



# TRUST: THE VALUE OF PESC

## COMMUNITY SOURCED OPEN DATA STANDARDS

ENABLING COST-EFFECTIVE CONNECTIVITY BETWEEN DATA SYSTEMS IN ORDER TO ACCELERATE PERFORMANCE AND SERVICE, TO SIMPLIFY DATA ACCESS AND RESEARCH, AND TO IMPROVE DATA QUALITY ALONG THE LEARNER LIFECYCLE

# TRUST: THE VALUE OF PESC

## COMMUNITY SOURCED OPEN DATA STANDARDS

### COLLABORATION FOR THE GREATER COMMON GOOD OF LEARNER ACHIEVEMENT

In fulfilling its 501 (c)(3) non-profit mission, all PESC APPROVED STANDARDS and technical information are made available to the education community online free of charge.

### PESC APPROVED STANDARDS & TECHNOLOGY

PESC TECHNOLOGY and PESC APPROVED STANDARDS are community-sourced and driven by PESC serving as an incubator to pilot and launch data standards using an open, transparent and collaborative process; and serving as an open data standards-development and open data standards-setting body governing resource mapping and maintenance of education eco-system taxonomies, schemas and shared code sets in various technologies (EDI, XML, PDFxml, JSON) produced as PESC APPROVED STANDARDS.

PESC APPROVED STANDARDS are platform and application neutral; adopted and integrated in systems, networks, applications, products and services; support a transaction or business process, and; can be implemented or used one independently from another.

PESC – Postsecondary Electronic Standards Council  
1250 Connecticut Ave NW ~ Suite 200  
Washington, D.C. 20036  
+1.202.261.6516  
[www.pesc.org](http://www.pesc.org)  
  
MICHAEL D. SESSA  
PESC PRESIDENT & CEO  
OCTOBER 14, 2017  
V O.1

## WHO WE ARE

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Established in 1997 at the National Center for Higher Education, PESC is an international 501(c)(3) non-profit, community-based, umbrella association with headquarters in Washington, D.C. of:

*Application Centers*

*Assessment & Testing Agencies*

*Colleges & Universities*

*College, University & State/  
Provincial Systems*

*Credential Service Providers*

*Data, Software & Technology  
Service Providers*

*Local, State/Provincial & Federal  
Government Offices*

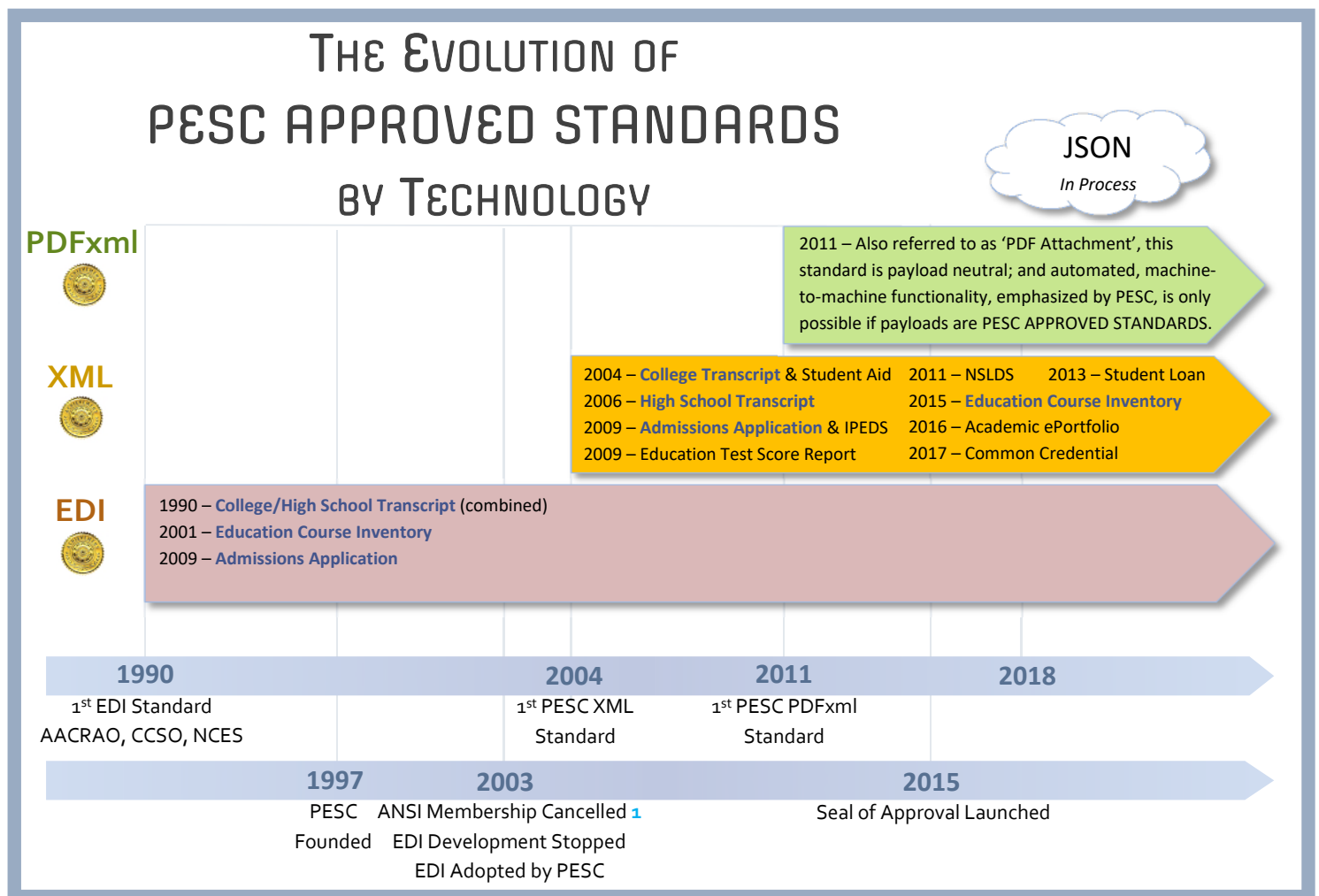
*Non-Profit Associations,  
Foundations & Organizations*

*Professional & Commercial  
Organizations*

*Student Information System  
(SIS) Vendors*

## ORGANIZATIONS TRUST PESC APPROVED STANDARDS TO EXCHANGE, EQUATE, LINK/ AND COMPARE DATA

As a new technology emerges, the PESC Community develops and produces a corresponding PESC APPROVED STANDARD to support that technology. This approach provides more tools and options for users and implementers with various needs or limited technical capacity, bridges sectors that may prefer one technology over another, and provides a trusted solution in which the value, integrity, meaning and identification protocols of the data content are identical regardless of which technology is preferred. Table 1 below illustrates how preferences in technology have driven the evolutionary development of PESC APPROVED STANDARDS.



**Table 1. The Evolution of PESC APPROVED STANDARDS by Technology**

As the community adopts a new technology, PESC develops and produces a corresponding PESC APPROVED STANDARD in that technology. Data contained in a PESC APPROVED STANDARD in one technology is equal in value and integrity to the same PESC APPROVED STANDARD in a different technology. For example, one organization using the PESC APPROVED College Transcript in EDI can trust another organization using the PESC APPROVED College Transcript in XML as development and production (through mapping) use the same definitions, taxonomies and code sets.

#### GLOSSARY OF TERMS

<b>AACRAO</b>	American Association of Collegiate Registrars & Admissions Officers	<b>JSON</b>	JavaScript Object Notation   JSON - LD (Linked Data)
<b>ANSI</b>	American National Standards Institute, US Chamber of Commerce	<b>NCES</b>	National Center for Education Statistics, US Dept. of Education
<b>CCSSO</b>	Council of Chief State School Officers	<b>NSLDS</b>	National Student Loan Data System
<b>EDI</b>	Electronic Data Interchange	<b>PDFxml</b>	Portable Data Format XML data embedded
<b>IPEDS</b>	Integrated Postsecondary Education Data System	<b>XML</b>	eXtensible Markup Language

## TRUST IN THE PESC STANDARDS DEVELOPMENT, APPROVAL AND MAINTENANCE POLICIES AND PROCEDURES

PESC is governed by an open, rigorous, disciplined and consistent process governed by PESC Members through the Standards Development Forum for Education, which is comprised of the Change Control Board, Technical Advisory Board, Standards Development Workgroups and a Steering Committee. These groups work in coordination with all PESC development, have inter-organizational representation, and together determine and propose all candidates for approval by PESC Members as official standards. Important milestones to note along the development, approval and maintenance process:

- To ensure openness, transparency and 'co-opetition' (equal cooperation among competitors), all PESC development must initiate with a formal **Letter of Intent**. The *Letter of Intent*:
  - Submitted by at least two PESC Members interested in developing and using PESC for production of an industry-based data standard.
  - Includes use or business case(s), appropriate justifications and articulations on why development and usage of an industry-based data standard are needed and/or required.
  - Issued publicly to allow all stakeholders the opportunity to participate before development starts.
- The **Launch** of a PESC workgroup to develop the proposed candidate for standardization is announced publicly again to allow other stakeholders the opportunity to participate in development.
- Once development is complete, the proposed candidate for standardization is released to the general public for a formal thirty-day **Public Comment Period** after which all comments are reviewed, considered and assessed for inclusion in the proposed candidate.
- With development and a thorough series of opportunities for public inclusion completed, PESC processes the candidate for **Approval, Ratification and Release** as a PESC APPROVED STANDARD. All PESC APPROVED STANDARDS include:
  - XML schema that outline data file design and structure
  - Implementation Guides that help explain and describe adoption and use
  - Instance Documents that display examples based on sample data
- **Maintenance and Release Management** of PESC APPROVED STANDARDS are conducted through PESC User Groups and the Standards Development Forum for Education.

PESC APPROVED STANDARDS by Technology	EDI	XML	PDFxml
<i>Academic College Transcript</i>	x	x	x
<i>Academic ePortfolio</i>		x	x
<i>Academic High School Transcript</i>	x	x	x
<i>Admissions Application</i>	x	x	x
<i>Common Credential for Certificates, Degrees &amp; Diplomas</i>		x	x
<i>Education Course Inventory (Catalog)</i>	x	x	x
<i>Education Test Score Reporting</i>		x	x
<i>IPEDS &amp; NSLDS</i>		x	x
<i>Student Financial Aid</i>		x	x

**Table 2. PESC APPROVED STANDARDS by Technology.** Development is driven by PESC Members.

## LEADING THE ESTABLISHMENT AND ADOPTION OF OPEN DATA STANDARDS ACROSS THE EDUCATION DOMAIN

PESC Partnerships, Affiliations and a User Community are developed and maintained by PESC to ensure coordination and interoperability across education and industry sectors.

### PESC Partnership and Affiliations

- Access 4 Learning (PK12)
- American Association of Collegiate Registrars and Admissions Officers
- APEREO (Open Source)
- Association of Registrars of the Universities and Colleges of Canada
- EMREX (Europe)
- Erasmus Without Paper (Europe)
- Groningen Declaration Network
- HR Open Standards
- Internet2
- State Higher Education Executive Officers
- U.S. Department of Education's Common Education Data Standards Initiative



### The PESC User Community

comprised of leaders and experts spanning policy, practice and technology at all levels from among the PESC Membership – ensure a holistic, pragmatic approach in believing that fostering open, transparent collaboration across educational communities to solve common and industry-shared problems brings much needed clarity, education and coherence to the education eco-system.



## CURRENT AND FUTURE CONSIDERATIONS

Factors that are currently under consideration by PESC due to their potential future impact on PESC's Partners, Members, Affiliates and/or Users:

### JSON and JSON-LD

Several PESC Members have begun transforming PESC APPROVED XML STANDARDS to JSON, a 'lightweight data-interchange format often offered as an alternative to XML' (*Google*), due to its compatibility with web services. In response to the emergence of JSON, PESC formed a JSON Task Force to develop and recommend the guidelines in using JSON as a PESC APPROVED STANDARD. Factors that are currently being considered by the JSON Task Force:

- 1) With a number of tools available (e.g. JAXB – Java Architecture for XML Binding), should the output of the PESC APPROVED STANDARD be ***Guidelines and Rules for Transforming XML to JSON*** (which would include additional supporting documentation, such as an XSLT stylesheet)?
- 2) In researching the utility and application of ***JSON-LD*** (JSON for Linked Data), the Task Force has received mixed messages. What impact is JSON-LD having in the industry and what role should it play in PESC development?
- 3) PESC Partner Access 4 Learning (A4L), primarily in the PK12 education space, is also considering the identical factors in addressing its approach to JSON. PESC and A4L have agreed to partner on their approach to JSON to ensure continued collaboration and interoperability. What other organizations would be appropriate for partnership?

### Diploma Supplement

The final guidelines for the ***Diploma Supplement*** were recently released by the European Commission and are required to be followed. The Diploma Supplement compliments the *Transcript of Record* (used in Europe as well – similar to the PESC APPROVED College Transcript) but adds new specific data elements. Europe's adoption of the Diploma Supplement will impact many other regions of the world, including Canada, Australia, New Zealand, the USA and others. Factors that are currently being considered by PESC as a result of the new guidelines for the Diploma Supplement:

- 1) Will Europe develop their own standard? If so, is there demand from the PESC Community and should PESC develop a corresponding PESC APPROVED STANDARD to bridge the European Diploma Supplement Standard? If not, should PESC organize a development workgroup, through Members and partnerships with AACRAO, the Groningen Declaration Network, Credential Engine, among others, to develop a PESC APPROVED STANDARD for adoption and implementation in Europe, Canada, Australia and New Zealand?
- 2) What impact might ***Blockchain*** have on the development of the Diploma Supplement and how is that to be tracked or monitored?
- 3) Can funding be obtained to support this development? If yes, which organizations are the stakeholders? If not, can PESC support development without funding?

## PESC EdExchange

PESC EdExchange is a neutral data exchange platform and digital look-up service, (Application Platform as a Service – aPaaS or PaaS), designed as a peer-to-peer network providing a secure, reliable and direct connection between users avoiding file-based technologies. EdExchange is operated by PESC and directly managed by PESC Members. The foundation of the service is a directory 'look up' server that lists institutions, service providers and others that are able to exchange data electronically. The server itemizes the technical capacity of each, which document types are supported electronically and additional identifier data. To exchange data, users then connect directly with the respective recipient.

Several pilots for EdExchange (California Community Colleges and Parchment) have been successfully completed and EdExchange is ready to progress to the next level. Organizations in Europe and Canada have expressed high interest in EdExchange and PESC is investigating establishing corresponding pilots due to this interest. Factors that are currently being considered by PESC as a result of the interest in EdExchange:

- 1) How can PESC establish pilots with EMREX and/or Erasmus Without Paper? Both European initiatives are focused on data sharing and exchange and are at the same stage in the product development lifecycle.
- 2) Can funding be obtained to support these pilots? If yes, which organizations are the stakeholder? If not, can PESC support establishment of these pilots without funding?

**1 Background on PESC and ANSI:** At the time of founding in 1997, PESC's identity as a data standards-setting body had not been established; yet, the community acknowledged the need for a formal standards body to review and approve any development work conducted under PESC. The solution implemented was for PESC and all the founding PESC Member organizations (AACRAO, Citibank, NASFAA, NCHELP, U.S. Department of Education, etc.) to join ANSI's X12 Committee, a cross-industry committee developing and producing ANSI Approved EDI Standards, and establish *Subcommittee A on Education*, of which PESC served as Chair. Two EDI standards were developed and produced with ANSI approval: the combined EDI High School/College Transcript and the EDI Education Course Inventory. ANSI's approach to the emergence of XML, however, was not viewed favorably by many in the Education Subcommittee, and coupled with a new ANSI approval process, which in a best-case scenario was projected to be a minimum of 3 years, lead all organizations within the Education Subcommittee to terminate membership in ANSI (which also dissolved the Education Subcommittee), and nurture PESC so that it could establish itself as a data standards-development and data standards-setting body. With knowledge garnered from the ANSI standards approval process combined with experience in standards development in student financial aid, PESC developed open, transparent ANSI-inspired *Policies and Procedures* for its newly established Standards Development Forum for Education, a PESC member-driven committee to develop and present candidates for standardization to PESC Members for approval and ratification.

