

Adoption Certification Workgroup
Draft Transcript
April 21, 2011

Presentation

Judy Sparrow – Office of the National Coordinator – Executive Director

Good morning, everybody, and welcome to the Policy Committee's Adoption Certification Workgroup. This is a hearing on EHR usability. This is a Federal Advisory Committee, so there will be opportunity at the end of the day for the public to make comment. Also, there will be a transcript made available on the ONC Website of this hearing. Just a reminder for workgroup members to please identify yourselves when speaking for attribution.

Let's go around the table here and introduce ourselves, starting on my left with Bill Munier.

William Munier – AHRQ/HHS – Director CQIPS

I don't know if this is on, but as you said, I'm Bill Munier. I'm Director of the Center for Quality Improvement and Patient Safety at the Agency for Healthcare Research and Quality.

Don Rucker – Siemens Medical Solutions – CMO

Don Rucker, CMO, Siemens Healthcare, long interest in usability, both large and small vendors over this decade.

David McCallie – Cerner Corporation – Vice President of Medical Informatics

David McCallie with Cerner, a member of the HIT Standards Committee.

Joan Ash – Oregon Health & Science University – Associate Professor

Joan Ash, Oregon Health & Science University. I'm Professor and Vice Chair of the Informatics Department there.

Charles Kennedy – WellPoint – VP for Health IT

Charles Kennedy, Vice President, Health IT for WellPoint and HIT Policy member.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Larry Wolf, Kindred Healthcare, Health IT Strategist and Co-Chair for this hearing.

Farzad Mostashari – ONC – Deputy National Coordinator for Programs & Policy

Farzad Mostashari, ONC.

Marc Probst – Intermountain Healthcare – CIO

I'm Marc Probst with Intermountain Healthcare.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

I'm Joe Heyman. I'm a solo gynecologist from Massachusetts using an EMR since 2001, so I'm old. I'm also Chair of the National Physician Advisory Board for Optum InSight, which was Ingenix up until a week ago.

Carl Dvorak – Epic Systems – EVP

I'm Carl Dvorak with Epic, computer science trained and a software developer by history. I'm responsible for application development at Epic.

Adam Clark – FasterCures – Director, Scientific & Federal Affairs

Adam Clark, I'm Director of Scientific and Federal Affairs at FasterCures and a member of the Health IT

Policy Committee.

Judy Sparrow – Office of the National Coordinator – Executive Director

Thank you. Do we have any workgroup members on the telephone? All right, with that I'll turn it over to Dr. Mostashari.

Farzad Mostashari – ONC – Deputy National Coordinator for Programs & Policy

I want to welcome everybody. We have had I think on average a public meeting of our FACAs or their workgroups every other day for the past two years. It's a sign of how much value we derive from the input, from the hard work, from the good thought of all of those who participate in the hearings, either as members of the FACAs' workgroups—those around the table here who fly in who take time out of their incredibly busy days, from the people, who as we will see, are testifying. Also from those on the phones and those who are here in the audience, members of the public who provide their input. I want to thank you all for your contributions and for helping us make better policy.

The issue of usability is one where we really do need large, wide-ranging views and perspectives to inform, to be able to make good policy. It's obviously a critical issue. From the provider's perspective, it is their daily life, their daily experience, and all too often we hear from providers that they look forward to the day when the technology works for them instead of them feeling like they're working for the technology. We hear from providers that they didn't really know what they were buying until they bought it, they didn't really understand what it would be like to use the system, and there wasn't the transparency in that they would hope. We also hear about potential safety issues with respect to usability, or poor usability of products and errors that can be attributed to the human-computer interface. So it obviously has many important implications for safety, for adoptions and effective implementation of systems for efficiency and the impact on physicians and hospital productivity. Those are all, I think, important issues for us to be engaged with and thinking about and seeing what we can do.

On the other hand, there's a risk. There's a very real risk that if done in a poorly thought through way, if there's too prescriptive an approach, if the science isn't there for how the usability is to be measured, if it's too subjective, if it's too prescriptive, we could end up having well-intentioned but severe unintended consequences. In the extreme we could end up mandating or regulating design of software. We could freeze in place the technology approaches of today and hinder the innovation that is so desperately needed, the constructive innovation for tomorrow's applications. Someone said, what if the next technology is all voice or all gesture, how are you going to accommodate those in your usability measurements? So it's a critical challenge.

I think the first step is for us to have an open and inclusive process so that we make sure that we do consider the issue from the fullness of the perspectives, that we do build on the work that's already taken place. I think the goal here is to have, as soon as possible, some common sense measures, heuristic approaches to thinking about measurement that can help, as Chuck calls it, both improve ability for the designers of the systems, but also marketability, in terms of the ability of transparency in the marketplace. Those are the goals.

I think there are many ways, if we can get to those set of widely accepted common sense measures, metrics, for usability the next step will be how they are implemented, what are the policy levers, and again, there's a wide range of potential approaches. There could be private organizations, the *Consumer Reports* approach to this. There could be voluntary testing through the testing laboratories as far as certification process. I just want to be clear, I don't see us saying if you score 73, you may market an electronic health record in this country, and if you score 72 you may not. That is not the purpose of what we're trying to do here. We're trying to really bring more transparency to this issue and more visibility to it.

With that, I'm going to turn it over to today's terrific co-chairs of the hearing, and Marc Probst will start.

Marc Probst – Intermountain Healthcare – CIO

Thank you, Farzad, and for the leadership, I want to thank Judy and the staff at ONC. This came

together rather quickly and so for all the panelists we know there wasn't a lot of time given to you either, but thank you. In reading through the testimonies, a lot of good effort was put into this, so thanks so much.

I had an interesting usability experience last night. As I was sitting on the airplane coming here reading these fine testimonies with my mind very attuned to usability—the flight was actually early. It landed at Dulles about 15 minutes early, which I thought was a pretty good usability comparison, pulled on to the tarmac, went to park, and I could see out of the window—I was in an aisle seat, but I could still see out of the window—that we were going to the people movers. So a 15-minute early flight turned into a 30-minute late flight by the time we got those dang people movers out there to take us from the airplane into the airport itself. There were a whole host of issues that came to mind. One was the immediate reaction I had when I saw those people movers. I knew this was going to suck. It was going to be a pretty bad experience from that point on, and indeed it was. I don't know if IAD was doing this for efficiency or effectiveness or what, but I know it was a usability problem and probably not one we'll solve here today. But it did relate to a lot of the issues I was reading.

I also found three quotes that I'll share and then I'm going to turn the time over to Larry to actually drive us through the meeting. But the quotes also seemed pretty applicable given the testimonies that I read. The first one is, "Experts agree that the best type of computer for your individual need is the one that comes on the market about two days after you purchased the one you just got." "Computers have enabled people to make more mistakes faster than almost any invention in history, with the possible exception of alcohol and handguns." "A computer makes it possible to do in half an hour tasks which were completely unnecessary before."

Those did hit home pretty well based on the testimony that I read. Again, thank you for being here. This should be a good conversation—really with the testimonies and the meat that's in those testimonies. What was nice to see is not everyone was on exactly the same page, and I hope we can get into some of the conversation to find what is the most meaningful or the most appropriate recommendations we can give to ONC and to the Policy Committee.

Thank you for being here and I'll turn the time over to Larry to drive us through the agenda.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Welcome, everyone. It's great to see a crowd here today around the table and in the room. We do feel like we've put together quite a diverse panel over the course of the day, everyone from providers and consumers to technology developers, folks who measure this and some folks who think deeply about design and where we might be going, so I think we've got a pretty interesting day in front of us. Getting ready for this, I dusted off an old book that was on a shelf, *The Psychology of Everyday Things*, and for those of you who have got great vision, you can see that there's a very interesting teapot or coffee pot on the cover that's got the handle and the spout on the same side. How often have we walked up to some device that should be easy to use, and we go, this isn't going to work, right? It looks beautiful but somehow beauty overwhelmed the need to actually make it usable.

Thumbing through Donald Norman's book, what struck me is that we actually have acquired a lot of ways in which we interact with the things in our world. He likes to talk about doors as a great example of, the architect got so carried away with making it beautiful they forgot to indicate how you actually open it. Where do you push, do you pull, does it slide? He said he's even found some doors that go up or down. How do you make this door work? It can actually be a pretty scary moment when you get trapped in an entranceway between a pair of doors, which seem to have stopped working completely. I think we've all experienced moments like that using information systems of various kinds.

We've also experienced moments when I would say that the technology actually itself became transparent, it was essentially invisible and we were able to accomplish the thing we wanted to do without any sense that we actually had to put any effort into using the technology. You could argue that some consumer products have actually completely hit a home run on that. Of course, when they first came out we were struggling with how do I make this one button work for everything. So there was some kind of

learning curve, but once we got through that it became “intuitive.” There’s a lot that goes on between the moment of, “This has got me completely befuddled,” to “This is so intuitive I don’t have to think about it. It just works like it ought to work.” We’re in an interesting transition with our information systems in healthcare. We’ve been through many, many decades of the early adopters being early adopters and we’re now in a transition where they’re going mainstream, and I think we’re at a great time of innovation and also great challenges, so we’ll hear a lot about that today. Hopefully by the end it will all begin to come together.

I guess I should apologize up front; we have a very full day. So if you need to stretch or walk around the back of the room, feel free to do so. It’s going to be pretty full. I wouldn’t make any claims for the usability of our chairs. With that, let me hand this over to Joe, who’s going to be leading the first panel.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

So far I see a very empty slot of panelists. The first panel is on the Care Provider Perspective and we have five very interesting and very diverse people who are going to be testifying. The first is Christine Sinsky, who I believe is on the phone. She’s a general internist from Dubuque, Iowa. She has a level 3 patient-centered medical home. She’s on the IOM’s Committee on Patient Safety and Health IT. She’s a frequent lecturer on practice design and medical homes.

The second person, and if I make minced meat out of anybody’s name, just correct me, it’s okay, Stanley Wainapel, Director of Montefiore Medical Center’s Department of Rehabilitation Medicine. He’s a professor of Clinical Medicine and Rehabilitation at Albert Einstein’s College of Medicine. Amongst his more than 60 published articles and chapters is the subject of physicians with disabilities.

After him will be Chantel Worzala, Director of Policy at the American Hospital Association. She has 15 years of experience with domestic and international health policy, concentrating on health IT since 2005. She served as a senior analyst on the Medicare Payment Advisory Committee. Then Nancy Staggers, who’s a Clinical Informatics Expert, with research on clinical systems usability. She’s a Professor of Informatics at the University of Maryland and she spent 25 years in the United States Army.

Lastly, will be Abel Kho. He’s Assistant Professor of Medicine and Associate Director of the Medical Informatics program at the Feinberg School of Medicine. He’s a Regenstrief affiliated scientist doing research on regional drug resistant infections using a health information exchange and he’s Co-Director of the Chicago Regional Extension Center.

We’ve asked these folks a couple of questions. We want to know how clinicians view usability, what are specific issues for those with disabilities, what are the aspects most important with reference to use, workflow, device interactions, and data presentation, and what are mission critical usability issues and ease of use issues?

With that, if Christine is on the phone we can start with her. I think what we’ll do is we’ll interrupt the usual flow by letting people ask questions right after Christine’s presentation because she needs to get back to her patients.

Christine Sinsky – Medical Associates Clinic & Health Plans – General Internist

Very good. Thank you, Dr. Heyman. Can you hear me?

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Yes, five minutes, Christine.

Christine Sinsky – Medical Associates Clinic & Health Plans – General Internist

Got it, thanks. It was heartening to hear Dr. Mostashari’s clear articulation of the need to connect the policy intent with the front line Usability is really critical to clinical care and I can’t think of a more pressing issue. As he said, I’m Christine Sinsky. I’m a general internist at Medical Associates Clinic in Dubuque, Iowa, and we’re a level 3 patient centered medical home. We’ve had an electronic health record since 2003. In addition to my own practice, I’ve also shadowed nurses and physicians across the

country as part of my work on practice redesign in the medical home. I've personally experienced the beneficial transformation of care through the use of HIT, and at the same time I've witnessed deep discouragement among clinicians and almost all is because of usability issues. Improvements are urgently needed. I will share with you a few examples and then offer recommendations.

Time and cognitive workload are two critical dimensions of usability. In terms of time, there's only so much of it in a day. A few more minutes per task adds up. For example, one primary care physician reported to me that it takes ten minutes of her time to order a routine mammogram through her CPOE system, a task that should reasonably require no more than a few seconds of clinician time. In a brief study in my own practice, we found it takes 24 seconds to enter a typical family history on paper, yet 2 minutes to enter that same information in structured text in our EHR. Multiply this by the hundreds of tasks each day and it isn't surprising that many physicians report that the EHR has added two hours to their workday.

In terms of cognitive workload, the mental work required to do the same task can be much greater in current electronic format. One issue is clutter. Low priority information often clutters screens and needlessly adds to the volume of information to be reviewed. It becomes a needle in a haystack issue. Another issue is ease of access. In the paper world, I could look at a woman's last 15 Pap smears on a single flow sheet. Those results are now sequestered in individual files, each at the end of complex navigational pathways, increasing the time and the mental work of acquiring data and seeing patterns. Just because information is very similar within the EHR doesn't mean it will be readily available to clinicians in the course of care. Fifty pages of scanned in outside records are technically in the records but functionally not accessible.

In terms of recommendations, for the vendors you need better information display, clear, concise, and easy to navigate, designed to match clinical workflows rather than anticipating that clinical work will conform to rigid electronic pathways. For healthcare organizations, it's time for a major upgrade in hardware. While the majority of usability is dependent on software, usability is also driven by hardware. Processor speed, bandwidth and monitor size and number matter. In terms of personnel, we need new staffing models to deal with this new disruptive technology. I think it's as if we're stumbling around without the right staff. It is as if the operating room had been developed but there are not yet circulating nurses or scrub techs. Some innovative organizations have begun to hire clinical assistants who work collaboratively with the clinician, interfacing with the electronic data systems while the physician interacts with the patient.

For policy makers: develop usability testing as part of EHR certification and require public reporting to allow providers to make informed purchase decisions. In addition, policy makers can foster a competitive, creative vendor environment by first requiring interoperability that allows the wholesale migration of an organization's data from one vendor to another. Without this, the purchaser has little leverage to influence the future usability and performance of the chosen EHR. In the current environment, once a purchase has been made the user is locked in. Second, policy makers can also foster creative innovation by requiring interoperability at the modular level, like smartphone apps, so that the purchaser can select the best combination of applications to meet their specific needs, for example, a robust family history module from one vendor and an outstanding medication module from another.

In conclusion, the challenges that nurses and physicians have experienced with EHRs can be boiled down to issues of added time and cognitive workload. Usability is key, and I'm really pleased that you're considering its impact. Thank you.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Thank you, Christine. Christine, let me just start off with a question, if you're familiar with stage one and the proposed stage two meaningful use criteria, do you think that they have any impact on usability, either negatively or positively?

Christine Sinsky – Medical Associates Clinic & Health Plans – General Internist

I think that the most challenging thing for me has been to see policy intent and then experience almost an

opposite in my daily practice, and how to change that I think is the challenge that is in front of all of us. So, yes, I have, and I can give you a very immediate example of that. In stage one, there's a requirement for a problem list, a very appropriate requirement, I believe. It's important to have a longitudinal problem list to get the big picture about a patient. Just two nights ago we had a meeting at a clinic where we recognized that our electronic health record, although we have a problem with in its longitudinal, it somehow doesn't get recognized as such in some sort of back end electronic audit. I don't understand the details of that, but the implications are then that the physicians at every single visit have to do about a 30 to 60 second workaround to enter a structured test assessment. So there's a usability issue, right, because no physician has an extra 30 to 60 seconds each visit to do an electronic make work task, and yet that's what we're doing to satisfy this requirement even though we already have a problem with. I hope that made some sense to you.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Yes, actually that problem list situation is a particular pet peeve of mine, the idea that you have to prove you thought of a problem even if there wasn't one. But in any event, why don't we open it up for questions from other people on the panel? Yes, Joan?

Joan Ash – Oregon Health & Science University – Associate Professor

I was intrigued by your use of the term "clutter," I appreciate that word. I'm wondering what your highest priority would be for fixing that problem. Do you have any suggestions for vendors and the usability and helping that particular issue?

Christine Sinsky – Medical Associates Clinic & Health Plans – General Internist

Sure. When you think about Google and how Google puts forth on their home page just about nothing, right, and it seems to me we should look at every single data bit on every screen and say is it high priority. If the blood pressure is 130/70 do we really need to show millimeters of mercury, or can those five characters be eliminated? I think if we did that on almost every screen we would reduce by 50% or more the number of characters that are displayed on a screen, because I think those characters come at a cost. When you have to read through all those characters to find the critical information you can easily miss the critical information.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Any other questions for Christine? Marc?

Marc Probst – Intermountain Healthcare – CIO

Christine, you talk about usability testing. Do you have any thoughts on what it is you'd be looking for? What would make a difference to you if you saw it as you went to go and select a vended product regarding usability?

Christine Sinsky – Medical Associates Clinic & Health Plans – General Internist

I think I'd like to see a couple of things. I'd like to see clip counts and screen counts. So probably the way I would like to see this is with a few standard patient setups so that I can compare managing a test patient and finding particular pieces of information in multiple records and see how many screen changes and how many clips it took to get to that point. Possibly even some test scenarios where real clinicians were asked to figure something out, they had to figure it out in multiple vendors and compare the scores. Because if you're so distracted by all kinds of extraneous information or by the pathway to get to information that you can't make a sound clinical decision at the end of it, that's really important to me, and to be able to test that and test users' ability to make an accurate cognitive decision would be helpful for me.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Go ahead, Adam Clark.

Adam Clark – FasterCures – Director, Scientific & Federal Affairs

I want to just get your impression on what this technology, what your perceptions are, how it's impacting the doctor-patient relationship. Are patients encouraged as they see the use of electronics to record this?

Are there ways that it can facilitate dialogue between the patients? Or are there negative impacts, as you see it, in deploying these technologies?

Christine Sinsky – Medical Associates Clinic & Health Plans – General Internist

That's a great question. I think the answer on that is that it's both. One of the very best things that I can do with my patients is turn the monitor toward them, pull up their x-ray, show the x-ray. Or we'll pull up another physician's note and we'll read that together, or I can show them the trend of their lab results, or I'll pull up up-to-date and we'll look at that together, and that has really improved my ability to be a good doctor to my patients. One of the things that I have noticed as I shadow other physicians and as patients just talk to me about their experiences elsewhere, is that sometimes patients will say something like, "My doctor never looks at me anymore. I don't feel like they're listening." I think the more that the implementation has put secretarial tasks on to the physician and the physician is typing in the notes while they're with the patient, I think that has a negative consequence for the patient's experience of the care. I'm in a position where I don't type my notes, I can dictate, and I dictate in front of the patient and I make that an inclusive kind of experience, so I haven't personally ... that problem with my interactions with the patient, but I know it's a real concern for patients whose doctors are typing while they're talking to them.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Go ahead, Carl.

Carl Dvorak – Epic Systems – EVP

Christine, a quick question for you, you had mentioned an example of taking ten minutes to order a routine mammogram, were they ever able to get to the bottom of that? Is that an exception case or is that the norm for all the clinicians in that practice? What was the cause, if they were able to get to it? Were they struggling to find it in the list, filling out too many fields, or being asked to complete something they didn't know, so they had to pick up a telephone and call someone? Do you have any sense of what the root cause of that was?

Christine Sinsky – Medical Associates Clinic & Health Plans – General Internist

No, this was a comment that a physician made to me when I was visiting their practice at a large center on the east coast, so I don't have that kind of detail. My impression was that this was a routine experience. My own experience with CPOE is that, although I haven't had something take me quite that long, it's just a series of dropdown boxes and a series of sometimes hard stops. I was ordering Imodium for a patient, to go home on Imodium the other day through the electronic health record, as part of discharge med reconciliation at our hospital, and I had to answer questions that were not relevant to this patient, and I couldn't get out of this endless cycle. That one probably did take me five minutes. I had to eventually just put in an artificial staff date and an artificial staff time for this PRN over-the-counter medication. So I think that sometimes it's just a misfit between generic, rigid dropdown boxes and the individual situation that you're in.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

I know that Paul Egerman is on the phone and he's our co-chair, and I'm wondering, Paul, if you have any questions? I guess not. Okay, any more questions? Yes, go ahead, Larry.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Some intriguing things you talked about that this is not just about clicks, although you did suggest that maybe we should be counting clicks. I wonder when you were talking about alternate staffing models, if that doesn't open up a whole conversation about we've automated the way we've always done it, but we're not necessarily automating new things that the technology makes possible. That we can actually get very helpful trade-offs of, yes, maybe this step takes longer but I've eliminated 14 phone calls that I used to get, or I've eliminated other things that took time but not the same time or not at the same spot in the process, or maybe we need to rethink some of the care process. What are your thoughts?

Christine Sinsky – Medical Associates Clinic & Health Plans – General Internist

First of all, I think you're right. There are some things that take less time and I'm hopeful that in the future there will be a lot of things that take less time, because technology in the rest of our lives is much more

user friendly than what I've experienced in electronic health record. For example, if I want to order a medication that I don't order terribly often it's quicker for me to determine that those, by going into the electronic health record and beginning to prescribe it, than it is to go and look it up in the PDR in the old days. So that certainly has saved me time.

In terms of the staffing model, that's actually an area where vendor design as well as policy interacts with our ability to be innovative around staffing models. I think we do need a partner with whom we can do collaborative work around the electronic health record. I would love to have a clinical assistant who comes in with me, in the room with the patient, and while I'm interacting with the patient, they're recording in real time the interaction. I may be giving her some additional cues, such as a ... systolic murmur so she can record that, but right now, there are technical problems that get in the way of that. We don't have a collaborative sign-in, and there are policy problems that get in the way of that in terms of who's required to do certain parts of the documentation. I think we will come to that. But right now I think in this first decade the reflex reaction has just been to task physicians with all of the work, and that's why physicians take two hours' worth of documentation home every night. My real concern is that physicians are feeling disheartened by this and defeated almost by all of this additional work. People feel that they're the word "secretary" and the pharmacist and the transcriptionist and doing all these additional tasks and it becomes unsustainable.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Chris, we're going to take one more question from Jodi Daniel, and if you could answer it briefly so we can let everybody have a chance to speak, that would be great. Go ahead, Jodi.

Jodi Daniel – ONC – Director Office of Policy & Research

Just quickly, I just wanted to ask when you do realize that something isn't working well or it takes ten minutes to get a mammogram ordered, something of that magnitude, what kind of feedback are you able to provide? Is there a mechanism for providing feedback and getting those problems corrected? How long does that take? I'm just wondering what the process is when you do notice that there's some usability challenges.

Christine Sinsky – Medical Associates Clinic & Health Plans – General Internist

It doesn't feel like there's an effective process for that. There is a way to give that feedback, but I have not actually seen those changes done reflected in future upgrades. So I know there's the process and not every suggestion can be implemented, but it feels like there's no connection back to the vendor back to the user.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Thank you very much, Chris. We're going to move on to Stanley Wainapel.

Stanley Wainapel – Montefiore Medical Center – Clinical Director, Rehabilitation Medicine

Thank you very much for allowing me to speak on this topic. I have a considerable amount of interest in it. I'm here as a healthcare provider and also as a healthcare consumer. In addition to being a physician, and specifically a physiatrist who specializes in working with patients who have disabilities and trying to maximize their level of function, independence, and quality of life, I also happen to be one of those individuals with disabilities myself. I have a progressive retinal disorder called choroideremia, which I've had since I was eight years old. But which, based on its slow progression, has required me to use a cane for walking for the past 25 years, to do my reading via talking books for the last 20 years, and to use information technology and computers with specialized software for the last 15 years.

I would not have my title of Clinical Director of Rehab Medicine and full Professor at Albert Einstein, nor would I have 60 publications if it wasn't for that information technology. Mostly what I have utilized has been text to speech software so that I would be able to read the screen, and that has allowed me to do my e-mail, to write my articles, to edit books, and when necessary to print out prescriptions for therapy for my patients. Sometimes I've also utilized optical character recognition (OCR) software. When there was some printed material that I wanted to review I could scan it in and it would then be read to me with a computer voice. That's much more efficient than it used to be and it's a lot cheaper than it used to be.

When I first heard about this in about 1981, the OCR type software and the machine that you'd use for it took up about a whole corner of a room and cost \$30,000. Now it's about the size of a camera and costs a couple of thousand dollars, so that's how technology marches on.

One of the reasons I'm interested in this area is because my own facility, Montefiore Medical Center, is going to an electronic medical record system and I am not sure how I'm going to be able to interact with that myself. Now, what do I need personally, as a person with a sensory disability? Well, it needs to be efficient enough so that when I have a day when I'm seeing 20 patients, I can see the 20 patients. What Dr. Sinsky was saying is very relevant to me. I have developed my own quick way of seeing patients, dictating a note, which is eventually transcribed, and having the good fortune, being a clinical director, of having a secretary who would come in with me and would write out things for me, since my handwriting is not only bad as a physician but it's bad as a person who can't see.

But when we go over to an electronic record, how am I going to handle that? I could, theoretically, interact with a program, at which case I would, of course, be turning away from the patient. Believe it or not, a blind physician very much uses eye contact with his patients. My patients like to be with me because I do maintain eye contact. I talk directly to them and I talk in plain English, which is also important. But in terms of using the electronic record not only would I have to type into it, but I would have to hear, the way that I do it now, I'd have to be hearing what I was typing. When you're not that good a typist, that can be embarrassing. You have to make changes.

My alternative would be to utilize, as an intermediary, my secretary to type in certain things. She's been with me long enough that I could probably instruct her in what needs to be and what doesn't need to be included. The alternatives, for example, of using voice activation, which is useful not only for a person with sensory deficit but also for a person with a motor problem—someone who has, for example, weakness of the hands or has arthritis of the hands—would be a problem because anything that I would do would have to be checked over. The way you check over is with text to speech. So this becomes an issue of efficiency, as well as an issue of how to interact effectively with your patients.

Now, I should also add that this is not just something that is an issue for the relatively few physicians like myself who have severe vision impairments. There are a lot of doctors, as they stay in practice longer, who are going to have low vision, maybe not severe vision impairment, and they aren't necessarily going to be in a situation where they can't continue to practice. They still will be able to practice. Then you have an even larger group of people with the reading issues, for example, dyslexia, that's the largest new disability among college students and graduate students, and those individuals similarly could utilize this particular kind of technology.

I think it is also important to make sure that the software that people like myself would be using is compatible with the system. For example, if something is written in Java script and it comes to me, my text to speech reader won't read it. I had a funny incident that occurred actually in reviewing some of the testimony that was coming in. I asked them please send it to me as an attachment in Word. Well, a number of the testimonies came in and I don't know if they were in a Word format, it looks like it was Docs, and as soon as I tried to open it, it would come up with nice gibberish, PK-9 Page 2, and so forth. My secretary had to go through all sorts of shenanigans and eventually was able to figure it the right way and then had to print it, and I will now have to review it with OCR software. Now, alternatively, some of the testimonies came in PDF format, no problem, I was able to do it. So again the usability is important from an efficiency point of view.

I could not agree more with Dr. Sinsky about the need to be able to maintain your doctor-patient relationship. I as a healthcare consumer, not necessarily because of my vision, I have gone in to see a doctor with a dermatologic problem and they've been sitting there merrily typing all of this information on me, and dermatologists really do have to look at you, and the idea of having to do this myself is a bit intimidating. I have no problem now, for example, if my secretary is out at lunch and I have to write up a physical therapy prescription for my patient. I have worked out my own computer format and I basically can put that in and then I turn my back to my patient and say, please pardon my turning my back to you, and then I write that out. But when I'm dictating for patients, for example, I'm facing them, I'm dictating

them, they're actually hearing what goes to their doctor, which is kind of a nice thing for them because they're actually hearing everything. I just can't tell them

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Okay—

Stanley Wainapel – Montefiore Medical Center – Clinical Director, Rehabilitation Medicine

But that's about all I would need to say at this time.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Thank you very much. This isn't really usability, but I just want to point out that in Massachusetts in three years, I think it's three years, as a condition of licensure you have to meaningfully use an electronic medical record, and it just occurred to me while Stan was giving his testimony how incredibly ridiculous that requirement happens to be.

Any questions from our committee members? Oh, that's right. I'm so sorry. I got off because of Chris. Okay, Chantel.

Chantel Worzala – American Hospital Association – Sr. Associate Dir. of Policy

Thank you and good morning. My name is Chantel Worzala. I'm Director of Policy at the American Hospital Association. The AHA represents 5,000 hospitals and health systems, and about 40,000 individual members. My remarks this morning are drawn mostly from consultation with our members and particularly those that have advanced EHR systems.

I want to start my remarks with a quote from a trip I took yesterday to the Edison Museum in West Orange, New Jersey, and Thomas Edison obviously was an amazing inventor and one of the quotes, and I may this a little wrong, but he said, "Invention is 1% genius and 99% perspiration." I think that's where we are right now is in that 99% where you need to work it through and work it through again and work it through again. That's really what usability, my members are telling me, is about. You test it. You try it. You improve it. So thank you for focusing on usability. It's obviously an important factor in the pace of adoption and we have seen lack of usability as something that is a barrier to adoption of electronic health records. Very quickly, usability, defining terms, is really the extent to which users can do what they need to do well, quickly, and to their satisfaction in real world clinical scenarios. It's that real world that gets complicated. What I'd like to do today is identify some of the unique aspects of usability in the hospital context, consider clinician views of usability, and describe some of the ways in which hospitals are working very closely with their physicians to address usability in their unique installations.

In the hospital context, usability and EHR systems are complex and demanding. An EHR product is part of an EHR system, and in that scenario where you're piecing together dozens of IT products, usability is also about how well the pieces fit together. Ease of integration is also a component of usability for EHR products. EHR systems in hospitals have many, many different users and they support many diverse clinical situations. You have a nurse doing intake in the emergency department. You have a respiratory therapist who's providing care at the bedside. You have a case manager who's thinking about arranging care after discharge. And of course you have a whole range of physicians. All of these folks interact with the information about the patient in the medical record. Usability also includes both the software and the device, and in a hospital setting care is very mobile, so many different devices are used and you need to consider that as well in usability.

The direct question: how do clinicians view usability? I had a wonderful quote from a CIO: "Make the right thing to do the easy thing to do." That pretty much sums it up. What were the characteristics of usability that underlies that, speed, that includes data entry, ability to retrieve information quickly, number of clicks and screens. A focus on reliability, as clinicians use EHRs more and rely on that as their primary source of patient data they have no room for unreliable systems that go down whether it's because the software is unreliable or the network has issues.

Efficiency is a key component for clinicians. In the hospital context, there are very large volumes of data

that need to be managed and they need tools that will allow them to very quickly filter and find the data that they need for their particular context and use. Accuracy is another characteristic. This is both of the data itself. If the patient data isn't accurate, the EHR isn't useful. But it's also about the clinical decision support tools, and this gets into some of the alerts. Is this an alert that's meaningful or not? Intuitiveness, is this a product or an application that you can simply pick up and use, or do you need a lot of training in order to use it? Stability of design—and this is very interesting in the context of meaningful use, where systems are changing rapidly. There's a need for these systems to have a stability of design so that when you interact with one system it looks very similar to interacting with another system. So are functions where you expect to find them and does the F1 key do here what the F1 key did in my office, that sort of thing.

Finally, of course the support for workflow. The ideal in using an electronic health record is that it will actually streamline your workflow and make the various steps that you need to take to care for a patient easier and logical. You obviously don't want a system that disrupts the workflow by putting steps out of order or asking you to input data that isn't pertinent to the care that you're providing at the time.

You did ask which of those aspects were mission critical and the response I got back from our members were that they were all mission critical when they impacted the safety and quality of care. But those aspects that were most likely to do so were decision support, and I heard from a number a concern about medication reconciliation, and that is an area where they're struggling with the usability and it is in fact impacting the care. Very quickly, to finish up, hospital IT departments are collaborating with their clinicians to ensure and improve usability of the systems. The kinds of things that they are doing are shadowing the clinical staff, collaborating in joint efforts in system design to get that feedback and make improvements, intensive training and support, really working with the clinicians to fine-tune CPOE and decision support systems, and also engaging with their vendors to provide feedback.

Just one note on the support for disabled physicians or physicians with different needs, that is something that is dealt with in hospitals through changes in use of color coding, if you're color blind using screen reader software, sitting devices for those in a wheelchair, but it is certainly something where our members identified the need for continued work. So thank you very much. This is a very important topic. Thanks again.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Thanks. Nancy?

Nancy Staggers – University of Maryland – Professor of Informatics, School of Nursing

Okay. I'm ready for the slides, please. All right.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Five minutes, please.

Nancy Staggers – University of Maryland – Professor of Informatics, School of Nursing

Yes. I'm going to make five major points in five minutes, and that is, patient-centered care, that is coordinating care; finding critical data; synthesizing data and information; mandating consistency; and then the effective regulatory influence so far. We need to remember that all the data need to be patient centered and that the main purpose of all of this is to coordinate care. From the nursing perspective, nurses are primary information and care coordinators. You can see if we had a patient who was a diabetic who had to go in to an acute care facility for an amputation, she could potentially go through all of these different contexts. Each context has workflow associated with it. It has team care. It has individual care. So usability is no small challenge. If we take an example of pressure ulcers, for instance, nurses are primary preventers of pressure ulcers, yet if we have the same diabetic patient who has a pressure ulcer, the inpatient nurses cannot see the treatment plans for home care and vice versa. So while we don't usually think of usability, including integration and interoperability, it's a must in healthcare.

We need support for team-based care. An easy example is in the operating room, we see team based care there between the surgeon, anesthesiology, and between nurses, like circulating nurses and scrub

nurses, so that's an easy place that we do team based care. But team based care is almost everywhere, with the patient at the center you see collaborations between nurses and pharmacy, between nurses, pharmacists, and physical therapists, and the people that you see here in the ring. We don't do usability well for team based care in EHRs currently. I didn't find any clinicians who would say that they would go back to a paper-based record. However, there are critical usability issues. One of them is being able to find critical data. So I offer you a screen shot here that will be made available to people who are on the phone and listening. This would be an ICU nurse who is looking at where are the critical changes in my patient. And the way that you find it on this system is that you look in the top right hand side and the green dots are where data are located in this system. Otherwise, it's blank white space.

