ITSS Summit – Day 1

Tuesday, April 23, 2024

IT SKILL STANDARDS 2020 AND BEYOND

Welcome and Introductions

Ice Breakers

Human Bingo

Marshmallow Challenge

IT SKILL STANDARDS 2020 AND BEYOND

Bingo

- Everyone will be given a Bingo Card
- You have 10 minutes to get a “Bingo” from having a person’s name in squares that are filled across, vertically or horizontally.
- A person can have their name in only one square on your board.
- After you “bingo,” bring the card to the facilitator while everyone else can continue to learn interesting things about their peers until they “bingo” or time is up.

The Marshmallow Challenge

- Built the Tallest Free-Standing Structure in 18 minutes
- Use only spaghetti, string, tape and a marshmallow
- The MARSHMALLOW has to be on top.
- Use the numbers on the back of your name badge to get into groups
  Each team has a bag with the pieces they can use for the challenge
- The exercise starts when I say GO!
- The tallest structure wins!

- Build a tower, build a team | Tom Wujec - Bing video
- For more info: Marshmallow Challenge

Break

IT SKILL STANDARDS 2020 AND BEYOND

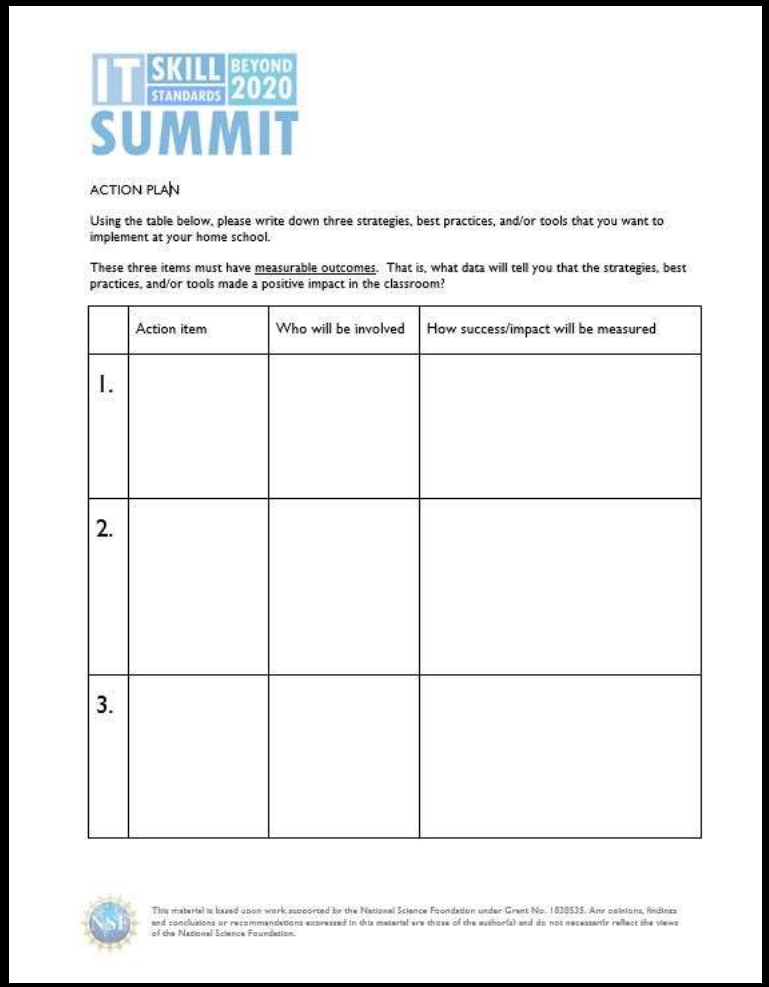
Today's Road Map

- ITSS Products and how to use them
- Overview of the ITSS process and the BILT Model

Action Plan

What will you do when you go back to your home school?

- Three strategies, practices, or tools to use at your home school
- Need measurable outcomes



IT SKILL STANDARDS BEYOND 2020 SUMMIT

ACTION PLAN

Using the table below, please write down three strategies, best practices, and/or tools that you want to implement at your home school.

These three items must have measurable outcomes. That is, what data will tell you that the strategies, best practices, and/or tools made a positive impact in the classroom?

	Action item	Who will be involved	How success/impact will be measured
1.			
2.			
3.			

