BILT "Tiger Team" KSA follow-up meeting
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Ann: We started in May re-evaluating the KSA knowledge areas for this year. A skills list is hundreds of things, but with your guidance our list is a much shorter list of consolidated, grouped knowledge areas. We also want to talk about which certifications you value. But most important are the things that we could not as a group fully define at the May meeting. We are careful with these meetings to follow the schedule. When our meeting time is up, we let you go. So that's why we're having you back today: to discuss these items again. You have in front of you the list. The ones that are mostly of concern are the ones with "Tiger Team request" noted. Look at K5 "Collaboration Technologies" and then you look at K6, K7, K8. We're not sure what you want us to do perhaps because these are rapidly changing areas. So this meeting will be a little different from the one we did in May where we asked for votes. This is a discussion. We want to hear what you have to say.

Mark: We did not vote on K5 at all in May.

Ann: We're probably going to change it anyway. We could vote on it at the end of the day, but let's first talk about what the BILT wants. So what does "Collaboration Technologies" mean to you? Should we call it something else? Should it be there at all? We should also look at K6, K7, K8.

Ivor: "Collaboration technologies" seems pretty broad. I'm trying to understand what was the intended goal of this domain.

Ann: Let me give you the history of how it has evolved over the years based on BILT feedback. Can I give you a definitive answer? No. But I can tell you where it came from. When we started this grant, the major emphasis was to get the legacy telephony people to talk to the data networking people and have their systems communicate. So it was collaborating between those two very different entities within a company. Legacy telephony today is much smaller. We are almost all IP-based. So that gives rise to some of the new topics that maybe don't belong in "Collaboration Technologies." Maybe it's something different. How do we teach SDN or teach "everything as a service"?

Matt: Lucas was one of the ones who was passionate about this, so I'd like to get his take on this. But, first I want everyone to understand that we've been struggling with the word "collaboration" for several years. This is the growth of telephony from when it was just RJ-11, then moved into RJ-45 and IT telephony. And, the blending of IT and telephony started to become one. So when you look through the list in K5 – VoIP, telepresence, IM, texts, mobility – all of these technologies are the marriage of traditional IT and traditional telephony. I believe that we still need to have some kind of spot in the KSAs where we can talk about telephony.

Tu: Do we have in our curriculum today anywhere something that relates to collaboration?

Ann: We want you to tell us what you want people to know, and then we'll figure out what we have. The answer is that some of this is covered, especially when you get down into the protocols.

Tu: I look at PSTN and hardly anyone uses that.

Matt: I move to strike PSTN.

Ivor: You need this topic, but maybe not this category.

Tu: What are the trends today? Mobility, I think we all agree.

Ann: Tell us what you think "mobility" means. What I find is that the word "convergence" is in the eye of the beholder. People say they get it, but then their answer is different from what we're doing. So we need to know what you really mean when you talk about "mobility."

Tu: We look at the way that we do cube-sharing or hoteling. Working remotely, working from home. There's a lot of collaboration going on. But, the point is what technologies allow us to be mobile and work from anywhere. You have instant messaging, you have the voiceover IP that forwards your phone. I call it "technology enablement." Those are the things we can think about and how can we take those technologies and put them back into "Collaboration Technologies."

Ivor: To me, mobility is the goal, and you have the enablers giving it to you. So when I look at K5 it seems like it goes from the big umbrella down to the micro level.

Ann: It does.

Ivor: So I think everyone would agree that collaboration is something that you want to include, and mobility is a component of that collaboration. So videoconferencing and VoIP and IM are all enablers. I think we agree that SDN is in the wrong place at the moment. Are we trying to get down to specific technologies or just general subject items?

Ann: We have to have sufficient detail so that once we distribute this nationally to 60 institutions there's enough there that instructors can know what kinds of things they should teach to produce the person you want to hire.

Lucas: It's such a massive topic. In a typical large customer you're talking about probably four or five different teams that would fall under this umbrella. You've got voice, you've got network, you've got Microsoft collaboration tools, Sharepoint, Skype, and Exchange. And, then you get into video teleconference which tends to be owned by desktop for some reason. Those are the guys who manhandle the boxes and work with network teams to get the appropriate pipes. It's so big. And, I agree SDN is misplaced but it definitely needs to be covered. I just don't think this is the venue. If you're going to learn the values of collaboration technologies and try to understand Exchange and instant messaging, then you'd also have the mobility piece and mobile device management (MDM). You get into this huge bucket. It's probably three classes. Which is fine, but it's such a huge group of technology.

Matt: I think the problem is that we're talking about associate's degrees. Entry level. If you keep it in the context of "we're trying to give them a basic understanding of operations," then look at the OSI model, which from my perspective is the foundation of everything else. "Collaboration Technologies" is just an element of it. All of these things start to swirl together. And to your point, Lucas, the challenge that we're having is that as these technologies integrate with each other, it becomes nebulous. So I'd like to move to strike the PTSN and the SDN Open Flow, but I'd like to add mobility of some sort in here. And we need to agree on what mobility is. And, then I want to talk about whether "Collaboration Technologies" is the right view because he has one distinct impression and you have a different distinct impression. The point of this meeting is for us to come together to say "This is what we agree as a unit is the right path."

Ann: We've spent quite a bit of time on the undergirding technology. Maybe there's a differentiation between the app and the protocols. I'm just brainstorming here. Maybe we ought to have some of that separated out.

Ivor: Given that it is such a big broad umbrella and that it's an associate's degree, you probably couldn't get down to the nuts and bolts even if you wanted to. That would take up the entire program.

Matt: I agree with Lucas. It would be three classes.

Ivor: I think you'd have to teach this at a high level. I don't think you could ever get down to the nuts and bolts in the timeframe allowed.

Lucas: I think a valuable thing for someone to learn would be how to consume and use these tools. That's something valuable for someone entering into the business world. To understand how to work with those tools. But, to administer and manage is probably going to be beyond the scope of a two-year degree. They'll have a good foundation to work towards that, but I don't think you're going to put someone on the messaging team right out of the gate.

