Electronic Clinical Quality Measures (eCQM) Engine

(ECQM)

Installation Guide and Release Notes

Version 1.0
January 2019
# Table of Contents

1.0 Release Notes ........................................................................................................................................ 1  
2.0 Installation Notes .................................................................................................................................. 2  
  2.1 Contents of Distribution ........................................................................................................ 2  
  2.2 Required Resources .................................................................................................................. 2  
  2.2.1 Application Server Resources .................................................................................. 2  
  2.2.2 Browser Standard ............................................................................................................ 5  
  2.3 Before You Begin: Installation Issues .................................................................................. 5  
  2.4 Prerequisites .......................................................................................................................... 5  
  2.4.1 Windows PowerShell 5.1 or Later .............................................................................. 5  
  2.5 Microsoft .NET Framework Verification ............................................................................. 5  
  2.6 Microsoft .NET Framework 4.5.2 Installation .................................................................. 6  
  2.7 Internet Information Services 7.5 (or later) Installation ..................................................... 9  
  2.8 .Net Core Runtime 2.1.6 ........................................................................................................ 15  
3.0 Installation Overview .......................................................................................................................... 18  
4.0 Installation Instructions: First-Time Install ..................................................................................... 19  
  4.1 Acquire the SSL Certificate ................................................................................................. 19  
  4.1.1 SSL Certificate Acquisition – IHS Domain ................................................................ 19  
  4.1.2 SSL Certificate Acquisition – Non-IHS Domain ....................................................... 24  
5.0 ECQM Application Server Installation and Configuration .......................................................... 25  
  5.1 RavenDB setup......................................................................................................................... 25  
  5.1.1 Prerequisites .................................................................................................................. 25  
  5.1.2 Create RavenDB directory .......................................................................................... 25  
  5.1.3 Unzip RavenDB zip file ............................................................................................. 25  
  5.1.4 RavenDB folder Permissions ....................................................................................... 27  
  5.1.5 RavenDB Setup as Service .......................................................................................... 27  
  5.1.6 Setup CqmReference Database ................................................................................... 29  
  5.2 ECQM Web Site Setup ............................................................................................................. 31  
  5.2.1 Create ECQM Folder ...................................................................................................... 31  
  5.2.2 Unzip ECQM application bundle .................................................................................. 31  
  5.2.3 ECQM Configuration Parameters ............................................................................... 32  
  5.2.4 Configure IIS Request Content Length ........................................................................ 36  
  5.2.5 Add ECQM Site ............................................................................................................. 39  
  5.2.6 Configure ECQM Connection Timeout ........................................................................ 40  
  5.3 Install the SSL Certificate ........................................................................................................ 40  
  5.4 Configure the SSL Certificate .............................................................................................. 42  
6.0 Initiate the ECQM System .................................................................................................................. 44  
  6.1 Reset the ECQM Application ................................................................................................. 44  
  6.2 Launch the ECQM Application ............................................................................................ 47  
Appendix A: Disable Logging in IIS Manager ....................................................................................... 49
Preface

This manual describes the installation of the Electronic Clinical Quality Measures (eCQM) Engine (Namespace ECQM) and additional support software needed.

ECQM is a browser-enabled graphical user interface for the Indian Health Service (IHS) deployed either locally on Site application servers or centrally on an Albuquerque Data Center (ADC) application server for calculating eCQM measures submitted by IHS sites. It provides functionality to import QRDA CAT-I files and generates QRDA CAT-III files to submit for CMS reporting.
1.0 Release Notes

This is the first release of the centrally deployed eCQM Engine tool as defined by the following change requests:

- 07533: Depression Screening (CMS 2) Consult or referral order is not getting picked up from RCIS
- 08722: Clinical Quality Measure Reporting (CQM)
- 08769: Extend Look Back Period Beyond 14 days
- 08948: CMS 32: Stratum 3 report: Transfer To: Hospital Measures-Acute care hospital
- 09025: eCQM – CPC+ Performance Reporting
- 09034: CQM: Update eCQM to the most current logic
- 09035: QM: Update the 2014 logic for both the currently certified CQMs and the Diabetes mellitus (DM) uncertified CQMs
- 09036: CQM: QRDA 1 available in XML format
- 09037: CQM: new CQM development for QPP-MIPS Installation Notes
2.0 Installation Notes

