[Dale Sanders]
Thanks Tyler. Thanks everyone. Once again I appreciate everyone sharing their time with us and hopefully we will do a good job of inspiring and informing everyone about this very timely topic in healthcare, and it's good to see so many friends attending today as well.

Today’s Agenda

- General concepts in data governance
- Unique aspects of data governance in healthcare
- The layers and roles in data governance
- Constant theme: Data governance as it relates to analytics and data warehousing
We have a lot to cover, so I'm going to try to make this as precise and concise as possible. We'll talk about general concepts in data governance independent of any industry. We'll talk about some of the unique aspects of data governance in healthcare. We'll talk about the layers and the roles in data governance that again tend to apply no matter which industry you're in. And the constant theme that I want to reinforce is this notion of data governance as it relates to analytics and data warehousing. And the underlying theme to that theme is that the analytics and data warehousing give data governance something to govern. And if you have a data governance body without a data warehouse or without an analytic strategy, the data governance's function tends to wander around because they don't have much to govern. So the data warehouse and the analytics technology in an organization is the great place to anchor your data governance beginning and then you can grow up from there.

A Sampling of My Up & Down Journey

I just want to show – we could truthfully spend an hour on this slide easily. It's a sampling of my up and down journey in data governance going all the way back to the early 1980's when I was an Air Force officer. I'm happy to talk about this slide in greater detail if anyone would like to do that separately. The message here is that it's difficult to find a perfect data governance environment. Now, the nice thing is over the course of my career, we always managed to migrate these data governance environments that were either too much data governance or too low data governance back to the centerline but these thoughts represent sort of the existing state of the data governance for the projects when I was involved with them.

One of the projects I want to bring out and focus on is this system called the maintenance management information collection system. That's an Air Force-based system and you can think of it as an electronic medical record for aircraft and you can think of the crew chiefs associated with those aircrafts as the primary care physicians. And those crew chiefs were
responsible for maintaining and optimizing the health of those aircrafts for the lowest price possible, the lowest cost possible by the way.

The reason I want to highlight MMICS is because it was a role model for me and my career for designing an information system from the analytics you want to the frontend. So we designed MMICS with an understanding of the data that we wanted to get out of the system first and then we backed into that the user interface and the data collection system in MMICS. And it was the perfect balance of user interface, data collection, and analytic governance. Still to this day I've never been associated with anything that well designed. And it's also interesting to note that those poor crew chiefs that maintain those Air Force aircrafts, they have to work in searing hot conditions out on the flight line, they have to work in subzero freezing temperatures. So the efficiency of user interface and data collection is also a very important attribute in that but it provided a role model for me that I held on to for the rest of my life and I wish that we could replicate that in healthcare. I wish that our EMRs were designed from the back forward, supporting the analytics that we want to pull out of that data and then optimizing the workflow and the efficiency of that data collection for the nurses and physicians. Maybe the next generation EMRs will be designed that way.

The Sanders Philosophy of Data Governance

My philosophy of data governance is to be as lean as possible and I believe that the best data governance governs to the least extent necessary to achieve the greatest common good. We'll talk a little bit more about the problems I see as failures in data governance, especially in healthcare from trying to govern too much too soon. And so, borrowing from an old, I think this was (04:38) that has this tagline in their advertising years ago, "Govern no data until it's time." And we'll talk about that concept as it relates to a Late-Binding™ Data Architecture and Data Warehouses and how Late-Binding™ of data, and just in time, governance of data, work very well together. So you've got data governance as a cultural attribute and you've got Late-
Binding™ Data Architecture as a technical attribute and the two come together very nicely. They complement one another.

**Data Governance Cultures**

So data governance tends to mirror societal governance in these three categories of governance. I've seen in my career very highly centralized authoritarian data governance, I've seen a balanced form of data governance which I think is the best form in our culture that tends to be sort of democratic, and then I've seen also highly decentralized governance. In an analytic and a data warehousing environment, these authoritarian data governance structures are typically characterized by centralized EDW but they also have a monolithic early binding data model associated with them and they tend to assume ahead of time a (06:00) what the analytics use cases will be for that centralized EDW. So what ends up happening is a very difficult time in adapting that Enterprise Data Warehouse to analytic use cases in the future. So you didn’t anticipate it at the beginning. The balanced democratic model still is characterized by centralized data warehouse but typically also associated with a distributed Late-Binding™ data model. We'll talk a little bit more about that later on.

