

Medicaid Innovation Acceleration Program (IAP)

Data Analytics National Webinar - So You Want to Build a Dashboard

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Jessie Parker (JP1): Hi, everyone and welcome to today's webinar on building data dashboards. My name is Jessie Parker and I'm the Government Task Lead overseeing the IAP Data Analytics Technical Support Work. I am also an analyst in the Division of Business and Data Analysis in the Center for Medicaid and CHIP Services (CMCS).

Today's webinar is going to cover a lot of ground. First, I'll provide a very brief overview of the Medicaid Innovation Accelerator Program (IAP) before I turn it over to our guest presenters. We'll be learning about laying the groundwork for building a dashboard, including assembling the right team. Then we'll hear from a state-university partnership in New Hampshire (NH) that created a data quality dashboard.

Next, we'll shift gears slightly to talk about designing dashboards, including pitfalls to avoid, and we'll finish with another state example from the Healthier Washington data dashboard before ending with questions and answers.

Today's speakers are Beth Schneider, a vice president in state and local government health and human services at Truven Health Analytics; Doris Lotz, Chief Medical Officer from the New Hampshire (NH) Department of Health and Human Services (DHHS); Joe Porter and Ashley Peters from the Institute for Health Policy and Practice (IHPP) at the University of NH (UNH); Kathy Rowell, co-founder and principal of HealthDataViz (HDV); and Kirsta Glenn, AIM Director, Washington State Health Care Authority.

This webinar is produced through the IAP program, which many of you should be familiar with. IAP is a cross-center collaboration at CMCS intended to support states' payment and delivery system reform efforts. We are in the data analytics functional area and one of the approaches we are using to increase data analytic capacity within state Medicaid agencies is to create webinars such as this one on data related topics and challenges that are relevant across many states.

Today's seminar is intended to lay the initial groundwork for creating a data dashboard. We know that many state agencies are interested in building dashboards for easier and faster program oversight and reporting. Our hope today is to provide you with a starting point for creating a dashboard with an emphasis on the important pieces of planning, design, and team composition. We also hope to drive home some of the biggest pitfalls of dashboards, which can lead you to incorrect conclusions without careful planning and the right team members involved.

The goal is that by the end of the seminar you will feel empowered to create a useful data dashboard for your state agency.

Our first speaker for today will be Beth Schneider from Truven Health Analytics. Beth will spend some time building our dashboard discussion from the ground level including what is and isn't a dashboard; displaying several state dashboard examples; and discussing how to build a strong data dashboard team. Thank you, Beth.

Beth Schneider (BS): Thank you so much. I thought I would start by quickly reviewing why states are interested in dashboards; what is driving the surge in interest.

There are several factors that are driving this interest. With ongoing Medicaid transformation, you and your leadership are seeking insights to drive program innovations. Second, time and attention spans in the digital age are very short so you need sound information that can be digested quickly and easily by diverse stakeholders to promote transparency. Lastly, the stakes are high; states are making big investments in new programs and effective monitoring is going to be the key to ensuring their success.

To get started, we wanted to define dashboards clearly. Dashboards are an ideal means to meet this need for quicker, better program insight because they provide "at a glance" monitoring of key trends and patterns that can guide decision-making on an ongoing basis. They are, however, part of a continuum defined by visual displays; at one end you have info graphics, which can be a combination of text, numbers, graphics, etc. that aim at educating or persuading readers on a specific policy issue or topic. Those are usually one-time. At the other end of the spectrum you have lengthier reports, which provide much more detailed, drill-down information, often organized logically by subcategories, such as your eligibility age groups.

While these distinctions may seem basic, it is important to understand your goals to select the right format for your purposes. As you approach dashboards, there are a number of considerations to keep in mind; for example, the audience and how you want to select the attendees or viewers. They may be internal, external, or some combination.

Additionally, you need to consider the type and purpose of your dashboard, which may be an executive dashboard designed to provide an enterprise view of key trends. A common format is strategic dashboards, which monitor agency or program performance against specific goals and targets. We are also all familiar with operational dashboards that monitor the effectiveness or efficiency of defined processes, such as claims adjudication. There may also be analytic

dashboards that explore program statistics at a somewhat deeper level without getting into the length of a very detailed report.

To illustrate, I wanted to take a look at a couple of dashboards that states have published on their websites. We start the session with the end goal in mind and just a quick Google search of a couple that I think are very illustrative of these topics.

The first is the Healthy Louisiana dashboard from the Louisiana Department of Health, which is a strategic dashboard designed to highlight outcomes from the expansion of Medicaid to more than 400,000 state residents. This dashboard provides up-to-date information on the impact of the program in terms of lives affected and outcomes, such as rates of preventive services or newly diagnosed diabetes cases, and a viewer can click to get more detail, for example, by month or by parish.

A second example is that of the Oklahoma Health Care Authority and their web alerts. These are published online to provide health service access to customizable views of Medicaid program statistics that may be of interest to legislators, providers, or the general public. For example, we are not going to go into any of the detailed dashboards, but you can select here to go in and access expenditures by category of service, by year, and then to view expenditures total per member, etc. at your option.

With that goal in sight and knowing what's possible, and we are going to see some very compelling examples from two states later in the session, how does a state get started? A key early step is forming the team. Given the strategic importance and visibility of dashboards, you want to get it right and that means having the right team. Key roles are shown here and some of them may be combined in a single person depending on the scope of your effort. Several of these roles are, no doubt, common to all of you from other IT projects, such as having an executive sponsor to effect vision, pull in the right resources, and make sure that effective governance is in place; having a project manager to develop and manage progress against the project plan; and drawing on your data management and IT staff who can provide access to all of the data required, as well as secure access to the final product.

I wanted to spend a few moments reviewing a few of the other roles shown here since they are particularly critical to dashboard success. Let's start with subject matter experts (SMEs). SMEs can be your folks in program and policy areas who have deep knowledge of policy and operations; they may also be experts in the disciplines that could vary depending on your dashboard content. If you are going to be producing a dashboard on health improvement programs and their outcomes you might include your medical director, possibly epidemiologists, etc.

The SMEs will vary based on focus; their role is really to drive the requirements and discovery process. For example, what questions should the dashboard address, for which stakeholders, with what measures? They also provide input to the report specifications; everything from what populations should be included or excluded, for example, are dual eligibles to be in or out; are

there measures and benchmarks already established for the program, if not how should these be designed.

