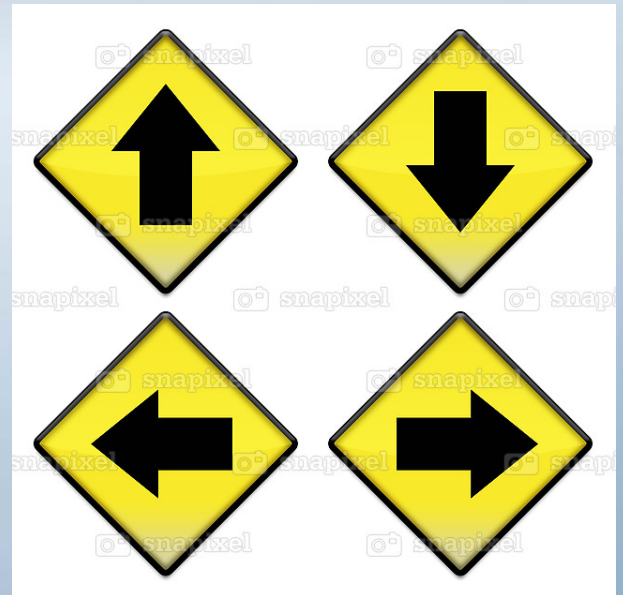


Internet identity: Forward in All Directions



Dr Ken Klingenstein,
Director, Middleware, Internet2

What's Happening

- Exponential growth in Federated Identity
- Exponential growth in Social Identity
- Integration of Internet identity
 - Interfederation
- The rise of attributes
 - For privacy, scalable access control

Key players

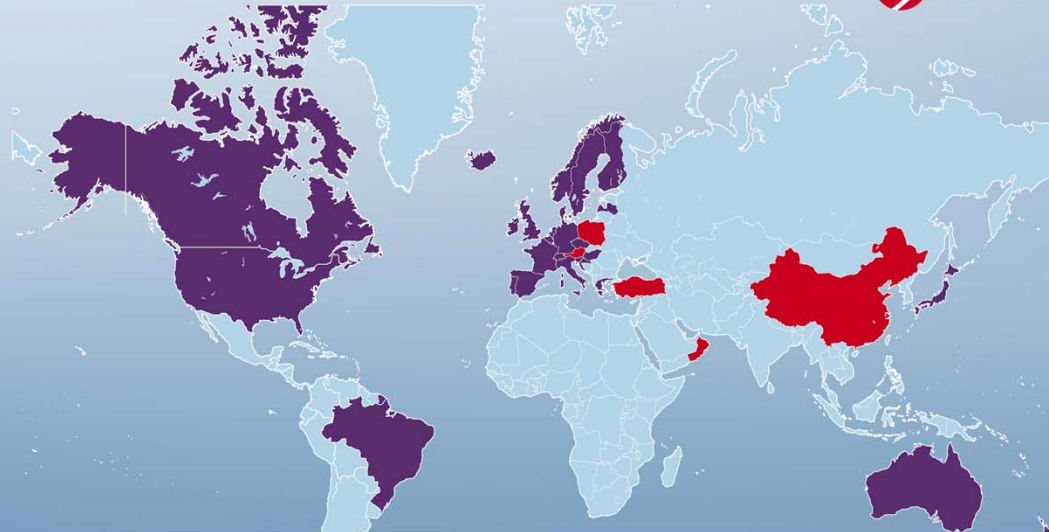
- NSF and the R&E community
- Google, MS, Paypal, etc.
- Mobile operators
- Government efforts
 - NSTIC, White House and NIST in US
 - STORK, etc in Europe
 - T-scheme in UK
- Standards groups – ISOC and IETF, OASIS, etc.

