

Microsoft® Research

Faculty Summit 2010

Delivering End to End Trust

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Microsoft Corporation

Trustworthy Computing



Security

- Secure against attacks
- Protects confidentiality, integrity and availability of data and systems
- Manageable



Privacy

- Protects from unwanted communication
- Controls for informational privacy
- Products, online services adhere to fair information principles



Reliability

- Dependable, Available
- Predictable, consistent, responsive service
- Maintainable
- Resilient, works despite changes
- Recoverable, easily restored
- Proven, ready



Business Practices

- Commitment to customer-centric Interoperability
- Technology Accessibility
- Recognized industry leader, world-class partner
- Open, transparent

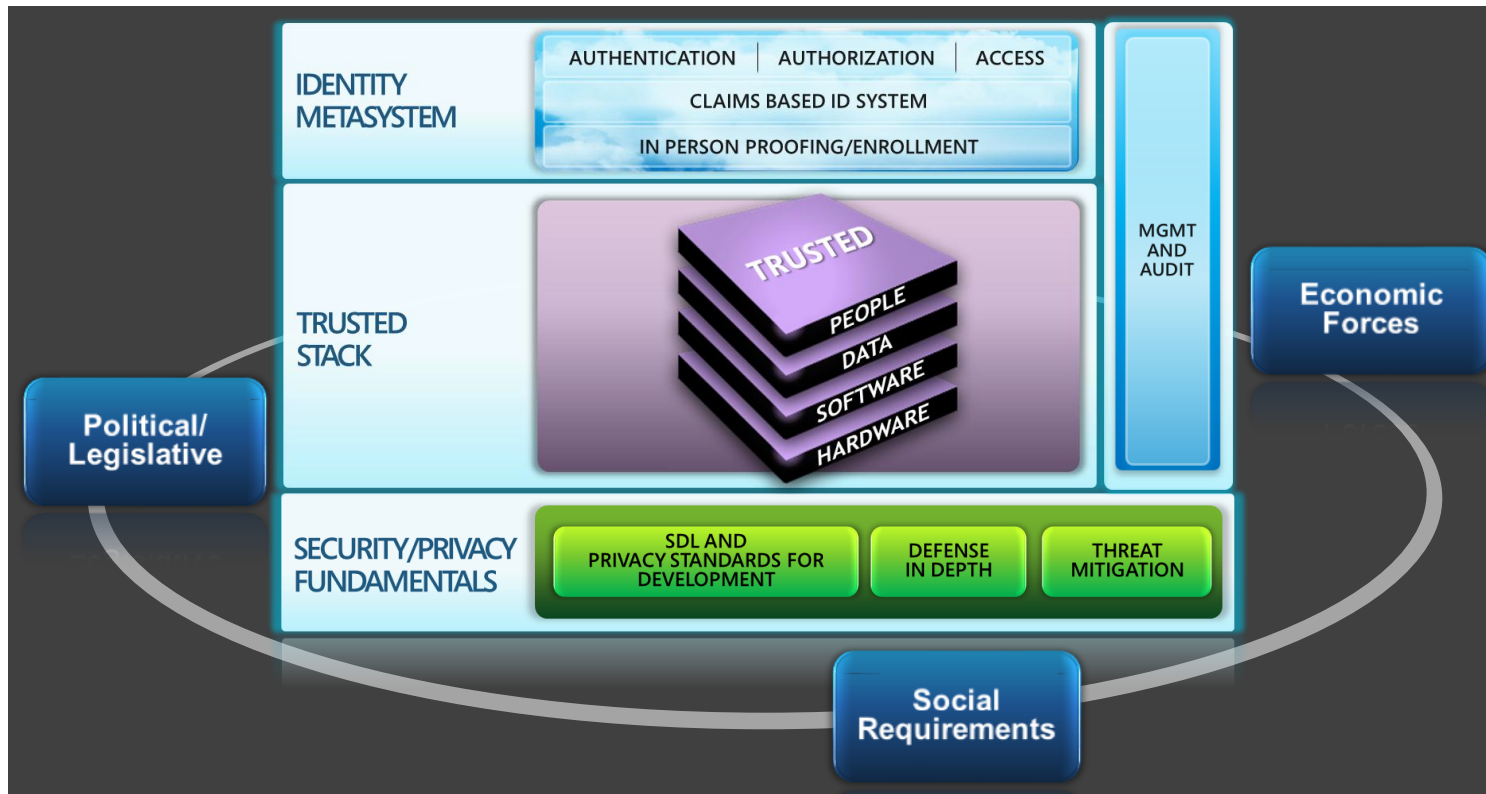
Path to End to End Trust

- 2002: Security Development Lifecycle
- 2005: Privacy Standard and Process
- 2006: Internet Battlefield, Identity Theft Analysis
- 2007: Trust User Experience (TUX) Team
- 2008: E2E Trust White Paper
- 2008: E2E Trust Team
- 2009: E2E Trust Roadmaps

End to End Trust White Paper

- Many believe need better security, privacy
- Greater connectivity and valuable targets lead to new threats and greater cybercrime
- Criminals anonymous and untraceable
- Need greater accountability
- Need to know who is who
- Need to have a trust framework

End to End Trust White Paper



- Conceptual vs. operational
- Who does what when?
- Apply standard PM techniques
- Create a roadmap

Roadmap Goals

- Help stakeholders see the “big picture”
 - Demystify, make it easy to see their piece
 - Analyze dependencies, critical paths
 - Highlight long poles like new standards, laws
 - Spot common building blocks across initiatives
 - Collaborate on implementation strategy
- Make insightful “calls to action”
 - Inspire and enable
- Track progress
 - Map activity, show trajectory

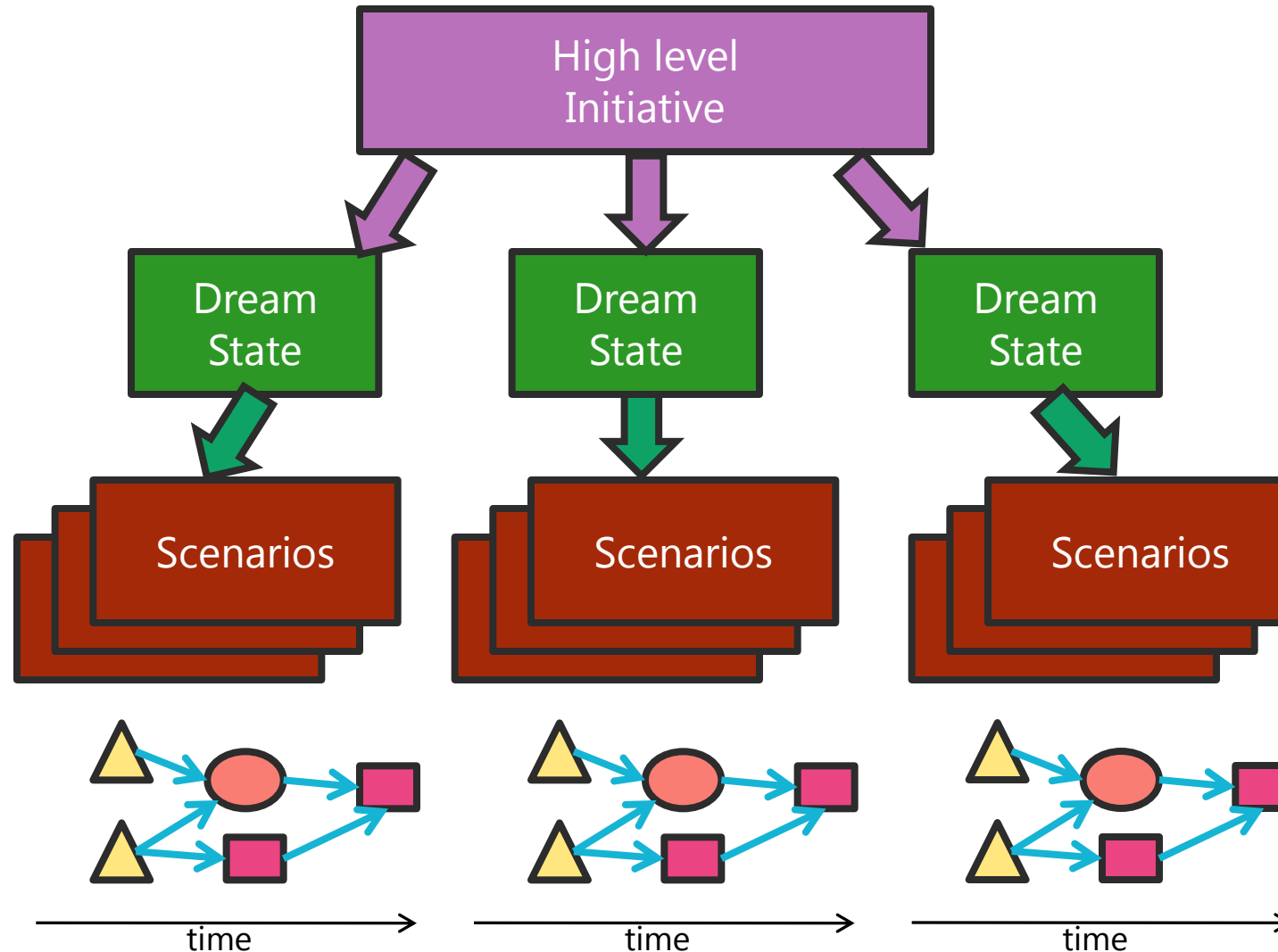
Roadmap Methodology

Start with a big play that has big impact for ecosystem

Identify high level wish list by stakeholder

Craft scenarios that embody the vision

Layout key building blocks by owner over time with dependencies



Online Health Care ...

Patient, provider, payer, regulator, researcher ...

Mary is traveling, feels sick ...

In person proofing, safe harbor, audit data standards ...

"SPICIER" Scenarios

- Tell a **STORY**
- **PERSONAL** details
- **IMPLEMENTATION FREE**
- **CUSTOMER** voice
- Deep **INSIGHT**
- User **EMOTIONS** and **ENVIRONMENT**
- Real **RESEARCH**

Example: Remote Care

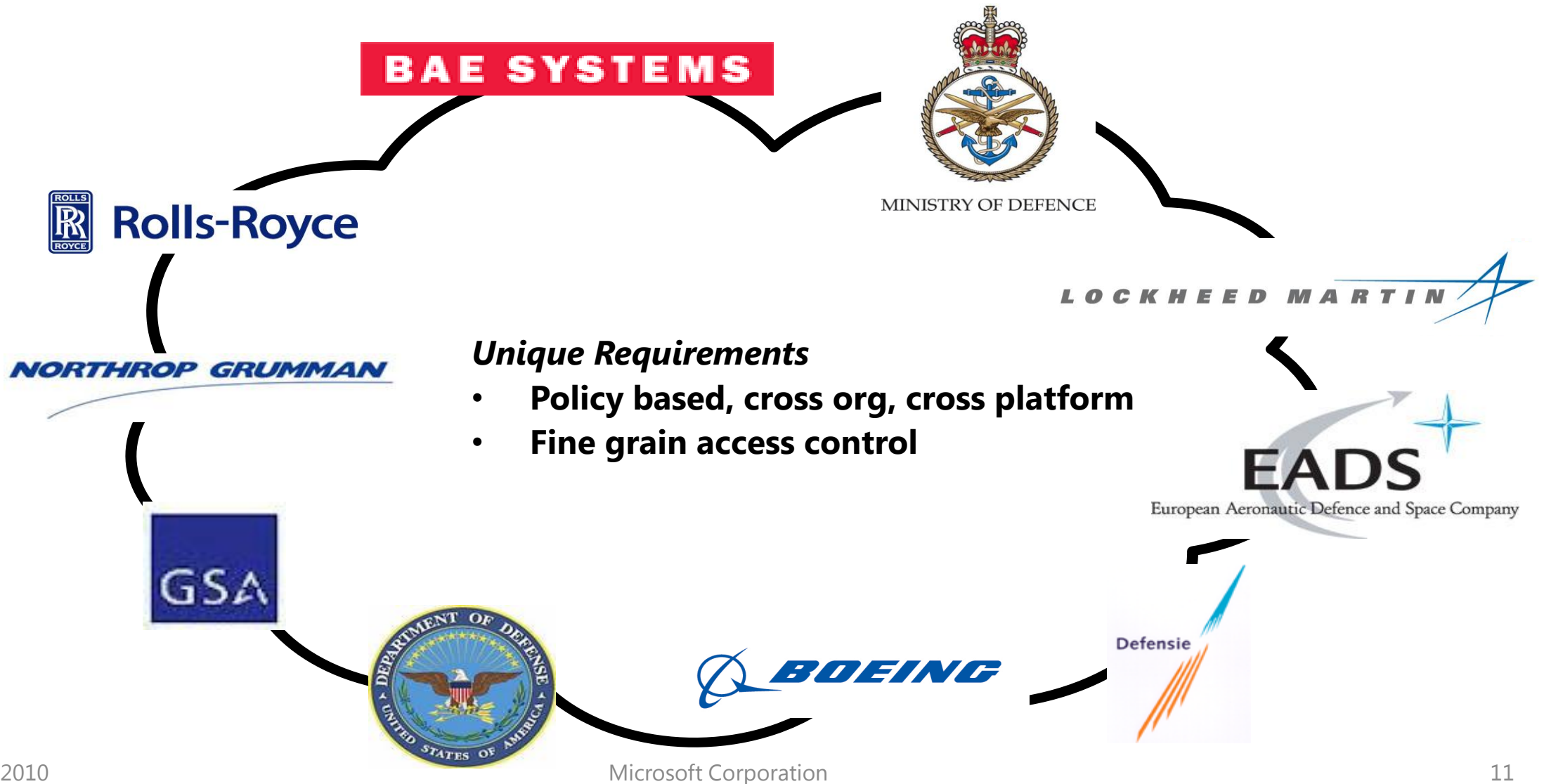


- Annie from Ontario is visiting her aunt in Saskatoon for the first time
- She develops throat pain and difficulty swallowing
- She is relieved to find a local walk-in clinic but they have no records for her
- Annie gives the doctor permission to see her online records just for this visit
- The doctor is able to access her records from his own computer
- Based on her history and allergies, the doctor confidently prescribes an appropriate medication
- Annie stops by the pharmacy, takes the medication, and starts feeling better