Given, as we'll hear later from Katherine Rowell that the design and building process is very iterative, you want the SMEs really involved at each cycle of design and development.

Let's turn next to the next role, which is the data analyst who has two overarching areas of responsibility. The first is to translate the requirements from those SMEs into design and development, which means choosing the right data; right detail specifications based on a very deep familiarity with the underlying data; implementing workarounds for the data if needed; and then applying advanced statistical methods and visualization techniques to bring the dashboard to life.

Another key area of responsibility for the analyst is guiding the interpretation and use of the dashboard to make sure the data are displayed in ways that aren't misleading or could be misused; Katherine will also speak to that later.

Critically important from this role is to help shape findings and recommendations; what we call the soul work. What does all this mean? Is our program on track? Where are we falling short? How can we focus improvements?

Finally, as you look to prepare for dashboards, we know that many of you will be drawing on existing state staff, but others may have the opportunity to be hiring and, if so, we are frequently asked, "How do you go about hiring and interviewing for a data analyst?" Here are some sample qualifications: we look for demonstrated experience with health data analysis, ideally a master's in a healthcare-related field with a very quantitative focus; demonstrated skills in statistics combined with and emphasizing an understanding of the underlying data; and the ability to leverage the applicable tools.

I have included here some sample questions. We recommend a behavioral-based interviewing process aimed at elucidating examples of past successes with the skill sets that are required, as we have been discussing. Also, the past use of statistical techniques and level of proficiency with different tools, for example, identifying and working around the equality issues; and successful past experience working with stakeholders to develop a dashboard.

Finally, the last key roles are your external partners. Many states, in building a team for dashboards, partner with external agencies that can provide specialized expertise to help jumpstart the effort. This could be sister state agencies with whom you are already partnering or who can bring unique data and insights; business partners who may bring broad-based analytic experience or focused program knowledge; and, last but not least, and we'll hear some examples along these lines, university researchers and policy experts who bring very refined skills in statistics, geospatial analysis, etc.

I wanted to put out there the question to folks: Has your state agency utilized any of the following for dashboard creation or other reporting? As mentioned, if you are in full screen just go ahead and click out. You can click on this bar and submit and we'll view the results shortly.

It looks like we have about 100 responses and it looks like there has been a high use of these external agencies pretty much across the board. Are we able to view those now? About one-third are not using or have not used to date any business partners, but you can see 27% using universities, even more using sister state agencies, and the highest share using business partners.

Thank you for that feedback; I think we will learn from the next session about the successful use of such partnerships so I am going to turn it over to Jessie for that introduction.

JP1: Thank you, Beth, for that introductory overview; I think that was really helpful. Building on Beth's discussion on engaging external partners to bring the right scope to the table, we are now going to hear from a state-university partnership in action.

Doris Lotz from NHDHHS will be speaking with Joe Porter and Ashley Peters from IHPP on how they collaborate to build a Medicaid Quality Information System (MQIS). In addition to sharing information about the MQIS dashboard, they will highlight how the state-university partnership was crucial to its development and its success. Partnerships such as these are ones that states can leverage to build comprehensive dashboards. With that I will turn it over to Doris, Joe, and Ashley.

Joe Porter (JP2): Thank you so much. This is Joe Porter and I'm going to start us off talking a little bit about the partnership itself and then I will hand it over to Dr. Lotz to talk about the MQIS system itself, why it was important, and how we were engaged to make that important work happen. Then we will turn it over to Ashley to talk more about the nuts and bolts and some of the detail around our experience that aligns with the summary information that was presented in the overview.

Ashley and I are with the university; we are in an institute known as the Institute for Health Policy and Practice. IHPP has had about a 15-year history working extensively with DHHS in their Medicaid office as well as other offices, such as elderly and adult services. The work we will talk about today stems from the Quality Assurance and Improvement aspects of DHHS. Our work ranges from policy development and analysis, review for implications for implementation strategies to align with new federal regulations, to the very technical work around data system development, which we will talk about today.

We have been working with the state on some core contract work that spans a whole host of broad issues and then, oftentimes, we will be brought in on specific grants and projects that the state has with very defined deliverables for which we play a distinct role in technical and/or project management development; MQIS is one example of that.

The last thing I will note around the relationship we have with DHHS is that we are actually part of the formal State-University Partnership Learning Network (SUPLN) that is run by Academy Health. We are one of about 15 partnerships right now that meet on a fairly regular basis, which gives us an opportunity to talk with other states that have similar relationships between a university entity and, largely, the state Medicaid offices; and with that we are able to leverage a lot of shared learning out of those experiences in addition to some of the history we have around that.

With that overview of the relationship I will turn it over to Doris who will talk more about MQIS, in particular, and why that work was really important for the department and why we were a part of that.

Doris Lotz (DL): Why did we put together this data management system? In part, to take what Beth Schneider opened up with: Why do you build dashboards? If you haven't heard this pithy business phrase before let me introduce it to you: "You can't manage what you don't measure."

In part this was just to get our hands around a pretty dynamic and complex program - the Medicaid program - with the department and the Office of Quality Assurance and Improvement (OQAI) division of Medicaid services and DHHS broadly, with us as its primary users. We knew we were dealing with aggregate data and that we wanted to be very transparent and publicly-facing; we knew we wanted to create data that was comprehensive, easy to find, and easy to use, primarily for us.

We are also very committed to the fact that we are a public program and we wanted to put together a system that allowed our data to be presented in a very timely way and to pretty much any kind of user that wanted to wander into the website and figure out the answer to the question that they had for themselves.

The MQIS system is not so much a dashboard by itself, but it is a system of data management that allows the user to create their own dashboards; to customize reports or to pull down from some standard groupings of measures or reports that we have and really make it a very dynamic, timely, and accessible system for whoever you are. As I said, we are in and out of that system on a daily basis helping us provide assurance when things are going well, and also drill down when someone raises a particular problem or area of concern for us. Ashley?

Ashley Peters (AP): To get into the nuts and bolts of this partnership as Beth mentioned, and Joe and Doris as well, what is the partnership that brought this forward? The main players are the NH Medicaid program, DHHS, IHPP at UNH, and a group on campus called the Research Computing Center (RCC).

