

SmartFace integration with Milestone XProtect

User Guide



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Introduction

SmartFace is a server platform for facial recognition. It incorporates extensive experience of Innovatrics with facial biometrics, identification and analysis as well as best practice of our research and development team with parallel processing and performance optimization. Processing multiple camera streams, real-time identification or demographic analysis are challenging tasks. SmartFace is covering most of typical use cases when it comes to facial recognition and biometrics.

SmartFace integrates with the outside world via REST API and ZeroMQ notifications and handles all the complex facial recognition tasks such as facial detection thresholds, template extraction, matching, tracking and age and gender detection, ensuring developers can focus on front-end implementation rather than spending time on learning the ins and outs of facial biometrics.

This document is intended to provide installation and configuration details of an integration with Milestone video management system. After reading this guide you should be able to configure Milestone XProtect, install Innovatrics' Milestone Agent and configure it, so Milestone XProtect Smart Client can receive SmartFace's events of detected and identified persons.

Key Features Overview

The latest version of SmartFace and an integration with Milestone XProtect provides features described briefly in the following chapters.

SmartFace Features

Current SmartFace version provides the following features:

- Real-time face detection in camera streams and video files:
 - Each detected face is stored in the database along with:
 - Location on the image
 - Cropped image
 - Time stamp
 - Age and gender
 - Biometric information
 - Biometric template
- Real-time face tracking in camera streams and video files:
 - Ability to track a person in a camera stream when a face is detected
 - Each tracked face contains information about timeline
 - First and last detection indicate entry and exit times
- Real-time face identification in camera streams and videos compared against multiple watchlists:
 - Possibility to add or remove people to and from various watchlists for identification purposes
 - Ability to send notifications when a person from a watchlist is identified in a video stream
 - Enrollment of detected faces into a watchlist



- Continuous face grouping in camera streams or video files:
 - Used for unique people counting
 - Occurs in configurable intervals
 - Looks through all detected faces in the past x minutes (configurable sliding window) interval
 - All the similar faces are grouped into an identity
 - Possibility to store full frames before and after the face detection (sequence of frames)
- Automatic grouping of uploaded photos:
 - Similar detected faces from the uploaded photos are grouped into one unique identity
- Live notifications about events that happen in the processed stream
- Demo GUI:
 - Simple Web GUI demonstrating SmartFace functionality and its features

Milestone XProtect Integration

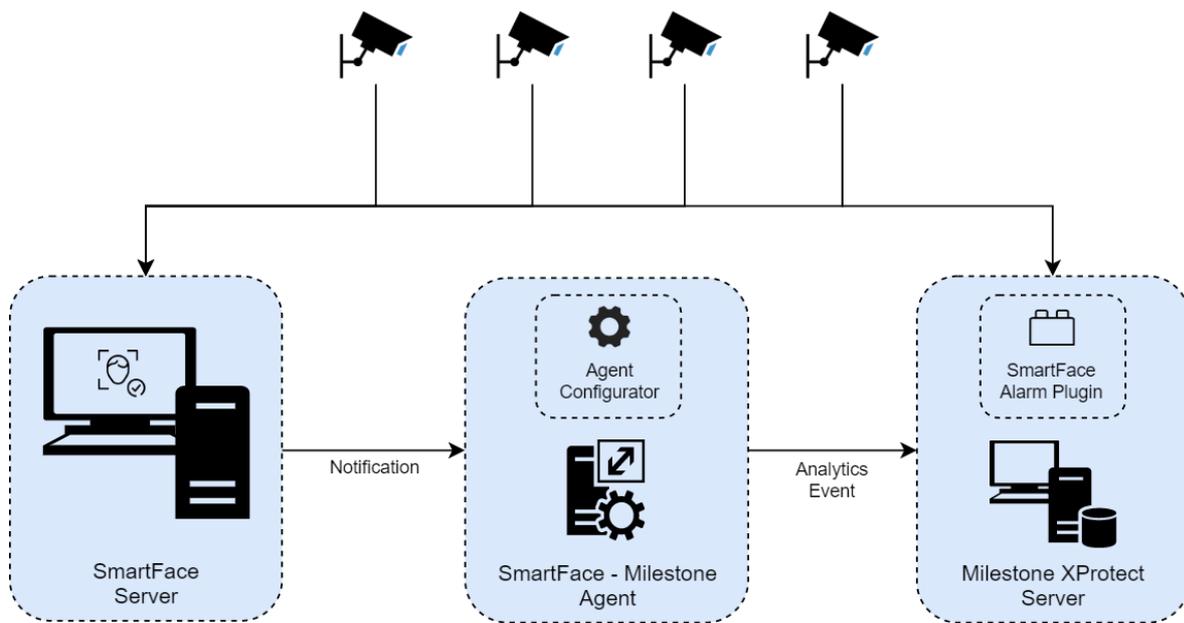
- Milestone XProtect Smart Client receives notifications about detected or identified persons
- Detected or identified persons are displayed with:
 - Cropped image
 - Time of detection
 - Estimated age
 - Estimated gender
 - Camera name
 - Watchlist name (in the case of identification)
 - Matched score (in the case of identification)
- Milestone XProtect Smart Client displays recorded videos from the time when a person was detected and identified