Prefix: ECQM

Current Version: 1.0

2.1 Contents of Distribution

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
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<tbody>
<tr>
<td>ecqm0100.zip</td>
<td>eCQM Application bundle</td>
</tr>
<tr>
<td>ecqm0100_RavenDB.zip</td>
<td>RavenDB bundle</td>
</tr>
<tr>
<td>ecqm010o_ECQM_BQRE_Dataflow_2018_ReportingPeriod.pdf</td>
<td>Supporting documentation</td>
</tr>
<tr>
<td>ecqm010i.pdf</td>
<td>eCQM Version 1.0 Installation Guide and Release Notes</td>
</tr>
<tr>
<td>ecqm010t.pdf</td>
<td>eCQM Version 1.0 Technical Manual</td>
</tr>
<tr>
<td>ecqm010u.pdf</td>
<td>eCQM Version 1.0 User Manual</td>
</tr>
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</table>

2.2 Required Resources

This section lists the computer resources required for each deployment strategy.

2.2.1 Application Server Resources

The eCQM Engine software has two components: the eCQM Web Application and an eCQM database. For local site installs, these two components should be installed on one machine (single-tier), which is described in this installation guide. For the centralized service deployment in the Albuquerque Data Center, two separate machines (multi-tier) are needed, for installation by the CSMT and eCQM Project Teams. Detailed instructions for a multi-tier installation are provided in Table 2-1.

There are two potential configurations for the eCQM setup as follows:

- **BQRE/ECQM Local Install** – Do not install on the same server as BPRM. The EQCM Application (IIS) and Database (RavenDB) and BQRE can be installed on the same machine.

- **BQRE local/ECQM central option** – BQRE can be installed on the BPRM application server.

The following resources are required for both a single-tier and multi-tier application server:

- Microsoft® Windows® 2008 R2 SP1 Server x64 bit (or later)
- Microsoft IIS® 7.5, 8, 8.5 and 10
• Windows PowerShell 5.1 or higher
• .Net Framework 4.5.2 or higher (required for PowerShell 5.1)
• .Net Core 2.1.6
• Microsoft Visual C++ 2015
• Four processor cores running at 2.0 GHz or faster
• 8-12 GB RAM running at 1333 MHz (Multi-tier)
• 60-100 GB free disk space (disk drives should be 10K RPM or faster)

**Note:** Do not install on the same server as BPRM.

However, the ECQM Application (IIS) and Database (RavenDB) and BQRE Export Tool can be installed on *one* machine.

### 2.2.1.1 Listing of specifications for a recommended application server

Table 2-1 shows the specifications for a sample application server capable of running the eCQM application suite. These specifications only represent an example and are not to be considered a stringent specification.

This example is from a Dell quote provided in 2014 and the total cost for this application server (including Windows Server 2008 software) was approximately $3,800.00.

**Table 2-1: Typical Application Server Specification Example**

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Installation Guide and Release Notes
January 2019
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</table>
2.2.2 Browser Standard
The following browsers are recommended for any workstations accessing the eCQM application:

- Internet Explorer® 11 or higher
- Chrome®

2.3 Before You Begin: Installation Issues
Internet connectivity on the application server is necessary to download the required installation items.

2.4 Prerequisites

2.4.1 Windows PowerShell 5.1 or Later
The RavenDB setup requires Windows PowerShell 5.1 or later.

Useful links on how to get PowerShell 5.1 can be found here:

- [https://docs.microsoft.com/en-us/powershell/wmf/5.1/install-configure](https://docs.microsoft.com/en-us/powershell/wmf/5.1/install-configure)

**Warning:** For Windows Server 2008 R2: if PowerShell 3.0 is already installed, you must uninstall it before installing WMF (PowerShell) 5.1.