Once we had this idea in place from NHDHHS for what the project goals were, what the system needed to do, and who needs to be part of this group, we brought in RCC to help us on the technical level. DHHS brought in the project goals, the relationship with data submitters because this tool, as Doris mentioned, is broader than a dashboard; it also intersects with folks in our

state, our managed care organizations (MCOs), as well as the state itself, putting data into this system and eventually creating reports for the public to see. It also brings this relationship with CMCS.

Our institute provided project management for this partnership and brought an historical understanding of NHDHHS as well as the translation of their needs to the technical team at RCC; it is a translation of project goals into this technical development that needed to happen to create this dashboard. The RCC team is a group of people who include data analysts, statisticians, programmers; a lot of the job descriptions that Beth talked about earlier.

How does this team function? It is a huge team effort. We would spend a lot of time, in person and on the phone; it ranged from 10-15 folks, doing all of this really great work with a lot of patience, which is good. I will talk a little bit more about how this MQIS has evolved over time.

This is our MQIS homepage, but I won't get too much into the system itself. We do have a URL so please feel free to take a look. MQIS began as a tool for NHDHHS to report 25 metrics. It has now evolved today to over 300 and I think that is a great reflection of how this partnership really works. There are requests every day to add new data, new features, and through this partnership we have created a pretty well-oiled machine; we meet on a regular basis and make the dashboard better and better.

The MQIS site has also really evolved to be a place for researchers, consumers, and anyone interested in NH quality information to go because it is a public site to learn a little bit more about the population here in NH.

Finally, what made this partnership successful is a really great team and really clear expectations at the beginning of the project about what the goal was. If we ever had questions the team was great about bringing those to the entire group and taking the time to really ensure that the ultimate goal of the dashboard was met.

The technical expertise from RCC here at UNH was key to the success of building this system. A defined project management structure, as well, really just aces in their places; and knowing when to bring in expertise outside of our group. We have talked to website experts to ensure the accessibility, etc. of the website and whenever we wanted to implement real time analytics, we brought in statisticians and other expertise from outside of our core group to really ensure, again, that we are successful.

JP1: Thanks to Doris, John, and Ashley for sharing their experiences with us about the university partnership; that was a really informative overview. If any state agencies on the call are interested in learning more about state-university partnerships, one resource is a learning network of over 20 partnerships called SUPLN that can help states plan to build a partnership as well as provide support to existing partnerships through webinars and meetings. If you are interested in more information on this you can email the Medicaid IAP email that will be listed on the last slide of our presentation today.

Shifting gears slightly, next we will hear from Kathy Rowell of HealthDataViz. Many of you remember Kathy from the excellent presentation she gave for us on Data Visualization back in January. Today Kathy will apply some of those same principles to the design of dashboards. She will also be discussing pitfalls to avoid.

Those of us on the data team at CMCS believe that while data dashboards are extremely powerful tools, they can also be extremely dangerous, poorly designed or misused, particularly when a statistician is not involved in the planning process. Kathy will outline some of the major missteps to avoid when building a dashboard from both a statistical and a design perspective. Welcome, Kathy.

Kathy Rowell (KR): Thank you. It's good to be back with everyone.

The first thing you really need to think about when you're developing these data visualizations and data dashboards is that you have a vision of where it is that you want to go and that everyone is traveling down the same road to get there because there is nothing worse than thinking that you know what you're all looking to eventually create and landing in different places around the world, understanding that you've all had a different vision. Although that sounds self-evident, we really find that this is key: you have to know where you're going or any road will get you there.

How do you go about doing that? One thing that we wanted to talk about today is really thinking about a process for discovery of your available data; what your stakeholders are looking to understand; analysis, the type of analysis that will be performed; design, how you will design these; how you will develop these dashboards; and how you will deploy them and then creating a real rigor and discipline around sticking with this process.

Let's think about some of those pieces in a little bit more depth. What do we mean by discovery? It is another way of talking about requirements gathering. Some of the steps you need to take are, for example, you have to know what data is even available to you; you have to identify it and evaluate it. We will talk more about that in a minute.

You also have to review the analysis that is happening and have to be confident that you can explain it and defend it, and that you're comfortable doing that in plain language in a clear and compelling manner because, ultimately, you are the one who is going to have to use these dashboards, present them, make sure that your stakeholders are able to navigate through to understand the information you're presenting. You have to understand that as well.

You want this discovery time to be a time when you set your project goals; as we said, if you don't know where you're going any road will get you there, and I don't think we can say that frequently enough. What is it that you are really hoping to accomplish? There is so much that we all want to accomplish, but what is it that we need to accomplish in a given project?

The other thing that folks miss that is a big step is really thinking about and using techniques to understand for whom you're creating these visualizations and attractive dashboards. A few of the things you can do is create personas, which are essentially an amalgam of who is going to be using these and what they help you do is stop self-referential thinking about what you would like to create; it helps you to step out and think from another point of view about what folks need, how they think about things, how they use interactive tools, and how comfortable they are with them. You can do that by creating personas.

You can also research users' mental models. What is it that they think about first? Is it an incident where they have cancer? What do they think about next? Where are the cases occurring? What do they think about next? It's patient demographics or whatever it may be, but they usually have a mental model in their head that will help you guide development and design.

As you have heard, it is establishing the right team. We also think it is extraordinarily important to always identify who is going to have the final, final authority because these things can take on a life of their own and you are never going to make everyone 100% happy, so you have to have somebody who says, "Okay. We're ready to go. Let's move this sucker out of development and into final stages."

All of this we find is extremely helpful if you put it into a project discovery document because then you can refer back to it and understand some of the things that you found out, where you're headed, what you know about your data, etc. It is like a project plan document.

In some of the more specific categories, for example, identifying and evaluating the available data, one of the first ones is, is it accessible? We hear from people all the time that they have the data, but they don't have the data in a way that makes it easy for anyone to create any sort of reports or visualization. You have all been there; the really old Excel spreadsheet that somebody has kept forever, but is really not in line with how the new tools are lined up to be able to adjust and display this data.

