing
☐	☐	Sales-Loans-ConsolidateYourLoans-OPB-VeryHigh	Inactive	Bid cap (\$8.00 bid ... Link Clicks	—	—	—	Ongoing
☐	☐	Sales-Loans-ConsolidateYourLoans-OPB-High	Inactive	Bid cap (\$5.00 bid ... Link Clicks	—	—	—	Ongoing
☐	☐	Sales-Loans-ConsolidateYourLoans-OPB-Medium	Inactive	Bid cap (\$3.00 bid ... Link Clicks	—	—	—	Ongoing
☐	☐	Sales-Loans-ConsolidateYourLoans-OPB-Low	Inactive	Bid cap (\$2.00 bid ... Link Clicks	—	—	—	Ongoing

For Troy Murphy, executing the media strategy communicates to Facebook that you are willing to pay more for his clicks on a loan consolidation offer than for the cashback credit card offer. When he accesses his Facebook feed, he is now more likely to see the loan consolidation offer instead.

Reducing wasted ad spend based on destination-specific interaction results

Individuals interact with your actions, for example, by clicking a link in the ad, accepting or rejecting the offer, or ignoring the action altogether. The individual's preferences captured in the results of these interactions can be used to increase the accuracy of adaptive models and leverage destination-specific responses.

The CapturePaidResponse service is used by media strategies to drive downstream learning based on paid interactions such as paid clicks. Interactions captured from paid channels are recorded and used to improve the accuracy of adaptive models and drive decisioning. This intelligent learning allows a media strategy to make destination-specific audience decisions for the same action.

For example, if Troy Murphy is more likely to click an ad on Facebook than on LinkedIn, the media strategy can put that individual into a higher-priority audience on Facebook and a lower-priority audience on

LinkedIn. In this way, you can bid more for the individual on the destination where they are more likely to interact with your message.

The service supports the POST HTTP method. The website to which an individual is redirected when they click the URL must contain JavaScript that fetches parameters from the click URL and passes them to the CapturePaidResponse service.

For the request, the service expects a JSON Object with the following attributes:

- *CustomerID* - Used to identify individuals based on information captured during their interactions with the destination. For individuals yet to be identified, a unique id is stored in a browser cookie. Once an individual has been identified as a customer, their encrypted customer id is stored. For more information, see [Identity Matching](#).
- *ExternalAudienceId* - For ad platforms other than Google Ads and Facebook Ads, this parameter is instead used to associate an ad to a specific audience and find the action corresponding to the ad. Configure the click URL of the ad to include the *ExternalAudienceId*. You can see the *ExternalAudienceId* for each audience in the AUDIENCE KEY field on the Paid Media Audiences landing page.
- *AccountId* - The ID of the paid destination.
- *ReferrerUrl* - The HTTP referer of the requested website.
- *Source* - The site which sent the request.
- *Utm_medium* - The type of link which was used.
- *AdSetID* - For Facebook Ads and Google Ads, include the *AdSetID* parameter in the click URL. For Facebook Ads, the *AdSetID* parameter corresponds to *adset_id*; for more information, see [About URL parameters](#). For Google Ads, the parameter corresponds to *{adgroupid}*; for more information, see [About ValueTrack parameters](#). The parameters identify the ad set for which the ad is created, and identify the action corresponding to the ad.
- *DestinationType* - For Facebook Ads and Google Ads, this parameter identifies the destination type.

An example POST request is below:

```
{ "CustomerID":"TestID31265",
  "ExternalAudienceId":"90a6",
  "AccountId" : "facebook_test_ac",
  "ReferrerUrl": "facebook.com",
  "Utm_medium":"Banner Ad" ,
  "AdSetID":"TestAd85372",
  "DestinationType":Facebook
```

In order to update which ads an individual is targeted with after they have accepted an offer, real-time container execution for paid media is triggered asynchronously if the request contains the container name and the response corresponds to a final stage, such as *Accepted* or *Rejected*.

Reduce wasted ad spend based on the predicted value of a click

Use the interactions recorded by the PaidCaptureResponse service to predict whether clicking on an ad would increase an individual's propensity to accept an offer, and therefore to align the willingness to pay with the predicted value of a click.

Cost per click (CPC) is a billing method for ad campaigns where payment is charged per click on an ad. Paid Media Manager provides the option to optimize your CPC ad spend by assessing the value of a click. That is, you can use the CPC bidding model to generate strategies which calculate how much a click on an ad would increase the individual's propensity, and therefore how much value is added by that individual's click.

The priority for the CPC bidding model is determined by the out-of-the-box adaptive model *CPCIncrementalLift*. The model determines the individual's propensity to accept an offer if they clicked on that offer by comparing adaptive analytics data from individuals who clicked an ad for that offer to the omni-channel propensity determined by the full set of adaptive analytics. The difference in propensity is called the incremental lift. The CPC bidding model uses that lift to align the willingness to pay with the value which the ad spend generates per individual.

