

HOLST: Good afternoon, and welcome everyone to our April Information Session, “Introduction to Measure Authoring Development Integrated Environment or MADiE.” My name is Haley von Holst and I am the information session lead for the CMS Measures Management System (MMS) contract supported by Battelle. Nikki Hunter, the MADiE product owner, will be our presenter this afternoon.

If you’d like to download today’s slides, they’ll be available on the CMS MMS Hub after the presentation. We will also post a recording of today’s session and a Q&A summary on the MMS Hub in a few weeks.

Welcome to Today's Presentation

Objectives

- Learn about MADiE and how it is streamlining electronic Clinical Quality Measure (eCQM) authoring and testing.
- Understand how this tool supports Centers for Medicare & Medicaid Services' (CMS) digital measurement priorities.
- Hear how users will transition to MADiE from the Measure Authoring Tool (MAT) and Bonnie, an eCQM testing tool.



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HOLST: As part of the Measures Management System's (MMS) outreach task, CMS produces these Information Sessions throughout the year to educate about quality measurement topics and engage those interested in measure development and maintenance. So, in short, we host these sessions for you.

I encourage you all to submit questions throughout today's presentation. You can use the Q&A feature near the bottom of your screen, and we'll try to address as many questions as we can at the end of the presentation. Now I will turn it over to Nikki to dive into MADiE.

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Moderator: Haley von Holst, Battelle
Presenter: Nikki Hunter, MADiE
April 24, 2024

[SLIDE 3]

→ Introduction to MADiE

Nikki Hunter
MADiE Product Owner

ICF

4/24/2024

HUNTER: Thanks, Haley. Good afternoon. We're really excited to dive into the topic of MADiE for you guys. Like Haley said, my name is Nikki Hunter. I am one of MADiE's product owners.

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[SLIDE 4]

Agenda

1. MAT and Bonnie Overview
2. MADiE Introduction
3. MADiE Transition Plan
4. MADiE Access
5. MADiE Demonstration
6. MADiE Resources
7. Q&A



HUNTER: We did touch a little bit on the high-level agenda for the day and the goals, but I did just want to give you guys a little bit more of an in-depth agenda. We'll start with the MAT and Bonnie overview, just to make sure everybody kind of understands those tools. So, then we'll go into a MADiE introduction, a MADiE transition plan and how to go about accessing MADiE. Then I'm actually going to do a MADiE demonstration, so you guys can see the tool in action. Then at the end we'll have a list of really awesome MADiE resources for everybody. And then we'll conclude with a Q&A session.

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[SLIDE 5]

MADiE Team
(Part of us anyway)



Nikki Hunter
MADiE Product Owner



Christina Biggs
MADiE Product Owner



Jae Jeong
MADiE Program Manager



Nate Moraca
MADiE Technical Lead



Chris Vasile
MADiE QA Lead



Lindsey Wisham
MADiE Subject Matter Expert
(SME)



Heather Frideres
Lead Solution Specialist



Chandra Bartleman
Senior Health Informatics
Solutions Coordinator

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HUNTER: All right. I get the pleasure of presenting all of this today, but I have a really awesome team alongside me. So, I did want to take a minute to kind of show you guys all of our team and introduce everybody. I won't go through and name everybody, but everybody on this slide is here today with us and is a critical part of the tool.

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[SLIDE 6]

The Rest of us!



Stan Rankins
Interoperability Architect



Gail Winters
Interoperability Architect



Jean Fajen
Contract Support



Ben Che
MADiE Security Engineer Lead



Brendan Donohue
MADiE Dev Ops Engineer Lead



Funky Bunch
MADiE Dev/QA Team



Legacy Exploders
MADiE Dev/QA Team

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HUNTER: And here is the rest of our team. We do have a couple people on this slide in attendance today as well. And then you can see at the bottom we have our “funky bunch,” which is our MADiE dev/QA team and our legacy exploders, which is our second MADiE dev & QA team. I couldn't include everybody, because we would have a bunch of slides, but I did want to call them out specifically.

MADiE CMS Team



Emmanuel Kalluri
CMS Contracting Officer's
Representative (COR)

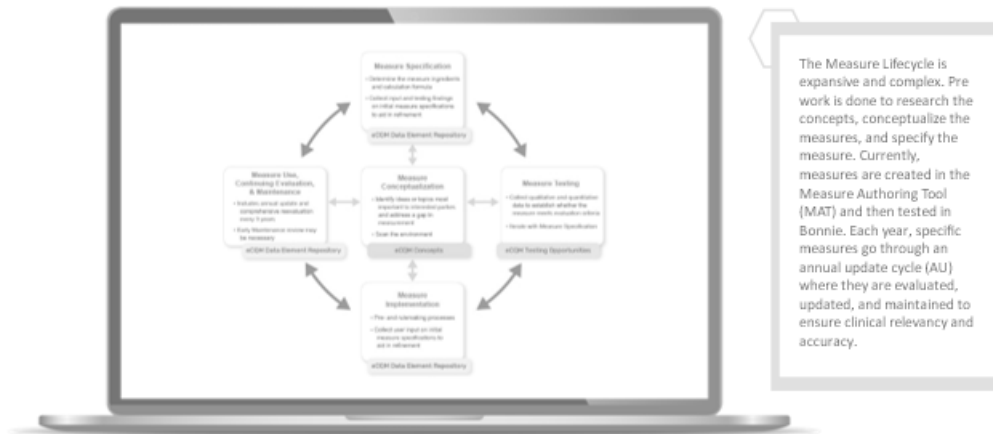


Crystal Kellam
CMS SME

HUNTER: We also have some really awesome MADiE CMS team members, Emmanuel, and he is our CMS contracting officer's representative or our COR. And then Crystal who is our CMS SME.

[SLIDE 8]

Measure Lifecycle



HUNTER: Okay, let's dive into our content now. You can see here that this is kind of a high-level overview of that measure lifecycle. It's a very expansive and complex lifecycle and a lot of prework is done. We have to do research, and we have to conceptualize what the measure will be. We have to specify the measures, and it's just a lot of work that happens prior to anybody even touching any of our tools. Currently, the measures are created in the Measure Authoring Tool or the MAT and then tested in Bonnie.

Each year these specific measures will then go through an annual update cycle or an AU where they are evaluated, updated and maintained to ensure that clinical relevancy and accuracy. So, as you can see on this diagram, it's very much a circular process that goes back and forth between a lot of these different pieces.

MAT, Bonnie FHIR, Bonnie QDM and Bonnie Prior Overview



The legacy tools measure developers have been using to author and test measures for over a decade are the MAT and Bonnie, which includes Bonnie Prior, Quality Data Model(QDM), and Fast Healthcare Interoperability Resources (FHIR).

MAT

The MAT is a web application that allows measure developers to author electronic Clinical Quality Measures (eCQMs) using Clinical Quality Language (CQL) and QDM or FHIR.

