



Data Sharing Agreements & Enterprise Rights Management

Jan 2011, London

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Structure of the talk



- Data Sharing Agreements (DSA)
- The Consequence Approach
- STFC Scenario
- Defining a DSA – vocabulary and policies
- Walk through of a use case
- Summary of Main Advances

DSA – roles & objectives



- **Data Producers:**
 - Need to ensure that data is
 - Used for the intended purposes only
 - Distributed to those who should receive it
 - Used only by those who should use it
- **Data Consumers:**
 - Need to ensure that data is supplied
 - to quality
 - to time
- DSA between pairs or groups of enterprises (e.g. a supply chain)
- DSA currently exist as **paper** MoU or Agreements
- Need for **technical enforcement** of DSA

Structure of DSA – 13/19 sections



- Definition of terms
- Parties to the agreement
- **Purpose of the agreement**
- Period of agreement
- **Justification for access**
- Description of the data
- **Data Quality - *labelled***
- Description of the data users
- Method of data access or transfer
- Location of data and custodial responsibility
- Restrictions on Data Use.
- Derived data
- Dissemination to third parties
- Confidentiality
- Disposal of data
- **Administration of the Agreement**
- **Breaches to the agreement**
- **Applicable Law**
- Signature

Badly drafted DSA clauses



- **Redundant constraints:**

5.8 Data or information acquired by one party from the other under the Agreement **shall not be disseminated commercially or otherwise disclosed**, transmitted or sold to any organizations other than the parties to the Agreement ...

- **Vague intentions can't be technically enforced:**

5.15 The parties agree to acquire and use data and information **in a manner that respects the scientific value of the data...**

Environmental Data Sharing AGREEMENT Between Environment Canada, Pacific and Yukon Region and British Columbia Ministry of Water Land and Air Protection, April 29, 2004

Well drafted DSA clauses



- 5.9 **Quality controlled data** or information acquired by one party from the other under the Agreement may be disseminated or otherwise disclosed or transmitted without cost to any individual or organization without the need for written consent from the party that owns the information providing that (1) the data or information are not modified, (2) the jurisdictional ownership is clearly acknowledged and (3) the release does not compromise the privacy or commercial competitiveness of the data source;
- 5.10 **Raw data or draft information** acquired by one party from the other under the Agreement may not be disseminated or otherwise disclosed to any individual or organization other than the parties to the Agreement without the written consent of the party that owns the data or produced the information;
- 5.12 The Agreement authorizes the production, dissemination and sale of **derivatives** by the parties.

Language of agreements



- **Default** – nobody can do anything
- **Authorisations**
 - Access authorisation
 - Usage authorisation
- **Prohibitions**
 - Constraints within the authorisations
- **Obligations**
 - Timing
 - Pre-obligations – obliged to do something before an action
 - Post-obligations – obliged to do something after an action
 - Trigger event
 - Authorisation events (e.g. When a user accesses a file)
 - General events (e.g. When a security level changes in the context)

- **Who**
 - **users** or users in which **roles** can access & use data
- **What**
 - What **data** or **data types** does the agreement apply to
- **Where**
 - What **location** can the access & usage take place
- **When**
 - What **time** can the access & usage take place
- **How**
 - What **functions** in which **software tools** can be used on the data
- Technological enforcement of DSA requires trusted providers of context information

Consequence approach



- An Enterprise Rights Management (ERM) solution
- **Combine:**
 - Access control
 - Usage control (UCON)
 - Digital Rights Management (DRM)
- To support **policies that can be technologically enforced**
- And that can be **drafted by managers**
- In an **expressive language** for DSA policies
- Which calls on **trusted context authorities** when evaluated

Access & Usage Control



- 2 stages: Credential Authentication and Action Authorisation.
- When a credential is presented to a controller it compares the credential to an access control list, grants or denies the presented request.
- Conventional access control actions are provide discrete access to a resource: read, write, delete, download.
- Conventional access control requires access to the controller and access control list – usually on-line.
- Usage control (UCON since 2002) extends the set of actions to address mutability (filter, merge, modify) to derive a new data set from the original.
- UCON is finer grained than access control and requires on-going authorisation often off-line. To control fine grained usage control the digital media are usually encrypted.

Digital Rights Management

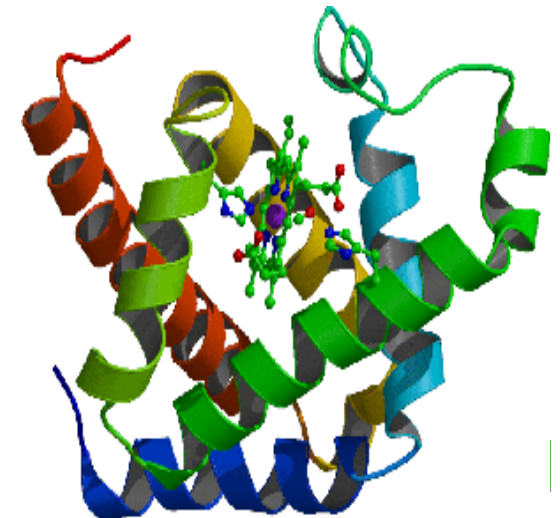


- DRM technologies control use of digital media by preventing access, copying or conversion to other formats by end users.
- They usually authorise playing or viewing of digital media on specific devices or by specific users.
- They usually operate through the publication of a license with the digital media which the player/controller can match to the specific device or specific user when a request is made to open the digital media.
- Licenses usually have an expiration date. Device and user identity credentials are usually provided by the host platform.
- Licences, the digital media and the player/controller are stored together so that off-line access is supported.
- To control off-line access the digital media is usually encrypted.

STFC Data Sharing Scenario



- A Research Council awards a grant to a consortium to **study an enzyme** that is essential to the lifecycle of HIV virus.
- The project will pave the way for the development of new drugs
- The consortium includes researchers from **several universities**, and a commercial partner.
- STFC **ISIS facility** beamline is used to:
 - collect neutron diffraction patterns of an enzyme bound to the interacting host proteins
 - Users will **download data and analyse it locally**
- **STFC store the experimental data**
- **Policies in DSA between STFC & universities state who has access to it, where and when ?**



- **Authorisation Policies**

- 1 Before the end of the **three year embargo period**, access to the **experimental data** is restricted to the **principal investigator** and **co-investigators**.
- 2 After the **embargo period**, the **experimental data** may be accessed by **all users**.
- 3 **Beamline scientists** can access **image data** related to or produced on their experimental station.

- **Prohibition Policy**

- 4 Access to **numerical data** should be denied to users which **country** is either **Iran** or **North Korea**.