Ivor: You're 100% correct. If you're administering this is a LAN-only environment versus a wide area network, you have three or four different technologies just in that bridge-point line. But you've got to cover it. It is valuable for them because the first day you get into an IT department, you're probably going to be using it. You may not think of it that way, but you will be using it.

Mercedes: I hear a lot of discussion about different levels of understanding. When we look at this list, are we asking for the students to have a general overview and understanding that these technologies exist? In which case it's probably okay that there's 15 different things to learn in one course. Or, are we asking them to be technologists? This goes back to the rating criteria of "level of proficiency." I think I also heard Lucas mention something about soft skills. Isn't it great when new hires know how something like WebEx operates and what it's used for in a business environment? I think we have to separate out that goal: what is the level of proficiency? We all agree that these technologies are very important. I think we all have to agree on level of proficiency across these platforms.

Matt: You said soft skills, but I don't think that's where Lucas was going. It was the proficiency of operational skills versus technical implementation skills. When I think soft skills, I think of your ability to communicate with other people in the room, how you write - different levels of skill associated with interaction with human beings.

Lucas: That should be covered for any degree, not just technology.

Matt: Yes, that and security. I think we've said at every BILT meeting.

Lucas: To know what's the appropriate venue and the basic operations.

Matt: And, I think that's her point. We should categorize that as ability to use and install the technology. Does it mean integrate across LANs and WANs? Maybe not. We should give the guidance to the instructors so they can understand what they have to do. If someone says the word "presence" to you and you don't understand the technology implementation and what presence means, you think "Yeah, I'm present." That's not what "presence" means here. Presence means I have an instant messaging device that tells me I'm on and active or I'm away. It lets people know I'm available to do work. Maybe that's not clear here. You talk to one layman versus a different layman, and you'll get a different answer. It's incumbent upon us to come together and make sure we're saying "this is how you use presence." In my years in the military, first they teach you how to operate it. Then they teach you how to fix it so you can recognize what's broken and what's not broken. And I think that same level of commitment is needed for our students.

Lucas: As long as we're saying install from the perspective of end-user versus administrator, I absolutely agree. Opportunities to do a fresh install on Exchange are very rare. But, on entry-level jobs you're probably going to be setting up someone's Outlook client a few times a day. So, understanding what those settings mean and how they inter-operate is probably the most you could ask.

Ann: So is it a category that you would perhaps call "operational skills"? Would it help if I went to the board, and we pulled out the things that are at that level - that you're not expecting people to administer but expecting people to understand and use and solve from a client level?

Tu: I suggest we still keep it "Collaboration Technologies" but pick technologies that are directly in use today and then define those terms. Video telepresence, what it is and the different kinds – Avaya, Cisco – plus the different technologies within that domain. Maybe just three to five technologies that we can teach the students. When you're looking for proficiency, you're not teaching them in-depth.

Ann: Is it how we used to teach Microsoft Office?

Lucas: Kind of. It's more at the consumption layer. To understand the end point, the client configuration is a valuable skill to have if they're looking at entry-level positions for help desk. "I've seen an Outlook profile before, I know what kinds of information I need to complete that profile." I think they should be proficient in using it themselves and the basic configuration of those tools for a person, not for an organization. If I had to take something else out, I would probably take out video telepresence and swap that out for additional time using Skype or WebEx. Those are increasingly more common to do video calls from your laptop than to go into a room that tends to be managed by someone else.

Ann: Are you okay with me starting to write things on the board?

Tom: Does it make sense to break it up into two? "Collaboration Apps" and then "Collaboration Technologies."

Ann: Sure.

Tom: Then just go down and fill those buckets. The collaboration app space is going to be the one that continues to change.

Lucas: If you were to talk to a developer about collaboration tools, they're going to speak a whole different language than an infrastructure or business analyst.

Tom: And, at that point it gives the student the opportunity to make a career path choice. For a period of time there will be jobs available for people to go deeper into collaborative technology - from a business enterprise perspective, cloud consultant and service provider and all of that. A wealth of opportunity in the collaboration space which ties into all of these things we've talked about. Using these collaborative services, which will all be cloud-based. You need to be able to orchestrate them into your business.

Lucas: The technologist helps your business identify which tools are appropriate for their discipline. That would be valuable information. People are asking for help with development, but those tools are vastly different from what accounting would ever use. I agree to separate those two out. Then, that will allow them to be "discipline specific" so if you've got a class that's developer focused, that tool set is going to be vastly different than another group.

Ann: So, if we put collaboration apps up here, what do you want to keep?

Matt: Let's talk about those two words. Right now we have "Collaboration Technologies," and it's kind of dull. I agree breaking it into two is a good way to go. I think adding the word "application" in the process might be confusing.

Ann: We can pick another word.

Matt: So now we're starting to blend K5 and K14. Maybe it's okay to do that, but we need to be cognizant that at a certain point some of these things are going to shift to other areas. Technologies are blending together. If I'm an associate's degree person, I really want to learn how to use instant messaging and install it on the client level and be proficient, be able to work with a voice over IP phone and understand what voice over IP is and how it interacts, have the ability to work with things like Skype. All of those, to me, are elements of basic mobility coursework that an associate's degree person should use. So, it's trying to figure out how to take this to the next level. How to shift from what the basic premise of voice over IP, video IP, and those technologies and separate them from the operations.

Tu: But, collaboration technologies are integrated technologies. Voice over IP is a career pathway itself. Instant messaging is a career path by itself. Those are specialties.

Lucas: Yes. They'll have a messaging team that will span Exchange, Skype, SharePoint. They practice the Microsoft collaboration tools. That's their specialty.

Tu: That's all they do all day.

Matt: It pains me to tell our faculty that they need to have these very specific styles of work where we should be looking at something that casts a wider net. So I agree that Skype – now owned by Microsoft – is a special case. But, there are other messaging tools trying to compete. I think we just need to work on implementing a basic framework and let the faculty figure out where they want it to play in their own region. And, let the regional BILTs decide.

Lucas: If we're going to teach to a vendor, we're going to teach to what's most prevalent in a given region.

Matt: We have to cast a wide net. As a national BILT, we have to give guidelines: 70% of the market is owned by Skype so you're probably going to need to target Skype.