And then the tribal form of data governance is there's no centerpiece of data warehousing in the organization and in fact you have multiple distributed analytic system with little or no ability to understand the full continuum of care in healthcare.
Characteristics of Democracy

So those characteristics of a democracy apply whether you're talking about society or you're talking about data and that is you have elements of centralized decision making typically through elected or appointed centralized representatives and the majority rules.

Then you have elements of decentralized action, centralized decision making but decentralized action. And the members of that centralized representation are appointed or voted in the office. So you have that decentralized participation through voting, through the local populist and then everyone is expected to participate in developing shared values, rules and laws and abide by them and act accordingly.

What I see a lot of times in healthcare right now are organizations that pretend to be democratic but they continue to be tribal. So there is a centralized data governance body but the members of the community tend to act in a very tribal way. They don't participate, as this would suggest, the democracy should, where we're all participating according to shared values, rules and laws. So you can't have a democratic centralized form of government with a tribal participation and that's an important part of creating a successful data governance culture in healthcare.
So let's talk a little bit about trying to find this balance between too much and too little data governance. Not enough data governance is you'd see these completely decentralized, uncoordinated data analysis resources. Lots of redundancy, lots of expense, both in human skills as well as technology. You see a lot of inconsistent analytic results from different resources, attempting to answer the same question. So nobody is really sure what the analytic results are. You see poor data quality. For example, you see duplicate patient record rates, in excess to 10% in the master patient index. And when there is a data quality problem, there's no formal body nor process for fixing those problems. So those data quality problems tend to languish forever. And finally there's an inability to respond to analytic use cases and requirements, such as Accountable Care. So if you don't have a data governance function in place and these new analytic requirements emerge in the industry, you don't have anyone to appeal back to for the toolset to support those new requirements.
What’s It Look Like?

Too Much Data Governance

So too much data governance has similar set of problems, and to me the most critical vital sign is you have unhappy data analysts and their customers. Data analysts are always frustrated, they don't have any support from above and of course then this trickles down into customers that they're supplying their analytics too. Everything takes too long and it's kind of, again it's a symptom of an authoritarian government in general if you look at some of the authoritarian states around the world. They're very inefficient. Everything takes too long. Loading new data takes too long. Making changes to data models to support analytic use cases takes too long. Getting access to data takes too long. Resolving data quality problems takes too long. Developing new reports, everything takes too long.

Let me go back to that just for a second…

Again, too much data governance, too much authoritarian centralized decision-making, too much assumptions ahead of time what – to sort of assume that you know everything is a big part of the downfall to too much data governance.

Now, I think Tyler has a poll question that will help us better understand the current state of affairs for data governance in your organization.

Tyler, do you want to pop that poll up?
Poll Question

What best describes the current state of affairs for data governance in your organization?

[Tyler Morgan]
Yup, I've got poll popped up and we'll leave that open for you. Again, the question is what best describes the current state of affairs for data governance in your organization? Is it authoritarian, democratic or tribal? We'll leave this open for just a few more seconds to give everyone a chance to vote.

Alright. We'll go ahead and close this poll now and let's take a look at the results.

So we have authoritarian in at 19%, democratic at 25% and tribal at 56%.
Interesting. That's more distribution than I expected. I hope some of you who have each attributes of those models will ask some questions and offer some thoughts later on in the Q&A session.

I think, Tyler, you also have another. And this is a little different, right? Those were the characteristics of your data governance. Now, we'd like to have an understanding of the effectiveness and try to correlate it too.

So what's the effectiveness of the data governance that you have?

Poll Question

How would you rate data governance effectiveness in your organization?

179 Respondents

5 – Very effective – 1.6%
4 – 7.2%
3 – 22.3%
2 – 44.1%
1 – Ineffective – 24.8%
Poll Question
How would you rate data governance effectiveness in your organization?

[Tyler Morgan]
Alright. We’ve got that poll question up now. On a scale of 1 to 5, rate your organization's data governance effectiveness. And we’ll leave this poll up for a few seconds as well and then share the results.

Okay. We’re going to go ahead and close this poll now. And our results, we have 2% coming in at very effective, 7% at 4, 22% at a 3, 44% at 2, and 25% at 1 in ineffective.

[Dale Sanders]
Great. Very interesting and pretty much what I would expect I think. Thank you all.