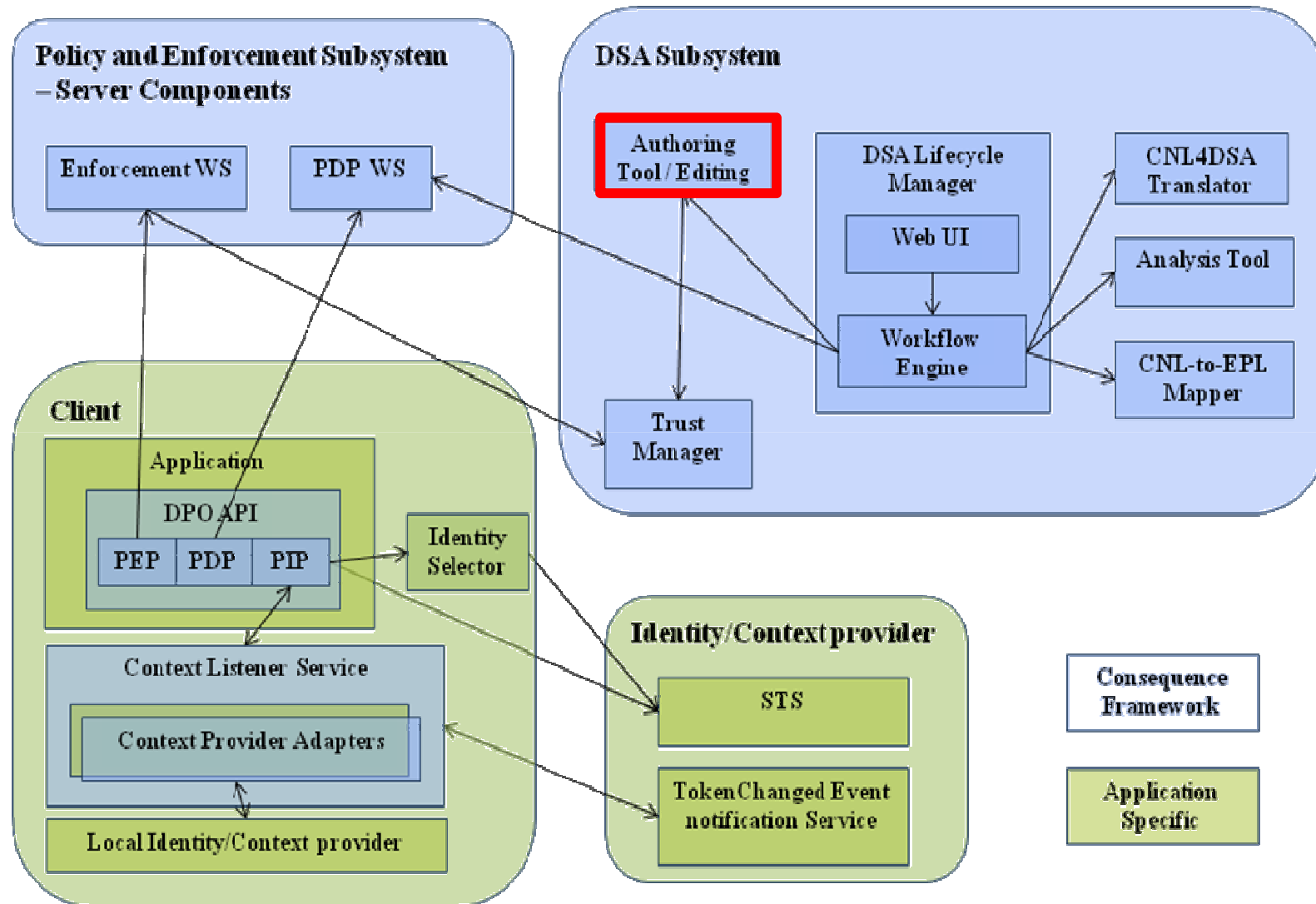
- **Authorisation Obligation Policies** – linked to policy 2
5 BEFORE a public user **downloads** data THEN the system **must** notify the principal investigator.
6 AFTER a public user **reads** some data THEN the system **must** log the event.
- **Usage Policies - prohibition**
7 IF a user does not use **eCat** THEN that user **cannot** **transform** experimental data into derived data.
- **Declarations**
Agreement start date and end date
Identity of trusted context authorities
Duration of off-line usage license

What do users have to do ?



- Define the ontology and DSA user vocabulary:
 - Protege V3.1.1, owl V1
- Define the DSA policies
 - DSA Authoring tool
- Publish application terms
 - Metadata Manager
- Map application terms to DSA user vocabulary
 - CNL/EPL config file GUI – one per domain/party
- Define STS for context variables: UID, location, (time)
- Define services to provide events (e.g. security level)
- Define services to perform obligation actions & action handlers,
- Application - client, server

Consequence Architecture



Define the ontology & vocab.

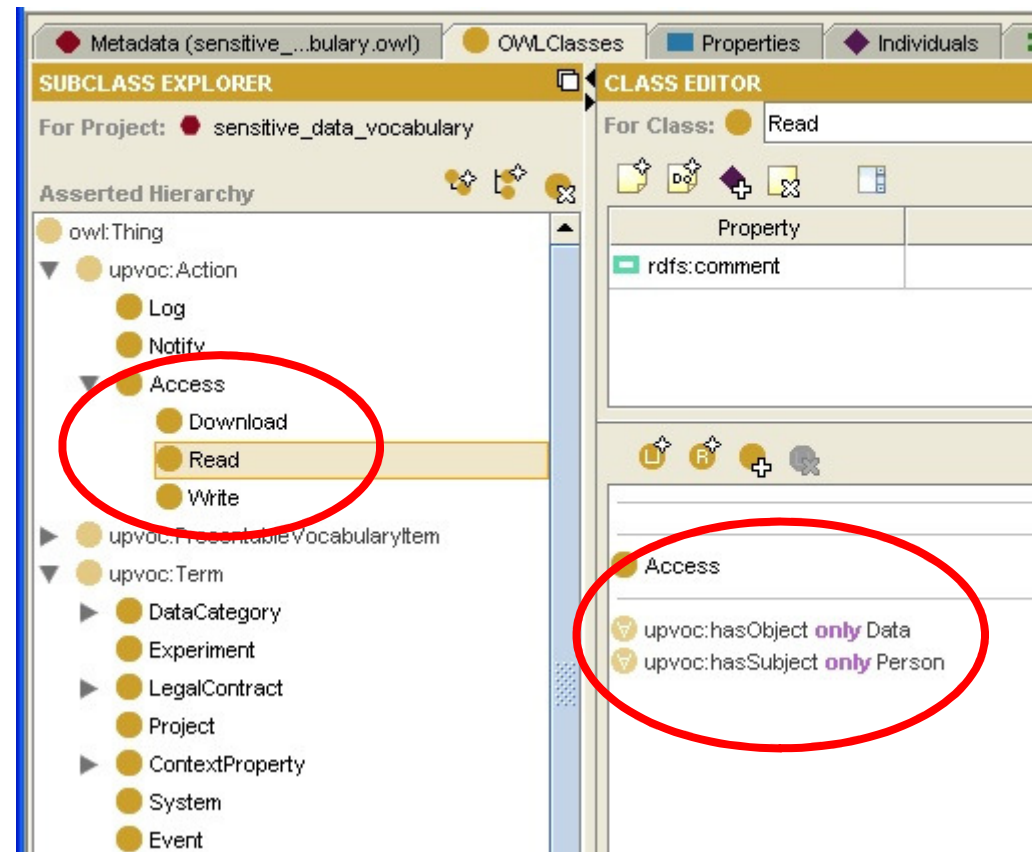


Ontology is defined in the standard language OWL
Standard tool Protege
V3.1.1

Define application
actions: system & user

Define terms & properties
relating terms

Vocabulary is defined as
presentable vocabulary
subset of larger ontology.



