



FOR IMMEDIATE RELEASE November 27, 2018 Contact: Jennifer Kim PESC Membership Services Director +1.202.261.6516



20TH ANNUAL BEST PRACTICES COMPETITION NOW OPEN 1ST PLACE WINNER TO BE FEATURED AT SPRING 2019 DATA SUMMIT

Washington, D.C. PESC is pleased to announce the 20th Annual Best Practices Competition is now open for submissions through April 19, 2019. The PESC 20th Annual Best Practices Competition recognizes, highlights and promotes innovation and ingenuity in the application and implementation of interoperable data standards for business needs.

First held by PESC in 1999 and awarded to the Ontario Universities' Application Centre (OUAC) for "Model of an Electronic Standardization Initiative: Ontario Universities Electronic Transcript (OUETS) System," the Annual Best Practices Competition is open to institutions, associations, organizations, government agencies and departments, districts, consortia, non-profit and commercial service providers and other education stakeholders that have collaborated to design and/or adopt an electronic standardization initiative via a specific implementation, and/or other medium such as, but not limited to, published articles, white papers, pilots and demonstrations. <u>1st PLACE WINNERS FOR 2018</u> Dr. Ken Sauer, Tari Lambert and Jillian Scholten of ICHE receiving 1st Place Award in 19th Annual Best Practices May 2, 2018 at PESC Spring 2018 Data Summit.

<u>1st PLACE WINNERS FOR 2017</u> Doug Falk of National Student Clearinghouse & Peter Meehan of iQ4 receiving 1st Place Award in 18th Annual Best Practices May 3, 2017 at PESC Spring 2017 Data Summit.





The 20th Annual Best Practices Competition for 2018/2019 is now open for submissions until close of business Friday April 19, 2019. All entries and submissions should be submitted by April 19, 2019 to michael.sessa@pesc.org or at: Michael Sessa, President & CEO, PESC, 1250 Connecticut Avenue NW Suite 700, Washington, D.C. 20036.

All entries will be judged by the PESC Board of Directors. First place and those receiving special recognition will be notified immediately by PESC, an official public announcement will be made immediately before PESC's Spring 2019 Data Summit being held in Washington DC at the Dupont Circle Hotel, and the award ceremony will be made during the General Session of the Spring 2019 Data Summit. Submissions can include documentation, artifacts and descriptions of the scope of a project, participants and partners, types of standards employed, relevant dates and project milestones, copies of articles (if an article submission), outline of mission/objectives and any related statistics (# of transactions transmitted, estimated cost savings, etc.). Fall 2018 Data Summit registration is open and all are encouraged to attend.

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/provincial systems; local, state/provincial and federal government agencies; professional, commercial and non-profit organizations; and non-profit associations & foundations.

LEADING THE ESTABLISHMENT & ADOPTION OF OPEN DATA EXCHANGE STANDARDS ACROSS EDUCATION'S 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 ecosystem when and where needed without compatibility barriers but in a safe, secure, reliable, legal, and efficient manner.

PESC, WHILE PROMOTING DATA EXCHANGE STANDARDS, DOES NOT SET, CREATE OR ESTABLISH POLICIES ON PRIVACY & SECURITY. Organizations and entities using PESC Approved Standards and services should ensure they comply with GDPR, FERPA and all local, state, provincial, federal and international rules on privacy and security as applicable. For more information, see <u>www.PESC.org</u>.

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Commentary from Your Chief Standards Evangelist PESC President & CEO Michael Sessa

Paper, Paper. How We Love Paper.

Yes, we love paper. We love to hold paper, feel paper, smell paper, fold paper, cut paper, tear paper, rip paper, crumble paper, crinkle paper, staple paper, file paper, stack paper, write on paper, print on paper, paint on paper, wrap things in paper, eat food on paper, print money on paper, shred paper, make holes in paper. You probably have a stack of paper in front of you right now. We love paper so much we created an entire industry *– recycling–* so we can continue using paper, but in a better way.

Along with the 'wheel', 'paper' is among the most successful standards ever.

The rise of video games, virtual reality (VR) and now augmented reality (AR) and their ever-increasing integration into our daily lives due to our obsessive fascination with video, will escalate. But at the same time, moving away from paper can seem counter-intuitive. You cannot see an electronic debit or credit, for instance, the same way you can see and feel a dollar bill...so it may not seem *real*. I would argue that paper is the most successful invention ever, having been adapted and integrated over thousands of years into almost every nook and cranny of our lives.

The same social conundrum holds true for data exchange, meaning you cannot see an electronic transcript or digital degree exchanged, so it doesn't seem real, or trustworthy.

In Education, what will it take to migrate from paper? The SPEEDE/ExPRESS (EDI-Electronic Data Interchange) Transcript Standard is 30 years old, the PESC XML College Transcript is 15 years old; what will it take for both to feel real, and be better than *paper*?

The challenge of the UBER affect.

The taxi cab industry could have created and even been Uber itself. Taxi cabs were slow and reluctant to migrate from a cash-based, paper system to electronic credit and debit. In Washington DC, the city only required credit and debit across all taxi cabs as of 2013 (1), though credit and debit cards were invented in 1950 (2). In steps Uber, with a new value proposition – no paper – and a new business model – user (passenger) interchangeable with provider (driver), and creating a new supply/demand model.

Now there's no way to turn back in time, and no one really wants to, except the taxi cab industry which will lose out on an industry expected to grow in the 13 years to \$285 billion, with taxi cabs less than a quarter of that share. (3)

Are you the next paper-based organization to suffer the UBER affect?

I think this is the question we all fear. If you think you are, what then do you do? With a long history in product management, I've learned that without a sense of urgency, some initiatives stall or falter. How do we make everyone aware of the sense of urgency? Did the taxi cab industry feel a sense of urgency or did the inertia to change override any sense of urgency? What is the lesson to be learned?

Every long journey begins with a first step.

Your job requires coordination, alignment and seamless operation of many disparate and complicated systems and applications. From funding and licensing, to policy and collaboration, to partnerships, integration and maintaining competitive products and services, interoperable student mobility can seem like an overwhelming challenge.

PESC understands these complexities and over our first 20 years, PESC has focused on these key building blocks and established a core competency in data management, standards and exchange.

PESC Members are leading the community with cutting-edge groups and pilots (like EdExchange for global data exchange and GEO Code for establishment of a single code), to demonstrations (at the Groningen Declaration Network, AACRAD & ARUCC) and new and innovative methods of data management (like with the JSON-LD Task Force and the Data Privacy & Protection Task Force).

We know you have many choices in attending conferences and events. PESC as a small non-profit provides high value not only to PESC Members and attendees of Data Summits, who help fund PESC, but to all colleges and universities across Canada, USA and all over the world that need data standards as well, but might not have appropriate funding or resources to directly participate in PESC.

In attending PESC's Spring 2019 Data Summit, you will not only learn about emerging initiatives and be provided with a tremendous amount of resources & contacts, you will also be able to participate in discussions with leaders and experts of emerging initiatives and connect through PESC to a growing global community.

> Please take a moment and register for PESC's Spring 2019 Data Summit. Please feel free to share this message as well. Join the effort and support global student mobility.

1 (https://www.downtowndc.org/news/credit-cards-in-d-c-cabs/) 2 (https://www.thoughtco.com/who-invented-credit-cards-1991484) 3 (https://www.marketwatch.com/story/ride-hailing-industry-expected-to-grow-eightfold-to-285-billion-by-2030-2017-05-24)

www.PESC.org



Transcripts on the Web? Oh My!

From B2B to B2Web

It may be difficult at this moment to think about Transcripts on the Web, but let's break this concept down for better understanding. Sure we all know the Web is driving every business and every industry in different ways. Data privacy and protection looks to control under specific circumstances how data is to be shared, but in higher education for data that is allowed, run to the Web, don't walk.

Transcripts, credentials, competencies, and let's not forget about financial aid in the US, all have a future on the web.

The key to achieving this vision has two parts: awareness of the uses and possibilities, and the actual pathway to make it happen. Awareness requires innovation, ingenuity, people, passion and creativity. Awareness also requires recognition of where social behavior is headed and how you compare. If there's any doubt that 'all roads lead to the Web', think about how reliant we all are to our mobile phones, our tablets, computers, laptops, social media networks, streaming video and audio, home security, and how that reliance continues to grow. Not convinced? Please consider this:

- "The growth of internet users [*worldwide*] has accelerated and reached 3.4 billion in 2016."1
- IBM reports that, "90% of the data in the world today has been created in the last two years."2
- "44 billion GB of data was created *per day* in 2016...predicted to grow to 463 billion GB of data created *per day* in 2025."3

 "93 percent of all internet users now go online via mobile devices (phones or tablets), and with the majority of new internet users now 'phone first', mobile's share is likely to increase."4

But what does it mean to migrate transcripts, credentials, competencies, financial aid to the web, and how can it be done?

The pathway to the web is paved in JSON-LD (JavaScript Object Notation for Linked Data).

We've grown accustomed to Portable Document Format (PDF) in which a document is presented in digital format in most cases on the Web. A PDF item looks like the paper version, and that brings us comfort as we all have a millennia-long attachment to and reliance on paper, and the majority of our processes are based in paper. But data in PDF can only be viewed, data cannot be captured digitally.

XML & EDI are major steps forward on the road to the Web. Both technologies provide the opportunity for automated, machine-to-machine processing, harmonization and interoperability, *in a business-tobusiness (B2B) environment*. To meet the growing demand of societal use, those using XML & EDI are now transforming data to make it web-friendly.

JSON-LD is the language of the Web. *Linking data* allows an individual data element to be tagged, identified and made 'discoverable' on the web. Discoverable for what purpose? The short answer is, for everything. This means we may need to build a B2Web layer on top of our B2B layer.

1 (<u>https://ourworldindata.org/internet</u>)

^{2 (}https://www.ibm.com/blogs/insights-on-business/consumer-products/2-5guintillion-bytes-of-data-created-every-day-how-does-cpg-retail-manage-it/) 3 (https://www.slideshare.net/Micro-Focus/growth-of-internet-data-2017) 4 (https://thenextweb.com/contributors/2017/04/11/current-global-stateinternet/#.tnw 8pHvZxpk)

Vote for Your Favorite 'Past' Best Practice

Promoting Innovation & Ingenuity In the Application of Data Standards For Business Needs

In addition to celebrating our 20th Annual Best Practices in 2019, we're taking a look back at the **Past 19 years of 1st Place Winners** and asking you to vote for your favorite!

All past 19 years of 1st Place Winners are posted online at www.PESC.org, so tell your colleagues to take a look and vote, vote, vote!

- Will it be last year's 1st Place Winner the Indiana Commission for Higher Education for its statewide implementation of PESC high school and college transcripts & partnership with Credential Engine?
- Will it be iQ4 & National Student Clearinghouse for joining forces and using NIST NICE to improve and scale verified workforce-ready graduates?
- Will it be the University of Tennessee System and AcademyOne for state-wide collaboration and implementation of an automated, reverse transfer system?
- Will it be Elon University and Parchment for trailblazing in competencies and credentials with development and integration of the Elon Experiences Transcript?
- Or will it be automated use of data standards at the University of Phoenix, OCAS, California, Georgia, North Carolina, Ohio – or our 1st Winner in 1999 OUAC for Model of Electronic Standardization Initiative: OUAC Electronic Transcript System (OUETS)?

The Past Best Practice receiving the most votes will receive Special Recognition at the PESC Spring 2019 Data Summit at which PESC celebrates the 20th Anniversary of the Best Practices Competition!

To Blockchain or Not. Is That The Question?

So you think you know blockchain? At PESC we ask you to rethink what you really know.

Digital credentialing has been at the top of the headlines for a number of years now. Whether a news story shocks us with reporting of a phony diplomas being issued, or all-too-common reports of violence horrify us with stories of death, destruction and total loss of history and documentation, including paper credentials, credentialing is much more complex than it may appear on the surface.

Emerging from this environment are the need and awareness to authenticate, or verify, and make credentials digital and mobile.

- Has there been enough discussion about this need?
- Does blockchain satisfy this need?
- What other factors are there to consider?

The short answers are 'no', 'maybe', and 'many'.

Let's start with the last item. The most challenging factors include the usual suspects: legacy, funding and change management.

Not every institution or service provider is at the same level of technological capacity or on the same platform. How to get from where you are and with the systems, technology and vendors you have, to blockchain (or any new system or network) requires cost/benefit analysis, funding, contracts, licenses, short/long term strategy, adoption & integration, training, staff, and so on.

All factors would be identified through solid use or business cases in which analysis, research and discussion focus on answering:

- What is the problem? What are we trying to solve?
- How are <u>all</u> stakeholders throughout the entire ecosystem impacted?
- How might we solve this problem in a cost effective, standardized way that improves service and delivery, preserves data quality and integrity, and enables equivalent implementations?

The cart before the horse?

For the second item, PESC amends the question to read: *What are all the solutions available, including blockchain, that might satisfy this need?*

It is very difficult to avoid the attention blockchain is receiving as a solution. Hold strong and focus on your needs, the needs of your students and learners, and your organization.

We must do the hard work while remaining open to all possibilities and solutions.

We are all eager to find the best solutions, beware though of a great solution in search of a problem.

Data Standards as Policy in the 4th Industrial Revolution

Understanding What Data Standards Really Are

A **'policy'**, as defined by Wikipedia, is "a deliberate system of principles to guide decisions and achieve rational outcomes; a statement of intent, and is implemented as a procedure or protocol; are typically instituted to seek some positive benefit, or to avoid some negative effect."

Educause explains that *policy* follows a life cycle involving five stages:

- 1) discussion and debate [of topic or idea];
- 2) political action [or group activation];
- 3) legislative proposal [or adoption of topic or idea];
- 4) law and regulation [or implementation];
- 5) and compliance [or evaluation].¹

We understand *policy* very well, the word itself dating back to almost five hundred years, as we can easily associate *policy* to our daily lives, in all the rules and regulations we agree to follow, we rely on, and trust from the contents of our refrigerators to the rules we agree to follow on roads and highways.

As policy affects the behavior of people, data standards affect the behavior of systems.

In using a data standard, two organizations agree to establish a *digital relationship* between the two with rules on how the relationship should behave:

- by discussing the mutual goals and identifying the case and benefits of exchanging digital data;
- 2) assigning a group to analyze and develop a plan;
- finalizing that plan for implementation and integration;
- 4) making agreement to the plan & implementing it
- 5) monitoring and updating the plan and relationship as needed.

Data standards are digital relationships.

At PESC, we refer to the digital relationship as *connectivity*. In being a relationship, successful digital *connectivity* requires an agreed-upon format or standard, protocols, meticulous management, and an understanding of the direct correlation between connectivity, data standards and business.

PESC understands these complexities and over our first 20 years, PESC has focused on these key building blocks and established a core competency in data management and exchange.

Efficient connectivity improves organizational performance, delivery and service, and ensures data quality and integrity while providing ROI.

Data standards, pillars of the world wide web, enable student mobility.