Finding critical data then would mean in the VA, for instance, going through hundreds of documents for my veteran. Trying to find out is this patient competent, what's his financial status, what's his social status, so that you can find out does the patient need to be placed in a nursing home, in a skilled nursing facility, or can the patient live independently. This is a critical concern, just sifting through all these data. In fact, one of the VA providers said, the way that I go through this is I spend some time up front but then I write my own note that synthesizes all these data and she called that death by keystroke, providing synthesized information as well as finding critical information.

One example is in a change of shift report. Here's an example of a change of shift report form that's newly designed from an electronic health record, and as you can see it's a sea of data. I'm a nurse and I want to know what happened to this patient in the last 12 hours since I was off. Are the vital signs trending down or up? In fact, they found an increased call to the rapid response team because they can't see subtle trends. They could see the numbers but not subtle trends. You can see a grid on the bottom of this slide, and that's how the nurse organizes her medication delivery and other tasks, because the EHR doesn't help her on that.

At the bottom also you see a note that says "incomplete information." So the list of orders that are in the middle are incomplete. You don't know which ones. Here's where information synthesis occurs in EHRs today, and that's in the provider's head. Here's another example of finding critical information, all the white space, how do nurses find missed meds, how do they find what's due, well they have to go up, they have to go down, they have to go side to side to find the critical medications. I would like to advocate consistency, so consistency here's examples of icon design. STD means something different to many of us. Here's another icon design that's in a military system that's deployed worldwide. Here are designs. One of the informative icons is a yellow square with blue and red dots, so we need some help in defining consistency for icons. Perhaps one way would be to develop a library of icons for healthcare icons. Here's another icon to do an insulin sliding scale. Consistency, summary screens that would be consistent, ways to find critical data.

Then last—and this is my own personal bias, but I'm not sure that RHIOs and ... have helped us, because what we need is national coordination and that's a place where the Office of the National Coordinator could really help us. We need building blocks. We need a Master Patient Index. We need a Master Provider Index. We need designs that are consistent for synthesizing data across summary screens and electronic medication records. Thank you very much for inviting me here.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Thank you. Abel?

Abel Kho – Northwestern – Assistant Professor, General Internal Medicine

Sure. Maybe I'll ... some time here. I just took a straw poll of my clinic, and what I found was that many providers just don't have a common concept of usability. What they do have in common is that they complain about issues of efficiency, inability to complete what they want to do in their workflow. That's what they think about it, not necessarily usability in the context that we think of it. As a regional extension center engaged with a wide variety of providers, we've noticed two distinct groups of clinicians who raise usability concerns: novice users just starting on an EHR, and experienced users who have either deep experience with a single EHR product, or multiple products; most providers in between find creative ways to make the EHR work well enough. Novice users are acutely aware of the concept between their speed

interacting with the EHR and the speed of the salesman who sold them the product. Most issues at this stage relate to ease of use, which training of post go-live support can address. When providers develop proficiency in the use of the EHR they start to recognize design features, which impede repetitive tasks in the workflow, even if just for a moment. I think you alluded to that earlier. In particular, poor contextual data presentation requiring the clinician to go out of context or sort through an overwhelming morass of data to find information to make a decision can dramatically reduce the efficiency, or worse, increase the risk of errors.

Take, for example, ordering medications, one of the more common tasks of a provider, for effective use key information ... allergies, prior lab results, current medications, and insurance providers need to be readily available within the workflow. The order of possible medications and the list of choices makes a large difference in the medication most likely to be chosen. As an example, we struggled with overuse of an ineffective antibiotic treatment for urinary tract infections, so we simply dropped it further down the list. Again, making the right thing easy to do certainly helped. Similarly, with ordering radiology studies, too detailed a list or too few on the list and a provider may struggle to find the ideal choice. In our practice it's easier to order an ultrasound for screening for peripheral arterial disease when doing a simple blood pressure screening test would provide the same information. Simplistically, that balance of presenting enough information in a clear fashion within context represents good usability. That failing, providing the ability to switch out of task to gather needed information while holding your spot, would also help.

As an organization tasked with the system ... meaningful use EHRs we feel an obligation to our members to try and raise usability as an issue. As part of an academic institution we see the value of further research. In our regional extension center application we included the creation of a ... usability as part of the EHR adoption process, we've engaged researchers in a local usability firm to provide usability expertise and facilities, and are in the final stages of hiring a postdoctoral fellow to lead research efforts. I'll digress for a second and point out for researchers out there, we recognize that any time you do a study you often wish you had thought earlier to start collecting data earlier, and this is, I think, a unique opportunity to do so. We feel that clear documentation measurement of the most common usability issues across a variety of users and products conducted in a non-punitive manner would engage both healthcare providers and EHR vendors and bring objectivity to this important area.

Usability can be reliably measured, as many of the other panelists can readily attest, and measurement will be the first step to making improvements. I think it's important to recognize that despite usability concerns, EHRs are a tool that dramatically improves our ability as clinicians to provide high quality care and despite the concerns raised the current state is certainly a dramatic improvement over the past. It's the Office of the National Coordinator's position to bring together the broad participation necessary to make progress in developing safer and better authentic health records, and look forward to working with others with similar goals. Thanks.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Do any of you want to comment on my meaningful use question about whether or not it has either helped or hindered usability?

Abel Kho – Northwestern – Assistant Professor, General Internal Medicine

I have some thoughts about that. We certainly find that some of the aspects of meaningful use stage one are about structured data capture, and structured data capture is one huge complaint that clinicians certainly have in terms of their impact on time. We recognize the need for it. We recognize the need to be able to measure quality and do research that makes a lot of sense. But I think that there's certainly potential for there being a lot more back end extraction of data or ability to define data that does not put the burden on the clinician. ... a great step.

Nancy Stagers – University of Maryland – Professor of Informatics, School of Nursing

I'll comment to that. I'm a nurse and I work with the Alliance of Nursing Informatics. One of the things that we noticed in meaningful use is that it's focused on physicians. So that means that nurses do all the data entry, but they don't get the value that you see. I would like to suggest that we have a systematic way that we're changing systems. With regulatory mandates, what we find is piecemeal changes that

end up with system workarounds and instantiations that are inconsistent across vendors, so anything that you can do to help systematic consistent changes would be helpful.

Chantel Worzala – American Hospital Association – Sr. Associate Dir. of Policy

I would certainly echo the tension between structured data, which is valuable, and the time that it takes to get that structured data into the record. With regard to hospital meaningful use objectives, the one that I hear about most in terms of its impact is the quality reporting. Most of the data needed to calculate the quality measures are not put into the electronic form in structured format as a course of care delivery. This is all something that needs to go back and be input specifically for the measure calculation. I hope that as we move forward with meaningful use we can find better ways to match the clinical quality metrics to the data that's captured during the clinical flow.

Stanley Wainapel – Montefiore Medical Center – Clinical Director, Rehabilitation Medicine

I would echo that also. I've been in practice long enough to remember when there was just a plain old fever chart at the foot of the bed. It showed a very useful and graphic record of what was going on in real time, and that's the sort of thing where if you are getting one point in time with a huge amount of information, if you don't have the whole picture you may lose the forest for the trees.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Any questions? Bill?

William Munier – AHRQ/HHS – Director CQIPS

I just want to make a comment, if I could. Is that allowed?

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Yes, sure.

William Munier – AHRQ/HHS – Director CQIPS

To your point about the meaningful use and whether that helps or hurts usability and it goes to the point of structured data versus non-structured data, and there isn't a one to one relationship in my view between structured data equals more time for data entry and unstructured doesn't. I think it's how you do it. A lot of the issues that we're talking about have to do with how well software developers have actually done the electronic health record and how well they haven't done it. So it's very complicated. Now, actually, if I have the opportunity later I might make a few further comments about that. This is a very, very important, but highly complex issue.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

David?

David McCallie – Cerner Corporation – Vice President of Medical Informatics

The question of structured data for measures, you mentioned and talked about the tensions there. I was a little surprised that no one mentioned the issue of data capture that's designed for the billing process as opposed to the clinical care process. We certainly get complaints about the complexity of documentation, particularly provider documentation, where you're in some ways paid for the volume of the documentation. The tool is designed to optimize the volume of documentation rather than to capture the essence of what's going on with the patient, and I'm curious to know if that's something you've experienced in your users. That's an open-ended question for any of you.

Abel Kho – Northwestern – Assistant Professor, General Internal Medicine

Certainly that's true. I think that as a product that many people do for a return on investment, I think they look to the product to be able to be efficient, and that's one of the complaints they have, they see that struggle between well, I've purchased, I'm going to build better, faster. When they see the documentation start taking more time, there's a tension there again. But I think to your point, it certainly can be a useful tool for improving the billing process. But again, capturing the clinical observations that happen is just not that well done, simply because you just can't put everything into a template. The world is just not that clear. When people come into your clinic, they have all sorts of strange off the wall things and you're not

going to find a quick one for that. So I think the prior point is a complex issue.

There are instances where structured data capture did do wonderful, you can click a box and you can capture the essence of an upper respiratory tract infection, and other instances where there's no way that you'll find any check boxes that will do anything remotely to what the person came in with. That's the kind of thing that I think we probably need to tease out, because with usability there are issues that are design issues that are likely, but there are clearly also time to implement issues, and we see that all the time too. So doctors may not always use the product as well as they could, and we recognize that sometimes it's a training issue. But teasing all that out is the tricky part, and that's what we'd be interested to find out more, how do you objectify what really impacts on the workflow.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Thank you. Those are tremendous testimonies, so thank you very much. I've seen systems that are incredibly complex, menu driven, lots of structured data, but when people are familiar with it, so it's a training issue and a period of time issue, they're incredibly fast, I mean, faster than anything that you could do with a GUI click with the icons and everything that goes through that. I guess my question is one generally for all of you around the issue of training. What kind of expectation should be out there around training? Because again we could build something very sexy and nice but it may not ultimately be as fast as something that was built for speed but takes more training to get people up to speed.

Chantel Worzala – American Hospital Association – Sr. Associate Dir. of Policy

I guess I'll take that one. I do think there's a balance between training and the system complexity, but underlying that is designing for workflow for particular providers. Right now, we're stronger in design for physicians, although the physicians in the audience might disagree with that, and we've had less emphasis on some other groups like nurses and pharmacy, OT, PT, so for them you end up training more heavily just so that they can understand how to do their workflow. I would say that our tools are complex enough that the expectation to have no training and to be intuitive is probably unrealistic, so there just needs to be a balance.

Abel Kho – Northwestern – Assistant Professor, General Internal Medicine

I do also think that training is geared toward non-users and so there needs to be ongoing training. You oftentimes see folks have rapid decay. The product is dynamic too, it's constantly changing, and you can't expect that what you learned a year ago is going to still, we get board certification every ten years or however many years, and you can't expect that what you've learned on EHR today is going to still apply ten years from now. I think ongoing training is really important as well.

Stanley Wainapel – Montefiore Medical Center – Clinical Director, Rehabilitation Medicine

I would agree with that. I would also say that in a hospital like ours every year you're supposed to review fire safety, infection control, and things like this, and I see no reason why if you have IC why you shouldn't be having IT as part of what you have to review on a yearly basis.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Go ahead, Carl.

Carl Dvorak – Epic Systems – EVP

... question—oh, go ahead,

Nancy Stagers – University of Maryland – Professor of Informatics, School of Nursing

I just wanted to add that it's not just the training of course, it's the support availability as well, and having someone to call on when there's a problem who's right there and can talk you through it.

M

I'll take a moment too to second David's observation. We work with ... but we notice a dramatically different charting technique. It's very concise, very to the point, and I think we've been the frogs in the boiling pot with regard to regulatory level of service and the coding requirements that come with the reimbursement rules.

Stan, we have a question for you, you commented on, I think Java being problematic sometimes with the screen readers, and I think you also commented on what I think was the new Doc X format from Microsoft not working with the screen readers. Are you seeing different screen reader technology emerging to keep up with the rapidly changing Web environment and the changing tools, like iPads and things like that? Or, are screen reader technologies slipping further and further behind?

Stanley Wainapel – Montefiore Medical Center – Clinical Director, Rehabilitation Medicine

I think that it has gotten better over time as different iterations of some different screen reader software, obviously I have no financial interest in any of this so I'm not going to mention it by name necessarily, but yes, if you get the updated screen reading software it does work better. They have tried to work with some of the more difficult issues, like, for example, the GUIs are a real problem. I know I am icon phobic, and the last thing I want to see is an icon or have to deal with is an icon because we have lots more trouble with that. But there is constant work on it because the goal is of course to make not just electronic health records but all sorts of technology, the Internet, etc., very much available for people with vision impairments.

Chantel Worzala – American Hospital Association – Sr. Associate Dir. of Policy

To me most of the issues you've raised have to do with the EMR as implemented, not with the EMR out of the box. I'm wondering if you have any recommendations about how EMRs as implemented could be assessed, usability could be assessed in the field? Abel, you mentioned that your REC is actually going to be assessing usability, and I thought that might be one aspect of it.

Abel Kho – Northwestern – Assistant Professor, General Internal Medicine

I think that's actually key. I think that that's right, we need to tease out the different aspects, which are affecting the workflows essentially. Some of it is training. There are things, I think Nancy mentioned it, around icon standardization is something that certainly could be a very helpful thing for people who work across multiple products, which people do, but I think guidance around how you would implement products I think would be helpful. Some of it does require ongoing support, so when you get the thing out of the box I think that that has to be customized oftentimes for an individual provider, and what's good for one guy is not going to be good for another person, so we recognize that. But I think until we get into the clinic and do track things like in situ what's going on in the workflow, what are the sticking points, maybe measuring things like clicks, etc., that certainly may help. But I think we do need to do a better job and tease out what are really design issues versus what's an implementation issue, and I don't have a clear answer for that yet.

Nancy Stagers – University of Maryland – Professor of Informatics, School of Nursing

I just have a couple of thoughts on that. One is that I think the organizations need to be more aware of usability, and usability is a partnership between the vendor and the institution. HIMSS just put out a white paper on promoting usability in organizations that might be helpful in that. So I think organizational awareness is one.

The other is to concentrate on critical aspects of the EHR, kind of that acid test, like the shift reports and handoffs among physicians, the electronic medication administration record and things that are tough to do. For example, in inpatient institutions typically any chemo is still on paper because it's been too complex to put electronically. So concentrating on the kind of acid test for usability would be good. Looking for consistency, doing heuristic evaluations of implemented systems is also very enlightening.

Chantel Worzala – American Hospital Association – Sr. Associate Dir. of Policy

Usability is both about metrics, but it's also about process, so what are the processes that the vendors and those who have implemented products put into place to improve usability, because it is that feedback and testing it for one person and testing it for another. Some of the hospitals I got feedback from do in fact have formal usability labs where they do their own very formal usability testing of following clinicians around and measuring the time that it takes to do tasks and workflow. I think as we talk through usability and how to improve usability, it's both metrics but also process, what are the processes that can be deployed both by vendors and by those who implement to improve usability.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Larry?

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

There are lots of really good comments here, guys. This is a great discussion and I'm glad that we're starting to stay with the grounding and what's actually happening. Workflow has sort of become one of those words that gets used for everything, sort of like we found our hammer and we're out chasing nails, but you've raised another piece which is sort of the cognitive piece. I'm wondering if in fact that's an equally big part of the problem and we should actually start thinking about thinking and how the information that's presented is helpful or not helpful for making a decision. And maybe counting clicks is not really the best way to figure out if the information actually was presented well. So, comments about the cognitive load issues and how to think about that, good things, bad things.

Chantel Worzala – American Hospital Association – Sr. Associate Dir. of Policy

I think cognitive burden actually is a severe problem with usability. ... published a paper in 2009 that has a different kind of title, "Computational Technologies," but really the underlying premise is that the cognitive load is too large. I would applaud you for starting at the point where clinicians think and do work and how much cognitive burden is there, what data do you need to make these decisions. As Abel talked about, just ordering a ... kinds of things that you need to pull together and making screens that actually pull those data together using graphical capabilities so that the human mind can quickly detect patterns is much easier, as humans are not good at discrete data. But the pattern recognition would be important, so that sounds like a fine place to start to me.

Abel Kho – Northwestern – Assistant Professor, General Internal Medicine

I think that you'll probably hear later on from a number of the panelists who have done quite a lot of work I think in this area of trying to identify what clinicians are thinking through. I think I've seen it recorded as either through iTracking or sort of a speak out loud as they're doing tasking and pick out what is going through your mind. I think that's clearly an important part to measure and there are ways of doing so.

Stanley Wainapel – Montefiore Medical Center – Clinical Director, Rehabilitation Medicine

I think that one of the big bugaboos for many physicians previously and today, is the fact that you are basically mostly reimbursed for technical things and you're not reimbursed for cognitive work. So the last thing you want to do to be efficient, to maintain your ability to make a decent living is to make the cognitive burden even greater.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

We have four people waiting to ask questions, so if we can answer them briefly because we only have 15 minutes left, that would be great. Jodi?

Jodi Daniel – ONC – Director Office of Policy & Research

Quickly, Nancy Stagers, you mentioned about looking at usability from the perspective of all users, not just physician users to be able to find critical data, and then I heard Christine Sinsky mention the concern about clutter and too much information. I'm wondering what recommendations you have about how you maximize usability for a variety of users without impairing usability for particular users, the doctors, in this case.

Nancy Stagers – University of Maryland – Professor of Informatics, School of Nursing

Let me clarify those remarks. When I said that you need to have, say, team based care, it would be designed for specific context with specific tasks. So the screens would be designed for those folks, rather than trying to be everything to everybody, and then you'd also design for specific workflows, there's that word again, and provider views. So you actually would reduce the clutter now, rather than trying to be all things to all people.

Jodi Daniel – ONC – Director Office of Policy & Research

... definitely have different views for different users—

Nancy Stagers – University of Maryland – Professor of Informatics, School of Nursing

As they—

Jodi Daniel – ONC – Director Office of Policy & Research

... have the information ... into their workflow.

Nancy Stagers – University of Maryland – Professor of Informatics, School of Nursing

Right, because there's the core set of data that all clinicians probably need to know, like is the patient NPO, what are the allergies, and what are current meds, but then there are specific pieces of data information that different care providers would need to know. So you need to tailor those needs to those and to the tasks that they're doing at the time.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Adam?

Adam Clark – FasterCures – Director, Scientific & Federal Affairs

This is really open to any of the panelists, it's going to be a rather broad question, and I asked Christine the same thing, more your perceptions on the usability with patient engagement. It's a critical component of meaningful use, where are we, where are the gaps, what can be improved? Anyone can answer.

Abel Kho – Northwestern – Assistant Professor, General Internal Medicine

I certainly think that that's important, and patients may be one of the better resources for really teasing out what's usable. We all use technology in every other aspect of our life, and patients do too, but they don't have the tunnel vision that we may have as providers. They may be able to bring in a fresh perspective and say, hey, well, I can do this and I'd love to be able to do this in the product, and that's, I think, a refreshing sort of perspective. I think that's an important aspect. I think we're still not there in terms of actually providing all of this information back to the patients, but now that the ... are thinking about having a study—

Adam Clark – FasterCures – Director, Scientific & Federal Affairs

Is that on the vendor end for functionality to be built in then?

Abel Kho – Northwestern – Assistant Professor, General Internal Medicine

I think many of the vendors do have patient-facing portals, but they're all implemented differently. Some sites have different comfort levels in rolling it out and providing functionality to patients. But we do think it's an important area and one of our researchers is actually looking specifically into that aspect of what's a functional system for patients and why would they use it or not use it.

Stanley Wainapel – Montefiore Medical Center – Clinical Director, Rehabilitation Medicine

I was just going to say that just remember that there may be not as many physicians who have disabilities, but there are an awful lot of patients with disabilities, and any way that this is going to be functional for them it has to consider things. So, for example, if there's something that you want to give them and they have to be in large print, Braille, it might have to be done in different ways to make sure that it's accessible to them as well.

Chantel Worzala – American Hospital Association – Sr. Associate Dir. of Policy

I think the patient is the key stakeholder. Just please remember that current personal health records that we've developed now require a lot of personal data entry, so it's a barrier to, say, older patients, for instance, and those who just don't have the time or the motivation to enter a lot of data. I had a personal experience with one personal health record that's connected to the EHR, and while it's really good, everything has to be released by the provider, so you just find incomplete information, so you might consider that.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Scott?

Scott White – 1199 SEIU – Assistant Director & Technology Project Director

Good morning, all, and thank you very much for your testimony. As a person who represents healthcare workers I hear almost the exact same complaints, and I'm also conflicted with, is this just providers participating in their own systems, that they don't work for us? Or, is there some other solution that—and not to blame the vendors and all, but it seems like we keep talking about there's too much of this or not enough of that. It doesn't work for me. Are we not including those who are using them in these decisions and would that be a recommendation to go to the ground, as Larry was talking about? Because I can't get my mind around everybody says all the problems, the problems, but yet, as Chantel said, I don't want to go back. So where's the solution? Is it a better product? Or, is it simply provide more staff to work around or work through those problems? Anybody can comment.

Nancy Stagers – University of Maryland – Professor of Informatics, School of Nursing

I'll take that one. I think it's a blend of problems. I think it's unfair that we blame the vendors for all of the issues as really we're fairly young in the development of electronic health records. I do think, though, that one of the reports from AHRQ about a vendor survey on usability was very enlightening and that was many vendors don't include usability principles and practices in their development processes. That is something that could change. In the end, again, it's a partnership between the institution and the vendors, so you could have the exact same system that's implemented quite differently in a different setting and be an abysmal failure, or be targeted to the wrong area. For instance, many times we buy acute care systems and then we stuff them into labor and delivery and expect the folks in labor and delivery to use acute care systems when it doesn't fit the workflow. So I guess I would plead for principles and practices of usability being incorporated into development. We can do some things on the back end, but it's best to start early and often with usability.

Chantel Worzala – American Hospital Association – Sr. Associate Dir. of Policy

I think it actually goes back to that quote from Thomas Edison, we're in that 99% perspiration right now and it is iterative and it's consultative and there is a usability science that needs to be leveraged and deployed, and it's those processes, in addition to specific measures, that I think will keep us moving forward.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

David?

David McCallie – Cerner Corporation – Vice President of Medical Informatics

My question is going to be ill-formed because I'm not exactly sure how to ask it, but the observation that I've made in listening to you today and in hearing the issues about usability from our customers and reading about usability in general is that there are trade-offs that you have to make. We've heard stressed that there should be better and more aggressive use of icons and standardization of icons and visualizations, and we've also heard testimony that icons are really hard and get in the way and visualizations that can't be read by the text reader are a problem and should be minimized. We've heard testimony that there's too much white space and then heard testimony that there's too much clutter. I wonder, is it possible to design a system that works for everybody? In other words, is usability something that is an abstraction, that can be set that everyone will agree is usable or do we end up building systems that have just different user interfaces for different users and that really one size can't fit all? What's the trade-off? What would be your advice back to the vendor community?

Stanley Wainapel – Montefiore Medical Center – Clinical Director, Rehabilitation Medicine

I would probably say from the point of view of people with disabilities it's sort of like a universal design that they have for kitchen equipment, that it's something that works for a lot of different people. Unquestionably, you have to reach some sort of consensus and in consensus nobody is entirely happy. I mean, just look at Congress. But in reaching that consensus you want to make at least as widely accessible as possible and probably people are going to have to do things a little bit differently in different situations. The first issue is that it has to be that you've got to have records that reflect the status of a patient and then the provider needs to be able to access what they can. If they have to do it a little bit differently in each situation, well, that may be.

Chantel Worzala – American Hospital Association – Sr. Associate Dir. of Policy

In usability we think about the user, so case stakeholders, we think about the context, we think about the particular tasks that they're doing. So I agree that some things can be standard, for instance, perhaps we could have a library of healthcare icons, but then there has to be tailoring, either adaptive user interfaces or user interfaces that are tailored to a specific task. For example, a surgeon and an OB guy just are not going to have the same workflow, so we absolutely have to tailor it for those folks. I guess I would argue more on the line of tailoring with a blend of consistency. For instance, in the electronic medication administration records too much white space really is a patient safety problem, where in, say, a primary care setting a lot of data on a screen actually might be exactly the opposite and you'd want to just pare it down to the essentials.

Abel Kho – Northwestern – Assistant Professor, General Internal Medicine

I think that's the kind of key information we need to start gathering. I think we're at an adoption rate of here we're going to here, the data is going to tell us that, will help us answer that question. I think the market will help us as well. I think the market is not going to look like this in five years. It will change. I think providers will with their feet and their pocketbooks and I think we'll see what really is most important to them. Maybe usability is or is not important. ... will tell us.

Stanley Wainapel – Montefiore Medical Center – Clinical Director, Rehabilitation Medicine

Just one comment on that, the notion of paring down a screen is an implicit or hidden form of decision support. The developers that I work with are anxious to display only the data that's necessary, but deciding what data is in fact necessary requires tremendous clinical knowledge that, frankly, most systems don't possess at this point. So there is a decision support issue that's tied quite in with usability, although it's below the surface.

Nancy Stagers – University of Maryland – Professor of Informatics, School of Nursing

... can do some things like display major categories and then if they want more information, then they can access it. For instance, if you have a nurse who's coming on shift who cared for a patient in the past, they wouldn't need to know all of the details of the history and why the patient's in the hospital. They just need to know what happened. So if you had a category that said history that you could just forego clicking on, for instance, that would help.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Chuck?

Chuck Friedman—ONC—Deputy National Coordinator

Thank you all for your testimony, and many, many excellent ideas and concepts were raised this morning. To put a little more focus—that would be very helpful to me. Let me ask you all the following question from the provider perspective. If you rubbed a lamp and the usability genie appeared and would grant you one wish with regard to usability, what would your wish be?

Abel Kho – Northwestern – Assistant Professor, General Internal Medicine

Stream line it.

Chantel Worzala – American Hospital Association – Sr. Associate Dir. of Policy

I think it's—and this is cheating, but it's the speed and accuracy.

Nancy Stagers – University of Maryland – Professor of Informatics, School of Nursing

I'd say incorporate usability principles and practices in organizations and vendors.

Stanley Wainapel – Montefiore Medical Center – Clinical Director, Rehabilitation Medicine

Easily customize user interface.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Carl?

Carl Dvorak – Epic Systems – EVP

We should have ... my question first now. Christine earlier commented on hardware issues. In particular, she commented on larger screens. As I go through hospitals today, I notice a lot of people working on laptops on carts with very small screens. Is that a comment that Christine made that you would agree with? Do you see it differently? What's your take on the general form factor in healthcare today with regard to EHRs?

Stanley Wainapel – Montefiore Medical Center – Clinical Director, Rehabilitation Medicine

I guess, there's certainly limits. Within a range, it's probably going to be fine for most users, like that 90% rule. For those who were using the Palm Pilot before, that clearly didn't work for tracking all your patients, but you're talking 17 inches versus 27. That's going to be a personal decision. When we moved screens to large screens, actually, I struggled with it initially because suddenly I'm like watching a tennis match. It was just too much space, but again, everyone's a little different. So, I think that people will again vote with their pockets and pick what they want.

Nancy Stagers – University of Maryland – Professor of Informatics, School of Nursing

I think it depends on the task. If you're sitting and working with a patient in a clinic, a larger screen would make sense. If you're a nurse making rounds, bedside rounds and doing change-of-shift report, a mobile device is what you need. But not a mobile device like a smartphone, it's a little too small. Maybe an iPad's just a little too big. So, whatever the device is, it needs to fit the task.

Abel Kho – Northwestern – Assistant Professor, General Internal Medicine

That is one thing that I've noticed is that in that in places where it's capable, we see the doctors put the large screens horizontal so they can see multiple flow sheet entries. We see the nurses flip them portrait mode because they need to enter 25 different attributes about that patient on the flow sheet so that's interesting comment you made as well.

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Well, you've been a spectacular panel. Thank you very, very much.

(Two minutes dead air)

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

I'd like to welcome our second panel. It's great to have you folks here with us this morning. I'm on but the room's not on. Okay, so it's great to be starting here with our second panel. We've made some great progress. We seem to have a lot of noise picked up in the sound system though too. So, we're switching here from a clinician perspective to the person at the center of the care, the patient and maybe even that's problematic because we have a metaphor of healthcare versus health. So, have at it with us.

Let's start with Beth Morrow and go ahead.

Beth Morrow – The Children's Partnership – Staff Attorney

Hello. I'm Beth Morrow. I'm with The Children's Partnership, and we are a children's advocacy organization that has focused on trying to make sure that the value of health information technology accrues to children and that it's developed and designed in a way that meets their unique needs. We are really grateful that you are involving the consumer perspective in this discussion. It's very important.

I thought first I would talk to the issue of—as a parent patient, the issue of the EHRs usability to the pediatric provider is essential. Even though it's really partially the pediatrician and pediatric provider perspective, it's also from the consumer's perspective that unless that physician can use the record to do the tasks necessary, they really can't provide optimal care. The example that came to mind, right off the bat, is the fact that generally an EHR doesn't really help a pediatric provider figure out the correct dosage of medicine for the child because it doesn't really reflect the age, weight dependent nature so they have to pull out a pocket calculator. This has come up as an example of sort of how out of whack the electronic records often are for pediatric use. I did want to highlight that the CHIPRA model pediatric

electronic medical record format that's being developed will help push those records towards being more usable but of course won't resolve all these issues that came up in the last panel.

In addition to that side of the picture, we really see the great opportunity for these systems to improve the doctor/patient relationship, and the relationship with the whole care team, which with respect to children, often includes both clinical and nonclinical caregivers and parents being the essential caregiver in that dynamic. Some examples of features in an electronic health record that add to the usability by enhancing this partnership are things like giving clear, viewable information through a parent specific view of the record that the provider and the parent can sit and discuss. That can often help a parent identify problems and be a strategic partner in figuring out where to go with care. They also can provide decision making tools and opportunities to have a conversation that can be really important to figuring out how to resolve issues and move forward, and then there can be tools that feed into the record from home, remote monitoring tools and other things that communicate important data from the family to the provider. Wanted to mention that parents of young children are ideal partners in this dynamic because they are eager to participate in this process, and they're also looking for information, and so it's a great way to build a lifelong involvement in care using the electronic medical record systems.

You asked specifically about safety. We believe that these tools can both improve safety and improve a parent's sense of safety and trust because consumers understand that the information in the system is really important to their safety. That when they're involved in making sure that that information is as good, complete and accurate as possible, that they can really have an impact on their own safety. So there are many tools like pre-visit screenings and questionnaires, opportunities for a family to look at the data and flag problems or add details that are missing, that are very important. As well as putting timely information into the consumer's hand, which they can then use when they're out in the world where there might not be perfect health information exchange, where they might have a caregiver that is not attached in any way to their records.

The last point I'll make, as I run out of my five minutes is that, you ask what's the biggest thing that's missing, and it's the most obvious. Just having enough rich information data in the system to really inform the care, both it impacts the provider's ability to do their job but it also really affects the family's ability to manage their own care. So, there's the consumer facing side and the provider's facing side of that dynamic, but it's essential to resolving this issue, and until these systems are truly usable, the data's not going to flow.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

So, next up we have, as he describes himself, E-patient Dave. Welcome.

Dave deBronkart – Society of Participatory Medicine – Cochair

Yes. My real name, this is Dave deBronkart, and I'm here as somebody who had an intense encounter with the healthcare system four years ago when I found out that I was almost dead from cancer, miraculous recovery. My hospital, Beth Israel Deaconess, has a homegrown medical record system that in some ways is great and in other ways exactly reflects the fact that it was designed in 1999 and hasn't been upgraded since. I can access my medical records from home, small parts of it. On the other hand, I'm involved on one of the participants in the Robert Ward Johnson open notes project, where I can see my primary's visit notes, so I'm sort of on the cusp, the leading edge of the wave if you will, of the chain to patients and families being actively involved with their medical records. My primary physician Danny Sands is one of these people who will turn the monitor so that as he enters things during a visit, it's a shared record that we're creating.

Having said that, I also approach this discussion as somebody who's been involved with data and computerized workflows for my whole career. Before I got deeply interested in healthcare, I was involved, for instance 30 years ago, in computerizing the newspaper industry. Going from the world where reporters would type things on typewriters and copy boys, as they were called, would carry things from basket to basket. I'll tell you that was hell getting that industry to computerize. People who have developed tremendous skill and expertise out of all of the ways that a newspaper page would be put together, every day under tight deadlines and a thou shall not miss environment, there was no such thing

as being a couple days late with the daily newspaper. It's funny because it was necessary to respect the skills and workflow in that industry. It took a full generation, a full 30 years, for people who were expert in the old way to age out of the system and a new generation of people to come up not objecting to computers from the beginning.

My written testimony was submitted late, just yesterday afternoon, because I came off a big travel blast, so I apologize for that, but I want to emphasize one thing in particular for this committee as we do the work of regulating in a way that supports achieving what's possible with health IT. I'm very concerned that on some of the medical and health IT blogs I've seen, there are truly ignorant attitudes or views being expressed about what we should expect of health IT. There were two things recently that I describe in my testimony. One was the stunned realization that EMRs perpetuate false information. Like oh my God, you put something wrong into the computer, and it's going to be there later. Well, for heaven's sake, we had the same problem a few millennia ago when writing was invented. But it reflects the culture change that we need to do because I'll tell you, I also see a whole lot of people on blogs bitching and moaning about the fact that these systems are so hard to use and they're never going to work and see I told you computers stink. So, we need to manage the expectations for what a computer can and cannot do.

The other was an article in the *Archives of Internal Medicine, Venerable Journal* saying that Stanford researchers had determined that EMRs do not improve quality of care. Now, since this entire initiative has been sold to the public under the goal of better care for your family, that's a nasty accusation. It turns out that all they evaluated was whether the physicians correctly prescribed what they were supposed to. I don't see, if you've got physicians who are largely prescribing the wrong thing, I don't see how installing a computer can fix that. So, it's a significant perception issue, and I'll do anything I can to help with that. I've only got one blog but just to wrap up, the data quality matters, I know you all know that, but this is important. I was aghast when I read the OIG report in November that says 15,000 accidental killings of elders, Medicare patients per month, we've got to do everything we can to overcome this. It's an emergency. Workflow matters because it affects data quality. I also don't want the doctors and nurses who care for me to be miserable in their work.

As a suggestion for vendors, I know there's a big change that's got to be made, maybe you can open up an API, turn yourself into an ecosystem where third parties can develop plug ins that might let them develop, at no cost to you, that are ways of capturing data. My time's up. Thank you.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

So, thank you Dave. Jenifer Simpson, you're up next.