Define the DSA policies



The authoring tool presents the words which could be put next into a policy

A screenshot of a web-based authoring tool for DSA policies. The interface is divided into several sections: "Credentials", "Roles", "Authorizations", "Obligations", and "Prohibitions". The "Authorizations" section is currently active, showing a text input field with the policy rule: "IF a Data hasEmbargoEndDate a EmbargoEndDate AND a CurrentTime isAfter that EmbargoEndDate AND". Below this field is an "Add" button. To the right of the main content area is a sidebar titled "Select one of the following choices" which lists various entities: available choices ..., REFERENCE, a CurrentTime, a Data, a DataCategory, a Date, an Event, an Icon, a Location, an MsExcel, a Person, a Signatory, a User, a Role, a Set, and a System. The "a User" option is highlighted with a red circle. At the top right of the tool, there are "Show references" and "Save" buttons, both of which are also highlighted with a blue rectangle. The "Add" button under the "Authorizations" section is also highlighted with a red circle. The "a User" option in the sidebar is also highlighted with a red circle.

DSA Authoring - references



IF a Data hasPrincipalInvestigator a Set AND a User hasRole a PrincipalInvestigator AND that User in that Set THEN that User CAN Access that Data Show references Save

IF a Data hasCoinvestigator a Set AND a User hasRole a Coinvestigator AND that User in that Set THEN that User CAN Access that Data ⚙ ↑↓

IF a Data has as data category a ImageData AND that Data hasBeamlineScientist a Set AND a User hasRole a BeamlineScientist AND that User in that Set THEN that User CAN Read that Data ⚙ ↑↓

IF a Data hasEmbargoEndDate a EmbargoEndDate AND a CurrentTime isAfter that EmbargoEndDate AND a User hasRole a PublicUser THEN that User CAN Access that Data ⚙ ↑↓

IF a Data has as data category experimental data AND

Add

Obligations

IF a User hasRole a PublicUser AND a NexusFile has as data category experimental data AND that NexusFile hasPrincipalInvestigator a Set AND a User hasRole a PrincipalInvestigator AND that User in that Set THEN a System MUST Notify that User ⚙ ↑↓ ⇒

IF a User hasRole a PublicUser AND a NexusFile has as data category experimental data THEN AFTER that User Read that NexusFile THEN a System MUST Log a Event ⚙ ↑↓ ⇒

Add

Prohibitions

IF a Data has as data category a NumericalData AND a User hasRole a PrincipalInvestigator AND that User hasLocation a NorthKorea THEN that User CANNOT Access that Data ⚙ ↑↓

IF a Data has as data category a NumericalData AND a User hasRole a PrincipalInvestigator AND that User hasLocation a Iran THEN that User CANNOT Access that Data ⚙ ↑↓

Add

DSA Authoring



a BeamlineScientist has no definition ► Change

Show references Save

Authorizations

IF a Data hasPrincipalInvestigator a Set AND a User hasRole a PrincipalInvestigator AND that User in that Set THEN that User CAN Access that Data

IF a Data hasCoinvestigator a Set AND a User hasRole a Coinvestigator AND that User in that Set THEN that User CAN Access that Data

IF a Data has as data category a ImageData AND that Data hasBeamlineScientist a Set AND a User hasRole a BeamlineScientist AND that User in that Set THEN that User CAN Read that Data

IF a Data hasEmbargoEndDate a EmbargoEndDate AND a CurrentTime isAfter that EmbargoEndDate AND a User hasRole a PublicUser THEN that User CAN Access that Data

Add

Obligations

IF a User hasRole a PublicUser AND a NexusFile has as data category experimental data AND that NexusFile hasPrincipalInvestigator a Set AND a User hasRole a PrincipalInvestigator AND that User in that Set THEN a System MUST Notify that User

IF a User hasRole a PublicUser AND a NexusFile has as data category experimental data THEN AFTER that User Read that NexusFile THEN a System MUST Log a Event

Add

Prohibitions

IF a Data has as data category a NumericalData AND a User hasRole a PrincipalInvestigator AND that User hasLocation a NorthKorea THEN that User CANNOT Access that Data

Comparing English, CNL & EPL



- **English:**

Any registered user can access any data after its embargo period has passed.

