

## NATIONAL CONVERGENCE TECHNOLOGY CENTER



STRENGTHENING THE IT WORKFORCE THROUGH CONNECTION



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# A MESSAGE FROM ANN BEHELER



**Ann Beheler, PhD**  
**Principal Investigator**  
**National Convergence Technology Center**

Dear Colleagues:

The original National Convergence Technology Center grant awarded in 2012 and the renewal grant awarded in 2017 sought to support IT educators across the country in teaching essential skills urgently needed in the workforce. Throughout the 2010s and now into the 2020s, demand for IT technicians far outpaces the supply of workers able to fill those positions. Adding complexity to that challenge is the fact that IT technology and tools continue to evolve at a rapid pace.

As you'll see in the pages that follow, the National CTC has done a lot since the fall of 2012. We have collaborated with IT professionals and employers to help align workforce curriculum through regular meetings and annual job skill validations; offered numerous free faculty professional development events across a variety of formats and modalities and tracked long-term classroom impact of that training; hosted free virtual labs to allow schools a chance to evaluate that system's value to students; supported innovative programs to boost completion like the University of North Texas's BA-IT program, a special "Diversity Summit" workshop, virtual internships for students, student portfolio modules, and stackable certificate models; managed a growing IT educator community of practice that convened regularly to share resources and problem-solve common challenges; guided select grant partner colleges in developing regional hubs of like-minded educators and employers; used online and social media tools to serve as a national distribution center for IT education best practices; and attended multiple national conferences to further share National CTC processes and products.

The National CTC has had a number of invaluable partners along the way. We've worked with educators from our grant partner institutions at El Centro College – now a part of Dallas College (Texas), Florida State College Jacksonville, Fox Valley Technical College (Wisconsin), Georgia Southern University, Lansing Community College (Michigan), Lone Star College (Texas), Orange Coast College (California), the University of North Texas, and Sinclair Community College (Ohio). And we've benefited greatly from the bottomless generosity of our host institution, Collin College.

And as I always like to say, all of the grant's work is driven by the expert perspectives and recommendations of employers. The esteemed members of our National Business and Industry Leadership Team – both CEO owners of small technical service firms and IT executives at large corporations – have been loyal and essential partners on this journey, not only attending our meetings, but flying across the country to join us at conferences to help spread the word about the value of the BILT Model and latest content updates. We cannot thank them enough for all that they have done.

I believe we've made a difference to hundreds of thousands of students and improved many IT programs at schools across the country. It's been a pleasure to lead this effort.



Ann Beheler, PhD  
Principal Investigator  
National Convergence Technology Center



From top left, clockwise. CTC staff and partners support the 2013 Tech Forum; the National CTC "home office" was located in the J Building at Collin College in Frisco TX; students present posters at HITEC 2014; CTC staff mark the end of Working Connections in 2022; BILT member Glenn Wintrich (center) receives the "Industry Recognition Award" at HITEC 2014 with Ann Beheler (l) and NSF's Dr. Celeste Carter (r); Collin College President Dr. Neil Matkin (l) attends Working Connections' 20th anniversary in 2022; Ann Beheler receives the "Innovative Program Award" for the BILT at HITEC 2019; CTC staff and partners attend the 2014 NVC review meeting.



From top left, clockwise. Working Connections attendees at the Monday evening networking event in 2019; CTC Director Helen Sullivan and PI Ann Beheler in 2013; CCN attendees network at dinner in Miami at HITEC 2018; CCN members attend the "Sunday meeting" in July 2018; Matt Glover (l) receives the "Industry Recognition Award" in Salt Lake City at HITEC 2017; attendees collaborate at the 2017 Diversity Summit workshop; faculty attendee at Working Connections in 2016; Ann with BILT members - from left Tu Huynh, Glenn Wintrich, Matt Glover, and Kim Yohannan - in Miami at HITEC 2018.

# A MESSAGE FROM MATT GLOVER



**Matt Glover**  
**BILT Chairman**  
**Co-Founder, Yern**



Greetings!

One of the goals of the National Convergence Technology Center grant was to “meet workforce needs” in the IT/ Cybersecurity sector. This was – and still remains – a huge undertaking as the IT industry continues to rapidly evolve and the essential skill sets of IT technicians continue to expand into new domains. Colleges often know they need to keep their curriculum aligned with workforce needs, but they frequently aren’t equipped to make that happen. The National CTC has done an excellent job showing colleges how to partner with business and industry and has capitalized on these partnerships to deliver faculty training, employer-aligned curriculum and labs, and innovative programs and modalities.

Most important is the National CTC’s tireless effort to teach and mentor educators across the country how to implement the Business and Industry Leadership Team (BILT) model to form a highly-engaged employer team as the foundation for all their work. Put simply, the BILT boosts and deepens educators’ relationships with their local and regional employers and creates a solid engagement framework to help ensure students learn what they need to know to be highly-sought-after upon graduation.

I was honored to be a part of this grant, serving as Chairperson for the CTC’s National BILT from 2014 to 2023. My BILT colleagues and I supported the National CTC by attending quarterly meetings to share our expert insights on the state of the industry, by providing guest presentations to faculty and students on emerging technologies, by assisting Dr. Ann Beheler and her team at national conferences to extol the value of the BILT model, and by participating in an annual prioritization of future-facing entry-level job skills. All of us volunteered many, many hours because we were committed to the grant’s work, which essentially is to build the American Workforce. We were committed to doing all we could to boost the number of workforce-ready job candidates for IT-related occupations.

I’m very pleased to report that our BILT’s success is being replicated at programs and colleges nationwide. Using their BILT teams, more and more faculty are teaching content they know is current with industry needs. Employers are becoming deeply invested in and connected to colleges and universities that provide the pipeline they need of “right-skilled” graduates. And, students are developing relationships with local businesses that often gives them priority for internships and jobs. The BILT model works. It’s been very gratifying to be a part of its development and adoption.

I believe IT programs across the country are much further advanced today than they were because of the work of the National CTC.

Sincerely,

A handwritten signature in black ink, appearing to read "Matt Glover". The signature is fluid and cursive, with the first name "Matt" and last name "Glover" clearly legible.

Matt Glover  
BILT Chairman  
Co-Founder, Yern

# PARTNERS

From 2012-2023, ten colleges and universities were NSF grant partners of the National CTC. Four institutions – Collin College, Lansing Community College, Florida State College at Jacksonville, and the University of North Texas – have been involved with the CTC from its inception as a Regional Advanced Technological Education Center. The partners convened every other week to help steer grant activities, which included supporting the CCN community, choosing cutting-edge professional development topics, sharing innovative curriculum, and promoting best practices like the BILT. Starting in 2017 with the renewal grant, the partners each supported specific technology topics and began work developing robust CTC-style regional hubs.