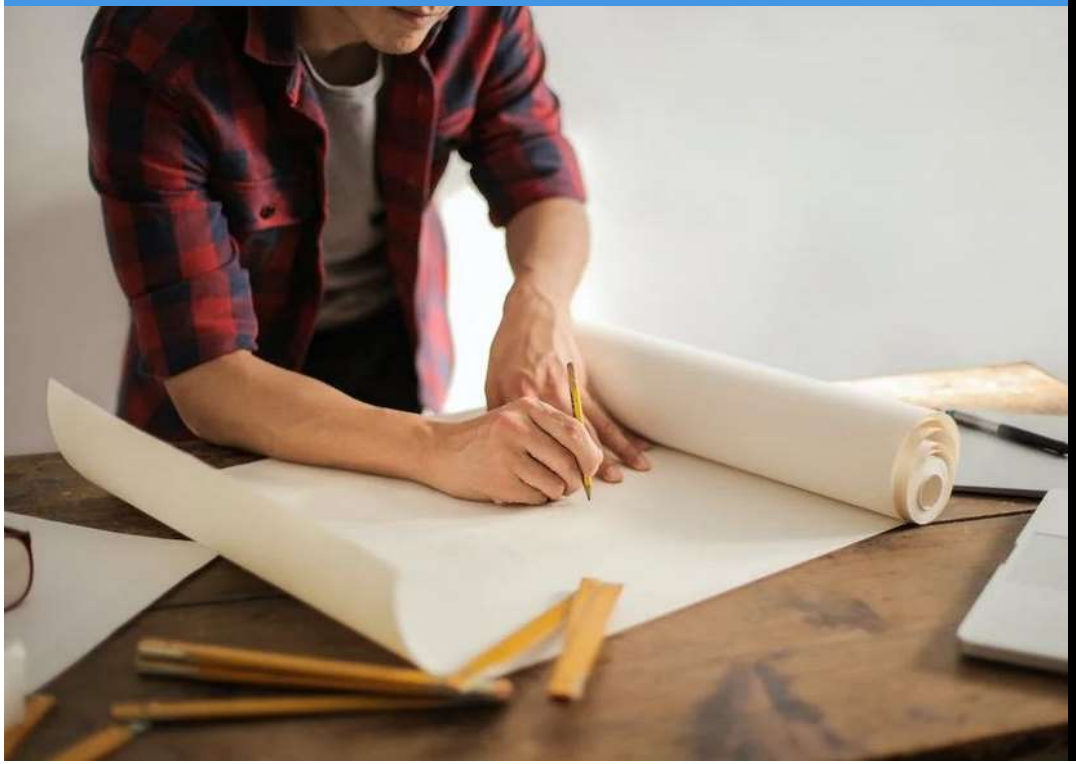
This material is based upon work supported by the National Science Foundation under Grant No. 1838535. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

ITSS Overview

Skill standards answer three critical questions

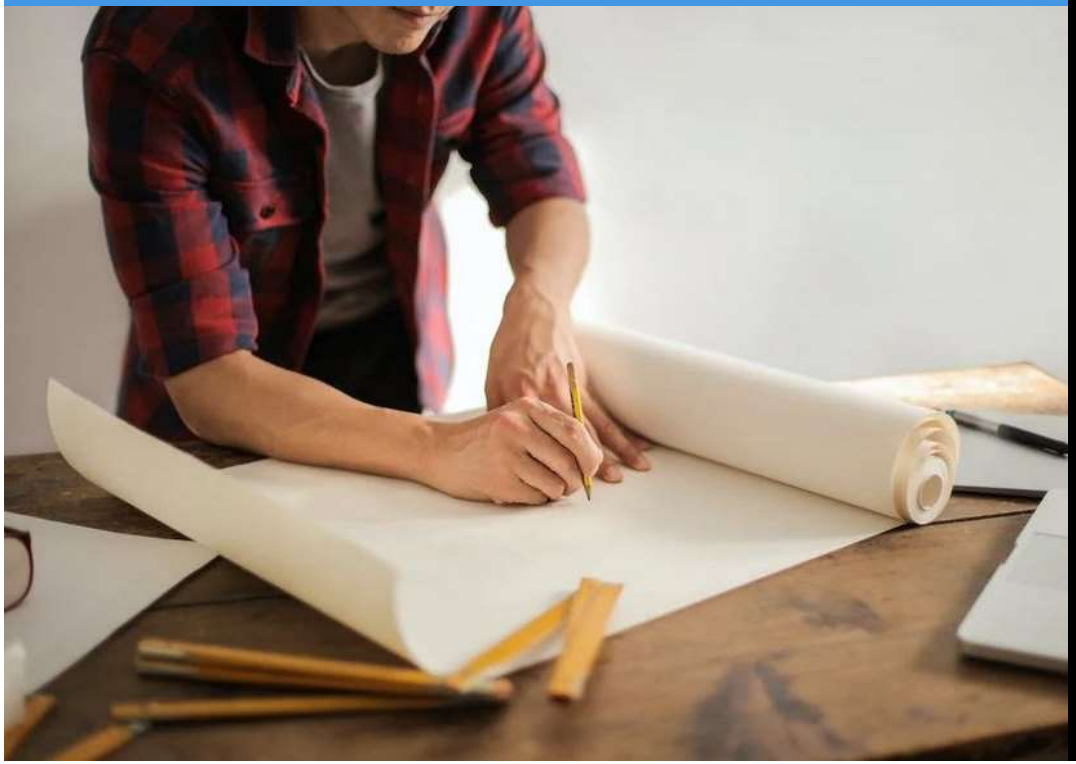
- What do workers need to know and be able to do to succeed in today's (and tomorrow's) workplace?
- How do we know when workers are performing well?
- How can colleges gain this information?

