



**JANUARY 2015- JUNE 2016**  
**INCOMMON REPORT**

**JULY 8, 2016**



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## Executive Summary

InCommon offers trust services to higher education institutions and research organizations, and their sponsored corporate partners. Services include the InCommon Federation, the InCommon Assurance Program, the InCommon Certificate Service, and the InCommon Multifactor Authentication Program. This document is an 18-month report from InCommon, covering January 2015 through June 2016.

This time period involved major change for InCommon, with new leadership, new staff members, and alignment with Internet2's new Trust and Identity Division and, in particular, the TIER (Trust and Identity in Education and Research) Program. This report follows three major themes from the time period: maturing InCommon, scaling identity federation, and realizing the vision.

InCommon is part of Internet2's new Trust and Identity Division, created in January 2016 and led by Vice President Kevin Morooney. Several activities and accomplishments are outlined in this report, including:

- A comprehensive review of InCommon Federation technical operations as part of overall priority setting and resource allocation
- Integration with GÉANT's eduGAIN global interfederation service
- Initiating a marketing and segmentation study to understand InCommon participants' needs for services and support
- Engaging the community in discussion about a number of issues and services, including federation for K-12, InCommon Certificate Service review, improving interoperability, and alternative methods for distributing metadata

This report provides the details for these topics and activities, as well as a recap of such areas as education and outreach, and working group discussions and reports.

## Major Themes

During this time period, three major themes took center stage:

- Maturing InCommon
- Scaling Identity Federation
- Realizing the Vision

## Maturing InCommon

### New Trust and Identity Division of Internet2

During this time period InCommon experienced continued growth, new leadership, and a move to the new Trust and Identity Division of Internet2. The year 2015 began with the appointment of Ann West as Associate Vice President for Trust and Identity for Internet2. In January 2016,

Kevin Morooney, previously CIO of Penn State, joined Internet2 to become the first Vice President of the new Trust and Identity Division. The establishment of this new management scope underlines the strategic nature of identity as a key component for the Internet2 community and beyond. In the first six months, Morooney began a planning exercise with the community to align the trust and identity services and work to community needs and create sustainable paths forward.

This new structure brings together existing staff members, three new staff members (Paul Caskey, Sally Ricks, and Nick Roy) hired into replacement positions, and a new alignment with the new Internet2 Trust and Identity in Education and Research (TIER) Program.

### **Operations Review**

InCommon Operations continued to develop new features and functionality for the InCommon Federation and started a process to review existing operations. These items are in addition to the significant contributions to InCommon's integration with the eduGAIN international interfederation service.

During August 2015, InCommon conducted a review of its technical operations, including support functions, disaster recovery and business continuity, change management and service lifecycle, security, onboarding processes, and support and development for federation software. The report from this review has been discussed by the InCommon Steering Committee and the InCommon Technical Advisory Committee, and will help form the basis for project planning and resource allocation.

### **Formalizing the Community Standards, Working Group and Document Practices and Processes**

InCommon staff worked with key community leaders to formalize the formation of Trust and Identity working groups and the responsibilities of chairs, and to standardize the process for document review and stewardship. The goal is to provide predictable processes for community review and input, and a common document repository that is easily accessible.

### **Realizing the Vision**

#### **Global Interfederation: eduGAIN**

Since the formation of the InCommon Federation in 2005, a top goal has been to enable international collaboration for U.S. research and education. In 2016, the Federation went into production with eduGAIN, the global interfederation service operated by GÉANT that enables seamless access to global services to all its participants. Currently 39 international federations participate in eduGAIN, offering convenient single sign-on interaction with higher education institutions, research organizations, and corporate Service Providers around the world.

The InCommon Steering Committee chartered the eduGAIN Policy and Community Working Group in 2014 to recommend a direction for deployment and to review InCommon's policy documents for recommended changes. The working group delivered its report in 2015 (see Appendix A below) and InCommon conducted a pilot by importing eduGAIN metadata into a preview InCommon trust registry. Technical work continued during the summer of 2015, including development of technical and policy documentation, such as the [Roadmap for Operationalizing eduGAIN](#). InCommon staff and Internet2 legal staff worked through the changes to the InCommon Participation Agreement that were recommended by the Policy Committee.

The public rollout began in November 2015. InCommon published [several web pages](#) containing information about eduGAIN and documenting the transition process, which lasted 90 days. Communications during that time included three webinars and 17 emails to key groups to outline the policy and technical implications of this integration. That process ended in mid-February 2016, when the new participation agreement went into effect and InCommon began the import and export of metadata with eduGAIN.

Global interederation touched almost every aspect of InCommon operations and affected all 834 (at the time) participating organizations. eduGAIN took four years to plan, with an intensive documentation, legal, technical, communication, and education effort during the last nine months of that time span. The InCommon trust infrastructure (metadata aggregate) increased significantly in size, from 17MB on February 14, 2016, to 33MB the following day when the Federation began importing eduGAIN metadata.