Collin College  
2012-2023  
Dr. Neil Matkin, District President  
[www.collin.edu](http://www.collin.edu)

Sinclair Community College - SCC  
2017-2023  
Dr. Steven L. Johnson, President and CEO  
[www.sinclair.edu](http://www.sinclair.edu)

Lansing Community College - LCC  
2012-2023  
Dr. Steve Robinson, President  
[www.lcc.edu](http://www.lcc.edu)

Georgia Southern University - GSU  
2012-2022  
Dr. Kyle Marrero, President  
[www.georgiasouthern.edu](http://www.georgiasouthern.edu)

Florida State College at Jacksonville – FSCJ  
2012-2023  
Dr. John Avendano, President and CEO  
[www.fscj.edu](http://www.fscj.edu)

Dallas College – El Centro Campus - EC  
2012-2023  
Dr. Justin Lonon, Chancellor Dallas College  
Dr. Bradford Williams, President El Centro Campus  
[www.dallascollege.edu](http://www.dallascollege.edu)

University of North Texas - UNT  
2012-2023  
Dr. Neal Smatresk, President  
[www.unt.edu](http://www.unt.edu)

Fox Valley Technical College - FVTC  
2012-2017  
Dr. Chris Matheny, President  
[www.fvtc.edu](http://www.fvtc.edu)

Lone Star College - LSC  
2017-2023  
Dr. Stephen C. Head, Chancellor  
[www.lonestar.edu](http://www.lonestar.edu)

Orange Coast College - OCC  
2012-2016  
Dr. Angelica L. Suarez, President  
[www.orangecoastcollege.edu](http://www.orangecoastcollege.edu)



From top left, clockwise. Kyle Jones (SCC) presents for the 2023 NVC; Bill Saichek (OCC), Ann Beheler, and Brian Nelson (LCC) in 2019; Elizabeth Halweg hosts Working Connections at FVTC in 2014; Ernie Friend (FSCJ) leads a 2017 HITEC workshop; (l to r) Ryan Murphy (SCC), Rajiv Malkan (LSC), Mark Dempsey, and CCN member Rafat Elsharef at HITEC in 2019; Eliazar Martinez (EC), Mike Harsh (Collin), and David Keathly (UNT) at a 2013 meeting at Dell; Belicia Miraval (EC) works with a student in 2015; partners attend the NVC dinner in 2023 – (l to r) Brenden Mesch (Collin), Debbie Miller, Richard Grotegut (Bay Area CCC, Carlos Cabrera (FSCJ), and Ann Beheler.



“ Being a grant partner in the CTC has proven to be an integral part of the success the UNT CSE has had in creating programs with wide student and industry appeal. Working with so many outstanding partners across the country has created new ideas and pathways that we would not have envisioned without these connections.”

– *David Keathly, Associate Chair for Undergraduate Studies, Principal Lecturer and BAIT Program Coordinator, University of North Texas Computer Science and Engineering*



“ The CTC has amplified my ability to work strategically with community partners in order to align curriculum with employer need and to forecast trends with industry standards. The BILT that was initially developed for our IT program, has now been adopted across 60 unique Associate of Science and baccalaureate programs in Business, Allied Health, Engineering and Education and Human Services. The BILT was ultimately adopted as a KPI in the College’s Strategic Plan.”

– *Dr. Sheri Litt, Associate Provost for Baccalaureate, Career & Technical Education, Florida State College at Jacksonville*



“ Before the CTC, colleges offering IT programs were isolated islands creating and updating curriculum with few connections to other schools. The CTC bridged those islands together, offering a place where instructors can gather to share know-how to keep programs on the cutting edge.”

– *William Saichek, Professor Emeritus, Orange Coast College*



“ To me, the most important impact from my school’s involvement in the CTC has been that our students had the opportunity to showcase their capstone projects at HITEC conferences. I’ve been witness to my students’ improvements every year. Appearing at HITEC boosted their resumes and proved to them that effort pays off. My college serves minority students so providing such an opportunity is invaluable.”

– *Belicia Miraval Albornoz, Professor of Computer Science, Dallas College - El Centro Campus*



“ The National CTC’s use of ongoing assessment has provided continuous feedback, insight, and improvement, which has helped guide technician education instructional content, foster innovation, fuel program updates, and build regional and national academic and business relationships. As a result, student lives have been improved in countless ways.”

– *Gordon Snyder, Professor, Holyoke Community College – National CTC’s External Evaluator*



“ For Collin College, the long-term impact will be the students and the technology industries they have entered upon graduation. The CTC has allowed faculty and the programs to stay current with the changes in technology and understand how to effectively introduce them into the classroom. Working Connections professional development training, in particular, has helped shape many classes and thus enhanced the learning opportunities for students.”

- *Dr. Brenden D. Mesch, Campus Provost - Technical Campus & Courtyard Center, Collin College*



“ Being a part of the CTC grant and applying the BILT model has helped Sinclair develop a better framework for leading and driving our industry teams. The BILT has been so successful, Sinclair is implementing it into seven other technical programs outside of IT.”

- *Kyle Jones, Chair, Computer Information Systems, Sinclair Community College*



“ The National CTC always provided Lone Star College and our Gulf Coast hub an opportunity to connect and collaborate – through ongoing virtual and in-person human networking – with other educators to share curriculum and assist in knowledge dissemination.”

- *Dr. Rajiv Malkan, Professor of Business and Computer Science, Lone Star College*



“ The CTC always provided free superb faculty trainings that directly impacted pathways at Lansing Community College and ultimately led to the creation of new opportunities for students in our region.”

- *Adam Richardson, Assistant Professor of Cybersecurity, Lansing Community College*



“ The CTC set the model for all of our regional efforts for the 28 colleges here in the greater San Francisco Bay Area. Our regional projects, shared curriculum, professional development, and, most importantly, the human networking has all been inspired by the CTC’s work. We call it “strength in numbers” here in the Bay Area.”