Uninstall windows update KB2506146 for Windows Server 2008 SP2 and KB2506143, for Windows Server 2008 R2 SP1.

2.5 Microsoft .NET Framework Verification
As mentioned in Section 2.2.1, Microsoft .NET Framework 4.5.2 or higher is required on the ECQM application server. To determine if it is already installed:

1. From the Windows **Start** menu, select **Control Panel**.

2. Click **Programs and Features**. A listing similar to that shown in Figure 2-1 displays.
3. Review the listing, looking for any Microsoft .NET Framework 4.x entries. If none are found, install the .NET Framework 4.5.2 (or higher) by following the instructions in Section 2.6. If Microsoft .NET Framework 4.5.2 (or higher) is listed, skip to Section 2.7.

Note: There can be more than one version of the .NET Framework on the server at the same time.

2.6 Microsoft .NET Framework 4.5.2 Installation

To install the .NET Framework:


2. Double-click the downloaded file to run the .Net Framework 4.5.2 setup. The License Terms dialog (Figure 2-2) displays:
3. Select **I have read and accept the license terms** to accept the license agreement.

4. Click **Install.** Respond to any prompts presented as the installation proceeds. When completed, the **Installation Is Complete** dialog (Figure 2-3) displays:
5. Click **Finish** to complete the installation. If necessary, restart the server.

6. As a final step, run the Windows Updates utility to check for and install any .NET Framework updates that may be available.

   **Note:** It is very important to check for and install any .NET Framework updates. These updates can be critical to the stability and security of ECQM operation.
2.7 Internet Information Services 7.5 (or later) Installation

To install the Microsoft IIS:

1. From the Windows Start menu, select Administrative Tools.
2. Select Server Manager to display the Server Manager dialog.
3. Click Roles in the left pane. The Roles pane (Figure 2-5) displays.
Figure 2-5: **Add Roles**

4. If you already set up a web server, click **Select Roles** and skip to Step 7.

5. If you have not yet set up a web server, click **Add Roles** on the right pane. Review the **Before You Begin** dialog and click **Next**.

6. The **Select Server Roles** dialog (Figure 2-6) displays:
7. Select **Web Server (IIS)**. The **Add Roles Wizard** (Figure 2-7) displays:

8. Click **Add Required Features**. The **Web Server (IIS)** dialog (Figure 2-8) displays:
9. Click **Next**. The **Select Role Services** dialog (Figure 2-9) displays:
10. Clear any checked boxes and enable the following role services:

- **Common HTTP Features:**
  - Static Content
  - Default Document
  - Directory Browsing
  - HTTP Errors
  - HTTP Redirection

- **Application Development:**
  - ASP.NET
  - .NET Extensibility
  - ISAPI Extensions
  - ISAPI Filters

- **Health and Diagnostics** (optional):
  - HTTP Logging
  - Request Monitor

- **Security:**
  - Request Filtering

- **Performance:**
  - Static Content Compression
  - Dynamic Content Compression

- **Management Tools:**
  - IIS Management Console
  - IIS 6 Metabase Compatibility

11. Click **Next** to display the **Confirm Installation Selections** dialog (Figure 2-10).
12. Click **Install**. The **Installation Results** dialog (Figure 2-11) displays:

![Add Roles Wizard Installation Results dialog]

Figure 2-11: Add Roles Wizard Installation Results dialog
13. Click **Close** to complete the installation and end the process.

**Note:** Please review the additional steps for disabling the IIS Manager Logging feature in Appendix A.

### 2.8 .Net Core Runtime 2.1.6

The ECQM application requires .Net Core 2.1.6. To install the .Net Core Runtime 2.1.6:

1. Download [.Net Core Runtime](https://dotnet.microsoft.com/download/thank-you/dotnet-runtime-2.1.6-windows-hosting-bundle-installer) installer from https://dotnet.microsoft.com/download/thank-you/dotnet-runtime-2.1.6-windows-hosting-bundle-installer.

