

The following transcript details the Honorable Randall R. Rader's (identified as RR hereafter) keynote speech at the 2002 High Technology Summit and the Q&A session with audience participants (identified by name as appropriate, general audience GA, or guest#1, guest#2, etc. hereafter).

RR: Good Morning. We have a rather daunting task together today. We have to really discuss, understand and learn the implications of the most important patent case of the last two decades. This *Festo* opinion, it deals with an exception to an exception to an exception. The doctrine of equivalence is an exception to the original infringement doctrine. A limitation on that exception is the doctrine of prosecution history estoppel itself, and, of course, the focus of the *Festo* opinion is a presumption within the exception to the exception to infringement. Despite that, it has taken on tremendous significance in intellectual property jurisprudence. What I'd like to do today in our time together, and this is a classroom, and we are going to participate together as students and teachers, all of us in a classroom type setting. I'd like to explore in this classroom, first, the rule of *Festo*, as we can divine it at its inception. One thing we've learned about common law jurisprudence is that there always are unforeseen, a term which we will be examining in some more complete dimensions, there are always unforeseen implications of an opinion. But we're going to start with the rule. Then we're going to look at some of the implications that we can at this point divine. And finally, I'd like to take you on a little tour of the psychology of *Festo*. I don't usually think of legal opinions as having a psychological dimension. But this one, because of the importance that has been placed on it in the press and within the intellectual property bar has taken on a whole psychological aspect that has affected the way we are viewing intellectual property, and I want to explore that with you as well.

Let's start with the rule, the rule of *Festo*. What we need is a hypothetical to understand what is at stake and I'm going to use the one that was most debated when the case was actually heard before the court of appeals for the federal circuit *en banc*. In various different iterations by different judges, we all dealt with this hypothetical. You have a process. It's a process like the process in the *Warner-Jenkinson* case, which is now quite familiar to us. It's a process, which involves a certain pH, a certain number of ingredients, and then we have a temperature, and here is your process that you have laid

out in your claim. We're going to look at one element, because we have learned that the doctrine of equivalence proceeds element by element, and so we look at a small common denominator to determine infringement, namely each element of the claim. And you have claimed in your process a temperature range of 50 to 100 degrees. Fine.

You submit your claim to the patent office and what do you suppose happens? Well, the patent office finds a piece of prior art where they used almost the same ingredients, a few different ingredients, almost the same pH, and they performed, in the prior art, their process at a temperature of 105 degrees. All right, my brilliant patent counsels, what are you going to do to respond to the rejection, which you have received? First, what's your rejection?

GA: Obviousness.

RR: Obviousness, of course. Obviousness. It's awful close to your ingredients, awful close to your pH, awful close to your temperature. It's too close; rejection obviousness. Okay, good. Your response?

GA: Narrow the claim.

RR: Narrow the claim. Very good. We're going to amend. Standard procedure. And so we do. And we decide the easiest way to distinguish our claim from the prior art would just be to change the temperature, and we drop our temperature to a new range, thus avoiding the prior art of 105 degrees. We are now in a range of 50 to 75, and we embellish our amendment with explanations that we have clearly distinguished our process from the prior art process, and we are now entitled to a patent, which indeed does issue.

And two months later, our competitor is practicing our claimed process identically, with one difference. Anybody want to guess what the difference is?

John Whealan: Temperature.

RR: Temperature. How come this solicitor of patents knows how to avoid patents so well? Makes you wonder a little, doesn't it? Whose side is he really on? What is the temperature they are going to use, by the way?

Guest #1: 76.

RR: 76. Well, you know, this is a pretty good patent law professor. But he's not quite right; it's going to be 75.6. Of course we round off to get where the professor wants, and there is no literal infringement. Your response is, of course, you sue them and what will you allege is your basis for infringement?

Judge Cohen: They stole your process.

RR: They stole my process. There's a good patent judge getting right to the point. They stole my process. But they say it isn't your process; your process is 50 to 75 degrees. This is not that; it's something different. And so you will say, well okay, I must concede there's a difference, because the judge will make me concede that, won't he, Judge Cohen? And then, I'll have to sue under the doctrine of equivalence. I sue under the doctrine of equivalence, saying 75.6 is equivalent to 75 degrees; it's an insubstantial change, adding nothing of significance. It performs the same function in the same way to get the same result. I use all the formulaic words, which would suggest infringement under the doctrine of equivalence.