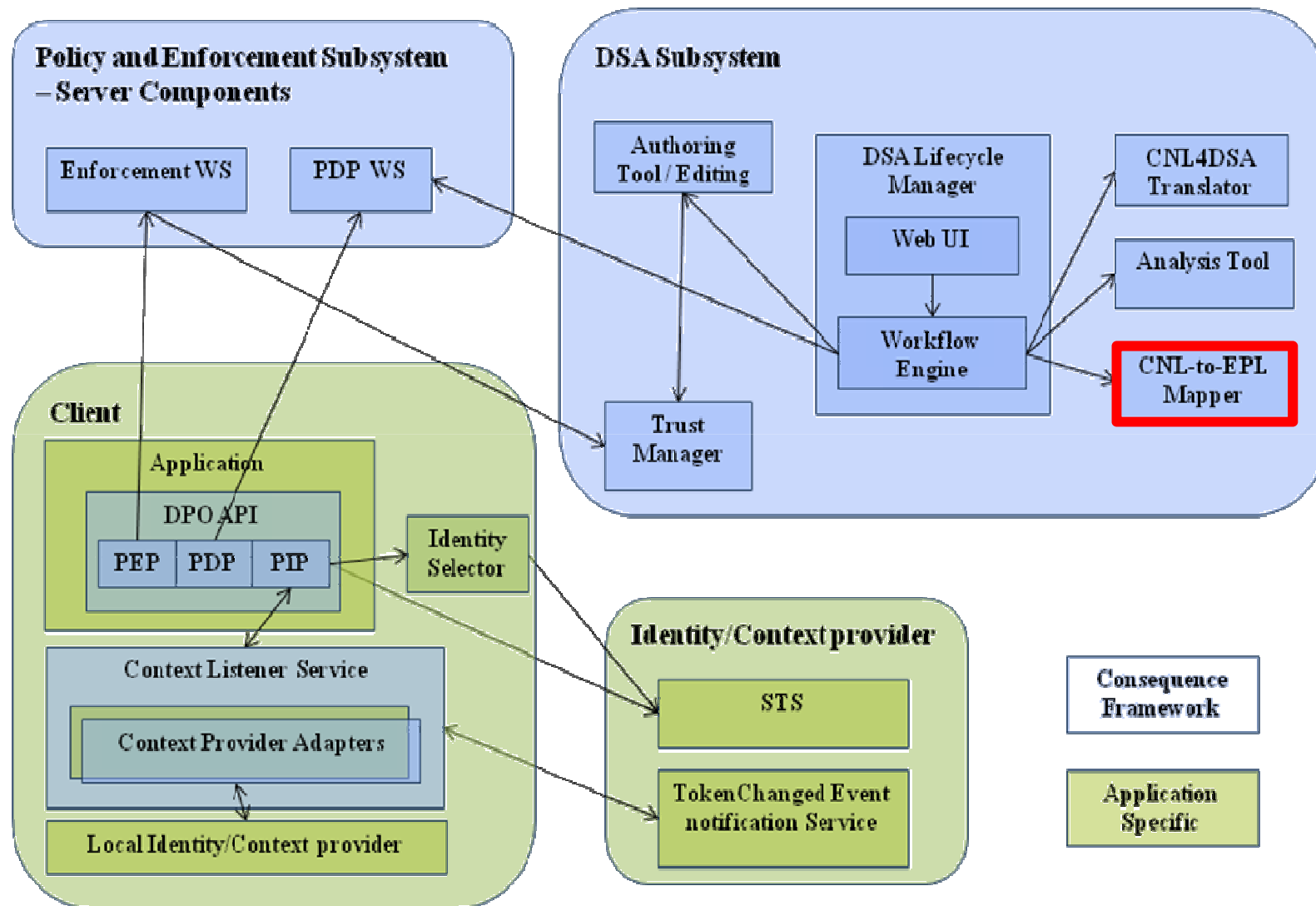
- Controlled Natural Language

IF a Data hasEmbargoEndDate a EmbargoEndDate
AND a CurrentTime isAfter that EmbargoEndDate
AND a User hasRole a PublicUser
THEN that User CAN Access that Data

- **Enforceable Policy Language:**

```
authorization a1read = allow read(),  
target( data_category=="experimental_data" ) to any  
  when( currentTime() > object.embargo_end_date);  
authorization a1generateGraph = allow generateGraph()  
target ( data_category=="experimental_data" ) to any  
  when ( currentTime() > object.embargo_end_date);
```

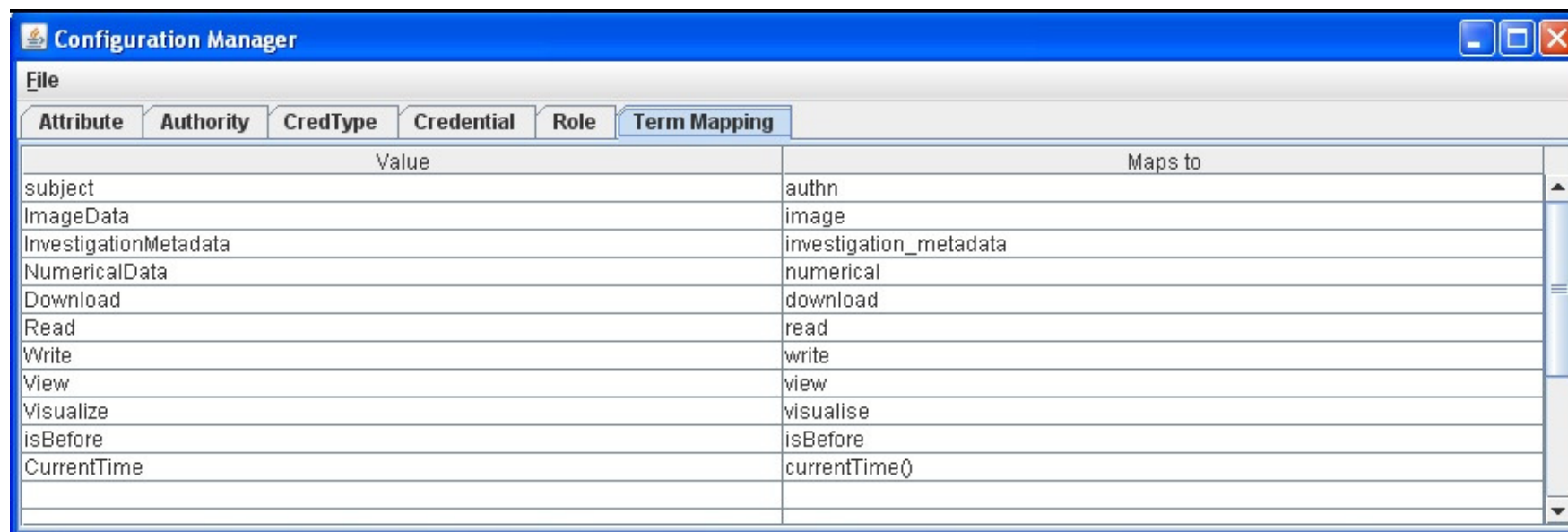
Consequence Architecture



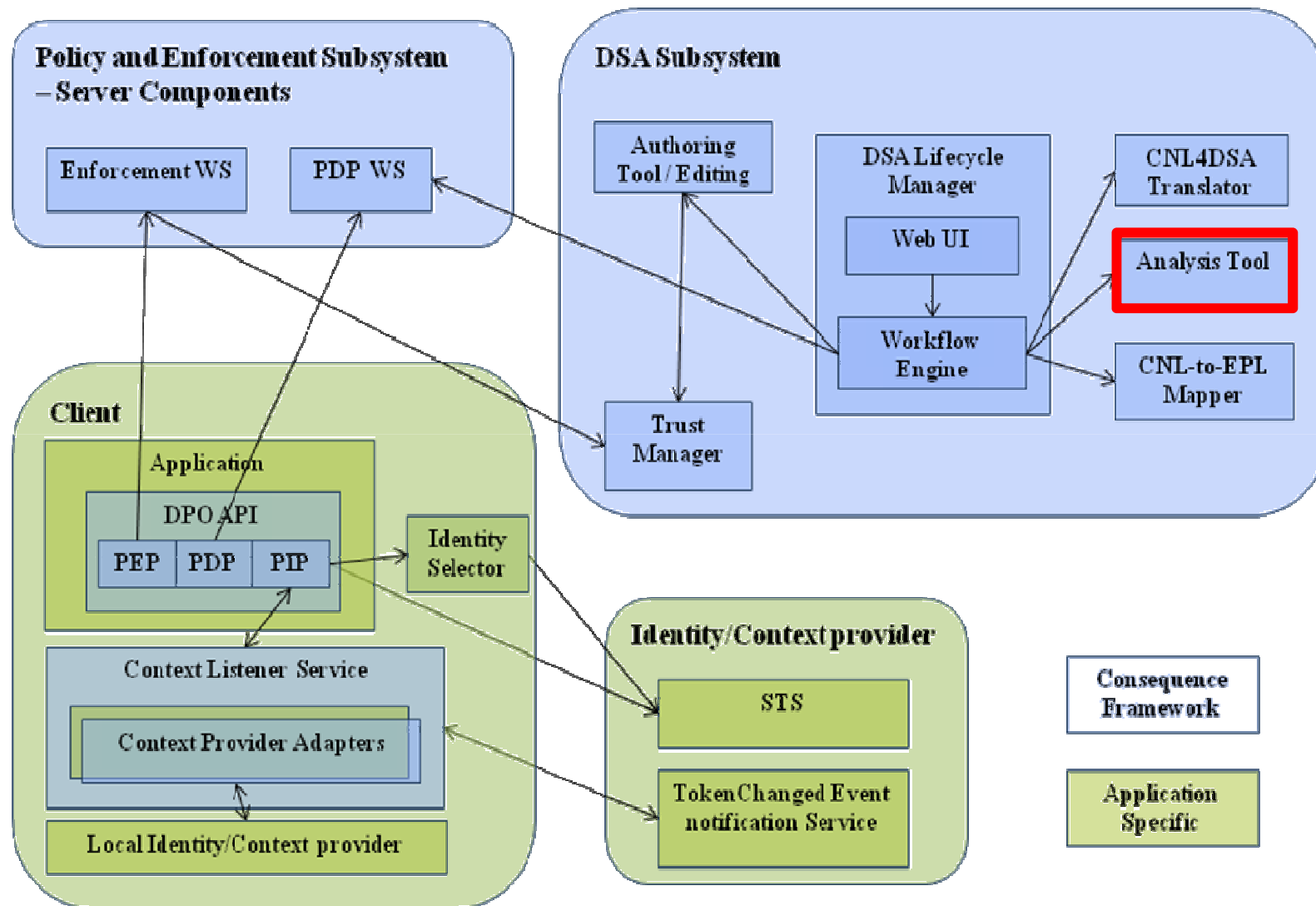
Mapping to the executable language



- Terms from the ontology that appear in the controlled natural language (CNL) must be mapped to terms used in the application which appear in the enforceable policy language (EPL).
- A GUI is provided for users to define the mapping.



