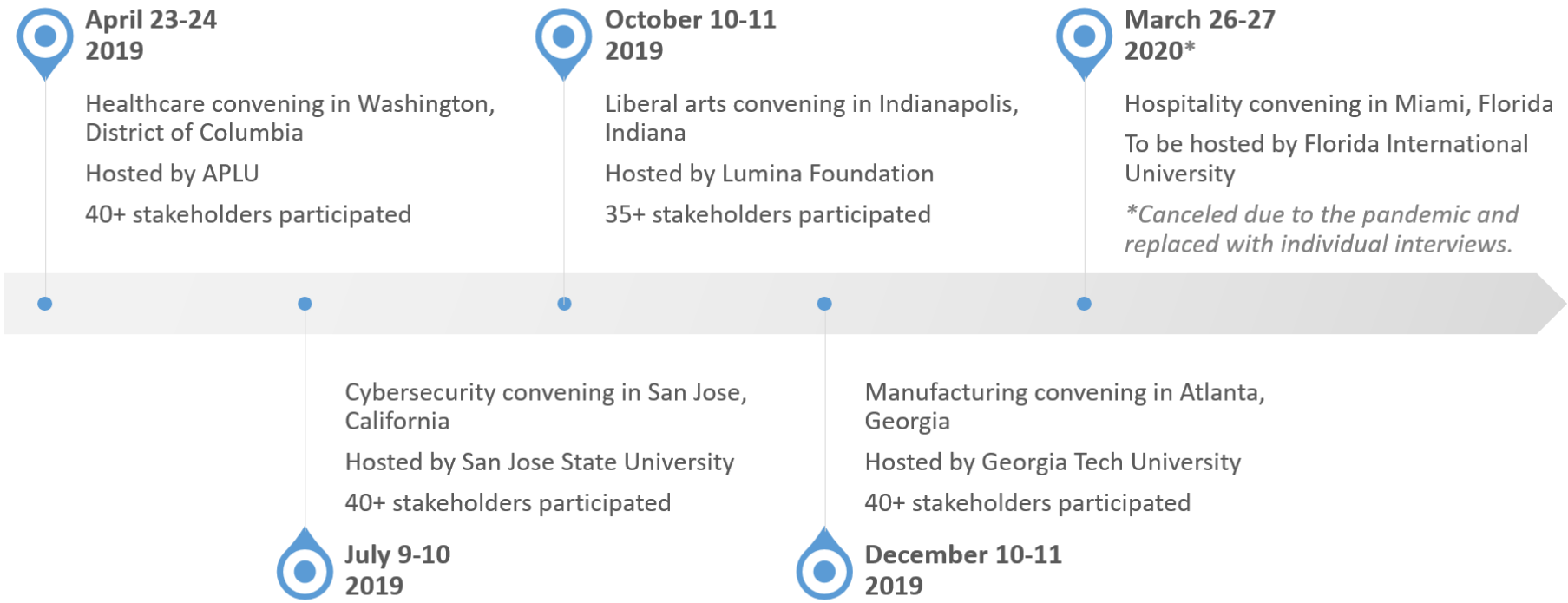
Appendices

Embedding Certifications into Bachelor's Degrees

Certification-Degree Pathways Project

Table of Contents

Appendix A: Convening Agendas and Summaries



Healthcare Convening
April 23-24, 2019
Hosted by the Association of Public & Land-grant Universities
Washington, DC

Agenda

April 23, 2019
12:00–5:00 p.m.

LUNCH AND WELCOME (12:00–12:45 p.m.) Members of the project team will provide a brief overview of the project, the convening objectives, and the agenda, and facilitate introductions.
LEVEL SETTING DISCUSSION (12:45–1:05 p.m.) Members of the project team will share themes that emerged from the pre-convening interviews and discuss definitions of credentials that will be used throughout the convening.
PARTNERSHIP EXAMPLES (1:05–1:30 p.m.) Attendees will hear examples of current partnerships and related outcomes, followed by a chance for Q&A.
TABLE DISCUSSIONS (1:30–2:40 p.m.) To gather information and knowledge, participants at each table will work together to discuss a set of facilitated questions.
BREAK (2:40–2:55 p.m.)
REPORT OUTS AND GROUP DISCUSSION (2:55–3:30 p.m.) Each table will select one person to report to attendees about the discussions related to a chosen question from the previous discussion.
MODELING EXERCISE (3:30–4:30 p.m.)

Using the information from the above discussions, participants will work at their tables to create a model for a type of partnership between a university and a certification body. Each group will then share their models with the rest of the participants.
FINAL TAKEAWAYS (4:30–4:45 p.m.) Based on the day's discussions, participants are each asked to provide up to three questions and takeaways on index cards. Volunteers are requested to share their thoughts with the other participants.
WRAP UP AND CLOSING REMARKS (4:45–5:00 p.m.)
ADJOURNMENT (5:00 p.m.)
LOCAL DINE-AROUNDS (OPTIONAL) (6:30 p.m.)

April 24, 2019
8:00 a.m.–12:00 p.m.

BREAKFAST (8:00–8:30 a.m.)
WELCOME AND REFLECTIONS (8:30–8:45 a.m.) The convening will begin with a recap of the discussions from day one, followed by a brief overview of the meeting agenda and objectives.
PARTNERSHIP EXAMPLES (8:45–9:15 a.m.) Attendees will hear examples of current partnerships and related outcomes, followed by a chance for Q&A.
TABLE DISCUSSIONS (9:15–10:15 a.m.) To gather information and knowledge, participants at each table will work together to discuss a set of facilitated questions.
BREAK (10:15–10:30 a.m.)
REPORT OUTS AND GROUP DISCUSSION (10:30–11:00 a.m.)

Each table will select one person to report to attendees about the discussions related to a chosen question from the previous discussion.
CROSS-CUTTING PARTNERSHIPS (11:00–11:30 a.m.) Each table will discuss a set of facilitated questions that relate to certifications that involve cross-cutting skills that may be relevant to degree programs across the university (e.g., project management skills for engineering, business, or liberal arts students).
FINAL TAKEAWAYS (11:30–11:45 a.m.) Based on the day's discussions, participants are each asked to provide one question, one important thing learned, and one action step that will be taken as a result of this convening on an index card. Volunteers are requested to share their feedback with the other participants.
WRAP UP AND CLOSING REMARKS (11:45 a.m.–12:00 p.m.)

Healthcare Convening Summary

PROJECT BACKGROUND AND CONVENING OBJECTIVES

Workcred, the Association of Public and Land-grant Universities (APLU), the Coalition of Urban Serving Universities (USU), and the University Professional and Continuing Education Association (UPCEA) have joined forces under a Lumina Foundation grant to explore how students can earn both degrees and certifications as part of their four-year degree program. Closer coordination among certification bodies and universities is needed to identify and scale practical opportunities.

A series of convenings between certification bodies and universities are being planned with the goal of identifying the barriers that would impede such partnerships and developing ways to overcome them. Each convening will address a different industry sector or topic, incorporating opportunities to embed certifications for cross-cutting skills, such as project management and data analytics, within degrees related to the sector. The ultimate output of the convenings will be a framework laying the groundwork for potential pilot programs to test different strategies and practices to better align certifications and degrees. This document summarizes the first of these convenings, focused on health care.

To provide a level-setting foundation for the discussions, the project team reviewed definitions of different types of credentials at the outset of the meeting, and highlighted the key themes that emerged from the interviews conducted with participants prior to the convening:

Certification Bodies

- Many certification body representatives reported that they are not at all or not very familiar with the process of curriculum development at universities.
- Certification body representatives expressed their interest in building relationships and partnerships with universities, but most admitted that they do not know where to begin.
- Some challenges to closer partnerships between certification bodies and universities include certification prerequisites for experience and getting adequate student buy-in.
- Certification bodies want to gain a better understanding of potential issues and barriers as seen by universities.
- To successfully embed a certification program into a degree program, both the certification body and the universities need to allocate resources and staff time to maintain the program and the partnership.

Universities

- University representatives also revealed that they were unsure of how to get started/connect with certification bodies.
- There is a general lack of understanding of how the certification exams are developed.
- University representatives expressed a desire to embed certifications into degree programs to lessen the burden of financial constraints on students (i.e., financial aid will not cover cost of

certifications outside degree programs), and introducing certifications to career planning conversations earlier in a student's academic journey.

- University representatives would like to see better and increased communication between universities and certification bodies.
- A better understanding of how these potential partnerships can affect return on investment (ROI) for institutions is needed.

KEY OUTCOMES

Based on the input from the convening participants, the project team will develop and share:

1. A matrix with information about certification bodies and relevant certifications
2. A guidance document that will help universities better understand how to determine a quality certification
3. A university point of contact for certification bodies to discuss partnership opportunities

PARTNERSHIP EXAMPLES – DAY ONE AND DAY TWO

Four participants shared information, examples, and related challenges around their current partnerships for group consideration:

1. **Natalya Mytareva, executive director at Certification Commission for Healthcare Interpreters (CCHI)**, explained that CCHI offers two certifications for medical interpreters: the Core Certification Healthcare Interpreter (CoreCHI™), which tests medical interpreters of any language on the core professional knowledge and skills needed to perform interpreter's duties in any healthcare setting, and the Certified Healthcare Interpreter (CHI™), which is a language-specific performance certification for Spanish, Arabic, and Mandarin interpreting in healthcare. Natalya provided examples of some of their successful partnerships with higher education institutions:
    a. University of Texas – Austin has had an interpretation and translation department for many years, but recently determined that they had a need for medical interpreting. Language faculty reached out to CCHI to align curriculum of the new degree program in medical translation to the CoreCHI certification exam. One challenge CCHI uncovered is that aspects of health care safety was missing from the interpreting curriculum, so the partnership was helpful in resolving the issue.
    b. Kent State University translation faculty invite CCHI to speak to students to expose them of other career paths available in the field.
    c. Evergreen Valley College (San Jose, CA) and Metropolitan Community College (Kansas City, KS) both offer a medical interpreter certificate program in Spanish in which local foundations pay for students to enroll in the program and the certificate exam must be taken to finish the program.

    Natalya summarized that although these partnerships are relatively new, they have seen more students pass the certification exam.

2. **Benjamin Amick, professor and chair of the department of health policy and management at Florida International University (FIU)**, revealed that FIU is currently examining various options for partnerships at different levels within the university. However, they are still grappling with many challenges, one of which is the fact that employers are requiring five years of work experience and a certification, so the university is looking at redesigning the master's program in the Department of Health Policy and Management to provide training that would prepare students for the certification exam. Benjamin reported that there is a lot of synergy within different parts of the university to pursue partnerships with certification bodies, including for certified health care quality and certified risk managers, which has not been done before.

3. **Ashley Forsyth, academic programs specialist at Project Management Institute (PMI)**, shared information about how they work with higher education institutions to grow the profession of project management. According to Ashley, PMI:
    a. Maintains a website (pmiteach.org) that is dedicated to project management faculty to provide reading lists, outlines of topical areas, examples of assessments and outcomes, and project management curriculum. It also offers a place for faculty to share best practices and other information with each other. In addition, PMI published two case studies, *Syracuse University: Meeting Employer's Needs Through Project Management Education,* and *Boston University: Addressing Global Demands Help School Expand,* that showcase how project management is being incorporated in academic programs. [To sit for the Project Management Professional (PMP)® certification, individuals must met significant experience requirements. To address the experience requirement, PMI developed the Certified Associate in Project Management (CAPM)®. Students interested in the CAPM must complete 23 hours of project management education before takes the certification exam.]
    b. Offers group discounted student memberships.
    c. Engages scholars, practitioners, and project management professionals through PMI Academic Resources, which provides funding for new research, opportunities for publication, and presentation of research findings at educational events around the globe.
    d. Runs the Global Accreditation Center for Project Management Education Programs (GAC) to confirm that an institution's program has been carefully assessed and that its scale, scope, and quality meet comprehensive, global standards for accreditation.

    One challenge that PMI is currently working to overcome is how best to relay exam results for students of integrated certification and degree programs. Currently, once a student takes the certification exam, even if part of a degree program, the student must bring a paper copy of the results to the institution, as PMI is not able share the information due to privacy regulations. Ashley revealed that PMI is exploring ways to move to proctor-based testing where faculty will be able to administer the exam themselves via computers and have access to the results that way.

4. **Michael Huffman, director of the office of continuing and professional education at Virginia Commonwealth University (VCU)**, offered insights into the challenges VCU is currently facing that may hinder the development of partnerships with certification bodies. Making changes to current degree programs at VCU is a slow process due to the approval regulations of the State Council of Higher Education for Virginia. Balancing those regulations with market demand has been a bit of a hindrance for VCU up to this point.

GROUP DISCUSSIONS AND REPORT-OUTS – DAY ONE AND DAY TWO

Participants on day one worked in small groups to discuss facilitated questions. The groups' input to each question is listed below:

1. *Regardless of whether you already have or are considering partnerships, what data and information do you need to determine fit in order to integrate certifications with four-year degree programs?*
    - Labor trends linked to certification data
    - Knowing which certifications are available/exist now
    - Long-term employability and job growth data
    - How a certification maps to a related curriculum
    - Student demand and program retention
    - Additional cost of certification
    - Testing, training, and prerequisite requirements
    - Data on what institutions have successful integrated programs, and their contacts
    - ROI data
    - Information about who is setting the standard or accrediting the program

2. *What are the different types of models that could be developed to better align or integrate certifications with four-year degree programs?*

    A three-sided model was proposed that would connect employers, certification bodies, and universities. The group noted that the certification exam should not be the main outcome and a "teach to the test" mentality should be avoided. It was also noted that there are competing goals in higher education, and that colleges and universities are not always focused on career preparation for their students. Consideration would need to be given to make sure that changes to curriculum could keep pace with, and not lag behind, changes in job market demands.

3. *What are the strengths and assets of universities and certification bodies that can help community college students who earn a certification transfer to a four-year degree program? What are the barriers?*
    - *Strengths include:*

        - Flexibility to come up with creative pathways (e.g., special topics course that eventually becomes a full course, track, major)
    - *Barriers include:*
        - Program development can be slow
        - Lack of communication
        - In general, neither universities nor certification bodies have a solid understanding of the others' curriculum/certification development process
        - It can be hard to keep up with the changing health care field
    - *Other Takeaways*
        - Establish relationships with schools by sending volunteer board members to the local community colleges

4. *How do certification bodies determine their prerequisites for their certifications? How can university programs be aligned with prerequisites? What types of new opportunities could be created for four-year degree students?*

    As a first step, institutions need to be informed that certifications exist and that they have value. More and better communication between institutions and certification bodies is needed. Participants also suggested providing a list of what data-driven method was used to develop the exam to share with institutions.

    Just as universities have approval levels, so do certification bodies. It was noted that certification bodies looking to make changes to prerequisites may meet resistance from the stakeholders who advise them.

    There is a need for more broad certifications in health care to facilitate entry into health professions, enabling students with associate degrees to transition easier to baccalaureate degrees. Unless a certification is directly related to the course credits and the baccalaureate degree, is not eligible for Title IV funds.

5. *What is the return on investment (ROI) of time and financial resources to universities and certification bodies to enter into these types of partnerships?*

    According to the group, the ROI needs to focus on the needs of the student, and the argument was made that there should be one cost for all students. It was also noted that with certifications, students know what they are getting, and often at a lower cost.

6. *What types of resources would universities and certification bodies need to provide to start and sustain these partnerships?*

    - A champion at the institution, ideally the president or provost, to preach the vision and facilitate discussions with faculty
    - A central office to act as a knowledge center for the programs/partnerships

- Policies that will preside over the process for equating competencies of a certification to equivalent college credits
- Faculty buy-in, especially in the development of the policies
- Access to labor market data and resources to interpret and leverage this data in a meaningful way
- For certification bodies, buy-in from universities to integrate programmatic accreditation
- Joint conversations with industry to help shape partnerships
- A national portal to connect institutions with certification bodies

7. *How do I determine who to work with within a university or certification body? Who is the decision maker?*

   As different universities have different structures, it was suggested that the role of "director for critical learning" or "central knowledge officer" be created. For certification bodies, the "certification director" or newly created "director of university partnerships" were suggested as appropriate points of contact. Employers and trade associations should play an important role too, mentoring and providing a support pipeline.

   Other Comments

   Certifications should be used to help students obtain experience required for some health professions. Sometimes certifications are not valued by educators unless they result in a living wage for the certification holder. Accreditation and licensure boards are often barriers. Corporations tell us that they value certifications but then they may hire people with no certifications. This may be because they do not have to pay as high a wage for a non-certified worker.

   All education programs should facilitate lifelong learning.

Participants on day two worked in small groups to discuss facilitated questions. The groups' input to each question is listed below:

1. *What are the benefits for students to earn certifications in areas outside of health care-related four-year degree programs?*

   A certification acknowledges additional content expertise. It provides increased marketability, versatility, experience, and facilitates lifelong learning. Significantly, earning these types of certifications can prepare students for a wider array of jobs.

2. *From the perspective of certification bodies, what opportunities do you see to align/embed your certification with health care-related degree programs? What opportunities do you see to increase the value of the credential and the degree by creating stronger pathways?*

There should be strategic conversations to determine which certifications are in greatest demand and which tracks would benefit students most. Creative solutions need to be worked out so certifications outside of health care would not increase the time it takes to earn the degree. Courses should be offered to support students in achieving the competencies needed to take the certification exam. Finally, partnerships should seek to create an ecosystem of support.

3. *How do you build buy-in with both universities and certification bodies to create, implement, and sustain these partnerships?*

   In this discussion, participants suggested to:

   - Gain buy-in from senior leadership at universities, starting with presidents and provosts
   - Focus on the value to students. Bringing benefits to students will increase buy-in
   - Use a pragmatic, multi-pronged approach involving all stakeholders, but be strategic
   - Find grants to build momentum and fund staff on both sides to see why it is important
   - Find opportunities to share student success stories to demonstrate the proof of concept and ROI

4. *What is the ROI of time and financial resources to universities and certification bodies to enter into these types of partnerships?*

   According to the participants, the ROI of these types of partnerships include:

   - Better communication
   - Greater cost-efficiency for the student
   - Improved student outcomes that translates to greater efficiency on the job
   - Reduced risk

MODELING EXERCISE

Working in the same small groups, participants from day one discussed and developed various models of partnerships between universities and certification bodies specific to health care.

- ALL STAKEHOLDER MODEL
  - Work with local industries, the K-12 system, career counselors/advisors, and all other related stakeholders in determining the core competencies that expand to all health care occupations
  - Involves multiple certification levels for meeting all needs:
    i. Develop a certification program with a community college for those who want to stop with a two-year degree, or no degree at all
    ii. Develop a next level certification program for students who wish to pursue a bachelor's degree
    iii. Potential for a higher level certification for mater's level students or people seeking advanced skills

- PRE-HEALTH CARE DEGREE PROGRAM MODEL
  - Provides multiple entries/tracks into health care during the first two years of the program
    i. Allied tech component with numerous course choices (at least one required), each attached to a related certification
    ii. Provides student with opportunity to work in the industry and gain experience
    iii. Could culminate with an associate's degree, or go into four-year degree or higher
    iv. This is a trans-disciplinary approach that gives language majors another option (e.g., students studying Spanish and health care)

- HEALTH SCIENCE DATA ANALYTICS PROGRAM MODEL
  - Engage key stakeholders from the beginning
    i. Higher education leadership
    ii. Certification bodies
    iii. Industry
    iv. Accreditation bodies
    v. Potentially community colleges
  - Gather data for the program
    i. Labor market analysis/survey local landscape
    ii. Evaluate existing curriculum to involve/adapt
    iii. State/local regulations that may impact
    iv. Funding to support
  - Develop implementation strategy
  - Pilot, adapt as needed

- BIOLOGY DEGREE WITH CERTIFICATION MODEL
  - Electronic health record certification
    i. First, need to evaluate the biology curriculum to identify best areas to connect the certification, what are the gaps
    ii. Involve stakeholders
      – American Medical Association, American Hospital Association
      – Advising center/career center on campus
      – Mechanism for certification bodies to connect with employers to make sure there is alignment
    iii. Map out best time to take courses aligned to certification and sit for exam within degree path

- ROI: employers should have less onboarding and training, fewer inefficiencies, and students gain more purposeful and meaningful careers that might not otherwise be aware of/pursued

- ADAPTING A TWO-YEAR PROGRAM INTO A FOUR-YEAR PROGRAM MODEL
  - The first two years of the expanded program can be general requirements, focusing the last two years on specific courses
    i. One year of didactic work (e.g., radiation stenography)
    ii. One year of clinical work (counts toward both certification and degree requirements)
    iii. Completion will have two parts – exam to determine eligibility and student uses exam for final for physics course
  - Considerations: would students want the four-year program? Both sides need to make concessions in order for it to work

- LIFELONG LEARNING MODEL
  - Relationship between what certification bodies and higher education should be – every step, they need to talk and collaborate
    i. Terminal credentials
      – Need to develop/determine standard, KSAs needed
      – Involve higher education representatives when creating the certification/exam
      – Recertification should be involved by both sides
    ii. Stackable credentials
      – 25% of a program completed can result in a credential
      – 60% completion results in another credential, and so on
      – Involves credit for prior learning component
      – Also involves a recertification element for credit (dual purpose)

- LIFELONG TRANSCRIPT MODEL
  - Help produce more content that all credentialing bodies can understand: E-based portfolios that will allow students to demonstrate all of their earned credentials to prospective employers
    i. Scalable, sustainable, and reliable
    ii. Collection of knowledge
    iii. Leverage opportunities for open education to translate into badges, that could translate into other credentials

iv. Student ownership – Students will have control to access their earned credentials through an e-based model platform

- Considerations: residency components
  i. Would not be free, need new FAFSA regulations to help
  ii. Virtual reality may start to play a role

CROSS-CUTTING PARTNERSHIPS

Working in small groups, participants from day two discussed how higher education could facilitate a one-stop shop for certification bodies to work across programs and what would success look like for cross-cutting certification partnerships? Key themes and recommendations that emerged include:

- Establish a director of certification or similar role within institutions
- Create central liaison office/institute to connect with certification bodies on campus to leverage a national network of open access of frameworks and maps to draw from
  - Maintain a portal of best point of contact/champions among faculty and certification bodies and comprehensive information about the programs (i.e., certification exam competencies, institution curriculum components)
- Restructure general education curriculum to create a common understanding of what was learned
  - Provides the flexibility to move between disciplines easier and the ability to develop a general education certification around a concrete set of skills
  - Could also develop a 4+1 program if the cross-cutting certification is really important, but doesn't fit easily in the 4-year degree program
- Elevate discussions to senior leaders and secure institution-wide commitment
- Jointly highlight program details and case studies (e.g., completion rate, employability, etc.) in national meetings
- Bring in advisors/career counselors to help discuss all available options and gain student buy-in
- Align partnerships to strategic goals of both sides and accreditation body requirements

TAKEAWAYS AND REFLECTIONS

Based on the discussions, participants provided key questions, takeaways, lessons learned, and action steps that will be considered in advancing the project.