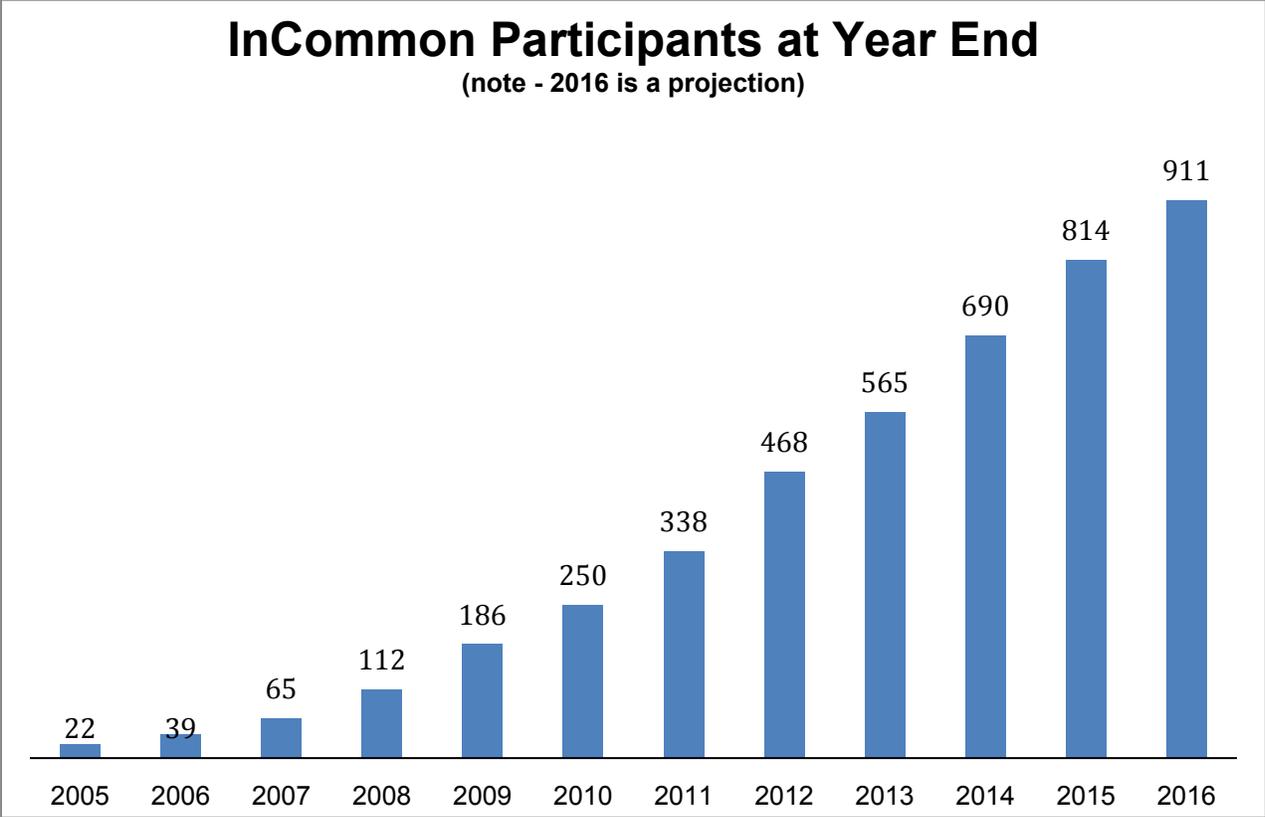
### [Operational Updates to Accommodate Global Interederation](#)

eduGAIN integration caused InCommon Operations to take a close look at several issues that resulted from importing eduGAIN metadata. In addition to developing several new policy rules to prevent the import of problematic metadata, InCommon Operations adopted measures to ensure that InCommon metadata would continue to be published and available, even if there was a problem with the eduGAIN import.

