Trends

Matt Glover – I think if I had 40 hours a week to spend just learning new technology, I wouldn’t have enough time to do it. That shows how many technologies enter our market. Like all new technologies that hit the market, they don’t need to stay. You can look back at Betamax to see that some technologies come, they have great ideas, and then they die a rapid death. uuuu
The things I want to focus on are the things that are going to transform the education of technologists. One of the key trends is what I’m calling “The Rise of the API Economy.” API, for those of you that don’t know, is an Application Program Interface. It’s simply a way for one software technology to communicate with a different software technology. It’s a bridge between two different technologies. What I’m seeing today is there are companies that are about to go IPO that have started this process of building APIs between businesses. They want in this digital economy and to be the ones that are the master bridge builders in this process. Now why is that important? That’s important because they’re taking it to the next level; in addition to building the bridge, they’re also creating bots to automate the manual efforts normal developers or technologists would have to do to maintain the bridging mechanisms. So, not only are they building the bridge, but they’re also building the bots to maintain the connectors between them. How does that impact us within the education space? They’re essentially building a platform to take over people’s jobs. Entry-level jobs of monotonous work are going to be “bot-ized.” They’re going to have a simple bot do the work for us, like maintaining log files or alerting people to any of the bridging work that’s being done through the API. This impacts multiple industries. Let’s say you have a cybersecurity system and you still have to have an API to tie that cybersecurity system into your business intelligence system. That is technology work that has to be done and maintained going forward. But, that will no longer be done by human beings. It will be done by the new API economy. I think what’s really interesting is that there is going to be more and more focus in 2018 on how to teach students how to create these types of bots and the mesh architecture APIs. If you think back just 20 years ago, even 10 years ago, large companies like Oracle and Microsoft tried to make their products sticky by building additional products on them so that you became an Oracle shop. So, you have 22 Oracle products in your shop that are all supposed to work seamlessly together, but they don’t because Oracle actually purchased that company and they gave it a new name. Just because it has a new name doesn’t mean the technology integrates. Millennials can’t afford the $30,000 license fees that the regular industries have been paying for years. They’re now going to go with cheaper open source technology. It’s created this huge new economy of micro-technology, meaning technologies that are stand-alone. So, instead of a comprehensive stacking technology all under Oracle or Microsoft, now it’s small companies like Periscope. Periscope is really good at one thing: dashboarding. So you have Periscope’s dashboarding technology that now needs to mesh into the backend technology of a SQL or Microsoft stack or Oracle stack. That API bridge mechanism is now critically important in the world around us. Hopefully, everyone has followed what I’ve said so far. I know I’m getting deeply technical, but I did want to mention that these trends are going to continue.

Ann Beheler – You and the BILT have been talking for quite some time about the importance of scripting, whether it’s programming, software development, or software-defined networks. The CTC focuses primarily on infrastructure. If that’s being controlled by software now, that says to me we’ve got to have a specialization in scripting, programming, API development, and those sorts of thing. Is that right?

Matt – Absolutely. It’s one of the bigger trends. We are also seeing programmable infrastructure. Gone are the days of running cable overhead and plugging it into the router. It’s fascinating that once the infrastructure work has happened – or now just happens wirelessly – you just put it into the system and you’re now at the keyboard typing commands and scripts to program it throughout your company at the same time. So, it’s definitely a revolution that we within the infrastructure framework have to understand is here. It’s not dying. It’s actually accelerating, and it’s going to accelerate past what I think what we’re currently capable of delivering in our curriculum that we have today.

Scott – Everything Matt just described is also happening within companies. At Cisco, we have tech engineers writing bots that are using our Spark interface to communicate and let people ask questions and get answers. We’re using the scripting that you described to automate all the hard work of going through
logs and traces so that the TAC engineer in ten minutes now can go through five gigabytes of logs as opposed to doing that task in four hours. So, everything that Matt described between companies is also happening in companies. Every new TAC engineer that joins Cisco is going to need these skills to get hired.