Architecture Overview

Integration between SmartFace facial recognition software and Milestone XProtect video management system (VMS) is done through the SmartFace - Milestone Agent. SmartFace - Milestone Agent processes notifications from SmartFace and transforms them into data structures, called Analytics Events, which are used by Milestone XProtect. SmartFace is processing the same video stream (RTSP) from cameras as Milestone XProtect. Therefore, it is required to map cameras configured on both sides (see the chapter Integration Configuration).

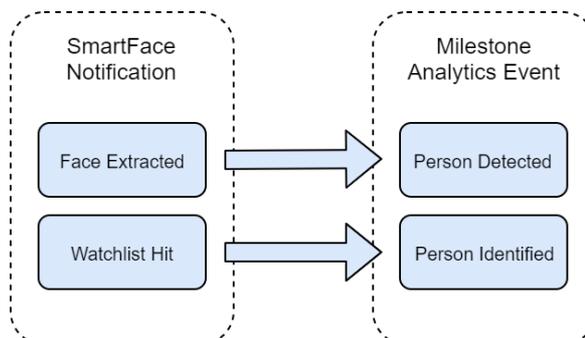
Analytics Events with information from SmartFace are then displayed in SmartFace alarm plugin installed on XProtect server.



Integration between SmartFace and Milestone XProtect

SmartFace – Milestone Agent

SmartFace – Milestone Agent is .NET console application that is registered as a Windows service. This service listens for ZeroMQ notifications from SmartFace and transforms them into Analytics Events that are sent to Milestone XProtect server. Following notifications are transformed into Analytics Events:



Transformation of SmartFace notifications into Milestone XProtect Analytics Events



It is required that the Agent connects to both SmartFace and Milestone XProtect server. Configuration of connectivity to both servers is read from a JSON file which is generated by Agent Configurator. For more information about this component, see the chapter Agent Configurator. Agent automatically reloads its configuration when the JSON file is created or edited.

The configuration file is located at:

C:\ProgramData\Innovatrics\SmartFaceMilestoneAgent\SmartFace_Milestone_Config.json

Logs for this service are located at:

C:\ProgramData\Innovatrics\SmartFaceMilestoneAgent\smartface_milestone_service.log

Agent Configurator

Agent Configurator is a Windows desktop application which enables you to easily set up all required configuration properties for the integration between SmartFace and Milestone XProtect and ensures that properties inserted are valid. With this application you configure a connection to SmartFace, Milestone XProtect and the mapping of cameras between these two servers. Created or modified configuration is automatically read by SmartFace - Milestone Agent.

Logs for this desktop application are located at:

C:\ProgramData\Innovatrics\SmartFaceMilestoneAgent\smartface_milestone_configurator.log

SmartFace Alarm Plugin

When notifications are sent from SmartFace, you can see them in Milestone XProtect Smart Client as Analytics Events. These events include information extracted in SmartFace. SmartFace Alarm Plugin renders and displays this information in XProtect Smart Client Alarm Manager. Alarm Manager is a module that is included in XProtect Smart Client automatically from version Express and higher.



Installation

For the proper functioning of the integration, it is required to install SmartFace server, Milestone XProtect and SmartFace – Milestone Agent. SmartFace and Milestone XProtect should be successfully installed before you start to install the integration components. The following chapter describes the process of installation and configuration of the integration components.