Jenifer Simpson – AAPD – Senior Director, Telecommunications and Technology Policy

Good morning, I'm Jenifer Simpson from the American Association of People with Disabilities. We're the nation's largest independent disability organization, and we work in many different areas but mostly we focus on the civil rights of people with disabilities. We are starting to get concerned, obviously, about health information technology and how our community of people with disabilities understands and knows about it. We were disappointed to find there aren't too many studies or much work being done on the usability and accessibility issues of people with disabilities because accessibility is a component of usability. You can make something usable, it might not be accessible. You can make something accessible, it might not be usable. So, we do make that distinction and we encourage the community to think about that further. I think Dr. Wayne ... actually drew some attention to some of those examples that we're quite familiar with in our world.

One of the things I did put in my testimony because we decided to take this on a little bit ourselves, was to do our own study of this issue. We obviously went in the direction of personal health records, which is the way we understand consumers are going to understand electronic health records. It's going to be at their end, what they will have. So we decided since no one else had done it as far as we could tell, our own study, and we did that a couple years ago. We found out a couple of interesting things about this, that people with disabilities are very interested and find PHRs to be very valuable in terms of medical care coordination, but they remain very cautious about how their information would be used specifically by government agencies. We're not sure why that is. We think more research needs to be done about that,

but in so far as people with disabilities are often high users of healthcare, SSI beneficiaries, SSDI beneficiaries, we think that's a very important finding that needs to be explored further. We also saw that there were a lot of benefits that people see to this and the kind of information that they would want. People with disabilities are frequent and sometimes are more interactions with the healthcare system than others, multiple providers. They may have had bad experiences, all kinds of different things. So, their relationship with their healthcare provider is very critical.

They talked about how it would be helpful in dealing with multiple providers, how having a personal health record would be helpful in transporting records from one provider to another in coordination of care and particularly about medications among multiple providers and accessing their own medical history particularly in emergency situations. They also mentioned the desire to have much more information about their own medical history, and they believed it would enable them to provide more accurate medical histories to their providers and to make more informed decisions on their own if they had actually much more access to more information. They were also interested in features such as the ability to refill prescriptions, to view laboratory results and the ability to store and retrieve records easily and the ability to schedule appointments and coordinate care. So just from that perspective, I think those are the kinds of information that a consumer is really looking at when they start to say, "How am I going to interact with the electronic records that everyone else has?"

Obviously, privacy, security issues came up as did accessibility. People are very much afraid of their records being misused, used improperly, people looking at them incorrectly. Our community in particular has experienced discrimination based on disability, so obviously, our community is hyper about this one, and we would expect those kind of standards to be very tight. As one person said, "I want my information to be as secure and private as my banking records." In regard to accessibility and usability, everybody said the same thing to which half of our respondents in the survey that we did talked about this, that they expected them to be accessible and usable, and they didn't want to have to go buy expensive additional equipment or add-ons in order to do work arounds, to get to the information. I think that's a very important piece of information in terms of what we mean by usability in our community.

We also have some additional recommendations that we put in our statement but we did come across the fact that our community believes their information belongs to them. They believe they have ownership of it, and they want to control and know who has access to it. So literally from their perspective, it's about what everyone else has with my information and what you're going to do with it. So, we have recommendations in terms of how to segment that, having high standards for security, tracking, who has the ability to look at the information. We're also looking at it too from the perspective, ADD, from the other users of the system, the employees of the providers who may have accessibility and usability needs. And I'm very glad to have heard that point brought up several times already because this is something that we're also concerned about because we don't want to see anybody losing their job because the health IT system, the EHR, the PHR, whatever is not usable by the widest range of users. Thank you.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Thank you Jenifer. So, Eva Powell.

Eva Powell – National Partnership for Women & Families – Director IT

I'm Eva Powell the Director of Health IT programs at the National Partnership for Women & Families, and as part of my role there, I lead the consumer partnership for eHealth, the consumer coalition of which my esteemed colleagues here on the panel are all a part. I think it's important first of all, to be clear about the differences between the usability of an EHR, which is primarily a provider issue and the usability of information that comes from the EHR, which is both a patient and a provider issue and about whether that information is used in ways that are meaningful to patients. Usability from a consumer perspective is the degree to which it enables effective collaboration between patients and providers to make better healthcare decisions. To that end, it must help support patients and their care givers in the roles they play in healthcare, including patient workflows.

Patients and their caregivers play four distinct roles in partnership with their providers—acting as agents of change by being vocal about priorities and goals and by giving feedback on their experience of the

care. Acting as informed decision makers at numerous points when interacting with the healthcare system, many of which occur before they ever see a provider; verifying facts and providing necessary context for ensuring the care they receive is right for them. Most importantly—and this is critical to meeting the goals of the National Quality Strategy—integrating health and healthcare into the full context of their lives. Health IT must provide the information and support patients need to be successful in these roles. For effective self-management, patients, like providers, need information to be available at the point in decision making, whether that involves taking a medication, considering a complex, invasive procedure or making changes to their diet or activity. From a clinical setting, information sharing provides a unique opportunity for patients to ask questions, for clinicians to access understanding and for patients and providers to work together to resolve identified issues. It also creates an opportunity to identify errors in the medical record and make revisions.

The patients spend the vast majority of their time outside of clinical settings, so information must be just as readily available to them when they are at home or on the go. Research shows that patients remember as little as 11% of what is told to them in the course of the clinical encounter, so real-time access to discharge summaries, care summaries and educational resources is essential to the success of any care plan. The information must be easy to understand, portable and available in common languages. Making information available to patients and their caregivers in both the clinical setting and in real-time from outside the clinical setting is essential to fostering and maintaining the relationship between patient and provider, and it's really hard to imagine how the goals of the National Quality Strategy will ever be met without this longitudinal, collaborative approach to care. Features that meet patient information needs during the process of seeking and obtaining care include appointment scheduling, prescription refills, access to test results, secure messaging with the providers, an ability to pay bills, portability and full access to health information provide transparency and choice. Collectively, these functionalities support patients' workflows, and, therefore, support their engagement and partnership with their providers.

The usability of health IT to support self-management beyond the walls of the traditional healthcare system has significant implications for the effectiveness of care, as well as good stewardship of our healthcare resources. For example, Group Health Cooperative in Washington State found in its medical home pilot that staff exhibited less burn-out and patients had 29% fewer emergency visits and 6% fewer office visits than patients served by nonparticipating clinics. But the use of secure messaging among pilot clinic patients was 80% higher than other patients, and that suggests that it's possible to decrease utilization and ultimately cost and increase communication if technology is employed effectively and in the context of redesigned care processes and workflows.

Usability of technology depends also on office design and placement of the technology. Systems should be set up in such a way that they're not a physical barrier between patients and their providers but rather a central focus of both patient and provider attention. This promotes the transparency and collaborative process that I've described, by enabling both provider and patient to see information, especially in visual format, and as well, is to discuss it relative to health and outcome goals. So, patient input including the assessment of their information needs and how they're using information provided to them should be included in the design of systems.

To my knowledge, there are no public opinion surveys that address consumer beliefs about the safety of health IT but I do know that according to responses to our field research with patients and consumers, that health IT plays an important role in improving safety by addressing problems with communication and coordination. Of course, the systems themselves have to be safe. When health IT is used as I've described, it can also contribute to safety by opening up conversation that might reveal information or trigger questions a clinician might not otherwise ask but that, nonetheless, has significant impact on care.

In conclusion, the best way to improve usability of health IT is to shift away from the notion that health IT used in provider settings should be designed exclusively for provider purposes. Rather, it should be designed and implemented in ways that support effective partnerships between patients and their providers. Thank you.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Well thank you all for your testimony here, a really great grasp of information. I think I'm hearing this theme of it's all about the information. It's easy to get wrapped up in specific technologies or things the system does or doesn't do. But I'm hearing a lot of emphasis on exact information, getting the information right, communicating it to all members of the care team, especially to the patient, and in fact leveraging the interaction between the patient and the healthcare system to get the information right and to make it effective. So, those seem like really important messages to bring to us.

I also heard some more comments that struck me that this notion of universal design, that we sort of have this push pull of we need to tailor the information on how the systems work to the specific roles that people have and how they use them and the information that they're looking for. But, we also need to be looking towards kind of the universal design sense of, this needs to be accessible to everybody, and we need to start to develop techniques that really enable that. I think that's probably a big challenge in front of us.

Let me open it up to others who've got questions. Why don't we start here with Dave?

David McCallie – Cerner Corporation – Vice President of Medical Informatics

Several of you touched on this real IT and point about transferring of information between the provider and the patient. Just an open ended question that maybe elaborate further on the tradeoffs around translating, if you would, the clinical specifics into a more consumer friendly language or explanations, that I think the naïve assumption would be that the systems should kind of translate from doctor speak, if you would, into a less technical language. But my experience has been that in fact given the degree that patients now want to self-research and share information about their own illnesses, that in fact, they don't want any loss of precision in that transfer of medical knowledge between the providers' worlds, where the language can be quite arcane, and the consumer world. Could you comment on that tradeoff? Is it just a matter of providing both versions of the data or should there be a bias in the direction of simplifying or a bias in the direction of completeness?

Jenifer Simpson – AAPD – Senior Director, Telecommunications and Technology Policy

Let me talk about that just a little bit. We had heard a case of a deaf person getting results on a lab test, and the lab test results were negative, that was the answer. The deaf person really didn't know that negative meant that they were not ... problem. So, they thought they had a terrible problem. So basically, I'm thinking that what we'll need to have more explanation of what a result is, but it would have to be simple, obviously, plain language. I don't see any reason why a system can't have something that has that in it. If we access it, why can't we have a summary, a well-known kind of summary. Like you said, people are always going all over the internet looking for answers but in our community, we have much lower users of the internet. We have a much lower rate of computer users, much lower rate of broadband in the home, high speed broadband in the home, so you can't assume that people will do that. So, there has to be—and I think it's true in the elderly groups too. There has to be a way to get the information through the medical process itself.

Dave deBronkart – Society of Participatory Medicine – Cochair

One of my activities is I'm the volunteer co-chair of the Society for Participatory Medicine, which is about doctor patient partnership, and we've have a lot of them ... very active patients in our membership. I belong to ACOR.org, which is a community of cancer patients and yet, I have to be careful about being too much out in the stratosphere myself when the vast majority of people are not. So, I think the reality is that there need to be levels of complexity. Some people will want to turn on the full medical level of detail but others really want it simplified, like just tell me the bottom line. Some people are starting to move toward having an actual shared care plan during hospitalization. Abington Memorial Hospital has written a report to spit out every day the consumer level of detail, in consumer wording, for what the care plan is for that day. I'm sure there are people, my sister for instance, when my father was in his final illness, really wanted to see all the detail about what was going on in the hospital. Your question actually immediately prompted me to think about in most data systems, there's a layered design where you have a presentation layer where filtering like that can be applied. That might be something to consider. Again, from the vendor's perspective, if they were to provide an API where people could develop different

presentation routines for the data that's under the surface, that would let others take the innovation risks of maximizing the value.

Eva Powell – National Partnership for Women & Families – Director IT

I'll add to that. I go along with what Jenifer and Dave said. I tend to think of this as perhaps taking a similar approach to this issue as we take to privacy and security, in that you cannot achieve privacy and security through one method alone, that there has to be an array of methods based on fair information practices to address privacy and security. I think perhaps a similar approach to this is maybe called for in the sense of, like Dave talked about, levels of complexity. There's also the opportunity just to have simple links in the electronic medical record that then link to external sources that are trusted and then the whole concept of team based care. If the person gets information they don't understand and need to talk to their provider, then one of the key attributes of the proposed stage two requirements in our view, is secure patient messaging. That's another method of, "Hey I don't understand this lab result. Can somebody get back to me?" It does not have to be the physician. It can be a nurse practitioner, a nurse, someone who can answer the question, and so, that's the way I tend to view addressing that issue.

David McCallie – Cerner Corporation – Vice President of Medical Informatics

Thank you and thanks to each of you for taking the time and very interesting information. I like the concept of the patient provider partnership that most of you have mentioned, and I see a huge range, as Dave you were just saying, in what that relationship might be. I mean, if you have a sick child with some very complex illness, you're likely to be very in tune to that and want very specific information, and you're going to take the time to educate yourself with the provider through what that process is. That goes all the way up the span to, "I still don't know which cholesterol is the bad one, but I know I've got the right drug to take care of that, and that's good enough for me." What it brings up as a question of is, is anywhere someone starting to aggregate or list out the use cases from a consumer perspective so that whether it's developers or healthcare systems, we could address those use cases the best? I mean, they're infinite, I'm sure, but right now if you go to an ATM, they all pretty much do the same thing, because the consumers in finance defined what they wanted that use case to be.

Dave deBronkart – Society of Participatory Medicine – Cochair

In that particular case, there's also an infinitely smaller number of things you want to do.

David McCallie – Cerner Corporation – Vice President of Medical Informatics

Absolutely, don't want to minimize it. But is there anyone, starting to look at what the use cases might be and starting to aggregate those?

Eva Powell – National Partnership for Women & Families – Director IT

I wouldn't say articulating use cases. We at the national partnerships have articulated what are the primary frustrations that patients and their families encounter with the healthcare system, in terms of them taking an active role in their healthcare, and they generally boil down to lack of communication, lack of coordination. I think it's hard to make the use case sit consumer perspective only because like you said, there are infinite numbers of potential scenarios. Even with the exact same scenario, there are two individuals. There could be two individuals that approach the same scenario very differently. So I think rather than a use case approach, perhaps address things that support the roles that I talked about, in terms of having access to information to be agents of change. I think this links up well with provider workflow differences as well. If you're in labor and delivery as opposed to a surgeon, you've got totally different workflows, but how can those different providers work with their patients to come up with the right set of tools to help them work in partnership?

David McCallie – Cerner Corporation – Vice President of Medical Informatics

So, perhaps it's me as a techie, that has a hard time getting my hand around it. The computers do specific things that they're asked to do and that's why we drive to things like use cases. I do think they'd be helpful for developers to understand what specifically would a consumer like to see. We're not going to get to every use case, sorry for the term, but I think we could start knocking down some pretty big pillars if we really understood what the consumers were looking for. We're getting there even with you saw the pan on the floor with the providers, which I think we have a lot more to experience with, we're still

trying to knock that down to where it's a good interaction and something that's very useful to them. It's just a comment but if you have a comment back, that's fine.

Eva Powell – National Partnership for Women & Families – Director IT

I think to that point is, what are the specific activities and functionalities? I think starting where consumers are already familiar with using technology such as online appointment scheduling, filling prescriptions, access to test results, secure messaging, ability to pay bills, that's a great place to start. Then from there, we'll learn additional use cases, such as—and I think a big one that we've heard from all of us is the ability to actually accept patient contributed information is huge.

When I reflect on the previous panel and the difficulty with structured data, and understandably that's really difficult on a provider of workflow, and there's some data that will not be able to be entered by a patient, but there's a lot of data that can be entered by a patient. Why can't we use the patient as a partner to start entering data, absolve the clinician of having to do that? That's great for their workflow, and obviously they'll want to confirm the information through conversation while they're actually seeing their patient, but that then contributes to the relationship we've been talking about. So I think again, it comes to a lot of the functionalities that the providers have been talking about and then some of these specific ones that I've just mentioned and then learning how to do things differently and changing workflows. Some workflows we need to support. Some we need to change.

Dave deBronkart – Society of Participatory Medicine – Cochair

There's a method also in Website development. My last day job, I was responsible for my company's Website. Rather than trying to figure out everything in advance that somebody's going to want to do with a Website—I mean, you do want to go through that exercise of identifying those use cases, but then there are tricks you can do to capture historically just from records of what people do on the Website, where there seem to be problems. For instance, it shouldn't be complicated to write code that just records how long people spend doing a particular thing or if there's a help function you can very easily just transcribe what help questions people typed in, and that can be a key to where it would be useful to optimize.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

I have a usability comment next to David is Thank you.

M

So, a lot of interesting, new and I think very valuable workflow's been outlined for example incorporating URLs to heighten the patient education experience or reading data. I think one of the challenges on the clinical side is that we're still running a lot of payment through the E/M codes and all the things you suggested have no codes, no payment mechanisms, and doctors who are fundamentally paid only if they somehow capture an E/M code. You could sort of in some abstract world, imagine the doc sitting there at the computer and never getting paid because they're doing all of these virtual things. It's sort of rejection of So the question is, do you have some thoughts on payment mechanisms, coding mechanisms, sort of some boundaries on this that could sort of work, somewhat in the current payment mechanism? I know we have protocol proposals out there for ... organizations and much more bundled activities where this would, I think, fit in fairly naturally. But in the current scheme, any thoughts on how we could pay for some of these interactions or classes of maybe generating a continuity of care document that would have a specific payment code that would just move the ball forward that we could sort of do somewhat expeditiously?

Jenifer Simpson – AAPD – Senior Director, Telecommunications and Technology Policy

I don't have any response from how providers are going to solve it. I do know that as a parent of a young man with severe disabilities and the caregiver for an 86-year-old mother, I spend an enormous amount of my time chasing down whether things have gotten paid or not, through either the Medicare system or my mother's retirement health plan that she has. Or my own son is on two different health plans because he has private coverage and he has public health system coverage. So I actually spend a lot of phone time, unpaid, to chase down who paid what, when and what's outstanding and who's supposed to do that. From my perspective, if we could have a payment system that I could also monitor, review and then trigger the right call to the right person at the right time to make sure a payment occurs, I think that could

maybe get at one of the problems here. Because until the wheelchair folks get their check, they're not going to pay the other clinicians on—I mean, I don't really know sometimes who pays who when, but it all depends on me triggering very often that particular insurer's supposed to pay, that Medicare's supposed to do that. Did you check this one here? So if we could somehow more involve the patient or the consumers who actually trigger the payment into this process, perhaps some of these problems would be solved.

Beth Morrow – The Children's Partnership – Staff Attorney

I do know that when telemedicine and telehealth began, this was a very similar problem. No one knew how to reimburse it, and so then no one wanted to do it. Eventually, it became such a part of the normal care giving experience that they just said, "Well, we have to figure out how we're going to support the technology side and how people can bill for it." It seems to have just moved and as that has occurred, telehealth is becoming a normal part of the care experience. So it will help to make a concerted effort to resolve some of the way this will be paid for and then the physicians can use it more effectively.

M

Sorry, I didn't have my ... up the first time ago. Dave, you commented on speed and trying to measure and access things from a counting key strokes, counting clicks or counting time duration of tasks. One of the things we bill extra time, is that many places of safety stop turns out to be a very good idea or to actually add key strokes or add clicks to ensure that what's being input is accurate. A great example is weight. When we were first doing this in the early 90s, we just let you default, would you like kilograms or pounds and then we assumed whatever you typed in was either kilograms or pounds based on your default. Later we realized that in certain scenarios, clinicians switched, that they'll forget that the system is going to interpret it as pounds or ... this kilograms because they had a kid and they didn't realize that it interpreted it as pounds. So then we add an L or a K. You have to state 30 L for pounds or 30 K for kilos, and that helped prevent some errors. But then we realized L and K are pretty close on the keyboard, so really if you're going to do that, you might want to think about the key stroke errors. Then we did LB for pounds and KG for kilograms and again that helped that as well. We still had doctors who although they thought kilograms, are so used to typing an LB they typed in 30 LB even when they meant to type 30 kilograms.

Then we went to a notion of, if the weight you've entered is 15% different than the previous weight, we're going to stop you right there, and pull a stop sign up and say, "Hey, you sure something might be different." Then, we get the pediatric snarls right there, it was different when he weighed more than 15%, we projected it on the growth chart and say, "Hey the kid was plotting the 85 percentile, you just put in a weight that put him way over the chart. Are you sure?" That There's that progression through time of learning but it also, I think the thing I want to be careful with is an assumption that we can just somehow magically count key strokes and assume it's better, because it's not always better. I think that surgical safety stops, sometimes making a doctor type in a dose, can be important to type in a confirming dose of a particularly dangerous drug can be an extra added safety check. I think someone commented earlier, people tend to pick things off lists very quickly and then feel very comfortable blaming a computer. I think there's a notion that actually is a building science of word view and search safety stops and extra steps to avoid accidents that are almost computer induced, simply because it made something convenient to do. Do you see that in any of your studies or observations?

Dave deBronkart – Society of Participatory Medicine – Cochair

Well, first of all I'm just thrilled with what you just described. My suggestion of just counting or paying attention to how long things take, was very much at a baby steps level of learning how to make the system more usable. I am no expert on this and so this afternoon's panelists will know a lot more about that. But what you described to me, is taking real wisdom, expert knowledge gained through practical experience and analysis of root causes of failures and building that intelligently into the workflow. I just applaud that to the skies. It's terrific. I don't have any particular studies to point to or anything, but that's absolutely a smart thing to do. Indeed, those are problems that have existed all over the place. I'm a power user with my keyboard with control keys and everything, and I will essentially push a macro button in my head and spit out 20 key strokes, which may accidentally delete something if I push the wrong macro button in my head. So I love what you said.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Chuck, ... a while.

Chuck Friedman – ONC – Deputy National Coordinator

Thanks Larry. So this is a weakly formed question, but I'm going to ask it anyway. Hope it generates a useful discussion. It strikes me that we are talking about health and healthcare here but there's a larger culture and society and world out there that makes it particularly relevant to ask a question to a panel concerned with consumers and patients about how several trends that are going on in our general society may affect the way we think about usability. I think a few of these trends are younger people coming along who are not only power users of every technology they touch, but also can't conceive of a world without it and also the proliferation of all kinds of handheld and mobile devices that everyone's just going to have and maybe everyone has already. How do these trends in the general society and maybe other trends that I didn't mention affect how we think about usability in health from a consumer point of view?

Jenifer Simpson – AAPD – Senior Director, Telecommunications and Technology Policy

I'll just give you one little example. When I talked about I was coming to testify here, in my office the young lady who uses a wheelchair says, "Oh, that's really cool. You're going to talk about things like I've got all my records on my ... drive, and when I take it to my doctor, you know what they do? They just print it all off, and they use it as in paper and how that should change." I go, "Okay. I'll use that example." So I'm going to use that example. So I think, yes. I think our younger people are using electronic media, they will be using handhelds, and they're going to expect their people, their medical people, their medical team to be able to interface with them that way and to use the secure messaging and all these other things. There's no doubt about it in my mind.

In terms of the handheld, I think a lot of them, they think there's an app for everything. There are apps for a lot of stuff. There's going to be apps for ... or apps for glucose measuring and blood pressure, all kinds of stuff because I work with the Telecom companies too, and they've all told me what their eHealth products are, and I think that's how that's going to capture the imagination of our younger generation. So they're going to connect that information. They'll expect that information to connect to their records and to be able to be used.

I also want to make the point that from the disability perspective, not everything's about disease. Everything is about health. My son has cerebral palsy. He has wonderful health. He doesn't have a disease. He just happens to have a medical condition. So the approach must always be based on the fact that this is about health and not about disease. So, the more we respect consumers from that perspective, I think the further we'll go in making using electronic systems work for all kinds of different populations.

Beth Morrow – The Children's Partnership – Staff Attorney

I think one thing that is important to think of as the future world is this notion of a lifelong record, because we are, in our lives, we've got 40 years with no records, but these kids that are being born, they're already starting in an electronic platform. As they grow up, I think that will be the expectation, that everything will be available in a fairly logical, organizable, controllable format and it will help ensure that those children and growing into adulthood are more engaged in their own care and health.

Eva Powell – National Partnership for Women & Families – Director IT

I think that part of the answer to the question is our healthcare system is archaic not just because we're stuck in paper, but because really none of the systems work to the needs of the patients. It brings up issues related to payment, how we provide care, what kinds of devices, where we provide care, and I just think about your example of people who are used to growing up with technology being part of their lives in every sense. I think about, I get pink eye, and I've got to truck myself into the office to get it looked at by the physician because that's the only way he or she gets paid. They tell me what I already know, and then they prescribe me a medication. I've got to truck myself halfway across town to go get the medication. This is not a patient centered system. This is not a system that is going to engage a patient. Before I do any of that, I'm going to think, how worth it is it for me to go through this process or can I just

wait this out and will it get better on its own.

So I think, part of this, part of the solution, part of the answer to your question is, thinking about the last role I mentioned that consumers play. Consumers have to integrate health and healthcare into the context of their lives. We're not waiting around to access the healthcare system. We're busy. We've got jobs. We've got lives, just like all of the rest of us do. So how are we going to be able to integrate these things into our lives? Technology has helped us in that regard in every other way. If I've got pink eye, I know I've got pink eye, can I take a picture of my eye and shoot it to my doctor and say, "Look, I know I've got pink eye, e-prescribe me something to the pharmacy right here where I'm standing on the corner, and I'll pick it up."? But there's really not much in our system that enables that right now, not the payment system, not our technology, not the culture and the mindset and the workflow of the physician. None of that supports that right now. So, I think that all of these things have to be worked on all at the same time, and technology is a key supporter of that but alone, it's not going to solve this problem.

Dave deBronkart – Society of Participatory Medicine – Cochair

Yes. It's funny, my doctor, my primary, Danny Sands, is known as being one of the first people to have published guidelines on how to use doctor patient email, and to this day I hear doctors moaning about, "I'm not going to do doctor patient email unless there's a billing code for it." This is ridiculous but more to the point of your question, when I talk to residents, kids just getting out of grad school, none of them say, "I'm not doing emails. Like, are you kidding? I'll do Skype with my patients." It's just an efficient way to do it. So one way to calibrate for us older people, to calibrate whether we are being crusty and archaic is to ask the young punks. Really, we have no idea what could be possible if we have our minds in the mindset of systems that were designed 30 years ago. It's funny because like it or not, you can either evolve and get modern or you can get run over all of a sudden.

This is a bit off the track of usability but then it's not. A couple of things from my career earlier, when desktop publishing was new, first of all, it completely killed the typesetting industry. I worked for the world's leading manufacturers of typesetting machines who saw themselves go out of business in five to ten years when desktop publishing came along. That's not going to happen in healthcare because it's infinitely more complicated, but Adobe established itself as the dominant photo program, Photoshop, largely because they provide this open API so people could, if Photoshop lacked a feature, somebody else could develop it. And bingo, Photoshop had that capability so it became the standard thing you buy because it'll be able to do anything. There was another point, but I lost track of it.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Thanks. We've got a bunch of folks waiting to ask questions. Go Adam.

Adam Clark – FasterCures – Director, Scientific & Federal Affairs

Eva, you had a nice summary, I think, a little bit ago so I'm going to direct my question to you but anyone else please feel free to respond. As we look at consumers, some things that I talk about when I'm talking with some of the disease groups and things that I hear, we need this electronic information, one, to be understandable by the consumers out there. I think we've heard that. It needs to be pertinent to who they are and where they are in the care spectrum. Are they actually the patient? Are they the care provider? Because we're looking for different types of information depending on who we are. But the third, most important thing—and I think this is something that we tend to miss—is it needs to be actionable. If there's nothing we can do with that information, it in many ways is meaningless.

We've heard a lot about portals. We've heard a lot, actually that patients want to do many, many different things than doctors want to do with this information. There's clearly the understandability that EHRs are meant to do certain things. Digital information can do many other things. So as we look at the broader context of meaningful use, and engaging patients, what are some things potentially that we can think about to accelerate this? At this point, patients are supposed to be provided a copy of their care summary. There are certain things we can do with that. But what can we do to really propel that forward so that the information either in the care summary or in their record can be actionable potentially outside of EHRs and meaningful use but the patients can take it home or access it from home to be doing things? Are there mechanisms through meaningful use that we can accelerate patient engagement?

Eva Powell – National Partnership for Women & Families – Director IT

I like your point about action ability, and I think there are a lot of things that go into action ability. The first that comes to mind, is the doctor patient relationship, in terms of information can be presented in a way that's understandable. But then knowing how that fits into the context of their health and their own health goals and what they need to do to achieve those, that's very much a place where the patient and provider have a dual goal that they need to work together on those things. So what comes to mind specific to meaningful use, with how we can advance this concept of action ability is to work on some concrete things that might lead us there. Chief among them in my mind is care planning, and I know that that's very— It's controversial because there's a lot of unknown or undecided or unstandardized, however you want to put it about a care plan. But I do think that there's been enough work done there that there are some steps that we can take to move forward with that. Not that we would have longitudinal shared care plan among all providers and all patients by stage two but I think that there are some real critical steps that we can take in terms of capturing the right information. We know what that right information is. It's actually newly endorsed through NQS. So that's step one, capturing that information, requiring that information be collected as part of the care planning process. So that's the best I can do right now. We're still looking into that. You'll hear more about that.

Beth Morrow – The Children's Partnership – Staff Attorney

Well another piece, I think, is making sure that the patients have the information when they're not sitting there in the office. So I think it was a great step to move towards the view download capability rather than just copy access. That recent change, I think, is very important to making things actually actionable and allowing the patient to follow up.

Dave deBronkart – Society of Participatory Medicine – Cochair

Just in very general terms, and I know this is obvious, but making access easy improves patient engagement. I have a Walgreens app on my phone. I have an American Express app. I can get at the records when I want them. One thing that as we—I used to work for newspaper systems vendors back then, and I'm sorry to be doing this tour through Dave's attic, but there was a mindset change. We were accustomed to the customers being one level of individual. As things shifted to more desktop publishing, one thing we had to deal with was all of a sudden we had a bunch of users who had no idea how our traditional users thought. So we had to get used to, we had to recalibrate to a different audience.

I'm thinking also, for instance, I certainly don't want to look at everything that's in my medical record at my hospital, if I have an app on my phone to do this, but I want to be able to flag things as my key items that I'm tracking. And you know mobile apps for instance, always have to be a subset of the full picture, so what if the EMR vendors in anticipation of increasing patient engagement were to add an ability for the consumer, the patient, to flag something that might be what shows up when they browse to it on the Website. That would be in a perhaps an unconventional way, that would be a really interesting kind of usability. Make it easier, in the same way we want to make it easier for clinicians to do their work, make it easier for consumers to get at what they want to see.

Beth Morrow – The Children's Partnership – Staff Attorney

I have one other thing to add. There was originally the concept of providing patients specific information, educational information, I think in meaningful use stage one, don't think it's in there now. As we move forward and Google—I mean a lot of people really can effectively research things right now, but I think the system is becoming so information heavy that it's going to be harder and harder for a patient to really find valuable information. They will go in and they will find things that are really about trying to sell a product. So I think as we move forward, that's going to be more and more important over time as a feature of patient engagement and really improving care and health.

Jenifer Simpson – AAPD – Senior Director, Telecommunications and Technology Policy

I'm just thinking aloud here. I just know in my community if I mention words like meaningful use, adoption, usability, these are very much inside Washington kind of words, and our deaf community probably doesn't even have a sign yet for some of this stuff. So, our blind community, they've never even saw the word. Anyways, I think this whole conversation about electronic health records, the move bigger

into all communities, so that everyone can ... participate in this kind of dialogue to understand. That means they need vendors engaging not just with the hospital systems or the providers or these ACLs that are being formed, but in more meaningful ways with consumer groups. I think that we need to do more discussions like this replicated elsewhere, quite frankly, because I think the pointers we made here adequately have the metaphor is Dave's metaphor with shifting in time from a way of doing business one way to another way of doing business. If you don't want people to be suspicious and distrusting of change, the way to do it, is to engage and build more awareness about what these changes are and to do educational work around that. Clearly, my community needs that.

Eva Powell – National Partnership for Women & Families – Director IT

I'll add to that. The way I've started thinking about this is that while there will be some applications or tools that are purely consumer, for use by consumers, and they'll be maybe some functions in an EHR that are purely for use by clinicians. When I think about EHR design, I really feel strongly that designing an EHR only to meet the needs of the provider is doing consumers a complete disservice because if what we're trying to move toward is patient centered care and a partnership, then these tools need to be designed for such, and they aren't, generally speaking today. So, what that then requires is exactly what Jenifer said, involvement of consumers in the design, and then likewise it will involve as part of provider training on how to use these products, not just you push this button and you go to this screen. But because it's been designed by the vendor to facilitate a partnership, then the training for the provider will also include how you use this tool to promote that partnership and to engage your patient in care. I think that's the way we need to be moving.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Okay, we've got quite a lineup and just a few minutes. Joan?

Joan Ash – Oregon Health & Science University – Associate Professor

You've all described very beautifully the idea of collaborative care, and I think one of the great powers of health IT is exam room computing, having the computer used in the exam room as the third entity in the room, and I've seen some beautiful examples of it. One of the issues though, when I talk to clinicians, they say, "The patients don't want me to use a computer in the exam room." I wonder if you have comments on that. How widespread is that desire?

Dave deBronkart – Society of Participatory Medicine – Cochair

I've heard that as a complaint when the physician is looking at the computer and the patient can't see what's going on. I heard one person say, "Was she IMing with her kids?" So, what my doctor routinely says is, this may not always be the case, but what my doctor says is, he explains, "I'm going to be entering some stuff in the computer so the other staff can see it."

Jenifer Simpson – AAPD – Senior Director, Telecommunications and Technology Policy

Yes. I was very struck by what Dr. Sinsky said right off about turning the screen, share the information with the consumer or whoever else is in the room because in many cases more than just the "patient" in the room, ... I accompany my mom to most of her visits. She's an elderly person. She can't understand the screen. But at least I can be there to help, when the screen is turned to me, explain, "Oh mom, that's your blood level there," or whatever. So I think maybe what needs to get to your question, is maybe there needs to be more work done on how doctors and clinicians and other people do those interactions using these new technologies in the actual room itself. Even simple things like turning screens, simple things like not looking like you are instant messaging but, "Gee, I'm just writing down your blood pressure right now," whatever it is, or "I'm making sure I'm sending the bill in." It's the communication piece. It's all about the clinician and the professionals communicating to the consumers and healthcare what they're doing. That's not really obvious I think, but it is necessary obvious in terms of actual practice. So maybe developing some practices around this needs to be some little work around that in terms of the research.

Eva Powell – National Partnership for Women & Families – Director IT

That's exactly what I mean in terms of training for providers. If the vendor has designed the screen in a certain way that it can only be mounted on a wall and turned, or I'm making this up, but then that needs to be part of the training for providers. Here's your screen. We've mounted it this way because you can

now see you can use it and turn it toward the patient because providers they want to do the best for their patients, and it's not they're trying to do a bad job, but they don't think of these things. It's just they're really overloaded and doing a lot with a little. So, to trigger those things as part of training, I think is key.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Okay, Charles. You've been patient here.

