Figure 1: CMS Logo

Measure Authoring Tool Release Notes

Version 5.5.0

May 29, 2018

Table of Contents

Enhancements

A description of the enhancements included in the Measure Authoring Tool (MAT) version 5.5.0 are listed below. For further information on the enhancements and processes of the MAT tool, including the use of CQL, please visit the MAT public website and read the 5.5 User Guide found on the Training and Resources tab: https://www.emeasuretool.cms.gov/.

1.0 Updated the MAT to Version 5.5

The MAT 5.5 release to production will deploy on May 29, 2018.

CQL Workspace

1.1   Replacing included libraries

The CQL Workspace and CQL Library Workspace now allow users to replace an included library with a newer version of that library, via the Includes tab. To replace an already included library, users must double click the library they wish to replace and will be brought to the included library page within the Includes tab. An "Edit" icon has been added to the top of the page that gives users the ability to select from a filtered list of available library versions and then select "Apply" to complete the replacement.

Users will be able to replace their library with another, provided the library meets the below criteria:

- For measures, the Replace Library table filters out and does not display any libraries that contain another included library, i.e. a library within a library.
- For standalone libraries, the Replace Library table filters out and does not display any libraries that that contain another included library, i.e. a library within a library.
- Libraries containing previous versions of the Quality Data Model (QDM) will not be available for selection from the Replace Library table.
- The Replace Library table will only display CQL libraries that have been versioned.

1.2 Program and Release options on Value Set retrieval

The MAT now allows users to select a specific program and release when retrieving value sets from the Value Set Authority Center (VSAC). If no program and release selection is made, the MAT will continue to retrieve the most current value set. There are two new drop-down menus on the Value Set search box that allow users to select a program and release value prior to retrieving their value set from VSAC. If a program is chosen, a release must also be chosen. Also, if a program/release combination is chosen, version may not be chosen. Release information will be displayed on the Applied Value Sets table for all applied value sets where a program/release was selected.

1.3 Entering Value Sets and Codes with the same name

The MAT now allows users to enter codes and value sets using the same name into their measures or stand-alone CQL libraries. This requires users to create a suffix when applying an already applied code or value set to make the second unique from the original. There is no limit on the amount of codes or value sets that may be applied to a measure or library. Suffixes applied to value sets and codes will be shown in the MAT exports as well.

When a repeat code or value set is applied, the user will see separate entries on the applied codes or value sets tables. To differentiate between the repeated applied codes and value sets, the suffix chosen by the user will display as part of the Code descriptor or Value Set name on the table. These codes and value sets will also be available for selection through the Insert icon in the attribute builder. The default birthdate and dead codes will not allow for multiple applications and a validation has been built in to prevent adding either of these codes with a user-created suffix.

1.4 Applied Codes table updates

Figure 1: Applied Codes table

Descriptor	Code	CodeSystem	Version	Version Included	Edit	Delete	Copy
Birthdate	21112-8	LOINC					
Dead	419099009	SNOMEDCT					
Provided Patient Education	10	ActCode	HL7V3.0_2017-07		✏	🗑	☐
Stopped Concurrent Therapy	13	ActCode	HL7V3.0_2017-07	✔	✏	🗑	☐

1-4 of 4

The Applied Codes table has had some additions in functionality and additional columns added:

- The Version Included column is a new addition and will display as blank for each row unless a user has designated they would like to include code system version for that code; the column will then display a green checkmark.
- The Edit column is a new addition to the Applied Codes table and allows for a user to modify an already applied code by selecting "Edit" (pencil icon) on each applied code row.
- The Copy column is a new addition to the Applied Codes table and contains checkboxes that allow users to select applied codes they would like to then paste into another measure or library.
- A new set of icons now displays above the table:
  - The copy icon allows users to copy codes to their clipboard that they have selected using the checkboxes in the copy column.

- o The paste icon allows users to paste codes from their clipboard to another measure or library.
- o The clear icon allows users to clear any selections they have made on the copy column.

1.5 Applied Value Sets table updates

Figure 2: Applied Value Sets table

The Applied Value Sets table has had some additions in functionality and additional columns added:

- The Release column is a new addition that will display the release information for any applied value set where a user has designated a release, otherwise, it will display blank.
- The Edit column is a new addition to the Applied Value Sets table and allows for a user to modify an already applied value set by selecting "Edit" (pencil icon) on each applied value set row.
- The Copy column is a new addition to the Applied Value Sets table and contains checkboxes that allow users to select applied value sets they would like to then paste into another measure or library.
- A new set of icons now displays above the table:
  - o The copy icon allows users to copy value sets to their clipboard that they have selected using the checkboxes in the copy column.
  - o The paste icon allows users to paste value sets from their clipboard to another measure or library.
  - o The clear icon allows users to clear any selections they have made on the copy column.