SmartFace Server

SmartFace is a server application which runs on a Windows platform. It requires several prerequisites as MS SQL, .NET Framework, RabbitMQ and Erlang. It is also required to have valid license for correct functionality of SmartFace. After installation it is necessary to properly configure the server and connected cameras.

For further details and installation steps, please see the SmartFace Product Manual.

Milestone XProtect

Milestone provides several versions for XProtect VMS from free Essential version to large-scale Corporate installation. However, the integration requires that XProtect VMS includes the Alarm Manager module. This module is available only from Express version and higher. For more details about XProtect versions, available functionalities and modules, please see the [Milestone Product Index](#) (product matrix).

For further details and installation steps please see the [XProtect Manual and Documentation](#).

Integration Installation

Installation of SmartFace – Milestone Agent is very simple and straightforward. The installation also installs Agent Configurator and creates a desktop shortcut for this application.

To install the integration, download exe installer from [Innovatrics CRM portal](#) first. Run this Windows x64 based installer, which creates, registers and starts SmartFace – Milestone Agent service. For connectivity reasons we recommend installing Agent on the same server on which SmartFace is installed.

In the case Agent is installed on separate server, it is required that Agent has connectivity to SmartFace server and Milestone XProtect server. It is also mandatory that TCP port 2406 on SmartFace server is opened for the correct reception of the SmartFace notifications.

Default folder where Agent is installed:

C:\Program Files\Innovatrics\Milestone Agent



SmartFace Alarm Plugin Installation

Before installing the SmartFace Alarm plugin, please make sure that XProtect Smart Client includes the Alarm Manager component (see the section Milestone XProtectMilestone XProtect Integration). The installation of SmartFace Alarm plugin is not automatic, please follow these steps to install this plugin:

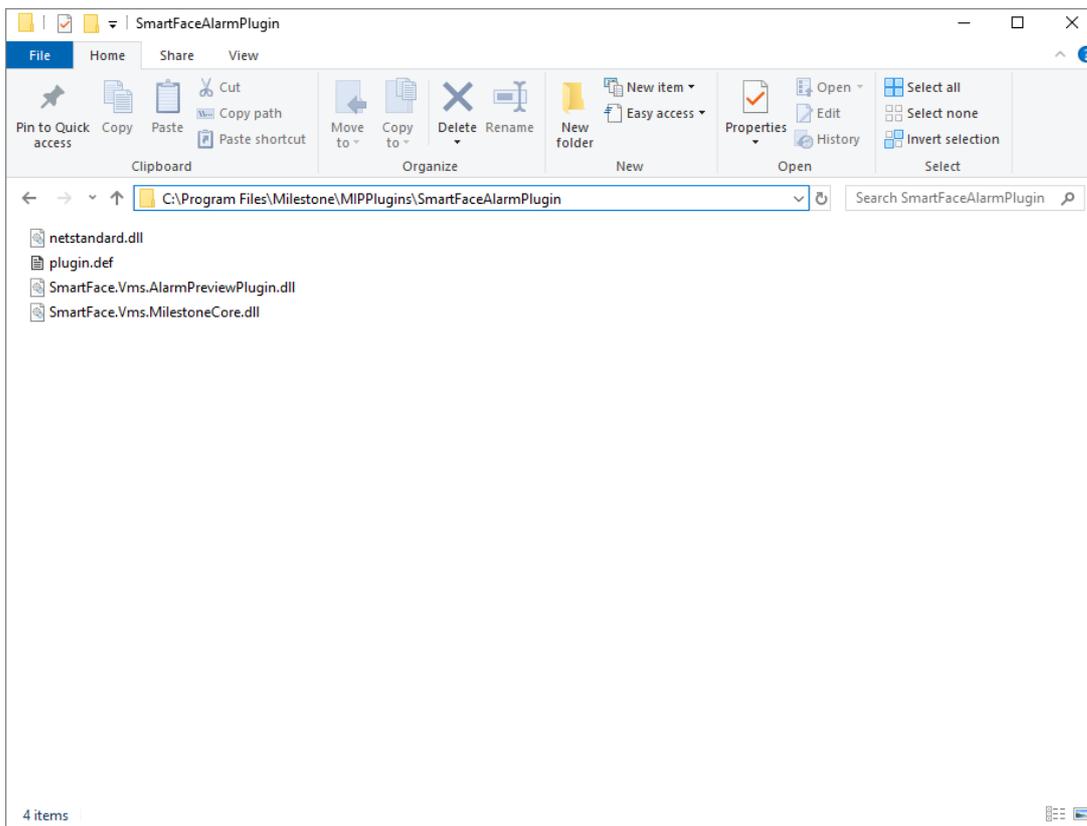
1. Download SmartFace Alarm plugin from [Innovatrics CRM](#) as a .zip file.
2. Extract the downloaded .zip file.
3. Create the folder *SmartFaceAlarmPlugin* on the machine that hosts Milestone XProtect server in the destination:

C:\Program Files\Milestone\MIPPlugins

4. Copy the extracted files into the created folder.

Expected path should look like:

C:\Program Files\Milestone\MIPPlugins\SmartFaceAlarmPlugin



SmartFace Alarm plugin location

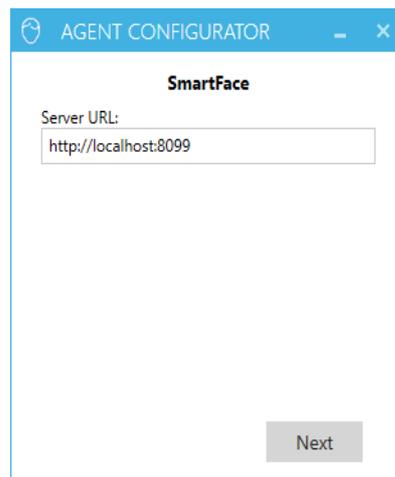
5. Restart Milestone XProtect server. Plugin will be loaded only after the restart.

Integration Configuration

Agent Configurator is a simple Windows desktop application with a graphic user interface. Its purpose is to configure the integration between SmartFace and Milestone XProtect. There are three configuration steps:

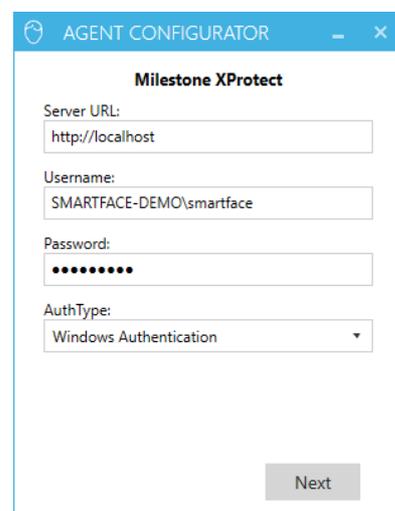
1. Configure SmartFace connectivity.
2. Configure Milestone XProtect connectivity.
3. Configure camera mapping between SmartFace and Milestone XProtect.

In the first step, set **Server URL** for SmartFace API endpoint. **Server URL** should contain a hostname and a port for this endpoint. Default SmartFace Web API port is 8099. In the case the Agent is installed on the same server as SmartFace, you can set the hostname as a localhost.



