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American Forensic Roundtable: Progress, Status, and the Future

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American Forensic Roundtable: Progress, Status, and the Future

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ABSTRACT In February 2014, a group of forensic experts was convened to discuss current topics in the profession. The topics ranged from progress since the National Research Council report in 2009, to education and training, certification, research, and other professional issues, including ethics. This transcript, which represents the dynamic interaction of the participants, has been edited for clarity and length.

INTRODUCTION

This manuscript represents the dynamic discussion surrounding a variety of topics by the authors at a meeting held in Seattle, Washington, in February 2014. The authors represent a range of levels of experience, job positions, and diversity of viewpoints based upon their careers in the forensic sciences. All of the opinions expressed in this transcript represent those of the authors solely and not those of their parent agencies or committees on which they serve.

PARTICIPANTS' DIALOGUE

Max: My first question is: if the NAS Committee on Forensic Science had been a teacher I think it would have graded Forensic Science with a D. It may have been an F, but they really liked DNA, so they probably graded it as a D. If you had to grade Forensic Science, in the United States, what grade would you give it and why?

Ken: Well, I'll start, I would have to say I think D would be a little harsh, but I would give it a C because of effort. You know, there's been a lot of effort and trying to do the right thing. In the past, you had to work with what you had and in some instances you didn't have much. They simply did the best they could, so I would upgrade from a D to a C, for effort.

Jeff: I have the privilege of having a wide range of daughters at home, from one in college to one in second grade, and so I would reject the grading notion and adopt the one that my second grader got as a "needs improvement." We have a "needs improvement" grade, I don't think we have a letter grade.

Max: Why would you reject the grading with "needs improvement"?

Jeff: You know, I've read the NRC report several times through, and um I think the language is actually softer than we felt like it was. I don't think it's,

“you guys are terrible,” it’s “look here’s some areas where you probably have some shortcoming and you really need to look at it,” and, so I see it more as a document that just pointed out some opportunities.

Terry: I would prefer what Jeff said. When I first read the report with my practitioner’s mindset here in Washington State, I was upset. I think now when you read it today with what we’ve done since, a lot of people are saying “you know some of that criticism was very well deserved” because I think a lot of us in forensics were resting on our laurels a little bit. So I think it woke us up, and I think what we’ve done since that event rates us an A+.

Sue: I wonder if I have to introduce myself every time—it’s the female in the room speaking! Actually, when the NAS report came out I believe a lot of people didn’t realize that there were any issues, as we’ve already discussed, and the fact that it’s not until you know what you didn’t know that you start taking another look, just like what Terry mentioned. And it really came to light through The Working Group on Human Factors; looking at latent prints, everyone in that field really felt “this is a slam dunk profession. We’ve got it down, we’ve been doing it for over a 100 years, we know exactly what we have to do with this.” It wasn’t until we started bringing in where the biases on each part of their analysis that individuals start realizing, wow, we never even contemplated that this was having an effect on our final result and errors were being made. And actually that first day of that meeting was discussing “what’s the definition of an error,” and that took a full day. Everyone had different perceptions on what an error is. So I believe people thought that the profession was excellent, that they would have given themselves a grade A, and it wasn’t until they became educated in human factors that, just like other professions, there is room for improvement.

Dean: I want to piggyback on a slightly different idea and I think in order to give a grade you have to reflect on a comparison-level back to something. And as kind of Jeff and Sue have alluded to, the reality is I think we were doing quite well with the resources that we have. I would have given forensic science at least an A-. I think what [the NAS report] has done is presented us with an alternate view and a different framework in which to look and grade. And so you’ve seen the shift of where we thought we were because of what we know today. So I see it more as a graduation, a shift if you will, of

perspective that is coming to light. We are getting one direction, in my personal view, from stakeholders and/or critics in the field, and it’s really forensic science’s turn to respond back to these things. Many of the things that come up today are related to areas that are not tangential but really on a parallel track to forensic science. And criticisms of the field such as bias and those areas we have not really studied or integrated into our laboratories because of how we’ve grown up and the demands that are placed upon us. We’re supposed to be a service entity within our organization and not a research-based organization. That’s not a criticism of the field it’s just a fact of where we come from.

Sue: This is Sue again, just jumping in on Dean, think about it, when you were in the university or even high school, did anybody talk about bias? Bias in the work? Bias in the science? That was not ever a topic.

Max: It was in my graduate education.

Sue: We’re not including that. [laughter]

Max: In archeology, there was always a concern of culture and contextual biases. If we say that something is a tool to scrape hides, and nobody alive was there to see it, you’re assuming it’s a tool to scrape hides, so you had to be aware of biases in those assumptions.

George: I tend to agree with everything that has been said, but I think the NRC report also ignored about 50% of forensic science. It ignored all of the toxicology; it ignored all of the drug chemistry; it ignored big chunks of what we do in our laboratories all together. And you know I think if you look at it, you say, look at the totality of what forensic science has been doing for the last 20 years, even before the NRC report came out, most of what was being done is very good and it’s still the same and there is no significant changes in it. And I think that the major focus of criticisms have been in the comparative sciences, and I think all of us in this room would agree that even before the NRC report came out we all recognized that there were things that could be improved in those comparative sciences and so that’s kind of my perspective on it.

Glen: I think it’s important to ask, who’s grading? Because if the forensic science community is grading itself, it’s done everything that’s been asked of it. Right? It’s achieved the level that was expected. And for that reason, it can’t be below average, right? But if someone else, anyone else, from outside the community is giving it a grade, comparing it to other disciplines, to other

scholarly areas, to other fields of practice, I mean it just doesn't compare. So, as a matter of fact it deserves an incomplete because it's done everything that's been asked of it so far, but it hasn't actually accomplished anything great yet and really needs to turn in that last report and really show everyone what it can do.

Max: Let me touch on that for just a second. So when you say, "it was doing everything that was asked of it," what do you mean?

Glen: Who was complaining up until the NAS report? The Innocence Project (or the NAS report), I mean whom else?

Max: Let's get to the edges of that a little bit. So are you saying that if we weren't asked—forensic science as an entity—weren't asked to be anything other than what we were by, say, those who administrated us—law enforcement—the bar that was set low in that matter.

Glen: Yes, I think the bar was set way too low.

Max: Interesting. Any thoughts on that?

Mike: I agree. You know, the grade should be an incomplete. If it were my course it would be an incomplete.

Max: This is from the two professors.

Mike: Well you know, there are always legal issues involved.

Glen: But you've never had a bad evaluation, of course?

Mike: Student evaluations are always an issue but, no seriously, I think it would be an incomplete. I think what the report did was to point out, it maybe ignored 50% of the profession, but for the part of the profession that it pointed to, there were some valid criticisms and some need for improvement. But I wouldn't grade my students on only 50% of the material. So that's why I would give an incomplete.

Jay: Jay here, you know, I agree with a lot of what's been said here today, but a lot us have been in the field for a while and some remember what it was like working in the field when it was unaccredited, in the '80s and early '90s. It was then that we had a lot of these similar discussions and we even asked "are we going to do accreditation?" Well the consensus was that we better do it, better do it now, or somebody else was going to do it for us and so you know, that's when you start gradually seeing the work product really change. The improvement didn't end with the beginning of

accreditation, it only got better. For instance, we began with the legacy system and transitioned to an even better ISO system. Laboratory people are occasionally reminded of this when they have to go to their archives and pull down the late 80s case and see their level of documentation then as compared to now. Compared to where we are today, I mean, there is a huge spectrum of difference between the scope of work and documentation done back then to now, and I think we deserve a lot of credit for that, so, Dean you were saying, "in the A-area." I am leaning towards that type of grade. Even though we have to acknowledge the comparison issues, we've got to do a better way of conveying and communicating what those conclusions mean, so, those are my thoughts.