The *CPCIncrementalLift* model is based on data captured by the CapturePaidResponse service. You must implement CapturePaidResponse in order for the model to work correctly. For more information, see [Reducing wasted ad spend based on destination-specific interaction results](#).

Creating a CPC-based strategy with the Strategy Builder

To create a media strategy which prioritizes paying for clicks based on how much they increase the individual's propensity to accept the offer, use the Strategy Builder.

1. In the Pega Customer Decision Hub portal, click **Intelligence > Strategies**.
2. Click **Create > Guide me through it**.
3. Enter the strategy name, for example, `CPC Based Targeting`.
4. In the Purpose section, click **Configure**.
5. Select the **Paid optimization** objective.
6. Click **Apply**.
7. In the Optimization section, select **Destination specific optimization**.
8. Select **CPC**.

Bidding

Which bidding models would you like to use?

 Bidding result: Bidding result 1 
 [Configure](#)

CPC
 Bidding strategy code: CPC

9. **Optional:** Click **Add bidding result** to specify another bidding model. This can be used to define different bidding models for different paid destinations.
10. To edit the default name for each audience, click **Edit naming**.
11. Select the strategy in the Next-Best-Action Designer.
 - a. In the Pega Customer Decision Hub portal, click **Next-Best-Action > Designer > Channels**.
 - b. In the Media strategy section, click **Configure**.
 - c. Select the strategy which you created.
 - d. In the Paid destinations section, for each paid destination, select the type of bidding results.

When the selected strategy runs, the audiences it creates in the destination platform indicate how much the click from an individual in that audience would increase the individual's priority to accept the offer.

High-priority audiences have higher expected business value, and therefore you may be willing to set a higher max bid for their interactions.

☐	☐	Ad Set Name	Delivery	Bid Strategy	Reach	Impressions
☐	☒	Sales-Cards-PlatinumCreditCard-CPC-VeryLow	● Inactive	Bid cap (\$1.00 bid control) Link Clicks	—	—
☐	☒	Sales-Cards-PlatinumCreditCard-CPC-Medium	● Inactive	Bid cap (\$3.00 bid control) Link Clicks	—	—
☐	☒	Sales-Cards-PlatinumCreditCard-CPC-Low	● Inactive	Bid cap (\$2.00 bid control) Link Clicks	—	—
☐	☒	Sales-Cards-PlatinumCreditCard-CPC-High	● Inactive	Bid cap (\$5.00 bid control) Link Clicks	—	—
☐	☒	Sales-Cards-PlatinumCreditCard-CPC-VeryHigh	● Inactive	Bid cap (\$8.00 bid control) Link Clicks	—	—

For Troy Murphy, executing the media strategy communicates to Facebook that if he clicks an ad for the Platinum credit card, he has a very high priority to accept that offer. When he accesses his Facebook feed, he is now more likely to see ads for the Platinum credit card.

Preventing known individuals from being targeted based on anonymous behavior data

Once you have enabled several offers to be available on the Paid channel, configure your paid destinations to prevent known individuals from being targeted by ads based on anonymous behavior data.

Traditional advertising campaigns rely heavily on targeting based on segments of behavioral and demographic data associated to anonymous profiles. For example, an ad for a UPlus Travel Credit Card may be targeted to everyone who viewed information on that credit card on UPlusBank's website. However, you may want that known individuals who are ineligible for that credit card are not targeted with ads for it.

Paid Media Manager generates an audience made up of all individuals who have been added to or removed from a paid audience on a destination within a specified time frame. By default the time frame is 14 days. The **Next-Best-Action negative target audience** can be used to negative target ad campaigns that rely on anonymous targeting. In this way, known individuals only receive ads in accordance with Next-Best-Action.



Note: If you disable or rename the **Next-Best-Action negative target audience** for a previously configured destination, individuals who are assigned to this audience will be removed from it after a period of time specified in the `paidmedia/allNBAAudience/TimeToLive` Dynamic System Setting. Until the end of that time period, negative target both the new and the old audience. For more information about the TimeToLive Dynamic System Setting, see [Paid Media Manager Configuration Settings](#).