The Triple Aim of Data Governance

1. Ensuring *Data Quality*
   - Data Quality = Completeness x Validity

2. Building *Data Literacy* in the organization
   - Hiring and training to become a data driven company

3. Maximizing *Data Exploitation* for the organization’s benefit
   - Pushing the data-driven agenda for cost reduction, quality improvement, and risk reduction

The Triple Aim of Data Governance

The Triple Aim of Data Governance, I'm kind of borrowing from the Triple Aim concept that we have in healthcare but now that quality of care for the patient, quality of care for the population and cost of care all boiled into the point of care.

The Triple Aim of Data Governance has to ensure data quality. That's kind of a first step in a data governance mission. And data quality in this context is defined by the completeness of the data that you have times its validity. So, are you collecting all the data that you need about a particular analytic use case and is that data valid. So the data governance committee and function must have strategies around data quality and ensuring completeness and validity of the data to support analytics.
Second is building data literacy in the organization. So the data governance committee needs to take on the responsibility for driving data literacy in the organization. It doesn't make any sense to build a library in an illiterate committee because no one is going to visit the library, right? So you have to teach people to read. Likewise, if you're going to have analytics technology like a data warehouse around, you have to hire and train people how to look and act and think like data literate organizations and employees. So hiring and training becomes very important to data governance.

Finally, there's data exploitation, and that is maximizing the value of data to the organization, becoming a data-driven organization that drives cost down, quality up and risk reduction down.

So again the battlefront of the data governance committee, you have to have a strategy, you have to have active projects under each one of these three areas to be successful. What are you doing about data quality? Where are you seeing data quality problems and missing data, the invalid data? What are you doing about hiring and training and becoming a data literacy organization, a literate organization, what are doing to campaign for this in the organization, working with human resources to do so. And then finally what are you doing to push the exploitation of data to better the organization as well from the executive level down to the frontline worker.

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Keys to Analytic Success

Our dear friends, (15:17) from Community Health elaborated with me and enlightened me about the importance of data governance for mindset, skill set, and toolset. So, the data governance committee again should have a role in each one of these, and that is are you setting the tone for being a "data driven" culture, are you campaigning, are you messaging that, do you have flyers going out, do you have articles in your paper, what are you doing to drive the notion that you're going to be a "data driven" culture, what are you doing to build those skills and the
skill set and then finally, what is the data governance committee doing to choose the right kind of tools to support that mindset and that skill set. And a data governance body should be participating in each one of these areas very proactively.

There are layers in the data governance model that I don’t think we always appreciate, and it starts up at the executive and board leadership. Then it filters down at the data governance committee, data stewards, data architects and programmers, the DBAs and systems administrators, and then finally the technical data access control system that surrounds the data warehouse and the analytics platform and all of that results in happy data analytics. It looks like it could be bureaucratic because we have so many layers but the truth is those layers should all be complementary and should be enabling a happy data analyst, not taking away from that.
The Different Roles in Each Layer

Executive & Board Leadership

"We need a longitudinal analytic view across the ACO of a patient's treatment and costs, as well as all similar patients in the population we serve."

But let's talk a little bit about some of the messages and the teams from each of these levels.

At the executive & board leadership, for example, they might say, "We need a longitudinal analytic view across the ACO of a patient's treatment and costs, as well as all similar patients in the population that we serve." So that might be an example of an aspirational goal communicated by the executives and the board leadership.

The Different Roles in Each Layer

Data Governance Committee

"We need an enterprise data warehouse that contains all of the clinical data and financial data in the ACO, as well as a master patient identifier."

"We need a data analysis team, as well as the IT skills to manage a data warehouse."

"The following roles in the organization should have the following types of access to the EDW."
Then the data governance committee's job is to take that aspirational goal and start translating that into skill set and tool set. So the data governance committee would step back and say, okay, to achieve that goal, for the continuum of care analysis of data, we have to have an enterprise data warehouse and we have to consolidate all the clinical and financial data in the membership to the ACO, as well as a master patient identifier that ties that altogether. And by the way, guys, there's tons and tons of these scenarios. I'm just picking out sort of typical dialogue that represents the sort of dialogue that occurs in each one of these layers but there's many more conversations in addition to these that I'm talking about.

We need to have a data analysis team. So in addition to the toolset, we need a skill set, as well as the IT skills to manage the data warehouse.

And we should also start defining who is going to have access to the data when we bring it together, which kind of roles, which kind of data analyst, what kinds of access to the data in the data warehouse. So starting to talk about access is very important.