Connectivity configuration to SmartFace server in Agent Configurator

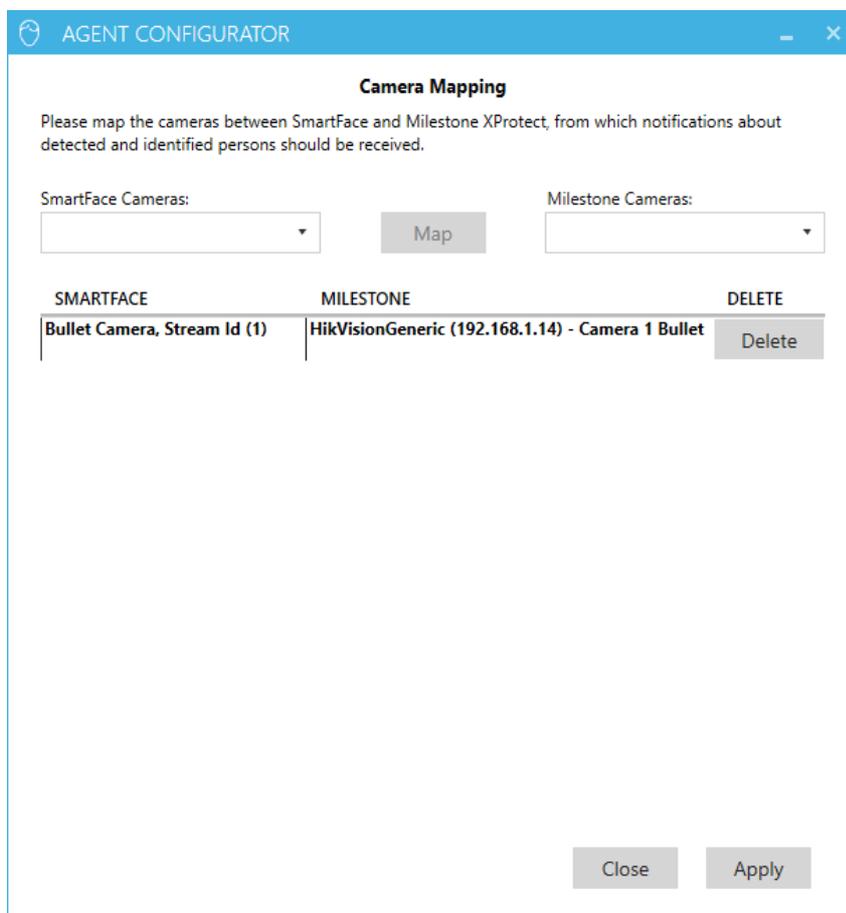
In the next step, specify **Server URL** for Milestone XProtect and the correct credentials. Make sure that the user used in the configuration belongs to the group which has read rights for camera configuration in Milestone Recording server and also rights to send Analytics Events. In the case Agent is installed on the same server as XProtect, **Server URL** can be set as localhost.



Connectivity configuration to Milestone XProtect server in Agent Configurator



When the connection to both servers is successfully established, Agent Configurator will load all configured cameras from both servers and display them in the following screen. In the last step it is required to map SmartFace cameras to cameras processed by Milestone XProtect. Notifications about detected and identified persons will be received only from cameras that are mapped.



Camera mapping between SmartFace and Milestone XProtect

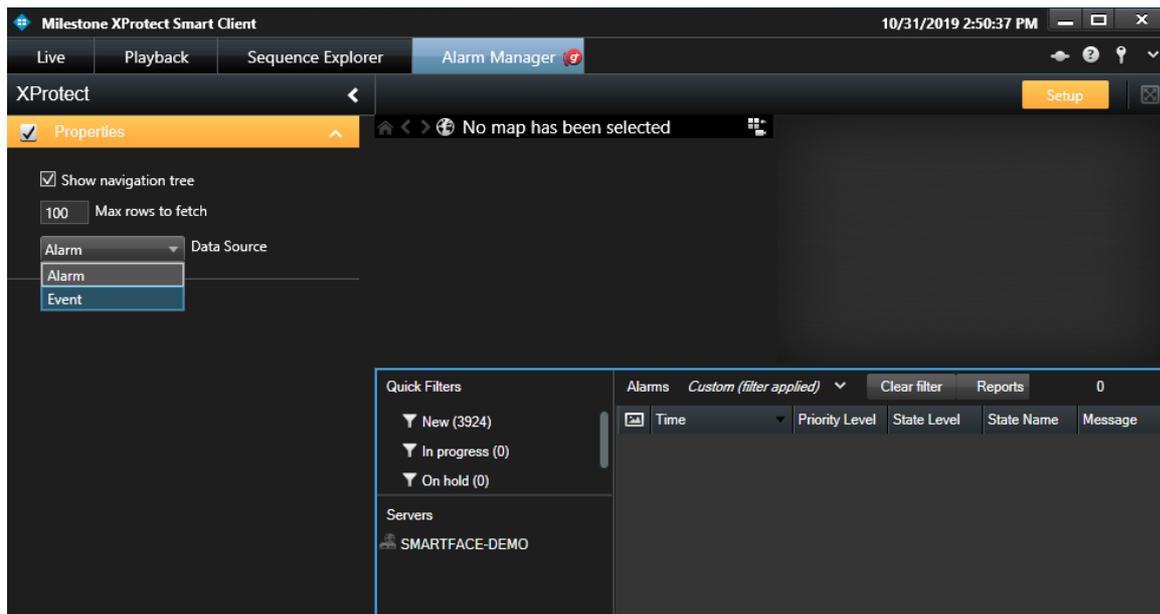
When all the relevant cameras from which notifications will be received are mapped, save the changes by selecting **Apply**. After that, SmartFace – Milestone Agent will automatically reload its configuration created or edited by Agent Configurator.