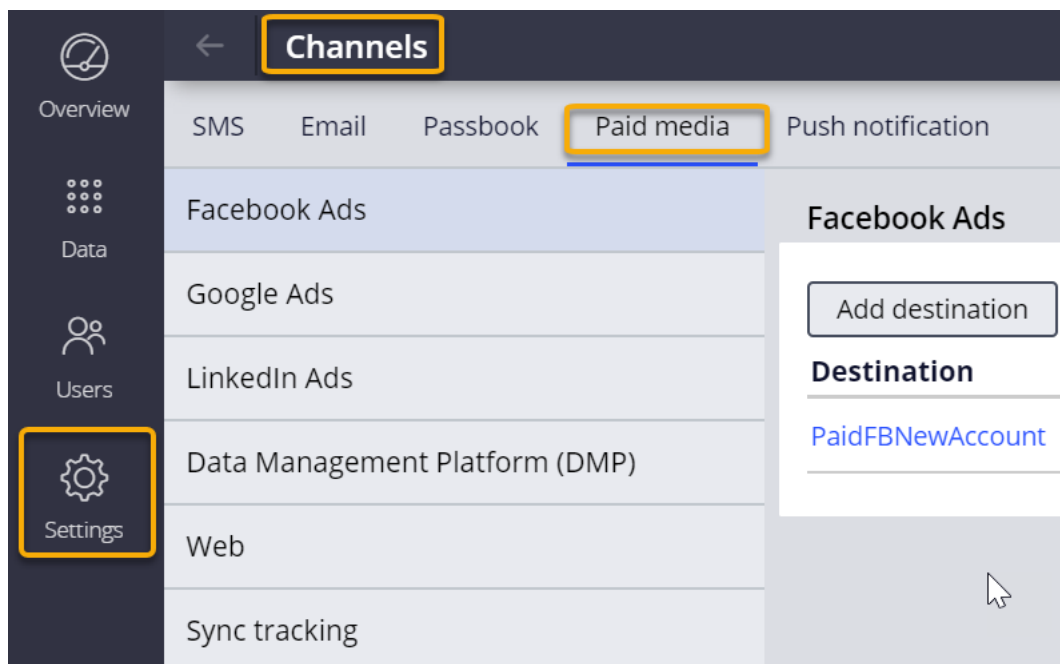
Prospecting with Next-Best-Action Paid Audiences

Paid Media Manager enables organizations to leverage their proprietary individual level data, decisioning, intelligence for prospecting by utilizing the look-a-like capabilities of media platforms. You can also prospect for new customers using lookalikes of Next-Best-Action Audiences. Lookalike audiences, also known as similar audiences in Google Ads, are audiences whom you want to target because they resemble individuals whom you already target in some way, and may also be interested in your product or service.

Configuring Facebook Lookalike Audiences

For Facebook Ads, lookalike audiences are created from a selected percentage of the population of a specified country. To configure them, specify the lookalike audience country and ratio.

1. Log in to App Studio.
2. Click **Settings** > **Channels** > **Paid Media** > **Facebook Ads**.



3. Edit or create a destination.
4. Configure the following settings in the **Facebook Ads assets generation** section:
 - **Lookalike audience country** - Enter the country of residence for audience members whom you want to target because they resemble individuals whom you already target. Facebook Ads lookalike audiences must be specific to a single country. For more information, refer to the Facebook Ads documentation.
 - **Lookalike audience ratio** - Enter the percentage of the population of the lookalike audience country whom you want to target. For example, a lookalike audience ratio of 0.01 targets 1% of the population of the selected country. Larger audience ratios target more people, but the targeted audience members may have less resemblance to individuals whom you already target. For more information, refer to the Facebook Ads documentation.
5. Click **Apply**.

What to do next:

For more information about Facebook lookalike audiences, see [Lookalike Audience](#).

Generating Google Similar Audiences

For Google Ads, similar audiences are generated automatically for all destinations where you enabled automatic campaign generation. The generation may take up to 48 hours. After an audience is generated, Pega Customer Decision Hub generates the associated ad group within the Next-Best-Action-driven campaign ad group structure.

What to do next: For more information about Google similar audiences, see [About similar audiences on the Display Network](#).

Configuring Facebook Lead Ads

Facebook Lead Ads provides a mechanism to drive individuals from an anonymous to a known state by running lead generation campaigns on Facebook and Instagram. They include a contact form for individuals that allows them to get in touch with a business. Leads generated with Facebook Lead Ads are captured directly in Pega Customer Decision Hub. For more information about Facebook Lead Ads, see [Lead ads](#).

To start using Facebook Lead Ads to collect contact information from prospects:

1. Ensure that your application can both send and receive data from Facebook.
2. Obtain a Facebook Ads access token with the following permissions:
 - manage_pages
 - leads_retrieval
3. Request the leads_retrieval and manage_pages permissions for Facebook Ads Lead Retrieval API and submit your app to App Review. These permissions are necessary to retrieve lead information once a lead ID is received from Webhooks.
4. In the Facebook Ads destination configuration, enter the access token and select **Enable Lead Generation**. Auto-generated Webhook URL and token appear.
5. In Facebook Ads, configure the Webhook URL and token, and subscribe to lead generation. For more information, refer to Facebook Ads documentation.
6. **Optional:** If you changed the field names in the Facebook lead form, edit the data transform **PegaMKT-Data-PaidMedia-LeadAdResponse.FacebookFieldMapping**.
7. **Optional:** Modify the default activity that saves captured leads to better integrate it with your lead handling process. The name of the activity is **PegaMKT-Data-PaidMedia-LeadAdResponse.ProcessProspect**.

What to do next: Captured leads are saved in the database table **mkt_paidmedia_leads** in the Pega Customer Decision Hub database schema. Ensure that expired prospects are removed from the table to prevent it from growing over time.

Reference

This section contains information for administrators.

