Dale Sanders: Thanks. And hi everyone, here we go. As usual, this is going to be bit of a fire hose. So lots to cover. Speaking of that, I want to give everyone that's on right now a fair warning that this is an intense text heavy tutorial. It's more like a graduate class and a typical vendor webinar. And so if you're expecting something different, you might not want to attend, we're going to go into some pretty nitty-gritty details. Part of the presentation today will sound more like an audible book than than a PowerPoint. But it's in the details where success or failure reside with this. So that's one reason I want to pass those details with all of you. All right.

Dale Sanders: So, the agenda today, four parts. I first want to start off with an appeal for our physicians and I'll share a little bit more about what I mean by that shortly. We'll go into the history of the analytics adoption models in healthcare. There been a few that have evolved for the last few years. So I think that history is important. We'll dive into the details of the current model. And then, I want everyone to think about what we do with the ninth level that I added in the October-November timeframe of this year. And that ninth level is direct to patient analytics and AI. What does that mean for us as professionals in the space? I don't have that fully fleshed out yet, those thoughts. So I welcome all the attendees to provide those thoughts and give that some critical thinking while we're in the webinar today.

Dale Sanders: So, health catalyst in HIMSS are actively soliciting input for the next version of this model. How can we improve the model? Where does it need updating and modernizing specifically around level nine? But every one of the levels and all the details. And so I ask that if you have thoughts, email me afterwards, @dale.sanderhealthcatalyst.com. Make sure you use the subject analytics adoption model webinars, so I can search on it in the morass of my inbox. And we'll fold those thoughts into the next generation model. Okay. All right.

Dale Sanders: So, appealing to our physicians. We've got a little bit of

Brooke MacCourtney: Audio issue. Yeah.

Dale Sanders: We good?

Brooke MacCourtney: I think we're good. Yep. Keep on.

Dale Sanders: I just want to appeal to everyone sense of empathy for our physicians. We are literally losing our physicians. Although, I did see a poll recently that indicated physician burnout is reducing, it's getting better. But those of us in this meeting, I believe, really, we're standing at the cliff edge in U.S. healthcare history, whereas professionals in data and professionals in analytics, we can either help the situation or we can drive burnout even further. And I would argue that analytics is actually contributing to the EHR problem. The EHR is certainly have their problems with usability and they're certainly contributing to burnout. But

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if you look at the way physicians are interacting with an EHR, a lot of those mouse clicks, a lot of those data entry keystrokes are actually being driven by the accumulation of analytic data. So we're actually contributing to part of the EHR problem. The EHRs are being blamed, but analytics is in the background.

Dale Sanders: So I want everybody as professionals and analytics to think about that. Think about the impact that we're having, think about the value of collecting more data on the backs of nurses and physicians. And think about the return on investment, the cost to clinicians and their well-being versus the value that data analytically to our interests. I would argue to that over and wrong measurement of physicians is hindering not helping data-driven healthcare as indicated in this study. In the journal in April 2018, 63% of the Quality Payment Program measures that were assessed in this study were deemed as clinically invalid or have uncertain validity. So one of the things I'm going to ask of all of you today, let's gather up, let's unionize, And let's figure out a way to reduce the burden of these enormously complicated and burdensome quality measures that so far have done little to actually change the cost and quality care of health care.

Dale Sanders: There are some exceptions. But I would argue that the proliferation of all these quality measures and the burden that it places on physicians is having an overall negative effect on our attempts to become data-driven in healthcare. So I'm actually soliciting for help in creating a grassroots movement to reduce and simplify the number of quality measures that are imposed upon our clinicians from primarily CMS and the private payer market. All right, so I'll come back to that topic later. Remember my email address though. And if you're interested in helping me with that grassroots movement, please reach out to me.

Dale Sanders: Wrapping up this topic is analytics professionals. We have two paths we can take, in the collection of data from EHRs in pursuit of measurement and analytics. What are we doing as analytics professionals to either contribute towards physician fulfillment or contributing to physician burnout. And I would encourage everyone on the call to reflect on this and when you engage in your organization's with an analytic strategy, be very deliberate about asking yourself, which branch of this diagram are you contributing to?

Dale Sanders: Okay, let's get into some of the historical context of these analytics adoption models. I dusted this off. Hence the rather rudimentary graphics. I produced this back in 2002, I was still at Intermountain. And those of you old enough to remember will recall that the software Capability Maturity index (CMMI), was pretty popular at that time, I thought we needed some similar kind of framework to guide people through analytic maturity. And so this was my first attempt at them. Satisfying level one compliance and regulatory measures you have to do that. Then accreditation at that time, especially Joint Commission was pretty important. Then accreditation and professional societies, STS, NEMI, etc.

Dale Sanders: Then meeting payer financial incentives, at that time, that wasn't as big an issue in the industry as it is today. We're looking at almost 20 years ago. Not nearly as many quality measures at that level as what we face today. And then finally at level five was evidence-based medicine routinely practice throughout the organization. So that was my first attempt at creating an analytics adoption model, a little more than this existed behind it. There wasn't much narrative. There wasn't much definition. There wasn't a recipe behind this

Dale Sanders: Couple of years past, Tom Davenport, who is pretty well known in analytic circles through Harvard and HBR, produced what he called the five pillars framework for Analytics maturity that came out around 2010 through the International Institute for Analytics. It had five pillars, going from analytically impaired up to analytical competitors. It was industry agnostic. I thought it was interesting, but I didn't think it was particularly relevant to healthcare and I think it's too generic. So I thought we needed something different. I put that in the back of my mind. HIMSS collaborated with the Davenport folks to create what they call the Delta model. And so HIMSS came out in 2012 with that Delta standing for data, enterprise leadership targets analysis. And that didn't go very well. There wasn't much adoption for it. And by the way, the whole time I was chatting with HIMSS about this, I played an active role in helping HIMSS come up with a follow on to their EMR adoption model specifically analytics. And what they found is that this model was too generic for the healthcare industry.

Dale Sanders: In 2012, with that background in that context, I thought, I'm going to borrow from the EMR adoption model very purposely, because it was a metaphor that existed, it helped drive the adoption of EMRs in the industry. And I thought people will recognize this metaphor relatively easily. So I went a level of a depth deeper. I published a paper in electronic healthcare in 2012 called a model for measuring industry wide adoption and capability of healthcare analytics and data warehousing the U.S. I specifically mentioned the U.S. because there are payment related analytic maturity details in this model. And so you'll see it looks a lot like the EMR adoption model. And that started gaining some interest and attraction.

Dale Sanders: Then in 2013, I took it another level of detail. And, for the most part of what we will review today are the details of this model with just a few changes. So I want to pause for just a second and talk through this. We're go into details later. But I want everyone to think about where your organization resides On this model. Where does your organization consistently operate on a comprehensive and persistent basis. And by the way, even though it's a level-oriented model that would suggest a serial stepwise progression through the model. The truth is you can operate with levels of maturity in each of these levels. You don't have to go stepwise through it. I would caution everyone though that if you try to jump up to level six, seven and eight, the more exciting and glamorous levels that we're all attracted to, without satisfying the foundation underneath, you'll struggle at

those upper levels. You'll never be fully efficient. And I will share a story from Intermountain that highlight personal experience with this.

