How to Measure Anything Interview with Douglas Hubbard

September 2007 Teleseminar Transcript

S   OK, Hi and welcome everyone. I'm Stacey Barr the Performance Measure Specialist of staceybarr.com and welcome to my free September 2007 Tele-Seminar on "How to Measure Anything?" with an exclusive interview with Douglas Hubbard. The total call, it will be about an hour and over this time I'm going to be asking Doug some questions about his very lofty claim (when he's been making for many years now) that everything is measurable. Now while I'm not sure that even I'm convinced that's true, obviously I don't think that's going to matter one little bit. The diamond in Doug's claim, is not that absolutely everything is measurable, rather that many of things that we believe to be immeasurable, actually can be measured meaningfully.

S   Now I will introduce Doug properly in just a few moments, but for those of you are new to my *mezhermnt* Handy Hints e-zine, or have joined this call through a friend or a colleague, welcome aboard – and just in case you don't know much about me or why I'm so passionate about something so dry as Performance Measurement, let me quickly explain. My career began as a Research Statistician in the early 1990's and I helped clients collect and analyse survey data for decision making about all sorts of things, as varied as 'the profitability of sheep farming', 'a recreational boat ramp usage' and even 'Grand Prix car racing'. But I quickly discovered that it's not numbers and analysis I really love, what I love is having objective feedback that helps you focus on improvement the results that matter most for your business and that's been my specialty for about 14 years now. Helping people in business use performance measures to focus on what matters most and stop wasting time, money, effort and energy in reaching their goals and targets. More specifically, making performance measures easy to understand, very practical and people friendly, is what my job's all about.

S   Now I'm really excited to introduce my guest today. Douglas Hubbard, President of Hubbard Decision Research and Doug's calling in from Illinois. Is that where you are right now Doug?

D   Yes, a Western suburb of Chicago.

S   Western suburb of Chicago, there you go. Doug is also the Author of a very recently released book 'How To Measure Anything, Finding The Value of Intangibles in Business'. He's also the inventor of 'Applied Information Economics' or AIE and that's a Measurement Methodology that's found him critical praise from the Gartner Group, Giga Information Group, and Forrester Research. He's an internationally recognized expert in the field of IT Values and is a popular Speaker at numerous Conferences. Doug's written articles for Information Week, CIO Enterprise, which is where I actually first discovered him in 1997 and DBMS Magazine. Doug was formally with Coopers and Lybrand and has over 20 years experience in IT Management Consulting, including 12 years experience, specifically in teaching

organisations to use his AIE Method and that's actually been applied by thousand's of large Fortune 500 IP Investments, Military Logistics, Venture Capital, Aerospace (I think that's pretty exciting) and also environmental issues. Welcome Doug, thanks for joining us today.

D Thanks, Stacey. Glad to be here.

3min

S Wonderful. Now hearing all those bips in the background, we're certainly getting a lot of callers coming in. So nobody be too distracted by that sound, that's all it means.

D Well I was going to impress everyone by actually counting as we went along here, but I lost track while you were talking so…

S OK! I'll be able to report that number back to you after the call Doug.

D OK Stacey. I'm always interested in that sort of stuff, yes.

S Lovely, you're not one of those people who walks down the street counting windows in the buildings that you are going past?

D Not all the time, ah no.

S That's good, that's good - I won't be worried. Doug I did, as I mentioned before, I first discovered you back in 1997. An IT Officer in the organisation I was working in at the time, he handed me a copy of your article 'Everything is Measurable' which was in CIO Magazine. What really caught my attention was what you called your 'clarification chain' and I have to admit that I have used that a lot over the years with my clients. It just explains measurability really, really well. I wondering, would you mind sharing with all of the callers what the 'clarification chain' is and maybe expand on it a little bit?

D Sure. Well it's a… I suppose an argument for why things are measurable as well as a tool that you can use. I'll mention a few steps in it. One is; if something is important it must be different in some relevant way, now imagine someone saying that Employee Empowerment or Strategic Alignment or Customer Satisfaction are important, but they're completely unobservable, they're indistinguishable from having it or not having it. That wouldn't seem to make sense to most of us. That if it something important, we must able to detect it somehow. So that brings me to the Second one; is that if it is different in some relevant way, it's observable. So if it's better - it has to be different, if it's different - it has to be observable. Now what's interesting is that this is actually contrary to some very important heroes for statisticians and metrics people. Deming, do you recall Deming?

S Edwards Deming, yeah W. Edwards Deming. The Father of Quality.

D Yes that's right. He actually said "the really important things can't be measured" and I disagree with Deming in that respect. If it's important it must be different in some way for the organisation that is observable. Now if it's observable, it's observable in some amount and if it's observable in some amount, it can be measured by definition – that's the clarification chain. If it's important it's different, if it's different it's observable, if it's observable, it's

observable in some amount and finally being observable in some amount is what we mean by measurement. So once you figure out how you actually observe these things – why do you even think it exists? Why do you think it's higher in some cases than other cases? Filling the blank with anything; strategic alignment, quality, customer satisfaction. You think it's higher in some situations than it is in others, then ask yourself "what are you observing that's telling you that they're different?". Well usually we can find some observations and as soon as you start to put your finger on that, you are well on your way to designing a measurement for it. That's the clarification chain.

6 min, 34sec

S   Absolutely, its wonderful. I love it's simplicity, but it really focuses us, I think, to a great extent on the way we use language. Particularly in our business plans and in writing goals. Our language isn't specific enough to be measurable, it's very fluffy and woolly and inert.

D   Yeah, absolutely.

S   And what you do with the clarification chain, I think, is start us there. It starts us with "well what is this fluffy language and how can we unpack it and make it specific and observable?". It's very, very powerful.

D   Oh sure. I hear it all the time, that somebody will say that there is something that is really important to them. It's something that they would like to track or learn more about, but it's immeasurable and once you go through the clarification chain, that just seems like an oxymoron. If it seems like if it's immeasurable that means it has to be invisible to the extent that you don't even have a reason to believe it exists in the first place.

S   (laughter)

D   If you think it exists at all, it's because you've observed something about it; you've come to some conclusion, some observation. Then it's just a matter of structuring, those observations. That's what scientific method is all about - structured observations.

S   That's fantastic. So Doug, has the clarification chain been a tool that you've used regularly with your clients through the years? And if so, how have you actually used it with them?