Federated Identity

- The now classic SAML 2.0 based meta-data driven trust federation, typically with a specified schema (eduperson+)
 - Shibboleth, OpenSAML, SimpleSAML, MS ADFS
- Thousands of applications now, from content-distribution to outsourced services, from access to supercomputers to access to national research grants, from student aid to student travel, from wikis to cloud services
- Started with NSF funding in R&E, but now has crossed over to health and medical, real estate, government, international electronic banking, and more.
- The infrastructure to provide leverage for other forms of identity

R&E Federations

Research and Education Identity Federations



Identity Federations in production

AU	Australian Access Federation AAF	IE	Edugate
BE	Belnet R&E Federation	IT	IDEM
BR	CAFe	JP	GakuNin
CA	Canadian Access Federation CAF	LV	LARFE
CH	SWITCH.ch	NL	SURFfederatie
CZ	eduID.cz	NO	FEIDE
DE	DFN-AAI	NZ	Taukiri New Zealand Access Federation
DK	WAYF	PT	RCTS.aai
ES	SIR	SE	SWAMID
FI	Haka	SI	AmesAAI Slovenska
FR	Fédération Education Recherche	UK	UK Access Management Federation for Education and Research
GR	GRNET	US	InCommon
HR	AAI@EduHr	int	IGTF
HU	eduID.hu		

Identity Federations in pilot

AT	ACDnet-AAI Federation
CN	CARS
OM	OMAN_XID
PL	Poland Identity Federation
TR	ULAKA.AI

This map is provided in good faith and represents an overview of current and planned federations. It does not constitute an endorsement or approval by Internet2.

International R&E federations

- > 100M users across >30 countries
- Coverage in several countries is 100%, and extensive in many others.
- Generally part of a national network but associated with another org or independent in a few
- Frequently linked to several government activities, in research, education, governance, health, etc.
- Some interfederation activities, including the Kalmar2 union and eduGAIN.
- www.refeds.org

Atlasses - PATHOLOGY IMAGES

Collection of high resolution histological images

Lang: Registered users: 16229

Hypertext atlas of Dermatopathology version 10.96, November 2010
Hypertext Atlas of Dermatopathology contains thousands of clinical and histological images of skin diseases. Virtual microscope interface is used to access histological images available in very high resolution. The Atlas is available in English and Czech.

Hypertext atlas of Fetal Pathology version 2.22, September 2010
Hypertext Atlas of Fetal Pathology contains clinical and histological images of various form of developmental anomalies. Virtual microscope interface is used to access histological images available in very high resolution. The Atlas is available in English and Czech.

Hypertext atlas of Neonatal Pathology version 1.11, September 2010
Hypertext Atlas of Neonatal Pathology contains clinical and histological images of various forms of neonatal pathology. Virtual microscope interface is used to access histological images available in very high resolution. The Atlas is available in English and Czech.

Hypertext atlas of Bone Marrow Pathology version 1.10, February 2010
Hypertext Atlas of Bone Marrow Pathology Pathology contains clinical and histological images of various forms of bone marrow diseases. Virtual microscope interface is used to access histological images available in very high resolution. The Atlas is available in English and Czech.

Hypertext atlas of Rare Lymphomas version 0.83, September 2010
Hypertext Atlas of Rare Lymphomas contains clinical and histological images of some rare hematologic/lymphatic malignancies of children. Virtual microscope interface is used to access histological images available in very high resolution. The Atlas is available in English and Czech.

Hypertext atlas of Pathology version 2.50, November 2010
Hypertext Atlas of Organ Pathology contains teaching materials for pre-graduate students. It is under construction and in full version so far available in Czech language only. The English version contains only chapters with images to enable image sharing (see below). The interface is similar to the Atlas of Dermatopathology. Many macroscopic and microscopic images are available, as well as images from CT and MRI scanners and endoscopes.

Demo pages of the Atlases
This page demonstrates technologies used in the Atlas on selected images (activation of arrows, sharpening, virtual microscope). This page does not require registration.

In order to have an access to the high resolution images you have to LOGIN below:

If you have an account in one of the following identity federation, click on the logo.

- eduID cz
- Log ind med WAYF
- SIR
- SWITCHaai
- DFN
- EduHr
- ide part
- GakuNin
- Reaktor
- AUSTRALIAN ACCESS FEDERATION
- arnes
- cafe
- Login KALMAR 2

If you are not member of any listed identity federation, click on the button below.