Dale Sanders: When I landed in Intermountain, I didn't know much about healthcare. I knew a lot about analytics and data warehousing coming from my space and defense background. And the Intermountain culture at that time was dominated by a focus on level five wasted carrier variability reduction. And so to a large degree, when I built a data warehouse or team built a data warehouse at Intermountain, that's where we also focus for a good period of time. Well, then, when I went out to the hospital as director of medical informatics, I got out in the front lines of care. I realized firsthand that we were spending way too much money on the production of level three and level four reports. And that was actually hindering our ability to move up the chain to the more differentiated levels above it.

Dale Sanders: So I was wearing two hats at the time. I was director of the data warehouse I was director of medical informatics. So we stepped back as one of the largest clients as well as the purveyor of the data warehouse. I said, "We've got to fix level three and four." So we reinvested in level three and four. Ironically, what I see in the industry now is a similar problem. So level three and four, those basic internal and external reporting requirements are consuming all the oxygen in the room, even though we'd all like to move at level five, six and seven and above. The truth is all of our inefficiencies and also the overwhelming number of quality measures and KPIs in level three and four are actually holding us back. So we have to increase the efficiency and the productivity of level four and below so that it frees up our time to get to the higher levels.

Dale Sanders: Let me just get back here for just a second. Sorry. We'll come back to the details of this shortly. But really important that you nail the foundations, be very mature in those so that it gives you the time and then the efficiencies to move to the higher levels.

Dale Sanders: Okay. So in 2015, in collaboration with HIMSS, HIMSS decided that the Davenport model wasn't working very well. So I said, I always wanted the model that I had been producing to be an industry standard, disconnected from health catalyst, disconnected from a vendor. And so I granted a creative common copyright to HIMSS to do what they wanted to with the model that I had produced and written. And they came up with the model that is currently in existence. And I want to give HIMSS great credit for the way they roll this out to the industry. The level of detail they go into, the professionalism they express and the knowledge they express when they go into their assessments, very much like the EMR adoption model but applied to analytics.

Dale Sanders: So they're seven actually eight level stage model is based largely upon what I produced and wrote in 2013. I'm working with Dr. Anne Snowdon. She's the director of clinical research at HIMSS Analytics. We're working together now. So that the modifications I make to my model are collaborative and supportive of

what they're doing at HIMSS. So again, if you have thoughts about any of this, reach out to an Anne and I so that we create something that's good for the industry.

Dale Sanders: Okay, so in 2019, I added level nine. That's the only change I made to the model. And level nine was direct to patient analytics and artificial intelligence. Empowering patients with analytics to make their own decisions, choose their own care and just be empowered as individuals.

Dale Sanders: One of the motives that I had when I wrote the model in the first place was to use it as an evaluation framework from vendors like Health Catalyst. So vendors could use this to guide their product development, not just Health Catalyst, but all vendors. And also clients of those vendors could use this model as a way to evaluate whether vendors are actually delivering and can help their clients move through each of these levels. So what you'll see over on the right hand side are the products that we are building or have built and the roadmap associated with each of these levels. So I would suggest to vendors that might be listening, I would suggest to clients who are evaluating their analytic options, even if it's building your own, ask yourself, what are you doing, what are vendors doing to provide products and services in each of these levels, so that we can progress as quickly and as affordably as possible to the highest levels.

Dale Sanders: And speaking of which, another motive that I had was to get resources move from essentially the plumbing of analytics up to the higher level value analytics in the rest of the model as quickly as possible. So again, when you ask yourselves, when you ask vendors, ask them, to what degree are you helping me as a client commoditize the lower levels of this model so that I can operate a level five, six, seven and eight and nine where the real value of analytics resides?

Dale Sanders: Okay, hang on. We're going to go into the details now. And this is where it's going to sound like an audible book. So like I said, bail out now if you have any reservations. All right, so here are the details at each level. And what I would suggest is that if you're a project manager, if you're a chief analytics officer, if you're a vendor with products and services, that you parse this statement, and you ask yourself to what degree does this apply to our products and solutions and to our clients? So level zero, the model is characterized by fragmented point solutions, which are very focused limited analytics capabilities typically focused on departmental analytics, such as finance, acute care, nursing, pharmacy, lab position productivity. New knowledge generated by these solutions tends to be isolated to one area which may encourage optimized sub-processes at the expense of enterprise wide processes. The fragmented applications are neither co-located in a data warehouse nor otherwise architecturally integrated with one another. Overlapping data content leads to multiple versions of the truth. Reports tend to be labor intensive and inconsistent, there is no formal data

governance function tasked with maximizing quality value data in the organization.

Dale Sanders: Point solutions in this level can satisfy the internal and external reporting that is important up to levels three and four. But they are not a market differentiator and cannot scale to the more complicated analytic use cases and business models associated with the upper levels of adoption. Cumulatively, fragmented point solutions at this level also tend to require significantly more labor from data analysts and systems administrators to use and maintain than a single integrated data warehouse. The same inefficiencies of decentralization hold true for the fragmented costs of software licensing and vendor contract management. Okay. Think about that. If you're ready, we're going to go through each one of the levels with this kind of detail.

Dale Sanders: Level one, by the way, I renamed, at one time this was enterprise data warehouse. My took a commercial approach to this and renamed it enterprise data operating system because that's what we call our platform in Health Catalyst. And it is different than a traditional data warehouse. But if you don't have the Health Catalyst platform, you essentially call this an enterprise data warehouse.

Dale Sanders: So level one is satisfied when core transactions source system data is integrated into an EDW. At a minimum, the following data sources are co-located in a single local or hosted data warehouse. Number one, you've got HIMSS EMR stage three clinical data. So you have to have at least an EMR with stage three maturity and that content has to be loaded in the data warehouse. You have to have financial data, particularly costing data. You need materials and supplies data and you need patient experience data. Those are the four fundamental data content areas that have to be in level one to satisfy that level one criteria. If available, data content should also include claims. Realizing that we built this model in 2013, friends, I would say now, every enterprise data warehouse needs to include claims. So this is an area where we can probably brush up on and refresh some of the content that's happened over the last 8 to 10 years.

Dale Sanders: A searchable metadata repository needs to be available across the enterprise. The repository provides natural language descriptions of the EDW content, describes known data quality issues and records data lineage. Metadata repositories is a single most important tool for the complete democratization of data across the enterprise. EDW data content is updated within one month of changes in the source systems. I think that's too slow for updates nowadays, friends, I would never advocate that nowadays. So that's one thing we'll definitely update with the new version.