D   I suppose it becomes subsumed in the way that I facilitate workshops. We have to define and clarify what this problem is and I'll find myself asking this the clarification chain, whether or not I'm always going through the exact same 4 steps, but I'll ask people you know 'why do you care about this', 'what's different about it', 'what do you see when it is different', etc, 'why do you think it's higher over here then over there'. And then once they start to talk about some of those concrete examples, they invariably end up defining measurable aspects of it.

S   There're some powerful questions just in what you've said there. A really good list that people could, you know, almost have a little kit bag of those sorts of questions when they're looking at their goals and saying 'well how can I measure this?', they could be pulling out those sorts of questions 'how do you know it's different', 'how would you know it felt better', and I think in your article actually you referred to imagining 2 organisations identically the

same, but 1 organisation has the result and the other organisation doesn't. Can you expand on that a little more as an example?

9min, 2sec

D   Yeah I actually talk about that in the article and in the book as a type of thought experiment and the idea behind the thought experiment is that if somebody says, you know pick something really intangible, something extremely difficult to measure. Let's say leadership.

S   Good.

D   OK organisation A is exactly like organisation B, except A has a little bit more leadership in it. So what are we looking at when we actually see the difference? What do we feel when we see the difference between the two? Would there be any observable differences at all? Well I think a lot of people would agree that leadership does have observable differences and since leadership has observable differences, have you ever said that person's a better leader than that one?

S   I have yeah.

D   Or one person is a good leader, another person is not a good leader?

S   Yes.

D   You must have made observations to cause us to come to that conclusion and once we can sit down and sort of classify those observations we can even take something like leadership, or vision, or quality and things like this and define them in measurable terms.

S   That's excellent, that's fantastic. So that's probably a good tip for everybody, is to maybe create a list of questions or scenarios or ways that you could explore where you are having the difference, where you're having the result and where you're not having it and really explore different dimensions, or what's different about the place that does have it versus doesn't.

D   Exactly.

S   Thanks Doug that's lovely. Now what… your whole reason for the clarification chain, one of the… it's purposes for existing is the fact that lots of people say "you can't measure that, that's too intangible, that's immeasurable, there's no way you'd ever be able to track that". These are questions or statements, I should say, that come up very, very early in almost every assignment I have in working with my clients, they come to me with that - not even with the open mind, they come to me with this idea of you can't measure this. It's almost like a challenge.

D   Sure.

S   I'm certain you've come up with that as well, would you like to share some of those sorts of issues that you've faced with your clients, about measuring the immeasurable?

D   Well like you said with the clarification chain, you know many of the responses I use now are almost scripted. I could almost write another book, just on the scripted response I get to many of these objections. Because I really hear the same category of objections, over and over again. In fact in the article and in the book, I identify there's only 3 reasons why anybody ever thought something was immeasurable and they're all 3 illusions. So these are the 3 reasons; you might recall these, but I talk about them at howtomesureanything.com: COM: Concept, Object and Method. They misunderstand the concept of measurement. They might think that a measurement is an exact quantity. That's not really what it means in any of the empirical sciences. Measurement means observations that reduce uncertainty about a quantity. That's what it really means.

12min, 8sec

S   Yeah.

D   It's the uncertainty reduction is the key part of this. If somebody says "well I can't get an exact quantity about this and therefore it's immeasurable". If that's what measurement really meant then lots of things would be immeasurable. But there are a lot of cases where we can make observations that reduce our uncertainty from what it was before. And uncertainty itself is measured statistically, right? You're probably familiar the width of a 90% competence interval, for example.

S   Yes.

D   Or the probability of some event occurring or not. Our uncertainty is expressed in terms like this when we speak in those probalistic terms and when we make observations, we can change those ranges in probabilities and that's a reduction in uncertainty. So that's the first thing. A lot of people… if someone thinks something is immeasurable because it's not an exact quantity they just didn't understand what the definition of measurement was. And I talk in the book a lot more in depth about some of the nuances of some of the empirical definitions and measurements, etc. But the second one is what we were talking about with the clarification chain. The object of measurement. Someone might think something is immeasurable just because they don't really know what they mean when they said it. And this is really the beginning of the clarification chain, right?

S   Yeah.

D   Someone says "I would like to measure performance, how do you measure performance, what do they mean performance, what's an example of high performance, what's an example of low performance, what do you see when you're looking at a high performer versus a low performer?" Basically identifying, clarifying, defining the things that you're looking at, that you're trying to measure. I had one person in a seminar that I was giving, give me an example of a difficult measurement, for this very purpose. He said "mentorship", I said "oh, mentorship, that's sounds very interesting, sounds like something I would like to have more of in a company, have good mentors in a company, what do you mean by mentorship?" and he said "I don't know." And I said "well that's the source of your measurement problem, you have to figure out what you mean when you use these words, but as soon as you figure out what you need, you can define measurement for it.".

14min, 20sec

Legend: S: Stacey Barr / D: Douglas Hubbard / Q: Callers

S This is why every good measurement conversation, every good measurement process begins with a conversation that doesn't even talk about measures, it talks about …

D Yeah it starts with, exactly, it starts with "what do you mean – fill in the blank?"

S Yeah, exactly.

D Then you just put in whatever words fits in there.

S It's like don't bother going any further until you actually have figures what that thing is that you want to have more of.

D Yeah exactly, the obstacle is not it's immeasurability, but a persons inability to articulate what they're talking about. That's the obstacle. It's not whether or not it's immeasurable once we figure out what they're talking about. But the 3rd things that's really the only other obstacle to understanding why everything is measurable, is methods. There are a few basic methods of measurement and most empirical scientific measurement methods come into a sort of a combination of these 2 basic methods and I talk about them in more detail in the book, but the idea that say conducting a controlled experiment would tell you something about whether or not your customer retention increased as a result of this IT project, have you ever heard this?

S Yeah.

D That, you know an IT Project makes a claim about Sales…

S Yes.

D … and then Sales goes up or down and whatever it does, right? And then someone says "yes, but how much of that sales was due to this IT Project?"

S What's it's contribution?

D Right, well isolating the effective individual variables in complex systems, that's what most of the empirical sciences are all about and do we think using methods like controlled experiments and regression models are exactly what that is all about. So isolating the effect of a single variable, when there could be dozens of other things or even hundreds of other factors that you haven't even identified that you have contributing to something like sales. That's exactly what you can do, with better familiarity with methods.