**Matt** – Even in your infrastructure, it’s becoming software.

**Ann** – The piece I’m a little concerned about is some of the folks that like to do infrastructure are excited about the plugging and the moving of hardware. You’ve said for a long time that the “rack ‘em, stack ‘em” jobs are already gone. But now it looks like they’re going to have to basically decide: do they like programming and scripting or do they want to move to a different area?

**Bill Morgan** – On the hardware side, we manage a lot of these deployments, so I manage a lot of people doing this. The configuration and utilization of the bots are part of the commissioning, and until it gets properly commissioned in provision and authorized from promotion to production, it doesn’t go into production. So these are skills that even the hardware guys can develop. They adapt quite quickly once they understand that it’s part of provisioning.

**Ann** – Doug Reeder from NTT Data was at a recent regional meeting talking about RPA, Robotic Process Automation. He said that bots are replacing people all over the place, and that they’re even incentivizing people within their company to write the bot that replaces them. It’s not like any of this is new. It’s just that we probably need to tone it to fit this particular focus.

**Matt** – All of the staff that report to me as the CTO have that as part of their hiring mantra. It’s written in their onboarding document that they sign: their job is to automate themselves out of that job because I have other jobs that they need to go do. That trend I think has been here for a while. I think it’s just probably surprising that people sign on for jobs that they’re automating out of.

**Candy** – I would like to talk about “Deep Learning.” What you’re talking about here, Matt, is that a form of deep learning? Where the advanced AI accelerates to the point of taking over the work and “Deep Learning” like IBM’s Watson and they’re teaching themselves to do this work? Is that where we’re headed?

**Matt** – I think that is definitely the next generation, but what we’re talking about here is the simple things. Consider if you have to – in a technical world – screw in a bolt 10,000 times. Instead of doing it 10,000 times, just write a simple bot that will go screw one in. Then, I can hit “replicate” and all of a sudden that one robot turns into a thousand robots and they’re all screwing those bolts in. So instead of it taking four days of me manually going and screwing each of those bolts in, it now takes about three minutes for the thousand bots. Does that make sense? It’s the simple features where it’s just trying to decide “do this or that?” A lot of these simple bots that we’re writing, we’re just making it so we can get the bulk of the work done. So, of those thousand bolts, say three of them got cross-threaded. That’s when the human is going to go and fix those three.

**Candy** – So, “Deep Learning” is too far ahead of us to start looking at that for this program?

**Matt** – I think we need to be aware of it. I would not say it’s too far ahead of us because as you know in technology within 18 months, it could be right in our face.

**Candy** – Okay. It’s something that we have been looking into, especially after Doug Reeder spoke. I heard him as well. I immediately thought about the BILT group, Collin, and all these colleges.
**Matt** – “Deep Learning” is also for more intellectually superior types of work. It’s good for Business Intelligence where you’re trying to mine through significant amounts of data all at the same time to try and come to some value proposition that that data holds. It’s the “Deep Learning” you’re talking about that’s going to help humans get to the really juicy bits of information much faster than trying to do it manually.

**Tu Huynh** – Matt, let me add a few things about APIs. What we see on the financial side is a significant transformation in terms of moving applications into the cloud. In the cloud you have multiple flavors, right? You have infrastructure as a service, platform as a service, and software as a service. Those are the three components that financial institutions are geared towards. A lot of times you have a host of legacy applications that we keep for years and years without updating. But we’re now moving to that era of the cloud. To your point about bots, a lot of times we are using those for a service like applying for credit cards and two minutes later you get approved. How does it work? Bots in the backend tie together all of your information and quickly give you an approval. With that being said, there’s a significant transformation out there due to the cloud element. I just wanted to share that with you.

**Matt** – I 100% agree.

**Amy A** – I would say that there’s also a trend to no longer have silo engineers. You don’t just have your networking team and your server team, or if you do, they have an understanding of how both technologies are working. This is related a lot to what Tu was just saying about the cloud and having to make those services work from any location. I think that the idea of being just a network engineer and just understanding routing and switching is going away.