Participant Reflections – Day One

Questions

- What certifications exist and how I do determine whether a certification is of quality/value to employers?
- How can we integrate other stakeholders?
- How do you accomplish the goals without adding time to the degree?

- How can campus majors build in a practical/pre-employment course into major curricula?
- What are the effective practices of new models at four-year institutions?
- What promising practices exist for forming communication channels between four-year institutions and certification bodies?
- What are the legal implications for colleges and universities as the models discussed may not be feasible until regulations are changed?
- What is the role of government in this issue?

Takeaways

- Universities need a culture shift.
- I am unaware of all the credentials available and how to determine their value/quality.
- Stakeholders need to better communicate and establish standard course requirements.
- Better communication and collaboration between universities and certifications bodies is needed.
- Learned more about certification and licensing bodies.
- There is a tremendous potential to help students!
- Open-mindedness is KEY!
- Everyone has to be willing to concede to something!
- Certification eligibility requirements should be revisited regularly.
- Certifications are not simply final exams but serve a specific important role.

Participant Reflections – Day Two

Universities desire a map/matrix with info about certification bodies, the quality/value of their certifications, and how to map to curricula

- We need a list of certifications and what they provide. We need data that shows the benefit to students of the certifications. Step: I will start presenting the ideas presented here to colleagues.
- Detailed information on certifications and certifying organizations to get a better big picture understanding of the utility for the university (e.g., inventory/database, length of time in operation, how to distinguish among certifying agents).
- I need a map to know what certifications exist and where an initial alignment to CIP Codes are. From there, I can take the starting point to connect to a SOC.

  CIP → SOC

  Certification → SOC

  CIP ←→ certifications
- Better overall landscapes of all certification bodies (e.g., matrix of certification bodies/requirements/current clients/4-year institution partners/details of certification.

- What do we need? Information and hub – access to all certifications with a matrix of requirements. More questions than answers – FAQs section on hub.
- Access to materials to evaluate quality of certification bodies.
- Need more info/awareness of what certifying organizations exist and what certifications are available. Would love the opportunity for a follow-up meeting.
- Understanding existing certifications and how competencies align with curricula.
- What we need: a comprehensive list of available certifications, including summary of jobs that align with these certifications.
- List of ICE-approved certification bodies with a descriptive narrative (concise) of its value, what it entails (i.e., education, work experience, etc.), and how a student (person) would benefit from a particular certification.

Certification bodies also have an appetite for information from and about universities

- ***(Need) from Workcred and APLU***: The schools that are open to incorporating a course or aligning to a certification. ***(Need) from schools***: A roadmap with timelines on what we certification bodies can provide to get momentum going.

Examples that showcase success can serve as a blueprint

- A list of examples or case studies of universities or certification units partnering. Include data and best practices to support success.
- A blueprint to start the process, and the conversations at the university leadership level.
- Multiple examples that showcase a variety of disciplines and cross-cutting certifications. A list of possible certifications that have resulted in employment for students (undergrad).
- What I need: A model public health program that has built certifications into the program and has been accredited.

Still, how do we go about forming a partnership?

- How do we form a great team or partnership to solve the KEY problem (certification into four-year degree program)?

Advice on what is needed to take this to the next level

- What do we need to get to the next level?
  - Map connections between staple disciplines at universities and associated certification bodies.
  - Longer term: Launch pilot leading to national initiation to establish certification officers on each campus.
- What is needed to take theory to practice:
  - Continue discussions at UPCEA level/conferences to introduce best practices and report on success stories.

    - Fund a pilot program or initiative that integrates goals of certification and university degrees.
    - Create some sort of communications channel/portal to facilitate discussions and networks.
- We need to take baby steps, such as: first we should work with degree programs directly related to certification and then branch out to unrelated degrees. We need to first identify schools that offer a degree in our field.

Focus on the student

- Takeaway: We need to rethink partnership for student success.

Buy-in from senior leaders is key

- Elevate the discussion to senior leaders (presidents and provosts) to ensure this becomes a broader topic of discussion on campuses.
- University participants mentioned that faculty buy-in is equally important, as is support from department chairs.

National exposure can help build support for the movement

- Next step: Find ways to bring this up and keep bringing it up at the national level. It has to be "trending" in a way. In other words, perpetual support for these ideas at many different angles will bring more people to the table, and more ideas and energy will emerge.
- Bring these discussions to national association meetings.
- Consider developing an op-ed that provides an overview of this pilot project.

Other

- Need to connect healthcare more to the study of analytics.
- Certifications in cross-cutting skills may be a more productive approach for the health care industry.
- Takeaway: Ideas that I'd like to share with campus leadership about the integration of certification in undergraduate programs.
- Include employers on the university advisory boards into these conversations.
- Utilize employers as an integrative tool versus just a recruitment tool (employers usually come to campuses twice a year, fall and spring, to recruit students who are graduating).

Cybersecurity Convening
July 9-10, 2019
Hosted by San Jose State University
San Jose, California

Agenda

July 9, 2019
12:00–5:00 p.m.

LUNCH AND WELCOME (12:00–1:05 p.m.) Mary Papazian, San Jose State University president, will welcome attendees to the convening. Members of the project team will provide a brief overview of the project and the convening objectives, preview the agenda, and facilitate introductions. Team members will also highlight the definitions of credentials that will be used throughout the convening.	**Mary Papazian** President, San Jose State University **Shari Garmise** Executive Director, Coalition of Urban Serving Universities, and Vice President, Urban Initiatives, APLU **Julie Uranis** Vice President for Online and Strategic Initiatives, UPCEA **Karen Elzey** Associate Executive Director, Workcred
CERTIFICATION BODY TED-STYLE TALK (1:05–1:25 p.m.) Jeff Frisk, director of the Global Information Assurance Certification (GAIC), will discuss how skills offered in undergraduate programs could be aligned with some of the GIAC certifications.	**Jeff Frisk** Director, Global Information Assurance Certification
UNVIERSITY TED-STYLE TALK (1:25–1:45 p.m.) Adam Downs, director of Academic Solutions, and Tina Burton, associate dean of the School of Business and Information Technology, at Purdue University Global will showcase a cybersecurity apprenticeship program that embeds certifications and culminates in a bachelor's degree. Participants should consider what elements of this partnership are transferable to their organization or institution.	**Adam Downs** Director, Academic Solutions, Purdue University Global **Tina Burton** Associate Dean, School of Business and Information Technology, Purdue University Global
TABLE DISCUSSIONS (1:45–2:30 p.m.)	**Julie Uranis** **All**

The goal for this session is to identify opportunities for universities and certification bodies to work together to better serve students by more closely integrating academic programs with national cybersecurity certifications.	
BREAK (2:30–2:45 p.m.)	
REPORT OUTS AND GROUP DISCUSSION (2:45–3:30 p.m.) Each table will select one person to report to attendees about the discussions related to questions discussed at each table.	**Julie Uranis** **All**
TED-STYLE TALK: NATIONAL SECURITY AGENCY (3:30–3:50 p.m.) Lynne Clark, National Centers of Academic Excellence in Cyber Defense Program Office at the National Security Agency, will discuss the Centers for Academic Excellence and current efforts to integrate competency development into academic programs.	**Lynne Clark** Chief, National Centers of Academic Excellence in Cyber Defense Program Office, National Security Agency
TED-STYLE TALK: USING CERTIFICATION EXAM BLUEPRINTS (3:50–4:10 p.m.) Bhaskar Dawadi, psychometric services manager at (ISC)^2, will highlight their certification test blueprints and how faculty can use them to align course competencies with certification exam content.	**Bhaskar Dawadi** Psychometric Services Manager, (ISC)^2
FACILITATED DISCUSSION: DEVELOPMENT OF LEARNING OBEJECTIVES AND INCORPORATION OF EMPLOYER INPUT (4:10–4:30 p.m.) Sheila Martin will facilitate a discussion about how universities develop learning objectives for classes and how they might consider the needs of input of employers in the process. The discussion will help university and credentialing bodies to talk together about how to share information about these needs and align processes that respond to them.	**Sheila Martin** Vice President, Economic Development and Community Engagement, APLU
TAKEAWAYS (4:30–4:50 p.m.) Participants will complete an online survey that asks for one takeaway and one question from today's session. Participants are asked to share their thoughts with the group. Other takeaways and questions will be highlighted during tomorrow's session.	**Sheila Martin** **All**

WRAP UP AND CLOSING REMARKS (4:50–5:00 p.m.)	**Sheila Martin**

July 10, 2019

8:30 a.m.–12:30 p.m.

BREAKFAST (8:30–8:45 a.m.)	
WELCOME AND REFLECTIONS (8:45–9:00 a.m.) The convening will begin with a recap of the discussions from yesterday's sessions.	**Shalin Jyotishi** Assistant Director, Economic Development and Community Engagement, APLU **Andréa Rodriguez** Assistant Director for Urban Initiatives/USU, APLU
UNCONFERENCE (9:00–9:30 a.m.) Participants will rank the questions that arose from day one's survey input. Participants will then select the question they wish to discuss with their colleagues.	**Shalin Jyotishi** **Andréa Rodriguez**
TED-STYLE TALK: USING THE NICE FRAMEWORK (9:30–9:45 a.m.) Marian Merritt, lead for industry engagement at NICE, will showcase how universities and certification bodies can use the NICE cybersecurity workforce framework.	**Marian Merritt** Lead for Industry Engagement, National Initiative for Cybersecurity Education (NICE) at the National Institute of Standards and Technology
TED-STYLE TALK: CROSS-CUTTING CERTIFICATIONS (9:45–10:15 a.m.) Ashley Dalton Forsyth, academic programs specialist at Project Management Institute, and Demetrius Norman, senior specialist, academic initiatives from SHRM will highlight examples of partnerships they have with a four-year institution or a resource that could be used to help integrate cyber certifications into degrees.	**Ashley Dalton Forsyth** Academic Programs Specialist, Project Management Institute **Demetrius Norman** Senior Specialist, Academic Initiatives, Society for Human Resource Management (SHRM)
MODELING EXERCISE (10:15–10:45 a.m.) Using the information from the previous discussions, participants will work at their tables to create a model for a type of partnership that could be developed and implemented by their university or certification body.	**Roy Swift** Executive Director, Workcred **All**

REPORT OUTS AND GROUP DISCUSSION (10:45–11:10 a.m.) Each table will be asked to share details of their model.	**Roy Swift** **All**
BREAK (11:10 a.m.–11:25 a.m.)	
FOCUS GROUP: DATA ANALYTICS/SCIENCE CERTIFICATION (11:25 a.m.–12:15 p.m.) On May 6, CompTIA announced that it is exploring a new certification in data analytics/science. Randy Gross, chief information officer and SVP of Certification Operations for CompTIA will facilitate a discussion with attendees about how this certification could be beneficial to academic programs or other certification bodies.	**Randy Gross** Chief Information Officer and SVP, Certification Operations, CompTIA
WRAP UP, FINAL TAKEAWAYS, AND CLOSING REMARKS (12:15–12:30 p.m.) Participants will complete an online post-convening survey. Data gathered from the survey will help design a roadmap for this ongoing project. Final findings and learnings will be shared with the group upon completion of the project.	**Shari Garmise** Executive Director, Coalition of Urban Serving Universities, and Vice President, Urban Initiatives, APLU
ADJOURNMENT (12:30 p.m.)	

Cybersecurity Convening Takeaways and Outcomes Summary

PROJECT BACKGROUND AND CONVENING OBJECTIVES

Workcred, the Association of Public and Land-grant Universities (APLU), the Coalition of Urban Serving Universities (USU), and the University Professional and Continuing Education Association (UPCEA) have joined forces under a Lumina Foundation grant to explore how students can earn certifications as part of their four-year degree program. The project team is hosting a series of convenings between certification bodies and universities with the goal of enabling closer coordination to identify and scale practical opportunities, and identifying the barriers that would impede such partnerships and developing ways to overcome them. Each two-day convening addresses a different industry sector or topic, and incorporates opportunities to embed certifications for cross-cutting skills (e.g., project management, human resources) within degrees related to the sector as well. The ultimate output of the convenings will be a framework laying the groundwork for potential pilot programs to test different strategies and practices to better align certifications and degrees. This document summarizes the takeaways and outcomes from the second of these convenings, focused on cybersecurity. Final findings and learnings will be shared upon completion of the project.

KEY OUTCOMES

Based on the input during the convenings, the project team will develop and share the following:

1. A matrix with information about certification bodies and relevant certifications
2. A guidance document that will help universities better understand how to determine a quality certification
3. A university point of contact list for certification bodies to use to build partnership opportunities

TAKEAWAYS, LESSONS LEARNED, QUESTIONS FOR CONSDIERATION, AND ACTIONABLE STEPS

At the end of day one and day two, participants were asked to complete an online survey where they provided their takeaways, lessons learned, further questions for consideration, and actionable steps that can be taken to advance the outcomes of the discussions:

Takeaways and Lessons Learned

Opportunities For Cooperation

- Depth of interaction between certification bodies and educators is more than expected
- Openness to incorporate certifications into curriculums
- Overcoming discrepancies and aligning certifications to degree programs could bridge a partnership
- Opportunities exist for sharing to determine some standard practices/offerings to meet the needs of academia – perhaps sector/industry specific
- It is good to know that there are university programs able and willing to work with certification bodies.

- Opportunities exist around building earlier pathways/connections with certifications and degree programs, or adding an option for certification instead of a final exam and thesis
- How to tie in certifications with graduate programs and use them as a way to get buy in from faculty to create a competitive edge for degree programs
- Deepening an understanding of certification bodies and how they do their work will help to work with other faculty on tightening the alignment between curricula and the job market
- There exists real possibilities for working with credentialing bodies to provide certification opportunities for undergraduates still in school to benefit from more employment opportunities

Perceived Barriers

- We use different languages
- Lack of collaboration between certification bodies and academia
- There is value in certificates and certifications for workforce and talent development; however, it is challenging to marry them with academia due to barriers presented by various constituent groups with different objectives and perspectives – we identified these groups as government, accreditation bodies, industry, and academia, although we recognize the barriers, we rarely have all of these groups together to address the barriers from the various perspectives
- There appears to be misunderstandings about universities, how they operate, and why
- That higher education remains disconnected from the real world, even in an area as new as cybersecurity curricula
- That incentives are not necessarily aligned between four-year schools and certification bodies; there is a chance to cooperate here but we really need to work on it holistically
- Not easy to convince a university to partner with certification body
- There is a lot of good will, with folks willing to make some changes, but not on a systemic level
- Lack of entry-level certifications for the industry that can be focused on overarching concepts
- Balance is delicate in asking a university to change curriculum to meet the requirements of a certification
- Often get so absorbed in own worlds that we tend to sideline the students and the issue of public (not just industry) benefit
- There is not a clear path about how to move these sorts of partnerships forward
- Higher education is behind the times in relation to the threat that a lack of cybersecurity understanding has on our nation; there is much work to do and the traditional tenured faculty model needs to move significantly faster to help address the challenge
- The challenge of identifying which certifications actually matter (to employers) in order to prepare students for employment

How Can We Overcome These Barriers?

- Better understand some of the differences between university approach and certifications; focus where possible on programs which are more tied to industry needs/jobs
- Extended education can be an ally to embedding certifications

- Extent of certifications and related degree programs available
- Has to be a willingness to collaborate on both sides
- Very strong opportunities/desire to collaborate between universities and certifying bodies

What Is Needed To Take This To The Next Level?

- Universities and certification bodies have a lot to learn from each other and a lot they can collaborate on – starts with an open mind and willingness to see what the other is doing right/better
- Finding the middle ground
- Clarity on return on investment (ROI) of certifications are needed by universities, government, and students (e.g., will financial aid cover the cost of certifications?)
- Need for accreditation bodies to be part of our discussions; aligning goals/objectives with multiple entities (universities, accreditation bodies, certification bodies, industry/employers, etc.) and understanding the value of these perspectives – need to bring all together
- There is a need to develop a reference document articulating the needs, values, concerns, etc. from the perspectives of the communities involved, e.g., industry, academics (including administration, faculty, students), certification providers, academic accreditation bodies, and perhaps others; such a document would serve everyone as a way to educate themselves about the differences and commonalities related to certification
- Certifications need to be requirements of programs for them to be effective

Steps To Creating A Successful Partnership

- Need to engage accrediting bodies
- Work on aligning course-level objectives with knowledge and skills needed to successfully complete certification and degree program
- Much more emphasis needs to be placed on incentives for universities; the benefits to the university itself seems minimal; need to have conversations about revenue sharing models
- There needs to be more understanding of certification and its role within universities
- Need further discussions on data science and data analytics toward a goal of achieving sound and aligned understanding about what those fields/disciplines mean
- Review the current offerings in cybersecurity to develop a new program
- Faculty know how to teach and are at the cutting edge of their discipline; certification bodies know knowledge, skills, and abilities (KSAs) and perform job task analyses (JTAs) to stay on top of employer needs; neither party is well-equipped to replace the other, yet their marriage can be incredibly fruitful
- Invite industry to voice their needs
- The need to continue to build a central infrastructure that supports these partnerships in a meaningful and productive way

Cybersecurity Can Be Applied To Other Disciplines

- Fascinated by the concept of music and other subject areas that can be relevant to cybersecurity

- Apprenticeship model is very interesting – how to incorporate what we are doing with work/study programs as well
- How we can pull people from different industries to have a career in cybersecurity
- There appears to be a connection between cybersecurity and music; curious how this can be used to identify candidates to grow the cyber workforce
- The role of certifications for a wide variety of majors
- Cybersecurity as a career (licensure), and the criticality of its competencies

Other Takeaways And Lessons Learned

- Interesting to see a "younger" profession grappling with the issues and growing pains that other professions have already dealt with; pleased to see spirit of cooperation on all sides
- University accreditation can differ for BS or BA programs
- Purdue Global's program is very interesting and should be explored by other academia
- Innovation and change can be painful and messy, but we must persist in our shared responsibility to embrace and deliver the future
- SHRM has a certification model that cuts across all industries
- The question on employer input could have been explored deeper – was focused primarily on our organizations, universities, and certification bodies. We are operating in a vacuum, the employers should be driving this conversation – some of the top cybersecurity firms in the world are within 20 miles of the meeting, but their ideas are not being included in our conversation
- Perspective that academia may be more forward thinking than industry
- Higher education has a real desire to incorporate certifications into their offerings
- Cybersecurity has multiple certifications; walked away with a clearer understanding of the details, as well as potential opportunities
- Have a better understanding of certifications, which helps make the case for including certifications in academic programs
- Certifications can add value to higher education and enhance student marketability to employers

Questions Raised by Participants for Further Consideration

Can This Type of Integration Work?

- Can educating for a career and training for a job be done homogeneously?
- How do we handle certifications that require more experience than a degree program provides?
- How can a certification, such as the International Association of Privacy Professionals (IAPP), which is highly dependent on some degree of real-world work experience, be incorporated into a scalable university degree program?
- Focus has been on classic four-year college, but how about other types of learners (i.e., those that go into the military, those that go to college at night and/or online, etc.)?
- How do we address the accreditation issue? How do we align the misaligned?