1.6 Ability to include a Code system version on the Codes tab

When applying retrieved codes to the Applied Codes table, users now can decide if they would like to include the code system version for each applied code. The Codes search box now contains an "Include Code System Version" checkbox. When selected, the code being applied will contain the code system version and this will be shown on the Applied codes table. The code and code system declarations in the View CQL section of the CQL Workspace will reflect the choice made when the code is applied.

Example Code System declarations:

- **Version included**: codesystem "LOINC:2.46": 'urn:oid:2.16.840.1.113883.6.1' version 'urn:hl7:version:2.46"
- **Version not included**: codesystem "LOINC ": 'urn:oid:2.16.840.1.113883.6.1'

Example Code declarations:

- **Version included**: code "Anesthesia for procedures on salivary glands, including biopsy": '00100' from "CPT:2018" display 'Anesthesia for procedures on salivary glands, including biopsy'
- **Version not included**: code "Anesthesia for procedures on salivary glands, including biopsy": '00100' from "CPT" display 'Anesthesia for procedures on salivary glands, including biopsy'

The default Birthdate and Dead codes will no longer display code system version when a new measure or library is created. For all existing measures and libraries, the default Birthdate and Dead code system versions will be removed from the CQL on the drafting and cloning processes.

1.7 Additions to the shortcut keys and Insert icon (attribute builder)

There have been a few additions to the shortcut keys and insert icon in the MAT:

The below functions have been added to the Ctrl-Alt-F shortcut key, and can also be found under the Pre-Defined Function item type under the attribute builder:

- AgeInWeeks()
- AgeInWeeksAt()
- CalculateAgeInWeeks()
- CalculateAgeInWeeksAt()

The unit for BPM (beats per minute) will now display as "{beats}/min" in the CQL, instead of "{H.B.}/min", when bpm is chosen by using either the Ctrl-Alt-U shortcut key or the attribute builder.
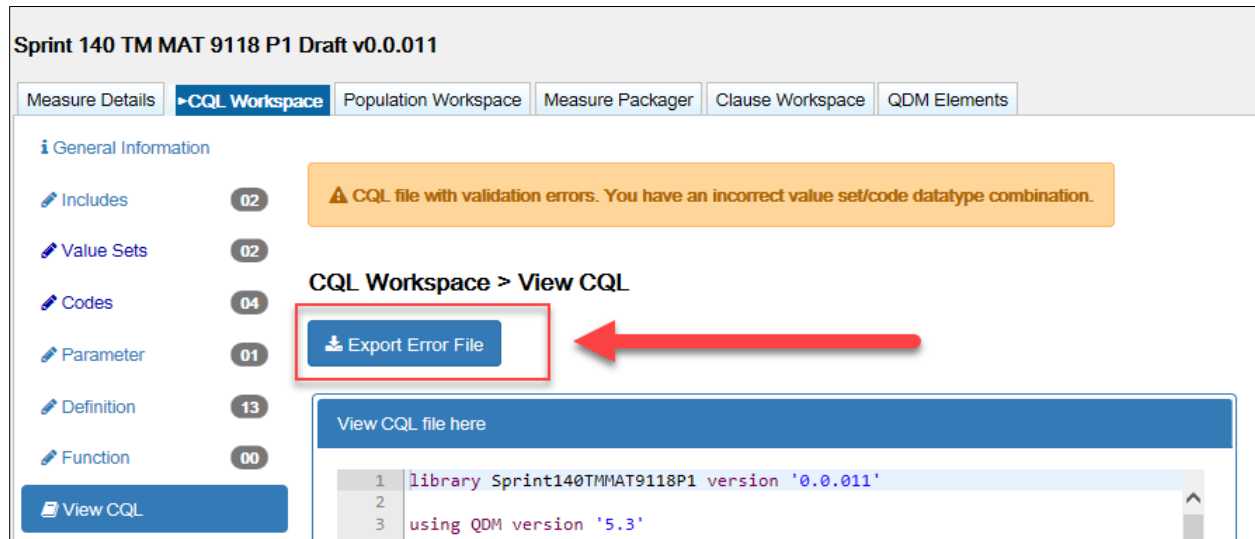
When a code is inserted via the attribute builder, the "~" symbol will now be used going forward in place of the "=" symbol.