The best data standards are open and communitysourced, PESC's cornerstone principle. A successful PESC requires active and engaged participation.

Join the revolution!

Lastly, in searching Wikipedia for data standard, Wikipedia responds with 'data standard' <u>does not exist</u>.

1 (https://er.educause.edu/articles/2009/3/the-policy-process-life-cycle)

Spring 2019 Data Summit

Register Today and Stay Connected with PESC!

Beautiful Dupont Circle in Northwest Washington, D.C. hosts this year's Spring 2019 Data Summit.

Historic Dupont Circle, a hub for education-based organizations, associations and think tanks, lists dozens of bistros, bars, boutiques, restaurants and museums, all within walking distance...a perfect venue to convene leaders, experts and organizations across education technology, policy and practice.

Taking place May 7 – 10, 2019 at the Dupont Circle Hotel in Washington, D.C. the Spring 2019 Data Summit represents PESC'S 20^{th} Annual Convening in Washington, D.C. of Members and stakeholders in higher education technology & standards.

PESC Technology, Services and Approved Standards serve colleges and universities; states and provinces; commercial organizations and government agencies; software vendors and technology providers; and non-profit organizations and associations.

All, along with the general public, are welcome and encouraged to register and attend the Spring 2019 Data Summit!

Session topics range from access, integration and implementation of data systems and application centers; development, maintenance and promotion of data exchange standards; open, communitydriven and standards-based best practices; emerging and innovative technologies; data privacy and protection, data quality and management, and data collection and reporting; mobility, portability and overall interoperability; and other key factors that drive global education data systems development and technology.

If your college, university or organization is involved in collecting and managing education data and uses a variety of service providers and vendors, the Spring 2019 Data Summit is the perfect event for you! To ensure colleges and universities are provided access to PESC and its mission, PESC offers a '2-for-1' option to institutions, which means two (2) from the same institution are eligible to register for the price of one (1). Contact the PESC office for details.

Register today, join your colleagues and get connected at PESC's Spring 2019 Data Summit!

At PESC we are elevating the entire education domain to a new standard of mobility and interoperability!

Highlights for the Spring 2019 Data Summit:

- > 20th Annual Best Practices Competition
- Keynote Speaker & Featured Speakers in General Sessions
- Technical Pre-Summit Training Workshops
- Active, timely Interactive Breakout Sessions
- PESC Annual Member Meeting

What's Included in the Spring 2019 Data Summit:

- Featured Speakers & Panelists who are leaders & experts across policy, practice & technology
- Breakouts on emerging technologies and initiatives
- Morning Continental Breakfast on three days
- Morning Breaks on three days with hot coffee
- Afternoon Breaks on two days with treats
- Hot & Cold, customized lunch buffet on two days (including gluten-free & vegan options)
- Annual Spring Summit Reception on first day with hors d'oeuvres
- Discounted hotel lodging rate w/in group block

Attendees of Spring 2019 Data Summit can expect:

- To learn about emerging initiatives and be provided with a tremendous amount of resources and contacts
- To be connected through PESC to a growing global community
- To hear about new opportunities, pilot projects and demonstrations
- To actively participate in discussions with leaders of emerging initiatives

Breakouts for Spring 2019 Data Summit include:

- Academic Credentialing and Experiential Learning Task Force Meeting
- Canadian PESC User Group Meeting
- Data Privacy & Protection Task Force Meeting
- EdExchange User Group Meeting
- GEO Code User Group Meeting
- JSON-LD Task Force Meeting
- Standards Development Forum for Education

The format for the Spring 2019 Data Summit:

The Spring 2019 Data Summit is comprised of two three main parts totaling three (~3) days:

- ½ day of Pre-Summit Workshops
- 1 ¾ days of Conference-style, General Sessions with Featured Speakers, lunches, reception
- 1 day of Breakout Sessions, concurrent meetings of work groups and initiatives

Pre-Summit Training Workshops for the Spring 2019 Data Summit:

- Data Privacy & Protection 101 PESC's Data Privacy and Protection Task Force, with partnership from AACRAO, Ellucian and the National Student Clearinghouse lead a discussion on the basics of data privacy & protection, technical implementation, resources and upcoming new rules, laws and regulations.
- EDI, PDF, XML & JSON 101 PESC's Academic Credentialing & Experiential Learning Task Force, Education Record User Group (ERUG), JSON-LD Task Force partner with the AACRAO SPEEDE Committee to lead a discussion on the basics of EDI, PDF, XML and migration to JSON & JSON-LD.

PESC Summits also host the AACRAO SPEEDE Committee & USCCF's JDX & T3 Innovation Network.

Data Privacy & Protection 101

- Mary Chapin, Chief Legal Officer, VP & Corporate Secretary, National Student Clearinghouse
- Doug Falk, CIO and VP, National Student Clearinghouse
- Julia Funaki, Associate Director, American Association of Collegiate Registrars and Admissions Officers (AACRAO)
- Rick Skeel, Director of Product Management, Ellucian

EDI, PDF, XML & JSON Implementation

- Matt Bemis, Associate Registrar, University of Southern California
- Jerald Bracken, Software Engineer, Office of IT, Brigham Young University
- Doug Holmes, Acting Manager, eTranscripts, Ontario Universities' Application Centre (OUAC)
- Alex Jackl, President & CEO, Bardic Systems

General Sessions

for the Spring 2019 Data Summit:

Value of Student/Learner-Centric, Hub/Spoke Models

- Bert van der Geest, Project Director, Ministry of Education, British Columbia
- Victoriano Giralt, CIO, University of Malaga
- Cathy van Soest, Manager, EducationPlannerBC Transcript Services

Digitalization: Revolution or Evolution?

- Matthew Pittinsky, Ph.D., CEO, Parchment
- Joellen Shendy, Project Strategy Director, Workday
- Rick Torres, President & CEO, National Student Clearinghouse

Reshaping the Ecosystem

- Bob Sheets, Ph.D., Research Professor, George Washington Institute for Public Policy (GWIPP)
- Natasha Jankowski, Ph.D., Director, National Institute of Learning Outcomes Assessment (NILOA)
- Jason Tyszko, Vice President, Center for Education and Workforce, US Chamber of Commerce Foundation (USCCF)
- Mike Baur, Program Manager, Michael and Susan Dell Foundation

Portability & Scalability

- Tom Black, Assistant Vice Provost & University Registrar, Johns Hopkins University
- James Kelly, Senior Director of Technology, Educational Credential Evaluators (ECE)
- Takis Diakoumis, CTO, Digitary

Integration & Implementation

- Megan McClean Coval, Vice President of Policy & Federal Relations, National Association of Student Financial Aid Administrators (NASFAA)
- Tom Green, Ph.D., Associate Executive Director, AACRAO
- Mark Leuba, Vice President, IMS Global
- Kirsten Schroeder, Global Business Services Partner, Education, EPA, OPM, Congressional Offices, IBM

- AACRAO American Association of Collegiate Registrars and Admissions Officers
- ANSI American National Standards Institute
- ARUCC Association of Registrars of the Universities and Colleges of Canada
- GDN Groningen Declaration Network
- HROS HR Open Standards Consortium
- NASLA National Association of Student Loan Administrators
- PESC Postsecondary Electronic Standards Council
- SPEEDE Standardization of Postsecondary Education Electronic Data Exchange
- US NCES United States National Center for Education Statistics

The History of Standards in Education | The Spark That Launched A Journey

The road to interoperability has been long and winding. What started as a small movement in 1982 in the Austin School District to send high school transcript data to the University of Texas at Austin in electronic form, encouraged leaders in Dallas and throughout Florida in 1984 to expand the movement, establish data networks, and spark the journey of standardization that would lead to the founding of AACRAO SPEEDE, PESC, two of the biggest data exchange networks in North America; and partnerships with ANSI, ARUCC, HROS, US NCES and the global Groningen Declaration Network.

Having joined as a PESC Member and Board Director representing NASLA in 1999, Michael Sessa then stepped in as PESC President & CEO in 2002. Michael will reflect back on the political climate at the time, technological factors driving the journey, success stories and best practices, challenges encountered, and the people whose passion, commitment and innovation set the cornerstone principle of PESC's mission.

Thursday May 9, 2019 12.30 pm – 1.15 pm *"It's All About the Data: The History of Standards in Education"* Michael D. Sessa PESC President & CEO

20th Annual Best Practices Competition Now Open!

PESC Annual Best Practices – Promoting Innovation and Ingenuity In the Application and Implementation of Interoperable Data Standards Across Education

PESC is pleased to announce the **20th Annual Best Practices Competition** is now open for submissions through April 19, 2019. The **PESC 20th Annual Best Practices Competition** recognizes, highlights and promotes innovation and ingenuity in the application and implementation of interoperable data standards for business needs across the education landscape.

First held by PESC in 1999 and awarded to the Ontario Universities' Application Centre (OUAC) for "Model of an Electronic Standardization Initiative: Ontario Universities Electronic Transcript System (OUETS)," the **Annual Best Practices Competition** is open to institutions, associations, organizations, government agencies & departments, districts, consortia, non-profit and commercial service providers and other education stakeholders that have collaborated to design and/or adopt an electronic standardization initiative via a specific implementation, and/or other medium such as, but not limited to, published articles, white papers, pilots and demonstrations.

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Meet CanPESC Canadian PESC User Group

A Direct Canadian Voice in Global Initiatives and Data Standards

The Canadian presence and influence within PESC has existed since the very formation of PESC in 1997. As Canadian students cross provincial and international borders to attain their education, the need for universities, colleges, application centers, government agencies, software providers and systems vendors that support Canadian and international markets to ensure mobility and interoperability has never been greater.

The formation of the Canadian PESC User Group (CanPESC) in 2011 solidified the importance of Canada's role within PESC and drew together many Canadians from across the country to work towards a common goal and "one common standard." As the voice and official committee representing Canadian interests, CanPESC serves a liaison role, coordinating and communicating its efforts across all provinces and territories, working closely with Canadian organizations like ARUCC, the Association of Registrars of the Universities and Colleges of Canada.

At the Spring 2019 Data Summit, CanPESC Co-Chairs will be serving as Featured Speakers and hosting a meeting of CanPESC during Breakout time:

Pre-Summit Training Workshop Tues May 7, 2019 EDI, PDF, XML & JSON–Development & Production 1.30pm – 3.00pm

- Doug Holmes, Acting Manager, eTranscripts, OUAC; Co-Chair CanPESC
- Matt Bemis, Associate Director, University of Southern California; PESC Board Vice Chair; Co-Chair PESC GEO Code User Group
- Jerry Bracken, Software Engineer, Office of IT, Brigham Young University

 Alex Jackl, President & CEO, Bardic Systems; Co-Chair PESC Academic Credentialing & Experiential Learning Task Force; JSON-LD Task Force

<u>General Session | Wednesday May 8, 2019</u> Learner & Student Centric, Hub & Spoke Models 9.00am – 10.00am

- Cathy van Soest, Manager, EducationPlannerBC Transcript Services; Co-Chair CanPESC
- Bert van der Geest, Project Director, Ministry of Education, British Columbia
- Victoria Giralt, CIO, University of Malaga

Breakout Session | Thursday May 9, 2019 CanPESC User Group Meeting

3.30pm – 5.00pm

• CanPESC In-Person Meeting w/ conference call, webinar, list options

Read more about the Canadian PESC User Group (CanPESC) under 'Groups' at <u>www.pesc.org</u> and look for the Canadian flag!

PESC's Data Privacy & Protection Task Force A Collaborative Group Spanning Policy, Practice & Technology

With GDPR newly implemented in 2018, several critical issues remain unknown about how postsecondary institutions (registrars and admissions officers) and Student Information Systems (SIS) vendors are implementing GDPR. Add in proposed revisions to FERPA and new laws emerging in California and other states, data privacy & protection will continue to impact data exchange for the next few years.

Are you ready for the coming changes needed for data privacy & protection?

At the Spring 2019 Data Summit, PESC will feature the Data Privacy & Protection Task Force. Register today to attend these timely sessions focused on topics and issues related to the legal, technical implementation of GDPR, FERPA and additional privacy & protection rules and regulations for institutions, service providers, third parties and student information systems.

- Pre-Summit Training Workshop Data Privacy
 <u>& Protection 101</u> Held on Tuesday afternoon May 7, 2019, attendees will learn about the implications of GDPR, FERPA and other rules and regulations, interact and learn from one another, and hear about new emerging rules and regulations.
- <u>Spring 2019 Data Summit Breakout Session</u> Data Privacy & Protection Task Force – Held on Friday morning May 10, 2019, the Task Force, Co-Chaired by Doug Falk of the National Student Clearinghouse and Julia Funaki of AACRAO, will convene for a regularly scheduled meeting to discuss current topics and advance the work efforts of the group.

Topics and Issues for the Data Privacy & Protection Task Force:

- What rules are colleges and universities applying to student records to determine if a record is subject to GDPR?
- Are there standards for the set of data elements required to correctly store GDPR indicators on the student record?
- Have SIS vendors already updated their systems to include GDPR attributes on the student record? If so, how did they determine the necessary fields and rules for storing GDPR flags and/or indicators?
- For the 'right to be forgotten,' what is the extent of responsibility for one organization informing another regarding data to be 'forgotten?'
- Have the legal departments of the SIS vendors interpreted GDPR differently, and if so, how might that impact how data is stored and exchanged?
- Might PESC need to coordinate standardizing transmission of GDPR indicators in EDI/XML and other file formats.
- What is the impact of the new law emerging out of California?
- How will the revisions to FERPA impact data exchange (EDI, PDF, XML)?

Are You Using EDI, PDF or XML for Student Data?

Changes Are Coming – Register Today and Stay Connected!

At the Spring 2019 Data Summit, PESC charges forward in promoting its mission of interoperability and also reflects back to embark on its 21st year to present State of Technology and Standards in Higher Education. Where Are We? Where Have We Been? What Did We Learn? Where Are We Going? How Will We Get There?

Ensuring data quality, data integrity, and data privacy and protection requires constant meticulous care. As more colleges, universities, states, provinces, vendors and service providers, application centers, systems and networks adopt PESC Approved EDI, PDF and XML Standards and migrate toward automated, electronic, machine-to-machine processing, the need to maintain and update these systems and networks also increases.

A segment of your overall business processes may rely on EDI, PDF and/or XML, and at the PESC Spring 2019 Data Summit, we ensure you connect to all the technical resources and information you need. With newly emerging privacy and protection rules, which join FERPA and GDPR, ensuring proper and accurate data exchange is the highest priority for PESC.

PESC Technology, Services and Approved Standards serve colleges and universities; states and provinces; commercial organizations and government agencies; software vendors and technology providers; and non-profit organizations and associations.

If your college, university or organization is involved in collecting and managing student data and uses a variety of service providers and vendors, the Spring 2019 Data Summit is the perfect event for you!