- Partnerships require mutual regard and willingness to learn about and from each other; how can universities provide more information to certification bodies that will result in asset-based approaches rather than competition?

What Are The Return On Investments To Partnering?

- How do we create incentives for faculty and universities to include certifications in our courses?
- How can faculty (other than those present) become aware of how to make partnerships with certification bodies? How can mapping course curriculum to training for certifications be done in a time-efficient manner?
- How do certification bodies feel about the process of working with universities? How do we better prepare faculty for these discussions?

Are There Current Models To Base Our Work On?

- In this room, is there a university model of certifications embedded into undergraduate or graduate programs? If so, how do you design educational experiences (or can you design educational experiences) to serve degree-seeking students and working professionals at the same time?
- Is there anyone doing this well – incorporating certifications into four-year degrees?

What Do Other Stakeholders Want Or Need?

- What are the barriers to integrate certification into academia from the perspective of the different communities involved?
- Better understanding of the decision tree (not administrative hierarchy) a university would use to determine whether or not a certification fits within a program – how are they valuing the certification – ANSI? Alumni? Industry? Cost? Etc.?
- We have a very active industry advisory (IA) group for our programs/departments, and they help us to identify the skills/competency gaps as well as the strengths of our programs; in our discussions, our IAs have not explicitly told us that they want our students to be certified in X (or hold a certain certification), rather the discussions are focused on specific skills, knowledge, or competencies that they seek in their employees. Is this the experience of other institutions? Does this signal the significance of "certifications"?
- "Soft skills" is a broad term – what are the specific soft skills being sought by employers of cybersecurity personnel? Are any certification bodies incorporating soft skills into their body of knowledge?

What About The Extra Costs?

- If the student needs to work just for basic living expenses, and still comes out with some tuition and fee-based debt, then who is going to pay for the certification?
- How can industry or certification bodies address students' concerns over the cost of certifications, and how do you motivate faculty to incorporate certification into curricula?
- How do we get the resources to train faculty in these "new" fields and get buy in from them to change curriculum to include certifications?

Are There Other Options?

- Where might other on-ramps begin for security roles prior to the completion of a bachelor's degree – short term/ fast track programs, associate's degrees?
- Precollege programs are on every campus now, and many are non-credit programs – why is no one working with these students to put them on a career trajectory? Universities would get to introduce students to campus and provide them with a tangible credential that could then be accepted for transfer credit at that university or any other
- How do we look at lifetime educational needs, not just initial degrees?

How Do We Move This Forward/What Are Next Steps?

- How do we bring the numerous entities discussed today (certification bodies, universities, accrediting bodies, etc.) to the table for partnership opportunities, quickly and in a rapidly changing cyber environment?
- How will we actually make something happen here?
- Template for partnerships – how do we integrate degrees and certifications while being open with the students about the value of each? How to ensure that the different pathways created are not creating different pathways for different socio-economic classes?
- What action items can each participant take away from this session and what is the reporting forum we have for follow up?
- Who will own this initiative after these convenings are complete? What are the steps forward?
- Roadmaps for partnership development

Other Questions

- How do academia and certification bodies anticipate changes in technology?
- How do faculty participants feel about these partnerships?
- What does being a center of excellence do for a college?
- What is the gap between cybersecurity textbooks and certification preparation materials?

Action Items

Develop Relationships With Convening Participants

- Reach out to universities/circle back with some of the certification bodies to explore more options
- Speak with Purdue Global for more information
- Further relationship with certification bodies and universities participating in the NSA National Centers for Academic Excellence program

Share Information With Internal Staff

- Relay the information to board of directors, committees, management/senior staff, and other certification staff
- Follow up with folks about how we might leverage frameworks and KSAs in our educational work

- Apply some of the educational perspectives and strategies with our education players
- Already have college partnerships so there is an opportunity for expansion
- Discuss the value of certification with the career services director
- Inform faculty of the status/scale of certification
- Brief university leadership/administration/deans/provosts/colleagues on discussions of convening about integrating certification within curricula
- See how conversations can be started with others in university about moving this forward
- Reach out to our cybersecurity/data science/computer science/IT department heads about enhancing the program and/or influencing curriculum development

Further Research

- Further research the current models of certification alignment programs to academic areas, and possibly develop future products with this alignment in mind
- Review current partnerships between universities and develop industry-specific relationship models
- Have a conversation around market competition; work to identify certifications applicable to entry/mid/senior level positions to assist with overall curriculum alignment
- Evaluate current certification partnerships and determine opportunities/needs
- Look specifically about revising and revitalizing cybersecurity credit programs
- Explore bodies of knowledge and try to align curriculum

Other Action items

- Being open to future collaboration with university programs which could align with certifications, and continue to work on partnerships and determine a model that works
- Work with the U.S. Department of Labor, U.S. Department of Defense, and U.S. Department of Homeland Security to help address the challenge on a national scale

Cybersecurity Convening Presentation Summary

DAY ONE

TYPES OF CREDENTIALS

The project team reviewed the definitions of different types of credentials to provide a level-setting foundation for the convening.

TED-STYLE TALK: GLOBAL INFORMATION ASSURANCE CERTIFICATION

Jeff Frisk, director of the Global Information Assurance Certification (GIAC), discussed GIAC certifications and how courses offered in university programs could be aligned. Jeff explained that GIAC uniquely provides 35 skill-specific certifications that are directly aligned with critical cybersecurity job duties, and validate competencies by testing needed skills hands-on. GIAC is also aligned to the seven National Initiative for Cybersecurity Education (NICE) framework workforce categories. Currently, Jeff pointed out, there is a great need to alleviate the skills mismatch and talent shortage in cybersecurity, which provides the opportunity for greater collaboration between certification bodies and related university programs. For example, such curriculum as the prevention of attacks and detection of adversaries, networking concepts, secure communications, and foundational windows and Linux security relate to the GIAC Security Essentials Certification. Additionally, GIAC currently has a partnership with SANS Technology Institute in three areas:

- Master of Science in Information Security Engineering (MSISE): 36 credit hours, 3-4 years
- Graduate certificates: 5 industry focused programs, 12 credit hours, 24 months
- Certificate in Applied Cyber Security (undergraduate certificate, upper division): 4 courses, 6-12 months (must have an associate's degree or 48 hours of undergraduate study)

In the discussion that ensued, it was suggested that although not all university curriculum and certification competencies will fit together perfectly, focusing on the general components and critical job roles in cybersecurity would be a great start to aligning the programs.

TED-STYLE TALK: PURDUE UNIVERSITY GLOBAL'S CYBERSECURITY APPRENTICESHIP PROGRAM

Adam Downs, director of academic solutions, and Tina Burton, associate dean of the School of Business and Information Technology, with Purdue University Global showcased their new cybersecurity apprenticeship program that embeds certifications and culminates in a degree. The program features two levels of apprenticeship and employers have the ability to choose either one or both levels depending on their needs. Level one focuses on basic and intermediate competencies, which ends with an associate's degree and three certifications earned. Level two encompasses advanced skills and provides two pathways to a bachelor's degree and three or more certifications earned.

In the discussion that followed, Adam and Tina clarified that the required courses are offered online through Purdue University Global while the student receives hands-on training with the employer. Additionally, each student is assessed prior to beginning the program, so students can start at level two right away, or begin at level one and move on to level two depending on their ability and goals.

TED-STYLE TALK: NATIONAL SECURITY AGENCY'S NATIONAL CENTERS FOR ACADEMIC EXCELLENCE

Lynne Clark, chief of the National Centers of Academic Excellence (CAE) in Cyber Defense Program Office at the National Security Agency (NSA), provided background on the CAE and current efforts to integrate competency development into academic programs. Lynne explained that the program was developed to train the nation in cybersecurity, not just government agencies. The program places a lot of emphasis on collaboration, where participating schools help newly joined schools get up to speed. There are different requirements depending on what is needed in the region, but all paths are mapped to the National Initiative for Cybersecurity Education (NICE) framework. Students are evaluated on their ability to perform a task in the context of a work role, and students are often sourced in high school from dual credit for high school and community college courses, and even in middle school and earlier, often from disadvantaged groups. A major goal of the program is to prepare students and businesses to view cybersecurity as fundamental for all sectors – all businesses require these IT skills in order to remain successful and evolve with the times.

During the questions that followed, it was pointed out that cybersecurity needs more integration of education and experiences to produce a well-rounded student. There is an increasing demand for this, but will take a lot of collaboration from all sides.

TED-STYLE TALK: USING CERTIFICATION EXAM BLUEPRINTS

Bhaskar Dawadi, psychometric services manager at $(ISC)^2$, highlighted certification exam blueprints and how faculty can use them to align course competencies with certification exam content. Bhaskar led participants through an overview of the certification exam development process, which begins with a job task analysis (JTA). JTAs are led by psychometricians with input from subject matter experts (SMEs) to validate the content, discuss job responsibility, set eligibility requirements, and finalize the exam blueprint. Then a question bank is created and the exam is built following the exam blueprint. In addition, a common body of knowledge is developed and updated on a regular basis, which can be used to prepare for the certification.

During the discussion that ensued, Bhaskar explained that $(ISC)^2$ has an International Academic Program that works with colleges and universities on cyber-related course creation, development of curriculum, and offers course training packets. Additionally, the Associates of $(ISC)^2$ program allows students to fulfill the work experience requirements of the certification. Universities can partner with certification bodies by using the common body of knowledge in university course curriculum or align the course to with certification exams. In fact, organizations and businesses hiring for cybersecurity professionals look for a combination of certifications and related degrees when assessing potential candidates, so working together in this way benefits the students and the industry, which ultimately benefits those receiving the cybersecurity services.

DAY TWO

TED-STYLE TALK: USING THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY'S NATIONAL INITIATIVE FOR CYBERSECURITY EDUCATION FRAMEWORK

Marian Merritt, lead for industry engagement with the National Institute of Standards and Technology (NIST)'s National Initiative for Cybersecurity Education (NICE), showcased how the previously mentioned NICE Cybersecurity Workforce Framework can be used. Marian explained that about 10 years ago efforts began to better understand cybersecurity work, and a framework was developed to standardize occupations and associated information to help create career pathways, professionalize the industry, identify gaps, create position descriptions, identify areas of interest, and create an ecosystem that guides activities and reduces confusion. The Framework, which is available on the NIST website, is comprised of seven workforce categories, 33 specialty roles, and 52 work roles, which also include specific knowledge, skills, and abilities (KSAs) required to perform a set of tasks. It also allows users to search keywords and related tasks or KSAs, and users can link back to the relevant work role, work ID, category, or specialty area for comparison.

Other related resources include Cyber Seek, which provides an interactive map about the supply and demand in the cybersecurity job market, and the Cybersecurity Career Pathway tool that shows key jobs within cybersecurity, common transition opportunities between them, and detailed information about the salaries, credentials, and skillsets associated with each role. There is also a NICE working group training and certifications subgroup who have created an illustrative mapping matrix of how certifications may be of value to a particular work role within the NICE Framework. Focused originally on the government workforce, the May 2019 Executive Order on Cybersecurity Workforce now encourages wide adoption of the Framework – having been adopted across the federal government, now increasingly state and local governments, and even industry such as JPMorgan Chase and AT&T are adopting the Framework. In closing, Marian clarified that the typical profile in cybersecurity is a 40 year-old white male, but since the Framework was developed, they are seeing a shift in sources of talent – from traditionally businesses stealing employees of competitors to now recruiting more from underrepresented groups.

TED-STYLE TALK: CROSS-CUTTING CERTIFICATIONS IN PROJECT MANAGEMENT AND HUMAN RESOURCES

Ashley Dalton Forsyth, academic programs specialist at Project Management Institute (PMI), and Demetrius Norman, senior specialist of academic initiatives from the Society for Human Resource Management (SHRM) each highlighted how their resources could be used as examples in integrating cyber certifications into degrees.

Ashley explained that they are starting to see multithreaded projects where project managers oversee several different aspects, including IT/cybersecurity. This makes a certification in other fields such as project management valuable to seemingly unrelated industries such as technology, and vice versa. To that end, Ashley shared information through this presentation about how PMI currently works with universities:

- Develops and provides teaching resources such as reading lists, outlines of topical areas, examples of assessments and outcomes, and project management curriculum to project management faculty through their website (pmiteach.org)

- Provides an Academic Network in which researchers, faculty, program directors, and academic administrators who teach, develop, or manage project management programs or courses can expand project management knowledge and offerings, and also offers a place to share best practices and other information with each other
    - The network is also open to faculty from schools that are interested in developing project management courses
- Offers funding for new research, and opportunities for publication and presentation of research findings
- Approves Registered Education Providers (REP) to offer training in project management and issue professional development units to meet the continuing education requirements needed by PMI credential holders
- Runs the Global Accreditation Center to confirm that an institution's program has been carefully assessed and that its scale, scope, and quality meet comprehensive, global standards for accreditation
- Works with their Academic Member Advisory Board (made up of faculty and researchers across academic disciplines, field of research interest/expertise, industry and professional role, and PMI geographic region) to provide expert support for and recommendations on the array of programs and services provided by PMI
- Offers group discounted student memberships

In addition, PMI has relationships with universities where certifications are part of the curriculum, students are awarded prior learning credit for having a certification and can finish the degree program sooner, instructors accept attainment of a certification for the final exam, or prepare students to take the certification exam on their own by aligning content to the course. Agreements differ for all universities partners, so future partnerships can be semi-customized for what the university wants.

Likewise, Demetrius from SHRM presented how they work with universities to offer students more opportunities:

- Develops and defines the competencies and knowledge necessary for effective practice as an HR professional through the SHRM Academic Alignment Program
- Offers students the opportunity to take related courses at partner schools and then sit for the certification exam
    - Students reach eligibility to sit for the exam upon reaching 500 HR-related experience hours, which can come from internships, work-study programs, directed projects, and/or independent study
- Provides SHRM HR curriculum guidelines and related content to teach
- Supports HR practitioners in their career and professional development

FOCUS GROUP: DATA ANALYTICS/DATA SCIENCE CERTIFICATION

Randy Gross, chief information officer and SVP of certification operations for CompTIA, facilitated a discussion with attendees about how a new certification in data analytics/science could be beneficial to

academic programs and other certification bodies. Randy began with an overview of CompTIA, which offers 13 certifications ranging from core IT skills to professional IT or cybersecurity mastery. CompTIA also has an Academy Partner Program, which is intended for schools, nonprofit organizations, job corps centers, and correctional facilities to provide resources for recruiting, training, and upgrading the skills of students in IT (partners.comptia.org). CompTIA has also developed an IT framework that defines technology operations and skills within four key pillars, each containing many different IT roles – infrastructure (e.g., network admin), development (e.g., apps), security (e.g., compliance), and data (e.g., analyst).

Randy explained that there is a significant and growing data analytics market; estimates show double-digit job growth and a widening skills gap in this industry worldwide. CompTIA is currently exploring skill sets in data analysis in reaction to a shortage of data analysis skills, a wide variation in job titles and responsibilities, and a lack of consistency in educational program offerings and credentials. CompTIA is initially focusing efforts on data science, and is recruiting subject matter experts to begin building the exam in the next six to nine months. Randy then collected data on the following topics related to the development of this new certification:

- Overview
    - What data analytics/science skills gap that universities are trying to address? What trends are emerging, present and/or accelerating?
        - Statisticians who can program
        - Partnership with general education to include math and IT
        - Differs per employer
        - Hard to determine what was learned
        - Distinction between data science and data analytics
- Who
    - Where are universities experiencing a demand for data analytics/science skills?
    - Who is asking for these skills? Is this pressure for data analytics/science skills coming from students, employers, both?
        - Mainly from employers
- Complementary opportunities?
    - How could a data analytics/science certification offered by CompTIA help universities demonstrate that students have acquired the specific skills? What is going to complement work that is underway?
        - Obtain needed/wanted certifications as you go, do not wait until the end
- Job-Task Analysis
    - What domains in data analytics/science would be most relevant in a certification? What specifically would you want a certification to help with ensuring competency with data analysis?
        - Interpretation and importing
        - Soft skills – communication, writing, animation/visualizations, and code of conduct
        - Data standardization and anonymization

Cybersecurity Convening Modeling Exercise Summary

Working in small groups, convening participants discussed and developed various partnership models:

Compromise Model

- What do certification bodies, universities, students, and employers need/want?
- Start by looking at the similarities between certification bodies and universities missions for ways to come together, and adjust mindsets to achieve both end goals
- Map curriculum to certifications that align
- Develop multiple certification pathways to encompass varied interests
- Require certifications as part of degree programs if both sides are committing time and resources to the effort
- Results in a well-rounded and certified student

Ecosystem Model

- Looks at attributes of a good model
- Incorporates stakeholder engagement – industry, students, universities, faculty development
- Focuses on education that matters – lifelong learning
- Model differs for undergrad, graduate, and professional students
- Goal is a work-ready individual

Gap Analysis Model

- Focuses on what should be done internally for all parties
- Identify gaps in employment outcomes and/or market need
- Determine possible pathways that relate to and fix the gaps
- Map what courses relate to which certifications, even if they are in other fields/areas
- Need a central coordinator for the university and outreach coordinator at the certification body to work together

Return on Investment Model

- Starts with a clear value proposition/ROI for both universities and certification bodies
- Involves endorsements from industry, and other stakeholder input and buy-in
- One central department needs to be the program owner, with shared responsibility across all involved program areas
- Partner with accreditation agency
- Consider certifying faculty to teach to the program
- Incorporate work-based learning to help student gain the necessary experience for employers and certification requirements

Non-Traditional Pathway Model

- Considers other avenues for integration (e.g., business school major or criminal justice field with cybersecurity specialization)
- Need to identify IT classes to incorporate that will help pass the exam, or add lab time/tutoring for those without the needed IT background
- Consider non-academic programs as well, like robotics clubs
- Needs strong advising

Certifications within Minors Model

- Minors have relatively easy approval process comparatively, often with easier buy-in
- Cybersecurity and philosophy, or music, or arts, etc.
- Provides a way to pursue a desired major, but with more employable skills for life after graduation
- Develops further talent for the pipeline outside of traditional paths

Apprenticeship Model

- Look at program and student data in development
- Focus is on the student, not making the pathway too convoluted
- Consider intermediaries, and role they can play in helping to develop programs and connect players together
- Faculty can focus on teaching and not on the details
- Consider helping willing faculty earn certifications, so courses can informally and organically align with certification competency parameters; recognize and reward faculty that are certified

Liberal Arts Convening
October 10-11, 2019
Hosted by Lumina Foundation
Indianapolis, Indiana

Agenda

October 10, 2019
11:00 a.m.–4:00 p.m.

WELCOME AND INTRODUCTIONS (11:00–11:30 a.m.) Members of the project team will welcome attendees to the convening, provide a brief overview of the project and the convening objectives, preview the agenda, and facilitate introductions.	**Karen Elzey** Associate Executive Director, Workcred **Julie Uranis** Vice President for Online and Strategic Initiatives, UPCEA
LEVEL SETTING DISCUSSION (11:30 a.m.–12:00 p.m.) Members of the project team will share themes that emerged from the previous two convenings on health care and cybersecurity. There will also be a discussion about the definitions of credentials and the variations that exist.	**Roy Swift** Executive Director, Workcred
POLLING (12:00–12:10 p.m.) Using Slido, members of the project team will poll the attendees about the skills they gained in a liberal arts undergraduate degree.	**Shalin Jyotishi** Assistant Director, Economic Development and Community Engagement, APLU
LUMINA FOUNDATION'S RESEARCH AND PORTFOLIO (12:10–12:45 p.m.) Debra Humphreys will discuss Lumina Foundation's current portfolio of work and how this project that's exploring closer alignment between certifications and four-year degrees fits into their broader portfolio.	**Debra Humphreys** Vice President of Strategic Engagement, Lumina Foundation
LUNCH (12:45–1:30 p.m.)	**All**
CERTIFICATION BODY TED-STYLE TALK: BARRRIERS ENCOUNTERED WORKING WITH UNIVERSITIES (1:30–1:50 p.m.)	**Christy Uden** Chief Operating Officer,

Christy Uden and Marya Ryan will discuss some of the challenges the Board of Certified Safety Professionals has experienced working with their university partners as well as provide attendees with some of their solutions to those challenges.	Board of Certified Safety Professionals **Marya Ryan** Program Director, Board of Certified Safety Professionals
UNVIERSITY TED-STYLE TALK: BARRIERS ENCOUNTERED INCORPORATING CERTIFICATIONS (1:50–2:10 p.m.) Monique LaRocque will share how the University of Maine is seeking to advance the conversation about embedded certifications and how they can begin to pilot a few programs that will bring added value to their students.	**Monique LaRocque** Associate Provost, Division of Lifelong Learning, University of Maine
TABLE DISCUSSIONS: BARRIERS ALIGNING CERTIFICATION AND DEGREES (2:10–2:40 p.m.) The goal for this session is for participants to discuss what they heard in the TED-talks and to identify perceived barriers and solutions to implementing pathways that align certifications and degrees.	**Julie Uranis** **All**
BREAK (2:40–2:50 p.m.)	
TED-STYLE TALK: AN EMPLOYER'S USE OF NON-DEGREE CREDENTIALS (2:50–3:10 p.m.) John Kessler will provide a perspective of how Accenture develops credentials for its professionals and how non-degree credentials could be aligned with four-year degree programs to prepare students for the workforce.	**John Kessler** Director of Global Certifications, Accenture
DEGREE-CERTIFCATION PATHWAY MODEL EXERCISE OVERVIEW (3:10–3:25 p.m.) Members of the project team will explain the purpose of the degree-certification model pathway exercise and discuss the template that will be used.	**Shalin Jyotishi** **All**
DEGREE-CERTIFCATION PATHWAY MODEL EXERCISE – PART I (3:25–3:50 p.m.) Participants will work individually to complete the first two sections of the model template.	**Shalin Jyotishi** **All**
TAKEAWAYS, WRAP UP AND CLOSING REMARKS (3:50–4:00 p.m.)	**Andréa Rodriguez** Assistant Director for Urban Initiatives/USU, APLU

Participants will complete an online survey that asks for one takeaway and one question from today's session. Participants are asked to share their thoughts with the group. Other takeaways and questions will be highlighted during tomorrow's session.	
ADJOURNMENT (4:00 p.m.)	
RECEPTION (5:30–7:00 p.m.) JW Marriott 10 S. West Street, Indianapolis, Indiana 46204	**All**

October 11, 2019

9:00 a.m.–1:00 p.m.