## Attachments

### **1. Sample of Letter of Intent**

*Common Credential for Certificates, Degrees & Diplomas*

### **2. Sample of Announcement to Launch Development**

*Common Credential for Certificates, Degrees & Diplomas*

### **3. Sample of Announcement for 30-Day Public Comment Period**

*Common Credential for Certificates, Degrees & Diplomas*

### **4. Sample of Announcement of Approval and Ratification**

*Common Credential for Certificates, Degrees & Diplomas*

### **5. PESC Footprint**

### **6. The Value of Standards**

### **7. Annual PESC Best Practices Competition 1<sup>st</sup> Place Winner 2016**

iQ4 and National Student Clearinghouse | *Extending the Capacity of Higher Education to Scale the Output of Verified Workforce-Ready Graduates*





## Attachment #1

### 1. Sample of Letter of Intent

*Common Credential for Certificates, Degrees & Diplomas*

**STANFORD  
UNIVERSITY**

**UNIVERSITY OF MARYLAND  
UNIVERSITY COLLEGE**

**UNIVERSITY OF  
SOUTHERN CALIFORNIA**

**AACRAO**

## LETTER OF INTENT

### COMMON CREDENTIAL FOR CERTIFICATES, DEGREES & DIPLOMAS

March 22, 2016

Michael Sessa  
PESC President & CEO  
1250 Connecticut Ave NW  
Suite 200  
Washington, D.C. 20036

We are pleased to submit to PESC this Letter of Intent (LOI) to communicate that Stanford University, the University of Maryland University College, the University of Southern California and AACRAO intend to work openly, transparently and collaboratively with the education community through PESC to develop an XML-based data standard: Common Credential for Certificates, Degrees and Diplomas.

We propose development, submission and consideration of this Common Credential as a PESC Approved Standard. This proposed standard can be used by any organization, school, college and university, district and state and/or service provider to fully communicate degrees, certifications and other similar credentials obtained by the student. Our deliverables will include the XML Schema, an Implementation Guide, and Instance Documentation.

While the traditional transcript contains comprehensive information about a student's educational experience, in some instances only a simple verification of a degree, diploma, certification or other credential is needed. While this standard does not propose to replace the traditional transcript, we look to meet the growing demand, now emerging across the landscape but especially in transfer, labor and workforce sectors, to verify credentials. A brief business case and justification is attached.

We are pleased to collaborate on this Letter of Intent and look forward to preparing and using an international data standard that will greatly enhance the process of communicating and verifying credentials.

Sincerely,

**TOM BLACK**  
ASSOCIATE VICE PROVOST  
& UNIVERSITY REGISTRAR  
STANFORD UNIVERSITY

**TUAN ANH DO**  
PESC BOARD OF DIRECTORS  
REPRESENTING THE  
AMERICAN ASSOCIATION OF  
COLLEGIATE REGISTRARS &  
ADMISSIONS OFFICERS

**PATRICK ELLIOTT**  
PESC BOARD OF DIRECTORS  
ASSOCIATE REGISTRAR  
UNIVERSITY OF MARYLAND  
UNIVERSITY COLLEGE

**W. MATT BEMIS**  
PESC BOARD OF DIRECTORS  
ASSOCIATE REGISTRAR  
UNIVERSITY OF  
SOUTHERN CALIFORNIA

# **The Business Case for the Development of a PESC Standard in XML for Supporting Credentialing and Experiential Learning Records and for Enhancing Data Exchange Mobility**

## **Overview**

The current transcript, designed to record learning in the form of course enrollments, courses credits and grades, is no longer a sufficiently robust approach to satisfy the needs of the modern learner. The current transcript standard was designed to record learning in the form of course enrollments, courses credits and grades. Higher Education institutions have long adopted the Carnegie Unit as policy which specifies that learning be recorded in the form of time. The GPA (grade point average), a calculation based on that standard, was commonly used to demonstrate a student's achievement. While the transcript and the Carnegie Unit have served the academy well for over a hundred years, changes in pedagogy and technology have caused a greater awareness that learning should not be measured just as course credits and grades, but should be more descriptive. Learning outcomes and a variety of other assessment methods are a means to describe learning more in the form of skills, capacities and abilities mastered, in addition to content knowledge acquired.

While there are new ideas about what should be recorded, Higher Education has not coalesced around a single approach, or even a handful of approaches. It will take time to settle on the best way to describe and record the learning that takes place on campuses. Further, non-curricular or experiential learning, arguably counting among the most important activities in which students can engage, is increasingly considered worthy of noting and recording, alongside the curricular learning that leads to majors and minors and ultimately degrees.

Starting over twenty-five years ago, transcript and course inventory standards were promulgated to enable the portability of the established records of the academy as data. EDI, XML and PDF formats have been employed in a variety of use cases to make data exchange quite common at least within Higher Education. Certainly many students benefit from the ease with which courses and credit information have transferred between institutions. And, the use of the PDF format has made it easier for the exchange of student achievement information with third parties outside Higher Education.

It is not too early to think about how to capture and convey learning data that describes experiential learning alongside one of its most common expressions of acknowledgement, the certificate credential. Paper certificate credentials have been in existence for centuries and are used by many organizations and institutions to recognize participation, completion or achievement. However, there is no standard at present enabling the exchange of information related to the certificate credential. Thus, it is

hereby proposed that the following XML standard begin to serve as a means both to create the digital form of the certificate credential and to embed within it the information that the certificate credential recognizes. Certainly this credential standard could be adopted to convey diploma information as well. The principal value proposition for a digital credential is to convey to the learner what (s)he has learned or achieved, but it must also provide a standardized form for the learner so that the personal data it contains may be more easily controlled and shared with others using certification and authorization technology commonly available today.

### **Credentialing and Experiential Learning Records Standard Description**

The standard is designed for both electronic certification production and recording credential learning records. The design of new standard incorporates current PESC standards. The new standard composes in 3 main sections:

1. *Transmission Data Section:* This section uses the existing PESC Request and Response of the XML Transcript standard. It describes the requesting source, i.e., in this use case, the organization or institution, and it also describes the destination, i.e., in this use case, the service provider for credential creation. It serves the same purpose as the PESC PDF (Portable Document Format) attachment standard, which is to make data exchange effective and machine-readable.
2. *Document Production Section:* This section has information for digital certificate file production. The data is used for presenting a statement of learning achievement levels and learning result recognition. The section also describes the data format requested, such as XML, PDF, or PDF with attachment.
3. *Credential Learning Record Detail Section:* This section describes acknowledgment of credential learning records and expression of learning that is more explicit in terms of intellectual skills, outcomes, goals or capacities. It adopts PESC Core Main Components, Education Course Inventory and College Transcript standards. This section is used in PDF attachments for better description and for machine-readable learning records.

### **Business Process Supports the Standard**

The new proposed standard supports the following business process scenarios:

#### **Scenario 1:**

The organization or institution produces an XML file that follows the standard when a learner participates, completes or achieves success in a supervised activity or program.

### *Scenario 2:*

The XML file is transmitted from the organization or institution to a service provider, the destination, for the creation of a digital artifact or credential—usually rendered in PDF format—using information from the Transmission Data Section.

### *Scenario 3:*

The service provider takes information from the Document Production Section to generate a digital artifact (usually per PESC PDF standard) as specified by the organization or institution. Credential Learning Record Detail Section relays comprehensive information about the supervised activity or program that is appended as an attachment file to the PDF artifact.

### *Scenario 4:*

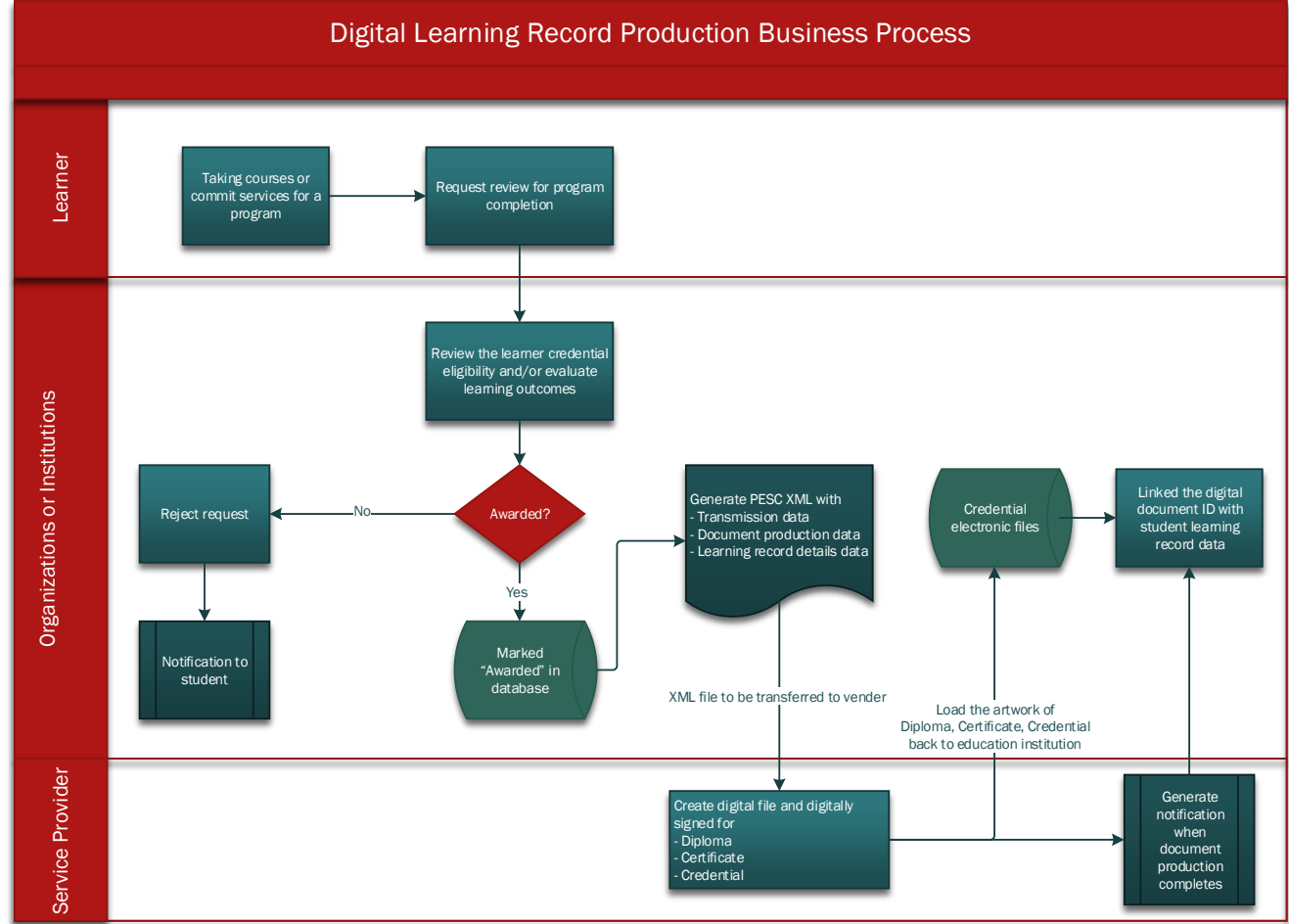
The organization or institution provides both digital versions of the artifact file and the appended detailed credential learning records to learners who in turn can make these available to other authorized third parties that request access.

### *Scenario 5:*

The learner also exports such digital artifacts and appended information to a variety of software locally hosted, on mobile devices or in the cloud. Any authorized third parties viewing these data via the Internet can validate the detailed learning records. The new standard can be used for better data presentation in either a contextual or graphical way.

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Digital Learning Record Production Business Process Diagram



Planned Collaboration for Developing the Standard

The work group is composed of staff from professional education enterprise system consulting firms, representatives from postsecondary institutions including members of AACRAO, representatives of educational software and service providers, representatives of state and federal agencies interested in credentialing and experiential learning records, and any others interested in the project.



## Attachment #2

### 2. Sample of Announcement to Launch Development

*Common Credential for Certificates, Degrees & Diplomas*



FOR IMMEDIATE RELEASE

April 12, 2016

Contact:

Jennifer Kim

PESC Membership Services Director

+1.202.261.6516

## COMMON XML CREDENTIAL DATA STANDARD FOR CERTIFICATES, DEGREES AND DIPLOMAS LAUNCHED BY PESC

(Washington DC) – PESC is pleased to announce that leaders from Stanford University, University of Maryland University College, University of Southern California, and the Association of American Collegiate and Admissions Officers (AACRAO) are collaborating through PESC to develop a **COMMON CREDENTIAL DATA STANDARD** for certificates, degrees and diplomas.

According to the Letter of Intent submitted on March 22, 2016, “the proposed standard can be used by any organization, school, college and university, district and state/province and/or service provider to fully communicate degrees, certifications and other similar credentials obtained by the student.”

*“By creating a standard credential data schema that provides more explicit expression of learning, it is hoped that in addition to helping learners to become more self-aware, third parties with whom the learners share this information could use it to further benefit the learners or the enterprises with which the learners are engaged.”*

*-Tom Black, Associate Vice Provost & University Registrar, Student and Academic Services at Stanford University and Chair of PESC's Academic Credentialing and Experiential Learning Task Force.*



FROM THE LETTER OF INTENT: While the traditional transcript contains comprehensive information about a student's educational experience, in some instances only a simple verification of a degree, diploma, certification or other credential is needed. While this standard does not propose to replace the traditional transcript, we look to meet the growing demand, now emerging across the landscape but especially in transfer, labor and workforce sectors, to verify credentials.



Development of the Common Credential will officially begin at the PESC Spring 2016 Data Summit. Leaders from PESC's Academic Credentialing and Experiential Learning Task Force will present ***Evolution of Data Records Management for Credentialing and Experiential Learning Parts I & II*** to attendees; and in subsequent concurrent sessions, at which the Task Force meets, will continue discussions of this emerging work and continue the dialogue from its quarterly Task Force meetings.

PESC's Task Force and list for the Academic Credentialing and Experiential Learning are open to the general public. Registration for ***Best Practices in Education Data Systems / PESC's Spring 2016 Data Summit*** is still available. Please check [www.pesc.org](http://www.pesc.org) for more information.

NOTE: *The Letter of Intent, required by PESC's strict Policies and Procedures Manual for development under the Standards Forum for Education, serves as the foundational artifact in open, community-based efforts and communicates transparently to the education technology community at-large to ensure alignment and interoperability with all other technology and data initiatives. Once development work is completed, the PESC Change Control Board will authorize release of the proposed Common Credential standard for a 30-day public comment period, followed by a PESC Member vote, and then ratification by the PESC Board of Directors as ratification as a PESC Approved Standard.*

#### **ABOUT PESC**

Established in 1997 and headquartered in Washington, D.C., PESC is an international, 501 (c)(3) non-profit, community-based, umbrella association of data, software and education technology service providers; local, state/province & federal government agencies; schools, districts, colleges and universities; college, university and state/province systems; professional, commercial and non-profit organizations; and non-profit associations and foundations.

Through open and transparent community participation, PESC enables cost-effective connectivity between data systems to accelerate performance and service, to simplify data access and research, and to improve data quality along the Education lifecycle. PESC envisions global interoperability within the Education domain, supported by a trustworthy, inter-connected network we call *EdUnify* - built by and between communities of interest in which data flows digitally and seamlessly from one community or system to another and throughout the entire eco-system when and where needed without compatibility barriers but in a safe, secure, reliable, legal, and efficient manner.

While PESC promotes the implementation and usage of data exchange standards, PESC does not set (create or establish) policies related to privacy and security. Organizations and entities using PESC Approved Standards and services should ensure they comply with FERPA and all local, state, federal and international rules on privacy and security as applicable. For more information, see [www.PESC.org](http://www.PESC.org).

# # #



## Attachment #3

### 3. Sample of Announcement for 30-Day Public Comment Period

*Common Credential for Certificates, Degrees & Diplomas*



FOR IMMEDIATE RELEASE

January 23, 2017

Contact:

Jennifer Kim

PESC Membership Services Director

+1.202.261.6516

jennifer.kim@pesc.org

## **COMMON CREDENTIAL PROPOSED STANDARD RELEASED FOR 30 DAY PUBLIC COMMENT PERIOD**

### **UPDATED XML TECHNICAL SPECIFICATION INCLUDED FOR COMMENT**

*Washington DC* – The Board of Directors of PESC is pleased to announce the release of the *Common Credential for Certificates, Degrees and Diplomas*, a proposed standard, for a 30 day public comment period. The XML development work which started in early 2016, has been meticulous, collaborative and transparent, and leaders have worked painstakingly to ensure major stakeholders participated in the development, analyzed and evaluated development work, and contributed to a more robust and usable standard.