S Sorry Doug I was just going to explore a bit of an example there, you… so if you were to want to determine if an IT Project actually did have an impact on sales you'd want to make very certain that Sales Team weren't modifying their selling process in any way at the same time or that they weren't changing the product lines that were being offset, or they weren't entering a new market or… you want to keep those things as constant as possible so that you were really trying to make sure the only change you were making was about the IT Project, that's kind of what you mean by controlled experiments?

17min

D   Well you could do it that way, that's kind of the hard way. I always say, I say in the book, the first method you think of is usually the hard way, if you think a little longer, there's an easier way. Most organisations if they're of any size they have a roll out period for an IT Project. There's some region or line of business that has it before other regions or lines of business, right? So a lot of people get stumped because they are thinking they have a before picture and an after picture and that's all they have. I say no you've got dozens, maybe hundreds of data points here to look. You have by week, each of these lines of businesses or each of these regions or each of these cities where you have offices etc, you have their weekly sales and how it changed as the IT Project rolled out to them. You could even correlate it to their adoption rate. How many users started getting on it at that period of time and if you could do a regression model or even just plot it out and just look at here's the increase in adoption rate in these different lines of businesses or these different regions and here's how sales changed as at came on board. And if you start seeing those plots come up in something close to a straight line, you say wow what's the chance that this could just be coincidence that the increase in sales in each of these areas, happened to coincide with when we rolled out the system? Now in some cases sales will be a little higher than in other places, because there's almost physical differences, there's business environment differences, etc. But if you could see a change in sales that could be isolated to the roll out schedule of the system. Well then you have lots of data points to make this on, you don't have just 2.

S   Absolutely and I mean just that idea that a lot of people will just measure the before and the after they won't appreciate the value of measuring historically and regularly through clients that you do build up that body of data that you can look for patterns again. You know, I believe one of my mottos is 'it's the patterns not the points' that really give you the information about what's going on with performance, so…

D   Oh that's a good motto. Actually I would say that even the idea that if you going to claim that same IT Project has some effect on sales, its not just the increase in sales that you should see but how did that increase happen, did it happen more in one department than another? Is it happening more with the Sales Reps that are using the system more…

S   Yeah.

D   … than the Sales Reps that aren't?" You should see certain patterns in how in the increase occurred, not just the increase.

S   Absolutely.

D   So anyway, that's where deconstruction is really the essential to all of this. You know sometimes I think that if a lot of business professionals were on CSI, if they didn't see a video tape of the crime and DNA evidence they would think it was up in the air, right? You know you have to use a lot of clues and you have way more data than you think and you probably need less data than you think. I say that over and over again in the book.

20min, 3sec

S   It's business' wise words. Is there a second part of your 3rd point about measurement Doug?

D   Oh no, I was simply going to point out a couple of measurement methods that you know maybe a lot of people didn't now you could do. For example, how does a Marine biologist estimate the population of a fish in the ocean? Or in a lake?

S   Not swimming and counting I'm sure.

D   Yeah, well I ask people how would they do it if it were in a particular lake? And I say how would you're average Accountant do it? Maybe there's some Accountants on the phone call and I apologise in advance. But, sooner or later someone would say "drain the lake." And I'd say "yes, the Accountant would drain the lake, to count the fish, or to measure the population of fish". Because when you ask the Accountant to measure the population of fish, they thought they heard count, instead of measure.

S   Ahh Hah.

D   So they assume those synonyms, but they are really not. But a Marine Biologist would do something called 'catch and release'. He would cast the net, catch a thousand fish, take them all throw them back and then you get them all mixed up with the population again, cast the net again. Let's say you catch another thousand fish and of those thousand fish you caught the 2nd time, lets say 50 of them are tagged. You have enough information to infer a 90% competence interval for how many fish are in the lake. Yes it's about 20,000 fish and it's somewhere between 15,000 and 25,000 when you do the math on it, but if your previous range was 5,000 and 50,000 that's a much narrower range. And that's called catch and release, so that's how you can actually estimate the size of populations, when you never see most of it. That's how they estimate the number of species of butterflies in the rainforest. They know they haven't found all the species, how can you estimate the number, that you haven't found? Through the same statistical methods that the census bureau uses to estimate it's undercount. The census bureau estimates the people that it missed counting. It was a simple statistical method, they don't actually do 'catch and release, tag' em' and through them back. They use other statistical methods and by comparing the results of different statistical methods you can estimate the total size of the population that you didn't see in either statistical methods.

S   That's amazing.

D   So that's… It's really amazing what has been measured with methods like this. Good sound measurements too.

S   Sampling very much relates to the last point that you've made about understanding populations, about draining the lake so to speak. I think it's something that's very underutilised in organisations too is, instead of sending survey forms out to all employees, or to all customers once a year, because that's all they can afford. Go in with much smaller samples and measuring more frequently, can actually give them much more valid and much more useful information.

22min, 55sec

D   Well absolutely and it depends on what you are doing with it. But if you're measuring something where you currently have a lot of uncertainty, chances are very few samples will

reduce your uncertainty a lot and that's the interesting apparent paradox with sampling. Is that the less you know now, the more the first few samples will tell you.

S   Yeah.

D   So If you have no idea what percentage of time your customers spend doing activity X. If you say "gee I think it could be, I don't know, it could be 0 to 60% of their time, they could spend in some activity that's related to this, I really have no idea." Well then you sample the first 8 people and none of them said they spend 5% of their time on it, well you could probably get rid of that upper bound. After 8 people, I mean you could work out the odds that you would just by chance happen to have chosen 8 people that spend less than 5% of their time doing this, if in fact more than 50% of their time is spent doing, for the population on the average. So that's why there's this small sample statistics, so the less you know now, the more the first few samples will tell you.

S   Which is a revelation.

D   People think how can I learn anything from 12 samples? That doesn't make sense and I say well try this, I have this example in the book, the jelly bin example. You know I ask people for what their 90% competence interval is for how many grams a jelly bean weighs on average? An average Jelly Belly jelly bean.

S   OK.

D   And they might in the past, they've given me ranges of something like ½ gm to 10gm and I say all right take 1 jelly bean and put it on a visual scale, I actually did this for the book and it said 1.4gms – would that change your range? Most of them rationally chose to greatly reduce their range, as a result of that first sample and that's rational, that makes sense that they should do that. They went into that sampling with they already had some ideas about the relative uniformity of jelly beans, etc.

S   Yes, so they could correlate with other information they had about…

D   Yes exactly.