To ensure colleges and universities are provided access to PESC and its mission, PESC offers a '2-for-1' option to institutions, which means two (2) from the same institution are eligible to register for the price of one (1). Contact the PESC office for details. From Ontario to Indiana, to Credentials Solutions, National Student Clearinghouse and Parchment (among many others), to Stanford University and all 114 of the California Community Colleges (which alone serves 2.1 million students), to all of financial aid - ALL USERS of PESC APPROVED STANDARDS -PESC is fulfilling its vision of a digital domain!

All For One PESC'S Mission

All For One and One For All?

For a data standard, *All For One and One For All*, by the very definition 'standard' itself, should be a firm statement. A data standard defined is use, and reuse where appropriate, of a unified technology and/or set of agreed upon (and supported) taxonomies, schemas, shared code sets and their operational exchange.

Data standards ensure that all those that trade, share and exchange data not only understand that data, but ensures every other organization it trades, shares and exchanges data with to have that same understanding. All for one data standard, and one data standard for all.

Data standards improve data quality, accelerate institutional performance, reduce costs and enable student data mobility.

For higher education though, *All For One and One For All?* is a question instead. Higher education systems, technology and standards have grown organically since the beginning of the digital age. An inadvertent consequence not envisioned in building many of these systems, technologies and standards, is the omission of interconnectivity between and among them.

PESC promotes and champions the best solution to connecting new systems, technologies and standards while ensuring usable solutions for legacy ones – **Neutral Data Standards**.

Only data standards enable complete, global connectivity within and throughout the education domain. This domain though must be supported by a trustworthy, digital network allowing data to flow

seamlessly and automatically from one network, system or application to another when and where needed without compatibility barriers, but through a safe, secure, reliable, legal and efficient platform.

Achieving this mission through open, neutral data standards will make student data mobile – the goal of PESC Members.

Achieving Student Mobility One Data Standard at A Time

It's all about the data, but achieving true student data mobility can be complicated requiring the alignment and seamless operation of many disparate factors. From funding and licensing, to policy and collaboration, to partnerships, collaboration, integration and maintaining competitive products and services, interoperable student mobility can seem like an overwhelming challenge.

PESC understands these complexities and over our first 20 years, PESC has focused on these key building blocks and established a core competency in data management and exchange.

PESC Members are leading the community with cutting-edge groups and pilots (like EdExchange for global data exchange and GEO Code for establishment of a single code), to demonstrations (at the Groningen Declaration Network, AACRAO & ARUCC) and new and innovative methods of data management (like with the JSON-LD Task Force and the Data Privacy & Protection Task Force).

We know you have many choices in where to spend your time and attention. PESC as a small non-profit provides high value not only to PESC Members and attendees of Data Summits, who help fund PESC, but to all colleges and universities across Canada, USA and all over the world that need data standards as well, but might not have appropriate funding or resources to directly participate in PESC.

MAY 8-10, 2019









Spring 2019 Data Summit | 20TH Annual Best Practices in Education Data Systems State of Technology & Standards in Higher Education

At the Fall 2016 Data Summit in San Diego

PESC Members and resources collaborated under the Academic Credentialing and Experiential Learning Task Force to produce the **PESC Approved Common XML Credential for e-Certificates, Degrees and Diplomas** in record time, implemented at Johns Hopkins University and Stanford University as part of the AACRAO-NASPA Comprehensive Learner Record Project. Keynote Speaker was Valere Meus, Director, Erasmus Without Paper, Ghent University.

Spring 2017 Data Summit in Washington, D.C.

PESC looked externally in producing "*Empowering the Mobility of Digital Academic Credentials*," showcasing external projects, resources and speakers (e.g. Credential Engine, Groningen Declaration Network, US NICE NIST, USCCF, etc.) and exemplifying the value and need for collaboration and engagement of all stakeholders in the ecosystem. Academic Credentials were examined and discussed from various perspectives: Admissions/Registrar, International, Systems/Technology, Policy/Research and Marketplace. PESC launched the **JSON Task Force** and the **Credential Data Mapping Initiative** launched under the Academic Credential Learning Task Force. PESC awarded **iQ4** and **National Student Clearinghouse** with its 18th Annual Best Practices Award.

Fall 2017 Data Summit in Toronto

For its **20th Anniversary**, PESC returned to Canada, now one of the largest users of all PESC Approved Standards, to invigorate global mobility and national collaboration across all ten provinces and three territories and honor **ARUCC** with its Distinguished Service Award. Topics ranged from Blockchain, Diploma Supplement and Student Mobility, to initiatives and pilots including MyeQuals in Australia/New Zealand; Data Exchange and Matching with McGill university, National Student Clearinghouse and CHESSIC; and the emergence of provincial Councils on Admissions and Transfer. (PESC held its Fall 2007 Data Summit 10th Anniversary in Montreal and its Fall 2012 Data Summit 15th Anniversary in Vancouver.)

Spring 2018 Data Summit in Washington, D.C.

PESC convened thought-leaders and experts across policy, practice and technology, featuring speakers from the Lumina Foundation, T3 Innovation Network of the USCCF, Lumina Foundation, Credential Engine, AACRAO, EMREX, US NCES National Forum on Education Statistics, Working Nation; and awarded the Indiana Commission for Higher Education with its 19th Annual Best Practices Award. PESC readied the community for the next big jump in technology due to the emergence of JSON, linked data and of the employment and training sectors as users on the supply/demand model, provoking innovation and collaboration like never before.

Fall 2018 Data Summit in San Francisco

PESC focused on those who interact with students and learners directly on the front line: Registrars, SIS Vendors, Application Centers and Credential Evaluators, examining the challenges of keeping pace with emerging technologies, meeting needs and demands of students and customers, continuous roll-out of new features and processes, all while maintaining the highest levels of data integrity, cost efficiency, safety, privacy & security. *Inspiring Digitalization Across Education and Employment* featured speakers from AACRAO, ACE, ARUCC, Common Application, Credential Engine, DegreeData, DIGARC, DXtera, ECE, Ellucian, National Student Clearinghouse, Oracle, Parchment, Stanford University, USCCF and Workday. PESC launched the Data Privacy and Protection Task Force. AACRAO's Janie Barnett and USC's Matt Bemis received PESC's Distinguished Service Awards.

<u>At the Spring 2019 Data Summit in Washington, D.C.</u>

PESC charges forward in promoting its mission of connectivity, celebrates its 20th Annual Best Practices and reflects back as PESC embarks on its 21st year to present **State of Technology and Standards in Higher Education**. Where Are We? Where Have We Been? What Did We Learn? Where Are We Going? How Will We Get There? Featuring Speakers from AACRAO SPEEDE Committee, BC Ministry of Education, Digitary, EdExchange, George Washington Institute for Public Policy, Groningen Declaration Network, IBM, IMS Global, Johns Hopkins University, Michael and Susan Dell Foundation, NASFAA, NILOA and the USCCF. PESC launches **History of Data Standards in Education** and Timeline. The Postsecondary Electronic Standards Council (PESC) presents the

Spring 2019 Data Summit

MAY 8-10, 2019 | DUPONT CIRCLE HOTEL | WASHINGTON DC

THE SPRING 2019 DATA SUMMIT REPRESENTS

PESC'S 20TH ANNUAL CONVENING IN WASHINGTON, D.C. OF STAKEHOLDERS

IN HIGHER EDUCATION TECHNOLOGY & STANDARDS.

PESC TECHNOLOGY, SERVICES & APPROVED STANDARDS SUPPORT AND SERVE:

colleges & universities; states & provinces; commercial organizations & government agencies; software vendors & technology providers; & non-profit organizations & associations – and all, along with the general public are welcome & encouraged to register and attend the Spring 2019 Data Summit.

SESSION TOPICS RANGE FROM:

access, integration & implementation of data systems & application centers; development, maintenance & promotion of data exchange standards; open, communitydriven & standards-based best practices; emerging & innovative technologies; data privacy & protection, data quality & management, and data collection & reporting; mobility, portability & overall interoperability; and other key factors that drive global education data systems development & technology.

HIGHLIGHTS FOR THE SPRING 2019 DATA SUMMIT

- > 20th Annual Best Practices Competition
- > Keynote & Featured Speakers in General Sessions
- Technical Pre-Summit Workshops
- Active, timely Breakout Sessions

Venue Setup

- > For Speakers Setup: WIFI, all hardware (microphone, laptop, projector, screen)
- > General Sessions Conference-style presentations
- Breakout Sessions Workgroup and open discussion

What's Included in the Spring 2019 Data Summit?

- Featured Speakers & Panelists who are leaders & experts across policy, practice & technology
- > Breakouts on emerging technologies & initiatives
- Morning Continental Breakfast on three (3) days
- > Morning Breaks on three (3) days with hot coffee
- > Afternoon Breaks on two (2) days with sweets & treats
- > Hot & Cold, customized lunch buffet on two (2) days
- > Annual Spring Summit Reception on first day with hors d'oeuvres
- > Discounted hotel lodging rate within group block

Venue Location

- > Dupont Circle in Washington, D.C.
- Metro, Airports & Weather
- > Restaurants
- ➤ Things To Do
- > Walking Tours
- > The Monuments
- > Smithsonian Museums
- > Cherry Blossoms

Summit Format

The Spring 2019 Data Summit is comprised of two main parts: 1 $\frac{3}{4}$ days of conferencestyle, general sessions with Featured Speakers, lunches, reception; followed by 1 day of breakout, concurrent sessions during which work groups and initiatives convene (2 $\frac{1}{2}$ days total).

HOTEL & REGISTRATION INFORMATION

Hotel	Dupont Circle Hotel 1500 New Hampshire Avenue NW Washington DC, 20036 United States +1.202.483.6000 Hotel Link
Group Discount Deadline	March 15, 2019
Group Discount Rate	\$261 (US) per night single/double
Group Name	PESC Spring 2019 Data Summit
Dress Code	Business casual
Early Bird Registration	Through March 15, 2019
General Public	\$975
PESC Member	\$795
Standard Registration	After March 15, 2019
General Public	\$1,225
PESC Member	\$975

STATE OF TECHNOLOGY & STANDARDS IN HIGHER EDUCATION | SPRING 2019 DATA SUMMIT

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		Standards Development Forum Change Control Board Technical Advisory Board		Groningen Declaration Network Update						
FRIDAY May 10, 2019		Global Education Organization (GEO) Code User Group		AACRAO SPEEDE Committee	ADJOURN					
	ION	Data Privacy & Protection Task Force)))))		Academic Credentialing Task Force)))))						
	MMIT REGISTRAT				tandards	Workshop EDI, PDF, XML & JSON-LD		JSON-LD Task Force)))))	AEETING	
THURSDAY MAY 9, 2019	FAST & DATA SUP	nplementation eder, IBM NASFAA	BREAK	<i>nplementation</i> ds ACRAO MS Global	lata – History of S PESC	Credential Engine		EdExchange User Group	PESC MEMBER N	
	TINENTAL BREAK	Integration & Ir 8.30-9.00 - Kirsten Schroe 9.00-9.30 - US NCES SCED 9.30-10.00 - Megan Coval,		Integration & Ir 10.30-11.00 - Open Standarr 11.00 – 11.30 - Tom Green, A 11.30-Noon - Mark Leuba, I	CH <u>'s All About the D</u> Michael Sessa, P	USCCF JDX & T3 Innovation Network		Canadian PESC User Group CanPESC)))))	ANNUAL	
WEDNESDAY MAY 8, 2019	CON	8.30-9.00 Welcome & Introductions - Michael Sessa, PESC 9.00-10.00 Learner-Centric, Hub-Spoke Models Panel - Victorian Giralt, University of Malaga - Victorian Giralt, University of Malaga - Victorian Geest, BC Ministry of Education - Cethy van Soest, EducationplannerBC		Digitalization: Revolution or Evolution? 10.30-11.00 - Matthew Pittinsky, Parchment 11.00-11.30 - Joellen Shendy, Workday 11.30-Noon - Rick Torres, National Student Clearinghouse	LUN 20 th Annual Best Practices & Awards 1	 1.30-2.00 1.30-2.00 Linked Data Bob Sheets, GWIPP Bob Sheets, GWIPP 2.00-3.00 2.00-3.00 2.00-3.00 Reshaping the Ecosystem Panel Natasha Jankowski, NILOA Jason Tyszko, USCCF Mike Baur, MSDF 	BREAK	Portability & Scalability 3.30-4.00 - Tom Black, Johns Hopkins University 4.00-4.30 - State 4.30-5.00 EdExchange Panel - Takis Diakoumis, Digitary - James Kelly, ECE		ANNUAL SPRING RECEPTION
TUESDAY MAY 7, 2019					PRE-SUMMIT REGISTRATION	Pre-Summit Training Workshop <u>Development & Production</u> EDI, PDF, XML & JSON 101 - Matt Bemis, USC - Jerry Bracken, BVU - Doug Holmes, OUAC - Alex Jackl, Bardic Systems		Pre-Summit Training Workshop <u>Development & Production</u> Data Privacy & Protection 101 - Mary Chapin, NSC - Julia Funaki, AACRAO - Rick Skeel, Ellucian	PESC BOARD OF DIRECTORS	
	7.30am	8.30-10.00am	10.00-10.30am	10.30am-Noon	Noon-1.30pm	1.30-3.00pm	3.00-3.30pm	3.30-5.00pm	5.00-6.00pm	6.00-7.30pm

All General & Breakout Sessions and Data Summit events are opened to all registered attendees.

