BILT Meeting Networking and Convergence Technology
May 10, 2016

KSA/job skills analysis update

		KSA Ranking 1 to 4 (with 4 being the highest)					
KSA	National Business and Industry Leadership Team Knowledge Domains		4	3	2	1	Avg.
	Name	Topics	Vote	Vote	Vote	Vote	Vote
K1	Unix / Linux OS		8	3			3.7
K2	Windows Server OS		3	2	2	1	2.9
K3	Operating System Maintenance	Includes topics such as account mgmt., installing apps, command line, directory, file structures, so scripting, confit modification, backup/restore, so admin, scheduler, stopping/starting services, change control, documentation, awareness of KPI and SLA/OLA	2	4	5		2.7
K4	OSI Model	Includes topics such as topologies, transmission media, Ethernet specs, CSMA/CD, operation of hubs, switches, routers, OSI model, TCP/IP protocols, IPv4, IPv4, CIDR addressing, subletting, gateways, routing and routing protocols, transport protocols, IPv6, IPv4/6 integration, IPv6 tunneling, hybrid environment, SDN/OpenFlow	9	1			3.9
K5	Convergent Network Technologies	Includes such topics as PSTN and telecommunications basics as well as computer networking/telephone integration, voice over IP protocols and details of protocols and implementation, SDN/OpenFlow, SIP and Web RTC protocols.	4	4	3		3.1
K6	Network Devices-Connectivity Components	Includes such topics as Nics, Hubs, Switches, Routers, Gateways, Cables and connectors, wireless access points, DTE, CTE, modems, sensors, wireless AP, fiber and fiber splicing.	8	3			3.7
K7	WAN Technologies	Includes such topics as packet and circuit switching, T and E carrier systems for data communication, multiplexing and concentrating, Sonet/Synchronous Digital Hierarchy, ISDN, etc., SDN, PRI ISDN, MPLS		11			3.0
K8	Wireless Infrastructure and WLANs	Includes such topics as cellular telephone, Personal area networks, Satellite data communications, microwave point to point, Broadband Mobile access/LTE, Wireless spectrum, Wireless IEEE 802 standards, near-field communications, wifi	1	9	1		3.0
K9	Troubleshooting and Equipment Repair	May include use of diagnostic software and use of hardware including hand tools as well as knowledge of troubleshooting methodology, critical thinking, situation assessment, documentation, inspection routines	8	3			3.7
K10	Infrastructure Monitoring and Restoration	Includes such topics as backup and recovery, centralized log monitoring and correlation, types of alarms, network monitoring and provisioning software, fault tolerance, mass storage and backup devices, network and computer system redundancy including storage, power, connectivity and hot swapping, disaster recovery planning, business continuity, MDM exposure but not required, sensors		11			3.0
K11	Network Security	Includes at least overview knowledge of topics such as knowledge of firewalls, password practices and procedures, encryptions, network virus protection, anti-theft and tamper proof devices, biometrics, security protocols, SSL, IPSEC, WEP, SSH, Security tools, Trojan horses, DMZ, Hack attacks, social engineering, public, private, symmetric, and secret keys, virus, worm, honey pot, and backdoor concepts, digital certificates, physical security, authentication, vulnerability scanners, intrusion detection systems, ACL, risk analysis, information security, data security	11				4.0
		Basic hardening dos and don'ts					#DIV/0!
		Certificate management					#DIV/0!
		DNS					#DIV/0!
		Application interactions					#DIV/0!
		Managing environments at scale					#DIV/0!
		Configuration management					#DIV/0!
		Password management					#DIV/0!
		Change control process					#DIV/0!
		Staying current with security advisories (how/where to find them)					#DIV/0!
		Concept of network security should be woven into all other IT courses; take a moment at key points in all curriculum to ask "Is this secure? Why or why not?" and "What would you do you make it more secure?"; add to the class tests these questions, concepts, and elements - build it up, open it up, secure it					#DIV/0!
K12	Virtualization Technologies (Network Function Virtualization NFV)	Includes such topics as installation of server and desktop virtualization solutions, management of virtualization solutions, administer/install/patch/recovery, virtual network and hypervisor configuration and optimization, identify solution	9	2			3.8
K13	Storage Management	Includes such topics as evaluation of storage architectures such as DAS, SAN, NAS, CAS; understanding backup, recovery, disaster recovery, business continuity, and replication; understanding logical and physical components of an information storage infrastructure, tiered storage	2	3	6		2.6
K14	"X" as a Service	Includes such topics as server virtualization as a services desktop virtualization as a services, storage virtualization as a services, I/O virtualization as a services, public/private cloud issues, security in the cloud, awareness of different "X as a service" types (differences between them), hybrid cloud	1	8	2		2.9
K15	Soft Skills	Interwoven into classes likely through projects. Oral Communication, written communication, leadership, teamwork, appreciation of diversity, conflict management, customer service, work ethic, professionalism, integrity, attention to detail, adaptability, organization, stress management, multi-tasking, problem solving, decision-making, intellectual risk-taking, thoughtful reflection, initiative, creativity, dedication, perseverance, pride in work, numerical and arithmetic application, following directions, information gathering, resource allocation, time management, technology and tool usage, critical thinking, willingness to continue learning, technical writing, presentation	11				4.0
K16	Basic Project Management	Basic understanding of principles including the individual's role in the process, accountability	10	1			3.9