BREAKFAST (9:00–9:30 a.m.)	
WELCOME AND REFLECTIONS (9:30–9:45 a.m.) The convening will begin with a recap of the discussions from yesterday's session.	**Shalin Jyotishi** **Andréa Rodriguez**
GROUP DISCUSSION: VALUE PROPOSITION OF A DEGREE-CERTIFICATION PATHWAY MODEL (9:45–10:15 a.m.) Participants will share with the group the value proposition they developed during the degree-certification pathway model exercise during yesterday's session.	**Julie Uranis** **All**
DEGREE-CERTIFCATION PATHWAY MODEL EXERCISE – PART II (10:15–11:00 a.m.) Participants will work individually to complete the remainder of the model canvas.	**Shalin Jyotishi** **All**
BREAK (11:00–11:15 a.m.)	
TABLE DISCUSSION: CHALLENGES, COSTS, AND INDICATORS OF SUCCESS OF A DEGREE-CERTIFICATION PATHWAY MODEL (11:15 a.m.–12:00 p.m.) Participants will discuss at their tables the challenges, costs, and indicators of success they identified for a degree-certification pathway model.	**Julie Uranis** **All**

GROUP DISCUSSION: MOVING FORWARD (12:00–12:45 p.m.) This session will focus on what type of support and technical assistance universities and certification bodies would need to implement a degree-certification pathway.	**Shelia Martin** Vice President, Economic Development and Community Engagement, APLU **All**
WRAP UP, FINAL TAKEAWAYS, AND CLOSING REMARKS (12:45–1:00 p.m.) Participants will complete an online post-convening survey. Data gathered from the survey will help design a roadmap for this ongoing project. Final findings and learnings will be shared with the group upon completion of the project.	**Shalin Jyotishi** **Andréa Rodriguez**
ADJOURNMENT (1:00 p.m.)	

Liberal Arts Convening Takeaways and Outcomes Summary

PROJECT BACKGROUND AND CONVENING OBJECTIVES

Workcred, the Association of Public and Land-grant Universities (APLU), the Coalition of Urban Serving Universities (USU), and the University Professional and Continuing Education Association (UPCEA) have joined forces under a Lumina Foundation grant to explore how students can earn certifications as part of their four-year degree program. The project team is hosting a series of convenings between certification bodies and universities with the goal of enabling closer coordination to identify and scale practical opportunities, and identifying the barriers that would impede such partnerships and developing ways to overcome them. Each two-day convening addresses a different industry sector or topic, and incorporates opportunities to embed certifications that align closely with specific academic disciplines or certifications that bring together two or more different disciplines. The ultimate output of the convenings will be a framework laying the groundwork for potential pilot programs to test different strategies and practices to better align certifications and degrees. This document summarizes the takeaways and outcomes from the third of these convenings, focused on liberal arts. Final findings and learnings will be shared upon completion of the project.

KEY OUTCOMES

Based on the input during the convenings, the project team will develop and share the following:

1. A matrix with information about certification bodies and relevant certifications.
2. A guidance document that will help universities better understand how to determine a quality certification.
3. A university point of contact list for certification bodies to use to build partnership opportunities.

TABLE DISCUSSIONS – BARRIERS ALIGNING CERTIFICATIONS AND DEGREES

Perceived Internal Barriers

Shared Governance

- Faculty / management resistance
- Who owns the content?
- Who should close the gap between degree and readiness for a job?
- Communication is lacking between universities and certification bodies
- Who do we talk to / work with within universities and certification bodies?
- Lack of adaptability / nimbleness

Matching Certifications to Degree Programs

- Can common competencies be identified?
- Increasing course / curriculum offerings
- Certifications seem to be too technical

- Many academic programs do not provide experience needed
- Education verses practical knowledge
- Some key skills from liberal arts degrees are difficult to “certify”
- No specific pathways from liberal arts to jobs

Data to Support This Type of Initiative

- Need validated data
- Certification databases are not universal
- Lack of understanding of the value of certifications

Other

- Fear of outside groups dictating curriculum
- Credit hour limitations
- Decline in resources (money, time, etc.)

Perceived External Barriers

Industry

- Disconnect from industry
- Is the credential too hard to obtain based on industry standards?
- Mixed, inconsistent messages from industry
- Less recognition / valuation of liberal arts degrees
- Very quick job redefinitions

State / Regulation

- What Title IV funds will pay for
- State required core classes cannot be changed
- Performance requirements
- Accreditation requirements

Other

- Quality job analyses
- Credentials are created, but do not have the “value” to be sustained
- Differences in the demographics between higher education and certification bodies

Possible Solutions

- Build internship program to encompass experience
- Develop better relationships with all stakeholders
- Increase communication / ask the right questions
- Increase availability / understandability of data

DEGREE-CERTIFCATION PATHWAY MODEL EXERCISE

Participants used a model canvas worksheet to guide brainstorming and action planning around two critical areas of focus for building degree-certification pathways. The first focus was around the value proposition of embedding certifications into degree programs. The second focus was around identifying which particular student populations are best positioned to reap the most value from earning a certification with their degree. Following the model canvas activity, it became apparent that there were questions that warranted further exploration with respect to these foci. The project team facilitated a plenary discussion with the participants around other aspects of the model canvas, with value proposition and student populations serving as the connecting theme.

Value Proposition Takeaways

- Without clear outcomes data for even the most well-known certifications, it is difficult for universities to clearly identify the value proposition of certifications, other than anecdotal guidance from local employers.
- Certifications themselves vary in quality; how can universities select which certification body to partner with?
- Part of the value proposition depends on how much time and money a university (and students) will incur to create and participate in degree-certification pathways.
- Can certification bodies and universities raise funds to help low-income, first generation students afford the certification fee? This would increase the perceived value for students
- Faculty may question the validity of the job task analyses used to develop certification exams.
- Some certifications involve many stakeholders in the development of its exam (e.g., certified persons, trainers, employers) – those certifications with a deeper level of validation from employers are likely to have the highest value proposition in the eyes of employers.
- Quality certifications could contribute to performance-based funding for universities.
- Universities are wary of an overemphasis on doing what “employers need” versus what “students need.” This rhetoric may create challenges in communicating the value proposition of certifications.

Student Populations Takeaways

- The attendees felt that first generation students and adult learners stand to benefit the most from degree-certification pathways.
- The liberal arts may be too broad for generalizations (e.g., a student in philosophy has different career and professional opportunities than a student in biology or English).
- It would be ideal to create pathways for the student populations that struggle the most in terms of employment outcomes and earning a competitive starting salary after graduating college.
- An expanded use for the Federal Pell Grant may allow more students to include certifications as part of their degree program costs.
- Students who stop college for any reason could leave with a certification rather than not earning any type of credential.

Other Next Steps and Lessons Learned

- For many universities, continuing education is often siloed off from the rest of the academic enterprise; in order to truly understand the value proposition of degree-certification pathways and the student populations that stand to benefit from these pathways, provosts and deans of continuing education need to work with one another and other university staff more closely.
- There is a need for there to be an "owner" of certification pathways within a university to streamline operations, ensure quality, communication, and the appropriate incentives – a "front door" for certification bodies needs to be created in universities and vice-versa (e.g., an assistant vice president for micro-credentials and badging like at the University of Maine).
- Predictive analytics and data-focused tools, such as the ones used by Georgia State University, can help identify base competencies in degree programs and map them to competencies assessed in the certification exam.
- The nature of certifications allows for updates quickly and frequently; it can be challenging for universities to respond to these changes in a timely fashion.
- There is a need for academic and student affairs leaders to meet with leaders from certification bodies on a regular basis to identify the appropriate student populations and value propositions – can APLU and/or UPCEA and Workcred be an ongoing convener of these constituencies?
- In order to understand the value proposition of certifications, faculty themselves may need to become certified. Can certification bodies and universities provide incentives for faculty-level certifications?
- Certification bodies, especially those connected to industry or professional membership associations, can incentivize universities to create pathways by recognizing them through a designation or public acknowledgement.
- The value proposition of pathways need to be communicated through senior leaders and through the grassroots by faculty and students.
- Accreditors may be unfairly portrayed as resisting degree-certification pathways, when in fact, many accreditors may be open minded about this. There are also differences among regional accreditors (e.g., Higher Learning Commission) and industry-specific accreditors (e.g., the Accreditation Board for Engineering and Technology (ABET)).

TAKEAWAYS, LESSONS LEARNED, QUESTIONS FOR CONSDIERATION, AND ACTIONABLE STEPS

At the end of each day, participants were asked to complete an online survey where they provided takeaways, lessons learned, further questions for consideration, and actionable steps that can be taken to advance the outcomes of the discussions:

Takeaways and Lessons Learned

Perceived Barriers

- Buy-in may be hard to obtain among liberal arts faculty members.
- Big obstacle in connecting credentials to degree programs is mostly one of mutual understanding of how each works and what each party brings to the table.
- University involvement and respect in certification process will be an uphill battle.
- Vastness of the project / how incredibly complicated this space is.
- Speaking different languages / differing priorities.
- How much confusion there still is in the academic world regarding the difference between certification and certificates; and the reverse with the academic accreditation and curriculum development processes.
- The time it takes to make a curriculum change.
- There seems to be a disconnect between what employers want and what colleges offer.

How Can We Overcome These Barriers?

- Partnering with academia to develop opportunities to achieve co-curricular credential options for non-traditional student that recognizes knowledge and skills at each year of completion.
- Liberal arts degree students can most definitely benefit from imbedded certifications but there needs to be level setting in universities about what they are.
- Certifications and proficiencies build employability, but they have to be complimentary and not an alternative to degrees.
- Having the right certification bodies / universities involved provides real opportunities.
- More awareness of what credentialing bodies do and what they can offer students.

What Is Needed To Take This To The Next Level?

- Gaining a better insight into how partnerships between universities and credentialing bodies can be developed.
- How employers use / want credentials.
- More real life examples of other partnerships / learning about some of the early efforts underway at both employers and universities.
- More dialogue, a framework, and more clarity of credentialing in higher education.
- Need for clearer understanding of the spectrum of certifications; which might be most appropriate under which circumstances?
- Consideration of micro-credentialing.
- New foundational skills for the digital economy.

Other Takeaways and Lessons Learned

- It *is* possible to work together to create career pathways.
- Huge educational revolution; we need to play or we won't remain solvent.

Questions Raised by Participants for Further Consideration

How Can This Type of Integration Work?

- How can we facilitate opportunities to forge better connections between the credentialing world and higher education?
- What does partnering and outreach look like?
- How do you find the right people at the certification bodies / universities to work with? The right programs / certifications to align? How would this work logistically?
- What is the best way to bridge the gap presented by certifications that require work experience as a prerequisite, since that is a common phenomenon?
- If certifications require prior employment experience, how can they be relevant to undergraduate degrees?
- How to balance career readiness with credentialing?
- How do we get buy-in on both sides? How can we help students see the relevance and worth of credentialing pathways?

What Would Industry / Other Stakeholder Involvement Look Like?

- How can we track results of individuals across the industry?
- How could we get universities to recognize workforce shortages and perhaps start programs?
- How might state bureaucracies be better used to lead change?

Are There Other Options?

- How do we think about the intermediary steps between the college degree and the certification? Often, both have invested a lot in their credentials and there is not a perfect match. Are there ways to think about scaffolds between them?
- How can credentials be options for degree non completers?
- Are there credentials / certification bodies for the outcomes of a liberal arts degree that we discussed, i.e., analytics, problem solving, team leadership, effective communication?

How Do We Move This Forward / What Are Next Steps?

- How do you start the discussion of credentialing on campuses?
- Would Lumina consider funding a few pilot projects to create degree-to-certification pathways?
- How can we pilot this somewhere with universities / certification bodies where it makes sense? By getting well-respected organizations into the pilot, it will typically gain momentum – you just need those pioneers.
- How can we consider future programs that are relevant in rapid changing markets?
- Are there specific examples that could be shared in terms of how credentialing has been implemented within liberal arts programs?
- What is the specific problem to be solved? We had some debate about the reality of a skills gap, overcoming what might just be perception, helping more students graduate, giving students

who graduate an even bigger leg up in the labor market, etc. These all have different implications for implementation and next steps.

Other Questions

- How can we know that badges aren't just the next gimmick?
- How can we all leverage [Credential Engine's] Credential Registry?
- You should do a poll of certifying bodies and universities as to who is issuing digital badges, digital micro-credentials, comprehensive learner records, or other digital manifestation of credentialing.
- It would be great to talk more about education for education sake, especially for this particular group of people, liberal arts folks; this part of the conversation needs to be addressed so there is common understanding.
- In the opening session, there was a discussion about the differences between certificates, certifications, degree, and licensing. But, it seems like there are many more different things that should be on the spectrum – badges, portfolios – where do they fit in? Do they fit in?

Action Items

Develop Relationships With Convening Participants

- Make connection with at least one university with programs relevant to our certification body's content area.
- Follow up with a few of the university contacts that we met for follow up discussions.
- Will follow up with fellow participants on projects identified during the discussions.
- Connect one of the certification body attendees with university administrators to explore a partnership.

Share Information With Internal Staff

- Tap into departmental colleagues' knowledge of academic accreditation and curriculum development processes; if there are gaps in their knowledge, undertake an effort to further educate.
- Connect my colleagues to one of the universities to see if there is a possible collaboration and initiate discussion about how to move this forward.
- Schedule conversations to talk through potential options for my campus.
- Check with departments to see if any currently offers or is considering offering a professional certification; also will survey fellow deans about certification offerings in their colleges.
- Share the fact that this is possible and that many are working on it / sharing information with campus stakeholders to gain further interest / buy-in.
- Present information to senior leadership team and seek their assistance on prioritizing this work – in particular, developing boot camps in the summer to provide additional skills for liberal arts majors.

Share Information With External Stakeholders

- Inform universities of certification processes more.
- Develop clearer articulations of the values of a university degree – specifically a liberal arts degree.
- Include recommendations regarding certifications in my in-progress book on credentials.

Align Programs / Develop a Pilot

- We plan to meet with the Lilly School of Philanthropy about a pilot program.
- Review existing bachelor and master programs to see if potential certifications might align to their curricula.
- We have started to map our general education courses to the National Association of Colleges and Employers (NACE) competencies; we should be doing the same for our degree programs.

Manufacturing Convening
December 10-11, 2019
Hosted by Georgia Tech University
Atlanta, Georgia

Agenda

December 10, 2019
12:00–5:00 p.m.

LUNCH AND WELCOME (12:00–1:00 p.m.) Members of the project team, and Nelson Baker of the Georgia Institute of Technology, will welcome attendees to the convening, provide a brief overview of the project and the convening objectives, preview the agenda, and facilitate introductions.	**Nelson Baker** Dean of Professional Education and Professor in the School of Civil and Environmental Engineering, Georgia Institute of Technology, and President of UPCEA **Robert Hansen** Chief Executive Officer, UPCEA **Julie Uranis** Vice President for Online and Strategic Initiatives, UPCEA
LEVEL SETTING DISCUSSION (1:00–1:30 p.m.) Roy Swift will facilitate a discussion about the definitions of credentials and the variations that exist. In addition, attendees will consider a set of guiding questions that are projected on the screen.	**Roy Swift** Executive Director, Workcred
KEYNOTE AND DISCUSSION (1:30–2:15 p.m.) William Bonvillian will provide an overview of the current state of manufacturing in the United States. His will share his insights about new models that are being developed to prepare the future manufacturing workforce and the role of universities.	**William Bonvillian** Lecturer in the Science Technology and Society and Political Science Departments, and Senior Director, Special Projects, Office of Digital Learning, Massachusetts Institute of Technology
BREAK (2:15–2:30 p.m.)	

UNIVERSITY MODELS AND GROUP DISCUSSION: CLEMSON UNIVERSITY AND OHIO UNIVERSITY (2:30–3:30 p.m.) As manufacturing jobs begin to require greater levels of education, universities are exploring ways to strengthen engineering education by incorporating pathways for students to earn industry-recognized certifications, certificates, and participate in various work-and-learn opportunities. In this session, we will explore how two institutions are addressing regional manufacturing workforce development needs by leveraging industry-recognized credentials and learning opportunities. This will be followed by a group discussion.	**Moderator: Shalin Jyotishi** Assistant Director, Economic Development and Community Engagement, APLU **Mark Johnson** Thomas F. Hash Endowed Chair in Sustainable Development and Director of the Center for Advanced Manufacturing, Clemson University **Todd Myers** Professor and Department Chair, Engineering Technology and Management, Ohio University
MAKING TOMORROW'S WORKFORCE FIT FOR THE FUTURE OF INDUSTRY: COORDINATING NON-DEGREE CREDENTIALS INTO BACCALAUREATE PROGRAMS (3:30–4:15 p.m.) Corporations such as Siemens, Google, AWS, and IBM have developed non-degree credentialing programs that assess whether individuals have the necessary skills. Learn how Siemens is working with universities to prepare students for career opportunities involving mechatronics.	**Gail Norris** Director, SITRAIN Digital Industry Academy, Siemens **Amanda Beaton** U.S. Program Manager, Siemens Cooperates with Education, Siemens
TABLE DISCUSSIONS: BARRIERS TO ALIGNING NON-DEGREE CREDENTIALS WITH DEGREES (4:15–4:45 p.m.) Participants will discuss what they have heard during the day and identify perceived barriers and solutions to implementing pathways that align non-degree credentials (e.g., certificates and certifications) and degrees.	**Sheila Martin** Vice President, Economic Development and Community Engagement, APLU **All**
TAKEAWAYS, WRAP UP, AND CLOSING REMARKS (4:45–5:00 p.m.) Participants will complete an online survey that asks for one takeaway and one question from today's session. Participants are asked to share their thoughts with the group. Other takeaways and questions will be highlighted during tomorrow's session.	**Andréa Rodriguez** Assistant Director for Urban Initiatives/USU, APLU
ADJOURNMENT (5:00 p.m.)	
RECEPTION (5:30–7:00 p.m.)	**All**

Renaissance Atlanta Midtown Hotel 866 West Peachtree Street, NW, Atlanta, GA 30308	

December 11, 2019
8:00 a.m.–12:00 p.m.

BREAKFAST (8:00–8:30 a.m.)	
WELCOME AND REFLECTIONS (8:30–8:45 a.m.) The convening will begin with a recap of the discussions from yesterday's session.	**Shalin Jyotishi and Andréa Rodriguez**
INTERACTIVE ACTIVITY (8:45–9:15 a.m.) Attendees will work in small groups to discuss and respond to a series of prompts.	**Andréa Rodriguez**
MODEL AND DISCUSSION: DEVELOPING AN ADVANCED MANUFACTURING CERTIFICATE PROGRAM AT FOUR-YEAR UNIVERSITIES (9:15–10:00 a.m.) Julie Diop will share an example of how a new modular curriculum can be designed to offer technician certificates at four-year universities in the skills needed by advanced manufacturers.	**Julie Diop** Program Manager, AIM Photonics Academy Program, Department of Materials Science and Engineering, Massachusetts Institute of Technology
BREAK (10:00–10:15 a.m.)	
MODEL AND GROUP DISCUSSION: INSTITUTE FOR ENERGY MANAGEMENT PROFESSIONALS (10:15–11:00 a.m.) This session will explore how the Institute for Energy Management Professionals, originally established at Georgia Institute of Technology, provides personnel certification services. Frank Faulk and Bill Meffert will discuss the relationship between the certification body and the university, and opportunities for others to develop a similar model.	**Frank Faulk** Certification Director, Institute for Energy Management Professionals (IEnMP) **Bill Meffert**, Group Manager, Georgia Manufacturing Extension Partnership, Enterprise Innovation Institute, Georgia Institute of Technology

TABLE DISCUSSIONS (11:00–11:20 a.m.) Participants will discuss what support they would need to adopt one of the models they have learned about at the convening.	**Sheila Martin** **All**
GROUP DISCUSSION: MOVING FORWARD (11:20–11:40 a.m.) Participants are asked to think about and discuss what type of support and technical assistance are needed to implement pathways that incorporate both degrees and industry-recognized non-degree credentials (e.g., certifications, certificates). In addition, the project team will share plans to use the information gathered during the convenings.	**Roy Swift** **All**
WRAP UP, FINAL TAKEAWAYS, AND CLOSING REMARKS (11:40 a.m.–12:00 p.m.) Participants will complete an online post-convening survey. Data gathered from the survey will help design a roadmap for this ongoing project. Final findings and learnings will be shared with the group upon completion of the project.	**Andréa Rodriguez**
ADJOURNMENT (12:00 p.m.)	