Glen: I think those are very good points. I also think that it's unfair to grade a person when the person hasn't turned in all the work that they've done and I think there is an awful lot that's been done in the forensic community that is behind closed doors and you cannot get access to it. There are journals that are kept secret because we're scared of the information getting into the wrong hands, when the criminals are often miles ahead of the game. But there's a lot being handed down through the ranks and that's familiar with bench level workers, but there is nothing in the public domain that is accessible by anyone who's trying to evaluate what's there. In terms of journals like CLIC (Journal of Clandestine Laboratory Investigating Chemists) and IAI (International Association for Identification), you cannot get them. So in terms of evaluating the status, you don't know what's in there and maybe there are some valid studies in there with known error rates, for example, but we'll never know and that hasn't changed.

Dean: I guess really the big question for me is: if we're going to take a course-level perspective on forensic science, is it a midterm grade? Are we able to evaluate and move forward? Or is this the final grade where we just throw the baby out with the bath water?

Ken: I think it's a quiz. We were doing what we could based off the knowledge we had. I think Sue mentioned this as far as improvements, once it was brought to our attention that something was wrong, we made an attempt to correct it. And so, looking back then, even with ABO Blood Typing, making convictions off of that, we thought that was the gold standard, but now we know to ask, how could we have done such a thing? And so, as improved technology comes our

way we do incorporate it into what we're doing. You have to look at the effort that's been in place. We're correcting those areas of deficiency and we're still putting forth a good effort. Strides are being made.

Dean: And to also throw in the fact that I question who the teacher is that's giving us the grade because this is really more like a student grading another student in an adversarial process. When we look at where we really are, in this comparison to education and not having a teacher who knows the answer I don't believe that the critics know the answer; I think they simply have a perspective on where they think things should be going. I think when you look at it, and it's a great question to start with and it's already spun into a wonderful discussion, but I really think we need to remember this is not a teacher with the right answer giving a grade and that goes for the NAS report as well. I think it's really a peer or co-student grading you in a competitive process.

Jeff: Let me just respectfully disagree. The National Academy of Sciences is not just a peer. It's a pretty renowned body. I think that we seem overly defensive or overly argumentative to say, "That's what they think." They were asked to comment and I think they did so pretty carefully and so I want to be careful we don't just dismiss those criticisms.

Dean: I would respectfully disagree with that point as well and I say that, because the NAS report, and although I am not offended by the report in pretty much most aspects, I don't think that it was a really a scholarly review. I don't disagree that the NAS, the National Academy of Sciences, is not a premiere body in the United States. But I don't think that they really spent the time and effort to really learn the details of what we've been doing in the field. So, I still think that there's more to do, and I don't think that their review was really a thorough review of what exists, as far as data and capabilities.

Vincent: I always find this an interesting topic to consider: what other scientific endeavors come under this level of scrutiny? Perhaps it is due to our direct interface with the legal community or the greater media interest that forensic science has attracted over the last few years. I think that you would be hard pressed to find another scientific discipline that is put to the test the way we have been as of late. You would also have a difficult time finding another scientific discipline that

accepts such a high level of dictation and oversight from external non-scientific entities. I do think that we have done a great job of doing everything that has been asked of us to the best of our abilities and within the resources we are afforded. Obviously our quest for improvement will never end as there is always room for improvement, but at what point have we done enough to satisfy this harsh level of criticism that we have been facing? Will it cease when we are 75% there, 99%? As we asymptotically approach the unreachable 100% level, there has to be a point where our field is doing everything within its capability at any given time that such harsh criticisms should cease. Are we any worse in comparison to other fields where mistakes occur with life threatening results? I'm not sure why we are placed under the microscope so much in comparison to other fields such as the medical profession. Is there an NAS report to investigate instances where the wrong leg is amputated or someone dies as the result of negligence in an emergency room?

Max: And I think, on that point, you tend to see those reports on very focused areas, like issues in surgery or issues in outpatient care or issues in obstetrics, very focused. What you don't see is these reports addressing the entire medical profession, the entire legal profession. And something I want to touch on, which is, are we viewed as a discipline, are we viewed as a profession, or are we viewed as a bunch of technicians?

Terry: I want to answer the question of how are we viewed, by asking by whom are we viewed? Whether we like it or not I think one of the major things that the United States has, as opposed to other countries, is the all-pervasive media that drives a lot of what we do. And in a wonderful, perfect world it shouldn't. We should be able to be viewed that we're unbiased, and we shouldn't be influenced by a set of events. But we all know that if the newspapers came over and find bias in one story they're going to zero into that and then everyone across the country would get painted with that same brush and that's where we have the issues. I think that in forensic science we're here as a group and were having meetings like this today and this week in Seattle but I don't think necessarily as a field, forensic science really acts as one unit. A lot of us are operating like cyborgs. And even though we say we have

ASCLD, we have the American Academy, we have this that and the other forensic body, I don't think we really communicate that well.

Max: What do you think it comes down to? If we're not operating at the professional education level, what does it come down to?

Terry: I think other events have caused us to withdraw unto ourselves, primarily with the nature of the financial crash that we had in 2008. All of us drew in, and asked "with our resources, what can we do to get our part done?" and I don't think we've opened up yet to get where we need to be since.

George: I think a big part, having visited a couple of forensic laboratories which had some large laboratories, I think the big difference between forensic science in the United States and everywhere else in the world that I am aware of is the fragmentation that we have in the United States, not all of the fragmentation within the forensic science field but the fragmentation within the law enforcement community that's investigating the crimes to begin with and almost everywhere else it's a centralized, police force even though they might have many, many offices but its one central office, and almost always one forensic laboratory and there is a lot more control and command and control in that kind of environment, and I'm not saying that they're bad, I'm just saying that that's the way it is. I think that that's why we don't tend to communicate that well and there is a lot of silence, and like Terry is saying, I see it even within my own laboratory. My toxicologists do not always know what the chemist are doing, even though the toxicologists are seeing the same drugs that the chemist are seeing they're just in a different environment. I don't think that we communicate well enough and I think there is so much going on in the U.S. and I hate to say but a lot of forensic labs are almost like a factory environment, there is so much coming in and so limited resources that its just like what can I do to get the cases done as quickly as possible.

Dean: I think a piece to add on to what George is saying about the fragmentation is when you look at forensic science across the United States, it is so diverse and I think most people who work in this field are so service oriented, so client customer service oriented, that you get fragmentation because one region, sometimes even within the same state or within the same locality, may have certain requirements in one court or

certain requirements for filling in one prosecutor's office verses another, that you get changes to laboratory reporting styles, perhaps even testimony styles, that affects how it's being done. And yet because of that desire to provide that level of service it's come back around against us now as "fragmentation" and "we don't have our act together" and there is this "mess that has to be fixed" by some of the critics and stakeholders; so I think part of it is our own operational upbringing history, that Jay touched on a little earlier, that adds to that effect.

Sue: Going right off what Dean just finished is our history. Forensic science bloomed out of law enforcement and a lot of individuals that were originally doing the analysis had no educational background or had very minimal. Except for those outliers if you saw the recent PBS Broadcast that was done by the academy or supported by the academy for the poison . . .

Max: *The Poisoner's Handbook.*

Sue: Right, which is phenomenal, but anyway, so that mentality has always been in the citizenry here across the United States that you just have to be part of law enforcement and you can work in the crime lab. You don't need a PHD, you don't need to go to college, you just have to have some kind of background with law enforcement. And on top of that, there are issues iwhen you have the student, well everyone here whose heard of the onslaught of students who wanted to be forensic scientists, and the first semester they drop out because they didn't realize they had to take chemistry. Heaven forbid.

Max: Or organic chemistry.