- *Richard Grotegut, Bay Area Community College Consortium Regional Joint Venture Lead*

# BUSINESS AND INDUSTRY LEADERSHIP TEAM

The Business and Industry Leadership Team (BILT) model – developed by the National Convergence Technology Center – offered a dynamic and stronger alternative to traditional business advisory councils that often only delivered passive approval of faculty-designed curriculum. The BILT model, by contrast, put businesses in a more active co-leadership role. This allowed employers to provide direct input into the knowledge, skills, and abilities (KSAs) graduates needed 12-36 months into the future, ensured curriculum stays current with workforce demands of the industry, and got students “workforce ready.”

Members of the National CTC’s BILT met each quarter; annually updated KSAs for entry-level IT infrastructure jobs via online voting; convened for smaller, single-topic “Tiger Team” discussions; donated instructors for faculty professional development events; hosted site visit tours for faculty; and frequently volunteered their time to participate on technical education panels at national conferences.

In the CTC BILT model, employers – from large corporations, medium-sized companies, and small businesses alike – connected more frequently with educators; regularly shared their perspectives on industry trends; provided annual, prioritized revisions of entry-level granular KSAs to help steer curriculum to workforce needs; and received feedback regarding what faculty had done with their recommendations. This deeper level of engagement created a strong sense of pride in and ownership of the program and the students.

For faculty and students, building strong relationships with local business leaders ensures their content is current and relevant, provides an avenue for industry participation in lectures or job fairs, and builds pathways to employment for new graduates. For the businesses, participating in a BILT and developing relationships with local high schools, community colleges, and universities will keep creating a pipeline of right-skilled future employees.





“The global business world is transforming at warp speed. In order to equip students with necessary workplace skills and respond quickly to commercial needs in this rapidly changing environment, having a BILT working with educational institutions is no longer an option. It is a must.”

– Carolyn Corbin, President, Center for the 21st Century



“Leveraging the expertise of educators and the passion of industry leaders, the BILT framework enables powerful collaborations that ensure program curriculum meets employer needs and that students are well prepared for the digitally-transformed workplace.”

– Mercedes Adams, Principal Learning Ambassador, Employee Education, NetApp



“As a member of the BILT for over 15 years, I've seen how well the process works to deepen the connection and engagement between industry and educators. The BILT model helps provide employers a wider pipeline of qualified workers, and it helps deliver high-paying careers to graduates.”

– Vincente D'Ingianni, Director of Professional Services, Binary Systems Inc.



“The BILT provides an excellent opportunity for me to help guide the nationwide development of two-year technology degrees that are increasingly, urgently needed for the multitude of open positions in the IT and Cybersecurity fields.”

– Aaron Burciaga, CEO, DataPrime



“Developing the BILT model within Gallatin College MSU has proven to be one of the best and most productive resources. The BILT model has provided endless advantages for our growth in local industry.”

– Ronda Black, Information Technology Program Director at Montana State University Bozeman, Gallatin College



*From top left, clockwise. Matt Glover (l) takes over as BILT chairperson from Glenn Wintrich (r) in 2014; Amy Arnold and Cody Hooper discuss KSAs in 2023; Chelsea Bray participates in a 2019 KSA vote meeting; Matt Glover (l) and Candy Slocum (r) discuss KSA vote results in 2016; Scott Veibel (l) and Corey Kirkendoll participate in a 2019 KSA vote meeting; Scott Veibel (r) hosts IT faculty for a tour of a Cisco facility in 2015; Vincente D'Ingianni shares perspectives on job skills in 2023; Ann Beheler (r) facilitates a KSA vote meeting in 2019.*



# BUSINESS AND INDUSTRY LEADERSHIP TEAM METRICS



**83** Employer Representatives from **71** Companies



**30** Conference Presentations and Panels by BILT Members



**75** BILT Meetings Including **30** Special Topic Tiger Team Meetings



**12** Employer-Led Annual Revisions of Entry-Level IT Infrastructure Job Skills and Certificates



**100+** Colleges and Organizations Across **35** States Adopted the BILT Model



**2750+** Hours Donated by BILT Members



**3** High Impact Technology Exchange Conference (HI-TEC) Awards  
2014 Industry Recognition Award - Glenn Wintrich  
2017 Industry Recognition Award - Matt Glover  
2019 Innovative Program Award - BILT

# CONVERGENCE COLLEGE NETWORK

The Convergence College Network (CCN) was a select cohort of IT educators and administrators from high schools, community colleges, and universities across the country that worked together in a community of practice to strengthen their programs. The National CTC led the CCN community by convening quarterly meetings, arranging professional development webinars, hosting group e-mail questions, and recruiting new members. There was no fee to join or minimum requirements to maintain CCN membership.

As with any successful community of practice, the CCN leveraged the know-how of the group for the benefit of all. No one person can know everything. The impact of the CCN came from interaction within the community. Members regularly shared curriculum and labs, traded best practices, and collaborated on common challenges outside of the formal CCN meetings and events. Those cross-institutional (and cross-state) interactions – many of which happened outside of formal CCN meetings and events - simply would not have been possible without the CCN framework.

CCN member schools were encouraged to provide yearly reports on – among other things – enrollment and completion numbers, employer engagement practices, and classroom impact of National CTC initiatives. Membership benefits were based on a school's participation. Using a transparent points system, schools that attended more meetings, provided yearly reports, and implemented CTC suggestions like the BILT model were classified as "Level 1" and received more benefits than those classified as "Level 2." The higher "Level 1" perks included additional travel reimbursement to attend faculty professional conferences and an early registration window for Working Connections events.





“Membership in the CCN supported faculty travel to technical education conferences around the country, and without the CCN, I wouldn’t have been able to attend these events. This means that my program and students would not have benefitted from the resources and collaborations that such conferences provided. I can point to several changes in our curriculum that were a direct result of attending these sessions.”

- *Bryan Bennett, Kirkwood Community College*



“The CCN has long provided me a powerful avenue for collaborating with other faculty. My experience was so positive, in fact, that as my career took me to a new job, I made it a priority to get my new IT program to join the CCN. When I moved a second time, I again made sure my new school embraced the CCN and became a member. The benefits were too big to do otherwise.”

- *Dr. Charles Desassure, Rose State College*



“I have worked with the CCN for over seven years, and the wealth of knowledge and willingness to share has been amazing. One of my favorite parts of CCN were the quarterly meetings, which offered a forum for other faculty to share innovative topics and strategies that we might be able to use at our own school. The CCN is a great group of people. It provided an invaluable nationwide reach of educational colleagues.”

- *Dr. CK Lambach, Waukesha County Technical College*



“I found the CCN to be a great value not only to myself but to my faculty and students. From training on leadership to how to create and run a BILT to the abundant professional development provided -- both in person and online -- that brought new concepts to my classroom, the CCN offered my program incredible support.”