Dale Sanders: The beginnings of the Enterprise Data Governance function are established with an initial focus upon reducing organizational and cultural barriers to data access, increasing data quality in the source systems and master data identification and

management. So data governance is functioning. Data stewardship for the source data content areas in the EDW is forming under clinical and administrative leadership. Organizationally, is best for the EDW to report to the CIO at this stage. Assuming that the CIO can facilitate access to and the extraction of data from the source systems. Later as EDW evolves from the construction and early phases of adoption, the organizational alignment can change to another C level executive who represents the functional use of analytics in the organization, such as the chief medical officer or chief quality officer. And nowadays I would add chief analytics officer to that.

Dale Sanders:
Okay. Level two, standardized vocabulary and patient registries. At this level, master vocabularies and reference data are defined and available in the EDW. These vocabularies and reference databases includes local master patient identity, physician identity, procedure codes, diagnosis codes, facility codes, department codes and others. Data stewardship for master data is functioning. Master vocabularies and reference data are identified and standardized across disparate source system data content in the EDW. Naming definition and data types in the EDW data content areas are standardized according to local master reference data, enabling queries across the disparate source content areas. Patient registries based on billing codes and defined by multidisciplinary teams are available in the EDW to support basic analytics for the most prevalent and costly chronic diseases and acute care procedures in the local environment. Data governance forms around the definition and evolution of patient registries and master data management. So again, we see some areas there where this could be updated. Billing codes is probably not a fine enough green and fidelity in today's environment for patient registries. So, clearly, I would say we need to step up and refresh that content.

Dale Sanders:
All right. Level three, automated internal reporting. Level three is characterized by automated internal reporting, where the analytic motive is focused on consistent, efficient production of reports required for, one, executive and board level management and operation in healthcare organization. And two, self-service analytics for key performance indicators and interactive dashboards at the director and management level. The key criteria for success in this level is efficiency and consistency of reports that are necessary for effective management, but alone are not enough to create differentiating value in the market. Ideally, once developed and deployed, the maintenance of these reports requires little or no labor support on our nearly entirely self-service. Also, the reports are reliable and their availability when needed, consistent and accurate, thus minimizing wasteful debate and the attractiveness of developing redundant reports, the end users and analysts consider more reliable, consistent or accurate.

Dale Sanders:
And analytic services user group exist within the organization that facilitates collaboration between corporate and business unit data analysts. Among other synergies, this group is organized to define consistent data definitions and

calculation standards. Data governance expands to include data quality assurance and data literacy training, and to guide the strategy to acquire mission critical data elements and subsequent levels of adoption. So I hope, friends, that you're starting to see that if you use this very deliberately, if you're a chief analytics officer if you're the leader of an analytics and BiFunction, if you take this statement, flip it around and turn it into a checklist, It gives you the recipe for starting to progress up this model. So use this and not only that, but it also gives you an opportunity to ask vendors to what degree are you helping us progress through these levels?

Dale Sanders: All right. So back to in reference to level four and these automated external reports, are we in an overwhelming environment? I would say yes. Is it meaningful? I don't think so. As indicated in this journal article in 2016, of the nearly 2000 quality metrics that existed at the National Quality Measures Clearinghouse at that time, only 7% of those measures were related to clinical outcomes. Less than 2% of those are based on patient reported outcomes. Things have improved a little in the last four years, but not much. And by the way, the Quality Measures Clearinghouse got deferred in 2017, so virtually all that work got transferred to HRQ and CMS. But the point here is that, back to my opening statements, we're overwhelming ourselves with quality measures that may not be all that meaningful. And I think all of us as analytics professionals need to open our eyes to them rather than blindly following and advocating for these quality measures, we need to start thinking about the value they provide patient care and the impact that they're having on clinicians and their fulfillment.

Dale Sanders: I went out to the CMS measures inventory tool in preparation for this just to find out what has changed, do we still have somewhere in the neighborhood 2000 quality measures. And as near as I can tell, using the measures inventory tool, you can see the criteria that I selected there on the left, we still have somewhere around 1400 quality measures and we have somewhere around 13 or 14 different measure types.

Dale Sanders: So again, I think it's time for us to step back and simplify this. It will reduce the administrative overhead in the industry and it will certainly release a lot of the frustration and the burnout that we're placing on physicians. The other thing that's interesting is that we were producing all these quality measures and things like that. But the reality is quite often what we believe is evidence-based medicine, and then we bake that into quality measures, turns out to be not evidence-based medicine and we reverse that care later on. And so, according to a German article in 2011, 46% of evidence-based standards, over the 212 articles reviewed in the journal that year, were later reversed, 35 studies suggested new standards of care, 16 were determined ineffective.

Dale Sanders: So again, we rush headlong into these quality measures believing that they are a reflection of true evidence-based care. But the truth is, I don't think we always

	know what evidence-base care is. So let's be a little more conservative. Let's focus a little more on what we know for sure, we should or should not be doing.
Dale Sanders:	Okay. Level five, now we're starting to move up into more differentiating higher value analytics at this level. A level five organizations are moving away from utilitarian internal and external reporting. They have a significant opportunity to differentiate themselves in the market based on quality and cost and enabled by analytics. Data at this level is used explicitly to inform healthcare strategy and policy formulation. The analytic motive is focused on measuring adherence to clinical best practices, minimizing waste and reducing variability using variability as an inverse proxy for quality. Data Governance expands to support multidisciplinary care, management teams, they're focused on improving the health of patient populations. Population-based analytics are used to suggest improvements to individual patient care. Permanent multidisciplinary teams are in place to continuously monitor opportunities that will improve quality and reduce risk and cost across acute care processes, chronic diseases, patient safety scenarios and internal workflows.
Dale Sanders:	The precision of registries is improved by including data from lab, pharmacy and clinical observations in the definition of patient cohort. The EDW content is organized into evidence-based standardized data marts that combined clinical and cost data associated with patient registries. The data content expands to include insurance claims if not already included, and HIE, health information exchange data feeds. On average, the EDW is updated within one week of source system changes. Okay. Again, you can parse this into a checklist and ask yourself to what degree are we operating in accordance with these attributes?
Dale Sanders:	It's interesting when we talked about care variation reduction and waste reduction in evidence-based care. What I would suggest is that we start focusing more of our analytic efforts on reducing low value care. There's a number of studies out that indicate the waste associated with low value care. The definition of low value care is smaller, less debatable than what constitutes evidence-based care deloitte in a well-documented, well research study in 2018 indicated $210 billion in direct unnecessary costs per year could be saved from the reduction of low value care. So when you go back to waste and care variability reduction, my suggestion is start with the definitions of low value care, as opposed to starting with evidence-based care. So think of low value care as the inverse of evidence-based care. If evidence-based medicine is what we should be doing, low value care is what we shouldn't be doing. Okay. It's a smaller discussion, it's an easier debate and there's significant money and patient value to be had in that strategy.
Dale Sanders:	Medicare has already essentially given us their definitions of low value care. And it's pretty simple. 31 measures in six categories. They've already defined the cohorts. They've essentially defined the analytics for us. There should be a standard part of every analytic portfolio at every health care system in the U.S.