Reminder that all of these rankings and votes are made considering what would be most valuable for an entry-level person. A "4" vote means that skill is more important; a "1" means that skill is less important.

Certifications

BILT Member	Highest Ranking Certificates
Matt Glover	C4, C5, C7
Vincente D'Ingianni	Same as Matt Glover
Yang Lai	Very close to Matt Glover's (specifically C7)
Glenn Wintrich	C4, C5
Candy Slocum	C4, C5, C6, C7, C8
Kurtis Sampson	
Tu Huynh	C4, C5 (not sure why we need C1 and C2)
Dan Myers	C2, C4, C5, C11, C12, C4, C7
Brian Smith	Agrees with the others
Kim Yohannan	C9, C13, C14, plus others
Cody Hooper	C5, C6, C7, C8

Overall, the BILT believes that all of the certificates are good. None are meaningless. The more you have, the better. The above chart reflects the highest ranking certifications identified by the BILT members that are important from an employer perspective when hiring.

The importance of classroom projects (real world experience) was also discussed: Cope Crisson (Collin faculty) described how this was incorporated into his classroom under the DOL grant project:

Involvement by businesses leader throughout
Provided application of what the student was learning
Students designed a network, built a network, and made formal presentation of the final project to a panel of business leaders.

Ann mentioned that the 3 students involved in the first class all got jobs and mentioned they felt the class project had a positive impact on their success.

Action (Ann Beheler): Share the "how to implement projects in the classroom" process and the video created under the DOL grant. It was also discussed that in the next grant proposal perhaps we include a research project to see if we can show impact of classroom projects on employment.

Actions identified for Tiger Team

Matt Glover, Vincente D'Ingianni, and Cody Cooper volunteered to be part of the Tiger Team. Others will be added. It was suggested that maybe these topics be spread across two or three different Tiger Team sessions.

- Should K3 include BYOD or VPN?
- K5 Convergent Network Technologies – Update and redefine. K5 should be renamed (IMS, Enterprise IMS, something else?) Scripting automation should be included. K6 through K8 runs on the K5 technology.
- Discussion: consider adding to K5 using tours/seminars to give students exposure.
- Should K5 include HL7 or CDA (health care protocols)?
- For the grant renewal, the CTC needs a "fifth grade definition" of convergence (K5). The old definition is out of date.
- Vincente D'Inganni provided these protocols:

  For SDN (Software Defined Networking), the applicable protocols are OpenFlow and ForCES (FORwarding and Control Element Separation) - RFC5810
  Applicable software technologies include OpenStack, Open vSwtich, Ryu (Python-based SDN Controller), Intel DPDK (Data Plane Development Kit)
  These software technologies and protocols are used with existing hypervisors to enable NFV (Network Function Virtualization).

  He also provided a list of IMS protocols that should be listed in K5.
- Discussion: K6 thru K8 (Network Devices, WAN, Wireless) will be merging over time.
- K8 Wireless Infrastructure and WLANs – Update and redefine "wireless" (for example Bluetooth should be added). What does "wireless" mean now?
- K9 Troubleshooting and Equipment Repair – Update and redefine.
- K10 Infrastructure Monitoring and Restoration – Update and redefine.
- Action: K14 ("X" as a Service) – Change name to "Everything" as a Service. Add the word "exposure." The idea is to understand the systemic "aaS" approach.
- Discussion: K15 Soft Skills – At what class level should soft skills be built into the curriculum. Team building & time management were particularly emphasized.
  - Start emphasizing the importance of "Playing well with others" in the lower level courses (100 or 1000).
  - Aspects of team building, time management, & project management should be included in ~ 80% of the higher level courses (200 or 2000). Do not wait to include in the capstone course.
  - One idea discussed was to include a team project in the class. Example, design & install a Local Area Network with multiple students having different jobs. This will provide students with practice of team work skills as well as exposure to the various roles.
- Action: Add new KSA regarding knowledge of the government regulations/compliance and their on-going impact to IT. Or maybe add it to K5.
- Action: Further review if a new KSA should be identified that lies in between scripting & software development. Is that "scripted automation"?
- Action: make C11 and C12 refer to Server 2012, not 2008. And it's now called MCSE, not MCITP.