Monitoring Outbound Runs and Real-time Container Updates

Use the Data Flows landing page to monitor the progress of each ongoing outbound run or real-time container update. The Data Flows landing page provides developers and application users with an overview of the current state of each run or update.

1. Click **Data > Data Flows**.
2. To review the ongoing outbound runs list, click the **Batch processing** tab.
3. To review the real-time container updates list, click the **Real-time processing** tab.
4. To see the details, click an item ID.

Monitoring Paid Synchronization Jobs

Use the **Sync Tracking** tab on the **Settings > Channels > Paid Media** landing page to monitor the status of paid synchronization jobs across segments, real-time, and scheduled runs. The following information is displayed for each synchronization job:

Status

The status of the synchronization job. Possible statuses include Pending, Running, Completed, and Failed. If the synchronization job completed with errors, expand the row to view more information.

Destination

The name of the paid destination of the synchronization job.

Start

The time when the synchronization job started.

End

The time when the synchronization job completed or failed.

Type

Indicates whether the synchronization job was triggered by Next-Best-Action, segment update, or background processing by an agent. To filter the job table by a specific synchronization type, use the drop-down list above the table.

Details

Depending on the type of the synchronization job, this column shows the name of the Next-Best-Action hierarchy level, customer segment, or agent which triggered the synchronization.

Error and Warning Handling

The Next-Best-Action Designer displays errors and warnings resulting from each scheduled and real-time paid run. Errors and warnings are displayed chronologically for the Next-Best-Action hierarchy level and paid destination on which they occurred.

If multiple errors are generated for the same destination, they are added to the existing work object. Paid Media Manager maintains a history of errors and warnings, as well as information about the number of records affected.

Errors that occur during Segment-based runs are logged as work objects of the type PegaMKT-Work-PaidSync. The paid sync errors are displayed in the Paid Sync tab of the Segment for which they were recorded.

If an error occurs, confirm that your account in the integrated platform is properly configured and activated, then resolve the error work object before triggering another paid run.

Errors displayed in the Next-Best-Action Designer come directly from the integrated external system. If you cannot resolve the problem yourself, contact the product team for your advertising platform.

To generate Paid Notification work objects, update the following Data transform rules:

- Data-Party-Operator – MarketingAdministrator
- Data-Party-Operator - MarketingAnalyst

For both rules, set the property **pyWorkPartyUri** to the operator ID used by your Marketing Administrator and Marketing Analyst.

Paid Media Agents

For information about paid media agents and job schedulers, see [Paid media agents](#).

Paid Media Manager Configuration Settings

Tune the configuration of Paid Audience updates by adjusting the following settings:

- RTPaidMediaCustomersForAPeriod event strategy - This event strategy accumulates events for a given individual for a given period of time. The default time is 5 minutes. Adjust this value if you want the updates to happen more or less frequently. Less frequent but larger API calls will raise the memory consumption.
- RTPaidMediaCustomersBatch event strategy - This event strategy accumulates a given number of events. The default number of accumulated events is 1000. Raise this value if you want the API calls to happen less frequently. Less frequent but larger API calls will raise the memory consumption.
- dataflow/paidmedia/customerBatchSize dynamic system setting - This setting defines the number of records processed during an outbound batch run. The default number of records is 2000. Adjust this value if you want to raise or lower the number of records which Paid Media Manager accumulates before it prepares an API call to LinkedIn, Google or Facebook. Less frequent but larger API calls will raise the number of memory pages created.
- paidmedia/allNBAAudience/TimeToLive dynamic system setting - This setting defines how long the system stores a record in the **All customers** audience. Individuals who are not targeted for more than the number of days specified in this setting are removed from the audience and are available for anonymously targeted campaigns on Facebook, Google, LinkedIn, and Adobe Audience Manager. The default is 1 day. Raise this value to keep records in the **All customers** audience for a longer time.
- paidmedia/ResponseWaitingTime dynamic system setting - This setting defines the timeout period for actions in paid channels. If an individual does not respond to an action within the specified time period, the system automatically records a negative response. The default timeout period is 604800 seconds (1 week).

Optional: Modify any of the following dynamic system settings for Adobe Audience Manager. For more information, contact your Adobe Audience Manager implementation team.

- paidmedia/adobe/api/authserver/url - This setting specifies the Auth Server URL for Adobe Audience Manager. By default, the URL is set to <https://api.demdex.com/oauth/token>.
- paidmedia/adobe/api/resourceserver/url - This setting specifies the Resource Server Base URL for Adobe Audience Manager. By default, the URL is set to <https://api.demdex.com:443/v1>.

- `paidmedia/adobe/traitsegment/toplevel/folder/name` - This setting defines the name of the top level segment and trait folder created under the parent folder in Adobe Audience Manager. The default name of this folder is Paid Audiences.
- `paidmedia/adobe/file/push/maxfilesizeinbytes` - The maximum size in bytes of synchronization files sent to Adobe Audience Manager. The default file size in bytes is 1000000000.
- `paidmedia/adobe/file/push/retrycount` - The number of times Paid Media Manager automatically tries to resend the synchronization file to Adobe Audience Manager in case of any synchronization problems. The default number of tries is 3.