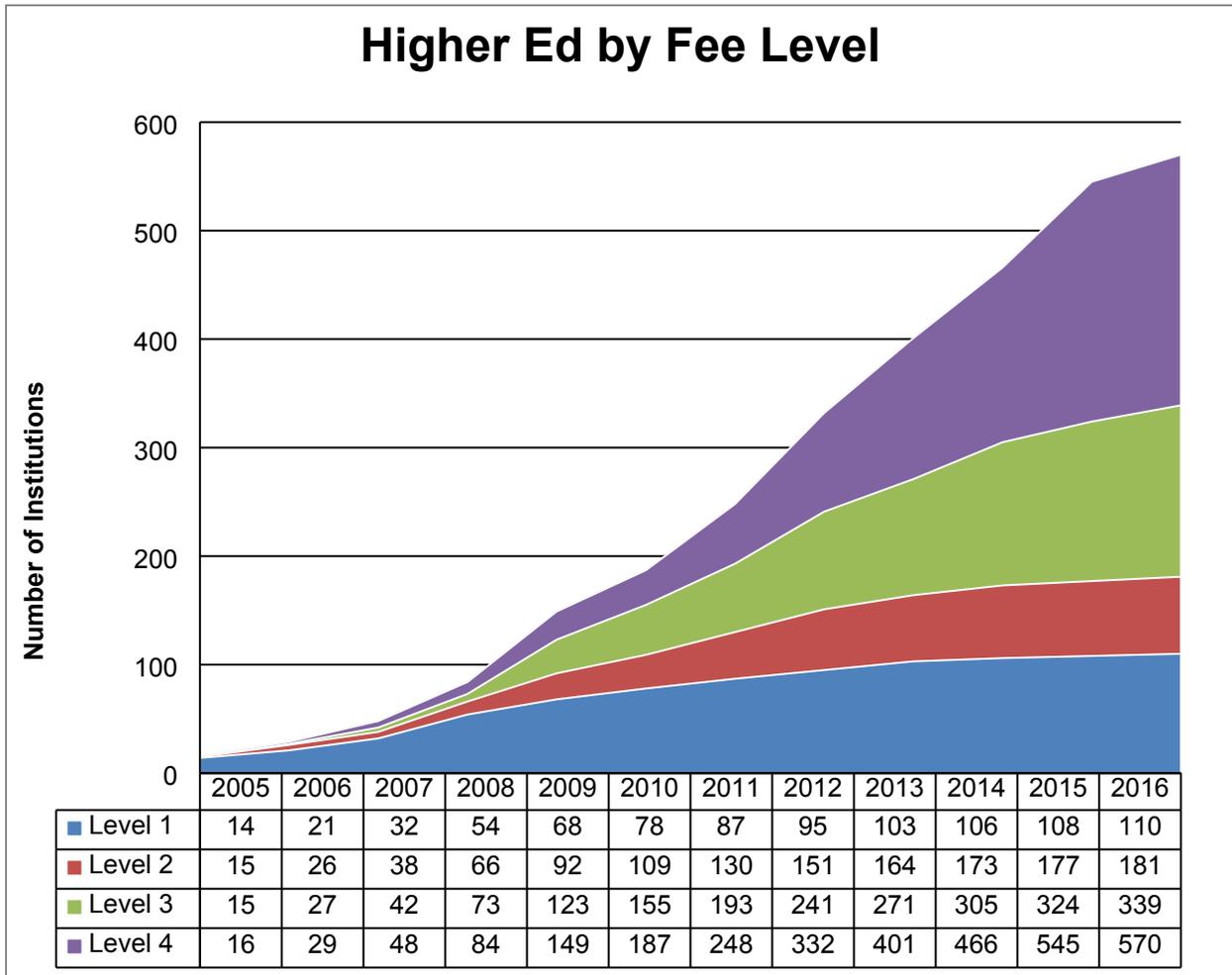
### [InCommon Marketing and Segmentation Study](#)

In parallel to its mission to serve the broad education sector, InCommon's demographics have changed over the last several years, with significant increases in the number of companies (many of them small) and smaller colleges and universities. In order to understand the expectations and needs of its participants, particularly in light of these changes, InCommon commissioned a marketing and segmentation study, with an expected completion in the third quarter of 2016. The three graphs on the following pages demonstrate some of the changes in demographics that prompted the study.