Spring 2019 Data Summit

Dupont Circle Hotel





ABOUT OUR SPEAKERS

Mike Baur Program Manager Michael and Susan Dell Foundation	Mike manages a portfolio of investments in the U.S. data-driven education practice focused on unlocking innovation by improving data interoperability through standardization initiatives. He works with state, district, and vendor organizations which execute projects to empower educators and students by providing the infrastructure to enable real-time access to accurate, actionable education data. Prior to joining the foundation, Mike was Managing Director at Academic Partnerships where he led efforts to promote the utilization of technology in delivering universal and affordable access to higher education institutes around the world. Earlier in his career, Mike was in higher education where he was an Enterprise Architect and Senior Technical Consultant. Mike has a bachelor's in computer science and a MBA from Harding University.	
Matt Bemis Associate Registrar University of Southern California PESC Board Vice Chair	Matt Bemis, Associate Registrar at the University of Southern California, is responsible for the Degree Progress and Transfer Articulation operations for the University. He serves as the administrator over the Degree Audit and Transfer Credit applications, is responsible for the certification of student athlete academic eligibility and is the project lead for the electronic data interchange (EDI) initiative at USC. He currently serves on the PESC Board as Vice Chair; on the AACRAO SPEEDE Committee and is former Chair; is Co-Chair for the PESC Education Record User Group and Co-Chair of the GEO Code User Group. Matt has a demonstrated appreciation for the important work that PESC supports, guides and directs. He remains very active in his volunteer commitments to PESC and AACRAO, through leadership and participation in PESC and AACRAO workgroups and Data Summits. Matt has also been representing PESC as speaker and presenter at Annual Meetings of the Groningen Declaration Network.	
Tom Black Assistant Vice Provost & University Registrar Johns Hopkins University	Thomas "Tom" Black is the inaugural University Registrar and an Assistant Vice Provost at Johns Hopkins. He leads the divisional registrars, who continue to serve individual schools, to help simplify and unify university registration activities. Tom is a nationally recognized leader in his field. Prior to his appointment at Hopkins, Tom served ten years as the University Registrar and Associate Vice Provost for Student and Academic Services at Stanford University, overseeing the University Registrar, Student Services Center, Accessible Education, Student Financial Services, and the Bechtel International Student Center. Tom has spent four decades working in related positions at the University of Chicago, Duke, and the University of North Carolina at Chapel Hill. Tom is a charter member of the Groningen Declaration Network. He is also a member of the American Association of Collegiate Registrars and Admissions Officers (AACRAO), honorary member of the Southern Association of Collegiate Registrars and Admissions Officers (SACRAO), and Carolinas Association of Collegiate Registrars (CACRAO).	
Jerry Bracken Software Engineer, Office of IT Brigham Young University		



MARY CHAPIN CHIEF LEGAL OFFICER, VICE PRESIDENT & CORPORATE SECRETARY NATIONAL STUDENT CLEARINGHOUSE	Mary Chapin is Vice President, Chief Legal Officer and Corporate Secretary for the National Student Clearinghouse, a position she has held since 2016. Formerly the general counsel of Direct Response Consulting Services, Euro DM Ltd. and Washington Lists, Inc., Mary has 23 years of experience advising domestic and international private and publicly-held corporations and nonprofit organizations. Her expertise includes data management and protection, privacy, regulatory issues, intellectual property, employment law, corporate governance and compliance, cybersecurity, and technology transactions. Prior to becoming general counsel, Ms. Chapin was a partner in the Intellectual Property, Media and Technology Department of McDermott, Will & Emery LLP, where she represented Fortune 100 companies to emerging growth companies in a broad range of litigation and transaction matters. She is licensed to practice law in Virginia, the District of Columbia, and New York. She is co-chair of the Litigation Forum for the National Capital Region Chapter of the Association of Corporation Counsel. Ms. Chapin also serves on the boards of directors of NOVACO, Inc. and its parent organization Shelter House, Inc., and the board of Emmanuel Lutheran Preschool. Ms. Chapin earned a bachelor's degree from the State University of New York at Buffalo and a law degree from the University of Toledo College of Law.	
MEGAN MCCLEAN COVAL VICE PRESIDENT, POLICY & FEDERAL RELATIONS NATIONAL ASSOCIATION OF STUDENT FINANCIAL AID ADMINISTRATORS	Megan is the Vice President for Policy and Federal Relations at the National Association of Student Financial Aid Administrators (NASFAA) where she oversees the Association's policy and advocacy efforts. Prior to joining NASFAA in the fall of 2010, she served as the Director of Government Relations for the federal Advisory Committee on Student Financial Assistance, where she contributed to several congressionally mandated reports on the postsecondary access and persistence of low- and moderate- income students. Megan began her career in higher education as an admissions counselor at Penn State University. She received a master's in higher education at Penn State and BA in political science from Allegheny College.	
Takis Diakoumis Chief Technology Officer Digitary		
Doug Falk Chief Information Officer & Vice President National Student Clearinghouse PESC Board Chair	Doug Falk has served in technology leadership positions for 18 years at the National Student Clearinghouse, where he is currently VP & CIO. As CIO, Doug provides vision and leadership for information technology initiatives that align with business goals to improve client responsiveness, quality, security and compliance, and cost effectiveness. He is responsible for providing leadership across multiple areas, including development, implementation and governance of information systems, enterprise architecture, information security, and technology infrastructure. Doug has served on the PESC Board of Directors for 12 years and as Chair for 6 years.	
JULIA FUNAKI ASSOCIATE DIRECTOR AACRAO	Julia Funaki received her Bachelor of Science from The Ohio State University and worked for the Columbus Council on World Affairs. Julia attended a graduate program at American University and worked in domestic and international admissions for the University. Upon completion of her Master's in International Communication she took a job in the foreign student services office at Ohio Wesleyan University. After returning to Washington and completing a Master's in International Education with an emphasis in Higher Ed Administration, Julia worked for the University of Maryland College Park in International Education Services. In 1996, Julia joined the staff at AACRAO. She has been involved with NAFSA and AACRAO as an author, presenter, and committee member and chair and serves on the faculty for the AACRAO Summer and Winter Institute.	



Bert van der Geest Project Director Ministry of Education, British Columbia		
Victoriano Giralt CIO University of Málaga		
Tom Green, Ph.D. Associate Executive Director AACRAO	Dr. Tom Green brings over 30 years of SEM experience and expertise to AACRAO, where he serves as the Associate Executive Director for Consulting and SEM. He served as dean or vice president of enrollment management at seven institutions, both public and private. Dr. Green led admissions, financial aid, registrar, student accounts, academic advising and support, adult reentry services and one-stop shop areas, twice serving as director of financial aid. His expertise in SEM planning, recruitment techniques, enrollment marketing and communications, financial aid analysis and resource utilization and student success techniques resulted in enrollment increases, improvements in student profile and retention rates, as well as net revenue. In 2006, Dr. Green joined AACRAO Consulting and since 2008 has devoted his career full-time to helping institutions reach their enrollment goals. His work has included both private and public institutions, from small private colleges to public flagships, from rural to highly urban, and specializations such as online programs, law schools, Hispanic Serving Institutions and Historically Black Colleges and Universities. His consultations have been performed in every region of the United States, in Canada, the United Kingdom, the Middle East and in Eastern Europe. As the Association's Associate Executive Director, he oversees all SEM initiatives, including the SEM Conference, content for member professional development, and also serves as Editor-in-Chief of SEM Quarterly, AACRAO's peer-reviewed journal of research and practice in the field. He oversees the AACRAO-NASPA partnership on Comprehensive Student records, a Lumina Foundation-funded initiative on the future of digital student records. Tom Green holds a bachelor's degree from the University of Iowa, a master's degree from the American Conservatory of Music, where he later began his academic career as a faculty member in music performance, and a Ph.D. in higher education leadership, management and policy from Seton Hall University.	
TROY HOLADAY, PH.D. President CollegeSource		
DOUG HOLMES ACTING MANAGER, ETRANSCRIPTS ONTARIO UNIVERSITIES' APPLICATION CENTRE		



ALEX JACKL PRESIDENT & CEO BARDIC SYSTEMS		
NATASHA JANKOWSKI, PH.D. DIRECTOR, EDUCATION POLICY, ORGANIZATION AND LEADERSHIP NATIONAL INSTITUTE OF LEARNING OUTCOMES ASSESSMENT	Natasha Jankowski, Director of NILOA, has presented at numerous national conferences and written various reports for NILOA. Her main research interests include assessment and evaluation, organizational evidence use, and evidence-based storytelling. She holds a PhD in Higher Education from the University of Illinois, an M.A. in Higher Education Administration from Kent State University, and a B.A. in philosophy from Illinois State University. She previously worked for GEAR UP Learning Centers at Western Michigan University and worked with the Office of Community College Research and Leadership studying community colleges and public policy.	
James Kelly Senior Director of Technology Educational Credential Evaluators PESC Board	Jim serves as Senior Director of Technology at ECE. Over the last 16 years, he has successfully built a foundational framework for technology to support infrastructure, applications, and strategic activities. These initiatives have been key to the growth of services offered by ECE helping the business triple in size during Jim's tenure. Jim manages a team of skilled technology professionals, sets technology goals and leads strategic planning initiatives. As part of ECE's senior leadership team, Jim supports internal and external systems while involved in planning, general leadership and management efforts. Jim also works with PESC and the Groningen Declaration Network to standardize credential evaluation data and contributes to educational data mobility internationally. Jim serves as Co-Chair of the PESC GEO Code User Group, Steering Committee Member for PESC EdExchange, and on the PESC Board. Jim has also been representing PESC as speaker and presenter at Annual Meetings of the Groningen Declaration Network. After graduation from the University of Wisconsin Oshkosh with a degree in Biology and a minor in Chemistry, Jim began a career in business and technology professional consulting for organizations that vary in both size and industry. Jim's consulting experience brings a wealth of knowledge in technology, project management, business systems, warehousing, and distribution to his current efforts.	
MARK LEUBA VICE PRESIDENT, PRODUCT MANAGEMENT IMS GLOBAL	Mark Leuba is a technology leader in education, with particular expertise in online higher education. Through his former firm, Pathway Technology Partners and affiliates Mark provided advisory and strategy services for leading institutions, foundations, non-profit and for-profit education organizations. A recent engagement was TIP - Technology Interoperability Pilot project sponsored by the Bill and Melinda Gates Foundation. Mark also consulted to BMGF and others assessing innovations in digital courseware and personalized learning products, competency-based education, strategic program management and product selection, organizational due diligence and education technology market analysis. Prior to forming his consultancy Mark served as Chief Technology Officer for Moodlerooms, a leading provider of open source learning management solutions where Mark led their transition to cloud-based platform services - at the time the largest migration of its kind in online education. As the Chief Information Officer for American Public University System from 2005-2009 Mark developed and executed a five year plan laying the technology foundation for unparalleled growth in the University's online programs. Before joining APUS, Mark held leadership roles in corporate IT, including nine years as Vice President of Applications for Random House, the world's largest consumer trade publisher. Mark's role in IMS Global is to guide its product management strategy and execution, building on the substantial success of the IMS team. Mark received his B.A. in Business Administration/Finance from the University of Baltimore.	



MATTHEW PITTINSKY, PH.D. CEO PARCHMENT	Matthew Pittinsky, Ph.D. is the CEO of Parchment and co-founder and former CEO of Blackboard Inc. Matthew is an assistant research professor of sociology at Arizona State University and also serves on the Board of Trustees of The Woodrow Wilson National Fellowship Foundation and the Woodrow Wilson Academy of Teaching and Learning, and the Board of Directors of CampusLogic and Picmonic. In 2012, the Teachers College at Columbia University awarded Matthew with The President's Medal of Excellence to recognize his impact and innovation in the field of education technology and entrepreneurship. He is a frequent speaker and has recently been invited to present at NewSchools Summit, Association of American Universities meeting, National Association for College Admission Counseling National Conference and SXSWedu. Matthew holds a B.S. in Political Science from American University, Ed.M. in Education Policy from Harvard University Graduate School of Education and a Ph.D. in Sociology of Education from Teachers College, Columbia University.	
Kirsten Schroeder Global Business Services Partner Education, EPA, OPM, Congressional Offices IBM	Kirsten Schroeder is a Partner in the K-12 National Practice component of IBM's Global Services division. Ms. Schroeder specializes in the development and implementation of business systems as well as business process redesign for public sector clients.	
MICHAEL SESSA PESC PRESIDENT & CEO PESC BOARD	Michael serves as President, CEO, and on the PESC Board, a position he's held since 2002. At PESC Michael manages PESC's membership, finances, events, marketing and website, strategic planning and PESC's fifteen committees and groups. He began his career in 1990 at a local branch of The Boston Five Cents Savings Bank in student loans and consumer lending & compliance and has dedicated his efforts to standardization and interoperability ever since. As evangelist at PESC, Michael speaks regularly at conferences and events throughout the USA, Canada and around the world. Michael first served on the PESC Board of Directors from 1999-2002, representing American Student Assistance (ASA) and the National Association of Student Loan Administrators (NASLA), before coming on board in 2002. Prior to PESC, Michael worked 10 years at American Student Assistance (Massachusetts Higher Education Assistance Corporation) as Director of Program Relations and Planning managing industry and government affairs and strategic technological initiatives. Michael is a 1989 graduate of Dartmouth College and was born and raised in Revere, Massachusetts, just north of Boston. He currently resides in Washington DC where PESC is headquartered.	
BOB SHEETS, PH.D. RESEARCH PROFESSOR GEORGE WASHINGTON INSTITUTE FOR PUBLIC POLICY	Robert Sheets conducts research related to education, workforce development, and economic development policy as well as labor market and education and workforce data systems. He is currently conducting research on innovation in higher education, student loan systems, labor market credentialing systems, and next generation workforce development policy including labor market and workforce information systems.	
Joellen Shendy Product Strategy Director Workday		



RICK SKEEL DIRECTOR OF PRODUCT MANAGEMENT ELLUCIAN PESC BOARD	Rick has been a long-time Member of PESC as a Member of the AACRAO SPEEDE Committee, as a member of Kuali, and was on the Committee that formed the foundation for what became PESC. He has worked with national and community standards groups for more than 20 years through his work on SPEEDE. He was a member of the PESC Board since July 2005, for more than 9 years and had to step down from his position on the Board for one year because of a change in employment. Rick worked at the University of Oklahoma for more than 38 years and retired from that institution at the end of October, 2012. He worked for the Kuali Foundation for two years and is now working for Ellucian. Rick is very interested in continuing the work he has been involved in for so many years, and believes in the value of PESC and its mission.	
Cathy van Soest Project Manager EducationPlannerBC		
RICK TORRES PRESIDENT & CEO NATIONAL STUDENT CLEARINGHOUSE		
JASON TYSZKO VICE PRESIDENT CENTER FOR EDUCATION & WORKFORCE US CHAMBER OF COMMERCE FOUNDATION	Jason A. Tyszko is Vice President at the U.S. Chamber of Commerce Foundation where he advances policies and programs that preserve America's competitiveness and enhance the career readiness of youth and adult learners. This includes the Talent Pipeline Management initiative, the Foundation's signature workforce development strategy. Tyszko's prior experience focused on coordinating interagency education, workforce, and economic development initiatives. In 2009, he served as a policy adviser to Illinois Gov. Pat Quinn's administration. In addition, Tyszko was deputy chief of staff and senior policy adviser to the Illinois Department of Commerce and Economic Opportunity. Tyszko received his Master of Arts from the University of Chicago and his Bachelor of Arts from DePaul University. He is a certified teacher in the state of Illinois.	



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FOR IMMEDIATE RELEASE March 8, 2019 Contact: Jennifer Kim Membership Services Director jennifer.kim@pesc.org +1.202.261.6516



MULTIPLE STAKEHOLDERS. ONE VISION.

PESC COMPLIANT JSON V 1.0 APPROVED XML REQUEST & RESPONSE V 1.0 APPROVED

Washington, D.C. The Postsecondary Electronic Standards Council (PESC) is pleased to announce the Approval and Release of *PESC Compliant JSON* version 1.0 and XML *Request & Response* version 1.0. As a PESC Approved Standard, PESC Compliant JSON v 1.0 defines unified translation rules (used by developers and programmers) for data transformations between XML and JSON technologies. As a PESC Approved Standard, XML Request & Response v 1.0 provides a digital method, a neutral way to communicate or signal, for requesting, sharing and/or exchanging data via paired standardized XML messages between organizations.

Development of JSON was conducted and produced through the JSON Task Force, launched at PESC's Spring 2017 Data Summit. In January 2018, PESC joined forces with the Access 4 Learning Community (previously the SIF Association), one of PESC's long-time Partners in PK12 to adopt a unified, education-wide strategy on JSON. Development of XML Request & Response was conducted and produced under the PESC Standards Development Forum for Education in collaboration with the AACRAO SPEEDE Committee.