S   So this is an important point then, is that distinction between measurements and counting, because when you think more about what measurement means you sort of thinking more about well it's reducing uncertainty, its not about knowing precisely or knowing with absolute certainty, its about reducing the uncertainty in our current understanding of something and that really does broaden the scope of how useful and applicable measurement can be in a lot of different situations versus the counting.

<u>25min 37sec</u>

D   Oh exactly, you know when I was doing my research for the book and I went back and looked at my 1997 article, I was shocked to see that I actually in the clarification I said, in the clarification chain I said what can be observed can be counted and or I think I said something to that effect.

S   Yeah

D   What can be observed can be counted or what can be counted, you know etc, etc and I wouldn't say that anymore. I use the words count and measurement very differently, so that's one thing that's changed about the clarification chain. Counting is, in the same sense that everybody understands the word to mean, is you are actually doing a piece wise identification of each item and you're saying you're counting it up as integers. Measurement is very different, measurement is what are the odds of getting this result if in fact this was the underlying state of things. That's what statistics is about. You say what are the chances I could have gotten, if I'm measuring the height of the average Nebraskan and I randomly sample 20 people, what's the chance that I could get an average in that first sample of 20, 5'9", if in fact their average height was over 6', it's pretty low actually, when you work that out, if you use your random samples.

S   Yeah.

D   And that's what most random sampling theory is about here.

S   Thanks Doug that's great. The title of the book is really interesting and provocative one I think 'How to Measure Anything' and I know that in putting this tele-seminar out to my list and just getting some of their responses to it, a few emails popped back saying "no you can't measure anything", and I wonder if they've missed the point a little bit about what this book really is about and what it does mean to measure anything. What give you the confidence Doug to make a lofty promise like that?

D   Well it's simply because every time I've seen someone claim something can't be measured, which has been for the last 20 years of my Management Consulting experience.

S   Yeah.

D   It has in fact in every instance, turned out to be measurable and in every instance it turned out that they simply misunderstood 1 of those 3 things I just talked about, concept, object and method - without exception and then I just started realizing, you know if I stood back for a moment here and looked at the basic arguments, the basic argument that some things are immeasurable is, has to be based on the idea that if it's not measurable that means I can't observe it at all. Now with sampling theory and things like this we understand that if you can observe it all, if there's a way to structure the observations to tell you more about it than you knew before, that's a measurement, OK? On the other hand if someone says, if this is important but I can't observe it at all, I would say " why do you think it's important then?" "Why does it matter to you?" I mean if somebody says "I can't measure, the hair colour of leprechauns", I would say well is it observable in some way to you, does it have any consequences to you in some way? They would say "no" and I'd say that's why, you know, you can't measure that because it's irrelevant, it has no bearing on reality. So it has, if it's something you believe exists at all and you care enough about it that you try to measure it, well then you've made some observations about it already, that tells you that it exists. You've made some observations that tell you that it matters. So we work through that thinking and we start to identify observations we can make to reduce our uncertainty.

29min, 34sec

S   I guess that conversation at the beginning would vary in length depending on the person, depending on the organisation, depending on how complex it was the thing that they were trying to measure, do you find that?

D   Well usually I… there almost scripted now for me. I simply identify which of the 3 things they misunderstand. Or a multiple of the 3 things they misunderstand and I explain it to them.

S   Yeah.

D   Once they, I realise that if it matters to them it must be observable and if we can observe it we can start to structure observations. Then that's, you know there's really nothing left in the argument that some things can't be measured. And by the way, in the book I describe things about how the Government and offing of Damage Claims in Civil Trials measure the value in human life. I've even used the measure of a value of a human life, in our lives, for IT investments.

S   Seriously?

D   Seriously? That example, that case study is in the book by the way. The value of human life, by the way if you want to know the answer is between $2M and $20M it's a range.

S   Is that right? Wow.

D   Yeah. You know how they do that?

S   No!

D   They look at how you spend your own time and money to figure out how much you value your life. It's called VSL 'Value of Statistical Life'. It's a methodology that's actually widely used in a lot of different programs. Have you every heard of this… maybe, we hear the advertisements all the time in the States, I don't know if you've heard of it in Australia or not, but there's this Heart Scan. You get this Heart Scan, you come in to a local hospital, you get this Heart Scan, it can detect if you have any you know, potentially fatal problems coming up.

S   OK.

31min, 27 sec

D   And every… they have people come on the Heart Scan advertisement and they explain "you know if I hadn't had this Heart Scan, I was otherwise healthy, but I had this Heart Scan and it found something that you know, fortunately we caught it in time and it saved my life". So let's take it for granted that those claims are true.

S   OK.

D   I think they are, I think they are true. That people have come on board and said this found some problem, some defect and it would have been deadly in a couple of years and

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fortunately I was able to have surgery that saved my life and I only discovered it because of this Heart Scan technology, based on MRI's. Well I know a lot of people who haven't done it and I haven't done it either. I chose to save my time and my money instead of getting the Heart Scan, even though there is some small fraction of a percent chance that it could've saved my life. Maybe I'll be dead in a year, but only because I didn't get this Heart Scan done, right?

S   Yeah.

D   But I chose to save my few hundred bucks and my time. You know a couple of hours, 3 hours or so with the commute and everything, to go do this and when you look at a bunch of purchases like that, you could choose the tyres on your car more often and be a little bit safer, you could get a 3rd smoke detector in your house. Now you may not consciously make these trade offs, but when you look at a large number of trade offs, its rational for someone to say "I'm not going to value your life more than you value your life and apparently you value your life between $2M and $20M" and that's actually used by almost every federal agency in the United States that has something to do with Public Safety. Like the FAA, the ETA, FDA, etc.

S   That's really out there that example, for me.

D   Yeah it is, but the fact is that you can't get around not putting a value on that because you have limited resources and you have to allocate them in some way.

S   That's exactly right.

D   We could right now in this country and every country in the world, they could save more of their citizens lives if they raised taxes a little bit and allocated them towards some Safety Program. You could do that right now in Australia.

S   Mmm.

D   If you paid more in taxes, it's conceivable that you could afford more Safety Programs and you could save more lives. How do you think an increase in taxes of say, oh ½ again would go in Australia.

S   Right now I'm not sure that any increase in tax would go down well.

D   Exactly, even if you could save an extra 2 lives a year.

34min, 5sec

S   It just wouldn't be in context.

D   By the time a program gets to the point where a human life has to be worth $100M to justify the program.

S   Yeah.