Example: .result ~ "Infectious disease, hcv, six biochemical assays (alt, a2-macroglobulin, apolipoprotein a-1, total bilirubin, ggt, and haptoglobin) utilizing serum, prognostic algorithm reported as scores for fibrosis and necroinflammatory activity in liver"

1.8 CQL Error Report

Users are now able to download an error report of their measure or library CQL on the View CQL tab of the CQL Workspace. The button to download the error report is located on the View CQL section and is labeled as "Export Error File". Selecting this icon will generate a .txt file that contains the entirety of the CQL file for that measure or library as it currently stands. At the bottom of the .txt file is a section that will display any errors contained in the CQL, organized in ascending order by line number.

Figure 3: Export Error File icon location

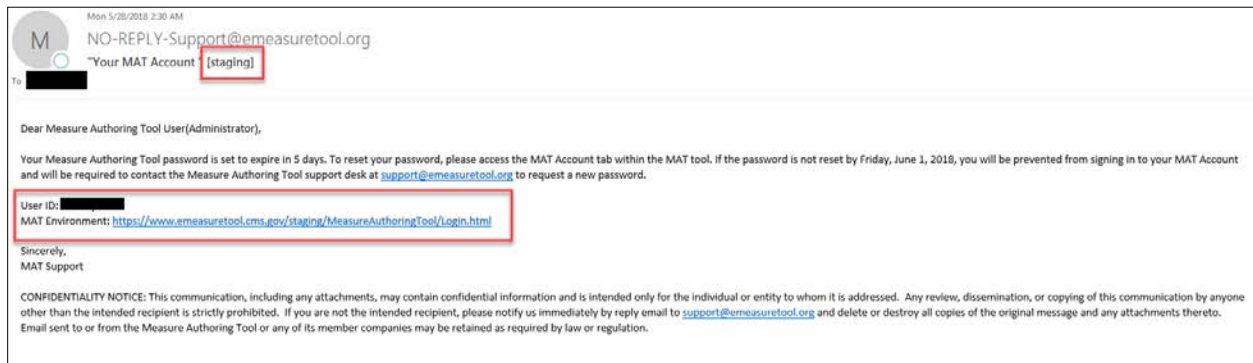

Miscellaneous

1.9 Removal of Measure Notes

The Measure Notes tab has been removed from the MAT as it was determined that they were not being used and are a legacy of prior MAT versions. The measure notes tab was a sub-tab of the Measure Composer.

1.10   Changes to MAT emails

There were three changes to the emails generated out of MAT to improve the clarity of the message for users who may be accessing the MAT in a testing environment:

- Addition of the MAT environment the email is generated from in the subject line of the email.
- Addition of a User ID field in the body of each email letting users know which User ID this email is being generated for.
- A direct link to the environment the email was generated from in the body of each email.

Figure 4: MAT email example

1.11 Added search bar to Measure & Library Sharing pages

Users will now see a search box when sharing their measure and/or their stand-alone CQL Library. This search box allows users to narrow the list of available developers when they wish to share their measure or library with another user. Users will receive a confirmation message after selecting Save and Continue and be redirected to the Measure Library or CQL Library page.
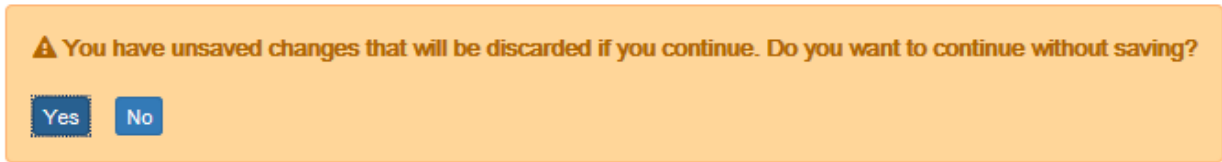
Population Workspace

The most noticeable change in version 5.5 of the MAT is the population workspace redesign. The MAT team considered user feedback to make the population workspace more intuitive and, as a result, have rebuilt the population workspace.