Charles Kennedy – WellPoint – VP for Health IT

No worries. Okay first of all, thank you all for your testimony. I represent the health insurance industry and as you probably know, we for years have tried to engage members in a variety of ways to these management programs, and one of those ways is personal health records. They were created in the spirit of trying to be more transparent, trying to more empower the consumer. The challenges we've had as an industry is the utilization's been quite low. Then patient Dave, when we began to read your blog, and we really did read your blog, it really made us pause because we began to ask ourselves are we potentially doing more harm than good. Well, your blog was pretty poignant about the errors in the data and the data quality. So, the question I have for you is, as you look to the future—

Dave deBronkart – Society of Participatory Medicine – Cochair

Okay, I've got a lot to say about that.

Charles Kennedy – WellPoint – VP for Health IT

Well, here's the question. As you look to the future, could you talk a little bit about the utility of billing data and the associated data quality issues with it and whether you see it as a viable path to empower patients.

Dave deBronkart – Society of Participatory Medicine – Cochair

No, no, no, no. Just for those who aren't familiar with my story, the very short version because we're short on time, is that two years ago, I tried to move—my hospital offered a button to move my data into Google Health and what came across was utter garbage. One of the main reasons was that they had transmitted the only structured data they had, which was insurance billing codes. So, examples, I don't know how true this still is today, but for instance, it said I had metastases to the brain or spine. I did not. The reason was because there was no separate billing code for we checked for it and it came back no he doesn't have it. Another example was that they had up coding. One of my CT scans had noted a slight enlargement of the aorta while I was in the middle of my cancer treatment. Perfectly normal, but the insurance billing clerk had seen aha, enlargement aorta, we can bill that as an aneurysm, which it is. An essential, in the interest of time I'll be blunt, it's extremely naïve and erroneous to take data that was entered for one purpose in one context and interpret it in a different one. Data entry that's perfectly fine perhaps for insurance billing, must not be construed where there were all the semantics had different meaning.

Jenifer Simpson – AAPD – Senior Director, Telecommunications and Technology Policy

I think one comment too, that I don't believe CMS had done enough in the area of evolving the new technologies with any kind of patient equipment or services, in terms of the billing codes. So, we're happy to work with others who want to talk to CMS about that because we think that would be the place to start these changes that need to occur.

Dave deBronkart – Society of Participatory Medicine – Cochair

Having said that by the way, I'm all in favor of my having visibility into my insurance records. I just don't want to construe it as clinical reality.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

David?

David McCallie – Cerner Corporation – Vice President of Medical Informatics

Just a quick comment to you, Dave. You've mentioned a couple of times the desirability of a plug-in model where people could build consumer exposures of data. There is a project you should follow if you

don't know of it, under the SHARP Grant Program which is an ONC grant process that funded fairly sizable grants for multiple years to four different institutions but one of them is building what they call a SMARt Platform. So if you look up SMARt Platform, you'll see exactly that project underway. It's being coordinated at Harvard Boston Children's, designed to create a plug-in model for both EHRs and PHRs so that independent people could create reusable modules that would work across different vendor products.

Dave deBronkart – Society of Participatory Medicine – Cochair

Adopted by the vendors?

David McCallie – Cerner Corporation – Vice President of Medical Informatics

It's early in the research. It's just, they're just a year into it. But yes, there is vendor adoption.

Dave deBronkart – Society of Participatory Medicine – Cochair

Great, wonderful.

David McCallie – Cerner Corporation – Vice President of Medical Informatics

Chuck's baby.

M

For those who are staying until the very end of this day-to-day, David Kreda, the last speaker on the last panel, will be speaking to the SMARt Platform so stick around.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Great.

M

I just had a quick question for all of you. Are you aware of any significant proportion of consumers that are actually beginning to choose physicians because they use electronic records? Sort of the reverse of the question about thinking they're harming quality but actually want to go to a physician with electronic records.

Dave deBronkart – Society of Participatory Medicine – Cochair

I don't know of any statistically valid numbers but anecdotally I hear from a lot of them.

Beth Morrow – The Children's Partnership – Staff Attorney

I don't have any statistics either but I'm hearing that as well.

Jenifer Simpson – AAPD – Senior Director, Telecommunications and Technology Policy

I would think that as we talked earlier, the younger folks would be particularly leaning in that direction. I don't know, there's no study, it's again where I think we need to do more survey work, more studies to find out exactly what is hard for us as consumers.

Eva Powell – National Partnership for Women & Families – Director IT

My colleague Christine Bechtel has done that and has not been pleased with the way her provider has implemented or used his health record. But as we've talked with people, it is anecdotal. I think to some degree because adoption rates are still fairly low and to make that as an absolute criteria, depending on where you are, may mean that you'll never receive medical care. So I think it's early but I think it's a good question to be asking. As word gets out and as more awareness is out there among consumers that hey this is the way we're going, that yes you'll start finding people asking about that.

Dave deBronkart – Society of Participatory Medicine – Cochair

Just as a glimpse of how the world is changing and really the access to new patterns does come through youngsters as they come up and start becoming consumers. There is an OB/GYN in Texas who is very active in social media, now this doesn't directly answer your question, but it's kind of a parallel glimpse. He is on Twitter and Facebook and he's observed that a couple of things. First of all, when he pushes

out, now he doesn't practice medicine on Facebook, obviously, but as he pushes out advice and just little reminders about things, he says his patients are making smarter choices in their behavior. But there's a business aspect to it too. As young women look for a doctor for the first time, they do what all of us do, which is ask our friends if they know anyone. What he says he's discovered is that he wins business because a satisfied patient will say, "Yeah, I like this guy and by the way, he's on Facebook." Now whoever would of thought of choosing a doctor because they're on Facebook, but business planners have to be thinking ahead and—

M

Thank you for your answers. One of the reasons I asked the question is I know of a pediatrician, this is a few years ago, but in Connecticut who used to survey routine, he's a very organized guy, and he used to routinely survey his new patients on why they chose him. After he had been on an electronic record for about three or four years, the number one reason became that he was the electronic doctor.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

I'll want the details on that. So, as we're about to wrap this up, are any of the committee members on the phone who've been silent but want to chime in? Okay, I'll probably add my own two cents. My partner recently had the experience of choosing a doc specifically because she was in a larger health system and their outpatient docs were all connected through the same system. He reported back that his experience in the exam room was that she was using the system interactively with him, showing him what she was typing, explaining what she was doing, and he was thrilled to not to have to have filled in another six page history. She did that part live with him. She didn't repeat questions that he already answered. It was streamlined and very effective. That larger health system's got him as a patient for a very long time because he now sees the value of his information being shared.

Great, well let's wrap this up. Judy, any administrative comments before we go to lunch?

Judy Sparrow – Office of the National Coordinator – Executive Coordinator

No. I think we'll just resume at 12:30.

(Lunch Break)

We're ready to resume the hearing if everybody would please take their seats, and I'll turn it over to Dr. Probst.

Marc Probst – Intermountain Healthcare – CIO

Thank you for the promotion. I'm just a lonely CIO but thank you for being here. I'm sure we're going to get some people trailing in from lunch, getting their blood sugar up just so we can be nice and engaged with the vendors. We have a Technology Developer's Perspective that we wanted to go through and appreciate this group of panelists for being here and taking the opportunity to talk to us and discuss some of these issues around usability. We asked some questions about what is the current industry practice in testing for usability, what's the current industry perspective for designing systems to ensure usability and what are the biggest usability challenges that are out there? I know we've got some great responses. I think we covered a spectrum wider than those questions but that's good. I think we really want to dive into what are some of the developer or the technical issues that are surrounding usability.

Our panel consists of Carl Dvorak from Epic, thanks for being here; Jacob Reider from Allscripts; Mary Kate Foley and Lauren Zack; Maureen Ladouceur; and Bill Hashmat, we've haven't seen yet but he may show up during the panel and the discussion. So Carl, we want to go in the order that we have here. You start us. The five minute limit is there. We're relatively strict although I don't have any weapons. So, keep as close to that as possible, that would be great.

Carl Dvorak – Epic Systems – EVP

Okay, sounds good. I think, just before I start, I think one of the critical discussions that we need to have for today is not just is usability a good thing or a bad thing. It's obviously a good thing, and it's changing dramatically through times technology involves. Although it is a science, it is an imperfect science. It

doesn't inform us as scientists like mathematics might inform us. We have to be cognizant of that. I think the real discussion here today is the appropriate role of government in usability with regard to EHRs, and I think we have to be very careful to navigate a course that doesn't lead us to a government forced marched mediocrity. Mediocrity will certainly make the bad a bit badder but it will often times, be deciphering the two innovations that make the break throughs. Yet, we've got to be cognizant that we all have a role and responsibility in making sure that we share our safety practices, share the practices that can make EHRs safer and better for patients into the future. So, that's definitely a tough question to navigate. You had asked some specific questions on usability practices, and I'll jump into those here in a second.

One thing I wanted to comment on additionally is usability is itself constrained through time by the technologies that underly the tools we work with. So, thank God we're not using punch tapes or green screens or punch cards to do the EHRs today. That would definitely be a usability barrier, and what happens in the next 20 years who knows. I think we want to be really thoughtful, though as to make sure we can harness that energy for the next 20 years. I think one thing that I found working with probably about a thousand developers that we have now, is that the single biggest element in making sure that you design usable software is to make sure that the developers themselves are immersed in the domains that they're going to develop for. We tell the story about developers who have spent time in their domain such that they will be confused for a pharmacist or confused for a physician sometimes because they really do learn it at a level that they understand and can anticipate what is the user likely going to need to do. That said, they're not perfect. I don't claim perfection in any way. There's still a tremendous amount that you learn a little bit through trial and error. But the emersion is the key thing.

I think the other thing to realize is that the usability experts, and we've employed many through time, you'll see in the written testimony, a pretty extensive usability program, usability experts don't often themselves make great software designers. It's about the same rate as any other human being. It's a bit of an art form. A bit of intuitive understanding of what a person would expect to do and when. And although you can quote the science in the text books, that doesn't in and of itself provide for good usability. I'm a very strong proponent of usability. I've measured by the clinicians who use it and how they report it affects their practice with obviously important awareness of the change in management element. If you ask them the first hour, you're going to get a story, then at the second week, then at the third month, then at the first year. So, you've got to be cognizant of the change management issues that go with it.

In terms of usability practice, we do extensive usability testing. I'm not going to read all of the testimony because you asked questions that filled several pages of testimony, but we do have a very significant focus on testing for usability and also testing for safety, and we apply that focus in proportion to the significance of the area. So more energy goes into order entry, more energy goes into clinical charting than might go into the demographics form and where the phone number gets placed. We try to focus those resources on the areas that matter most. We do simulation testing. We do navigational energy measurements. We try to understand the difference between a small button that moves around on the screen and hitting a larger button that's always in one spot on the screen. We do evaluations with customers. We do walk throughs for workflow as was commented on this morning, that's a critical element. Good workflow will make up for tremendous amount of usability issues because it helps them get their job done quickly. And we also see that sometimes the constructs behind workflow can lead people to do the wrong thing if you're not careful, so you have to be very thoughtful that your workflows match up.

One thing we do notice is that we heard talk this morning about usability, a universal design, or some sort of universal role. We work with many, many users, probably about a quarter million physician users, and it is hard to pin down any universal role or method that they use. So I think we have to be always aware of—someone commented this morning that flexibility in user interface, flexibility in workflow, the roles of clinicians and the care teams and the management of healthcare is changing dramatically through time. So I think we've got to respect that and be very careful not to lock in some sort of sense of what usability means at this moment. I've seen some of what NIST has published as an effort to try to gauge usability, and I think it's willfully inadequate from truly appreciating the context and the difference between an

orthoped, an ophthalmologist, a family practice doctor, you have to take all those into account or you're measurement is skewed. They need different things, how far a laboratory result is away from an orthoped is a very different experience than from a family practice doctor.

I'd like to summarize just I'll just jump to summarize here. I had a couple of key summary points I'd like to get to real quickly. I think in terms of what ONC could do and should do, one thing is to promote and organize the wealth of already existing and verging usability human factors information that's out there. I do not believe that further investing by ONC would necessarily advance this science. It is a flourishing science. The consumer industry is moving very, very quickly, and I think rather than spend additional money to try and recreate a wheel that's already been created and moving very quickly, we could jump on board that and capture the energy and the synergy from that.

I think we could ask the RECs to allocate resources to get feedback on usability that would help other people in the REC to understand what might work better in which kind of practice, and again, always recognizing it may vary by the kind of practice that you have. I think we should promote reference existing industry evaluators that collect real user feedback on usability. I think KLAS stands as a great example of that. Someone mentioned consumer reports ... are very similar to that in approach. I think we should develop simple but effective best practice guidelines to help clinicians evaluate usability. Again, I think it could be a very personal experience. I'm still shocked that Steve Jobs released an iPhone without cut and paste. I've forgiven him. But some users will choose that over a Blackberry, that's a free choice, even though Blackberry had cut and paste. There's not a universal right or wrong to this.

I think we should continue to support existing upstanding organizations like the Institute for Safe Medication Practices to try to ... the safety related elements of usability designed for workflow, all three of those go into that mix. That's a very good use of resources at ONC. I think we should definitely avoid a potentially flawed approach that a simple scoring system will yield. I know that was announced at HIMSS but I'd like to see us fall back from that position. I think it would definitely lead to people programming to the task, rather than programming to the users' needs.

I think we could create a process at ONC that would better understand the usability impacts of the new regulatory requirements. When I show users the new smoking status choices, they think I'm an idiot. I try to absorb that and not blame someone else, but they look at some of these rules and requirements that are coming through and they think, "Oh my God. Who created that? Clearly they don't have any medical background. What were they thinking?" So I think one thing we really could do to make a big difference on usability in the coming three or four years, is watch and be very careful with how we orchestrate those quality measures. Recognizing that not any one physician has all that data and you could create huge encumbrance of additional data entry or guessing at data that they don't actually know or have or maybe have at a higher level than what the quality measure might ask for.

I think we also would benefit by reviewing and increasing the transparency in the discussions and funding the projects related to usability going forward. I think that's a key thing where we spend our grant funding often creates the conversation, and I think we want to make sure that we've got transparent downs process that factors in not just the exceptions that are all too often used to typify the norm but factors in the common everyday experience with the HRs across the country. Thanks.

Marc Probst – Intermountain Healthcare – CIO

Thank you very much. Jacob?

Jacob Reider – Allscripts – Chief Medical Informatics Officer

Thank you Marc. Like Carl, I think I probably wrote too much in my written testimony, so I'll try and be more concise than I was over the weekend writing too much. So, I'm a family doctor. I started my career in health IT as a family doctor, as a customer. I was John's customer about a decade ago. I've been a customer of many companies and so my claim to fame here was that I wrote a blog post in 2004 that actually got me a job working for an IT vendor. The blog post characterized the rotten usability of the product that I was then using. I got a call from the president of the company, who after he asked me to take it down and I said no, we developed actually a pretty good relationship.

Over the course of the subsequent handful of years, I've learned a lot about how it's really hard to do this stuff right. So I've come from the nagging user to be the representative of the organization that tries to listen to nagging users. I've learned a lot about how it is that companies struggle with these challenges. As Carl described, they're not easy challenges and as the technology has evolved, our ability to address them has also evolved. So I'd like to think about these things in a unique way. Rather than call this usability, let's talk about user experience and the continuum of user experience, which starts with functionality. It does something and moves beyond functionality into reliability. It does something reliably. Beyond reliability is usability. It makes sense. It's usable in some way. It's consistent. Beyond usability is convenience. It anticipates my needs. It's super easy. It thinks the way I do. It surprises me sometimes. Then beyond convenience is meaningful. Meaningful is the pinnacle of our pyramid here that we're trying to aim for of course. I feel this from usability experts who designed this pyramid before meaningful use was ever uttered in these buildings.

So, as we think about each of those things and the context of what we're trying to do, I think about some of the things we've talked about earlier today and also in other meetings. Safety for me is probably number one. So what we're really talking about here is how can the government assist in accelerating the progress of the industry in moving towards safer and then secondarily more efficient health information technology. If it's safer, it's better, and I think we would all argue we would rather something take two minutes and be safe than take 30 seconds and be unsafe. So that's where I would start to ask the questions that I think Carl alluded to earlier in the day when he described the scenarios where they actually slowed down users to make them safer users. So at the mis-usability conference last summer, we saw this wonderful example of how bicycle riders' lives are saved by those little corral things that we see at the edge of the bike path, because if they go barreling across the road they get smooshed by cars. If we slow them down, it's actually better for them. That also works for users of health information technology. Anybody who's used an iPad and sent an email with typos all over the place because auto complete was faster and easier but it was imprecise and it actually anticipated the needs of the user incorrectly. We don't have that margin of error available to us in healthcare.

So what are some other roles that government could play here? I would agree with Carl, predictably perhaps, that a scoring system might not really nail this the way that we need it to. If NIST is going to develop a thermometer to take the temperature of this industry or to take the temperature of various products, I would question whether we've done sufficient research to know that what the dependent variables need to be here. Speed, click counts, all of these things you can always come up with anecdotes where in fact the longer quick count is probably better. I would agree that there may be some metrics but I would question that we know what those metrics are yet. So research, education, there's a lot to be learned. There's a lot that we, the vendor community, can learn. There's a lot that the implementers can learn. Many examples, and we heard from some of them this morning, about how we want systems to be either: A, more flexible and customizable or B, draw those barriers. As Steve Jobs demonstrated, constrain it where they can't do things that they're accustomed to doing and in fact that protects them from themselves.

So, I'm at zero, so I'm going to stop now and ... for Mary Kate.

Marc Probst – Intermountain Healthcare – CIO

Thank you Dr. Reider.

Mary Kate Foley – athenahealth – Vice President, User Experience

I'm Mary Kate Foley. I'm the Vice President of User Experience at athenahealth, and I'd like to introduce my colleague Lauren Zack, who's Director of Usability for us. So at athenahealth, we definitely acknowledge that healthcare information technology lags well behind other industries in usability. At HIMSS recently, it was clear that we were still introducing the definition of usability, that is specific users, in a specific context of use, achieving their goals efficiently, affectively and with satisfaction. But meanwhile, other industries are already supported by far more usable systems, already derive benefits from usability and certainly no longer struggle with user adoption, not in the same way we do, but all is not lost. We believe that we can learn from their example in order to make our own successful

transformation to highly usable and highly used EHRs.

So not to ... the simpler but more accessible examples, but if you consider ATM machines, they seem so obvious now, but it wasn't that long ago that a teller used to stand next to you to help you complete your transaction. This magic was just impenetrable when it first came out, at least to some people. Now you don't even need a pen or an envelope to deposit a check. You just slide it on in and it tells you what you've deposited. Financial services, it used to be cutting edge to list transaction forms online, PDF analogue and available for downloading, you could print them, you could fill them out with a pen and you could mail them back in with a stamp, and that was cutting edge technology. Now not only can you execute a transaction online, and I use the singular but many more transactions than we probably ever use, but you can first experiment with all sorts of calculators, your transactions are confirmed the way you want, via text or email and your online statements are private, secure and up to date.

So, those are couple of simpler examples but other industries climbing the complexity curve have made similar advances. So how did they leave their early jerry-rigged days behind and become increasingly usable? Vendors employed rigorous usability methodologies to inform user-centered design iterations. The vendors employed these methods well, delivered more usable products. Word got out about their usability improvements, which not only led to greater market opportunities for those vendors but also raised the usability bar for all competitors in that market. Expectations changed. To compete effectively, all products had to become more usable. What was deemed revolutionary in those early days was surpassed by innovations in effective and efficient interactions, creating a beneficial and ongoing cycle of increasing usability. The key is the proven process, executed well. So we advocate for education and promotion of a rigorous, reliable methodology rather than a scorecard.

Any good program should include direct observation of users' behaviors, working on tasks that matter, either in their usual daily context or in a reasonable facsimile. Reasonable facsimile can be hard to achieve so that's one of the difficulties that we face. It's also important to include a number of methods from the usability toolkit, so you better understand motivations, perceptions, mental models, usage levels, order of operations, for instance, in addition to observing behavior directly. It's clinical to strike the right balance between those multiple methods, to figure out how they inform each other.

Conducting comparative usability tests on less complex applications, especially walk-up-and-use products, can be pretty straightforward. I've done that a fair amount myself. Lauren has done that a fair amount herself. Devising and conducting usability evaluations on a single complex cooperative work application that supports human to human to computer interaction, such as an EHR, is considerably more challenging but you can do it. We break this down into reasonable pieces and balance across our methods. But then when we think about comparative usability ratings of multiple EHRs, that looks to me to be pretty daunting. I haven't figured it out yet, and I'll be interested to hear who has. The ratings validity would depend on the protocol just like testing a single system, including the necessary types of evaluations, executing them well and balancing them appropriately. In addition to being reliable and valid, a useful protocol for comparing EHRs would be to scale well and to be brisk to execute.

To move briskly, it can be tempting to sidestep techniques such as direct observation. But proxies, such as substituting a demo for hands on use by a target user, can yield both false positives and false negatives. Keystroke-level inspections seem promisingly reliable, but require prohibitive amounts of support from system experts before they can even start, and the analysis might not be valid before the exercise is even finished. So to give you an example, we release updates every month and on the EHR, it's every other month that we're improving things. So before we got to the end of a study like that, we'll probably be out of date.

So, here's what we do do at athenahealth. We're committed to drastically increasing EHR usability, and we have a rigorous repeatable process that we use. We conduct regular ethnographic studies. We use heuristics and cognitive analyses to assess human factors, particularly about risks. We devise experiments to directly observe how easily and efficiently target users can complete target tasks. We analyze those issues and improve the product accordingly because we embed these user-centered processes in all EHR development projects. Then we marry this robust UX capability to a platform that

measures actual clinical usage of the EHR.

We don't focus on prettiness alone. I'd like to make it good looking, and it does definitely have a relationship to usability, but we won't do work on looks when it doesn't have that relationship to usability. We don't equate having clinical experts on staff with a full embedded usability program, invaluable but they're a compliment to those activities. They help us quite a bit with our scenarios and our test cases. We don't confuse user forums with usability programs. They're excellent resources for discovering clues about conceptual models, understanding perceptions, and so on. But self-reported information can't stand alone. It is not a substitute for diagnostic usability activities that would allow us to see what people do rather than what they say they do.

We welcome this increased focus on usability. It's got to happen. It's absolutely essential, and we'd like to help. In particular, it seems very attractive to help dislodge some of the misperceptions about doing usability. But we're less than enthusiastic about mandates for specific design details or about unreliable comparative protocols that would keep us working on the wrong things and would inhibit innovations that would lead to greater EHR adoption. So, we strongly recommend that you hold vendors to a high standard in usability methods, the same methods that have worked in many other industries. Thank you.

Marc Probst – Intermountain Healthcare – CIO

Great. Thanks Mary Kate. Lauren, did you have any comment to make or not? Okay. Maureen.

Maureen Ladouceur – Vocollect Healthcare Systems – Vice President, Clinical Solutions

Good afternoon. I'm Maureen Ladouceur. I'm the vice president of Clinical Solutions of Vocollect Healthcare Systems. I'm also a registered nurse, by background. So to focus my remarks on two areas, one of which an area of design strategy that we've employed to help achieve usability. And the second being, related to some observations from the aspect of implementation in the field as it relates to the topic of usability as well and how that influences everything we're talking about today.

We've all agreed today that the topic of usability is abstract, that it's really kind of a culmination of a number of things, including core system design. My expectations for what this technology's supposed to do for me and how I do my job, the extent to which it has been trained and properly implemented and also my own sentiment and perception of that technology. One of the methods that we've employed within Vocollect Healthcare to be able to further understand that, is to direct observation and contextual research. The reason being, while not intuitive in something you would expect, often times what users actually convey to you about what they do and how they do their job and, therefore, what they need, is often a conflict with the reality of how they actually do their job and, therefore, what they actually need. The only way to effectively diagnose that and assess that and the implications is to watch somebody do their job.

At Vocollect Healthcare what we've done is we've actually employed people in the field to effectively view that on an ongoing basis. An example, early on, when we were initially designing our product, one of the primary needs articulated by users was I need to find out ... information more easily. I don't have that information readily available. It causes mistakes and it causes things to be missed. What we identified upon doing direct field research and watching people actually do their jobs and how they gather information was that that was only actually part of the problem. While in many cases, the information was there, sometimes it wasn't. Often times, it was fragmented. It was scattered, and it did not equate to an actionable ... for the caregiver to move forward with.

So, we identified as part of that, that what we needed to do was to address that quirk requirement but we actually needed to create a much more precise capability. That capability taking the onus or the burden off of the caregiver needing to know to proactively look at something to figure out what to do. That led us to creating an auditory plot so we're actually kind of reaching out and tapping the caregiver to create certain care to complete certain care such as bladder retraining programs, turning and positioning and other things that need to be done on a consecutive time based requirement. That capability and that direct observation led to increased compliance and all the outcomes that you would expect from being able to implement HIT in that environment. So embedding contextual research contextual observation as

part of a design methodology is critical to really figuring out what the need is so that you don't spend all this time developing something that actually only solved part of the problem.

Second area that I'd like to focus on is implementation. If we as an industry focus all of our attention on usability in terms of system design and quick throughs and what the pages look like and meeting certain design requirements and ignore the various phenomenal impacts of the implementation seg, we're going to be doing ourselves a disservice. Biggest implementation challenge that we've publicly all as vendors witnessed, is that of changed management. Having witnessed countless implementations of different technology or the same technology in a variety of different organizations, it can go phenomenally well, and it can go really bad, depending upon how that implementation is managed. If the implementation is managed well, user perception, proficiency, ... goes up, your compliance levels goes up and the business outcomes that you were looking to achieve clinically, operationally and financially actually do come to fruition.

What we've identified and observed is that taking the focus of not trying to teach somebody about a new piece of technology and not trying to focus on the functions and the features, but teaching clinical people how to make decisions, clinically based with this new set of data and this new format, using this new approach is critical. So employing scenarios such as clinical labs, role playing, clinical scenarios, embedding that type of curriculum early on and then on an ongoing basis at the 90 day mark, 6 month mark, year mark, you see that usability factor and perception inherently go up. So in looking at mandates that are focused specifically on the design of the application and ignoring that very critical piece of the clinical implementation and teaching people who are otherwise not very comfortable with it, how to make it work for them, is a critical piece to this topic and something that should be considered at large. Thank you.

Marc Probst – Intermountain Healthcare – CIO

Thank you very much. Bill, welcome.

Bill Hashmat – CureMD Healthcare – CIO

Thank you everyone for the opportunity and dedicating your time and effort towards the most pressing cause of our time. My name is Bill Hashmat and I am cofounder and CIO at CureMD Healthcare. Since 1997, our mission has been to reduce technology barriers by providing adaptable, accessible and affordable technology for every provider. We take immense pleasure and pride in being awarded the highest available usability rating for our ... product line. We feel encouraged that ONC is formalizing usability testing as part of its certification program, and this formalization is much overdue. Now we all know that efficient information delivery is the key to reap maximum benefits from our decades-long investments in developing, standardizing, adapting, interconnecting lifesaving health information. The United States brings the most cutting-edge technology to the world and as we lead towards wide spread adoption, we must invest in not only effective, but also safe information delivery through following investments.

These are some of the recommendations that we have: Number one, creation of mandates for comprehensive usability testing program, development of a comprehensive usability culture, having standards, guidelines, common terminology, common workflows. Number two, development of a common user interface that will help people depend less on training because if they move from one system to the other, they would have the same interface. A lot of times, you have probably experienced providers using another system for the inpatient and then using other systems, couple of other systems, at different clinical settings, so having a common user interface would save tremendous amount of training and user aggravation. Then, in addition to that, promotion of standardized health pathways/treatment plans, development of a nationwide early intervention alerting system. Somebody earlier mentioned that you can have quick quality stops that can be really tremendous because those quality stops can ensure that you are being alerted with the requirements that are there to perform certain clinical measures. Then initialization of a paper to digital conversion frame work, which is very, very important. We have spent decades in collecting paper-based records and somehow we got to utilize that information into clinical decision making. Cumbersome system design still remain the biggest threat to our investment. Making usability a key focus of the certification program from ONC will ensure that our

HIT investments will bring the promised results.

Now, going back to the questions: Number one, what is the current industry practice in testing for usability? We can all talk about the sky and the moon in terms of our efforts in usability, but I don't think that we have done anything on that. There is no formal usability testing procedures available in the industry. There are few vendor organizations have active usability personnel on staff. What work is being done on usability is still not very systematic, and we don't have any guidelines, any programs. You can go down to a doctor's office. I was just talking to a researcher ten minutes ago and I was asking them what if we have on an average a 70 years old patient would have, let's say 20, 30 visits. Now each visit would have maybe five, ten pages. Let's say that if we put some abnormal values in that, we put some really critical erroneous information in that, do you think that a doctor would be able to pick it up in five minutes? I truly believe that they cannot. So we've got to really do something about it.

Number two, what is the current industry perspective for designing systems to ensure usability? The industry is very clearly looking up to the government all in independent body to develop and mandate usability guidelines, testing programs, standards and with well-defined performance matrix for EHRs.

Question number three, what is the biggest usability challenge? There are a number of challenges. The key ones are: the majority of the systems in use are very, very old and may not evolve that easily. Number two, even a bigger challenge, mass adoption drive is more profitable than usability investments for vendors. Why would the vendors invest in usability when there is no recognition of usability at least from the financial perspective? Number three, to have a recognized independent usability testing organization to control and oversight.

Now, question number four, what voluntary steps can industry take to improve usability? What does the industry see as the government's role? The industry must involve usability experts in system design and continuously upgrade process to embrace key findings. The government should mandate usability research, evidence-based measurements and improvement agenda for certified patient program.

Now, my conclusion is that healthcare practitioners are swamped with information overload leading to generation of serious errors and potential mistreatment. There is an urgent and acute need to provide cognitive support to healthcare providers. Well-developed and tested EHRs can deliver some of this promise. It will involve enhanced information organization, better visualization instead of unorganized textual presentation, reducing the burden of effort, matching the way practitioner's process information.

Cumbersome system design remains the biggest threat to the ARRA investments, making usability testing the corner stone of ONC certification program could ensure our investments and efforts yielding promised results and diminish the chances of EMR failures. Encouraging vendors to adhere to and achieve certification of government set standards would increase design and development controls and will ensure a continuous control of vendor processes. Thank you very much.

Marc Probst – Intermountain Healthcare – CIO

Thank you very much and thanks to this whole panel, very good information. I look forward to the discussion with the work group here. Real quickly, Carl, you put a stake right through my heart. I mean we use green screens all the time, but that's okay. I understand your principal. I had a quick question for the panel, as you guys conceive your questions. When it comes to multiple systems, it's pretty easy if it's all within your own application. But when you start thinking about the fact that many organizations—and I might even suggest most organizations—use multiple applications within a workflow to meet their clinical information system needs, without someone setting standards of workflow or requirements, fairly rigid standards, how do you see that working? What role do the developers have in defining what those standards are or how that could be done? I think Bill you hit upon a lot of that within what you were saying. So was that clear enough question, really it is multiple systems and where do standards fit in that, and who should be defining those?

Carl Dvorak – Epic Systems - EVP

First crack at that, but before I do, I wanted to also reference in my testimony and currently I've drawn the

first straw so I'm not sure of the HR association. In preparation, I did a poll of what actual vendors have and of the respondents 14 of 19 had designated staff responsible for the usability aspects of design, 13 of 19 had designated staff responsible for usability in the testing process, and 15 of 19 had structured feedback for usability from customers. The ones that did not tended to be the very small entrants into the market, where they would have staff that they claimed covered those aspects, they'll have doctors sometimes often programming themselves. I just thought that would be helpful in terms of bringing some of the specifics to the table, and the association has vendors that account for about 95% of all EHRs in the country, so I think this more accurately typifies the current state.

Marc, with regards to your question, maybe a little bit biased I guess by history, but I've been in a world where we've done pieces and parts and tried to fit them into other peoples' pieces and parts. I think at the end of the day, you can't go out and buy a car with a BMW frame, a Ford engine, a Buick interior, a Toyota stereo system in it, and that's our reason I think. There's a certain amount of safety to be deemed from things built to work together and although I see certain areas where you might do the API and the apps kind of concept where that could be safe, maybe gathering biometric device data in a PHR, great opportunity for the app sort of model. I think when it comes to some of the core aspects you actually put patients at risk because those ... don't generally line up and those vendors don't work and lack step. They're not tied together. They don't release their software versions together. They don't update their interfaces together. They don't correlate their changes in ... together. I think going down that path, you fundamentally wind up with patient safety problems because of lack of integration. Everyone can see them and they ... what to do instead, but I think that's an observation I've had through the years.

Jacob Reider – Allscripts – Chief Medical Informatics Officer

We'll go down the line perhaps. I'll try and answer quickly. So, if I get the question right, it's if I'm driving a Toyota and then I get into a BMW, I should be able to use the BMW just the same, right? So if I'm at the VA and then I'm at the Presbyterian Hospital, and most cities have one of each, I assume, then I should be able to navigate the EHR just as I would have.

Marc Probst – Intermountain Healthcare – CIO

That is part of the question. But I think Carl was kind of striking on, the deeper part of the question, no actually I may use one system for order entry, I may use one system for my PHR or my clinical documentation and integrating those, and they're not going to see mostly work with one another without some sort of standards.

Jacob Reider – Allscripts – Chief Medical Informatics Officer

Okay right, two different questions. I was prepared to answer question one, and I think ... question two. So I think question one is, nobody mandated that a BMW be designed in a certain way and that the Ford be designed in a certain way. These systems evolved on their own. The gear shifter thing, you know if somebody innovates a really great way to shift gears and users love it, and it's safe and it works really well, they should be allowed to. So, I'd be concerned about standards. Well, once upon a time, a few months ago, somebody at NIST taught me about that the hierarchy of the way that this goes about guiding industry, so guidance, guidelines, and standards. So, if there's guidance, sure, I have no issue with that. Guidelines, maybe there's going to be some constraint of the freedom of innovation, and standards, I think would be scary in this to me.

Marc Probst – Intermountain Healthcare – CIO

So, just a question and not to put you on to much in the spotlight, but the steering wheel's in the left side of the car, every car, is that a guideline or a standard? That's really the question we get to, right?

Jacob Reider – Allscripts – Chief Medical Informatics Officer

As Carl mentioned, there is some government employees who drive on the wrong side.

Marc Probst – Intermountain Healthcare – CIO

But they deliver the mail and I like them and my dog bites them.