The MAT expresses complex measure logic and exports measures in several formats: a humanreadable document that can be viewed in a web browser and a CQL file containing the CQL library in its entirety. For integration into electronic health records (EHRs), the MAT provides an eCQM HQMF XML document, an Expression Logical Model (ELM) XML document, and a JavaScript Object Notation (JSON) file for QDM / CQL measures. For FHIR / CQL measures, it provides JSON or XML bundles.

Bonnie

Bonnie is a software tool that allows eCQM developers to test and verify the behavior of their eCQM logic. Bonnie enables measure developers to independently load measures they have constructed using the MAT. It helps measure developers execute the measure logic against the constructed patient test deck and evaluate whether the logic aligns with the intent of the measure.

Bonnie was designed to integrate with the nationally recognized data standards CMS quality reporting programs use for expressing eCQM logic for machine-to-machine interoperability.

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HUNTER: So now I wanted to give you guys a little bit of background on MAT and Bonnie for those of you that maybe weren't super familiar with these tools. These are our legacy tools, and they have been around for measure developers for over a decade at this point. MAT is the Measure Authoring Tool. It is a web application that allows measure developers to author electronic clinical quality measures or eCQMs using Clinical Quality Language or CQL. And then Quality Data Model (QDM) or FHIR standards.

The MAT allows our users to express that complex measure logic, as well as then export those measures in a bunch of different formats. We export a human-readable format which is very user-friendly and easy to read. We also export a bunch of different machine-readable formats, specifically in ELM, JSON, and all of those different files there.

Then we have Bonnie. Bonnie is a software tool which is also a website that then allows those eCQM measure developers to test and verify the behavior of those

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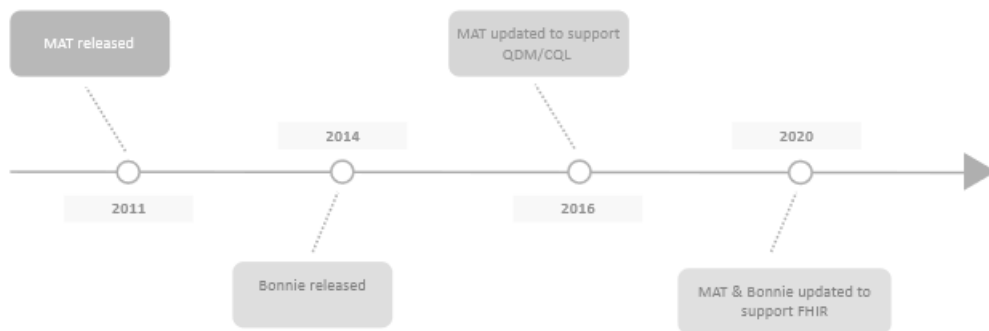
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eCQM logics. The users will export those test cases, or those measures from MAT, and then import the measures into Bonnie. They'll construct synthetic test cases and then execute those synthetic test cases against the measure to ensure that the measure aligns with the intent of the measure that was specified initially and is just written accurately.

Bonnie was designed to integrate with the national recognized data standards. That's the Centers for Medicare & Medicaid Services (CMS) quality reporting program (QRP) uses for expressing that eCQM logic for machine-to-machine interoperability.

[SLIDE 10]

MAT & Bonnie - History



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HUNTER: So here is a brief history on our MAT and Bonnie. MAT was released all the way back in 2011. Then Bonnie was released in 2014. So, there was a while there where it was just the authoring, and then Bonnie came in and allowed for that testing. Then in 2016 MAT was updated to support the QDM CQL specification of measures. And then in 2020 MAT and Bonnie were updated to support FHIR.

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MAT & Bonnie - Workflow



Measure developers author measures in the MAT. This also involves creation of CQL Libraries. After the measure construction is complete, the measure will be packaged and exported. If measure testing is needed, the measure developer will import the exported measure package into Bonnie and synthetic text cases are created. Measure developers may then execute the measure logic against the test cases to evaluate whether the logic aligns with the intent of the measure. Should updates be needed in the measure, they must go back to the MAT, update, package, export, re-import to Bonnie, and re-test the updates.

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HUNTER: So here is kind of what that workflow looks like currently in MAT and Bonnie. On the left-hand side you can see some screenshots from MAT. That is where, like I've stated, the measures are authored. Then on the right here are some Bonnie screenshots. So, they'll author in MAT, export from MAT, import into Bonnie and then test. Should something in the measure not quite be specified correctly or they found something that they needed to add that they didn't account for, they then have to go back to MAT, open up MAT, edit the measure, reexport, reimport into Bonnie, to then test. So, it's just a very long process to make potentially small updates, and so from there along with some other things, we came up with the idea for MADiE.

Introducing!



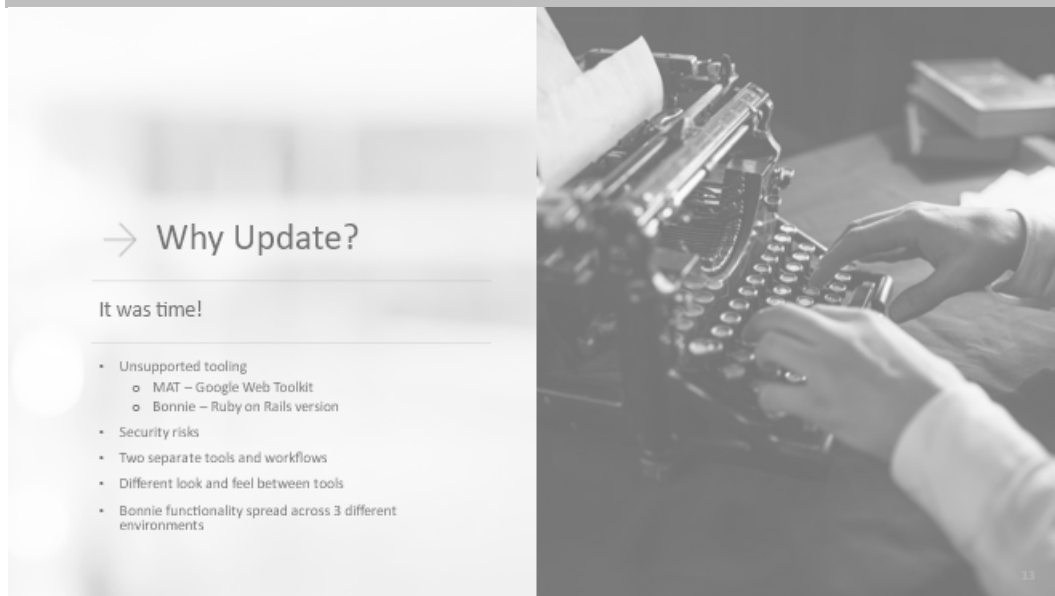
MADiE is a software tool that redefines eCQM development and testing by making it a self-contained experience that includes dynamic authoring and testing within a single application.