“This credential standard will promote interoperability where presently there is none for credentials that serve as alternatives to the academic transcript,” states Thomas Black, Associate Vice Provost & University Registrar, Student and Academic Services at Stanford University and Chair of PESC’s Academic Credentialing and Experiential Learning Task Force. “There is great potential to innovate using this standard, and now it is time for our respective communities to embrace the ideas and concepts that are incorporated in the standard for the betterment and prosperity of our students and graduates holding these credentials,” Mr. Black continues.

The PESC directive that launched this development concluded that while the traditional transcript contains comprehensive information about a student’s educational experience, in some instances only a simple verification of a degree, diploma, certification or other credential is needed. While this standard does not propose to replace the traditional transcript, the PESC community looks to meet the growing demand, now emerging across the landscape but especially in transfer, labor and workforce sectors, to verify credentials.

“In true collaboration, PESC’s Technical Advisory Board has also released an updated version of PESC’s XML Technical Specification, on which the Common Credential is based, and we’re asking for public comment on the XML Technical Specification as well,” states Michael Sessa, PESC President & CEO. “The XML Technical Specification is the result of merging PESC’s original specification with that of the U.S. Department of Education’s specification in 2003, a major milestone in the history of PESC, as with a combined, single XML Technical Specification, technical interoperability is now baseline enabling applications and data to flow throughout the education network,” Mr. Sessa continued.

**THE 30 DAY PUBLIC COMMENT PERIOD OPENS TODAY JANUARY 23, 2017  
AND EXPIRES AT THE CLOSE OF BUSINESS ON FEBRUARY 21, 2017.**

The proposed standard is posted at [www.PESC.org](http://www.PESC.org). Included as the 'standard' are the Implementation Guide, XML Schema and Sample Instance Document. The PESC community is also asked to review and comment on the newly updated *PESC XML Technical Specification*. All comments from the PESC community and the general public must be made by e-mail to PESC President & CEO at [Michael.Sessa@PESC.org](mailto:Michael.Sessa@PESC.org). Public comments can address any and/or all part of the standard being proposed. The comment e-mail should clearly identify the:

- 1) Responder full name and appropriate contact information (phone, email, organization, etc);
- 2) Source of the comments, i.e., whether the comments are individual or originate from a group the responder represents;
- 3) Nature of the responder's interest in the standard (what is the issue and why is it important?);
- 4) Element(s) of the proposed standard with which issue is taken;
- 5) Changes suggested resolving the issue(s).

### **The Process for PESC APPROVED STANDARDS**

Within 30 calendar days after the close of the public comment period, the Change Control Board (CCB) of PESC's Standards Forum for Education will address and consider all public comments and make, in consultation with the Academic Credentialing and Experiential Learning Workgroup any necessary revisions. All public comments will be posted to the PESC website during the review process. The CCB's consideration/revision period expires on March 23, 2017 unless extenuating circumstances exist which require further deliberation.

Once any changes resulting from the public comment period have been incorporated, the CCB will recommend to the PESC Board of Directors that the proposed Common Credential standard be submitted to a vote by the PESC members. The PESC office will issue electronic ballots to the official contacts of PESC member organizations. Completed ballots, including the reason(s) for any rejection, must be returned to the PESC office via e-mail attachment, fax, overnight delivery, or U.S. Postal Service within ten (10) business days.

Acceptance of the specification as a PESC APPROVED STANDARD requires an affirmative vote of at least 80% of all votes cast. Once the PESC members accept and approve the specification, the PESC Board of Directors will within seven (7) calendar days ratify the vote or refer it back to the CCB with specific instructions for further work.

PESC staff is responsible for the administrative process, including tabulation of the ballots, publication and posting of all necessary documents and communications, and implement version control on all documents, as needed. PESC APPROVED STANDARDS are freely accessible at [www.PESC.org](http://www.PESC.org).

### **ABOUT PESC**

Established in 1997 at the National Center for Higher Education and headquartered in Washington, D.C., PESC is an international, 501 (c)(3) non-profit, community-based, umbrella association of data, software and education technology service providers; schools, districts, colleges and universities; college, university and state systems; local, state/province and federal government agencies; professional, commercial and non-profit organizations; and non-profit associations & foundations.

Through open and transparent community participation, PESC enables cost-effective connectivity between data systems to accelerate performance and service, to simplify data access and research, and to improve data quality along the education lifecycle. PESC envisions global interoperability within the Education domain, supported by a trustworthy, inter-connected network built by and between communities of interest (systems, states, districts, etc.) in which data flows seamlessly from one system to another and throughout the entire eco-system when and where needed without compatibility barriers but in a safe, secure, reliable, and efficient manner.

To achieve its mission and vision, PESC organizes committees, activities and events to: accelerate performance and service, reduce cost, lead collaborative development, set and maintain common data standards, promote best practices, link public and private sectors, and serve as data experts.

# # #



## What is PUBLIC COMMENT and why is it important?

Under the PESC development, approval and maintenance policies and procedures process for PESC Approved Standards, public comment period is a necessary and critical step. Organizations use PESC (a 501c3 non-profit) as a neutral link to the education community to ensure an open, transparent process when new electronic reporting or digital formats for data exchange are needed.

With collaboration at its core and an ANSI foundation, this process requires mandatory, proactive efforts be made by PESC to ensure the public and all education stakeholders have equal, sufficient time and preparation in knowing about upcoming standardization initiatives that may directly or indirectly impact their business and/or their processes.

The public process starts when two or more PESC members submit an open *Letter of Intent* requesting that PESC establish a workgroup for development of a standard. PESC publishes this *Letter of Intent* so that PESC members can join the development workgroup; and non-members (the public) can prepare to use the standard once completed (all PESC Approved Standards are open and free to the public.)

Prior to completion, the second primary public effort made by PESC is asking the public to comment on the proposed standard *before* it is released as an international standard. The standard, once approved and released, will stipulate how reporting should be performed electronically, what data elements are included, and will include supporting documentation to describe how the electronic reporting or digital process should be implemented.

In asking the public for comment *now*, we seek the public's opinion on the proposed documentation (e.g. XML Schemas, Implementation Guides, Instance Documents, etc.) to ensure that when used together the proposed standard, if implemented according to how it is described, will serve the need that is envisioned. In providing comment, the public can recommend improvements and/or edits so that the standard once finalized and released is that much more improved. If no public comments are made, then the proposed standard in most cases becomes the final approved and released standard.



## Attachment #4

### 4. Sample of Announcement of Approval and Ratification

*Common Credential for Certificates, Degrees & Diplomas*

FOR IMMEDIATE RELEASE

MARCH 31, 2017

Contact:

JENNIFER KIM

PESC MEMBERSHIP SERVICES DIRECTOR

+1.202.261.6516

## COMMON CREDENTIAL FOR CERTIFICATES, DEGREES & DIPLOMAS RATIFIED AS PESC APPROVED STANDARD XML TECHNICAL SPECIFICATION v 2.2 RELEASED

(Washington DC) – The Board of Directors of PESC is pleased to announce the release of the *Common Credential for Certificates, Degrees and Diplomas* as a PESC Approved Standard, ratified through PESC's development, approval & maintenance process. Now approved and released to the general public, this *Common Credential XML Data Standard* is expected to be used by any organization, college, university, school, district, state, province, and/or service provider to fully communicate degrees, certifications and other similar credentials obtained by the student.

*"This standard does not propose to replace the traditional transcript, but to meet the growing demand, now emerging across the landscape, but especially in transfer, labor and workforce sectors, to verify credentials."*

- Letter of Intent March 22, 2016

- AACRAO  
- Stanford University  
- University of Maryland University College  
- University of Southern California



Tom Black and Mei Hung of Stanford University directed the efforts and team, completing the technical development segment in 10 months.

PESC Members that approved the Common Credential:

- |  |   |
|--|---|
| ➤ AACRAO                                   | ➤ NASLA                                     |
| ➤ AcademyOne                               | ➤ National Student Clearinghouse            |
| ➤ ACT                                      | ➤ Oracle                                    |
| ➤ Alberta Postsecondary Application System | ➤ Paradigm                                  |
| ➤ Bardic Systems                           | ➤ Parchment                                 |
| ➤ California Community Colleges            | ➤ San Francisco State University            |
| ➤ College Board                            | ➤ Stanford University                       |
| ➤ Credentials Solutions                    | ➤ Student Connections                       |
| ➤ ECE                                      | ➤ University of Denver                      |
| ➤ Ellucian                                 | ➤ University of Maryland University College |
| ➤ Florida International University         | ➤ University of Missouri System             |
| ➤ Georgetown University                    | ➤ University of Phoenix                     |
| ➤ IERF                                     | ➤ University of Southern California         |
| ➤ Indiana State University                 | ➤ University of Texas at Austin             |

Documentation for this newly PESC Approved Standard is posted on the PESC website at [www.PESC.org](http://www.PESC.org). Organizations looking to communicate their use of this or any other PESC Approved Standard should contact the PESC offices at 202.261.6516.

(continues)

***“By creating a standard credential data schema that provides more explicit expression of learning, it is hoped that in addition to helping learners to become more self-aware, third parties with whom the learners share this information could use it to further benefit the learners or the enterprises with which the learners are engaged.”***

*- Tom Black, Associate Vice Provost for Student Affairs and University Registrar, Stanford University*

PESC's Academic Credentialing and Experiential Learning Task Force formed and convened for its inaugural meeting at PESC's Fall 2015 Data Summit in Washington, D.C. With Tom Black, Associate Vice Provost for Student Affairs & University Registrar at Stanford University, as Task Force Chair, and Co-Chairs Joellen Shendy, Associate Vice Provost and Registrar at the University of Maryland University College and Alex Jackl, CEO and Founder of Bardic Systems, the Task Force committed to monitoring and tracking current initiatives, providing speakers and presenters at several industry-leading conferences and events, serving as a clearinghouse for information, and ensuring PESC is prepared for standards development work as the community is reaching the point in which standards are needed.

Community development on the Common Credential for Certificates, Degrees & Diplomas initiated at PESC's Spring 2016 Data Summit held April 13, 2016. The entire development cycle and release to the public of this newly PESC Approved Standard (from origination through the joint Letter of Intent, through broad-based testing and open evaluation and vetting, and finalizing with public comment period and approval by the Change Control Board, PESC Members and PESC Board of Directors) took exactly one year.

In continuing to its supportive, complementary message to each initiative that fostering collaboration across educational sectors to solve industry-shared problems brings much needed clarity and coherence to the education eco-system, PESC's Spring 2017 Data Summit is dedicated to *Empowering the Mobility of Digital Academic Credentials*.

PESC is pleased to recently announce the addition of *Connecting Credentials* as co-sponsor for *Empowering the Mobility of Digital Academic Credentials*. *Connecting Credentials'* Co-Director Evelyn Ganzglass joins the PESC program as a featured speaker and will discuss the Marketplace Supply and Demand including the upcoming roll out of new workgroups and initiatives under *Connecting Credentials*.

For more information about the *Empowering the Mobility of Digital Academic Credentials* including registration, see [www.PESC.org](http://www.PESC.org) or tweet us @PESCupdates using #PESCspring17summit.

For more information about *Connecting Credentials*, see [www.ConnectingCredentials.org](http://www.ConnectingCredentials.org).

PESC is sponsored annually by Credentials Solutions, National Student Clearinghouse, Oracle and Parchment Inc. PESC partners include AACRAO, APEREO, ARUCC, EMREX, EWP, Groningen Declaration Network, Internet2, SHEEO, and the US Department of Education's Common Education Data Standards (CEDS) Initiative.

PESC is a proud exhibitor at AACRAO's Annual Meeting and the Annual STATS-DC Conference of the National Center for Education Statistics (NCES) of the US Department of Education and is a proud Affiliate of the NCES National Forum on Education Statistics.

PESC is a proud sponsor of AIR's Annual Conference and of the Annual California Electronic Transcripts Workshop and CCCApply.

PESC is celebrating its 20th Year Anniversary at EDiINTEROP | PESC Fall 2018 Symposium and Data Summit being held in October 2017 in Toronto. A Program Committee is being organized

**ACTIVATING INTEROPERABILITY ACROSS THE EDUCATION DOMAIN**



under the Canadian PESC User Group and a separate announcement will be issued with details and information.

### **ABOUT PESC**

**ESTABLISHED IN 1997 AT THE NATIONAL CENTER FOR HIGHER EDUCATION & HEADQUARTERED IN WASHINGTON, D.C.,** PESC is an international, 501 (c)(3) non-profit, community-based, umbrella association of data, software and education technology service providers; schools, districts, colleges and universities; college, university and state systems; local, state/province and federal government agencies; professional, commercial and non-profit organizations; and non-profit associations & foundations.

### **LEADING THE ESTABLISHMENT AND ADOPTION OF DATA EXCHANGE STANDARDS ACROSS THE EDUCATION DOMAIN.**

Through open and transparent community participation, PESC enables cost-effective connectivity between data systems to accelerate performance and service, to simplify data access and research, and to improve data quality along the Education lifecycle. PESC envisions global interoperability within the Education domain, supported by a trustworthy, inter-connected network built by and between communities of interest in which data flows digitally and seamlessly from one community or system to another and throughout the entire eco-system when and where needed without compatibility barriers but in a safe, secure, reliable, legal, and efficient manner.

**ABOUT PRIVACY** While PESC promotes the implementation and usage of data exchange standards, PESC does not set (create or establish) policies related to privacy and security. Organizations and entities using PESC Approved Standards and services should ensure they comply with FERPA and all local, state, federal and international rules on privacy and security as applicable. For more information, see [www.PESC.org](http://www.PESC.org).

# # #



## Attachment #5

### 5. PESc Footprint



It takes many organizations working together to support students and learning throughout the entire education eco-system and no single organization can do it all alone by itself. PESC, with an open, transparent community-based approach, the cornerstone principle of efforts & initiatives, therefore, seeks out ingenuity, innovators, best practices and organizations with common interests and missions with which to collaborate.

We partnered with the **Office of Federal Student Aid (FSA)** of the U.S. Department of Education early on and merged our separate technical XML architecture and data modeling guidelines into one combined set. With the deployment of FSA's Common Origination and Disbursement System, which included **Common Record** (one combined record to include all federal grants, loans and work-study), **Common Record** became a **PESC APPROVED STANDARD**.

Since then, all federal grant, loan and work-study files have been issued to and between every college & university financial aid office in the country <sup>(1)</sup> in **Common Record**.

Since then as well, we continued with FSA to make **Enrollment Reporting** in the **National Student Loan Data System (NSLDS)** a **PESC APPROVED STANDARD**.

The **Gainful Employment Reporting** standards are expected to be submitted by FSA in the near future.

We partnered with the U.S. Department of Education's **National Center for Education Statistics (NCES)** to make five components of student reporting into the **Integrated Postsecondary Education Data System (IPEDS)** a PESC Approved Standard. Through NCES Reporting, we know that at least 29 states support **PESC Approved Standards**, while we've heard from at least 6 Canadian provinces directly about full adoption of **PESC APPROVED STANDARDS**.

PESC continues to foster new and innovate paths and strengthen our partnerships across sectors and systems to expand our footprint worldwide:

- We are collaborating with stakeholders in Canada through the **Canadian PESC User Group** to promote and adopt interoperability throughout each province.
- With **Internet2** and **InCommon** we partnered and joined forces to launch the **Common Identity & Trust (CommIT)** Collaborative to bring sustainable, reliable *single sign-on* services to the education domain.
- With **ARUCC**, we exchanged memberships allowing each to access the resources and networks of the other.
- We launched **EdExchange** to provide a useful service for data exchange.
- We launched **Single Institution Code** to help manage institutions codes and identifiers.

- With the **Data Quality Campaign (DQC)**, we are affiliates as we support the DQC in the efforts to ensure the use, sharing & exchange of quality data.
- With **State Higher Education Executive Officers (SHEEO)**, we are partners as over 29 states reported their support of **PESC APPROVED STANDARDS** to NCES.
- With the **Institute of Education Sciences (IES)** of the U.S. Department of Education, PESC has been appointed an Affiliate Member of the **National Forum for Education Statistics**.
- We're working with PESC Member **Smarter Balanced Assessment Consortium** to ensure **PESC APPROVED STANDARDS** satisfy state needs.
- As a global leader, PESC has been appointed full signatory to the **Groningen Declaration Network** which furthers the European partnership we established with the Rome Student Systems and Standards Group (RS3G).