**Matt** – I would agree with you. To that point, I think it’s important to talk about the hybrid cloud. I know it’s a capstone event for us, but it’s also a huge trend. We have a lot of businesses out there that have their own private clouds. We also have public clouds. Sitting in between those two, between the public and the private cloud, is what we’re calling a hybrid cloud. There are some pretty incredible technologies that are being pulled together there. Aside from the rising API economy, there’s also the challenge of dealing with hybrid cloud cost containment. We have new cybersecurity platforms being built out to help protect organizations. Smaller hybrid cloud players are now working on becoming “verticalized” so that they can play in the same sandbox with other, bigger industry cloud providers. So, there’s a lot of work that’s being done in the hybrid cloud space specifically designed for smaller investments to make significant transformational changes to compliance and hyper-scalers. Companies are blending those two contrasting elements of compliance and speed-to-market/scale-to-market together through bots and technologies. And, that’s the way that they’re getting that efficiency and speed-to-market.

**Amy A** – We mentioned a little bit about the emphasis on security. I think there’s definitely a trend here to go from the one or two big firewalls to block things off to micro-services and individual layers of security, which we’ve been doing for a few years. It’s definitely becoming more of a trend to have these micro-services and these firewalls or security services per service versus per site.

**Matt** – I agree. I see a trend coming back called “zero trust.” I don’t know if you guys remember what this was, but about a decade ago the “zero trust” approach implied that an IT team could simply prohibit people from using non-corporate issued devices and applications. However, today, the more modern “zero trust” model will accommodate individual’s personal preferences. So, baking the security trust down to the app level instead of the hardware level so you can use things like BYOD and not put your company at risk is a huge step forward in the “zero trust” methodology. I’m also seeing things in cybersecurity called
“deception technologies.” These are security enablers in operational technology and the Internet of Things where the cyber companies flood the system with a thousand fake credentials for every one genuine credential. So, when hackers are trying to generate a credential, they can’t differentiate a good credential from a fake credential. As soon as the hacker gets on the technology with a fake credential, the security operations team receives an alert that an unauthorized user is lurking on the network. They can immediately initiate an incident response. I also saw something recently on cybersecurity where they’re building it into the physical hardware versus it being virtual because virtual can be hacked. So there’s a big trend of making it hardware-centric and not all just software.

Ann – Are we to the point of convening a Tiger Team to focus on scripting, programming, and API? Is that premature? Or are we way behind?

Matt – I’d like to get a market analysis on how far along a lot of the companies are. Because, remember, we’re still focusing on small to mid-tier businesses. Although the top-tier businesses like the Dells and Micros are already there, not everybody is going to get a job from those folks. So, I think we need to be aware of it. Should we assemble a Tiger Team? Absolutely. I would not discourage that. But how quickly is it going to impact our curriculum? I’m not quite sure yet. It’s probably going to be within 18 months.

Ann – That’s soon for us, Matt. Colleges don’t move very fast.

Matt – I think what it will do is it will transcend. I think we have 64 colleges in our network. If we start teaching our students this information now, it will definitely give them a leg up over competitors for job entry because they’ll understand this deeper layer of technology and the automation of the technology. And quite frankly, as a chief technology officer, I’d rather hire the person who can automate their job over the person who just wants to maintain their job.

Ann – Why don’t we put out a request to everybody on the BILT, not just to people that are on the call today, about their interest in being on this Tiger Team? We try to be very respectful of your time. Maybe meet for a couple of hours and do several things through virtual meetings. We’d really appreciate your guidance on this so that we can get in line and be able to offer students the education you want them to have.

Matt – If there’s nothing else on trends, I’d like to pass it back over.