User Preferences

User preferences are accessed via the **Preferences** item in the operator’s drop-down menu.

Marketing-specific user preferences are listed in the **Pega Customer Decision Hub preferences** section of the Preferences dialog and include the following:

Preference Name	Purpose	Default Value
Validate Key Codes	Sets a user preference to require key code entry in marketing artifacts (such as actions and treatments). If this requirement is enabled at the system level by the administrator, this user preference is ignored. ☒ Validate Key Codes This will be ignored if the system administrator enfc	Disabled

Administrative Settings

This appendix outlines the various application configuration options that are available for the administrator to configure the marketing application. These settings should be configured as part of setting up the marketing application and can be adjusted later, as the need arises.

The Application landing page is available only to marketing administrators with access to App Studio, and lists various configuration options. This landing page is accessible in the Pega Customer Decision Hub portal via **Settings > Application** or **Configuration > Settings > Application Settings**. If you access it from the **Configuration > Settings** menu, the Application Settings landing page works in read-only mode.

To change any of these settings, click the **Edit** button on the particular setting's landing page. In edit mode, click **Save** to save and apply your changes to the settings; or click **Cancel** to discard your changes.



Note: These settings are stored in a node-level data page. Any changes made to these settings on a particular node should be immediately visible to all processes running on that node. In a multi-node environment, changes may take up to an hour to reflect across other nodes. In such situations, it is advisable to manually flush the data page on each of the nodes after changing these settings. To do so, open the Declare_MKTSystemSetting data page (under PegaMKT-System-Setting) and click the **Clear Data Page** button on the Load Management tab.

Configuration Settings

This landing page contains settings pertaining to the overall execution infrastructure.

Outbound Default Data Source	Displays the database instance where the customer table resides and where the application will store execution data (such as data pertaining to Segment execution).
Outbound DB Preview File Size	Displays the number of records displayed in the preview file when previewing the contents of the data written for a Database Template.
Batch Size	Displays the size (number of records) into which back-end processing is batched, in order to leverage performance improvements from vertical and horizontal scalability.
Output File Date Format	Displays the default format to be applied to date fields in a File Template.
Use Simulation Data	Specifies whether Dashboard widgets should use simulated data. Enable this setting to review the Dashboard and its capabilities in the absence of real data.
Use Decision Data Source	Specifies whether a decision data store (such as Cassandra) should be utilized to retrieve any customer-centric data which is not required for segmentation. Using decision data sources requires the configuration of a DNode in your system. Review the Pega 7 DNode Cluster Management landing page help topic for details.



Note: Exercise extreme caution in toggling the **Use Decision Data Source** setting on a live system. This setting is propagated to and utilized in the creation of Segment execution data. Toggling this setting after creation of Segments might necessitate the re-creation of these artifacts.

Artifact Settings

This landing page contains settings pertaining to the behavior and display of artifacts.

Email Responses

Require key codes	Specifies whether key code entry is required for artifacts (such as actions, and treatments). If this setting is enabled, it will over-ride the user preference for specifying key codes.
Default Response Page	Displays the Rule-HTML-Section rule that will be used as the default response page for Email responses.
Default Action Expired Page	Displays the Rule-HTML-Section rule that will be used as the default page for Email responses to expired actions.
Default Action Not Available Page	Displays the Rule-HTML-Section rule that will be used as the default page for Email responses to actions that are no longer available.
Geofences	
Mapping License Key	Displays the license key to use for the Google Maps™ mapping service.
Default Customer Location Properties	Displays the properties on the customer class to be used as the defaults for the customer's location (latitude and longitude) when filtering on Geofences in Strategies.

Inbound SMS Settings

The Inbound SMS Settings tab is available if you access the Application Settings page via the **Configuration > Settings > Application Settings** menu. The Inbound SMS Settings tab displays the list of properties on the customer class that relate to a phone number. When an inbound SMS is received, the system looks at this list of properties to determine the customer columns in which it should look for the sender's phone number.

This tab works in read-only mode. To update the inbound SMS settings, click **Settings > Channels > SMS > Inbound** in the App Studio navigation bar. For more information, see [Configuring an Inbound SMS Account.htm](#).

Any property specified here must be a property on the customer class and must be mapped (via the external mappings) to a column in the customer table.

Manage Data Relationships

The **Manage Data Relationships** tab is available if you access the Application Settings page via the **Configuration > Settings > Application Settings** menu. The **Manage Data Relationships** tab displays the customer class for the application. It also lists the associations between the customer class and its related external entities (e.g. Purchase Data, History, etc.).

This tab works in read-only mode. To update the data settings, click **Settings > Context Dictionary** in the App Studio navigation bar. For more information, see [Associating Entities with the Customer](#).