Notifications about detected and identified persons are now sent to Milestone XProtect.

Milestone XProtect Smart Client

Information extracted in SmartFace is displayed in Analytics Events in XProtect Smart Client. These events are displayed under the **Alarm Manager** tab in the bottom pane. In the case Analytics Events are not visible and a list of alarms is displayed instead, please follow these steps:

1. Select the pane where the alarms are displayed.
2. Click **Setup** in the right top corner.
3. Choose **Event** as a **Data Source** in the **Properties** pane located on the left.
4. Click **Setup** again.



Setting up a display of Analytics Events instead of alarms in XProtect Smart Client

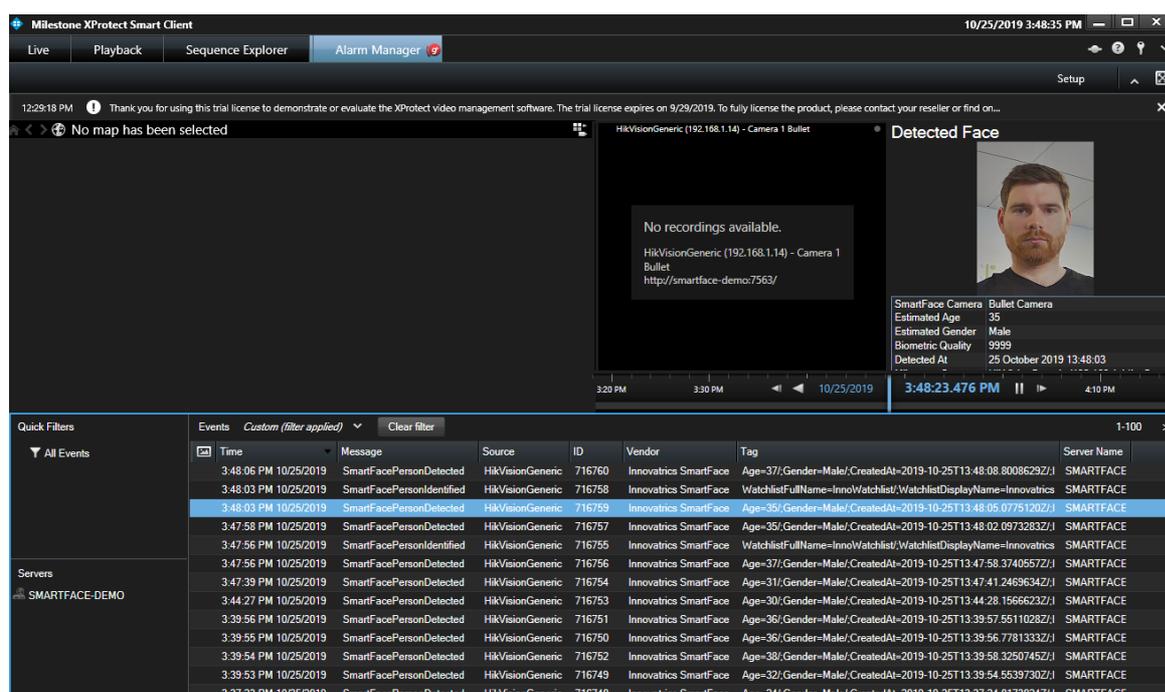
If the configuration of the integration between SmartFace and XProtect is correct, a notification about detected and identified persons is displayed at the bottom of the pane. You can view whether a face was only detected or also identified against a watchlist in the **Message** type for the received Analytics Event.



Detected Person

It is possible to view information about every detected person together with its cropped image through notifications received from SmartFace. A notification contains the following information:

- Cropped image
- SmartFace camera name
- Estimated age
- Estimated gender
- Biometric quality
- Detection time
- Milestone camera name



The screenshot shows the XProtect Smart Client interface. The top bar displays the date and time: 10/25/2019 3:48:35 PM. The main window is titled "Detected Face" and shows a cropped image of a man's face. Below the image, a table provides the following information:

SmartFace Camera	Bullet Camera
Estimated Age	35
Estimated Gender	Male
Biometric Quality	9999
Detected At	25 October 2019 13:48:03

The bottom part of the screenshot shows an "Events" table with the following columns: Time, Message, Source, ID, Vendor, Tag, and Server Name. The table contains several rows of detected person events, with the most recent one highlighted in blue.

