Employer-Academia Disconnect

- Significant disconnect between needs of organization and what higher education institutions are produced
  - 23% believe that college graduates are fully prepared to enter cybersecurity industry with a certain knowledge set and applicable technical skills
- Current education environment does not provide a <u>common</u> baseline set of skills
  - To build role-specific knowledge necessary to meet employer workforce requirements
- Students don't always know the value of what they've learned and cannot always explain it in an interview

Employer-Academia Disconnect

- For a student without meaningful work experience
  - Only supporting student document is university transcript
  - Missing actual skills or rigor to obtain that grade

University Transcript

Last Academic Standing:			Good Standing						

Subject	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
CSCI	545	G	Advanced Data Communications	A	3.000	12.000		
CSCI	556	G	Advanced Database Applications	A	3.000	12.000		
CSCI	588	G	Advanced Systems Architecture	A	3.000	12.000		
CSCI	693	G	Parallel Algorithms	A	3.000	12.000		

	Attempt Hours	Passed Hours	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	12.000	12.000	12.000	12.000	48.000	4.000
Cumulative:	12.000	12.000	12.000	12.000	48.000	4.000

How can a transcript show these desired skills?

Preferred Skills:

Job Posting

- Linux Experience
- Application framework experience such as Spring Framework
- Familiarity with Microservices
- Familiarity with Docker or Kubernetes

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Proposed Solution

- Employers require a more work-skill specific transcript that matches the need of the job specification

  – But there are no standards on how job specifications are listed

- Goal:

  – Derive and quantify student-readiness for cybersecurity work roles

- Proposed Solution:

  – Input takes advantage of existing infrastructure and previous work

    - Use existing Learning Management System (LMS) framework in the form of course assessments

    - Use NICE Framework work roles and KSAs for cybersecurity

  – Workforce Readiness Tool (WRT) maps and aggregates course assessments to KSAs across courses and program

    - Generate transcript with quantitative feedback & readiness score

Micro Transcript generation

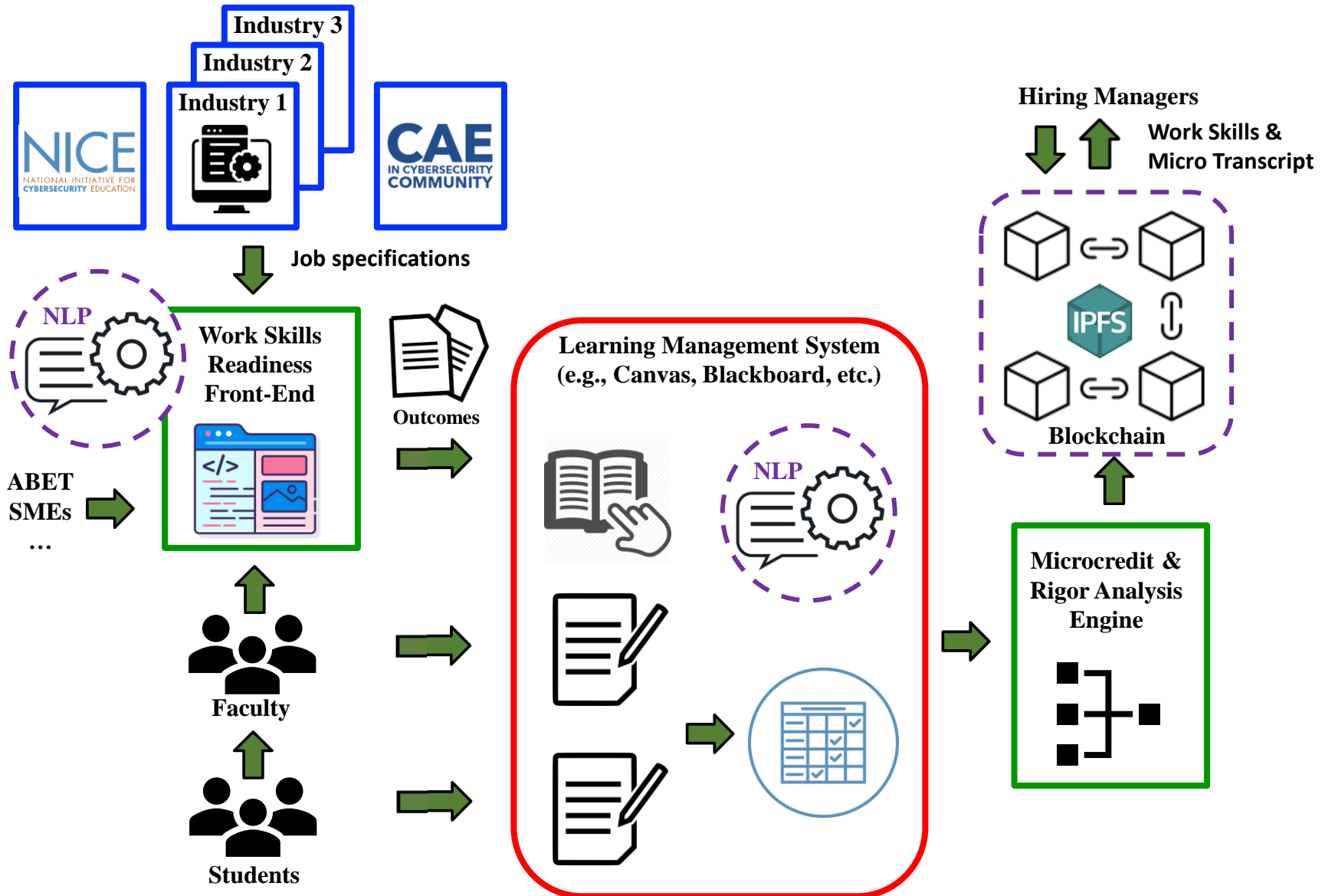https://www.youtube.com/watch?v=3iyp1vXLQEo

