



**HIT Standards Committee  
Architecture, Services and APIs Workgroup  
Final Transcript  
December 4, 2014**

**Presentation**

**Operator**

All lines are now bridged.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

Thank you. Good afternoon everyone this is Michelle Consolazio with the Office of the National Coordinator. This is a meeting of the Health IT Standards Committee's Architecture, Services and API Workgroup. This is a public call and there will be time for public comment at the end of the call. As a reminder, please state your name before speaking as this meeting is being transcribed and recorded. I'll now take roll. David McCallie?

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Here.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

Hi, David. Arien Malec?

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Howdy.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

Hi, Arien. David Waltman? Gajen Sunthara? George Cole?

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Hello.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

Hi, George. Indu Subaiya? Janet Campbell?

**Janet Campbell – Software Developer - EPIC Systems**

Here.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

Hi, Janet. Josh Mandel?

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children’s Hospital**

I’m here.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

Hi, Josh. Sean Nolan? And from ONC do we have Debbie Bucci? I know Debbie is on.

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

Here.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

And Mazen? Okay with...

**Mazen Yacoub, MBA – Healthcare Management Consultant**

Yes, Mazen is here too, thank you.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

Hi, Mazen and with that I’ll turn it back to you Arien and David.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

It sounds good, so this is Arien, we gave...we framed up the charter of the Workgroup last time and had some early discussion on some homework, so how to think about the charter, as well as some discussion on the overall work plan and gave you some homework to think about the 10-year roadmap.

I think for this meeting we’re going to spend some time talking about the roadmap and then going to our homework lesson, our homework report, and then we also had some framing for potentially a way to think about architecture, services and APIs in ways that mimic the structure of other large scale networks or other ultra-large scale systems like the Internet and like the web.

So, with that maybe we can go to the first part of the deck. So, Michelle, I think you said that some of the aspects, some of the milestones in the work plan have changed a little bit. Do you want to update us on the FACA milestones?

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

Sure, so we were originally planning for the interoperability roadmap to be presented at the January Policy Committee and Standards Committee meetings but it’s looking like it won’t be released until after the January and Standards Committee meeting which is January 27<sup>th</sup>. That means that it will likely be presented at a February meeting. So, that pushes out the release of the interoperability roadmap which also pushes out the charge for this Workgroup to respond to the interoperability roadmap.

So, it could be a good thing. That means that you might have some time over the holidays to actually not talk about the interoperability roadmap and relax. And then come February you'll be very busy responding to the interoperability roadmap.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Great and I think notwithstanding it's good for us to get framed to the first draft of the interoperability roadmap and more importantly start thinking about what we think an interoperability roadmap actually should be addressing and should contemplate and see if we can frame up, from an architecture services and API's perspective, what a valuable and useful roadmap would look like. Can we go to the next slide?

Here's where we are, we're in December and we're doing our homework. All right, next slide. So, Michelle who is going to be giving this brief from ONC?

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

Debbie are you able to speak to these slides?

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

Sorry, I was on mute, I think, I am, but I don't have the screen up I was listening. So, basically it was the overall charge, I think the first slide is the overall charge of the roadmap and, let me look, I do have it up. Okay, so we're on slide four, right, the 10-year...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Correct.

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

Interoperability vision.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yes.

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

And, yes, essentially this...go ahead.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

No, please go ahead.

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

Okay, so essentially this lays out the 10-year interoperability vision to leverage Health IT and support but not limit care delivery, billed incrementally, establish best minimum practices and create opportunities. And then, the guiding principles were to build upon existing Health IT infrastructure, one size does not fit all, empower individuals, leverage the market, simplify, maintain modularity, consider the current environment and support multiple levels of advancement, focus on values and protect privacy and security. And I would think that...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I think we're on the...I think we're on the next slide I think. Can you advance the slide?

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

Okay.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah, the guiding principle is the right slide.

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

What should the road... guiding principles, yes, sorry.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yes.

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

And then...so there maybe a couple of others that may be added to this but this is what they've started out with. And then, next slide.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Deb, Debbie?

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

Yes?

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Can we go back and just...I want to make one comment on the slide before?

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

Sure, the guiding principles? Okay.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah. Just the third from the last bullet point on establishing best minimum possible is worth calling out. I think on some of the other Workgroups that I've been on where we've been discussing the roadmap this point gets a lot of attention and I think it's worth mentioning particularly when it comes to standards because it gets complicated, you know, when you're trying to be very precise about a standard and yet the goal here, the guiding principle is that we're really setting minimum, we aren't trying to set a cap on what you would do but rather to set the minimum of what we would expect everyone to do. And I'll just point that out because I think it's something that will come back as we get into our subsequent discussions.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah, I'm going to pile on that one and also note that there has been an ongoing discussion about whether we're talking about floors or ceilings with respect to the roadmap.

And I think there is broad agreement that there is one frame of the roadmap that's thinking about and contemplating raising the floor and trying to make sure that we have enough leverage to be able to have people do lots of innovative stuff above that and raise the ceiling.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yes, this is David, that was the thought I was trying to pick up there, floor and ceiling is better than minimum and maximum but I like that, thanks.

Okay, you can go back to...are there any other comments on this slide four? We went by it in a hurry. I think it's not anything new in here, but sometimes coming back and looking at these things after you've thought about them a while you see something you didn't see the first time through.

**Janet Campbell – Software Developer – EPIC Systems**

I think the only thing that might actually be a little bit instructive is that, you know, right now those are pretty...this is Janet, I don't think anybody could look at that and say, you know, empower the individual that's a horrible idea, but looking specifically as we get into the details of the roadmap tying those back to the guiding principle because I think otherwise sometimes it sort turns into just words and they are important points and it's important to explain why the policy or the projections are the way they are. So, anyway more a comment for ONC than anybody else here I think.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah, I think, this is David, I think that's good. I mean, there are actually some powerful ideas here that are easy to read and just go "of course" but in fact they're not necessarily trivial like create opportunities for innovation, you know, that's one of the core drivers behind this notion of an API Workgroup is you need APIs to have innovation.

So, I think every now and then we probably ought to come back and look at this slide again and make sure we're still in sync with it.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah and also just looking at support health not limited to care delivery and recall that the JASONS just released their latest hits version that was focused entirely on this notion of supporting health and not care delivery. So, we can take sentences like this and expand it into an entire report from the JASONS.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

And then I think, you know, the tension that we'll run into as we get deeper into today's call and I'm sure as we react to the official roadmap in February is that middle bullet point about build incrementally from current technology, what does that mean, and if we define pivot points in our technological approach like shifting to an API-based approach how do we do that in a way that's consistent with this vision. So, I'll just point that out as that's a potential source of some tension. Okay, Debbie, I'll let you pick back up. Maybe we should look at the next slide and just...