D   You could say well gee that same money could save more people some more hours. So you can't get around the cold hard economics of the fact that you have limited resources and people choose that there's some point of diminishing returns on how much they're going to pay to save someone else's life. Or even their own and that's the VSL 'Value of Statistical Life' and that's actually in the cash flow of our lives, that I've done in IT systems for the Federal Government.

S   There's a corollary to this I think Doug, which is not being able to measure something perfectly is no excuse to not measure it at all.

D   Yes, the existence of noise is not the lack of signal.

S   Yes that's beautiful.

D   The existence of error does not mean that you won't learn something. You have more error now – think about uncertainty as error, right?

S   Yeah.

D   If you were to estimate something now without making any measurements at all, you'd have a lot of error, right if you had to measure say the performance of someone in your organisation and you hadn't many observations at all, if you just did an estimate, basically a guess, you'd have a lot error. Well whatever measurement method you've come up with would probably have less errors that that and that's what measurement is right? That's what we meant by measurement in the first place, the reduction of uncertainty.

S   Exactly, which brings us closer to being able to make a slightly wiser decision.

D   Yes, exactly. It doesn't matter that we haven't eliminated uncertainty, it's that we have less uncertainty and that's still key. It always gets back to those things.

S   There is… I was just going to say Doug, to the callers a lot of the Performance Measurement Meetings that I've participated in, with Executives, Managers or Decision Makers. So many of them, they're sitting there looking at their Performance Reports with Performance Measurements, they're spending more time debating the integrity of the data or the integrity of the measure, not actually seeing what value they can get of what that measure is offering them. It's a behaviour I think we really need to become more aware of and shift, so that we think of more in terms of the glass is half full with these measures, as opposed to half empty. This measure has something to tell us, what can we get from it as opposed to just discounting it totally because it hasn't got 100% integrity.

<u>36min, 40sec</u>

D   Yeah, exactly – that's an extremely irrational behaviour that happens a lot in business.

S   Mmm.

D   They'll throw out any research on uncertainty reduction at all, because it's not a 100% uncertainty reduction. You know I can improve your backs at the Black Jack table by 50% and if you play all night those averages will average, that's if you're making a lot of good money, but someone would say "well you're not making all these predictions perfectly on the next card, so I'm not going to take your information at all". That doesn't make sense, nobody would do that, right? But we do it all the time in business.

S   Yeah.

D   We say here's this information about the Study or this Performance Measure, etc, because it has some error, it has no utilities, it hasn't had any error reduction at all and that's obviously, that's a fallacy.

S   Absolutely. Doug have you got anymore examples that you can share maybe related to IT or related to some of the other things you've mentioned like Leadership or Employee Performance, that kind of illustrates this process again of how something traditionally considered immeasurable, actually has become measurable?

D   Oh sure. Well you know lets take something really fuzzy like IT Risk.

S   Right.

D   Right? That seems really fuzzy and touchy feely, right? Well I mentioned in one of the 4 maxims I talk about in the book, 2 of which I've mentioned. One is assume it's been measured before, assume you have more data than you think, that you need less data than you think and that the measurement is cheaper than you think.

S   So these are the attitudes to start out with?

D   Right. These are good attitudes to start out with, because we usually end up making the opposite a highly unproductive attitude, which is we assume that it's never been measured before. If we figured out how to measure this thing, we'd win a Nobel Prize, because no one else on this planet has ever measured this. Right?

S   Yeah.

D   That's the attitude we are starting out with and we also start with the attitude that we don't have the data that we need and we are going to need tonnes of data. Usually the opposite is true and finally we start out with the assumption that anything that's going to be a useful measurement is just going to cost or be unfeasible for some reason. All of those turn out to be unproductive assumptions. By the way they have not made any measurements to come to those conclusions, at all. There's a lot of error in those measurements.

39min, 12sec

S   That's true.

D   They have more error in their judgements about measurement methods than the measurement methods would. Right?

S   Yeah.

D   What measurements did they use to come up with those judgements? None.

S   None!

D   Exactly. They'll say "it's based on my experience". Your mean your non-random sample of experience? Right?

S   Yeah.

D   Right. It's not like they were doing the math all the time. People don't remember things, they don't remember the standard deviation of their experience or the mean of their experience, they just remember a bunch of anecdotes.

S   And sometimes they could take just a sample of one for them to build that conclusion too.

D   Yeah exactly. What they tend to do in fact, this is what's been determined in years of decision psychology research, decades really – what people do is they remember the times they were right. That's what the statistical analysis of their experience comes down to, is remembering the times they were right.

S   That's a worry!

D   Isn't it! Because that's why they're statistically over confident, I talk about that in the book too. People put a very high chance of being right on subjective odds. If they're making a prediction on failure, 90% confident when you track them in reality, they only right 50% the time that they're 90% confident.

S   Ah hah!

D   But anyway the first thing was, about measuring IT Risk, the first thing was to assume that you weren't the first to measure it. What else, who else measures risk all the time? Actuaries.

S   Absolutely.

D   We should be doing what Actuaries do, we don't have to event a scoring system for measuring risk in IT. Risk to an Actuary is probability and magnitude of a loss, that's what Risk is about.

40min, 54sec

D   The probability of a loss and magnitude of a loss.

S   The probability of a … OK good.

D   In those 2 dimensions are risk.

S   How likely it is that its going to happen and how big it is when it happens?

D   Yes, exactly and that concept is just as relevant to IT as it is to you know considering the premium for an Insurance Policies.

S   Yeah.

D   Or insuring the failure of a rocket launch that's carrying an expensive satellite, things like this.

S   Mmm.

D   Actuaries by the way do a lot more than insure things that they have mortality tables for they insure very difficult to predict events, actually. So take it for granted that risk has been measured before and that you don't have to invent any risk measurement method.

S   Right.

D   That's the first thing. So when we talk about measuring the risk in IT and I spend a whole chapter on measuring risk in the book. We do it with Monte Carlo simulations, by the way I'll do 2 or 3 or half a dozen Monte Carlo simulations in the morning, OK? Before 11am, I'll do that many, they're not difficult things to do. I knock them out all the time, there's a lot of tools out on the market for doing these sorts of things.

S   Now do you need to be a Statistician to learn these things? Can the book help come to an understanding of what a Monte Carlo simulation is? How its useful and give them enough knowledge that they know who to go and see to have sort of thing done and why?