Manufacturing Convening Takeaways and Outcomes Summary

PROJECT BACKGROUND AND CONVENING OBJECTIVES

Workcred, the Association of Public and Land-grant Universities (APLU), the Coalition of Urban Serving Universities (USU), and the University Professional and Continuing Education Association (UPCEA) have joined forces under a Lumina Foundation grant to explore how students can earn certifications as part of their four-year degree program. The project team is hosting a series of convenings between certification bodies and universities with the goal of enabling closer coordination to identify and scale practical opportunities, uncover the barriers that would impede such partnerships, and develop solutions to overcome the barriers. Each two-day convening addresses a different industry sector or topic, and incorporates opportunities to embed certifications that align closely with specific academic disciplines or certifications that bring together two or more different disciplines. The ultimate output of the convenings will be a framework laying the groundwork for potential pilot programs to test different strategies and practices that better align certifications and degrees. This document summarizes the takeaways and outcomes from the fourth of these convenings, focused on manufacturing. Final findings and insights will be shared upon completion of the project.

KEY OUTCOMES

Based on input from the convenings, the project team will develop and share the following:

1. A matrix with information about certification bodies and relevant certifications.
2. A university point of contact list for certification bodies to use to build partnership opportunities.
3. A guidance document that will help universities better understand how to determine a quality certification.

OVERARCHING THEMES

The following themes emerged from the convening:

- There are numerous efforts to better align manufacturing competencies with undergraduate curricula, but there are still challenges including that many manufacturing needs are highly localized and few such efforts appear to scale:
  - Some efforts (e.g., Siemens, AIM Photonics) seem to be structured to scale.
  - Need for universities and certification bodies to work together and map course work with certification test blue prints.
  - Certifications may be easier to align with university certificate programs and seen as a package.
- All programs seem to struggle to find ways to pay for certification exam fees and training:
  - Some of the challenge is related to federal policy for financial aid.
  - Some is related to higher education not being incentivized to offer certification programs with financial aid, i.e., they want programs to be a new source of revenue.

- Credential definitions continue to be difficult to communicate, although less so in manufacturing (e.g., need to describe the difference between a "minor" and a "certificate").
- Continued resistance by higher education to the goal of aligning curricula with the needs of manufacturing, despite the highly applied nature of engineering:
  - Be more creative in incorporating applied learning, using case studies and problem-based learning.
  - Build closer relationships between faculty and industry experts in the field.
- Even when shown working models of embedded certifications, there seems to be a lack of creativity on how to apply within their own organizations – does this suggest a need for capacity building for certification alignment?
- College degrees are becoming more important in manufacturing.
- It is important for engineers and production workers to learn to work together. Programs that put them together in a learning environment are very effective.
- There was disagreement about whether universities were producing what manufacturing companies want:
  - On one hand, they hire the graduates.
  - On the other hand, maybe not enough of them and maybe not as fast as they would like.
- Smaller manufacturers do not seem to be knowledgeable about the benefits of credentials.
- Additional research is needed to demonstrate the benefits of certifications, both to the companies and to the worker.
- Many current certification examples are delivered on top of degree programs, not concurrent with them.

TABLE DISCUSSIONS – BARRIERS TO ALIGNING NON-DEGREE CREDENTIALS WITH DEGREES

During this session, university, credential body, and industry representatives discussed what they heard during the convening and were asked to identify perceived internal and external barriers and solutions to implementing pathways that align degrees and non-degree credentials.

Perceived Internal Barriers

Buy-In and Support

- Obtaining buy-in from both program-specific and research-oriented faculty.
- Adequate program staffing and how to get faculty who understand the industry needs.
  - Workload issues of existing faculty.
- Perceived lack of interest among faculty and administrators.
- Faculty academic freedom and the perception of program (e.g., educating students for the long-term, not just to have specific skills required by a company).
- Resistance to change.

Funding

- Inability to procure the appropriate and necessary equipment and training.
- Funding for college education is already a challenge.

Integrating Degree and Non-Degree Programs

- Are certification programs large or small volume opportunities? Small volume opportunities are often not going to make sense to universities, despite industry needs.
- Universities can be slow to react and develop new programs, while certification programs may be quicker to respond by updating certifications to meet industry needs.
- What are the other courses that prepare students to take a certification exam? Is it possible that there is duplication of courses across departments or programs?
- Many of the most in-demand and recognized certifications are already embedded at two-year colleges. How can four-year degree programs be redefined to better meet needs?

Other

- What is the return on investment for faculty, administrators, students, parents?
  - Will someone who earns a degree and a certification have an easier time securing a job or earning a larger salary? If you can convince people that they are more likely to get a job and make more money, you will win over the students and parents.
  - On the flip side, student retention is a concern if they can earn a non-degree credential and leave without completing a degree.
- Certifying faculty – should there be an applied learning requirement for faculty?
- Impact on non-traditional students needs' (e.g., raising children, working, etc.) is unknown.
- Lack of trust in university curriculum – work-based learning is perceived as more valuable because it is actual experience.

Perceived External Barriers

Industry

- Too much industry influence.
- Manufacturers do not seem to know about or find value in many certifications and certificates.
- Unless manufacturers provide equipment or training, it can be very challenging for universities to offer a full-scale program.
- Hard to work with employers and scale programs if there is a lack of clarity regarding the necessary skills.

State and Regulation

- Real and perceived lack of funding from states and inadequate state budget planning.
- Differences between states.
- Conflicting programs within states.

- Portability (e.g., state level licenses often create a disjointed approach to certification and licensure and college programs; students pass the test in one state, but often cannot transfer to another without starting over).

Other

- Definitions and lack of common understanding of credentials.
- Competition from neighboring colleges and local programs.
- Declining student populations.
- Job market needs may have adverse impacts on longevity of a program.
- Technological changes accelerating.
- Ambiguity around experience requirements and what counts for experience.
- Providing relevant and timely research – by the time the research is completed, relayed to appropriate audiences, and then action is taken, needs may have changed.
- Concern that engineering curriculum is too full already due to ABET accreditation requirements.

Possible Solutions

- Gather information and demonstrate the value for employers, students, and parents.
- Engage state and federal-level agencies in the process.
- Procure external funding sources to facilitate sustainability and ease of student access (e.g., grants that offer structure and support resources).
- Develop broader impact statements and concepts to help get funding and support.
- Work together on standards, like open badge standards or definitions of credentials.
- Engage employers.
- Create collaborations among universities.
- Incentivize appropriate faculty activities.
- Engage the financial aid community.
- Additional funding is needed to upskill instructors and to cover the costs of certification exams for students.
- Clearly define who owns the core processed and who is engaged in the processes.
- Add an applied learning requirement for faculty.

INTERACTIVE ACTIVITY

Attendees worked in small groups to discuss and respond to the following prompts:

The year is 2025, enrollment into the manufacturing-related degrees has decreased by 45% across the nation – what led to this outcome?

- High tuition costs.
- Rise of standalone credentials and more professional certifications required over degrees.
- Rise in digitalization, technology, and automation.

- Students are stopping out as they become fully employed and their job consumes more of their time – cannot complete the degree due to the rigidity of the program and scheduling.
- Expansion of learning analytics.
- Better alignment of interest, aptitude, and programs to meet industry need.
- Number of traditional-aged students has declined and flattened.
- Major manufacturers change minimum education requirements, moving away from requiring a degree.
- Economy is booming and students are going directly from high school to jobs.
- Recession (e.g., not enough jobs, small and mid-level facilities not able to sustain hiring, etc.).
- In-house, skill-specific training is valued more than a degree.
- Disconnect between higher education and industry in terms of needs, knowledge, skills, or abilities.
- Lack of investment in innovation; manufacturers relocating out of the U.S.
- Shutting down degree programs that require large facility funding to start and maintain.
- Decline will not be unilateral – some schools may feel the problem, but some may still do well.

The year is now 2030 and universities and credentialing bodies have joined forces to design a method to help inform degree curriculum and relevant credentials – what methods did they come up with and what was the result(s)?

- Methods
  - Redefine programs to ensure currency.
  - Creation of national standards based on validation surveys.
  - Build closer relations with industry.
  - Create work-based learning pathways; expand apprenticeship programs with academic partners delivering structured learning experiences.
  - Develop process for submitting credentials to evaluate prior learning.
  - Creation of a collaboration model to co-develop curriculum and programs.
  - Create high-value certifications that are accredited and marketed as improving employment opportunities and career advancement.
  - Overcome barriers of funding and resistance.
  - Re-invest and re-prioritize engineering technology programs.
- Results
  - More technology-enabled system that facilitates better communication between universities and credentialing bodies.
  - Outcome-oriented program design based on manufacturing needs.
  - More skilled employees and satisfied employers; increased productivity, production, and profits.

  - On-going consortia to better allow for shared resources and recognition of credits, courses, and non-degree credentials.
  - Creation of new occupational roles and programs based on a practice analytics.
  - Base-level competencies per program and job; better job alignment and placement.
  - Push for reenergized STEM field programs.
  - Possibility that there will only be a few large certification bodies.

TABLE DISCUSSIONS – SUPPORT NEEDED TO ADOPT A MODEL INTEGRATING DEGREES AND NON-DEGREE CREDENTIALS

Participants were asked to think about and discuss what type of support and technical assistance are needed to implement pathways and adopt one of the models that was shared during the convening that incorporate both degrees and industry-recognized, non-degree credentials (e.g., certifications, certificates):

- Better and more resources (e.g., monetary, leadership buy-in, dedicated staff).
- Better articulation of the problem, solutions, and collaboration models.
- Templates on how to work together and best practices, as well as information for points of contact.
  - Clemson University has a great model, which is well funded, and has industry support.
- Regional and sector variability (e.g., Purdue University, Vanderbilt University, Michigan State University, University of Tennessee at Knoxville – each university is focused on a different technical area).
  - Manufacturing Engineering Education Program (MEEP) award from the Office of Naval Research – successful program at Davis Technical College in Utah, scaling it for manufacturing across Department of Defense.
  - Northrup Grumman sends workers to Davis Technical College to onboard for a week.
- Community colleges and certification bodies working more with universities to inform curriculum – helps them to know more about the advanced technology so they understand how their program fits into the bigger picture (e.g., Enterprise State Community College).
- Industry defining and driving efforts to determine what is needed (e.g., working within universities as faculty).
- Political and government influence.
- Flexibility to mold current content and programs into what is needed
  - Noncredit programs, minors, certificates, work-based learning, etc.
- Integration of more real-world experiences and applied learning in courses. There needs to be a balance of theory and applied learning.
- Better relationships with accrediting agencies (e.g., Wichita State University faculty and overseeing accrediting agency review each other's work to make sure they are developing material that fits the certification).

- Consistency in delivery across like programs and within universities (i.e., departments, colleges, etc.).
- Academic home and resource hub for certification programs on campuses.
- Focusing on the best outcomes for students.
- Focusing on quality certification programs (i.e., look to see that certification bodies are accredited by a third-party organization such as the ANSI National Accreditation Board).
- Universities are responsive to major funders (e.g., National Science Foundation, Department of Defense) as opposed to market demands.
- Sustainability plans need to be developed for support certification-degree pathways.
- Clearinghouse which lists by sector all certifying bodies and academic programs.
- Balancing the needs of teaching faculty versus research faculty.
- Work with community colleges to fill gaps and needs.
- Stackable credentials and programs that fit best within degrees.

TAKEAWAYS, LESSONS LEARNED, QUESTIONS FOR CONSDIERATION, AND ACTIONABLE STEPS

At the end of each day, participants were asked to complete an online survey where they provided takeaways, lessons learned, further questions for consideration, and actionable steps that can be taken to advance the outcomes of the discussions:

Takeaways and Lessons Learned

Perceived Barriers

- The different types of credentials and incorrectly used terms.
- That almost no one has a clear way to integrate certifications into conventional degree programs.
- Lack of resources and funding.
- Problems in procuring equipment, dedicated staff, etc.
- Policy changes and politics.
- The need to provide relevant training and education for technology that is changing so quickly, and the complexity of developing programs relevant to constantly changing industry needs.
- The challenge that U.S. industry faces to continue to draw qualified talent.
- Disconnect in current certification programs and manufacturing-related degrees.
- Rigidity of accreditation.
- Higher education has constraints from established structures that make it very difficult for universities to respond to change and alter curricula quickly.

How Can We Overcome These Barriers?

- Better understanding of the different types of credentials and how each could fit or integrate with another.
- Work together – everyone is encountering the same problems and barriers.

- A list or clearinghouse for existing manufacturing certifications and related academic programs with points of contacts and how to develop appropriate, valid, and connected programs.
- Bring in and collaborate with community colleges and industry.
- Develop standardized credit for prior learning, skills-based, and applied-learning programs.
- Identify program advocates from financial aid, career counselors and advisors, industry representatives, and faculty.
- Consider recertification as a way for universities to become more involved with certification bodies.
- Need to hire more teaching or clinical faculty, as they may be more receptive to responding to industry needs than research faculty. There also may need to be new job titles.

What Is Needed To Take This To The Next Level?

- More working collaborative models and examples of successful programs (e.g., Siemens program).
- More recognition and demand for new models of education and training.
- Develop ways to offer curriculum that prepare students to take the certification exams.
- More research on return on investments for all stakeholders.
- Coordination across a state so that each university within the state can collaborate – maybe one offers cybersecurity certification while another pilots a robust manufacturing technician certification program.

Other Takeaways and Lessons Learned

- Universities can be a good place for delivery of certification content, but do not need to develop or provide the certification itself.
- There are some interesting workforce partnerships happening between community colleges and universities to create a learning pathway or transfer pathways for students.
- Gained insight into the university perspective of incorporating a certification program – different than the way community college programs use certifications and certificates.
- University-issued badges must have a perceived value to students.
- Certification bodies want universities to add certifications to their curricula.
- There are fewer credentials embedded in university programs than previously thought, meaning there is opportunity here.
- Each of the case studies presented was overseen by an owner-leader, who played a major role in the success of the program.

Questions Raised by Participants for Further Consideration

How Can This Type of Integration Work?

- Can we add certifications or certificates to an already jam-packed curriculum?
- Certifications created based on industry need might not match curriculum at schools – how can these become aligned to match competencies employers have deemed important? There needs

to be a union between curriculum development regulations and the rigor of certification development.

- Can we build pathways from certifications to two-year degrees to four-year degrees?
- How can universities map curriculum to job roles (i.e., industry certification objectives)?
- So much of the activity and funding is focused on two-year schools. Should four-year universities be trying to get into this business?
- Can the university bureaucracy issues be overcome?

What Would Industry and Other Stakeholder Involvement Look Like?

- How could companies and industry become more involved in the planning, development, and evaluation processes, and provide resources?
- Do manufacturers want certificates embedded in four-year or graduate programs?
- Is there a way to convince the federal government that universities should play a role in technician training, and provide financial aid funding for this?
- If manufacturers do not recognize the value of certifications, then why pursue them? How much does industry actually value certificates and badges versus actual degrees?
- How can we develop state programs that will jump-start certification-oriented education?
- How could universities expand offerings in this arena without unduly harming 2-year technical college and community college partners?
- What can industry do to push higher education institutions?

How Do We Move This Forward / What Are Next Steps?

- How do we move beyond this discussion? What are the next steps to effect change? What are the things we need to do as a group after the conference to keep the discussion and momentum going?
- How can we better demonstrate the value of the certifications and degree programs?
- How can universities persuade research-oriented faculty to enter workforce education?
- Who can create and offer a widely-recognized and valued manufacturing credential (e.g., PMP or Six Sigma certifications)?

Other Questions

- What certifications are already available, that we do not need to develop?
- Should training that is relevant for a job today be integrated, parallel, or completely separate from a bachelor's degree? How can we best facilitate continued training throughout a student's life and career?
- How do we address the external challenges mentioned over a short time period?
- How do we get rigorous certifications into STEM curricula?
- How can we be more agile?
- The need for a list of relevant programs was mentioned in the final discussion – what would it take to get this?

- As the landscape changes for higher education due to this kind of work, what will be the end result? In other words, some universities may not survive, but what other institutional pieces will disappear?
- Could we get more information on how Wichita State University built its badge and certificate programs?

Action Items

Develop Relationships with Convening Participants

- Make connections and relationships with others who attended the meeting.
- Follow up with participants on opportunities and programs discussed.

Share Information with Internal Staff

- Share what I have learned and the conversations I have had here with my team.
- Go back to internal staff and consider ways to not only share exam objectives (e.g., competency standards), but also additional supporting information and training in order to support the integration and use of certifications.
- Begin discussions with faculty, provosts, deans, and advisory boards to reexamine program curriculum, completion pathways, and transcript information.
- Communicate with colleagues and leadership groups in the department to brainstorm opportunities and prepare for challenges.
- Work with my engineering-focused academic units to consider aligning lab and capstone experiences with credential competencies.
- Consider what we have learned here as we redevelop our extended education area and build our online programs.
- Work more closely with continuing education units to develop certification pathways.

Share Information with External Stakeholders

- Share the information with our workforce taskforce to help us prioritize the areas the university should explore.
- Reach out to associations to gauge interest in supporting certificate and certification programs within a university setting.
- Reach out to and gauge interest from state consortia.
- Embed the concept into discussions with our industry partners.

Align Programs and Develop a Pilot

- Pursue working with universities for extending our certification program.
- Consider opportunities for certification in current curriculum offerings and work with partner schools to get credit for current certification programs.
- Meet with our state Manufacturing Extension Partnership (MEP) to explore pilot project opportunities.

- Check with local community colleges on potential partnerships.
- Determine viability of new certificate programs or micro-credentials that lead to certifications.

Other

- Explore federal financial aid funding for certificate programs.
- Continue to explore affordability questions (and who pays).
- Look into different certification programs that are ISO/IEC 17024 accredited.
- Consider how we can hold a convening in Dallas for advanced manufacturing.
- Seek to understand all certifications available for manufacturing.

Appendix B: Organizations Represented at Project Convenings

Convenings are represented by the following abbreviations: C = cybersecurity, H = healthcare, L = liberal arts, and M = manufacturing. Representatives could attend more than one convening.

Universities

California State University, Fresno (L)
California State University, Fullerton (L)
California State University-Northridge (C)
Clemson University (M)
Cleveland State University (M)
Florida International University (H) (C)
George Mason University (H)
Georgia Institute of Technology (C) (M)
Georgia State University (L)
Indiana University - Purdue University Indianapolis (C) (L)
Massachusetts Institute of Technology (M)
Middle Tennessee State University (M)
Montana State University (M)
Morgan State University (H)
Oakland University (M)
Ohio State University (H)
Ohio University (M)
Purdue Global (C)
Rutgers University-Newark (L)
San Jose State University (C)
State University of New York at Albany (M)
University of Alabama, Birmingham (C)
University of California-Riverside (H)
University of Cincinnati (L)
University of Colorado, Denver (C)
University of Illinois at Chicago (L)
University Louisville (H) (M)
University of Maine (L)
University of Maryland-College Park (C)
University of Massachusetts, Lowell (M)
University of Memphis (H)
University of Mississippi (M)
University of Missouri (L)
University of Montana (M)
University of North Carolina, Charlotte (C) (L)
University of North Texas (L) (M)

University of Pittsburgh (M)
University of Texas at Arlington (L)
University of Texas at San Antonio (M)
University of Washington, Tacoma (L)
University of Wisconsin, Milwaukee (C) (M)
Virginia Commonwealth University (H) (C)
Wayne State University (H) (C)
West Virginia University (H)
Western Kentucky University (M)
Wichita State University (M)

Certification Bodies
ABRET Neurodiagnostic Credentialing & Accreditation (H)
American Health Information Management Association (H)
American Society for Clinical Pathology Board of Certification (H) (L)
American Translators Association (H) (C)
The Association of Technology, Management, and Applied Engineering (M)
Board of Certified Safety Professionals (L)
Cardiovascular Credentialing International (H)
Certified Financial Planner Board (L)
Certified Fund Raising Executive International (L)
Certification Commission for Healthcare Interpreters (H)
CertNexus (C)
Commission for Case Manager Certification (L)
CompTIA (C) (L) (M)
Global Information Assurance Certification (C)
HR Certification Institute (H)
Institute of Hazardous Materials Management (H)
Inteleos (H)
International Association of Privacy Professionals (C)
International Board of Heart Rhythm Examiners (H)
Institute for Energy Management Professionals (M)
INFORMS (H)
ISC^2 (C)
National Inspection Testing and Certification, Corp (H)
Pharmacy Technician Certification Board (H)
Project Management Institute (H) (C)
Siemens (M)
Society for Human Resource Management (C)
Society of Certified Senior Advisors (L)

Other Participants

Accenture (L)
American Institute for Manufacturing Integrated Photonics (M)
FloridaMakes (M)
Institute for Advanced Composites Manufacturing Innovation (M)
National Association of Manufacturers (M)
National Initiative for Cybersecurity Education (C)
National Security Agency (C)
SME/Tooling U (M)

Appendix C: Interview Questions Prior to Healthcare Convening

Introduction to the Project, It's Purpose, and Goals

Workcred, the Association of Public and Land-grant Universities (APLU) Coalition of Urban Serving Universities (USU), and the University Professional and Continuing Education Association (UPCEA) are joining forces under a Lumina Foundation grant to explore how students can earn both degrees and certifications as part of their four-year degree program.