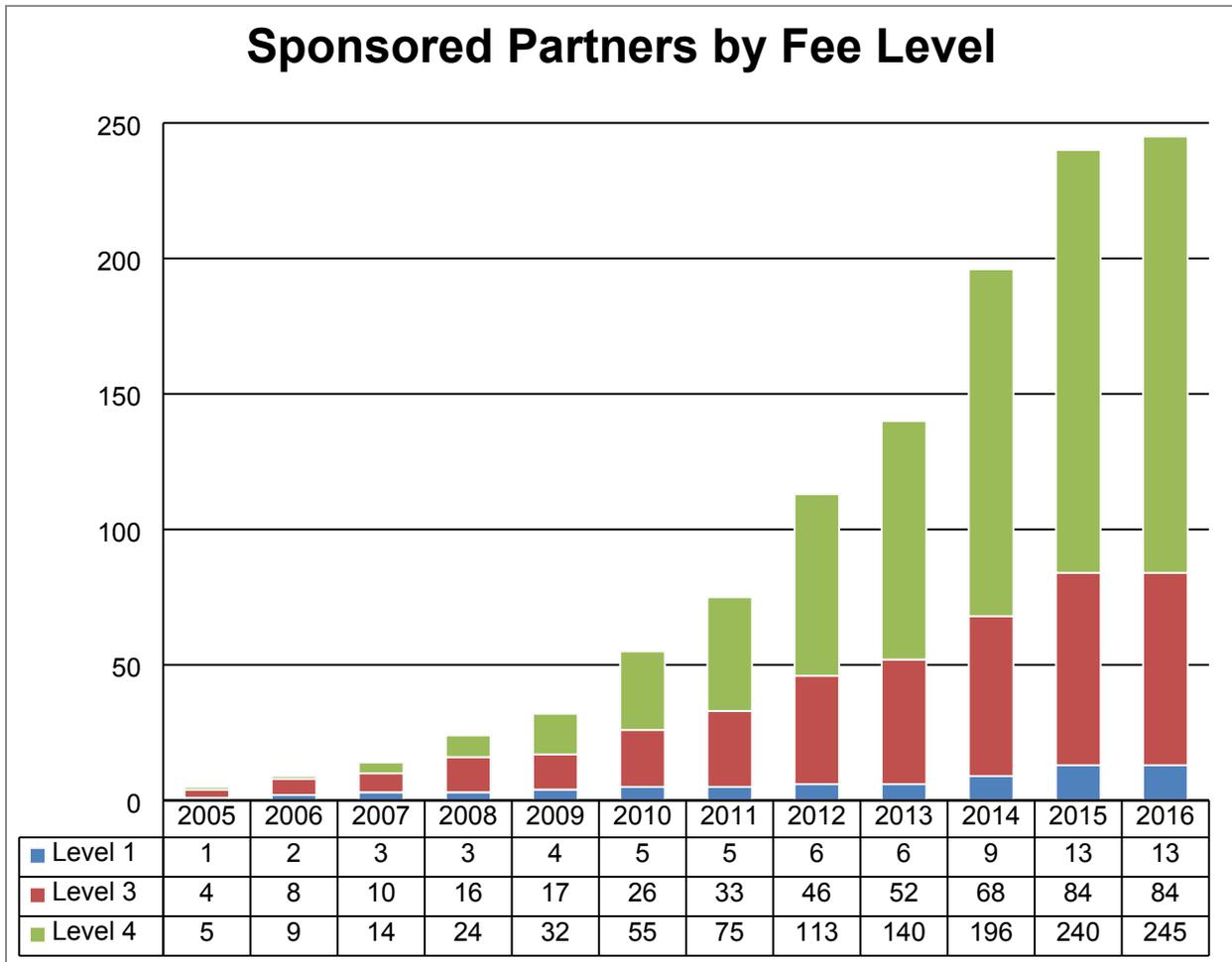
The graph below shows the total number of InCommon participants as of December 31 of each year (this includes all participants, whether using the Federation, the Certificate Service, or both). The graph demonstrates a continued growth in total numbers, although the percentage growth, year over year, is slowing..



The graph below shows the growth in higher education organizations according to fee level, which is based on size. Most growth is in level 3 and 4, which represent mainly smaller schools with modest research expenditures. Levels 1 and 2 represent Very High and High Research schools respectively. Future growth in InCommon will come primarily from level 3 and 4 schools.



The graph below represents the growth in the Sponsored Partner category, which includes mainly corporate and non-profit organizations wishing to offer services through the InCommon Federation. The graph demonstrates that the increase in the number of Sponsored Partners has recently come from smaller companies, possibly those looking to streamline on-boarding and access to their services for their customers.



## Attribute Release: A Step Towards Improved Interoperability

The need, identified by the community, for more consistent and predictable attribute release prompted InCommon to pursue and complete two related work items: the new Global Research and Scholarship Service Category, and promoting the Federation-wide release of such attributes to all Service Providers.

**Research & Scholarship Category** – InCommon originally defined the Research & Scholarship (R&S) category of Service Providers (SPs), which allows an Identity Provider to release a defined set of attributes to a category of SPs. As SPs are added to the category, they automatically receive the necessary attributes from IdPs that support the category. R&S has since been adopted globally and InCommon operations worked to migrate all InCommon R&S Service Providers and Identity Providers to the global standard. Today 55 InCommon SPs are included in the global R&S category. A total of 122 InCommon Identity Providers release attributes to R&S services; 39 IdPs release attributes to all global R&S SPs while another 83 IdPs release the attribute bundle to R&S SPs registered by InCommon only.

**Federation-wide Attribute Release** – At its April 6, 2016, meeting, the InCommon Steering Community approved a resolution to move toward a policy of all Identity Providers in the Federation releasing a common set of attributes to all Service Providers:

*InCommon Identity Provider Operators will move to releasing an identified set of attributes to all InCommon Service Provider Operators.*

There are significant ramifications to this policy. During the summer of 2016, InCommon and Internet2 Community Engagement staff are conducting a series of calls with a diverse set of participants to understand the array of attribute release policies and processes. A report will be made available to the community.