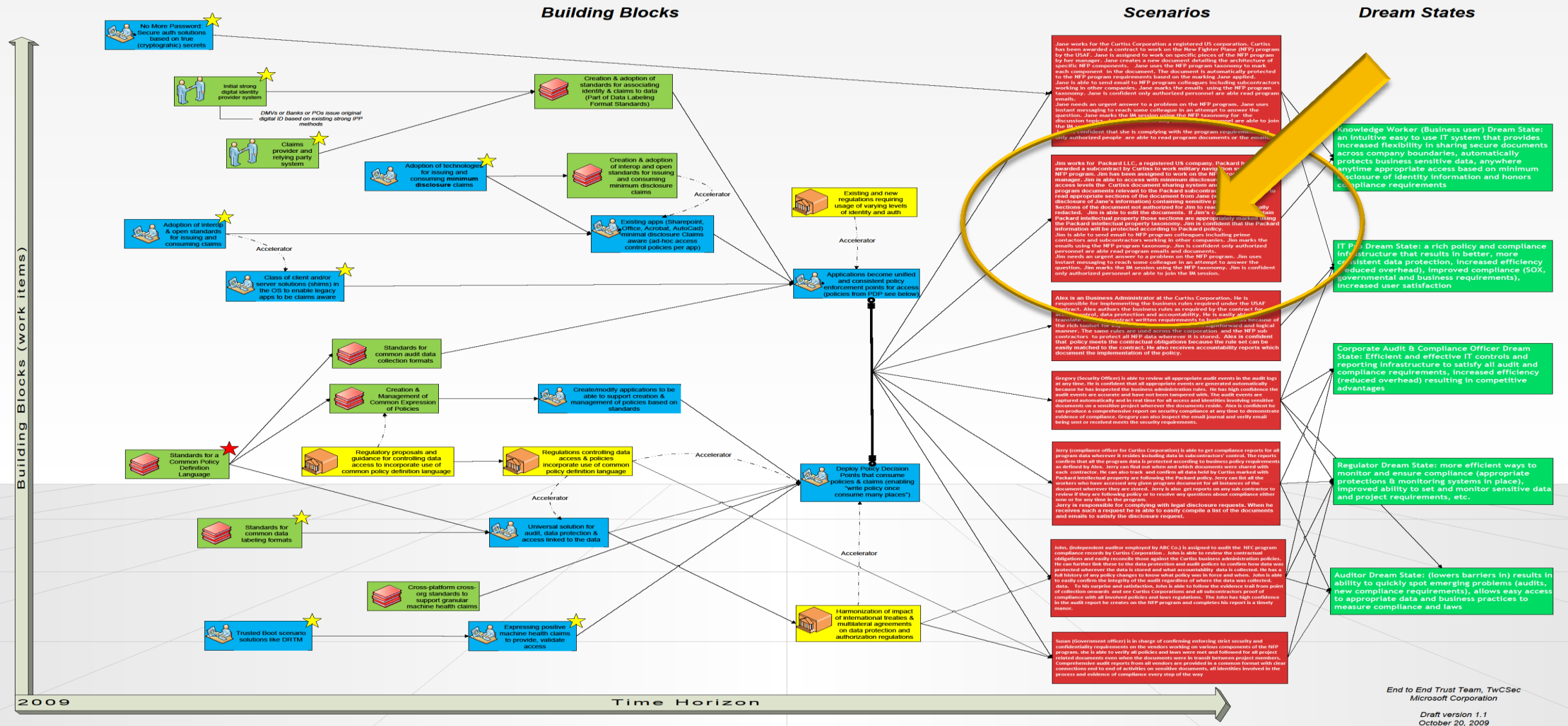
Key Initiatives

- Enable online health care
 - Manage privacy risks
- Enable eCommerce
 - Reduce online fraud
- Protect critical infrastructure
 - Preserve personal freedoms
- Enable secure online collaboration
 - Manage distrust between parties

Trans-global Secure Collaboration Program (TSCP)



Secure Collaboration

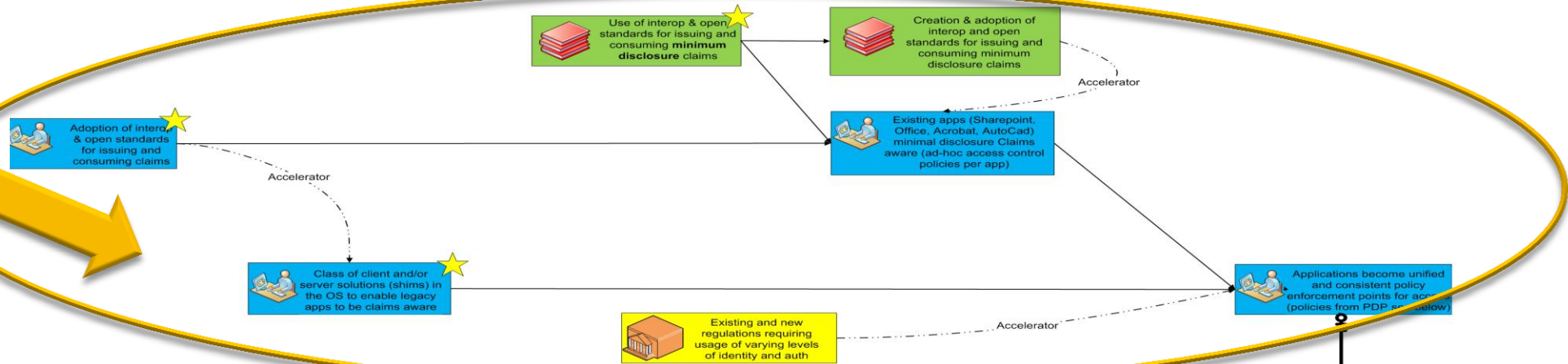


Scenario Simplified

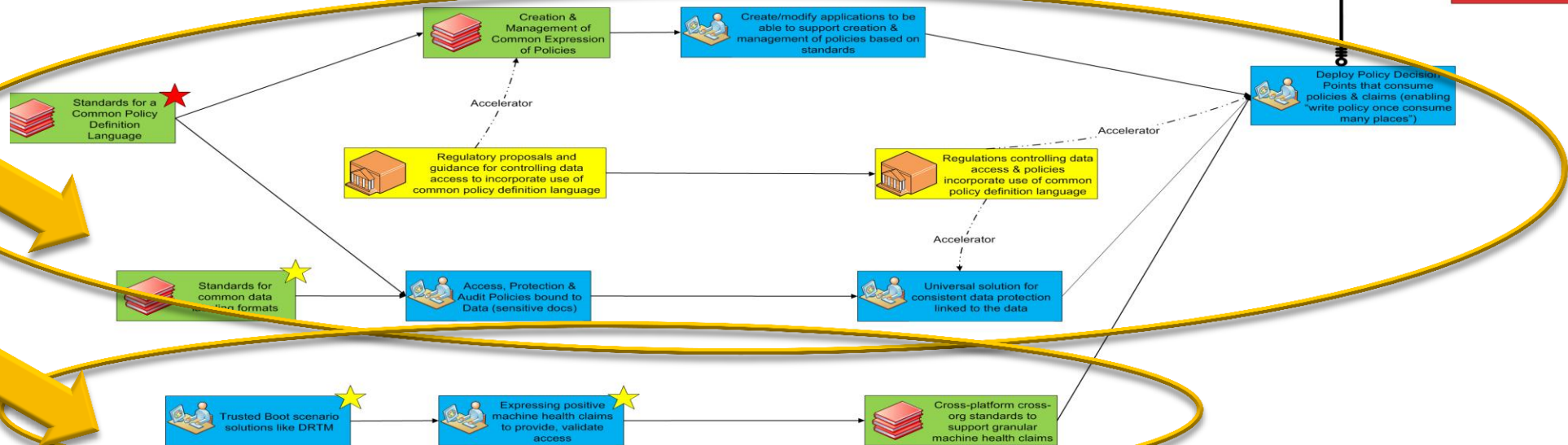
- Jim is able to securely collaborate and share sensitive project data
- With partners in multiple organizations
- Based on a common project taxonomy
- Regardless of the application being used

Building Blocks for Scenario

Identity Claims



Universal Policy Based Access

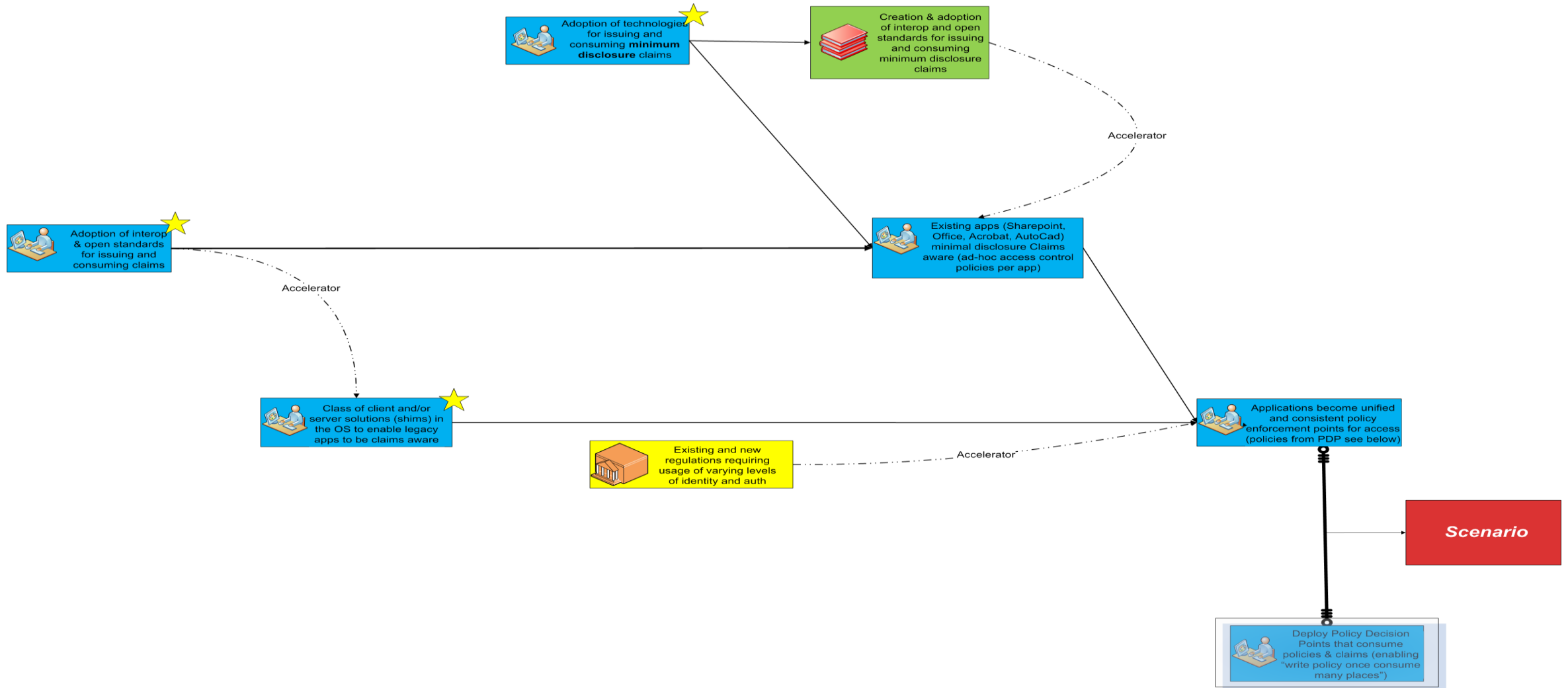


Machine Health Claims

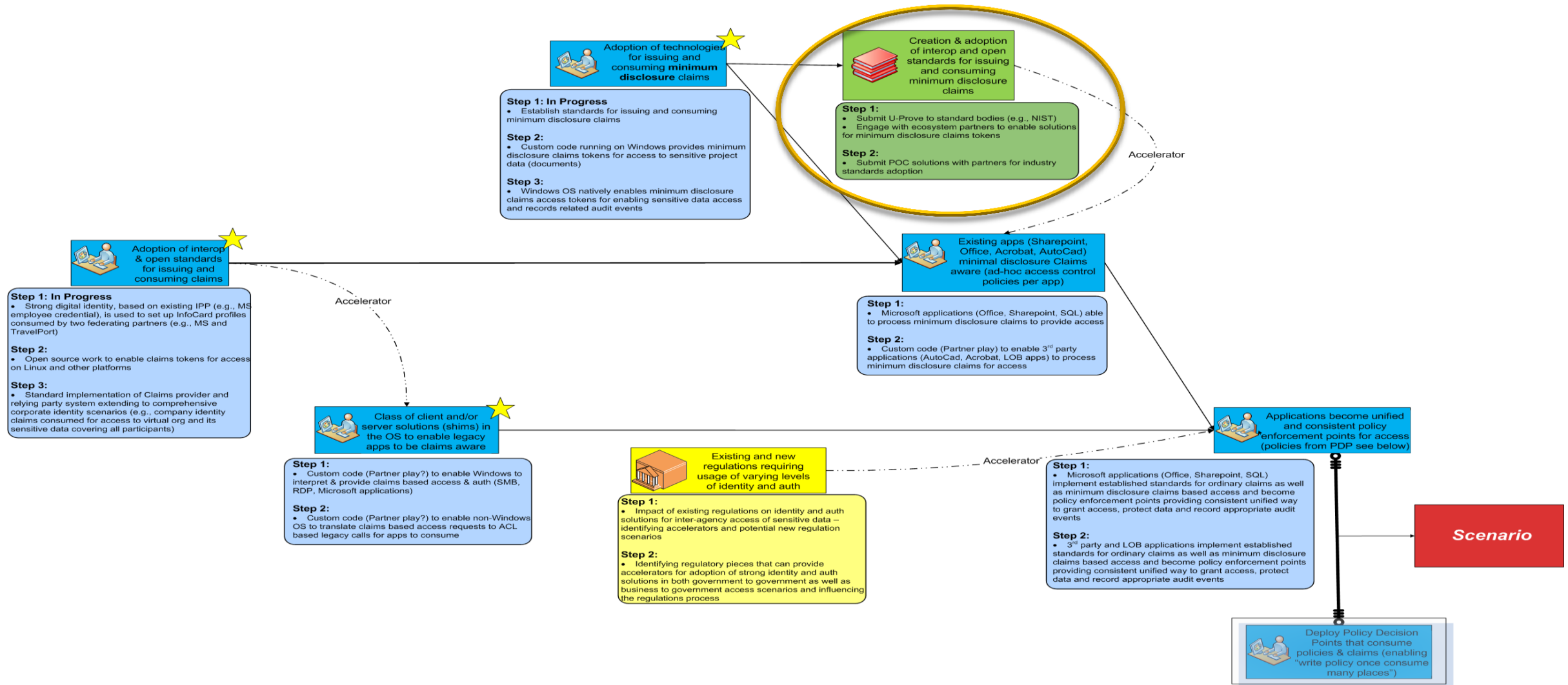


Scenario

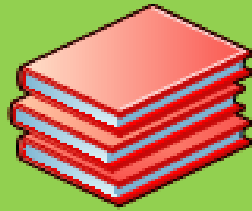
Identity Claims: Building Blocks



Identity Claims: Projects



Identity Claims: Standards Example



Creation & adoption
of interop and open
standards for issuing
and consuming
minimum disclosure
claims