Why Are Skill Standards Important?



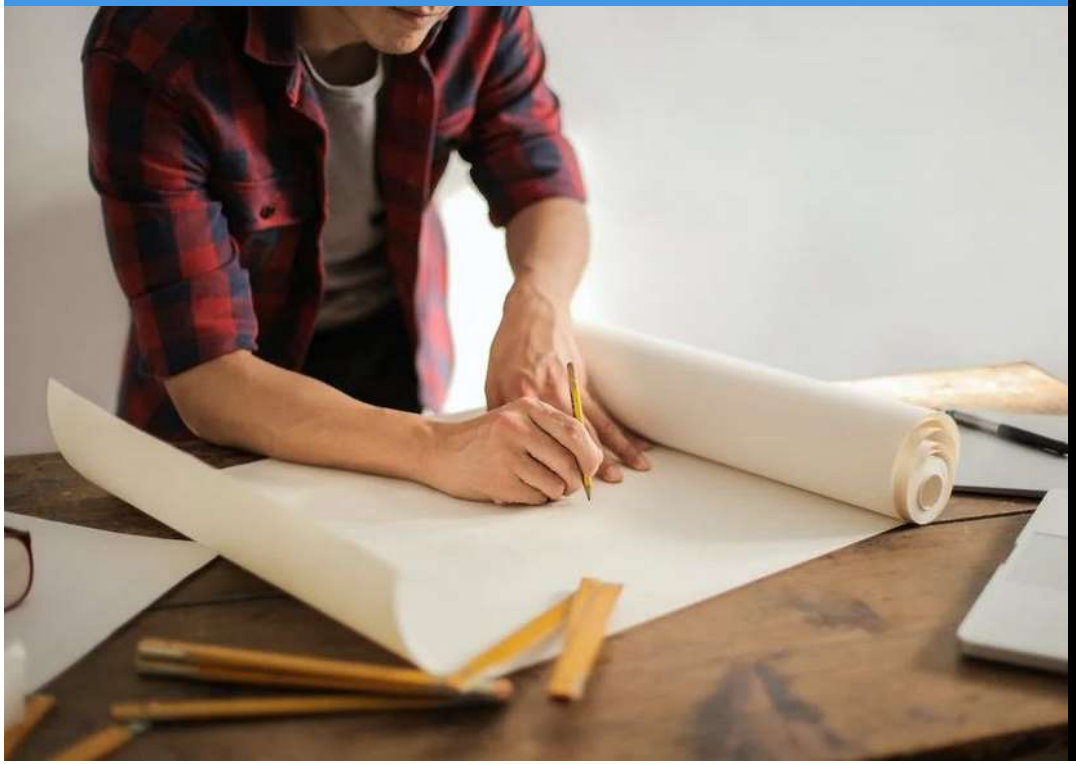
1. **Provide a blueprint** for how the technical knowledge and skills in the IT high-performance workplaces are organized and how the roles of workers contribute to the success of the enterprise.

Why Are Skill Standards Important?



2. They **make IT careers more accessible to students and employers** because they provide transparency regarding the knowledge, skills, and abilities (KSAs) as well as the performance needed for success in the job market.

Why Are Skill Standards Important?



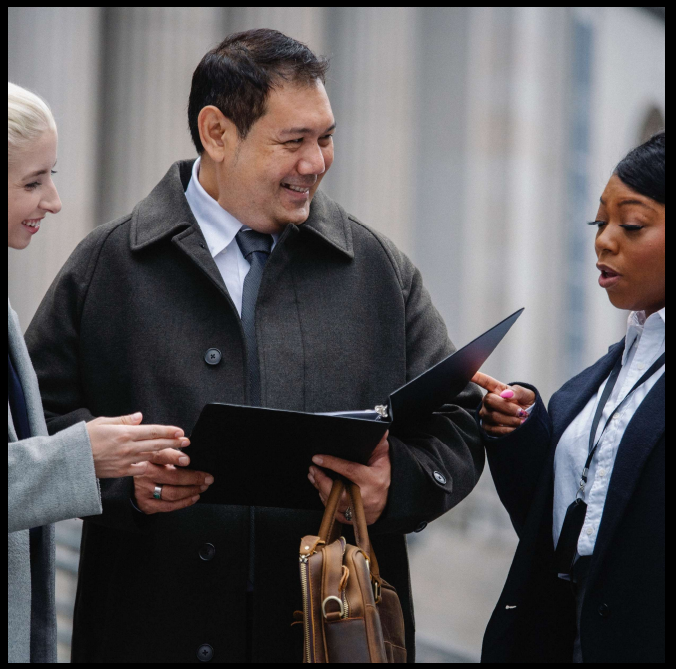
3. Business and Industry want to hire **students who can integrate products**, not just one vendor experts.