Mercedes: We need to start with the domain of expertise, explain why it's important, then teach something specific to one vendor or one solution. Here's the most prevalent videoconference solution; here's a couple of the others that might be of interest, but you're only going to have time in these courses to show the nuts and bolts of one. Again, it's about that level of proficiency. We want them to know about the domain, why it's important and what it does - then have a couple of specific examples of the tools or technologies that solve that business problem. If we could define those domains and be very specific then I think that gives a lot of freedom to the regions and what that actual solution looks like in their area.

Matt: I think we have titles now, and we're trying to define the domain. Ann is at the whiteboard where she's trying to list some of this stuff.

Mercedes: I understand we're separating things out. But, I'm nervous about separating the domain understanding from the application of that knowledge. I'm not sure what the bright red line is where something would be a collaboration skill or technology versus an app. At some point either you have a complete overview class of everything and no hands-on, and the hands-on comes in the application course. Or you look at a course that gives you a blend of domain understanding plus the hands-on. You have to define the "app" for me.

Ann: I took out the word "app" as you were talking. I'm just trying to listen to you and make suggestions how we might organize this. Does "collaboration tools" work?

Matt: I'm doing a search online now looking for keywords. Here's one: "Enterprise Mobility Collaboration."

Ann: I think what you're telling me is that the underlying technologies and protocols are separate from using the tools. You want them to use the tools, but that's at a higher level or at least not a detailed technology level. It's more about using a set of software.

Matt: Think about voice over IP, which is nothing but ones and zeros in the sky. Someone's going to have to show students the different implementations of how voice over IP works and collaborates with mobile devices. And, in my opinion, Bluetooth should be up there. When we talk about collaboration tools, I think we should probably layer in those connectivities. The reason I'm talking about this is that because I'm a visual learner. I want to see what the end result is. If I have VoIP here, what does it get me? If I understand what the protocols do, how does that relate to real life? How many people here use voice over IP?

Ann: We all do but we may not know it.

Matt: Exactly. And, so those foundational pieces of understanding of voice over IP are all I'm trying to get those students to learn in that space.

Tom: Those are all enabling technologies. Voice over IP is not the service of the app.

Glenn: When I look at this list, I think one of the key ingredients is "what are the things we want to just give an overview and understanding of?" and "what are the things that they're going to actually have to touch and do work with?" Anything that requires them to actually touch and do probably should be separated out so we have an "understanding" block: understand Bluetooth, understand voice over IP, understand PSTN. There may need to be a block somewhere else that says: connectivity

of PSTN system to a voice over IP system. That's an actual hands-on activity - you're in there, you're doing work. I think that's part of the struggle we're having – we have apples and oranges in this. There are areas where a network guy does work, but he doesn't do work on Bluetooth or instant messaging. He just needs to have awareness and understanding of them. So, we separate out things that will require him at some point to put fingers on a keyboard or walk over to a patch panel. Those aren't awareness; you're actually going to have to do something.

Ann: I've continued to write. Are we talking about these students being able to explain the various domains such as messaging, voice over IP, Bluetooth, Skype-like, videoconferencing, presence, and others? Explain them and explain the business relevance plus know how to use and configure from a user viewpoint?

Glenn: Are we asking them to use and configure Bluetooth and messaging or is that outside the domain of networking?

Ann: I'm asking you.

Lucas: I bet most of them have that concept down.

Matt: I beg to differ. I've seen too many people who have been anti-technology. In my world, it's like breathing. But to get my mom to do something?

Lucas: Do we think that profile of person is what we're expecting?

Matt: We want to assume that the student doesn't know. By the way, I think Bluetooth will be a 15-minute conversation inside a curriculum. "This is what Bluetooth is." Some easy answers on a quiz, students get it, check the box on Bluetooth. It's simple technology. But I think one of the big pieces is security. The minute someone cracks the ability to break into Bluetooth then everyone's mobile device is at risk. What I find fascinating is "why is that?" How many people know why that is? As long as we give students a basic understanding of these technologies then they can make good decisions.

Glenn: I agree. Basic understanding but there should be no hands-on requirement for Bluetooth and instant messaging because if an end user has a problem, they're going to call the end user help desk and hopefully it won't be a network guy sitting there.

Matt: They'll go to YouTube like everyone else.

Ann: Please look at the list I have, and tell me what to change.

Matt: We still have a challenge. Voice over IP and videoconferencing, to me, are technologies. I guess we need to go through the process of separating the two as much as we can, knowing that some are blended.

Ann: Could some be here and over there?

Glenn: I think we should have one column for the understanding level, and the next column either "n/a" or "deeper dive." Voice over IP would be a much deeper dive than a 15-minute understanding.

Matt: I love that idea. So, it's the categories laid out with the different elements and levels of understanding underneath each one.

Ann: I think we'll have a whole other section of protocols because we're good at teaching protocols. And, that's true across the country.

Phil: I'm working with a city to turn it in to a smart city, and they just invited IBM to use artificial intelligence as a tool.

Ann: Are we ready to throw in AI tools?

Matt: No.

Ann: Remember this is an associate's level degree. That may be a little advanced. Under "Collaboration Technologies" do you want a deep dive on messaging, yes or no? You want someone to be able to set up messaging for enterprise or desktop?

Matt: Let's make sure we have the top category first. Is everyone okay with "Enterprise Mobility and Collaboration" as the K5 area?

Ann: Maybe it's K5 and K6 at this point. Or maybe K5 and K5A. I don't think they should stay in the same K.

Matt: They're kind of blended, though. You can say that K5 is "Enterprise Mobility and Collaboration" which eliminates a lot of noise. Then in K5 we can break it out into "Enterprise Mobility" and "Collaboration Technologies." Now we have two branches of K5. "Collaboration Technologies," in my opinion, is what enterprise mobility sits on. So, what technologies should be included? Voice over IP, PSTN, Bluetooth, video conferencing technology. Anything we're missing?

Tom: Secure VPN.

Matt: There's another K for that.

Ann: The history of this is that we had 450 separate line items, but over time you guys liked to put them all together.

Matt: It's the way our brains work.

Ann: That's fine, but the fact that we've grouped them might have caused us more trouble than it was worth. Ultimately there are specific things you want taught. At this point, we have to keep them in groups. We can't redo it all.