Mary Kate Foley – athenahealth – Vice President, User Experience

So, Marc, to your point, I actually think the steering wheel on the left is a convention. I think that if you were to put out a car on the U.S. market, and the steering wheel was on the right, you would let the consumer decide whether that was something that they wanted to use, whether they felt that was okay.

To the other question that you posed about interoperability of systems, I think one of the questions is design for use case. So, for example if you have a multispecialty practice and one radiologist, and so he's using a radiology system that integrates with his hospital system, doesn't mean that the EHR system should be designed so that that radiologist can do everything that the EHR is meant to do. It should be designed so that he can still use his hospital-based system but yet, get the information out about the patient name, about the current diagnosis, about the questions that the primary care provider has posed, and then also to do his notes so that the notes get integrated into that chart. So if those tasks are well designed by the EHR system, there's no reason why a radiology system couldn't work in concert with that. So I think that's part of that degree of interoperability that I think you need to look at.

Maureen Ladouceur – Vocollect Healthcare Systems – Vice President, Clinical Solutions

I just have one comment here. So I think that when we look at the topic of government involvement in what we're talking about today, there's the topic of interoperability and there's the topic of usability. I concur with Carl's comments about usability being a little bit of a slippery slope, and we have to be careful what we do there so that innovation is primary; we let the market and the consumer drive the activity. However, I think what we heard a lot this morning from both the consumer panel and the provider panel is that when you adopt a big, old, monolithic EHR or EMR, it's inherent that it's not going to do everything great. There's going to be some components of it that really work well, and there might be some components of it where it's just not quite working. Being able to facilitate choice through interoperability that would only be a function of having some sort of standards that would enable that, I think would be critical for providers and consumers and for everybody to get what they need out of HIT moving forward.

Bill Hashmat – CureMD Healthcare – CIO

As I mentioned, moving from system to system is unnecessarily taking cognitive stress. Now if we can follow common user interfaces that have similar look and feel and probably a lot similar workflow, so it can really save time and effort. So common user interface, Microsoft is investing a great deal of time and money in that, and I think that we can learn from them and other people and come up with a common user interface for healthcare IT.

The other thing about standards—you've got to have standards. Standard are all over us. We see sharpener pencils, tire size—everywhere that we see, the world is full of standards. There is a thin line between defining very strict standards and then having possibilities of innovation, but without standards, I think that is why we are where we are in health IT. So based on those standards, we can always, in a way, come up with more high-fidelity designs and maybe speech integration in that and other things. So the sky is the limit for innovation, but without standards, how can you really move?

Mary Kate Foley – athenahealth – Vice President, User Experience

I'd just like to comment on this. I think that, perhaps, if I can articulate what worries me a little bit about imposing standards—particularly prematurely—I wonder if other panelists have had the experience of users of our systems, no matter what role, saying, "Come on, we do this the same. We all do this the same way. Can't you just do this the same way?" And you know what? It turns out not everybody does it the same way. Now I believe there's something that's the same—some mental model, some steps at a certain degree of detail, and we haven't discovered that yet. If we get that, then that's tantamount to saying in the U.S., your steering wheel's on the left. We don't know yet where we want the steering wheel is what I'd say. So I would hold off on those sorts of things until the conventions come along.

Carl Dvorak – Epic Systems – EVP

I think the point you hear is commonly spoken. The beautiful thing about standards is there's so many to choose from. I think standards play a vital role in society and how we interact, technically as well as many other ways. But then there's a whole different level of mandating conformance to certain standards for certain purposes in certain industries, and I think that's—it's not that the world is anti-standards; standards are a good thing. I do think, with regard to innovation, it is important to be able to differentiate

through innovation. If you don't have the ability to differentiate, you don't have the ability to compete. I know ONCs got a lot of money, but ONC doesn't have enough money to fund all the paychecks of all the EHR developers out there as we become wards of the state. There are a lot of people working every single day to try to innovate. If you don't innovate in this industry, you die. You have to work hard at it, and I think that's one of the benefits of having that vibrant competition and that vibrant, "Let's one-up each other. Let's make it to the next level," and I would hate to lose that through this kind of a process.

Marc Probst – Intermountain Healthcare – CIO

Thank you for that. Carl, I noticed in your written testimony, it was right up front that there is differentiation based on usability, and that's a market driver, and I'm sure that drives innovation. I didn't mean to be trite on the standards statement, but there is a—I still have the question—it's not for the panel—this is just a comment, and then we'll get into these other folks' questions. What degree of standard is appropriate? Is it driving on the right side of the road and no dashed line in the middle and that gets us to where we need to be to move, or what it is? I think that will—that's a debate we're not going to solve today, but I do really appreciate your answers.

Carl Dvorak – Epic Systems – EVP

... verify when we talk about standards here, I'm thinking we're talking about design standard of this. We're not talking about making sure that you are using some ... CT or whatever because, of course—and maybe we are. We'll get into that, but that was not the question I was answering.

Marc Probst – Intermountain Healthcare – CIO

Okay, I'm sure I've screwed up the list because a lot of these went up while I was talking, but, Charles, I think your was up first.

Charles Kennedy – WellPoint – VP for Health IT

Well, EPA health plan, since we aren't usually involved with the direct provision of care, we tend to look at EMRs from the perspective of effectiveness. And, Maureen, your comments particularly resonated with me because you linked the usability and technology to other steps—change management, supporting the physicians in the decision making—to getting an effective result. So I guess my question is, from a broader perspective of effectiveness is what we're all after, could you talk a little bit about how to relate usability to some of those other things that are required to get the effective result? Should they be linked? Are they things we can do from a policy perspective? Or are they really best kept very separate?

Maureen Ladouceur – Vocollect Healthcare Systems – Vice President, Clinical Solutions

I think that the—just to round out my comment there a little bit with a quick editorial. As an observation, most of the time when technology is being implemented, we're taking a very systems view. We're looking very much at to bring up the ... looking at workflow from a systems perspective. We're looking at integration plans. We're looking at the functionality inherent in this technology at more of a transactional level, and that's often where the practice is. If you think of Maslow's Hierarchy of Needs, that gets you your food and water, but it doesn't get you much higher up the pyramid. I think that integrating the process as a best practice to include teaching people to go through their—in the case of nurses—the nursing thought process. Going through that nursing process as your subject of assessment, object of assessment, using the data that you now have available to your benefit, and coming up with a plan that you can execute on, re-teaching those processes at the appropriate clinical level in the context of this technology. Is that a component of usability? I don't know.

I think usability, from a design perspective, needs to be able to facilitate that. I think it's more being sensitive to the fact that whether you're employing individuals within your organization to assist with that, you're partnering with your vendor to be able to have that level of support, whether it's coming from a third-party consulting company, it's an integral part of what needs to happen or you can't even really talk about usability. Because if you don't put it all together—the people, the process, and the technology—it doesn't matter if it's the best system in the world, people are going to struggle, and you're not going to have the intended outcome.

Mary Kate Foley – athenahealth – Vice President, User Experience

I just want to add something that's a little bit tangential, but when we talk about usability testing—and some of the folks were talking about should it be part of the certification process, should it not be—this is a great example of something that is easy to overlook if you were doing a traditional usability test. I can measure ease of use. I can measure user satisfaction. But when you get to effectiveness, that is something that, while incredibly important to this discussion, is going to be overlooked in either formative or summative usability testing. So it kind of highlights for me the need to be looking at a broad sense of what usability is and how we can decide to measure it because I think usability testing itself isn't going to get to this.

Marc Probst – Intermountain Healthcare – CIO

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Jodi Daniel – ONC – Director Office of Policy & Research

So I've heard a couple of things. I've heard, "Be careful about being prescriptive on design and usability because of the risk to innovation." I've heard about other industries and cars developed and people bought the car that is useful to them and provides the functionality they want—same thing in the banking industry. I was hearing about ... did get designed so that people can use them. So people could also switch banks very easily and take their money out, and then go to another bank and put their money in and use that system if, in fact, they had a better online site. Some people buy cars very frequently, and there isn't much—you might lose some money on selling your car and buying a new car, but it's minimal difficulty in switching products.

So one of the challenges we have where (ONC) we're trying to put out a lot of money in a short period of time and trying to encourage adoption and also the use of the EHR is that transitioning from one EHR to another EHR is very difficult. Picking the right EHR is very difficult for, particularly, a non-sophisticated provider who sees the nice demo but doesn't really know whether it's usable or not until they're actually using it. By then, it's really hard to switch; they've invested a lot of money. They've invested a lot of time. It's very hard to get information out of one system and into another.

Farzad started off the day, and he was talking about transparency. I think that was one of the things that we're looking for is, how can we help people to make educated decisions about a product that will suit their needs before they buy the product and spend all that time and money implementing the product? So I would just love your feedback on that. What can we do short of, "Well, this'll just develop better over time, and people will work out the kinks, and then in ten years we'll have better products. Meanwhile, there's a lot of pain and difficulty in transitioning in the interim.

Carl Dvorak – Epic Systems – EVP

We have made some specific recommendations for how to best accommodate that. I think the interoperability standards hold the key to doing that effectively, the same way you interoperate about a patient record you could, basically, have a mass interoperation between your old and your new. That would likely be the only rational solution. The notion that you'll have—I think there's 200-some EHR products now being certified. I forget the exact number, but it's large. The notion that each of those 200—

Jodi Daniel – ONC – Director Office of Policy & Research

It's over 500.

Carl Dvorak – Epic Systems – EVP

Is it 500 now? Wow. The notion that each of those 500 would do custom programming to each of the other 499 is a certain form of insanity. So I think you probably just leverage interoperability standards and do a—light the pipe up from one to the other as best you can. I think you'll have to recognize that that's only a small fraction of the issue: the reinstall, the workflow aspects, the fact that it's different. You'll likely find that a fairly large percent of them don't like the world any better in the new space either. So you'll have a lot of personal perception. I might've bought a Zune player and decided I wanted an iPod instead, and I'll have to work through the kinks of getting my information moved over. I think even banks have the same thing. When we switch banks, you have to go re-enroll and do the whole thing over again; it's a bit

of a pain, but it's not that complicated. I think with health records we'll have to stay with a standard that we can also afford or we'd be basically ... when you couldn't really accommodate 500 to 500.

Jodi Daniel – ONC – Director Office of Policy & Research

Right. So I understand, to your point it's hard to—the transition problem is going to be a challenge we have to overcome. But the question is how we get better information for the people—are more likely to buy a right product, maybe not the right product, but a right product from the get-go, rather than having the pain of having to transition.

Carl Dvorak – Epic Systems – EVP

That was your second question. I think just what you're already doing with the REC is largely a part I think you've done good advice on, including their physicians. You could publish reasonable things that one would think to walk through in terms of a demo and a scenario and hands-on if they like. Physicians, we're not talking about an uneducated community here. These are some of the brightest minds in society; they've been to school the longest. I think they are well equipped to make these choices and make these decisions, especially with regard to feasibility and workflow. If something's broken under the covers that they couldn't have seen, I guess that's an issue. But that's usually handled more contractually then enough.

Jacob Reider – Allscripts – Chief Medical Informatics Officer

I'll try and be short—education, research, and assistance. So education—educate us, with us. I think we've heard a certain number of respondents—so we asked 46 vendors about their processes; 19 responded and 15 of 19—so there might be some bias in our respondent sample there. But people are using user-centered design processes. I think there's consensus, at least on this panel, that user-centered design is better, but many have not made it a religion within their organizations, and perhaps, they could. They might do that with some nudging from NIST, and that might be guidance, rather than standards, so that's education of the vendor community. Here's how one might go about doing it, and then there's also education of the buyers, "Here's the stuff you ought to look for. Here are the questions you might want to ask."

One of those questions might be, "Are you using a user-centered design process," because that's education that when as soon as the customers start asking it, we start recognizing that they're intelligent buyers. Research is research, and I would say the kind of research that SHARP grant has started, but also, maybe, some more applied research working with us and really engaging. I think Mary Kate did a great job explaining some of the rigor that's required. This is not stuff that you do and turn around tomorrow and figure out. It's not something you do with a one-way mirror. It's really hard work to do really well, and so I think the vendor community would be happy to participate with basic science researchers or sociologists, etc. Assistance, I think the REC program is a great example of helping people, getting folks out there on the ground, sitting there with doctors and helping them make good decisions.

Mary Kate Foley – athenahealth – Vice President, User Experience

I would like to follow up on one thing. We've been talking a lot about the risk to innovation, but that's us playing the world's smallest violin for you guys. This should not matter so much to you. What really ought to worry you is that these sort of mandates at the design level could be a 'be careful what you've asked for situation'. We'll get programming to these design standards and we're not even really sure if they're the best way to do things. We know it's good to alert for drug-drug interactions, but is the parade of alerts—it's how you do it. What's the best way to do it? So what you should really be concerned about is if mandating certain things or trying to devise a workable protocol that isn't actually valid or reliable may actually get us no improvement in usability. That should be your biggest concern.

Marc Probst – Intermountain Healthcare – CIO

Larry.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

So the problem with an interesting conversation, I have a whole page of questions, so I don't think I get to ask them all. So I guess I better pick and choose. So maybe, first an observation as an old "techie" that—and this was mentioned a little bit earlier this morning—software is actually a pretty deep stack of things that make it all work. The products tend to be known by their user interface, which in some ways is a tiny, tiny part of the whole of the application—what you need to actually deliver something that functions. There clearly is huge competitive advantage in what the user interface is and how it looks and how users respond to it during that initial five seconds of getting to know someone, "Is this someone I want to get to know or not." Or, "Does it so put me off that I really need to be dragged through hours of training before I'm willing to click the master, touch the screen, or whatever it requires that I do to interact with it."

I have a radical question I think I'm going to come—well, maybe I'll just stay there; maybe that will be my radical question. So the radical question, in part, was also raised this morning, if we look at something like Photoshop, that one of the success factors in Photoshop was that they made it possible for people to build plug-ins. So my guess is that a lot of money goes out to buy the Photoshop framework so you can get that not-very-expensive plug-in that does the really cool thing that you want to do. But we don't seem to be seeing that, historically, in much of healthcare in a healthcare software. So picking on that one piece as a piece—so hang on to that thought of maybe it could be something vendors could do. You could have your own standard. Photoshop didn't go to NIST and say, "Help me create a test framework so I know people are building plug-ins for my app." They managed that as a vendor.

If I go to the extreme of oversimplifying the problem, about ten fifteen years ago (about fifteen years ago), this browser thing suddenly took off, and we thought we had the universal front-end to everything for a while until we realized that it didn't really work. So I'm going to take that flawed analogy and take it to today. So today, we have tablets sweeping the landscape—15 million by last count from one vendor alone and a bunch of folks chasing after them. So is it inconceivable that a few years from now we might actually have my user interface that I take with me, and I go into health organization 'A' where I work in the mornings on Monday, Wednesday, and Friday, and it syncs up with the local system, and I'm using my interface. Now I go to my office around the corner with a different back-end and I'm using my interface. I go to the VA and I'm using my—maybe not the VA, never mind. But I go to the VA and I'm using my interface. Is that complete fantasy, or is there actually a road from here to there that actually makes some sense?

Carl Dvorak – Epic Systems – EVP

I'll start off again. One thing first, pretty much all Photoshop-type tools have plug-ins, so I think it's important to not lose cause for effect. They've always had plug-ins; that's been the norm, not the exception. I think what made Photoshop great was its execution and the way it exploited the Macintosh platform. It really hit a zone for graphic artists that was just not being met anywhere else.

With regard to your question on pushing the plug-in user interface, I think we'll certainly see more and more personalized preferences or preference sets that are transportable with providers. Maybe one day we'll even see some semblance of an order set seed that could be dropped onto a new computer system, and maybe it'll bring up order sets that are sort of similar there. But so many of those things are so tightly tied to the inventory—what's in the pharmacy stock. The tentacles run much deeper than people imagine. I think you also have the safety burden of if you try to do the app thing below a certain level, you'll start to bump into the safety issues, which are documented, and Kildridge did a nice article on what are the safety problems as you cross a pharmacy to a CPOE system and back. There are dramatic patient safety impacts there. So I think yes to the preference level; yes for some kind of apps where it works and it's still safe for patient care and intuitive providers. Below another level, probably not, because I think you're then back to the swapping engines and transmissions and suspensions and cars to mix and match, thinking you'll end up with a safe car.

Jacob Reider – Allscripts – Chief Medical Informatics Officer

So Apple has a very tightly integrated app store model. So they control it very tightly, and there's a—Clay Christiansen writes that you can read the distinction between the loosely coupled and the tightly integrated. I'm a—kind of religiously—I'm a loosely coupled guy. I'd much rather have best-of-breed

loosely coupled things, philosophically. But when it gets down to whether they really work or not, you can look at the difference between the Apple iPhone store and the Android store. What do you have in the Android store: chaos. There's not predictability. There's not reliability. There's a lot of garbage there, so your signal to noise ratio is not good. Apple has controlled that system very well. So it's very reliable, and users can have confidence that if they spend their \$1.99 or \$19.99 on something, they're going to get something of value. So I'll echo what Carl's saying, maybe less eloquently. I think that there is some appeal, and I would be surprised if every vendor at this table didn't have some thoughts, plans, programs, etc. around creating some kind of plug-in mechanisms so that third parties could come and build applications on top of our applications, and our ... could certainly

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... standardize...

Jacob Reider – Allscripts – Chief Medical Informatics Officer

So, did Apple and Google decide the standard for how they would create their app stores? No. Those two vendors decided that they would do it themselves. Is there an opportunity for a universal standard? I don't know.

Mary Kate Foley – athenahealth – Vice President, User Experience

I tend to think that, having listened this morning, we talked about could you have rolled specific views of the data—what you needed just within one system? So logically, you can take that concept beyond, and there are some things that are quite attractive about it. I think, at this point, what would really be most helpful to me as a vendor is ever-deepening my understanding of the points of purchase—so rather than, “Could you solve it this way. Could you solve it this way. Could you solve it this way.” I'd rather have a more exposed canon of knowledge about different (I'm going to use the use-case term) different use cases. So the mainline use cases we understand. We get down a couple levels below that, but then there's always something in a nook or a cranny, and if that were exposed right from the beginning, that would be more helpful to us. So a deeper understanding of the problem is what I would go for.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

So before I set down my card, I don't know how to ask this as a general question, so I'll be really specific. So Maureen is with Vocollect, and they have a technology that I suspect is very different from what the rest of you guys are using. I wanted to bring that out as an example of, the actual way in which the user interacts can be hugely different, and maybe if you talk a tiny bit about how your users interact, and maybe some others could jump in about other things they see as innovations that might be coming in the way folks interact with machines?

Paul Egerman – Software Entrepreneur

This is Paul, could you put me in the questions queue?

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Sure. Oh, sorry. It's Marc ... do that.

Marc Probst – Intermountain Healthcare – CIO

Okay sure.

Maureen Ladouceur – Vocollect Healthcare Systems – Vice President, Clinical Solutions

Were you going to repeat the question? I'm sorry, no? Okay.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

No, he wanted to get in the queue.

Maureen Ladouceur – Vocollect Healthcare Systems – Vice President, Clinical Solutions

Okay. Yes, at Vocollect Healthcare Systems we have a system called AccuNurse. The intent behind AccuNurse is to provide a mechanism for users to be able to interact with, and interface with, clinical data differently than what is currently available with a keystroke based application. What AccuNurse

effectively enables users to do is to be able to get clinical data on-demand using voice. So we're looking to leapfrog keystroke-based technologies that require a user to either be tied to some type of device that they're holding, or some mounted kiosk on a wall, or some computer screen. We're trying to take clinical care to an interactive level where you're actually interacting with the data throughout the day on a real-time basis to be able to make the most timely, accurate, and appropriate decisions.

To Larry's point, it's a very different technology than, probably, what anybody else has here. It's a very different way of being able to accomplish your clinical goals and to achieve the best operation on financial results. But having said that, there certainly is a dependency on interactive between this technology and other core systems if it's something that the mass market would be able to take advantage of and benefit from. Certainly, the issue of interoperability, standardization, and the extent to which those things move forward, would certainly drive a lot of what that could be.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

So to put it though into one phrase, the nurses wear a headset with a mic boom that's wireless. So they're connected to computing capability while they walk around, and it talks to them, and they talk to it.

Maureen Ladouceur – Vocollect Healthcare Systems – Vice President, Clinical Solutions

It's like having a clinical coach in your ear—document by answering questions, communicate silently. So again, we're taking the dependence off of a computer screen, the dependence off of paper, and allowing you to have that information, literally, on-demand at the point in time with which you need it.

Carl Dvorak – Epic Systems – EVP

I'll add to that too, I think there's been tremendous innovation—and people speak in terms of monolithic system—but we've got iPhone applications for the patient, iPhone applications and iPad applications for the doctor, Android applications coming out. We've got voice control, integrated third parties with Nuance. You can dictate on an iPhone or iPad workstation. We just did some more quick gesture recognition to avoid the vector for germs and viruses etc., on screen. So you can now motion to an ICU panel, and it'll adjust and go to a different view for you. So there's a tremendous amount of innovation. I think we'd want to be careful not to label certain companies with monolith because I don't think that's an accurate perception.

M

We have—

Carl Dvorak – Epic Systems – EVP

...those technologies are provide by third parties. They're tools you plug in.

Marc Probst – Intermountain Healthcare – CIO

We have 7 people and just a little over 15 minutes. So we can get to each person, if you can direct your question to an individual on the panel versus across the whole panel or a couple of people, we might be able to move through this, but we do have several people. Joan, why don't you go ahead?

Joan Ash – Oregon Health & Science University – Associate Professor

I'll involve at least three of you in my question. We've heard mixed messages from you: regulate, regulate at the highest, and provide guidance. I'd like to ask you why, especially Jacob and Carl on the guidance and Bill on the regulation end, why do you feel that way?

Bill Hashmat – CureMD Healthcare – CIO

Without regulation, we would not have any incentive to go out and achieve that. You remember the state of the EHRs before CCHIT started to appear in 2006. Everyone was doing everything differently. So they came in and they said, "Okay, you've got to have driver lists. You've got to do e-prescribing like this. You've got to do all the various things in an organized manner," and they mandated certain steps. So from there, 2006 to 2008, they introduced other things, and then in 2011 more items—interoperability standards. So I think that without mandating a track or a path, then why did we do the ONC certification.

We can allow all the EHRs to build the way they feel like and then let the doctors decide whatever works for them.

So again, I strongly believe that standards are a pathway, a guideline. It should not stop us to innovate and progress healthcare IT is very fragmented. We haven't really invested a lot of energies in developing the best IT out there if we compare it to the other industries. So we should do that work and allocate some resources and efforts and time to achieve usability requirements. We have come a long way in the past 20 years in adapting all different standards, and there's been a great deal of work, and I appreciate all the efforts of all the companies have put into that—starting from ANC standards, NC standards, all the way down to ONC standards today. However, without standardization, it's going to be increasingly difficult to adapt a framework that can allow intuitive information delivery, ensuring safety is built into that information delivery, and reducing the amount of effort. Because today, you see, physicians don't really have time. Now we are squeezing them in terms of payment for services.

Based on that, you have earlier heard that people said that they—on an average, a physician is supposed to spend about two hours every day to complete their EMR work. If we divide the \$48,000 that ONC is going to give them, after a year of practice it's about \$1,200 a month. If you divide that with 40-50 hours a month, you can understand why the physicians are resistant. I believe that if we continue to really push the systems down—we are, just through the RECs, about 12,000 providers are being enrolled every month.

Now my biggest worry is that what would happen, because I have seen lots of ...stalls in the past 15 years, and spent a lot of time with the end-users, and tried to really work my way through. But one organization or ten organizations alone cannot really deliver unless there is a standard out there, unless there is a framework. I'm not saying that mandate it to begin with. We can have a flexible track, and I tell you that if you look at it from the technical, from the technology perspective, we don't have much to do in the next eight or nine months or so in terms of achieving any standards. Meaningful use stage two, there are not many requirements, so if you ask any of the CIOs today in all major companies, other than 5010 and ICD-10, those are the two major projects out there. Without having a defined track, it can be optional.

Jacob Reider – Allscripts – Chief Medical Informatics Officer

As you might guess, I see it very differently, and I think it's an important difference. My background is doing this since 1993 for physicians with end-user EMR applications. We've done this long before stimulus existed. We did this long before Stark exceptions existed. CCHIT was created, in part, to help deal with the Stark exceptions and physician inurnment differentiation. Why are we just giving money? Are we giving something productive? Meaningful use is a construct to avoid people getting \$44,000 to buy a box and put it on their shelf. That's the real cause and effect behind those. I think we try and use these vehicles to make improvements, and that's fine and that's okay, I guess.

But having been here long before stimulus and planning to be here long after stimulus, I think it's important to remember that the reasons people bought an EMR in 1996 was because they felt they could make an improvement in efficiency. Because they felt they could make an improvement in patient safety, or because they felt they could make an improvement in the experience with the patients and the providers that they employed or cared for. I think that's something we should not lose track of. This isn't entirely about government money. This existed before, and it'll exit after, and I think we have to recognize the meaningful use program in ONC is geared to help create some acceleration in what was already deemed a reasonable thing to do.

Marc Probst – Intermountain Healthcare – CIO

Okay, Chuck?

Chuck Friedman – ONC – Deputy National Coordinator

Let me preface what I'm going to say by saying what I'm about to say is a complete hypothetical. I'm a big fan of *Consumer Reports* and the way *Consumer Reports* tests products, but particularly automobiles, which are complicated, which are operated by humans, so there's that element of person-machine

interaction, which is important. Anybody can answer but I'm interested in Mary Kate and Carl or Jacob to respond to this. When you look at a review by *Consumer Reports* of a vehicle, they use not one, but a panafleet of measures, each of which is measured repeatedly to achieve reproducibility, and which are collected separately and then amalgamated to create an overall rating. But I'm not even sure that amalgamation is necessary. There's very, very useful information in the reproducible assessment of each of these 40 or 50 facets of an automobile that they measure. My question to you is, will that—could that—work in the assessment of electronic health records? I'm very interested in your answer to this question because it's a laudable methodology, and I think it's a template that, at least, we should juxtapose with the EHR usability conundrum.

Mary Kate Foley – athenahealth – Vice President, User Experience

Do you mind if I respond to a couple things along the way before I get to a conclusion?

Chuck Friedman – ONC – Deputy National Coordinator

Sure.

Mary Kate Foley – athenahealth – Vice President, User Experience

One of the things that strikes me that's a big difference between the situation that *Consumer Reports* bases—I can't think of a counterexample to this—is that there's often a single user for—one person drives a car. You haven't got a team of people—they don't test how easily somebody sitting in the shotgun seat can read the GPS out loud to—they're not doing cooperative work. That's one of the things which—I actually would have thought, from time to time, it would be nice to test some of our competitors, but I can't figure out a reasonable way to do it, and I'd be happy to keep talking to other people about ways to do this. So we ask you to consider promoting the process, the methodology, and if we can work together to figure out a methodology—not the answer, but the methodology that we would use across vendors—I think that's very interesting.

I think that would be a very interesting thing to do, but I haven't had the brainstorm yet that helps me figure out—now if we could agree on some particular metrics—Bill, you were talking about the two (several people have talked about the two hours at night, take the charts home and finish things up. That's why I like digging into problems. This is a problem we hear over and over and over again. So one thing that we're doing—we don't know the answers yet, but we've instrumented the product so that we can—we keep track of the amount of time that providers document in the system, and we don't include the thinking time. You're going to think however long you're going to think about a clinical problem. But we record the amount of time that you're interacting with the system, and now we're starting to—and this is pretty new stuff. It took a while to come up with a normalized way of counting all of this across all the different appointment types, all the different scenarios and so on.

So there's a lot of learning to be done. How does tenure on the system matter? What if you use this kind of implementation strategy versus that? How does that matter? What if you have access to ongoing learning and support vehicles? What about the size? What about context? What about specialty of course? We're starting with the providers, with the physicians, but I'd be really interested to get to a place where we could do that for everybody who uses the system.

Carl Dvorak – Epic Systems – EVP

... Mary Kate's comment. We faced a similar situation many years ago where you get these frustrated responses of, "It takes me two hours a night to do my charts." So we actually instrumented a while ago and, indeed, we've noticed this distinct pattern. A small number really did, literally, laboriously chart for two hours—a very small number. We figured out what help they needed and got that to them. There was a larger group, though, that was fascinating. You saw this interesting pattern where about every seven and a half minutes, they did a couple steps, and then seven and a half minutes of silence and a couple of steps—seven and a half minutes around the clock. Top of the hour, five minutes of work— seven and a half minutes, couple steps. People were picking away at their 'in' basket as they watch TV. It turns out that was the time between commercial breaks. But they count it as two hours because for two hours they had the laptop open. So you do get a lot of real-life understanding of those scenarios when you do dig

into the data to understand it. So I would also—I think it's a great question to ask the class though because they do some of that as well.

Jacob Reider – Allscripts – Chief Medical Informatics Officer

I'll try and be super quick. It reminds me of the problems we have in evidence-based medicine. So what's our measured outcome? Are we doing patient oriented evidence that matters? I always explain to my medical students, it means I can explain it to grandma. So this is a drug you'll take that will save your life, not lower your HDL—or LDL, I guess, would be—sorry. Sorry. Let's hope it doesn't lower the HDL. So which measure are we looking at? Are we looking at morbidity and mortality or are we looking at disease-oriented evidence, which would be the HDL? That's my biggest concern.

So to answer your question, I think that at some point we may be able to get there from here, but these are—because of the variability that I think Mary Kate described so well, I don't think we're there yet, and I haven't had the brainstorm either. We work in this industry, and we're super interested in answering exactly the questions that you raise. So could we in some way get closer to that? Perhaps, but it's got to be very—it's for the pediatric cardiologist who works in the three doctor practice, this one works great. Buy that car. For the general surgeon who works in a major medical center, buy that one. Our metaphor starts to break away.

Marc Probst – Intermountain Healthcare – CIO

We have maybe five minutes left, so we do have to be quick. Joe?

Joe Heyman – Optum InSight – Chair, National Physician Advisory Board

Well, even though I have to be quick, I'm going to direct this at Bill, and maybe Carl or Jacob might react to Bill's answer about this. At the AMA, twice now we've had a resolution introduced that there ought to be an imposition of a common user interface—twice—and each time it gets defeated, thank goodness, because I think it's a terrible idea. I think it's not just different specialties who use things differently, it's different physicians in the same specialty who prefer one interface over another interface. I've also—we have this legendary guy in Massachusetts, Grant Rodkey, who works for the VA who's about—he's in his mid-'80's. He wants to set up a not-for-profit commission to use this as a common user interface and just give it away nationally.

Then I was thinking to myself that there's the problem of one doctor who works at three hospitals and the three different hospitals use three different EMRs. It occurred to me that rather than having the same interface, if they were just intuitive for them to use it, completely intuitive, the doctor could go to any of the three. Because it's intuitive, even though they've done in a different way—the same way I could use a Mac or a PC—that doctor could use any of those three EMRs. So Bill, my question to you is why do you think that there should be—unless I misunderstood you—I thought I heard you say there ought to be a standard user interface, which I think is a bad idea.

Bill Hashmat – CureMD Healthcare – CIO

Common user interface can solve this problem of moving from system to system, and it can start out at a common terminology level. At least you have basic fundamental things out there, and then you can always configure it to add or remove data elements from there, at least certain areas like on the problem list, maybe on face sheet or other areas of the EMR. So the best thing would be to ask any of our research centers to do a research on it, and then study it, and then probably come up with some recommendations rather than a group saying for it or providing arguments against it. It would be good if we engage any research center and try to get some findings from them. That would be my answer to that.

Carl Dvorak – Epic Systems – EVP

Yes, and again, a difference in there. I think you'd have to actually—to solve the problem, you'd have to get the workflow through the organization to be the same, otherwise, you'll increase frustration. We actually experienced that situation where clinicians used one version of our application in practice and then go to a hospital that actually used our application as well. You have to be very cautious of the subtleties of, "I thought it was going to be the same because it sort of looked the same," when, in fact, it

wasn't the same. So I think common user interface doesn't alone solve that problem at all and might even lead to some more insidious mistakes from not realizing what's actually different because it looked the same on the surface.

Marc Probst – Intermountain Healthcare – CIO

Very good point. Okay. Thank you. David.

David McCallie – Cerner Corporation – Vice President of Medical Informatics

Just a funny anecdote. When, apparently, someone at Cerner got the e-mail from Carl requesting a response to this survey that he mentioned earlier, they said, "What the heck is Epic asking us about our usability for," and threw it in the trash. The positive point of this is that it is a very competitive industry, and usability is certainly an area in which I think all of the vendors feel that it is a competitive arena. So I would cast my—shifting gears here, not to ask a question but as a vendor on the panel here, cast my agreement with both Carl and Jacob and Mary Kate as to what they've said. I think the market will figure this out.

Marc Probst – Intermountain Healthcare – CIO

Thank you. ...?

M

Yes. I'll direct it to Carl, because you raise the question in meaningful use and cigarette smoking history of something that I would call out of process documentation because cigarette smoking may or may not be the issue at that visit. I think as we're sitting here thinking about policy around usability, one of the things that strikes me is we're still very much anchored in this circa-1990 documentation around CPT coding, so half the note is really about government mandates on reimbursement. So these long review of systems that, charitably put, would be of low probative value, almost equally long physical exams where it would be hard to exactly document what the value of that was or what was done to do that in order to just get paid that relatively small sum on the cognitive side.

So I'm wondering, does it make—I think there's a bit of a challenge for meaningful use one, two, and three with out of process documentation questions and how to formulate that. But I'm wondering whether some of the policy should be about having a more 2011 view of how we document to the E/M codes where we now have these software tools. That was all written to be good stewards of the Medicare dollars when everybody was on paper. It was the ... limited steps so people couldn't just defraud us as taxpayers. Now we have a whole different set of tools. Maybe the seven and a half minutes between commercials should be part of our usability thing—re-think what I think is potentially the single biggest correctable barrier to usability that's out there in EMRs. My colleagues in our setting, over half of every note is meaningless documentation where there is zero data. The effort that is spent by clinicians trying to find what acutely happened to the patient in that sea of camouflage is extraordinary. I think it's something that this group might be able to put into as a policy and really use the modern tools to move us into the age because that's something I think we can do here. I'm just curious with your observations about how you explained the cigarette field.