Is it accurate? Is it well defined? Are those definitions being used the same way across the data sets by the folks who are submitting data potentially? It is always a question of do you have enough; is the end big enough? We know the pitfall of this is small sample sizes can skew the results that we're trying to report. Do we even have enough of the data that we need to communicate the message that we need to or that we find in the data?

Is it complete? You have a million records, but 990,000 of them are missing the date that you need to do something meaningful, so it is not complete data.

Is it objective or is the sample size skewed? Is it really representative of the population at hand?

A big one: Is it timely? There is nothing worse than really old data and although we don't have real time data very often, the timelier it is, certainly, the better it is; we have more trust in it as being actionable.

You also need to be able to explain and defend the data analysis and statistics. We have data analysts and we have statisticians, but I find one other place that folks struggle is the ability to push back and ask if those are the correct statistics and can they explain them; can I explain them in plain language because when you are out there using these or trying to persuade folks of what's in here, you need to be able to defend that analysis. It is also all about understanding what is in that dashboard and the ability to communicate about it clearly when you need to. It is not just when you need to when you're in the room, but also the narrative that may be written up to explain what folks are seeing or supportive notes, etc.

Everyone really wants to run to the computer and say now create me this really beautiful, interactive, high tech dashboard, but we can't encourage you enough to step away from the technology long enough to get in the room with your team and simply do the low tech, high value sketching. I will tell you when we teach workshops and work with clients, it's hard to get them to step away from the technology, but once they do it's transformative. Anyone can do it and it really helps you to explore and design in a collaborative manner. When you start to do that and you lay it out on a piece of paper or a whiteboard, you start to see things in a different way and you start to think potentially about what other data might I bring in to give this context. How else might I arrange this so that it makes more sense? Step away from the computer and reunite yourself with markers and paper; it's really great. If it is not working, you crumple it up, throw it away and nobody's feelings are hurt; you just go back to the drawing board.

Once you have a sketch the other thing that sketch helps you to do is your team then has a "back of the napkin" guide for what it is that they are going to develop. The next thing to do is develop a prototype; that's just an early sample or release of what it is you're envisioning you are ultimately going to build. You can use sample data that makes it quick and easy; you don't have to have full functionality. What you are really looking to do is to test concepts and solicit feedback with what you think the dashboard is going to look like for your end viewers.

Here is our golden rule and we never break it because if we do it always comes back around and hurts us: never, ever, as in never send out prototypes cold via email or tell me what you think. We always demonstrate the prototype first to our end viewers, users, the team, etc., and here's why. It is a prototype, it is sample data often, it does have limited functionality, and being able to explain it and show it to someone allows you to orient them to the dashboard, orient them to your thinking about your approach to developing the dashboard, and also advise them. When they say they really want this data point, you may be able to say either that's a great idea we didn't think about or, more often, you have to say we love that idea, but we don't have that piece of data; in the future maybe we will. Doing this allows you an opportunity to really talk them through what is going on here before they take one look at it and say it's not working for me because it doesn't have that data point or whatever else it is and move along.

Once you have the prototype and they have had a chance to give you feedback, etc., then you're ready to do the final production-ready displays. That is when you set a clear plan and direction; we're going to build this out and test it a little bit more and then before you do anything else,

you need to do the regression testing, i.e., does that data on that dashboard reconcile to your source data. There is nothing worse in the world than putting something out there and somebody gets the “gotcha” of that member is wrong. This is part of the final production-ready piece of work that you have to do. It’s not all that fun sometimes, but it is necessary.

Again, briefly, when you send these out you want to be able to orient people and you want to use the terminology that influenced your design. So we use the Idaho map that shows where rates of diabetes are higher in the state and we’ve given you some figures about the underlying population, the diabetes rate, the uninsured rate, the primary care physicians per 100,000 in population; then you can orient folks. Now we have listed by public health district the highest rates of diabetes and you can also see the points we have graphed and down below we’ve shown you where the public health districts have the highest rates of diabetes in relationship to other contextual data like uninsured rates and access to primary care physicians. Doing that throughout your prototype and final design helps you to orient folks and get buy-in and feedback. That is the overall design approach.

Let’s dig into some of the pitfalls that we often see on dashboards. These are a handful, but they are some of the ones that we see most frequently, especially around the design and staff piece of it. Certainly, it is displaying poor quality data; incomplete data, not a big enough end, etc.

A big huge one, and we talked about this in the webinar a few weeks ago about Data Visualization, is inadequate context. Everything in data analysis is compared with what, and if you haven’t compared something with what, you haven’t answered my so what. Implying correlations that don’t exist, or may not exist, displaying unimportant or incomplete data, unnecessary precision and I will show you a sample of this. Because analysts and statisticians and so key to the work that we do, they have a tendency to give us way more precision than we usually need in these high view dashboards, so you want to think about that as well so we are not distracting viewers.

Incorrectly encoding the data, not using color directly, using incorrect statistics, and, again, back to our regression testing, displaying data that has not been reconciled back to the source data.

Our example of not enough or incomplete data: In this example that we created, survey data, but I want to be clear that this could be any type of data - claim data, registry data - we just chose the example of survey data. Imagine on the left-hand side that you send out an experience survey to your beneficiaries and you send out 1,000 and get 100 back; that is a 10% response rate and you graph it out using a simple bar chart. It looks like 75% of your beneficiaries are very satisfied. Then you send out a second mailing and what comes back is a total of 750, so a 75% return; we would all be thrilled to get that in surveys. Now what we see with a bigger end, 47% of our beneficiaries are not satisfied at all. We’ve got to make sure we have enough data and complete data to really understand what’s going on. More importantly, not to either rest on what we think is a good result or miss an opportunity to improve something.

Inadequate context: This is all back to, “compared with what.” Time and time again we see something like on the left-hand side where a dashboard might say the readmission rate is 15%.

Unless I have a ton of experience or some other number in my head, that means absolutely nothing to me. So, we have to always show the “compared with what.” For example, it might be compared to a national readmission rate and then we say we have some work to do. It’s not uncommon for us to see figures standing alone without the “compared with what.”

Also, showing data in a way that makes it appear there’s some relationship where none exists. Folks are always really eager to [inaudible] that they have worked on has had a result. In this example, not actual, it could be something like we did a team outreach program about sexual behavior and unintended pregnancies and we really helped a lot of teens who came to our program and, oh look, the state teen pregnancy rate has gone down. However, these are not matched samples so the two have nothing to do with each other that we can show with any statistical rigor, so we can’t just display data this way; it is incorrect.