The Different Roles in Each Layer

Data Stewards

Data stewards are the next layer in the data governance process and these are the folks at the frontend of care. They typically have been underappreciated. They have been working in finance or maybe they're a nurse informaticist. They've been toiling away for years. They understand how the data in their environment is collected. They understand the pros and cons of the data quality in their area. I think the data steward role is going to be an emerging and very important role in healthcare and I'm looking forward to these folks getting the recognition that they deserve.
So again quite often it's a registrar that's been toiling away for years or maybe the manager in HIM or the manager of group of registrars and they will stand up and say, "I'm responsible for patient registration. I can help with the facilitation of that analytics aspiration that's coming down from the board."

You'll get the same kind of response from data stewards that are responsible for clinical documentation in Epic, for example, nurses and physician leadership at the frontlines who know how the data is collected.

The Different Roles in Each Layer
Data Architects & Programmers

And then finally someone from finance, typically associated revenue cycle and cost accounting. They can step forward with their health as well. Then the data architects take that, the aspirations, the support of the data governance committee, the expertise of the data stewards, and they are going to start technically implementing that content to support the aspiration of the executives and the board leadership with the help of the data stewards. So they're going to work with the data stewards to extract and organize the data from registration, EMR, rev cycle, cost accounting and we're going to load that into the Enterprise Data Warehouse. They're going to ask the data stewards, "Can you sit down with us and help us talk about the data content in your areas."
The Different Roles in Each Layer

DBAs & System Administrators

DBAs and system administrators, here are the roles and the access control procedures that we need to associate with this data. And again, that's based upon the guidance that the data architects receive from the data governance committee. These are the kinds of people, here by name and by role, that will need access to this data in order to produce the reports that the board and the executive leadership would like to see.

Finally, the DBAs and the systems administrators are pulling this altogether in an access control list. They’re building easy ways for people to gain access and submit request for access and they build the database roles and the audit trails to support all that.

The Different Roles in Each Layer

Data access & control system

“When this person logs in, they have the following rights to create, read, update, and delete this data in the EDW.”
The Different Roles in Each Layer
Data Access & Control System

And then finally the data access & control system is keeping track of all these. When the person logs in, they have the following rights to create, read, update, and delete this data in EDW.

So those are all of the layers associated with the governance process from the aspirational down to the detailed technical level that you need to keep track of in mature data governance environment.

The Different Roles in Each Layer
Data Analyst

I almost forgot about the data analyst. Very very important, right? Now, the data analysts are going to benefit from all those different layers. I'm going to log in to the EDW and I'm going to build a query against that data and I should be able to answer those types of questions for the board and the executive leadership.

And they always typically engage the data stewards, "Can I cross check my results with you to make sure I'm pulling the data properly and interpreting the data properly? And can you give me your stamp of approval that this is a valid report before I publish it to the executives and the organizations and the other consumers?"

And then they'll feedback to the data architects, "I'll let you know if I have any trouble with the way the data is organized or modeled. And if so, we'll iterate and we'll improve upon that."
Alright. So that's the ecosystem of data governance. You need to have maturity in each one of those levels to be successful.

Who Is On The Data Governance Committee?

In terms of the membership of the data governance committee, this is what I recommend. I'm glad to see the emergence of the chief analytics officer. It's a new role in healthcare. I think it's a great new role. I think it's awesome. And if you don't have one, I would highly and suggest that you advocate for one in your organization. It's going to be critically important in the future. They should be of course a very important member of the data governance committee.

The CIO tends to function as the data technologist, so I think the CIO is really in a great position to understand not just the technical issues of data but the utilization of data and healthcare and be that generalist that can support all of the consumers and all the use cases.

You have to have the clinical data owners, the chief medical officer, the CNO as well, that's really important. The CFO needs to be involved because they typically own the financial and supply chain data. And then if you have research in an academic medical center, then it's really important to have a chief research officer as well representing the researchers' analytics data needs.

So that's the starting point for the data governance committee. It's an executive committee, as you can see.
Data Governance Committee Failure Modes

So some of the failure modes that I've seen in data governance committees, I'd like to highlight here, I see what I call wandering and that is the lack of direction and experience. You'll see a lot of discussion about we know we need data governance but we don’t know how to go about it.