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

And move slower, right, so let's go to the next slide, five.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah, just, you know, just...because we know kind of where we're headed and for me it's useful to look back at these things and say "okay, I get where that came from now" or "OTOH I see a problem coming." Anything jump out at anybody on this list of the nine guiding principles?

**Janet Campbell – Software Developer – EPIC Systems**

I don't have my computer can somebody just briefly tell me what the slide says?

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

Sure. So, there was a list of, what is it, nine, we have actually nine guiding principles that say...and I'll read through them, build upon existing Health IT infrastructure.

**Janet Campbell – Software Developer – EPIC Systems**

Oh, it's that slide, okay, sorry, I thought we moved past that.

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

You've got it? Okay.

**Janet Campbell – Software Developer – EPIC Systems**

Yes.

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

Do you have that slide?

**Janet Campbell – Software Developer – EPIC Systems**

I remember it.

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

Okay, great, wow. Okay, so, if no other questions should we go ahead and move to slide six?

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yes.

**Debbie Bucci – Office of Standards & Interoperability – Office of the National Coordinator for Health Information Technology**

Okay, slide six, please. And these are just simply stating what should the roadmap do and they have stressed help stakeholders make decisions in the short run that build to an interoperable future, describe a path to get from current state to future state, describe actions required to make that path a reality and who must take them, and serve as a living document, update regularly which I think is a very good key. So, the next slide I'm sure Arien you take over it's the hourglass but is there some discussion around this slide?

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

This is David...

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children's Hospital**

Yeah this...

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Can you go back to the slide that...yeah, there we go. Again, I think that the challenging one here for us is going to be that second one, describe a path from current state to desired future state. So, I'll just register that that's the one that I think is challenging and is what maybe we can offer guidance to our colleagues who are looking to this group as a source of wisdom.

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children's Hospital**

This is Josh; I would just raise one other comment about something that a roadmap might do that I don't see on this list which is providing a built-in method for feedback or self-assessment. And I understand the last bullet point on this list sort of gets at that which is to say every once in a while we can go back and revise the roadmap but how do we know if we're on track. And I think...

**Janet Campbell – Software Developer – EPIC Systems**

Yeah, that's a really good point, this is Janet again, that was something that I was noticing through more the later stages of the roadmap it was difficult as written to see how we'd measure success with it. So, very good point.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yes. I'm going to transition to next piece relating to the notion of an hourglass. This work came to us from the Interoperability Workgroup, the IO Workgroup, what is it Information Exchange and something Workgroup of the Policy Committee, and one of the aspects that was in the JASON Task Force, Joint Task Force, Report was the notion of an architectural view of health interoperability and the notion of whether the Internet hourglass is applicable to healthcare.

And the connection to the roadmap I will pontificate as is my...how I roll, for a second, that in my role in product management I've seen two different kinds of roadmaps one is a view that says "this feature is coming on-line this time, this feature is coming on-line this time, this feature is coming on this time" and those roadmaps tend to not, tend to change very quickly and not be that useful.

The kinds of roadmaps that I find more useful are saying “we’re solving this problem here, we’re solving this problem here, and this problem here, and here’s how solving problems builds on top of one another to create something potentially more compelling for our customers.” And that’s a transition to this notion of the Internet hourglass in a sense that I’m not sure that we’ve got a strong view with respect to the roadmap about what success looks like and what we’re building toward.

And so the Interoperability Workgroup from a policy point’s perspective had a perspective that the Internet hourglass is potentially a framing notion for thinking about architecture services and APIs.

So, for those who aren’t familiar, the hourglass has been a core architectural principle of the Internet and the notion is that there is a spare set of services or protocols that everyone implements in common. There is heterogeneity below the stack and heterogeneity, increasing heterogeneity as you go up the stack and if we go onto the next slide we have some examples of how this plays out.

So, the classic Internet hourglass starts with the Internet protocol as kind of the glue that runs the Internet. There is a little bit of heterogeneity or parsimony above the stack in two ways, two transport mechanisms TCP and UDP.

There is more heterogeneity on the application stack, the transport application stack, so HTTP, SMTP, RDP and blah, blah, blah, a whole set of transport protocols. And then a large variety of network applications that are built on top of those core protocols and are composed, in many ways, from those four protocols.

Below the stack when you think about IP you can implement via Ethernet, via WiFi, via ATM and below the stack on Ethernet there is Coax and twisted pair, and token ring, and a whole bunch of different network topologies on which you can run Ethernet.

And so you see this notion of a spare set of services in the middle, a parsimonious set of services above that and then a wide variety of heterogeneity that sit above that parsimony and the architectural notion is that the high degree of standardization around a carefully selected parsimonious set of standards and services enables a wide degree of uses and applications, and a wide degree of implementation methodologies below the stack.

So, the analog to the modern Internet is building on top of the...the modern web building on top of the Internet is HTTP and TLS really become the core enabling architecture. On top of that there is a set of enabling services and content standards like HTML5, JSON and OAuth 2, and composed of that fairly spare set of protocols there is a ridiculous number of web services Amazon, Google, the Apple App Store, Google Play, etcetera, you know, there is a few other standards and protocols that sit on top for streaming and for doing those kinds of things but really you’ve got a spare set of services at the bottom and a ridiculous number of uses of those services on top of it.

And then if you think below the stack there is a wide variety of programming languages, libraries, browser technologies, hardware that implement that parsimonious set of standards, services and protocols.

So, just as a thought experiment given that I believe one of the architectural end-points that we want to get to is the notion of innovation and modularity as outlined in the roadmap, and innovation and modularity I think mean to me that, just as in the Internet or in the web, there is a wide set of services that loosely couple and drive strong heterogeneity and uses that aren't necessarily preordained and pre-foreseen but are built on top of a parsimonious set of stacks.

This picture is really just a notion of framing out what might be an overall architecture where for example HTTP and TLS, potentially with a better certificate or identity frame, serve as the underlying transport substrate but on top of that parsimonious stacks like FHIR and FHIR profiles that are composable with a set of security stacks like OAuth 2 and OpenID Connect may help create another parsimonious set of services like MPI and record locator services that in turn generate a heterogeneity of uses and applications, and again the same analog below the stack you get EHRs, PHRs, HIEs, blah, blah that all implement the core standard and services.

So, we wanted to frame this up to see if it's a useful way of thinking about providing architectural, long-term architectural guidance that helps be an enabling framework for thinking about a 10-year roadmap to build towards. So, with that as set up I'm going to see if there are any questions on the set up.

I'd like to suggest we spend a little bit of time thinking about whether the Internet hourglass or the hourglass is a useful framing notion for thinking about the healthcare architecture and then there were a number of comments that were already made for the roadmap that I think we should be tee'd up to discuss and after that maybe go up to open comment and public comment and close out for today.