- *Susan Randall, Cleveland Community College*



“The CCN offered an online forum for questions to those facing a challenge in curriculum, enrollment, or policy. I asked the community several questions in the past years, and the CCN members always provided different perspectives and answers to my questions, which helped me greatly.”

- *Patrick Logue, South Plains College*



*From top left, clockwise. CCN attendees network at dinner in St Louis at HITEC 2019; attendees collaborate at the "Sunday meeting" in July 2018 at Collin College in Frisco, TX; attendees practice virtual labs at pre-conference workshop in Pittsburgh at HITEC 2016; faculty attend special CCN-only tour of a NetApp data center in 2015; faculty engage in workshop exercises at the 2016 "Sunday meeting" in Frisco, TX; more faculty collaborations at the 2016 summer CCN meeting; arriving for the Sunday CCN Sunday meeting in 2023; "family reunion" group photo at the 2019 CCN "Sunday meeting."*

# CONVERGENCE COLLEGE NETWORK METRICS



**89** Community Colleges    **10** Universities    **1** High school  
**32** States



**50%** of CCN Faculty (2021-2022 Survey) Reported Feeling “Very Connected” or “Connected” to Other CCN Faculty Members



**20** CCN Member Schools Were Recruited by Existing CCN Member Schools



**62** CCN Member Meetings 2012-2023  
**2098** Duplicated Seats Filled at Those 62 Total Meetings 2012-2023



**103** CCN Faculty Members’ Travel to **16** National Education Conferences Supported by CTC Reimbursement Money 2013-2023



**68** Strategic Questions Discussed Via Group Emails Outside of Formal Meetings 2015-2023



**85** CCN Member Schools Sent Faculty to at Least One CCN Professional Development Webinar or Meeting 2014-2023

# WORKING CONNECTIONS

Working Connections – first launched as part of a professional development initiative in 2002 funded by Microsoft and the American Association of Community Colleges – has been a part of the National Convergence Technology Center (CTC) since its origin as a National Science Foundation project grant. Working Connections routinely offered the sort of cutting-edge IT technical education that's often only available through expensive commercial training. Working Connections made the newest technologies and industry trends – often identified by the National CTC's BILT member employers – available to educators and also encouraged robust collaboration among attendees. The time attendees spent talking with one another in the break room was often just as valuable as the time spent in the classroom.

The goal of Working Connections was to provide attendees with the expertise needed to teach their respective track topic in a subsequent semester, bringing the most current information to their classrooms either as a stand-alone course or as supplemental information to an existing course. Historically, 75% of attendees selected a topic they were not already teaching, thereby introducing new topics and skills their students may not have otherwise received. The National CTC conducted annual longitudinal surveys each January to better measure the ongoing classroom impact of Working Connections training.

Both Summer Working Connections (five days in July) and Winter Working Connections (three days in December) have been a part of the National CTC since 2012. In 2015, Winter Working Connections moved to an online format. The National CTC also supported several special “franchise” Working Connections regional events at grant partner colleges outside of Texas – Florida State College at Jacksonville, Lansing Community College in Michigan, and Fox Valley Technical College in Wisconsin.





“For most community college faculty, training budgets are either nonexistent or minimal. And of course, IT is changing constantly. So, we’re always needing training in new technologies, and Working Connections provided that for free, plus they often offered travel help as well.”

- Glenn Jones, Tulsa Community College



“The biggest impact of Working Connections was that the content and delivery were always timely. Any event planned occurred at a time when faculty was preparing to update or create new content. More importantly than that, Working Connections stayed on top of emerging technology trends and brought this information to the community for immediate absorption.”

- Renee Blackshear, Texas State Technical College



“If it were not for the free training provided at Working Connections, I would have missed a lot of great cutting-edge training that so greatly benefited my students.”

- Rafat Elsharef, Milwaukee Area Technical College



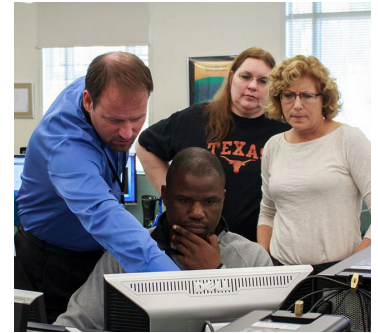
“I think one of the biggest problems I’ve ever had with Working Connections is the fact it always offered multiple tracks and I had to choose just one.”

- Mike Harsh, Collin College



“The ‘Data Analytics with Tableau’ training track from Working Connections in 2019 sent me down a wonderful path -- to explore the field of data science. That planted seed developed into a full-fledged curriculum (AAS degree) at Camden County College in New Jersey. From 2019-2020 two math professors and I created this new first-in-New Jersey two-year curriculum in Data Science.”

- Anita Wright, Camden County College



*From top left, clockwise. Attendees check in at Collin College for the start of Working Connections in 2013; attendees discussions with data analytics instructor Rajiv Malkan (l) in 2019; troubleshooting a lab with virtualization instructor Philip Seely (l) at Winter Working Connections in 2013; attendees network over lunch at Collin College in 2013; attendees at Working Connections North in 2014 at FVTC in Wisconsin; attendees collaborate over a lab exercise in 2016; instructor Sam Bowne (top) guides attendees through a cybersecurity exercise in 2015; attendees discuss a lab assignment at the 2017 Working Connections.*



# WORKING CONNECTIONS METRICS



**265** Schools from **39** States



**3283** Duplicated Enrollments

**1152** Unduplicated Attendees



**49** Total Events – Includes Both In-person and Online Working Connections

**225** Tracks Covering **88** Different Topics



**10** Vendors Donated Instructors - AWS, Citrix, CompTIA, Dell, EMC, Juniper, NetApp, Palo Alto Networks, Splunk, Wireshark University

Longitudinal Impact – Average of **55.4%** Response Rate Per Survey

**171,516** Students Taught Working Connections Content

**14,884** Sections Implemented Working Connections Content

**502** Degrees and Certificates Implemented Working Connections Content

**629** Programs Implemented Implemented Working Connections Content



# FURTHER PROFESSIONAL DEVELOPMENT

Before 2020, special topic professional development events had been delivered solely to Convergence College Network (CCN) community. That included a two-day “CCN Summit” in 2018 that attracted 30 educators from 23 institutions across the country to learn about BILT implementation, data reporting, and student portfolios. Recordings were posted on the National CTC’s YouTube channel for wider reach. The pandemic inspired a change in 2020 whereby all IT faculty members nationally were welcomed to special topic professional development presentations.