- Provides measure authors with an intuitive, inclusive and easy-to-use interface
- Uses current technologies to provide a secure and efficient user experience
- Leverages modern human-centered design (HCD) processes:
 - Continuously incorporate user feedback and iterative design to inform present and future development
 - 100% 508 compliance to ensure accessibility

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HUNTER: So now introducing MADiE or the Measure Authoring Development Integrated Environment. This is a software tool that redefines eCQM development and testing by making it a self-contained experience that allows users to dynamically author, as well as test, within that single application. It is an intuitive, inclusive, and easy-to-use interface. It utilizes current technologies to provide a secure and efficient user experience, and it also leverages modern human-centered design (HCD) processes.

So, we're continuously incorporating user feedback and continuously reaching out to our users to understand their needs better and their wants for the tool better, and then incorporating those into MADiE. MADiE is 100% 508 compliant to ensure accessibility, so our visually impaired users are able to utilize MADiE.



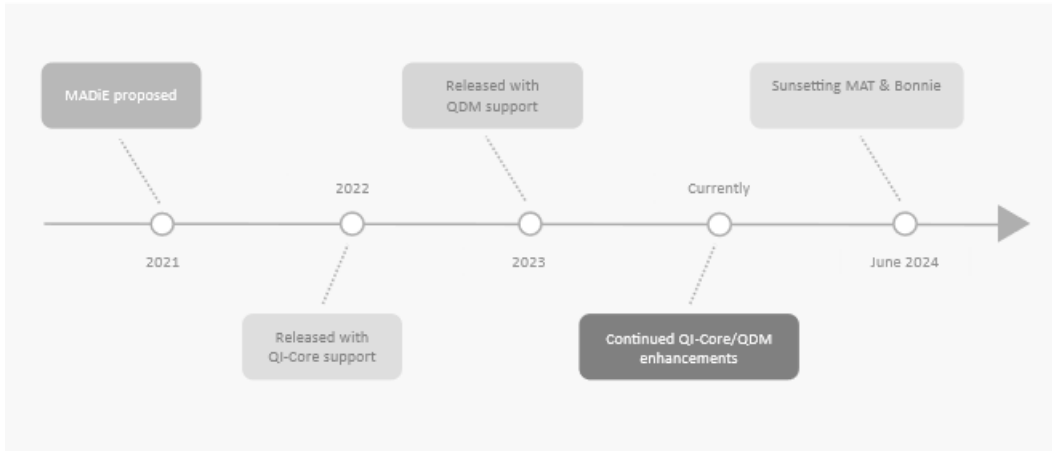
HUNTER: Okay, so why update? It was time. In MAT and Bonnie, we had some unsupported tooling. MAT used Google Web Toolkit. I don't know if any of you are familiar with that, but it is no longer supported by Google. And then Bonnie utilized Ruby on Rails, an old version, so these introduced some security risks to the tools. Along with that we had the two separate tools and workflows. And then the tools were initially designed by two different companies, and so they had a different look and feel between the tools. Not only that, Bonnie functionality was spread across three different environments.

So, for Bonnie to be fully supportive of the AU process, we had to have a Bonnie prior version that utilized the previous QDM version of Bonnie. So right now we support QDM 5.5. We have Bonnie QDM which supports the current QDM version, QDM 5.6. And then we also had to introduce Bonnie FHIR which supports Bonnie FHIR. So, it was three tools that essentially did the same functionality, just supported those different standards. So that not only is

confusing for users to make sure they're utilizing the correct Bonnie, but it is a lot of upkeep for our team.

[SLIDE 14]

MADiE - History



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HUNTER: So, a brief MADiE history. In 2021 we proposed MADiE. Then in 2022 we were able to successfully release MADiE with QI-Core support. In 2023 we released with QDM support, and so now MADiE supports both data models. And then currently we are continuing to enhance MADiE for QI-Core as well as QDM. And then in June of 2024, so here in a few months, we will be sunsetting MAT and Bonnie and so they will no longer be available to utilize.

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MADiE - Workflow



Measure developers author the measures in one tab of MADiE. After the measure construction is complete, the measure developer can switch to the “Test Case” tab to generate synthetic text cases. Measure developers may then execute the measure logic against the test cases to evaluate whether the logic aligns with the intent of the measure. Should updates be needed, the measure developer can switch back to the measure tabs.

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HUNTER: Here really quickly is a brief overview of what the workflow in MADiE looks like now. So, on this left-hand side you can see some of the “authoring” screens. And then on the right-hand side you can see some of the “testing” screens. I don't know how apparent it is in these screenshots, but it will definitely be easier to see when I demo. All you have to do is switch between the different tabs to go from authoring to testing, and so it's very much so a more streamlined process that allows for quick back and forth and easier measure development and testing.

[SLIDE 16]



HUNTER: All right. We wanted to talk about that MAT and Bonnie to MADiE transition.

[SLIDE 17]

Transitioning to MADiE



MAT and Bonnie will be sunsetted* on

June 28, 2024

* Sunsetting means that MAT and Bonnie data and websites will no longer be accessible after this date.

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HUNTER: On June 28th of 2024 MAT and Bonnie will be sunsetted. What this means is that MAT and Bonnie’s data and websites will no longer be accessible to the user after that date.

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MAT and Bonnie Migration to MADiE



The legacy tools MAT and Bonnie – which includes Bonnie Prior, QDM, and FHIR – will not be accessible after June 28, 2024. Below are key dates in the migration timeline.

- **April 2024:** MADiE continues to release key features to support QDM measure development, as well as enhancements based on prioritization discussions.
- **May 2024:** Measure developers need to begin migrating measures, libraries, and test cases to MADiE if that process has not begun already.
- **June 28, 2024:** MAT, Bonnie FHIR, Bonnie QDM, and Bonnie Prior shutdown. These tools will no longer be accessible by any measure developers.

The measures and test cases currently contained within MAT and Bonnie will not be accessible to users after June 28.

Users can transfer their QDM and FHIR measures and import test cases directly to MADiE. (Note: Test cases in Bonnie Prior cannot be imported into MADiE).

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HUNTER: So, this means we’ve got to transition everybody over to MADiE. Some of these important dates here, again that June 28th, they will no longer be accessible. In April we are continuing to release those key features to support QDM measure development and enhancements based on the different prioritization discussions we’ve had, both with users as well as CMS. Then in May of 2024 measure developers will begin migrating those measures, libraries, and test cases to MADiE. Most likely that process will have already begun ahead of time, but that is when it will really begin full force, because this last AU cycle will have been completed.

And then again on June 28th all—or MAT and all three of our Bonnie environments will be shut down. These tools will no longer be accessible by any measure developers, as well as our team internally.