So, given that I want to open it up for discussion. David, anything more you want to add to this notion of the healthcare hourglass?

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

No, I think you did a good job of explaining the, you know, the history behind it and the thoughts. The one thing I would add that's always been an important notion to me about, you know, what makes the Internet scale so well is that once you have agreement on the, you know, the narrow waist of the hourglass you don't have to revisit that when you are developing the higher level services.

So, the JASON Task Force notion of data sharing networks that would take for granted the availability of a well standardized public API and then go solve interesting problems, address interesting use cases above that layer without having to go back down and revisit it to me seems what we're trying to capture and bring forward in the notion of scale.

And I think that might be a little bit different than the way we've tended to think about healthcare standards in the past not completely because they are layered to some degree but we have a tendency to go back and start from scratch and re-argue the first principles of things like "how do I represent a time interval" and "how do I represent, you know, a medication."

And the goal here I think with the notion of an API and the JASON Task Force's recommendation of a standard set of core services is that if we can get those things settled and done well, and hopefully the Argonauts will help us speed that process to figure out what that means. Then we can do these higher level things without going back and revisiting the narrow waist of the hourglass.

So, I hope that makes sense. I hope it's...I mean, maybe it's completely trivially self-evident, but I don't know it wasn't to me when I first was thinking about it.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

It's George, I'll chime in here. So, I love the model and David something you just said is...something, as I was looking at how do you apply the hourglass and particularly the neck, the narrow portion to healthcare, I kept thinking, and you brought this up as how do we get to the point where we don't have to revisit and redefine.

And so, you know, I'd almost...I think, if I were to have drawn the right-hand column I would put FHIR and FHIR profiles at the next level up and more in line with TCP and UDP, and I would think that in the lowest level we, I think, at some point need to come to agreement around just what are the properties of a medication or an immunization.

I mean, we have the clinical item list and we have the administrative list, and the functional list, but what I see in reviewing any specification around trying to define those concepts is we do continue to revisit...

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

And I think that's one of the things we need to try to stop doing.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah, this is David, let me respond to that because, you know, your first observation is totally...I totally agree, this slide got communicated via a textual e-mail and the formatting made the...our ONC helpers who translated my crude e-mail into a slide didn't understand the way I was laying it out so that was a mistake we should have caught before, so I agree that FHIR and FHIR profile is a layer above the Internet's narrow waist, but if you just think of shifting down to the point of where the stuff that we're talking about we begin our narrow waist discussion closer to FHIR.

But to your second point, and I didn't think about this until you said it, you know, FHIR itself I saw a wonderful presentation about it from Josh at AMIA. If FHIR itself layers above many of the standard data element, aggregate data element types that emerged out of the v3 HL7 work and I should have thought about maybe putting that slide in here, Josh you know which slide I'm talking about.

FHIR is not starting from scratch it's actually layered on top of a lot of HL7 learning and that's one of the attractive parts about it, that's where, you know, you hope that with 15 years of work that those things are pretty well thought out and we don't need to revisit them, which is not to say that it's sealed or finished but we are...FHIR is layering over a more fundamental layer, I don't know if it even has a name. Josh, does it have a name, those core HL7 data types?

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children’s Hospital**

Well, so I think the way that FHIR is designed, David, it certainly does take advantage of learning from previous generations of HL7 that includes learning from v2 or learning from v3 and there are mappings sort of back and forth with those kinds of data types, but it’s not like there is a conical set of data types that FHIR then implements on top. That idea was certainly tried I think perhaps in the HL7 version 3 world where there were entire specifications written only in the abstract with no information about how you would actually serialize or communicate information and then on top of those you would build additional profiles.

My take is that, you know, that approach where you define things entirely in the abstract and only then make them concrete when you want to use them was a real challenge for the industry and in particular for developers to understand those pieces.

So, I think one way I might characterize this is to say, and we can figure out where in a diagram like this we should put FHIR, but just as a sort of my own perspective I would say that FHIR takes a stand on some of those issues that George mentioned. So, you know just what is a medication, what are the things that belong to a medication or a prescription or an allergy.

You know ultimately these are the subjects of much debate and I think they will continue to be because these are clinical entities that evolve over time with our clinical understanding. I don’t think those will ever settle. But to the extent that we have some shared agreement about what those things are, to the extent that there is a fundamental truth I think FHIR tries to take a stand and say “here’s the world from that perspective.”

**Janet Campbell – Software Developer – EPIC Systems**

This...

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

...

**Janet Campbell – Software Developer – EPIC Systems**

Sorry, go ahead?

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Yeah.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

I’ll jump in, I mean, I want to say, very sort of cynically I think what Josh just said very nicely is they started from scratch, this is Sean, right?

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children’s Hospital**

Well, I would disagree with that characterization but I think that’s...you know, that’s fine but I think what they attempted to do was put together something that in the whole was coherent.

**Janet Campbell – Software Developer – EPIC Systems**

And actually maybe that does sort of lead into what I was going to ask, I'm curious of your thoughts on this, if it's...this is Janet, something that you said about how the Internet succeeded and scaled because we have defined this narrow neck and I mean, I've not been in the standards world for as long as others, but I guess what I'm wondering is, I mean, haven't we sort of had concepts like that in the healthcare world as well, you know, where we say, HL7 v2 that we're going to have PID segments and this is what's going to go in them even, yes, there were these segments and that was troublesome.

But, I guess what I'm wondering is, you know, what are we doing different now that will cause us success when we've failed in the past?

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

So, David here, I'll take my cut at it, I think in some cases we have layered things Internet style although HL7, you know, of course the early versions of it used lower level sharing protocols that weren't based on anything but something that got made up, I forget what the earliest protocol was called, I remember implementing it in the 80s but maybe that was before there was an alternative but that's not the issue.

The real issue I think is what's different about the FHIR approach or the RESTful approach in general is the composability idea that we can layer things together because they're designed to be layered together. You can compose them together in ways that are just not possible the way we used to think about things like say NCPDP or HL7 v2 or even v3 because it was so complex it was not easy to layer things together.

So, one of the...you know, the insights of the Internet to separate HTTP from HTML allowed a certain kind of flexibility, you had an independence between the mechanisms to move the data around from the actual stuff you were moving around. Now we've, I think, used that principle now pretty commonly with something like say Direct and things like that so it's not new to healthcare but we haven't had it at the granularity that FHIR gives it to us.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

But wait, so this is Sean, I'm going to try to make us be really sort of honest with ourselves about it and myself too, because...and I'm not trying to be...on anyone more so than myself, but the...so what you just described David was a content transport distinction between HTTP and HTML and in fact we do that with HL7 v2. We had a really interesting use case over Direct where HL7 v2 messages, content, were sent over the transport of Direct to communicate vaccine status.