You'll see quite often technical overkill. And this is me, by the way. I've made this mistake in my career. I've been the overly passionate and inexperienced IT person that leads the data governance committee and I get wrapped up in the forest. I can't see the forest for the trees. Several occasions in my career I bring executives together and I start asking them to help me start defining naming conventions and data types for data base columns. That was pretty embarrassing. I see this repeated over and over. So by the way all the flaws that I identify, I've made these mistakes myself, that's why it's so easy for me to see them again. So don't let this happen to you. It's very common especially in healthcare.

Unfortunately you see politics among members of the data governance committee. They can be passive aggressive sometimes, narrowly motivated about their particular area, what I call data posers. They tend to be data driven and selfless but when they leave the committee, they're not and they go back to their offices. They can be territorial and defensive about their data. And this is one that I see quite often that's really disheartening and that is they make assumptions and they'll say things like "we don’t trust people with the data. They're not smart enough to use that data properly." And so rather than educate those folks and work with them to train them and become data literate, they just pull back and they put up walls and defensiveness around those data. It doesn't work.

The other is I see a lot of "red tape" and that is committee members are not governors of the data, they are really more like bureaucrats. And rather than trying to create a data driven organization, they start acting more like a data security committee than a data governance
committee. And I feel a lot of red tape around the processes for accessing data and there's limited access to data too. And again, they tend to confuse data governance with data security.

So I think, Tyler, you have another poll question here relative to those risks or failure.

**Poll Question**

Your organization's biggest risks to the success of the Data Governance Committee

182 Respondents – Multiple Choice

- Wandering – 52%
- Politics – 61%
- Technical Overkill – 20%
- Red Tape – 36%
- Other – 16%

**[Tyler Morgan]**

Yes, we do. We just got that up there now. What are your organization's greatest to the success of your data governance committee? Now, you can select one or more of the following
here – wandering, technical overkill, politics, red tape or other. I'd like to remind everyone as well that you can ask questions using the questions pane in your control panel. We will be addressing those questions during our questions and answers time. We'll leave this poll up for just a few more seconds and then share the results to everyone.

Alright. We'll go ahead and close that poll now and share the results.

Now, we have had a couple of questions asking as what's the participation level of this poll. So, I'll let you know that for this particular poll, we've got 175 individuals who answered this poll with 52% wandering, 20% technical overkill, 61% politics, 36% red tape, and 16% other.

[Dale Sanders]

Interesting. Thanks everyone. I think, Tyler, correct me if I'm wrong but we will summarize the results of these polls and send that out (27:25) to all the attendees, is that right?

[Tyler Morgan]
That is correct. The recording will follow the these results and the summary will be available, as well as the slides and the information for everyone.

[Dale Sanders]
Great.

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**Data Governance & Data Security**

- Data Governance Committee: Constantly pulling for broader data access and more data transparency
- Information Security Committee: Constantly pulling for narrower data access and more data protection
- Ideally, there is overlapping membership that helps with the balance

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Data Governance & Data Security
Speaking of data governance and data security, it has to be balanced. What I like to see in cultures is the data governance committee constantly pulling for broader data access and more data transparency. In contrast, the information security committee tends to constantly be pulling for narrower data access and more data protection. But the reality is there has to be a healthy tension. I tend to be very risk-tolerant. Given my background and information security, you’d think I would be more paranoid than I am but I believe that it’s really important to create a sense of risk tolerance when it comes to the utilization of data in an organization. Now, obviously I always want to protect patient identifiable data. You always want to protect the employee data but everything else from that should be pretty open and pretty transparent.

Ideally, what I like to see is overlapping membership between these two committees because that forces those people to wear both hats and you generally see better balance, so that one of these dogs are not overwhelming the other.

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Tools for Data Governance

Some of the tools that you need for data governance are very important to the management of data. You need to have data quality reports that expose validity and completeness. So validity can be checked against things like master reference data, things like gender, for example, is a good example. Reference checks against BMI and blood pressure. So they’re arranged value check in some of those deals. And then of course completeness is simple checks like no values and things like that. But those basic data quality reports are critical to the data governance function.

You need to have what I call customer relationship management tools around the data warehouse that tells you who’s using which data, when and why. A lot of it is driven from your audit logs and things like that. But the data governance committee should be looking at this kind of reports all the time so that they understand what it is that they’re managing.
You need tools for "white space" data management. So there's always data that you need in an organization for analytic use cases that's not being captured in the transaction systems, particularly so in research agendas. So you need some sort of tool for capturing this data and loading it into the data warehouse and that's what I call "white space" data because it's kind of the data between the lines that you need to fill in that the transaction systems are not yet capturing, like Epic and Lawson and things like that.