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Measure Transferring



Transfer measures from MAT directly to MADiE

Steps to transfer measure

1. Log into MAT
2. Select the measure to transfer
3. Click "Export" in the actions menu
4. Select "Transfer to MADiE"
5. Click "Save" or "Open"
6. Log into MADiE. Your measure will now display in My Measures within MADiE

A success or failure email will be sent to the email associated with your HARP ID.

There are limitations to the transfer, such as only the MAT measure owner can transfer the measure. Please reference the MADiE User Guide for complete details.

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HUNTER: So, what this process looks like is different for measures as well as test cases. I won't go into in-depth details here, because this is actually one of the things I will be demoing, but of note for measures we can transfer measures from the MAT directly to MADiE via a push of a button within MAT. After you have transferred your measure, you do get a success or a failure emailed out to the email associated with your HARP ID.

There are a few limitations with this transfer, such as only the measure owner can transfer the measures. And then inside the MADiE User Guide we have a bunch of additional details about specific data that won't completely be transferred over and how to address that.

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[SLIDE 20]

Test Case Transferring– QDM Test Cases



Bonnie allows for bulk export and re-import into MADiE for QDM test cases

Steps to export test cases

1. Log into Bonnie QDM
2. Click the measure name of the measure containing the test cases to export
3. Click the gear icon and select "EXPORT"
4. A test cases zip file will be saved to your downloads folder
5. Test cases will need to be unzipped to be uploaded to MADiE

Steps to import test cases

1. Unzip test cases exported from Bonnie QDM
2. Log into MADiE
3. Select the measure to import the test cases
4. Open the measure and navigate to the "Test Cases" tab
5. Select "Import Test Cases"
6. Click "Select File" and select the JSON file unzipped in Step 1
7. Click "Import"
8. If import is possible*, the test cases will be imported

*There are limitations to the import, specifically around when expected values are set. Please reference the MADiE User Guide for complete details.

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HUNTER: Okay, for Bonnie test case transferring and getting those into MADiE, that is a little bit of a different process, if you're looking at QDM test cases vs. FHIR test cases. So, for QDM test cases these are kind of our step-by-step instructions. Again, I will be demoing this today so I won't go into detail, but Bonnie will allow for both exports of those test cases. And then users will then reimport them into MADiE for QDM test cases. There are some limitations on this import, specifically around expected values or sets. In Bonnie users are allowed to say, "I anticipate that this synthetic test case will meet my measure's initial population." That is an expected value. And if there are differences with your measure in MADiE compared to what Bonnie had that measure set up as, those expected values might not carry over. Again, the MADiE User Guide goes into much greater and better detail than what I'm saying, so definitely visit that if you have more questions around it.

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Test Case Transferring– FHIR Test Cases



Bonnie Allows for bulk export and re-creation in MADiE for FHIR test cases

Steps to export test cases

1. Log into Bonnie FHIR
2. Click the measure name of the measure containing the test cases to export
3. Click the gear icon and select "EXPORT"
4. A test cases zip file will be saved to your downloads folder

Steps to re create test cases

1. Unzip test cases exported from Bonnie FHIR
2. Log into MADiE
3. Select the measure to import the test cases
4. Open the measure and navigate to the "Test Cases" tab
5. Select "New Test Case"
6. Fill out the title, description, and group based off the information in Bonnie, and test case will be created
7. Open the test case for editing
8. Open the JSON file correlated to the test
9. Select the entire JSON, copy JSON, paste into test case editor
10. Save the test case
11. Repeat Steps 3-10 for all test cases in file

Please reference the MADiE User Guide for complete details.

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HUNTER: So, this is related to our FHIR test cases. Again, like I said, that process is a little bit different. We don't currently have a bulk import, so we have that bulk export from Bonnie and then recreation in MADiE for those FHIR test cases. Currently, for FHIR test cases in MADiE we support a JSON format. So that bulk export from MADiE will export them in a JSON format, and then the users will create that test case in MADiE. And then they will copy the JSON and paste it into the test case.

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[SLIDE 22]



HUNTER: Okay, we wanted to touch on our MADiE access.

[SLIDE 23]

MADiE Access Instructions



Pre-requisites

- HCQIS Access Roles and Profile (HARP) ID
 - Existing MAT/Bonnie users have one
 - Visit <https://harp.cms.gov> to create one
- Set up HARP two-factor authentication



Request MADiE Access

- Request MADiE-User role in HARP
- Allow 1 business day for MADiE Security Officer to approve your role
 - An auto-generated email will be sent after approval.
- Log into MADiE
 - For instructions, see the "Logging into MADiE" section of the access guide.
 - Accounts that are not logged into at least once every 60 days will be deactivated.
 - After an account has been deactivated, the user will need to rerequest the MADiE-User role in HARP.

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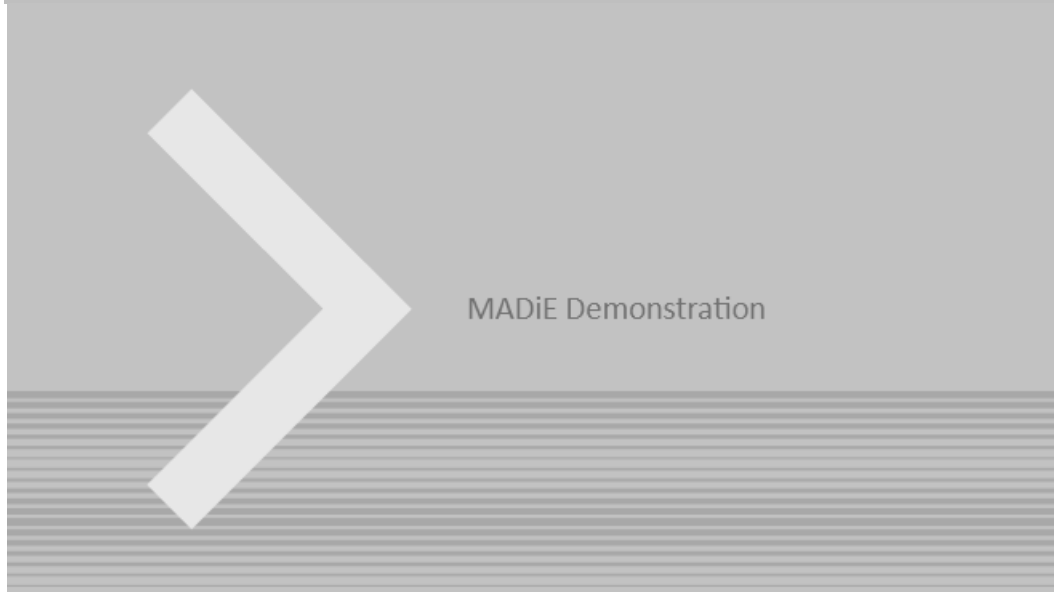
Presenter: Nikki Hunter, MADiE

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HUNTER: Some prerequisites for MADiE access is that we need a HCQIS Access Role and Profile, or a “HARP ID” is what you normally hear it referred to as. If you are an existing MAT or Bonnie user, you already have one of these. You’re good to go on this prerequisite step. If you don’t, you can definitely visit the harp.cms.gov to go about creating one. Then to request your MADiE access you need to log into that HARP account and request the MADiE user role. Our amazing MADiE security help desk will review that role, and then they will either approve you or deny you. Most likely you’ll get approved, don’t worry. Once you are approved, an autogenerated email will be sent out to you knowing that you’ve been approved. And then you can go ahead and log into MADiE.