2. Run the installer (preferably in administrator mode).

![Figure 2-12: Microsoft .NET Core 2.1.6 – Windows Server Hosting Setup](image)

3. Click **Install**.
4. Click **Close** after installation is successfully completed.

5. After successful install, restart the WWW and WPA services as described below.

6. Open the Command Prompt CMD in Administrator mode by right-clicking on **Command Prompt** and choosing **Run as administrator**.

7. Run the following commands in CMD:
   - `net stop was /y` - This will stop the WWW and Windows Process Activation service.
   - `net start w3svc` - This will start the WWW service.
Figure 2-15: Administrator Command prompt
3.0 **Installation Overview**

The ECQM v1.0 installation requires two files:

1. **ecqm0100.zip** – application bundle

2. **ecqm0100_RavenDB.zip** – database bundle for eCQM application

Save both files where accessible to the application server.
4.0 Installation Instructions: First-Time Install

ECQM contains components that run on the application server. The application operates in a web-based environment; there is no separate installation necessary on user workstations.

4.1 Acquire the SSL Certificate

ECQM utilizes the Secure Sockets Layer (SSL) protocol to ensure secure communications between its components. If your site is not on a secure domain, you must acquire an SSL certificate. If your site is on a secure domain, an SSL certificate may not be required but is still highly recommended.

Note: Since the SSL certificate acquisition may take up to 24 hours, it is recommended that you acquire the SSL certificate before beginning the ECQM installation.

The process for acquiring this certificate for sites on the IHS domain is different than that used by sites that are not on the IHS domain.

4.1.1 SSL Certificate Acquisition – IHS Domain

If your site is on the IHS domain, to acquire your SSL certificate:

1. Click Start | Administrative Tools | Internet Information Services (IIS) Manager.

2. Click the server name. The IIS Manager dialog (Figure 4-1) displays.
3. In the center panel, double-click **Server Certificates** in the **Security** section (near the bottom of the panel).
4. In the Actions panel (on the right), click Create Certificate Request. The Request Certificate Wizard (Figure 4-2).

5. In the Distinguished Name Properties dialog, enter the information as follows:
   - Common Name. The name through which the certificate will be accessed (usually the fully-qualified domain name of the machine).
   - Organization. The legally registered name of your organization or company.
   - Organizational unit. The name of your department within the organization (e.g., IHS).
   - City/locality. The city in which your organization is located.
   - State/province. The state in which your organization is located.
   - Country/region. The two-character Country code.
Figure 4-3: Request Certificate Wizard - Distinguished Name Properties

6. Click Next. The Cryptographic Service Provider Properties dialog (Figure 4-4) displays.
7. Leave both settings at their defaults:
   - **Cryptographic service provider:** Microsoft RSA SChannel Cryptographic Provider.
   - **Bit length:** 2048.

8. Click **Next**. The **File Name** dialog (Figure 4-5) displays.
9. Type a path and file name for the certificate request file.

   **Note:** Make note of the filename chosen and the save location. You will need to open this file as a text file and copy the entire body of it (including the Begin Certificate Request and End Certificate Request tags) into the online order process when prompted.

10. Click **Finish** to save the SSL certificate request file.

11. E-mail the file to IHSServerCertificateRequest@ihs.gov. Request the SSL Certificate in CER format for the ECQM Application. A certificate will be issued within 24 hours and e-mailed to the originator of the request. Once the certificate is received, proceed with the ECQM installation as described in Sections 5.0 through 6.0.

### 4.1.2 SSL Certificate Acquisition – Non-IHS Domain

If the site is not on the IHS domain, the steps for acquiring an SSL certificate will vary, depending on the certificate provider. Several vendors (e.g., GoDaddy, Thawte, and Verisign) provide SSL certificates, and the process for acquiring the certificate is different for each.

Follow the steps provided by the SSL certificate vendor to acquire an SSL certificate, and proceed to the ECQM installation instructions.
5.0 ECQM Application Server Installation and Configuration

5.1 RavenDB setup

ECQM application requires RavenDB to store data.