D   Oh yeah. In fact the book has a website howtomesureanything.com and I actually give people a simple spreadsheet based example of a Monte Carlo, it can't be any simpler than that.

S   Great.

D   It's just Excel. It's just a combination of formulas in Excel, randomly generating a bunch of scenarios, that were defined in the book. So once someone sees how simple it is, they can kind of take it from there and figure it out for themselves.

S   Right.

42min, 41sec

D   So that's what we talked about, that's what we mean by measuring risk is we're figuring out what's the uncertainty about these things? Can we quantify our current state of uncertainty and how much would we lose if we turned out to be wrong? And that's what we mean by measuring the risk of any investment.

S   Yeah.

D   Including IT.

S   It's nice and simple.

D   By the way, you do have a lot of empirical data, by the way as well. Just to take one example, IT projects cancel with some regularity. It's not as if there's no data on this at all, the Software Productivity Research Institute has data on this for a few decades, actually. At least the last 20 or 30 years. The Software Productivity Research Institute, I think its still spri or spr.com, its either spr.com or spri.com, but they've got this empirical data on the failure rates of IT projects. Those cancellations, you know where you've spent some money and then someone pulls the plug before you finish. That happens, some percentage of the time and one of the best predictors is the duration of the project. If a project is about a year long, about 14.4% of projects cancel, that a year long or longer. There's data on that, you don't have to wing that.

S   So there is, there's data. OK thanks Doug that's great. Now we're starting to draw closer to time for our caller's to ask some questions, but before we do that, I'm wondering if you wouldn't mind maybe summarising some practical tips that people can start doing straight away, immediately after this call, to sort of get a better crack at measuring what they've up to now believed to be immeasurable.

D   Oh sure.

S   How could you summarise some tips for them?

D   Allrighty. Well first off define this thing – what is it? That's the beginning of all scientific analysis.

S   Yeah.

D   Is defining what it is that you are talking about. Secondly figure out how to quantify how much you know now. There's almost nothing you need to measure in this world that you don't already have some idea about. If somebody said "well this performance, has the performance of this group of people improved this year or not and by what percentage?" they wouldn't say "I have no idea" they'd say "it can't be the case if their performance has improved by more than double." "it can't have gone down by half" that doesn't make any sense.

S   OK.

<u>45min, 15sec</u>

D   In the book I call that the 'absurdity test'. At some point you know the value is absurd and in between the 2 absurd points is your range, that's what you know now. Where the absurd starts to become unlikely but feasible, that's the bounds of your knowledge, OK?

S   Right.

D   So quantify how much you know now, in the book I actually show methods for training people how to quantify their current uncertainty of outcomes, so that they get good at it. So that they can put odds on it, it turns out some people are very good at putting odds on things. Bookies are very good at pointing odds on things it turns out to be.

S   Yeah.

D   If you can learn to be as good as a Bookie, well you can, when you read the book. You can learn to be as good as a Bookie about that – putting odds on things and then you ask why do you care about this and when does it start to make a difference, what would you do for example if you were measuring some groups productivity and the productivity was lower than you expected or higher than you expected, what would you do that would be different and what is the point at which you begin to do that.

S   OK. So this is about the implication, how did this… would this actually drive me to some sort of action.

D   Yes, exactly. So then you sort of really starting to describe the framework of the measurements when you are doing this. You are saying "why do you care about it?". There's some threshold at which some action will engage, when you measure this thing and sometimes you find out that that threshold might be pretty far away from where you think it is now and so that might even simplify your measurement problem. So as soon as you sit down and quantify where that threshold is, versus what your current uncertainty is you might say "well gee it's either very unlikely, or very likely, that that threshold could make a difference here". You know am I going to be high enough on this performance increase that their bonuses kick-in, or are you going to be low enough that I should fire the manager or something like this. There's got to be some observable consequences for it.

S   Great.

D   And finally, you know master a few basic empirical methods. Great Yogi Bear quote I was telling you earlier Stacey…

S   Yeah.

D   … if I'd heard this before I wrote the book I would have left it in the book, but it's Yogi bear said "it's amazing what you can see when you look".

S   I love it.

47min, 25sec

S So quit talking about the limitations about what other measurement you're trying to use and start making the observation, you might be surprised and you know what, people usually are, because we find out all the time, that people are… if we can get them start making observations and get out of the conference room and talking philosophically about the types of errors they think it might have.

S Yep.

D Using their very erroneous judgement about statistics, right?

S Yes.

D They get out into the world and start making some observations, they'll start to learn a lot. In fact there's one really important concept that I talk about in the book that I mentioned in a later article in CIO magazine, called the 'IT Measurement Inversion', that is there's a formula for computing the value of information. It's been around for almost 60 years now and it's widely used in a variety of fields and it's odd but IT almost uniquely doesn't know that there's a formula for the value of information.

S Wow.

D It's used in Government, it used in business, its used in portfolio management, the Census Bureau knows about it. There's 1300 statisticians working in the Census Bureau, that's the most statistician I've ever heard of in any organisation. They were a client of mine, they had 1300 statisticians. How many of them do you think measure risk in IT? None of course, just like everybody else in the world. So even in those areas, they've got all this understanding of the quantities… for the formula, for the value of information. There is an economic formula for the value of information and in some cases its very simple, its more like the cost of being wrong X the chance of being wrong. If you want to boil it down to it's simplest possible cases, there's some more complicated examples, but when you workout the value of information, it turns out you end up measuring completely different things than you otherwise would have.

S Is that right?

D Yes and I talk about that in the article, 'The IT Measurement Inversion'. In the book I just call it the 'Measurement Inversion', because since I wrote the article in 1999 I've applied this to many non-IT investments and problems, including forecasting fuel for the battlefield for the Marine Corp and it doesn't matter what area I applied it to it turns out the highest value measurements are routinely the things that people never thought about measuring and the things they spent all their time measuring so far, were among the lowest value measurements. So we call that the 'Measurement Inversion', what we used to call the 'IT Measurement Inversion' and it turns out that if you start making observations for things that you've never observed before at all. You almost always are going to have an epiphany. In the book I call it the 'Epiphany Equation', the formula for the value of information. Its called the epiphany equation, because you're just much more likely to have an epiphany if you look under a rock, you've never looked under before and you're probably… if you haven't done

the math on the value of the information, it's highly unlikely that by chance alone you've chosen the highest value measurements to make. You probably haven't

50min, 21sec

S   Yeah.

D   You're probably measuring all the wrong stuff just like everybody else.