You need to have a metadata repository that exposes which data is in the data warehouses. Really really important to the democratization of data to have these yellow pages or this atlas that's associated with the content in the data warehouse. That also exposes, by the way, data quality problems. And identify the data stewardship and things like that, how much data is available and over what period of time, those were all attributes of metadata repository.

The Four Levels of Closed Loop Analytics in Healthcare

This is another one of those slides that we could talk a long time about. I want to thank Denis Protti and Corinne Eggert in Canada for their collaboration on this, and it's what we call the four levels of closed loop analytics in healthcare. And the message here, and again this is worth a longer discussion later on but the message here is that there tends to be four decision-making levels that you support with analytics in healthcare right now and the data governance body needs to address those four different kinds of consumers and those four different loops.

So the innermost loop is what we call really tightly closed loop analytics where you're feeding data from the EDW right back to the electronic health record and you're just seeing protocols and order sets and things like that dynamically on the fly based upon what you're seeing in the data in the EDW. Then there's kind of the integrated practice team levels and the level where you're working on protocols and things like that. You're going to feed data back to that group
of people so that they can look at the lower level here in a more analytically informed way. So what is going on here at this closed loop level is affecting patient outcomes and costs. And how do we adjust our protocols to that? Then as a practice team level, now you're starting to look at adjusting the delivery of care across the organization and the coordination of care between integrated practice teams in the ACO. And then finally up at the performance level, you've got executive and clinical leadership that are looking at things like the formation of the ACO, where do we put new clinics, what can we do in the organization or in the community we serve to start looking more like a population health and a public health system.

So, your data governance committee is going to be supporting each of these four levels in the organization in healthcare in the future, and again probably a topic for greater detail and discussion later. I'm happy to do so if anyone is interested.

### Healthcare Analytics Adoption Model

Some of you have seen this healthcare analytics adoption model in the past and I'll just briefly go through it again. Our best take on the progressive development of an analytics strategy in healthcare, starting out at the kind of this tribal level down here at level 0, the formation of data warehouse, organizing the data around basic vocabulary and registries, automating your internal and external reporting to get that out of the way and then moving up into the levels 5, 6, 7, and 8 where true differentiation for your organization can occur through analytics. And so, the data governance body needs to look at this and ask itself how are we performing in each one of these levels? What kind of progress are we making with the skill set and the toolset and the mindset in each of these levels? And currently right now in healthcare we need to really be focused on up through level 6 for sure, possibly level 7. Level 8 is a little bit aspirational but we've got to take care of these basic levels down below level 8 fairly quickly and the data governance committee should be playing a big part of that.
Progression in the Model
The progressive patterns at each level

- Data content expands
  - Adding new sources of data to expand our understanding of care delivery and the patient

- Data timeliness increases
  - To support faster decision cycles and lower “Mean Time To Improvement”

- The complexity of data binding and algorithms increases
  - From descriptive to prescriptive analytics
  - From “What happened?” to “What should we do?”

- Data governance and literacy expands
  - Advocating greater data access, utilization, and quality

So one of the things that the data governance committee should look for is the expansion of data content. As you move up in each of those levels, data content expands. They're adding new data sources. The timeliness of your data has to increase because you're becoming more agile and you're making decision cycles much faster as you go up and as the data literacy in your organization increases. The complexity of data binding and algorithms increases and this is another form of data governance. So those algorithms need to have some form of governance and that's an important function of the data governance body as well.