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that serves up Medicare patients. And by the way, a lot of these low value care guidelines apply beyond the Medicare population.

Dale Sanders: Okay, level six, population health management and suggestive analytics. I was pretty proud of that term at one time suggestive analytics. And it was kind of cool. I've forgotten about it. There was actually some jokes about it with suggestive analytics event. But anyway, what it really means is we're suggesting things to people rather than trying to prescribe things to people in our analytics. Suggesting and nudging versus prescribing, it's a lot easier. Level six is characterized by organizations that have achieved a sustainable data-driven culture, and established a firm analytic environment for understanding clinical outcomes. Okay. The Accountable Care Organization shares in the financial risk and reward that is tied to clinical outcomes. So now we're starting to get into a change the economic model. At least 50% of acute care cases are managed under bundled payments. Well, I don't think we can influence that in the industry. I wish that were the case but we're moving a lot slower towards bundled payments than what I was hoping we would in 2013.

Dale Sanders: Analytics are available at the point of care to support the triple aim of maximizing the quality of individual patient care, population management and economics patient care. So we have good embedded clinical decision support around the triple aim. EDW data content expands to include bedside devices, home monitoring data, external pharmacy data and detailed activity-based costing. Data Governance plays a major role in the accuracy metrics, supporting quality-based compensation plans for clinicians and executives. On average, EDW is updated within one day of source system changes. EDW reports organizationally to a C level executive who's accountable for balancing cost of care and quality of care.

Dale Sanders: All right. That's the good news and the fun part about population health, but I think everyone would probably acknowledge that it's not moving like we thought it would. Value-based care isn't moving, we're still at least a 90% fee for service environment. Bundle payments haven't taken off like I thought they would. A great fascinating study that was just published this week in Health Affairs. One of the most current and well thought out studies of its kind concludes that the 22 ACOs that were evaluated in the study are having a very difficult time addressing social determinants of health. And fundamentally, population health is about those social determinants. So it's moving much slower than we thought it would. This quote is pretty telling. The ACOs were frequently flying blind, lacking data on both their patients social needs and the capabilities of potential community partners.

Dale Sanders: So I've actually knocked my enthusiasm down a little bit for level six just because it's so hard to get there. And it's so hard to sustain until we really change the nature of U.S. healthcare, especially the economic incentives and economic reimbursement models. I'm starting to believe that we should be

focusing more and more of our time and effort on optimizing care delivery from level five and below. We should not give up on level six and above, but we just need to be careful about investing too much too soon to the detriment of level five and below.

Dale Sanders: Okay, so a little bit of a contrarian opinion. But our rest of population health is facing some challenges and the reality is we only have so much time and money. And if you're distracted too much by population health to the detriment of the core mission of delivering the best care, the safest care to the patients we serve, that's a harmful strategy.

Dale Sanders: All right. Level seven, clinical risk intervention and predictive analytics. Level seven organizations are able to move into the arena of predictive analytics by expanding on their optimization of the cost per capita populations and capitated payments. Again, a bit of a naive belief in 2013, that we will be much further along on per capita and capitated payment models. Their focus expands from the management of cases to collaboration with clinician and payer partners. Okay, now we're starting to broaden the notion of what the care team looks like to manage episodes of care, including predictive modeling, forecasting and risk stratification. So you can ask yourself here to what degree are we engaged in value based-care? How much of our quality of care is at risk from an economic perspective? To what degree are we collaborating with our payer partners to manage episodes of care? Are they in meetings with us where we talk about this kind of thing? Do we have to collaborative models around risk prediction and forecasting and risk stratification?

Dale Sanders: The analytic motive at this level expands to address diagnosis based, based the per capita reimbursement models. Focus expands from management of cases to collaboration to clinician and payer partners. Hey, that's a repeat of the same sentence. Probably it isn't. Clearly, we need to edit that out, don't we?

Brooke MacCourtney: Yeah. Let him fix that.

Dale Sanders: Skipping a bit. All of that risk management is focusing on outreach triage escalation referrals. Physicians, hospitals, employers, payers and members patients collaborate to share risk and reward. What that suggests is cost savings are being passed on to patients who participate in improving their health. Patients who are unable or unwilling to participate in care protocols due to constraints, such as cognitive disability, economic inability, geographic limitations to care access, religious restrictions and voluntary non-participation are flagged in registries. So we know that and we can address the way we engage with those patients on a very specific personal basis. Data content expands to include home monitoring data, long term care facility data, and protocol specific patient reported outcomes. On average, that EDW is updated in one hour or less if source system changes.

Dale Sanders: Okay. Now, the interesting thing is we're kind of in love with predictive analytics. Predictive analytics have essentially become a commodity. But my postulate here is that predictions without interventions are liability to the decision maker, not an asset. So we need to rethink our love affair with predictive models and ask ourselves to what degree can we intervene if we predictor a risk? And if we can't intervene realistically, we need to focus our attention on those areas where we can.

Dale Sanders: Okay. So a little bit of a contrarian view the love affair with predictive analytics right now I think is a little bit misplaced. There's an interesting article in a recent, while the current issue of nature machine intelligence. The title of that article, Accurate Data-driven Prediction, does not mean high reproducibility. This is one thing that our chief data science officer, Jason Jones, reinforces in us in the industry on a regular basis. And telling quote from that paper is as follows, it is generally understood that association does not necessarily indicate causation and we all know that right? However, since causes can be used to make quality predictions, many practitioners of data science take prediction accuracy as an indicator of how likely that a predictor is a cause of the outcome. In fact, prediction accuracy and causal validity are measures in two different worlds and a wrong link between them is very harmful for data driven discovery.

Dale Sanders: So in addition to being a little too enamored with predictive models and not paying enough attention to what we should be doing, eventually, there's a lot of possibility and probably high probability that the models that we're producing and the conclusions that we are landing on from these predictive models are probably misinformed. We're assuming causation when causation does not exist.

Dale Sanders: Level eight, hang on friends, we're almost there. These are the aspirations around personalized medicine and prescriptive analytics. And so imagine this, in 2013, the state of thinking and the state of my mind in learning that was all, what, eight, nine years ago, when I started writing this in 2012. I read this last night again for the first time in a long time. And it's still relevant but I think there's some naivete here. At level eight, the analytic motive expands to wellness management, physical and behavioral-functional health and mass customization of precise patient tailored care. Healthcare delivery organizations are transformed into health optimization organizations under direct contracts with patients and employers.