- Action (not KSA): Potential for company site visits by students (broaden beyond 60 hours). Ann indicated she might be able to pilot this as part of the grant. Kathy Fant agreed to work with the Tiger Team on this project. Inspired by Glenn Wintrich story – Perot Systems used to cross-train everyone on health care systems and lingo so everyone was more familiar. It could benefit IT students to get a four-hour seminar on IT in manufacturing or health care or construction one Saturday. Give them a feel for IT applications in different industries.

Working Lunch Discussion – Value of badges

- Matt Glover discussed Mozilla OpenBadges. It is a new online standard to earn badges for skills you learn online and off and show your badges on the places that matter. This shows a student's desire for continual learning and that the student is dedicated to their future.
- Cody Cooper (Cicso employee) talked about the Cisco Learning Network. Employees earn badges for completion of professional development (mostly focused on soft skills) and the badges are visible to the employee and others. One badge was "Be Unforgettable." Some involve little more than watching a video and then taking a short quiz.
- Question of whether employers even know the term "badge." Ann Beheler defined it as something less than a certificate but could show knowledge in a specific area.
- Glenn Wintrich: rather than focus on the badge, students should look for other ways to make themselves stand out. This could be posting articles on LinkedIn or writing articles for a student newspaper. Show the employer you have passion, engagement, drive, and motivation.
- IT is less about degrees and more about know-know. What can you do for the employer?
- The badges have to mean something. CCNA means something, but it takes a year to earn it.
- There could be value in badges if they lead to something more. Consider a "benchmark badge." You gather badges as you progress towards a certificate on degree. Maybe badges can encourage a student to go farther. Rather than worry if employers value badges, maybe the question is whether students and schools can find value in badges. Make it mean something for the program.
- Question of how to communicate the badges to the employers.
- Proposal of the CCN getting together as one to unify and codify badges – what they are and what they mean. Maybe also create a 501c3 to help push the badges out.
- Need safeguards in place to protect against the lazy – that is, not just a series of checkboxes that delivers a badge.

The "Next Big Thing" for proposal renewal due October 2016

- Ann Beheler ran down for the BILT the broad recommendations and ideas from the April 2016 NVC meeting (e.g. alumni groups, e-book on process/best practices, growing and deepening the CCN community, diversity summit – find a way to institutionalize recruiting and retention strategies, continue Working Connections).

- IoT – the CTC won't focus on the sensors, but how to connect the sensors. Just as before it was servers needing to talk to PBX that led to a new paradigm of convergence, now we're seeing operational tech (sensors) needing to work with IT (data). It's this integration shift that is coming with internet of things.
- SDN
- There is an upcoming convergence of Operational Technology with Information Technology. Both will need to be educated about the functions of each.
- Parsing of data into something meaningful.
- Smart City Technology
- Be aware that there will be a shift from "rack 'em and stack 'em" as the process may eventually be automated.
    - When is this expected to happen? 2016 to 2022 slower decline with much faster decline beyond 2022. The question is what will replace those jobs as the standard entry-level IT position.
    - Careers change will be pivotal. Learning is continual in the fast paced changing world of IT. The only thing that won't change in an industry that's always changing – you have to be work-force ready. You have to be ready to go to school for the rest of your life.
    - Large to medium companies are moving from back end to front end. In some larger companies, IT is now being built into the various functions (Finance, Marketing, etc.) with the IT budget owned by the functions vs the CTO.
    - Keep in mind that the U.S. economy runs on small businesses. They will not adopt the cloud.
    - Significant amount of data will be stored and processed. Only information of value will be sent to the cloud. And as things move to the cloud, CCNA will become less desirable. The cloud is cheaper than data centers full of networks and servers.
    - This might be key to include in the grant proposal. The bar for the entry level position will go up. This tide is rising. The easy stuff will be automated. The IT jobs will continue; the worry is that there will be fewer entry-level jobs that typically help a technician get his feet wet. Those jobs will be automated. (Just as there are no more database administrators; now that's automated and companies are hiring database analysts.)
    - 2016 will be the year of the API (application program interface). Employers will need managers/orchestrators of 1000s of APIs.
    - Explore for the new grant. As lower skills will be automated, should networking courses have a level of programming built into it?
    - UNT reports that the "CS Essentials" course is mostly logic and problem solving. Ann Beheler says many "Intro to Computers" courses are essentially Office Suite tutorials.