"Over the past year, Members of the A4L Community, lead by A4L's Technology Director John W. Lovell, and PESC have been productively working together on a joint approach through the JSON Task Force," states Dr. Larry L Fruth II, A4L CEO. "PESC Compliant JSON v 1.0 will be referenced in the upcoming A4L Unity Technical Specifications as a data exchange option for SIF Specification users and is a model for collaborative open standards development between standards organizations," Dr. Fruth concluded.

"PESC and the A4L Community working together on JSON is the perfect example of the power of collaboration between standards bodies and the value of providing a unified approach for education," adds Michael D. Sessa, PESC President & CEO. "As PESC Members are heavy users of XML, our highest priority was to provide a standardized migration, or mapping, strategy between XML & JSON to these users, many of whom were already experimenting with JSON. XML has proven very successful for efficient, business-to-business digital exchange and delivery of data. The addition of JSON enables standardized business-to-web delivery."

PESC MEMBERS APPROVING PESC COMPLIANT JSON v 1.0 AND XML REQUEST & RESPONSE v 1.0

AACRAO AcademyOne ACT Access 4 Learning Community Alberta Post-Secondary Application System Bardic Systems California Community College System Camosun College Carnegie Mellon University College Board Common Application Credentials Solutions DegreeData Digitary Educational Credential Evaluators EducationPlannerBC Ellucian ELM Resources Florida International University	Indiana Commission for Higher Education Indiana State University iQ4 National Association Student Loan Administrators National Student Clearinghouse Nova Scotia Council on Admissions & Transfer OCAS Ontario Universities' Application Centre Oracle Parchment Stanford University University of Chicago University of Chicago University of Denver University of Denver University of Denver University of Jousiana at Lafayette University of Missouri System University of Oregon University of Phoenix University of Southern California U.S. Chamber of Commerce Foundation
Florida International University Federation of State Medical Boards	U.S. Chamber of Commerce Foundation Workday
Gotocollegefairs	



JavaScript Object Notation



PESC Compliant JSON v 1.0 and XML Request & Response v 1.0 are posted online as "PESC Approved Standards" at www.pesc.org. All PESC Approved Standards are free; developed through a rigorous, yet open and transparent voluntary, consensus-based development, approval and maintenance process; and made available to all education stakeholders worldwide for use, adoption and implementation.

About the Access 4 Learning Community

The Access 4 Learning (A4L) Community, previously the SIF Association, is a unique, non-profit collaboration composed of schools, districts, local authorities, states, US and International Ministries of Education, software vendors and consultants who collectively address all aspects of learning information management and access to support learning. The A4L Community is "Powered by SIF" Specifications as its major technical tool to allow for this management and access simply, securely and in a scalable, standard way regardless of the platform hosting those applications. The Access 4 Learning Community has united these education technology end users and providers in an unprecedented effort to give teachers more time to do what they do best: teach. For further information, visit http://www.A4L.org.

About PESC

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LEADING THE ESTABLISHMENT AND ADOPTION OF TRUSTED, OPEN DATA 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.

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PESC Compliant JSON Version 1.0.0 02/04/2019

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02/04/2019

Executive Summary

Business Problem

Currently, PESC provides standards for the electronic exchange of Transcripts, Applications for Admission, Electronic Portfolios, Test Scores, Common Credentials, and other standards. These standards provide exchange partners with a basis for creating exchange software and interpreting the data sent to them. These standards currently support Electronic Data Exchange (EDI) and eXtensible Markup Language (XML) formats. With the recent increased use of Javascript Object Notation (JSON) as an exchange medium for web services and other data exchanges, users of PESC standards have expressed the desire to use JSON as an exchange medium.

Solution

PESC has embarked on a phased approach to provide PESC Compliant exchanges of PESC standards using JSON. The first phase is to provide rules for interpreting XML schema standards in the generation and parsing of JSON. This might appear to be a manual process. However, the EdExchange project, using Java technology, has demonstrated that the XML schema can be used to automate the creation of programming language objects. In turn, these enforce the constraints of the schema on the generation of JSON, as well as determine the validity of an incoming JSON instance. This document provides detailed rules and examples that will assist the PESC community in generating and consuming PESC compliant JSON. Our experience with EdExchange is that most of these rules are implicit in tools such as JAXB, and those that are not implemented by default can be implemented via configuration options.

The second phase of this project will explore the application of PESC standards through JSON schema language, JSON-LD, and/or OpenAPI specifications. In addition, PESC will continue to search for the holy grail of a modeling language that will act as Chomsky's "deep structure" [3] for standards. This would allow one specification to encapsulate the constraints on any type of serialization and provide for the translation between them. This second phase is not in the scope of this document.

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1 Introduction

1.1 Overview

This document describes a set of rules for the creation of JSON exchanges that must be followed if an exchange is to be considered PESC compliant. PESC uses XML Schema Language to specify the data model for its various standards (e.g., High School Transcript). The rules in this document instruct the implementer how to interpret the XML Schema as a data model for JSON exchanges. In addition, the document summarizes guidelines for simplifying XML Schema to promote consistency between XML and JSON serializations.

1.2 Purpose

The purpose of this document is to establish JSON as a viable format for PESC data exchanges without sacrificing standardization. There have been many attempts to define translation rules between XML and JSON. Most of these rely on direct syntactical transformations without reference to an underlying data model, thus resulting in difficult interpretations and excessive type checking on the part of the receiving application. For example, a repeatable element in an XML schema that exists as a single element in an XML instance document would be rendered in JSON as a name-value pair (e.g., {"A": 3}, but if the element was repeated, it would be serialized as a JSON array (e.g., {"A": [3, 4]}). The receiving application must do type checking and process the two cases differently. In the data-model-aware situation, the type would always be an array and type checking would not be needed.

This document is the first step in establishing JSON as a standard of data exchange for PESC. The next step is exploring alternative expression of data and validation models that would complement or replace XML Schema Language. Some of the alternatives that PESC will explore include JSON Schema, JSON-LD, and the Content Assembly Mechanism (CAM).

1.3 Scope

This document applies to the exchange of JSON-formatted content for any PESC standard.

1.4 Intended Audience

The audience for this document consists of managers and programmers wishing to exchange JSON content compliant with the PESC data model for any of its standards.

1.5 Assumptions

The reader should have knowledge of XML, XML Schema, and JSON. For a review of these topics, the following sites have easy to read tutorials:

- XML: <u>https://www.w3schools.com/xml/</u>
- XML Schema: <u>https://www.w3schools.com/xml/schema_intro.asp</u>
- JSON: <u>http://www.json.org/</u>

2 XML Schema Simplification

In order to align with technology trends in information exchange while still supporting PESC's existing standards, the standards for both XML and JSON should promote expression of comparable semantics, simplicity of translation, and ease of implementation. Thus, the education community can have a choice of exchange formats without sacrificing interoperability. To accomplish this objective, the following requirements should be followed when creating new XML schemas for PESC standards:

- Do not define mixed elements with complex content.
- Limit the use of attributes.
- Use a single namespace if possible so that name conflicts will not occur in JSON.
- Do not define global elements in XML schemas as this will require namespace qualification of elements in instance documents.
- An element name should not be used twice in a sequence. However, an element can be repeatable.

3 **JSON** Generation and Translation Rules

3.1 Requirements for Rules

- JSON exchange data shall comply with RFC8259, "The JavaScript Object Notation (JSON) Data Interchange Format" [2].
- The name "value" will be used to designate XML element values and thus may conflict with attributes of the same name. The name conflict rule below shall be used to resolve this conflict. JSON exchanges shall follow the data models expressed in XML schemas and interpreted by the rules below.
- Although there are no specific required reserved words, the intent is to allow implementers to utilize JSON-LD; thus no "@" sign plus key words should be present unless following JSON-LD syntax. The link to these key words can be found at https://json-ld.org/spec/FCGS/json-ld/20180607/#syntax-tokens-and-keywords.
- Any information needed for translating from JSON back to XML shall not be contained in the JSON itself. For example, "@" or "_" will not appear before an attribute name to denote that name was associated with an XML attribute. This will allow programmers to view PESC JSON as they would any application natively using JSON. However, translation tools may use metadata gathered by the tool from the XML schema for translating JSON back to XML. For example, the JAXB framework keeps information about attributes as Java annotatons. This allows JAXB to use these annotations for creating attributes in XML from JSON, just by matching the property name.
- If a name appears in JSON, the value should always be of the same type (string, number, boolean, object, or array), or the value may be null under defined circumstances (see 3.3.8 Nillable Elements).
- If an element is optional, it may be omitted from the JSON. This may require existence checking by a receiving application.

3.2 General Approach

The basic strategy is that XML elements are generally represented as a name-value pair. The XML tag name becomes the JSON property name. The value, whether simple or complex, becomes the JSON value. When XML attributes are present, even for simple content, the JSON value part will always be an object. Attributes are translated as a property representing simple name-value pairs. When an XML object contains attributes and simple content, a property named 'value' will have the value of the tag in the XML.

Examples: <TAGNAME>TAGVALUE</TAGNAME> becomes {"TAGNAME": "TAGVALUE"}

<TAGNAME someAttr="atrValue">TAGVALUE</TAGNAME> becomes {"TAGNAME": {"value": "TAGVALUE", "someAttr": "attrValue"}}

To meet our goal of having JSON take the form of typical/customary JSON, some transformations may not work as someone coming from a pure XML world might expect. Consider numbers. If one sends a float of 1.00 and is processed somewhere in the middle as a JSON number, what is received should be 1. Now in the vast number of use cases this is not a problem. From a Computer Science perspective , 1.00 equals 1 as both should be parsed into a numeric type before being compared. However, if you are conveying a science question where significant digits matter, a directional heading where leading zeros should be maintained, or a similar case, you should ensure your data schema uses a string based type and not a numeric one. The astute reader will realize that this problem is nothing new; however, if one chooses to convert XML into JSON, it is much more likely to occur.

Similarly, JSON has no requirement to maintain the order of elements while XML does. This means that if you convert JSON into XML you either need to produce elements in the expected order AND use JSON tools that maintain that order, or correct the order for the XML representation. In order to accomplish this reordering the proper location of every element must be known. As you might imagine this tends to be a resource intensive process. As such, any JSON enabled software should clearly state whether it maintains document order of elements or not.

3.3 Rules

As with XML, it is understood that exchange partners may decide that certain rules, as specified below, do not fit their business models or tools. The JSON produced by violating these rules would not be considered PESC-compliant and may not work in an exchange expecting such compliance. However, PESC still encourages that exchanges use standards as guidelines, even if not compliant. PESC would also appreciate feedback as to the reasons for the deviations so that standards may be improved.

The examples below assume element A, which is part of a complex type, is being defined by a type definition.

<xs:complexType name="top"> <xs:sequence>

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```
<xs:element name="A" type="AType" minOccurs="0" nillable="true"/>
</xs:sequence>
</xs:complexType>
```

3.3.1 Name Collisions

There may be rare cases where a schema element defines both an attribute and a child element with the same name or an attribute on a simple content element with the name "value", which is reserved for specific purposes. This will cause a name conflict, which is not allowed in JSON objects. To resolve this conflict, the property name in JSON should be preceded by an underscore (i.e., "_").

3.3.2 Optional Values, Arrays, or Objects

If the following rules would result in empty JSON values ("", [], {}), the name-value pair for that element may be omitted from the JSON if the element in XML is not required.

3.3.3 Complex Content with Attribute

Attributes on a complex element with complex content will be treated as another name-value pair in the object's properties.

Schema:

```
<xs:complexType name="AType">

<xs:sequence>

<xs:element name="B" type="xs:string" minOccurs="0">

</xs:sequence>

<xs:attribute name="attr" type="xs:string" use="optional"/>

</xs:complexType>
```

Translation:

```
<A attr="text"><B>text2</B></A> becomes "A":{"attr": "text", "B": "text2"}
<A attr="text"></A> becomes "A":{"attr": "text"}
<A><B>text2</B></A> becomes "A":{"B": "text2"}
<A/> becomes "A": {} or A is omitted
```

Generation:

attr="text" and B="text2" becomes "A":{"attr": "text", "B": "text2"} attr="text" and B=no data becomes "A":{"attr": "text"} attr=no data and B=no data becomes "A":{} or A is omitted.
3.3.4 Simple Content with Attribute

Simple content with an attribute will be converted into a JSON object named for the simple element. If the attribute is optional according to the schema, the attribute will be generated only if it has a value. However, even if the attribute is not present, the JSON serialization will always be an object with a "value" property.

Schema:

```
<xs:complexType name="AType">

<xs:simpleContent>

<xs:extension base="xs:string">

<xs:extension base="xs:string">

<xs:attribute name="attr" use="optional"/>

</xs:extension>

</xs:simpleContent>

</xs:complexType>
```

Translation:

text2 becomes "A":{"attr":"text","value":"text2"}
<A>text2 becomes "A": {"value": "text2"}
<A/> becomes "A": {"value": ""} (since an empty tag is meaningful)

Generation:

A="text" and attr=no data→"A": {"value": "text"} A="text" and attr="text2"→"A": {attr="text2", "value": "text"} A=empty string and attr=no data→"A": {"value": ""} if A is an optional child A=no data and attr=no data→omit A

3.3.5 XML Types to JSON Types

The schema type determines the type of a JSON value.