## Scaling Federation

### Steward Program

A significant barrier to growing the federation is the InCommon staff time involved in business functions and ensuring policy adherence of trust as expressed in the metadata as well as the technical support of the site administrators. The goal of the Steward Program is to outsource this staff intensive set of functions to partners that already have relationships with the audience. The first proof of concept of this idea is to extend federated identity management to K-12 and community colleges by partnering with the state and regional Research and Education networks. This program grew out of several pilots done through the Quilt InCommon Pilots Working Group. Under this program, the Steward (which is North Carolina's MCNC in this case) will assume the registration authority functions of InCommon, including such things as organizational vetting, identity proofing of key individuals, and metadata management. The Steward will also supplement the K-14 institutions' ability to participate in the Federation by

providing technical and operational support on their behalf. InCommon has developed an implementation timeline, with an expected rollout in 2016. InCommon/Internet2 drafted the legal structure and presented a high-level project plan and proof-of-concept pricing to InCommon Steering Committee.

### **Per-Entity Metadata Pilot: Evolving Federations**

InCommon distributes its trust registry (also known as “metadata aggregate”) in one large XML file. Now that InCommon imports the eduGAIN trust registry file, the aggregate size has increased significantly. This is already posing significant technical issues to some participants and is expected to become more pervasive as the aggregate increases in size. A pilot continues to study alternative ways to distribute this information using a dynamic process that queries a server for the metadata entries required at the time (similar to the DNS data delivery model). This pilot explores the utility of signed per-entity metadata as an alternative to the metadata aggregate. InCommon’s metadata query server has been in operation since September 2014, with the current project end date of September 2016 (unless renewed).

### **Engaging the Community: Working Groups**

A number of community working groups worked during 2015 and 2016 to explore potential new services and to spur collaboration around identity topics of interest. The wiki space has a list of current and past [InCommon working groups](#) and guidelines for working group chairs.

### **Steering Committee**

The InCommon Steering Committee is the policy body for the InCommon Federation and related services. During the past 18 months, the Steering Committee has focused on the development of InCommon priorities, strengthened the relationship between InCommon and the TIER Program, enacted a new privacy policy, and worked on policy matters related to eduGAIN and the Steward Program.

### **Assurance Advisory Committee**

The InCommon Assurance Advisory Committee (AAC) is the oversight body for the InCommon Identity Assurance Program, which provides policies and frameworks for increasing trust across the federation. The AAC has identified the InCommon POP (Participant Operating Practices) as a barrier to the adoption of assurance profiles and is exploring alternatives, outlined later in this report. In addition, the AAC has begun developing a small set of “baseline expectations” for IdPs, SPs, and Federation Operators, and developed a Multi-factor Interoperability Profile for Service and Identity Providers to use to communicate the need for and use of MFA at the time of the transaction.

### **Technical Advisory Committee**

The InCommon Technical Advisory Committee (TAC) provides guidance on the technical aspects of operating the InCommon Federation. The TAC has had a busy 18 months, with work related to eduGAIN, chartering working groups to explore federation interoperability, multifactor authentication, the use and potential use of external identities on campus and in the

Federation, and improving access through the use of service categories like Research & Scholarship.

Below is a list of InCommon-related working groups, the group's chair and where to find their work products. Appendix A provides a summary of each group's accomplishments.

Working Group	Chair	Working Group Materials
Federation Interoperability Working Group	Walter Hoehn, University of Memphis	<a href="https://spaces.internet2.edu/x/ioRRBQ">https://spaces.internet2.edu/x/ioRRBQ</a>
eduGAIN Community and Policy Working Group	Teresa Semmens North Dakota State University,	<a href="#">Interfederation Overview: Joining the International Federation Community."</a>
Certificate Service Review Working Group	Chris Bongaarts, University of Minnesota	<a href="https://spaces.internet2.edu/x/s4RRBQ">https://spaces.internet2.edu/x/s4RRBQ</a>
Multifactor Authentication (MFA) Interoperability Profile Working Group	Karen Herrington, Virginia Tech	<a href="https://spaces.internet2.edu/x/CY5HBQ">https://spaces.internet2.edu/x/CY5HBQ</a>
New Entities Working Group	Jim Jokl, University of Virginia	<a href="https://spaces.internet2.edu/x/mwvkAg">https://spaces.internet2.edu/x/mwvkAg</a>
External Identities Working Group	Eric Goodman, University of California Office of the President	<a href="https://spaces.internet2.edu/x/-gTkAg">https://spaces.internet2.edu/x/-gTkAg</a>
Alternative Identity Provider Working Group	Janemarie Duh, Lafayette College	<a href="https://spaces.internet2.edu/x/oQLkAg">https://spaces.internet2.edu/x/oQLkAg</a>
Identity Provider of Last Resort Working Group	Keith Hazelton, University of Wisconsin-Madison	<a href="https://spaces.internet2.edu/x/iwvkAg">https://spaces.internet2.edu/x/iwvkAg</a>
Quilt InCommon Pilots Working Group	George Laskaris, NJedge.net	<a href="https://spaces.internet2.edu/x/zAQwAg">https://spaces.internet2.edu/x/zAQwAg</a>
InCommon Workday Community Collaboration Group	C.W. Belcher, University of Texas at Austin	<a href="https://spaces.internet2.edu/x/u4dHBQ">https://spaces.internet2.edu/x/u4dHBQ</a>

## Certificate Program Review

The InCommon Certificate Program was established in 2010 as a way to significantly reduce costs and increase flexibility in the use of a variety of digital certificates (SSL, client, extended validation and others). The program now has 362 subscribers. A working group has conducted a survey and identified desired features and improvements for the next generation of the program and will be publishing their report in July 2016.