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terena.org https://login.terena.org/wayf/module.php/discopower/disco.php?entityID=https%3A%2F%2Fterena.org%2Fsp&return=https%3A%2F%2Flogin.terena.org%2Fwayf%2Fmodule.php%2Fsam%2Fsp%2Fdiscosp.php%3A%2F%2F... Google

SELECT YOUR IDENTITY PROVIDER

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808 entries

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- Internet2
- AAI@EduHr - Croatian Research and Education Federation
- Aberdeen College
- Aberdeen College Staff
- Aberystwyth University
- Abingdon and Witney College
- Accrington & Rossendale College
- Adam Smith College
- AESIR
- ALBA - CELLS
- Anglia Ruskin (Old System)
- Anglia Ruskin University Login

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National Science Foundation (US) https://identity.research.gov/sso/fedauth.jsp?env=prvw&app=portal
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InCommon Federation

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- Lehigh University
- Louisiana State University
- North Carolina State University
- Oklahoma State University Main Campus
- Penn State
- Texas A & M University
- The University of Arizona
- The University of Memphis
- University of Alaska Statewide System
- University of Arkansas
- University of Baltimore
- University of California, Berkeley
- University of California, Davis
- University of Central Florida
- University of Chicago
- University of Cincinnati Main Campus

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* If you have eRA Commons credentials, you may begin using the NIH Login link. After July 18, 2011, the eRA Login link will be removed.

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Search for account name: [Frequently Asked Questions](#)