Dale Sanders: Fixed fee, per capita payment from patients and employers for health optimization is preferred over reimbursement for treatment and care delivery. Clearly, we're not moving economically in this direction fast enough. Analytics expands to include natural language processing of text, prescriptive analytics and interventional decision support. Prescriptive analytics are available the point of care, prescriptive, not predictive this time prescriptive, we're actually starting to suggest interventions. To improve patient specific outcomes based

upon population outcomes. So we're mining large data sets and we're inferring what that might mean to the patient specifically being treated in the clinic or the bedside. Data content expands to include 7 by 24 biometrics data, genomic data and familial data. The EDW is updated within minutes of changes in the source systems. At this level, healthcare organizations are completely engaged as a data-driven culture and shift from a fixation with care delivery to an obsession with risk intervention, health improvement and preventive medicine. New data content in the enterprise data warehouse is combined with not-yet-discovered algorithms that can identify relationships between genomics, family history and patient environment. Smartphones, cloud computing, gene sequencing, wireless sensors, modernized clinical trials internet connectivity, as in 5G. Advanced diagnostics, targeted therapies and other science will enable the individualization of medicine.

Dale Sanders: But unlike any prior time in medicine, this level is superimposed on a world of social networking, omnipresent smartphones with pervasive connectivity and ever increasing bandwidth. Consumers have an unprecedented capacity to take charge. It is their DNA, their cell phone, their precious individual information. The resulting analytics will be applied early in the patient's life to develop a lifelong health optimization plan. When healthcare delivery is required, the patient's treatment protocol is tailored specifically to that patient based upon the insights gained from these new data sources and algorithms. The boundaries of evidence-based medicine are extended beyond the limited applicability randomized clinical trials to include the quasi-experimental evidence that emerges from local and regional enterprise data warehouses. This locally derived evidence is shared with commercial clinical content providers to iteratively enhance the knowledge content from randomized clinical trials. So clearly some aspirational things were in my brain at 2012, 2013.

Dale Sanders: Clearly, though, there are still some things that we could be doing and sort of a checklist fashion to evaluate to what degree are our organizations and our products and services capable of making progress on level eight, even if we can't live up to all of the aspirations, what can we do in chip away with some progress?

Dale Sanders: I enjoyed this study from Netherlands speaking of patients owning more of their own data. It was published in 2018. And it studied the rate of patient requests for a specific therapeutic or diagnostic intervention over 1985 through 2014. So pretty significant study. Wondering, to what degree are patients requesting specific drugs, therapeutics, diagnostic interventions over that timeframe? Is there a change? But what the study concluded is that there are significant increases in requests by patients. And there's also a significant increase in compliance by general practitioners to address those patient request. The interesting thing in this study was the type of requests surprised me. So request for blood tests doubled over that timeframe. Requests for urine tests went up by 26 times. Request for radiology and imaging didn't go up that much 2.4

times, I thought it might go higher. But medications barely increased, which I thought was interesting.

Dale Sanders: So patients, to me, aren't asking for therapeutics as much as they are data about themselves. And then they'll decide what to do with that data. I expected there to be a significantly higher increase in requests for prescriptions. So that was pleasantly surprising. But patients want their own data, they want to be empowered.

Dale Sanders: All right. Now this is where I need all of your collective health for the betterment of the industry. All of our families and all of us that are patients, what data do we want about ourselves? Direct to patient analytics and artificial intelligence who help us own our own healthcare and healthcare decisions. So this is a version of a conversation that I've imagined between a patient and a physician. But last night I edit it to indicate that it was actually with an algorithm.

Dale Sanders: So it's, "Hello, Dale, thank you for your data." Assuming that Dale is the patient, "I've submitted my data, I control my data, I have a full robust set of data about my health, including my social, and socio-economic data. I submit that to a service in the cloud more than likely and that services going to offer the following. I am calculating a health optimization recommendation for you informed, not only by the latest clinical trials, but also by local and regional data about patients like you. The real world health outcomes over time of every patient like you and the level of your interest and ability to engage in your own care. I will tell you within a specified range of confidence which treatment or health management plan is best suited for a patient specifically like you and how much that will cost." And then this morning, I thought about adding another statement to that. And that is the algorithm, the avatable also add that, "I have identified several other patients who you might want to interact with socially who have a similar digital phenotype and health condition and they can become a part of your healthcare influence."

Dale Sanders: Anyway, think about that level nine friends, think about the data, the analytics, let's try to get maybe a little less aspirational than what I've conveyed in this slide specifically, what kind of data should we be delivering to clients If we're vendors, patients, if we're healthcare systems, to help them own their own healthcare decisions.

Dale Sanders: Okay. So in closing, I just want to suggest, again, that submit any thoughts for improvement to the model. To me, Anders or Anne. By the way, we'll make these slides available for everyone, include the subject line, analytics adoption model. And I wish I would have included another statement in here. If you're interested in helping me, working with me to create a grassroots movement to appeal to the payers, to CMS even administrative leadership at healthcare systems to reduce the quality measures burden, both the complexity as well as

the number of quality measures they're placing on the backs of physicians, reach out to me and let's see if we can make a difference this year.

Dale Sanders: All righty. I am done, Brooke MacCourtney.

Brooke MacCourtney: All right. That's a lot of content to go through. So hopefully everyone's stayed with us and still awake.

Dale Sanders: Yeah, I wonder.

Brooke MacCourtney: Hopefully. So we're going to have one poll question. Was our only poll question today. So before we dive into our Q&A, so now's a good time, if you'd like to submit a question to, ask of Dale, now's a good time to do that. And I'm going to go ahead and launch this poll.

Brooke MacCourtney: So, while today's webinar has been focused on healthcare analytics adoption model, some of you may want to learn about the work that health catalyst is doing in this space or maybe you'd like to learn about our other products and professional services. So if you'd like to learn more, please answer this poll question. And we'll go ahead and get started with our Q&A. And we'll leave that poll open for a minute and let people answer. Just right there.

Dale Sanders: I always have a hard time keeping my mouse to come back

Brooke MacCourtney: Swipe all the way down. There you go.

Dale Sanders: Is there?

Brooke MacCourtney: Yep.

Dale Sanders: There it is. I got it. Okay.

Brooke MacCourtney: And then the questions.

Dale Sanders: Questions. Okay. Now, let's go back up here.

Brooke MacCourtney: Back to there.

Dale Sanders: There we go.

Brooke MacCourtney: So just pop open the questions panel.

Dale Sanders: Okay, got it. No questions?

Brooke MacCourtney: I've got a bunch on my screen. Will go ahead and use my screen.

Dale Sanders: Okay.

Brooke MacCourtney: All right.

Dale Sanders: Okay. Neil Chawla asked, hope Catalyst and HIMSS both have different models today, are they going to be combined into one?

Dale Sanders: Neil, they're almost the same. They're very, very close to the same. The reason, there are difference is primarily because HIMSS is taking a little bit more of an international approach to their model. And so my model tends to reference a fair amount of economics, but as you could tell from the slides, I was naive a few times about what I thought the economic model of healthcare would look like by now. So, but to the degree that we can make those models the same model. I'm happy too because I want the industry to have a common framework.