To support the development and adoption of **Common Education Data Standards (CEDS)**, PESC partnered with **NCES of the U.S. Department of Education, Council of Chief State School Officers (CCSSO), DQC, the Dell Foundation, the Gates Foundation, Schools Interoperability Framework Association (SIFA) and State Higher Education Executive Officers (SHEEO)**.

The **Common Education Data Standards (CEDS)** span the full student lifecycle from early learning, elementary, secondary, postsecondary and into the workforce and **PESC APPROVED STANDARDS** remain in full alignment with **CEDS**.

With Founding Member **AACRAO**, due to common missions PESC has hosted the **AACRAO SPEEDE Committee** since PESC's formation. AACRAO hosted and nurtured PESC, its activities and events, until formally established.

The **AACRAO** and the **SPEEDE Committee** collaborated with **NCES** and **CCSSO** in the early 1990's to develop admissions and registrar standards in **EDI**, now used by thousands of organizations internationally both through peer-to-peer and through hub models like the **SPEEDE Server**. With PESC's growth, these **EDI standards**, which served as the foundation for PESC's XML-based data standards, are now **PESC APPROVED STANDARDS** as well.

(1) Every college & university receiving federal aid.



With tremendous support from AACRAO and our founders to establish & support PESC; from our members, sponsors and partners; to institutions, colleges and universities, state and province systems; service providers and government agencies that implement and use PESC APPROVED STANDARDS; with our roots in ANSI; with a meticulously, highly-disciplined and transparent standards-development and maintenance process, and with a strong, powerful and vibrant community-based approach to all of its efforts and initiatives, PESC has become a world leader for interoperability.



## Attachment #6

### 6. The Value of Standards

Dr. Ken Sauer, Ph.D.  
Indiana Commission for Higher Education

Established in 1997 and located in Washington, D.C., the Postsecondary Electronic Standards Council (PESC) is a non-profit, community-based, umbrella association of colleges and universities; professional and commercial organizations; data, software and service providers; and state and federal government agencies.

**PESC's mission is to lead the establishment and adoption of data exchange standards in education.**

The goals of the mission are to enable the improvement of institutional performance and foster collaboration across educational communities in order to lower costs, improve service, and attain system interoperability.

The following information is an excerpt from an interview conducted for the September 2006 edition of The Standard, PESC's monthly electronic newsletter.

**Ken Sauer, Ph.D.**

is the Associate Commissioner for Research and Academic Affairs for the Indiana Commission for Higher Education.

Dr. Sauer currently functions as the academic officer for the Commission where he has been for 21 years.

To access the full interview, please visit [www.PESC.org](http://www.PESC.org).

# The Value of Standards in Indiana

**and the Midwest Higher  
Education Compact**



Postsecondary Electronic Standards Council  
For information on new development efforts, current meetings and events,  
and how to join, call +1.202.293.7383 or visit us online.





**PESC:** Tell us a little about the Indiana Commission for Higher Education.

**Dr. Sauer:** The Indiana Commission for Higher Education, created by statute in 1971, is the state coordinating agency for Indiana colleges and universities. The agency has a small staff, which is located in Indianapolis, and works with a large number of individuals in leadership positions in colleges and universities, the business community, the media, and the executive and legislative branches of state government.

Included among its principal functions are the following:

- forging a consensus among state leaders regarding long-range plans and policies to guide the development of higher education in the state
- approving new degree programs for public institutions
- making a biennial budget recommendation for higher education to the Governor and General Assembly
- working with the Indiana Department of Education to enhance the K-12 preparation of students
- contributing to state economic development initiatives.

The agency does not have direct jurisdiction over the state's private institutions; however, there are overlapping interests. For example, the Commission includes the needs of private postsecondary institutions in the budget recommendation for state student aid programs. Indiana has one of the most generous state student assistance programs in the country for students attending private colleges and universities.

**PESC:** What is your IT strategy... what are you trying to achieve?

**Dr. Sauer:** We are trying to use technology to leverage resources so that we can accomplish state educational goals quickly, effectively, and efficiently.

The Indiana e-Transcript Initiative — which allows high school students to request their transcripts be sent to colleges electronically, and which allows high schools to send transcripts electronically to other high schools and colleges to other colleges — is a good example of this.

**PESC:** What barriers do you encounter?

**Dr. Sauer:** When it comes to the e-Transcript program the biggest barriers have more to do with human issues than technological ones. In large part, it takes the voluntary

participation of an awful lot of people in both k–12 and post-secondary education to make a state-level initiatives work, and so much time and effort is spent reaching the right people and convincing them that they need to place a high priority on the project.

Funding is also a barrier, although in Indiana's case, the generosity of ISM Educational Loans, Inc. (the Indiana secondary market for student loans) underwrote the implementation of the project, which is good news for students and schools, since there is no charge for any transcript sent within Indiana.

**PESC:** Please explain the e-Transcript Initiative?

**Dr. Sauer:** The e-Transcript allows kindergarten through college institutions to electronically send transcripts among Indiana schools, between schools and colleges, and soon from college to college. Students register online for the service. Once they are signed on, they simply indicate to which schools they would like a copy of their transcript sent. That information is then accessed either on a batch or individual basis by the high school counselor, who then electronically approves the request. The transcripts are sent in electronic form to the requested school(s) and the school(s) can then download the information in PDF or raw data XML format. The student is notified by email when the transcript is sent by the high school guidance counselor and again notified when the receiving school downloads the transcript.

The process also works for schools outside of Indiana. If the school is in one of the eleven mid-western states that comprise The Midwest Higher Education Compact (MHEC), the process will soon mirror that of the Indiana process. If the student requests transcripts be sent to any non-participating school, however, Docufide, our contracting company, prints and sends the transcripts for the student. Even with this process, the student is able to do all requests electronically and the high school guidance counselor is able to approve the sending of all transcripts electronically.

The e-Transcript initiative both for Indiana and MHEC are based on PESC's XML High School Transcript Standard.

**PESC:** Can you quantify savings gained by using standards?

**Dr. Sauer:** While I could work out a dollar figure saved based on the cost of paper, envelope, printers, toner and stamps needed to send paper transcripts, the real savings with the e-Transcript is in human terms.

Students no longer need to make appointments to meet with counselors just to make a request for transcripts, nor do they need to follow-up by phone with high school counselors or college admissions offices to see if the transcripts were received. This may seem trivial, but often times the college needs transcripts at three different intervals within the students' senior year. There's a significant amount of time spent by parties at all levels, not to mention the stress it puts on the student wondering if the document is lost in the mail, or just sitting on a desk unopened.

High School counselors can now spend their time providing guidance instead of licking envelopes and filling out transcript forms. College admission offices can spend less time fielding calls from distraught high school seniors about transcript receipt and more time working to ensure a smooth admissions process.

**PESC:** Quantify process efficiencies gained by using standards...

**Dr. Sauer:** There are the obvious efficiencies of time and effort, but I'm more excited about the derivative capabilities. As previously mentioned, the transcript data can be downloaded in PDF or as XML data to be incorporated into a college's database. Once we are able to collect the information in a database, it allows for advanced analyzation.

For example, we can now look at how students who took algebra and trigonometry in high school do in college calculus. We can then break that information down by geographic location, school district or gender if we choose. We have the ability to do advanced analysis of what is working and what isn't working from high school to college.

Another derivative is a program we are currently working to implement. We call it the Diploma Audit System. The e-Transcript sets up our ability to monitor students' progress throughout their education and notify them each step of the way about their progress.

To receive a state standard diploma in Indiana a student must complete what is called the Core 40 — forty units of high school credit. The credits are aligned with what is needed to be successful in college. At the end of each semester, the software can analyze a student's progress and notify him or her of what classes, what grades and whether or not he or she is on track for graduation. The notification not only helps the student, but can be used to

notify high school faculty, parents, etc., if additional help is needed or if the student is progressing as needed.

**PESC:** Do you require standards in RFP language?

**Dr. Sauer:** When the Commission issued the RFP to invite vendors to submit proposals to implement our e-Transcript Initiative, we specified that the transcripts had to be transported using PESC XML standards.

**PESC:** How many trading partners do you have?

**Dr. Sauer:** Since the Indiana e-Transcript Initiative was launched in October 2005, we have 90 percent of our nearly 400 public and non-public high schools participating in the Initiative. Fifty percent are able to transmit transcripts electronically right now and the other 40 percent are in various stages of implementing this capability. All public four-year and two-year colleges, and 75 percent of our 31 private colleges, are able to receive transcripts electronically from high schools. Including initial, mid-year, and final transcripts, we project a total of more than 200,000 high school transcripts to be sent electronically during the current academic year.

We expect the project to get much bigger over the next year or so. The Midwest Higher Education Compact (MHEC), consisting of the 11 Midwestern states, has just launched an e-Transcript Initiative that intends to replicate the Indiana experience on a regional basis. The same company that Indiana contracted with to implement our e-Transcript Initiative has been selected to provide these services for the other Midwestern states.

**PESC:** What should we all be paying more attention to?

**Dr. Sauer:** One of the biggest hurdles is trying to integrate what are now separate databases into a seamless "k–16" system. It's very difficult to transmit information from the k–12 sector to the postsecondary sector, and in many cases it's just as much of a challenge to transmit information among the various databases within each sector. The challenge is not just the funding of one giant database, but how to address the duplicative information among the databases since the same data is handled differently, with different input and output codes. The e-Transcript is a good example of an initiative that makes the k-16 system a reality, and work needs to be done across multiple databases throughout the nation's k–16 system.



## Attachment #7

### 7. Annual Best Practices Competition 1<sup>st</sup> Place Winners: iQ4 & National Student Clearinghouse



FOR IMMEDIATE RELEASE  
APRIL 17, 2017  
CONTACT:  
JENNIFER KIM  
202.261.6516

## **iQ4 AND NATIONAL STUDENT CLEARINGHOUSE AWARDED 1<sup>ST</sup> PLACE IN 18<sup>TH</sup> BEST PRACTICES COMPETITION**

**EXTENDING THE CAPACITY OF HIGHER EDUCATION TO SCALE  
THE OUTPUT OF VERIFIED WORKFORCE-READY GRADUATES**

Washington, D.C. The Board of Directors of PESC is pleased to announce [iQ4](#) and the [National Student Clearinghouse](#) as 1<sup>st</sup> Place Winners of PESC's 18th Annual Best Practices Competition for its submission, ***"Extending the Capacity of Higher Education to Scale the Output of Verified Workforce-Ready Graduates."***

The award-winning submission received high praise from the PESC Board for its open and broad collaborative approach, sophisticated automation, transparent capacity, use of national standards and innovative technology employed, and for the positive results and outcomes it immediately produces.

The overall goal of this initiative is "to scale the next generation workforce by accelerating technology-risk and cybersecurity skills training," and is accomplished through a financial, industry-driven coalition, the Cybersecurity Workforce Alliance (CWA). The CWA originally formed in 2015 with iQ4, City University of New York (CUNY), John Jay College of Criminal Justice, the State University of New York, University at Albany, and eight senior cybersecurity executives, and now has 500+ members. CWA members "virtually mentor the college student workforce in solving scenario-based cybersecurity business problems to accelerate awareness, experience readiness and scale the student workforce, so they are more attractive to hire and can provide almost immediate value to the private sector by improving a company's technology and security capabilities globally."

The competency-based model, proven in the cybersecurity sector, is transportable across all faculty, disciplines and industry sectors, and leverages the NIST Critical Infrastructure Framework and the National Initiative for Cybersecurity Education (NICE Workforce Framework), now automated on the iQ4 Workforce Risk and Mobility platform and made available as open source.

Students from public higher education institutions can now graduate with a combined academic and workplace skills portfolio, captured in a co-curricular transcript, and are landing career-inspired jobs, having no prior background or experience, with companies that have never hired from those institutions before. "On-the-job training while in class" is transformational and salary levels are life-changing.

"On behalf of the iQ4 team, the CWA and our strategic partner the National Student Clearinghouse, we are thrilled and honored to receive this 1<sup>st</sup> place award and very special recognition. Data Standards, Trusted Source, Empowerment, Mobility and its value to students, education and employers, are the centerpieces of our work. Our teams continue to work relentlessly to solve the student workforce readiness challenge, that can measure applied knowledge, performance and progression, at massive scale, core to our Skills Passport co-curricular data driven credentialing. Industry can now utilize academic and applied learning data, to map student skills, competencies and academic accomplishments to their hiring needs. Working together we will transform our next generation workforce."

**FRANK C. CICIO, JR., CEO and Founder, iQ4 Corporation**

**MULTIPLE STAKEHOLDERS | ONE VISION**



**iQ4 AND NATIONAL STUDENT CLEARINGHOUSE  
AWARDED 1ST PLACE IN PESC 18TH ANNUAL BEST PRACTICES COMPETITION**

“This is a next generation solution that is showing real results. Determining industry and job profile standards are at the heart of this initiative along with the platform itself, enabling workforce and education to collaborate. The result is a demonstrable closing of the skills gap. The National Student Clearinghouse and iQ4 are very honored to be recognized.”

**RICARDO D. TORRES, President and CEO, National Student Clearinghouse**

“When the history of cybersecurity is written, the CWA and the Epic Challenge Program will be hailed as trailblazers in cybersecurity education. I strongly believe that we, the consortium members of the CWA, are not only creating the next generation of the cybersecurity workforce, but also preparing them to protect and defend this great nation. The work we do here protecting our national critical infrastructures is a part of our journey towards the attaining the ultimate technological nirvana: cyber-resilience and freedom from cyber warfare.”

**GOPAL PADINJARUVEETIL, Vice President, Chief Information Security Officer Auto Club Group, Michigan**

“We are pleased at the University at Albany, SUNY to be working with our partners on this virtual internship in this cybersecurity project-based course. It inspires our students to work hard and learn in a powerful way that builds on their academic curriculum to get them work-ready before graduation. The documentation in the iQ4 platform of the skills learned adds a critical component and the partnership with the National Student Clearinghouse provides authenticity, access, and scale. From my perspective in Higher Education, this work is transformational and the PESC award recognizes that.”

**JAMES STELLAR, Interim President, University at Albany, SUNY (State University New York)**

“The virtual internship has provided our students with a remarkable learning opportunity. Through it, they learn about what cybersecurity work is like; they develop soft skills through industry mentor feedback that help them gain entry to one of fastest growing global career sectors.”

**ANNE LOPES, Associate Provost for Strategic Initiatives and Dean of Graduate Studies, John Jay College/CUNY (City University of New York)**

“Preparing the next generation of cybersecurity experts through higher education is a mutual passion between iQ4 and EC-Council. This starts by incorporating real-world skills, hands-on education and stackable credentials in Cybersecurity domains. Tracking knowledge, skills and abilities within these credentials, while being able to translate those into marketable records for students to showcase to employers is invaluable. We congratulate iQ4 and the National Student Clearinghouse on their successful efforts.”

**WESLEY ALVAREZ, Director of Academics, US. The International Council of E-Commerce Consultants (EC-Council)**

“Congratulations to the CWA for being recognized for its hard work in preparing students who are ready to meet the demands of the financial industry. It is exciting to see CWA, a financial, industry-driven coalition, successfully address many of the objectives in NICE's Strategic Goals, *Accelerate Learning and Skills Development*, *Nurture a Diverse Learning Community*, and *Guide Career Development and Workforce Planning*.”

**BILL NEWHOUSE, Deputy Director for the National Initiative for Cybersecurity Education (NICE), National Institute of Standards and Technology (NIST), U.S. Department of Commerce**

“This program takes a unique approach to teaching by applying assignments to actual work the student would likely perform on the job. In addition, the use of current cyber security threats and industry professionals involved in the creation of the curriculum, assignments, lectures, and the live critiquing of assignments provides students with the ability to hear what the expectations as a future employee. The often long jump that a student needs to make from learning theory in the classroom to applying their learning and demonstrating their ability is eliminated through this learning approach.”