Sue: And going beyond that, they just see what's on TV and they want to get into it, and I think that's still is a perception nationwide it's a fun job to have, let's get out there and see if we can solve that puzzle, and no we don't need any educational background.

Max: Going back to Glen's notion, what forensic science was asked to do. Our history has affected our current status, that is, if we haven't been treated like scientists and we haven't grown up as a science then, it is actually more ironic than you suggested. Originally, forensic science started in the wniversities and the police would go to people like Locard, and have them assist out of the laboratories in the university. When forensic science came to the United States, it got subsumed under law enforcement because it was so useful.

Law enforcement realized they didn't have to keep going to the university, they could just get their own experts and that's, I think, when it started being shaped as not a science, but as, literally, a technique under law enforcement. If we grew up under that umbrella of law enforcement and it has restricted our involvement in science, then, arguably, are we a science? More importantly, are we a profession? Those are two completely different questions. Address those however you want.

Glen: We are definitely a profession because we have professionals out there who are doing it. But, are we a science is the bigger question, like how academic or how scholarly is it? There is very rarely a building on a university campus that you can point to and be like "oh, that's where they do that forensic stuff." I mean you can point to an engineering school, a med school, chemistry, physics, you can point any of those out at a university but you can't point to forensic science. Sometimes it's a major within a chemistry program, sometimes it's in a law school, sometimes it's in its own school of criminal justice, but how many people there do actual science? A lot of criminal justice deals with the social ramifications. So that doesn't help us. The scholars are so fragmented, just like the profession is, and for many of us basically the perspectives are from the profession. But until we become cohesive and have a home, like all to ourselves, one building, one name, you know, until then its going to be hard for us to wave our own flag and say this is where we are, this is what we do, this is the grade we deserve, we're figuring out what we're doing.

George: I think until the educational system in this country decides that they're going to train people to become a forensic scientist and that person can go get a job in a forensic laboratory and begin working within a reasonable period of time and not have to go through an on the job training program to do the job that they're being asked to do, that's when it will become just like a law degree, just like an engineering degree, just like a chemist who goes to work for DUPONT. That's the problem that we face in this country I think as far as being a science that's recognized in the traditional sense

Max: I will argue that point. You were talking about vocational training, you were not talking about science education and there is a huge difference. As my General Counsel says at least once a day, law school prepares you for nothing except taking the bar exam. You

cannot step out of law school and suddenly start working in a law firm; it doesn't happen and arguably in any other discipline rarely do you step out and suddenly become a working, contributing member to that enterprise. I think that part of that law enforcement mindset has seeped into laboratory directors and supervisors who say, "You graduate on the last day of school and the first day after graduation you should be able to pick up a case and run with it." Is that cheating us out of the science of our discipline and are we looking actually for a vocational type of education?

Terry: I take issue with that. What my experience is with a lot of the people who we get with forensic science degrees and master's degrees and it's very blatantly obvious as soon as they start, that they're not ready to produce anything. They seem to have a lot of knowledge about small areas of forensic science, and as for basic science knowledge, a lot of them don't have it. That has a lot to do with their educational system I think. And if you are just going along with the law enforcement mindset, you guys are right, you should be ready to go but in reality that doesn't happen. You really have to train everybody up for two years before they can use anything they learn.

George: I was not saying that you would graduate and then the next day you would begin and start to do case work, but I think there is always going to be that, that familiarization period. But when you hire a new chemist and you have to bring them into your laboratory and to teach them basic chemistry all over again, that they should have learned in the university, that's a failure of the educational system, and how to use the instrumentation of how to interpret the data from the instrumentation.

Max: Is it less an issue of the push-pull between academia and industry than of fundamental sense of what they out to know as a chemist, as a pilot, as an engineer, or physicist or whatever?

George: Exactly

Max: Do academics fall under this as well?

George: Right.

Glen: It's only a failure of the educational system if it's not doing what it was asked to do. If its not producing someone who can actually function at the bench and honestly I am going to argue for the extreme case that a university was never designed to produce anything useful. Basically it was designed to educate

people and that was all. You know, the only thing an educator is good for is educating someone else, maybe, right? They're just learning and we need, in many respects then, when someone earns a degree in history, the question is not what vocation are they good for or how do we teach someone to practice history in their employment sector, it's just "lets teach them history." Let them go, let them learn, let them produce new knowledge, right? And then if it turns out that they're accidentally good at something, well that's alright, but that was never the goal, and I think forensic science education ought to be more like that. This is just arguing the extreme case. We ought to just push the boundaries of what's possible in this discipline, and if it turns out that our graduates are accidentally good at naturally functioning in the work place than that's a bonus to you. But from an educational perspective the extreme argument is that we just need to educate people and push the boundaries of the scholarly discipline.

Jeff: So, especially in my role in FEPAC, we get questions about, why even have accredited bachelor's degrees in forensic science, why not just chemistry or physics? And there are some good arguments around that. But it's caused me to think about, if forensic science is really in an educational way, in a university way, a separate discipline, what makes it different as opposed to just vocational training? And the only thing I can think of that makes it different is, if I'm in a chemistry lab doing an experiment, the only rules I need to worry about are quantum mechanics, statistical mechanics, thermodynamics, and kinetics. But if I'm a forensic scientist I've have to have some understanding of those and then this whole other purpose of court decisions and how I am allowed to communicate those results, or which tests might not ever work because they're too fragile for a judicial system. And so it seems like there is something about that intersection that makes it forensic science and a physicist doesn't have to deal with that.

Max: My viewpoint on this is specific, but I put us in the same category as astronomy, paleontology, geology, or other historical sciences that reconstruct past events. There's a set of rules that govern that, mostly borrowed from geology, like super positioning, but I also throw in Cuvier's Law of Parts, which states if you look at a little piece of something and know where it came from. We do that all the time, we walk along and we see a little piece of something in the gutter, and we

recognize it as part of an automobile tail light or a cigarette lighter. We have a handful of principles that govern what we do and allow us to say what we say. I think all too often in academia get pushed to teaching recipes and students are encouraged to start cooking, but don't get time to learn how to be a chef, but just short order cooks. I don't know if that's Vinnie was getting at, in terms of just learning.

Glen: And the other thing I was going to add to that was that I think there needs to be a research component in forensic education. If you look across the various institutions that are out there, everyone has different standards. You know some people get a master's degree without ever doing a thesis, and what value is that? And then you have some kids that are doing these really in-depth theses that they are spending hours and hours and days and days working on and are basically in the same place as everybody else who didn't do the research. I think that research is a very important aspect worth developing, and the ability to think forensically.

Max: That reminds me, a couple years ago, I sat through an educational seminar in Indianapolis on forensic science and they had some recent graduates, and the overarching feeling from them was confusion and regret. One of the students with a master's degree said it best, realizing they were sitting next to someone at work who had a bachelor's degree in forensic science, and that student knew more than they did, but the master's student was getting paid more. Their question was, "Why did I spent those extra two years just to get a little extra money, when in fact the person next to me actually knew more about forensic science than I did and didn't incur extra tuition costs?" That just broke my heart.

Dean: I just want to pick up on something about our profession and whether it is a science from the standpoint from the university perspective. And this is a bit of a soapbox item for me, but, and I think you've used the term too, Max, but we don't produce information, we produce knowledge and as scientists we have to take contaminated, insulted, and degraded materials in an un-pristine environment and turn it into perfect knowledge that's going to be used to determine the life and liberty of someone on the other end of the line in an adversarial process. That is an absolutely unique position that, to Vinny's point earlier, no one else in the sciences, in the law, or medical practices ever gets put into. And I think what George was trying to say

earlier—not to put words in his mouth is—and what resonated with me with what he saying is, are we really preparing people from a university perspective and are they ready to work in that environment? I understand Glenn’s point, that we’re producing people with knowledge, but are we really producing people with the knowledge that can work within the framework in the uniqueness of forensic science? I think the answer is no from what I’ve seen, and that’s why it takes so long to go through these training, periods within laboratories to get people up to speed to do forensic science. I think that’s one of the unique challenges of our field that I do think needs to be addressed in an academic environment in some way. The reality is forensic science wasn’t in the interest of most universities until it started making them money. Until they can start bringing people in, and it was a revenue generated area for them, it really didn’t become of interest to the universities. This has not been forensic sciences’ problem; it’s been really a problem within academia and yet, in my personal view, I think it’s been thrown back in our profession’s face.