Workforce Readiness Tool (WRT)

- Combining course assessments and work roles in NICE Framework, WRT quantifies student qualifications
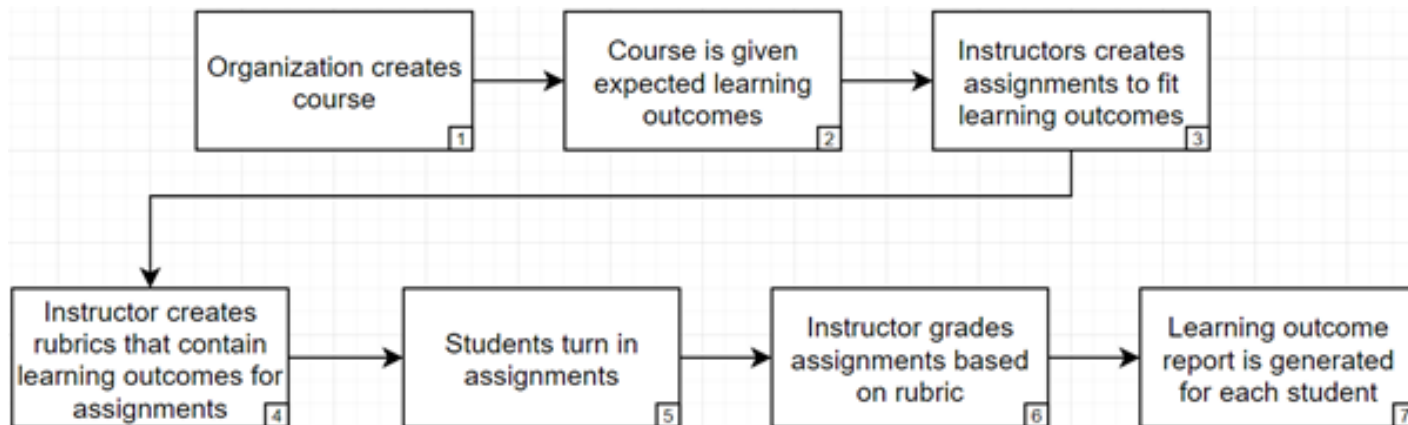
- Determine student competency to complete tasks in work role context such as internships

  - Readiness score quantifies areas specific to job/work roles and needs
  - Match percentage to identified internship and missing skills
  - Blockchain supports transcript auditability, immutability, & verifiability

WRT Overall Architecture and Flow

Industry 3
Industry 2
Industry 1

NICE — NATIONAL INITIATIVE FOR CYBERSECURITY EDUCATION

CAE — IN CYBERSECURITY COMMUNITY

Hiring Managers

Work Skills & Micro Transcript

IPFS

Blockchain

Job specifications

NLP

Work Skills Readiness Front-End

Outcomes

ABET SMEs …

Faculty

Students

Learning Management System (e.g., Canvas, Blackboard, etc.)

NLP

Microcredit & Rigor Analysis Engine

How to read Workforce Ready Transcript (WRT)

Integrating NICE Framework work roles and industry job specifications, students are assessed on KSAs (Knowledge, Skills, and Abilities) for cybersecurity work roles based on three outcomes: Basic, Advanced, and Missing (i.e., not attempted).

University of North Texas
College of Engineering
Department of Computer Science and Engineering

Name: **Some Student**
Program: **B.S. in Computer Science**
Date: **05/19/2022**

Role: Penetration Tester: 57% Match

KSA	DESCRIPTION	LEVEL
SEF	**Security Frameworks**	
SEF-1	OWASP	Basic
SEF-2	Web App	Advanced
SEF-3	Mobile App	Missing
SEF-4	Wireless	Missing
PRG	**Programming Languages**	
PRG-1	PHP	Advanced
PRG-2	Python	Advanced
PRG-3	Java	Basic
PRG-4	C#	Missing
PRG-5	Ruby	Missing
PRG-6	Bash	Advanced
PRG-7	C	Advanced
PRG-8	C++	Advanced
OPS	**Operating Systems**	
OPS-1	Windows	Advanced
OPS-2	Linux	Advanced
OPS-3	Mac	Basic
OPS-4	Unix	Missing

Role: Penetration Tester: 57% Match (cont'd)

KSA	DESCRIPTION	LEVEL
CCS	**Cloud Computing Services**	
CCS-1	AWS	Basic
CCS-2	Azure	Missing
CCS-3	GCP	Missing
CAT	**Code Analysis Tools**	
CAT-1	VeraCode	Missing
CAT-2	CodeSonar	Missing
CRT	**Certifications**	
CRT-1	OSCP	Missing
CRT-2	GPEN	Missing
CRT-3	GXPN	Missing
CRT-4	OSCE	Missing
CRT-5	PNPT	Missing
CRT-6	CEH	Advanced
PEN	**Penetration Testing Tools**	
PEN-1	Metasploit	Basic
PEN-2	Kali Linux	Advanced
PEN-3	Nessus	Basic
PEN-4	Burp Suite	Missing
PEN-5	Cobalt Strike	Missing

*** For demonstration purposes only – not actual WRT transcript ***

Conclusion

- The end-product is a workforce readiness transcript (WRT) tailored to the individual student
    - With a quantifiable substantiation of preparedness for employment as a cybersecurity professional
    - Includes a match percentage and missing tasks and KSAs for each work-role metric an employer can use to assess how well a student's skill set matches their needs