Consequence Architecture



DSA Analysis



Expected: True ▼

Add query

Query	Expected	Result	
Can the Subj person perform the action read on the Obj data	true	false	Remove

SUBMIT ☐ Table of Access

Context

data hasembargoenddate embargoenddate

currenttime isafter date

user hasrole role

user haslocation location

Table Of Access

Data

NexusFile

User

Event

DSA Analysis



☐ Table of Access

Context

data hasembargoenddate embargoenddate

currenttime isafter date

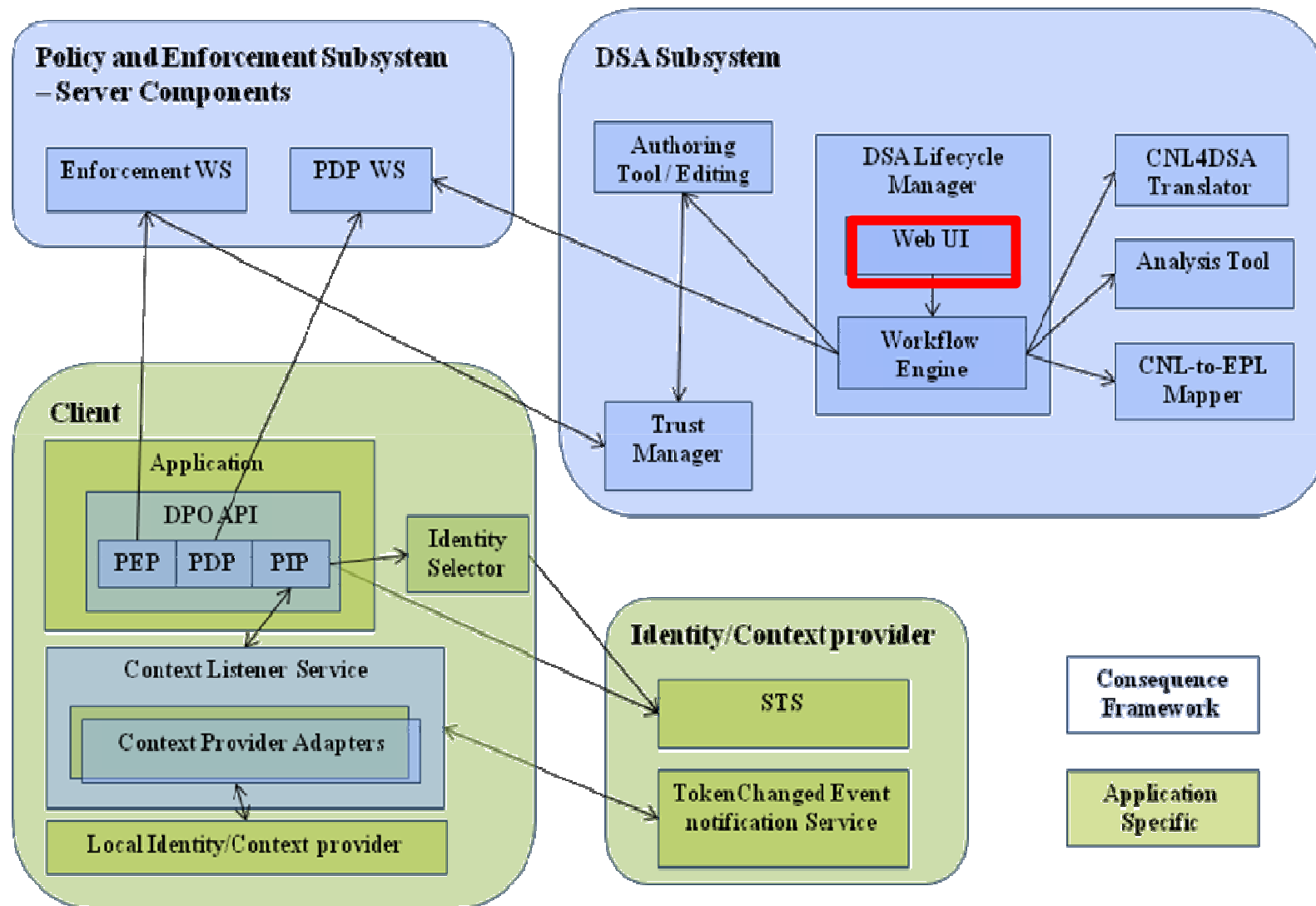
user hasrole role

user haslocation location

Table Of Access	Data	NexusFile	User	Event
Person	***	***	***	***
Signatory	***	***	***	***
User	download write read merge view filter visualize modify	read write download modify visualize filter view merge	***	***
System	***	***	***	***

Load / Save Context and Queries

Consequence Architecture



DSA deployment



The screenshot shows a web application interface for STFC. The breadcrumb trail is "Home > STFC > DSA > DSA-de31206b-0f2e-41b8-b8b3-570b428176f7 > Workflows". The main heading is "Workflows: DSA-de31206b-0f2e-41b8-b8b3-570b428176f7". Below this, a message states: "Use this page to start a new workflow on the current item or to view the status of a running or completed workflow." A section titled "Start a New Workflow" contains five workflow options, each with a checkmark icon and a description. The option "Deploy to STFC policy server" is circled in red. Below this section, a "Workflows" section contains a table with columns "Name", "Started", "Ended", and "Status". The table is currently empty, with a message stating "There are no currently running workflows on this item."

Home > STFC > DSA > DSA-de31206b-0f2e-41b8-b8b3-570b428176f7 > Workflows

Workflows: DSA-de31206b-0f2e-41b8-b8b3-570b428176f7

Use this page to start a new workflow on the current item or to view the status of a running or completed workflow.