Max: How do we close the gap? How do we establish and manage expectations more accurately from the outset, from the student who expresses interest in forensic science, all the way through to their first day in a laboratory on the job? How do we set and manage those expectations better, closing the gap between academia, industry and profession?

Sue: I was under the impression that FEPAC was supposed to have input, as well as The American Board of Criminalistics with their desire to move the exam down into the university’s hands so they could apply it near the end of the students curriculum period that they could then test themselves to see how well they understand some of the issues that are out there and the fact that some universities have actually taken it on themselves to actually apply more hands-on casework for the students before they graduate. That doesn’t occur uniformly across the United States; there are a select few universities that have gone that extra step to include that, but, Jeff I am going to ask you, does FEPAC not . . . isn’t that the point of some of the issues that you look at in a curriculum, to see if it’s really addressing what’s needed for forensic science?

Jeff: Max probably has even more of the history of FEPAC, but I think that one of the very initial problems was the word *forensics* was being used so

wildly, freely, and in such an undisciplined manner in universities, that it could mean a sociology degree where you’ve had a criminal justice class or somewhere else it could mean essentially an analytical chemistry degree that they’ve just substituted to just work forensics. So it was an attempt to begin to normalize as a lab director you’d get someone who says, “I’ve got a degree in forensic science”—if its FEPAC accredited there is some curriculum we could attach to that? The thing I think FEPAC is wrestling with right now is that we say we accredit forensic science programs, but if we use the language of the AAFS, we accredit criminalistics programs. It was a very specific. We don’t do forensic anthropology, but we’ve added digital & multimedia programs. There are a lot of other sections in AAFS. So now there is discussion of what if we broaden that accreditation and then it would change the academic requirements. These requirements might take the form of, “I don’t care what you’re studying you’re going to have FEPAC, you’re going to need at least a year of chemistry and at least a semester of calculus. These are something that everyone has to have regardless of your discipline and I don’t think, to be honest with you, that we’ve answered that question yet. We haven’t even really figured out how far we can expand the accreditation.

Max: Let me jump in for just a second as a footnote on FEPAC. Unless there is some overriding reason, in my experience, the Commission won’t read each and every syllabus at the outset, at some level it has to get broadened out to not be that granular. But how broad do you make it? Do you try to encompass everybody or do you focus in on those things like anthropology and toxicology? Do you leave that for the master’s level? It’s a different structure.

Sue: Just jumping in real quick. You’d be surprised or maybe you wouldn’t, I just took liberties with that, to find out ABC exams taken by students and how poorly the results are from that exam.

Max: I think if you talk to educators, it’s actually the FSAT that they were talking about.

Sue: Right.

Max: If you talk to educators I think a lot of them are very disenchanted with that test for a number of reasons. They feel it’s unrepresentative of their curriculum or the test doesn’t ask what it

intends to teach. There's some discussion in the community on that.

Sue: Oh, well taken.

Glen: When I was the director of a forensic program at Ohio University, I administered the FSAT test for four or five years in a row and what's odd is we don't actually know the questions on the test, unless you read through it, which you sign a form saying that you won't, so we don't actually know what's on there, formally. When you get the results back, there are some issues. I mean it's administered incredibly well. Right? They send you this big packet, so it's done really, really well. When the grades come back, what we see is basically a compilation of all the master's and bachelors programs that took part in the FSAT that year and there is no differentiation between the two, first off, so you don't know who you're competing against. Then you basically get broken down by sub-discipline; whether it's biology, or chemistry, or arson, it's gets very specific. And some of those subdisciplines, some of those subsections may have only five questions, but when determining the grade for that student, for that particular section, you are going off the results of only a few questions. So, basically we are trying to evaluate a program, based on 10 or 12 students that took 200 multiple choice questions, five in one area, and five multiple choice questions to determine how well you should be doing in chemistry or biology (well there are many more questions in biology). The main problem is that we don't even know what questions are being answered so it's really hard from an academic perspective to put any weight on that. I mean if we come third out of all the programs then we can advertise that, that's great, but we don't know what it means.

Vincent: Obviously I'm on the ABC board of directors and I'm finding this conversation very informative. So I just would ask to provide feedback on the test to ABC.

Glen: Well, we're not supposed to read it. We can't; we signed the form saying we won't read it.

Vincent: If you're looking for what type of information was going to be tested then, I think that more effort can be put forth to provide that information to the educators. Educators should have some idea as to what type of material is on the exam. One thing that I do want to share about that exam is that it's a criminalistics exam, much like the GKE that I took back in the

day. By the way, I think students who take the actual ABC exams tend to do better than the practitioners because all of that information is fresh in their mind. Getting back to my point, the exam is a general knowledge exam, which I think is very important for forensic practitioners. I think this goes back to the conversation we were having before. People that are going into the field should have a very broad general view of what they're going to face in that laboratory. It is critical for the person that goes into toxicology to know what a drug chemist does, the person who is performing the DNA examinations should be aware of what the trace examiner does and so on and so forth. If you have that little bit of general knowledge you can at least have an appreciation for what the other people around you are doing. This is certainly important for complex cases that cross disciplinary lines. From a case management perspective, a well thought-out approach to dividing the specific case related tasks can be made and the maximum amount of information can be extracted. These decisions often need to be made on the frontline at the bench level. It is very common for scientists to receive evidence with a specific request, while the potential for the evidence under consideration goes beyond what has been asked. All too often people are so discipline centered that they do only what is asked and the full potential of the evidence goes unrealized. If forensic scientists have a general appreciation for the other disciplines, they will be far better equipped to make that judgment as they are performing the work.

Max: Let me explore this a bit. How many people in the room have graduate degrees? Ten of you. How many of you had to take some form of comprehensive exam for your graduate program, like a written comprehensive exam? Five? Okay, Mike what was yours in? When you took your comprehensive exam what degree were you going for?

Mike: PhD in chemistry. So we actually had cumulative exams over a period of 18 months. So we were continually being tested and we were continually studying.

Max: And what areas of the chemistry did that cover?

Mike: Physical organic chemistry, synthetic organic chemistry, spectroscopy, kinetics, mechanisms.

Max: It covered the breadth of chemistry?

Mike: Of organic chemistry, yes.

Max: Of organic chemistry?

Mike: Yeah, but some scientists would probably disagree that it was comprehensive.

Jeff: In my chemistry PhD we had initial placement exams, identifying deficiencies, and if you didn't pass those you had to take remedial kind of undergraduate class and then about the halfway mark you had to show that you were going to pass, that your research had potential to succeed, but you also then, you were given a handful of questions from across the breadth of chemistry and in about 48 hours and a lunch box and having access to a library and return with the right answers to these questions and then the defense of a thesis.

Max: Okay. The reason I ask is, based on what's been discussed in forensic science, are we too inclusive? Generally, if I mentioned the word "forensic" it would be tossed around very liberally in the academic world. Do we really know where to draw the line on where we are as a science profession? Do we include forensic engineering, for example, which is very specific? Obviously, the academy would because all these different categories exist, but who are we as a science and a profession?