Logging into MADiE is in one of our amazing documents that we have, our access guide. So, you can find instructions there to do that. Of note, we do require that you log into your MADiE account every 60 days. This is in alignment with CMS’ security policy. So, if you do not log into your account once every 60 days, you will be deactivated. So, you will need to reactivate yourself, should this happen to you, and to do that you just kind of go through those steps of re-requesting MADiE access. So, you’ll log into your HARP account and request that MADiE user role.

[SLIDE 24]



HUNTER: All right. So now I am going to go through a MADiE demo for everybody. So let me share my screen. I am already logged into the MAT here. You can see that I have a decent number of measures. They're all different test measures and what not, different QDM, FHIR measures, all of the above. So, the measure that I'm going to go ahead and show you guys how to transfer today is a QDM measure, and it is my "introduction to MADiE demo" measure. So, I'm going to select this measure. You can also do that down here in this "my measures" tab if you wanted, but I'm just doing it up here.

Then I'm going to select "export" and then "transfer to MADiE." And then "save" or "open." Either will work, and my measure is being processed and transferred over to MADiE and I will receive an email when that process is complete. So now I will come over here and I will log into MADiE. Like we said, you need that HARP ID. So let me type all of that in, and sign in. Every MADiE user will set up a two-factor authentication (2FA) which you did not see, because I just logged into

MAT and had to do that same two-factor authentication. Normally, I would have gotten a screen that asked for a code to be sent.

Here is MADiE. This is our MADiE homepage. You can see this “introduction to MADiE demo measure” here. Let me also grab that email, so that you can see here that my measure was successfully transferred from MAT to MADiE. It will give you the measure name, the version, any CQL, or adding that measure CQL library name.

So, let’s go in and look at this measure now. I’ll select it and view. So, for those of you that might be familiar with MAT, this doesn't look drastically different. A lot of things here are the exact same. You can edit your measure name, CQL library, your abbreviated title. You just have a bunch of different fields here, just different descriptions, definitions, copyright field. All of this is just metadata surrounding your measure.

Now I’ll move over to my “CQL editor.” Here is what I am seeing. So, you can see that I have some errors here. This first error is related to this library, and so this is also something people will need to take into account when transferring their measures from MAT to MADiE. If you have a standalone library that you yourself created, you will have to generate that in MADiE. You can see that I don’t have any errors around my MAT global comments, because this is already a library that was generated in MADiE. So, I just need to generate this QDM demo library. So let me go through that process of showing you all what that looks like now.

So, I will come back over here to my CQL library. I know that I need the QDM demo library. So, I can come over here and I can search for that, and it is right here. For our libraries, we do not have an automatic transfer over to MADiE, so I

will need to recreate this in MADiE. So, this is my details. I'll come back over to MADiE and come over to my "libraries" tab and I'm going to add a new library.

So, I'm going to copy my CQL or my library name exactly. Of note, library names must be unique in MADiE. So, if there was already a library of this name, I could either reuse that library, or I would need to adjust this library name. Then my "model" is going to be QI-Core. And then my "description" is going to be QDM demo library. And then I'm going to say "SemanticBits" as the publisher, and then we will continue.

So now I have a shell library created. I can come in here and I can edit it. I don't have any CQL here. No problem, I'll come back over to the MAT and open my CQL library and I will copy all of this. You can see I'm sure really great at writing CQL here, very much so a test library. A real-world library. I will copy all of that. I'll paste it into my measure over here, and I will save it.

Now I need to go back out to my "libraries" tab. This is a draft. We can only include versioned libraries in our measures, so I will come over here and I will version this. I'm going to create a "major" version and continue. So now I have version 1.0 of my QDM library. If I come back to my measures, and then view this, come over to my CQL — you can see now once it will load here in a second that I do not have any errors. My CQL is good because this library now exists.

Of note, if you are actually in here recreating and transferring these measures, we do have a known issue that you do have to come in and you have to make some changes to your CQL editor to be able to add test cases as well as export. So, all I'm going to do is I'm going to come in here and I'm going to simply add a space. I'm going to save it, and that takes care of that problem for me.

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Coming over to our “population criteria” tab, all of this information was transferred over for me. I don’t have to enter any of it. You can see here all of this is blank, because I didn’t enter it in my measure in MAT. Now for our test cases we’ll load this page. I don’t have any test cases here; however, I know that I have these test cases for this measure in Bonnie. So let me come over to Bonnie and log in here quickly.

And then this is that “authentication” that I was speaking about earlier, so I will receive a text here in a moment and I will enter my code. You can set this up differently. You can set it up to email you where you can use different authenticator apps. I personally just like the text message so that is what I have mine set up for.

Okay, you can see now here in my Bonnie, this is Bonnie QDM so this is support for QDM 5.6. If I scroll down to my “introduction to MADiE demo” I’ll open this. So, you can see I have 85 test patients. So I will click here, and this is our t. case “action” tab, and I will come over here to “exports.” It’s going to export that for me. We’re good, so now let me come back over here to MADiE. I can import test cases. So I’m going to select the file and then oh, I lied to you. I forgot a step, my apologies.

Let me pull it up here so that you guys can see it. Let’s go to our “downloads.” This is the ZIP file. We are only allowed to import JSON, and so I’m going to double click on this, and it’s going to unzip it for me. If your operating system doesn't allow you to double click, you can right click and unzip. There’s plenty of different unzip functionality, but mine just allows me to double click. You can see that I have two files there.

So now what I'll be able to do is I'll be able to select my file, and then I have too many in my downloads. This is the one I want. Okay, or is it this one? I think it's the same thing. My apologies, I was testing the demo ahead of time. I will select this and I will open it. Yes, you can see here that I have "85 test cases" from this file. I will click "import" and it's going to go about importing all of those test cases for me. You can see 85 of them imported successfully which is awesome.

Sometimes if a test case cannot be imported, an example of that would be we require a test case title and group, the combination of them to be unique. So, if they were not unique, that test case could not be imported and I would receive a message stating, "this test case couldn't be imported due to not unique title and/or group." So, you can see here all of my 85 test cases.