**CHRYSANTHE CUPONE, Manager, Information Security Awareness, IT Risk Management and Services, American Express**

**iQ4 AND NATIONAL STUDENT CLEARINGHOUSE  
AWARDED 1ST PLACE IN PESC 18TH ANNUAL BEST PRACTICES COMPETITION**

"By the extension of the workplace into the classroom via mentors and 'real world' curriculum, the program provides one of those unique opportunities to positively impact not only students, but security professionals (mentors), the Cybersecurity industry, and the Business. It is truly a win for all."

**TERESA DUROCHER, Information Security Professional**

"Working with our partners, we have "cracked the code" in creating an innovative technology solution, that presents complex data, and respects privacy, in a powerful and compelling user experience! We are all exploring new groundbreaking frontiers that will raise the bar and help level the playing field for students globally."

**KYLE HAMILTON, Chief Innovation and Data Science Officer, iQ4**

"The NIST National Cybersecurity Workforce Framework (NCWF) is being adopted internationally, so this initiative has two key values: first for overseas students studying in the USA and then returning home with verifiable credentials and, secondly, for the global expansion of the Cybersecurity Workforce Alliance with workforce ready candidates."

**PETER MEEHAN, Head of International and Partnerships iQ4**

The award-winning submission made by iQ4 and the National Student Clearinghouse is posted on the PESC website with prior winners at <http://www.PESC.org>. An Awards Ceremony will be held during the General Sessions at PESC's Spring 2017 Data Summit being held May 3-5, 2017 in Washington DC at the Embassy Row Hotel.

**For more information about iQ4**, please contact [CWA@iQ4.com](mailto:CWA@iQ4.com) or visit [www.iQ4.com](http://www.iQ4.com).

**For more information about the National Student Clearinghouse**, please visit [www.studentclearinghouse.org](http://www.studentclearinghouse.org).

**For more information about NIST NICE** including an upcoming webinar on Wednesday April 19, 2017 2:00 pm EDT *Rethinking Credentials for Cybersecurity Careers*, please visit <https://www.nist.gov/itl/applied-cybersecurity/nice>.

PESC's [Empowering the Mobility of Digital Academic Credentials](#) | Spring 2017 Data Summit on *Best Practices in Education Data Systems* is being held May 3–5, 2017 in Washington DC and is co-sponsored by [Connecting Credentials](#).

PESC celebrates its 20<sup>th</sup> Year Anniversary October 18–20, 2017 at [EDiINTEROP 2017](#) | PESC Fall 2017 Symposium and Data Summit to be held at the Radisson Admiral Hotel Harbourfront in Toronto.

#### **NEW GROUPS FORMING AT PESC**

**JSON Task Force** - PESC is establishing a Task Force to advise PESC Members and the education community on the impact and utility of JSON in the education domain and its relationship to XML. Under the continued leadership of the PESC Technical Advisory Board, this Task Force will continue the ongoing discussions about JSON and ultimately recommend what action, if any, PESC should undertake as a result of the emergence of JSON.

**CREDENTIAL ENGINE/HR-XML/PESC Mapping Workgroup** – A joint Workgroup is forming to open discussions with stakeholders in credentialing to analyze, compare, discuss enhancements and identify opportunities to advance interoperability. Under the continued leadership of the PESC Academic Credentialing and Experiential Learning Task Force and with input from the Education Record User Group (ERUG), this Workgroup will identify updates or enhancements to PESC Approved Standards.

**EWP/EMREX/PESC Mapping Workgroup** – PESC is forming a Workgroup to analyze, compare, discuss enhancements and identify opportunities to advance interoperability with Erasmus Without Paper (EWP) and EMREX. Under the continued leadership of the ERUG, this Workgroup will identify updates or enhancements to PESC Approved Standards.

**iQ4 AND NATIONAL STUDENT CLEARINGHOUSE  
AWARDED 1ST PLACE IN PESC 18TH ANNUAL BEST PRACTICES COMPETITION**

**XML REQUEST/RESPONSE Development Workgroup** – PESC is forming a Workgroup to develop Request and Response XML standards for all PESC Approved Standards. Under the continued leadership of the Steering Committee of the Standards Development Forum for Education and with input from the ERUG, this Workgroup will develop and produce Request and Response formats useable for all PESC Approved Standards.

*The inaugural convenings of these Groups will occur at PESC's Spring 2017 Data Summit, taking place May 3-5, 2017 in Washington, D.C. at the Embassy Row Hotel in Dupont Circle. See [www.PESC.org](http://www.PESC.org) for more info.*

**PESC IS SPONSORED ANNUALLY** by [Credentials Solutions](#), [National Student Clearinghouse](#), [Oracle](#) and [Parchment Inc.](#) PESC partners include [AACRAO](#), [APEREO](#), [ARUCC](#), [EMREX](#), [EWP](#), [Groningen Declaration Network](#), [Internet2](#), [SHEEO](#), and the [US Department of Education's Common Education Data Standards \(CEDS\) Initiative](#).

**PESC IS A PROUD EXHIBITOR** at [AACRAO's Annual Meeting](#), [ARUCC's Annual Meeting](#), and the [Annual STATS-DC Conference](#) of the National Center for Education Statistics (NCES) of the US Department of Education.

**PESC IS A PROUD SPONSOR** of [AIR's Annual Conference](#) and of the [Annual California Electronic Transcripts Workshop and CCCApply](#).

**PESC IS A PROUD MEMBER/AFFILIATE/SIGNATORY** of is [AACRAO](#), of the [NCES National Forum on Education Statistics](#), and of the [Groningen Declaration Network](#).

**PESC HAS A STRONG HISTORY** that includes AACRAO, SPEEDE, EDI, ANSI, X12, Canada, the US Department of Education and Y2K. Read more at [www.PESC.org](http://www.PESC.org).

**IN FULFILLING ITS NON-PROFIT MISSION**, all PESC Approved Standards are available to the education community online free of charge at [www.PESC.org](http://www.PESC.org).

## **ABOUT PESC**

**ESTABLISHED IN 1997 AT THE NATIONAL CENTER FOR HIGHER EDUCATION & HEADQUARTERED IN WASHINGTON DC**, PESC is an international, 501 (c)(3) non-profit, community-based, umbrella association of data, software and education technology service providers; schools, districts, colleges and universities; college, university and state systems; local, state/province and federal government agencies; professional, commercial and non-profit organizations; and non-profit associations & foundations.

**LEADING THE ESTABLISHMENT & ADOPTION OF DATA EXCHANGE STANDARDS ACROSS THE EDUCATION DOMAIN.** Through open and transparent community participation, PESC enables cost-effective connectivity between data systems to accelerate performance and service, to simplify data access and research, and to improve data quality along the Education lifecycle. PESC envisions global interoperability within the Education domain, supported by a trustworthy, inter-connected network built by and between communities of interest in which data flows digitally and seamlessly from one community or system to another and throughout the entire eco-system when and where needed without compatibility barriers but in a safe, secure, reliable, legal, and efficient manner.

**ABOUT PRIVACY** While PESC promotes the implementation and usage of data exchange standards, PESC does not set (create or establish) policies related to privacy and security. Organizations and entities using PESC Approved Standards and services should ensure they comply with FERPA and all local, state, federal and international rules on privacy and security as applicable. For more information, see [www.PESC.org](http://www.PESC.org).

# # #

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*iQ4-Cybersecurity Workforce Alliance*  
*Applied Learning and Standards Based*  
*Performance Metrics*

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Confidential Joint Submission

**iQ4 Corp. and National Student Clearinghouse**

For PESC 2017

Spring Data Summit Best Practice Application

Empowering The Mobility Of Digital Academic Credentials

White Paper

**EXTENDING THE CAPACITY OF HIGHER EDUCATION TO  
SCALE THE OUTPUT OF VERIFIED WORKFORCE-READY  
GRADUATES**

**Authors:**

Frank C Cicio Jr. CEO iQ4 Corporation and Founder, Cybersecurity Workforce Alliance (CWA)

Ricardo Torres, CEO, National Student Clearinghouse (NSC)

Portia Pusey Ed. D., Educational Researcher, Cybersecurity Workforce Development Projects

Peter Meehan, iQ4, Head of Strategic Partnership, Cybersecurity Workforce Alliance, EMEA

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# *iQ4-Cybersecurity Workforce Alliance Applied Learning And Standards Based Performance Metrics*

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## Executive Summary:

1. An industry-led movement called the Cybersecurity Workforce Alliance (CWA) accelerates the supply of workforce ready entry-level candidates with a virtual-internship model. **Industry experts mentor learners to solve scenario-based cybersecurity business problems to accelerate awareness, experience, readiness and scale the student workforce.**
2. Virtual-internships and CWA online learning community, grounded in competency-based learning. Extending the workplace into the classrooms via the iQ4 Workforce Supply Chain and Mobility Platform (iQ4), which underpins the CWA virtual community. **The CWA competency-based model, proven in the cybersecurity sector, is transportable across all faculty, disciplines and industry sectors.**
3. The CWA leverages the NIST- Critical [Cybersecurity] Infrastructure framework and the National Initiative for Cybersecurity Education (NICE) taxonomy, which describe the specialties, competencies and knowledge skills and abilities required for Job Family functions required to operate a NIST framework effectively. iQ4, with JPMorgan Chase, co-chair the NICE Workforce Workgroup to make the taxonomy useful and transportable across all sectors. The taxonomy has been extended under this leadership to 1,235 rows of 4-tiers including KSAs. The Financial Services industry has adopted NIST/NICE, as have the Federal Communications Commission (FCC) with the Utilities Technology Commission (UTC) expected to follow soon because in a standards-based Alliance they do not have to ‘go-it-alone’. The taxonomy also describes learning outcomes which industry can describe to Education so courses can be aligned to measured outcomes. Students are assessed against the KSAs for data driven verifiable credentials. **The taxonomy has been automated on the iQ4 Platform and is made available to Alliance members as “Open Source”.**
4. Digital Academic and Supplemental Transcripts integrate verified student career related activities from the iQ4 platform (community service, apprenticeships, internships, co-ops, externships, service learning, mentoring etc.) with a new Portal from the National Student Clearinghouse (NSC). **Student records include verified credentials showing academic and experiential learning progress and performance.**

## Addressing the Cyber Skills Gap:

The weak link in the supply chain of qualified cybersecurity workers is the capacity of educational institutions to produce the number of workers needed to fill the millions of cybersecurity job openings projected by 2020. The pipeline to a workforce of trained professionals ready to contend with the ever-changing landscape of threats is restricted by the limited numbers of trained faculty and the time consuming formative feedback processes needed for growth in competencies.

*Transformation Required: Building the capacity and broadening the expertise of colleges and universities to prepare learners with the skills that employers need to address the newest threats requires an industry-education partnership that replicates on-the-job training. This will assure that graduates are ready to productively contribute to cybersecurity teams on the day they are hired.*

### **The Solution:**

The CWA is a division of iQ4 Corporation, is a 502-member (and rapidly growing) industry driven movement, formed in January 2015, with the City of New York (CUNY) John Jay College of Criminal Justice, to scale the next generation workforce by accelerating technology-risk and cybersecurity skills training. CWA members mentor the college student workforce, so they are more attractive to hire and can provide almost immediate value to the private sector by improving a company's technology and security capabilities globally. CWA mentors are practicing cybersecurity experts with professional expertise, knowledge of regulatory requirements and experience responding with the most current threats and responses. By virtually extending the workplace into universities and colleges the CWA develops "workforce readiness" and has demonstrated a reduced post-hire training time by 3-6 months, which is delivering a Return on Investment (RoI) to Industry of over 30:1. In the past two years, CWA mentors have projected that participation will reduce an employer's typical first and second year attrition and rejection rates by improving the percentage of "good-fit" hires. Most importantly, the CWA supports the recruitment and retention of cybersecurity students from all disciplines. Between 2015 and 2016, 193 students participated in the Epic Challenge with less than a 5% percent dropout among open enrollment students and a single dropout in programs which require a student application.

## *Benefiting from NIST/NICE Standards*

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The CWA education to Industry supply chain curriculum is based on the NIST Critical Infrastructure Framework and NICE Taxonomy, which underpins it.

The content for a CWA challenge covers core competencies e.g., knowledge, skills, and abilities relating to the identification, detection, protection against, response to and recovery from an insider threat including how to build and maintain communications with executives, peers and regulators. Plus, the essential skills (e.g., teamwork and communications skills), which are required in the workforce. The assignments of the virtual internship are designed to assess both core competencies and essential (soft/professional) skills.



**Learning outcomes** are centered around the NITS/NICE frameworks to deliver the values described in the graphic, below.



#### General knowledge and awareness – Knowledge of:

- Cyber threats and vulnerabilities
- Cybersecurity principles
- The need for apply security within national and international laws, regulations, policies, and ethics as they relate to cybersecurity.
- Core in demand Cyber security roles and the basic work profiles of those roles when working in teams (e.g. Risk, CISO/InfoSec, IT Analysts, Governance, Compliance, Behavioral Analysts)
- Basic risk management processes (e.g., methods for assessing and mitigating risk)
- The nuances within Insider Threat landscape e.g. between IP Theft, Sabotage, Collusion, etc.

The NICE taxonomy is used to identify the KSAs that students are taught and measured on for the role they will play within their team based project throughout the course. Role Description: -

Passport
 Projects
 Workgroups
 Role Profiles
 Communities

**Information Security Officer - CWA**

Manages information security implications within an organization, specific program, or other area of responsibility, to include strategic, operational, infrastructure, policy enforcement, emergency ...

**Details**

Created by: Frank Cicio  
 Category: Cybersecurity - Investigate  
 Positions Open: 0  
 Positions Fulfilled: 0

Contact: Team leads -  
 Location: REMOTE  
 Hours: PARTTIME  
 Address: , New York, New York 07117

**Description**

Manages information security implications within an organization, specific program, or other area of responsibility, to include strategic, operational, infrastructure, policy enforcement, emergency planning, security awareness, and other resources.

As the students are candidates to entry-level roles, they are assessed (only) on the 10 core principle KSAs for that role; whereas in a full professional role the job may require circa 40 KSAs – some “required” and some an “asset”.

Information Security Officer: Example entry-level KSAs below.



## 10 Skills & Personal Qualities

[All Categories](#)


Skill	Yrs. Exp.	Required
<b>Essential Skills</b>		
<b>CRITICAL THINKING</b>		
▼ Analytics		✗
✓ Demonstrates the ability to identify and evaluate problems or issues	8	✓
<b>PROFESSIONAL DEVELOPMENT &amp; LEARNING</b>		
▼ Professionalism		✗
✓ Consistently meets expected results within deadlines	3	✓
<b>COMMUNICATION</b>		
▼ Strategic Communication		✗
✓ Communicates appropriately with people at various levels and backgrounds, even if they have differing viewpoints.	2	✓
▼ Verbal Communication		✗
✓ Able to communicate a point demonstrating logic, reasoning, and soundness of argument.	0	✓
▼ Written Communication		✗
✓ Demonstrates a mastery of language structure and syntax through formal and informal writing.	0	✓
<b>Cybersecurity - Oversee and Govern</b>		
<b>TRAINING, EDUCATION, AND AWARENESS</b>		
▼ Financial Industry Awareness		✗
✓ Knowledge of Financial Industry (e.g., banking, insurance, securities) Products and Processing	0	✓
<b>SECURITY PROGRAM MANAGEMENT</b>		
▼ Information Assurance		✗
✓ Knowledge of information assurance (IA) principles used to manage risks related to the use, processing, storage, and transmission of information or data.	0	✓
▼ Risk Management		✗
✓ Knowledge of risk management processes (e.g., methods for assessing and mitigating risk).	0	✓
<b>Cybersecurity - Operate and Maintain</b>		
<b>SYSTEMS SECURITY ANALYSIS</b>		
▼ Information Systems/Network Security		✗
✓ Knowledge of cybersecurity principles.	0	✓
▼ Vulnerabilities Assessment		✗
✓ Knowledge of cyber threats and vulnerabilities.	0	✓

## *iQ4 Platform*

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The CWA uses the iQ4 Workforce Supply Chain and Mobility platform to promote efficient standards-based collaborations between the industry and educational partners. iQ4 consists of three components that support workforce pipeline development: the taxonomy tool (of industry defined role profiles), digital passport, and the Epic Challenges.

**Digital Passport:** Comprehensive Proficiency Profile for individuals which reports on technical/ career competencies, essential (soft) skills, work-related experiences, personal highlights, interests, and formal and informal education (shown in Figures 1, 2, 3 & 4).