Mike: I would argue that we should be inclusive because forensic science is a very inclusive field generally speaking. To maybe put that in perspective though, I can relay a story that was told to me by Bill McGee, who founded the forensic science program at the University of Central Florida almost 35 years ago, and this program was founded under a grant from, I believe it was under the Nixon administration, the Safe Streets program. Part of that grant was to go around and talk to crime laboratory directors about what they wanted to see in a forensic science program. And what Bill told me was that the question he got, almost without exception, from crime laboratory directors was; why are you developing a forensic science program when we hire chemists? And that's a very, I think very narrow view of forensic science and we should be broader and more inclusive. But coming back to some of the issues on education, I think that we are supposed to teach people to think, and I would argue that if you feel like in your training discipline that you're going back and reeducating people then you should look at the people your that hiring and where your hiring them from. And I would argue that you are training, you are not educating. You are not going back to teach basic principles,

and the students that we teach, and I'm sure most of the students from other programs have been educated in a lot of areas very broadly and hopefully we teach them to think. Your training goes on top of the education that they've already received because there is a very big difference between educating and training.

Max: As people have mentioned, students seem to be taught a little about everything. Are we being too inclusive at the educational level? Are we trying to get them to understand fibers and insects and documents and DNA and . . . but also teach them they're going to get drug tested. Can we be inclusive professionally but be more narrow educationally?.

Ken: I agree with Mike, I really do believe as though we are being trained to think, and this goes back to your point with law school, with your general council's comment that they are trained to take the BAR exam. I disagree with that in the sense that I don't think they were trained to take the BAR, but rather being trained to think. What prepares them for the bar exam is that course that they have to pay extra for. By taking that practice course, or that training course, they are then prepared to take the bar, and maybe we should move into something more along those lines, where the forensic science programs or undergraduate and master's degree programs teach you how to think, and then maybe you take a certification type exam. I don't think we, meaning the schools and universities, are going to be able to train practitioners because of what **George** mentioned earlier, that lack of communication, but I also think it has a lot to do with ego because every institutional work place feels as though they have the right way of doing things, and so no matter if you work someplace else, when you transfer to another place, they're going to teach you to do things their way, regardless of how long you've done it. So because of that ego, the universities could train the perfect forensic scientist, they come out with flying colors and they can start working for Lab A; Lab A is going to train them to do it their way. The lab may not completely agree with the way they learned to do things in school and will put the employee through their own training program, so the work is consistent. And that has something to do with ASCLD and ISO because things have to be done consistently and uniformly.

Max: Within our jurisdiction.

Ken: Yes, because things have to be done a certain way, you have to be consistent with what you're doing.

So if I take an outside person when they're doing things a little bit differently, than the rest of my bench analyst, we have a non-compliance issue. So it's all-inclusive in that sense.

Max: That's a good point, because I've seen lots of laboratories that will hire somebody who has five, seven years experience and then put them through the exact same training program that they would put a brand new graduate through, in lock step. If you want to crush morale, that's a great way to do it.

Glen: We do face some problems that are sort of set in stone, some disconnects between what's practiced and what's taught. One example is, rounding significant figures, I mean, we can educate students as to how to do this in an objective manner and when they arrive in the workplace, there are all kinds of different working regiments and the SOP tells them to truncate a number and ignore the fact that everything they've learned in their education tells them to round a number, this is the problem. How do we solve problems like that? This is the difference between the science that is educated and then what's practiced, and we need to fix these kinds of problems if the students are going to have any hope of being able to cope with the stress.

George: I think, and just to use your particular example Glen, I think part of that is the desire of forensic scientist have the general will to be conservative and take into account the legal environment in which those results are going to be produced, and you know, truncating a number is always going to be more conservative than rounding that number, because you know, half the time you're going to round upwards verses rounding downwards and you know, there is some legitimate practical reasons for that decision and I'm not saying its scientifically the best approach, I'm not saying that, but I'm just saying there is a practical, some practical reasoning behind those decisions.

Terry: Good reason. I was thinking of going back to the other point, I think we've actually improved tremendously. Think of the state we were in the past, we had latent fingerprint examiners and we had firearms examiners who didn't have the educational requirements. The ASCLD Legacy Program used to say that you didn't have to have a baccalaureate degree to do those disciplines. I don't even know of any crime labs today who would hire anybody to do

latents and firearms, unless they have a bachelor's degree. So we've really raised the standards there on that one, and I think about some of the discussion about the universities training people to think—that's what we need. Training people to think is great but a lab director often has somebody come in and then has to put them through a training program just like somebody else has gone through, for the last number of years. If somebody demonstrates they can think, then the lab system should say their training should be a lot more truncated

Max: It doesn't matter what a person knows when they come in; we're going to grind you through the same training machine.

Terry: That's disheartening

Max: That really is.

Vincent: I actually lived that situation.

Max: Let's turn from education. In the past when I've worked with forensic accountants and fraud investigators, they've used the rubric "ABC" for people who commit fraud. You can have a bad apple, a bad bushel, or a bad crop in terms of lack of integrity. Given the range of what I will euphemistically call forensic failures, is the issues of negligence, misconduct, out right criminality, what do you think the main causes of forensic failures are, under that rubric of ABC? Is it bad apples, is it bad bushels, or as bad crop?

Dean: I have a two-word answer, and this is simply a bad farmer.

Max: A bad farmer?

Dean: Yeah. I really do believe that. I really do believe that part of what we have is a passive acceptance by many who are leaders in this field. Specifically crime lab directors who I think really need to do more about crime lab quality issues, understanding leadership and management, understanding real business practices running in their environment, political awareness. There is a whole host of things that by no fault and design are we failures at but were not good at it because we've never been educated in it. We've never been trained in it; we've never really put forward those things that have happened. So we do get our bad apples. You cannot control the rogue drug chemists that end up deciding to steal or use drugs within a laboratory. You can put mechanisms in place to catch those but you can't necessarily prevent those 100%. But I

think if you look at the totality of things going on and many of the “meltdowns,” and my personal view point, I think it stems back to leadership issues within the organization and sometimes it can be directed to those at the top within the forensic organization and sometimes it can be directed to the leadership of the parent agency that is not supporting the laboratory well enough, so that’s why I say it’s a bad farmer.

Max: Are we incidental farmers, that is, always hoping that we get a good crop? Hope is a lousy strategy. That we haven’t been trained or educated on how to be farmers or to look for early warning signs, to manage and have expectations, to reinforce integrity and ethics? Is it lack of management education or is it simply that we are ignorant of those issues?

Dean: Well if you’re asking me, I think it’s a little bit of both. But I think it’s more on the farmer rather than the lab. I don’t think most lab directors are ignorant about thinking that these things don’t exist and that they don’t have to worry about it; I just don’t think we’ve really been trained in how to handle it. You touched earlier about educational gaps of practitioners or professionals in the field. I think there is a very similar type of educational gap, if you will, for the leaders, the thought leaders of our industry. We’re improving on that; we’re doing a lot. I think ASCLD by way of an example as an organization has more recently held leadership courses. West Virginia program has done things as well as UC Davis has done some training. But it’s not enough; we’re not preparing people. And it’s in every industry; it’s not just ours. You know, when people move from a world of expertise and whatever that narrow scope is to now running an organization, we’ve done, I’d say, a not-so-effective job of transitioning, moving from technology-based knowledge to, I’ll call it people-based knowledge, in order to do our job effectively.

Vincent: I think that analogy is a great analogy, but the question I want to throw out is, does anybody think this might be a result of the civil service processes that many laboratories have in place to produce their leaders? Many laboratories are constrained by such practices and do not have enough say over who would be a good fit. It basically comes down to the person who has been around the longest.