```
xs:string, xs:token, etc.
<A>3.3</A> becomes "A": "3.3"
```

```
xs:integer, xs:decimal, etc.
<A>3.3</A> becomes "A": 3.3
```

```
xs:boolean
<A>true</A> becomes "A": true
```

```
xs:date, xs:time, xs:dateTime to JSON String using ISO 8601 string format
<A/>>1990-09-02T03:03:00-0500</A> becomes "A":"1990-09-02T03:03:00-0500"
```

3.3.6 Repeatable Element

The values of a repeatable element are translated to a JSON array even if the element only has one instance.

Schema:

```
<xs:complexType name="top">

<xs:sequence>

<xs:element name="A" type="AType" minOccurs="0" nillable="true"/>

</xs:sequence>

</xs:complexType>
```

```
<xs:complexType name="AType">
```

```
<xs:sequence>
```

```
<xs:element name="B" type="xs:string" minOccurs="0" maxOccurs="unbounded">
<xs:element name="C" type="xs:string" minOccurs="0">
```

```
</xs:sequence>
```

</xs:complexType>

Translation:

```
<A>
        <B>text1</B>
        <B>text2</B>
        <C>text3</C>
</A>
becomes
"A":{"B": ["text1", "text2"], "C": "text3"}
```

<A>

```
<B>text1</B>
<C>text3</C>
</A>
becomes
"A":{"B": ["text1"], "C": "text3"}
```

Generation:

B="text1" only and C="text3" becomes "A":{"B": ["text1"], "C": "text3"} B=no data and C="text3" becomes "A":{"C": "text3"} B=no data and C=no data becomes "A":{} or omitted

3.3.7 XML List Type

If the schema specifies a list then the space separated list is specified as an array.

Schema:

```
<xs:element name="A" type="AType" minOccurs="0" nillable="true"/>
<xs:simpleType name="AType">
<xs:list itemType="xs:integer"/>
</xs:simpleType>
```

Translation:

<A>1 2 3 becomes "A": [1, 2, 3]

Generation:

A= a list of "C", "CD", and "E" becomes ["C", "CD", "E"] A= no data becomes "A": [] or omitted

3.3.8 Nillable Elements

Elements defined with the xs:nillable="true" (by default xs:nillable is false) may carry the xsi:nil attribute in the instance documents. These elements will be assigned the value of null in JSON. The xsi:nil will not be treated as an attribute for translation puposes.

Schema:

<xs:element name="A" type="AType" minOccurs="0" nillable="true"/> <xs:simpleType name="AType" type="xs:integer"/>

Translation:

<A xsi:nil="true"/> becomes "A":null <A xsi:nil="false"/> or <A/> is not valid XML for this integer simple type so it cannot appear in valid XML. Translation will not be necessary.

Generation:

A=no data is omitted A=null value to be transmitted becomes "A": null

3.3.9 Required Empty Simple Element

If an element is required (minOccurs > 0) and the element is not nillable or xsi:nil is false, the empty tag (e.g., <A/> or <A>) will be translated into the empty string if the empty string is allowed by the type definition (e.g., xs:string with minLength="0"). If the XML instance document being translated is valid, the empty tag cannot occur for any type that does not include the empty string, and thus there will be no need for translation.

Translation:

<A/> becomes "A": "" if a string with minLength="0" <A/> becomes "A": [""] if repeatable and a string with minLength="0" <A/> cannot exist in a valid XML instance document if its type does not include the empty string

3.3.10 Required Empty Complex Content Element

A complex element with excluded children that must be present (i.e., minOccurs > 0) shall be represented as an empty object in JSON ("A": {}).

3.3.11 Sequence and Choice

XML schemas can specify that child elements be presented in a particular order through the xs:sequence and xs:choice constructs. JSON objects do not have an explicit order to their properties. Indeed, some JSON tools will alphabetize the property names for display. As a result, the order of JSON properties are not required to be in the same order as specified in the XML Schema xs:choice or xs:sequence. If translation from JSON to XML is required, the XML Schema may be used to reorder the property names for an XML instance document.

3.3.12 Union Types

The xs:union schema element allows for the defined element to be one of several types. For translation, this requires that the value be interpreted by determining the most specific constraint of the XML element value. For example, an integer is more constrained than a string. Processing of the union type requires type checking when parsing the JSON string so it should be discouraged in XML schemas.

Schema:

<xs:simpleType name="AType"> <xs:union memberTypes="xs:string xs:integer" /> </xs:simpleType>

Translation:

<A>3 becomes "A": 3 <A>450-3 becomes "A": "450-3"

Generation:

A=number 34 becomes "A": 34 A=string String becomes "A": "String" If the generator wants a number interpreted as a string, then the following translation could be created:A=string 345 becomes "A": "345"

3.3.13 Facets

Facets in XML schemas are used to further constrain the value of a simple type. These constraints should be used in generating JSON content. For example, if the maxLength in the schema for an element is 80, the value for that corresponding JSON property should not be greater than 80 characters.

String Facets:

xs:length, xs:minLength, xs:maxLength, xs:enumeration, xs:pattern, xs:whitespace

Number Facets:

xs:totalDigits, xs:fractionDigits, xs:minInclusive, xs:maxInclusive

Schema: <xs:complexType name="top"> <xs:sequence> <xs:element name="A" type="AType" minOccurs="0" nillable="true"/> </xs:sequence> </xs:complexType> <xs:complexType> <xs:restriction base="Atype"> <xs:restriction base="Xs:decimal"> <xs:restriction base="y"> </xs:restriction> </xs:simpleType>