- Provides a record of career related activities such as: community service, apprenticeships, internships, co-ops, externships, service learning, mentoring etc.
- Validates proficiency reporting and confirm prior learning through project-based assessments or challenges
- Documents progress on career pathways/roadmaps and credential “stacking” across institutions
- Reduces the time and cost required to complete credentials through competency-based pathways which identifies gaps in individual proficiencies and provides recommendations for appropriate courses/learning experiences/training
- Identifies subject matter experts that can respond to learner questions
- Assures data integrity of measured assessments through *National Student Clearinghouse*<sup>ii</sup> validation of co-curricular transcripts.
- Students active data résumés are transportable between iQ4’s Passport on the iQ4 Workforce Risk and Mobility Platform and NSC’s “MyHub” digital mobile academic records Platform.

See over for screenshots

Figure 1: NSC MyHub Portal: my education, my transportable information

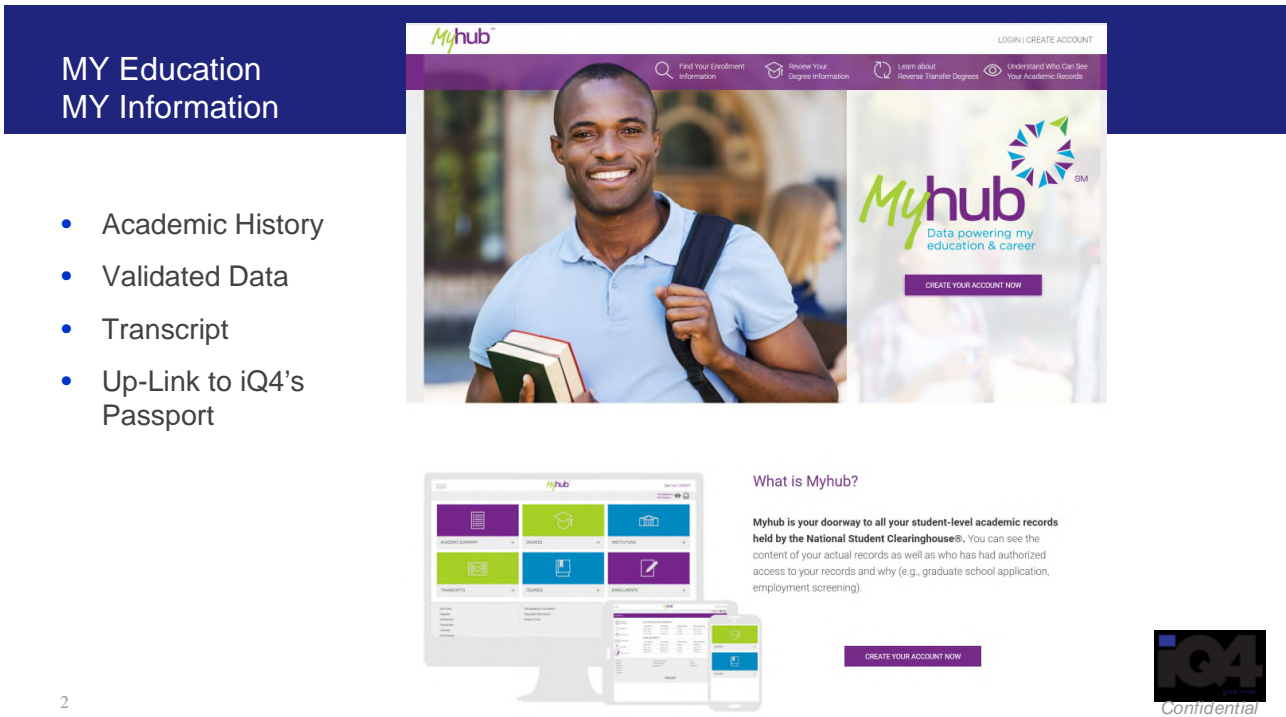


Figure 2: NSC MyHub Portal: empowering students with *their* data

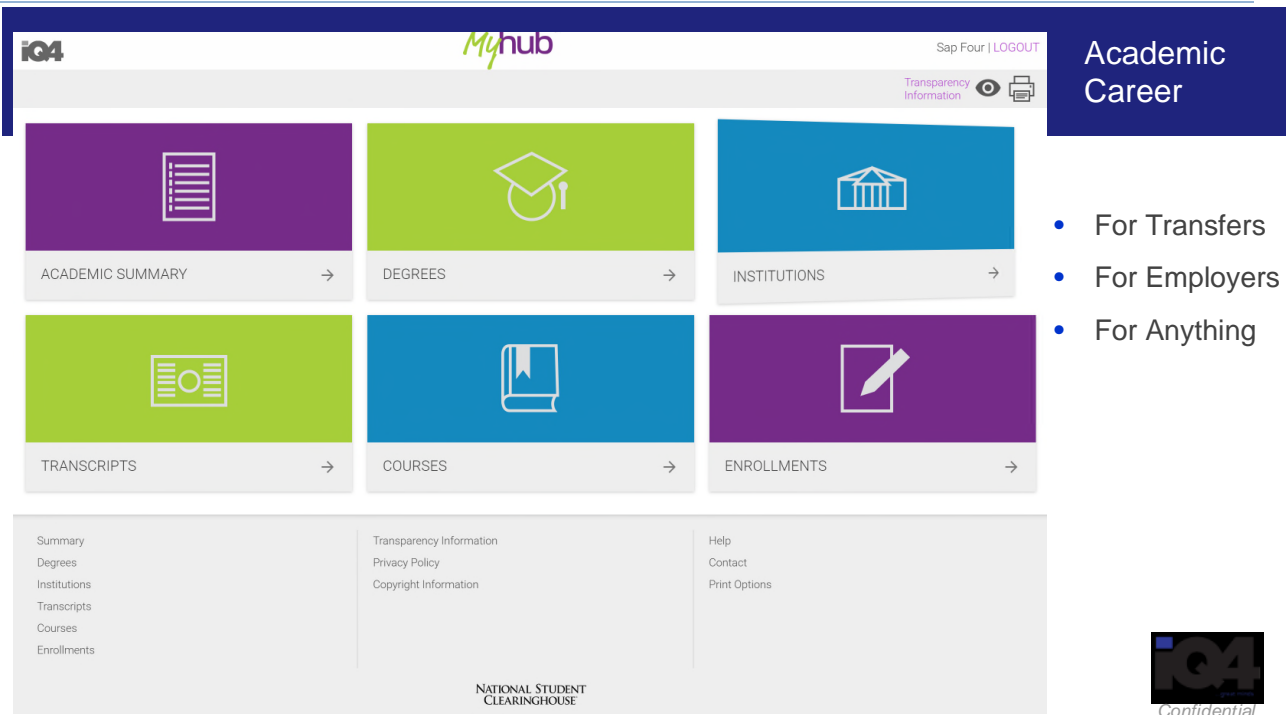
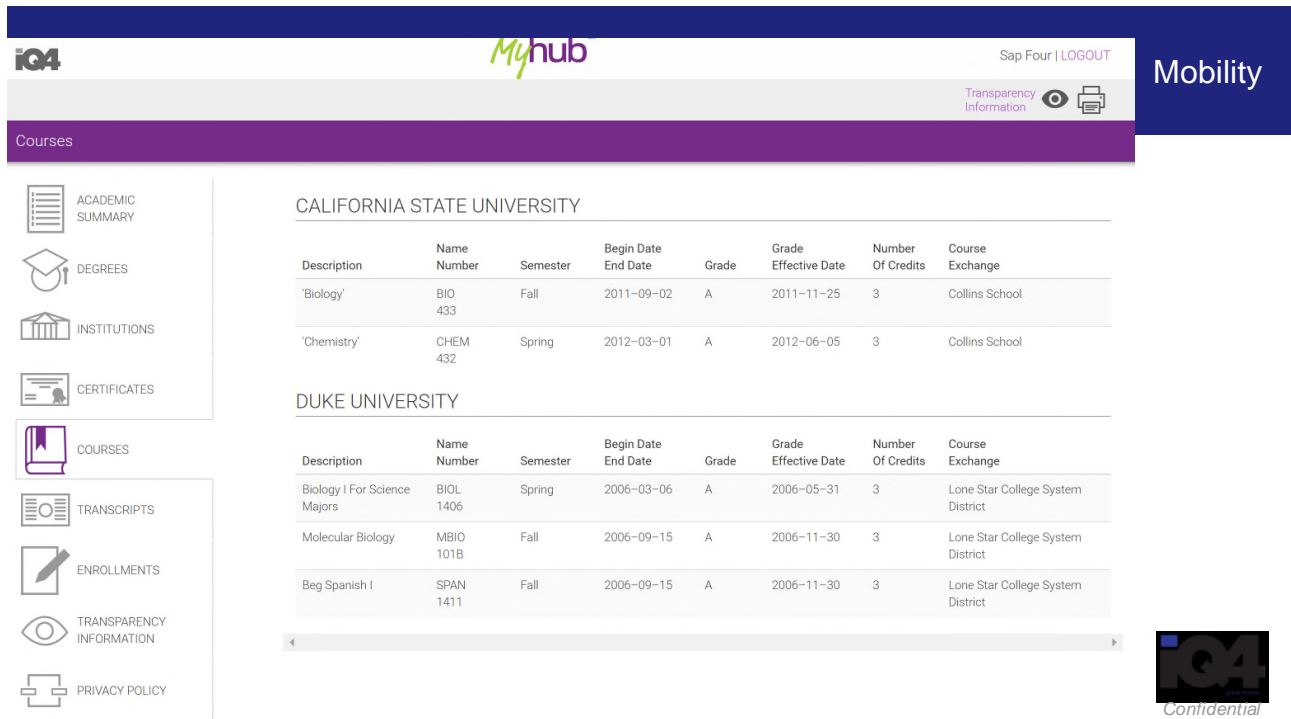


Figure 3: NSC MyHub Portal: example transcript – course report



The screenshot shows the NSC MyHub Portal interface. At the top, there's a navigation bar with the iQ4 logo, the Myhub logo, and a user profile section for 'Sap Four | LOGOUT'. A 'Mobility' button is on the right. Below the navigation bar is a 'Courses' section. On the left, there's a sidebar with icons for Academic Summary, Degrees, Institutions, Certificates, Courses, Transcripts, Enrollments, Transparency Information, and Privacy Policy. The main content area displays two course reports:

**CALIFORNIA STATE UNIVERSITY**

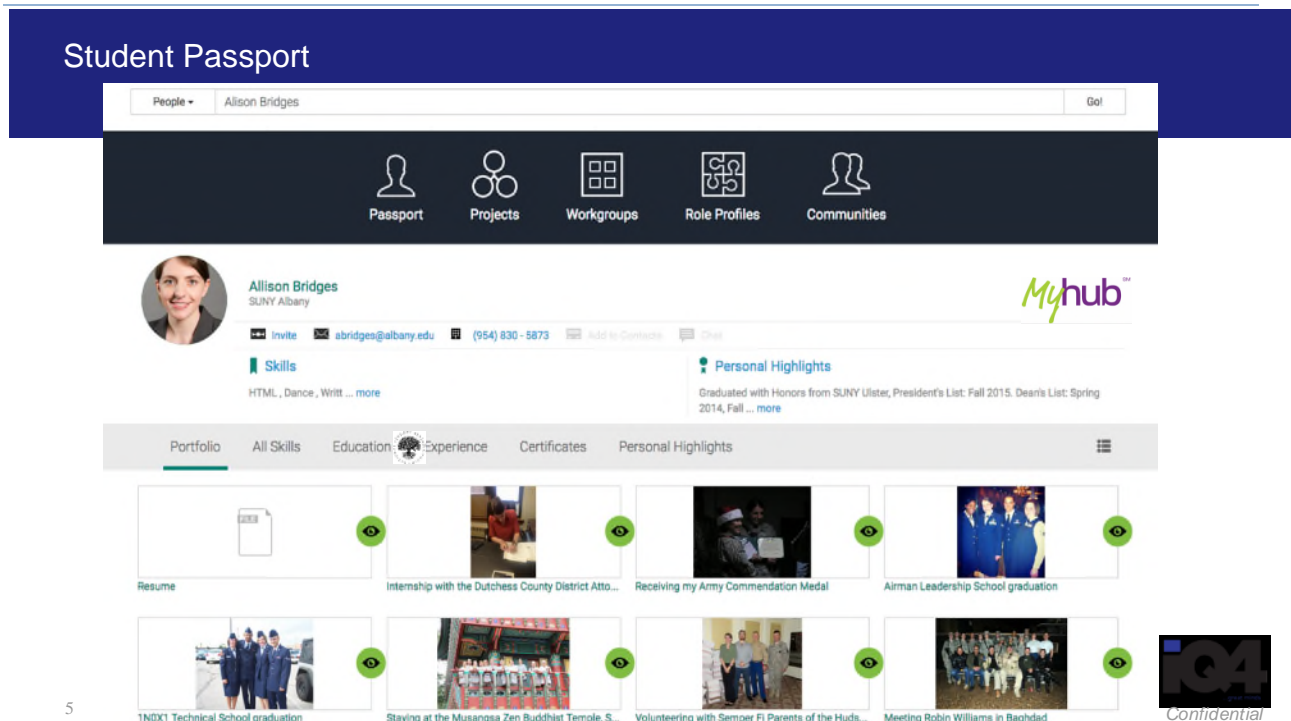
Description	Name Number	Semester	Begin Date End Date	Grade	Grade Effective Date	Number Of Credits	Course Exchange
'Biology'	BIO 433	Fall	2011-09-02	A	2011-11-25	3	Collins School
'Chemistry'	CHEM 432	Spring	2012-03-01	A	2012-06-05	3	Collins School

**DUKE UNIVERSITY**

Description	Name Number	Semester	Begin Date End Date	Grade	Grade Effective Date	Number Of Credits	Course Exchange
Biology I For Science Majors	BIOL 1406	Spring	2006-03-06	A	2006-05-31	3	Lone Star College System District
Molecular Biology	MBIO 101B	Fall	2006-09-15	A	2006-11-30	3	Lone Star College System District
Beg Spanish I	SPAN 1411	Fall	2006-09-15	A	2006-11-30	3	Lone Star College System District

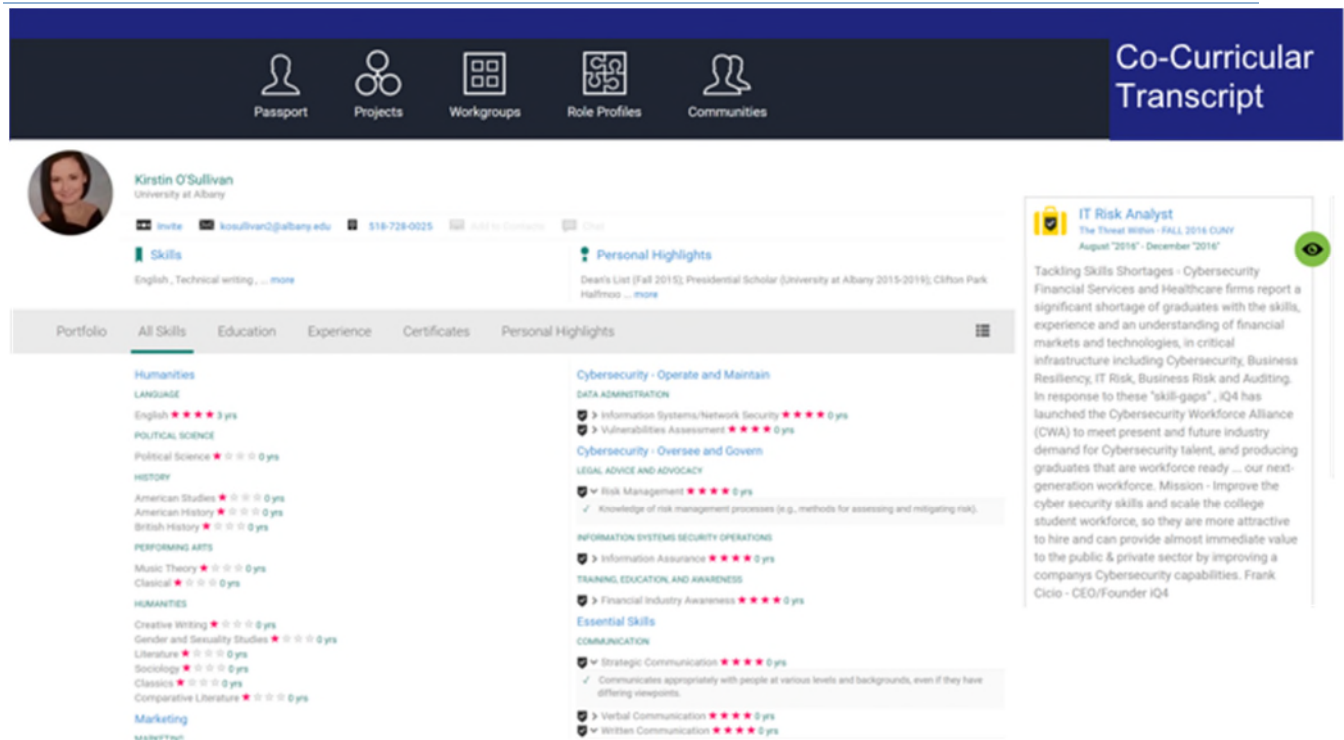
At the bottom right, there's a small iQ4 Confidential logo.