Customer Class Name	Displays the class that maps to the customer data table.
Customer Class Ruleset, Version	Displays the ruleset and ruleset version to use for storing system-generated rules pertaining to the customer class. Ensure that the specified ruleset version is unlocked.
Seed List Definition	Use the Seed List Definition link to view the current Seed List structure. Clicking this link opens the SeedListPopulationRD Report Definition, which represents the structure utilized by the Seed List editor. If desired, modify this Report Definition to update the columns visible in the Seed List editor.
Associated Customer Data	Use the grid in this section to associate entities with the customer class. Refer to the implementation guide for guidelines on using a custom customer class and defining associations between the customer class and external entities. Use the Manage Data link next to a data entity to launch the Data Management landing page for that entity.



Note: The name of any database column listed in the External Mapping tab of the customer classes must not exceed 27 characters.

This landing page also enables synchronization of the Seed List structure with the customer class structure. For details, refer to the [Updating Seed List Columns](#) section of the Seed Lists chapter.

Associating Entities with the Customer Class

The Context Dictionary landing page enables management and configuration of associations between the customer class and other external entities that are related to it (e.g. Purchase Data, History, etc.).

Refer to the Configuring your Customer Class chapter of the Pega Customer Decision Hub Implementation Guide for details.

Use the **Manage Data** link next to a data entity to launch the Data Management landing page for that entity.

Pega Customer Decision Hub Dynamic System Settings

You can modify the various Dynamic System Settings used by Pega Customer Decision Hub. For more information, see [Pega Customer Decision Hub Dynamic System Settings](#) on [Pega Community](#).

Passbook Settings

In order to use the Passbook functionality and send passes to customers, the administrator must upload valid certificates into the system. This is done from the **Certificates** tab of the Passbook landing page. This landing page is accessible in the Pega Customer Decision Hub portal via: **Configuration > Settings > Channels > Passbook**

Administrators must upload the following two certificates:

- Apple Certificate
- Organization Certificate

Uploading the Apple Certificate

Users must upload the Apple Worldwide Developer Relations Certification Authority (WWDRCA) certificate. This can be downloaded from: <http://www.apple.com/certificateauthority>

Only one instance of this certificate type can be uploaded into the system. Use the **Upload Apple Certificate** button to launch the upload certificate dialog. Use the **Choose File** button to locate the certificate and upload it. No other information is required while uploading this certificate.

Upload Apple Certificate

Please upload a valid Apple WWDRCA Certificate (e.g. AppleWWDRCA.cer)

Choose File

AppleWWDRCA.cer

Close

Upload

Uploading the Organizational Certificate

Users must also upload the Apple .p12 certificate for their Organization or group. This certificate is associated with a pass type id and can be generated from the iOS Provisioning Portal, which is accessed via the iOS Dev Center (<http://developer.apple.com/devcenter/ios>).

Currently, only one instance of this certificate type can be uploaded into the system. Use the **Upload Organization Certificate** button to launch the upload certificate dialog. Use the **Choose File** button to locate the certificate.

In addition, provide the following information:

Setting	Description
Certificate Password	Password associated with the certificate. The system will validate this password and will not upload the certificate in case the password is invalid.

Setting	Description
Organization Name	(Optional) Organization name to display on delivered passes. If this is not provided, the organization name associated with the certificate will be used.

Upload Organization Certificate

×

Please upload a valid Organization Certificate (e.g. MyCo.p12)

Choose File

nbam_coupo...40703.p12

Enter the Certificate Password:

....

What organization name will be used on passes?

Pegasystems Inc.

Close

Upload

To review an existing certificate or to delete a certificate, use the **Open** action from the **Actions** menu to launch the certificate rule form.

System Health

Pega Customer Decision Hub provides a diagnostic tool for your marketing application called System Health. System Health allows marketing administrators to quickly review errors and warnings associated with their marketing application. The System Health landing page is visible only to administrators and is accessible in the Pega Customer Decision Hub portal via: **Configuration > Settings > System Health**.

Each time the System Health landing page is launched (or refreshed), the health check is initiated. Once the check is complete, the results of the check are displayed and resemble the following:

System Health

Last updated July 23, 2019 8:09:29 AM EDT

System Errors

7

Errors

4	2	1	0
Agent	Channel	Configuration	Runtime
Errors	Errors	Errors	Errors

System Warnings

15

Warnings

0	10	5	0
Agent	Channel	Configuration	Runtime
warnings	warnings	warnings	warnings

Errors (7)

Category	Source	Message
Agent	ADMSnapshot	Error: This agent is not running on any of the system nodes. Use the source link to manage this agent.
Agent	PegaMKT-FieldMarketing	Error: No agents are enabled for this ruleset. Review associated Agent Schedules.
Agent	PegaMKT-PushNotification	Error: No agents are enabled for this ruleset. Review associated Agent Schedules.
Agent	PegaMKT-Engine	Error: No agents are enabled for this ruleset. Review associated Agent Schedules.
Channel	Default	Error: Unable to connect to the 'Default' Outbound Email account. This account serves as the default Email delivery account for the system.
Channel	PegaMKT-Work	Error: Unable to connect to the 'PegaMKT-Work' Outbound Email account. This account is used to send Program-related emails.
Configuration	Configuration Settings	Error: The required mapping License Key for Google Maps has not been specified.