```
Valid: {"A": 3.45}, {"A": 123456.123}
Invalid:
{"A": 0.12345}, {"A": 123456789.123}, {"A": "Three point five"}
```

Note: fractionDigits is the maximum number of digits to the right of the decimal, not the required number of digits.

3.3.14 Namespaces

Namespace definitions will be treated like any other attribute and added as properties to the JSON object. Namespace prefixes in XML will be part of the name used for JSON properties. Namespace definitions with prefixes not used in the XML instance document may be excluded from the JSON instance.

3.3.15 Schema Information

Attributes related to XML Schemas (e.g., xmlns:xsi namespace and xsi:SchemaLocation) may be excluded from the JSON instance.

3.3.16 Root Element

The XML root element name shall be included as a property of the top level JSON object.

3.3.17 XPath Expressions

Some PESC standards use XPath expressions to identify a particular element in an XML instance document. While there could be an interpretation of XPath for JSON, JSON tools are using other expressions to identify elements in a more straight-forward manner. JSONPath appears to be implemented in most programming languages. Since XPath expressions appear to be just strings in XML, it may require schema-specific code to identify and translate XPath to JSONPath.

/AcademicEPortfolio/Competencies[CompetencyID="Competency1"] becomes \$.AcademicEPortfolio.Competencies[?(@.CompencyID == "Comptency1")] or \$["AcademicEPortfolio"]['Competencies'][?(@.CompetencyID == "Comptency1")] The JSONPath specification is found here: http://goessner.net/articles/JsonPath/

This translation	table was extracte	d from (Goessners's	JSONPath	specification	(above):
				~		· /

XPath	JSONPath	Description
/	\$	the root object/element
•	@	the current object/element
/	. or []	child operator
••	n/a	parent operator
		recursive descent. JSONPath borrows this syntax from E4X.
*	*	wildcard. All objects/elements regardless their names.
@	n/a	attribute access. JSON structures don't have attributes.
[]	[]	subscript operator. XPath uses it to iterate over element collections and for predicates. In Javascript and JSON it is the native array operator.
I	[,]	Union operator in XPath results in a combination of node sets. JSONPath allows alternate names or array indices as a set.
n/a	[start:end:step]	array slice operator borrowed from ES4.
[]	?()	applies a filter (script) expression.
n/a	()	script expression, using the underlying script engine.
()	n/a	grouping in Xpath

3.3.18 XML Features Not Translated

XML has several notations that do not have a corresponding construct in JSON. Therefore, to meet the "no special names" requirement, the following XML notations will not be translated from XML to JSON.

- Processing instructions
- Comments
- xsi attributes: xsi:lang, xsi:type, xsi:schemaLocation

4 Tools Support

To assist with the creation of data model aware JSON, various software tools may be used to encode the XML schema rules into language objects that can then be serialized into JSON, XML, or other language. Our experience with these tools indicates they may not enforce all constraints in their objects and that some additional code or post processing may be needed to meet this specification.

4.1 Java JAXB

Currently, a combination of JAXB (Java object model creation from XML Schema) and MoXY (JSON serialization) have been successfully used to create data-model-aware JSON. The PESC EdExchange program uses this tool to create JSON for transcript exchanges.

4.2 Python

The xmlschema package for Python has been used to translate between XML instance documents and JSON using the XML schema to drive the translation. This solution appears to implement most of the rules above. It has the advantage that XML is translated into Python dictionaries where additional transformations can be applied before converting to JSON. Unfortunately, some XML Schema Language constructs such as xs:union are not supported.

4.3 A4L Tool Set

The Access 4 Learning Community is excited enough about this JSON representation that they have already developed a set of reference tools for it. These tools start with their internal schema representation and produce both a flat file with all the needed information to properly serialize JSON from one of their standards plus code and transforms capable of doing the work. While these serve as great examples between starting with an internal format and the performance concerns of the resulting code, the expectation is that people will create native solutions using the flat file to process things correctly. This exercise can be found at GitHub here: https://github.com/nsip/sifxml2pescjson.

4.4 CAMV Editor

The CAMV editor uses OASIS-defined templates to provide a data model from XML Schema (and other sources) that can be used to translate between various data exchange respresentions including XML and JSON. This software is freely available as an open source project on <u>SourceForge</u>. The JSON Task Force plans to examine this software for compatibility with this PESC standard.

Appendix A: Revision History

DATE	SECTION/ PAGE	DESCRIPTION	Version	MADE BY
02/04/2019	Whole Document	JSON Task Force approved document	1.0.0	Michael Morris Steve Margenau Doug Holmes Jerald Bracken Alex Jackl

Appendix B: References

[1] PSEC, PESC Standards Forum for Education, PESC Policies and Procedures, 2015

[2] IETF, RFC8259, The JavaScript Object Notation (JSON) Data Interchange Format, 2018

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The Value of Standards

A Del phi Study

June 2003

Standards = Liquidity

There is a clear and sudden shift in attitudes towards software standards. The climate of economic constraint and risk aversion along with the mandate to integrate systems on both sides of the firewall has created a sea change in the sense of imperative to adopt software standards.

In this climate standards create liquidity -- the ability to leverage IT investment in unforseen ways.

In this groundbreaking study, Delphi gathered the responses of more than 800 end users, software vendors, and service providers to identify the current attitudes and expectations for software standards.

The results portray a shifting landscape where standards will provide the foundation for long term advances in the way software is built, bought and deployed.



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Delphi Group makes every effort to achieve substantial accuracy in all reported information. The research analysis is created or developed from sources believed to be reliable, however Delphi Group cannot insure that all data are ultimately timely or fundamentally correct. Analysis reflects time-sensitive opinion, which is subject to change.

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What It All Means

In a nutshell:

The research, follow-up interviews, and analysis for this study all point to one overwhelming take-away: *Standards have shifted into high gear, not only garnering attention from business buyers but more importantly, they are being seen as a mandate for competitive stature, cost effective IT and operational excellence.*

Software standards have always been the subject of much controversy. In an industry characterized by a myriad of proprietary alternatives, haphazard collections of point solutions, fiefdoms of incompatible applications, and severe integration standards have been an elusive target.

The results are clear in their portrayal of a shifting landscape where standards will provide the foundation for long term advances in the way software is built, bought and deployed.

Although standards have been promoted from the outset as a panacea for this chaotic landscape, it is not until recently that the forces of connectivity, uniform platforms for cross-enterprise/industry applications and IT industry consolidation have created a climate where standards can live up to their promise.

In this groundbreaking study, Delphi gathered the responses of more than 800 end users, software vendors, and service providers to identify the current attitudes and expectations for software standards.

The findings of this study present the clear portrayal of a shifting landscape. The economics of integration and the mandate for controlling the cost of software ownership present a strong business imperative for standards. The maturation and adoption of software development standards will provide the foundation for long term advances in the way software is built, bought and deployed.

The responses to the survey which underlies this study clearly point to a greater need for the role of software standards.

The attitudes reflect a practical understanding of the role that software vendors and standards bodies will play in the symbiosis that allows foundational standards to evolve. The opportunity for significant change in operational excellence, supply chain interactions, and new market opportunities from the adoption of standards is just as clear.

Among our group of survey participants, half indicated participation in a software standards body. This is not difficult to accept given the

While tactical thinking does indeed predominate in today's conservative spending climate, the lack of enterprise integration has created such a costly infrastructure that it represents an immediate and pressing mandate for standards. Compliance with standards in software development is not simply a strategic direction, but a business imperative.

> repercussions and move away from the legacy of rampant software deployment in the past that relied on proprietary platforms. Billions of dollars have been spent on software that represents closed, dead end solutions. Although it may have taken an economic crisis for standards to take center stage in the minds of organizations, we do not see a return to prosperity diminishing the trend.

Increased interest in the role of componentization of applications and the availability of standardized directories for building on-demand applications will fuel the intent evidenced by IT users and developers of IT solutions to build interoperability.

The historical pressure to mitigate the risk of picking the wrong standard will dissipate rapidly as the risk of not integrating enterprise and, more significantly, value chain solutions, increases. Customers, partners and suppliers will push hard to demand greater flexibility and reliability in the business processes that are supported by technology. This will translate into an intense market scrutiny of software vendors' ability to work in synchrony, a mode far removed from the hardwired patchwork solutions that typify today's value chains.

Leveraging the underlying data and the information systems investment that has been made in repositories of customer, market, and transactional data will be brought to the center of every software evaluation. Proprietary repositories and datastores will be deemed a competitive liability. This is plainly illustrated as an underlying theme in many of the interviews we conducted for the study, which spoke to the historical risk and cost of migrating from applications that held data and information in proprietary vaults.

The current economic pressure to deliver tactical applications may have caused strategic planning to take a back seat. However, standards and integration are not luxuries in this sort of an environment. The study results show that standards are very much front of mind for end users and software developers.

While tactical thinking does indeed predominate in today's conservative spending climate, enterprise integration has created such a costly infrastructure that it represents an immediate and pressing opportunity

What remains to be achieved in the standards game is establishing a solid perception that the software industry is placing its bets in obvious and visible fashion on organizations which are going to be central to the industry's success.

for standards. Standards also provide options for agility in choosing and deploying solutions that have not been available in the past. The free market dynamic this introduces is essential to nearly every other aspect of a business – it is long overdue for buyers of IT solutions.

Respondents were overwhelmingly in favor of standards that provided interoperability between business partners, and saw this as critical for long-term economic health and prosperity. The economies introduced by standardization also reduce dramatically the tooling, skill reusability and competency of the work force.

Standards lacking the perception of widespread support and demand will fail to capture a critical mass of support by commercial software vendors.

While this point may appear obvious to some, it attests to the need for the visibility of standards adoption. Reestablishing trust through a visible commitment to standards is critical to both the buy-side and the sell-side of the software industry. Organizations such as OASIS, W3C, and IETG will be essential in achieving that goal. In the absence of such a coherent vision, the IT industry will continue to flounder with or without economic recovery.

Finally, as with any investment, standards will require more established benchmarks of return and payback. While survey respondents wholeheartedly acknowledged the inherent payback in adhering to standards, the actual metrics were harder to come by.

In many ways the best standard may well be the one that nobody questions - its cost is part of the price for survival. That state of standards, however, is still beyond reach in the software market. Near term solutions will require role models, benchmarks, and substantive analysis. This was best characterized by one respondent in a follow-up interview:

"Historically, our systems have been highly proprietary systems built almost entirely internally. By adopting and adapting standards that are not encumbered by excessive IP claims and that are achieving traction with both software vendors and end users, we are realizing a number of benefits:

- more use of commercial off-the-shelf software in our system
- larger pool of skilled job applicants in the market; lower learning curve to make new staff productive
- shorter development times because we benefit from the analysis & design efforts of experts that is embodied in the standard (otherwise, we'd go through the same exercise ourselves)
- faster agreement on interface/exchange requirements with both suppliers & customers
- improved ability to distribute work between our staff and outside contractors"

Large Global Information Services Firm

Executive Overview

Key Findings of This Study

A clear and sudden shift in attitudes towards software standards as enablers of organizational liquidity.

Standardized Software approaches have been an elusive target.

It is not until recently that a climate evolved where standards can live up to their promise.

Standards will provide the foundation for long term advances in the way software is built, bought and deployed.

There is an increasing expectation for the role of software standards.

Vendors and standards bodies must play together in a symbiosis that allows foundational standards to evolve.

Billions of dollars have been spent on solutions that represent closed, dead end solutions.

Componentization and on-demand applications will fuel standards.

The risk of picking the wrong standard will take a back seat to the risk and cost of not integrating.

There will be intense market scrutiny of software vendors' ability to work within integrated environments.

Proprietary repositories and datastores will be deemed a competitive liability.

Standards and integration are not a luxury.

Standards provide options for agility in choosing and deploying solutions with a lower cost of ownership.

The economies introduced by standardization also reduce dramatically the tooling of the work force.

Without a coherent standards vision, the IT industry will continue to flounder with or without economic recovery.

Analysis & Observations

In May of 2003 Delphi conducted a survey intended to identify the perceptions and experiences of software providers, integrators and end users regarding the value of software standards. The survey resulted in 800 verified responses. The analysis of that survey provides insight to the benefits, obstacles and attitudes towards standards.

The population represented a fairly even split of IT and non-IT respondents and an even split of US and non-US respondents. Except for the intentional emphasis on software providers, computer software vendors and IT services, the organizations participating represented a balanced cross section of the economy by industry and by size.

One of the more interesting initial findings was that, despite the large representation of IT industry professionals and widespread acknowledgment of the value of standards compliance, more than half of the respondents did not indicate participation in a software standards body. This speaks to the rampant deployment of software in the past that relied on proprietary platforms, protocols, and hardwired interoperability. In follow-up interviews, however, respondents who indicated they were not participants acknowledged, consistently, that the market was now exerting extreme pressure on them to move towards standardized approaches to integration across applications and platforms.

The standards most often cited as required for compliance within the respondent's organization were also those most often mentioned in the industry press, the highest ranking being XML. Interviews demonstrated a strong inclination on the part of the respondents to favor standards which were not only highly visible but also critical to e-business and web-based applications. Although respondents indicated a preference for practical standards, such as XML, interviews did point to an increased interest in the role of componentization of applications and the availability of standardized directories for building on-demand applications.

There was a high correlation among respondent communities (users, vendors, integrators) with respect to the reasons not to participate in a standards effort. The lack of critical mass, in terms of adoption, was the most often stated reason for not participating or complying with standards. Other practical reasons, such as cost and difficulty in achieving compliance, also ranked high. In follow-up interviews, it became clear that much of this was near term pressure to reduce costs and mitigate the risk of picking the wrong standard.

In considering the value proposition of software standards, the principal value as perceived by respondents was clearly the integrity of the underlying data and information systems investment, along with the resulting liquidity. This illustrated an underlying theme in many of the interviews that spoke to the historical risk of migrating from applications that held data and information in proprietary vaults. It is our opinion, based on the survey and follow-up interviews, that this will continue to be the highest priority for end-user organizations in selecting standards.

Longer term strategic promises of value chain integration and swapping of applications rated much lower in comparison with the basic objective of data preservation when viewed in the survey data analysis. However, it is important to introduce a caveat here. Current economic pressure is on tactical applications. Strategic planning has taken a back seat. Respondents were overwhelmingly in favor of standards that provided interoperability between business partners, and saw this as critical for long term economic health and prosperity. While software vendors were cautious about admitting to the value of this sort of interoperability, they admitted that in the absence of such standards only a handful of enterprise software vendors could survive - limiting innovation and market choices. The conclusion, although not always articulated in precisely this way, was that standards were an absolute mandate if the IT supply side is to support the vast majority of current players.

Portability of Data and leveraging IT investments for the future were overwhelmingly the most significant benefits in using standards for software development. In follow-up interviews, respondents were consistent in their observation that, although these benefits are not a new and sudden realization, the imperative to leverage standards in realizing these benefits is. While, in the past, lock-in may have been considered a bitter pill that one had to swallow in order to deploy a solution rapidly, it is no longer acceptable. The increased value and liquidity of data and applications that result from standards has become much clearer to both IT and business buyers. The benefit of reusable skill sets, associated with prior generations of standards, such as SQL, ranked lowest among benefits selected by respondents. Although odd at first glance, respondents indicated that this was in part due to the much larger talent pool available in today's market. Again this is an economic factor that could easily change attitudes.

Interestingly, the results shift with some drama when the question is modified to ask about the respondent's actual experience with standards. Experience seems to run contrary to anticipated benefits, with skill set reuse now being ranked by 61% of respondents as having benefitted through standards. Clearly, there is high value here even if the current economic cycle is masking it temporarily.

The increased value and liquidity of data and applications that result from standards has become much clearer to both IT and business buyers.

There is a high correlation among respondent communities (users, vendors, integrators) regarding the perceived threats to software standards. The notable exception is that software vendors acknowledged the difficulty in verifying compliance, picking a standard, and supporting a full range of options in compliant software. The biggest threat to software standards is the proliferation of competing software standards. The old adage that "the good thing about standards is that there are so many of them to choose from," rings true in this observation. The threat is better stated as an absence of critical mass around most standards efforts. Software vendors and users want to see committed large scale efforts on the part of cornerstone software vendors and standards bodies to invest in specific standards before committing their own organizations to them.

Time to market pressure on software vendors also represents a significant threat to standards since it is resulting in software released prior to its being adequately compliant. Interestingly, standards are not perceived as a competitive threat to software vendors by respondents.

Despite widespread recognition of commonly accepted vendor specifications, the overwhelming factor in standards participation was software vendor neutrality. The respondents had difficulty reconciling the two differing views. Comments ranged from, "in the ideal world, standards would not favor any one software vendor," to "without a large player's selfish interests, a standards body will not create the critical momentum needed." SQL was often raised as an example of IBM's strong self interest in DB2, which in turn spawned Oracle's success with its own RDBMS.

The practical side of this debate is the Catch-22 of any standards effort, creating critical mass among participants. Without a *perceived* preponderance of support, a standard will not attract participation according to respondents. Respondents want to see this preponderance of support in the form of a visible commitment, and that often comes from a particular cornerstone software vendor's efforts prior to the achievement of a real critical mass.

In practice, respondents voiced what can be characterized best as a *First* and *Second Order* approach to the issue of neutrality. The First Order was to ensure that the standard had sufficient backing to allow it to be reliably used. In this case a vendor carrying the flag was considered acceptable. The second Order's priority is to validate acceptance of the standard across vendors so that portability and extensibility would be available as the software deployment evolved.

Reusability of software was the most frequently cited "single greatest benefit" anticipated from participation or compliance with standards. This was reflected across each of the respondent communities. It also spoke to the stated trend towards componentization that many respondents noted in their follow-up interviews.

Finally, it was consistently the case that respondents, both in the survey and in follow-up interviews, whole hartedly acknowledged the inherent payback in adhering to standards. Even those respondents who took a very practical approach and stated that standards might slow down their efforts initially, agreed that in the long run, the presence of a standard represented a much more secure investment.

Despite this, the vast majority of respondents did not or were not able to measure the benefit of standards. As one participant stated, "We did not compute the actual value. That the value is overwhelming is obvious."



Wherever you see the magnifying glass above it indicates that the chart adjacent to it is a closer analysis of the preceding chart. Usually this means that we selected only certain key variables to analyze which highlight the most interesting aspects of the responses.

Bridging the Information Archipelago

Key Findings

The principle value of standards was clearly in leveraging the underlying data and information systems investment, thereby increasing the liquidity of their investments in the future.

Longer term strategic promises of value chain integration and swapping of applications rated much lower in comparison with data preservation.

Analysis & Observations

In their classic 1983 HBR article "The Information Archipelago", McFarlan, McKenney, and Pyburn laid out a thesis that has defined the IT community for the last two decades. In many ways, we are still living among islands of information. But these islands are now best characterized as continents. Enormous investment has gone into their creation and enormous value lies not only in each of these collections but, more importantly, in the connections between them. One only has to look as far as the recent failing of USA homeland security in bridging the challenging disconnects between agency repositories to see this.

The principal value of standards, as perceived by respondents, was clearly leveraging the underlying data and information systems investment. This illustrated a recurring theme in many of the interviews that spoke to the historical risk of migrating from applications that held data and information in proprietary vaults. It is our opinion, based on the survey and follow-up interviews, that this objective will continue to be the highest priority for end-user organizations in selecting standards.

Longer term strategic promises of value chain integration and swapping of applications rated much lower in comparison with the basic objective of data preservation when viewed in the survey data analysis. However, it is important to introduce a caveatee here. Current economic pressure is on tactical applications. Strategic planning has taken a back seat.