So, it's important we should identify that but that's different than what FHIR is trying to do. FHIR is purely a content standard and they go to great lengths to talk about how it can be transmitted over HTTP in a REST style or lots of other things too, right?

And I would continue down that path and say, you know, the templated CDA was exactly an attempt to do that. Now Arien made an e-mail with some good comments about documents as a package but we've used that format to represent sending a single medicine or just allergies, or just other things and you can argue...you have a really legit argument that it's super complex and ugly and painful, but that's a matter of degree and quality of implementation not philosophy of implementation, right? That was kind of the whole point of this templated CDA was that they come up with these different templates for things.

So, I'm really nervous that we're not truly describing a new approach but we're a little bit clocking the traditional approach which is that old one sucked we'll do it better, it was too hard, too complicated or too other things, those other qualities that we don't like and accidentally or whatever clocking it in a new philosophy which may not be there.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Sean, this is David, I'll take my response to that and then I'll bet the others will have things to say too. Points well taken, I think differences in degree of ugliness and complexity have a huge amount of impact on the actual scalability of things. The friction that has to be overcome to get something done at scale can be the inhibiting factor even with a philosophically pure design if the friction is...

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Agree, agreed but let's just call it that then is all I'm saying.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Okay, but, so, but the other point I want to make which is maybe I formed my...maybe I used my examples or picked bad examples. The other difference I think is the granularity and design of lowest level feasible granularity with a clear model for composability is where FHIR's approach is different from example a CDA template or at least CDA templates the way we have been using them. So, that's...

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

I just would be...

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Granularity is...

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Careful that you use it in a composable way all the time, it was hard to implement them all but that's how they're used commonly.

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children's Hospital**

You have some...

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Like an integration with for example when we did Walgreens it was just medications encapsulated in a package we didn't have any of the other stuff and we didn't have to learn or understand any of the other stuff they just wrote to the one little piece of that spec, right?

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yes, difficulty in specifying that how you did it in a reasonable and easily assminable way is another piece of friction, FHIR tries to address that with the profiles there's certainly not a finished product there but certainly understanding how to...I think they're trying to learn from that experience with the complexity of specifying CDAs or an RMIM and HMIM, and all of the other ways that were tried to define what a message was in v3 speak. But let's have some other comments I don't want this to just be me and Sean.

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children’s Hospital**

So, this is Josh, Sean I think I fundamentally agree with you actually that FHIR is not introducing wholly novel concepts here and maybe of transport and of content being separated and the idea of different levels of granularity.

What I think the compelling advantages are, are simply here’s a way to design a healthcare data API that makes sense in the context of 2010 or 2011, or 2012, or maybe 2014 in an environment where we see a lot of App developers building on similar types of APIs in other domains with great success and giving them a set of tools that have worked quite successfully in those domains. So, that’s really my perspective.

In terms of what’s new or different, you know, from a theoretically perspective that’s better, you know, the thing I point to probably the most often is FHIR’s approach to extensibility which is an extensibility model where people can layer additional meaning into their resources in a way that is more discoverable so you can’t just add a random extra extension to an element you have to give your extension a dereferenceable name that anyone in the world can plug into a web browser and understand what that extension means so out of the gate we have a little bit better chance of interoperability even around data with extensions in them, but the...

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Yeah and I get it and I’m not...I actually am supportive of it I think it’s a great model but, so I’m not arguing those things I really am not. What I’m arguing is...so, for perspective in 2009 I came in and made a point which I don’t know if Janet, but I know that some others of her team would laugh at me for which is, you know, which was IHE was just...there’s no way we could have done this, right, and this was so complicated and weird, and had all these problems, and so we needed something new and we did that and that was Direct, we didn’t create it, the whole cloth, but we certainly were starting from scratch in a lot of ways.

And, you know, and I could still sit here and believe that, and I do, that Direct should have gone far farther than it has, but there is now a new crop of people sitting back doing exactly what Sean did in 2009, right, and, you know, that just seems...you know, yes, I’m not the old cranky guy I guess but, you know, it’s not...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That’s how it happens.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

It’s just I really worry that...like we could come out and say, FHIR is better for the reasons Josh said therefore we think we should be moving towards this new model, great...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Guys, I...

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

I could maybe get on there, I can't get on the board saying, hey, in the past we couldn't do any of these things and FHIR is now going to enable all this stuff it didn't have before because we could walk through using IHE or Direct, or a lot of things and show, yes this is exactly how it could happen and those matters of degree in friction and stuff are really hard to talk about because they depend on your developers, they depend on you, you know, your motivations and lots of those other things.

So, I think we look kind of silly if we say, new, brand new approach here's FHIR, that's kind of where I keep emotionally struggling a little bit, is that a little clearer maybe as to where I'm at.

**Janet Campbell – Software Developer – EPIC Systems**

Maybe one thing if I could just add to that as well, I'm...you know, we're all Argonauts, right? I think that that group in particular is sort of, yeah, let's put our money down on that one because, on that standard because we think it's going to succeed, but I think the thing that concerns me a little bit is this idea that this is the golden key or possibly the golden fleece, you know, the thing that unlocks all doors.

I worry a little bit that we say, okay, now this time we've got it right because we're matching the Internet approach, but and my point that I feel like is in concert with Sean is that we kind of were doing that a bit and yet we didn't have the positive results that we thought we were going to and so if we're not learning from our mistakes are we just making the same ones over again.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

So, can anyone hear me?

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Now we can.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

You can hear me?

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah.

**Janet Campbell – Software Developer – EPIC Systems**

Yes.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Oh, I was talking and talking, and talking, and nobody could hear me and my phone wasn't on mute. Let me see if I can summarize what I heard through this discussion. I heard in the reference to v2 Janet and George making the point that v2 itself was composable to a degree if you knew one big segment you knew them all sort of.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Sort of.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

V2 had limitations in terms of six field formats so that if you had a new way of doing it you had to create a new field way at the end and all kinds of funky stuff. But that level of composability was actually quite useful in practice.

I think Sean pointed out that v3 and CDA aspired to that level of composability. I think the v3 experiment, HL7, has reasonably concluded wasn't able to get to that level of composability.

I'm wondering whether rather than argue FHIR versus, rather than argue that FHIR is a brand new approach if we can agree on the notion of composable clinical data elements and interoperable representations as at least one of those fundamental layers of the stack and that then there is a utility function on standards that supply that which are, you know, do they work for certain kinds of interchange but not others, so v2 worked for messages but not for documents or for atomic data elements. How composable are they really?