## InCommon Affiliate Program Transition

InCommon and Internet2 completed the transition of the InCommon Affiliate Program to the Internet2 Industry Program. InCommon formed the Affiliate Program several years ago as a way to involve companies that provide support to organizations wishing to join the Federation. Examples include consultants and companies that have cloud-based and other offerings that support federated identity management. The InCommon Affiliate Program had six members and all transitioned to the Internet2 Industry Program. Trust and Identity staff members continue to interact with these companies and serve as liaisons with the Internet2 Industry Program.

## Documentation and Metrics for Shibboleth IdPv3 Upgrade

InCommon Operations provided detailed documentation for [upgrading to Shibboleth IdPv3](#). Given that Shibboleth IdPv3 has been redesigned from the ground up, and that about 90 percent of InCommon Participants use Shibboleth, this is a key resource. To track progress within the Federation, InCommon publishes a [list of IdP deployments that have upgraded](#) to Shibboleth IdPv3. The [Shibboleth IdP Probe](#) tool used to produce this list has been contributed back to the community.

## Increasing Trust: Replacing the Participant Operating Practices Document

As noted above, the InCommon Assurance Advisory Committee has identified the InCommon POP (Participant Operating Practices) as one impediment to higher levels of assurance.

The POP was designed to inform the community about the practices followed by a specific Identity Provider or Service Provider. Over time, it has become evident that this process is not working as originally intended. The POPs are not always maintained, they do not follow a standard format, they are not machine readable, and there is no consistency in the practices followed or the language used to describe such processes. Because of this, the AAC began developing a small set of baseline expectations for IdPs, SPs, and Federation Operators, to establish a “floor” for trust across the InCommon community. The AAC intends to have these expectations drafted and vetted by the community during 2016.

## TIER (Trust and Identity in Education and Research)

InCommon played a key role in the development of the new Internet2 TIER Program, which aims to connect key identity and access management software components, and promote standard campus practices and policies in the IAM area. TIER issued its first release in April 2016, including:

- Shibboleth Single Sign-On and Federating Software (Identity Provider version 3.2.1)
- Grouper enterprise access management system (version 2.3)
- COmanage Registry (version 1.0.3)
- First Look Containers and Virtual Machine Images
- Application Programming Interfaces (APIs) - to enable extension and flexibility
- InCommon Multifactor Authentication (MFA) Interoperability Profile (draft)
- InCommon SAML V2.0 Implementation Profile for Federation Interoperability v20160303
- InCommon Global Interfederation (in production through InCommon Federation)
- MACE-Dir eduPerson 201602 (including ORCID Identifier)

InCommon working groups and staff supported the development and distribution of this release, which was a first look at a container delivery mechanism and APIs, and included InCommon interoperability profiles, among other assets.

In addition to the InCommon working groups, members of the trust and identity community were involved in a number of working groups that support TIER (Trust and Identity in Education and Research). The Internet2 wiki includes a [list of those working groups](#) and links to their individual wiki spaces. TIER working groups include:

- TIER Ad Hoc Advisory Interim Working Group
- TIER Component Architects Working Group
- TIER Data Structures and APIs Working Group
- TIER Entity Registry Working Group
- TIER Packaging Working Group

## Education and Outreach

### IAM Online Webinar Series

The monthly IAM Online webinar series marked its sixth year of operation in 2015. Appendix B includes a list of topics, speakers, and number of attendees during 2015-16. Altogether 1,383 attended these 13 sessions of IAM Online.

### InCommon Shibboleth Installation Workshops

2015 marked the sixth year of these workshops, which focus on the installation and configuration of Shibboleth. The community and Internet2 staff trainers overhauled the curriculum for the fall sessions to focus on the new Version 3 of the Identity Provider in anticipation of the July 31, 2016, date for the end of support for version 2. Five workshops took

place in 2015, including one developed specifically for CLAC (Council of Liberal Arts Colleges) schools. Total attendance for 2015-16 was 273. See Appendix C for details.

### **2015 Technology Exchange**

In its second year, the Internet2 Technology Exchange has become established as an important technical meeting for trust and identity in research and education in the U.S., with a significant global component and attendance. The trust and identity community combined three focused meetings into the 2015 TechEx: REFEDS, the conference for research and education identity federations worldwide; Advance CAMP, the unconference meeting that explores just-in-time issues and challenges of community-wide interest or concern; and two tracks of CAMP, with campus-focused sessions comprised of community proposals. More than 200 trust and identity professionals from 11 countries attended.