The issues of portability and value fall into what we would term liquidity -

Which of the following do you believe to be the single greatest benefit offered by approved standards in software development?



the ability to leverage IT investment in novel and unexpected ways. The advent of the internet has brought this sort of reusability into the limelight, giving business people as well as technologists a much better appreciation for the value of standards.

Respondents were overwhelmingly in favor of standards that provided interoperability between business partners, and saw this as critical for long term economic health and prosperity. While software vendors were cautious about admitting to the value of this sort of interoperability (not surprising when considered from a parochial competitive standpoint) most admitted that in the absence of such standards only a handful of enterprise software vendors could survive -- severely limiting innovation and market choice. The conclusion, although not always articulated in precisely this way, was that standards were an absolute mandate if the IT supply side is to support the vast majority of current players.

The Benefit of Standards: and the Winner Is...

Key Findings

Once again data portability and leveraging the underlying information systems was noted as the principle benefit offered by standards.

The benefit of reusable skill sets, associated with prior generations of standards such as SQL, ranked lowest among respondents.

However, the results shift with some drama when the question is modified to ask about the respondent's actual experience with standards. (facing page)

Experience seems to run contrary to anticipated benefits, with low ranked skill set reuse now being ranked by 61% of respondents as having been benefitted through standards.

Analysis & Observations

The recurring theme is that standards provide a fulcrum to leverage IT investments and create liquidity. Contrasting this with the lower ranked benefit of cost reduction demonstrates that the experience of the respondents points to a critical benefit of revenue enhancement over direct cost savings. Standards provide a platform for realizing opportunities that would otherwise remain hidden. Follow-up interviews with respondents frequently indicated that ROI was not just a matter of cost savings but more importantly new ways of working within the organization or with partners.

The benefit of reusable skill sets, associated with prior generations of standards such as SQL, ranked lowest among benefits selected by respondents. Although odd at first glance, respondents indicated that this was in part due to the much larger talent pool available in today's market.

Interestingly, the results shift, with some drama, when the question is modified to ask about the respondent's actual experience with standards.

Which of the following do you believe to be the single greatest benefit offered by approved standards in software development?



Experience seems to run contrary to anticipated benefits, with skill set reuse now being ranked by 61% of respondents as having been benefitted through standards. Clearly, there is high value here even if the current economic cycle is masking it temporarily.

Portability is a fundamental aspect of ROI and payback for the deployment and adoption of standards. Comments from survey participants back this up with hard evidence of standards having impacted bottom line results in quantifiable and qualitative ways, as shown in the comments on the facing page.

...Or Is It?

Which of the benefits derived from open approved standards have you or your organization experienced directly?



"Our metrics show that specification cost is cut by 30%, conception is reduced by 50%, while semi flow analysis (data mapping between an application and the data structure) stay the same. Using (a standardsbased approach) compared with classical development, time is reduced by 45%. Maintenance is reduced by 20%."

"The standards play has a very important role to ensure reusability : it has a legitimacy that is recognized by other companies. We estimated 60% of the project implemented on a standard will reuse the solution, compared to about 20% usually."

"We meet the standards compliance as mandated by our customers. We have measured that we would have lost over 60% of our sales by not being compliant with the designated standards. This is measured through tracking each closed sale as described by the sales person."

"We measured total cost of ownership ... it would have cost 4 or 5 times the amount if delivery had been implemented without standards."

Narrowing the Field, Increasing the Odds

Key Findings

Respondents rank the biggest threat to software standards as the proliferation of competing software standards for the same issue or objective.

Half of all respondents do not believe that standards are likely to increase deployment time or investment.

Time to market pressure on software vendors represents a threat to standards since it is resulting in software released prior to its being adequately compliant.

Standards compliance is not perceived as a competitive threat by software vendors.

Analysis & Observations

There is a high correlation among users, integrators and software vendors regarding the perceived threats to software standards. A notable exception, however, is that software vendors acknowledged the difficulty in verifying compliance, picking a standard, and supporting a full range of options in compliant software.

The biggest threat to software standards is the proliferation of software standards. The old adage that "the good thing about standards is that there are so many of them to choose from," rings true in this observation. The threat is better stated as an absence of critical mass around most standards efforts. Small to mid size software vendors and users told us that they want to see committed large scale efforts on the part of cornerstone software vendors and standards bodies to invest in specific standards before committing their own organizations to them.

What surprised us in this, however was the value that respondents placed on an independent third party's role in validating compliance. We even had one respondent go so far as to suggest that there be government regulations with respect to software standards. His point being that this is how important it is to preserve the investments made here. While it was an interesting argument, most respondents reacted with concern over a legislated approach and still felt strongly that standards should be a free market phenomenon, yet still verified by some sort of accountable body. Time to market pressure on software vendors also represents a significant threat to standards since it is resulting in software being released prior to its being adequately compliant. End users also pointed out that this same free market dynamic can cause software vendors to release software before it is compliant in order to speed time to market. Software vendors, on the other hand, told us that standards and software development must both be considered evolutionary in that neither can stand still waiting for the other in the early stages of a new technology or a new standard. This did not discount the perception of standards but rather acknowledged earlier views that a standard must reach critical mass in market demand and perception of support in order to warrant delays in software release cycles - as also reinforced by the perception that adoption requires longer development times, expressed by nearly half of all respondents.

Interestingly, standards are not perceived as a competitive threat to software vendors by respondents. This is a positive shift in perception owing to the market attitude towards standards as a necessary force in preserving IT investments. We see this as a critical finding in that it does represent the emergence of a new attitude on the part of software vendors towards standards.

Greatest Shortcomings & Threats to Standards



Shifting out of Neutral

Key Findings

The overwhelming factor in standards participation was software vendor neutrality - more dramatically evidenced in the charts on the facing page.

Analysis & Observations

In practice, respondents voiced what can be characterized best as a *First* and *Second Order* approach to the issue of neutrality. The First Order was to ensure that the standard had sufficient backing to allow it to be reliably

Factors Driving Participation in a Specific Standards Body



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used. In this case a vendor carrying the flag was considered acceptable. The Second Order's priority is to validate acceptance of the standard across vendors so that portability and extensibility would be available as the software deployment evolved.

What was especially insightful in follow-up interviews was the degree to which the overall administration of the standards process by some sort of committee was discounted. In most cases respondents saw this as the "fat" in a standards process. Immediacy of the standards body and its ability to sequence incremental and regular enhancements was seen as key to creating both visibility and momentum for a standards effort.

Factors Driving Participation in a Specific Standards Body (cont.....)



Playing the Perception Game

Key Findings

Lack of critical mass in terms of adoption was the most often stated reason for not participating or complying with standards.

The Catch-22 of any standards effort is creating critical mass. Without a perceived preponderance of support a standard will not attract participation according to respondents.

Interestingly, standards are not perceived as a competitive threat by respondents.

Analysis & Observations

Practical reasons such as cost and difficulty in achieving compliance ranked highest, while lack of critical mass, in terms of adoption, was the most often stated reason for not participating or complying with standards. In follow-up interviews it became clear that much of this was near term pressure to reduce costs and mitigate the risk of picking the wrong standard. With the trend moving towards consolidation in the IT industry, as well as the imperative to integrate existing systems, we expect these priorities to change in the near term.

The practical side of this debate is the Catch-22 of any standards effort, creating critical mass among participants. Without a *perceived* preponderance of support, a standard will not attract participation, according to respondents. Respondents want to see this preponderance of support in the form of a visible commitment. This may seem to be a contradiction -- critical mass is often defined in terms of support by one or more cornerstone software vendors, and yet buyers clearly seek vendor neutrality in standards. Further development of this notion among study participants, however, validates that *compliance* by top vendors is ultimately necessary to its validation, but that standards development must be an open and democratic process.

Regarding their own participation in a standards body, it was clear from respondents' views that lack of speed, high cost and low adoption were the common impediments. However, what was not shown in the survey data was the bearing that a standards perception of having achieved (or

Reasons Cited NOT to implement or Comply with Standards



likelihood of achieving) critical mass had on these impediments. In other words, the adoption variable has two distinct components; perception of success and actual adoption. An example used by some respondents was that of UNIX vs. Windows (albeit admittedly not standards, but offer an analog to the standards development process).

UNIX had a very long ramp up and was considered to be a costly initial port for software vendors as well as end users. Despite the promises of long term cost savings, UNIX languished for some time and decisions to port to it were postponed by a perpetual wait-and-see attitude in the market. While there was low adoption for some time there was also a perception of risk in its ever achieving critical mass for enterprise applications. Windows also had a its share of naysayers. In enterprise environments, it suffered a similar fate of slow adoption. However, perception differed dramatically in that Windows was seen as a more likely platform despite its apparent enterprise limitations.

According to respondents, achieving a critical mass ultimately relies more on this issue of perception. Respondents believed that this perception was the result of influence exerted on line of business professionals rather than IT professionals. In fact, most follow-up interviews revealed that it was a business function that set the agenda for standards in their organization. In the case where a CXO was noted, the CEO as standards czar outnumbered CIOs in the same capacity by a margin of 4-1!

What this means to standards bodies and participants in standards efforts is clear. Visibility among business buyers and influencers is essential to achieve if a standards effort is to have longevity and substantial impact.

Reasons Cited NOT to Participate in or Comply with Standards



 $0\% \ \ 10\% \ \ 20\% \ \ 30\% \ \ 40\% \ \ 50\% \ \ 60\% \ \ 70\% \ \ 80\% \ \ 90\% \ \ 100\%$

Exceeding Expectations

Key Findings

One of the most overwhelmingly consistent responses showed up in this survey question.

Reusability of software was clearly the single greatest benefit perceived by respondents from participation or compliance with standards.

Analysis & Observations

Reusability of software was clearly the single greatest benefit perceived by respondents from participation or compliance with standards. This was reflected across each of the respondent communities. It also spoke to the stated trend towards componentization that many respondents noted in their follow-up interviews.

"Thanks to our compliance with the specifications, we can develop in one hardware/software architecture and implement in others quite different without previous knowledge or training."

Very Large Software Vendor

It was consistently the case that respondents, both in the survey and in follow-up interviews, wholeheartedly acknowledged the inherent payback in adhering to standards. Even those respondents who took a very practical approach and stated that standards might slow down their efforts initially, agreed that in the long run the presence of a standard represented a much more secure investment.

"[calculating the benefit of standards] would be an equation like that of a call option: you pay a price for the right to get the benefits of a standard, if [the one you choose] is finally dominant, you reap earnings from it."

Mid Size Software Vendor

Benefits Expected from participation or Compliance with Standards





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Just One More...

Key Findings

The standards most often required for compliance with the respondent's organizations were also the most often mentioned in the industry press, with two having their origin in software vendor specifications - Sun's J2EE and Microsoft's .NET.

Analysis & Observations

Finally, the standards most often cited as required for compliance with the respondent's organizations were also those most often mentioned in the industry press, with two having their origin in software vendor specifications – Sun's J2EE and Microsoft's .NET. The highest ranked standard was XML. Interviews demonstrated a strong inclination on the part of respondents to favor standards which were not only highly visible but also critical to e-business and web-based applications. Although respondents indicated a preference for practical standards, such as XML, interviews did point to an increased interest in the role of componentization of applications and the availability of standardized directories for building on-demand applications.

For which of the following do you/your firm require compliance with from your commercial software suppliers?



Profile of Survey Respondents

Key Findings

The data is based on 800 survey respondents.

There was a fairly even split of IT and non-IT respondents.

There was an even split of US and Non-US respondents.

The respondents' organizational size was representative of a balanced cross section of the economy.

Analysis & Observations

The population of respondents represented a fairly even split of IT and non-IT professional and an even split of US and Non-US respondents.

Software			<mark>28.</mark> 0%
IT Consulting/Professional Services			25.5%
Government	6.6%	6	
Financial Services & Insurance	6.6%	6	
Other, please specify	6.0%		
Education/Libraries	5.1%		
Computer Hardware	2.6%		
Telecommunications	2.3%		
Aerospace/Defense	2.3%		
Manufacturing	2.1%		
Entertainment & Media	1.8%		
Architecture/Engineering/Construction	1.7%		
Transportation or Logistics	1.4%		
Publishing/Press	1.4%		
Healthcare/Medical Services	0.9%		
Retail/Wholesale	0.8%		
Semiconductors & Electronics	0.7%		
Process/Petrochemical	0.7%		
Pharmaceutical	0.7%		
Energy	0.7%		
Utilities	0.5%		
Legal	0.4%		
Consumer Goods	0.4%		
Automotive	0.4%		
Mining & Natural Resources	0.3%		
Biomedical	10.1%		

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Except for the intentional emphasis on software providers, computer software vendors and IT services, the participating organizations represented a balanced cross section of the economy by industry and by size.

One of the more interesting initial findings was that, despite the large representation of IT industry professionals, more than half of the respondents did not indicate participation in a software standards body. This speaks to the rampant deployment of software in the past that relied on proprietary platforms, protocols, and hardwired interoperability.

In follow-up interviews, however, respondents who indicated they were not participants in a standards effort acknowledge consistently that the market was now exerting extreme pressure on them to move towards standardized approaches to integration across applications and platforms. Software developers and systems integrators represented the largest respondent communities. However, in order to best characterize the respondents, it is important to note that broad categories can be misleading, as shown in these charts.

For example, many respondents fell into multiple categories as both developers and users of software.

While there was a substantial representation of end users, the majority of respondents where somehow involved in the software or services industry.



United States		53.7%
Western and Central Europe	15.6%	
Canada	6.6%	
United Kingdom	6.4%	
Australia and New Zealand	5.8%	
Other Asia/Pacific	4.5%	
Central and South America	2.4%	
Eastern Europe	2.0%	
Africa	0.9%	
India	0.7%	
China	0.7%	
Japan	0.5%	
Middle East	0.4%	

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Key Findings

Despite the large representation of IT industry professionals, more than half of the respondents did not indicate participation in a standards body. Yet standards compliance is acknowledged by the vast majority of respondents.





Delphi Research

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DISTRICT BY DISTRICT STATE BY STATE PROVINCE BY PROVINCE REGION BY REGION COAST TO COAST

The PESC High School Transcript is emerging in every high school across the land.



MULTIPLE STAKEHOLDERS. ONE VISION.

FOR IMMEDIATE RELEASE March 7, 2019 Contact: Jennifer Kim PESC Membership Services Director +1.202.261.6516

U.S. CHAMBER OF COMMERCE FOUNDATION JOINS PESC

Washington, D.C. The Postsecondary Electronic Standards Council (PESC) is pleased to announce the addition of the U.S. Chamber of Commerce Foundation as its newest Member to join PESC.

"The Chamber Foundation is excited to join PESC and to contribute toward the ongoing development of data standards for education," states Jason A. Tyszko, Vice President, U.S. Chamber of Commerce Foundation Center for Education and Workforce. "In today's talent marketplace, data is king, and good data starts with highquality data standards," adds Mr. Tyszko, who will serve as the PESC Member contact.

"The Chamber Foundation is a true stakeholder in the new emerging ecosystem," states Michael D. Sessa, PESC President & CEO. "Jason, his team, and all the successful initiatives they administer, prove the value of collaboration. We are very happy to welcome the Chamber Foundation into PESC and PESC looks to progress efforts as a Member and participant in the Chamber Foundation's Job Data Exchange (JDX) and T3 Innovation Network," Mr. Sessa added.

The Chamber Foundation joins additional new PESC Members that have recently joined:



- U.S. Chamber of Commerce Foundation Jason Tyszko, Vice President, Education & Workforce Development
 Camosun College
- Dan Hodgson, Director of Institutional Research & Planning
- Duklas Cornerstone Consulting Joanne Duklas, President
- Gotocollegefairs.com
 Holly Lazzaro, Executive Director
- Indiana Commission for Higher Education Ken Sauer, Ph.D., Associate Commissioner & Chief Academic Officer
- McGill University Romesh Vadivel, Asst. Registrar & Director, Service Point, Enrolment
- Nova Scotia Council on Admissions & Transfer Ruth Blades, Operations Manager

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

ABOUT THE CHAMBER FOUNDATION CENTER FOR EDUCATION AND WORKFORCE

Our mission is to inform and mobilize the business community to make a difference in education and workforce reform through engaging partnerships, challenging the status quo, and using our research, programs, and policy to connect pressing education and workforce issues to economic development. A center within the U.S. Chamber of Commerce Foundation, an affiliate of the U.S. Chamber of Commerce, the Center for Education and Workforce is dedicated to strengthening American's long-term competitiveness. Our mission is to inform and mobilize the business community to make a difference in education and workforce reform. We work directly with business leaders, educators, community leaders, and other stakeholders to develop and promote solutions for the most pressing education and workforce.

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.

PESC IS SPONSORED ANNUALLY by Credentials Solutions, National Student Clearinghouse, Oracle, Parchment, DegreeData & ECE.

PESC PARTNERS include AACRAO, APEREO, ARUCC, A4L, DXtera Institute, EMREX, EWP, Groningen Declaration Network, HR Open Standards, 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 & of the Annual California Electronic Transcripts Workshop and CCCApply.

PESC IS A PROUD MEMBER/AFFILIATE/SIGNATORY of AACRAO, of the US 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.

IN FULFILLING ITS NON-PROFIT MISSION, all PESC Approved Standards are available to the education community online free of charge at www.PESC.org.

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Expanding PESC's AMBASSADOR PROGRAM

To activate awareness & adoption of data standards,

PESC and its Members promote digitalization and advocate for automated, machine-to-machine connectivity. In supporting and governing PESC, Members are the best spokespeople to champion the need & value of data standards and communicate a common, shared vision of seamless life-long learning.

PESC established International Ambassadors in 2018 after partnering with the Groningen Declaration Network (GDN). International PESC Ambassadors were established for leaders from PESC Members who also attend the Annual GDN Meetings held around the world to ensure a unified message. With 15 International PESC Ambassadors at last year's Annual GDN Meeting in Paris, PESC was very well represented and our mission resonated clearly.

In expanding the Ambassador Program, PESC adds several new categories based on key topics & functions. Sign up today to help spread the word and expand the movement!

Join one or all so that PESC is well represented year-round!

- 1) PESC International Ambassadors
- 2) PESC Ambassadors for Credentialing
- 3) PESC Ambassadors for Transcripts
- 4) PESC Ambassadors for EdExchange
- 5) PESC Ambassadors for GEO Code

What's expected as a PESC Ambassador? PESC will list you on its website, promote you as a contact person & liaison for PESC, and you agree to be available should someone contact you with questions about PESC, data standards and interoperability.

To sign up to be a PESC Ambassador, please visit www.PESC.org or contact Jennifer Kim at PESC.



STANDARDS MAKE THE WORLD GO 'ROUND PESC Members Make Standards Free & Open Join the Effort. Join the Community. Join PESC.

www.PESC.org



NOTIFICATION OF PESC MEMBER MEETING

Thursday May 9, 2019 Dupont Circle Hotel Washington, D.C.

Please be advised the 21st Annual Member Meeting of the Postsecondary Electronic Standards Council will convene 5:00 pm EDT on Thursday May 9, 2019 during the Spring 2019 Data Summit at the Dupont Circle Hotel in Washington, D.C.

PESC Membership meetings are open to all PESC Members & with prior notification, other interested parties. Registration is open for the Spring 2019 Data Summit and early bird discounted rates are still available. Please register at <u>www.PESC.org</u>.

Elections for PESC's Board of Directors will be held during the 21st Annual PESC Member Meeting. The election cycle and timeline follow:

Schedule for Elections – PESC Board of Directors

	March 4, 2019	Nominations Open from PESC Members		
۶	April 5, 2019	Nominations Close		
۶	April 10, 2019	Proxy Ballots Issued to PESC Members in good standing		
	April 15, 2019 – May 3, 2019	Proxy Ballot Voting		
	May 9, 2019	In-Person Voting at Member Meeting Spring 2019 Data Summit		
⊳	July 1, 2019	Two Year Terms Begin		

Nominees can communicate directly and independently with PESC members. Nominees looking to communicate with PESC Members over the coming weeks *through PESC's Member list*, may submit no more than 2 communications (emails, letters, etc.) to the PESC office. In turn the PESC office will issue that nominee's communication(s) directly to the PESC Members.

Nominees appearing on the ballot are also provided with 5 minutes each to address the PESC Members immediately prior to elections at the Member Meeting.

Nominees must be from PESC Member organizations in good standing and with dues paid current. Likewise, Members must be in good standing with dues paid current in order to be eligible to vote.

PESC does not accept 'write-in' candidates on the final ballot.

www.PESC.org



NOMINATION FORM

BOARD OF DIRECTORS

ELECTIONS TO BE HELD IN PERSON: MAY 9, 2019 | 5.00pm DUPONT CIRCLE HOTEL | WASHINGTON, D.C.

Nominee First and Last Nan	ne			<u>–</u> ר
Nominee Title		Organization		٦
Street Address				<u>۔</u>
City, State/Province and Zip	1			- -
Phone	Fax		E-mail Address	

Please complete this form, attach a brief BIO of the nominee, and return both to PESC by close of business on Friday April 5, 2019:

> PESC 1250 Connecticut Avenue NW Suite 700 Washington DC 20036 Fax: 202-261-6517

Email: Michael.Sessa@PESC.org

www.PESC.org