So, v2 had limitations in terms of when you wanted to extend it they were poorly extendable, when you wanted to change it was poorly changeable so how well does it solve for change and addition, and extension. And those are fitness functions but the general principle of composable data elements that have interoperable representation seems like it's a pretty good notion that we tried and we hope we're trying to create better this time. I'm wondering if that's a framing of this that encapsulates the discussion we just had?

**Janet Campbell – Software Developer – EPIC Systems**

I mean, I think that when you first said, can we get behind this aspect composable elements that are interoperable is the direction we should go in with that I can agree. I agree with that.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

And then also the notion that there is at least implicitly a fitness function to standards that provide that and we hope, because we're all backing it, we hope that FHIR is a more fit approach.

**Janet Campbell – Software Developer – EPIC Systems**

And can I ask a dumb question, you say fitness function and I haven't heard that framed that way, can you tell me what you mean by that? I'm sorry.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I mean a utility function or some way of saying there is some relatively clear criteria for what makes one more fit from an evolutionary perspective than another.

**Janet Campbell – Software Developer – EPIC Systems**

Okay.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

And we, you know, v2 has done a good job it's lasted us a long time and it's been the workhorse, v3 ahh, CDA ahh, ahh, yeah sort of, we have hopes that FHIR actually has a better fitness so that it will be...it will serve that layer of the stack better than other things we've tried before.

So, I'm just wondering whether it's a way of reconciling what I think is appropriate and Sean saying, no we tried this and it, you know, what's new this time, we think the notion is composable data elements with interoperable representation is a good one, we believe there is an implied fitness function or applied utility function, or implied goodness function and we hope that FHIR does a better job of that.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

So, I would translate maybe your abstraction of utility and fitness to the concreteness of things like lower friction, better...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Sure.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Availability of tools, familiarity to developers even who come from outside healthcare...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

More extensible, better able to survive bilateral asynchronous cutover.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Better utility, better ability to serve a variety of functions, message, documents, atomic elements.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Right.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yes.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Right, so I mean, I do think that this friction notion is an extremely important one. You know isomorphic and function does certainly not mean equal in desirability, right?

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's right.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

I mean, we could still be writing all of our applications in assembler but probably most of us don't do that anymore.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Turing machine, everything is Turing machine anyway.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Isomorphic to Turing but we don't go to that level because it's just not efficient the friction is too high. So, I think that's one of the things that is positive about the direction that FHIR is going in. I say that based on just a little bit of experience with working with outside parties creating smart Apps and being, you know, very pleasantly surprised at how quickly people who never had heard of it before could read the spec, adopt it and use it with incredibly low friction.

It was...compared to...I couldn't imagine teaching them how to use CDA to solve those problems in the timeframe and with the minimum amount of fuss and bother that we were able to do that with FHIR. So, that friction is a really important thing and maybe it's just one component of your overall, you know, fitness and utility...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Abstraction. The one other...I want to segue back to one thing that Sean, that you said, that I want to cue up for discussion because I'm confused about this and maybe it's a semantic thing, but you said FHIR is just about data. And I understand that technically speaking FHIR is mostly about data but there is also no question in which that it is tightly wed to the RESTful APIs of HTTP.

And I wonder if we need to be careful when we say FHIR do we mean RESTful FHIR or FHIR as a resource specification language, or do we not need to worry about that distinction.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

This is Arien, I'd rather be explicit and say, HTTP plus TLS and SMTP as a transport stack.

**Janet Campbell – Software Developer – EPIC Systems**

For FHIR?

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah and then...

**Janet Campbell – Software Developer – EPIC Systems**

Sorry, FHIR over SMTP?

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Sure.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

You could imagine it.

**Janet Campbell – Software Developer – EPIC Systems**

Sorry, go ahead, okay, yeah, yeah, go ahead, sorry.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

And then...so, you know, one of the things just as an editorial function, one of the things that makes HTTP more survivable, I mean, HTTP is kind of the cockroach of Internet or web standards, is the notion that no matter what stack you pick up whether you program in Rust or Go, or Node.js, or whatever the cool kids are doing these days, Swift.

**Janet Campbell – Software Developer – EPIC Systems**

Assembler.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Turing it seems, Turing.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I don't know if...

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

FHIR.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

There is an HTTP stack in a Turing machine but whatever the cool kids are doing...

**Janet Campbell – Software Developer – EPIC Systems**

...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

At the very least you've got an HTTP stack and there is something powerful in a universal transport that everybody at least should be able to run on top of.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

So, back to the original question Arien...

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

So...

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

When we say FHIR in these conversations what do we mean?

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yes.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Do we mean FHIR plus HTTP, RESTful transport? Let me drop the word "RESTful" do we mean FHIR equals the resource plus transport or should we be more specific?

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah...

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children's Hospital**

Do we want to keep RESTful?

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I'd rather be explicit about the components of the thin waist as more abstract entities and then map them to the representation that we believe are applicable right now because those may change over time but the notion of a universal transport and transport security stack seems to be one that's been highly useful.

I think we agreed on the notion of a composable data, composable data with interoperable representation as a useful notion and when you combine those two you do get a notion of FHIR over HTTP as at least a minimum level of stacks.

**Janet Campbell – Software Developer – EPIC Systems**

Could I ask, one of the things that I've found really confusing about FHIR and especially based on what you've said right here is why we still consider that, you know, the best next step is to put a C-CDA document over, you know, a RESTful interface? Because to me that sounds like it's in a...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I don't.

**Janet Campbell – Software Developer – EPIC Systems**

Okay.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I don't know why. So, I think the FHIR use case, the best FHIR use case is atomic data, data access it's clearly the thing that you can't use right now.

**Janet Campbell – Software Developer – EPIC Systems**

I agree.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I'd also say, so this is...Jen, this is more of a fitness function issue. If you want to do XCA on an iPhone it ain't happening.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Well, hang on, I mean, this is...I'm going to take a big disagreement with that, I mean a document is a document, is a document.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

And FHIR can move documents just as well as it can move problems.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's where I was going David, that's where I was going.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

And if the document...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's where I was going.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah, if the document happens to be a CDA from the dark old days of 2012, you know, you've got to move it, right? I mean, it's a document. You wouldn't use...

**Janet Campbell – Software Developer – EPIC Systems**

So, you're saying sort of that the document is your atomic composable element?

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Exactly, well, it's not...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's right.

**Janet Campbell – Software Developer – EPIC Systems**

Okay.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's right, that's right.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

But isn't...

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Aren't we...

**Janet Campbell – Software Developer – EPIC Systems**

I think Sean is trying to say something.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

I thought I was with you guys for a minute there.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

OTOH.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Aren't we really just...when we say FHIR we really mean FHIR resources.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Well, I think we mean...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I think we mean FHIR resources that what I'm saying I trying to be explicit.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

I think we mean FHIR resources and transport is...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's right.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Transport.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's right.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

You really mean FHIR resources.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I'm trying to...