Over the next year, Workcred, APLU/USU, and UPCEA will host several convenings between certification bodies and higher education institutions with the goal of creating new opportunities for students to earn credentials with labor market value. Each convening will address a different industry sector or topic.

The project seeks to:

- Gain a better understanding of the knowledge that higher education institutions and certification bodies have of each other.
- Gather information about the level of interaction that currently exists between higher education institutions and certification bodies.
- Uncover barriers and challenges that prevent higher education institutions and certification bodies from developing partnerships.
- Identify opportunities to strengthen relationships between higher education institutions and certification bodies.

The ultimate output of the convenings will be a framework laying the groundwork for potential pilot programs to test different strategies and practices to better align certifications and degrees. Input received from this interview will help to inform the convenings.

Questions for Certification Body Participants:

1. Are you familiar with the curriculum development process at higher education institutions?

2. Do you have current partnerships with institutions of higher education to align or embed certifications into four-year degree or other programs? (*Feel free to share links, if appropriate*)

    a. If you answered **yes** to question 2, please describe the partnership(s), including the name of the university and the specific degree program.

        i. What was the outcome(s)?

        ii. Does your certification body have a process to review university curricula to determine if there is alignment with the certification test blueprint?

    b. If you answered **no** to question 2, are there four-year degree programs that you believe would benefit from a closer integration with your certification(s)?

        i. Please provide examples.

3. From your perspective, what barriers or challenges exist that prevent closer alignment or integration of certifications and four-year degrees (e.g., cost, lack of awareness, prerequisites for certifications)?

4. What do you hope to get out of the convening?

5. Is there any other information that you would like to share with us?

Questions for University Participants:

1. Are you familiar with the work of certification bodies?

2. Do you have current partnerships with certification bodies to align curriculum with certifications or embed certifications into four-year degree or other programs? (Feel free to share links, if appropriate)

    a. If you answered **yes** to question 2, please describe the partnership(s), including the name of the certification body and the certification?

        i. What was the outcome?

        ii. Are you familiar with how a certification body conducts a job task analysis and develops the standardized exam/assessment?

        iii. Do academic programs at your institution have a process to review certification test blueprints to determine if there is alignment with academic curriculum?

    b. If you answered **no** to question 2, are there current health care or health-related degree programs that would benefit from a closer integration of certifications and degrees?

        i. Please provide examples.

3. From your perspective, what barriers or challenges exist that prevent closer alignment or integration of four-year degrees and certifications (e.g., cost, lack of awareness among faculty, lack of student demand, state regulatory barriers, institutional and state approvals)?

4. What do you hope to get out of the convening?

5. Is there any other information that you would like to share with us?

Appendix D: Pre-Convening Materials

Themes from Pre-Convening Interviews with Certification Bodies

Value in Partnerships

- Most certification bodies are not familiar with the process to develop curriculum at universities.
- Nevertheless, they recognize that the educational landscape is changing rapidly, and they see value in exploring opportunities and partnerships with universities. The need for integration and partnerships is likely to grow in importance in the future.
- Certification bodies see the integration of non-degree and degree credentials as an opportunity to give students a leg up, while creating a pipeline for young professionals into the field. The approach can help to grow interest in the profession and expose students to the field.
- Many certification bodies are interested in developing relationships with universities and exploring development of curricula for new and/or expanding occupations.
- Some certification bodies indicated that they do not know where to begin the conversation to explore a partnership. Even those that currently have no formal program integrating certifications into degrees value opportunities to connect, learn from, and partner with educators.
- There is also an interest in raising the visibility and value of specific professions and the certification.

A Recognition that Resources and Further Discussions Are Needed

- Many certification bodies discussed the importance of being able to articulate the return on investment (ROI) associated with industry and university partnerships.
- To successfully embed a certification program into a degree program, both the certification body and university need to allocate resources and staff time to maintain the program and the partnership.
- There need to be more discussions among universities and certification bodies to understand the level of certifications and how those levels match up to a four-year undergraduate degree.

Potential Challenges

- Some challenges to closer partnerships between certification bodies and universities include certification prerequisites for experience and getting adequate student buy-in.
    - For some certification programs, bachelor's degrees are prerequisites; others are moving toward making degrees prerequisites.
- Certification bodies want to gain a better understanding of potential issues and barriers as seen by colleges and universities.
- Some certification bodies are concerned that a potential partnership with a university would be viewed as being biased toward a specific university.

- Credentialing bodies are interpreting the ISO/IEC 17024:2012, *Conformity assessment -- General requirements for bodies operating certification of persons,* standard differently, which impacts how they approach potential partnerships.

Themes from Pre-Convening Interviews with Universities

Background and Knowledge

- How do certification bodies set minimum qualifications for exams?
- Restriction to students at the graduate vs. undergraduate levels
- Degree inflation--what role does this play in the world of credentialing bodies?
- Who authorizes the certification/credentialing bodies?
- Defining: accreditation, certification, credentialing bodies (i.e., certain states do not recognize or adhere to the terminology)
    - *Example:* VCU indicated that the lexicon of a certificate vs certificate of completion for non-degree programs is confusing and can be a barrier for state regulatory issues (CHEV - Council of Higher Education in Virginia)
- How does it all work and how can it be infused into the university eco-system?
- High need for roadmaps to increase awareness, understanding, and knowledge
    - Lead into internal buy-in
    - Leadership support and advocacy
- Role of Faculty: Adjunct/Part-Time vs. Full-Time/Tenured Track
    - Some may be better positioned to help with the alignment due to their integration in the field (i.e., part-time/adjunct)
    - *Example:* Florida International University shared that in the School of Public Health, adjuncts (many of whom have earned certifications themselves) help develop courses that align curriculum with certification

Students

- Career advising and its alignment to certifications
- Embed certifications into degree programs to lessen burden of financial constraints (i.e., financial aid will not cover certifications outside the degree programs)
- Introducing certifications to career planning conversations early-on in the student's academic journey
- More intentionality behind embedding certifications into certain programs (i.e., liberal arts, arts & sciences majors) rather than the typical programs (STEM)
- The need for cross-curriculum transferability via 21st Century Skills:

    - Soft Skills
    - Transferable Skills
    - Moving away from the traditional skills to the marketable sustainable skills (i.e.: cultural competence; flexibility & adaptability; information, media and technological skills; learning & innovation; emotional intelligence, anticipation; contextual competence)
- Demographic shift from traditional learner to non-traditional learner (i.e., adults, single parents, returners/stop-outs)
    - Meeting students where they are to help them: reskill and upskill
    - Automation and high need for quicker degrees/education validation for economic and social mobility

Barriers and Challenges

- Cost/Financial aid will not cover certifications outside a degree curriculum
- Role of advisors and clarifying how certifications play a role in their degree and post-degree completion
- Both are important for the students and the universities-but no one talks about it
- No one asks questions because everyone is too busy
    - *Example:* University of Memphis mentioned asking about the CLEP exam and if students can earn credit for that to decrease the time to earn a degree. He asked someone in the registrar's office and that is possible! Went through the old files and found 15 years of CLEP exams with credit that could have been accepted as part of the students' major. People need to asks questions
- We need to have a champion on each campus that can encourage institutional buy-in (i.e., leadership, faculty, staff, deans)
- Lack of institutional communication
- Not knowing when projects and initiatives are occurring
- Episodic/ad hoc knowledge of new projects and goals
- Lack of personnel capacity to follow-through
- Lack of understanding of how this affects ROI for institutions (i.e., students go to different universities to earn a certificate, loss of funds and students)
- Hesitancy and lack of awareness
- A need to better understand where the workforce is going and why these controversial follow-through/spearheading this project onsite
- Cannot be a one-off conversation just to collect data

Curriculum and Certification Development Process

Introduction

To support shared understandings, APLU, UPCEA, and Workcred have detailed some of the integral parts of curriculum and certification development. By no means is this document comprehensive and all-inclusive of the highly-nuanced processes of designing or revising four-year degrees and industry-recognized certifications; rather this document serves to expose leaders from each domain (higher education and certification bodies) to the work being done elsewhere.

Curriculum Development Process

Four-year Degrees

Four-year degrees are typically comprised of two different types of courses: general education courses and major-specific courses.

- General education courses emphasize many of the skills valued by employers, often termed 'soft skills' (verbal and written communication, critical thinking skills, creativity, adaptability, etc.), and imbue the skills of being a lifelong learner—one that can understand contexts, seek information, and interact in environments in which they have received no formalized training.
- General education curricula are comprised of courses from many different academic departments and are sometimes termed 'interdisciplinary programs' for this reason. Some individual courses can themselves be interdisciplinary, including content from multiple academic disciplines in one course.
- Courses in a major are specific to the program of study/degree a student pursues.
- Major courses may include requirements tied to specialized accreditations or focus on areas of expertise of faculty members at the institution.

Curriculum and course content can be influenced by a variety of factors. Faculty interests/research, industry relationships, departmental requirements, school/college/institutional requirements, and the requirements of outside entities (state boards, national and regional accrediting bodies, etc.) can all influence individual course content and the curricula of programs. Courses that count towards a bachelor degree must not exceed a certain number of "credit hours" (typically 120). This limit is put in place due to the cost and time students incur to complete their degree programs and state and federal accountability measures and financial aid requirements. Students sometimes take additional courses that exceed the credit hour cap in cases of double majors (e.g., BS in biology and chemistry), or multi-degree programs (e.g., BS in Nursing and BA in political science).

In general, new programs and courses (and significant course revisions) must be reviewed and approved at many levels before they can be delivered. The processes for reviewing and approving new courses and significant course content revisions typically occur over a shorter timeline than the academic program approval process. Many course content revisions can be executed by instructors and faculty without additional approval.

Most programs must be approved within an institution by an academic department, college/school governing body, dean of the college/school, provost, president, and the institutions' governing body

(board of governors/directors/trustees, etc.). Once these approvals have been granted, the institution is often required to seek approval from a state entity, the institutions' accreditor, as well as any professional associations or accrediting bodies that exist relevant to the major. Depending on the complexity of the approval process, it can take years from inception to the first course offerings of a new program.

In most cases, the instructional content of four-year degree programs and courses is reviewed at some interval determined by the institution and/or its accrediting bodies. In many cases this is every three to five years. Between formal reviews, faculty members regularly update their course materials, in keeping with the learning objectives for the course, as they see fit.

Certification Development Process

Background: Understanding Terminology

There is a great deal of confusion in the marketplace about the various types of credentials, how they differ, and the appropriate use for each. Adding to this confusion, credentialing terms such as "certificates" and "certifications" are often confused and misused. Although they sound similar, they are in fact very different:

Certificates are generally associated with training or educational courses, and are "good for life," meaning they carry no time limit or renewal requirement. A certificate cannot be revoked for reasons of incompetence or unethical behavior. There are multiples types of certificates (e.g., certificate of participation, certificate of achievement, assessment-based certificate). Only assessment-based certificates measure the knowledge and skills learned in the education or training experience. Certificates can be issued by both higher education institutions and professional associations

Certifications, on the other hand, are generally created for high-stakes areas such as health, safety, and finance, where they are often required to obtain a specific job or position. Certifications are based on a job task analysis – a systematic analysis of the job or practice area – and an examination is used as a third-party, independent judgement that the individual obtained the competencies required. Certifications are time-limited and can be revoked for incompetence or unethical behavior.

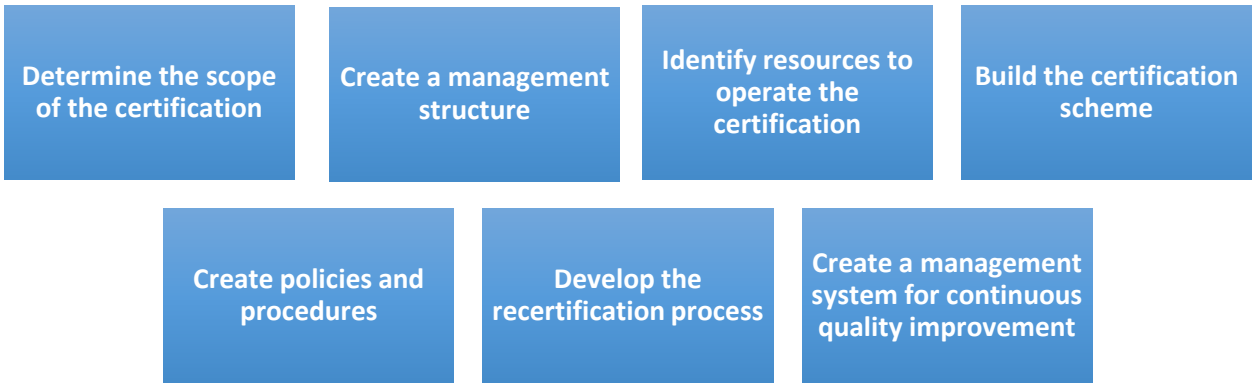
Figure 1: Elements of a Certification

Certification	
Assessment created by	○ Industry or professional association certification bodies
Awarded by	○ Industry or professional association certification bodies
Awarded for	○ Third-party, independent, competency assessment
Indicates	○ Skill/competency mastery
Time to complete	○ Variable – as designed
Time and renewal requirements	○ Time-limited ○ Renewable through a recertification process
Revocation process	○ Can be revoked for incompetency or unethical behavior
Certification standard for being accredited	○ ANSI/ISO/IEC 17024, an international and national standard
Content standards	○ Based on a job task analysis ○ Should be reviewed/revised on an annual basis

Developing a Certification

ISO/IEC: 17024:2012*, Conformity assessment – General requirements for bodies operating certification of persons*, is a national and international standard that establishes benchmarks for the development and operation of quality certification programs. The basic elements involved in creating a certification are outlined below, many of which can be developed in parallel:

Figure 2: Key Steps to Develop a Certification



Determine the scope of the certification

The certification body is responsible for defining the scope of the certification, as well as for any decisions relating to expanding and reducing the scope of the certification.

Create a management structure

The certification body must document its structure, policies, and procedures in order to manage impartiality and to ensure that the certification activities are undertaken impartially. When the certification body is a defined part of a legal entity, the structure must include the line of authority and the relationship to other parts within the same legal entity. Offering training and certification for persons within the same legal entity constitutes a threat to impartiality. A certification body that is part of a legal entity offering training must, among other steps, identify and document threats to its impartiality on an ongoing basis, and must have a documented process to demonstrate how it eliminates or minimizes those threats.

Identify resources to operate the certification

The certification body manages and is responsible for the performance of all personnel involved in the certification process.

Build the certification scheme

The certification scheme is the foundation upon which the certification is based, and must include the involvement of appropriate experts. A certification scheme involves the following elements:

- Scope of certification
- Job task analysis and descriptions
- Required competence – knowledge and skills
- Abilities (when applicable)

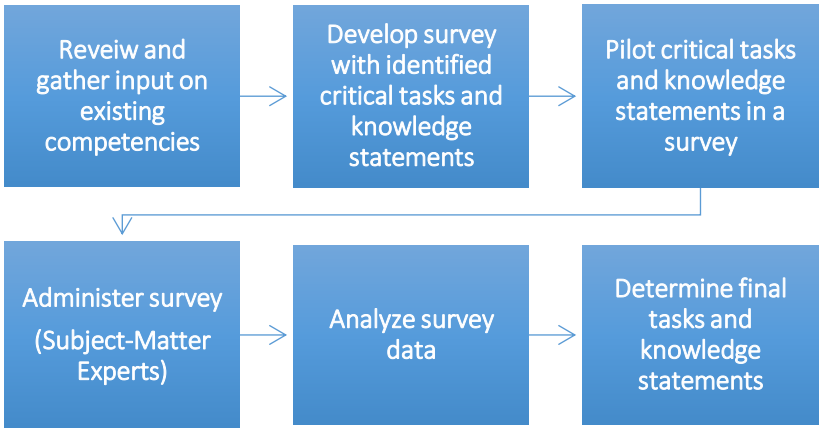
- Prerequisites (when applicable)
- Code of conduct (when applicable) describing ethical or personal behaviors required
- Criteria and assessment methods for initial certification and recertification
- Surveillance methods and criteria (if applicable)
- Criteria for suspending and withdrawing certification
- Criteria for changing the scope or level of certification (if applicable)

Job Task Analysis to Examination Cycle

Underpinning the certification exam is a job task analysis – a systematic analysis of what people do and know to complete a job or task. The main purpose of a job task analysis is to develop the blueprint for the certification exam, but it can also be useful in developing body-of-knowledge studies, educational content and offerings, professional development activities, and candidate criteria.

A full job task analysis breaks down tasks into knowledge, skills, and abilities (KSAs), and sometimes the specific steps as to how the work is performed. This process of gathering input about KSAs can be done through a combination of activities including a focus group of subject matter experts (SMEs), a DACUM (developing a curriculum), shadowing, literature review, or interviews.

Figure 3: Example of a Job Analysis to Examination Cycle



The development of the examination is an intensive process that involves a psychometrician who develops a test bank of questions. Each question or test item is reviewed by SMEs for bias related to culture, gender, sexual orientation, and geography, and is reviewed in a timely manner to examine how each question or test item is performing. The initial exam form should be pilot-tested and a passing score (or cut-score) established. It is important to ensure that an adequate number of candidates representative of the candidate population participate in the pilot test; this number may vary, but 30-50 test takers is generally seen as the accepted minimum. Significantly, there is also an ongoing process for how exams should be revised to represent changing knowledge.

Create policies and procedures

A number of policies and procedures must be developed, ranging from determining prerequisites for the certification to policies for filing appeals and complaints:

- Prerequisites for the certification

- Criteria for initial certification
- Certification processes:
    - Application
    - Assessment process
    - Examination process
    - Accommodations for special needs
    - Decisions on certification
- Due process for suspending or withdrawing a certification
- Records and information requirements
- Appeals
- Complaints
- Use of logos/marks

Develop the recertification process

Certifications include a recertification or renewal component, which have specific requirements for when a person must update his/her certification. Recertification requirements should be based on the initial job task analysis and should be used as a signal to the employer of continued competence. In an ideal situation, an individual who obtains his/her certification in 1990 and 2020 would both have the knowledge and skills for competent performance.

Creating the management system for continuous quality improvement

The certification body must establish, document, implement, and maintain a management system that is capable of supporting and demonstrating the consistent achievement of the requirements of ISO/IEC 17024.

Accreditation for Certification Bodies

What stands behind a credential – how it is developed and maintained – is critical to its quality, market value, and effectiveness. Rigor and adherence to best credentialing practices are the foundation of well-developed credentialing programs. Nationally- and internationally-accepted standards exist to ensure the quality of these programs. ISO/IEC: 17024:2012*, Conformity assessment – General requirements for bodies operating certification of persons*, is a national and international standard that sets the bar for certification programs.[1] Accreditation to the standard by an organization such as the American National Standards Institute (ANSI) provides a neutral, third-party attestation that a certification program meets globally-accepted benchmarks, increasing the integrity and mobility of the credential holders.

The process used by ANSI to accredit certification bodies is based on an international standard (ISO/IEC 17011). Adherence to a rigorous internationally-recognized accreditation process ensures that the process conforms to the highest accreditation standard and represents the best practices in accreditation. The ANSI accreditation process involves both a review of a paper application and the performance of an assessment (onsite visit) to validate information provided by each applicant. The use of an onsite assessment for accreditation of personnel certification agencies is unique to ANSI.

[1] For certificate programs, ANSI/ASTM E2659-18, *Standard Practice for Certificate Programs*, is the globally-recognized American National Standard.

Defining Different Types of Credentials and Opportunities to Strengthen Integration of Four-Year Degrees and Certifications

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Coalition of Urban Serving Universities

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How Do Credentials Differ?