EDUCATORS

use skill standards to create curriculum that is relevant, current, and future-facing to better prepare students to meet employers' job requirements.

EMPLOYERS

use skill standards to improve communications about job openings so they hire the most qualified candidates to address their current and emerging needs, and to improve their internal training and development.



ITSS 2020's Purpose

- WIDEN the pipeline of qualified IT workers.
- CREATE a contemporary and future-facing set of IT Skill Standards.
- ASSIST both employers and educators to more easily apply the standards.

ITSS 2020's Purpose

SHARING...

1. The future-focused IT skill standard PRODUCTS

2. The PROCESS of technical skill standard development

Seven IT job clusters

Skill standards completed

1. Infrastructure Connectivity Administration and Engineering
2. Technical Support
3. Technical Project Management
4. Software Development Engineering
5. Data Management and Engineering (the IT side of Data)
6. Data Analytics and Predictive Modeling

Skill set completed

1. Cybersecurity

Four skill standard products

Created by Employer SMEs

- **Tasks + KSAs** with numerical average of prioritized votes
- **Key Performance Indicators** (KPIs) for Tasks
- Levels of Key **Employability Skills**

Created by Educator SMEs (building on Employer SME work)

- **Student Learning Outcomes** to help create/update curriculum

Task, Knowledge, Skill, and Ability

This is a snippet of a KSA and Task list.

The entire list contains a minimum of 100 items across all sections.

Technical Support Tasks and KSAs		
		Avg
Tasks SPECIFIC THINGS an entry level person would BE EXPECTED TO PERFORM on the job WITH LITTLE SUPERVISION.		
Install, Configure, Update, Maintain		
T-1	Install and maintain network infrastructure device operating system software (e.g., IOS, firmware).	3.0
T-2	Install and configure hardware, software, and peripheral equipment for system users in accordance with organizational standards.	3.7
T-3	Manage changes/updates for both internal and external customers when policies and procedures cha	3.4
T-4	Maintain computer hardware.	3.6
T-5	Provide technical support for software maintenance or use.	3.7
Knowledge Knowledge focuses on the understanding of concepts. It is theoretical. An individual may have an understanding of a topic or tool or some textbook knowledge of it but have no experience applying it. For example, someone might have read hundreds of articles on health and nutrition, many of them in scientific journals, but that doesn't make that person qualified to dispense advice on nutrition.		
K-1	Knowledge of the basic operation of computers.	3.9
K-2	Knowledge of computer networking concepts and protocols, and network security methodologies.	3.5
K-3	Knowledge of operating environments, organizational software and applications.	3.6
K-4	Knowledge of practices of internal, external, and global customers (as applicable).	3.2
K-5	Knowledge of internal organizational communication processes.	3.3
Skills The capabilities or proficiencies developed through training or hands-on experience. Skills are the practical application of theoretical knowledge. Someone can take a course to gain knowledge of concepts without developing the skills to apply those concepts. Development of skills requires hands-on application of the concepts.		
S-1	Skill in identifying possible causes of degradation of system performance or availability as well as skill in initiating actions needed to mitigate this degradation.	3.3
S-2	Skill in using the appropriate tools for repairing software, hardware, and peripheral equipment of a s	3.4
S-3	Skill in conducting research for troubleshooting novel client-level problems.	3.1
S-4	Skill in configuring and validating network workstations and peripherals in accordance with approved standards and/or specifications.	3.4

Task, Knowledge, Skill, and Ability

Task: Specific things an entry level person would be expected to perform on the job with little supervision.

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Task, Knowledge, Skill, and Ability

Skills: The capabilities or proficiencies developed through training or hands-on experience.

Skills are the practical application of theoretical knowledge.

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Task, Knowledge, Skill, and Ability

Abilities: Abilities have historically been used to describe the innate traits or talents that a person brings to a task or situation.

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Key Performance Indicators

Technical Support Key Performance Indicators

For the entry-level employee, all tasks are typically done under supervision for as much as the first year and then with some independence with verification after the employee has more experience. All tasks are done according to company guidelines.