### **2016 Global Summit**

The 2016 Internet2 Global Summit included “identity morning,” with a joint meeting of the two leading trust and identity advisory groups (InCommon Steering and the TIER Community Investor Council). The groups reviewed a number of trust and identity programs, including eduGAIN, the status of the Shibboleth Consortium, and the first TIER release. The Global Summit also brought together TIER working groups and architects to review the TIER release and discuss plans for the next version.

## **Conclusion**

The past 18 months have brought significant change for the InCommon community and staff, as well as increased expectations for an accelerated pace of new features and enhancements, as the InCommon Federation continues to become a critical infrastructure for many in the community.

Looking to the rest of 2016 and into 2017, working groups will continue to focus on projects outlined in this report – such as attribute release issues, improving interoperability, and expanding the scope of the Federation. Key challenges in the short term include increasing the responsiveness to community needs in terms of service and support. Increasing trust, Global interederation and integration of K-12 into the Federation means continuing to scale the Federation architecture and business operations to meet the demand.

The creation of the Trust and Identity Division underscores the importance of this area to Internet2. Fortunately, we are blessed with committed staff and community members to provide both the leadership and the hard work needed to continue to build the infrastructure and to deliver first-rate services.

## Appendix A: Working Group Summaries

### Federation Interoperability Working Group

*Chartered by: InCommon Technical Advisory Committee*

*Chair: Walter Hoehn, University of Memphis*

*Wiki: <https://spaces.internet2.edu/x/ioRRBQ>*

This working group developed a list of requirements for scalable interoperation for those developing SAML software to ensure that it interoperates with research and education federations such as InCommon and listed such requirements that could be tested in some type of framework. The working group [delivered a final report](#) in March 2016, including a profile that sets out software conformance requirements to improve interoperability within an identity federation (the [SAML V2.0 Implementation Profile for Federation Interoperability](#)). Kantara, a multi-sector identity-related standards and community group, has agreed to be the caretaker of the profile and for promulgation across key government and corporate sectors.

### Certificate Service Review Working Group

*Chartered by: InCommon Executive Director*

*Chair: Chris Bongaarts, University of Minnesota*

*Wiki: <https://spaces.internet2.edu/x/s4RRBQ>*

This working group reviewed and provided input on matters pertaining to the next generation InCommon Certificate Service. Members reviewed a number of short-term tactical issues, conducted a community survey, and provided a list of desired features for the next generation certificate service. The working group has conducted the survey and [has released a draft report](#).

### Multifactor Authentication (MFA) Interoperability Profile Working Group

*Chartered by: InCommon Assurance Advisory Committee*

*Chair: Karen Herrington, Virginia Tech*

*Wiki: <https://spaces.internet2.edu/x/CY5HBQ>*

This working group developed a specification that enables Service Providers to request and for Identity Providers to be able to communicate that a person used another factor when authenticating. The group assembled use cases, developed a list of widely deployed MFA technologies, and defined requirements for the profile. For the TIER release in April 2016, the working group issued a number of documents for public review, including its [final report](#), and an [InCommon MFA Profile](#).

### New Entities Working Group

*Chartered by: InCommon Technical Advisory Committee*

*Chair: Jim Jokl, University of Virginia*

*Wiki: <https://spaces.internet2.edu/x/mwvkAg>*

This working group formed in 2014 in anticipation of new types of service and Identity Providers being included in the InCommon trust registry; via eduGAIN, for example, and the Steward Program, which will include K-12 districts into the Federation. The working group [published its final report and recommendations](#) in April 2015, providing guidance to both Identity Providers and Service Providers in anticipation of these “new entities” coming into the metadata.

### External Identities Working Group

*Chartered by: InCommon Technical Advisory Committee*

*Chair: Eric Goodman, University of California Office of the President*

*Wiki: <https://spaces.internet2.edu/x/-gTkAg>*

This working group explored the use of social identity such as Facebook and Google to access campus services and considered use cases, trustworthiness of such identities, architectural patterns, and business and technical criteria to be considered. Their [final report and recommendations](#) was delivered in May 2015.

### Identity Provider of Last Resort Working Group

*Chartered by: InCommon Technical Advisory Committee*

*Chair: Keith Hazelton, University of Wisconsin-Madison*

*Wiki: <https://spaces.internet2.edu/x/iwvkAg>*

Service Providers often find that at least some of the population of individuals they serve are not represented by a traditional campus Identity Provider, or that the campus IdP does not release the required attributes for access. This working group evaluated the issues and requirements around an “IdP of Last Resort” (now known as “Unaffiliated Identity Provider”) that could register and provision such individuals. The working group issued its [final report and list of requirements for an IdP of Last Resort](#) in June 2015. The international organization of federation operators (REFEDS) has [picked up this work](#) and is developing international standards.