Texas Skills Standard update

Ann – The next thing for discussion is the Texas Skills Standard. The state of Texas has a group that reports to the governor on skill standards for various technical fields. The information that they are using came from the Northwest Center for Emerging Technologies (NW CET) in Bellevue, Washington. The analysis was published in 2003. Obviously if it’s 2003, it needs to be reviewed again to determine whether it’s obsolete or not. We sent out the link to the online version of this document so that you could look at it. We are being asked as the national IT center at the NSF and we’re being asked by Texas to update these skill standards. The problem is that we don’t have money in our budget to support the entire effort. We know this is voluntary for you, and we appreciate you donating your time to help with this. I was around when they created this document and it was several months of work to get it put together. My approach is to go after some supplemental money from the National Science Foundation to fund this. For now, we could look at the topics and see if they’re even the right topics. I’m not totally sure they are any more. They may need to be updated. Obviously, there’s no mention of cloud or APIs or anything of that nature. I would ask you,
please go through and review it. I don’t want you to read the entire document, but read some of it, and give us some feedback. We will send you a survey asking what you think about the topics. I need to categorize the request to the National Science Foundation so that I at least know what we’re looking at. Does that make sense? I know some of you have already volunteered to work on this.

One thing I didn’t say is how these are used. These skill standards in the state of Texas are used almost like the CAE2Y designation. The CAE2Y is the security designation. They ask the colleges to cross-reference their programs and show how they are meeting the skill standards. And, if they are meeting them they give the college a $5000 stipend to use as needed, whether it’s buying small equipment or funding professional development. Plus, the college gets to say that their curriculum aligns with the skills standard. There is a need for this nationally, so there’s really no need to do it just for Texas.

Amy A - It absolutely sounds important, especially if it helps colleges obtain additional funding for these skills we’ve been talking about that we need to develop.

Ann - We will be sending a survey. There are eight sub-areas. What I would like you to do is decide whether the topics are still relevant and suggest some new ones.

Matt – I think it’s really important that everybody take a moment and look at this. Although there are great folks in the government that help run this great country of ours, I’m not sure they’re going to all be up with technology and what’s happening in the world around them because they’re not in it every day. Having the BILT members review it is critically important so we can get this information back and say “These are the critical trends that we’re seeing.” Because I believe, Ann, this document was written ten years ago?

Ann – No, more than that. It was written in 2003. The research was done prior to that.

Matt – At least it was done in this millennium, which is good. But, we need to refresh it and I would rather have minds of technologists who are impacted by this doing the refresh versus minds of non-technologists trying to think through it.

Ann – It was created by businesses in the first place. At Bellevue, Washington, they did not use our approach exactly. However, they did involve businesses from Microsoft and several other major companies up there. And, they had other people nationally on their team.

**Hybrid cloud capstone update**

Ann – The last time we went over our “Knowledge, Skills and Abilities” in May, there was a suggestion for developing a capstone problem or a case study that addressed the hybrid cloud. Since that time, we’ve had several meetings with a BILT Tiger Team. On October 11, we had on the call Cope Crisson from the Collin College faculty who does the virtual internship capstone class. We also had NetApp and Dell EMC on the call. What we’re doing now is asking other colleges in the Convergence College Network (CCN) what kind of cloud capstones they offer. The BILT members, meanwhile, are discussing the various roles in entry-level cloud jobs. We’re having a second phone call on November 17. As a starting point, I have gathered all of the outcomes for all of the courses at Collin from the computer networking degree and I’m sending them out to the Tiger Team. If anybody else wants to be involved in this we’ll be very happy to have you. The next call is 3:00pm this Friday. The issue is trying to determine what kinds of things the students would know by the time that they got to this capstone. Again, this is a first step. We haven’t gone very far with it yet.
**BILT group letter**

**Mark** – We have had a couple of different requests from the CCN community. Our regional hubs have asked for help expanding the regional BILTs. One idea was to obtain a letter from the National BILT endorsing the BILT model. That could help the hubs recruit new members into their regional hub BILTs. A separate request is from CCN schools that have had trouble internally, either from faculty or administration, in trying to move their BILT towards the more engaged model that we use. One school in particular wanted help because they hit a wall with their colleagues. So, the idea was to address both of those needs with a letter. We’d like to draft a group letter, then circulate for everyone to edit and modify. We can use the letter for recruiting new members and also use it within the CCN community to overcome internal administrative barriers. We want the letter to show why you think it’s essential for program to use this model and keep curriculum current. That is the proposal.

**Ann** – I want to make one comment here. It’s amazing to me that in 2017 that there’s still so much concern from faculty and administrators about asking business to lead college curriculum. It can be very controversial to sell to faculty, and actually to some deans, that it is appropriate to have the businesses leading curriculum. We will draft something and send around to the entire BILT. I think the letter is going to help a great deal on the regional hubs.