Back to the unnecessary precision: What we are talking about here is in our dashboard, on a public site, you really don’t need the decimal point on a lot of this data. What you are really trying to show is if something is bigger or smaller or what the distribution is; you don’t need all of that level of precision and it can be both intimidating and distracting. The statisticians love to put it in and I say that’s great, but it needs to come off because I just want to show the story very clearly here and I know the supporting documents and analysis and we have the statistical rigor, so we can show this data.

We don’t want to misuse or overuse color. If we think about pre-attentive processing that we talked about in the Data Visualization session, color should be used to capture our pre-attentive processes, which, in human terms, says if something is different, I look there; you’re trying to say here is a comparator, here’s something that’s different, here’s an opportunity. Yet when you are selling data like this that’s really the category of race and ethnicity, these colors don’t mean anything. What you are trying to do is show the shape of the data and what is bigger or smaller in the distribution. We don’t want to misuse color and we certainly don’t want to use things like red, yellow, or green for those folks who are colorblind and are not able to differentiate those colors. Use color judiciously, use it to leverage pre-attentive processing, use it to say, “Hey look here, this is important.”

Also, we need to think about encoding the data correctly. In our last webinar we talked about the length of bars and how bar charts start at zero because you’re encoding the length of how big something is, but in this example it’s the difference between zero in your data value, which is a real value, versus “I don’t have any data.” Missing and incomplete data should not be shown, for example, on a line graph as zero; rather it should be shown as a gap with some sort of note that says there is no data. Zero is a real number, but no data means no data, and that’s just one example.

Even though we are all pretty sure we get this one right, I shared previously an example of where we just make these mistakes. For example, if we wanted to look at the Medicaid beneficiaries’ inpatient length of stay, of community versus academic hospitals, it would not be correct to show the mean or average number of community days as an average length of stay and median days

for academic. We know that mean days could have outliers in it and median days will take care of those outliers by and large. However, we do see examples where just the wrong statistic is used or different statistics are used to make a comparison that is not there.

A few other pitfalls to avoid, for example, trying to do too much in one project; everyone wants everything on a dashboard and it is not humanly possible. We need to think of dashboards as our overview, understanding that we drilled down and we have supporting reports in different focus areas and then we can always drill down to detailed lists; that is really guided analytics. Overview dashboards highlight information and then we can drill down to further levels of detail.

The other pitfall is really not having the right folks in the room. From day one you need your subject matter experts in health and healthcare and the underlying data in IT in data visualization, statistics, math, and analysis; you have to build those teams.

Too much information and detail: So much detail can be put some of these reports that you can't see anything.

Again, not having somebody who says we are going to put this out into the world, it's done.

This is when we want to take a minute to speak about and that is executive monitoring high level dashboards of any type the hardest thing is summarizing tons and tons and tons of data. One of the things we are always encouraging folks to think about are the categories of data. What is it that you really need to summarize and how is that underlying data categorized? We pretty much all have categories, but you have to know what those are and words to summarize them.

Too many details can crowd out the summaries you are trying to get across. Remember, those details are not lost; they are in there and they are in the supporting reports and information.

Don't attempt to boil the ocean; don't grasp at too big a project and don't try to get too much on these dashboards. You might want to try something like a 3x3x3 approach: three months to research for what's possible, three months to create it and get it ready to go; and three months to foster adoption. Give yourself a time limit and see what you can get done; that can be extraordinarily helpful.

Again, just to reiterate, you have to get the right team in place; it takes a team and a village to make this all happen and to work collaboratively.

I am going to say this again: building consensus is great, but final authority; otherwise your project may never see the light of day because you will be chasing your tail for a long time. Figure out who is going to be the ultimate voice of this is done.

Then, of course, celebrate your success and have feedback loops because these things are not one and done; they are dynamic. The metric may change, the audience may change, and so you always have to be working it out. Thank you.

JP1: Thank you, Kathy, for an excellent overview of best practices to ensure success when building a dashboard. Our last speaker of the day is Kirsta Glenn from Washington (WA) State. Kirsta will be talking about Washington's journey to build a data dashboard in support of their community health transformation including what went well and lessons learned during the process. She will also outline how they built a strong data analytic team within the state. Welcome, Kirsta.

Kirsta Glenn (KG): I want to start out today talking about what helped us most in our journey; the end of the journey and the start, and then I will walk us through it.

The first thing we had was a clear value proposition for our key stakeholders who had control over funding, removing barriers for us, and sponsorship. That allowed us to have a long-lasting product that would help us into the future.

We also created a network of support for the dashboard effort that went far beyond our initial team and that network included leadership, subject matter experts, data experts, IT, and communications within our agency.

The third was that we listened to our customers intelligently to help them provide information effectively. We found that our customers weren't data experts, they weren't experts in the measures we were using, and they weren't experts in data visualization tools; they could tell us very passionately about their needs for data and information and when we came up with the products for them they would then say that's not quite it, we really meant something else. I think the importance of sketching out initially, in an inexpensive way, was crucial to us and helped our customers grow along with us.

Our value proposition was to engage community partners to initiate projects that would help the state achieve its goals in health system transformation. We decided the best way to engage those community partners in this work was to build a data dashboard and provide actionable information. Our community partners were Accountable Community of Health (ACH), which are kind of Washington's accountable care organizations. These organizations have vastly different skill levels; they come from different backgrounds, but they had the same overall goal of initiating projects in health system transformation that would help the state achieve its goals, which included value-based payments and whole person care.

We also had a set of well-defined measures that we were using in value-based payments; in WA we call those the common measures. We also had a data source that was regularly updated. It turned out that our customers, along with set measures and regularly updated data was a good platform to build a dashboard; a dashboard was a good tool to help us achieve our goals. We made an early and good decision to build a dashboard.

On the next slide, we see that in our requirement gathering the first point we came to was that we needed to use publicly available data. Because our ACHs are not HIPAA covered entities, we

needed to be providing them with data the public could see. The ACHs were also our primary customers and I went through some of their background. One point to bring out is that they were very interested in the geographic detail within their areas. There are nine of them within the state of WA and each includes a number of counties and they were interested in geographic detail within those counties to help them hotspot where they wanted to focus their projects.