This new approach kicked off with the successful “Brown Bag” webinar series, which offered bite-sized 30-minute presentations on an emerging IT topic or classroom strategy. From 2020-2023, 16 “Brown Bag” webinars were delivered on a range of topics including blockchain, cyber student competitions, quantum computing, and virtual labs. Over 500 attended in “real time” with another 1200 viewing recordings online. The success of that series led to a further rethinking of the online Winter Working Connections 3-day model held each December. The National CTC piloted an approach with longer Winter Working Connections tracks in 2021, then launched the new “Friday Workshop” series in Spring 2022. In total, the National CTC offered 10 “Friday Workshops” and filled 173 seats. As convenient and cost-effective as online training may be, especially during COVID, it was and is no substitute for the connections and networking that happens among attendees at in-person events. At the 2019 and 2023 in person Working Connections, an average of 97% of attendees reported making new contacts, compared to only 73% at the 2020 and 2021 online Working Connections.

Note also that a special two-day “BILT Summit” workshop was hosted in 2023 to focus solely on strategies to develop a successful BILT. Forty-three faculty and administrators from 18 schools attended.



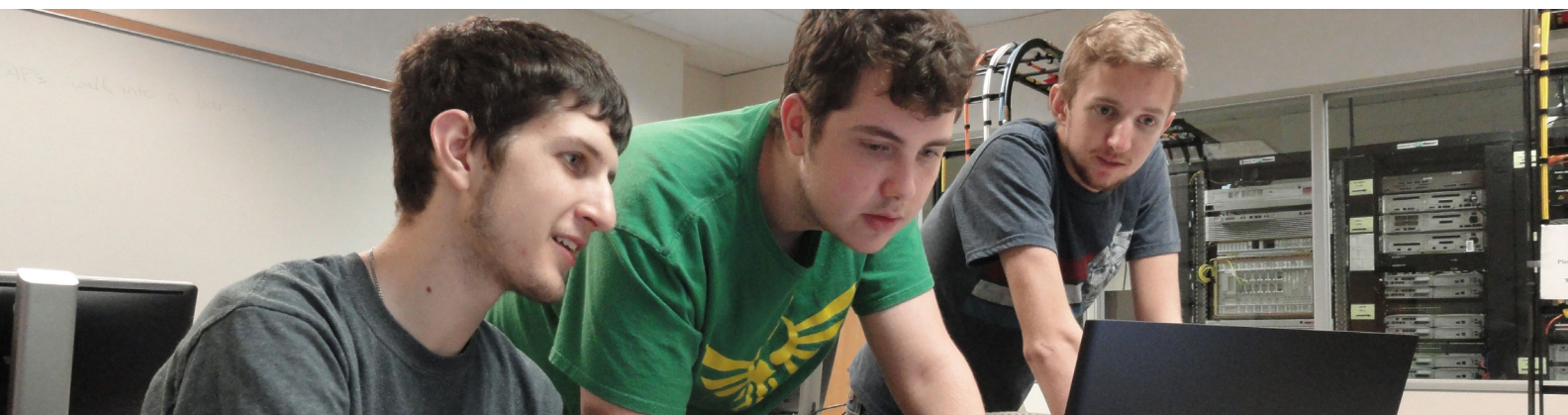
# VIRTUAL LABS

Three National CTC partner schools - Collin College, Florida State College at Jacksonville, and Georgia Southern University - hosted Network Development Group (NDG) virtual labs for CCN member schools to help prove their value and effectiveness to administrators. Virtual labs change how students engage in hands-on exercises by providing convenient 24/7 online access. Instructors benefit as well from a system that helps automate lab management and allows students to proceed at their own pace. Virtual labs also offer cost savings for colleges that lack funds to acquire expensive lab equipment and pay for support.

Specifically, the CTC helped provide labs to support A+, Net+, Security+, CySA, Ethical Hacking, and Digital Forensics classes. Starting in Fall 2021, the CTC extended access to high school programs partnering with CCN member institutions. The CTC also hosted several training events to teach faculty how to manage the virtual lab system, use existing NDG labs, and build custom labs of their own.

The National CTC provided virtual labs to support over 3700 students from 30 institutions across 14 states. This work was supported by a 2011-2015 synergistic partnership with Collin College's Department of Labor NISGTC grant that developed open source virtual labs.

El Centro College - now a part of Dallas College - and Tarrant County College leveraged their experience with CTC virtual labs to convince their administration to acquire NetLab directly. North Arkansas College and Texas State Technical College likewise secured grants to fund their own NetLab system as a result of their experience with the free CTC-provided labs.



# CONFERENCES

National CTC staff, education partners, and BILT members frequently attended national and regional educator conferences to broadly share all of the CTC's materials, best practices, and processes.

This conference dissemination included both traditional lecture presentations and panel discussions. The panels many times featured BILT member IT professionals who traveled to the conference to share their perspectives on the value of the "BILT Model." Close to half of all conference sessions delivered by the National CTC, in fact, featured some element of teaching and promoting adoption of the BILT.

National CTC hosted seven half-day workshops from 2013-2022 at annual HITEC conferences that allowed attendees to get hands-on practice with new virtual labs – many of the labs were presented by the faculty who developed them. From 2012-2014, the National CTC also co-sponsored an annual regional IT Technology Forum conference for educators held at Collin College in Frisco, Texas.

IT and cybersecurity student posters were also a big part of National CTC presence at conferences, giving students from within the CCN community the unique opportunity to showcase recent classwork and network with educators and employers.

Conference dissemination also involved staffing information booths. Almost always, the National CTC had a presence in the exhibit halls, either as a stand-alone booth or as part of a larger National Science Foundation ATE shared booth. This allowed for one-on-one conversations with educators and employers regarding grant programs and activities.



# CONFERENCE METRICS



**67** Conferences Attended by CTC Staff 2012-2023  
Across 18 States Plus Washington DC



**147** Individual Conference Sessions, Divided Into  
104 Presentations, 24 Panels, 13 Workshops, 6 Breakfast Roundtables

**18** Of Those 147 Sessions Were Delivered Virtually 2020-2021  
Because of Covid Restrictions



**4,096** Conference Attendees Present for Those 147 Sessions



**30** Conference Sessions Featured Active Participation of at Least One BILT Member

**64** Sessions Presented BILT-related Topics



**40** Sessions Presented Special Topics Related to IT Program Improvement

**11** Sessions Presented Virtual Lab Topics and Workshops

**10** Sessions Presented Topics Related to the CCN Community of Practice

# DIVERSITY SUMMIT

Eight Convergence College Network (CCN) member schools from seven states attended a two-day “Diversity Summit” event in February 2017. Each school sent a team of three members – a counselor, a faculty member, and an administrator. Seven subject matter experts (SMEs) on diversity and inclusion from education and industry shared successful recruitment and retention strategies.