Carl Dvorak – Epic Systems – EVP

Because with meaningful use, we've got things that are new and interesting. It's hard to judge better/worse at this point because things that are different/better, things that are different and the same, and things that are different and worse. Smoking fits into the different and worse for most sites who have actually been managing smoking cessation in any active way. I think, with regard to the E/M world, the charting for reimbursement world—again, our experience in Europe with live sites there, working with other countries is—although we've grown used to it and grown numb to it, it is a tragedy of significant proportion that we control doctors lives and force them to chart this gibberish and garbage. You'll see it. You see people copying things in the note that clearly exist elsewhere because if it's not in the note, they feel they're going to get an audit, and they're going to get penalized for it. I think if there were an opportunity to work on policy on that front, it would be the single biggest thing we could do nationally for usability with regard to EHRs.

Marc Probst – Intermountain Healthcare – CIO

Well done. Okay, Bill?

William Munier – AHRQ/HHS – Director CQIPS

A quick observation and then a quick question. Seems like the debate is not that there should be no regulation, but I worry there might be too much. So what's just the right amount? The problem with government servants, of which I'm one, is that they tend to be actually very well meaning and very compulsive, and you get experts together and competing experts, and they always want to be exhaustive about everything they do, and that's how you get the long lists.

That's a whole topic for an afternoon, but my question is—and I know the next panel is on testing for meaningful use, but I really wanted to direct this question at the developers. Larry mentioned before flirting with the software and getting to know it in the early stages, and then having a deeper relationship over time, and the EHR is a classic one where people don't really know what they've got for three to six months once they're in there. The real usability is that level, not the superficial level. Yet, anybody testing it, somebody that isn't familiar, somebody who doesn't buy it, is just going to be at the flirting stage, not the deep love stage where it really counts. So how do you respond to that? How does somebody who's going to be assessing usability actually come up with a workable situation?

Jacob Reider – Allscripts – Chief Medical Informatics Officer

I definitely think that one's hard. You kind of start somewhere between the lemon law and preference. If I buy a Ford because it's \$6,000 cheaper than an Audi, and two months in I think, "Oh, I've made a tragic mistake. I'd rather have the Audi," I can't. I've got to go sell the one and buy the other and deal with it. I think there's a difference. If something simply doesn't work as advertised, that's a much easier line to try to draw, but I don't know if I have a great answer to that question. Do you want to—?

Maureen Ladouceur – Vocollect Healthcare Systems – Vice President, Clinical Solutions

I just want to add one thing. I think this actually ties directly to what Dr. Friedman was talking about in terms of the *Consumer Reports* model. The information that the users need in order to make that informed decision needs to be surfaced, but I don't think it's going to be one five-star rating or one variable in that consumer report. One of the points that several people have made is around process. If I knew which vendors were doing iterative usability testing, which ones were going out in ethnographic studies three to six months after an implementation and finding out about use, that's information that I think around process of development that could then help when you see a demo when you're doing your assessment about whether you want to buy that car or not.

Jacob Reider – Allscripts – Chief Medical Informatics Officer

I would argue that it's also the same as Jodi's question. So what are some of the dependent variables, to now go back to Chuck's question, that we might look at? What are the patient-oriented outcomes? Implementation time. So if it's easy to implement and fast, and we can—that data can be gathered. If users implement one system in three weeks and another one in ten weeks and both are successful, then maybe the one that was implemented in three weeks was better—more usable. So usability has a negative correlation with cost. So if it's more usable, it'll be cheaper, training will go down, and this is a lot of the expense of many systems. So I think these are some of the—if we kick these things around for another little while, I think we can come up with some of the things that are really the outcome measures and not the disease-oriented measures that we have been using ... variables like common staff members working on ... budget.

Marc Probst – Intermountain Healthcare – CIO

Thank you. Clearly, I'm the moderator that can't stay on time. Paul, did you have a quick question?

Paul Egerman – Software Entrepreneur

Yes. I'll try to be quick. It seems that we've had a lot of discussion about usability from the standpoint of user interfaces and common user interfaces, and I have a question I guess I'll ask Carl. Is there any benefit in having common user concepts instead of the interfaces? If you look at things like episode of care, or episode of service, or visit, or even medical record number, or patient id, it seems like we don't

have uniform definitions of what these things mean within healthcare. And perhaps if we had those definitions, that might make it mitigate a small percentage of these problems.

Carl Dvorak – Epic Systems – EVP

I think you actually have quite a number of them already at the concept level. Are they always spaced out to the nth degree? No. But I do think as I line up RFP after RFP after RFP from many sophisticated sites as well as many sites that are less sophisticated, they seem to nail the concepts pretty consistently, so I do believe that these concepts really are more common than different.

Maureen Ladouceur – Vocollect Healthcare Systems – Vice President, Clinical Solutions

To the extent that they're a guest, we could try to identify them and see if we can—that's more promising, I think.

Marc Probst – Intermountain Healthcare – CIO

You are an excellent panel, and we really appreciate the discussion. Just one theme as it went through the conversation—and I am as guilty as anyone else—but these aren't automobiles. This is people's medical information that we're dealing with, and I think we will be held to a higher standard as we deal with that and the fact that we need to share that information. I guess my personal belief is standards—we need to look way deeper than simply a common UI (user interface), but how do we actually share data? How do we interact those data? I know there's other subgroups working on that and I know each of you have been in your development organizations. So thank you very much, and thanks.

(Dead air for a minute)

Charles Kennedy – WellPoint – VP for Health IT

We're going to go ahead and get started with the Measuring & Improving Usability panel. My name is Dr. Charles Kennedy; I'll be moderating this panel. We have Jiajie Zhang who will be our first speaker, so why don't you go ahead and introduce yourself, and we'll be starting the clock in just a moment.

Jiajie Zhang – NCCD – Co-Director

My name is Jiajie Zhang, a professor of University of Texas in Houston. Actually, I'm one of the first readers of the first draft ... this morning. A design of ... because I was studying my Ph.D. with Don Norma at that time. Back to my job here, I'm the principal investigator and co-director for the ONC-funded SHARP-C project where we focused on the way people interact cognitively with the EHR, and our charge there is to find ways to help the industry improve EHR usability. I'm also the director of usability at the Texas Gulf Coast Region ... Center where we are actively testing commercial EHR systems.

Usability, for us, refers to how useful, usable, and satisfying a system is for end users to accomplish goals in the domain by performing sorting and sequencing of tasks. My written testimony addressed the methods we have developed over the years and how we are able to improve EHR usability to support healthcare providers in making safer actions right now. Today, however, I want to speak to the larger issue at hand. Why is usability so important?

Healthcare can be like a house of cards—just play cards stacked together. When things go wrong, one misleading piece of information can cause the wrong foot to be amputated, and one missing fact can cause the patient to get a deadly dose of medication. Think of me, a usability expert, as the home inspector. I inspect homes for functionality, usability, and safety for homebuyers. The home sellers may hate home inspectors because we generate a list of problems to be fixed. Homebuyers, on the other hand, like home inspectors. Very few homebuyers would ever buy a home without a comprehensive home inspection because nobody wants to buy a home with a cracked foundation, a fire alarm that goes off for no reason in the middle of the night, an air conditioning unit that has regular downtimes in hot summer in Houston, or a security system too complicated to activate or shut off. Home inspection is a profession, it requires certification and license, and there are established testing procedures to follow, and there are standards for many of inspection items.

I'm also an architect here on the brand of both ... and the buyers. I have computers to incorporate good functionality, usability, and safety features into the design even before starting to build a house. Architecture is also a profession. There are codes or standards for home construction. The codes ensure the basic functionality, usability, and safety of our houses. Architectural codes, even if strictly followed, do not divert innovation. Just look at the homes in the best neighborhoods—the variety of creative designs can be quite amazing.

Why does home have anything to do with EHR? Usability is the foundation of EHR. Without usability, an EHR is a house of cards ready to fall down on the patients. EHR usability is a compilation of inspection and design, and it offers a solid foundation for EHR to be usable and satisfying. This means it contributes to safer and more effective care. Usability makes sure the ... do not spend too much time looking for one information because we know it will not have this time to spare. Usability makes sure the information is presented in a clear way so the nurse, the physicians, or this unit clerk can understand and make good use of information. I do not think any of us would argue with that, and I know you are aware of the lives lost in our healthcare system today due to medical error.

For the EHR vendors team audience, I also say that the current state of safety in healthcare isn't your fault; it is opportunity and we must address it today. EHR has great potential in decreasing medical errors if we focus on usability as the foundation. In this economy, there are plenty of homes on the market, but before you start a contract to buy a house, hire a home inspector. Before you buy EHR, read the consumer report of the EHR. While you are designing a EHR, hire a usability expert. Remodeling can be very expensive for both homes and EHR, and replacing a home or EHR that isn't usable can cost you a lot more. Thank you.

Charles Kennedy – WellPoint – VP for Health IT

Thank you, Dr. Zhang. Our next speaker is Svetlana Lowery. Welcome.

Svetlana Lowry – NIST – Health IT Usability Project Lead

Good afternoon, everybody. My name is Lana Lowry, and I'm the Health IT Usability Project Lead at the National Institute of Standards and Technology. I have devoted my 30 years to practicing the scientific discipline of human factors to improve the usability and accessibility of many complex systems. First of all, I would like to express my appreciation for the fact that we are actually discussing usability and human factors at this important public forum today, and I would like to present an overview of the work that NIST is conducting in close collaboration with other organizations.

NIST is working with other government agencies, with academia, with the industry, to establish a framework that, first of all, defines then assesses health IT usability and accessibility. Usability is a key factor in meaningful use because at the end of the day, no one can be satisfied with a system in which the system itself is a contributing factor to an error in patient treatment. It is very essential that meaningful users—doctors, medical technicians, nurses, administrative staff, and others—be able to successfully access, retrieve, process, and enter data easily without errors and without excessive time burden.

We know from science that humans have many capabilities but also have many limitations—limitations in the ability to perceive, process, and act on information presented to us. We also do know from human subject science that if we design our systems in a way that exceeds these limitations, we will produce use error. The challenge, therefore, is to develop systems that develop human performance, not undermine it. In response to this challenge, NIST is developing an EHR usability protocol that provides the detailed specifications of an objective, repeatable procedure for measuring and evaluating the usability of health IT systems. The goal is to establish four ... methods for measuring usability that will uncover critical usability issues that may impact performance and errors in EHR use. These methods will be based on known human factors principles, processes, and best practices. Simply put, applications should be designed to eliminate the cause for error, including human error.

Or on a practical level, this means that first we deliver a process that describes guidelines of usability factors associated with critical safety issues. Second, we deliver technical evaluation protocols to ensure

EHR developers have a framework to understand how usability affects critical safety issues in patient care. This protocol will be presented and discussed in workshop settings at NIST on June 7th this year.

In developing our guidance to measure the usability of EHR systems, we are adopting existing best practices, such as the FDA human factors evaluation process, the Army MANPRINT process, Navy human system integration, FAA ... certification process, and potentially others adopted by federal agencies with oversight on system usability. We are ... customizing these best practices and methods to the specifics of EHRs. We're closely working with diverse experts from government, industry, and academia in the fields of human factors, clinical practice, informatics, safety risk, and accessibility. The intent of our EHR usability program to validate an applications user interface is not leading users to make critical usability and potentially safety-related errors.

I will quickly ... key components of the protocol. These key components will include identification and reduction of use errors through thorough analysis of all users groups, user environments, and use cases. Demonstration of evidence before much user research ... either ... usability testing and cognitive work throughs, and changes made as a result of this research. Validation studies conducted by qualified professionals with a truly representative range of real users under realistic conditions all users that ... with documentation of remediation.

Establishing best practices—educating the industry that some qualitative methods such as focus groups and surveys are not sufficient for the identification and mitigation risk associated with use errors. The goal is to help each of our developers generate via formal usability reports in common industry format standard for reporting the results of summative usability testing that was released by NIST in November 2010.

Finally, let me be clear, the usability evaluation program is focused on helping developers of systems assess and demonstrate the details where it's free from design-induced user errors. The program will not dictate particular user interface designs. Providing these tools and guidance will empower the ... community to integrate while being sensitive to the impact and importance of user-interface design decisions on medical staff and patients. NIST is working in close collaboration with HIMS HR usability task force, the EHR vendor association, the ONC SHARP team, and U.S. Access Board, and other public and private stakeholders, in order to ensure maximum transparency and opportunity for constructive technical input. NIST is hosting a technical workshop on June 7th of this year at our agency in Gettysburg. We hope to see you there.

Charles Kennedy – WellPoint – VP for Health IT

Thank you, Ms. Lowry. Our next speaker is Ben Shneiderman from the University of Maryland. Welcome.

Ben Shneiderman – University of Maryland – Professor, Computer Science

Thank you, Charles, and thank you to the committee for giving an opportunity to talk about this, especially Judy Sparrow for organizing this event in advance. The written testimonies of the many speakers, including my own, are available. While I might have started with them, today's events have left me with such an emotional reaction that I feel I need to address some of the issues that have been raised during the day here. We heard some of the concerns raised by user groups and ... strong statement that says our medical system is archaic. That goes directly at odds with the vendors who believe they are being innovative in advancing the technology, and the vendors who fear that measurement by others would hinder innovation, while measurement by themselves, of course, advances innovation.

So I'm left with a puzzling set of things, and Joseph ... statement that common user interfaces would be a terrible idea when we've heard the presentation that repeatedly, in industry after industry, there has been a benefit from common user interfaces. Now, maybe your perception of what common user interfaces mean is the dictation of very strict specific rules, whereas I think the discussion earlier about common concepts are more of what happens. When industry groups get together, as NIST successfully did with the IUSR effort that produced the common industry format for reporting, if the industry is involved in making those decisions, then you will have a wise, sensible approach to conducting measurement that is

also open and public. That's the central thing I must turn to. My greatest concern is the closedness of this industry to discussion. When I've asked for Epics user manual, for example, I was told, "No," that it was a protected document. When I asked to see it for demonstration, I was told I would have to sign a non-disclosure agreement. I was told I could not print screens and describe them in scientific papers. So again and again, I'm torn by the conflict that I see by an industry that is making an effort to include usability but reserves the right to judge itself.

Again and again, we know that an open process across multiple industry groups, whether it's bank teller machines—which I participated 35 years ago—in automobiles, in aviation and air traffic, in mobile phones, has produced enormous successes for those industries themselves. So, I do call—and I see I don't have to call too hard—for usability measurement because that's quite well accepted, but the aspect of the usability addressing consistency remains controversial. The success of usability research over the last 30 years is that we have a successful set of strategies for producing what's been called 'plastic interfaces' that one physician could adapt the display for their needs, whether they have poor vision and want larger fonts and more information or less information, we can provide those controls. The vendors can provide those controls to allow the users to customize as they wish. And so that approach will allow for the diversity of users that will include—as Dr. Wainapel's really moving testimony about the importance of accessibility and universal accessibility by users with different kinds of disabilities—and others like Nancy Stagers testify about the importance of registered nurses as well as physicians. We can do all those things. We do it in automobiles where you get in the car, you adjust the seat, you adjust the mirror, you adjust the lights, and you adjust the sound. It's adjustable; we expect it. It's not excessively expensive. It's a natural part of what we expect in systems. I expect it from the electronic health systems that are used in public situations.

Now Chuck Friedman asked a very reasonable question about why not *Consumer Reports* strategy, and I don't think he got fair answers. I think that is another approach. No one measurement strategy will solve all things just as no one medical test will tell you the condition of a patient. Sometimes you need a blood test. Sometimes you need an x-ray. Sometimes you need alternate advice—and same thing for usability. We have many, many, ways of doing measurements, and we need to invoke these multiple strategies.

I return, finally, to the point about openness and the need for different strategies of independent oversight. This would be the great value that the ONC could bring is a reasonable approach for independent oversight that would make more public. We have the celebrated Apple systems—have a public Apple HCI guidelines document. I haven't seen a public document from the vendors that we can discuss that will be seen by other vendors and held openly. I haven't seen the chance for this kind of review and independent oversight that would allow a systematic approach like the CIF would allow. I'm pleased that respondents such as Bill Hashmat said, "Without standards, how can we move forward?" Now the word 'standard' scares people, but I think standards, when developed by the community of the vendors themselves can produce benefits. Let's make those standards. Let's make them public. Let's measure the benefits. Let's really improve what we've got. The situation as it stands now is frightening and deadly. We need to do better. We know how to do better. Let's do it. Thank you.

Charles Kennedy – WellPoint – VP for Health IT

Thank you for setting us straight there Ben. Our next speaker is Dr. Ross Koppel. Welcome.

Ross Koppel – University of Pennsylvania – Adjunct Professor of Sociology

Good afternoon. Thank you. I'm a sociology professor at the University of Pennsylvania, also a professional principle investigator at Penn School of Medicine. I'm PI on the AHRQ project to create a guidebook to mitigating HITs unintended consequences. I'm chair of AMIAs evaluation working group. I'm an evaluator on the project Chuck talked about, the SHARP project at Harvard, and I've written a few articles on HIT and patient safety.

Now to your question: Can usability be measured? Absolutely. As my colleagues to my right here have indicated, human factors is a robust science that could be used to improve HIT. Now it's also true that to enhance marketing and to reduce the vendors' liability, HIT systems not only encourage local customization, they absolutely require tens of thousands of local implementation choices, each of which

affects usability, good and bad. By compelling vast variations across medical settings, the current industry structure actually mitigates, or maybe even invalidates, the value of EHR bench testing and certification. Conversely, standardization—reasonable standardization— would both increase usability and reduce HIT-related medication errors and medical errors.

Areas of usability that would be helpful given the absence of usability measurement in HIT on a systematic basis, any scientific method would be helpful. What parts of usability are too theoretical for measurement—these are your question. Answer: none. As we teach in epistemology and research methods (what I teach) the goal of science is to build theory, and the goal of scientific theory is to guide experimentation. Human factors is probably a more robust science than several areas of medicine.

Last question: Will measuring usability stifle innovation? Au contraire. Measuring usability would encourage innovation. Your question, in fact, turns the matter on its head. We've had innovations in bells and whistles while core usability has often been ignored. Insufficient focus on usability has retarded HIT's innovation. We didn't force physicians to go out and buy iPhones, and we don't force teams to explore evolution's design functionalities. Good design and functionality are mutually reinforcing and encourage voluntary adoption. If HIT were more usable, our current carrot and stick policies would've been superfluous.

The other absolute essential to achieving both usability and innovation requires that we enable clinicians to report HIT problems without fear of retribution—instantly and with serious analysis of their reports and response—enabling frictionless or near-frictionless clinical feedback and measuring usability would spur innovation. Usability has been ignored at the peril of patient safety and to the detriment of HITs efficacy.

I close with an observation linked to your important question about HITs use by the visually impaired. Vendors have actually tried to provide equal HIT access for blind clinicians. Ironically, they've done this via HIT user interfaces that are so hard to navigate, have such confusing menus and dropdowns, generate irrelevant and obscuring pop-ups, and require so much clicking and scrolling that even having perfect vision is of limited value. I look forward to your questions, and I hope that we have a chance to also talk about the related link between standardization and interoperability, which is critically important, and for which there are ways of achieving interoperability with alternative methods like digital pens or other forms that have almost instant semantic interoperability. Thank you.

Charles Kennedy – WellPoint – VP for Health IT

Dr. Koppel, thank you for your remarks. Our last speaker is Bakul Patel from the FDA. Welcome.

Bakul Patel – FDA – Policy Advisor, CDRH

Thank you for the opportunity to participate in this workshop and share FDA's perspective on usability of electronic health records. We understand it's really important that electronic health records can actually reduce healthcare costs and also minimize clinical errors at the same time. This benefit can be realized with an EHR system that is designed and has considered the intended users and the environments the users actually reside in and has systematically incorporated those considerations into design through analysis and through a thorough evaluation that doesn't stop at the time they deploy. FDA Center for Devices and Radiological Health has been evaluating usability of medical devices in clinical environments, as well as home environments, for a long time. The principles, we also call that as human factor principles, and the methods used to measure and evaluate usability of medical devices in both clinical and home use environments can be applied to EHR as well.

The FDA's experience has shown that users will make errors—that's inevitable with technology—especially with new technology. Some of the things that commonly are measured are ease of use, intuitiveness, user satisfaction. That is easy to measure and there's a lot of ways to come up with creative methods of number of clicks, etc. to understand is it satisfying. However, productivity and patient safety is a category that people forget and not tend to focus on. The state of the art of usability software where safety is not critical often relies on objective measures such as completing specific tasks or just doing a focus group or understanding the ease of use ratings. Although these evaluations are straightforward

and readily yield numerical scores, they do not provide a rich quality of information regarding the ways that errors can happen or the reasons the users made the errors.

When evaluating medical devices, the FDA takes the risk-based approach that seeks to ensure that most important aspect of systems are evaluated by the manufacturer, and most importantly, in the hands of the representative population that represents the users. We have found that through careful evaluation and testing, user interface design can be optimized such that it'll be easier to use and potential of users can be reduced or eliminated. It's important to note that these essential and specific modifications to user interface can be best identified and implemented through careful investigation, user interactions with the system while the system is being developed as well.

Various measurement techniques to evaluate usability and determine ease of use, intuitiveness, and user satisfaction are well known, like I said before. Measuring usability in EHRs is unique. It's not as if it is another IT system. User productivity and effect of patient safety is critical for clinical use as well. Just to list a few examples of how FDA goes about looking at evaluating usability is, assessment of user-related risk—so this is a risk analysis that takes into consideration of what's the intent and how other users would react—and I didn't find those others. I didn't find those critical tasks in the process whether through clinical workflow, or as part of a screen that should be evaluated. Characterization of the ... users and their environment—their background—and using those methods and analyzing the use environment and combining all of the above to conduct meaningful design validation is important not only before deploying, but at implementation as well.

When EHR technology is used in the home, it is important to understand and recognize and define the needs of the users and influences is enormous. For example, a home user may not be able to understand the same terminology as a clinician may. Also, there are other factors to be considered. For example, a slow, unreliable internet connection, as well as electromagnetic interference in a home environment. These are all part of usability. Usability measurement is essential for demonstrating the success of innovative technologies. Can innovation happen? Yes, there is definite opportunities for innovators to develop smart systems that are user-centric and can be adjusted to suit the needs of user-specific populations—being at home, being a clinician, being a nurse, or any other user that is using the system. The capabilities of information technology—having used that opportunity even further to help monitor user interactions and provide that feedback—that can be iterated and made sure that it's better.

To summarize, I would just like to observe that usability is not just about measuring something, it's about observing users, making sure that it's continuously monitored, and knowing the environment the users are. Things are going to change. Users are going to get more mature; they're going to learn more. And those levels will change and I think the systems need to adapt to those. At any point, one last thought is identifying the critical task that clinicians and users have to follow is important as well, and I didn't find what do you handle first because you don't want to handle everything at the same time.

Having said that, thank you for the opportunity to address this important issue.

Charles Kennedy – WellPoint – VP for Health IT

Thank you Mr. Patel. Let me just stop for a few summary comments. Even though there may not have been alignment with what you heard earlier in the day, when I read through your written testimony, as well as your verbal testimony, it was all highly aligned. What I thought was that you all communicated that frameworks exist to measure the usefulness and usability and satisfaction, as well as the productivity and efficiency in patient safety, that those frameworks are here and are usable. Another thing I found in your testimony was not to focus on clicks or things like that, but rather to take a risk-based approach that takes advantage of techniques such as human factor science, performance-based test, user-centered design, etc.

You all talked about the importance of quantitative measures, but I'll also emphasize not to ignore qualitative measures to assess things like emotional impact, stress, and frustration. In fact, I'm carrying two laptops as a manifestation of that frustration. You all seem to agree that usability measurement does not stifle innovation and creates substantial value and may even focus innovation toward value. Then

finally, I think I read from your comments that current health IT state usability measurement and improvement is a highly variable activity with an overall coordination, sharing of experience or systematized process beyond what an individual vendor might or might not do. We heard a very impassioned plea to highlight the importance of an open process with external review. So I find that very enlightening and very educational.

With that we'll open it to any questions. Dr. Rucker?

Don Rucker – Siemens Medical Solutions – CMO

Had a question—admired your writings over the years. You mentioned the comment about a standard UI or some standards there, and I just want to throw out a thought that I wonder about. Which is I think part of the reason that healthcare systems have not hit the usability mark on some level—because that's why we're here, fundamentally—is because we actually use too much of a standard. The standard we use too much of are the Windows-like or Windows—specifically Office-based user interface standards—that were designed for people who sit at desks at a fixed distance from a keyboard at a fixed distance from a screen. So when you think about things like scrolling list boxes, those make sense when you're not interrupted 30 times in an hour or 50 times in an hour in a clinical environment, and you control that environment, and it's a constant environment. But I just wonder that a lot of the reason that the tools haven't worked is that the logical way to build software in America is to use the Microsoft foundation classes or the Java UI tools, and maybe what we actually have are too much standards. That we should rethink the business—I see you cringing—rethink the business of should we build and explore things that are healthcare specific tools with lots of interruptions, very challenged environments, of even the angle I get to stand over a nursing counter to look at a screen.

In particular, I don't think we have nailed either as a process in what we've discussed here today or certainly as a business, the mental models. Commissions have deep, deep mental models. You don't get through four years of med school or four years of nursing school and all the training that goes in a residency without having socialized in some extraordinarily deep models, and I don't think we've explored those model. I don't think we have a framework to incorporate those models well. I'm just curious as we explore all of this, where are we going to get the creativity? Because I think some of this is absolutely not about standards but about raw creativity, and if you look at the differential track records and performance, there are clearly some more creative players in building screens over the last 40 years. So I wonder about that tension between the UI components we have and the UI components we need, and was just curious what your thoughts are on those.

Ben Shneiderman – University of Maryland – Professor, Computer Science

Thank you. I'm a little mystified by your point about there being too much standards. I don't see that the interfaces I've seen follow the standards that exist. I see ...

Don Rucker – Siemens Medical Solutions – CMO

Let me rephrase that. Too much reuse of widgets that were not built for healthcare. So a widget in the UI technical

Ben Shneiderman – University of Maryland – Professor, Computer Science

I'll come to that. What I see are horizontal scrolling—a known bad idea. I see large amounts of white space, poor layouts, and poor designs, and things that are not exemplified by the existing successful systems. So I think many of the vendors have strayed from those. Some have done an admirable job. I agree with you that healthcare is a difficult, complicated, and highly varied field. But maybe that's all the more reason we need to have a discussion about putting some order to it. In 30 years in dealing with other industries, every industry believes it's special. Every industry believes they're more creative, different, and therefore, should not address the issue of standards. Yet, when an industry comes to deal with the common issues of design, of terminology—Carl Dvorak told us there are some efforts, and there are some efforts about terminology. But I'm told the story of a physician who gets a report about a patient with congolese hemorrhagic fever, and is frightened about this. It turns out it was coded as CHF, but the importing changed what was chronic heart failure to another term.

The change in values, in metrics, and the lack of terminology standardization are really problematic issues. We're dealing with medical reconciliation, the names of drugs, the spelling of them, and so on. There's so much variability because everybody wants their independence. The nature of computerization in almost every field is to come together to make some common ideas, some concepts, workflows, and terminology so that people can work together, so that learning times are shortened, so that collaboration that was so important here is facilitated.

So I think the perception you're saying is one I've heard before. I would like to encourage you—and I'd be glad to engage in a further discussion to suggest—if the industry itself would choose to begin to work on those issues, I think they would find benefit to themselves—that then, there could be more rapid, more compact, more efficient, more effective principles and designs that would be developed. I see again and again that process. So I just repeat, if the way to get there is let the different vendors publish their interface guidelines documents so we can begin to compare those, and also, let's begin a process by which we could have systematic evaluations across multiple vendors. That will get us to get a better understanding and will lead to the virtuous place we want to be—supporting true creativity by the vendors and the physicians—true creativity, not the minimal differentiation.

Carl Dvorak, he celebrates the diversity and the product differentiation of competing products, but they're differentiating on the wrong metrics. If they differentiated on the support of creative diagnostics, I'd be very impressed. But to differentiate by the color of the fonts and last name/first name versus first name/last name and the 35 ways that systolic and diastolic pressure are shown is not creativity. It's not freedom. It's just chaos.

Ross Koppel – University of Pennsylvania – Adjunct Professor of Sociology

Don, I agree with your question about certain standards being taken from the past. I don't think it's Word or Microsoft-based, I think it's the DNA of HIT, which is billing. So they were billing—spreadsheets basically is where this stuff came from originally.

Don Rucker – Siemens Medical Solutions – CMO

No, I'm talking about very specific code snippets out of these development environments. ... ambiguity about where they came from.

Ross Koppel – University of Pennsylvania – Adjunct Professor of Sociology

But to your question on standards versus creativity and innovation, I think there's a misunderstanding about standards here. We must be able to get standards in how we present blood pressure. Is it one column over the other, is it in the same cell with a slash? I have examples of 40 different ways of recording blood pressure, and it literally includes things like diastolic (because 'D' comes before 'S' in the English alphabet) and then four pages later, after all kinds of lab reports, is systolic. You're a physician, Don, that's called malpractice or worse. And hundreds of different ways, things like too low, noncompliant, patient refuses to sit down, these are nuts.

On the other hand, there is room for experimentation with, for instance, different graphic displays of information with different ways of displaying the allergies and the like, but we should agree, as we have not, that we should start out with those allergies that have anaphylactic shock and end with those with a rash. Currently, a lot of the vendors sitting around here, the allergies are listed alphabetically, and if there are more than two, you've got to pull a drop-down menu. You know who I'm talking about. This is unacceptable, as Ben says, freedom. It's destructive. I just end by saying I study a lot of residents who rotate around to five different hospitals in the case of their residency. They have to learn five different systems with different displays, and it's scary. They're also trying to learn medicine at the same time.

Charles Kennedy – WellPoint – VP for Health IT

David McCallie

David McCallie – Cerner Corporation – Vice President of Medical Informatics

I think that one of the concerns that you might have heard in the previous panel about measuring usability comes from a fear that what you'd be measuring is current convention or received wisdom, rather than

something that really correlates with a deeper notion of usability. We see paradigm shifts that occur in software every now and then where current convention is thrown out the window, and maybe there's an initial rejection of it because it's different, and then it catches on. I think the iPhone might be a good example of that. I suspect Apple didn't publish those guidelines until they had released their iPhone and had assured themselves on some market acceptance.

But my question is I heard statements to the effect that it's scientifically proven and more valid than many fields of medicine. But can you give me some more thoughts on how you can be sure that what you're measuring isn't just local convention, or isn't perhaps other factors that are filtered into the usability that really have nothing to do with the design of the software *per se* but have to do with the overall system. For example, we heard complaints earlier this morning about too many clicks to order a mammogram. That may have been bad software design, but it may have been that in that particular case the payer was putting up a hurdle in front of ordering the mammogram by asking for additional data with an overt intention of discouraging the use of what might have been judged to be an inappropriate test. We tried to design an e-prescribing system a few years ago, and one of my goals to the team was to surface to actual cost to the patient out of pocket of the medicines so that the physician could give the patient choices between the various—once a day is going to cost you more than two times a day. We couldn't get that data; it's hidden from us. The payers wouldn't let us get it, so we had to build clumsiness into the user interface that, in fact, reflected external constraints. So how do you know that you're measuring the right thing, and if you release a score that's not measuring the right thing, we're going to get something unanticipated, unintended?

Jiajie Zhang – NCCD – Co-Director

Let's start with some comments here. First, standards do not have to be about the actual GUI objects, it can be about a process and performance—that both process and performance can have some standards. To answer your question directly about what we actually measure in our lab as part of the ONC—and we are doing some objective measures of the performance by skilled users for the various established meaningful use cases set up by NIST. The same use cases are the ones used for certification for stage one. These use cases are independent of the user end of this. You can use touch screen; you can use gestures. Anything can be tried. So this measure is the measure of the performance and process and we have erected a ... protocol that can generate the performance measures which are highly reliable, and we can compare the performance of different ... systems after the sample. We are actually actively testing the commerce system ... lab at this time. For the vendors here, and I do have a challenge for you, if you think your system is highly usable, please send your ... to our lab. We'll do testing, get a report from *Consumer Reports*, and we have data to generate a *Consumer Report*-like kind of summary, and if only we get the support from the vendors. So please send your products to our lab, and we will give you a report.

Svetlana Lowry – NIST – Health IT Usability Project Lead

I appreciate your question, by the way; it's a very good question. How do we know that what we're measuring is accurate, and how do we know what we measure will not produce some inaccurate results? In my testimony, I made it very clear that we're not going to set any design standards, and we're really not in the position of evaluating design or prescribing industry how to design. I give you very simple plain examples. For example, we cannot tell the developers, "Please do not use red on blue, or blue on red, or green on yellow, because users can't see it because it needs ... we're telling you what color to use. But boy, we can tell you the minimum contrast must be 1:10. You feel free to use any color you want, but every user out there will be able to see that."

That's one example. I will give you another example that I, personally, like very much because I have ... When you get yourself on the plane and when you walk by the cockpit, you look at that cockpit and you say a little prayer that the pilot will get you down safely. Do you care at that point what color is the device? What shape? What layout? No, you don't. The only thing that you care about, the capacity, the mental capacity of that pilot and logical protection and psychometric reactions are equivalent enough to get you down safely. That's our measurement. Human performance—accurate human performance with the minimum or no critical errors and no inadvertent errors—these are the measurements that I dare anyone in this room to start arguing with me about.

Charles Kennedy – WellPoint – VP for Health IT

While Bakul Patel had put a stronger emphasis on satisfaction and perception, I think the history of this field's success has been on performance—speed of learning, speed of performance on benchmark tasks, the rate and distribution of errors, retention a week or a month later. While one could easily invent benchmark tasks, which would go awry, I invite the industry to come together and choose 30 benchmark tasks against which they will be evaluated, and they're welcome to redesign their systems to be as good as they can. Hopefully, improving to those 30 benchmark tasks will also improve the system for other tasks, but it will make it comparable. We can then look and see what's happening; we'll know.

NIST's process with the manufacturing industry over a century and with the CIF process in the last decade—and again and again in the database industry in the chip manufacturing—the manufacturers propose a set of benchmarks and then that would be their innovation that guides the development. Now, once the benchmark is made public, it's open for discussion, and we have a public process for deciding what are the key things to look at? What are the key things to measure? Those evolve over time also. So I would say, looking at other industries will give you some experience about how to do it. I think this industry can do that too, and it will benefit the public and increase people's trust in the medical field. Also, it will reduce costs and reduce errors and the deaths that come from them.