The internal constraints were that we wanted to use state health and claims data as our data resources; we did not have a lot of capacity to go out and use other data sources. Our initial focus was on the common measure set and, again, that was our stakeholder and leadership desire as that would promote their goals of value-based payment.

On the next slide, we see the journey. Our journey started in 2015 with a State Innovation Model grant (SIM) that we received. We began with three staff members. Since that time, we have built up to about 13 staff members. Our initial three had subject matter expertise; they had IT knowledge including a lot of experience around data privacy and security issues and we also had a fantastic project manager. We also had environmental advantages of a well-articulated goal, which I brought out. We had the support of our leadership and funding through our SIM grant so we felt we were in a lifeboat and had certain tools, but were missing other tools and had to figure out how to get to port with what we had.

We were immediately aware that we were missing the individuals who could build the dashboard for us. On the next slide, you will see how we decided to address that. Rather than hiring those staff in ourselves we decided to complement the skills of our team through a contractor. We had the choice whether we bought an off-the-shelf dashboarding tool, whether we would build it ourselves, which, as I said, we decided not to do, or whether we would hire a contractor to build a customized tool. We decided on the last option and I think we made a great choice; it really worked out well for us.

We contracted with Providence Health Services Center for Outcomes Research and Education (CORE). I think the key to their success in helping us was they had extensive experience coding HEDIS measures, which are very complex clinical measures used that rely on claims data. They also had experience with Medicaid claims data from the State of Oregon where they had built a similar dashboard. Bringing that skill and experience into our project was invaluable.

We contracted with them to calculate the measures, to build the dashboard in Tableau, which is the tool they were used to using and is also our state visualization tool, and we wrote into the beginning contract that our plan was to hire analysts internally. As we hired those analysts part of the contract was that Providence CORE, our contractor, would provide technical assistance to our analysts so the dashboard would eventually shift over and be able to be run internally.

On the next slide, we have the rollout; June 2016 was our first quarterly release. Since that time, we have had two additional releases and our fourth release is set for this June. At each release our target was to add at least three new measures and increase functionality over time. Besides those HEDIS, or clinical, measures we began with that were part of our common measure set, we

have added some health outcome measures and some diagnosis rates, which were requested by our customers. We've built out technical documentation, created some underlying data files that customers can have access to if they want to do further exploration and analysis, and right now we are working to integrate some trend data; to this point we have not provided trends.

We have a picture of the homepage for the dashboard on the next slide. There are tabs along the top and also underneath and then some basic information about how to use the dashboard. The first three tabs are more documentation on how to use it; the following five tabs actually get into the data.

The next slide shows some high-level pictures of the dashboard. I think the URL for the dashboard is going to be shared and it's publicly available so if you wanted to go in and look at the dashboard that would be fantastic. We have a population explorer that allows the user to look at, for the Medicaid population, demographic breakouts by county and the percentage of Medicaid clients by county. We have a measure explorer that allows the person to look at the demographic breakouts for the HEDIS measures, or the clinical measures. Our statewide measures are those population health measures I mentioned and can also be looked at by county. The population health measures are not available on a finer level of geography. Finally, the measure maps allow the user to compare two different measures by various levels of geography.

The next slide shows a close-up of that so you can see the side-by-side comparison for these two measures. The one on your left is actually adult access to ambulatory care and the one on the right is child access to primary care. Those outlines for WA are our counties. Brown shows that the measure is lower and blue is a better reading for that measure. Looking at this map, which is for fiscal year 2016 that goes from July through June for the state of WA, the ACH could look at this map and be able to identify for which measures they are doing relatively worse and for which measures they are doing relatively better.

We are really glad we chose a contractor and started out that way because it allowed us to really get on the ground running quickly and not have to learn a lot of information by trial and error; and we chose a contractor who had experience that was really relevant to what we were trying to create. We are glad we built our analytic team over time and that we have been able to develop that capacity and use a contractor as a mentor.

We are glad we based the dashboard on our own data; it gave us a lot more control. We spent a lot of time constructing the underlying database; it has stood us very well over the year and provided verifiable results.

We also worked very closely with our customer user group. With those ACHs they were kind of being stood up at the same time that we were standing up the dashboard. There were three liaisons; three people from the ACHs who provided a lot of intensive information to us as we were building the dashboard. We fully leveraged the strengths of visualization tools. I am not sure this would work for everyone, but we saw what Tableau would do and built those things in

rather than coming with a lot of pre-defined requirements around functionality. We also planned for multiple releases.

We have lessons learned: analytics capacity takes time to build. Coding HEDIS measures from claims data we found very difficult. We needed clear roles and responsibilities and those changed over the year as we built our analytics staff internally. Clear communication and project management between teams was something we constantly worked on. Our customer needs changed over the development timeline; just highlighting the need to have a flexible and nimble tool. We had to align our dashboard with a lot of other dashboards being built out there, some better than others, but I think the technology is out there and dashboards are becoming ever easier to build.

There is an importance of growing external communication as our dashboard became more popular and was used more. The technical documentation also became more important over time as the dashboard was used more. We also realized this is the first step in a long process to create a lasting product.

Our team: Since the spring of 2016 we hired seven analysts; we have been very fortunate to get a fantastic team with a broad skill level, knowledge, and experience. We've partnered with other teams in the agency who have expertise in health systems transformation initiatives: regulations, contracting, finance, etc.; the team is large that supports this effort. We have also aligned our work with other ongoing efforts within the agency.

We have the future as we see it now. The first is a sample vision and commitment and we have continued to seek the value proposition for this dashboard across the agency. For example, we have used it for annual legislative reports on diabetes, to feed agency performance management systems, and to handle ad hoc requests that come in; we are constantly promoting and using this dashboard and adapting it to a variety of needs.

We need sustainable funding. Our SIM grant ends in early 2019 so we are looking to shift the dashboard operations internally so that we can handle that within our agency and won't be required to pay a contractor forever to do this.