Time	Message	Source	ID	Vendor	Tag	Server Name
3:48:06 PM 10/25/2019	SmartFacePersonDetected	HikVisionGeneric	716760	Innovatrics SmartFace	Age=37;/Gender=Male;/CreatedAt=2019-10-25T13:48:08.8008629Z/	SMARTFACE
3:48:03 PM 10/25/2019	SmartFacePersonIdentified	HikVisionGeneric	716758	Innovatrics SmartFace	WatchlistFullName=InnoWatchlist;/WatchlistDisplayName=Innovatrics	SMARTFACE
3:48:03 PM 10/25/2019	SmartFacePersonDetected	HikVisionGeneric	716759	Innovatrics SmartFace	Age=35;/Gender=Male;/CreatedAt=2019-10-25T13:48:05.0775120Z/	SMARTFACE
3:47:58 PM 10/25/2019	SmartFacePersonDetected	HikVisionGeneric	716757	Innovatrics SmartFace	Age=35;/Gender=Male;/CreatedAt=2019-10-25T13:48:02.0973283Z/	SMARTFACE
3:47:56 PM 10/25/2019	SmartFacePersonIdentified	HikVisionGeneric	716755	Innovatrics SmartFace	WatchlistFullName=InnoWatchlist;/WatchlistDisplayName=Innovatrics	SMARTFACE
3:47:56 PM 10/25/2019	SmartFacePersonDetected	HikVisionGeneric	716756	Innovatrics SmartFace	Age=37;/Gender=Male;/CreatedAt=2019-10-25T13:47:58.3740557Z/	SMARTFACE
3:47:39 PM 10/25/2019	SmartFacePersonDetected	HikVisionGeneric	716754	Innovatrics SmartFace	Age=31;/Gender=Male;/CreatedAt=2019-10-25T13:47:41.2469634Z/	SMARTFACE
3:44:27 PM 10/25/2019	SmartFacePersonDetected	HikVisionGeneric	716753	Innovatrics SmartFace	Age=30;/Gender=Male;/CreatedAt=2019-10-25T13:44:28.1566623Z/	SMARTFACE
3:39:56 PM 10/25/2019	SmartFacePersonDetected	HikVisionGeneric	716751	Innovatrics SmartFace	Age=36;/Gender=Male;/CreatedAt=2019-10-25T13:39:57.5511028Z/	SMARTFACE
3:39:55 PM 10/25/2019	SmartFacePersonDetected	HikVisionGeneric	716750	Innovatrics SmartFace	Age=36;/Gender=Male;/CreatedAt=2019-10-25T13:39:56.7781333Z/	SMARTFACE
3:39:54 PM 10/25/2019	SmartFacePersonDetected	HikVisionGeneric	716752	Innovatrics SmartFace	Age=38;/Gender=Male;/CreatedAt=2019-10-25T13:39:58.3250745Z/	SMARTFACE
3:39:53 PM 10/25/2019	SmartFacePersonDetected	HikVisionGeneric	716749	Innovatrics SmartFace	Age=32;/Gender=Male;/CreatedAt=2019-10-25T13:39:54.5539730Z/	SMARTFACE
3:37:23 PM 10/25/2019	SmartFacePersonDetected	HikVisionGeneric	716748	Innovatrics SmartFace	Age=24;/Gender=Male;/CreatedAt=2019-10-25T13:37:24.8173024Z/	SMARTFACE

Notification about detected person in XProtect Smart Client

XProtect server can be configured to record a video sequence from live streams based on received Analytics Events. If the recording of video sequences in XProtect server is enabled, the recorded sequence of the video footage will be displayed next to the notification from SmartFace.