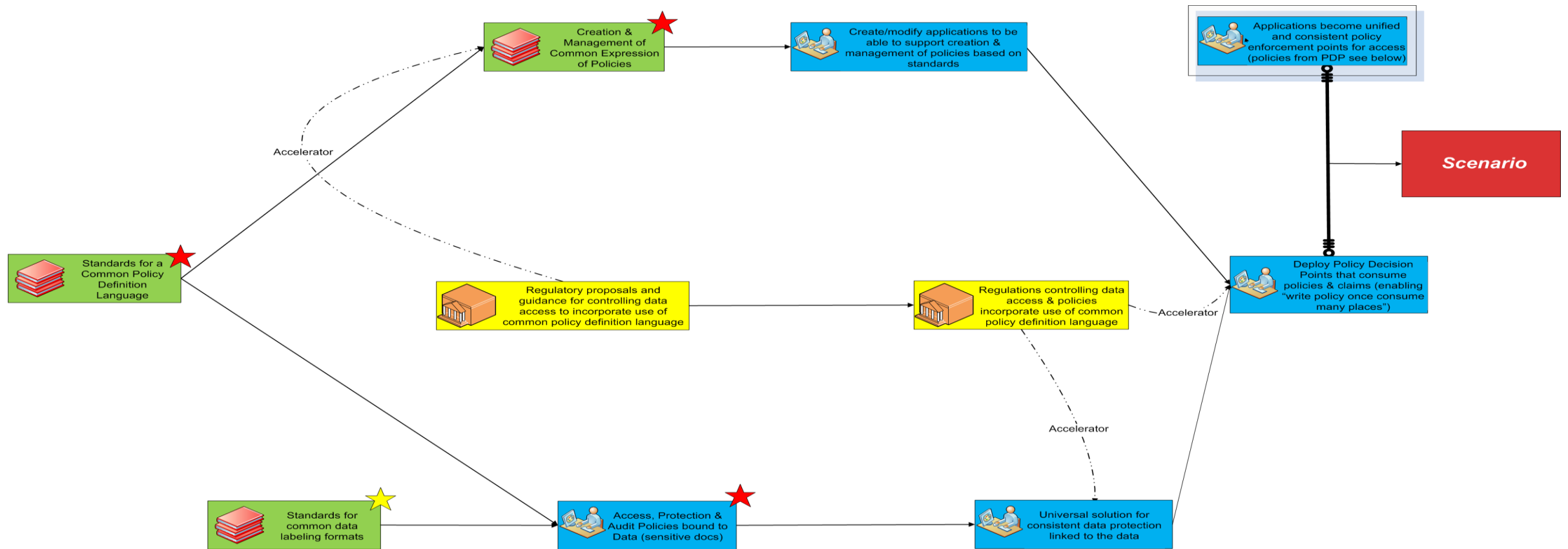
Step 1:

- Submit U-Prove to standard bodies (e.g., NIST)
- Engage with ecosystem partners to enable solutions for minimum disclosure claims tokens

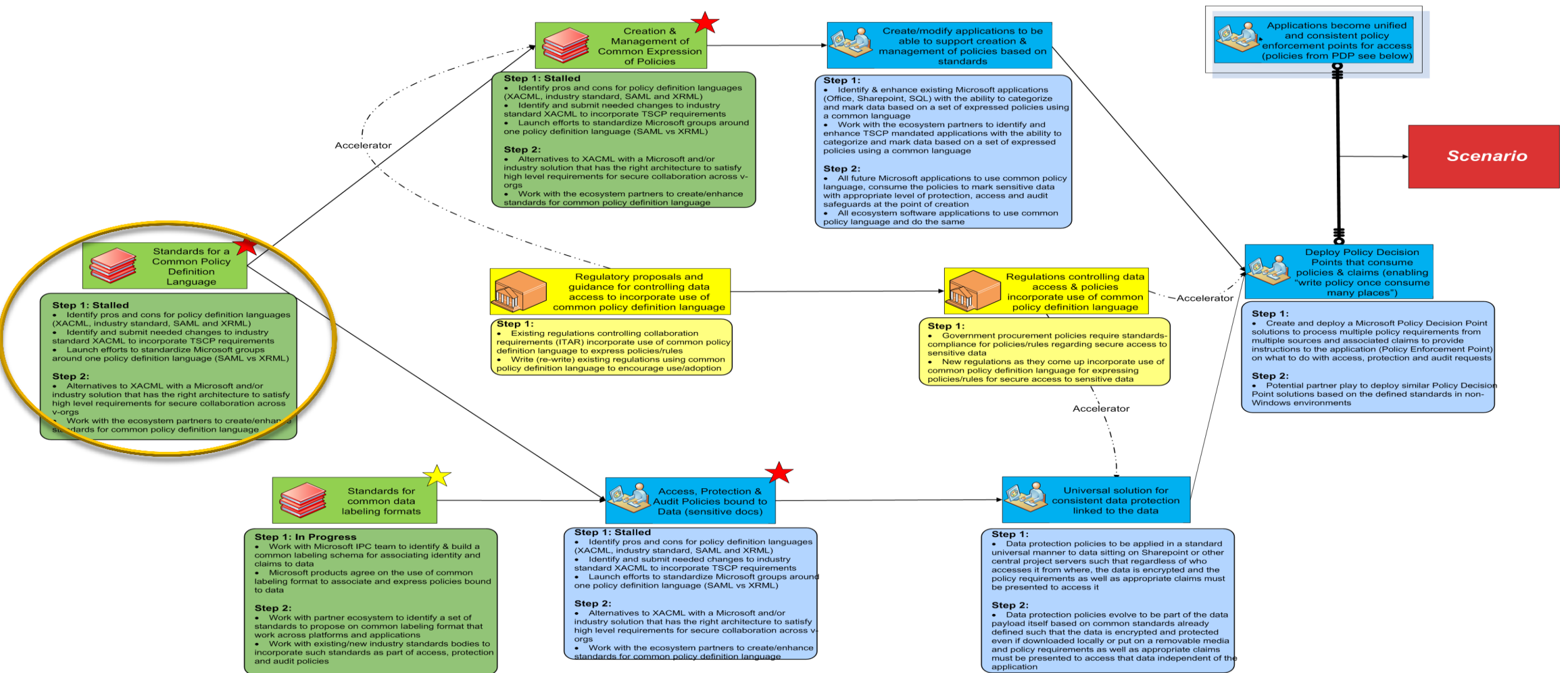
Step 2:

- Submit POC solutions with partners for industry standards adoption

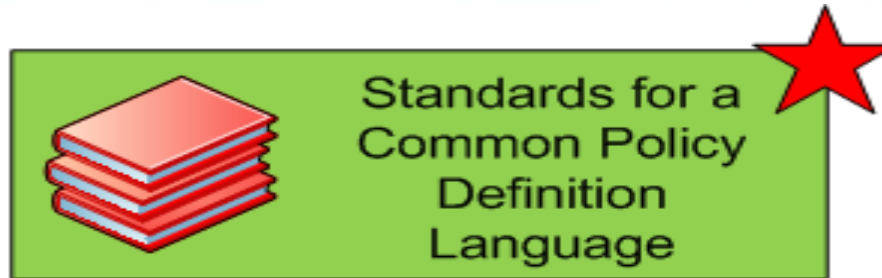
Universal Policy: Building Blocks



Universal Policy: Projects



Universal Policy: Standards Challenge



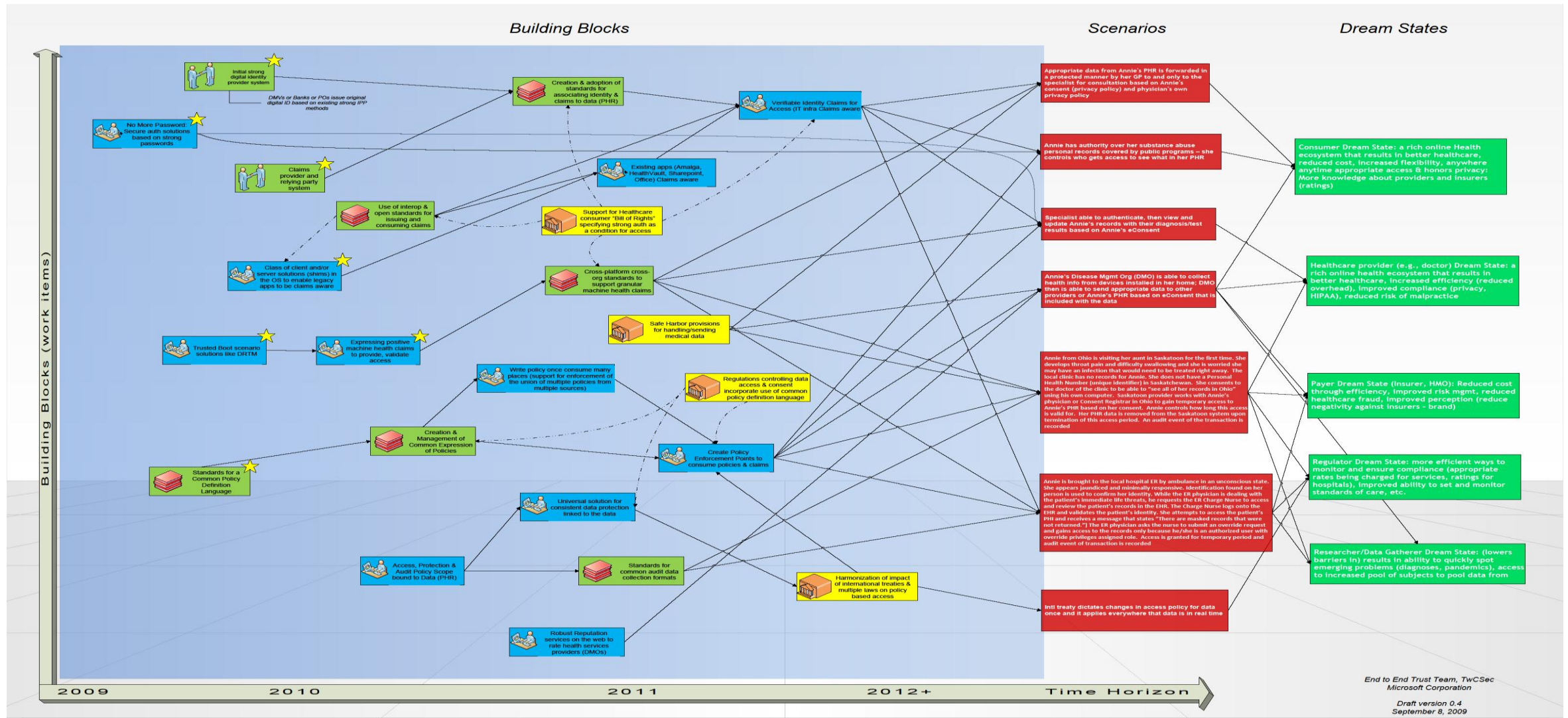
Step 1: Stalled

- Identify pros and cons for policy definition languages (XACML, industry standard, SAML and XRML)
- Identify and submit needed changes to industry standard XACML to incorporate TSCP requirements
- Launch efforts to standardize Microsoft groups around one policy definition language (SAML vs XRML)

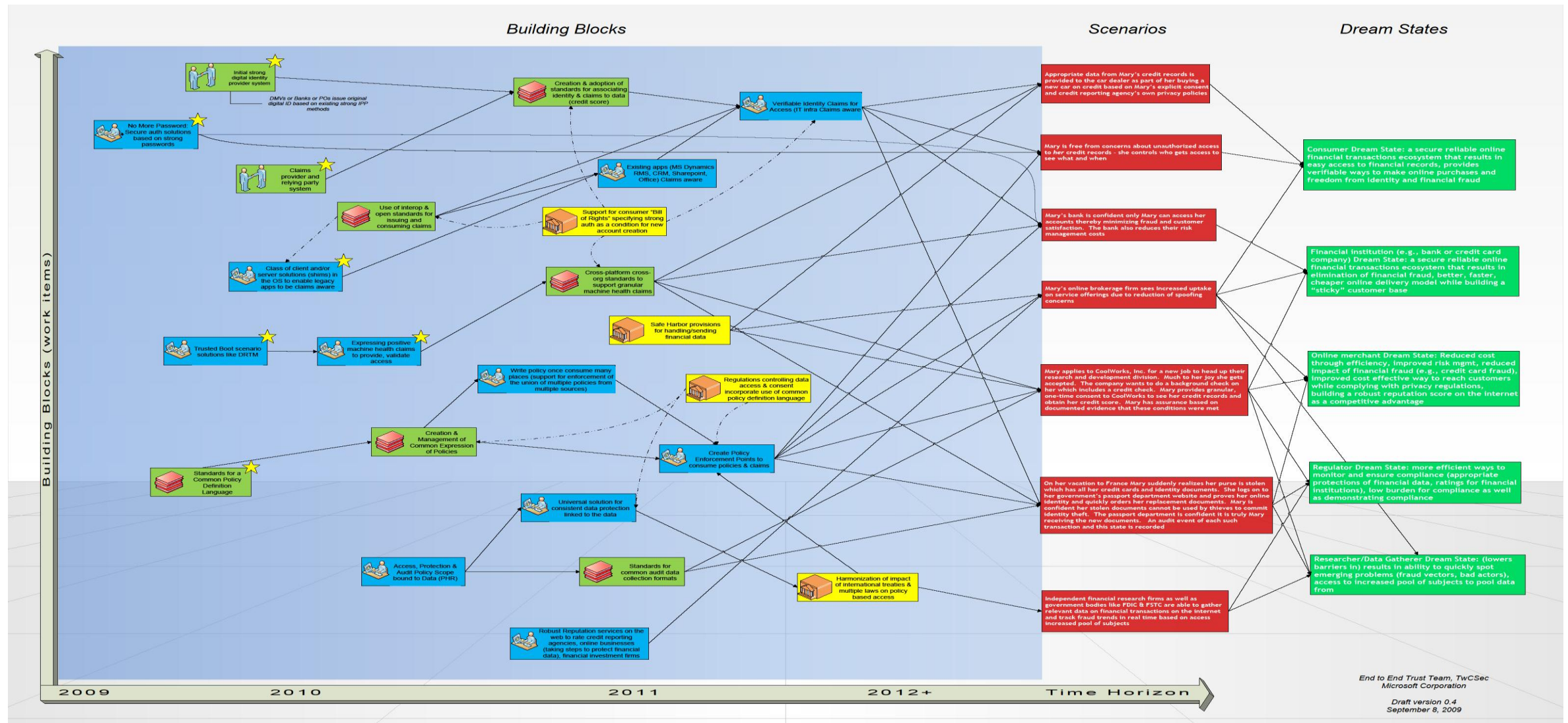
Step 2:

- Alternatives to XACML with a Microsoft and/or industry solution that has the right architecture to satisfy high level requirements for secure collaboration across v-orgs
- Work with the ecosystem partners to create/enhance standards for common policy definition language

Roadmap: Online Health Care High Value Internet Transactions



Roadmap: Financial High Value Internet Transactions



“Building Block” Families

System and Device Health

Digital Identity, Claims-based AuthN and AuthZ

Rule Based Data Access

Reputation Services

Verification (post-transactional, aka Audit)

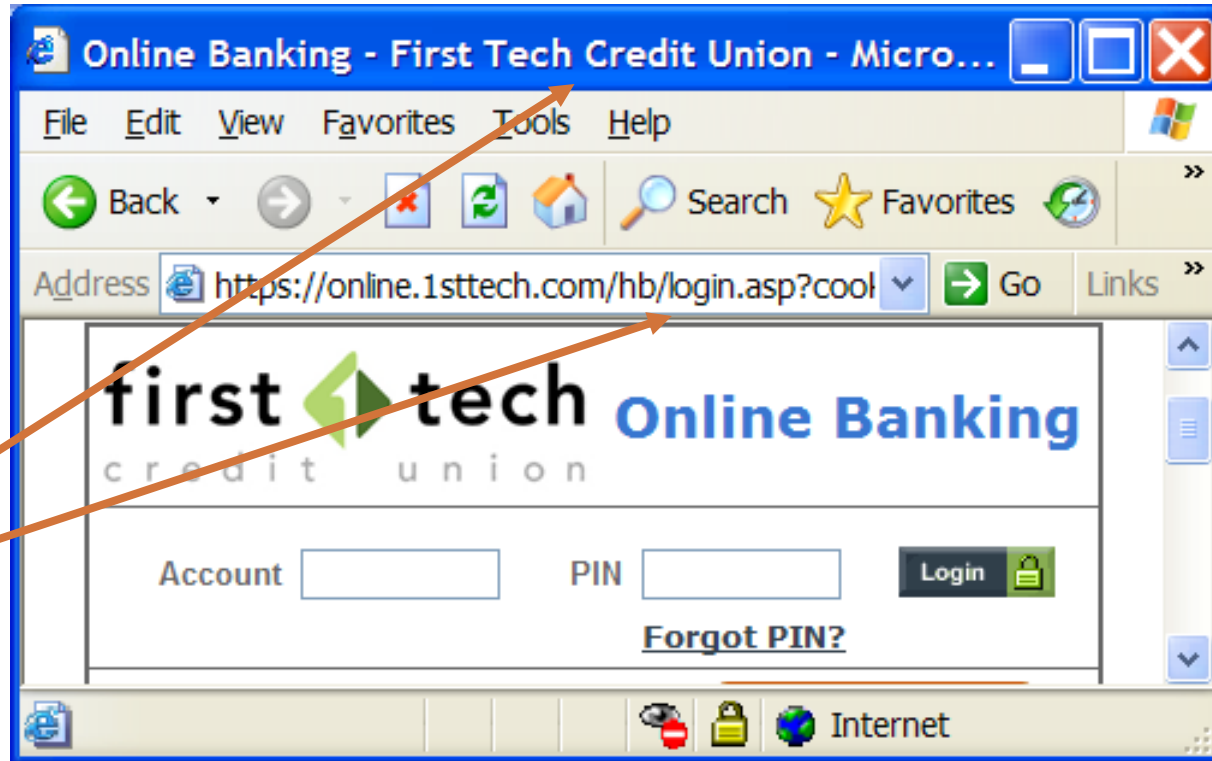
Trusted User Experience (TUX)

Assurance and Integrity

Trust User Experience (TUX)

- TUX is when you are put in the hot seat and need to make trust decision
 - Is this really your bank site
 - Is it OK to click on a link in your email
 - Is it safe to install new software?
 - Should I share my data?
 - How do I set the right permissions?
- Creating great TUX is hard and essential
- Must consider UI, underlying architecture, and user's mental model

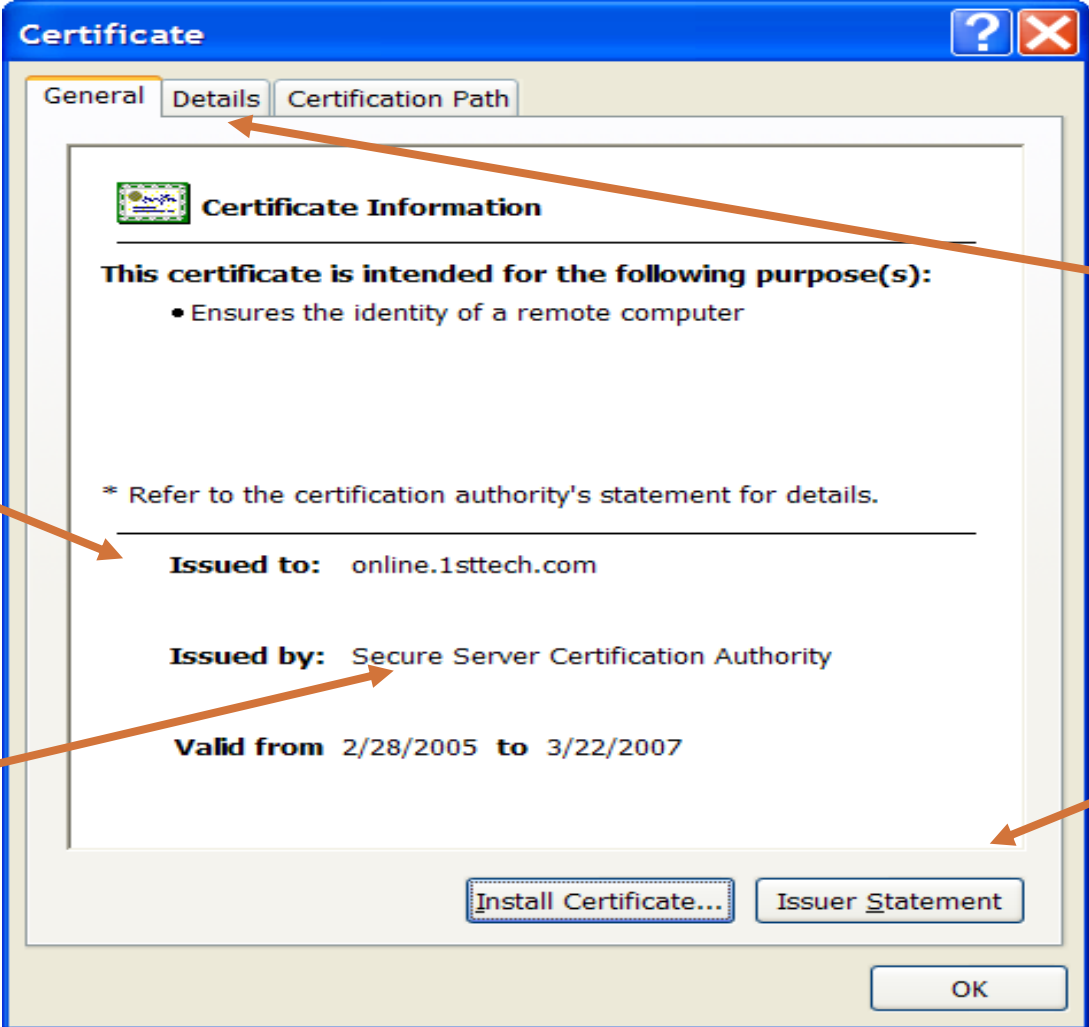
Login Please ...



Name is
different, is that
OK?

Has a “lock” but need to inspect – *bad guy can
get one too!*

Have to Dig ...



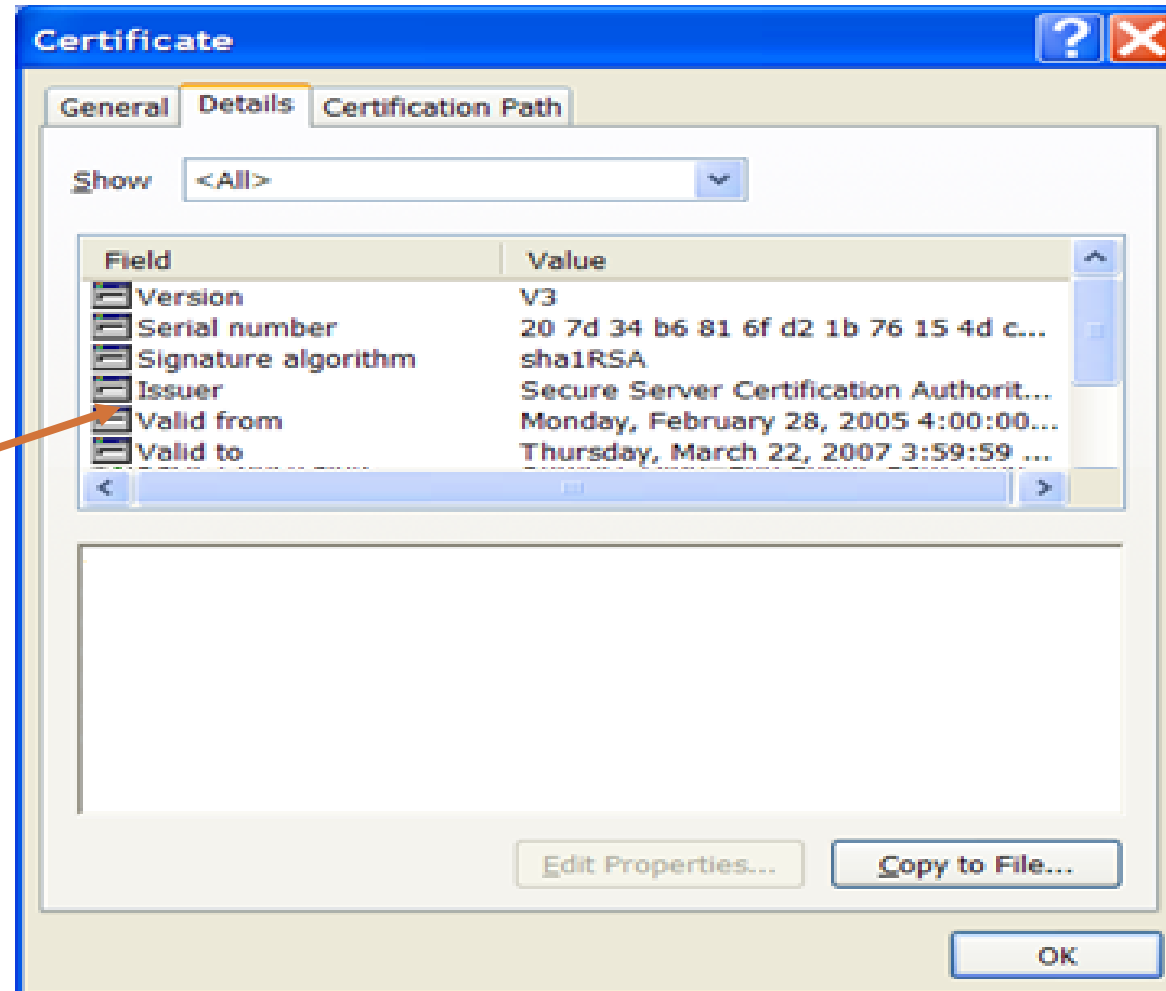
The screenshot shows a Windows 'Certificate' dialog box with three tabs: 'General', 'Details', and 'Certification Path'. The 'General' tab is active, displaying 'Certificate Information'. It states the certificate is for the purpose of ensuring the identity of a remote computer. The 'Issued to' field shows 'online.1sttech.com', and the 'Issued by' field shows 'Secure Server Certification Authority'. The validity period is from 2/28/2005 to 3/22/2007. At the bottom are buttons for 'Install Certificate...', 'Issuer Statement', and 'OK'.

Annotations with arrows pointing to specific parts of the dialog:

- Name of site, not organization**: Points to the 'Issued to: online.1sttech.com' field.
- Should I trust this CA? Not branded**: Points to the 'Issued by: Secure Server Certification Authority' field.
- Can click here to see additional information - but it won't indicate which fields were verified by CA**: Points to the 'Details' tab.
- Have to click here to learn what checking was done – no standard!**: Points to the 'Issuer Statement' button.