1.12 Population Workspace redesign

The new Population Workspace follows a left-navigation structure and was built similarly to the CQL Workspace. There are a few noteworthy features of the new Population Workspace to highlight:

- As in previous versions of the MAT, populations will display dynamically based on the Measure Scoring type chosen. If the measure scoring type is changed, the populations shown in the left-hand navigation on the Population Workspace will be added and removed as necessary to match the new scoring type chosen.
- The right-click menu structure has been removed, and all the functionality of the right-click menu has been built into each screen.
- Definitions, Functions and Aggregate Functions may be selected in easy to use drop-down controls on each population, measure observation and stratification tab.
- Users must save their changes by selecting the Save icon on each population tab before moving to another population tab. There is a validation built in that will alert the user if they attempt to move to another tab with unsaved changes left on the page.

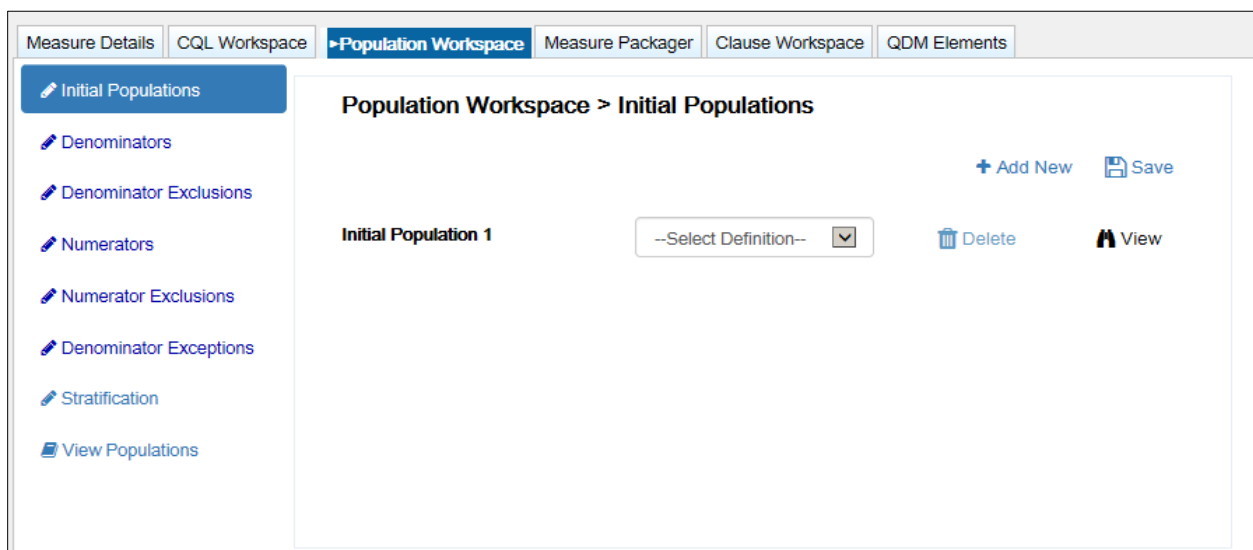**Figure 5: Unsaved changes message – Population Workspace**

1.13   Populations tabs

The Populations screens listed below all share a common layout and functionality. These screens allow for addition or deletion of any of the below populations and allow users to associate a definition to each population.

- Initial Populations
- Denominators
- Denominator Exceptions
- Denominator Exclusions
- Numerators
- Numerator Exclusions
- Measure Populations
- Measure Population Exclusions

Each Population tab contains an "+Add New" link, a Save icon, a single population row, and each row contains delete and View Human Readable icons. All of the populations sections allow for a user to enter an unlimited number of populations on each tab. Each tab must contain at least one population. If a user attempts to navigate away from a tab with unsaved changes, they will be shown a warning message.