School teams each developed a customized “action plan” that identified specific diversity strategies – with measurable goals – to be implemented across the next 18 months. Action plan activities were funded by the CTC, and progress was monitored through quarterly meetings. The ultimate goal was to develop impact evidence (e.g. enrollment reports and retention reports) compelling enough to convince the teams’ administrations to fund their action plans on an ongoing basis with institutional money.

Action plan strategies included high school outreach; “in reach” to current college students; new internal systems to better streamline data and support students: student mentor programs to encourage persistence; updated marketing materials to focus on inclusion; faculty training and best practice sharing on inclusion; and a female role model co-instructor for an entry-level class.

The program ended June 2018. Of the 21 total action plan goals proposed by the teams, at the time of the final report submission, ten goals were completed, five were partially completed, and six were yet to be completed. Further, six schools believed that involvement in the “Diversity Summit” initiative had a positive impact on their school and/or program and seven presented project evidence to their administration, almost all of which planned to adopt those strategies long-term going forward.



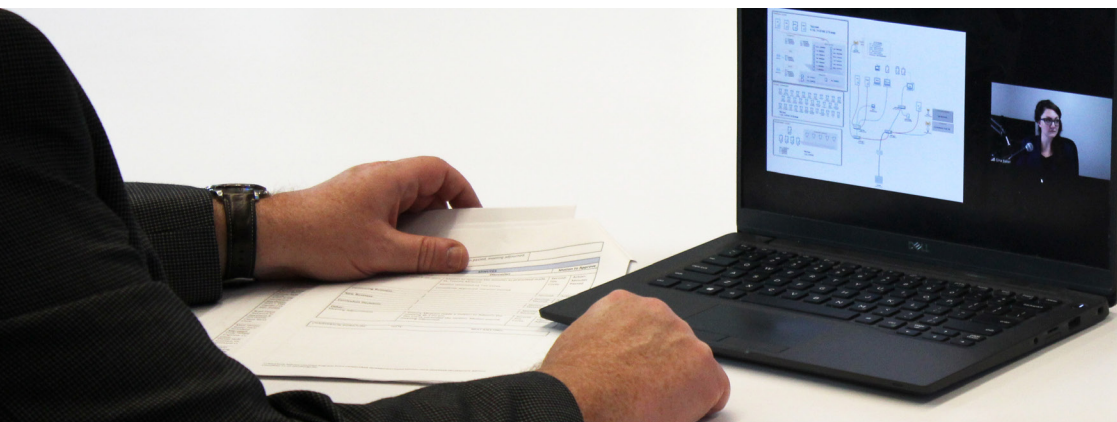
# PORTFOLIOS

The National CTC's portfolio pilot project investigated the BILT's belief that portfolios can help expedite the hiring process. The work of Erie Community College's – a member of the Convergence College Network – IT department chair Louise Kowalski formed the basis of the pilot project methodology. Louise developed a series of modules to help students create an effective LinkedIn profile, develop a personal online brand, and curate their classwork in an e-portfolio.

Across six semesters (Spring, Summer, Fall 2019; Spring 2020; Spring, Fall 2021), 1264 students from eight schools (six community colleges, two universities) participated – 715 received a version of Louise's lessons, while 549 served as the control group and received no lessons. Survey responses at the end of each semester suggested that most faculty and students found the content valuable, easy to implement in existing classes, and helpful in boosting student confidence in technical skills.

Regular focus group meetings with participating faculty helped adjust methodology throughout the pilot program to improve effectiveness. This included producing supporting videos with employers to help students better understand how to successfully use their portfolio in an interview.

Each December, participating schools tracked the career progress of each student cohort to determine whether there was a difference in employment status between student/graduates who received the lessons and those who did not. Despite the small sample size and the number of variables at work, results indicated students who received the lessons did get hired into IT jobs more often than students from the "control" group who did not receive the content. Specifically, 240 duplicated treatment students got jobs in IT, while only 29 from the control group got IT jobs.



# OUTREACH AND SOCIAL MEDIA

The National CTC employed a number of tools to disseminate materials, best practices, and processes.

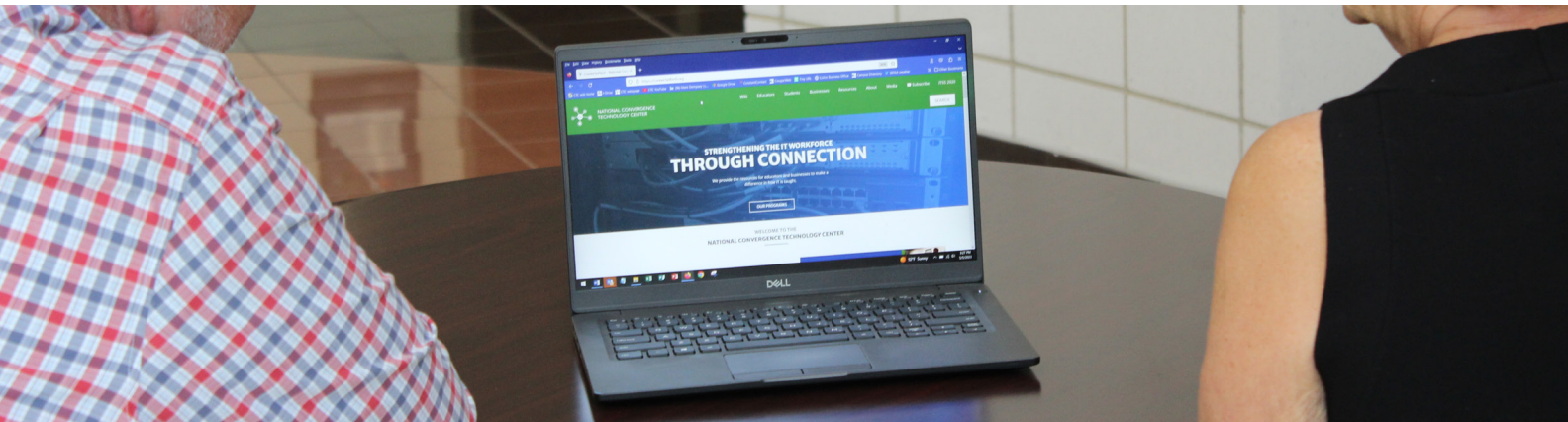
The public website offered both general overviews of grant goals and specific resources related to employer engagement and IT education. From May 2013 to September 2023, the National CTC's website featured a weekly blog article to promote grant news and events, disseminate best practices, and showcase students and CCN faculty members.