5.1.1 Prerequisites

5.1.1.1 Windows PowerShell 5.1 or Later

The RavenDB setup requires Windows PowerShell 5.1 or later. This step is discussed in detail in Section 2.4.

5.1.1.2 Visual C++ 2015

Visual C++ 2015 is required to complete the setup for the CqmReference database in Section 5.1.6.

5.1.2 Create RavenDB directory

Create a directory RavenDB preferably C:\RavenDB, into which to unzip the downloaded RavenDB zip package.

5.1.3 Unzip RavenDB zip file

Unzip the downloaded ecqm0100_RavenDB.zip into the folder created in previous step.
Figure 5-1: Creating a directory to unzip file

Figure 5-2: File location
5.1.4 RavenDB folder Permissions

Make sure the LOCAL SERVICE account has full access on RavenDB folder.

![Permission settings](image)

Figure 5-3: Permission settings

5.1.5 RavenDB Setup as Service

This step will require Windows PowerShell 5.1 or later. Please refer to Section 2.4 for guidance.

1. Once PowerShell 5.1 or later has been installed; open **PowerShell** in administrator mode.
2. Use the command `$PSVersionTable` to confirm the PowerShell version is 5.1.x.

3. Using the `cd C:\RavenDB\` command, set the directory to where RavenDB zip package is unzipped.

4. Set PowerShell execution policy to **Unrestricted**. Run the command `Set-ExecutionPolicy unrestricted`.

5. Type `A` at the next prompt.

6. Run the command `.\setup-as-service.ps1`. 
Figure 5-7: \setup-as-service.ps1 command

7. Note the URL for RavenDB: http://127.0.0.1:27019.


9. Type A at the next prompt.

Figure 5-8: Set PowerShell execution policy to Restricted

5.1.6 Setup CqmReference Database

1. Open RavenDB portal in Chrome or IE11 using the URL http://127.0.0.1:27019.

2. Select Databases from the left menu and click New Database.
3. Type in database name **CqmReference** and click the **Create** button.
4. Once the database is created; it will display the **CqmReference** database information.

5. Verify the database size and documents as shown in Figure 5-11.

![Figure 5-11: Database information display](image)

**5.2 ECQM Web Site Setup**

**5.2.1 Create ECQM Folder**

1. Create an ECQM folder in the `C:\inetpub\` directory.

**5.2.2 Unzip ECQM application bundle**

1. Unzip distributed `ecqm0100.zip` application bundle into the `C:\inetpub\ECQM` folder created above.
5.2.3 ECQM Configuration Parameters

1. Locate the `appsettings.json` file in the `C:\Inetpub\ECQM` folder.

2. Open the `appsettings.json` file in a text editor (e.g., Notepad).

3. This file must be edited with caution. Do not add any extra characters, spaces, or enter lines in this file. Also ensure that all edited values are in double quotes as displayed below.

   Note: If there are access issues in saving this file after completing the modifications, make a copy of this file and save it to the Desktop or Documents folder, complete the changes in that file and then copy/paste that file to the `C:\Inetpub\ECQM` folder to overwrite the original file. Alternatively, write permissions could be added to the `C:\Inetpub\ECQM` folder for the current user making the modifications.

4. Configure the default Super Admin user by filling the Username, FirstName, LastName, and Email fields as shown in Figure 5-13.
Note: Figure 5-13 has the IHS D1 directory (credential store) information for authentication. If the site is using another or local directory service (user credential store), please modify the highlighted fields as shown in Figure 5-14. Make sure that the Directory Name value and Super Admin Domain value are the same.
5. Please use the correct port (LDAP) in the directory settings. The default port for Microsoft Active Directory (LDAP) is **389**.

6. Optional: The **LDAPS** (secure LDAP) parameter can be set to **True** if it is implemented in the directory service; please input the correct port for LDAPS.

7. The document store settings show the URL for the RavenDB. For a single-tier installation the default value is the correct value.
8. Save and close the `appsettings.json` file.