And they respond, saying. What will they say in response?

GA: You're estopped

RR: Yes, it doesn't matter whether it's an insubstantial difference or not. We don't even have to get there because you are estopped under the doctrine of prosecution history estoppel from ever even invoking the doctrine of equivalence because you surrendered the subject matter you are now trying to recapture. You may not use the doctrine of

equivalence to recapture subject matter, which you surrendered. Okay, what's your response? You going to give up? Do you give up?

GA: No.

RR: No, you don't give up. Let's take a look at it as of 1994, before the federal circuit's *Festo* opinion. The rule for prosecution history estoppel is, at that time, characterized as being very flexible. How would you advocate that you do not fall under a flexible rule of estoppel? I need some new patent lawyers here. Yes?

Guest #2: I amended to get around the 105; I didn't amend to get down that low.

RR: Very good. I did not surrender 30 degrees just to get around this. Let's look at the purpose of what I was doing. I was trying to escape that prior art. Anyone looking at what I did before the patent office can see that all I was doing was evading this prior art. My surrender was only the surrender of such subject matter as was necessary to get around that 105 degrees. Therefore, looking at the purpose and the substance of my amendment, I did not surrender.

You would respond to that, as the infringer, in what way? How would you respond? Yes?

Guest #3: If you didn't want to give it up, you shouldn't have gone so low.

RR: You had a chance to choose here, precisely. If you didn't want to surrender a full twenty-five degrees to distance yourself thirty degrees from the prior art, you didn't have to make that choice. You were the one selecting the scope of that amendment. You selected your scope and chose to give notice to the public that you were going to fall down to seventy-five degrees.

Now, under the federal circuit, frankly, under the flexible bar rule, that would have been a very compelling argument, and may have prevailed even under the rule of flexible amendments in the pre-*Festo* era of the Court of Appeals for the Federal Circuit.

But let's look at what the federal circuit did. It said, with unequivocal certainty, you, by definition, have surrendered all scope between the breadth of your prior claim and the narrowness of your amendment. That is completely surrendered, and not in one wit can it be recaptured. This is a complete bar. The federal circuit grabbed a little phrase from *Warner-Jenkinson*, which said that there is an absolute bar to the doctrine of equivalence in the event that there is a presumption of application of the estoppel rule. Now we have traced the history, right up till what the Supreme Court did.

Now the Supreme Court reversed the federal circuit. I'm going to put aside that word "reversed" until we come back in just a few minutes and look at the psychology of what happened with the Supreme Court's opinion. Let's look at the rule they put into place. The first part of the rule of the Supreme Court is that estoppel will apply to all kinds of amendments, amendments based on prior art, such as we have in our example, but it could also apply to amendments merely to clarify the scope, such as might arise under, in the United States Code, section 112, the section which deals with adequate disclosure under enablement, or priority principles under the doctrine of written description. That section is often invoked by the patent and trademark office to make sure you clearly and adequately described what you have invented. And they require you to describe more fulsomely your invention. Even if we are just making descriptive amendments, if those have some effect on claim scope, the Supreme Court has said the estoppel rule can apply to those. You can be estopped by rephrasing your description of your invention. That's a rather non-controversial step.

Now how do we apply the rule with regard to the scope of the surrender, the flexible rule versus the complete bar rule. This Supreme Court reinstated the presumption, which it had erected in the *Warner-Jenkinson* opinion. Let's just read exactly what the Supreme Court said. It says, "[W]hen the court is unable to determine the purpose underlying a narrowing amendment [if we don't have an explanation as to exactly why we went all the way from 100 down to 75 degrees, and that's going to be in most cases the circumstance we encounter] -- and hence a rationale for limiting the estoppel to the surrender of particular equivalents [we don't know why the surrender was so large] -- the court should presume that the patentee surrendered all subject matter

between the broader and the narrower language.” What does that sound like to you?
That sounds like the complete bar.

Now, you can't jump too quick on that, because one paragraph down, the Supreme Court says, “This presumption is not, then, just the complete bar by another name.” This is not just the complete bar, they say. Well, but I thought, Professor, you just said a minute ago, in most circumstances we are going to have amendments that do not have a fulsome explanation of the reasons for the differential between the broader and the narrower claim language. Doesn't that mean in most cases you're going to have a complete bar rule, under what we now call the presumption? And yet the Supreme Court says it's not the presumption; it's not the complete bar; the presumption is not the complete bar by another name.