We see in the last weeks the great concern about the aviation industry, which is enormously safe, and yet at the same time, the number of deaths in the medical industry that are preventable is much higher and we all should be working to make that number lower by making more visible and providing independent oversight and reporting about processes. There's some efforts, AHRQ has developed some reporting standards about medical performance, but not about the interface. The college of surgeons has NSQIP, National Surgical Quality Improvement Program, but they report the performance on every surgery of certain types. They decide on the types of surgery. They report about the error rates, but those data are not public. I've written and asked for them; they are not public. They're only available to those who participate in the program. We need to open up this field. This is a time of openness. We have open government. We have open industries in almost every field, but here I'm constantly against the barrier of a closed industry.

Ross Koppel – University of Pennsylvania – Adjunct Professor of Sociology

As the author of the *JAMA* article on "Hold Harmless" and intermediary and—what was the other one—"Hold Harmless" and nondisclosure clauses within vendor contracts. This is an area that AMIA, my organization, recently came out with a paper and a policy saying that it was unethical for vendors to include the hold harmless and learned intermediary and nondisclosure clauses. Now, to the best of my knowledge, this has had zero effect, and several vendors have, in fact, sued employees and other physicians who have taken screen shots and publicized them. But at least there was a reaction and a step in the right direction.

Bakul Patel – FDA – Policy Advisor, CDRH

Just a couple of quick comments, I think, just echoing—I think we need sensible consensus standards developed by industries, and it needs to be at the right level. It cannot be at the detail level of put the x here or the ok there. But it needs to be at some level which is attuned to the users in this area. So not to joke about this, but other industries have done pay per click; I don't think we are there yet. People have to pay for per click, so if it takes five clicks to go get a mammogram, I think we should pay for that—or somebody should pay for it. I don't know who it is. But I think that begs for what is optimal number of clicks? I think in some instances it would be two is ... and some instances it should be five. But I think that's where the standards come in and go, "That's the right amount for this faculty." So localization of measurement should be taken into account of that's not representing just one person, or department or floor, or a facility but also representing across where this field needs to go.

M

Can I respond to this?

Charles Kennedy – WellPoint – VP for Health IT

Go ahead.

M

A little bit of insider knowledge and just unfair advantage to Dr. Zhang's grant had a site review a few weeks ago, and I was privileged to be on the review panel for the SHARP grant and got to see up close some of the work that was being done, which included professor Shneiderman presentation from your group, and there was quite a bit of feedback from this group of panelists to Dr. Zhang that you were measuring the wrong thing because you were measuring the meaningful use criteria, which are certification tests, but which are not the way people actually use the system. That was feedback from our panels to your group and whereas it made sense for you to be measuring that because it was something you could do across vendors since every vendor had to do it. In fact, the workflow of how people use systems doesn't fit what's being certified, and that's by design.

Certification is a capability test, not a usability test. So you publish a number of scores, which may in fact correlate with usability, but you're not really measuring the way the systems are intended to be used. And professor Shneiderman the presentation that we got from your group was regarded by most of the people in the audience as not as good as current systems. It was a medication reconciliation process, and we were quite surprised that it was considered to be worthy of a presentation as to how to do this because it wasn't as good as what we admit are probably inadequate systems in the market today. So I'm just not sure I trust everything you're saying. I think it's a great theory, but are we there?

Jiajie Zhang – NCCD – Co-Director

Two comments here. First one is that measuring something is better than measuring nothing. Second, the set of use cases is established by NIST covered the basic set of tasks that outpatient clinicians use, and we can expand it. We are happy to include more for testing. On the other hand, from our experience, even by looking at ... use cases, we're testing 12 or 15 cases in the core set. By looking at this, we actually generate an 80 page up to 100 for each vendor about our findings to them and we can use these to change their system to improve. From our ... more exercise here by changing a couple of use cases, I mean the design, you have to ... system because some problems are common across ... system. For instance, on one case we did a small exercise where we designed the interface for medication energy and as part of the use cases, and improvement was from anywhere between 200 seconds to 82 seconds for the new design. For one single task like the check the medication energy to modify, the item numbers error, the number of steps was reduced from 90 steps to 10 steps. So it can be dramatic. So I think the changes can be done. I think the problem is that if you do that for a small set of cases, you can expand that for other things that could impact closeness in performance.

Svetlana Lowry – NIST – Health IT Usability Project Lead

I would like to add a couple of words. This is also a good question. Are we measuring what we're supposed to measure, and I really appreciate Dr. Zhang's answer. We have to start somewhere, and this is a brilliant start. The NIST is conducting a research right now on defining critical tasks that may impact the patient's safety. We will discuss here everything cannot be critical. Somebody has to define what it critical. That's why I invited all of you to this workshop, because your knowledge is so invaluable here. We have incredible team of experts in clinicians and human factors experts and the safety risk management experts. We're working very hard to define those most critical tasks that have to be paid most close attention—the official name for that definition of the safety usability framework. Please join us at the workshop where we'll show you our first draft, and we will be happy to take all of your input.

Ross Koppel – University of Pennsylvania – Adjunct Professor of Sociology

So, obviously people can game the standard. There's a requirement that somebody who enters with potential pneumonia enters an ER be given antibiotics within two hours, four hours, whatever it is. One ER was handing everybody who walked in a small tube of Neosporin. Thus, they could check off that everybody got an antibiotic within seconds of—whether or not they had a heart attack or whatever. So yes, you can game the standard.

M

What does that have to do with usability? A vendor was giving out the Neosporin? What's the point of that?

Ross Koppel – University of Pennsylvania – Adjunct Professor of Sociology

Well, I'm getting there. Okay. Here's the point. In one of the evaluations for certification there's a requirement that you be able to order a drug with a certain drug schedule—a slightly complicated schedule. It would take on paper a minute, maybe half a minute on it—with a good EHR maybe three minutes. This one judge told me that he watched a case where they went for eight hours and had to pay an extra \$4,000 for another two hours. There were a bunch of engineers and programmers working on it, and eventually they succeeded. As far as the certification standard was checked off, they did it. So my physician friend said, "You know, I don't have a bunch of engineers and programmers every time I order a drug." We need standard that make sense, absolutely, and they need parameters that correspond to the needs of medical care. So as my colleagues have said, it's not just standards, but it's the right standards for the right thing.

Ben Shneiderman – University of Maryland – Professor, Computer Science

I'd be glad to discuss my own research, and I'd like the feedback from you as a committee didn't provide specific feedbacks about that. We thought we had made advances in systematic, yet flexible, approaches to the interface design in clarifying responsibility, in logging performance, a variety of design features that were not recognized or commented on by the committee, but I'd be glad to discuss that—

Charles Kennedy – WellPoint – VP for Health IT

I have been a fan of your work for years, and I followed your Website carefully, so I certainly respect the backdrop. Very good. Well, I think we had a gauntlet throw down with some attitude. Anyway, moving right along, Joan, where are you going to take us.

Joan Ash – Oregon Health & Science University – Associate Professor

I'm going to take us away from the vendors for a second because I think a good implementation is a beautiful marriage between the vendor and the organization, and we talked this morning about the responsibility of the organization perhaps being equal to that of the vendor because every organization customizes the vendor's products to fit its local situation. I think you are the perfect people to ask how you would go about assessing usability once a system has been implemented?

Jiajie Zhang – NCCD – Co-Director

For our project under the SHARP, we have four-year projects, but for the first couple years we focused on a few things. The first one we haven't finished rapid assessment protocol, which we do in the lab. Our staff too, we are guarded ... approval, and we are getting to the clinics to do the real setting assessment of the workflow and actual use. So it's part of the process over there.

Ross Koppel – University of Pennsylvania – Adjunct Professor of Sociology

Okay, it's a wonderful question, Joan, and the vendors are in a terribly difficult position because there are 5,200 hospitals with umpteen different systems. My own hospital has 46 major systems and 116 minor systems, and if we put in an EHR or COPE, presumably, it has to work with a bunch of them. The lack of standards makes that even harder. With that said, I think there is too much flexibility, and I would say that it's done in the name of marketing. So as we're sitting around this table, there are at the same moment probably 50,000 physicians hacking out drug-drug interaction databases, hacking out alert levels, hacking out order sets—all of them idiosyncratic, all of them differing by probably very little, extending massive amounts of time, and we lose because of it.

What I see with my residents that I study is that they go to one hospital and the alert level comes in at 52 mg, the second hospital comes in at 54, medically insignificant, the next one at 57, and the fourth hospital has gotten so angered at alerts that are overridden that they've taken it away. Unfortunately, the medical student who's on the second day of this rotation doesn't know what he's doing—I don't have to finish that sentence. We have far too much flexibility, I think, in terms of setting certain rules and regulations that should be set with a common format. We would all benefit and healthcare would benefit.

As regards to the joining of other systems, there's a tension there. On the one hand, vendors are eager to sell suites of systems that are interoperable with their own systems. On the other hand, what would be better for medicine is if there were standards and total interoperability so that they would work across the different vendors. That's a tension that I can't resolve, but I'll just put it out there as something that we all live with.

Jiajie Zhang – NCCD – Co-Director

I just can make a small comment. I think you hit on the right point there. It's not just interface; it's also the workflow. Also need to start—as ... of the engineers in the room would probably attest to this ... you need to have some feedback, and that feedback needs to be present continuously in order for us to correct what is going to happen next. It's not—you just do once and you forget about it. It's not doing the implementation only, it's all the time, but we need to start somewhere, and to start measuring. Even if it's a small thing—as why did that error happen? If somebody clicks a wrong thing or somebody catches a wrong thing happening, why is that not fed back, into the correction? So I think that's important to sort of keep that into There's no one answer for what should we measure, but I think the process is important.

Charles Kennedy – WellPoint – VP for Health IT

I have a question. Back when I was designing—working on a design of an EMR, you know we had a tab for labs, a tab for radiology, a tab for meds, etc. But it always struck me that that wasn't a particularly convenient way for presenting the data as I, as a physician, use it. I think of a patient's diabetes. Why can't you show me everything associated with the diabetes because in general, physicians think by disease states. What that has led me to are the challenges with the data—with integrating the data together so that it can be seen, let's say, by disease state. Does usability testing today, in any way deal with the data issues, and if so, how?

M

Of course.

Jiajie Zhang – NCCD – Co-Director

Sure ... some systems I believe have different views for the different tasks that you talk about. Like the views based on the department, the views based on medical problems, the views based on time—whatever—so they can be modified and display different type of information according to your needs of there. This is part of—can be tested over there because what ... testing here is independent of interface itself. It's ... by the process so we can measure the performance levels for the task.

Svetlana Lowry – NIST – Health IT Usability Project Lead

Actually, I heard in your question something a little bit more different. What you just described is called user-centered design. That's exactly what you were talking about. NIST released in 2010 the guidance to the industry on user-centered design, and that particular guidance basically identifies the role of medical staff as the subject matter experts. It's very important to involve them when you form the user requirements, when you build the workflow diagram, because you need to know the subject matter expertise how to design around user needs. I often say that usability is the flour in a cake. You have to bake it in. You cannot add it at the end.

What you just brought up is a very important aspect of user-centered design. How user needs are incorporated in the beginning of the design, not when code is already written. The other thing is we often hear that the interfaces are built by the doctors. No, doctors have to treat people. The interfaces have to be built by the GUI designers and human ... people. Doctors have to serve as the testers and subject matter experts. These are main principles of user-centered design and I really appreciate you bringing this up, even if you did not realize that your question was uncovering that.

Charles Kennedy – WellPoint – VP for Health IT

My role as a moderator. Thank you. Marc—oh, no, Larry, next. I'm sorry.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Yes, I jumped in here. Hopefully this will be quick. Earlier, the notion of frictionless feedback was tossed out and it seems to me that feedback is a really powerful factor in how we interact with the world—that it helps us figure out, “Oh, I just screwed up. I can get back on track.” The quicker we get the feedback the more we can get on track quickly and avoid all kinds of errors. How does that play into this testing? Because I’m hearing anything but frictionless—I’m hearing huge development cycles. I’m hearing users not getting feedback on—that they picked the wrong choice.

Ross Koppel – University of Pennsylvania – Adjunct Professor of Sociology

Thank you for that wonderful question. So, if a CMIO spends \$150 million on a system and then \$600 million implementing it, cross training, you can’t ask the people of Washington not to get sick, pregnant, or in accidents for the next three years while you’re bringing up XYZ live. That’s a heck of an investment. So, a physician finds a problem—why does it take me two minutes of scrolling to find two pieces of information that should be contiguous? Why is this arrayed in such a way that I can’t see it to get a clinical view—whatever. He or she makes a complaint to the help desk. The help desk explains that it’s a user error, but the physician insists upon going beyond that and it gets sent to the vendor. I invite the vendors to correct me if I’ve got this wrong.

The vendors prioritize. First, what’s going to harm somebody by Thursday? They want to fix that immediately. Then they have other business decisions. What’s cheap to repair? What can we repair, but it will prevent the hospital from ordering band aids and Tylenol for the next two years? Or it will interfere with the pharmacy IT system or something like that? What affects the most number of customers? So this is a pediatric hospital—there are very few of our customers who are pediatrics; that gets lower. What can go into a forthcoming patch that we’re coming out and again, won’t screw up the other functions we’re coming up with? What is so sexy and so clever, that it should be saved to the next version, iteration, that will sell for whatever version of about \$35 million? Then, lastly, what is going to be attractive to some potential customers with whom we’re flirting?

Now, in that list of priorities, only one coincided with the needs of clinicians. So, the prioritization is what we would expect, but it’s not necessarily what’s best for innovation or improvement of healthcare. The other issue is that it’s very hard to complain. I have colleague after colleague who writes up about problems, sends it in, and they say, “I’m sorry, we can’t reproduce it.” Or, “What screen were you on?” Or “What sub-routine?” Or “What other tests had the patient ordered?” Or, “What five screens were you on previously?” I mean, personally I’ve been working on some software that would allow physicians to “frictionlessly”—that’s a word—submit their screenshots and comment, but that hasn’t yet been funded.

I think it’s essential that physicians and nurses and others be allowed to present their problems and that be dealt with by independent, clear-thinking authorities in a transparent way for the larger industry. I think that can be done.

Jiajie Zhang – NCCD – Co-Director

Just one quick comment here—many of the problems should never occur if you start user-centered design ... beginning.

Ben Shneiderman – University of Maryland – Professor, Computer Science

You asked about frictionless, I would say the response is continuous process improvement. It’s a well-established idea in manufacturing and other fields. You develop a mechanism, a part of the process that tracks the problems, and records their frequency, and has a systematic and rapid way of dealing with them, so I think it’s possible. It takes effort and maybe we simply should say that the company needs to put more effort on usability than has been done. It seems to be warranted and the payoffs would be large to them as well as the public.

Charles Kennedy – WellPoint – VP for Health IT

Alright, Carl?

Carl Dvorak – Epic Systems – EVP

Ross asked me to clarify—I think on something was wrong so I'll jump on that first and then I've got a question. I think that—just to start with, I think we've got to be careful of exceptions being used to typify norm. I think the hyperbole—although it sounds good with bravado—\$150 million to acquire a system, \$600 million to install it, \$35 million for an upgrade. Probably, an order of magnitude off for a very large health system; two orders of magnitude off for an average health system; three orders magnitude off for the average clinical practice of one to five doctors. I think we want to be careful as we—

M

... large hospitals

Carl Dvorak – Epic Systems – EVP

—again, I think one order of magnitude off then for the large health systems, two for the average, three for the small. I speak with experience on that. That is something I do have visibility to. People, I think, generally try to please users and my question goes back to what I think is the essence of what we're trying to get to here, and that is the role of government.

I don't think the presumption that you make that vendors are afraid of measurement is entirely true. I think they're definitely afraid of measurement by someone who might have a bias. I think that's a significant fear. They're also afraid of measurement by someone who might have a rubric or a paradigm that doesn't actually align with what their users need or ask for. Because you can't commercially succeed if I build "X" but I can only sell "Y." So I think the heart of this matter comes down to could we, should we, how can we construct a system where the end user physicians, those who do typify the norm every day, get the biggest voice in this process and that the process is funded by them, because it's to their benefit? Rather than have a government defined paradigm—not every measurement is meaningful. I took two measurements on my way to lunch, 12 and 8, but not every measurement is meaningful, right? They always have to be interpreted against some sort of rubric, and when you create the rubric, you create it against an idealized sense of design.

As David commented earlier that's where things can get off the track and you can really justly measure, but if you're measuring toward the wrong objective, you won't get there. What recommendations would you make to keep the measurement system physician user-controlled and funded through physician users rather than some sort of ivory tower or government controlled mechanism? How would you try to keep the voice of the clinician front and center in the majority of what happens, and not the extremes or the exceptions that typify, or use the—?

Ben Shneiderman – University of Maryland – Professor, Computer Science

I think I said it three or four times already, and maybe others can give you the answer, but I was inviting industry groups to participate. This is what NIST has done for a century. Its success in the manufacturing industry is a clear one. Its success in the past decade with a common format—report format, brought together Boeing, the purchases and the suppliers, right? Boeing and Microsoft and State Farm—they brought the users and the providers together, and they developed a mechanism that they could all benefit from. I said that three or four times; I hope people understand that.

Svetlana Lowry – NIST – Health IT Usability Project Lead

.... It's a usability standard reporting. It's available on the NIST Website. We released it to industry in November 2010. It basically—it's a metaphor. We're going to give you thermometer; it's up to you what you're going to do with that. If you still want to measure the temperature with your head, you can do that or you can use the tool and measure it. We are institute of standards and measurements.

Now, your concern about doctors—I will not comment anything about policy or politics because we're solely technical organization, but I understand your concern. What we're going to do now and to make sure that the protocol that we develop is reproducible and valid, there will be validation. There will be testing on the reproducibility—these are very valid and important concerns but we've done it many times in our history; we know how to do it. Again, we're going to give you thermometer to the industry, and you can use it for good.

Carl Dvorak – Epic Systems – EVP

Actually, I downloaded that because I was interested in using it when it first came out. What I noticed, it was more of a process for how to measure but didn't really describe the rubric against which to measure and didn't account for the clinical context or the practice patterns that one would measure against. So it was more process to measure; not so much a set of measurements.

Svetlana Lowry – NIST – Health IT Usability Project Lead

That's what we just were discussing. This is a brand new field for us. Like Dr. Zhang said, we've got to start somewhere. We gave you guidance on most important things that we absolutely sure about. Now I just iterated for you we're working on the framework with the specific clinical issues, measurements, and so forth. We awarded contract that hopefully we will launch soon to define the usability of EHRs. Because it's a new entity, and we need to study and we need to know what we don't know. It's the research in progress, but still, the tools are common to the industry to support ... development process.

Carl Dvorak – Epic Systems – EVP

So my question is who will ... that?

Ben Shneiderman – University of Maryland – Professor, Computer Science

... just to clarify that CIS is more than a decade old. The application to EHRs is what's new, but the process and the industry involvement has been applied in other industries. You can do it, you really can.

Ross Koppel – University of Pennsylvania – Adjunct Professor of Sociology

I'm off by an order of magnitude for the ... and implementation of a large system in a large hospital, and I'd love to see those CMIOs either be handed back the money just for the differential or whatever, because I'm surprised—but you know, you did do this for a living. I just take the reports so we can hack that out another time.

Charles Kennedy – WellPoint – VP for Health IT

Very good. Chuck?

Chuck Friedman – ONC – Deputy National Coordinator

So I'd just to connect a couple of things that have been said here to be sure I understand how they relate to one another. Ben, you have talked about—and I think it's a very interesting and great point, if things are going to be measured, really engage in the industry in a fundamental way in deciding what should be measured and I think the merit of that approach is self-evident. Jiajie, you have a lab that's open for business; you've hung out your measurement shingle and you are testing systems. Have you engaged the industry in determining the metrics that you're measuring now? Are you moving—and to whatever extent you are—are you moving in that direction to implement the approach that Ben has so, so eloquently argued for?

Jiajie Zhang – NCCD – Co-Director

At this time, the measures are generic measure, like the time it takes to finish a use case ..., these are independent of any specific system, whatever. So these are generic measures for performance, and the second one is we use the NIST meaningful use cases, which are all implementation independent. So we combine these two together to generate a first set of measures. We are on our way to do more measures for the ... workflow. That will be involved the ... how the workflow should be done, so we have a plan for that.

Svetlana Lowry – NIST – Health IT Usability Project Lead

... to see what is already robust enough in this method to incorporate in our protocol.

Ben Shneiderman – University of Maryland – Professor, Computer Science

Just a small clarification—I think I focused on the vendors getting together, but I mean the users as well, physician groups as well. The industry, defined broadly, not just the developers of the software.

Charles Kennedy – WellPoint – VP for Health IT

I think we're at the end of our time. Larry?

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

I think we were short nine minutes that the other section got, so maybe we can continue for another nine?

Charles Kennedy – WellPoint – VP for Health IT

Larry's call.

M

Actually I think it's the committee's call. Are there open questions we should be addressing? I think we're all set. Thank you.

(Break)

Judy Sparrow – Office of the National Coordinator – Executive Director

Ladies and gentlemen, we're ready to begin if you'd please take your seats. Okay, Larry Wolf?

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Welcome back. I see that we have all the problems with 4th graders getting back from a break. So, it's been a long day. I appreciate everybody's hanging in there with us. Now we have our last panel. I think that this is going to give us, actually, a pretty interesting way to wrap up the day so I'll hand it over to Chuck Friedman to introduce the panel.

Chuck Friedman – ONC – Deputy National Coordinator

Thank you very much, Larry. Thank you in advance, panelists. I'm sure we're going to have a very lively and energetic discussion and we appreciate the testimony you submitted in advance to us. Just to frame up this session, I think as we look ahead to what it might be, we're going to sense that there is going to be some overlap—I think it's a good overlap—between this discussion and the panel that preceded it on measurement. There's going to be some discussion and presentation in this panel as well on how usability can be measured. The difference in this panel—the difference in emphasis—will be seen in the focus in this panel on the larger ecosystem, and how a market and environment that supports usability can be developed through measurement but through other mechanisms as well.

We have four panelists and we're going to move from my left to my right beginning with Karen. Karen we'll start with you and we'll ask you just very briefly to introduce yourself. Thank you very much.

Karen Bell – CCHIT – Chair, Certification Commission

Well thank you very much, Chuck, and thanks to all of you. I'm Karen Bell and I'm Chair of the Certification Commission for HIT. I very much appreciate the opportunity to share our experience in usability testing with all of you.

Most of you know that CCHIT is a not-for-profit organization founded in 2004 in response to ONCs initial strategic framework. Our public mission is to support the adoption of robust, interoperable HIT through a credible certification process, which includes educational resources and a focus on buyer protection. You may not know, however, that we have certified well over 500 vendor EHR products in our various independent and voluntary CCHIT Program, from ambulatory and in-patient to long term, post-acute care with a myriad of specialty programs in between. We've certified well above 250 EHR products in the ONC authorized testing and certification program.

Recognizing the importance of usability early on, the Commission first undertook the development of usability testing in 2008, launching this process in October of 2009 with our CCHIT-certified 2011 Ambulatory EHR program. This initial usability instrument is embedded in the CCHIT certification inspection process that assesses typical, clinical workflows. This focus on inspection in the context of a comprehensive, clinical workflow differentiates our CCHIT-certified programs from the work we do as a current ONC-ATCB. The ONC certification is meant to be executed criteria by criteria with no expected

integration testing or attention to clinical workflow. We have, therefore, not conducted usability testing on any ONC-ATCB certified EHRs, unless they have also been CCHIT certified for 2011.

Knowing that usability testing would require greater sophistication over time, our goal for the initial instrument was that it incorporate the new definition and be reliable, valid, based on observable characteristics, focused on patient safety and efficiency, traceable to supporting literature, easily learned and executed by jurors and reportable. All questions were developed by CCHIT in consultation with experienced consultants in the field of usability testing. During a regular CCHIT certification inspection, three content expert jurors, at least one a practicing physician, rate time and effort to execute workflows, 20 observable characteristics of screen design, including horizontal movement, and overall satisfaction. All scores are compiled, averaged, and reported via a 5-star rating system.

While all CCHIT-Certified 2011 Ambulatory EHR Applicants are required to participate in this usability testing, the rating does not affect their ultimate certification status. Applicants have the option of publishing their star ratings immediately, a later date, or not at all. To date, 75 products have been certified in this initial program. Almost 60% have achieved a 5-star rating and 89% have opted to publish their ratings on CCHIT's Website. Many include those results in their own marketing materials. Since the aim of CCHIT certification is to raise the bar of EHR products in support of improved patient care in clinical productivity, the availability of published criteria, test script requirements and other materials is likely to resolve in successful vendor preparation before the inspection occurs.

Looking forward, we queried our 19-member board of commissioners at its April 12th meeting about next steps with respect to usability. Not surprising, many of their comments and recommendations mirror what you've already heard today with some additional suggestions and emphasis worth outlining here. Number one: Usability testing must be an objective assessment of an EHR product that is subject to inter-rater reliability. IRR is actually part of everything that we do in our certification program, which again differentiates it from what we do at the ONC program.

Two: Clinicians should be included in test design, and I think we've heard today that perhaps patients and consumers of healthcare should be as well. Usability test design should not be developed by software usability experts alone, as is frequently the case. Number three: More robust usability testing above and beyond what I've described to you today is necessary, but should address specific outcomes and measurable results, particularly in the areas of patient safety, improved provider productivity, and better access to well-organized patient data coming from across the healthcare spectrum. This requires, of course, interoperability and the ability to sort data and present it appropriately.

Four: One size doesn't fit all. EHR design and its accompanying usability testing should be unique to diverse care settings and for different types of clinicians and specialists. Five: Usability testing processes should be limited to an integrated testing approach that is grounded in clinical workflow, and should not be tied to the current menu-driven criteria required to support meaningful use. Lastly, number six: To support voluntary adoption of usability testing and reliance on its results, research is needed to demonstrate a link between usability and improved outcome, and to educate the provider community regarding these benefits.

I thank you, again, for the opportunity to comment today. While acknowledging the challenge that usability poses for all of us, we believe that our practical experience provides confidence that the health IT community can successfully collaborate in the design of fair, reliable, and more robust usability measures. Thank you very much.

Chuck Friedman – ONC – Deputy National Coordinator

Thank you, Karen, very much. Our next speaker is Mike Smith. Mike, thank you very much. Please take a minute to introduce yourself.

Mike Smith – KLAS Enterprises – Senior Research Director

Thanks, Chuck. First of all, it's an honor to be here and certainly do appreciate all the efforts that are being done by this committee and certainly many others to help improve patient care. I'm Mike Smith, I'm

a general manager with KLAS Enterprises—and by way of introduction to KLAS for those of you who are not familiar with KLAS, KLAS is a market intelligence research firm that focuses exclusively on the healthcare provider market, and monitors and reports on the performance of HIT software vendors, consulting firms, and medical equipment vendors. Our mission is to improve healthcare technology delivery by honestly, accurately, and impartially measuring vendor performance for our provider partners. We currently interview over 2,000 individuals from provider organizations annually to understand their successes, challenges, and needs. A major portion of our research is focused on clinical systems, such as EMR systems, ED systems, pharmacy systems, barcode scanning systems, and so forth. We're also measuring clinical portals, patient portals, HIEs, and, in fact, for the past several years we've been publishing in-depth research on clinical market share, CPOE adoption, clinical and ambulatory EMR performance, and readiness for meaningful use.

I'm just going to address some of the questions that you guys posed: Can transparent reporting improve usability and will this promote or hamper innovation? I think that reporting on usability, if done the right way and we've heard a lot of discussions about the right way to do that, certainly can be a good thing for the industry. That said, it will only improve usability if the vendors feel pressure to improve and if the vendors have flexibility in how they achieve better usability. Most provider organizations buy an EMR system once and then have to live with that choice for a long time; I think Jodi made that point. It's a big investment for a provider to purchase. Taking a scientific approach to measuring the usability of a product through measuring number of clicks, time to perform a task, and so forth in a lab environment only tells part of the story. Understanding how the EMR product performs in a live, fully functional environment based on performance, usage, satisfaction, and other factors can provide a realistic view of the usability of a system.

For example, some research that KLAS has done for the past several years on CPOE has helped providers identify EMR vendors that have—that are having success getting their client base to adopt, use, and have a positive experience with CPOE. Some of the areas that we're reporting on include the percent of hospitals doing CPOE, the percent of physicians at those hospitals doing CPOE, the percent of orders being done electronically by physicians, and the physician satisfaction with the system. I believe that the level of adoption in the system, combined with how deeply the system's being used, the level of physician satisfaction, and the sustainability of the system can help pinpoint how successful the providers would be at getting physicians to use the system in a meaningful way. Because of the public nature of our research and its potential impact on future business for vendors, the research seems to be helping drive innovation and giving vendors a lot more focus around not selling their certified product—or just selling their certified products, but also ensuring that the product is successfully implemented, adopted, and used by their clients.

What other actions can improve usability? Some of this is based on feedback that we've collected from some of our providers, who we deal with. There are a lot of other actions that I think can improve usability. Some of which fall on the shoulders of provider organization and some that fall on vendors. I think the providers should be placing a greater focus on what they're trying to accomplish with technology as opposed to getting to deploy that technology. We've had a lot of discussion about workflow. Workflow plays an important role in usability. Last week, I spoke with a CMIO from an academic medical center that made the following statement. He said, "The reason we were so successful with an ED deployment is that we understood all the processes and created a system to improve the care delivery. It's not actually about the electronic record itself, it's about the care process and how usability—the usability, the data visualization, and contextualization of the data improve the process of care." Ensuring that an EMR works effectively and efficiently within a clinician's workflow across the various departments and settings appears to be a key to usability. Vendors can help by sharing, and perhaps helping implement, best practices in workflow, and working closely with the providers to continually enhance and improve their products to meet their needs.

We also see it in programs around training; ... training and implementation also play an important role in the success of a product and how usable it is. So programs on training and education, sharing your best practices, designing systems with high availability and high performance, and ongoing optimization projects all improve usability. Also, providing actionable data for physicians and others through analytics

could help enhance the physicians' ability to care for patients and an organization's ability to make changes that can lead to other improvements that can enable effective practices.

How can end users better appreciate the challenge of usability at the time of purchase? I think it's important - and this is again based on some feedback that we collect from providers that we interview - I think it's important that providers first get the right people to evaluate the product when they're considering making an acquisition—or acquiring a product. They should include strong representation from those groups such as nurses and physicians across departments that will be using the system. Additionally, providers should get the people in their department understanding and assessing the vendor in their current workflow. They should have the vendors take them through scenario-based demonstrations. A provider in the Midwest that just barely selected an EMR vendor indicated that they offered their own scenario so that the vendor wouldn't just show them scenarios they knew how to perform. Another provider—so it enabled them to essentially go in and test out whether it would work in their own environment. Another provider that's a show site for a major EMR vendor suggested that the provider should identify unhappy customers so that they can understand and drill into the details of why they're unhappy. KLAS believes that a strong combination of opinion-based satisfaction research from key stakeholders, combined with the measurements of market adoption, paint a strong picture of usability today.

Just a couple of other mentions here: What voluntary steps can the industry take to create a market around usability? I think that there is some onus on the providers. They need—they need to create a higher bar of what technology can bring to the table and drive vendors towards usability. Ultimately, what we're seeing in the marketplace is the providers are going to vote with their wallets. So if they believe that the products are working and it will meet their needs, we're seeing purchasing decisions that would reflect that. We also believe that vendors need to take an active role in helping with best practices, implementation, with training, and helping ensure that their clients have a successful experience. Coupled with working closely with them to understand what their problems are and what their challenges are, and incorporating and fixing those problems.

We asked the question about what information needs to be provided across all vendor products; that's a tough question. There are a lot of different things that could be asked. From a KLAS perspective, we're currently asking a lot of questions that touch on usability. Are they perfect? I don't know that I can say that they're all perfect, but certainly we do ask a number of questions in areas such as: The ease of use of the systems, system response in this current product functionality, physician satisfaction, future plans, would they recommend it to a peer or a close friend, would they buy it again. That all gives good insights into what the overall user experience reflects. We also do a lot of focus research in areas such as: adoption, usage, impact of workflow, reasons why there is physician resistance, which we do see, gains in efficiency, and challenges and so forth. These are areas that measurable and comparable; although not perfect, they do give some—a good overall view of usability. Thank you.

Chuck Friedman – ONC – Deputy National Coordinator

Thank you, Mike, very much. Our next speaker is Doug Solomon. Welcome, Doug. Thank you, and please introduce yourself briefly.

Doug Solomon – IDEO – Chief Technology Officer

Thank you all for inviting me. It's really a pleasure to be here and to get to meet many of you, who I've spoken with before, in person. I'm the Chief Technology Officer of a company called IDEO. I've worked in a combination of healthcare—both in developing countries, as well as in the U.S., for the past 30 years—and in technology companies, spending 15 of those years working at Apple Computer. So I have a great deal of experience in good and bad user interfaces.

To tell you a little about IDEO: We're an innovation and design consulting company. We've been around for about 30 years. We do a lot of work in health and wellness; it's a large proportion of the work that we do. Usually companies come to us because they're looking for disruptive innovation. If they're just looking for incremental changes, like to change the color or the shape of something, we're not the right company for them. But companies come to us to totally redefine a new field and we've done that

repeatedly over many years, and if we had more time we could certainly talk about that. So, we make our methods public which is probably unique to many consulting firms. We think that really the differentiation is in how you apply the methods and not really in the methods themselves, and so there are many books and articles—I reference some of them, which I'd encourage you to take a look at in my printed testimony.

Just today I'd like to talk about design thinking. This is the process that we use in thinking through innovation programs. Design thinking originally started in product design; if you look at this slide, which is maybe not too visible to many people from here. The bottom is kind of the tangibility and top is intangible. We started out using it for product design, but we found over time that design thinking was really useful for things that were less tangible, like looking at processes in organizations, and looking at service design, and strategy design, and even branding design, which is very intangible. So over the years we've constantly learned how to apply our processes to less and less tangible kinds of things. So design thinking is—it's very applicable beyond physical product design.

Something is screwy with my slide so for some reason all my hidden slides are being shown, so I'm going to skip through these very quickly because I cut out many slides—wanted them to be in your pack.