Matt: I think next year we're going to have to break them up just because of how fast everything is moving.

Lucas: Under "Collaboration Technologies," we're focused on the supporting structure of whatever's going to end up in the "Enterprise Mobility Tools." What are the baseline protocols, technologies.

Matt: That's right. How do you make enterprise mobility work?

Lucas: How do we pipe that all together in a way that functions?

Matt: Which is why Tom was adding VPN - which is important - but now I'm saying let's not do that because we start muddying the water if we have other Ks. So, should we add it here and say that this is also in K11?

Lucas: One way to look at it is there's the client VPN. But, there are others with the same baseline technology but with completely different sizing and configuration and management. So, maybe we just focus on VPN for client.

Matt: Right now, I can get Airdrop. I can drop technology from my iPad to your iPhone in seconds. The user-level view is what we're talking about. These are all collaboration technologies, and there are probably a thousand of them. Do we need to get into this networking stuff that's covered in other Ks, or do we want to just say this is the operational layer of technologies? Here's the underpinning.

Vincente: This particular topic is one I've been working on for years, and I've watched this topic grow. I was even the one who wanted to put in SDN OpenFlow. I think it needs to stay the way it is. You can strike SDN/OpenFlow – the only reason that was added is because the next generation of 5G wireless networks is going to be based on OpenFlow. I still think people need an understanding of the basic protocols. And, the tools are just a way of showing it.

Ann: If you want to break out the tools to emphasize that this is just "use" we can certainly do that. I'm looking at it from the perspective of a faculty member. If I'm at College XYZ and I didn't hear all of this discussion, what do I need to do? I highly recommend it to be separated out.

Matt: What level of proficiency do we want marked down here going back to Glenn's earlier point? To me, this is basic understanding of how it works. "101"-style material.

Ann: For all of these?

Matt: Yes, basic understanding. And, these are the building blocks for how enterprise mobility operates. And, we also need to note that this isn't 100% of everything. We're just covering the basic framework so they can have an intelligent and accurate conversation at a dinner party.

Ann: Or, at their office when they're the new kid and everyone's trying to make them feel dumb.

Matt: So, is everyone okay with the "Collaboration Technologies" section? We feel like we're done there?

Ann: You don't have to be done for very long, but are you done for right now? What about the "Enterprise Mobility" section?

Matt: Does messaging, Skype, and presence need to be in both "Collaboration Technologies" and "Enterprise Mobility"? Or, just "here are the basic building blocks" in "Collaboration Technologies" which is PSTN, voice over IP, video conferencing, and Bluetooth. And, then in "Enterprise Mobility" will be made up of messaging, Skype, presence.

Lucas: And MDM.

Matt: Yes, MDM. Do we want to separate those out or have them blended?

Ivor: It'd be hard to not blend them.

Matt: I'm trying to think as a professor. If I'm reading this, I'm going to be thinking that the people at the CTC don't know what they're doing. Or will they understand: building blocks on this side, enterprise mobility on that side.

Ann: Let's ask a couple of faculty members. Kathy and Mike, is it clearer to separate them or clearer to put them together? Faculty members know they're not supposed to take over this conversation, but I am asking.

Kathy: It's clear that one is the technology side and one is the business side. When I look at this, I think that we need a business course for using all of these applications. Maybe an enterprise mobility management course that deals with how mobile devices connect and introduces what these different applications are and how to manage them.

Tom: I like the idea that the "Collaboration Technologies" section creates the foundation and the overview, and then the "Enterprise Mobility" section is use-cases and applying the technology to solve business problems. The quicker they can do that, the more impact they're going to have wherever they go to work.

Mercedes: I'm still struggling with the framework of separating these two things out. Because we're saying we're going to separate these into two different KSA areas, but to get the full value you have to take both courses. You have to get both pieces. I'm concerned we're broadening our definition in a way that puts more assumptions on the student.

Lucas: These aren't courses, right? They're skills you gather through coursework.

Ann: Right. My point in separating them out is that I'm afraid we're going to get back here again and won't be able to understand it. The part on this side is the building blocks ("Collaboration Technologies"), the part on this side is the implementation ("Enterprise Mobility").

Matt: You'll have to label them.

Lucas: As for spending a bunch of time on protocols, let's be honest, how many of your entry level people dig into H3.3?

Vincente: I teach them how to do that. And you have to use tools to do that – the tools we've just discussed are the ways that we demonstrate that.

Lucas: Protocol flow analysis is very network-focused. If that's the track you're on? Absolutely. But, if they're on a server administrator track, I think understanding that they can track with Wireshark and work with network peers is vastly more important than breaking into H3.3. So I do think it needs to be separated into two focuses. One on how we work with these

protocols and what they mean and how they interact with the applications that consume them. Here are the applications and here are the basic configurations from the client standpoint. So, not only are you a good corporate citizen but you also can do basic help desk and support work and set up an Outlook profile.

Vincente: That's exactly how I taught the VoIP course.

Lucas: I think we're all in agreement on going this way, so now it's just a matter of what falls into what bucket. One is about the interconnectivity and the types of applications that consume it, the other is how do you as a user consume it and assist other users with the basic configuration.

Vincente: When I taught the VoIP course, I got deep enough into the message flows and how to understand the protocols and then, after that, if you want to know to more, you can take it a little farther. But, most of it was Wiresharking - gathering it up and putting the trace on. That's as far as we'd ever imagine on this.

Ann: So whether it's two Ks or two parts of the same K, they have different areas of focus. Is that enough for now?

Matt: I agree with everything if you guys agree. The "Collaboration Technologies" section, to me, is done. They are the building blocks for enterprise mobility that needs to be well understood. Then for the "Enterprise Mobility" section we have messaging, Skype as an example (we could do Google IM), video conferencing, presence, MDM.

Lucas: For "Collaboration Technologies," think of them as all of the "interconnects" that move between these types of applications without being application-specific. "Enterprise Mobility" allows for that region freedom. So, now we can talk about how these things terminate to each other. In San Francisco, you'll be talking about Google technologies, but here in Dallas you're talking about the Microsoft suite. We know how the data gets there now let's talk about the application – OSI Layer 7.