Staffing: Competition for talent is intense here in WA State; we are very close to Seattle. We were very fortunate in hiring our initial staff and we hired several millennials. We found that millennials are different from the traditional state workforce for a number of reasons: they move in and out of jobs more often; they place importance on doing work that has social value; working on a team; having access to the latest tools and technology; workplace flexibility; and workplace balance. Even as a state agency we have been able to address a lot of those concerns. We allow telework; we actually had a baby at work for three months so that someone was able to bring their child in; we support commutes to reduction and different commute options; and we really try to shield the team from a lot of the bureaucratic headaches that come with state work.

For sustainability, aligning with other related efforts within the agency has been crucial. We believe that we have created a sustainable project, mainly because of what I brought out at the beginning: a clear value statement; a network of support within the agency; and working effectively with our customers so we create a product that is really valuable to them.

That is the end of my part of the presentation.

Tracy: Thank you so much, Kirsta, for sharing WA State's dashboard experience. Before we move on to questions and answers let's recap some of the take-home points from some of our presenters.

- We learned that it is crucial to set dashboard creation for success by building a strong data analytic team. The team should include data analysts, SMEs, data managers, and a project manager to oversee the work.
- If there are gaps in your team consider bringing on external partners with specialized expertise, tools, or data access for policy research and analysis.
- At the start of dashboard development, defining and adopting a step-by-step process will help to ensure you are set on a path to success.
- Remember to avoid the common pitfall of using incomplete or misleading data, which may cause the viewer to draw an incorrect conclusion or imply correlations that may not be true.
- Once your dashboard is in place remember to employ continuous improvement by soliciting and considering changes to the dashboard on a regular basis to stay relevant.

We will now move on to the question and answer portion of our webinar and we do have a few questions queued up already. The first couple of questions are for Kirsta. Our first question is: Do you provide access to any personally identifiable health information or do employ small numbers suppression?

KG: Our dashboard is publicly available so within the dashboard itself we don't provide access to personally identifiable health information. We have also developed a small numbers policy internally and we suppress any numbers that are less than ten. There are areas on our dashboard with suppressed information that our customers would like, so we pursue individual data sharing agreements with each of those customers to have access to the underlying data sources.

Tracy: Thank you. How have you recruited strong candidates with diverse expertise?

KG: This was a real challenge for us within the state classification system. Our classification system within WA State was developed back in the 1980s and the salaries have not kept up with the private marketplace. The initial positions that we had listed were also project positions for the SIM grant and we were not able to recruit staff. We were able to reclassify those positions by using our WA Management Service classification. We also reclassified some as epidemiologists and a couple of actuaries. Through that reclassification we were able to offer competitive salaries and to get support within the agency to make the positions permanent. With those techniques we got some really fantastic staff.

Tracy: Thank you. I have a question for Beth: What software tools are states using most often for dashboard development?

BS: I think you heard Kirsta mention Tableau and that is being very commonly used. Other states we work with have used Cognant because they may have that as their underlying BI tool and that is interoperable with a number of other solutions. The use of statistical tools to support in terms of R, which is now integrated with Tableau; SPSS or SAS are common examples as well. I think Tableau and Cognant are two of the most frequently used that we see.

Tracy: Thank you. I think the next question I would direct towards the NH team or Kirsta. The audience member says, "In the medical field there's effort to be able to compare providers based on outcomes and cost. The two examples are broken out geographically, not by providers. Are you seeing a movement towards meaningful comparisons of providers of health services?"

KG: In WA State that wasn't the use case that we were tasked with, but there are separate efforts within the state that provide information broken out by clinics; I don't know that we have any publicly available information right now broken out by provider.

DL: I think we are very interested in doing something like that. We certainly want to get to the point where we are rating our MCOs. We do want to take advantage of other efforts to look at providers so we don't ideally want to do something for a provider just for the Medicaid program, but maybe partnering across the state; borrowing something from CMS or somehow working synergistically with what CMS has done with some of the providers. It is very much a topic of conversation, but not something that we are moving on right now in any kind of active way.

AP: I would just add, as folks are well aware, there are a number of logistical challenges on the provider side around accurate identification with i.d.'s, but I think what we've seen, as WA was saying, there is a lot of interest at the clinic levels for summarizing locations of care and attributing individual providers to those clinics has been a challenge; we are still struggling with some of the technical details of how to do that, but we are on other projects, not the one we talked about today, doing some of that provider level work.

Tracy: Thank you. Our next question is may also be directed towards NH and WA. Can someone speak to the challenges of maintaining Medicaid and state marketplace insurance enrollment data? What are some challenges you have faced and how have you overcome them?

DL: We don't have marketplace data on the website; the data is reflecting the aggregate of the Medicaid program and our two managed care programs that are participating in our standard Medicaid. Our extension population is being done through a premium assistance program, so that's managed more like a commercial product than it is a Medicaid product.

KG: We have the MCOs within WA State report data to the state and then it's maintained within the agency. I don't think we have experienced challenges maintaining that data.

DL: We do have some data on our MQIS website about the expansion population, but again, who are your business partners and what are your use cases; they behave more like the commercial sector so their data is dumped into our comprehensive health information system, our all care claims database. It would be a little bit of a different list, but something we would certainly be interested in doing going forward.

Tracy: Thank you. Our next question is for Kathy. Can you discuss the pros and cons of static dashboards versus interactive dashboards? What kinds of investments would states require to move to more interactive displays?

KG: That is a fantastic question. The reason that we create personas and we do the exercise of figuring out mental models is that the tools do a lot of very cool things; through Tableau or Click. The interactivity and the functionality is amazing, but if you think about the first remote control, they did some very cool things as well, but only people who designed them could figure them out.

You have to be extraordinarily careful and you have to step away from the whiz-bang things these tools can do and you have to think very carefully about who is using these tools, how familiar are they with the entire concept, and what is their mental model of how they interact with all of this. We tend to err on the side of less to begin and we don't think it's always as self-evident as some folks who are very familiar with the tools and use them all the time find them.

The short answer is you have to think long and hard about your audience, whether they have any experience with these types of tools and then you have to really research and understand their mental model about how they interact with these tools. That is an entire discipline in itself, but it's really about talking and reviewing with folks and not just letting the tool go crazy.

Tracy: Thanks. What kinds of investments do you see as necessary to do interactive displays?

KG: Quite frankly, the tools come technically able to do those things, so I believe the investment is in taking the time to understand who is going to be using the end result of creating these tools. Tableau has every bell and whistle you can imagine as do others such as Click, etc. To me the investment is the willingness to take the time to understand how people can really use these tools effectively so they don't get frustrated and walk away from them.