	Task	Key Performance Indicators
Install, Configure, Update, Maintain		
T-1	Install and maintain network infrastructure device operating system software (e.g., IOS, firmware).	Current hardware, software and system documentation are obtained and evaluated. System hardware and peripherals are installed, configured and maintained according to specifications. System and peripherals are tested for functionality and performance. Operating and application software are installed, configured and upgraded according to specifications. Maintenance includes appropriate follow-up action according to company policy. Changes are documented and distributed in accordance with company policy.
T-2	Install and configure hardware, software, and peripheral equipment for system users in accordance with organizational standards.	
T-3	Manage changes/updates for both internal and external customers when policies and procedures change.	
T-4	Maintain computer hardware.	
T-5	Provide technical support for software maintenance or use.	
Troubleshoot and Support		
T-6	Troubleshoot system hardware and software.	Users/customers are serviced in a timely manner. Customer input is gathered and analyzed. Relationships are managed so that users/customers are satisfied with the level of service. Problems are correctly identified and causes are isolated. Recommendations based on customer input and analysis of system data are developed and presented to key personnel. Solutions are thoroughly researched, using existing knowledge base. Solutions are selected based on technical benefits, risks analysis and cost effectiveness. Solutions are tested in a complete and realistic manner. Test scenarios are representative of actual use and environment. Resolutions are documented to the appropriate level of detail in accordance with company policy.
T-7	Diagnose and resolve customer reported system incidents, problems, and events.	
T-8	Identify, test and implement solutions to computer hardware and software problems or escalate if required.	
T-9	Test software performance in relation to troubleshooting.	
T-10	Test computer hardware performance in relation to troubleshooting.	
T-11	Collaborate with others to resolve information technology issues.	
T-12	Identify and escalate issues to improve computer or information systems.	
T-13	Provide recommendations to others about computer hardware or software.	
T-14	Escalate computer hardware and software problems according to organization policies.	
Monitor		
T-15	Monitor and report client-level computer system performance.	System performance is monitored and reported according to procedures. Disruptions, outages, security violations and attacks of network services are monitored, recognized and reported in a timely manner, in accordance with company policies and procedures.
T-16	Monitor computer system performance to ensure proper operation.	
T-17	Assess or monitor system for cyberattacks.	
T-18	Responds to crises/security incidents following SOPs.	
Research and Evaluation		
		Appropriate information sources for current and emerging technologies are

Employability Skills

Three possible levels

Technical Support Employability Skills	
Workplace Professionalism & Work Ethics	Level 1 - Employee learns expectations of workplace environment (professional behavior and ethics) and adheres to practices with some guidance. Level 2 - Employee exhibits sound professionalism, judgment, and integrity and accepts responsibility for own behavior. Employee exhibits these qualities without guidance but occasionally refers to policies as needed.
Written Communication	Level 1 - Employee understands written instructions and executes tasks with guidance and feedback from supervisor. Employee clearly communicates concepts in writing. Level 2 - Employee comprehends and executes written instructions with minimal guidance. Employee composes well-organized written documents.
Oral Communication	Level 1 - Employee understands oral instructions and executes tasks with guidance and feedback from supervisor. Employee communicates concepts orally while clarifying for meaning. Employee develops listening skills. Level 2 - Employee comprehends and executes oral instructions with minimal guidance and exhibits good listening skills. Employee clarifies for meaning without needing prompting from supervisor.
Teamwork	Level 1 - With guidance and feedback from supervisor, employee obeys team rules and understands team member roles. Employee actively participates in team activities, volunteers for special tasks, and establishes rapport with co-workers. Level 2 - Employee demonstrates commitment, enthusiasm and supports team members. Employee follows up on assigned tasks and leads by example.

Focuses on these 11 areas

- Workplace Professionalism & Work Ethics
- Written Communication
- Oral Communication
- Teamwork
- Problem Solving & Critical Thinking
- Organization & Planning
- Adaptability & Flexibility
- Initiative
- Accuracy
- Cultural Competence
- Self Development & Career Development