	CERTIFICATE*	CERTIFICATION	DEGREE	LICENSE
Awarded by	Education and training providers, employers, labor unions, and industry associations	Industry certification bodies	Education institutions	Government agencies
Awarded for	An exam at the end of a training or education course or a one-time assessment	Third-party, independent competency assessment	Course of study	Meeting requirements of an occupation
Indicates	Education/ knowledge/skills	Skill mastery/ competencies	Education, successfully passed courses	Legal permission
Time to complete	Variable, generally less than 2 years	Variable	Variable, generally 2 years or more	Variable
Time and renewal requirements	Often no time limit, no renewal requirement	Time-limited, includes recertification	No time limit, no renewal requirement	Time-limited, renewal generally required
Revocation process	Cannot be revoked	Can be revoked for incompetence or unethical behavior	Cannot be revoked	Can be revoked for incompetence or unethical behavior
Examples	CNC Machinist, Zurich Insurance Apprenticeship	CompTIA Cybersecurity Analyst, Certified Energy Auditor, Medical Laboratory Scientist, MLS(ASCP)^{CM}	Bachelor of Science in Engineering, Associate of Arts in Business Administration	Electrician, Professional Engineer, Registered Nurse
Standard for accreditation	ANSI/ASTM E2659-18, a globally recognized American National Standard	ANSI/ISO/IEC 17024:2012, an international and national standard	National, regional, or programmatic	State law defines scope of practice

* There are many types of certificates. Some examples include: certificates of participation, certificates of achievement, certificates of completion for apprenticeship, and assessment-based certificates.

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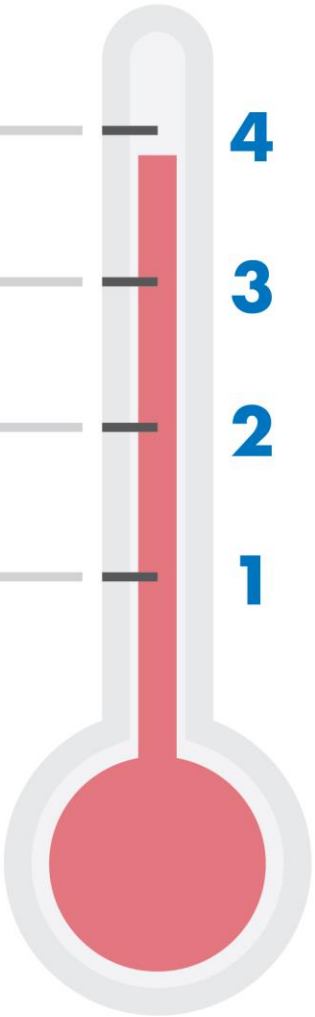
DEGREES OF RIGOR
FOR THE MANY FACES OF CERTIFICATION

Accredited by a third party (e.g., ANSI, NCCA) — **4**

Ability to revoke certification for violation or unethical behavior — **3**

Recertification requirement — **2**

Standardized exam — **1**



Note: Training that is followed by an assessment to measure the learning outcomes is an assessment-based certificate, not a certification as sometimes referred to.

TYPES OF CERTIFICATES

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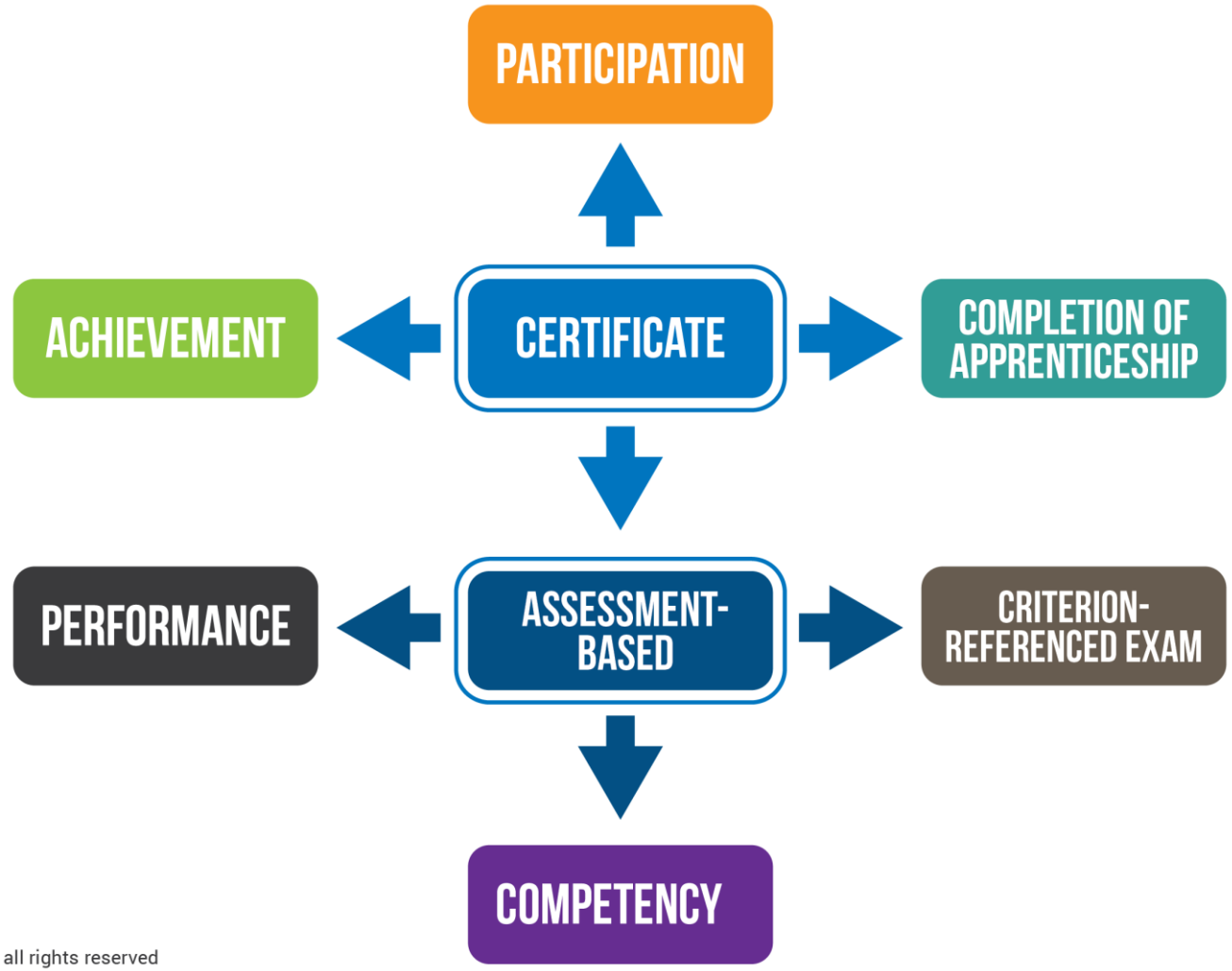


Value of Voluntary Certifications

Lifelong Credential and Continued Competency

- E.g., Certified Safety Professional ®

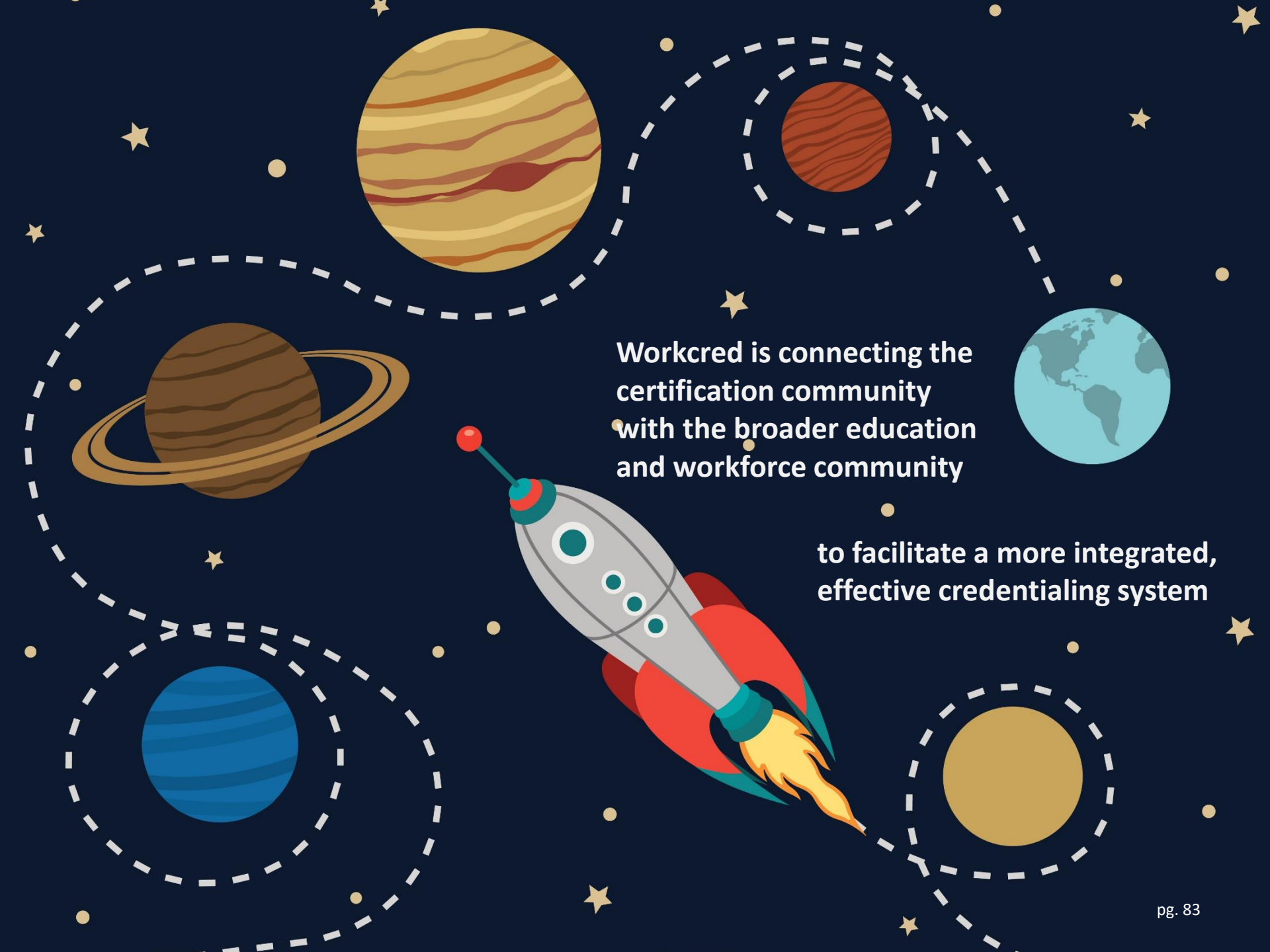
Required for Employment

- E.g., Information assurance certifications (A+, CISSP, GSEC, CEH, CISA, etc.)

Revoked for Violation of Ethics or Code of Conduct

- E.g., Certified Financial Planner

CHANGING CREDENTIALING LANDSCAPE


Workcred is connecting the certification community with the broader education and workforce community
to facilitate a more integrated, effective credentialing system

Issues Impacting Certification Bodies

Variety of Credentials

- More than 650,000 unique credentials offered in the U.S.
  - Traditional degrees
  - Boot camps
  - Digital badges
  - For-credit certificates
  - Non-credit certificates
  - Certifications
  - Nanodegrees
  - MicroMasters™ degrees
  - Certificate of completion for an apprenticeship
  - Licenses
  - High school diplomas

Return on Investment (ROI)

- Policymakers, employers, and consumers want to the know the value of credentials.
- These stakeholders want to measure the ROI of certification attainment.
- What is the role of credentials in the hiring and promotion process?
- Does having a specific credential result in a wage gain?

Data

- Schools can use data to expand and improve educational programs.
- Employers can use data to identify high-performing institutions and quality sources of talent to improve hiring and training decision making.
- Students can use data on program outcomes to make more informed decisions about what credentials to earn and where to obtain them.

CONVENINGS TO STRENGTHEN INTEGRATION OF CERTIFICATIONS AND DEGREES

Creating New Opportunities

OPPORTUNITY

To convene certification bodies and universities to explore how students can earn both degrees and certifications as part of their four-year degree program

PROBLEM

Insufficient opportunities for students to earn certifications with labor market value and integrate certifications with a four-year degree

CONVENING PARTNERS

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Coalition of Urban Serving Universities

Association of Public & Land-grant Universities

UPCEA

FUNDED BY Lumina Foundation

Convenings

Health Care	• APLU (Washington, DC) • **April 23-24, 2019**
Cybersecurity	• San Jose State University (San Jose, CA) • **July 9-10, 2019**
Liberal Arts	• Lumina Foundation (Indianapolis, IN) • **October 10-11, 2019**
Manufacturing	• Georgia Tech University (Atlanta, Georgia) • **December 10-11, 2019**
Hospitality	• Florida International University (Miami, Florida) • ***Planned for March 26-27, 2020 (but cancelled due to the COVID-19 pandemic and replaced with individual interviews)***

Convening Format

Focus on Specific Topic

- Promising practices from universities and certification bodies; explore opportunities for partnerships; small group discussions to identify new models

Focus on Cross-Cutting Skills

- Benefits of certifications in HR, Project Management, Translation, etc. to students studying specific topic

Expected Outcomes

Better understanding of current relationships between universities and certification bodies.

Stronger relationships and improved dialogue between these entities.

A framework on which to build pilot programs that can be tested and scaled.

Appendix E: Communications and Outreach Activities

Workcred, APLU/USU, and UPCEA have highlighted and promoted the project through both internal and external communication networks, as well as through presentations and published articles. The following list contains information about each of these communication and outreach activities undertaken to highlight various aspects and efforts of the project:

Presentations

- February 2019: Roy Swift presented to the Certification Network Group meeting (see related news item: Dr. Roy Swift Highlights Issues and Solutions Impacting the Certification Community at Certification Networking Group)
- March 2019: Karen Elzey and Roy Swift presented to USU's 21st Century Workforce Group comprised of mid- and high-level leaders from 39 universities across the country
- June 2019: Shalin Jyotishi presented at the APLU Commission on Economic & Community Engagement (CECE) Executive Committee meeting
- June 2019: Roy Swift moderated the panel, "Bolstering Student Success through Financial Literacy and Aligning Certifications with Degree Programs," at the APLU Joint Summer Meeting of CECE-Council on Research in State College, Pennsylvania. The panelists were Karen Elzey, Workcred; Mary Kay Svedberg director of education, Certified Financial Planning Board; and Billy Hensley, president and CEO, National Endowment for Financial Education (see related news item: At APLU's Joint Summer Meeting, Workcred to Showcase How Certifications Bolster Student Success, Careers)
- September 2019: Karen Elzey, Andréa Rodriguez, and Julie Uranis presented at the National Governors Association Educate for Opportunity Cross-State Meeting in St. Louis (see related news item: Connecting Industry Certifications and Degrees: Workcred to Participate in National Governors Association Event)
- October 2019: Shalin Jyotishi presented to the Workcred Board of Directors
- November 2019: Andréa Rodriguez presented to Workcred's Credentialing Body Advisory Council
- November 2019: Karen Elzey moderated the panel, "Enhancing Student Employment Outcomes through Degree-Certification Pathways," at the APLU Annual meeting in San Diego. The panelists were Latha Ramchand, provost, University of Missouri; Mary Kay Svedberg, director of education, Certified Financial Planning Board; and Susan Brandies, chief financial planning officer, Pure Financial (see related news item: Enhancing Student Employment Outcomes through Degree-Certification Pathways: Workcred Joins APLU Annual Conference)
- February 2020: Roy Swift, Shalin Jyotishi, and Andréa Rodriguez joined Julie Uranis at the Summit for Online Leadership and Administration Roundtable to present a session on "Embedding Industry Certifications in Undergraduate Degree Programs." (see related news item:

Embedding Industry Certifications in Undergraduate Programs: Workcred to Showcase Themes at UPCEA's 2020 Summit)

Articles

- September 2019: Shalin Jyotishi wrote the article, "How Universities Are Addressing the "False Choice" Between Education and Employment Readiness of Students," for the fall 2019 edition of *IIENetworker*, a publication of the Institute for International Education
- December 2019: Isabel Cardenas-Navia and Shalin Jyotishi provided input to for the article, "Why isn't it a no-brainer to embed 'certifications' into bachelor's degrees?," in "The Edge," a weekly newsletter of *The Chronicle of Higher Education*
- February 2020: Isabel Cardenas-Navia and Shalin Jyotishi shed light on the importance of embedding high quality, industry-recognized certifications into college degree programs in *IndustryWeek* article, "A New Approach to Filling High-Level Manufacturing Jobs"
- May 2020: *EvoLLLution* highlights the work on embedding certifications with degrees through an interview with Holly Zanville and Karen Elzey in article "Embedding Certifications into Bachelor's Degrees Could Improve Transitions into the Labor Market"
- June 2020: Karen Elzey explains how graduating with a combination of certificates or certifications and a bachelor's degree can show employers that candidates have a breadth of knowledge in article by *Wired*, "More Students Are 'Stacking' Credentials en Route to a Degree"
- July 2020: In this article featured in *RealClear Education*, "Combining Degrees with Quality Certifications is a Win for Everyone," Karen Elzey and Shalin Jyotishi emphasize the relevance and importance of integrating quality, industry certifications into degrees to ensure better outcomes for students

Workcred Press Release and Letters from the Executive Director

- December 2018: Workcred, APLU, and UPCEA Awarded Lumina Grant to Connect Degrees and Certifications
- Throughout the project, Workcred provided updates on the project in its routine *Letters from the Executive Director*

Videos

- August 2020: In a new Workcred video, "Differing Types of Workplace Credentials," Roy Swift illuminates various types of credentials to help people understand how they differ, and appropriate uses for each (see related news item: New Workcred Video Demystifies Different Types of Credentials)
- September 2020: Roy Swift discusses the disconnect between credentialing organizations and academia, and the initiatives that are being undertaken to facilitate understanding and foster relationships between these two groups in this video interview by Xvoucher.

Appendix F: Questions Universities Can Ask Certification Bodies to Assess Quality of Certifications

1. What is the purpose (scope) of the certification?
2. What, if any, competing certifications address the same purpose (scope)?
3. What are the eligibility requirements for the certification?
4. What employers/types of employers seek out candidates with this certification?
5. Is the certification a requirement in any professions or industry sectors?
6. Is the certification preferred in any professions or industry sectors?
    a. If not, is there any movement towards preferring this certification?
7. Is there any evidence of improved employability outcomes for certified individuals (e.g. higher average salary, greater odds of being hired, job descriptions listing certifications as required or preferred, etc.)?
8. Who are the stakeholders that interact and build the certification?
9. Is the certification body a stand-alone, independent organization, or is it part of or affiliated with another organization?
    a. If the certification body is part of another organization, how does it maintain independence from the functions of the other organization (e.g., the membership function)?
10. Was a job task analysis done to support the validity of the certification?
    a. If so, was there a validation survey conducted? When was it last conducted?
    b. Was there a representative sample of industry included in the analysis?
11. Are there procedures for revoking the certification from an individual for reasons of incompetence or unethical behavior?
12. Do parts or all of the certification test blueprint match an existing academic course, certificate, or degree program?
    a. If so, which ones?
13. Was there a nationally recognized process for determining pass/fail of the examination? *(Note: Certification bodies do not generally report specific scores since a certification is a pass/fail examination.)*
14. What is the pass rate for individuals taking the certification exam?

15. Is there a recertification process for the certification?
    a. If so, is it based on a job task analysis?
16. Does the certification body have a policy that indicates how often the certification exam is updated?
    a. If so, what is the process to continually improve the certification program?
    b. If not, how is the certification exam updated, or is it?
17. Are the certification exam items reviewed for bias related to gender, race, ethnicity, geographic location, etc.?
18. Are certification exam items written to specific task statements to ensure the questions are measuring what they are supposed to be measuring?
19. What rationale and data is used to establish the prerequisites to sit for the exam?
20. What security measures are taken while delivering the examination?
21. How is the certification exam proctored, in person or remotely?
22. How often and where is the examination offered?

Appendix G: Pre- and Post-Convening Survey Data

If you represent a certification body, do you currently have a partnership(s) with any universities to align your certification exam(s) with a four-year degree program(s) curricula? Or if you represent a university, do you currently have a partnership with any certification bodies to align your four-year degree program(s) curricula with certification exam(s)?

	April Health Care		**July Cybersecurity**		**October Liberal Arts**		**December Manufacturing**	
Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Yes	33%	37%	57%	33%	57%	32%	77%	19%
No	67%	63%	43%	67%	43%	68%	23%	81%

If you do not currently have a partnership(s), have you ever considered partnering with a university/certification body to better align the programs' curricula?

	April Health Care		**July Cybersecurity**		**October Liberal Arts**		**December Manufacturing**	
Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Yes	42%	65%	33%	57%	57%	82%	67%	50%
No	58%	35%	67%	43%	43%	18%	33%	50%

How likely are you to pursue a partnership (or an additional partnership) with a university/certification body to better align the programs' curricula?