S   All the stuff that was easy, all the stuff that was traditional, all the stuff that everybody else did.

D   Exactly. People measure what they know how to measure, not what they should.

S   Absolutely. Well we're just about ready to take questions Doug, but while everybody who wants to ask a question, sort of gets their… gets their question framed nicely in the heads – I'll give them a couple of minutes to do that – maybe you could share with us how people can get a copy of your book? Where do they go?

D   Well it's been on Amazon for a while, about 3 weeks, you can go to amazon.com, I'm sorry you can go to howtomeasureanything.com, that's the book's web site and it also has all the downloads, the spreadsheet examples I talk about in the book, those are all free, anybody can get them. They make more sense if you read the book first, but you don't have to buy the book to download the spreadsheets actually. I have examples of calibration questions there, I have forum there, I also have a measurement challenge in the forum.

S   Oh good.

D   A lot of people ask… try to come up with very difficult measurement problems and we discuss them.

S   That sounds great.

D   So I encourage you all to participate if you can.

S   Wonderful, so that's howtomeasureanything.com.

D   That's correct.

S   OK well I'll un-mute the call lines now and if anyone's got a question for Doug, please just say your name and go ahead and ask your questions. So lets un-mute. Great, who has our first question for Doug?

Q   It's Francois here.

S   Hello Francois, how are you doing?

Q   Oh fantastic. You can just imagine how excited I am about this talk.

Legend: S: Stacey Barr / D: Douglas Hubbard / Q: Callers

52min

S   Yes I can.

D   Oh I'm glad you're excited, thank you.

Q   I'm so glad about this book and I'm so glad of how clear you are, but I must admit that it's sometimes quite an upward battle to convince people you can measure everything, so I'm really looking forward to getting hold of your book and dish it out to some clients that give me that argument. I'm definitely going to give them some of that.

D   Well you know and I do make a distinction there, you make an interesting way of phrasing that, because I don't actually tell people to measure everything.

Q   Yeah.

D   What I tell them to do is I ask them to apply this value of information formula and then they actually end up measuring very key things.

Q   Yes.

D   That's what's interesting, is after they've applied that formula, they end up measuring just a small fraction of what they thought they should be measuring, because it turns out that only a few things really matter. Which you know kind of makes perfect common sense, but you know when we design performance metrics and all sorts of things we feel like we have to measure everything and it turns out that most things that we would like to measure, don't really have much chance of having bearing on a decision so… I say that everything is measurable, I don't necessarily say they should measure everything, in fact I wouldn't.

Q   I think I have to admit that I've made the mistake in the past to try and convince companies to measure everything and obviously that wasn't a good strategy.

D   Oh yeah. There's very few things that matter and what matters is usually a surprise. When you do that calculation of information gathered. So take it for granted that most people aren't very good at guessing what they should measure. I don't even try to guess anymore, I just wait to see what the information value calculation says and then I say "aah hah, OK now that makes sense, I should measure that thing."

Q   Really?

D   For everything that we choose to measure, from the information value calculation, everything that it indicates that we should measure, there is a dozen other things we could've measured that we didn't.

S   That's got to be encouraging to a lot of people, because this is one of the problems that most people face, particularly in large organisations is they are drowning in measures that are meaningless. So there's a lot of hope in that I hope, for people…

<u>54min, 14sec</u>

D   Oh sure.

S   … it's about finding you can find the most meaningful nutshell of measures if you like as opposed to measuring for pleasure. Thanks Francois for question and your comment.

D   Oh Francois, did you have any other questions? Francois? I guess not.

S   No, no. Anyone else got a question?

Q   Chris here.

S   Chris go ahead.

D   Hi Chris go ahead.

Q   Sounds very good and I like the sound of it, but in small enterprises how to make the measuring cost effective so that small businesses can take advantage of the same.

D   Well I have a small business. My small business is my wife and I and sometimes a few subcontractors and so we have a very small business, I gather it's probably smaller than yours, is that right?

Q   Yeah, we're a bit bigger than that, but yeah.

D   Oh OK. Well we use… I apply these methods all the time so if we find it economical then you can probably find it economical. The point is that at first people don't really know how much they should be spending on measurements. You don't really know until you figure out how to complete the value of information, it's only then that you can figure out ahh hah this measurement right here is worth you know, $2000 a year to measure and I reduce my uncertainty on this for less than $2000 a year and most of the time you'll probably say yes, I can make some observations that tell me more than I knew before. So again there is an economic argument against measurement sometimes and that can be a legitimate argument, there's a lot of measurements that aren't economically justified, in making but in fact most people are too quick to say that measurements are uneconomical. They haven't figured out what the measurement is worth, from its decision value with the formula for the value of information and they haven't actually sat down and done any analysis of the cost of the measurement. So they don't really know for a fact yet that a measurement is uneconomical, that they can't do it. So I would say you know, lets learn how to do that math first. Work out the cost of the measurement, the value of the measurement, make sure that the value is a lot higher than the cost and then it's justified, even for a small organisation.

S   It sounds like there is going to be some action learning in that as well, you have to… if you haven't really taken measurement seriously in the past and haven't really done it before you do need to appreciate that you will need to put some time into doing a bit of that learning and you know figuring out how to do these value calculations and maybe looking at measuring a couple of things, bringing those measures to life and through using them, learning that and fine tuning it over time.

56min, 48sec

D   Exactly and I have some, on the book's download website, I have some simple information value calculations on spreadsheets, so it's not that hard to learn.

S   Great, that's…

D   I've taught a lot of people.

S   Doug we are coming close to the call, I'm just wondering have you got time to hang around for another couple of minutes to maybe take one more question?

D   Yeah sure, absolutely.

S   Great thanks for your question Chris. Has anyone else got a question?

Q   Hi Doug and Stacey, Martin's my name.

S   Hello Martin.

D   Hi Martin.

Q   Can you hear me all right? I've just been sitting listening quite intently and it's interesting I just… having just finished a project and coming to the realisation that as a Project Manager, often we don't have necessarily sufficient input into the business case and the underpinning assumptions around the benefits which underpin the business case, which is really the key to getting funding and all the sorts of things that often are a dilemma. In this particular instance, it's interesting in that what's emerged was that the project was delivered, starting with the outputs of the project were delivered, you know on time and pretty much on budget, which was my responsibility, but when it came to looking at the benefits and the score-carding activity, you can probably guess what I am going to say.

D   Sure.