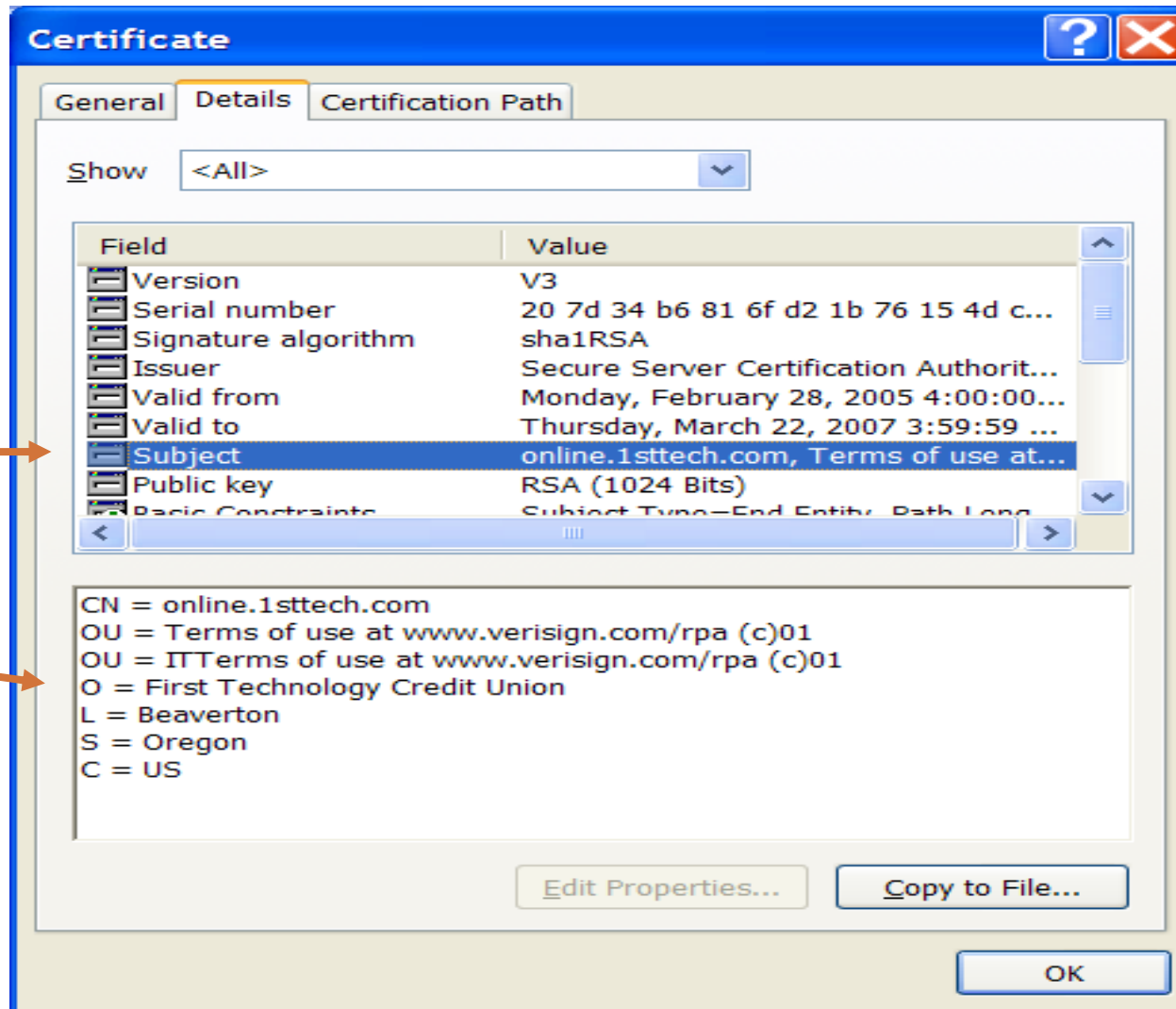
And Dig ...

Which field lists
organization and
location?

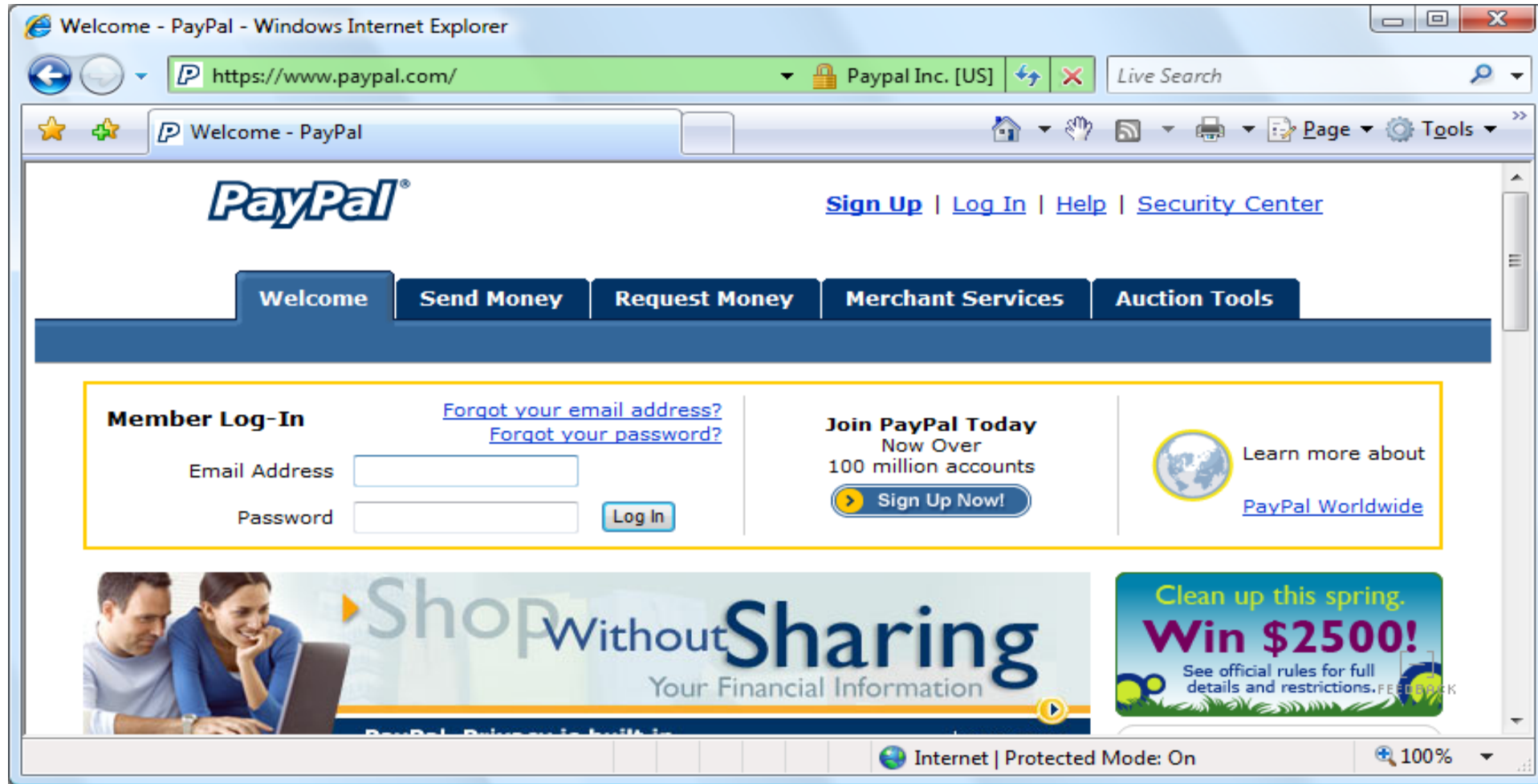


And Dig Some More ...

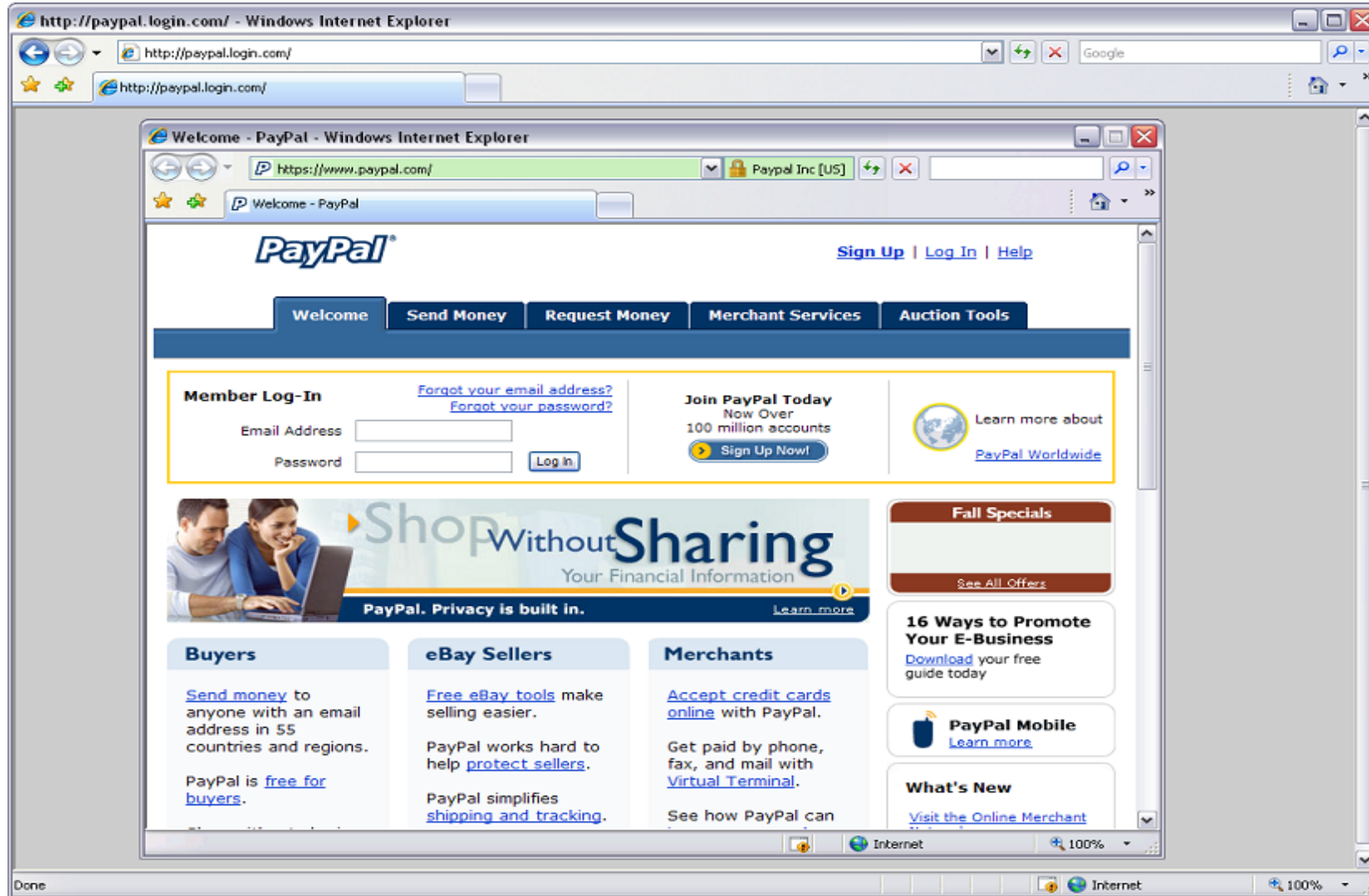
Need to click on
“Subject” to learn details
like organization or
location