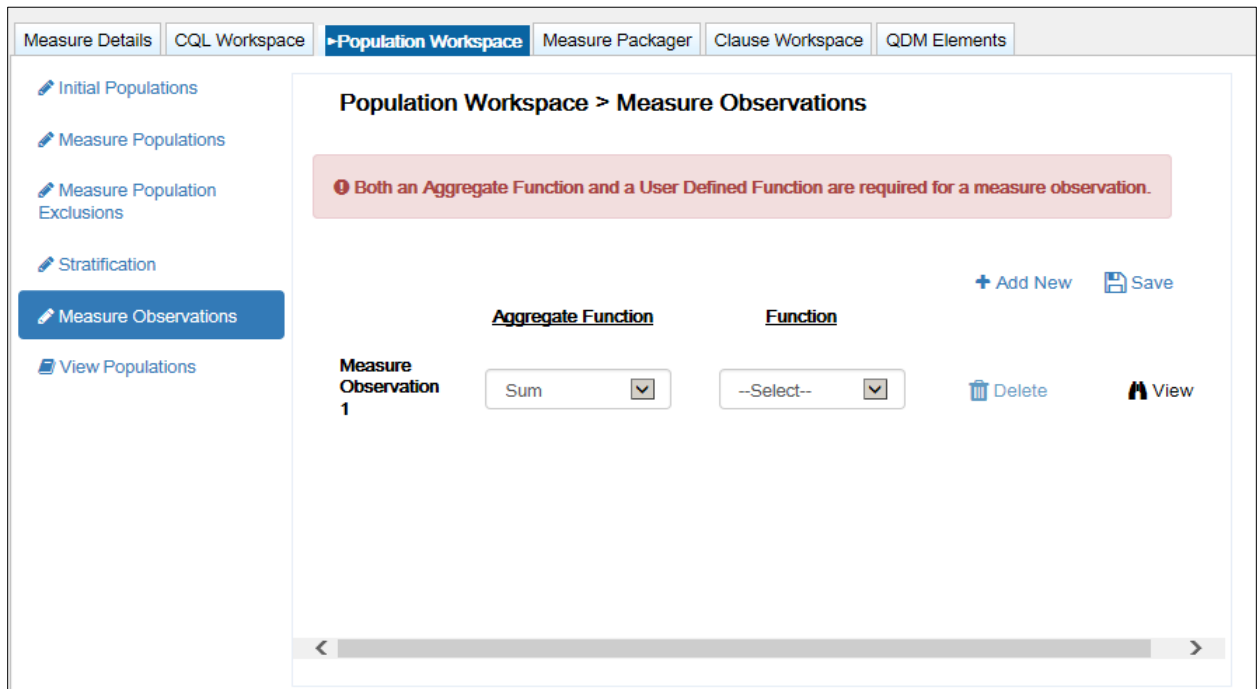**Figure 6: Population Workspace – Initial Populations tab**

1.14 Measure Observations tab

The Measure Observations tab on the new Population Workspace is very similar to the rest of the populations tabs. Instead of a right-click menu structure, users will now make their selections using the Aggregate Function and Function drop-down menus and add additional measure observations by using the "+Add New" link. Each measure observation row contains a delete icon and a View Human Readable icon that will open a new window with a Human Readable view of that measure observation.

There has been one change to the way measure observations are handled in the new Population Workspace. Both an Aggregate Function AND a user-defined Function are required in order to save a measure observation row. If a user attempts to save without valid selections for both fields, they will receive a warning message that prevents the save.

Figure 7: Population Workspace – Measure Observations tab

1.15 Stratification tab

The Stratification tab has been updated to align with the design of the other population tabs. Instead of using the right-click menu structure, Stratification and Stratum now have their own rows. Users are able to select "Add New Stratification", which will add a new Stratification line as well as a Stratum line.
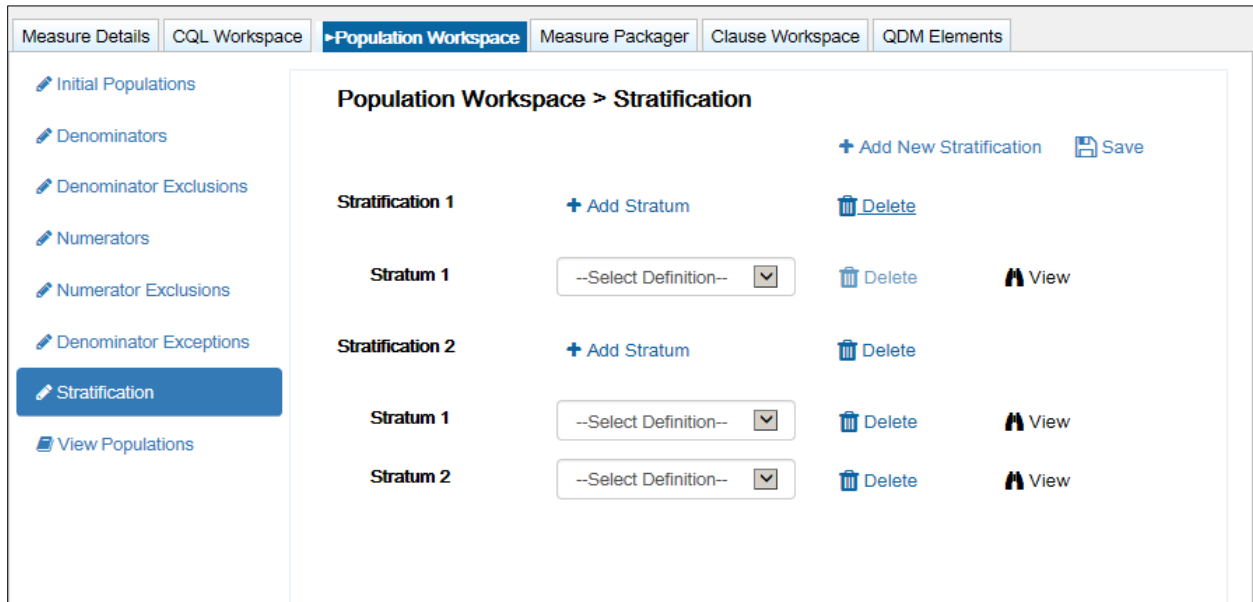
To add a new Stratum, users will select the "+Add Stratum" link on each Stratification row, allowing them to add an unlimited number of Stratum rows to each Stratification.