Start a New Workflow

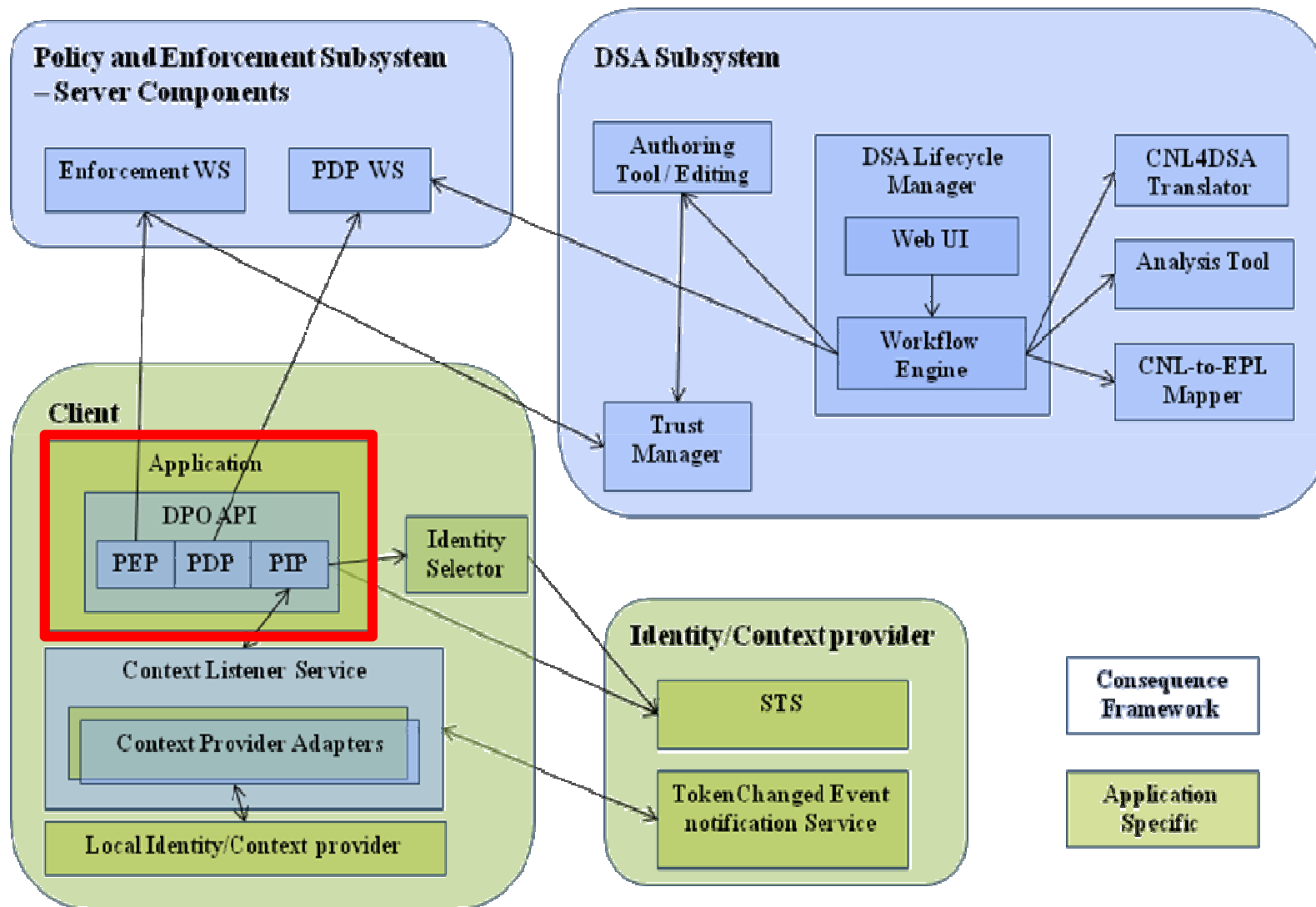
- ☒ Approval
Routes a document for approval. Approvers can approve or reject the document, reassign the approval task, or request changes to the document.
- ☒ Collect Feedback
Routes a document for review. Reviewers can provide feedback, which is compiled and sent to the document owner when the workflow has completed.
- ☒ Create link on STFC front page and get friendly name
- ☒ Deploy to STFC policy server
- ☒ Send DSA to STFC Mapper

Workflows

Select a workflow for more details on the current status or history.

Name	Started	Ended	Status
Running Workflows			
There are no currently running workflows on this item.			
Completed Workflows			
Send DSA to STFC Mapper	1/14/2011 11:04 AM	1/14/2011 12:59 PM	Completed

Consequence Architecture

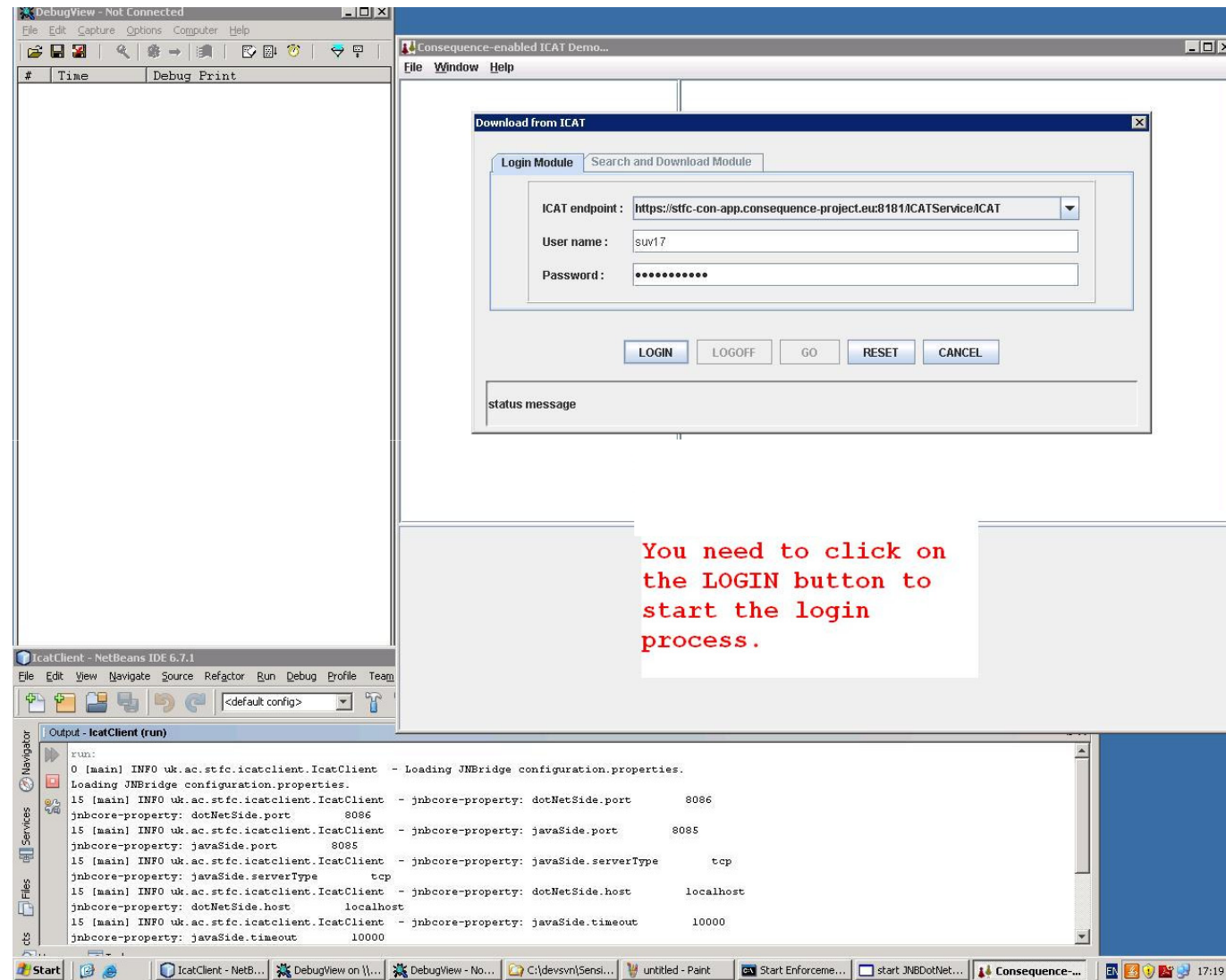


ICAT client application - login



The user identifies themselves by logging into the application.