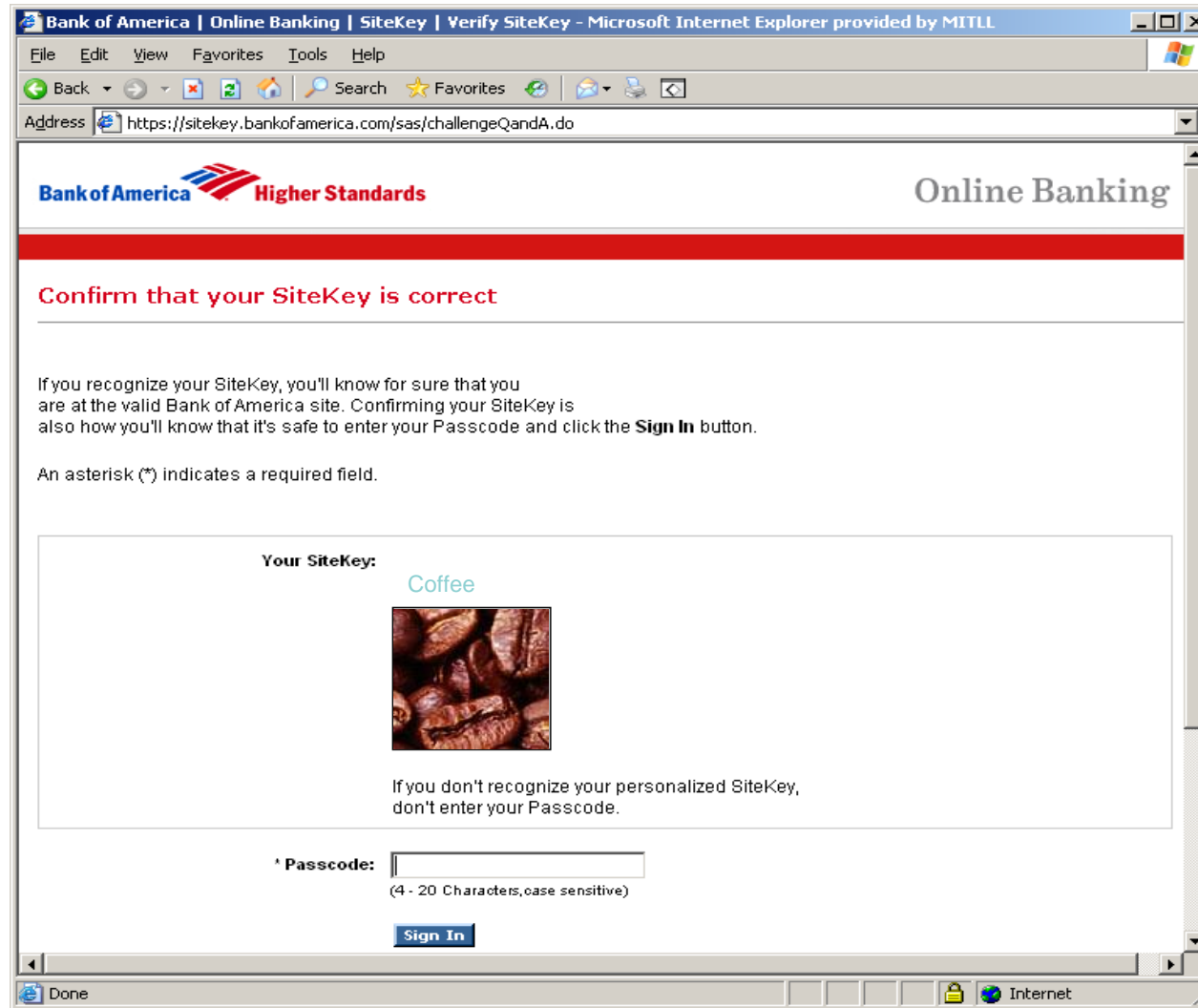
Better Mutual Authentication



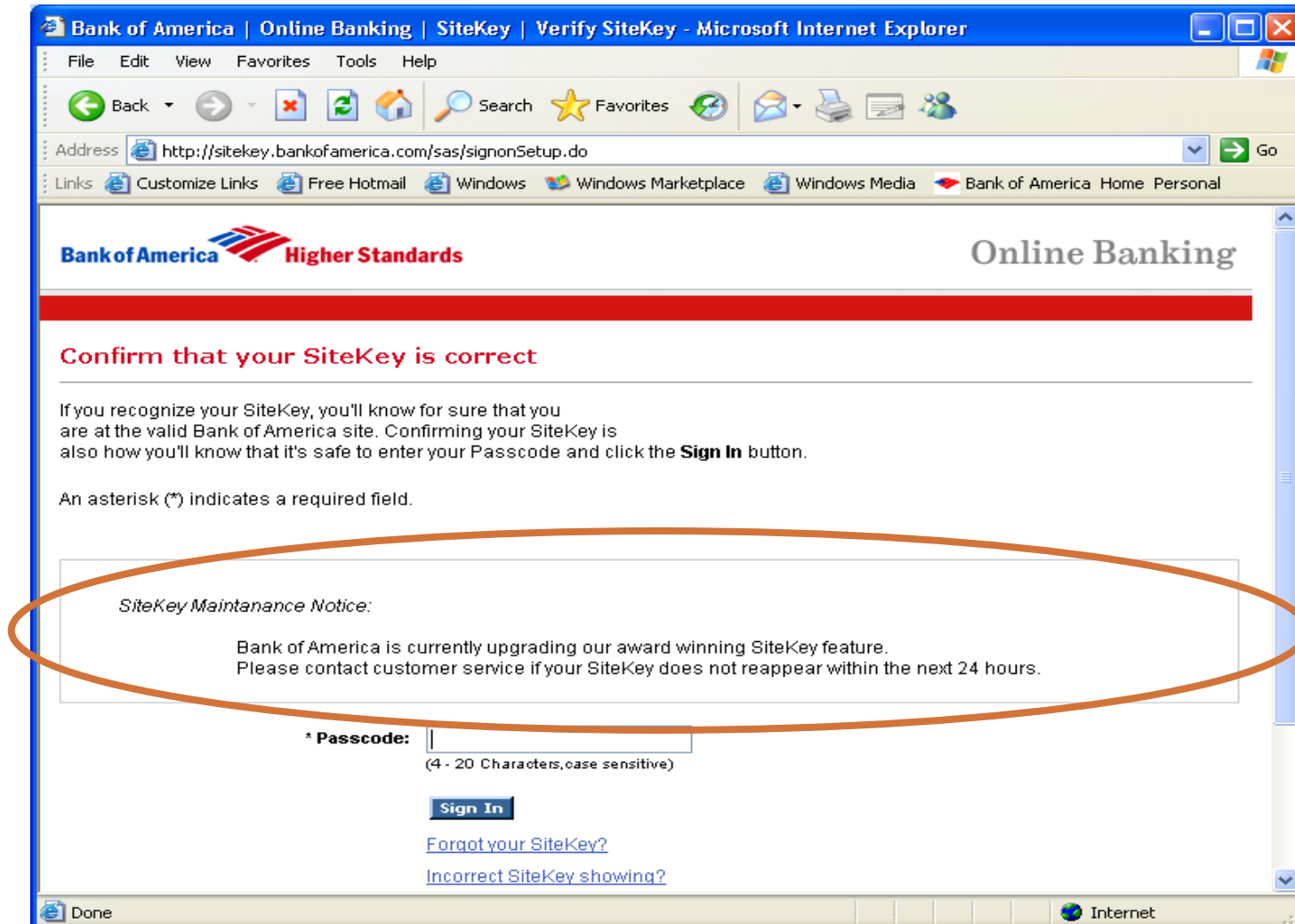
Picture in Picture Spoof



What About Visual Secrets?



Ignored by Almost All – 92%!



TUX Vision

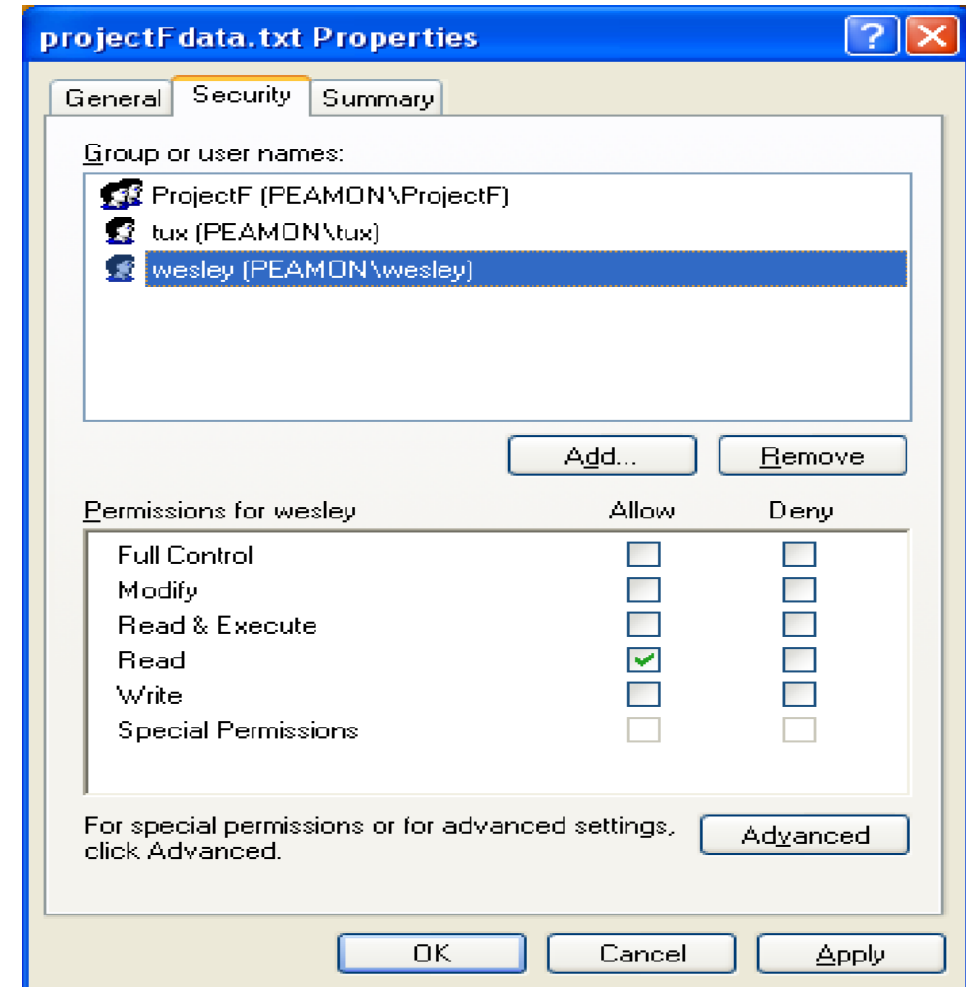
- Consumers
 - Safer, more confident
 - Not distracted from enjoying digital lifestyle
- Businesses
 - Better able to connect with customers, partners, and other businesses
 - Can honor trust promises, reduce breaches, and protect and build their brand

TUX Research Areas

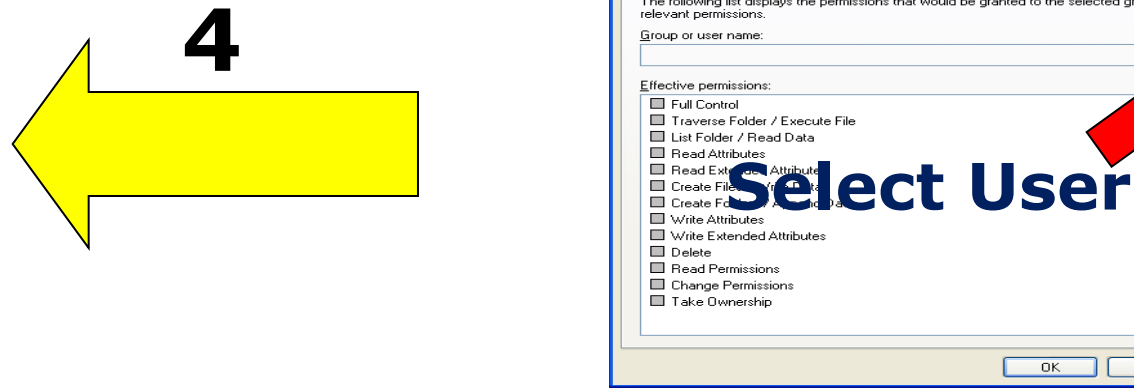
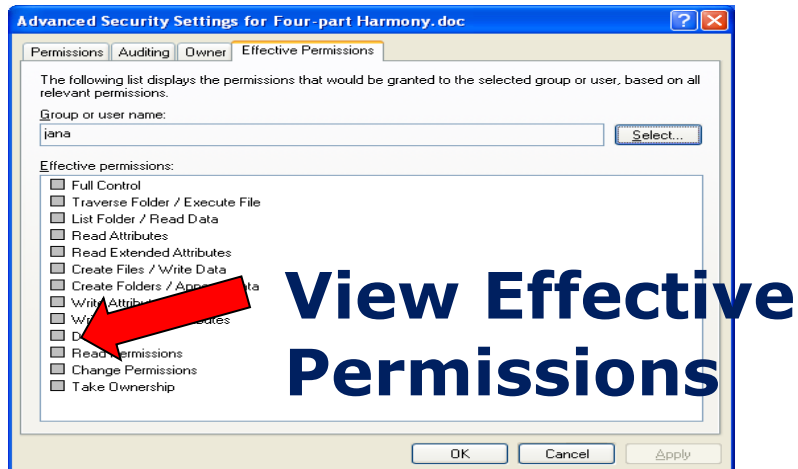
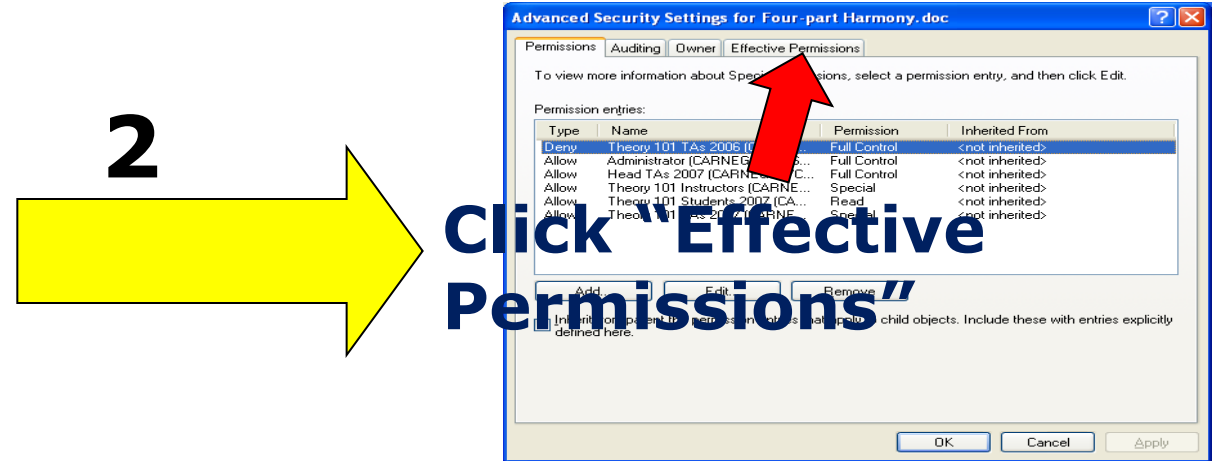
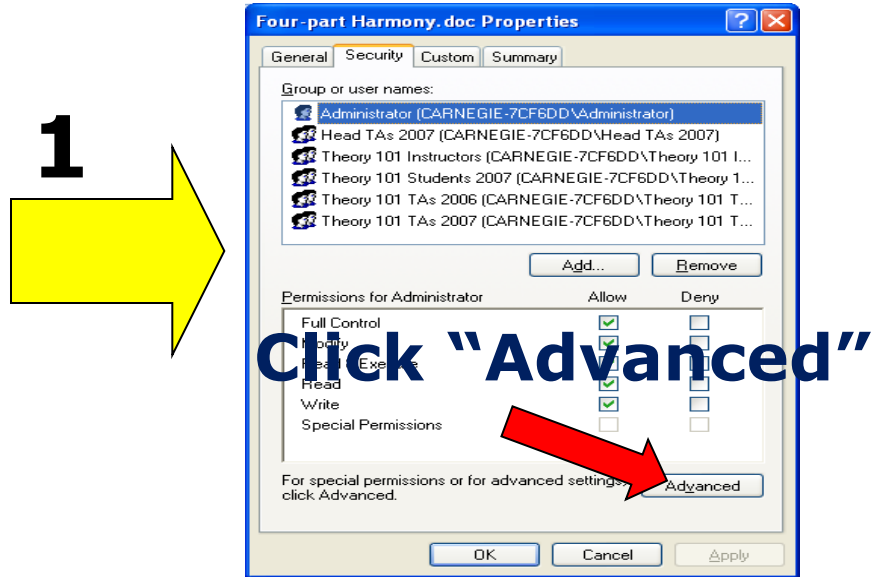
- Authentication
 - Secret questions (IEEE Symposium on S&P 08)
 - Social Auth (CHI09)
 - Backup Auth Configuration (SOUPS09)
- End-user warning/consent
 - Application Authorization (submitted to CHI10)
- Access-control management
 - Laissez-faire file sharing (NSPW09)
 - Expandable Grid
 - Advanced Permissioning Experience

Access Control – Status Quo

- Use ACL Editor
- Really hard if groups and deny rules in play
- 19 screens!