Dale Sanders: Okay. Susan McDonald asks, what is the HIMSS' EMR stage three clinical data?

Dale Sanders: Well, I'm referring to the seven levels in the EMR adoption model, Susan. And so you at least need to be on level stage three of that model, before you worry about starting to load EMR data into the data warehouse. So basically, what I'm saying is, take care of your EMR adoption and configuration first, because that's where a lot of the valuable data content resides. Once you've hit at least stage three in that model, then go ahead and start thinking about how you load that data into the data warehouse. And of course, the further up that model you are, the better the data content will be.

Dale Sanders: Dave Chris asks, low value care someone's income, How do you propose to drive that change without controlling practitioners? They already hate IT because of VHRs. Well, actually Dave, I haven't found any great cultural opposition and I've been in the front lines of this now for a long time. I haven't seen a reaction from, I would say, I don't know, maybe 90% of clinicians that they would resist low value care is a hit on their income. I think that's worth thinking about. But my experience with this is that practitioners are more willing to embrace the analytics around low value care, because it's a simpler, easier conversation than what evidence-based medicine is. There's so much debate about what evidence-based medicine is, and then we think we nail it down and then a year later, we reverse the definition. I was lamenting about this the other day, there's a new study that came out that suggests we still don't really understand what a hypertensive patient is. There's relatively consolidated views on what low value care is. I haven't seen great opposition economically to that yet, but it's good to know, good to think about.

Dale Sanders: Aaron asks, "Dale, I appreciate your emphasis on value-based care. I remain concerned that current BPCIA and ACO behavior is diverting facility care without

changing care delivery design, outcomes metrics are financial and operation and not patient centered."

Dale Sanders: Yeah, I would totally agree with that. Aaron. Yeah, let me think about your second sense there for a minute. I remain concerned that current BPCIA and ACO behavior is diverting facility care. Yeah, I think what you may be suggesting are simple things like we're bed capacity and things like that. We haven't really changed care delivery. Yeah. Well, we have a whole infrastructure of U.S. healthcare that's based around treatment, not prevention. And I think that's one reason we're struggling with population health, culturally as well as technically.

Dale Sanders: Let's see. Brooke MacCourtney is thumbing through our questions here. Susan McDonald asks, on slide 36, are there any privacy concerns?

Dale Sanders: Well, yeah. I think there's always privacy concerns with personal data. But I would also say there's personal value and there's also societal value in taking advantage of that data. I'm half joking, full truth sometimes suggested that contributing a de-identified data to the betterment of society is a little bit like donating blood. I do think that we all need to relax our paranoia about clinical data privacy, it can be protected. It should be protected. Those who don't protect it should be penalized. But the value of that data to individuals, to society and to broader human potential is critically important to the human race.

Dale Sanders: Okay, let me go down here a little bit. Let's see here, friend.

Brooke MacCourtney: Yeah.

Dale Sanders: And then you can maybe delete.

Brooke MacCourtney: Yeah.

Dale Sanders: Jennifer Mayor asked, What is your timing of updating the model? Well, my goal is to have it updated by HIMSS. I don't think that's going to happen. But it will happen before June for sure, Jennifer, before June one way or another.

Dale Sanders: Let me delete these friends

Brooke MacCourtney: Yeah.

Dale Sanders: Okay. I'll give you the details.

Brooke MacCourtney: Yeah. I will delete it for you.

Dale Sanders: All right. What role does genomics and precision driven care inform your analytic model? P. Kaplan ask. Well, quite a bit. In the upper levels I referenced genomics pretty significantly. Been in 2013, I have to say, 2012, I was a little more optimistic about what we might be able to do with genomics data. It's interesting, right? It's almost like every time we think we understand genomics, we realize we don't. And gene expression and the complicated choreography of gene expression right now, genes that are turning off and on literally during the day that we formally thought would take a generation to change and then you throw the microbiome on that. So we clearly have lots of opportunity, especially around pharmacogenetics and I would say targeted therapy and cancer right now. Immunotherapy and that sort of thing around cancer right now, we should take advantage of that. But there is a lot of mystery around genomics. And I think genomics might be the next thing that we face in terms of a reality check, like we're facing with population health.

Dale Sanders: The complexities of population health have been sobering. And the mystery of the human genome is becoming more and more sobering. Encouraging and exciting, but also sobering.

Dale Sanders: Okay. John asks, it seems as if level eight and nine are capturing elements of shared decision making. Yes, that's what I was hoping would come across. However, this terminology is not being used. Great point. I think we should use that. That's a great suggestion for an edit John. Thank you. Let's capture that. Thank you.

Dale Sanders: What level of health literacy on behalf of patients is required to effectively participate in their care? Well, that's a great question, Peter. And it's significant, right? That's one thing I think we should not be naive about. And that's part of personalized care is understanding those cognitive, economic, cultural language barriers risk to care.

Dale Sanders: And you know the work from, gosh, I'm forgetting I'm going to apologize forgetting her name. But the woman that led the patient activation measures work a few years ago. And some of the work we did at Northwestern, we came to the stark realization that some patients just can't engage in their own care. And so in those cases, it's really important that we provide care coaches and care management teams who can help. But we have to assess their ability to participate in their own care before we can tailor that kind of an approach. So essentially, we have to augment those patients who are incapable of taking care of themselves and engaging in their own care. And you know what? There are some patients who don't want to engage in their own care. They literally check out there. They're fine with who they are. And they don't want to be bothered by the healthcare system. They don't want to be engaged. And I think we have to respect that as well.

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Brooke MacCourtney: I just want to know, we are at the top of the hour, but we still have quite a few questions. Do you have a few minutes until done?

Dale Sanders: I can go over.

Brooke MacCourtney: Okay.

Dale Sanders: How many folks do we have on the line?

Brooke MacCourtney: So, we still got 177 people online. So if you'd like to stay on line, we'll keep on answering a few of your questions.

Dale Sanders: These are great thought provoking questions. So I'll stay as long as we have reasonable interest. I'm impressed everybody's awake.

Dale Sanders: Do you know of examples of personalized data wellness, fitness trackers, etc. being correlated with EDW hospitals? Thomas is asking that. Yeah, it's happening. But I would say it's in the realm of science experiments, not operational impact yet. It's interesting, it's kind of intriguing, but to the degree that it's really impacting healthcare. One of the challenges where I've seen this implemented is clinicians don't know what to do with the data and it obligates them to do something, if we include it in the EHR. So it's an evolving area right now, Thomas, no significant progress.

Brooke MacCourtney: Let's do this.