### Quilt InCommon Pilots Working Group

*Chartered by: InCommon Steering Committee*

*Chair: George Laskaris, NJedge.net*

*Wiki: <https://spaces.internet2.edu/x/zAQwAg>*

This working group dates to a task force formed in 2011 to create a K-12 Federated Identity Management Roadmap. The working group formed in 2012 as a partnership between InCommon and the Quilt, an organization of the 36 state and regional networks in the U.S. The working group formed eight pilots to explore methods for allowing K-12 districts and community colleges with a straightforward way to participate in InCommon. The working group issued a [white paper in October 2015](#), providing the results from the pilots and its recommendations. This work has led to the Steward Program, which InCommon expects to launch during the third quarter of 2016.

## Appendix B: IAM Online Topics 2015 - June 2016

IAM Online is a monthly series delivering interactive education on Identity and Access Management (IAM), brought to you by InCommon, Internet2, and the EDUCAUSE Higher Education Information Security Council.

### **“Working Group Reports: Making Federation Easier”**

Speakers: *Janemarie Duh (Lafayette College), Eric Goodman (Univ. of California Office of the President), Keith Hazelton (Univ. of Wisconsin - Madison), Jim Jokl (Univ. of Virginia), David Walker (Internet2), Steven Carmody (Brown Univ.)*

Attending: 80

### **“Features and Functionality of Shibboleth IdPv3”**

Presenters: *Scott Cantor (Ohio State and Shibboleth Development Team), Marvin Addison (Virginia Tech and Shibboleth Development Team)*

Attending: 200

### **“Improving Authentication Security”**

Presenters: *Kristin Judge (National Cybersecurity Alliance), Jeff Shultz (NSTIC), Brett McDowell (The FIDO Alliance), Stephen Somogyi (Google), Theresa Semmens (North Dakota State Univ.)*

Attending: 142

### **“External Identities in Higher Ed”**

Presenters: *Dedra Chamberlin (Cirrus Identity), Eric Goodman (Univ. of California Office of the President), Todd Haddaway (UMBC), Andrew Morgan (Oregon State Univ.), Erica Lomax (Oregon State Univ.), Tom Barton (Univ. of Chicago)*

Attending: 142

### **“Three Access Management Case Studies”**

Presenters: *Erica Lomax (Oregon State Univ.), Andrew Morgan (Oregon State Univ.), Mandeep Saini (GEANT), Albert Wu (UCLA), Tom Barton (Univ. of Chicago)*

Attending: 95

### **“InCommon Certificate Service Case Studies”**

Presenters: *Jim Basney (National Center for Supercomputing Applications), Chris Bongaarts (Univ. of Minnesota), Kevin Jesse (University of Rochester)*

Attending: 91

**“Multifactor Authentication: Campus Deployment Case Studies”**

Presenters: *C.W. Belcher (Univ. of Texas at Austin), Brad Judy (Univ. of Colorado), Paul Caskey (Internet2)*

Attending: 200

**“Stronger Authentication and the FIDO U2F Open Standard”**

Presenters: *Keith Hazelton (Univ. of Wisconsin-Madison), Stina Ehensvard (Yubico), Kevin Casey (Yubico)*

Attending: 61

**“InCommon: Interfederation, K12, and Changing Demographics”**

Presenters: *Klara Jelinkova (Rice Univ.), Ann West (Internet2)*

Attending: 62

**“InCommon Technical Work Updates and Plans”**

Presenters: *C.W. Belcher (Univ. of Texas at Austin), Chris Bongaarts (Univ. of Minnesota), Steve Carmody (Brown Univ.), Walter Hoehn (Univ. of Memphis), David Walker (consultant)*

Attending: 66

**“Registries and Records: The Ties that Bind”**

Presenters: *Warren Curry (Univ. of Florida), Chuck Moore (Penn State), Renee Shuey (Penn State)*

Attending: 118

**“K-12 and Federation: Report from the Pilots”**

Presenters: *Shaun Abshere (WiscNet), Bernie A'cs (National Center for Supercomputing Applications), Mark Beadles (OARnet), Scott Isaacson (Nebraska Educational Service Unit Coordinating Council), George Laskaris (NJEdge), Mark Scheible (MCNC), Ann West (Internet2)*

Attending: 60

**“Free the Attributes! Attribute Release, Scalable Consent, and User Convenience”**

Presenters: *Rob Carter (Duke Univ.), Ken Klingenstein (Internet2), Keith Wessel (Univ. of Illinois), Tom Barton (Univ. of Chicago)*

Attending: 66

## Appendix C: InCommon Shibboleth Installation Workshop

Locations and Attendance, January 2015 - June 2016

Month/Year	Host	Attendees (max = 40)
<b>2015</b>		
May	George Washington University (Vienna, VA)	34
June	OARnet (Columbus, OH)	43
June	Trinity College for CLAC (Hartford, CT)	20 (max was 20)
Sept	Citrus College (Cupertino, CA)	40
Oct	University of Texas at Arlington	40
<b>2016</b>		
February	MCNC (Research Triangle, NC)	34
May	University of Chicago	34
June	Rochester Institute of Technology	28
Total		273