Inspect User Permissions



Bring up Computer Management interface

Click on "Users"

Double-click jana

Click "Member Of"

Read group membership

5

6

7

8

9

Computer Management (Local)

Name	Full Name	Description
Administrator	Administrator	Built-in account for administering the computer.
ASPNET	ASP.NET Machine Account	Account used for running the ASP.NET application.
bill	bill	
dslab	dslab	
frank	frank	
Guest	Guest	
HelpAssistant	Remote Desktop Help Assistant	
jack	jack	
kelly	kelly	
lonnie	lonnie	

jana Properties

Member Of

- Theory 101 TAs 2006
- Theory 101 TAs 2007
- Users

Full name: jana

Click "Member Of"

OK Cancel Apply

~~TAS~~ 2006
TAS 2007

Read group membership

Bring up Computer Management interface

Click on "Users"

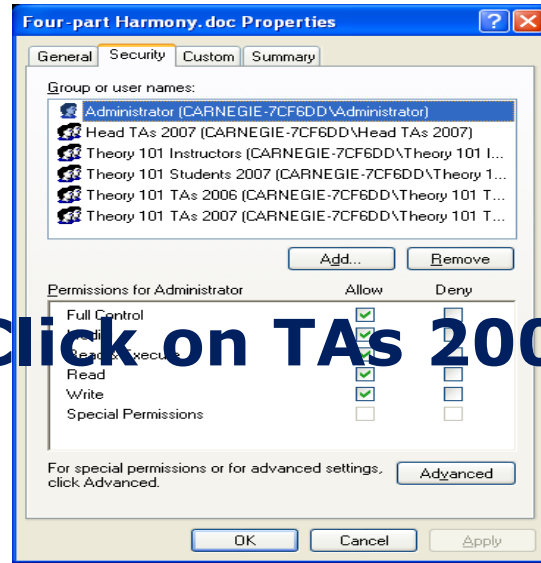
Click "Member Of"

Double-click

Inspect Group Permissions

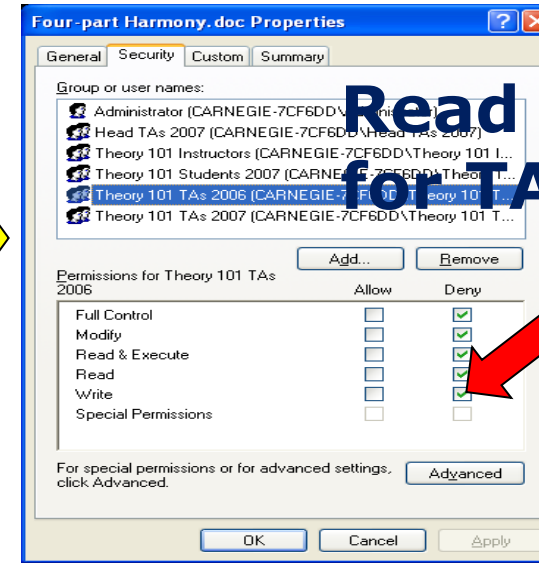
10

Click on TAs 2006



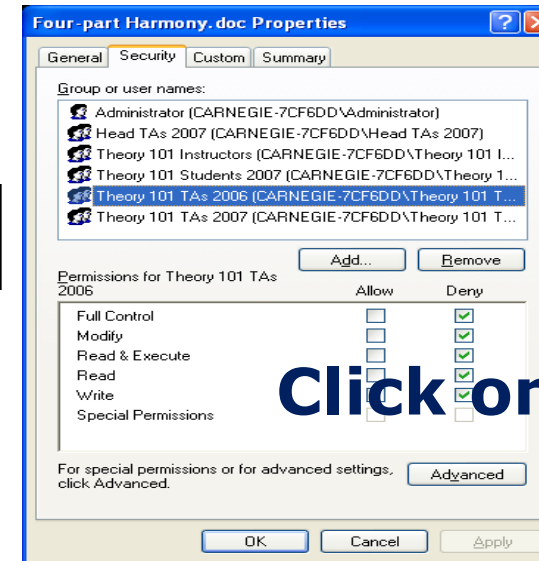
11

Read permissions for TAs 2006



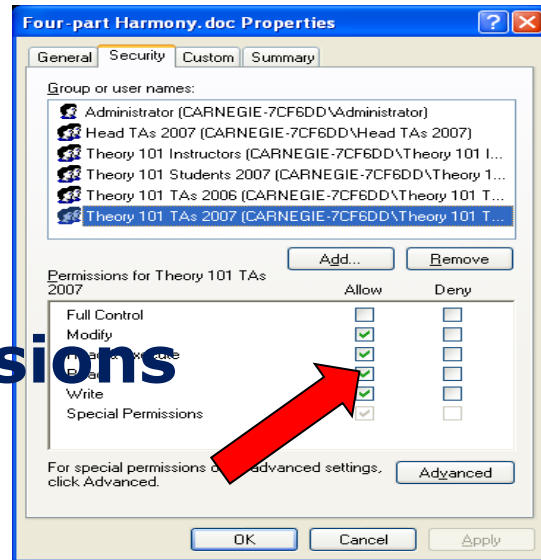
12

Click on TAs 2007



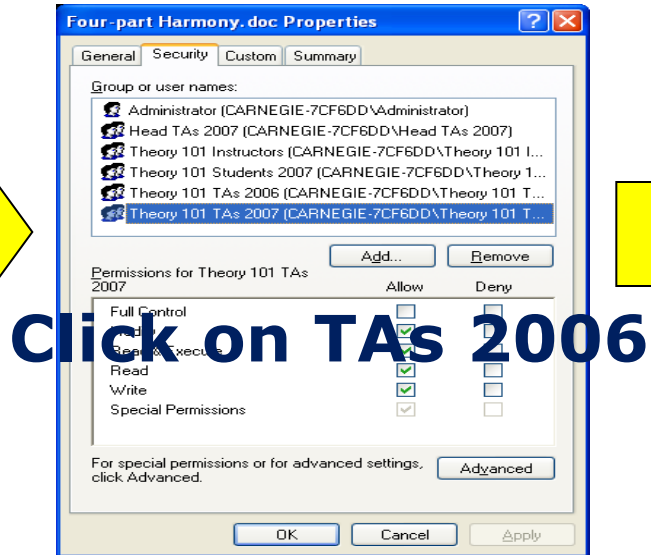
13

Read permissions for TAs 2007

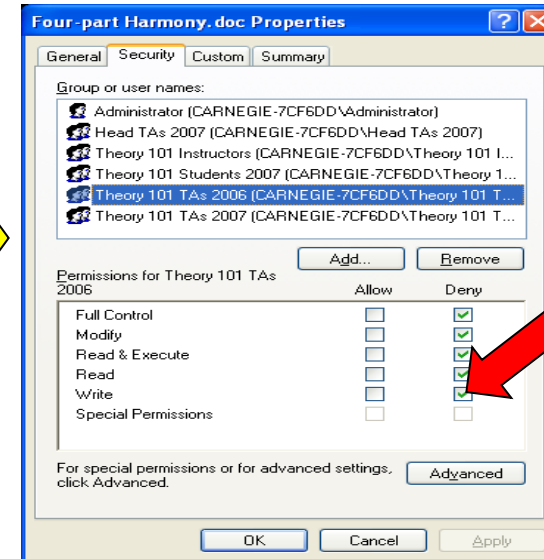


Change Group Permissions

14

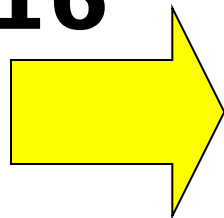


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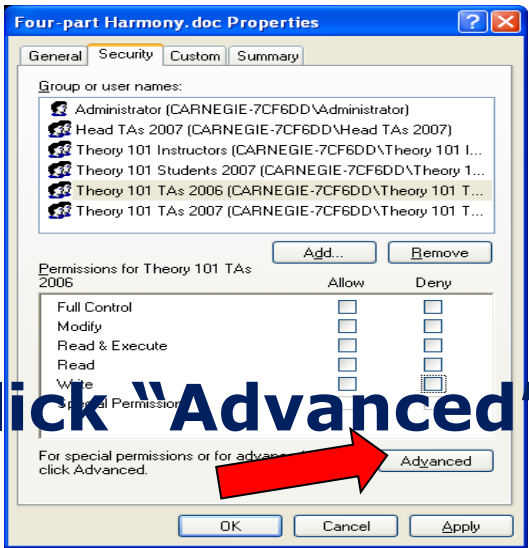


Check Your Work

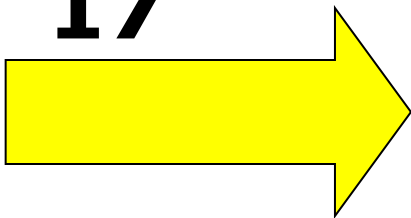
16



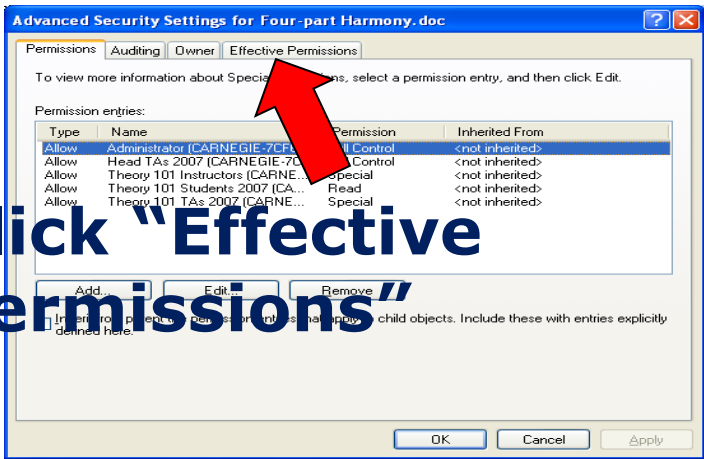
Click "Advanced"



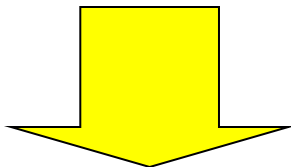
17



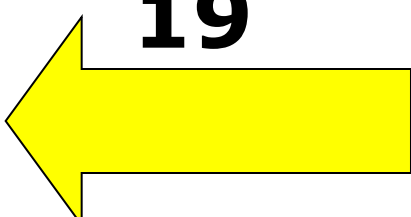
Click "Effective Permissions"