Ann: Are we eliminating messaging, Skype, and presence on this side?

Matt: I would eliminate Skype.

Vincente: Messaging and presence are still protocols.

Tom: We need to also cover the security elements.

Vincente: Absolutely.

Ann: Where should we put it?

Tom: It would have to be in "Collaboration Technologies." It's an overview; it's an awareness. The path to more clarity and detail will be in network security classes.

Vincente: You need access control and cryptography.

Matt: I wouldn't add that in. What we said previously - and we probably need to reinforce it - is that every one of these Ks has a security awareness. That's in K11. We'd said that two pieces need to be in every course – security and soft skills.

Lucas: As long as it's always part of the discussion.

Matt: But, there is a piece we need to focus on as well. Think of yourself coming out of school at 18. You walked into school and didn't know anything about the technology. That's where our brains should be. We need to look at it from a different perspective.

Ann: Don't forget that some of our students are "re-trains." People who are changing careers. So they may have a little more maturity. I don't mean to shut down discussion, but I am going to do so. We told you we'd be done at 11am and unless you insist on staying later, we want to honor that time and end at 11.

Matt: One more thing. “Enterprise Mobility” is the only section that has operational-level proficiency. There are two different things here. There’s the “Collaboration Technologies” section, which is basic understanding of the building blocks, and then there’s the “Enterprise Mobility” section, which is the operational level proficiency and includes the installation and use of said technologies.

Ann: We have that here.

Matt: Okay then, I think we’re done.

Tu: I’m still uncomfortable with the names. It’s confusing. Maybe it’s better to call overall K5 “Collaboration Technologies and Enterprise Mobility” so it matches the breakouts.

Vincente: I have a bold idea. Just call it “Convergence Technologies.”

Ann: Which is what it was in the first place! I understand, Tu, and I think we can capture that in the descriptions so it’s understandable.

Matt: What’s the concern?

Tu: It seems to be too much. Maybe call it “Enterprise Collaboration Technologies” to cover both sub-categories “Collaboration Technologies” and “Enterprise Mobility.” It’s confusing – you have “collaboration” in the big K5 name and also in the subcategory.

Matt: I’m thinking first semester is “Collaboration Technologies” for building blocks and the second semester should be “Enterprise Mobility.”

Ann: Let’s let the faculty worry about that. You just tell them what you want people to know. Okay, K5 was the big thing for the Tiger Team today. We don’t need to vote. You wouldn’t have spent this much time on it if it wasn’t important. It’s a four. People have to know it, right?

Matt: It’s the future, yes.

[See bottom of this document for a revised K5 grid.]

Ann: For K6, the BILT said we need to provide general knowledge for any entry-level IT person. I don’t want to spend any time on that. But when we get to protocols (K7), are we covering the right protocols? Are we still wanting them to know about the T&E system? Are we still wanting them to do PRIs? Do you want to get rid of some of those? Are there others that you want them know?

Tu: I say leave the legacy technologies there.

Ivor: I think when we had this discussion originally, this was to plan for a syllabus that comes into play three years from now. And then the students graduate two years after that.

Ann: No, it’s for a syllabus that comes into play next fall or spring for people who will graduate two or three years after that.

Ivor: So we’re talking 3-4 years ahead.

Ann: Yes, but you’re not going to spend a lot of time on ISDN, are you? Do you teach it all, Kathy?

Kathy: Just barely.

Ivor: I work on networks all day. I have two young guys and they can’t even spell T&E. We don’t see it anymore. If it’s not Ethernet, they haven’t seen it.

Tu: In government facilities, they still use modems.

Ivor: I think if you want to mention T&E, okay. Just don't spent a lot of time on it.

Lucas: ISDN is still prevalent in financial because a lot of ATMs run on ISDN. But it's a niche.

Ivor: I'm working on a project to install 8000 ATMs right now but not a one of them is ISDN. AT&T shut down Frame. If you want to mention ISDN, fine. But, just as part of a technology overview.

Yang: I agree with Ivor. Looking from a manufacturer's perspective, we don't offer ISDN or PRI. We barely offer T1 interfaces nowadays. We have only one device that operates on DSL. And this is from a manufacturer that works with telcos.

Kathy: They need to know that when they walk in and haven't heard of it, it's not a new technology.

Ivor: I think the other part of wireless LAN controllers (K7) is sensors. You'll find a lot of sensors in data centers these days. I think those are valuable things for students to be aware of. I think a lot of the other things are pretty clear. Definitely Mac and R.

Matt: If it's older technology that's easy to pick up, then we just forgo it from the program.

Lucas: I'd probably spend the bulk of time on MPLS in K7. Isn't that where the majority of the connectivity is being routed through today?

Ivor: Yes, but the underlying technology supports SD-WAN.

Matt: MPLS is dying. At my old company, everything was networked. Tried and true technology. But, now with the cloud at my current company, we're in seven countries and don't use MPLS.

Lucas: They all stand independent?

Matt: They tie back, but it's all behind the machine and not through MPLS.

Vincente: And, no one knows the difference.

Matt: Well, we do notice a difference. I don't spend $2 million a month on MPLS anymore. Now I spend $30,000 a year. I've noticed a budgetary difference.

Ivor: WAN is a good story, but it's still a story. It's switch configurations for companies. That's what AT&T calls it. It's an emerging technology that they're still trying to figure out. I don't think MPLS is going away tomorrow.

Matt: It'll take a decade. And you'll see the government still on it 20 years from now.

Ann: I'd like to talk about wireless. How important is it for our graduates to understand detailed wireless technology (K8)?

Matt: It's huge.

Vincente: Everything in K8.

Ann: Collin College is looking to write an NSF grant to beef up its wireless offering. We've had some general purpose non-vendor-specific courses for a while. I'd like to hear what's important about wireless and what are the major vendors students should know. We can't go to the NSF and ask for specific brands. But, the BILT can say that you want Collin College to beef up wireless curriculum and offer some possibilities of vendors.

Tu: A lot of companies have moved over from the physical wires to the enterprise wireless. There are multiple manufacturers in the market. In the next 3-5 years, more will do so. About 40% of Comerica Bank right now has already converted. I can take my laptop up to the 5th floor for a meeting and it works.