**Note:** If there are access issues in saving this file after completing the modifications, make a copy of this file and save it to the Desktop or Documents folder, complete the changes in that file and then copy/paste that file to the C:\Inetpub\ECQM folder to overwrite the original file. Alternatively, write permissions could be added to the C:\Inetpub\ECQM folder for the current user making the modifications.
5.2.4 Configure IIS Request Content Length

To configure the IIS Request Content Length:

1. Click **Start | Administrative Tools | Internet Information Services (IIS) Manager**. Select the server name in the IIS Manager Tree.

2. Double-click the **Request Filtering** icon as shown in Figure 5-16.

   ![Request Filtering](Image)

   **Figure 5-16: Request Filtering**

3. Click the **Edit Feature Settings** link in the **Action** pane on the right side.

4. Set the **Maximum allowed content length (Bytes)** to **100000000** (one hundred million) as shown in Figure 5-17.

5. Click **OK**.
5.2.5 Add ECQM Application Pool

To add the Application Pool:

1. Return to the IIS Manager opened in Section 5.2.4 and browse to Application Pools in the tree structure below your IIS node as shown in Figure 5-18.

2. Right-click Application Pools and select Add Application Pool. The Add Application Pool dialog (Figure 5-19) displays.
3. In the **Name** field, type the name of the application pool (ECQM).

4. In the **.NET Framework version:** field, select **No Managed Code**.

5. Click **OK**.

6. Right-click the newly-created application pool in **IIS Manager** and click **Advanced Settings**. A dialog similar to Figure 5-20 displays:
7. Change the **Idle Time-out** value to **15** minutes.

8. Change the **Identity** value to **LocalSystem**.

9. Click **OK** to save the changes and close the dialog.

### 5.2.6 Add ECQM Site

To add the new website:

1. Right-click **Sites** in the **Connections** pane of the IIS Manager and select **Add Web Site**. The **Add Web Site** dialog (Figure 5-21) displays.

![Add Web Site dialog](image)

**Figure 5-21: Add Web Site dialog**

2. In the **Site name** field, type **ECQM**.

3. Click **Select** and select the ECQM application pool created in the previous steps.

4. In the **Physical Path** field, browse to the `C:\inetpub\ECQM` folder created in Section 5.2.1. Be aware that the location will be different if the folder was created on a different drive.

5. Set the port number in the **Binding** section. The recommended port for ECQM is **47019**. The port may need to be added to Firewall exceptions if firewall is enabled.

6. Click **OK** to save the changes and close the **Add Web Site** dialog.
5.2.7 Configure ECQM Connection Timeout

To configure the ECQM connection timeout:
1. Select the **ECQM** site under the Sites tree control.
2. Click **Limits** on the right side under **Configure**.
3. Set the **Connection time-out** to **900** as shown in Figure 5-22.
4. Click **OK**.

![Figure 5-22: Connection time-out](image)

5.3 Install the SSL Certificate

**Note:** Follow this section if SSL configuration is required.

To install the SSL server certificate acquired in Section 4.1:
1. From the Windows **Start** menu, select **Administrative Tools**.
2. Select **Internet Information Services (IIS) Manager**.
3. Click the server name in the left panel.

4. Double-click **Server Certificates** in the **Security** section (near the bottom of the panel).
5. In the **Actions** panel (on the right), click **Complete Certificate Request**. The **Complete Certificate Request** dialog displays.

**Note:** The Complete Certificate Request must be completed on the same system where the Certificate Signing Request was generated (Section 4.1.1, Step 11) to ensure the private key is correctly associated with the new certificate.

6. Click the ellipses button (…) to browse to the location where the server certificate file acquired in Section 4.1 was saved.

7. In the **Friendly name** field, type the friendly name for the certificate. This name is intended for use for management of certificate stores on the server.