A monthly email newsletter was published from September 2013 to September 2023 via MailChimp. The newsletter distribution list eventually topped 1800 subscribers. Newsletter content originally repurposed weekly blogs, but starting in 2020 shorter articles were written exclusively for the newsletter to boost engagement.

Regular social media posts to Facebook, Twitter, and LinkedIn promoted events and publicized blog content. Starting in 2018, a #BILTWednesday tip on implementing the BILT model was posted weekly.

YouTube provided an ongoing platform to showcase best practices. While most focused on strategies for successful BILT implementation or faculty professional development topics and presentations, some videos featured short interviews with employers, faculty, and IT students across the country.

National CTC best practices were further disseminated to wider audiences through appearances in League of Innovations newsletters, National Science Foundation blog posts, the Community College Journal, and a May 2021 article in the Community College Journal of Research and Practice.





# OUTREACH AND SOCIAL MEDIA METRICS



**61,000**

Visitors to the CTC ConnectedTech.org Website 2017-2023



**33,521**

Unique Monthly Newsletter Opens 2013-2023

**24,570**

Unique Monthly Newsletter Clicks 2013-2023



**789**

Downloads of "Implementing the BILT Model" PDF 2020-2023

**275**

Downloads of Updated IT Entry-Level Worker KSA Worksheet 2020-2023



**27,900**

Facebook Page Reach (Users Who Saw CTC Page in Their Feed) 2016-2023

**2,560**

Facebook Post Engagements (Users Who Interacted with a Post) 2016-2023



**357,400**

Twitter Post Impressions (Users Who Saw CTC Tweet in their Feed) 2016-2023

**3,120**

Twitter Post Engagements (Users Who Interacted with a Tweet) 2016-2023



**16,900**

YouTube Channel Video Views 2013-2023

**826**

Total YouTube Channel Video Watch Hours 2013-2023

# RESOURCES



Visit [tiny.cc/IMPACTSlegacy](https://tiny.cc/IMPACTSlegacy) to access the following resources:

**“Diversity Summit” Summary**

*February 2017-June 2018*

**“Student Portfolio Pilot” Summary**

*Spring 2019-Fall 2021*

**“Working Connections Longitudinal Surveys”**

*2013-2019*

**Brown Bag YouTube Playlist**

## CTC STAFF



“My favorite part of working on the CTC grant has been seeing faculty make connections. The magic happens when you see how our work helps an instructor from Minnesota get ideas on how to improve his class from an instructor in Texas. They’re teaching the same thing in different states, but now they’re collaborating.”

- Mark Dempsey, 2012-2023



“Having been a part of this team for over ten years, I have sat in many BILT meetings, counted many votes, and captured many employer comments. I’ve seen firsthand how the BILT process is truly unmatched in bringing together faculty and employers. Watching the BILT spread across the country and impact program after program has been a highlight of my time with the CTC.”

- Christina Titus, 2012-2023



“I’ve been proud to be a part of this grant and the way so many of our events – especially Working Connections – have impacted hundreds of thousands of students across the country.”

- Debbie Miller, 2012-2023



“I was fortunate to work on the Convergence Technology Center and witnessed first-hand the major changes it made for students and also for faculty and businesses. Friendships and professional relationships extended beyond just meetings, events and workshops. I heard from numerous faculty who told me how this was the first time they had a network of contacts they could call upon at any time during the year. This network has been a lifesaver for many.”

- Helen Sullivan, 2012-2016



“As the CTC’s social media coordinator, I enjoyed capturing many inspiring moments at workshops, conferences, and meetings – faculty and students sharing their journey in IT, BILT members working to help enhance IT curriculum, and dedicated staff members providing the best experience for everyone.”

- Amy Garrison, 2017-2022



From top left, clockwise. Students from Collin College and FSCJ talk to the NVC grant review panel in 2023; BILT members discuss KSA vote results in 2016; Bill Saichek (OCC) leads a HITEC breakout session in 2014; educators and industry SMEs support the 2023 NVC meeting; student presents her poster in Austin at HITEC 2013; (l to r) BILT members Glenn Wintrich and Tu Huynh with CTC Director Helen Sullivan in Austin at HITEC 2013; CTC videographer and social media coordinator Amy Garrison works behind the camera; CTC convenes the annual NVC grant review meeting in 2018.



From top left, clockwise. CTCT staff at a 2013 exhibit booth – (from l) Heather O'Neil, Ann Beheler, Jen McGarvey, Helen Sullivan, and Mark Dempsey; 2016 CCN members pose for the annual "family photo;" Mark Dempsey at the 2012 Tech Forum booth; attendees collaborate at the 2017 Diversity Summit; (l to r) Christina Titus, Ann Beheler, Amy Garrison, and Mark Dempsey plan an event in 2018; instructor Andrew Hurd (l) answers questions at Working Connections in 2017; instructor Banu Sundhar (l) teaches at Working Connections in 2019; (from l) Tu Huynh, Debbie Miller, Ann Beheler, and Mark Dempsey celebrate HITEC's 10th anniversary in 2018.

# SUPPORTING MATERIALS

## BUSINESS AND INDUSTRY LEADERSHIP TEAM

### WHAT IS A BILT?

The BILT (Business and Industry Leadership Team) consists of executives and technicians, from both large corporations and small companies, who understand the current and future state of the IT industry nationally and what skills will make graduates employable. Keeping curriculum current with business world demands is one of the best ways to get students jobs.

In an engaged BILT, employers co-lead college programs by...

- participating in a forum to share trends with other business leaders in a neutral, non-proprietary environment
- using a structured and repeatable process to update the knowledge, skills and abilities (KSAs) businesses want workforce-ready grads to have 12 to 36 months into the future
- influencing the creation of a pipeline of skilled future job candidates
- developing relationships with local high schools, community colleges, and universities preparing those future employees
- generating goodwill and positive press as the company demonstrates its commitment to workforce needs



NATIONAL  
CONVERGENCE  
TECHNOLOGY CENTER

Ann Beheler, abeheler@collin.edu  
Mark Dempsey, mdempsey@collin.edu  
www.connectedtech.org



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### WHY JOIN A BILT?