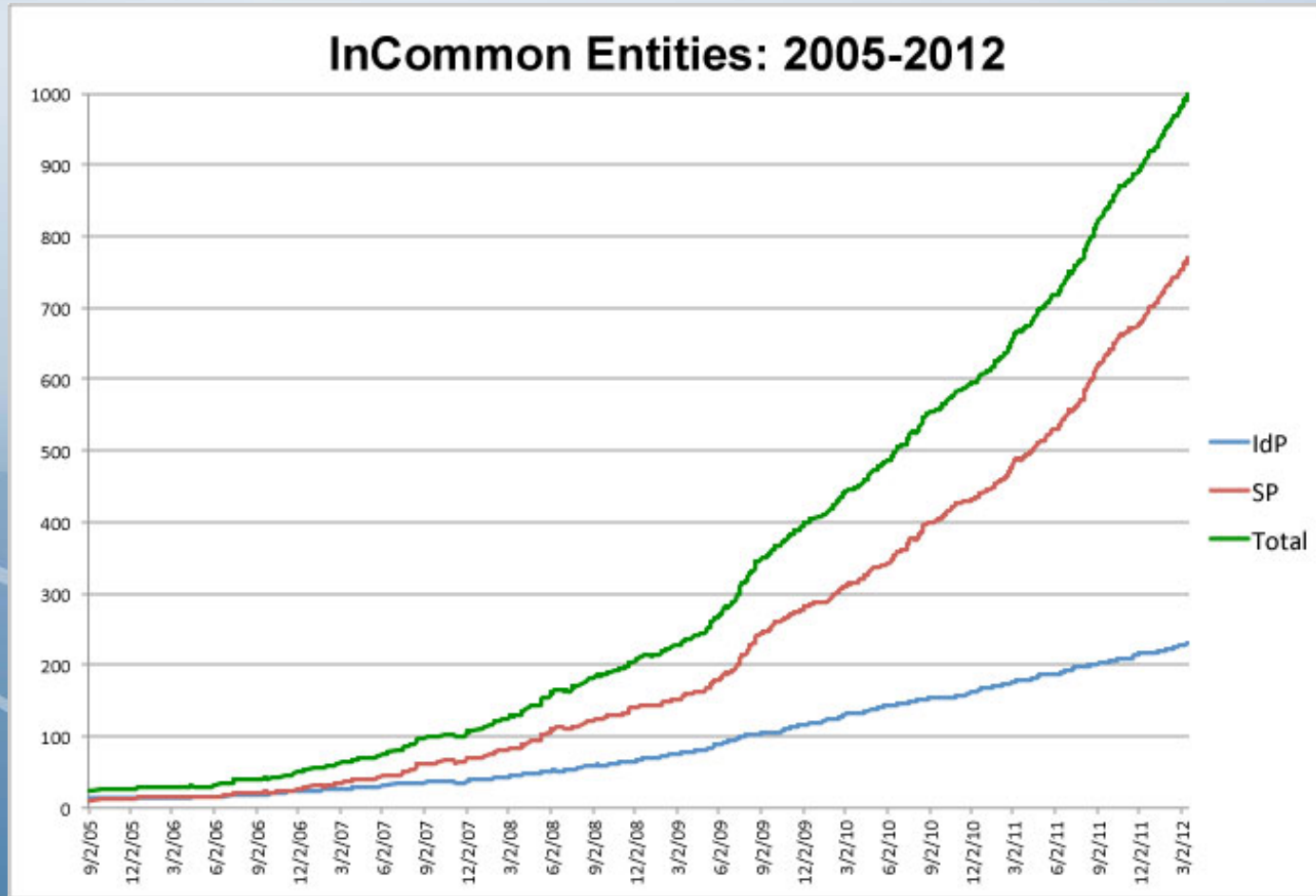
Login Account Options

Account	Category
Case Western Reserve University	Research Organizations
Colorado State University	Research Organizations
Columbia University	Research Organizations
Cornell University	Research Organizations
Duke University	Research Organizations
eRA Login	NIH
Google	OpenID
Indiana University	Research Organizations
Johns Hopkins University	Research Organizations
Medical University of South Carolina	Research Organizations
NCBI Primary Data Archives Login	NCBI
NIH Login	NIH
Northwestern University	Research Organizations
Oregon Health & Science University	Research Organizations
PayPal	OpenID
Rutgers, The State University of New Jersey	Research Organizations
Stanford University	Research Organizations
Stony Brook University	Research Organizations
The Ohio State University	Research Organizations
The Pennsylvania State University	Research Organizations
The University of Arizona	Research Organizations
UKPMC Funders Group grantees	Portable PMC
University of Alabama at Birmingham	Research Organizations
University of California San Diego	Research Organizations
University of California, Davis	Research Organizations
University of California, Irvine	Research Organizations
University of California, San Francisco	Research Organizations
University of California-Los Angeles	Research Organizations
University of Chicago	Research Organizations
University of Florida	Research Organizations
University of Illinois at Urbana-Champaign	Research Organizations
University of Iowa	Research Organizations
University of Maryland Baltimore	Research Organizations
University of Memphis	Research Organizations
University of Michigan	Research Organizations

InCommon today

- 300+universities, 450+total participants, growth continues rapid
- > 10 M users
- Traditional uses continue to grow:
 - Outsourced services, government applications, access to software, access to licensed content, etc.
- New uses bloom:
 - Access to wikis, shared services, cloud services, calendaring, command line apps, medical, etc.
- FICAM certified at LOA 1 and 2 (Bronze and Silver).
- Certificate services bind the InCommon trust policies to new applications, including signing, encryption, etc.

InCommon Growth



Types of services connected by InCommon

- R&E Centric
 - 300+ Universities providing services to students, staff, alumni, external users, K-12, etc.
 - NSF, NIH, National Supercomputing and DataBases, National Labs, GSA, Education, Veterans, etc.
- With outsourced content and service providers
 - OCLC, JSTOR, Travel management, Testing Services, HR systems, Loan providers, Parking management, NBCLearn, Elsevier, IEEE, ATT, Box, etc.
- With related business partners
 - Particularly health care – NIH, Mayo Clinic, UHC, VA
- With markets selling to students, etc.
 - Student Universe, UniversityTickets, National Student Clearinghouse, SAT's

A typical enterprise-InCommon use profile

- Academics use it to get to Elsevier journals, OCLC holdings, IEEE, etc
- Staff use it to get to the cloud and do their employee/payroll entry
- Students use it to take on-line class tests at an outsourced test service
- Researchers use it to get to Grants.gov and Fastlane
- Researchers use it to get to CILogon and use the Teragrid , Open Science grid, etc.
- Researchers use it to get to the Clinical Trial wikis at NIH, PubMed, etc.
- Many collaborators and administrators use it to get shared wiki space at Internet2, Educause, the CIC, the UC system, the UT system...
- Students are using it for student tickets, software at Microsoft, etc

South – Social Identity

- A very large and fragmented marketplace
- Some key players are more on the sidelines – Facebook, Twitter, etc
- Most other key players engage in OIX (OpenId Exchange) – Google, Yahoo, Microsoft
 - Evolving protocol settling into OpenIdConnect
 - Looking at partnerships for higher LOA, e.g. with mobile, postal service, etc.
- Exploring what the marketplace is
 - In a landscape where each vendor wants to own it...