Figure 4: iQ4 Student's Digital Passport – an active data résumé”



The screenshot shows the iQ4 Student's Digital Passport interface. At the top, there's a 'Student Passport' header. Below it, there's a search bar with 'People' and 'Allison Bridges' entered, and a 'Go!' button. A navigation bar contains icons for Passport, Projects, Workgroups, Role Profiles, and Communities. The main content area features a profile for Allison Bridges, a SUNY Albany student. It includes a profile picture, contact information (email: abridges@albany.edu, phone: (554) 830-5873), and a 'Skills' section listing HTML, Dance, and Writing. A 'Personal Highlights' section lists achievements such as 'Graduated with Honors from SUNY Ulster, President's List: Fall 2015' and 'Dean's List: Spring 2014, Fall ... more'. Below the highlights, there's a 'Portfolio' section with tabs for All Skills, Education, Experience, Certificates, and Personal Highlights. The Portfolio displays a grid of images representing various achievements, including a Resume, Internship with the Dutchess County District Attorney, Receiving my Army Commendation Medal, Airman Leadership School graduation, 1N0X1 Technical School graduation, Staying at the Musangsa Zen Buddhist Temple, S..., Volunteering with Semper Fi Parents of the Hudson River, and Meeting Robin Williams in Baghdad. At the bottom right, there's a small iQ4 Confidential logo.

Figure 5: Passport Transformed into a Data Driven Transcript Including Assessments



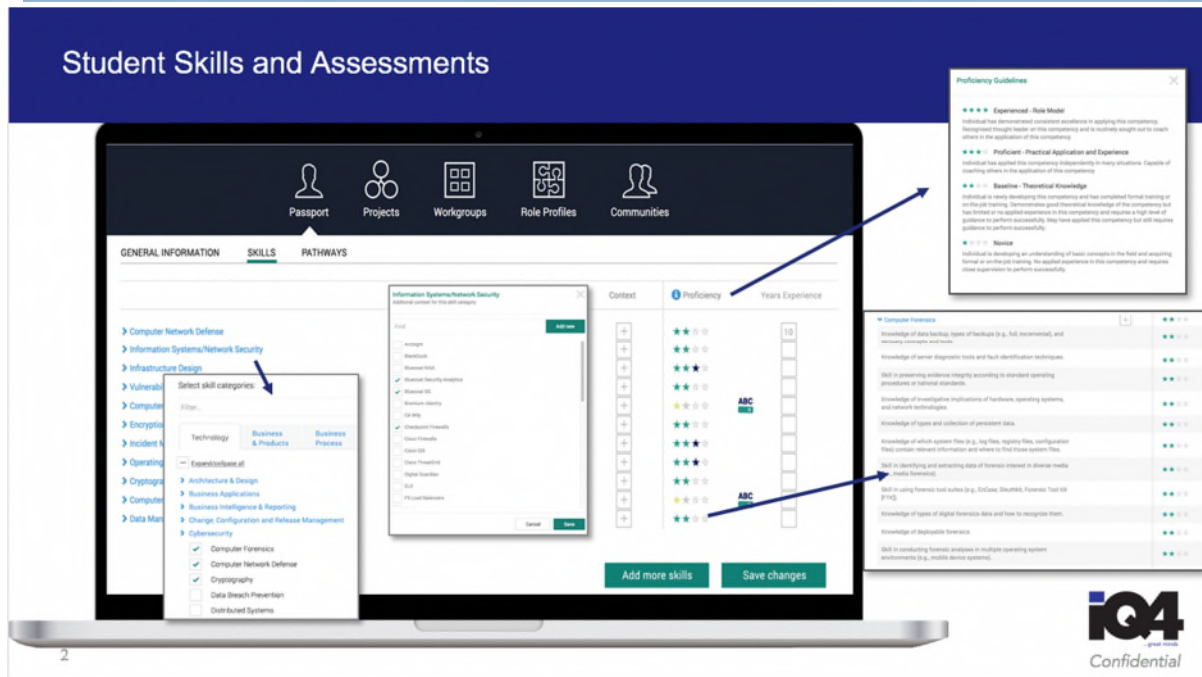
**Standards and Taxonomy Tooling:** a unified framework for understanding the competencies associated with different credentials, certifications, degrees. The Platform tooling includes an automated version of the National Initiative for Cybersecurity Education (NICE) / NIST Cybersecurity Studies Workforce Framework (skills mapping in Figure 6) and which align Cyber/Risk job families to teaching outcomes and educational designations, including National Security Agency Centers of Academic Excellence.

- Provides a common language lexicon and industry defined role profiles that represent entry level positions which enables employers to describe the competency gaps in their workforce that they need to address
- Enables the comparison of the vast landscape of credentials to identify competencies associated with employer required certifications
- Supports diversity efforts by representing, women, military and corporate training in terms of competencies

The first action a student undertakes is to complete their digital Passport, described in the associated user guides. Based on CWA member, industry and customer feedback a new user interface, improved navigation to assemble skills or assemble job family roles. (Figure 4).

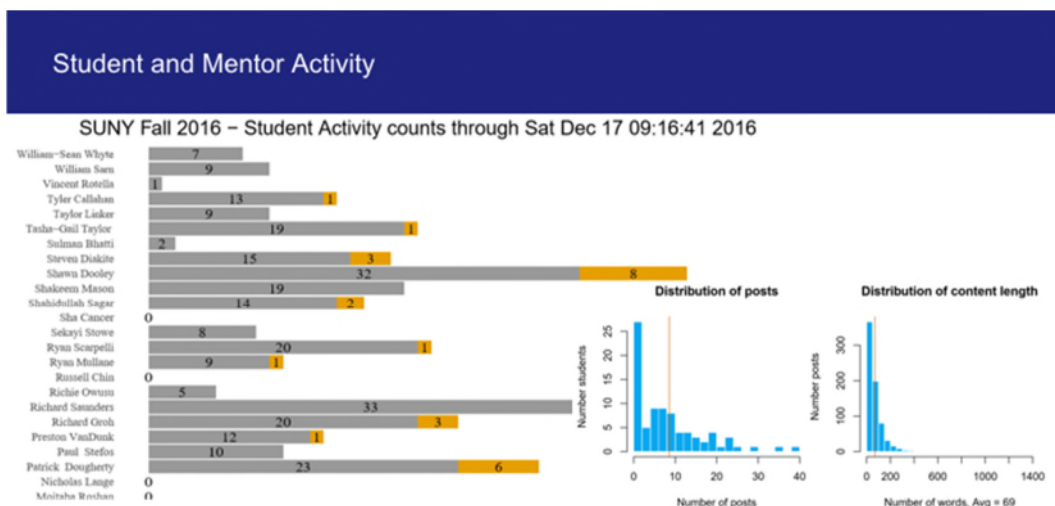


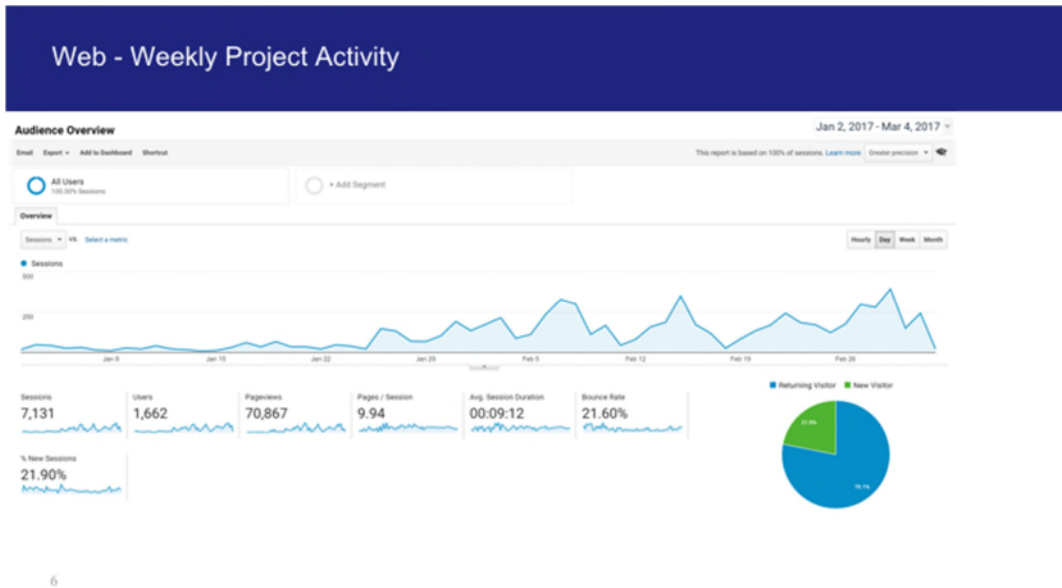
Figure 6: Standard (NICE) Taxonomy Student Skills and Proficiency Assessment



Project-Based Learning and Assessment (Epic Challenges): “virtual-menternships™” in which students perform authentic job roles (ex. technical, procedural, legal, behavioral, skills and proficiency) as part of interdisciplinary project teams mentored by industry subject matter experts with faculty oversight. (Students monitor their progress and receive feedback for their performance through the engagement interfaces pictured in Figure 7.)

Figure 7: Platform Interactions – Student Engagement Interfaces





Features of the iQ4 virtual learning platform:

1. Virtual applied learning platform creates massively scalable (critical thinking) problem-based learning experiences by extending the workplace into the classroom. Learners solve real-world problems and receive independent measures of their performance (Figure 9).
2. Mentor and peer assessment of learning outcomes, real-time knowledge and soft skills in a variety of contexts including classroom, work-based and online learning validates reported proficiencies are provided to the learners in real-time (Figure 9)

Figure 9: Analytics: Including Mentor Assessments

Weekly Mentor assessments of Assignments – to show measured *performance* and *progression* from which to academia, mentors and hiring managers can surmise *potential*.



3. Community of practice provides the deliberate practice and continuous corrective feedback required for growth in competencies
4. Orientation unit (Cyber101) provides background information and context to non-technical members of the project teams to successfully participate in the Epic Challenges. The CWA alumni mentor resource pool comes faculty and students across multiple disciplines such as information technology, law enforcement, medical/business administrators, accountants, psychology, communications, and mathematics)
5. Virtual partner learning environments and tools augment existing facilities and technical tool access. Current partners include EC Council Cyber Range laboratory exercises and Red Owl Insider Threat Digital Surveillance system.
6. Student-Mentor ratios averaging 8-1 increases the course capacity of a single faculty member. One faculty member serves as the facilitator who administrates and aligns the CWA to existing courses and departmental curriculum. The industry mentors serve at no cost to the educational institution and lead projects teams, typically of eight students.

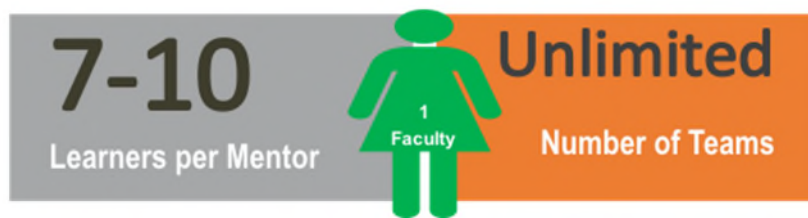
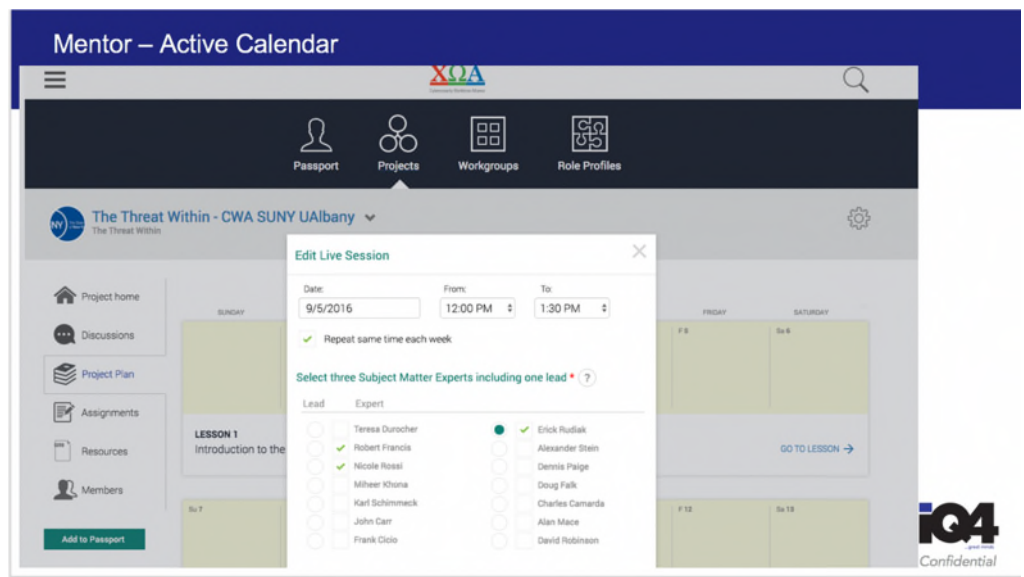


Figure 10: Assigning Mentors to Project Teams and Curriculum Dates

Ease of use –

Flexibility in scheduling mentors or substitute into curricula and weekly mentoring sessions





## Learning outcomes – Great Jobs

The Epic Challenge is part of the applied learning initiative at the John Jay College of Criminal Justice, City University of New York, and the College of Emergency Preparedness, Homeland Security and Cybersecurity at the University at Albany, State University of New York. CWA graduates are already strengthening the cybersecurity workforce, for example, at the FBI, Mellon, New York District Attorney's Office, International Securities Exchange, Deloitte, the New York State Emergency Resilience, The United States State Department, PwC, Capgemini, The New York State Governor's Office, K2Security, Regeneron Pharmaceuticals, Dave and Busters Inc. and are conducting research at Harvard.

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# Competency-Based Education

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*The Department of Education defines competency as “the ability to apply or use knowledge, skill, behaviors to successfully perform critical work tasks, specific functions, or operate in a given role or position”<sup>iii</sup>.*

Recent trends indicate that more employers are requiring college degrees from their candidates and more non-traditional students need workforce specific training<sup>iv</sup>. Therefore, employers and educators are returning to strategies which can accelerate competency development or the degree attainment process. Competency-based education has been proposed as a solution because it provides recognition for prior learning and work experience, learner-centered self-paced educational experiences, and competency development aligned with workforce needs<sup>v</sup>. This brief reviews the research on competency-based education as it relates to the success of the CWA applied learning and performance measurement.

Competency-based education (CBE) is rooted in the educational reforms of the 1950's which linked the mastery of scientific principles to improved national security. During this time, the solution to the perceived lack of scientific talent was to provide and improve educational opportunities<sup>vi</sup>. The Findings and Declaration of Policy section of the National Defense Education Act (1958) states,

*“The Congress hereby finds and declares that the security of the Nation requires the fullest development of the mental resources and technical skills of its young men and women. The present emergency demands that additional and more adequate educational opportunities be made available. The defense of this Nation depends upon the mastery of modern techniques developed from complex scientific principles. It depends as well upon the discovery and development of new principles, new techniques, and new knowledge.*

*We must increase our efforts to identify and educate more of the talent of our nation<sup>vii</sup> (p.183.)”*

An educated strong workforce will both assure and support growth in the economy, “expand opportunity, and widen the pathway to the middle class<sup>viii</sup>. Furthermore, there is an urgent need for a trained workforce to address the crisis in cybersecurity. Therefore, the return to a CBE strategy could represent an evidence-based approach to education and training that successfully addressed national defense in the 1950’s<sup>ix</sup>.