**Regional Hubs**

**Ann** – After the next five years, the CTC goes out of business. That’s just a rule with the National Science Foundation. So, what we’re working on is getting regional hubs up to speed. The hubs want to continue having BILT leadership, continue working with high school and universities in their areas with solid 2+2+2 agreements, and continue our CTC grant work. We’re also working with them to go get some funding along the way. It won’t be center-level funding; it won’t be millions of dollars. But, several hundred thousands of dollars can help with the collaboration and get this going. We are asking a BILT member from our national BILT to be available to mentor a regional hub BILT. For example, we have hubs in Houston and in Lansing. We have seven locations across the US that we’re working with. Getting this together means convincing people in the region – other than just the community college leading the hub effort – that businesses should lead the work. This seems intuitively obvious to me, but evidently it’s not. So, you will hear more from us on that. The mentoring will be virtual via WebEx or teleconference.

**Tricider Poll Update**

**Mark** – Last November on the BILT call, there was a request to develop an online resource to build community and provide an opportunity to have dialogue outside of our meetings. We found the Tricider application. It’s an online a poll where you can not only answer a question with your answer, but you can also vote and comment on other people’s answers. It’s more than a simple survey. For a while, I was just sending the polls out prior to the quarterly BILT meetings. That was getting some response, but not a lot. To try and boost that engagement, I’ve started doing a poll every month. Maybe you’ve noticed that. I’ve tried to get people more in the habit of using it, and it seems to have helped because the responses have gone up. So, we’re going to continue to try it once a month to see if it helps create some dialogue more consistently.

In fact, I want to go over recent responses because we did get some good feedback. One question was to the BILT: “What’s the one practical, essential thing about security you’d like to tell every IT student?” I want to read a few of the answers and we could talk about them if you would like.
“Security must be solution-wide, not just security on individual pieces.”
“Security requires a personal passion and commitment to obedience, compliance, and continued education.
“The fact that someone is always trying to breach security provides IT security professionals an opportunity to be innovative, creative, always forward looking.”
“With the projected boom of IoT, it’s important to be mindful of the potential cybersecurity issues that will emerge.”

That’s some of the highlights of that question. Do you want to talk about security in the IT job workforce?

Ann – I think this underscores what’s already been said.

Bill – As the threat factor seems to be increasing on an exponential curve, the necessity of these automated bots becomes more and more relevant. People that are in the space and have the skills to think through different ways to automate certain activities help with the security paradigms.

Mark – Thank you for that comment. We also asked for the educators, “What’s been the most effective way to teach soft skills or teamwork concepts to your IT students?” Here are some answers.

“Eight-week hybrid course based on Technical Customer Service. The focus when we meet is group work on everything from verbal, written, and team skills. Final project: students prepare a skit of a good and bad IT Support Person.”
“Running a computer repair lab where they are required to interface with customers”
“Project-based assignments”
“Assigning projects where two people or more have to work together.”

These are things we’ve heard before in previous meetings: the idea of assigning group work and projects as often as possible.

Ann – Part of the new grant focuses on having projects like this in at least two or three courses and creating a write-up that can go in the student’s portfolio. Then, we want to follow up with the students with a portfolio to see how that might improve their job possibilities and the timing of getting a job.

Matt – I would definitely say that of the 60 technical projects that I have in my queue, 57 of them are team-based work. That means if the three to five people that are working on a project fail to deliver it, then it impacts their job, their raises, and their bonuses. So, if you make that into a student view, it should impact their grade. If the project fails, those five people have to now figure out a way to pick it up and make it work because the option of it just failing is not an option. And, they all get impacted by that grade, not just one on the team. Having the students go through that process is a critical call to action for educators around the world.