Tracy: Thank you. I have a two part question that is for our WA State and NH presenters. Is any of the data that you are using broken out by managed care product? What was the role of managed care entities in creating or publishing the dashboard?

DL: One of our primary motivations was we were just going from a fee-for-service (FFS) Medicaid program to a managed care Medicaid program and concurrent with that we received our grants from CMS so we had the local imperative to do a lot with the data we intended to collect and

some resources to do that. The managed care data is the primary source for the aggregate data that is actually presented on the website.

As I said before, we built it with us as part of the use case scenario so in any of the individual measures that pop up or any of the dashboards that you want to create on your own, simply clicking into the graphics that are there will disaggregate into our two managed care companies. It is a very easy way to compare them in the same graphic if you are aware of some of the little built-in tricks that we have. We absolutely use the aggregate data that they are providing to us; it's updated as soon as we get that data and confirmed that it's validated, so we are putting in new data all the time. We absolutely use it to monitor both the program in aggregate and in the individual MCOs.

KG: As I mentioned earlier, we have five MCOs and they supply data to the state so we already have that within the agency and that's what we use so we do not have to deal directly with our MCOs. We also don't disaggregate the information by MCO; that was not a priority for our customer group and there are other dashboard resources within the state that already do that. We have looked at breaking out our information by eligibility group. For example, children and the categorically needy disabled groups, as well as the expansion adults. We have the ability to do that, we just haven't done it yet.

Tracy: Thank you. Another question for the states as far as reporting the data: What would you consider timely, particularly for claims data?

DL: WA has a six-month time lag for our claims data. Again, we are getting that through MCOs into our system and we find that within six months we have reasonably accurate data. We are looking at some other sources of information that might provide closer to real time information, but for our claims data that is the lag that we use.

KG: In NH, we are presenting aggregate data; as it is submitted to us we submit it as soon as we validate it. We built into the MQIS system some corridors so that we can do some system-generated data validation; if you are outside the corridor it will ping one of the data analysts to look at it and try to figure out why it has been called out so we can make sure we are presenting data that is valid. After it passes through that quality control it is presented right away, so it depends on the frequency of the data that is given. If we are getting updates on a weekly or monthly basis then MQIS is updated on a weekly, monthly, quarterly, or annual basis depending on how the data is submitted to us. We are not really looking at data with claims lag necessarily; we are looking at aggregate data that is coming to us, making sure it's good, and then putting it out there for consumption.

Tracy: Thank you. I think this question would best go to Kathy. One of our viewers notes, "I imagine that the data needs to exist online in an accessible form. Is there a greater danger of hacking?"

KR: I think NH and WA could also speak to this, but just like any other data information that we work with it all has to be secure, HIPAA compliant, etc. and most of the services that we use, whether it's Amazon web services or other databases that are built, all would have those security measures around them and there are experts who help build those databases. Although, perhaps not on public websites, but for internal use the software reporting tools such as Tableau do allow you to set user views so if there something you don't want one group to see, but you want another group to have access to, the software allows you to build in all that security.

KG: Our data is publicly available and the data files that underlie that that feed this Tableau dashboard are also publicly available. At least for this effort we don't need to worry about hacking.

DL: Similarly in NH we're talking about population level data so we're not putting anything out there that would be at risk of identifying an individual or putting the state's broader claims systems or other data eligibility systems or other things at risk; they are not connected in that way so it is not really posing a security risk per se. We really want to let people know how the program is doing, not necessarily individual providers or individual patients; they are different data sets and it's a different use so I don't think it is really a concern, but that depends on how you build it.

Tracy: Thank you. I have a question that any of our presenters could weigh in on: What types of secondary documentation do you provide to end users of the dashboards at various phases of development, for example, from implementation to the final product? I will open this up for anyone to weigh in.

KR: When we are creating these we are not necessarily creating the documentation until we get to the final dashboard and reports that will be deployed. However, what we do is once we have got what we believe is our final, we will craft 3-4 questions about what we believe the end users will be able to perform and what they will be able to do using the dashboards and reports that we have created. Then we do user experience testing; that means we will give the tool to some people, we will give them the questions that we believe they should be able to answer, and then we watch and see if we have designed and built it in a manner that makes it self-evident that they can do those things. That provides us with a ton of feedback.

On the final public user documentation, one piece of advice we would always give is that we need to step away from this cursive knowledge in the way that we talk about things because we're experts, and we need to talk about everything that's out there and test it for plain language. Is this really understandable in plain language?

On the technical side of it we do deep documentation so that our clients can maintain it all. I'm not sure if that helps, but those are three things that we do, especially that we just give it to them to see if they can navigate and answer some questions to see if our designs are working.

KG: On the WA side our process sounds pretty similar; we do extensive in-house testing, testing with people who aren't SMEs, and then we do testing with certain customer groups before we go live.

AP: For MQIS we also do a similar set of user testing once we are in a spot for the public release of the site. I will say that throughout the entire process because we were such a big group, we also had milestone documents that we internally reviewed with DHHS to ensure the design of the site was on track. That included a business requirements document, a functional requirements document, technical specifications, and then, eventually, some user testing documentation.

We currently also help maintain an administrative user guide, something that is publicly available for the Medicaid program in NH. When they have folks join the team it is a training document to ensure that all of the backend work that they do, which is a lot, is really clearly laid out. We add to that document every time a new feature is added, which is pretty often; we have monthly reviews.

Tracy: Thank you. I believe that is all the time we have for the Q&A so I will turn it back to Jessie.

JP1: Thanks, Tracy. I would just like to take a moment to thank everyone for taking the time to join us for this webinar as well as thank all of our guest speakers one more time for their great presentations.

All the participants will get an opportunity in a moment to complete a post webinar survey, so please hang on and complete that for us; we find your feedback to be extremely helpful. If you would like any more information on the IAP program, the learning collaborative for state-university partnerships, or if you have any question on what the data team is doing at CMCS, you can reach us a medicaidiap@cms.hhs.gov. Slides and a recording of this session will be posted on our Medicaid IAP data analytics website and we will email all the participants with the link when they are posted.

I think that wraps it up for today. Thank you, everyone.

[end of tape]