Identified Person

It is possible to view an information about an identified person together with its cropped image and an image from watchlist through notifications received from SmartFace. A notification contains the following information:

- Cropped image
- Watchlist image
- SmartFace camera name
- Watchlist name
- Identified person name
- Identification time
- Matching score
- Milestone camera name

Time	Message	Source	ID	Vendor	Tag	Server Name
3:48:06 PM 10/25/2019	SmartFacePersonDetected	HkVisionGeneric	716760	Innovatrics SmartFace	Age=37;/Gender=Male;/CreatedAt=2019-10-25T13:48:08.8008629Z/	SMARTFACE
3:48:03 PM 10/25/2019	SmartFacePersonIdentified	HkVisionGeneric	716759	Innovatrics SmartFace	WatchlistFullName=InnoWatchlist;/WatchlistDisplayName=Innovatrics	SMARTFACE
3:48:03 PM 10/25/2019	SmartFacePersonDetected	HkVisionGeneric	716759	Innovatrics SmartFace	Age=35;/Gender=Male;/CreatedAt=2019-10-25T13:48:05.0775120Z/	SMARTFACE
3:47:58 PM 10/25/2019	SmartFacePersonDetected	HkVisionGeneric	716757	Innovatrics SmartFace	Age=35;/Gender=Male;/CreatedAt=2019-10-25T13:48:02.0973283Z/	SMARTFACE
3:47:56 PM 10/25/2019	SmartFacePersonIdentified	HkVisionGeneric	716755	Innovatrics SmartFace	WatchlistFullName=InnoWatchlist;/WatchlistDisplayName=Innovatrics	SMARTFACE
3:47:56 PM 10/25/2019	SmartFacePersonDetected	HkVisionGeneric	716756	Innovatrics SmartFace	Age=37;/Gender=Male;/CreatedAt=2019-10-25T13:47:58.3740557Z/	SMARTFACE
3:47:39 PM 10/25/2019	SmartFacePersonDetected	HkVisionGeneric	716754	Innovatrics SmartFace	Age=31;/Gender=Male;/CreatedAt=2019-10-25T13:47:41.2469634Z/	SMARTFACE
3:44:27 PM 10/25/2019	SmartFacePersonDetected	HkVisionGeneric	716753	Innovatrics SmartFace	Age=30;/Gender=Male;/CreatedAt=2019-10-25T13:44:28.1566623Z/	SMARTFACE
3:39:56 PM 10/25/2019	SmartFacePersonDetected	HkVisionGeneric	716751	Innovatrics SmartFace	Age=36;/Gender=Male;/CreatedAt=2019-10-25T13:39:57.5511028Z/	SMARTFACE
3:39:55 PM 10/25/2019	SmartFacePersonDetected	HkVisionGeneric	716750	Innovatrics SmartFace	Age=36;/Gender=Male;/CreatedAt=2019-10-25T13:39:56.7781333Z/	SMARTFACE
3:39:54 PM 10/25/2019	SmartFacePersonDetected	HkVisionGeneric	716752	Innovatrics SmartFace	Age=38;/Gender=Male;/CreatedAt=2019-10-25T13:39:55.3250745Z/	SMARTFACE
3:39:53 PM 10/25/2019	SmartFacePersonDetected	HkVisionGeneric	716749	Innovatrics SmartFace	Age=32;/Gender=Male;/CreatedAt=2019-10-25T13:39:54.5539730Z/	SMARTFACE
3:37:23 PM 10/25/2019	SmartFacePersonDetected	HkVisionGeneric	716748	Innovatrics SmartFace	Age=24;/Gender=Male;/CreatedAt=2019-10-25T13:37:24.8173024Z/	SMARTFACE

Notification about identified person in XProtect Smart Client



Triggering Alarms

Once the notifications about detected and identified persons are received in XProtect, multiple alarms with various rules can be triggered based on the events that the integration is sending.

It is necessary to define an Analytics Event in Milestone XProtect Management Client for every type of event (detected and identified) received from SmartFace. Analytics Events must be named the same as the events received from SmartFace. You can find the event names from SmartFace in the messages displayed in XProtect Smart Client.

Please follow these steps to define Analytics Events:

1. Open Milestone XProtect Management Client.
2. Unfold **Rules and Events** in **Site Navigation**.
3. Right-click **Analytics Events**.
4. Click **Add New ...**
5. Set the name of the event:
 - SmartFacePersonDetected
 - SmartFacePersonIdentified
6. Save the Analytics Event.

You may set up multiple alarms with various rules, triggered based on incoming events, only after you created Analytics Events with correct naming.