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children's Hospital**

So, Arien made a very clear analogy, this is Josh, a very clear analogy between in the Internet stack the thing in the middle is transport but I think Arien is saying in our stack the thing in the middle is not transport. Did I understand you right?

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I think this was the formatting of the slide in formatting that David was referring to.

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children's Hospital**

Oh, no I don't mean in the slide, I mean in what you were saying was the most fundamental core piece of what we would be describing.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I think...

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children's Hospital**

I think you were saying the most fundamental core piece was the resources, the content rather than the transport.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Right. I do believe there is a fundamental core thing that is the resources that probably plays an analogous role to HTML5 in the web stack. I do think, and maybe it's for comment, I do think there is value in the healthcare ecosystem if there is at least one widely available and ubiquitous transport and security, and transport security.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

But, I think, Josh, I like your point that the core of what we're doing new here is really nailing these resources.

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children's Hospital**

Well just...I should restate my point. I wasn't actually trying to make that point I was just trying to see if I understood Arien.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Okay.

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children’s Hospital**

I tend to think that...

**George Cole – Principal Scientist, Community Solutions – Allscripts**

So, this is George, I actually and back to the first comments I had on this slide, I actually view FHIR resources as a concrete implementation a level above what I would consider to be in the neck which I think in the healthcare domain would be transport, yes, but also that set of named composable, I don’t know whether we want to call them classes or objects, or what have you, but I think FHIR is an implementation attempt...

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children’s Hospital**

Yes.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

A level above that, FHIR resources are, actually.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

George, what...I’m not following you above what?

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Well, so I think the core pieces are not FHIR resources themselves. I think FHIR resources are this year’s starting or last years, or 2012 starting attempt...

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yes.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

At implementing on the core composable components that we need to have...that are the neck of healthcare. And I think...

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

But...

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Ten years from now there might be yet a different implementation on top of those core resources but today there are...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

But this is...

**George Cole – Principal Scientist, Community Solutions – Allscripts**

FHIR resources.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

This is Arien, that's exactly what I was trying to say as well. There is a useful concept of core composable data elements with interoperable representation and there is a FHIR as the best implementation that we believe now but we're going to have our quantum field representation of healthcare in 2020 and we're going to want to jump to that and we don't want to have FHIR memorialized as the only, only, only ever way of doing it.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

But so I'm...this is David, you guys have lost me here and I want to go back to George's statement. George are you referring to the notion of something like an information model that the FHIR resource is trying to represent or are you just...

**George Cole – Principal Scientist, Community Solutions – Allscripts**

I...

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Reserving the thought that there could be something new?

**George Cole – Principal Scientist, Community Solutions – Allscripts**

No, maybe it is an information model David, I just...it...I think at the heart of all of this...and I think where actual implementations always struggle is how to map on top of that information model and here...

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

So, you know, the way I see that is, you know, the mistake that we made with v3 was we believed we had a robust enough information model that we could move that around and that the receiver would be able to understand what we sent because we had it so tightly coupled to this unambiguous information model.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Yeah.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

And I think our experience has proven that to be completely wrong. So, what the FHIR resource...the FHIR developers did was to say, let's decouple those two and let's agree that we can move resources around according to a predefined profile that both sender and receiver agree to knowing that this profile is capturing some as yet unenumerated information model, some shadow of it, it's a projection from the high dimensional space of information model down to, you know, a JSON structure with coded fields and value sets against which those codes can be translated and the sender and receiver agree to do that and that is a resource, and that's in and of itself a valuable thing even if we don't quite know what that information model is yet.

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children's Hospital**

So, yeah, I think...so this is Josh, I think, you know, George has the intuition that FHIR is very concrete it must be the concrete instantiation of something.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Right.

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children’s Hospital**

And what is that abstract saying? I guess I have two answers. My first and neither one of these is meant to be flippant, so please don’t take them that way.

My first answer is, well, FHIR actually is the thing. FHIR is designed to capture that information model and it does it in a more concrete way than you might expect but if you look at the way FHIR resources are designed they’re designed to answer a question like, you know, what are the things that go into a medication, what are the things that go into a lab result. It really does try to provide an information model at that level.

The second answer I would give is, yes maybe there is some more abstract notion and FHIR is just, to really twist metaphors here, FHIR is the projection of that notion perhaps into the wall of a cave, from a flame, but I don’t think we should go looking into that flame it’s dangerous and it hurts our eyes and we spent too long seeking it. I think we should just use the shadow for what it can do for us.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah, this is Arien, I think, that’s good. I’d say there is a trick in healthcare. The way I’d represent this is there is a trick in healthcare that’s been successful, it was successful in v2, it was not as successful as we wanted in v3 but not because the trick was a bad trick just because the implementation maybe wasn’t so good and we hope it’s more successful in FHIR.

And that trick is the notion of composable reusable concrete data elements that represent at least the basic things that you want to say about a flue and so I’d agree with the way that Josh just presented it and say that that’s what I was trying to get to in the notion of composable models with interoperable representation in this case it’s instantiated as FHIR.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

And this is David, I’ll jump in and say, you know, I agree with Josh’s second interpretation...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yes.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

And his projection onto the wall of the cave and that we don’t need to worry about, you know, what God’s got up there behind the projector that we can’t yet quite visualize.

The way I’d describe it to other people in informatics speak would be the v3 model was, you know, based on the notion that you had computable semantics, that you could actually look at the information model and compute the meaning of the elements that were moved around. We’ve basically decided we don’t know how to do that yet, we tried and it didn’t work as well as we thought. So, what FHIR gives us is semantics by contract.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

By contract, yes.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Because it’s not computable semantics it’s semantics by contract and the contract is to profile and if both parties agree to use the profile and agree what that profile means for their particular use case then off they go. And, Sean, yeah, that’s the way v2 worked, I know. V2 did a lot of good.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

So, I think we've got...I think we've got enough agreement that we could probably write our new flavor of this stack first in some abstract terminology and then as proposed, you know, for this portion of the roadmap up until good until 2017 or 2020 proposed instantiation of that thin waist.

**Janet Campbell – Software Developer – EPIC Systems**

Could I...you know, I don't know that we would actually want to take this on now because it's sort of a process of running before we can even walk. But, I think that one thing that I've seen missing in many of these kind of technical roadmaps and modeling of language is that a lot of that middle stack and the flames on the wall of the cave or the chart on the wall of the cave, etcetera, a lot of that is based around nouns and I think that, you know, maybe in the post 10-year roadmap really the key is going to be having verbs.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah...