Student Learning Outcomes

Technical Support Student Learning Outcomes		
	Knowledge	**Student Learning Outcomes**
K-9	Knowledge of interrelation between different organizational groups.	Describe a company's organizational structural, group roles and responsibilities, and internal and external communication processes.
K-10	Knowledge of organizational chart and roles/responsibilities of company personnel/departments.	
K-32	Knowledge of an organization's information classification program and procedures for information compromise.	
K-5	Knowledge of internal organizational communication processes.	
K-35	Knowledge of procedures used for documenting and querying reported incidents, problems, and events.	Understand the a company's business process for systems documentation. Describe business processes and issues for IT professionals including privacy laws, software licensing, ethical and professional behavior.
K-41	Knowledge of documentation processes and procedures.	
K-8	Knowledge of business issues regarding software licensing.	
K-2	Knowledge of computer networking concepts and protocols, and network security methodologies.	Explain the OSI model as it applies to various network environments. Identify and summarize techniques to secure network communication. Use operating system commands to manipulate files and directories and perform systems software troubleshooting. Explain various terminologies and technologies related to cloud-based systems. Identify differences and similarities between public, private and hybrid cloud-based environments. Describe the Voice over Internet Protocol (VoIP) telecommunications systems within the networking protocols.
K-20	Knowledge of systems administration concepts.	
K-28	Knowledge of remote access processes, tools, and capabilities related to customer support.	
K-19	Knowledge of measures or indicators of system performance and availability.	
K-24	Knowledge of Cloud-based technologies and concepts (e.g., IAAS, SAAS, PAAS, file/sync/share).	
K-44	Knowledge of VOIP telecommunication systems, both cloud based and on premise, as well as the OSI model and common networking protocols.	
K-45	Knowledge of what is cloud based and what is on premises as well as the different support models for each.	
K-21	Knowledge of physical computer components and architectures, including the functions of various components and peripherals .	Identify and resolve common hardware faults and failures. Describe how to Install, configure, diagnose, and perform preventive maintenance on different hardware devices. Identify the components of integrating the TCP/IP protocol into the networking environment. Describe how to identify issues with software installation, configuration, permissions, and licensing restrictions. Describe how to assemble commonly required components in a standard desktop/laptop computers.
K-22	Knowledge of electronic devices (e.g., computer systems/components, access control devices, digital cameras, digital scanners, electronic organizers, hard drives, memory cards, modems, network components, networked appliances, networked home control devices, printers, removable storage devices, telephones, copiers, facsimile machines, etc.).	
K-34	Knowledge of IT system operation, maintenance, and security needed to keep equipment functioning properly.	
K-1	Knowledge of the basic operation of computers.	
K-11	Knowledge of preventative maintenance procedures and processes.	
K-12	Knowledge of applicable backup and restoration procedures.	Explain the organization's backup and restoration process.

When and How to Use IT Skill Standards

	EXISTING program	NEW program
Compare the KSAs, Tasks and SLOs created by ITSS	✓	
Use comparison to fuel discussion at faculty meeting	✓	
Use comparison to fuel discussion at Business Advisory Council (BILT) meeting	✓	
Validate/clarify the KSAs and Task		✓
Use SLOs to create new curriculum		✓
Consider labor market demand		✓

IT Skill Standards Process and the BILT Model

Major Goals for Institutions of Higher Ed and US Employers

STUDENTS complete certificates and degrees and are well-qualified for ready employment or transfer

EMPLOYERS are highly engaged and want to hire students

Implementing Business & Industry Leadership Team (BILT) Model proven effective to meet BOTH GOALS

What is a BILT?

- A Business Advisory Council "**on steroids**"
- A **structured, repeatable process** that can be used for any technical program
- A model that puts employers in a **co-leadership role** that greatly increases their engagement with your program

BILT Essential Element
Co-Leadership

Employers report they are more likely to hire graduates from programs for which they have **curricular leadership** responsibility

Employers report they will assume this role (and more) if:

- Their time is respected
- There is a method for ensuring their input is consistently and seriously considered by faculty members
- They consistently receive feedback on their recommendations

BILT Roots

- National Science Foundation (NSF) Center of Excellence in Convergence Technology
  Based at Collin College (TX) [2012-2023] with Regional Center prior to the national
- Established BILT model through work with business leaders from across the nation to determine the Knowledge, Skills, and Abilities that "workforce ready" graduates will need
- Model implemented at more than 100 colleges and projects in multiple disciplines.
- US DOL and ED recognize BILT as leading model for strategic employer engagement
- Pathways to Innovation NSF project was launched BILT Academy to scale the model