Matt: Think about installing a network in a 100,000 square foot building. It would cost several million dollars to wire it. Just the copper and pulling cable and making sure it's shielded and all of that. You're adding to the building's cost but not adding value. The only time wireless cannot be used, in my experience, is when you're trying to have a castle wired with 12-foot thick walls. Wireless significantly saves money. Nobody that I know (and I know my company is cutting-edge) plugs in anything. And I don't see that being a requirement in the future. I see people getting father and father away. Some laptops now don't even have a connectivity plug. You can't plug it in to anything. They're architecting that out.

Tu: We mentioned this K8 topic ("Wireless Infrastructure and WLANs") 3-5 years ago and the big concern was security. That concern died down, which is why now you're seeing advancement in wireless.

Lucas: So what do we expect a student to walk away with?

Tu: A certification for wireless.

Lucas: Is that the focus? As a network specialist?

Matt: There are a couple of technologies on here that I'm chuckling at.

Tu: The focus is on enterprise wireless. Carrier wireless is different. Students need to focus on enterprise wireless solutions.

Ann: What vendors besides Cisco?

Matt: I'd have to do some study on who's the market leaders. I'd focus on the top three leaders.

Tu: The new Toyota headquarters in Plano is a completely wireless Cisco solution.

Matt: The only time now that you pull wire is to set up a wireless network.

Ann: Do you want wireless certifications at this point or do you just want knowledge? We cannot in this Collin College NSF grant proposal suggest something that you have not suggested to us. We are not trying to weigh the discussion towards any one vendor.

Lucas: Here's my problem with being totally vendor agnostic if we're talking about employable people: how many job descriptions do you see where they say "general knowledge of wireless"? They're asking for whatever their platform of choice is. That's what they're hiring.

Matt: You'd have to stick to the top three.

Ann: I want you to tell me the top three.

Tu: You'd have to do a market analysis.

Matt: And, the market always changes. I can tell you that two years ago Cisco wasn't number one. Not even close. They may have jumped since then.

Tu: It could be that a small guy out there is number one.

Matt: I remember, I think, two years ago Aruba Networks was dominant. Now they're probably owned by Dell or HP.

Vincente: They're owned by HP.

Tom: Top three are Cisco, Aruba, Ruckus.

Matt: Ruckus is a good one.

Ann: I'll send that out afterwards. That's not a part of the KSA analysis.

Matt: I'd say that they all mostly operate in the same way. When I look at Aruba Networks' capabilities, they have an amazing dashboard. I think they do a really good job – or they did years ago – of showcasing security overlays. If you have someone parked out in front of your building and you see a rogue IP pop up, that's the guy in the car trying to tap into my network or he's on my network and he's not authorized.

Ann: Okay, we need to move to K14 "Cloud and Cloud Services." Glenn wanted us to put this on the Tiger Team list to talk about advanced studies capstone project. Maybe whoever's interested can work on this. It'd be not just for Collin College. It would be for all 60 institutions.

Matt: For right now, I would say that almost 100% of companies are hybrid cloud whether they believe it or not. There are very few companies like mine that are 100% cloud. I would say the bulk – more than 90% – of the companies out there are hybrid cloud. Having a capstone course trying to solve a hybrid cloud problem is a good idea.

Ann: Who would like to be involved to design this? It's like an RFP we send to the students. This is what the customer wants. You have a business problem to solve that has to meet specific criteria. They present the project and write it all up.

Mercedes: I'm passionate about this so I'll volunteer NetApp to help.

Lucas: I'll do it.

Tom: I'll help.

Ann: That should be enough to design something, then we'll present it back to the group. Before we run out of time, I want to talk about certifications, which we didn't get to in May. First of all, a general discussion. Are certifications important or not? It varies from year to year. One year you say they are, the next you're not as sure. How important are they?

Matt: Can we do an analysis on how many people get jobs with certifications versus those without?

Ann: We have no manpower to do that.

Matt: I would like us to do that. I would like us to figure that out.

Lucas: I can tell you that certifications standing alone don't typically do a whole lot. If you have two balanced candidates – one's certified and one is not, the certified one is going to get the nod. Certifications are a "board-tilter" and a "door-opener."

Matt: I had someone apply for a position: master's degree, tons of certifications, and no practical experience. He's what I call a "paper tiger." Those guys, I'd never give them a job. That's sad because he worked so hard to get where he wanted to go but couldn't answer any basic questions on networking. My networking guy asked him five simple questions and he failed three.

Lucas: There are tons of IT professionals with no right to the title. But, we have to look at entry-level positions and if you're talking about hiring someone for help desk, someone I'm willing to put time and effort into, then the degree is good. The certification – especially when acquired as part of that degree – is a door-opener. That's how you get past the gatekeepers to a hiring manager.

Matt: A certification also says "I'm interested in this career path. I follow through with what I start." But, the question is: is it tangibly making a difference in the market where people who are certified are 15% more likely to get a job over those that are not?

Glenn: Certifications don't make you brilliant, but I can speak from three companies – Perot Systems, EDS, and Dell. For all three of them, when you started looking at entry-level job posts, there would be an item in there with something like "CCNA certified." And if you didn't have it, the recruiter wouldn't pass you along to the hiring manager unless you used LinkedIn to get a friend to pass along your resume. It wasn't important that you had a certification for the hiring manager, but they put these certifications in there (like Security+ or CCNA) for entry-level jobs because having those boxes ticked opened the door

to get past the recruiter. It gets you to the hiring manager interview. That's really the value of the certification. Not the brilliance you get from it, but that it opens the door.

Lucas: You have to clear the gatekeeper somehow. I hate paper tigers. If I had two people I was interviewing, one has a litany of certifications but the other one has practical knowledge and he can clearly talk and demonstrate? Easy hire. But we're talking about getting people new to the industry past the gatekeeper. They have help desk positions now needing four-year degrees. It's insane. These recruiters have no idea what they're asking for.

Matt: There are three avenues. One is a non-certified person – no certificate, no certification; another is a person with a college certificate (or degree) – a collection of completed courses; and then finally a certification, which is more of an industry-accepted norm. I'd say that an industry certification outweighs the other two. I'd hire someone with an industry certification without a degree. A college certificate is almost meaningless.