Q   What's got me stumped is that you know the benefit measures are sort of cluttered in this noise that's associated with the masking events and as a consequence when you look at the overall justification, its simply not there and now we're in a situation where you know you're rummaging around trying to I guess re-engineer the process and what ultimately will have to happen is we've got to go back and find some more Capex funding to initiate further system changes to in fact be able to derive those benefits. I guess the learning in all that for me, was to get an absolute understanding of what the underpinning assumptions are and its really… the question is when you get to the measures and actually start measuring its too late, if you're measuring the wrong things or you find that you can't actually get the data that you need and that's… I'd say I work for a very big organisation, I won't say who it is, in Australia, but it seems to be a dilemma that I think many project people face, where at the end of the project you have to find I guess, justify why you've actually done it.

59min, 4sec

D   Well you said several things Martin, that I can respond to.

Stacey Barr, the Performance Measure Specialist's Teleseminars
How to Measure Anything – Interview with Doug Hubbard, September 2007

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stacey

Q   This was an IT project.

D   An IT project, right. One is you talk about assumptions in the business case. As I discuss in the book, when you use Monte Carlo's (Monte Carlo simulations, that's where you generate thousands' of random scenarios to simulate the outcome), in Monte Carlo's you don't use exact numbers, you only use exact numbers when you know what quantity exactly. So how many of those benefits, quantities do you think they knew exactly when they made the business case.

Q   Certainly I think there was… because it was really based on gathering data out of reporting systems. The question was they I guess made some assumptions it really wasn't based on simulations.

D   Right, exactly. They probably didn't know any of the numbers exactly, right?

Q   I'm certain of that, I'm certain.

D   Right, they put exact numbers in the business case, but they didn't know the numbers exactly. What I say is that with Monte Carlo's is you don't have to make assumptions about exact numbers, because you don't need exact numbers in a Monte Carlo, you put in ranges and then we use those ranges to generate simulations. The fact is that you didn't really know that the R or Y was going to be 58.2%, right? In fact it's highly unlikely that it would be exactly that, its probably going to be something else. What you really knew about those benefits is that they were in some range and then once you've identified what that range is you can say what kind of observations can I make now that would reduce my uncertainty about those ranges. So I don't even use the word assumption, when I make business cases, because I don't want people to make any assumptions. I don't want them to state anything as a fact that they don't actually know and if you can do probabilistic modelling, you don't have to state anything as a fact that you don't actually know. You don't even have to assume that you are going to finish the project, you can put there's a chance it's going to cancel before you finish. You don't have to make any of those assumptions. Instead of assumptions, use ranges and probabilities, that's the first thing. Secondly you mentioned something about tracking benefits after the fact, we talk a little, I think we discussed this a little bit earlier about separating out the individual variables and that much of scientific method is about isolating the affected individual variables. You talk about these masking events, but in fact it's not just the value that should change with these masking events, that you talk about. It's that, how that value increased and with what specific pattern of increase, if it were due to one thing and not another. So it's always that next level that you get into. You also mentioned that you worry about getting the data and I always tell people again, you've got way more data than you think and you need a lot less data than you think, that's not… the data is not the issue, the issue is how clever we are, how resourceful we are in terms of getting the data, what data we really needed and what was the last thing you mentioned that was very interesting? Oh you mentioned the scorecard, I don't use scorecards, that's a pseudo measurement. That's something you use when you don't know how to measure something. So you make up a scorecard and you feel like it's more of a measurement because there's numbers in it, but it's really not. There's actually been a lot of research in Decision Psychology about the use of scorecards and weighting systems and there're certain kinds of weighted scoring systems and that's what it is right? A kind of a weighted score?

<u>1hr, 2min, 37sec</u>

Q   Yes, essentially. I guess it's a legacy from the past that's ready for the changing.

D   Allrighty. Well there's been a bunch of research about whether or not weighted scoring systems like that actually improve decision and it turns out they usually don't. There's only a few examples where they actually improve decisions and those methods have some very specific properties that almost no one ever uses, like for example normalizing the data on each of the parameters, you know so that they are all expressed as what they call an e-score and none of the parameters are these ordinal scales where you weight something 1 to 5, is that what you do, you weight something, you score each thing as say 1 to 5 or 1 to 10 and then you weight it and add it up?

Q   Not specifically in this case.

S   That certainly gets used.

D   Yeah, it happens a lot and those cases, those are the very kinds of models that track records show and every case where they've measured, just don't seem to improve decisions. So don't use a scorecard if you can get by with… I wouldn't use it at all, there's some other much more meaningful measure to use, there's an actual observable unit of measure that you could use. There's nothing that you need to assess on a scorecard that can't be better assessed with some other unit of measure definitions.

Q   OK, thanks very much.

D   OK.

S   I think that's going to be it for questions for today Doug. So what I'm going to do is just mute the call again and we'll wrap this thing up.

D   OK, thanks a lot.

S   OK Doug thank you so much for taking the time to join us today and especially for sharing so many great tips on how to make things measurable. I certainly got a lot more out of it myself than I had expected, I really appreciate it and I reckon we are all going to think twice before declaring something to intangible to measure.

1hr, 4min, 30sec

D   Well I appreciate your time, I hope I didn't get too wordy on some of the responses.

S   Oh no, its fine it sounds like…

D   It's a big topic.

S   It is a huge topic and to squish it into an hour and to allow question time is no mean feat. So hopefully everybody's going to be going and visiting howtomeasureanything.com. Thanks everyone for joining us on the call today. The call recording is going to be available in a few days, we'll email you a link when it's ready. You'll be able to download it or listen to it online and Doug I think you are going to be putting a copy of it on the book's website also?

Legend: S: Stacey Barr / D: Douglas Hubbard / Q: Callers

D   Yes I will.

S   Great, well I'm looking forward everyone to sharing lots more practical performance measure ideas and tips with you in the coming months, that are going to help you save time, effort, money and energy in your business organisation, by measuring the results that matter most, in the meantime feel free to come visit me at www.staceybarr.com and if you are not a subscriber already, you can sign up for my twice monthly free email newsletter 'mezhermnt handy hints' at www.mezhermnt.com, which is pronounced measurement.com and yes I do realise that's not how you spell measurement, I'm just liking to have a little bit of fun. Thanks everyone for joining the call, thanks again Doug.

D   Thanks a lot Stacey appreciate it.

S   And everyone have a great day – bye!

<div align="center">END OF TRANSCRIPT</div>

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