Now something that is different about MADiE from Bonnie is Bonnie automatically ran those test cases through your measure. That caused a lot of performance issues in Bonnie. So, in MADiE what we have done is made it so the users have to click "run tests" to see their things. Now this is really scary, because you're seeing here, "Oh, my gosh, I had 100% coverage over here, but on this page I only have 14%. What's going on?"

Well, if we come back over, you can see the measurement period is set to 2026. If I come back in here, my measure measurement period is 2024. So, if I come back here and if I change this quickly, this should solve that problem. Switch over to my test cases. You can see that flow right there. It's still much easier to go back and switch things in my measure to then come over to my test cases.

Once I come to my test case, it does take a minute for that “run test” button to become enabled because it’s loading all of those value sets and everything needed to execute those test cases behind the scenes. So, we will give it a moment here while it loads all of that for me. There we go. I’ll click “run tests.” There we go. Now I’m at 100% passing and 100% coverage. These are tabs so if you click over here, you can see all of your different populations and it shows you what is covered vs. what is not.

So, it shows that highlighting, and then this is all of our test cases. If I wanted to edit a test case, I can come in here and I can click “edit.” For QDM it is very much a UI interface here for our users. We can come in and change the date of the birth with the date selector. We can come down here and we can add different encounters and select via the date encounters and all of that. I’m not going to add one, because this test case is passing as expected, but this is definitely a user interface (UI) screen.

Something really cool that we like a lot is that this is actually draggable. The CQL, it can be kind of long. There’s a complex CQL out there. I can drag it all the way over here so that I can see the different CQL, or if I have a big element, I can drag it back all the way over there. And then I see this side of the screen much more clearly. We also here show our highlighting, so I can click my “run tests.” And then you can see this highlighting as well as the different results, so this is the results of my initial population and all of the definitions used. This here is where we can set those expected vs. actual values. And then our details, which is where our title and our description and group is set.

So, this is the “flow.” Yes, this card all changes. This is the flow of transferring a QDM measure from MAT to MADiE and then importing those QDM test cases.

I'm not going to go through the flow of a QI-Core measure. I do have one here that I did want to show you guys, so that you could see kind of what that looks like in MADiE. So, we will click and we will view it. These screens look hardly any different, and that is on purpose. We wanted the flow for QDM and the QI-Core measures to be as seamless as possible. We wanted to make sure that it was the same user experience regardless of what standard you were developing in.

So again here, this is our CQL. You can see a bunch of different CQL here. This “population criteria” tab is the same. This “test case” tab here is the same. It is one where editing test cases is where the difference will happen. So let me open one of these for editing. Here is where the difference lies. You can see that this is not a user interface (UI). It is a JSON editor, and so users come in and they will type “JSON” here. Again, we know that JSON isn't as useful as the user interface (UI), so we have a lot of really helpful resources which I'll go over at the very end of the presentation to help users write these JSON files. If you are exporting from Bonnie FHIR and then recreating your test case here in MADiE, those will export a JSON file for each test case. So, it really is just as simple as selecting that JSON from that file, copying it, and pasting it into your test case here.

All of these other tabs, though, look the same. Let me run our test case so you can see. These all look the same. Our expected actual—this looks different because this is a Boolean measure and my other one was not. My other was not a patient-based measure, and so I was looking for encounters in that measure. So, I had one encounter for initial population whereas for here, this is looking at “did this test case meet the initial population — yes or no.”

So that's not a difference between FHIR. That's a difference between just Boolean vs. encounter. And then our “detail” section there. Back out here, these

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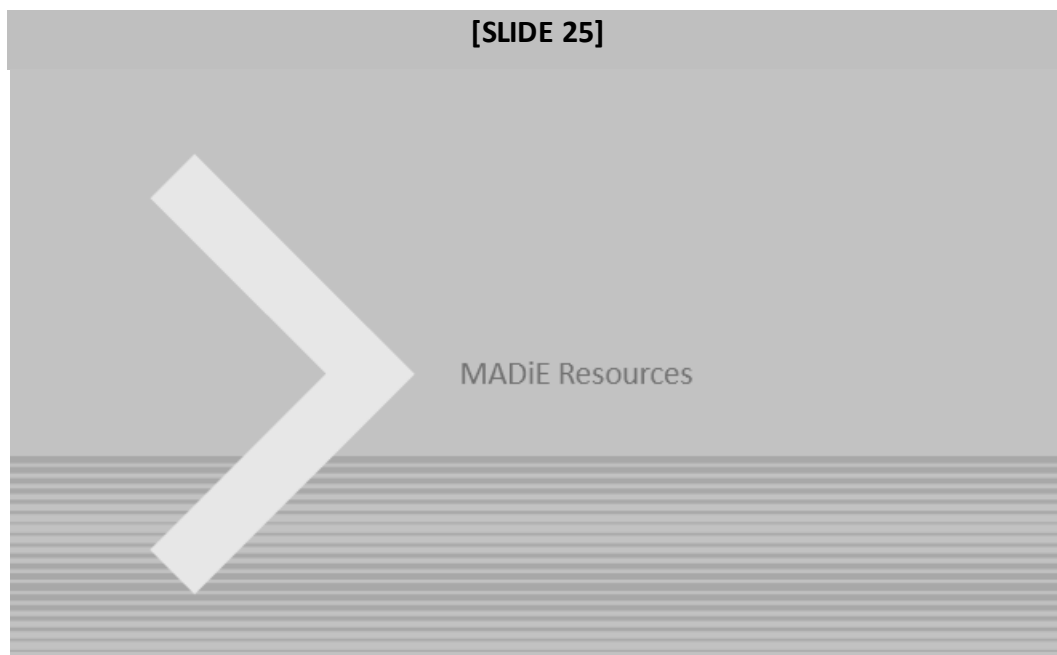
are measures that I own or have been shared with me that I can see on this screen. So, if a measure is on your “my measures” section, it is a measure that you can edit essentially. Then over here on our “all measures” tab, this does take a little bit longer to load because there’s much more measures. This is a list of every measure within MADiE. So if there was a measure that you needed to look at to reference for some reason, it could be found here.

We can also search via measures up here. So, for example, we’ll just type in “QDM” and hit “enter.” So now I’ve returned a list of measures that contain the words “QDM” somewhere within that title. There are 79 of those in MADiE at this point. If it is a measure that I do not have the ability to edit, I can still look at it. I can still view it, but I just can’t change anything. So, these fields are a little bit grayed out to make it noticeable that you can’t edit it and I can’t click into that field. Same with the editor. I can click in, but I can’t type anything.

“Test cases,” do allow you to run the tests and see passing and percentage on a test case page without being an owner. I can’t edit any of these test cases; however, I can run that test case and see what those results were. You can see here that this test case failed, and this test case is invalid. What that means is that it just hasn’t been filled out yet. Once you create that test case shown, you have to go in and add some information to it. It will be invalid until that information is added.