Well evidently the Supreme Court is placing a great deal of emphasis on its three methods of evading the presumption. Those are described in a single sentence, which I'm sure will get more ink than most sentences in American jurisprudence will ever get. “The equivalent may have been unforeseeable at the time of the application [I think they also mean at the time of amendment; they probably just slipped]; the rationale underlying the amendment may bear no more than a tangential relation [tangential relation] to the equivalent.” Now don't jump too quickly at that tangential language because they have described the same principal in other words which seem to have different implications. They also say, just up here a little bit higher, they described as well this tangential relationship between the equivalent and the amendment as a peripheral relationship.

What's the difference between a tangential relationship and a peripheral relationship? Now we can see that the Supreme Court is just kind of generally saying the purpose of the amendment is different from what the equivalent is really directed at, but the two words they've chosen have different implications. What's a tangent?

Guest #4: Line that touches a circle or an arc.

RR: And angles off in a different direction. Something going in a different direction. So we get the idea from tangential that it's talking about an amendment that had a far

different purpose for narrowing your claim than what the equivalent is actually achieving. We'll use it in our hypothetical in a minute; see if we can figure out what that's talking about. What about a peripheral relationship? Now it has the same purpose, but it's on the periphery of that purpose. It's related, but not to the central aspects of the amendment. One is looking at an equivalent and an amendment of different purposes, dimensions and functions; the other is looking at the amendment and the equivalent as having similar functions, dimensions, purposes, but the equivalent is somehow on the periphery of that, giving an excuse for perhaps evading the estoppel principle. And the third important principal that the Supreme Court gives us for evading the complete bar rule is there also "may be some other reason suggesting that the patentee could not reasonably be expected to have described the insubstantial substitute in question." Some other reason.

Now, just for a second, take our example. We are sitting here at 75 degrees, having narrowed ourselves to that. We have an infringer who is just over the top of the narrowing amendment. They are saying we are estopped to use the doctrine of equivalence. We want to fit into one of those three categories. Let's take the first one. Do we have any chance of saying that there is some reason dealing with foreseeability that should allow us to escape the presumption? Creative minds, any foreseeability issues here?

GA: Yes.

RR: What do you have for foreseeability over there, Judge Cohen?

Judge Cohen: The difference between 75 and 75.6 is de minimus.

RR: It's so small. But now he's looking at the equivalent here, isn't he? He's focusing in on that equivalent. What is the focus of this foreseeability inquiry that we are looking at?

John Whealan: The amendment.

RR: The focus is on the amendment, the solicitor says.

Guest #5: I just wanted to ask if it is objective foreseeability or subjective?

RR: I think we will find as we look at this that they are looking at an objective test. I don't think that it is expressly stated, but as we look at what they are talking about for foreseeability, I think you'll see that it is phrased always in terms of what a drafter of patent amendments at that time would have foreseen as a likely equivalent at the time of the drafting. In fact, the Supreme Court says something very close to that. The patentee must show that at the time of the amendment, that's back here, remember, at that time, one skilled in the art, what art are we talking about?

Guest #6: The art of claim drafting.

Guest #7: Art of the process.

RR: Interesting, I got two answers right here, and they're precisely the ambiguity in the phrase. Professor said, it's the art of claim drafting because that's the art we're really worried about here, the drafting of the claim. We had another answer, and that is the process. It's the art of the process. It's this art over here. It's the chemistry or the biotechnology, or whatever we're amending into. I think that is not as difficult a problem as it appears at first blush. The drafter, of course, is going to be performing his or her art only in the framework of the particular technology that is being revised. Therefore, it's going to require skills in both. You're going to have to know what the prior art is that you are distinguishing so as to understand that the distinction is sufficient to evade the prior art. You are also going to need to know how to accomplish that purpose in language. This is a legal skill, notice; this is a scientific skill, notice. I think our "one skilled in the art" has got to have a confluence of those skills.

Professor?