**Janet Campbell – Software Developer – EPIC Systems**

So, actions like, schedule of the visit or...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

You know it's interesting, that's right, Janet, it's interesting, this is Arien, if you look at the web there is way more heterogeneity of verbs than there is of nouns and the kinds of verbs that there tends to be more standardization around are security and authentication and authorization. I don't know of good examples where there are lots of standardization of...maybe I'm just not thinking of it in the right way, but there is a lot of standardization on where you can get parsimonious standardization of verbs.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah, I'm not...this is David, Janet could you give us an example of verbs that you had in mind?

**Janet Campbell – Software Developer – EPIC Systems**

The thing I was thinking about in particular, David, if you remember when we were in Utah and they were talking about the grand plan for having remote care plan management and a lot of the services that they were explaining there and the way that interoperable care needs to be practiced seemed to be focused more on interoperable processes and the thing that, you know, now I want you to file this order in your system and now I want you to schedule this appointment, which is sort of almost a collection of first find the available appointments, then offer them, then choose one.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah.

**Janet Campbell – Software Developer – EPIC Systems**

And that was what I was thinking, anyway.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah, so I think that's a great observation in our hourglass when we tried to put a punitive one together. I would consider those to be, you know, something you might call, you know, sharable services that are built on top of the primitives.

**Janet Campbell – Software Developer – EPIC Systems**

Yes, yes.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

So, it could achieve what you describe using FHIR wrapped up in a sharable service in some way. You could say, do the following transactions and the following sequence and you could achieve that goal. So, you know, I think, maybe naïve...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Maybe it's too naïve to believe, but the belief is that if we all have implemented those core services it will be a lot easier to come up with really interesting higher level, sharable composed services on top of the core.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

This is Arien...

**Janet Campbell – Software Developer – EPIC Systems**

I like that.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

I think that's right and I think there is a missing, maybe a missing element that we don't know what it is yet which are the chunkier bundles, FHIR calls them bundles, the compose resources that say, you know, usually a patient and a procedure, and I don't know what, I don't know the FHIR resource models well enough to know what an order looks like, but usually an order looks kind of like this and, you know, that there are some composed resources that provider higher level components that maybe sit up the stack a little bit but are still parsimonious enough that they're not in the wild west of heterogeneity.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Yeah, but that's still just a big noun, right, like I think Janet's point is an interesting one...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

In that if you look at like the nouns don't have state over time which is a big component, right, like if you think about what happened when we did lab results on Direct...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yes.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

It worked but you had to sort of add these requests, we actually had to add request IDs, you had to change some of the ways that FHIR would forget work, there were lots of these sort of pieces that I don't know how you'd fit them in. It's a very interesting question.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Because I don't know how they fit on these diagrams very well.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Let's keep that one...who is...Deb are you taking notes for us? Let's keep that one as one that we want to flag as a future discussion point.

**Janet Campbell – Software Developer – EPIC Systems**

And to be clear too I mean, I think that none of this invalidates what you've said so far. So, and I think it was David who said that, you know, we'd build upon the primitives and we get the primitives first. There is just a question of, you know, should we acknowledge that the primitives are not the end state, which I think we kind of have already done, but we could even sort of be more specific about that looking outwards of, okay, then the next problems to tackle are.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah, there is a part in the new JASON, this is Arien, there is a part in the new JASON Report that says, well, FHIR great but we still need APIs and it was a little confusing to me what they meant by that, but now that I'm thinking about it in this frame I think what they mean is, nouns are great but you need verbs too.

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children's Hospital**

I feel like it's worth pointing out, this is Josh, that what's being proposed within the scope of FHIR as a standardization effort within HL7, does encompass or at least is beginning to encompass some of those verbs too and just to give one concrete example there is a set of resources that are being proposed as part of the second draft of FHIR around appointment scheduling. So, there is a resource that represents that appointment that's in the process of being scheduled and a protocol that's described by which several parties who might participate in that appointment can update their status effectively responding "yes" or "no" that kind of thing is being described as part of the spec.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

But, I'll also point out, this is David, that, you know, the Internet debate has raged for years on the value of RPC, Remote Procedure Call, which is a verb oriented approach typically stateful with RESTful approaches which is noun oriented and stateless, and I think you can...if you go and rehash all those arguments it's a draw.

I mean, well, it's not a draw the Internet won so, you know, the RPC model is a shortcut that makes sense in well-defined use cases but it's not nearly as generic as a noun oriented RESTful model where you transfer state with the movement of the data so that you don't have to maintain state...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

If we continue this long enough we're going to be in...

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah, we'll be in...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

We're going in triplets, we're going to be in triplets because we'll compose relations of nouns and call them verbs.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yes, yes. So, but it's a good point when we...we need some work, we need some examples of how we would use these tools to solve real problems.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

I think, the point stands regardless of what philosophy we have behind it.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Arien can we ask that we go...make one sort of just slightly...you talked about, hey, we're going to try to maybe make a cut at these diagrams with different labels and I'd love to...what would be really useful in this a little bit about the mail thread that I had back around Thanksgiving was it should try to tease out where maybe are we really saying something that might change the game versus, you know, frankly just in different methods of degree, it doesn't even matter that it's sort of some fundamental thing or not.

I would love to be able to, as an exercise, and I'm happy to do this and I think people will...there will be a lot of opinion in it, but take whatever you kind of want to model out there and say, okay, let's look at IHE and use your fitness function idea and let's score them and let's at least have an argument about that because it might be a good way for us...take a few examples, just whatever they are...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

And then...I just want us to get to a common language about those functions and those values and those dimensions on which we're talking because otherwise, especially in conference call land, we can end up in the like, you know, I'm going to make point A about dimension A and somebody says, yes, but dimension B, and somebody else says dimension C.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yes, correct.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

And it's hard to close it out.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Sean, this is Arien, one of the thought experiments I like to run is exactly that, now I want to point out that IHE is a profiling body and not a thing.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Right, no, I get that, I get that.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

But, if you look at...if you take your components as Consolidated CDA documents and XDS you can do, you know, X number of things, if you take your components out of this stack you can do Y number of things and, you know, IHE by the way is marching down towards FHIR and OAuth 2 so this is really about, if you take your components from this stack what's the heterogeneity that you can get to and what are the unexpected use cases that you can get to. I think that's what you're saying?

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Yes, absolutely, I just want to test them...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Against some of the use cases.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Correct.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

And I meant, the XDSs of the world and those things not the IHEs of the world...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's right.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Those things.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's right, yes.

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children's Hospital**

I...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Josh, did you want to get in?

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children’s Hospital**

Yeah, this is Josh, I just wanted to add sort of what I hope is a very short orienting question and this is in response to Sean’s initial comment earlier and the notion of building this diagram, you know, I fully expect or I kind of hope that we’re going to have great success with these technologies in the next 5 years but 5 years later, you know, we or somebody else hopefully will be saying, time for something new and that just seems like progress to me and, you know, maybe that’s okay. Am I in the right Workgroup here, we’re going to build a diagram that’s going to have stuff on it that’s right today and it will be wrong in 5 years and we can just build it?