	April Health Care		July Cybersecurity		October Liberal Arts		December Manufacturing	
Pre-Convening Responses[2]	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Definitely Likely	25%	17%	50%	0%	29%	0%	20%	9%
Somewhat Likely	50%	50%	17%	70%	29%	33%	80%	64%
Not Very Likely	25%	17%	17%	30%	29%	67%	0%	27%
Not Likely at All	0%	17%	17%	0%	13%	0%	0%	0%

	April Health Care		July Cybersecurity		October Liberal Arts		December Manufacturing	
Post-Convening Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Definitely Likely	47%	44%	44%	32%	50%	8%	50%	25%
Somewhat Likely	33%	44%	36%	53%	33%	62%	30%	64%
Not Very Likely	7%	6%	20%	11%	17%	23%	0%	0%
Not Likely at All	0%	0%	0%	0%	0%	0%	0%	0%
Not Applicable	13%	6%	0%	5%	0%	8%	20%	11%

[2] Data figures in the tables were rounded to the nearest whole number; as a result, columns may not add up to exactly 100%.

How well do you understand the university curriculum development process/the certification exam development process?

	April Health Care		July Cybersecurity		October Liberal Arts		December Manufacturing	
Pre-Convening Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Understand Very Well	22%	20%	14%	13%	36%	21%	23%	7%
Somewhat Understand	39%	44%	36%	53%	43%	33%	46%	56%
Understand a Little	28%	24%	21%	22%	14%	33%	23%	26%
Do Not Understand	11%	12%	29%	13%	7%	13%	8%	11%

	April Health Care		July Cybersecurity		October Liberal Arts		December Manufacturing	
Post-Convening Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Understand Very Well	20%	25%	29%	26%	50%	23%	33%	33%
Somewhat Understand	47%	63%	50%	47%	17%	38%	50%	59%
Understand a Little	27%	6%	7%	26%	33%	38%	17%	4%
Do Not Understand	7%	6%	14%	0%	0%	0%	0%	4%

From your perspective, how desirable is it to align university curriculum and certification exam content?

	April Health Care		**July Cybersecurity**		**October Liberal Arts**		**December Manufacturing**	
Pre-Convening Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Very Desirable	50%	68%	57%	38%	79%	42%	67%	44%
Somewhat Desirable	28%	28%	43%	56%	14%	50%	33%	52%
Not Very Desirable	22%	4%	0%	3%	7%	4%	0%	4%
Not at All Desirable	0%	0%	0%	3%	0%	4%	0%	0%

	April Health Care		**July Cybersecurity**		**October Liberal Arts**		**December Manufacturing**	
Post-Convening Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Very Desirable	53%	44%	50%	37%	83%	15%	58%	33%
Somewhat Desirable	33%	56%	50%	53%	0%	62%	42%	56%
Not Very Desirable	7%	0%	0%	10%	0%	23%	0%	11%
Not at All Desirable	7%	0%	0%	0%	17%	0%	0%	0%

From your perspective, how possible is it to align university curriculum and certification exam content?

	April Health Care		July Cybersecurity		October Liberal Arts		December Manufacturing	
Pre-Convening Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Very Possible	28%	48%	43%	38%	29%	29%	31%	44%
Somewhat Possible	50%	48%	36%	53%	57%	58%	69%	44%
Not Very Possible	22%	0%	21%	9%	7%	8%	0%	11%
Not at All Possible	0%	4%	0%	0%	7%	4%	0%	0%

	April Health Care		July Cybersecurity		October Liberal Arts		December Manufacturing	
Post-Convening Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Very Possible	0%	19%	21%	32%	50%	0%	42%	30%
Somewhat Possible	47%	63%	71%	42%	17%	77%	33%	59%
Not Very Possible	53%	19%	7%	26%	17%	23%	25%	11%
Not at All Possible	0%	0%	0%	0%	17%	0%	0%	0%

From your perspective, how likely are you to make investments to improve the alignment between university curriculum and certification exam content?

	April Health Care		July Cybersecurity		October Liberal Arts		December Manufacturing	
Pre-Convening Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Definitely Likely	22%	56%	23%	28%	29%	38%	39%	44%
Somewhat Likely	44%	36%	64%	69%	43%	50%	46%	44%
Not Very Likely	28%	8%	14%	3%	14%	8%	15%	11%
Not at All Likely	6%	0%	0%	0%	14%	4%	0%	0%

	April Health Care		July Cybersecurity		October Liberal Arts		December Manufacturing	
Post-Convening Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Definitely Likely	20%	38%	29%	21%	33%	23%	42%	22%
Somewhat Likely	47%	44%	57%	63%	50%	54%	33%	74%
Not Very Likely	13%	19%	14%	16%	17%	23%	17%	4%
Not at All Likely	20%	0%	0%	0%	0%	0%	8%	0%

After participating in the convening, would you consider participating in a pilot program to create new or accelerate existing partnerships between certification bodies and universities?

	April Health Care		July Cybersecurity		October Liberal Arts		December Manufacturing	
Responses	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*	*Certification Body*	*University*
Yes	86%	88%	83%	95%	100%	85%	92%	96%
No	14%	12%	17%	5%	0%	15%	8%	4%

What elements influence your ability to commit to participate in a pilot?[3]

Certification Body Responses	April Health Care	July Cybersecurity	October Liberal Arts	December Manufacturing
Staff Capacity	64%	83%	83%	50%
Financial Resources	36%	33%	67%	67%
Time	71%	67%	67%	67%
Internal Processes	71%	33%	33%	25%

University Responses	April Health Care	July Cybersecurity	October Liberal Arts	December Manufacturing
Faculty Commitment	56%	47%	85%	41%
Student Demand	44%	37%	62%	41%
State Regulations	44%	11%	31%	19%
Internal Processes	50%	42%	62%	26%
All of the Above	50%	53%	31%	70%

[3] Participants could select more than one answer.

Appendix H: Phase II Interest

1. Do you represent a credentialing body, employer, or university?

ANSWER CHOICES	RESPONSES	
Credentialing body	36.76%	25
Employer	1.47%	1
University	61.76%	42
Total Respondents: 68		

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2. For **university** representatives – Would you like to be considered for participation in a possible phase II project to build or scale certification-degree pathway models at your institution?

ANSWER CHOICES	RESPONSES	
Yes	94.74%	36
No	5.26%	2
TOTAL		38

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3. For **credentialing body and employer** representatives – Would you like to be considered for participation in a possible phase II project to build or scale certification-degree pathway models with a university or a consortia of universities?

ANSWER CHOICES	RESPONSES	
Yes	95.83%	23
No	4.17%	1
TOTAL		24

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4. For yes responses to question 2 or 3, which degree and/or certification program(s) are you interested in building certification-degree embedded pathways?

   Academic disciplines and degree programs that respondents expressed interest in embedding certifications:

   - Business and business administration
   - Computer and information science

- Cybersecurity
- Data science and data analytics
- Engineering
- Engineering technology
- Environmental science
- Healthcare including allied health, behavioral health, gerontology, nursing, and pre-med programs
- Hospitality management
- Information systems
- Liberal studies
- Logistics management

Certifications that respondents expressed interest in embedding into degree programs:

- Certified Analytics Professional (CAP) and Associate CAP (aCAP)
- Certified Culinarian and Certified Pastry Culinarian
- Certified Fund Raising Executive
- Certified Meeting Professional (CMP)
- Cybersecurity: CISSP, SSCP, CCSP, CSSLP, HCISPP
- Human Resources Certifications
- Inteleos (ARDMS/APCA)
- Medical interpreting
- Project management
- Safety certifications
- Six Sigma and Lean certifications
- Translation and interpretation

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5. Do you have specific ideas about a certification-degree pathway model that you would like to test?

ANSWER CHOICES	RESPONSES	
Yes	20.75%	11
No	79.25%	42
TOTAL		53

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6. For yes responses to question 5, please describe the model that you would like to test:
    - Coordinating internal university resources: Develop a model for the continuing education division to serve as the host for a university/credential agency badging. The continuing education division would be the host for all short credentials and would work

collaboratively with all other university departments. This would allow all the school and college units and professional development units to provide certifications to both academic and professionals that need short programs or certifications at a reduced cost.

- Behavioral Health: Create a pathway from high school to associates degree and beyond. Build a CNA/CMA type model nationally recognized credential that would lead to workforce recruitment, retention, and ultimately better care for the most vulnerable populations with mental and behavioral health disorders.
- Engineering: Embed nationally recognized certifications such as the American Composites Manufacturers Association (ACMA's) Certified Composite Technician certification into relevant engineering degree programs.
- Cybersecurity: Create a model that "tiers" industry-recognized cybersecurity certifications based upon proficiency level (entry, intermediate, and advanced) that is mapped to academic credentials (e.g., high school diploma, associates, bachelors, masters, professional degrees) to demonstrate the appropriate credentials to demonstrate capabilities or qualifications for the appropriate levels of employment. This would create a cybersecurity career pathway for learners that incorporates the role of education, training, and experience with the corresponding credential (degrees, certificates, certifications, badges, etc.) that meets employer needs.

Appendix I: Value Proposition

Certification-degree pathways have value to multiple audiences. Below are examples of the value propositions identified by the convenings' participants for each specific audience.

Students

- Gain both a broad-based education and industry-specific skills that hiring managers seek in new hires
- More easily communicate their knowledge, skills, and abilities to employers because of an increased understanding about the relationship of their academic coursework to the competencies assessed in the certification exam
- Expand the possibility of students' career opportunities and awareness of career and credential pathways
- Allow students to move beyond their academic disciplines. For example a Spanish major could earn a certification to be a medical interpreter, a music major could add a cybersecurity certification, or a biology major could earn certifications to become a medical lab professional
- Receive prior learning credit for a certification that would count toward a bachelor's degree program
- Experience better pay, higher employment rates, and increased job opportunities sooner and possibly more affordably than if a degree and certification were pursued separately

Certification Bodies

- Increase awareness and attainment of their certification as well as improve understanding of how the certification relates to a variety of career and credential pathways
- Better understand how a broad-based education afforded by a bachelor's degree contributes to the success of industry professionals who hold both degrees and certifications
- Expand partnerships with universities to develop new programs to meet recertification requirements to maintain a certification
- Build relationships with professionals earlier in their career, adding new voices to help them understand changing demands for their certifications

Universities/Higher Education

- Improve responsiveness of universities to the needs of students and employers
- Recruit new students by developing more opportunities to count certifications for academic credit toward a bachelor's degree
- Differentiate their programs from other higher education programs
- Support a variety of student segments including unemployed workers (due to COVID-19 or automation), non-traditional students, and traditional students alike
- Help faculty learn to better articulate the skills they are imparting to students
- Strengthen relationships with employers
- Engage faculty in developing curriculum that is both academically rigorous and labor market relevant

- Facilitate the ease in which students move from the university to the labor market, and back again

Hiring Managers/Employers

- Have access to more information about what an individual knows and is able to do if they earned both a degree and a certification
- Know that an individual has specific competencies that are required to perform a job in addition to a broad-based education
- Know that individuals who earn a certification and re-certify will continue to learn and update their skills. This complements the bachelor's degree which is representative of an individual's knowledge at the time of attainment
- Establish stronger relationships with both universities and certification bodies that can contribute to the employer's broader workforce development strategy

Overall Societal Value

- Strengthen the value of each credential
- Result in improved career outcomes for students and workers
- Build a common language and common currency around skills that cross universities, employers, certification bodies, and the public at large

Appendix J: About Workcred, APLU/USU, and UPCEA

Workcred

Formed in 2014, Workcred is an affiliate of the American National Standards Institute (ANSI) whose mission is to strengthen workforce quality by improving the credentialing system, ensuring its ongoing relevance, and preparing employers, workers, educators, and governments to use it effectively. Workcred's vision is a labor market that relies on the relevance, quality, and value of workforce credentials for opportunities, growth, and development.

Association of Public and Land-grant Universities (APLU)

The Association of Public and Land-grant Universities (APLU) is a research, policy and advocacy organization representing over 230 public research universities, land-grant institutions, state university systems, and affiliated organizations. Founded in 1887, APLU is North America's oldest higher education association with member institutions in all 50 U.S. states, the District of Columbia, four U.S. territories, Canada, and Mexico. Annually, member campuses enroll 4.7 million undergraduates and 1.3 million graduate students, award 1.1 million degrees, employ 1.3 million faculty and staff, and conduct $41 billion in university-based research.

Coalition of Urban Serving Universities (USU)

The Coalition of Urban Serving Universities (USU) is a president-led organization committed to enhancing urban university engagement to increase prosperity and opportunity in the nation's cities and to tackling key urban challenges. The Coalition includes public urban research universities representing all U.S. geographic regions. The USU agenda focuses on creating a competitive workforce, building strong communities, and improving the health of a diverse population. USU has partnered with APLU to establish an Office of Urban Initiatives, housed at APLU, to jointly lead an urban agenda for the nation's public universities.

UPCEA

UPCEA and its members brought the knowledge gained from research, benchmarking, and data collection about non-degree credentials, which includes how to expand their use and acceptance. UPCEA's November 2017 convening, "The Future of Credentials," outlined important themes that were incorporated into this series. Participants included deans and other senior administrators responsible for leading institutional efforts in professional, continuing, and online education.

Appendix K: Project Team Bios

Project Co-Principal Investigators

Karen Elzey serves as Associate Executive Director of Workcred and advances its mission to strengthen workforce quality by improving the credentialing system, ensuring its ongoing relevance, and preparing stakeholders to use it effectively. Prior to joining Workcred, she was the vice president of the Business-Higher Education Forum. Ms. Elzey previously served as vice president of the U.S. Chamber of Commerce's Institute for a Competitive Workforce and as founding director of Skills for America's Future, an employer-led policy initiative at the Aspen Institute. She earned her B.A. in American Studies and M.A. in Sports Administration from Miami University, and completed Georgetown University's Executive Leadership Program at the McDonough School of Business.

Sheila Martin is APLU's Vice-President for Economic Development and Community Engagement. In her role, she leads and engages with senior university leaders and policy stakeholders on issues relating to talent and workforce development, innovation, entrepreneurship, and social, cultural, and community engagement, including directing APLU's Commission on Innovation, Competitiveness, and Economic Prosperity. Dr. Martin previously served as the Director of the Population Research Center and of the Institute of Portland Metropolitan Studies, as well as a Professor in the School of Urban Studies and Planning at Portland State University (PSU). Prior to joining PSU, she served as Governor Gary Locke's Economic Development Policy advisor. She earned her B.A. in Political Science and Economics from Southern Illinois University, a M.A. in International Studies from the University of Kentucky, and a Ph.D. in Economics from Iowa State University.

Julie Uranis serves as the Vice President for Online and Strategic Initiatives at UPCEA and the Managing Director of the National Council for Online Education. She leads the planning efforts for the Summit for Online Leadership, which established UPCEA as the source for innovations focused on online leadership, strategy, and management. She also leads the planning of the Online Leadership Roundtable, the premier annual event for postsecondary chief online learning officers focused on thought-leadership and policy. Prior to joining UPCEA she led two units at Western Kentucky University as the Director of Distance Learning and Continuing & Professional Development. She began her career at Eastern Michigan University (EMU) where she held both teaching and administrative positions. She earned her B.A. in History from the University of Michigan-Dearborn, a M.S. in Technology Studies, a Graduate Certificate in Community College Leadership, and her Ph.D. in Educational Leadership, all from EMU.

Other Project Staff

Workcred

Isabel Cardenas-Navia is Workcred's director of research, in which she advances Workcred's research agenda to examine workforce credentialing issues and needs. Previously, Dr. Cardenas-Navia was the vice president of programs, and previously the director of emerging workforce programs, with the Business-Higher Education Forum (BHEF). Through her career, she led and facilitated projects bringing

together Fortune 500 employers and higher education institutions; produced novel research on workforce issues in emerging technical fields. Prior to BHEF, Dr. Cardenas-Navia was the president and founder of Alta Vision Consulting, where she provided short-term, project-based consulting in policy and workforce development in scientific and technical fields. Dr. Cardenas-Navia also served as a post-doctoral fellow with the National Human Genome Research Institute. She has a Ph.D. in Biomedical Engineering and certificate in Biomolecular and Tissue Engineering from Duke University, and a B.S. in Mechanical Engineering from Yale University.

Janet Forte serves as a senior manager of operations at Workcred where she oversees the day-to-day management of Workcred, its Board and advisory councils, consulting contracts, research, and educational activities. Previously, Ms. Forte served as a program administrator in standards facilitation at the American National Standards Institute (ANSI), where she gained broad experience working with the Homeland Defense and Security Standardization Collaborative, the ANSI Network on Smart and Sustainable Cities, the America Makes & ANSI Additive Manufacturing Standardization Collaborative, and the Energy Efficiency Standardization Coordination Collaborative. She holds a B.A. in Spanish, with a minor in Criminal Justice from Campbell University, and a Master of International Studies, with a concentration in sustainability, from North Carolina State University.

Roy Swift is the executive director of Workcred and previously served as the chief workforce development officer at ANSI. His previous position at ANSI was the senior director of personnel credentialing accreditation programs. Prior to ANSI, Dr. Swift was a consultant to educational, certification, licensure and health care organizations. From 1993-1998, he was executive director of the National Board for Certification in Occupational Therapy. This appointment followed a 28-year career in the United States Army Medical Department. Dr. Swift holds a B.S. in occupational therapy from the University of Kansas, an M.S. Ed. from the University of Southern California, and a Ph.D. in continuing and vocational education with an emphasis in continuing competency in the professions from the University of Wisconsin-Madison. He has also successfully completed the University of Chicago's three-week management development course.

APLU

Shalin R. Jyotishi was the Assistant Director for Economic Development and Community Engagement at the Association of Public and Land-grant Universities (APLU), North America's oldest higher education association. Shalin directed APLU's signature Innovation and Economic Prosperity Universities program and served as a core researcher and strategist in the areas of workforce development and R&D innovation ecosystem building. Outside of APLU, Shalin fulfills his entrepreneurial calling as CEO of the Journal of Science Policy and Governance, Inc., a non-profit organization and peer review publication focused on student policy engagement. He has held past roles at the Alfred P. Sloan Foundation, the American Academy of Arts and Sciences, the University of Michigan, and the American Association for the Advancement of Science. He is a proud graduate of the University of Georgia, the birthplace of public higher education, where he was an editor for the *Education Law and Policy Review* and supported research at the UGA Institute of Higher Education.

Andréa Rodriguez is a first-generation and bilingual high school and college graduate working in higher education. She oversees the universities' strategic and continuous improvement models to help develop a sustainable and scalable framework to support: 1) equity, 2) community capital and assets, and 3) student-centered experience and learning. Currently, Andréa serves as Assistant Director for the Office of Urban Initiatives at the Coalition of Urban Serving Universities (USU), a partner of the Association of Public and Land-grant Universities. Her work focuses on three critical areas: University Transformation, Student Success, & the Future-of-Work. Andréa earned her B.S in English Literature and her M.A. in Liberal Studies with a focus on Secondary Education from The College at Brockport, SUNY. She later pursued a Master of Education in Higher Education Administration with a focus on Student Affairs from George Washington University. She is currently completing her Ed.D. in Educational Leadership and Management, focusing on Education Policy at Drexel University.

UPCEA

Jordan DiMaggio joined UPCEA in April 2013 as its Database and Communications Specialist. In August of 2014, Jordan became UPCEA's Associate Director of Communications and in February 2017 he became the Associate Director of Policy + Communications for the organization. Jordan oversees all association and conference webpages while providing email and content marketing expertise. He also is the community manager for UPCEA's professional networking platform. Prior to joining UPCEA, Jordan worked on Capitol Hill for former U.S. Senator Jeff Bingaman as his Systems Administrator and Legislative Aide. He graduated from the University of New Mexico with a bachelor's degree in Political Science.

Robert Hansen has served as Chief Executive Officer of UPCEA since September 2010. He has led the century-old organization through dramatic changes since that time. He established the Center for Research and Marketing Strategy in 2011 and then established a number of initiatives targeting the association's unique role in online leadership and management under the umbrella of the Center for Online Leadership: the Summit for Online Leadership, the Online Leadership Roundtable for chief online learning officers, and the *UPCEA Hallmarks of Excellence in Online Leadership*, which were endorsed by several leading associations serving the C-suite and other organizations in the online space. Hansen previously served as Associate Provost for University Outreach at the University of Southern Maine, a regional public university located in Portland, Maine. Hansen earned a B.S. in Psychology from the University of Illinois, an M.A. in English Language and Literature from the University of Michigan, and a Ph.D. in English from the University of Notre Dame.

Molly Nelson joined the UPCEA team as Director of Marketing and Communications in 2014. Molly directs the association's internal and external marketing and communications efforts, including the bi-weekly *UPCEA Briefing* e-newsletter and the association's *Unbound: Reinventing Higher Education* e-magazine. She also manages the production of other publications and event collateral. Molly received her baccalaureate degree in English and Psychology from The George Washington University and also received a master's degree from the Communication, Culture and Technology program at Georgetown University.