Jeff: I think the apple, bushel, crop is a great way of looking at it, and I could probably talk about

each one but I don’t want to filibuster, but the apple one came to mind and I don’t think there is anything we can do about the bad apple problem. There is some underlying population of bad apples, and they’re going to become doctors and pilots and school teachers who have sex with their students, or crash airplanes, and we’re going to get our fair share of those. But I wonder if we’re going about it the right way with the training in our approach. So you know we’ve spent a considerable amount of top focusing on our ethics and statements, and that almost seems like this pledge of allegiance, everyone raise your right hand and pledge that I won’t cheat. And it’s remarkably ineffective against the bad apple, I mean, they’ll just lie, right? So I wonder if our ethics training should be less about getting people to take the pledge of allegiance and more about teaching young examiners a pathway for what do you do when you begin to recognize and detect problems. If there is something wrong with my coworker, how do I courageously confront that? What do I do that’s productive for my team? That is not an easy problem and it goes in that category of hard leadership conversations that have to happen. But when you’re 25 years old, that’s a lot of baggage to be carrying around. I’m wondering if we’re missing probably an opportunity to train our examiners. I think Dean, when you onboard people, and we had talk a few weeks ago, that you spend several hours talking to them about those various things.

Dean: I don’t know how many people use, you can call it a new employer orientation but the term is now onboarding, for bringing people into an organization, and for their second day on the job, their first assignment is to meet with me. And its, uh, rather unsettling to have to appear in the “principal’s office,” right, your first week, second day on the job and I go through three primary things with them and I talk about the importance of image, and image as it folds into two aspects: one, the Professional Guide to Responsibility that ASCLD/LAB puts forward, and I actually go through that with every employee. I also tell them that ethics are meaningless in my point of view. And it’s a semantic intent that I do that because as I tell most people we are also a law enforcement agency and our custody operations houses an average about 20-25,000 inmates per day. Every one of those people housed in

there knows ethics. Because ethics to me is the difference between knowing what's right and wrong, and they know the difference between right and wrong because they're being held accountable for it. The problem they have is they didn't practice integrity; they didn't use their ethics when no one was watching. So ethics to me are meaningless, it's integrity that is and becomes the issue and I don't stand for anyone who doesn't bring integrity to the workplace. I also talk about the idea of teamwork which is more just about workplace issues. Then I talk about professional and personal growth; I expect everyone to grow personally and professionally every year when they are a part of this organization and I think the true test, and is this is what **Jeff** may be eluding to, I've followed up with people a few months later after coming on board and I've asked them, you know, "hey, do you remember that discussion we had?" and I am surprised how many of them remember all three things I talk about. Which means that, one, it's having an impact on them, and two, I think it's a very direct and easy way of changing a culture in an environment, which is very difficult to do because I can't stand up and profess this to everyone. But sometimes the best way to eat an elephant is to just take one bite at a time and you got to start somewhere and that's where I have chosen to start. So if it's successful over time I think aspects like that, and I'm not saying that that's the best way of doing it, but it's just the way that I have found in my organization that works, but that is a way of addressing the bad apple who may or may not be teetering on the edge who could create a bad bushel, a bad crop, because that cancer, that toxin tends to grow in those environments. So if we can head it off in the past then all the better for us.

George: I do something very similar to **Dean** with new employees, and I don't always give them that the second day cause sometimes our schedules don't quite match and don't take several hours, I try to limit it to maybe an hour, okay maybe 30-45/45 minutes. But I go through integrity and going through the consequences of not having integrity are, you know, you lose your job immediately, no questions asked, no pass and go. You know being a professional on the job, being a part of the team, the same whole thing, and you know, you would be amazed at some of the people come in and they think that forensic science is just like being on TV, it's *CSI*, and I say no, what you're going to do has a direct impact on somebody's life, and even if the

person is not guilty of the crime they've been accused of you're having a direct deposit of impact on their life and it's an amazing eye-opening experience for some of these people. Treat each case as if it was your family involved.

Glen: Contrary to my previous statement, we are actually trying to help produce graduates with some usefulness. It's a hypothetical argument, and we are in the process of having a very serious discussion at West Virginia University about ethics and integrity and issues like this. We've had some instances very recently with some students, for instance, where they were required to keep a log book in certain courses they were taking and there were some omissions, and some going back and post-dating things, and you know, things that are relatively trivial from the student's perspective. Things that are very trivial, minor discretion in terms of honesty and integrity and things like that, and we're deciding as a faculty how to seriously take this, and honestly we're very much on the scale of "this is very, very serious." This is absolutely unacceptable in the work force and therefore we need to teach them that now. Basically, not letting the bad apple effect the whole bushel and we're taking a very strong stance on this and were about to develop some strongly worded pledge of allegiance kind of thing. We're trying to let the bad apples get to the mess up the whole crop here.

Jay: I agree, Dean, George, what you said about your interviews and we've done the same thing. As a matter of fact, I challenge our management team with this statement, "folks are we missing anything? I try to get them to step back and look at our system and think about what our people are doing." Obviously the news is filled with derogatory stories and it feels like it's every day. In reality though, about once a month some new thing pops up so it's encouraging to hear that we're having these discussions. However, I'd like to ask another quick question to everybody here: how many people here had a similar interview with your boss when you first came on board?

Max: Only one person. That's a great question.

Jay: So, you know, to hear that we're having these discussions out there now, I mean that, underscores the importance of how we feel about these issues.

Max: Absolutely. Because if you read anything from Deming, you know that change has to happen from the top down, right?

Sue: My generation didn't cheat so . . .

Max: Well, that was back in the Nixon generation, right?

Jeff: Or you at least didn't get caught, right?

Jay: When I was new to my first laboratory job, I wandered into the lab and the staff forgot that I was arriving. There was no one there to introduce me to the other employees or least show me the lunchroom. Later, others would mention, "we should give you a tour and show you around." However, they never did. So, from my perspective, things have changed completely from those days to now at my lab. I think there is a feeling that we're taking the management role more seriously.

Max: If we have issues in our facility with time and attendance, we pull the access badge data and look back so we can see who accessed those doors and when. If you talk with the employee, they seem shocked that we would actually check the validity of their movements and their statements. Somehow, saying, "Even though I lied to you, why didn't you believe me?"

Sue: That's a trick question.

Max: I love your question about your conversation with your boss. It has to be from the top down and so often I think it does start at that level. Rarely do you get that throughout the whole organization, push those values and visions, and reinforcement of ethics. Rarely does that happen uniformly throughout the whole.

Dean: You know Max, I got a very good education, I apologize for interrupting, Vinny. When I was working at another laboratory where I had collateral duty where I had to manage our IT department, so I was the CIO for a major law enforcement entity. I also had our property and evidence, our records and warrants unit, you know, a whole host of other things. When I left that unit everyone was like, "wow you really intimidated people!" And I said, "really? I don't find myself that way. I'm just a little guy, you know, why am I intimidating?" And one of the senior supervisors in the unit said, "I've been here for 26 years and you're the first person who's been at the captain's level of this ship, and you showed up every day on time and left everyday on time," and she said, "You put the fear of god into people because they knew you meant business." Now, I hadn't said a word about time or anything, but it really was an overwhelming realization for me that the things you do and the people

who watch you have an amazing impact and a cascading effect throughout the whole organization, not just the people you're interacting with on a daily basis. So that point was taken well from both of you gentlemen. I'm sorry [for interrupting again], Vinny.

Vincent: I have never officially had that conversation with anybody, supervisors or bosses, as an individual, but I did get it when I was a student during my graduate education, that integrity and ethics are very important things. These are topics that are routinely discussed within the lab at the group level however. Going back to what Glenn was talking about with respect to documentation and how it is extremely important; that is something that was drilled into me during graduate school and is something that sticks with me to this day, 15 years later. From the documentation perspective, important lessons on integrity and honesty can certainly be learned and it is important for students to be exposed to this concept at an early stage. It is not something that does go away.