Warnings (15)

Category	Source	Message
Channel	BusinessEvent	Warning: Unable to connect to the 'BusinessEvent' Outbound Email account. This will impact delivery of Action treatments that utilize this account.
Channel	IntSampleClient	Warning: Unable to connect to the 'IntSampleClient' Outbound Email account. This will impact delivery of Action treatments that utilize this account.



Note: Due to the nature of some of the checks performed (e.g. validating Email and SMS account connectivity), the System Health check may take some time to complete. During this duration, a loading screen is displayed. To reduce this load time, administrators should ensure all connection-related errors and warnings are resolved.

The System Health page displays the following information:

- Last updated date and time
- Errors and Warnings cards
- Errors and Warnings grids

Errors and Warnings Grids

The Errors and Warnings grids provide detailed information on the health check failure (i.e. error or warning).

▼ Errors (2)		
Category	Source	Message
Channel	Email Errors	Error: There are 858 Offer Email delivery errors.
Channel	Outbound File	Error: Unable to write to SGFile template's destination. Failure message: Directory is read only
▼ Warnings (14)		
Category	Source	Message
Channel	Inbound SMS	Warning: The connection to the Inbound SMS account 'KMSMSC' has failed. The system will not process messages sent to this account.
Channel	asdf	Warning: Unable to connect to the 'asdf' Outbound Email account. This will impact delivery of Offer treatments that utilize this account.

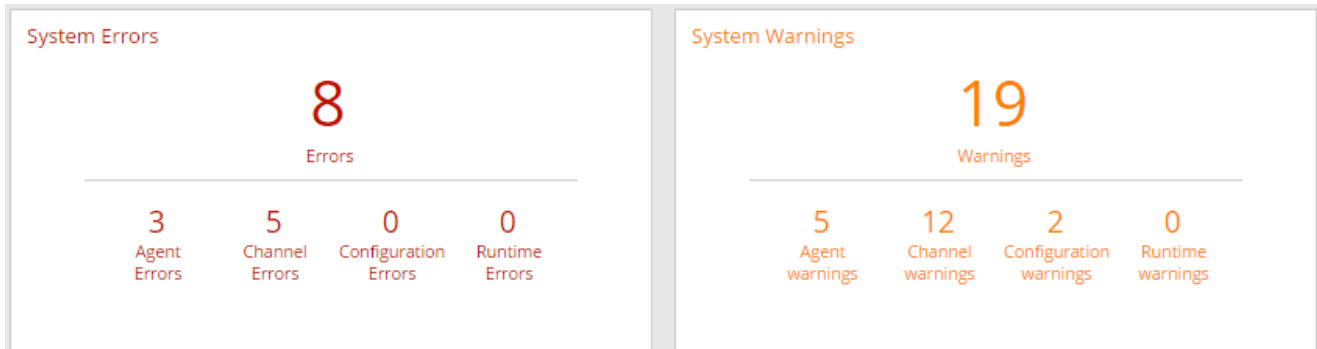
The following columns are available in both grids:

Column Name	Description
Category	Category of the error or warning (Agent, Channel, Configuration, or Runtime)
Source	Actionable area of the system associated with the error or warning. This could be a landing page, a data instance, a rule form, or a work object. Clicking this field will open the referenced object or page. In most cases, the administrator should be able to rectify the failure by making appropriate changes in the opened object or page.
Message	Descriptive text that explains the error or warning. For longer messages, use the More link to view the complete message and the Less link to revert to the abridged view.

The header of each grid displays the total number of items in the grid. Users can also click the header to toggle the grid view between expanded and collapsed. Additionally, each column in the two grids supports sorting and filtering.

Errors and Warnings Cards

The Errors and Warnings cards are displayed at the top of the System Health landing page and provide the administrator with a quick overview of the status of their application.



Each card displays the total number and a breakdown of this total into the following categories:

- Agent
- Channel
- Configuration
- Runtime

Clicking anywhere on a card ensures that the corresponding (Errors/Warnings) grid below is visible. This may result in the other grid being collapsed.

Agent Errors and Warnings

The following table explains the scenarios that contribute to the Agent Errors and Agent Warnings lists.

Failure Scenario	Use Source link to...
The agent is not running on any system nodes.	Launch the Agent Detail page for this agent. Administrators can manage (stop and start) the agent from this page.
The agent has failed and stopped on at least one system node.	Launch the Agent Detail page for this agent. Administrators can manage (stop and start) the agent from this page.
The agent has stopped on one or more system nodes.	N/A
No agents are enabled for this ruleset.	N/A

Optional Pega Customer Decision Hub agents are those that are not tied to core functionality and may not be utilized in some installations. Typically, these agents perform channel-specific functionality such as Email, SMS, and Push Notification. Administrators should be aware of the functionality being used by their marketing application, so they can better assess the true impact of failures in these agents.