Professor Adelman: I think you're jumping a little too quickly. You've got 105 degrees. OKAY that's the prior art. This 75 better be somehow better than 105 or you hoodwinked the examiner and shouldn't have gotten your claim and obviously would be rejected for obviousness. So, there's got to be something in this 50 to 75 range that distinguishes patentably over that prior art. Now the question, it seems to me open. Why did you pick 75? Is that the start of the improvement, or does the improvement start at 80? Or what did you know? Because very often it may be that you think and have good reason to believe that 75 is a very safe range; that it really isn't good at 75; its really only good maybe at 65, but you are a good claimer and you want to protect yourself and you go to 75. And then you find out later that some change can be made in the process. The accused figures out that you can manipulate the process and get the same thing at 80. And I would say that that is unforeseeable and would come squarely within the unforeseeable language.

RR: Do you see what Professor Adelman is driving at? Let me take an easy case. At the time we dropped it to 75, it was very clear that the process would really only work within those parameters of 50 to 75. We had only enabled it within those ranges. If we went beyond 75 degrees, the process failed to work. It killed some bacteria that were necessary, and the process would not work. Aha! What happened in the interim between us knocking it down to 75 degrees and them going above 75 degrees? Well, they or someone, maybe even us, found an additive. We found an additive that could be put into this process that would preserve the life of the bacteria at a higher temperature, thus allowing the process to be performed at a higher temperature.

Now, make me an argument that there may be a reason not to apply the presumption. Professor Adelman has given us a good opportunity to explore what foreseeability means.

Guest #9: It's a classic case of later developed equivalence, right? It wasn't equivalent at the time, but it is now, and I couldn't have foreseen that.

RR: Precisely. And stated in the terms that the Supreme Court has used, at the time of the amendment, it was unforeseeable that the process could be practiced above the temperature of 75 degrees because the bacteria would die. Therefore, I narrowed myself based on the foreseeable implications of my invention. In the interim, there has been a new development, the classic after-arising technology, which gives rise to something I could not have foreseen. And in that instance, the Supreme Court's formulation would apparently say, the presumption has been rebutted, equivalence kicks in to capture the 75.6 and you are back in business.

Yes, sir?

Guest #10: But if you are going to go by the objective test, won't the rebuttal be that you claimed up to 100 before, so there must have been some foreseeability?

RR: Well, I was overly cautious; I was being overly cautious. This person who purported to be practicing at 105 really had never successfully practiced. They had just written it into a scientific article that it might work at 100 degrees. In a surfeit of caution I had claimed up to 100 degrees, but I knew that it really only worked up to 75 degrees. At that point the bacteria died and the process didn't work. Yes?

Guest #11: Couldn't you also make an argument that under the doctrine of equivalence there is no infringement even on this unforeseen development? Because what the competitor really did was he advanced the art, and although what he did looks like it fits under the patent claims, it's really a different invention. He put the additive in.

RR: Look there, they added something; they advanced the art and they should not infringe because they advanced the art and they have a different invention. Not a bad idea. It just isn't correct patent law. The reason it's not correct patent law is because you are literally infringing; you're practicing each and every element of the claimed invention, plus one. Now the way that the patent law resolves this conundrum is to give you a patent for your additive, which is an important advance. It allows the practice of this process at higher degrees. You will get a patent on your improvement and you will

then be able to block the use of the patent at higher temperatures; you'll have a blocking patent.

Foreseeability as described by the Supreme Court, and it really goes back to some federal circuit jurisprudence of the middle nineties, is focused on a different foreseeability, not the foreseeability of whether you can find a way foreseeably to vary from the claims. There is always a way to foreseeably do that. The question is whether at the time of the drafting of the amendment, the amendment drafter, or if we are talking about an original claim, the original claim drafter could have foreseen the potential application of the technology and thereby have literally claimed it. You have an obligation to literally claim the full scope of your invention. And if you have failed to claim some of your inventive scope, I've enabled this much, I'll only claim half of that, what about this other half over here? Can I recapture that by the doctrine of equivalence? That's very close to the issue that came up in *Johnson & Johnson*. [You must] claim the full scope of what you've enabled and if you have not then you cannot recapture your claim drafting error under the doctrine of equivalence. That foreseeability equation is a little different than a rogue reapplication of the doctrine of equivalence.