Max: I think that's a key point, because again all too often I think it starts with the lab director. At West Virginia University, we did research on teaching ethics and so many people said, "You can't teach ethics; either you're raised right or you're not." I think that is such a wrong-headed notion, such an absolving of any responsibility to say, "I want to learn how to be better, I can learn how to do things the right way, and adhere to professional standards." And to say either you got it or you don't, I think it's a cheat. Let me ask one last question to round out the discussion, what are the biggest changes that will affect forensic science in the next 5 years? I'm not asking, what are we going to do, what challenges we face, but what are the biggest changes that will affect forensic science in the next 5 years? How will our environment change, how will society change, how will the profession change, police and courts, whatever, what are the biggest changes were going to face in the next 5 years?

Terry: I know for instance from my state, the biggest change that we're going to see, and that I think a lot of other states will see too, is arrestee DNA legislation. It is not universal in this country and in my state we've been trying to get it introduced for 6 years now, and each time we get shot down. If arrestee legislation gets adopted in more states, especially with the recent U.S. Supreme Court ruling, then that will really impact us tremendously because of the large amount of resources

we're going to have to come up with. So that's the immediate one in my mind because it's so close to happening here.

Max: And the notion that those are typically unfunded mandates.

Jay: And I will add onto that by agreeing that we're actually expanding that testing in our state this year, from violent felony arrests to any felony arrest. Eventually we will be doing the same for some types of misdemeanors. Rapid DNA, um, is going to be the bigger challenge and change our world. How these systems are deployed, especially if they go into booking stations and, how we pay for these new programs will be huge challenges. Right now the federal DNA money is distributed to crime labs, now, are we going to have booking stations and jails competing for that same funding source? Are policymakers going to add money? In our current funding system, I don't know where that money is going to come from. The second thing is what are we going to do with this data? Who is going to tackle reviews? How will we ensure privacy? For instance, will crime labs develop call centers to be able to interact with booking stations to make sure that the data is correct and compliant? Thirdly, we've just discussed booking stations but what about our other customers? The detectives will want crime scene samples tested with a Rapid DNA instrument. Ultimately, we just have to ask how crimes labs are going to both interface and pay for this new technology.

Max: And with that being said, is it DNA or is it law enforcement wanting more answers faster, or at least thinking they do, versus what should or should not be laboratory functions?

Jay: Yeah, you know, they want things faster. I think it comes down to being faster and better. We spent so many years putting field services in the lab and now the technology is allowing us to do just the opposite. In Salt Lake, we're already putting technology in the field that allows officers to test synthetic drug compounds. I think we're seeing some of that technology in others disciplines such as toxicology. However, for all of this to be successful, they will always need crime laboratory training, oversight, and support.

Max: Right.

Sue: I see that a change is going to occur with us, with all the development of DNA and agencies moving

funding to that area to support it, that agencies are cutting back on other disciplines and removing those from the crime lab. I believe in the future, whether it's in 5 years, or its going to be in 10, agencies are going to realize that DNA is not the get all—we need to support that analysis with some of these professions that we have since cut and we are going to have to bring them back into the lab and we're going to now have to train those individuals that we had shut down, five, ten years ago to bring them up to speed to support us where we had them before and just didn't give them the scientific basis to show that their profession was just as top-notch as what DNA has come out to be.

Max: Some attorney had made a presentation about evidence, and Carl Slavka asked the question, "Do you understand that the DNA only tells you who, the rest of forensic science will tell you the what, where, when, why, and how?" I think about that when I talk to our Forensic Science Laboratory Division Director, and I ask how many resources do we have that can answer the question "Who?" Are there more questions that are pertinent to the case or to the investigation that we're not answering? How do we allocate those resources correctly?

Sue: I find it very disheartening to see agencies whittling back their staff but upping it in one area.

Max: Right.

Sue: And I think they're in for a rude awakening in five and ten years as I mentioned, when they realize that they cut off part of the leg that they shouldn't have.

Glen: I attended the Forensic Science Institute of Ohio meetings for a number of years and you could see it there, they would have probably 7 or 8 of the labs have document examiners when I started attending these meetings, and by the time I left there was 2 left. So then in terms of validation there was only one lab that could be validated against the other and if they consolidated any more than that they would have to go out of state for validations, so definitely, we're going to need, you know, we've gone so far in terms of DNA and minimizing as far as we can, and we have to come back a little bit or at least maintain or not go any further than that.

Dean: I just wrote down a few notes on my little "thought cloud" here, but I see several changes for forensic science; one, is a mere caliber of personnel coming into the laboratory. I see a large number of

people trying to enter the field and I think laboratory systems will have an opportunity to kind of pick from the cream of the crop from that perspective. I see an unfortunate deluding of science with the structure of undergraduate degree programs that are specific in forensic science; I'm more of a proponent of that I'd rather have someone have an undergraduate degree in a natural science and then go on for a master's in forensic science as some sort of polishing, finishing degree and preparing them, kind of what George was talking about earlier, for the discipline and the profession of forensic science as opposed to someone who has just a spattering of education on forensic science areas, but no real in-depth understanding of a particular science. I see an increased focus on the sciences that's going to continue to grow and become more intense for the field, and whether that's through oversight, or whether it's through stakeholder input, I see all of these things continuing to put pressure on the field of forensic science for the next few years. I fully expect the things we've talked about for the next few years, such as accreditation and certification, will probably become mandatory, and I think it will extend beyond just the traditional 400 or so crime labs across the United States. I think that will be a necessity that will have to be seen by any forensic science practitioner in the field, private, public, small law enforcement, large crime lab, no boundary, no spectrum. If you're presenting evidence in court or if you have the potential to than you're going to have to follow under that umbrella. And I see issues with transparency. There is a lot that is being asked of crime labs to share with what's going on with the work that we do, the notes we take, validation studies, and I don't think most people have a problem with that until you reach the corrective actions stage. When issues in the laboratory or transparency about corrective actions come about I think it presents a very nervous and very unsettling position for many laboratories, and until there is some agreement in the criminal justice community that it will actually be used for purposes of improvement for the field and not for badgering, belittling, and beating, the three B's of those who practice in the field, I think there will always be this tug between those in the adversarial courtroom and those practitioners providing the science. Those are just some high level things that I see.

George: I agree with almost everything that Dean said, although one thing that I would add onto what you said, is that I think the caliber of the people who are in the leadership role within laboratories will continue to improve and that we will continue to do a better job of educating the policy makers within our local and state jurisdictions, which will, in turn, make them better understand what the needs and the real issues are. Because at the heart of it, no politician wants to have his or her state or locality in the newspaper for a forensic science law suit, and at some point you're going to get them to understand that it takes a certain level of resources necessary to do the job at the level in which the criminal justice system is demanding it be done at. To go back to your open records or freedom of information thing, I think every lab will eventually get to be where all of their policies and all of their procedures and all of their corrective actions, everything will be freely available on their websites for anybody and everybody to see whenever they want, which will in turn reduce the burden of work the laboratories having to deal with in just responding to those things on a day-to-day basis.

Max: And we've taken a step in that direction. We get a lot of requests for how many guns were seized in the district for a particular calendar year. And so what we do is pull all the data put it in a spreadsheet format, in a file, and then we put it on our website. This cuts down enormously on the numbers of specific questions we get. We provide the data and they can do whatever research they want to do, but we can't do it for them.

George: And we're doing the same thing in Georgia with all of our procedures and everything, and it has cut down especially on the plaque that gets into the blood alcohol, or the breath alcohol, tremendously on the requests that we get from that respect.