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah.

**Janet Campbell – Software Developer – EPIC Systems**

And it’s not the RIM right? We’re not building the RIM again.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That’s right.

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children’s Hospital**

Right.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

I think everybody agrees...

**Joshua C. Mandel, MD, SB – Research Scientist – Boston Children’s Hospital**

Otherwise we have to find universal truths and we’re not going to find universal truths here.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

We’re not going to find universal truths, so Josh that’s what I was going to...

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

But I will say that if we define things that can’t get...that don’t get developed before they get decided they were the wrong thing, which is the history of this particular space, that’s a problem.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yes.

**Janet Campbell – Software Developer – EPIC Systems**

Well, as long as they’re not required to be implemented before we realize they’re the wrong thing.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

And I think it would be useful if we just had a set a framing function or a frame to say, you know, FHIR is a flue and flues are generally good and FHIR is a good flue, and, you know, if you’re going to go to the next generation of things you probably need...you’re probably going to need another flue or maybe we’ve got what flue is a little bit wrong and we need to generalize it.

Because I think in many ways what happened with v3 to FHIR we're not arguing to Sean's point about whether we need a flue, we're arguing about, oh, you know, maybe that's really not such a good one and this one should be better. That maybe too abstract.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yes.

**Janet Campbell – Software Developer – EPIC Systems**

You lost me on flue.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

I think that was okay. I'll give you some...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Sean was with me.

**Janet Campbell – Software Developer – EPIC Systems**

But it is the stall for flue that's going to be tough for this you know or that can be tedious I guess.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Well, yeah, and there is I think also a...there is a belief in the community that maybe is the core of what my fear has been which is there is sort of...there is always this little buzz around which is not that we have been progressing in degrees and getting better and better, and throwing things out and trying new things but that we've just fundamentally got it wrong over and over again, and that is not a...I mean if it's true okay but if it's not true we need to kind of break or maybe we have an opportunity to break that way of thinking and therefore move forward a little more incrementally and consistently.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Good, so that gets to another Internet success criterion which I think is worthwhile and I think actually gets to some of the roadmap comments as well and gets at Sean's comment. So, one of the success factors of ultra-large scale systems like the Internet and the web is that you don't standardize until you implement and you don't certify until you have a standard. And we've tended, in the last few years, to get that almost entirely backwards.

We standardize and then we certify and then we implement and we wonder "huh, why doesn't it work" and I heard that coming out of both Janet and George's comment and I think it's worthwhile reflecting as, you know, one of the other architectural principles of the Internet, the IETF notion that you, you know, standards are draft standards until they've got multiple people who have implemented them and demonstrated a production level interoperability at some level of scale and then and only then can you actually iron out all the details and call that a standard. And then and only then once you have a standard do you write your certification criteria.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Yeah, I think...this is David, the, you know, one of the goals of this Argonaut exercise is to get the stuff defined with vendor input and, you know, a provider group who will use that input sufficiently quickly so that we can in fact pile it aggressively and figure out what we got right, what we didn't get right so that by the time a certification question comes up we're pretty comfortable that we know what we've got.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Yeah and by the way just to be explicit about this I was hearing us kind of petering out on the Internet hourglass and so I was sort of doing a transition over to Sean and Janet, and George's comments so I just wanted to be explicit about that transition. Are we dead? Are our brain full?

**Janet Campbell – Software Developer – EPIC Systems**

Totally.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Close.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

It is the end of the day. You know I...well, maybe never mind.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

So, here's what...if our brains are truly full, here's what I would suggest as next steps for this Workgroup. I think we had a fabulous discussion today. I think we've got a framing that we can put together that encapsulates the discussion points.

I'd also like to suggest that we take the e-mail comments that Sean and George, and Janet put together and try to see if it fits that overall framework and there may be some other aspects that are just different points.

And what I'll commit to with David is to put together a slide deck that encapsulates this conversation to see if it's something that might be a starting point towards our next meetings, actions relating to the final roadmap and there might be, I don't know, Michelle if there is an interim reporting out point that we'd have to the Standards Committee or otherwise?

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

No.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Okay.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

But we can have one.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Well this...Arien, maybe this is something that we can circulate and iterate on a couple of times just in the meantime...

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's what I was thinking.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

You know over the long break between now and our next meeting.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's right.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

I mean, we do have to stick to the official definition of ONC, right? The Office of No Christmas.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

No, you're getting a break this year.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

We're actually getting a Christmas break so it's pretty awesome.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Wow.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

A holiday break, it's nice.

**David McCallie, Jr., MD – Senior Vice President, Medical Informatics – Cerner Corporation**

Okay, the Office of Partial Christmas.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's right.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Well, if that seems agreeable as a next step David and I will put together a version of the deck that encapsulates this discussion, encapsulates the written comments that we got, we'll send it around to the Workgroup for feedback and then we'll review it in our next meeting in January. If that's agreeable to everybody and I'll wait three beats. Then I would suggest we give ourselves a few more minutes and open it up for public comment.

**Janet Campbell – Software Developer – EPIC Systems**

So, just to be clear there is no homework besides reviewing the deck?

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

No homework besides mine. I've got the only homework assignment. All right, should we go to public comment?

**Public Comment**

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

That would be good, operator can you please open the lines?

**Lonnie Moore – Meetings Coordinator – Altarum Institute**

If you are listening via your computer speakers you may dial 1-877-705-2976 and press \*1 to be placed in the comment queue. If you are on the phone and would like to make a public comment please press \*1 at this time.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

It sounds like no public comment?

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

Yes, there is no public comment, thank you.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

All right, well thanks everybody and we will get back together in a little less than a couple of months but there will be some e-mail in between now and then so you won't forget about us.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

And you got lots of invites for the future meetings during this break.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

That's right.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Yes, we do, all right.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Take care all.

**Arien Malec – Vice President Strategy & Product Marketing – RelayHealth Corporation**

Thanks everybody, Happy Holidays.

**Michelle Consolazio, MPA – Federal Advisory Committee Program Lead – Office of the National Coordinator for Health Information Technology**

Thanks everyone, bye.

**Janet Campbell – Software Developer – EPIC Systems**

Happy Holidays.

**Sean Nolan – Chief Technology Officer – Adaptive Biotechnologies**

Take, care everyone.

**George Cole – Principal Scientist, Community Solutions – Allscripts**

Bye-bye.

**Janet Campbell – Software Developer – EPIC Systems**

Bye.

**George Cole – Principal Scientist, Community Solutions – Allscripts**  
Bye.