I showed you guys the “library” section. Quickly already, the same thing goes here. The “my CQL libraries” are libraries that I own or have been shared with me that I can edit. The “all CQL libraries” is a list of all of the CQL libraries within MADiE.

One of the last things I wanted to demo with MADiE specifically before I turn the screen back over to our PowerPoint is that for this “UMLS active” up here, when I logged into MADiE for the first time this said “UMLS inactive.” I clicked on it and it popped up a screen for me to put in my UMLS ID, that really long number. I inputted that and I logged in, and MADiE will actually keep those credentials safe for you and it will log you in each time. So that is not something that you continuously have to do, whereas in MAT that’s something you had to do every single time you logged into MAT. So, if you timed out of MAT because you went and got lunch and you logged back in, you had to sign into UMLS. So that is just another thing that we updated in MADiE to ease user burden a little bit. So, with that I am going to stop sharing and I will turn it back over to the PowerPoint.



HUNTER: So now I did want to touch briefly on the MADiE resources.

MADiE Resources – MAT Public Website



The MAT public website contains a [MADiE MVP tab](#) with the following resources:

- [Login](#) button to MADiE
- MADiE Access Guide – how to request a MADiE account
- User Guide – provides details regarding tool functionality
- JSON Test Case Guide – steps for using the JSON test case editor for FHIR test cases
- Known Issues – updated regularly
- Release Notes – posted with each MADiE release
- MADiE Measure and Library Sharing Request Form v2.0 – to request measures and test cases be shared – submitted by the owner to semanticbits-madie-help@icf.com
- MADiE Measure or Library Ownership Transfer Request Form is now available. This form should be submitted by the owner by emailing semanticbits-madie-help@icf.com.

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HUNTER: Our team has worked really hard to put a lot of useful resources out for everybody. All of these can be found on that MAT public website, specifically this “MADiE MVP” tab. We, like I said, have a bunch of different really awesome things. Here you can find just a login button to MADiE. So, if you didn’t have that URL favorited or whatever happened, you’re on a different computer, that is where you can find a login button to MADiE.

We also have that MADiE access guide which is how to request a MADiE account that I referenced earlier. We also have our user guide. This provides a lot of really in-depth detail regarding the tool functionality, specific examples about what and can’t be transferred, and specific things on what to do if things go awry. All of the above. That is a really awesome resource, and that user guide gets updated every release.

Another really useful thing that we have that I touched on briefly is a JSON test case guide. This is our steps for users to help them enter JSON test cases with

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that FHIR test case editor. Like we said, we know that JSON is not something that quite a few people are very good at writing. It's not user-friendly and it is not something that is easy to write or read, so we did put this test case guide out there to help users get kind of a head start on that.

We also have a "known issues" document. This just lists all of our known issues that we are aware of in MADiE. This again is updated regularly. If we release MADiE and a known issue is resolved, it's removed from that list. If a help desk ticket comes in and we investigate it and we realize that is an issue with MADiE, we add it to that "known issues" list. So that is something that is updated all the time, and it's up to date as of when you open it.

We also list out our "release notes" with every MADiE release. We release MADiE approximately every two weeks. So, with every release we update those "release notes," and it will specify what exactly we updated with the release.

We also have the MADiE "measure and library sharing" request form. This is what you would fill out if you wanted to share a measure or a library with somebody else on your team. So, the owner needs to fill it out, and then submit it to: semanticbits-madie-help@icf.com. And then we can take that request and get that sharing done, and then get it back out to you.

Then we also have a MADiE "measure or library ownership transfer" request form. So should you own measures and you are going on extended leave or you accepted a position at another company and you need to transfer ownership to somebody else to work on that measure, that form is out there. Again, you as the owner fill it out and then you email it to: semanticbits-madie-help@icf.com. We'll take care of that transfer for you.

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MADiE Resources – QI-Core Profile Examples



- The MADiE team has created a measure in MADiE with an included test case JSON bundle that contains entries for many QI-Core (v4.1.1) profiles.
- The purpose of this test case JSON bundle is to provide users the framework for commonly used QI-Core v4.1.1 profiles that can be leveraged with their own test case development.
- The measure (QI-Corev4.1.1 Test Case Template) is a blank measure (no CQL and no population criteria) with one test case (QI-Corev4.1.1 Example Bundle version 2).
- The QI-Core profiles examples in the JSON bundle are for guidance and are not intended to fulfill any measure or testing requirement. Update to reflect the specific details of your test case.
- Measure developers may copy any of the profiles from the QI-Corev4.1.1 Example Bundle version 2 test case directly to your test case(s) or use a source code editor (e.g., Notepad++ and Visual Studio Code) and make any updates needed to meet your testing needs.
- The MADiE Test Case JSON Guide, available on the [MADiE MVP tab](#) of the MAT public website, has been updated with detailed information regarding the QI-Corev4.1.1 Example Bundle version test case in MADiE and provides additional guidance for using this resource.

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HUNTER: Okay, this goes hand in hand with that JSON document that I was referencing for QI-Core test cases. This is a QI-Core profile example. So, we created a measure in MADiE that has one test case I guess I should say has a JSON bundle that contains entries for many of the QI-Core profiles. Of note, that's Version 4.1.1 currently.

The purpose of this test case JSON bundle is to provide users a framework for a lot of those commonly used QI-Core profiles. So, what users can do is they can go out to MADiE, grab that measure, open those test cases, find the profile they need, and copy that section of the JSON into their test case. And then they can update it to reference specific dates that are relevant to their measure, specific encounters, and all of the above. It gives people a template to then fill out, and so they don't have to ensure that their brackets are in the right place, or their commas are in the right place. It's all there and you just fill in that information.

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It is important to know that this is just for guidance. It won't fulfill any measure or testing requirements. It's there for you to fill in the specific details of your test case. So, like I said, you can copy it from there and paste it into your test case, or you can use another source code editor — Notepad++, Visual Studio Code — to make any updates you need and then paste it into your test case.

And then again, we reference the test case JSON guide which is available on that MADiE MVP tab. In that guide it does reference this test case, and it gives you more in-depth instructions on how to go about utilizing this profile example.

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Next Steps



- [Sign up](#) for a MADiE Account.
- Familiarize yourself with the resources on the [MADiE website](#).
- Transfer your MAT measures and Bonnie test cases into MADiE.
- Complete work in MAT and Bonnie and ensure your measures and test cases are transferred before June 28, 2024.
- [Register to attend](#) the MAT/Bonnie/MADiE User Group to join a community of measure authors and testers!