Let's jump really ahead quickly here. Tangential/peripheral, what kind of an argument might we make there? We've seen how foreseeability comes into play, particularly with after-arising technology which cannot be foreseen, as a way to evade the presumption, which is in fact something very close to the complete bar rule. What about peripheral? Tangential? Well, the amendment had one purpose; the equivalent something very different. My creative mind is going to have to stretch here a little bit, but I made this amendment for the purpose of evading this prior art because, as I said earlier, I knew that this really didn't work, so it was merely to get within the range of what I had actually enabled. Now the equivalent purpose is something quite different. The equivalent is expanding, because of this after-arising technology, into a different area of practicing my invention. Maybe they've applied the invention to an entirely different use than it had ever been used for before, still literally within the scope, but a different purpose -- tangential. Same with the peripheral, the fringe of the same purpose. These are terms, which are going to need a good deal of clarification. But I can see how it's at least related, somehow a subset of the foreseeability principle.

Maybe a quick example is the *Warner-Jenkinson* facts. Remember the facts of *Warner-Jenkinson*? You were distinguishing a pH that was above the range that you had claimed. So you narrowed the scope of your claimed range of pH. The equivalent was below that range. Now I would say, perhaps, in making an argument that is tangential to my purpose that is peripheral to my purpose. My purpose was to avoid this prior art that was above my pH. This equivalent is below; that's a different question entirely. And that may be the kind of thing that comes into play with tangential/peripheral.

Now what's another reason that I can avoid the presumption? Well, maybe again I can come back to the *Warner-Jenkinson* facts. It foams. I knew that the whole process started to foam up and would not work as an ultra-filtration device at pHs below the range that I claimed. So my claim was very reasonable within the realms of what I understood the process to be at the time. In the interim there have been advances in the technology. They can now make it work without foaming, but there's that reason that it was not claimed. The Supreme Court spends much of its opinion discussing limits of language, the problem I like to characterize as Plato's Cave analogy. All you scientists never read Plato's Cave, did you? Do I have to explain it to you? The difficulty of language is actually describing things. The Supreme Court deals with this in some eloquence. That may be the type of reason where language is limited in its ability to draw boundaries. Now, I must confess I've been doing this patent business for fourteen to fifteen years and seen an awful lot of cases, and I haven't seen a case that clearly turns on the imprecision of language. Language does have at least sufficient precision to usually define the bounds of amendments and inventions. But I can perceive that it's a possibility that language could be such an inhibiting factor on your ability to express [for example] a DNA sequence, which can have so many variances within. You know you can vary a few amino acids here and there, the three codons, nucleotide codons that form an amino acid can be varied along this chain and it still performs the same function. So maybe the limits on my language ability to express all the variants along this protein chain could be of the type of other reason that we're talking about.

I have just a few minutes now and I'd like to discuss with you some of the implications of this. The first implication of *Festo* is that it does have the benefit of tying the doctrine of equivalence to the prosecution process, and thus it averts one of the great

demons of patent law. The greatest demon of patent law is, if I did this in one of my classes they would have done what I've trained them to do; they would have all screamed back at me "hindsight," and I would of course explain to them that that's the great *dragon* of patent law. This is the great *demon* of patent law, which is different. The demon of patent law here is the invocation of a narrow claim in a validity context, which is then broadened in an infringement context to capture more potential infringers. This doctrine of presumptions with foreseeability is kind of the center piece of it [and] does link the two processes conceptually.

How are we going to determine infringement under the doctrine of equivalence? Much of it is going to turn upon placing ourselves in a drafting perspective, and thus conflating the scope of the claimed invention in the validity context with its scope in the infringement context. A story. *Johnson and Johnson* had just come out. A good friend of mine, a member of my church congregation, outstanding patent lawyer that many of my friends here would recognize if I gave his name, comes to me and he says, "Jeez, Randy, you are really dumb. You know, you couldn't have disclosed more your weakness in patent law of having never drafted claims than by writing the concurrence you wrote in *Johnson and Johnson*. It's clear you never drafted a claim. It's impossible when you are drafting claims to anticipate future equivalence. You've just really betrayed your ignorance."