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## *CWA: Competency-Based Learning and Assessment*

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Hopefully, sooner than later, education systems will realize the importance of not just lecturing their students but instilling the skills needed to succeed in the workforce

**Arrissa | Information Security Officer | DDoS | Information Science - Communication**

Through the CWA collaboration a network of employer mentors, faculty and Epic Challenge student alumni is growing to meet the hiring needs of the CWA industry members and provide a member ecosystem to sustain the competency-based virtual “virtual-menternships™” model. The CWA adopted the competency-based education (CBE) approach as a means to bring a cost-effective solution to higher education to address the learning needs of underserved populations.

“Social stratification is embedded in the current system of U.S. higher education: only a small and privileged set of people participates in the selective, residential college experience. A study of new enrollments since 1995 conducted by Georgetown University's Center on Education and the Workforce demonstrates large disparities among whites and non-whites. The data show that 92 % of new white enrollments were in 468 of the most selective colleges, while 72% of new Hispanic enrollments and 68 % of new African-American enrollments were at two-year and four-year open-access schools. Completion rates at the two-year and open access schools are much lower (49%) than the selective schools (82%)<sup>x</sup>.

High cost of tuition is just one of the barriers to higher education from underserved

populations<sup>xi</sup>. Testimonials from the first two years of Epic Challenges underscore Pont’s research which indicates that adults who do not pursue training or education require more information or incentives for them to overcome barriers of time or lack of motivation<sup>xii</sup>. The Epic Challenges connects education and training to real jobs, career advancement opportunities, and pathways. “Having the opportunity to speak and interact with industry mentors was beyond what any of us had imagined. This program solves problems which I had always found backwards with the employment system. First employers require students to have real-life experience when they aren’t willing to give enough people opportunities to display their skills. Many students are discouraged because their skills do not fit directly with what employers are looking for. Working on a real-life problem made the project more enjoyable since the skills can also get you hired. This experience exposed me to cyber security and its importance.” (Epic Challenge Student)

Furthermore, the CWA addresses the reliability and validity of degrees and credentials by engaging industry in the education process. “If industry professionals do not take the time and resources to educate future generations, there would be a huge lag in innovation and professionalism since you must hire these people anyway; why not at least expose them to the real thing early giving them the interest and experience (Epic Challenge Student).”

This [Epic Challenge] class taught me vast amount of information that I plan on retaining. This class has changed the way I view cyber security. When I started this internship, I didn't know what to expect and turns out this internship was nothing like I had thought it would be. I learned the core values of cyber security that rest on the NIST framework. The mentors critiquing us on our memos and projects helped me learn how to take constructive feedback and apply it to better our work. I learned the differences between academic writing and business writing skills. I believe this virtual internship provided real world experience. I would recommend this internship to anyone who is interested in gaining real world experience and not only cyber security experience.

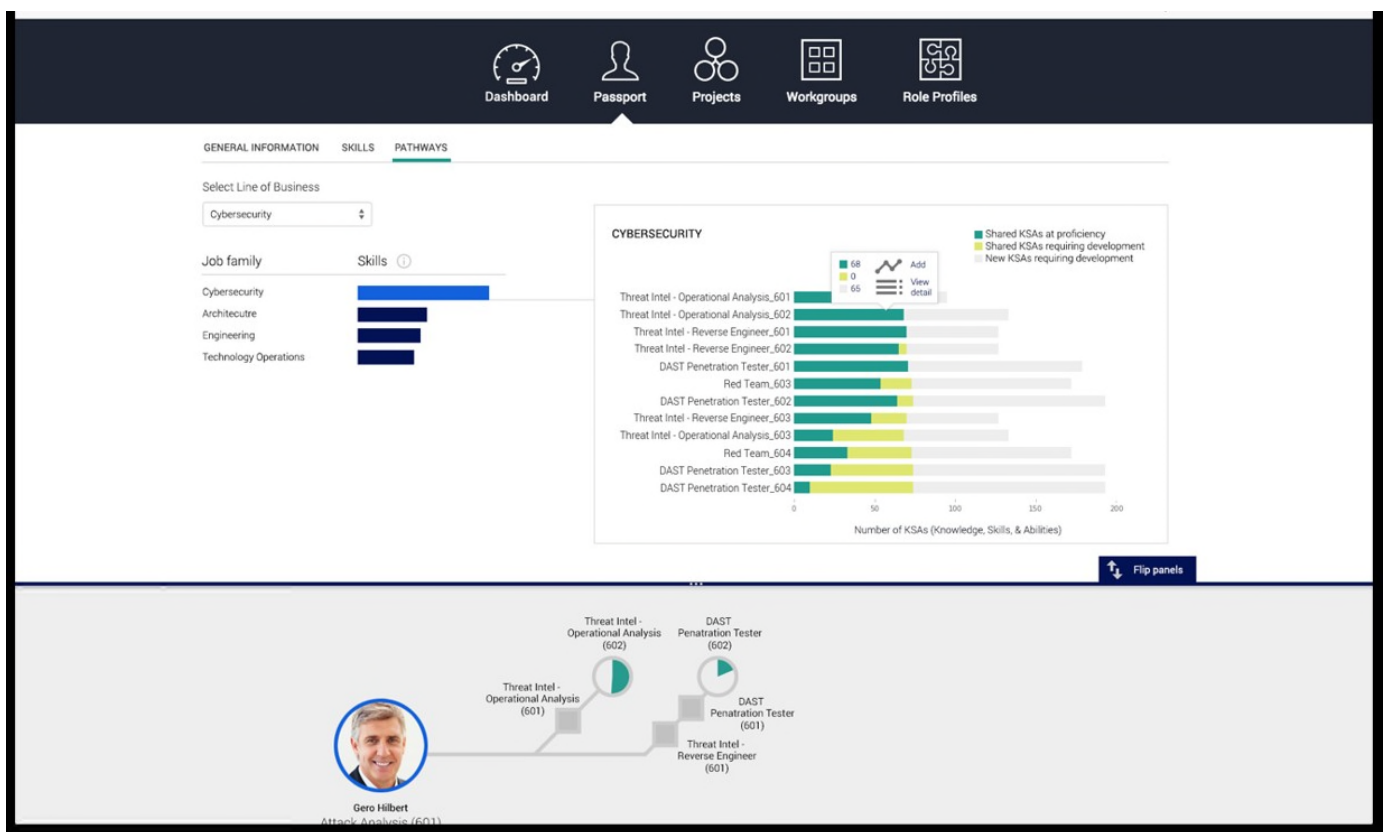
**Abdullah | Compliance Analyst | Bad Gateway | Informatics**

The Epic Challenges validate degrees and credentials by using demonstrated mastery as the measure of proficiency (Figures 3 & 5). This means that Epic Challenges learning starts at a student’s current competency level and supports his/her growth to the mastery target established by CWA and faculty. The competency-based Epic Challenge uses performance metrics established by industry SME’s and faculty on the iQ4 platform. The 2017 Epic Challenge, called “Threat Inside”, was a virtual real-world project curriculum, defined by industry and engaged faculty, mentors and student multidisciplinary teams. The core competencies included in the 2017 challenge assessed the knowledge, skills, and abilities relating to the identification, detection, protection, response and recovery from an insider threat. The educational outcomes included building and maintaining

communications with executives, peers and regulators. These are essential skills (e.g., teamwork and communications skills), which are required in the workforce.

Participation in the Epic Challenge serves to magnify an employer’s commitment to the program. One mentor from the 2016 Epic Challenge wrote, *“Just had a chance to review all the materials and the students did a really good job. I will speak with our HR on how we can have a mini-career day to invite the students to the company HQ where we can give a quick session on what we do, how we are structured and how we are dealing with some of the same issues that addressed in the assignment. Give them an opportunity to ask questions, provide some feedback, etc.”*

Figure 11: (Top) iQ4 Proficiency Profile by Line of Business and Job Family with Career Pathways Below



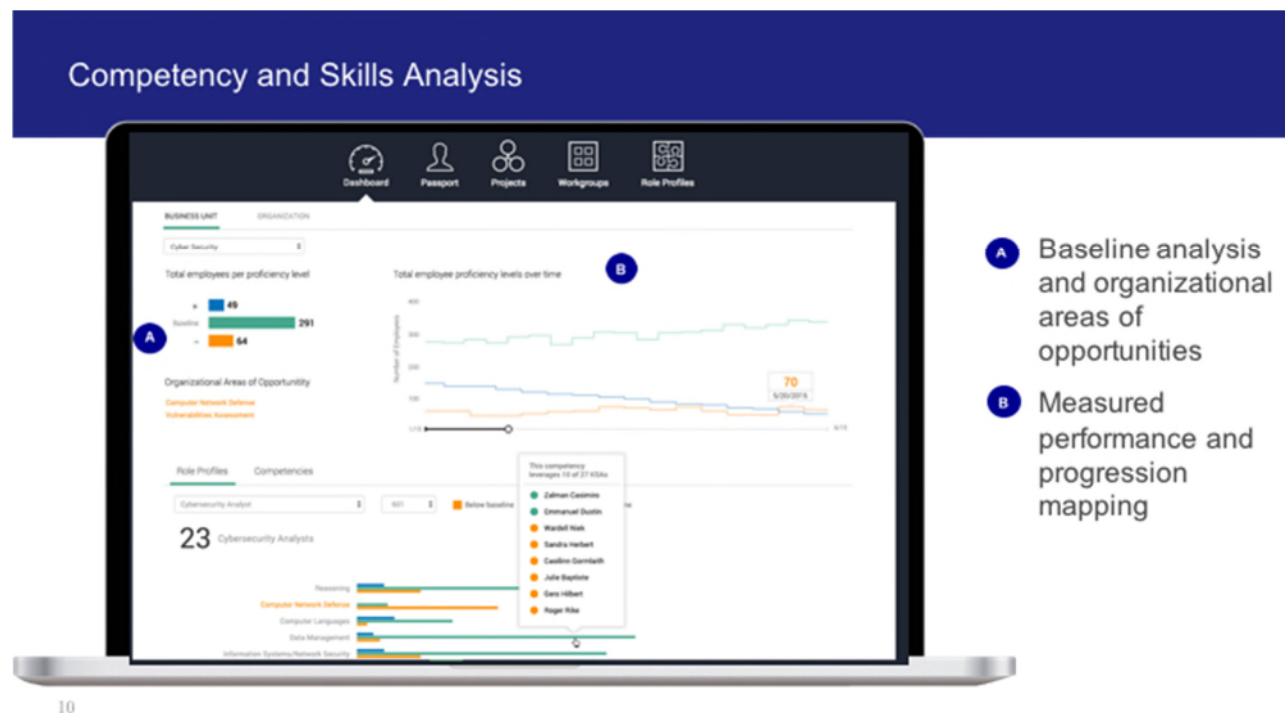
CWA Industry members have concluded that the three-month Epic Challenge program results with students having *“the poise, knowledge and confidence equal to a new hire with six to twelve months’ experience”*<sup>xiii</sup>. There are four characteristics of CBE that are integral parts of the Epic Challenges and the CWA approach that the U.S. Department of Education correlates with successful learning outcomes<sup>xiv</sup>.

1. Planning for competency-based education initiatives: The CWA industry members work closely with faculty to ensure that the objectives of the Epic Challenges are clearly defined. Furthermore, Epic Challenge scenarios, learning activities and course projects have been pilot tested, evaluated and revised to assure a smooth transition to implementation at a large scale.

Selecting assessment methods:

1. The Epic Challenges use formative assessment techniques from the faculty member, industry mentor and peers to provide real-time corrective feedback so that the students will demonstrate a high level of proficiency in the summative assessment.
2. Creating and ensuring that learning experiences lead to competencies: With measurable competency objectives as the targets the iQ4 proficiency progression in the Digital Passport enables learners monitor their own progression toward specific competency goals (Figure 11).
3. Reviewing assessment results to identify changes needed to strengthen student outcomes: The iQ4 proficiency progression in the Digital Passport identifies trends in all students' competency development and can provide targeted instructional interventions to address gaps in student competency development.
4. Using analytics within industry and States to identify workforce risk by shortage in numbers and competency so to advise education the priority skills and competencies Industry needs.

Figure 12: Dashboards: Workforce Risk, Vulnerabilities Needing Professional Development





The CWA represents a competency-based solution that addresses the accessibility affordability of higher education. The CWA industry mentors increase the capacity of educational institutions with content expertise. The mentors also provide external assessment which contribute to the reliability and validity of degrees and credentials. Finally, the CWA is competency-based training and education that connects to career advancement opportunities and pathways for all learners.

For more information, contact:

Frank C. Cicio Jr.

Chief Executive Officer / Founder

iQ4 Corporation, Cyber Workforce Alliance

co-Chair NICE / NCWF National Cybersecurity Workforce Framework- Private Sector  
FCC CSRIC WG7 Cybersecurity Workforce NCWF

m: 201.914.4655

e: [frank@iQ4.com](mailto:frank@iQ4.com)

[www.iQ4.com](http://www.iQ4.com)

## Endnotes

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- <sup>i</sup> Personal communication, CWA Mentor- Senior Advisor, Federal Reserve Bank of New York.
- <sup>ii</sup> National Student Clearinghouse, a nonprofit education organization, is the trusted and neutral partner to more than 3,600 secondary and post-secondary institutions in the United States. They serve their educational partners by securely compiling the academic records of students and facilitating the validated exchange student enrollment, performance and related information to prevent resume fraud.
- <sup>iii</sup> McClelland, D. C. (1973). Testing for competence rather than for intelligence. *American Psychologist*, 28, 1-14.
- <sup>iv</sup> Weise, M. R. (2014) *Got Skills? Why Online Competency-Based Education Is the Disruptive Innovation for Higher Education*.  
<http://er.educause.edu/articles/2014/11/gotskillswhyonlinecompetencybasededucationisthedisruptiveinnovationforhighereducation>
- <sup>v</sup> U.S. Department of Education, National Center for Education Statistics (2002). *Defining and Assessing Learning: Exploring Competency-Based Initiatives*, NCES 2002-159, prepared by Elizabeth A. Jones and Richard A. Voorhees, with Karen Paulson, for the Council of the National Postsecondary Education Cooperative Working Group on Competency-Based Initiatives. Washington, DC.
- <sup>vi</sup> Hodge, S. (2007). The origins of competency-based training. *Australian Journal of Adult Learning*, 47, 179–209.
- <sup>vii</sup> Hodge, S. (2007). The origins of competency-based training. *Australian Journal of Adult Learning*, 47, 179–209.
- <sup>viii</sup> The White House (2015). *Fact Sheet: Training for Americans for Better Jobs and Higher Wages to Grow the Economy*. <https://obamawhitehouse.archives.gov/the-press-office/2015/04/02/fact-sheet-training-americans-better-jobs-and-higher-wages-grow-economy>
- <sup>ix</sup> Hodge, S. (2007). The origins of competency-based training. *Australian Journal of Adult Learning*, 47, 179–209.
- <sup>x</sup> Carnevale, A. P., & Strohl, J. (July 2013). *Separate and Unequal: How Higher Education Reinforces the Intergenerational Reproduction of White Racial Privilege*, Georgetown University, Georgetown Public Policy Institute, Center on Education and the Workforce.
- <sup>xi</sup> Weise, M. R. (2014) *Got Skills? Why Online Competency-Based Education Is the Disruptive Innovation for Higher Education*.  
<http://er.educause.edu/articles/2014/11/gotskillswhyonlinecompetencybasededucationisthedisruptiveinnovationforhighereducation>
- <sup>xii</sup> Pont, B. (2004). Improving the access to and participation in adult learning in OECD countries. *European Journal of Education*, 39 (1).
- <sup>xiii</sup> Personal communication. CWA Mentor – Federal Reserve Bank Of New York
- <sup>xiv</sup> U.S. Department of Education, National Center for Education Statistics (2002). *Defining and Assessing Learning: Exploring Competency-Based Initiatives*, NCES 2002-159, prepared by Elizabeth A. Jones and Richard A. Voorhees, with Karen Paulson, for the Council of the National Postsecondary Education Cooperative Working Group on Competency-Based Initiatives. Washington, DC.