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HUNTER: So, for all of you that joined today, we did want to give you some next steps around MADiE. So, your first step, if you don't already have one, would be to sign up for a MADiE account should y. want to start utilizing MADiE, and then familiarize yourself with the resources on the MADiE website. Then transfer any of your MAT measures and Bonnie test cases into MADiE. And then complete your work in MAT and Bonnie and ensure your measures and test cases are

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transferred before that June 28th date, because afterwards you won't be able to access them.

We also just wanted to do kind of a shameless plug for our MAT/Bonnie/MADiE User Group, and so definitely register to attend that. It's held monthly on the third Thursday of every month, and it is just a community of measure authors and testers. We give regular updates on MADiE. We talk about the releases that have happened. This last user group we went through some enhancement requests that we've been given and just talked with users one-on-one on that call to see what they liked, what they didn't like, and if they had any recommendations. So, it's just a really awesome place to come and learn more about MADiE and share your thoughts.



Q: "Where can I get more information on eCQMs and the development process?"

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HUNTER: We recommend starting out on that eCQI Resource Center, which is ecqi.healthit.gov. It gives so much really good information about everything eCQM-related and just the whole process as a whole, and so that would be our recommendation of where to start.

Q: "As an eCQM end user of the specification packages, will the MADiE packages look any different? Have different contents than the MAT output? And if yes, if you could please explain."

HUNTER: So, the contents of the packages will be the same. The format for those QDM measures is slightly different. If you were to export a QDM measure from a MAT, the file structure is just one file. All of the files needed for that export are just thrown into that one file. In MADiE if you were to export a measure, it is a little bit more structured. So, we have different folders that divide the data. So, we have the CQL folder where any CQL files live in. We have a resource folder where different included libraries that our JSON and XML files live. The QDM structure from MADiE matches a lot more like the FHIR structure that both MAT and MADiE export.

Q: "And then if you could expand, just what are some of the pros of using MADiE compared to MAT and Bonnie?"

HUNTER: Yes, I kind of alluded to it in my presentation, but really the workflow. In MAT and Bonnie, it's very tedious to export/import tests, edit, export/import tests — that flow. It can take quite a bit of time just to change something from greater than to greater than/equal to, whereas in MADiE you can just switch to a

different tab, change it, save it, back to test cases. So, it's much quicker. It's a much more refined workflow.

And then just the overall way, or the look and feel of MADiE. We're trying really hard with MADiE to do that human-centered design (HCD), and so we're constantly taking feedback from users which allows for a better user experience in MADiE.

Q: "If I'd like to start developing measures but have never used MAT or Bonnie before, where should I start?"

HUNTER: So that MAT public website, the MADiE "training and resources" tab is going to be where to go. The user guide is out there, albeit it's a bit of a dry read. I'll be honest, but it will give you a bunch of really good information on how to implement measures in MADiE. We also have some training videos out there that users can look at, and there's a bunch of different community calls that users can attend to learn about how to create the content of the measure. The MADiE team, we can't really help with that piece. We can just help with how to create the measure, but the measure development community I'm sure as many of you know is really awesome and available to help with all of that other piece.

Q: "Who are the intended users for these tools and any specific use case examples?"

HOLST: I think Christina was kind to answer. She said, "Intended users are quality measure developers. Our tools are also used by measure testers and implementers, as well as reviewers — all part of the measure authoring workflow in an effort to get eCQM measures authored and tested."

Q: "Could you speak to measure visibility and the wider eCQM list?"

HUNTER: So, if somebody wanted to expand on that question, are we talking about the measures that get posted?

[UNIDENTIFIED SPEAKER]: So, you haven't been monitoring the questions as closely as we have.

HUNTER: I have not, I'm sorry.

[UNIDENTIFIED SPEAKER]: The questions seem to be centered around basically anything that I build in MADiE is available for anybody else that's in MADiE to see, and that is the case at this point. Our answer is, "Yes, that's the case at this point." If there is something else like request it, you know, feel free to as always go to our ONC JIRA issue tracker and enter an enhancement request. We take those enhancement requests very seriously and analysis on them and bring them up for prioritization with the whole community in some of our other meetings. So, feel free to enter enhancement requests if you come up with some.

RANKINS: Can I interject something?

HUNTER: Sure, Stan.

RANKINS: So, MAT had the ability, you could indicate as a user that you wanted your measure to be private. Is that on the backlog for MADiE?

HUNTER: At this point, Stan, it is not something that is on the backlog. If users see the benefit in it, it is something that we can get an enhancement request put into ONC JIRA. Like Christina said, we can get it out there.

RANKINS: I thought I would follow up for the user just in case.

HUNTER: Thank you, Stan, I appreciate it.

Q: “Since CMS IDs can no longer be generated in MAT for new measures, how do we keep numbers consistent between QDM and FHIR versions of the same measure? So, if we generate a new number on each version in MADiE, then will we end up with different ID numbers?”

HUNTER: So, when we release the ability in MADiE to generate those eCQM IDs, we turn it off in MAT to keep those numbers not overlapping. In MAT right now to keep those eCQM IDs the same between QDM and FHIR, when you convert a measure from QDM to FHIR, that CMS ID comes with it, and FHIR is kind of tacked onto the end of it.

In MADiE that is something that will be happening. That converting from QDM to QI-Core is something that we are beginning in the next couple of weeks, starting to implement within MADiE. That is a very big undertaking, and so that won't be complete for a while. But then once that is complete — those eCQM IDs or CMS identifiers — will retain from the QDM and the FHIR measure. They'll be the same as long as you convert from QDM to FHIR.

HOLST: Thank you. All right, I think that is all we have time for today. We will post a Q&A summary on the MMS Hub in a few weeks, and so we will follow up with those if we didn't have a chance to talk about your questions today. We'll be sure to share that resource in the coming weeks.

[SLIDE 30]

Announcements

CMS Measures Under Consideration Entry / Review Information Tool (MERIT) Closing May 10

CMS MERIT closes for measure submissions at 8 p.m. (ET) Friday, May 10. Check out the following CMS MERIT resources to learn more about tool and the pre-rulemaking process:

- [Quick Start Guide for Submitters](#)
- [2024 Guidance for Measure Submitters](#)
- [Pre-Rulemaking Frequently Asked Questions](#)
- [Pre-Rulemaking Overview](#)

Please contact MMSSupport@battelle.org with any questions.

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HOLST: So, before we wrap up, I think we have a quick closing announcement and just really want to thank our presenters for the great and informative presentation today. So just a quick announcement for those still on the call and that CMS closes for measure submission at 8:00 pm, Friday May 10th.

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HOLST: So, check out the following CMS MERIT resources to learn more about the tool and the pre-rulemaking process. So, we have those linked there, and always contact MMSSupport if you need anything else. Any final words from our p. enters? And if not, we will wrap up and just thank you all again so much.

HUNTER: Thank you for letting us come and present.

HOLST: Wonderful, all right. Hope everyone has a great rest of your day.

WEBINAR CONCLUDES

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