NSF

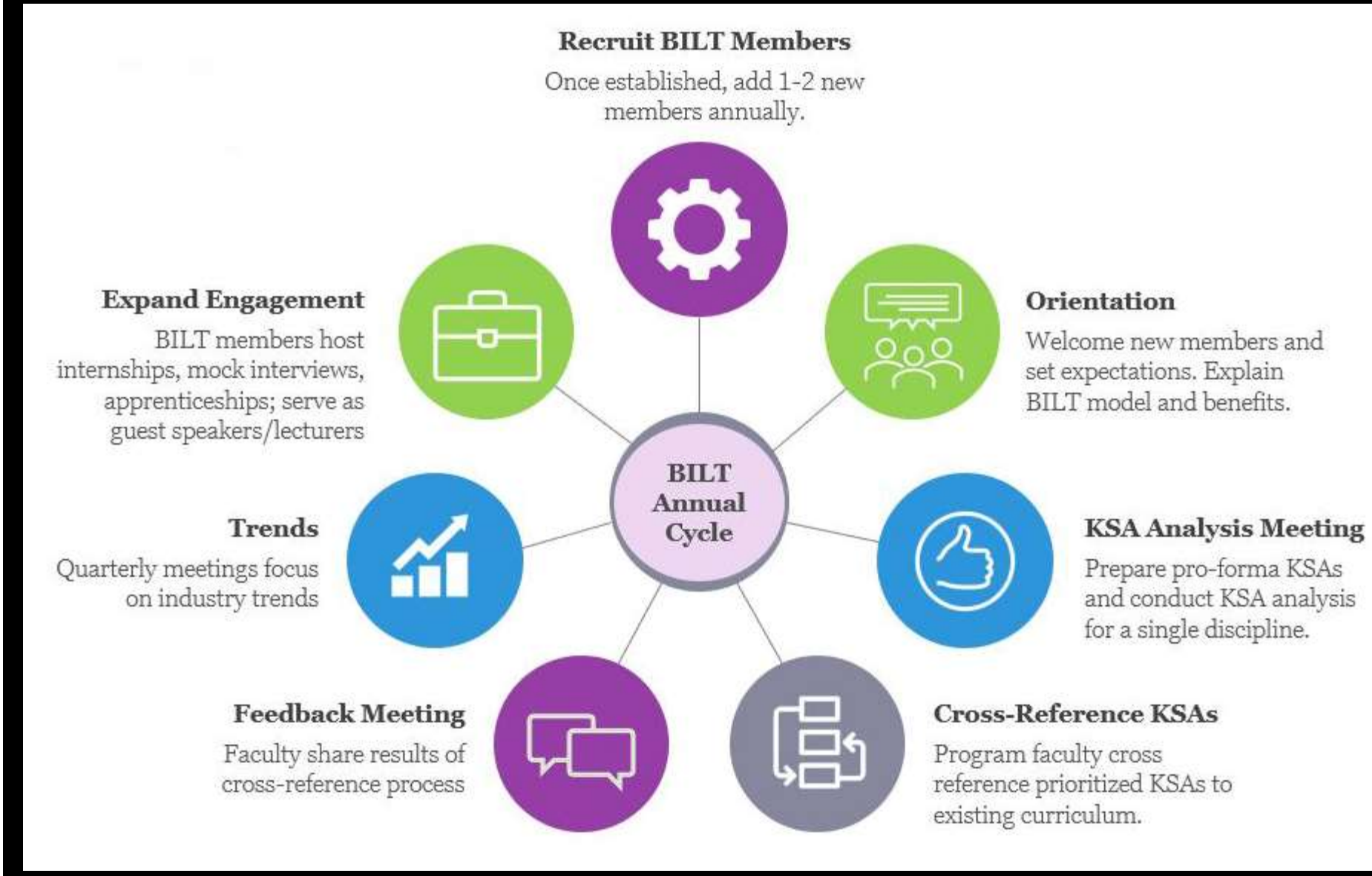
CTC NATIONAL CONVERGENCE TECHNOLOGY CENTER

BILT Meeting Cycle

- Building and maintaining a thriving BILT is a high-touch activity with frequent two-way communication.
- Know your BILT members' "WIIFM" – what's it in for me?
- Emphasis on growing a pipeline of right-skilled job candidates.

BILT Meeting Cycle

- Annual KSA analysis meetings (initial and annually, single 2-2½ hour meeting).
- Industry Trends/Feedback meetings are held 2-3 times per year via web-meeting software to get ahead on the updates.


Recruit BILT Members
Once established, add 1-2 new members annually.
Orientation
Welcome new members and set expectations. Explain BILT model and benefits.
KSA Analysis Meeting
Prepare pro-forma KSAs and conduct KSA analysis for a single discipline.
Cross-Reference KSAs
Program faculty cross reference prioritized KSAs to existing curriculum.
Feedback Meeting
Faculty share results of cross-reference process
Trends
Quarterly meetings focus on industry trends
Expand Engagement
BILT members host internships, mock interviews, apprenticeships; serve as guest speakers/lecturers
BILT Annual Cycle

BILT and ITSS Working Together

	BILT model narrow scope (local region or single program)	ITSS process broad scope (large region or state) think of it as "BILT plus"
THOUGHT LEADER		THOUGHT LEADERS IDENTIFY CLUSTERS
SME	SME VOTE AND DISCUSS CLUSTER KSAS	SME VOTE AND DISCUSS CLUSTER KSAS
SME		SME VOTE AND DISCUSS CLUSTER KPIS, TASKS, AND EMPLOYABILITY SKILLS
FACULTY		FACULTY DEVELOP SLOS BASED ON KSAS
FACULTY	FACULTY UPDATE CURRICULUM TO ALIGN WITH SME FEEDBACK	

Thought Leaders

Approximately 100 "Thought Leaders" identified the first set of project Job Clusters