Well, besides picking myself up off the floor, I said, "Well, if I could indulge you for a minute, my dear friend, maybe there's another side to this. Maybe you have betrayed your own weakness in never having litigated a patent case and finding yourself in the posture of protecting the public domain against inflated patent claims. Maybe the virtue of having tried and litigated more patent cases than probably any federal judge in many decades has given me that perspective. As between the public and the patentee, shouldn't the burden really be on the patentee to describe their invention? And if there is some imprecision in the anticipation process, shouldn't the burden of that fall on the patentee, who after all is claiming in an *ex parte* setting, and knows what they're claiming, and has the ability to define what their claiming? And looking at that burden shifting in a positive sense," I said, "what this opinion really does is elevate the importance of the patent lawyer's claim drafting exercise." We are placing the ultimate

premium on the ability of the patent lawyer to capture in legal terms the balance of the claim and yes, if necessary, foresee the full limits of the scope of what has been invented.

Another virtue of this formulation is that it really does acknowledge the central purpose of the doctrine of equivalence. The Supreme Court spent three or four paragraphs reiterating their dedication to the doctrine of equivalence, reciting to us *Winans*, and *Graver Tank*, throwing in *Warner-Jenkinson*. But conceptually, if I have the ability to claim the full scope of my invention, that invention, if fully captured, should be able to be enforced under literal infringement in almost any circumstance except conceivably that imprecision of language problem, which again I don't have a good example of. The central purpose of the doctrine of equivalence, I might posit, may be after-arising technology protection. That's the one function that literal patent claiming cannot suffice to protect. If there is after-arising technology, which really does change all the rules of the claiming game, then you must have an equivalent, which allows you to accommodate your now antiquated language to the new language of a changing technology.

International implications. Is this just the creation of another new standard that will put us in further conflict with the Japanese, and the Germans, and the other major patent-granting nations of the world? I think we can look at this positively, as actually putting us more in line with the international systems. Particularly, the Japanese have traditionally placed a central emphasis on literal infringement by similarly placing an obligation, a premium, on adequate drafting of literal claim scope. We may be actually, with this doctrine, putting ourselves more into the international mold.

What about, back to something Judge Cohen wanted me to talk about, how are we going to enforce this foreseeability principal? Are we going to have *Festo* hearings just like we have *Markman* hearings and invite experts? First we'll have legal experts to explain that, "Now if I were drafting claims in this process art I would have come down to 78 degrees not 75 because...." And another expert, "Oh, no-no-no, this was precisely the right patent drafting skill." And other experts in the process arts, who know this chemistry, coming in and opining on the prior art. We'll have to see; that is an unanswered question. I know that it's my sense that that is not the central focus of what were talking about here. The foreseeability principle is not a fact-finding enterprise as

much as it is the application of an objective standard of what should have been claimed, with knowledge of the prior art at the time of the claiming. Those sound to me less like factual inquiries, although there's a factual component. Certainly you're going to have to have knowledge of the scope and content of the prior art and how it can be expressed in language. But I think what we're talking about is less a fact-finding and more an objective standard of application.

Let me just say a word or two about the psychology of *Festo*. Psychology, of course, all depends upon who is on the couch and being psychoanalyzed. I think perhaps the most important people to put on our couch for psychoanalysis are not here today. They are the business leaders. They're the ones that picked up the New York Times and read, "Reversal of the complete bar!" And it said to them, I think, putting on my psychiatrist hat, I think it said to them that the Supreme Court has validated the value of patents once again. Our legitimate expectations, as the Supreme Court trumpeted, are to be honored. To use another phrase from the Supreme Court's opinion, our property rights have value. I think that the word "reversal," it's a big word, its primary impact may be in this psychological realm where people suddenly see the federal circuit has been reversed and therefore there is a renewed value to patents and their role in our intellectual property scene. As a legal implication, I think we've seen that the presumption, in many instances, is going to operate to achieve the same results as the complete bar.

Finally, let's put the federal circuit on the couch. The federal circuit might feel quite upbraided. After all, the [Supreme Court] told them quite clearly that they had not followed *Warner-Jenkinson*. *Warner-Jenkinson*, it said the absolute bar only applies only if there is no explanation. The federal circuit didn't seem to have read the whole sentence. The federal circuit seems to have upset these legitimate property right expectations. The Supreme Court spanked their wrists for that. And finally, the Supreme Court spent pages extolling the virtues of the doctrine of equivalence, seeming to change the focus of the federal circuit that had been looking for ways to limit, if not eliminate, the doctrine of equivalence. The psychology is always hard to predict, but I think we will look back years from today and still consider *Festo* a great turning point in American jurisprudence. I think we will validate it as a very positive improvement. Thank you.