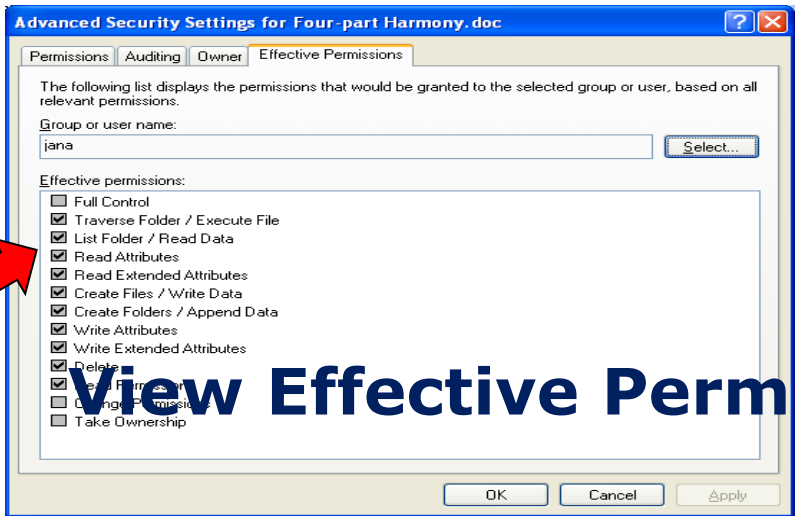
18



19



View Effective Permissions



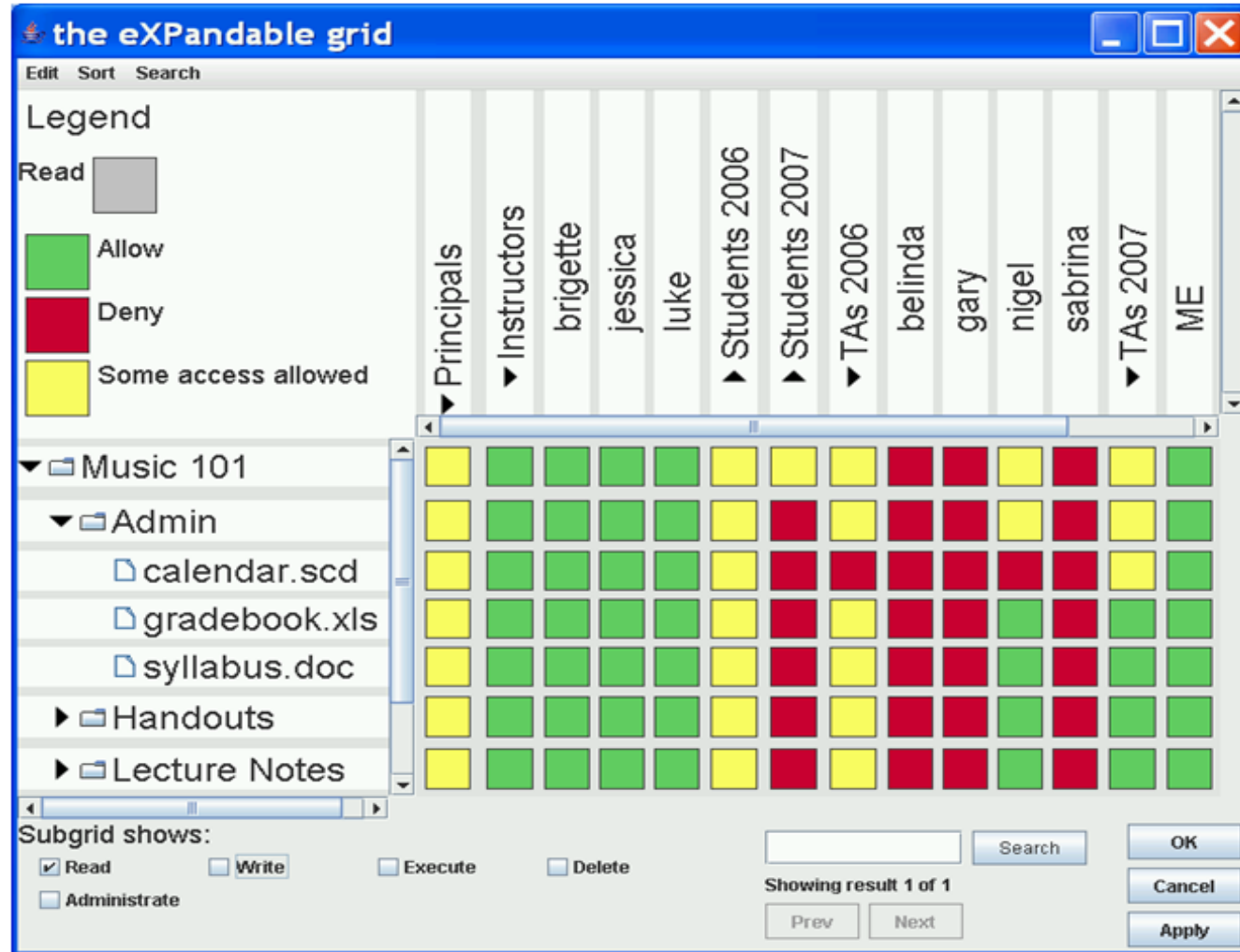
Select Jana



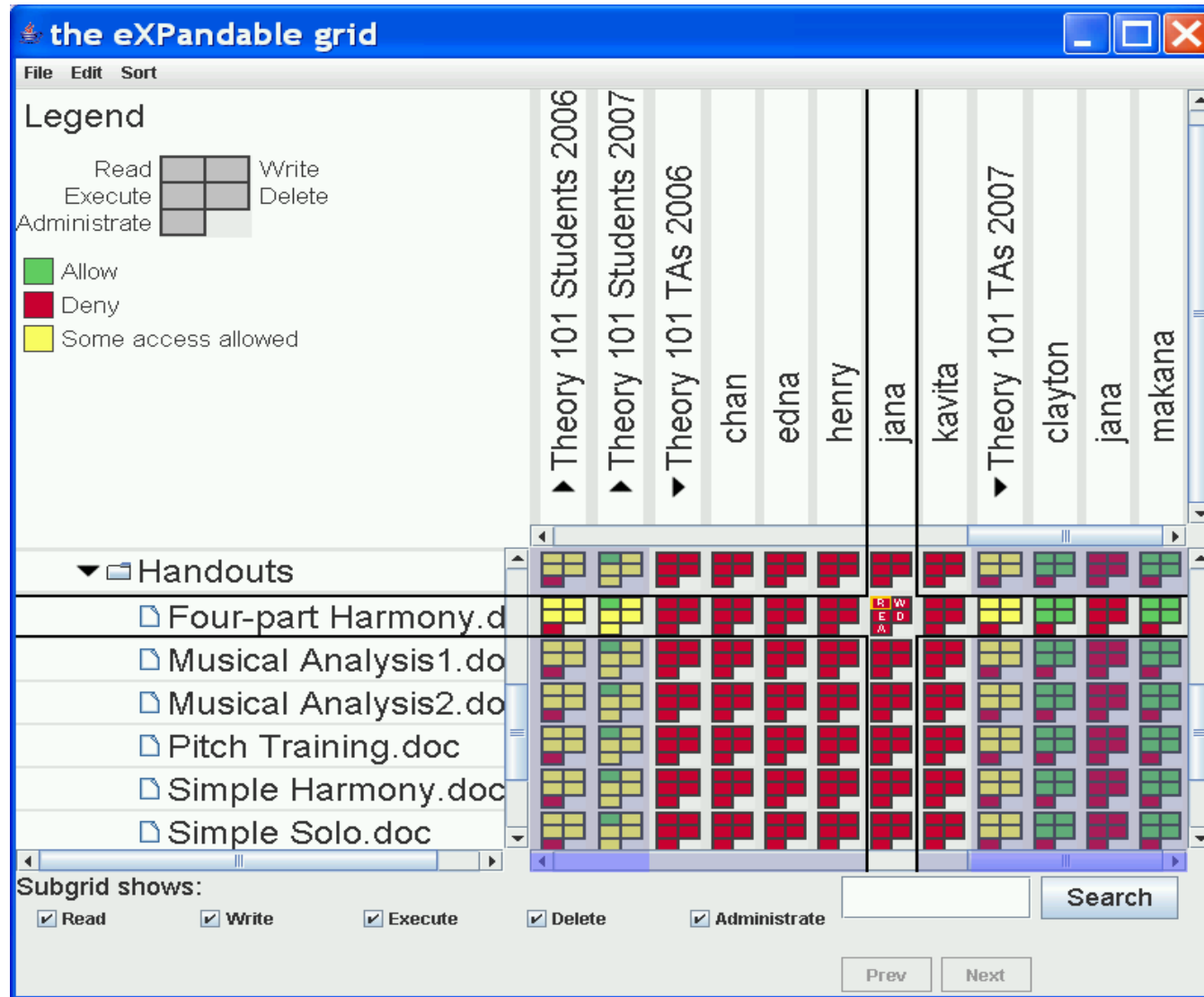
Challenges with ACL

- Key information is distributed
- Easy to make silly mistakes
- Need a way to directly check and manage permissions


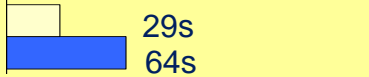
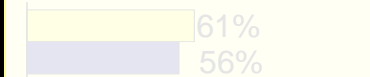
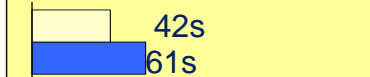
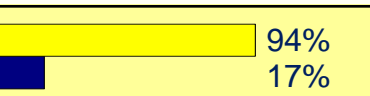
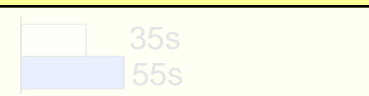
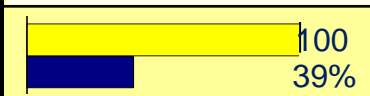
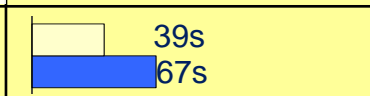
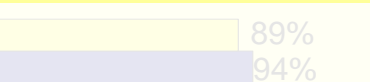
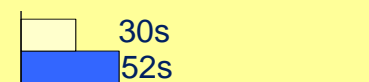
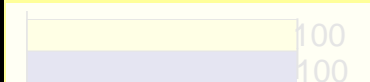
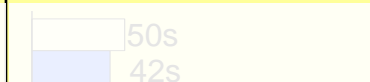
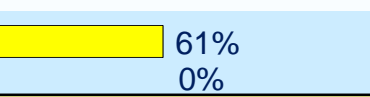

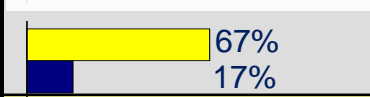
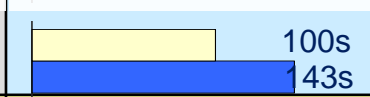
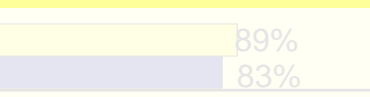
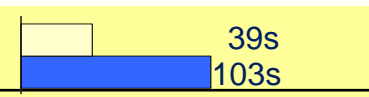


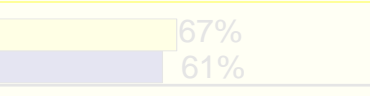
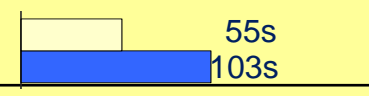
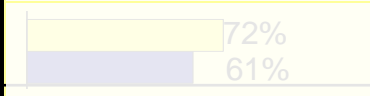

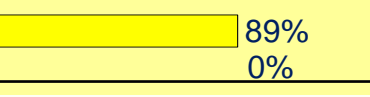

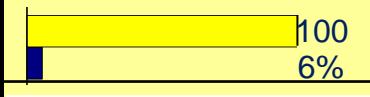


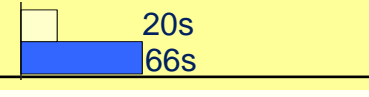







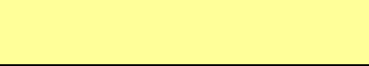
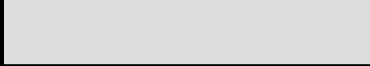
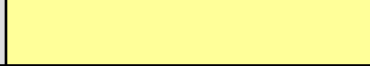
Expandable Grid



Next level (if you need it)



And the winner is ...

	Small-size		Large-size	
Task type	Accuracy	Time	Accuracy	Time
<i>View simple</i>	 Grid 89% Windows 56%	 Grid 29s Windows 64s	 Grid 61% Windows 56%	 Grid 42s Windows 61s
<i>View complex</i>	 Grid 94% Windows 17%	 Grid 35s Windows 55s	 Grid 100% Windows 39%	 Grid 39s Windows 67s
<i>Change simple</i>	 Grid 89% Windows 94%	 Grid 30s Windows 52s	 Grid 100% Windows 100%	 Grid 50s Windows 42s
<i>Change complex</i>	 Grid 61% Windows 0%	 Grid 70s Windows Insufficient data	 Grid 67% Windows 17%	 Grid 100s Windows 143s
<i>Change complex</i>	 Grid 89% Windows 83%	 Grid 39s Windows 103s	 Grid 67% Windows 83%	 Grid 73s Windows 104s
<i>Compare groups</i>	 Grid 67% Windows 61%	 Grid 55s Windows 103s	 Grid 72% Windows 61%	 Grid 73s Windows 104s
<i>Conflict simple</i>	 Grid 89% Windows 0%	 Grid 29s Windows Insufficient data	 Grid 100% Windows 6%	 Grid 52s Windows Insufficient data
<i>Conflict complex</i>	 Grid 100% Windows 94%	 Grid 20s Windows 66s	 Grid 94% Windows 78%	 Grid 105s Windows 116s
<i>Memogate simulation</i>	 Grid 89% Windows 94%	 Grid 42s Windows 118s	 Grid 78% Windows 78%	 Grid 71s Windows 115s
<i>Precedence rule test</i>	 Grid 89% Windows 94%	 Grid 42s Windows 118s	 Grid 78% Windows 78%	 Grid 71s Windows 115s

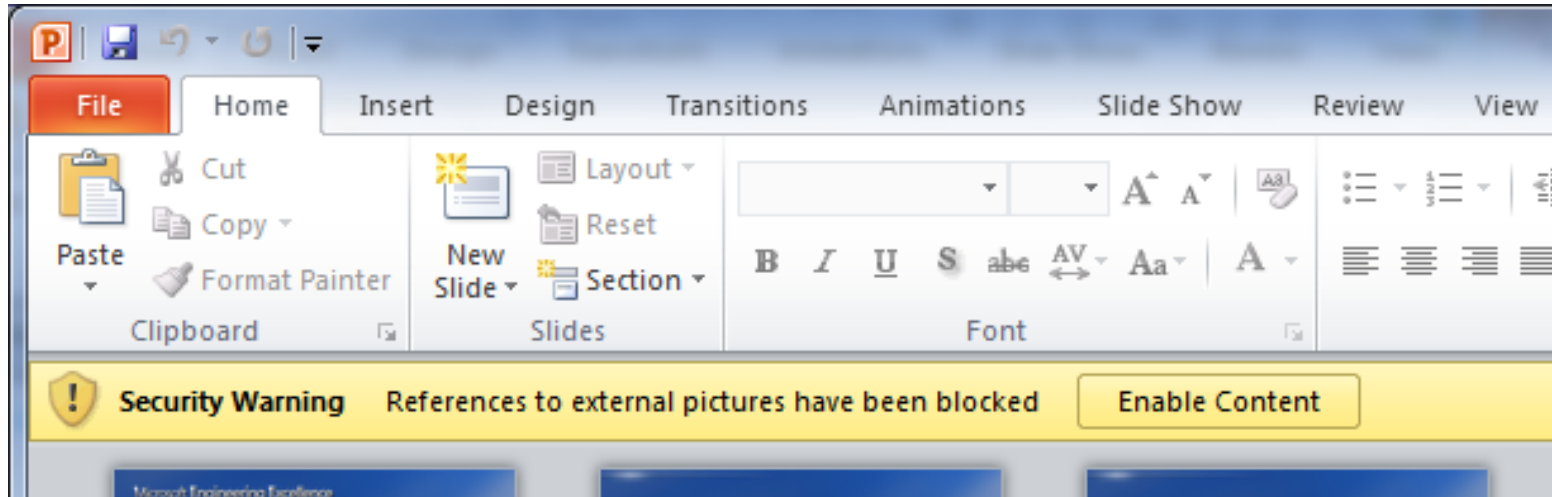
Secret questions

(IEEE Symposium on Security and Privacy 2009)

	Statistically guessable	Guessed by untrusted partner	
Forgot			<i>Fact-based questions</i>
32%	14%	18%	Grandfather's occupation
35%	23%	17%	Favorite historical person
14%	10%	17%	Mother's birthplace
5%	5%	12%	What is your father's middle name?
17%	—	5%	What was your first phone number?
9%	1%	8%	What was the name of your first school?
21%	8%	13%	Where was your first job?
			<i>Preference-based questions</i>
18%	1%	11%	Best childhood friend
21%	—	4%	Favorite teacher
25%	6%	7%	What is your favorite restaurant?
15%	1%	8%	Who is your favorite singer?

Warnings – Latest Thinking

- No TUX is good TUX
- If you have to warn, be safe by default and don't interrupt



- If you have to interrupt, give users realistic steps they can follow

Open Questions

- Does an interruptive warning, when well-written and actionable, actually help users avoid attacks?
 - What can we realistically ask users to decide?
 - When should we warn versus just take action?
-
- What is the sweet spot for “informed consent” and how do we get there?
 - How do we facilitate minimal disclosure?

Want to Learn More?

- End to End Trust
 - <http://www.microsoft.com/endtoendtrust>
- Symposium on Usable Privacy and Security (SOUPS)
 - At the Microsoft commons 7/14-7/16
- Jeff's Email Address
 - Jeffreyf@microsoft.com



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