And then finally working on that expansion of data literacy is really important because as you go up that model, this is a very complicated level 8 culture, requiring highly trained, highly educated folks. And so, the data governance body better be working to get up to that level.
Another set of patterns that you'll see as you progress up through that level is the six phases that I described right here and that is there's a cultural tone of being data drive. Then you're knocking down barriers and access to data. Then you're establishing formal stewardship of data, who those data steward is going to be. You're focusing on improving the data quality of the data because the truth is until you get access to data and you start exposing the data and until you have data stewards in place, you can't do much about data quality. You won't see any data quality problems until you start exposing it and then you better have a team of data stewards in place to help when those data quality problems become apparent. Then start focusing on the full utilization of the data. Then the strategic acquisition of data is really important if you are going to get up to level 8 in that analytic adoption model. It includes things like genomic medicine and genomic data content. So you need to start working right now as a data governance committee because it's going to take your organization quite a number of years to get the data content that you need for level 8 in place.
This is a description of the data that we need to govern in healthcare. Starting out right now, with these first six, these are the data elements in our environment right now that we need to be working on. These are the core data elements or data sources that we need to be focusing on. Then, the next phase here, 7 through 12, is starting to expand the content. We're getting into more complicated use cases, HIE data, bedside monitoring data, external pharmacy data, familial data, home monitoring data is going to be very important. And then finally working on patient reported outcomes, long-term care facility data, genomic data. And then the real time 7/24 biometric data of all patients in the ACO I think is an inevitable part where we’re headed. I might point out that there's really no solutions in the market right now for detailed cost accounting or patient reported outcomes data but there are two really really important elements of data for us to provide the best care possible for the country. So if there are any vendors out there listening, working on these two areas, I believe it's critical for the industry and I think there will be a pretty significant market for both of those in the future.
So just a discussion here about master data management for just a moment, and this is from Wikipedia, and "master data management comprises of processes, governance, policies, standards, and tools that consistently define and manage the critical data of an organization to provide a single point of reference." So tangibly what that means is you've got things like ICDs, CPTs, SNOMED, LOINC, RxNorm, facility codes, all of those kinds of things are standardized and they're sequestered in some place, typically in a data warehouse, where you can reference those and use those for data quality checks and references and things like that.

The other part of this is more complicated. It's not the vocabulary but the analytical rules associated with that data and that's considerably more complicated to manage and again kind of a topic for another discussion probably.
I want to talk about this notion of data binding as it relates to governance too. So if you have 115 and 60 of data elements, they're pretty meaningless pieces of data. They're just numbers. They don't mean anything until we bind that data together through analytic software to a vocabulary and some rules about that data. And in this case, the vocabulary is systolic and diastolic blood pressure. Oh okay. Now I'm starting to see some meaning because I bound that data to a vocabulary. Ah...okay, I get it. Now, the more complicated thing is the rule about that data, what does that measure represent in this context is a normal blood pressure, right? So that's when I talk about Late-Binding™ and that sort of thing. That's kind of what I'm talking about. That's vocabulary binding and rules binding.

Why Is This Binding Concept Important?

Knowing when to bind data, and how tightly, to vocabularies and rules is CRITICAL to analytic success and agility.

- **Comprehensive Agreement**
  - Is the rule or vocabulary widely accepted as true and accurate in the organization or industry?

- **Persistent Agreement**
  - Is the rule or vocabulary stable and rarely change?

Data Governance needs to look for and facilitate both.
Now, why is it important? Because data governance needs to facilitate and encourage the comprehensive and persistent agreement of those bindings, and it's relatively easy in our culture and in our industry to bind data to a vocabulary.

Data Binding & Data Governance

We do a decent job of that. At least we have the tools and the capability to do that. But there's all sorts of variability about what constitutes hypertensive patients, for example. I can come up with at least six different definitions that are standard in the industry for measuring and defining what a hypertensive patient is.

Why Is This Binding Concept Important?
So the data governance committee needs to facilitate this comprehensive and persistent agreement, particularly around the rules associated with binding data – things like length of stay, hypertension, that kind of thing. We don’t – even basics like that, we don’t have persistent comprehensive agreement in the industry. So the data governance committee needs to do that locally.

Vocabulary: Where Do We Start?

So where do you start with vocabulary? There are about 20 data elements in healthcare today that make up 80% to 90% of analytic use cases. They will grow over time but right now it's fairly simple. So from a vocabulary perspective, the data governance committee needs to look at how consistently and accurately the organization is capturing and managing these data elements across the organization – because, for one reason, they represent a lot of the overlap between the different source systems that we're pulling data from. And so, this has to be standardized in order for you to perform those continuous analytics, continuum of care analytics in an ACO. Alright. That's the easy part. Vocabulary is relatively the easy part.
Clinically it's more complicated. I see consistent opportunities across the industry in the following areas. So, if you're asking yourself analytically from the data governance committee, where do we start focusing our efforts for improvement and where do we focus our data governance initiatives around quality, literacy, and utilization? We see a lot of success in CAUTI and CLABSI. We see a lot of success in pregnancy management and in particularly around elective induction, discharge medications and adherence for MI and CHF, prophylactic pre-surgical antibiotics, lots of opportunities in materials management and supply chain, glucose management in the ICU, knee and hip replacements, lots of opportunities and gastroenterology patient management, spine surgery, heart failure. So those are some typical places where we see across the industry organizations making good progress, and what I mean the progress, it means that you've got the data, you've got the culture, and you have a focused area that your data governance committee can work on to facilitate quality and behavioral change.
I might mention here that it's important to kind of scope your beginnings according to your scope of influence, and I would argue that we're still learning how to manage outpatient populations. We don't really know how to do that. In contrast and in theory, we should have almost complete control over the healthcare provided to an inpatient population. They're within the borders of our organization, we're managing them very closely. When a patient moves to the ambulatory environment, it's about the environment, it's about their lifestyle, it's about their friends and their behaviors. So it's a lot harder to manage those folks.