Each Stratification and Stratum row contains a delete icon. Each Stratification must contain at least one Stratum and the delete icon will be enabled only if there is more than one Stratum associated to a

Stratification row. Stratification rows may be deleted at any time, provided there is at least one stratification remaining.

Each Stratum row contains a "View Human Readable" icon that will open a new window showing the Human Readable view of each associated Stratum.

Figure 8: Population Workspace – Stratification tab

1.16 View Populations tab

The View Populations tab is the default view when a user navigates to the Population Workspace. The tree structure is meant to display the entirety of all populations, similar to the old population workspace. The tree order follows the same order as the chosen measure scoring type and will change if the measure scoring type is changed. The View Populations tab is read only and only allows for users to expand and collapse the tree. The View Populations tab is the only available tab on the Population Workspace when the measure is in a read-only state.

MAT Exports

1.17 Removed "using" from Human Readable Terminology section

The Human Readable export was updated to remove the word "using" in each row of the Terminology section.

1.18 Codesystem declaration changes on the Human Readable and HQMF exports

Human Readable Terminology section:

Codesystem declarations will no longer display in Terminology section of the Human Readable. This was a cosmetic change only.

The second change to the Terminology section is to conditionally display the code system version information for a referenced code system based off the user's decision to either include or exclude code system version for the applicable code.

Example (user chose NOT to include code system version for the applied code):

- *code "appointment" ("ActMood Code (APT)")*

Example (user chose TO include code system version for the applied code):

- *code "appointment" ("ActMood version HL7V3.0_2015-07 Code (APT)")*

HQMF:

The HQMF export went through a similar change to support the user's choice for either inclusion or exclusion of code system version.

Example (user chose NOT to include code system version for the applied code):

- *<cql-ext:code codeSystem="2.16.840.1.113883.5.1001" code="APT" codeSystemName="ActMood">*

Example (user chose TO include code system version for the applied code):

- *<cql-ext:code codeSystem="2.16.840.1.113883.5.1001" code="APT" codeSystemVersion="HL7V3.0_2015-07" codeSystemName="ActMood">*

CQL-to-ELM Translator

1.19   CQL-to-ELM Translator version 1.2.20

The CQL-to-ELM Translator has been upgraded to version, 1.2.20. This version of the CQL-to-ELM Translator includes validation for UCUM units used in CQL. This also includes the updated CQL-to-ELM formatter. The MAT will continue to use tab indents in the CQL editor for the 5.5 release.

System Fixes

2.1 Added the progress bar to additional MAT screens

The progress bar used in the MAT has been added to additional MAT screens that were not previously using the progress bar. The progress bar has been added to the following areas in the MAT version 5.5:

- Population Workspace
- CQL Workspace
- Measure Packager tab

2.2 Fixed "page jumping" issue due to the appearance of the loading bar

In previous versions of the MAT, users noted they observed a "page jumping" scenario where the page would shift up once the progress bar reached 100%. The MAT development team created a solution by creating a designated space at the top of the page to solve the observed page jumping issue related to the loading bar.

2.3 Changed the filtering process upon packaging

The MAT has been asked to filter out expressions that exist within a measure but were not used in conjunction, either directly or indirectly, with the expressions paired to the populations for the measure when the exports are created. We have changed the process by which the MAT determines which expressions are used in such a fashion. This modification is to ensure that all expressions used in connection, either directly or indirectly, with the expressions paired to the populations are identified and shown in the exports as expected.