Tu: I wouldn't say that because some companies require bachelor's degrees. Industry certification is different. The industry needs specialists. An enterprise wireless specialist needs the certification. Maybe it's a combination of both – maybe it's a degree and certification to get you into the door. Maybe Matt is the exception to the other companies that want that bachelor's degree.

Ivor: Depends on who the target company is. For a large company, you won't make it through HR without it. But for a smaller company? If they come to my place they'll probably talk to me. And it'll probably be soft skills that are the deciding factor. If you go Toyota, you're not getting through HR without the paperwork.

Ann: There were four things when I was teaching networking that I thought was important. One, the actual hands-on experience of that particular institution if they have hands-on labs. If you know that school has labs that's a plus. Two, to finish a certificate or degree. Third is industry certification. The last thing is student projects. You've all said to students "bring us a project that's complete so we can talk about it with you." If you don't have experience, this is the way to show it. So those are four things that I thought at that time made someone more marketable.

Brian (on chat) agrees that certifications are more of a qualifier at the HR recruiter stage.

Lucas: Here's how the process works. As a hiring manager, you go to HR and say "I need a Network Specialist II." They have the job description already up and start taking in all these resumes. And they just filter down: check, check, check. And you don't even get looked at if you don't have some of these things on the board. If you're not hitting any of those things that they're expecting, HR isn't going to even know you exist. Personally I don't think someone really knows their stuff because of a certification, but if we're talking about employables and getting someone to where they can demonstrate their capabilities to a hiring manager, you have to have something.

Matt: I also like the premise of the "stackable certificate" where we're layering one on top of the other that allows our students to get employed right away. And then still work towards their degree. If they get employed at a company like mine, typically there is an education reimbursement program where the company helps pay for college. That makes it so people are leaving college debt free. So there's a huge opportunity nationwide by using these stackable certificates. Did that help answer your question?

Ann: Yes. Here's what I want to ask quickly. Does anyone disagree with CCNA being one of those top three certifications they ought to get?

Vincente: Unfortunately, yes. I've competed against Cisco all my life.

Ann: Is Security+ another one that's important?

Group: Yes.

Ann: What's the third one? Or are there choices for the third one or maybe there isn't a third one?

Vincente: Since the whole goal is to get government money—

Ann: At Raytheon.

Vincente: What I've been aware of since working at Raytheon is the Department of Defense actually has a list of baseline certifications to be able to work in certain areas. And of those certifications, A+, Network+, SSCP, GSEC, Security+, and CISSP. Those are the primary ones that will get you to the first level.

Ann: But not all of those, right?

Vincente: Not all are required, no. You need one of these to work in each one of these boxes here. There's an interesting little chart (https://iase.disa.mil/iawip/Pages/iabaseline.aspx) here. It's for working in information assurance in data centers. This brings me back to what I mentioned last time about security. Everyone keeps saying security is big and has to be incorporated in everything. When you look at this chart, you'll see that the CISSP certification is the one that gets you the farthest.

Ann: Doesn't that require experience also?

Vincente: CISSP has a number of different levels. With no experience and you pass the CISSP, you can become a CISSP associate and that'll get you to the third level. Half of the CISSP, which they call the SSCP, is at the same level at Security+ and Network+. Going back to what I said last time, it seems to me that it would be an interesting thing to do to take the CISSP domains and make them KSAs. Then map other things to that. That way, you're approaching every one of these topics with security in mind.

Ann: We could consider that next year if you guys want to do it.

Matt: I like that idea. It can also help with stackable certificates.

Vincente: I brought it up last time and I was sort of writing it out, mapping our Ks to the list. It's probably better to go the other way. When you're making these grant proposals, you can say we're following Department of Defense standards in network security.

Ann: Would you work with us to try and flip this for next year?

Matt: I think we need to have a Tiger Team before next year's KSA meeting to through and break out these things. It may even be multiple sessions given how passionate we are. I don't want to bend the will of the group to my thoughts. I want the group to bend the will of all of us. Those of us who are passionate about this can come up with our own scenario to break up the KSAs, and if you're not an expert in some specific area, don't worry about that area. It would be really nice to see different perspectives when we come together in the next Tiger Team to work through how to break this up before we get into next year's KSAs.

Lucas: I also think we need to track these as far as what is the predetermined goal/job for each area of IT. At my company, you have to get one industry certification each year. It's mandatory; get it or you don't get a raise. CISSP is advanced. It's great to organize around that and build. But that's more of a focus for a security or network person. If I'm going for an OS administrator or something like that, there's a big middle portion of CISSP that applies to me so understanding that is valuable. But H223 doesn't mean anything to a systems administrator versus a network administrator. So we're going to have to start separating these because it's just too much.

Vincente: One of the other reasons that I bring this up is that they say CISSP training is a mile wide and an inch deep. You cover every little thing. You don't have to go towards the CISSP at the top. You can start with SSCP, and then get your CISSP if you don't have your associate's. You can build on it. The training that is required for that covers everything we've gone over here.

Lucas: I look at what I know of my customers and what I knew when I was a customer and I think about where I can help people get employed. As important as security is, still today those teams are not the largest hiring teams.

Mercedes: I just attended the HITEC conference and listened to the Department of Homeland Security rep tell us how many open jobs exist today in the security space. I tend to agree that it's a great place in which to layer a significant focus. And the

more we can help people with this, the more long-term employees they'll be. I would think about it very broadly. When you think about things like cloud technologies, the number one issue is still security. I just think it's a foundational layer.

Lucas: Foundationally, yes. I just don't know if we're going to get a lot of people employed straight from here.

Mercedes: We will. There are hundreds of thousands of jobs that require security-level focus.

Vincente: When I got to Raytheon, they wanted me to get a CISSP. For years, I said "I don't need that." And now, I'm going around helping train other employees. I have a colleague who has recently taken all of the training, had zero practical experience, and is unable to pass the test. He's been working in technology for many years. So there is still a need for a practical, hands-on piece. And if you don't have all of these pieces, you won't understand the domain. The whole idea is to organize it around the domains so you can show the students career paths.