Where Do We Start, Clinically?

We see consistent opportunities, across the industry, in the following areas:

- CAUTI
- CLABSI
- Pregnancy management, elective induction
- Discharge medications adherence for MI/CHF
- Prophylactic pre-surgical antibiotics
- Materials management, supply chain
- Glucose management in the ICU
- Knee and hip replacement
- Gastroenterology patient management
- Spine surgery patient management
- Heart failure and ischemic patient management

Where Do We Start, Clinically?
So, when you're looking for opportunities, I want to go back up to this slide. You can see there's a pretty heavy emphasis on inpatient progress here on this slide. And the reason for that, I believe, I had to think about it actually. When I started listing these out, I thought, how come I don't have things like asthma on here or how come I don't have things like diabetes management on here? And the reason is we still aren't seeing huge breakthrough improvements in cost or quality of care in those outpatient areas across the industry because it's so hard to manage.

And so, that's what prompted me to sketch out this chart, which basically says in a highly outpatient oriented environment, you have a pretty low degree of influence and actually we don't have much data because there's a lot going on in the community, in the ambulatory setting that we don't understand that we don't collect any data on. Whereas in an inpatient setting out here, we're collecting lots of data, we have lots of influences in ACO because those folks are within the walls of our organization. So that's kind of the background on how I came up with that list and what I think it really means when you're trying to scope what should we be doing with our analytics data governance strategy.
In Conclusion

So, in conclusion, I'm a big advocate in our society for practicing the same form of data governance that we practice in our society, finding that balance between centralized and decentralized governance. I think the Federal versus States' rights is a good metaphor. We work in it all the time and I think that applying that metaphor to data governance is a good way to frame it.

Remember the triple aim of the data governance and the battlefronts of data quality, data literacy, and data exploitation. And again, also give you a data governance committee something to (45:17) their teeth into, and analytics and the data warehouse does that. So a lot of organization will start with a data governance body without any kind of analytic strategy, without a data warehouse, and that's where I see folks wandering around a lot. The data warehouse and the analytic strategy give your data governance committee something to do. So I would highly encourage that you tie the two together.
Before we move on to the Q&A sessions, I just want to give a plug for this analytics summit that we are organizing. I'm really really excited about this. This is a vendor agnostic thing. This is not a sales opportunity for Health Catalyst. We believe in sharing the blessings of our success with all of you and we believe that by educating the market, it improves everyone's understanding, it will put greater pressure on us. We have a great lineup of speakers. There's more speakers on the way but Ray Kurzweil from Google will be there. Billy Beane, the guy behind Moneyball. Glenn Steele from Geisinger will be there. James Merlino from Cleveland Clinic. Michael Leavitt, the former secretary of Health Human Services. Lots more coming. So, really I highly encourage everyone to put this on their calendar. Let's see...what is the date... I can't see the date. There it is. September 24th in Salt Lake City and we look forward to seeing you there.

And I think, Tyler, you're going to give away a free pass to this or something. Is that right, friend?

POLL QUESTION

[Tyler Morgan]

Yes. As a matter of fact, we will be giving away a free ticket to the healthcare analytics summit. It's really simple. I've got a poll here that I'm going to put up here in just a moment. And if you'd like to be entered into the giveaway and you believe you can attend the summit on these dates, then by all means, answering in affirmative. We will announce the winner from this random drawing by email and usually following the webinar.

So I'll leave this up for just a bit to allow everyone who would like to take the opportunity to be able to do so.
Okay. I'll leave this up for just a few more seconds and then close it down.

Okay. I'm going to go ahead and close this right now. I'm actually going to share with you. It looks like about 80% of you know your schedules well enough that you believe you can attend. That's exciting.

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