The server can now determine their role in different projects: PI, Col, BS, PublicUser.



Keyword search for data



Once you have logged in, the Search and Download Module tab will be enabled. Click on that to select the download menu. Do a keyword search using HIV as input. Note that you can also use this menu to download a datafile. You just need to select the right operation using the drop down list. Click on the GO button to start the process.

The screenshot shows the 'Consequence-enabled ICAT Demo...' application window. A 'Download from ICAT' dialog box is open, with the 'Search and Download Module' tab selected. The 'Select ICAT Service' dropdown is set to 'https://stfc-con-app.consequence-project.eu:8181/ICATService/ICAT'. The 'Select ICAT operation' dropdown is set to 'Keyword Search'. The 'Input Message (Params)' field contains 'HIV'. The 'GO' button is circled in red. The 'Login Module' tab is also visible. The 'Logged into ICAT successfully.' message is displayed at the bottom of the dialog box.

The bottom of the screenshot shows the 'Output - IcatClient (run)' window with the following log output:

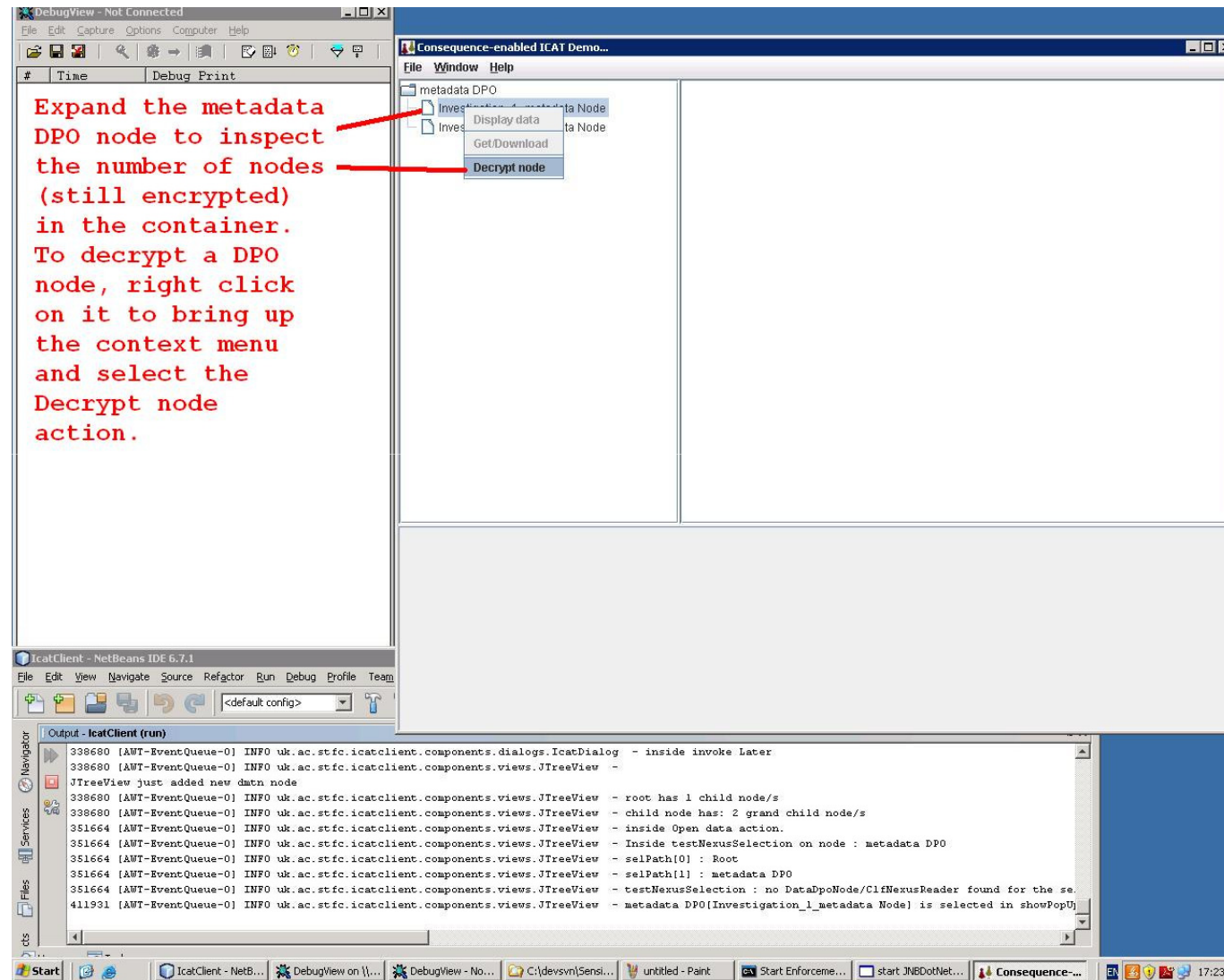
```
run:
0 [main] INFO uk.ac.stfc.icatclient.IcatClient - Loading JNBridge configuration.properties.
Loading JNBridge configuration.properties.
15 [main] INFO uk.ac.stfc.icatclient.IcatClient - jnbcore-property: dotNetSide.port 8086
jnbcore-property: javaSide.port 8085
15 [main] INFO uk.ac.stfc.icatclient.IcatClient - jnbcore-property: javaSide.serverType tcp
jnbcore-property: dotNetSide.host localhost
15 [main] INFO uk.ac.stfc.icatclient.IcatClient - jnbcore-property: javaSide.timeout 10000
jnbcore-property: javaSide.timeout 10000
```