Channel Errors and Warnings

The following table explains the scenarios that contribute to the Channel Errors and Channel Warnings lists.

Failure Scenario	Use Source link to...
Default outbound email account has not been configured.	N/A
There are action email delivery errors.	N/A
Outbound email account could not be validated.	Open the email account's rule form and re-test the connection.
Outbound email account fails to connect.	N/A
Outbound SMS account fails to connect.	N/A
Default Passbook certificate could not be opened.	N/A
No default Push Notification app exists or default app has no defined variants	N/A
Default outbound SMS account has not been configured.	N/A
The Apple Passbook certificate could not be opened.	N/A
Could not write to the template file.	N/A
Inbound SMS account fails to connect.	N/A

Configuration Errors and Warnings

The following table explains the scenarios that contribute to the Configuration Errors and Configuration Warnings lists.

Failure Scenario	Use Source link to...
Public Link URL is not specified.	Open the Resource URLs landing page. Administrators should set this URL if their marketing application utilizes the Email channel.
The required mapping License Key for Google Maps is not specified.	N/A
The specified default destination ruleset version is locked.	Open the access group. Administrators should update instance to reference an unlocked ruleset version.

Failure Scenario	Use Source link to...
The selected customer Email property used to determine the recipient's email address does not have external mapping.	Open the Customer class defined on the Application Settings page.
Outbound Default Data Source is not configured or doesn't exist in the system	Open the Configuration Settings landing page tab. Administrators should update the settings to point to a valid data source.
The Outbound Default Data Source fails to connect.	N/A
The default destination ruleset for an access group is not specified.	Open the access group. Administrators should set the Default destination ruleset to their marketing application's artifacts ruleset.
The default destination ruleset for an access group is not locked and no open versions exist for the ruleset.	Open the ruleset. Administrators should add a new unlocked version and update the access group to reference this new version.

Using a Configuration Modal Window

The configuration modal window is utilized in multiple places within Pega Customer Decision Hub. This appendix outlines the components of a configuration window and how to use the window to select items.

Configuration Window Components

The configuration modal window has the following components:

1. **Items list** - The left half of the window has a list of selectable items. This component has the following usage patterns:
 - The modal presents the twenty most recently updated rules (e.g. Strategies) in the system.
 - If there are more than twenty results, use the **View 20 more results** link at the bottom to load the next set of results.
 - Use the search box to search for rules by name or description.
 - The refresh icon refreshes the list of results, retaining any search criteria that was previously entered.
 - Use the **Create** link (if available in the window) to create a new rule. The system pre-populates relevant fields on the rule's create form. After creating the rule, refresh the list of results in the modal to see your new rule.
 - Click an entry in the list to select it. Upon selection, the system displays information about the selected entry in the details panel on the right.
2. **Item details panel** - The upper portion of the right half of the window lists pertinent details about the currently selected item. Use the link in this panel (if present) to open the corresponding rule.
3. **Selected items panel** - The lower portion of the right half of the configuration window lists the items that have been selected so far. Clicking an item link in this section opens the corresponding rule. This panel also displays an informational message (either *Only 1 can be added* or *Multiple can be added*) to indicate how many elements can be selected using this configuration window.

Selecting Items

Based on the element being configured and its intended usage, users can either select a single item from the list or multiple items.

Click **Add** to include the corresponding item as a selection for the configuration. In the case of a single-select configuration modal, the **Add** button is disabled on all other rows once an item has been selected. To select a different item, first remove the currently added item by either clicking **Remove** in the item's row or by clicking the corresponding trashcan icon in the selected items panel.

After adding the desired items, click **Apply** to confirm your selection changes and close the configuration window. Alternately, click **Cancel** at any time to discard selection changes and close the configuration window.



Note: When a configuration window is triggered from an already open configuration modal window, the new window slides in. Upon application of selected values or cancellation, the secondary window slides out and returns the user back to the original configuration window.

Assigning custom categories

You can assign categories to your marketing artifacts. Assigning categories allows you to filter the artifact lists on the landing page and easily find artifacts of a specific type. Categories are available for artifacts like segments, actions, Treatments, and others.

1. **Optional:** If you have not previously enabled categories in your application, enable them with the Categories toggle.
 - a. Log in to Dev Studio as an administrator.
 - b. Click **Configure > System > Release > Toggles**.
 - c. Click the **Edit** icon by the Categories toggle.
 - d. Set the Categories toggle to ON.
2. Open an artifact where you want to assign a category.
3. Click the **View Categories** link at the top of the page.

The **View Categories** link only appears if categories are enabled in your application.
4. Click **Add Category**.
5. Click an existing category to select it, or click **Create new** to create a new category.
6. **Optional:** You can create sub-categories to better organize your marketing artifacts. For example, you can have a general Sales category, and more specific categories for Sales/Phones and Sales/Tablets. To create a sub-category, click the **Create sub-category** icon by an existing category.
7. To filter the artifacts list on the landing page, click the **All Categories** link and select a category.