Key Directions in Social Identity



Social Identity – Key Directions

- Getting technical interoperability, including those not yet in
 - Dealing with the new complexities, needs for profiles, etc
- Alliances for better LOA and attributes
 - Mobile and IdP/email provider
 - Banks and IdP/email provider
- Getting a proper marketplace for identity
- Marketplace for attributes - Monetization

A Proper Marketplace for Identity

- Who pays for services
 - The service provider, the user directly, the user indirectly (perhaps through tracking and advertizing)
- Who competes to provide services
 - Monopoly, big dogs, a marketplace
 - Will set directions for interfaces, discovery, innovation, low barriers to entry
- Who sets the rules
 - About security and privacy of data
- And what does it cost?

A Proper Marketplace for Attributes

- Some attributes can have broad monetary value, e.g. verified postal address, over legal age, current location
- Who owns these attributes? How are they verified? When is consent necessary to release them? What form does consent take?
- Who can “buy” them? What are the rules of use? Who makes money?
- First markets being tested now...

Integration of Internet identity: federation and social

- Ability to deploy a variety of identity types to solve a use case
- Gateways and other approaches to credential conversion
 - PIV in federation
 - Social2SAML gateways
 - SAML2Social gateways
- Integration opportunities increase with OpenId Connect

What's coming

- Privacy managers
- Interfederation
- Anonymous credentials

Interfederation

- PKI is globally scalable
 - Unfortunately, its not locally deployable...
- Federation is locally deployable
 - Can it scale globally?
- Inter-federation
- Like BGP, only 1000 times harder

Interfederation

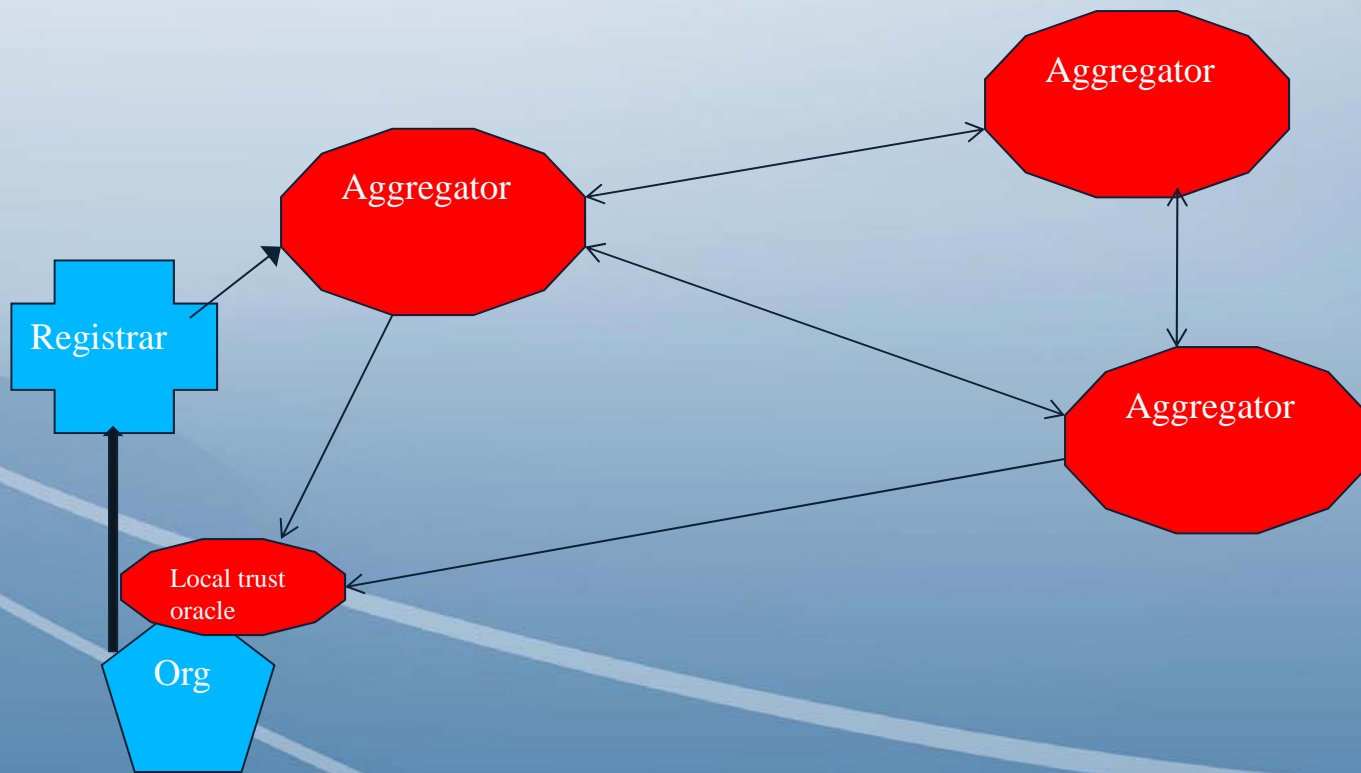
- Connecting autonomous identity federations
- Critical for global scaling, accommodating local federations, integration across vertical sectors
- Has technical, financial and policy dimensions
- Several operational instances – Kalmar2 Union, eduGAIN, ad hocs (UC Trust, Texas)
- Use cases now numerous, across sectors, within sectors
- Short-term and long-term approaches
- If its called the Internet, shouldn't the marketplace start talking about “interfederated identity”