8. In the **Select a certificate store for the certificate** field, verify **Personal Store** is selected.

9. Click **OK** to complete the procedure.

### 5.4 Configure the SSL Certificate

**Note:** Follow this section if SSL configuration is required.
To configure the SSL certificate:

1. In the **IIS Manager** window, select the name of the server where the certificate was installed.

2. Under **Sites**, select the site to be secured with the SSL certificate.

3. In the **Actions** pane, click **Bindings**.

4. Click **Add**.

5. In **Add Site Binding**:
   
   a. For **Type**, select **https**.
   
   b. For **IP address**, select **All Unassigned**, or the IP address of the site.
   
   c. For **Port**, specify a port for SSL, the default is **443**. The recommended port for ECQM is **47019**.

   **Note**: When installing SSL with HTTPS, first remove any previous site bindings for HTTP. The **Site Bindings** dialog as shown in Figure 5-25 will indicate whether there any HTTP site bindings and allow their removal.

   d. Select the **SSL certificate** just installed. Click **OK**.

   ![Edit Site Binding dialog](image)

   **Figure 5-25: **Edit Site Binding** dialog

6. Click **Close**.

7. Close **Internet Information Services (IIS) Manager**.

   The SSL Certificate is now configured. Visit the website via an HTTPS connection, using the domain name, not the IP address, to verify the installation.
6.0 Initiate the ECQM System

6.1 Reset the ECQM Application

To reset the ECQM application:

1. **Stop** ECQM website.

2. **Stop** ECQM website application pool.

![Figure 6-1: Manage Web Site - Stop](image)

- **Stop** ECQM website.
- **Stop** ECQM website application pool.
3. **Start** ECQM website application pool.

Figure 6-2: **Application Pool Tasks - Stop**
4. Start ECQM website.
6.2 Launch the ECQM Application

To launch ECQM:

1. Open Internet Explorer.

2. In the Address bar, enter the IP address of your Windows application server and the port number.
   
   a. For sites using SSL: https://domain_name:47019
   
   b. For sites not using SSL: http://ip_address:47019

3. Wait for the ECQM Login screen to load.
4. Confirm that the drop-down has the domain / directory name selected as configured in the ECQM Configuration Parameters section.

5. Please login using the DefaultSuperAdmin credentials as configured in the Section 5.2.3.

   Note: At this stage, the application only authorizes the Default Super Admin user. Once the Admin logs in, he/she can add additional users as per the user manual.

6. Click Login. For further steps please refer to the user manual.
Appendix A: Disable Logging in IIS Manager

The Internet Information Services (IIS) manager is set up by default with a Logging feature which allows it to capture certain types of requests to log files in the IIS installation folder. We recommend disabling this logging feature for the ECQM websites as it may result in storage issues if the log file is not maintained or monitored.

The following steps show how to disable the Logging feature for each ECQM website setup at your site. This information can also be found on the Microsoft website at: https://technet.microsoft.com/en-us/library/cc754631%28v=ws.10%29.aspx.

1. From the Windows Start menu, select Administrative Tools.

   ![Figure A-1: Opening Internet Information Services (IIS) Manager](image)

2. Select Internet Information Services (IIS) Manager to display the IIS Management Console.
3. Select the **ECQM** website in the left pane.

4. Double-click **Logging** to display the **Logging** dialog.
5. Click **Disable** in the **Actions** pane.

Figure A-4: Disabled **Logging** window
# Acronym List

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Term Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADC</td>
<td>Albuquerque Data Center</td>
</tr>
<tr>
<td>CRUD</td>
<td>Create, Read, Update, and Delete</td>
</tr>
<tr>
<td>eCQM</td>
<td>electronic Clinical Quality Measures</td>
</tr>
<tr>
<td>IHS</td>
<td>Indian Health Service</td>
</tr>
<tr>
<td>IIS</td>
<td>Internet Information Service</td>
</tr>
<tr>
<td>SSL</td>
<td>Secure Sockets Layer</td>
</tr>
</tbody>
</table>
Contact Information

If you have any questions or comments regarding this distribution, please contact the OIT Help Desk (IHS).

**Phone:**  (888) 830-7280 (toll free)

**Web:**  [http://www.ihs.gov/helpdesk/](http://www.ihs.gov/helpdesk/)

**Email:**  support@ihs.gov