The National Convergence Technology Center (CTC) finds that getting business and industry to actively co-lead, rather than just advise, a program's focus and curriculum produces positive results for students.

BILT members have the unique opportunity to...

- widen the pipeline of right-skilled job candidates
- interact with other key IT leaders nationally

The table below shows how the CTC's BILT differs from traditional advisory boards.

Advisory Board	Business-led BILT
May only give advice	Co-leads
Annual KSA* suggested	Annual KSA* required
May "rubber stamp" existing programs	Actively helps faculty improve program
May only meet just once a year	Meets at least three times a year
If advice is ignored, commitment may erode	When advice is valued, commitment is boosted
May not be highly invested in success of the program	Feels ownership of the program

\* Knowledge, skills, and abilities update.

*The "What Is a BILT?" poster was featured at the CTC's exhibit hall booth at the 2022 ATE Principal Investigator's conference in Washington DC.*



The Convergence College Network (CCN) is a select cohort of community colleges and universities from across the country that allows IT educators to regularly network, problem-solve, and share with one another to enhance and energize their programs to ensure their students are "workforce ready."

There is no membership fee. Instead, CCN member schools receive benefits based on their unique level of engagement and participation. The chart below explains the differences in benefits offered to "Level 1" and "Level 2" members.

BENEFITS	LEVEL 1	LEVEL 2
Participate in unique cost-reduction virtual labs that share technology resources online among several schools	✓	
Register early for National CTC free professional development events in advance of the general public	✓	
Request sizable travel reimbursement assistance for National CTC professional development events	✓	
Access a robust collection of IT/convergence curricula and classroom resources developed by instructors	✓	✓
Collaborate with CCN faculty to incorporate new technologies, build alliances, and improve programs	✓	✓
Learn how to develop a Business and Industry Leadership Team (BILT) to align curriculum with workforce needs	✓	✓
Network with National CTC leaders who have written successful grants and get feedback on proposals	✓	✓
Receive regular updates on current industry trends and job skills needs from National CTC's BILT	✓	✓

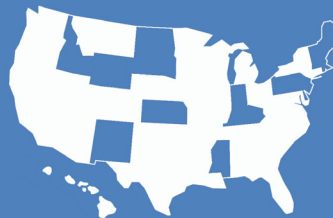


Ann Beheler, abeheler@collin.edu  
 Mark Dempsey, mdempsey@collin.edu  
 www.connecttech.org



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**89** community colleges  
**10** four-year universities  
**1** high school  
**32** states



*This Convergence College Network flyer was developed in 2021 to help recruit schools into the CCN.*

# SPECIAL THANKS TO MANY WHO MADE THE NATIONAL CTC SUCCESSFUL:

## **NATIONAL CTC STAFF**

Dr. Ann Beleher  
Helen Sullivan  
Mark Dempsey  
Debbie Miller  
Christina Titus  
Amy Garrison  
Tricia Connor  
Jennifer McGarvey  
Heather O'Neil

## **COLLIN COLLEGE**

Dr. Neil Matkin  
Karen Bell  
Julie Bradley  
Cindy Cammuse  
Michael Coffman  
Dr. Jay Corwin  
Mike Harsh  
Dr. Jon Hardesty  
Dr. Carey Israel  
Dr. Toni Jenkins  
Dr. Abe Johnson  
Dr. Brenda Kihl  
Craig Leverette  
Nicole Loshe  
Dr. Brenden Mesch  
Dr. Gregory Newman  
Dr. Donald Weasenforth  
Cindy White

## **BILT MEMBERS**

(attended 5 or more meetings 2012-2022)  
Mercedes Adams  
Phil Andrews  
Amy Arnold  
Tom Boehmer  
Chelsea Bray  
Rick Brunner  
Curtis Burchett  
Aaron Burciaga  
Susan Coefield  
Carolyn Corbin  
Vincente D'Ingianni  
Lucas Figg  
Ivor Flannery  
Eric Fusilero  
Maurice Gibson  
Matt Glover  
Ron Halbach  
Cody Hooper  
Dan Huff  
Tu Huynh  
Corey Kirkendoll  
Yang Lai  
Jim Lantrip  
Kimberlee Millikan  
Bill Morgan  
Lynn Mortensen  
Oliver Reiter  
Kurtis Sampson



**BILT MEMBERS CONTINUED**

Earl Simpkins  
Candy Slocum  
Bob Thomas  
Scott Veibell  
Kurt Wall  
Glenn Wintrich  
Kim Yohannan

**NVC MEMBERS**

Kim Yohannan, NVC Chairperson  
Mercedes Adams  
Deborah Boisvert  
Aaron Burciaga  
Carolyn Corbin  
Dr. Linnea Fletcher  
Matt Glover  
Ron Halbach  
Tu Huynh  
Lynn Mortensen  
Dr. Catherine Oleksiw  
Dr. Tom Pensabene  
Pete Saflund  
Dr. Gerhard Salinger  
Gordon Snyder  
Jeff Wacker  
Glenn Wintrich

**BAY AREA COMMUNITY COLLEGE CONSORTIUM**

Richard Grotegut

**EL CENTRO COLLEGE (DALLAS COLLEGE)**

Julian Carranza  
Eliazar Martinez  
Belicia Miraval-Albornoz  
Beth Stall

**FLORIDA STATE COLLEGE JACKSONVILLE**

Pamela Brauda  
Ernie Friend  
Dr. Sherri Litt  
David Singletary

**FOX VALLEY TECHNICAL COLLEGE**

Elizabeth Halweg

**GEORGIA SOUTHERN UNIVERSITY**

Dr. Chris Kadlec  
Dr. Timur Mirzoev

**LANSING COMMUNITY COLLEGE**

Karl Dietrich  
Brian Nelson  
Jason Mitchell  
Adam Richardson  
Ed Suniga

**LONE STAR COLLEGE**

Bruce Caraway  
Dr. Steven Kahla  
Dr. Rajiv Malkan

**ORANGE COAST COLLEGE**

Bill Saichek

**SINCLAIR COMMUNITY COLLEGE**

Angela Fernandez  
Kyle Jones  
Ryan Murphy

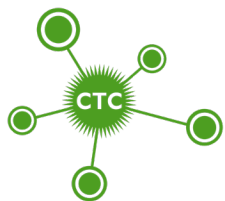
**UNIVERSITY OF NORTH TEXAS**

Dr. Jacob Hochstetler  
David Keathly  
Dr. Robin Pottathuparambil

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