- Thought Leaders were typically CTOs, CIOs, CISOs or other individuals responsible for "seeing the future" to keep their companies in business.
- Purpose was to identify 8-10 of the most critical and difficult to fill job clusters for the future
- Thought Leaders were reconvened to identify remaining 2 to 3 clusters
- ITSS project team synthesized the results

Never start with a blank wall

Network Engineering

	COMMON JOB TITLES
Designs and builds computer network systems, including software and hardware. Runs program and system tests, solves technical problems and maintains the network system. Designs and analyzes computer network models.	Network Engineer Senior Network Engineer Solutions Architect Automation Engineer Infrastructure Engineer

BG OCCUPATION	POSTINGS LAST 6 MONTHS	UNFILLED JOBS LAST 6 MONTHS	+/- THROUGH 2026
Network Engineer/Architect	76,707	>40%	6.5%

Data from Labor Insights tool from Burning Glass Technologies

IT SKILL STANDARDS 2020 AND BEYOND

Both Skill Standards Process and BILT Model use the BILT voting process.

Employer SMEs

- ITSS project team compiled pro forma KSAs and Tasks.
- Employer SMEs voted on the pro forma KSAs and Tasks they wanted workforce ready grads to do/have in the future using the structured, repeatable (electronic) process from the BILT, followed by discussion
- Employer SMEs could add, change, and delete items during the 2-3 meetings per job cluster that were held

Employer SMEs

- Employers identified the appropriate level of Employability Skills needed per job cluster
- ITSS worked with ~250 different business SMEs over first 6 job clusters

After the meetings

Project team synthesized data across meetings (votes + discussion)

Employer SMEs at follow-up meeting…

- **Verified** the synthesis done by the team and changed anything they did not approve
- **Voted** on Key Performance Indicators (KPIs) for Tasks

Employer SMEs additionally…

- Assisted with dissemination
- Provided ideas to sustain updates

Break

IT SKILL STANDARDS 2020 AND BEYOND

Activity

Your Business Advisory Council

IT SKILL STANDARDS 2020 AND BEYOND

Business Advisory Council

- May meet once or twice a year
- May "rubber stamp" existing program
- Faculty may drive meeting agenda
- May only give advice and suggestions
- Job skills recommendations delivered through discussions
- May not be highly invested in success of the program
- May not be kept in the loop on how suggestions implemented

Business Advisory Council	BILT
May meet once or twice a year	Meets quarterly
May "rubber stamp" existing program	Actively helps faculty improve the program
Faculty may drive meeting agenda	Employers help develop agenda – especially sharing trends
May only give advice and suggestions	Co-leads
Job skills recommendations delivered through discussions	Job skills recommendations created through voting process
May not be highly invested in success of the program	Feels an ownership in the program and its students
May not be kept in the loop on how suggestions implemented	Regularly informed on how suggestions implemented

Business Advisory Council	BILT	ITSS Process
May meet once or twice a year	Meets quarterly	Meets as needed
May "rubber stamp" existing program	Actively helps faculty improve the program	Actively helps faculty improve the program
Faculty may drive meeting agenda	Employers help develop agenda – especially sharing trends	
May only give advice and suggestions	Co-leads	Co-leads
Job skills recommendations delivered through discussions	Job skills recommendations created through voting process	Job skills recommendations created through voting process
May not be highly invested in success of the program	Feels an ownership in the program and its students	Feels an ownership in the program and its students
May not be kept in the loop on how suggestions implemented	Regularly informed on how suggestions implemented	

PLUS

- Develops addition materials – KPIs, employability, SLOs
- ITSS content feeds back into the BILT

Today's Road Map

- ITSS Products and how to use them
- Overview of the ITSS process and the BILT Model

Tomorrow's Road Map

- Seven essentials of the BILT model
- Recruiting employers
- Preparing for the KSA meeting
- Conducting the KSA Meeting
- Behind the Google Sheet
- Employability Skills
- After the KSA Meeting
- Key Performance Indicators
- Student Learning Outcomes
- Cross Reference

IT SKILL STANDARDS BEYOND 2020 SUMMIT

ACTION PLAN

Using the table below, please write down three strategies, best practices, and/or tools that you want to implement at your home school.

These three items must have measurable outcomes. That is, what data will tell you that the strategies, best practices, and/or tools made a positive impact in the classroom?

	Action item	Who will be involved	How success/impact will be measured
1.	Meet with people at your college to provide BILT overview and process for implementation.	The team that attended the ITSS Summit, the college administration, and other college faculty	The college administration and other faculty buy into the idea of the BILT.
2.	Recruit employers for cyber program - host orientation meeting.	Faculty and administrator responsible for cyber program.	About 20 employers were recruited, and an orientation meeting was held.
3.	Host a BILT KSA meeting for cyber program.	Faculty and administrator responsible for cyber program.	KSA meeting held (at least 10 employers attend) with vote and discussion on pro-forma KSA list.

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