Ann – When I taught these sorts of projects, I had a rubric. I know that Cope also has a rubric now. But when I had a rubric, it was a rubric that gave everybody on the team 60 percent of their grade from the team presentation or the teamwork. From there, you knew which ones were contributing and which ones were not. If you didn’t do well on the 60 percent, you weren’t going to pass. I ended up putting these sorts of projects in classes because I came from industry and realized many of the entry-level graduates did not know at all how to work on teams or how to communicate.
Mark – I saw a very interesting presentation at the ATE conference in D.C. last month about team-based learning. With these two presenters, their students are in teams the entire semester together. Even for the quizzes, they’re working together. It’s like what Matt was saying, they’re all accountable for the group. And so, there’s peer pressure. There’s an expectation that makes the freeloaders start to pitch in as well.

The last Tricider item I wanted to show you is this. We asked the BILT members, “What’s the one practical, essential thing about professionalism or teamwork you’d like to tell every IT student?” Here are some of the answers.

“Initiative and self-direction to do the “A” job without detailed directions.”
“Leaders want leaders... not followers.”
“How you handle adversity speaks volumes to your professionalism because that is a true test of how professional you are. It is easy to be professional when all is going well, but not so easy when things go not as planned or expected. An attitude of learning from challenges is what is needed and demonstrates professionalism. It is the attitude of understanding what happened and what can be done to overcome or mitigate it now.”

I think this Tricider poll could be a really good channel for more content and dialogue. We will try to keep doing this once a month to see if it can continue. And, I hope everyone, when you get the email from us, will go out there and either contribute or vote and comment on someone else, and also read what everyone else is saying. These are all posted on the BILT LinkedIn group page. That’s where you will find the Tricider links.

Matt – Sometimes I’ll get those Tricider notifications and I will not have time at that moment to respond to it. Would it be possible for maybe three reminders to go out on one monthly Tricider? Because I think the challenge I have is that if you hit me when I have the moment, I will take the moment, but if you hit me when I don’t have the moment trying to remember to get back to it is difficult.

Mark – We can try sending out multiple reminders, sure.

CCN Yearly Report Revisions

Mark – We wanted to let you know how we have changed the “CCN Yearly Report.” Every year we ask all the “Level 1” CCN schools to submit a yearly report. They’re due March 1. We ask questions about enrollment, graduation, what are they doing to recruit, conferences they attended. Everything like that will be in the report. As you know, “Level 1” CCN members have to host two BILT meetings locally at their school. One of those has to involve job skill discussion. I just did a quick check of our report from last spring. About 75 percent of the CCN are reporting that they’re doing the two meetings plus the KSAs, which is great. But, we would like to go a little bit deeper with the data so we’re asking for more specifics this time. For example, we want to know if they’re using the national KSA list we update each summer as a baseline. We want to know if they’re doing their job skills discussion in real time, rather than by survey or email. We also want to know if the faculty is using the feedback from the local BILT to update the curriculum, so it’s not just going into the ether and disappearing. We want to know if the BILT is getting updates from the faculty about what they’ve done with the recommendations and the feedback. Also, we want to know who’s doing more than one or two BILT meetings a year, if the BILT meetings are regularly featuring a trends discussion, if faculty’s getting invited to the BILT meetings. As you can see, we’ve broken out the essentials for the BILT model into individual questions on this report so now we can really see where the
gaps are. We want to know which elements the schools are having trouble with so we can zero in and really help. We will definitely keep you posted on all of this. We will have more data once we get the reports in March.

Ann – We’re not ready to talk about it yet, but we’re working on more training material to help people understand the BILT better. There’s group called CORD, the Center of Occupational Research and Development. They’re based in Waco and work on CTE programs. I’m going to be working with them on developing a BILT tool kit. They’re interested, we’re interested. So combining our efforts hopefully will allow us to develop training material to help people be more successful in implementing a BILT. We think you BILT members are the key to everything. If we are not developing graduates that are skilled in the manner that you wish them to be, then we’re failing. We feel very strongly about this, and we appreciate the fact that you’re willing to work with us.

Mark – I think the CCN is doing a really great job with the BILT, but we just want to see them take it to the next level and help them be more successful in getting more out of their BILTs.

Besides from the Tiger Team activity, we won’t talk again until after the New Year. Happy holidays and thank you for your time this morning.

Adjourn