Matt: I want to say "yes, and." We have a foundational obligation to our students to cast a wide net. You ever hear of the guns and butter theory? You can take people and say "you're a farmer," and make them farm. But if they don't want to farm, they're going to be terrible farmers. Or you can take those same people and turn them into gun makers. But if they don't want to make guns, they're going to be terrible gun makers. Maybe that person really wants to be a farmer. So they're checked out when it comes to making guns. Too many times, especially in these cybersecurity events, people are moving into security for the money. If you remember the dotcom bubble, if you could spell IT you were in IT. People with no technical aptitude were entering IT in droves. So I agree with Mercedes that security is a great thing, but I don't want someone checked out of security working as my security technician. So I'd rather us cast the widest net. I like the idea of using CISSP categories to organize the KSAs, but allow the students to have varying paths – an operational path or a security path. I could get all of the lower certifications before CISSP and still be an amazing, diligent network engineer.

Vincente: Raytheon gives bonuses for certifications, certain amounts for certain certifications. The ones that were the highest were CCIE and CISSP.

Mark: Are we leaving this certification list as is or only listing the ones we've discussed?

Ann: I have down here A+, Net+, Security+, CCNA, and CISSP. And, maybe we don't let these others keep floating along.

Vincente: The watered-down CISSP is SSCP.

Ann: I have three announcements. I'm involved with Stanford Research Institute in a study of what businesses truly want in employability skills. That's the broad term for soft skills. I will be asking some of you to be involved in interviews. I may or may not be in that interview. I'll create the protocol for it. When you have Stanford Research Institute standing behind what you're doing, it might have sway. Stanford Research Institute is affiliated with Stanford University. It's an ATE research project, but not a huge project. It's only a two-year project. We kicked the project off yesterday.

Tu: Is there a particular segment you've targeted?

Ann: IT employers and manufacturing employers. I think what I'm excited about is not so much that the project is happening but that once the project has happened with the SRI name on it, someone will read it. Secondly, we are funded for five more years. One of the things that you wanted us to do is to find out that if students create a portfolio of completed projects, what is the effect on them getting employed? Does it help them get jobs faster? Is it useful? We'll be kicking that off maybe nine months from now.

Glenn: It's important that the students not only create a portfolio, but are able to speak intelligently about the items in the portfolio. Sounds like the same thing but it's not. One is the things you did, the other is being able to speak to the hiring manager and explain what you did you so they can ask you questions. The paper itself is meaningless if you can't talk about it.

Ann: If I were helping a student do a portfolio, I'd have them use the capstone group work. They're not only explaining the technology and the solutions, but also how they worked with the team. That teamwork and soft skills side of things can be the hardest part. Third, the Texas Skills Standards board. A group called NWCET in the early 2000s created national skill standards for IT. Texas took those and used them. They called us and they know we have a BILT process that works. They

want us to look at their skill standards and let them know what we think. They want our BILT to see if those standards are useful. They haven't been updated since 2003.

Matt: If it was 2013, it'd be too old.

Ann: I'll send you a link. I wanted to bring this up at the end. This is a longer discussion – I'll bring it up again on the Tuesday quarterly BILT meeting. We need to find people who really want to look at it and give us substantive feedback. I think we need a project grant to go recreate an updated list. Right now, they're either too general and not useful or too detailed and out of date. The Texas Skills Standards board wants us to look at it, but I told them we don't have funding and our BILT is very busy already. I'm not sure how to do it, but I think it's valid to do.

Tu: Are they looking at occupations?

Ann: Yes, eight different IT job titles. I think it's fine for us to just to look at the ones in our domain.

Matt: Is there an opportunity for articulation agreements and getting high school-level work into community colleges?

Ann: I'm not sure. I do know at one time if you could match your courses and check the boxes in the Texas Skills Standards, they would give you money for your program. Not sure if they still do that. They're people of good intent but they're not IT people.

Tu: Those skills are obsolete. They're 14 years old.

Ann: Yes, but some are written so general that they may still apply. But then again, if they're general, I'm not sure you'd know what to do with that anyway if you were designing curriculum. So, those are my three announcements, but first and foremost we need you to do the KSAs and all the things you always do for the CTC. Then, if you want to donate more time then you're welcome to do so and we'd appreciate it.

Matt: Who'd be willing to get the research done on the value of certifications? I'm sure it's already been done.

Ann: I'm not sure it has. It's not that I don't think that's important. Our grant was funded for $4 million for five years instead of $5 million for four. We have a big list of things to do with a small staff. So I'm not sure we have the person-power to do that research.

Matt: Someone's had to have done it already.

Ann: It's hard because students don't have to tell you when they get a certification. Businesses don't have to tell you if they hire your student. And when you contact them, they're not even sure who they hired from which school. In Texas you can get employment data through unemployment insurance data, but it doesn't show who they worked for or in what industry. It would take a lot of work to dig it out.

Matt: I think it's foundational for us as a BILT to be able to make decisions on certifications. I think it'd be amazing to share with our students that there's, for example, a 27% chance of getting a job if you have this certification over that certification.

Lucas: We've got quite a few headhunters that work in the entry-level space in Dallas (like Robert Half). We could call them and explain the situation. They may already track that and might be able to get that to you based on who they've placed. What's the over-under on certified versus not? What's your position as a recruiter?

Matt: My guess is it's already been done. We just need to find it.

Ann: At Novell, we knew who took and passed the certifications but couldn't tell the colleges.

Matt: I don't think it's a college thing. I think it's taking the top six or seven placement agencies and doing an analysis on what certifications do and what the employability is.

Ann: Thank you all for joining us!

K5	**Enterprise Mobility and Collaboration**	Collaboration Technologies - Making enterprise mobility work. A basic understanding of the building blocks for how enterprise mobility operates. Also an awareness of the security requirements. * PSTN * messaging * VOIP * videoconferencing * Bluetooth * presence
		Enterprise Mobility - Applying collaboration technologies to solve business problems. Operational-level proficiency to use, configure, operate from a user viewpoint. Understand domain and relevance. Case studies. * messaging * use VOIP * Skype-like * videoconferencing * Bluetooth * presence * MDM