Dale Sanders: How gloomy is the horizon for quality payments? Well, Philip asks that, Philip Snyder. Sometimes I think people confuse my realism for pessimism. But I'm a realistic determinist. That means I'm determined to stay the course on what I think is fundamentally important. And quality based in economic models is fundamentally important. But you have an entire economic system that thrives on fee for service. The hospitals thrive on fee for service, the insurance companies thrive on fee for service. Even though they would want us to believe that they're interested in reducing the cost of care. The reality is when the cost of care goes up, they keep handing those premium increases on to the rest of us. United Healthcare makes $14 billion last year and if I were King of U.S. healthcare tomorrow, I would flex the economic muscles of CMS to drive improved economics faster than what we've had the courage to do so far. I would turn CMS from being the world's largest governor of healthcare and bureaucracy of healthcare to the world's largest customer of healthcare that uses that customer purchasing power to drive changes in the economics and the incentives of behavior.

Dale Sanders: Question from Evan, do your models include a role for internal utilization management for risk groups, such as Medicare advantage and what is that role?

Dale Sanders: That's a great point, Evan. You're right. It should, but I don't mention that. Let me give that some more thought. We should probably include that in the next version. And if you have any further thoughts or suggestions that would accelerate my brain on that topic, I'd love to hear more about that. I can tell you from a client's perspective, from a vendor perspective, it's a critical part of level four, level five, level six analytics that drives a lot of what we do at client sites. So that's a really good point. Really good point. Thank you for that. And I hope we don't forget all these.

Brooke MacCourtney: We have record of all of them. We have records of all of the questions.

Dale Sanders: You do?

Brooke MacCourtney: Mm-hmm (affirmative)

Dale Sanders: All right, great. Okay.

Dale Sanders: Joe asks, does the waste reduction level need a mention of throughput data? Patient satisfaction and financial success are both very tied to throughput, both inpatient ambulatory and possibly patient outcomes as well, not as direct.

Dale Sanders: Joe, what I think you might be saying there is throughput and access or the same access to care. So you're thinking of availability and throughput and productivity. That's another good point. If I missed that, Joe, would you send me a message? But I think I understand what you're saying.

Dale Sanders: The ability to provide access, move patients through the system. Okay, yeah. Joe says generally true. Okay. Thank you.

Dale Sanders: Okay. Annie Gray asks, what have been the biggest challenges, roadblocks you've seen with health systems adopting a culture of analytic decision making? I think the biggest barrier right now is, I think there's two. Truthfully the economic incentives to be really data-driven and move up into anything above level four, is not that compelling, the economics to get to level five waste reduction. The truth is, we still get paid for waste reduction at the organizational level. Hospitals still make money on wasteful care. Until we change the economics that's going to stay the way, the same thing. So that's why.

Dale Sanders: The economics just haven't moved fast enough. But the other is the overwhelming number of quality measures driven by payers on the organization and non-clinicians is sucking all of the resources out of the room that could be applied to higher level, higher value, more differentiating analytics. So I don't really think there's... We don't see widespread cultural opposition to the adoption of analytics. There might be 1% outlier, out there once in a while, but most organizations want to be more data-driven. The degree to which they

become data-driven though, is constrained by the economic incentives. And also by just the fact that there are so many quality measures. It's hard to do anything but address all those.

Dale Sanders: Ananda asks, how do you see the issue of health data ownership playing into grass roots and long-term efforts to conceptual designs. Well, I assume you're asking there Ananda, health data ownership by patients. Hopefully, the 21st Century Cures Act is currently instantiated will survive to the final rule. And that will drive the first important step which is just simply access to the data. Then we have to figure out how to actually give patients access to their data in a way that's meaningful to them. And then we have to figure out a way to engage them with their data so that they know how to interpret it either themselves or through a care coach. I've been advocating the creation of a role in organizations that I call it a digitation.

Dale Sanders: And if I were still a practicing CIO, CMO, CAO, I would carve out somewhere in my budget, a group of people who would essentially be the digital phenotype facilitators for patients. And they would sit between the patient and the care provider. And they would develop analytics plans for specific patients as well as groups of patients.

Dale Sanders: And granted, it would be an experiment of sorts, but that's the sort of thing that we have to progress towards. And by the way, I'm borrowing that idea for my time in the space and defense sector. So in the space and defense world with rockets and missiles and satellites and spacecraft and things like that. There are folks who own the digital telemetry strategy of those space and defense systems.

Dale Sanders: And they are in essence, what I call a digitation in healthcare. It's their job to develop the telemetry strategy for those products and systems. And that's the same concept we need to apply to patients and their care and their digital phenotype and their digital twin. And then fold that into their control and access and utilization of that data.

Brooke MacCourtney: Yeah. Just a time check. We are about 10 minutes past the hour. And we still have quite a few people online 135.

Dale Sanders: Okay, I tell you what? Let's hang on until we're at 100 people. And then we'll adjourn. This is really fun, though. Thanks, everyone. It's very thought provoking. This is exactly what I needed.

Brooke MacCourtney: This question is pretty interesting.

Dale Sanders: Okay, yeah. Teresa Drive asks, are you exploring a level 10? Suggestions include blockchain, telehealth, telemedicine and home-based services to extend the continuum total cost of care or home medical and social care.

Dale Sanders:	That is interesting friends. Yeah. There's some noticeable absences they're around telehealth. Coincidentally, I have a meeting with a good friend of mine, Joe Dealto, Intermountain, who leads the analytic strategy for telemedicine at Intermountain and he's doing some intriguing work in that space. So yeah, that's a good idea.
Dale Sanders:	I don't usually get into technology implementation in the model. So blockchain, I work at the conceptual level and leave implementation alone for the moment. So I probably wouldn't talk much about blockchain, I don't think unless I talked about the concept of trust management and that kind of thing. But yeah. Good thoughts, Teresa. Thank you.
Brooke MacCourtney:	Let's try this.
Dale Sanders:	Michael Vises asks, is NLP sophisticated enough to move away from requiring discrete data collection in EMRs and instead apply NLP tools to clinical documentation? Yeah, Michael, that's interesting. I suspect in you the same kind of cynicism that I have about NLP. Realizing that I grew up my career a part of it, was in the National Security Agency. We were all about NLP. I came with an NLP background into healthcare. I funded a lot of it at Intermountain. We have a lot of experts like Peter Howard and others who were leaders in that field. The reality is constantly trying to extract discrete data moments from healthcare notes is just brutally hard. I think it's the most part of a fool's errand.
Dale Sanders:	It's fragile, it's not scalable. What I would advocate that we do more of an NLP is pattern recognition and neural nets, augmented with text content. I should have and I could have included a couple of recent articles one of those in nature around the use of heterogeneous, non-harmonized EHR data, including text, exposing that to neural networks and looking for patterns in the data that indicate diagnosis and also outcomes related interventions. About literally like 50% of today's clinical notes are cut and paste from previous notes. So the belief that what we have in clinical notes is somehow this incredibly rich, meaningful data content is largely not true. It's not true. And if you think about it, for physicians have been encouraged over the years to document in clinical notes, information that justifies billing and information that avoids malpractice claims. So, our motives around clinical notes are twisted. They should be about documenting those really genuine, juicy pieces of data about a patient's health care without worrying so much about billing and malpractice.
Dale Sanders:	Again, if I were practicing CIO, CMO, CAO, I would be working with my clinicians and my administrative executives to improve the quality of our clinical notes as well as minimizing the number of clicks for quality measures that exist in the EHR. So I'd have a whole step back data quality strategy around the EMR, minimizing quality measures, minimizing clicks, maximizing, simplifying the value of the content in a clinical note.