Ken: I just think in the next five years one of the biggest areas will be training, and make no mistake about it, this is not just going to be at the bench level. We need training at all levels. Going back to your ABC rubric, we can easily identify the bad apples on the bench, but there are some bad apples that are running the laboratories and we need to correct that as well. I don't know how to fix it, but it's definitely not going to be a checklist. I think the NAS Report referenced that in one of its recommendations how a check list can make sure that

something is done but it's not going to ensure quality and until we can do something about the training at all levels we're going to continue to have these problems. You're going to have your problems with lack of integrity and people just not doing the right thing, they have to be trained for that.

Mike: I'm not sure I have a crystal ball to allow me to say what's going to be really making a difference in forensic science, but from an academic and administrative perspective, I think what we would like to do is bring up, improve, everything through education and research, and doing that is going to depend on the level of funding that's available. So everything that's going to be improved in forensic science is tied to funding. We have a very unique, maybe even strange, business model, we hire a faculty member, perhaps in the chemistry department, and up front we put out a minimum of a quarter of a million dollars in a start-up funding for these people. They have to do research, publish papers and obtain grants, which is a main component of their job. They have to get grants from federal funding agencies in order to get tenure and keep their jobs. If they don't get grants, then they go away and now we have to put up another quarter of a million dollars in a start up, or more, for somebody new. So I think that, if the industry is going to improve through the academic programs, then we have to have more money coming in from federal agencies. I'm sure that applies in the operational labs as well because every laboratory, whether it's through Coverdell funds, or just their base funding in their district, they need more money in order to improve. So it all comes back to money.

Vincent: I would like to go back to what Jay and Jeff were talking about pertaining to the analysis that's going to be taking place in the field. Keep in mind that forensic scientists are a very small part of a very large criminal justice system. I recently saw an article aimed at non-scientific law enforcement professionals talking about some field portable instrumentation that is going to be used for drug analysis, and there was a highlighted comment in the article that said something along the lines of, "cut out the middle man, get your analysis done right on the spot." I was kind of appalled by that statement and what it implied. The middle man as I read it is the forensic laboratory. Here we are going to great lengths to ensure that quality work is being performed in the laboratory by rising to the levels of accreditation, pushing toward certification, and putting

robust quality systems in place in our laboratories; what's going to stop bad stuff from happening in the field when this technology is unleashed to the far greater number of non-scientific personnel?

We have already seen a somewhat analogous situation with respect to drug field testing and, to a certain extent, canine accelerant detection at fire scenes. There are numerous instances where people are bringing the results of such presumptive testing into the courtroom with no form of laboratory confirmation. We now face the prospect of putting more powerful instrumentation into the hands of people who don't understand the theory of operation, which should be troubling to all of us. As a trace evidence examiner, I have already seen some questionable things when it comes to the use of such instrumentation for hazmat identifications. People that have barely been trained to operate these instruments are making judgment calls based on library hits that they view as infallible. Wrongful conclusions are being drawn because either a similar compound is present and a library hit is spit out or a relatively benign compound that is identified is the major component of a potentially dangerous mixture. In either case, something far more dangerous may be present, be it in smaller quantities, that is going undetected and a potentially hazardous situation is created. Consider also the fact that the operators are not certified, they are not working for an accredited laboratory, they are not using published methods, they adhere to no form of quality system, nor do they routinely possess the educational background required to understand the theory of operation.

This idea of placing instrumentation at the scene is going to have huge implications moving forward. What we are seeing now is just the beginning of what is to come. Just think about all the work going on with micro-scale DNA analysis. Would it be acceptable for someone that does not meet DAB requirements to perform on-site DNA testing?

The irony here is that the very thing that is slowing us down (accreditation, standardization, thorough QA/QC systems, etc.) and making these options more palatable to law enforcement for temporal reasons is what makes the use of the laboratory critical. The laboratory, after all, is a controlled environment that is staffed with experts whose sole purpose is to perform such tasks and interpret results obtained there from using their extensive education, training, and experience. If this happens and this powerful instrumentation is placed in the hands of non-scientific personnel we

are right back where we started 40 years ago and we haven't learned a thing. In my view one of two things, if not both, must occur: 1) we need to find ways to streamline what we do in order to provide more timely results; and/or 2) we will need to move scientists into the field to operate these instruments.

Glen: At least one of the areas of change in the next five years should be in the area, the area that's been discussed here, of point-of-crime measurements. That is, on-site chemical tests. I think you mentioned twice that on-site measurements with GC-MS as screening, and I think we need to be more careful here, because at the point where you're doing GC-MS, you're not screening, you're confirming, and you can do confirmatory analysis outside, and this is where we need to think about changing the way that we do it. I mean, at least consider it. You can do confirmatory measurements outside, you can do it, analytical chemists can do it, whether the community wants it or is willing to adopt it is a little bit different. This is where the change could happen.

Jay: Well if I gave law enforcement the option of confirmatory testing in the field, they would love to do that, but that's a matter of policy. We allow them to screen with these techniques and in reality some of the testing is confirmatory but part of the accepted "confirmatory" practice is to send it to the crime laboratory for any courtroom purposes or decisions.

Jeff: So I'm on a one-man campaign to abolish use of words like *confirmatory* and *presumptive* because I think there is an underlying error rate that we're really talking about. But more, I was smiling to myself. I think what Vinny is proposing was really captured well in the television show *Star Trek*. They have a Tricorder, but only Spock gets to use it. When the guy in the red shirt with no name tag is eaten by the monster, the Tricorder never drops to the ground, right? By analogy, we want our experts to play a key role in the fielding of new technologies. The other thing, too, that I was thinking was in the next five years, if the OSAC concept takes traction and standards start becoming complimentary across the forensic landscape – if they look the same, feel the same, undergo the same sort of scrutiny, then that can also be transformative.

Max: Wrapping up, I want to close with some changes I see we will face. One I see and feel most directly is the issue of independence and transparency Dean mentioned. The DCDF was created as an

independent agency. Some may think independence will produce some sort of new age for laboratories. But I think it swaps one set problems for another set of problems. As an independent laboratory, you take on the burden of that new set of problems yourself. You've got no one to blame in that sense. You've got to control that burden yourself. The other one that I see also acutely is staffing and succession planning right now. In the U.S., we have four generations in the work force. This is the first time in the history of our country that we have four generations in the workforce. How do you onboard, plan for, train, manage, and retire the people that we hire in a way that helps the organization. It has to be diplomatic but functional: We are hiring people who overtly have science degrees and they're working next to people who don't but have decades of experience. That is essential tension for us trying to push the profession forward as a science. The last one, and Jeff and I have had many long, conversations on this that have been productive and insightful, I think we need to do a better job at finding ourselves. I think we are in very great danger of falling apart, spinning out of control into a thousand sub-sub-sub disciplines, and with that goes any hope of lobbying in our favor for improvements in the discipline or the profession. A plurality of voices does not make a better argument; you need focus, you need coherence, you need that sense of community and I think, as Dean always says, it's a lack of leadership. We need people to work together and set aside egos and pull us, all of us, in one direction as a true example. I think we are very much in danger because the stakes are high and resources are tight. The essential threat is losing ourselves in the process of trying to maintain ourselves. Finally, change management. Law is conservative, law enforcement is conservative, forensic science is conservative, so what hope does forensic science have other than to be triply conservative? We need to be more flexible; we need to be more nimble; we need not to throw the baby out with the bath water; we need not to get rid of some of these disciplines that founded forensic science just because it's not the current flavor. To start over again is a much higher cost; having invested in someone or something, and then to have to start over again and reinvest in what was discarded has at least doubled the cost of regaining it. So, for things like questioned documents, trace, shoeprints, whatever other examination types, we lose that, and the cost of reinstating that is going to be huge. This has been

fabulous. I want to thank everybody for coming. The insights were fantastic and I really enjoyed this and I look forward to this making it to print for the community. I think it will be a good spark for a lot of conversation. Thank you all.

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