One of the things that we do, which has been talked about a lot today, is to observe people in their natural environment. We think this is critically important. We don't do focus groups. We don't look at people through one-way mirrors. It's perfectly good for certain kinds of situations, but we think as design thinkers we need to watch people doing the work as they normally do it. So we spend a lot of time in hospitals, in clinics, in people's homes, and we watch them as they do their work. We look at them not only as individuals, but we also like to look at them as part of an immediate social network so we look at them, let's say, within their workgroup or their family group—whatever is relevant to the situation. We also like to look at them within the larger culture. I think, sometimes, we can easily get lost at just looking at the user interface and thinking that's the key to usability. Whereas, a lot of the keys to usability have to do with the social and cultural context that people operate in. Every hospital has its own culture, and you have to understand those cultures to really implement systems that are actually going to work.

We try to look at not only what people say and do, which are highly observable; and also, of course, what they say and do are often totally different from each other. But we try to—also try to infer what people are thinking and feeling, and this is where it takes really skilled sociologists and anthropologists and psychologists to really observe people. We find we learn a great deal from doing that.

We tend to look at all of our projects through these three lenses in this Venn diagram. The first one is desirability from a human point of view. The second one is viability from an organizational point of view; sometimes that's from the business point of view if it's a profit-making organization. The third one is feasibility from a technological point of view. As design thinkers, or human-sensor designers, we always come in through the human desirability lens and we keep iterating among those various perspectives because all of them are very important. We find that the best innovation lies at the intersection of those three factors: human factors, technology factors, and business factors. Because without any one of those factors, innovation isn't very sticky and isn't going to have very much impact.

I'll skip through this—you can look at it in your slides. Sorry about this. So I wanted to jump into five, very quickly, design principles that I would propose as just something for you to consider. Not as any proposed standards or regulations or rules or anything of that sort; just something for consideration.

The first one is to exceed user expectations. Where are users getting their expectations today? It's not from the competing EHR systems that vendors in this room and elsewhere are selling. It's from consumer products, like the iPhone and the iPad and the Android phones, and in this case Facebook. People expect the kinds of usability that they have in these experiences, and if they don't have them in the workplace they simply refuse to use them. Or they create work-arounds to using them that are not always very optimal. So I'd say we need exceed expectations, not just meet current expectations.

The second design principle I would propose is to reward individual participation. By that I mean to look at what motivates people as individuals and what the organization wants them to do, and try to find that

intersection point, and leverage that intersection point. I hear in many hospitals and clinics people talking about compliance with health information technology systems. If you hear that word “compliance” you know there’s a big problem. So I think build on things that really matter to people. I’m always impressed, especially working in large hospitals, with the kinds of things that motivate people to do a great job and to make them stay up late at night or get in early in the morning. They want to do a great job, and we can build on those motivations in the systems that we design.

The third one is, with apologies to Robert Frost, saying, “Take the road *more* traveled when you’re building EHR systems.” The idea here is, is work the way people work. Don’t ask people to do unusual and difficult actions. Also allow people to customize the way that they want to work in the systems that we have. It’s not all that hard to do; we’ve done it many times. I think one good example is Turbo Tax. I think the tax code is probably somewhat comparable, at least, to medicine; maybe not quite as complex. But they’ve done a very good job to allow people who want to be guided through it to get a guided tour and get their taxes done; other people who wanted to jump to form 5278 - they can jump right there and fill it in. I think customization is very important.

The fourth one is to demand intuitive interfaces. Demand is a really strong word but we will never accept less than totally intuitive interfaces in the work that we do for our clients. Because we’ve learned, over time, that only one or two little impediments, which could be as simple as having to reenter a password a second time, or have a different username and password for a system, or having to click through on a link and go to a totally foreign interface. Only a couple of those are needed to totally destroy the utilization of systems.

I want to go back to something on that. I’ll just say it briefly. ATM was used as an example earlier, several times, as a really good system for usability. I think it actually is very poor as a system for usability. Many ATMs today have up to five slots that you have to put things in and no one really knows which things you put in which slots, or which direction you put those things in the slots. I think we’ve all experienced that problem of putting the ATM card in backwards. We actually recently—and I’m not trying to tout our work—we totally redesigned ATMs for a large bank in Europe and I think you’ll start seeing them soon. When you see them you’ll realize that you can totally rethink complex systems and make them much better—the least of which is to have people not with their back facing the people who want to rob them, but actually putting them in a different position.

The final one is to iterate early and often. I like to think that all of our systems should be always in beta, like Google is. They only recently took Gmail out of beta after about five years. Almost everything they do is constantly changing. By keeping things always in beta, and continually prototyping and improving our systems, we give ourselves the permission to make changes; whereas if we locked things in stone, users get very upset if we move things one—one or two pixels to the left or to the right. So we need to teach the users that things need to change and always change for the better.

Those are my prepared remarks. There’s so much to say and I’d love to address any questions later on. Thank you.

Chuck Friedman – ONC – Deputy National Coordinator

Thank you, Doug. I’m sure the questions will come based on prior experience during the day. Our final panelist is David Kreda. David, you were plugged a little bit before, I don’t know if you were here. So, there is some expectation of what you’re going to talk about and I hope that is, in fact, what you’re going to talk about.

David Kreda – Harvard/Boston Children’s Hospital

I am going to read my testimony if that’s what you mean and then answer questions that come up. Good afternoon. Thank you very much. My name is David Kreda, and I’m here on behalf of Dr. Isaac Kohane and the SMARt Project at the Harvard Medical School. SMARt refers to Substitutable Medical Applications, Re-Usable Technology. It’s one of four ONC-funded advanced research projects. Dr. Kohane, who is the principal investigator, and Dr. Kenneth Mandl championed this project to address what I think has been discussed today and thought to be the case, a wide gap between the usability of everyday software and

clinical software. My formal role, in any event, in SMART is as the translation advisor and this means I am worrying already about getting SMART into clinical use that it may serve as one beacon, for certain, of innovation in clinical IT.

A side comment, I am also a software designer and have worked in the National Service area and in healthcare. I know how hard it is to design and to test software, so I don't envy anyone – vendor, implementer, doctor, in this process.

Now, let me summarize what we can say about usability when it's said very quickly. Clinicians are distracted and debilitated by interacting with their software. To get to the data they must fumble with navigation. To make sense of data spread over many screens, they must take notes, perversely repapering what is supposed to be paperless. To enter data, they must dismiss a plethora of clinical alerts that actually jade their attention. Upon reaching pertinent screens, they're compelled to provide responses that do not accord with what they want to say or even know. Because of these problems, and because these problems are widely experienced, we welcome a greater focus on usability of clinical software.

Now I want to speak to the five questions; one more than typical for the suite. Can transparent reporting improve usability? Will this promote or hamper innovation? Well, the biggest problem in the industry is that we cannot criticize things publicly. Now, gripes can be expressed and we've heard some today, but the details in the main remain under wraps because of intellectual property anxieties. This blunts our awareness and our ability to solve problems faster and better. In much of the software industry, we can see, we can print, and we can criticize. Therefore, we influence what gets fixed. In healthcare, contracts and conventions leave our failures hidden and their opportunities unrecognized. So transparent but detailed reporting, shorn, of course, of patient particulars, will permit natural information markets to emerge and we believe that will spur innovation.

What other actions and programs can improve usability? Well, today all-or-nothing purchases invite many poor user experiences. They also invite insurmountable replacement costs. Accordingly, anything that would encourage vendors to offer application programming interfaces would be a particular boon for focusing on improving usability. With such APIs, as they're called, users themselves or third parties can solve pressing problems that may not be urgent for vendors. Now, our project in particular believes that modularity offers a path toward healing usability woes. With such modularity, whole systems will not have to be adopted or dropped en masse. Modularity creates software choices and competition at many levels of granularity so that we can see usability tackled in cost effective, timely, and a targeted manner.

How can the end user appreciate the challenge of usability at the time of purchase? Well frankly, we think it's impossible today to understand that challenge until you've actually bought the product. If detailed reporting became a fact in the industry, this would change. Nonetheless, even if you have this choosing any monolithic system still entails falling on the sword. That's because not all parts will work ideally in all contexts. That's one of the reasons, again, that our project envisions and encourages application substitution so that after-the-fact replacement of the weakest parts of a delivered system can be addressed.

What voluntary steps can industry take to create a market around usability? Well, vendors do not, as a rule, announce their flaws. I'm in those shoes. I know. I heard the earlier presentation. If a sufficient number of using institutions were routinely disclosing their experiences in detail, including by function, vendors who evaluate software would emerge—some maybe already have—and create a more fluid information market. It would also increase pressures on vendors to look at some of these things with a different set of priorities. It might cause them also to open and mature these APIs sooner, make them more robust. When their users develop compelling solutions, they would absorb some of them into their products. By the way, some of the vendors around the table today do have such APIs and some of their users are doing this and support a track to see the results.

Then the last question is: What uniform information can be provided across all vendor products? Well, we think that earliest disclosure of user experiences can point to the best types of data with the greatest

utility. Now we can speculate and we can also measure things. But whether it's click counts, screen counts, information density, consecutive analysis of which steps people take and the like, in the end the best way to see what will emerge as the most important measures is to have a more fluid information market. Thank you.

Chuck Friedman – ONC – Deputy National Coordinator

Thank you, David. Do we have questions from the panel?

M

Help me out with—I think, I'm not sure I understood the API modularity. Are you suggesting that people can go in and customize given modules? Or that they can swap them out with other vendors if they don't like a particular module? Or—exactly, what is it that you meant?

David Kreda – Harvard/Boston Children's Hospital

Well, an actually fact—with API's you could do both. But to start with, just two examples. It's possible today to create an institution, whether it's Epic or with Cerner, and I think with other major, mainstream EMR's, it's possible to create some user experiences by grabbing data from those systems and create new screens that may essentially, for example, bring information together that otherwise is on many different screens. So you might call that an example of user-generated content that operates within these systems. But those same API's, or ones that are slightly more mature and robust, could also be used by third parties, perhaps actually engaged by the provider organization, or just independently, to create plug-ins which we talked about, or was talked about earlier. Those are means of addressing certain types of usability issues and certain functional issues that simply may not be high on the priority list because a business case may not be there for the vendors or for which they simply lack an appreciation for what the problem really is no matter how loudly that particular user or users have announced the problem.

M

So that would get at Doug's point that he made about allowing customization to some extent. But if I hear you right, it would get at it in a way that wouldn't prevent upgrades. Because if you go in and tamper with the base system then the vendor can't upgrade the system; you certainly don't want to do that.

David Kreda – Harvard/Boston Children's Hospital

Unless they markedly change and retire prior existing API's so that the calls to them no longer work. Yes.

Marc Probst – Intermountain Healthcare – CIO

So, I was kind going to ask this of the last panel, but I figured—I got a little timid and thought I might be barking up—thought I might be barking up the wrong tree for a little sympathy as a developer of software. As you look at usability, every industry is unique. There's no doubt about it. I've spent my whole career in healthcare. We have so many requirements; if you go to things like HIPAA and you got all this privacy or security or accounting or disclosure (yes I'm talking to you). All of these types of things—how does that impact usability? Because I'm thinking even on the API's, I mean you need a really detailed level of control to assure that you don't go—you know, go south, on some of these requirements. Any thoughts or on usability and the uniqueness of the industry, or—?

Doug Solomon – IDEO – Chief Technology Officer

I don't really think that there's much of an issue with HIPAA and APIs. I think it's kind of comparing two different things. Clearly, if you're transmitting data through an API then I would need to meet HIPAA requirements in terms of encryption and identification of patients and so on. But I think that they're totally compatible from my perspective. What do you think, David?

David Kreda – Harvard/Boston Children's Hospital

Yes, I completely agree. Inside the firewall, it's just another clinical IT application.

Doug Solomon, Chief Technology Officer, IDEO

...and I'd say even outside.

David Kreda – Harvard/Boston Children’s Hospital

...well, and with appropriate engineering also outside. A lot of the systems that are out there now that use cloud-based systems, essentially you are outside, as it were, of the institution; but you’re always inside at the same time.

Marc Probst – Intermountain Healthcare – CIO

Okay, am I crazy, or—?

M

Just a comment on that. I think there’s a lot more to HIPAA than just transmission of data across firewalls. The complexity that I think gets in the way of user usability has to do with implementing of access controls and requirement of fairly elaborate processes to declare which patients you should be having access to and trying to justify that but do it in a way that doesn’t irritate the physicians. Try to make the system smart enough to know who you’re supposed to be responsible for and have access to without asking, but not err in the direction of inadvertently giving access because that’s an auditability issue. But it’s very complex inside the system, and I think that’s what Marc’s concern was more addressed at. I think once it—crossing boundaries is pretty straightforward.

Doug Solomon, Chief Technology Officer, IDEO

I have to ... with you.

M

Yes sure.

Doug Solomon – IDEO – Chief Technology Officer

If you have an API, which is unaware of whom the user is. That is, if you’re going to an API and you’re not aware of whom the user is—then of course, exactly those sort of boundaries will be traversed inappropriately. So one of the aspects of appropriate API design, in fact, has to deal with authorization of user access, most certainly.

Chuck Friedman – ONC – Deputy National Coordinator

So I actually put myself in the queue for a quick question, is that alright folks? Is that allowed? Okay, thank you. Karen, I looked at your distribution of star ratings from your program and I juxtapose that with statements about usability of systems in general that have been made by some members of this panel and some members of other panels, and I don’t get the same picture with the majority getting five—that’s five out five, right? With the majority getting five out of five, and almost all of the rest getting four out of five, the results of your testing paint a very different picture of usability than we’ve been hearing from some of the other speakers today. Can you speak to that?

Karen Bell – CCHIT – Chair, Certification Commission

Thank you very much, Chuck. I certainly can. I think it comes down to the fact that usability is an evolving definition, and usability will, over the course of time, change. When we first developed our initial product it was very clearly an initial product. I sort of laughingly referred to Dr. Shneiderman’s comment about the lateral scrolling; but that’s 1 of 20 similar kinds of things that we test for, that are done objectively. It certainly doesn’t meet the kind of usability requirements that we’ve been talking about today in other ways. That will come down the line. So, that I think what you’re seeing is the result of two things.

Number one, it is basic usability testing. But it is an introduction and it can be done. Secondly, and I mentioned this and I apologize for speaking so quickly, so I did try to keep in my five minutes, and that is that we do believe that certification is a process that should lead to improvements. That said, we basically give open-book tests; so all of our criteria are available online. I mean, they’re all available to you if you want to look at them right now. Vendors know what’s coming, so they are able to prepare for it, and most of them do. Which is why you do see 60% at the five star level; you see another 40% at the four; and only small percent are at the three because they had the opportunity to plan and prepare. Again I do want to stress, this was the first step. It was practical. It was to demonstrate that it can get done,

and it was to essentially then lead us and provide us with the opportunity to begin to evolve usability testing in some of these other areas we've talked about today.

Chuck Friedman – ONC – Deputy National Coordinator

Thanks, Karen. Okay, so I have Larry next in queue.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

So maybe this is more of an end-of-the-day, philosophical question for you guys to explore with me. I sort of felt like the core of the day, we were in a sense dancing around “how bad are things?” What I'm hearing here is maybe we should be dancing around, “how good are things?” So whether it's Karen's results on usability that's—even if was just the beginning, most people did pretty well. So, chill out. The systems are not as bad as we've been hearing all day. Not everybody splits blood pressure across multiple screens; you actually can see the two values side by side in the conventional sequence. You know it's like—it's shocking, but I can understand how a system can get in the place of not doing that. But I'm sort of hearing a different theme from you guys of, you know, meaningful use was meant to be a floor, not a ceiling.

We want people to be overachievers. We want folks coming at us saying, “You know, these systems are amazing! We didn't know how good it was. We had this hurdle of capital. The incentives got us over it, and now it's great!” So let's just sort of—I guess I want to flip the tone of the conversation into maybe there's a lot here to celebrate, and how do we sort of build on what we have and extend it. I also want to pick up on something in a lot of Mike's comments on looking at adoption as an end measure of usability. If you have high levels of physician adoption, we've got over some level of hurdle of usability. Even if there's a coercion in there; even if there's a compliance guy running around with a big stick in there. I've said plenty. Pick some thread of that and comment.

David Kreda – Harvard/Boston Children's Hospital

Well I would like to say that it's very difficult to know cause and effect when you have a substantial stimulus at the outset and a stick at the end. That adoption is not a measure of usability just because you have people turning on these systems. In fact, one of the comments made earlier talks about preserving the right of the physicians to evaluate what the best products are. I think that accords with what happens when we do go out and buy a car if we're talking about a single physician or maybe two or three. But as far as I know, in large institutions, not just hospitals, the economic buyer is rarely the user. The system is acquired, and upon being acquired the issues begin to surface. Then the question is, “How is this addressed?”

I read the testimonies this morning. I wasn't able to be here—Dr. Sinsky for example—and I want to comment a bit about one of the points I made in my testimony, which is about—you can call it disclosure or you call it transparency in reporting. That is, it's very difficult even if you are another medical professional, I happen not to be, but at another institution, to be able to discuss and see what a colleague of yours might be going through unless they use almost a ... approach. Which is that they kind of scroll away the report or the thing they're working with and they show you and they comment upon how good or bad it is.

I would say to address your point directly, there is a lot to rejoice, in the sense that there are a lot of technologies and approaches that are out there for improving the experience and, in fact, a lot of the vendors are trying to improve their products. But that gap between, oh let me quite actually Dr. Sinsky which I think was—I don't know if she said this morning. She said to me once when I was talking to her, “I feel like a genius at home when I'm using software. When I come into the clinical facility I go down a few steps in IQ.” I think this is the type of experience that a lot of physicians experience, and I suspect it's because it's not possible for them to do their regular work and address all the issues that confront them. So I wouldn't be so sanguine about where we are today even though I think that there are a lot of steps underway to try to improve the situation.

Mike Smith – KLAS Enterprises – Senior Research Director

Maybe I could just make a couple comments here too. I do think that there's some very positive things that we are seeing in the industry that are being done by vendors to improve their products. They appear to be—and I can't say this for all of them, but we certainly do see some instances where they're taking a much more active role. Working directly with the providers to help them with training, with implementation, to help improve their products, looking at creative ways of implementing products and creative solutions for people, perhaps, in a community setting versus those in large organization settings, and so I think that there are some good things. Now that said, I think that there's ground to cover.

There are still a number of organizations out there that frankly don't quite know what to do and aren't very sophisticated and are going to need help to be successful. Some are—I just spoke with one last week that hit the brakes before moving forward with a major decision because they didn't feel like the organization was ready yet, to move forward despite the ... that's out there in the industry. That said, I do think that the nice things, some positive signs, and some positive energy that's going on in the marketplace around trying to help these folks meet their requirements. I am seeing some situations where, because they're rushed there are not always the best outcomes that are occurring, right? So in some instances a hospital has been so focused on hitting that timeline they aren't spending, perhaps, as much time as they should laying the groundwork to ensure that it's being used properly and successfully. And I think that we have to be careful because some of those scenarios are playing out.

In terms of adoption, I agree. I don't think adoption can be the only thing. You can be a hospital and force all of your physicians to use a system. That doesn't necessarily mean that it's a more usable system. But what it can reflect—we've seen scenarios where it's been mandated and the doctors have said, "No." We've seen scenarios where it hasn't been mandated and the usage is at 100, the adoption is 100%. The adoption rate does help because these physicians will push back, I think as most people in here know, and the depth of adoption. So in other words, if all of your orders are being done by your physicians and it's sustainable, then I think that is something you can look to, as perhaps a reflection of how successful you've been. Does it mean that it's usable as it can be? Obviously there are other areas you can—things you can measure as well. But I think it is playing out in the industry that we're seeing some products that I think are working fairly well, for provider organizations and we're seeing some nice physician satisfaction which I think also plays into that.

Doug Solomon – IDEO – Chief Technology Officer

I'd like to add a few comments as well. I certainly think there's a lot to be proud of. So I would agree with both of you. But in the history of technology, there's no end to innovation. And one of the things, for those of you who haven't worked with design thinkers before, we tend to be very optimistic so we always believe that there's a solution to every problem and we're going to find the solution and I'd say often times we do. But I think in terms of technology, there are a lot of challenges ahead that are going to have to be met. One is the movement away from desktop computing metaphors. I mean that's clearly on the wane; laptops have exceeded desktops for the first time several years ago. Smartphones have exceeded computers, you know, in this past year. Tablets are becoming popular and a lot of other form factors so I think, you know, we're not going to be seeing ten years from now people using desktop computing metaphors for doing electronic health records. So that's a challenge.

I think another maybe challenge and opportunity that we're seeing from a lot of other fields, including in pharmaceuticals and automotive and others, and I put this in my testimony, is the idea of open innovation. I think there's a lot to be said for opening up APIs and plug-in architectures and allowing others to come in and experiment. I think it can be done in a way that maximizes patient safety. I think you see the kind of innovation in the iPhone kind of marketplace and the Android marketplace, it's something that we can have also in this area if we're able to open it up and allow people to participate. So I think there are a lot of challenges ahead in terms of technology and a lot of opportunities that perhaps haven't been leveraged as much up until now, and I say that we can celebrate the past but also celebrate the future.

Karen Bell – CCHIT – Chair, Certification Commission

...add that I don't think we still have a good sense for the measures of success for usability. We've talked a little bit about adoption and don't think that that's probably the best measure of success. We've talked about patient safety, but we're not real clear about how we're going to measure patient safety with

respect to how it's affected by usability. We've certainly talked a lot about the need to be able to organize data so that physicians and clinicians don't miss critical information and they can focus on it quickly. So I think until we are a little bit clearer about what we can anticipate, the advantages of usability to bring us to, in terms of some of those results, it's going to be very hard to really say, well usability is—we're there; it's being successful. I think we really need to be—have a lot more discussion about what we really expect it to do for us.

Chuck Friedman – ONC – Deputy National Coordinator

Thank you. Carl?

Carl Dvorak – Epic Systems – EVP

Just a couple comments on some of the testimony. One thing I think is interesting to point out, it's been mentioned multiples today—horizontal scrolling. For those who are real big fans of horizontal scrolling, you have to know it's back. The touch interface makes horizontal scrolling a very natural thing, and if you remember back far enough, vertical scrolling was evil because people didn't know to hit the little button versus the page scrolling so scrolling was bad 15 years ago. Then Microsoft invented the little scroll wheel, scrolling became cool again. In touch interface ... has made horizontal scrolling reasonable. So if you hop in your iPad you'll actually notice there's quite a bit of horizontal scrolling capability built into the iPad. So I think we will see that resurgence and I think it characterizes an important point. Usability perception is a moment in time, and technology continuously changes. I think, if we're lucky, we'll always chase our tail and hopefully never catch it as we spiral up towards better and better usability. I think there is a key element at work behind the scenes here.

David, you painted a very bleak landscape—a landscape in despair; a landscape with little usability. Then your comments on the AP model that you're doing for ONC as a solution I think you said “a patch to heal the woes.” One concern I've noticed here is when people start to plug too many pieces and parts together at an individual level, they end up having to become their own support person. There's no other institution with the same constellation of systems as they've plugged in together. There's no community of learning. There's no best practice capability to share and encourage best practices. What would you do different in your world to avoid some of the safety problems that have been measured in the world that we've seen in the last 20 years, of pieces and part systems built with interfaces?

David Kreda – Harvard/Boston Children's Hospital

Well, I think it's a very good question. I'll try to answer it, but let me preface it with one point. In your testimony I think you mentioned immersion, and how important it is for people to be immersed in the actual discipline to construct these products. I think one of the challenges in developing applications that work is to have an opportunity to see what does and does not work, and try to improve upon it. That's one of the things that happens in the general software industry. Now when you have that opportunity, you then create a problem. The problem is now how do you manage all that innovation? It's quite clear that if we allowed ourselves to imagine a world in which physicians in a hospital could plug in whatever they wanted to plug in to the system they're using, we could create another type of, as you put it, a bleak landscape. I hope I didn't actually depict a really bleak landscape in my testimony, if I did I do apologize—I think—

Carl Dvorak – Epic Systems – EVP

...debilitated, perversely repapering, fumbling—

David Kreda – Harvard/Boston Children's Hospital

Well that's correct, that's correct. I don't actually have to, I hope defend it because a number of physicians this morning set that out as their experience. But here's the point: We would, in fact, have to have a world in which the chief medical information officer, the chief information officer, the chief technology officer, and the like, would have a say in what are the things that people can use and plug in. In fact, more to the point I would even say that those vendors, yourself, Cerner's, and others who develop and offer robust APIs, if you should do that, would in fact take a very active role in curating some of those things that are made available to your users. What we're talking about here is the possibility to liberate the energies that we've seen occur in other industries, which are very information-intensive, that explore

and try to exploit process improvements and the like. So, therefore, I would say that you always have to manage—of this change process. In this case, we haven't gotten to the point where we can tell you exactly how that would happen. Because first, we're trying to break into, or rather introduce, this particular model into this industry. We're not alone in trying to do this.

Doug Solomon – IDEO – Chief Technology Officer

I think there are a lot of lessons that can be learned from other industries, companies like SAP and Salesforce have very—a robust developer community and there is some curation of applications and there is support. In fact, it's opened up entirely new business opportunities to help create these plug-ins and then actually administer their use and charge for maintenance. So I think there are some good business opportunities there as well. But I totally agree with you, Carl. I think it could be a disaster as well if it's not done properly.

Chuck Friedman – ONC – Deputy National Coordinator

Okay. Any other comments on Carl's questions? Okay, David.

David McCallie – Cerner Corporation – Vice President of Medical Informatics

Just to maybe offer some observations on the AP thought. From our own experience, we've deployed a pluggable interface now to our clients for—oh, I guess it's coming on about two years that lets our clients extend and create new functionality on top of the API. It certainly has some flaws, but it's been extremely successful from the point of view that, as I think Bill Joy once said, "There's more smart people that don't work for you than do with for you, no matter how big you are and how many smart people you have working for you." So that it has allowed some of our users to push forward with capabilities that we just hadn't gotten around to. Either we didn't have the internal expertise or there weren't enough people asking for it, so it's been successful in that regard; in some ways beyond our expectations.

On the other hand, you know, as Haeckel or somebody said, "If phylogeny recapitulates..." No, it's "ontogeny recapitulates phylogeny." The users who develop these plug-ins make the same mistakes that we made in the 20+ years that we've been developing software, typically around access control issues, audit and logging issues, patient safety issues, making assumptions about what was being done in other modules when, in isolation, they couldn't tell that it was, in fact, being done. So it's not a panacea but I think it is a step in the right direction. I'm not sure that it will go across vendor because the complexities just go up so much once you, you know, open up the need to be not only standard within a vendor's complex world but across other vendors complex worlds as well. However, we support, as David as you know, we've talked many times, and we support your attempt at building this cross-vendor model and more power to you to make it work. But it is going to be a hard problem to deal with some of those emergent principles, emergent problems.

That's just a statement. Feel free to react if you want. Take it as a question, but I think it's a good experiment to go do.

David Kreda – Harvard/Boston Children's Hospital

That's, in fact, what it is. It's one of the aspects of innovation is that you do make an experiment, and you try to experiment a lot and what we hope will happen is that there will be enough contributors that things of value will emerge even if they simply inspire then very specific reimplementations within existing systems.

Chuck Friedman – ONC – Deputy National Coordinator

Any other questions or comments from the panel? No? Seeing and hearing none, Larry—I think we turn this back to you.

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

Thank you. Maybe we're all just worn down. It's been a long day. So Marc, do we have some closing comments?

Marc Probst – Intermountain Healthcare – CIO

We have public comment first, or?

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

I think we proceed to public comment.

Judy Sparrow – Office of the National Coordinator – Executive Director

This is the time in the meeting we do ask for public comment. Let's see, if anybody in the audience wishes to make a comment, please come up to the microphone, which Joe is putting up right now. Please identify yourselves and also there's a 3-minute time limit. So we have up at the microphone Carol Bickford.

Carol Bickford – ANA – Senior Policy Fellow

This has been a very informative panel series today. I thank you very much for hosting this event. I do want to make sure that the preponderance of conversation has been about physicians, but we have to attend to the fact that there are many other clinicians that engaged in this teamwork process and that conversation should also assure that we have patient participation in the usability discussions.

Judy Sparrow – Office of the National Coordinator – Executive Director

Thank you, Carol. We do have somebody on the telephone. We have Dean Kross.

Operator

Dr. Kross, your line is live.

Dean Kross

Yes, Dr. Kross from Pittsburg. This was a sobering meeting. I am astounded that there are such problems with these devices, and we're first—after the 10-15 years of deployment and use—that we're first waking up to whether they're usable or not. Jeff Shuren of the FDA has stated in numerous presentations that these are medical devices ... equally as astounded as to why there's an end around the FDA when the FDA is perfectly equipped and prepared to deal with these as medical devices and deal with usability issues. Every day my patients are subject to risks and I have to stand guard 24/7 to make sure something ridiculous something doesn't happen to my patients as a result of the user problems with these devices. If people care to comment, you know that's fine. If not, I want this to be on the record that the FDA should be regulating these devices and that, therefore, perfectly equipped to be able to do that.

Judy Sparrow – Office of the National Coordinator – Executive Director

Thank you, Dr. Kross, so noted. We also have Lawrence Richards on the telephone.

Lawrence Richards

Are you ready for me?

Judy Sparrow – Office of the National Coordinator – Executive Director

Yes, sir.

Lawrence Richards

Well I thank you. I'm a medical doctor; very soon it will be 50 years that I've been a medical doctor. I want to remind everybody of the comment I made at some other call-in several weeks ago. I think you had best keep this just to physicians for the first couple years. We're going to have oodles of problems with those alone. If you try to start with several other disciplines at the same time you're going to just go exponential on your problems. I think I read something someplace that said that a bunch of vendors were already certified. After listening to ya'll—I missed the morning by the way, but I've been here the whole afternoon basically. After listening to this afternoon's comments it sounds to me like somebody gave ... the wrong recommendation, that you better rework your vendors, that were not supposed to be—the learning parameter for the vendors so that they turn out something worthwhile. They should test it with some of us first and then maybe they should be certified. I think it's alright to try to include some non-physicians for the time being, for some form of input. I think it's a waste of time to consider consumers at

this time. Wait 'til you've the doctors working well and then bring in the consumers, and then after that, then bring in these other people.

Those are my thoughts. If anybody wants to ask any question or exchange any comments, I'll stay on the line.

Judy Sparrow – Office of the National Coordinator – Executive Director

Good. Thank you, Dr. Richards. We appreciate all the public comments. I don't think there are any more so let me turn it over to Marc Probst and Larry Wolf for closing comments.

Marc Probst – Intermountain Healthcare – CIO

Well, this is the—it's not the first step on the journey because so many of you have been doing so much work in this space already, but for us, as it goes with the policy committee, it is the first step on a journey. We really appreciate the input. We appreciate the work that's gone on. I just think it was a wonderful day so thank you so much for your participation. Many of you put in a lot of hard work.

Larry, do you have any last words, or—?

Larry Wolf – Kindred Healthcare – Senior Consulting Architect

So I guess I'll add to that, that I certainly have pages of notes here that whatever my user interface is I'm going to have to clench down into something that actually makes sense to me tomorrow morning, and the day after. So I think we have some homework to do in terms of having to report back to the policy committee in a couple weeks.

Judy Sparrow – Office of the National Coordinator – Executive Director

Thank you everybody.

Public Comment Received During the Meeting

1. Dr. Stagers is absolutely correct when talking about consistency. As VP of nursing of a company that manages 18 nursing homes, we want systems that can "talk" to other systems, that can transfer information from a referral source to one of our skilled nursing facilities without having to data enter and the ability to transfer bedside assessment directly to the EHR.
2. How much time is expected to elapse between meaningful use stages (1, 2, 3)?
3. Usability and human factors is one of the most important factors in gaining adoption. Very valuable to pay attention to this. Usability can be measured. Usability can be subjective. Various principles of usability can be more or less relevant depending on the context. Therefore one principle or measure might be important in one context but not in another. For instance, we have designed ordering dangerous drugs to actually have more clicks and verification steps rather than less. As CMIO at Trinity Health, we have designed a health system monitoring and reporting to identify near misses and feedback to focus our efforts on the intersection of process, usability and configuration that are leading to risks. This monitoring by the vendor or implementer rather than specific usability certification may be the most important next step.
4. The government will identify specific barriers to exchange and usability, and will develop those plans to address such barriers, please discuss and give us examples of some of the anticipated geographic barriers to exchange and usability as they impact the following populations groups: Patients, stakeholders, providers, laboratories, pharmacies, hospitals and behavioral health facilities.

5. This is where we need to have a discussion about healthcare analytics. EHRs are the device to provide meaningful patient information in a more efficient way.
6. YES! Use VistA and just give it away. Better yet, use VistA for the underlying data repository and let our vendors only innovate with the UI. They can make their profits that way.
7. Rebecca Grayson: HIMSS has published a guide for ambulatory practices on how to include usability evaluation as part of vendor selection
8. Why should we expect that market-oriented, profit-oriented companies that have failed to deliver for 30+ years will be able to deliver now unless government mandates standards? They claim to need room to innovate, but they clearly want room to profit without regard to health outcomes.
9. How do you establish a "user" cognitive ability "baseline" if asking multiple providers to figure something out? Much variation in perception and capabilities of users.
10. Does the panel see a role for FDA in oversight of safety and effectiveness of EHRs as a medical device?
11. Viewing and sharing cumulative diagnostic test results is one important EHR functionality area where data fragmentation and infinitely variable reporting formats need to be replaced by using a standardized format that can display complete, clinically integrated, easily read information. Are any of the panelists working to correct the flawed test results reporting process status quo?
12. "The market will tell us, will vote with their pocketbooks" implies that providers have options to switch to a different product in 5 years. That is a very expensive and risky process and the providers currently in the incentive cross-hairs will be stuck as they will not have financial or enthusiasm to do it again just for 'usability'. Every EMR presents compromises and the shoppers, including the government and the RECs must include tools that help buyers determine whether the usability compromises are major (rule out) or minor (go forward). Every product currently certified has a majority of users extremely satisfied with the usability and the related compromises of their particular product. Conversely, there are users not happy with the very same product. The variability is the user, not the product. Very hard to certify 'users'.
13. Speed of data entry is only one part of good design. Ability to share with other people, including patient and family, is important. Fast command-line interfaces, as one part of a design, can have some utility, but there is no one best approach. Additionally, training is costly, and a poor investment if there are good tools which do not demand as much accommodation from the users.
14. EHR work flow should be based around nursing work flow; however, nurses gauge their "work flow" depending on what is happening on their unit, with their patients. Therefore the EHR flow needs to be flexible.
15. Have the policy committee consider use of voice recognition for EHR?
16. How determine what is critical?
17. How important is it to avoid the "lock in" effect?