Dale Sanders: Okay. Let's see, James. Hi, James. Hoffman asks, how much does adoption of this model depend on the underlying electronic health record? Well, quite a bit. It's pretty fundamental. It's a critical content area and data content area. And as I indicated, no sense in even trying to build out a platform if you don't have at least level three or stage three maturity and your EMR.

Dale Sanders: But you do ask a really good following question, or can a EDW and associated tools compensate for the electronic record? They can to some degree. So here's a hidden little secret. When I landed at Intermountain, we had the health system. A very proprietary EHR, very powerful but extremely proprietary EHR.

Dale Sanders: Data warehousing in 1997, and healthcare was a novelty. And so when I came in, from Space in Defense with a background in data warehousing, advocating for data warehouse, it wasn't exactly well received because we were building out a product with 3M called the clinical data repository. There just wasn't much support for an enterprise data warehouse. But I needed to do something with this new phase of my career. So the first iteration of our data warehouse at Intermountain had no clinical data in it. It was cost data, supply chain data, ancillary data from radiology, lab pharmacy, it didn't have traditional EHR data from the Help system. And we got all sorts of value clinically, administratively and cost wise out of that EDW data content until we could get past the technical and the cultural hurdles of extracting data from the Help system.

Dale Sanders: So, EHR content is fundamental. But you can make a lot of progress analytically in an organization if you're having a hard time pulling and utilizing EHR data. Great question. Thank you.

Brooke MacCourtney: Al right. We'll just do a couple more. We're getting close to our 100 number.

Dale Sanders: Okay. John asks again, where do you see the provider engagement part of the quad aim being incorporated in this model? That's a great oversight, John, we should put that in there. Especially given my opening comments about physician burnout. So, yeah, let's figure out where we incorporate that in the model. Thank you for that suggestion.

Dale Sanders: Are you are you picking one for me? If picking on interesting one.

Brooke MacCourtney: I'm trying to pick one. If you want to pick one.

Dale Sanders: Yeah, go ahead.

Brooke MacCourtney: Okay. Maybe not that one.

Dale Sanders: There's one right there. This right here.

Brooke MacCourtney: Which one?

Dale Sanders: This one. As an analyst at a health center with no chief analytics officer or CIO, how can I use this roadmap to convince leaders in my organization that developing an analytic adoption strategy is important?

Dale Sanders: Well, I would give your executive team a free pep talk if you wanted one, Zachary. I think, as with all new ideas in any organization, you have to test the waters of the culture. And I'm a big believer in two metaphors. One is, you plant seeds and ideas. And you let those seeds and ideas germinate at the rate that makes sense for the soil and the culture that they reside within. So I'm a big believer in seed planting and then nurturing and watering those seeds. Let those seeds germinate at the natural progression of the soil and the culture that they reside within. The other metaphor that I use a lot of times is, you need to know when to paddle and when to go with the flow and if you never paddle against the current or with the current of a culture, you're destined to bounce between the banks randomly and who knows where you're going to end up. But then you also have to know if you're paddling upstream against the current of a culture and that's going to wear you out it's going to burn you out, you're going to go nowhere.

Dale Sanders: So there's an art to this becoming analytically driven. As I've said in previous webinars, I was once a technologist, but now I consider myself a psychologist because the soft skills associated with becoming analytically driven are as important as a technology. So there you go, there's a philosophy answer to that question.

Brooke MacCourtney: Al right. So right at 100.

Dale Sanders: Okay. So we-

Brooke MacCourtney: We can do one more. One pick.

Dale Sanders: Let's see here. Is there anyone here that I know, that I've overlooked. I don't see the names that I recognize. Let's see a couple of...

Brooke MacCourtney: And those of you asking about Dale's contact information that, will be part of the slides when we post those and send those tomorrow you will have that information.

Dale Sanders: Yeah and it's very easy email address, dale.sanders@healthcatalyst.com. Let's see. Let's go to the high reliability question here friends. My organization is really interested in becoming a high reliability organization. And in the Health Catalyst blogs, I recognize a lot of similar language and referencing engineering carriers risk management sensors. Do you see the analytics framework you've laid out as being congruent with improving reliability of a health organization, given your reservations about predictive abilities? Yeah, for sure I do, Madison. I don't want you to take any of my realism as pessimism. Be smart about being

data-driven, be aware of the limitations of your data. But think of it as an inverted pyramid. We're on this journey of becoming analytically driven, you're going to have a fair amount of uncertainty at the top of that inverted pyramid. But as you progress technically and culturally, the uncertainty about the organization, the uncertainty about your data, and hence the reliability of the organization will continue to become more and more precise.

Dale Sanders: And by the way, you're speaking to someone who grow up in nuclear warfare and weapon systems and aircraft were high reliability was just ingrained in what you do and what we do. So a lot of the processes, a lot of the data strategy that I employ now is highly influenced by my upbringing in the space and defense sector. Thanks, Madison. Okay. You know what? Let's ask Asha last question there. Aha you may read there. There you go friend. Asha says, thanks so much for sharing this insight. How can the healthcare analytics model framework be used to facilitate social care integration in the operation? Well, I think that starts to emerge, Asha, in level six of the model where we start talking about population health.

Dale Sanders: And I want to inform that level of the model with some of the recent studies that have come out about the role of social data and social connections, the revolving door between social determinants of crime and social determinants of health, including in the data governance function in the data strategy. Imagine having an analytics strategy working group as a subcommittee of your board, which by the way, you should have, okay. Every organization should have a subcommittee that's all around data and analytics as an asset. Call it the analytics subcommittee of the board. And in that analytics subcommittee, should be folks from IT, clinical administrative leadership, all the usual suspects, the shared services, but also you need law enforcement there, you need your payers sitting at that table. You need the social support services of the community religious organizations, soup kitchens, food banks, they need to be a part of that too.

Dale Sanders: And, by the way, I'm speaking from experience from the great opportunity I had to work on some of this in Canada, where the ministers of health in the provinces have the ability to bring together those constituents. And there's just a culture in Canada that allows for that sort of thing. So good reminder. And in the data governance portions of the model, I want to emphasize the Important of the social support network being a part of the healthcare systems steering committee.

Dale Sanders: Okay. Done. Well, I better drop off.

Brooke MacCourtney: Yep. We'll go ahead and end there. And if your questions didn't get to us, we apologize for that. But we'll provide Dale's email address If you have suggestions on improving the model, or any questions, we can see if we can follow up that way.