Buckets of interfed issues

Both short-term and long-term approaches must address:

- Exchange, and massage, of metadata
- Policy alignment
- Alignment of payloads (attributes)
- Operational issues – error handling, incident handling, legal and contractual, etc

Future metadata flows in Interfederation



Emerging key software and protocols

- MDA – metadata aggregator
- PEER – metadata registry management software
 - There may be multiple PEER services instances
- MDX – the query protocol(s) to request metadata; return via normal publishing protocols
- Improved discovery services – accountchooser, discojuice, embedded discovery services
- End-entity categories – an important new type of metadata, allowing for certified apps and IdP's.

Interfered policy areas

- Federation operations
 - Legal status and bone fides
 - Operational issues – signing key and metadata protection, incident handling, etc
- Federation to member relationships
 - Contractual
 - Vetting of members and delegation of metadata
- Community standards
 - LOA
 - End-entities and vetting values
 - Attribute bundles
- IdP-SP direct relationships
 - What issues do they work directly? If they have a contract? If they don't

Is interfederation getting harder?

- Or, as Ian says, do we just understand the problem better?
- In the old days, just exchange signing keys
- Now, do you understand my metadata? My attribute bundles? My application categories and how I assess apps? My policies
- And do I understand yours?
- And with more use cases every day...

User Contexts

- Individuals do trusted Internet transactions in a variety of contexts
 - The enterprise/federated use of identity well-established; may be enhanced with roles
 - Consumer
 - Citizen
 - Geo-temporal
 - Personal “wallet” – preferred language, accessibility, etc
 - Others?
- Same identity; different roles; different policies and governance on privacy, etc

Scalable privacy

- Small spanning set of attributes
 - Extensible but end-user manageable
 - Use of bundles to minimize complexity
- Rich metadata for trusted dialogue
 - Defaults, learning to minimize dialogues
 - Putting the informed into informed consent
- End user privacy manager with quality UI, some out of band consent, getting the defaults right
- Integration of federated and anonymous credentials

At the center, integration

- Across user contexts
- Across devices and platforms
- Across millions of users and sites
- Across federated and anonymous credentials
- Through portals and gateways
- Leveraging the common business processes
- Making the market

Impacts

- A true global layer on top of the original Internet
 - Connecting people, not machines
 - Close to the wetware, so lots of policy
- Number of users \gg 1 billion
- Moving towards 2-factor authentication
- Exposes inconsistencies in policy, behavior, etc.

A personal comparison

- The original Internet was massively consequential but relatively technically thin
 - Intentionally kept the technology simple
 - Most of the work was in making the marketplace of equipment, applications and users, and businesses.
- This Internet identity stuff is very, very important but relatively rich in issues
 - A result of working so close to the wetware, connecting people not machines
 - How much work will making the marketplace be?



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