Encrypted Metadata results



Metadata as well as data is protected by policies

Only metadata from those datasets which the client is authorised to see is shown



Select data file to download

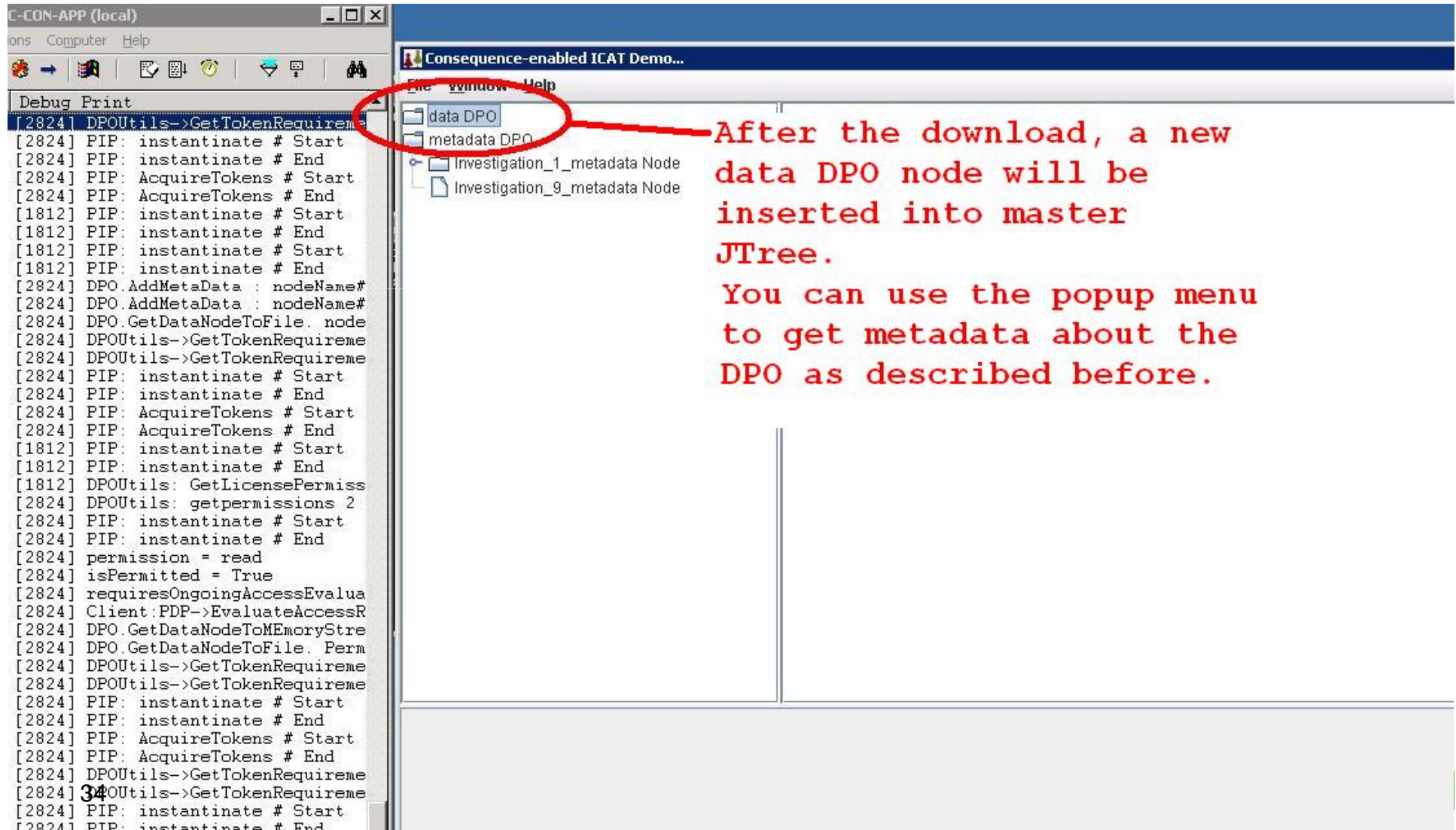


The screenshot shows two windows. The left window, titled "STFC-CON-APP (local)", displays a "Debug Print" log with various system messages and timestamps. The right window, titled "Consequence-enabled ICAT Demo...", shows a hierarchical tree view of data nodes. A red circle highlights the "Investigation_1_metadata" node under the "Investigation_1_metadata Node" folder. A red arrow points from this node to a text box on the right. The text box contains the following text: "After decryption, a new child node is inserted under the DPO node. You can expand the children nodes and use the context menu to display the data or to download a data file (when in the correct context)." Below the tree view, a context menu is visible with the following options: "Display data", "Get/Download", and "Decrypt node".

After decryption, a new child node is inserted under the DPO node. You can expand the children nodes and use the context menu to display the data or to download a data file (when in the correct context).

Access Control on the file to be downloaded from server to client

Navigate file (DPO Object)to find data



Debug Print

```
[2824] DPOUtils->GetTokenRequireme  
[2824] PIP: instantinate # Start  
[2824] PIP: instantinate # End  
[2824] PIP: AcquireTokens # Start  
[2824] PIP: AcquireTokens # End  
[1812] PIP: instantinate # Start  
[1812] PIP: instantinate # End  
[1812] PIP: instantinate # Start  
[1812] PIP: instantinate # End  
[2824] DPO.AddMetaData : nodeName#  
[2824] DPO.AddMetaData : nodeName#  
[2824] DPO.GetDataNodeToFile. node  
[2824] DPOUtils->GetTokenRequireme  
[2824] DPOUtils->GetTokenRequireme  
[2824] PIP: instantinate # Start  
[2824] PIP: instantinate # End  
[2824] PIP: AcquireTokens # Start  
[2824] PIP: AcquireTokens # End  
[1812] PIP: instantinate # Start  
[1812] PIP: instantinate # End  
[1812] DPOUtils: GetLicensePermiss  
[2824] DPOUtils: getpermissions 2  
[2824] PIP: instantinate # Start  
[2824] PIP: instantinate # End  
[2824] permission = read  
[2824] isPermitted = True  
[2824] requiresOngoingAccessEvalua  
[2824] Client:PDP->EvaluateAccessR  
[2824] DPO.GetDataNodeToMemoryStre  
[2824] DPO.GetDataNodeToFile. Perm  
[2824] DPOUtils->GetTokenRequireme  
[2824] DPOUtils->GetTokenRequireme  
[2824] PIP: instantinate # Start  
[2824] PIP: instantinate # End  
[2824] PIP: AcquireTokens # Start  
[2824] PIP: AcquireTokens # End  
[2824] DPOUtils->GetTokenRequireme  
[2824] 34 DPOUtils->GetTokenRequireme  
[2824] PIP: instantinate # Start  
[2824] PIP: instantinate # End
```

Consequence-enabled ICAT Demo...

- data DPO
- metadata DPO
 - Investigation_1_metadata Node
 - Investigation_9_metadata Node

After the download, a new data DPO node will be inserted into master JTree.

You can use the popup menu to get metadata about the DPO as described before.

Select data in Nexus file to view



The screenshot shows the "Consequence-enabled ICAT Demo..." application window. On the left is a command console with a log of system messages. The main area displays a hierarchical file tree under "data DPO". The tree structure is as follows:

- data DPO
 - 20090108GS00023643.nxs Node
 - clf
 - Astra-Gemini
 - LA3
 - N_PUMP
 - N_COMP
 - N_UNCOMP
 - S_UNCOMP
 - ROAMING
 - SPEC
 - LA3_ROAMING_SPEC** (highlighted with a red oval)
 - LA3_ROAMING_SPE
 - LA3_ROAMIN
 - LA3_ROAMIN
 - S_PUMP
 - S_COMP
 - FIBRE_SYS
 - SAD_TABLE
 - experiment_identifier
 - program_name
 - data_type
 - experiment_description
 - shot_date

A right-click context menu is open over the highlighted "LA3_ROAMING_SPEC" node. The menu contains the following options:

- Display data
- GetDownload
- Decrypt node

To the right of the application window, a red text annotation reads: "Use the context popup menu to display the data referenced by the node."

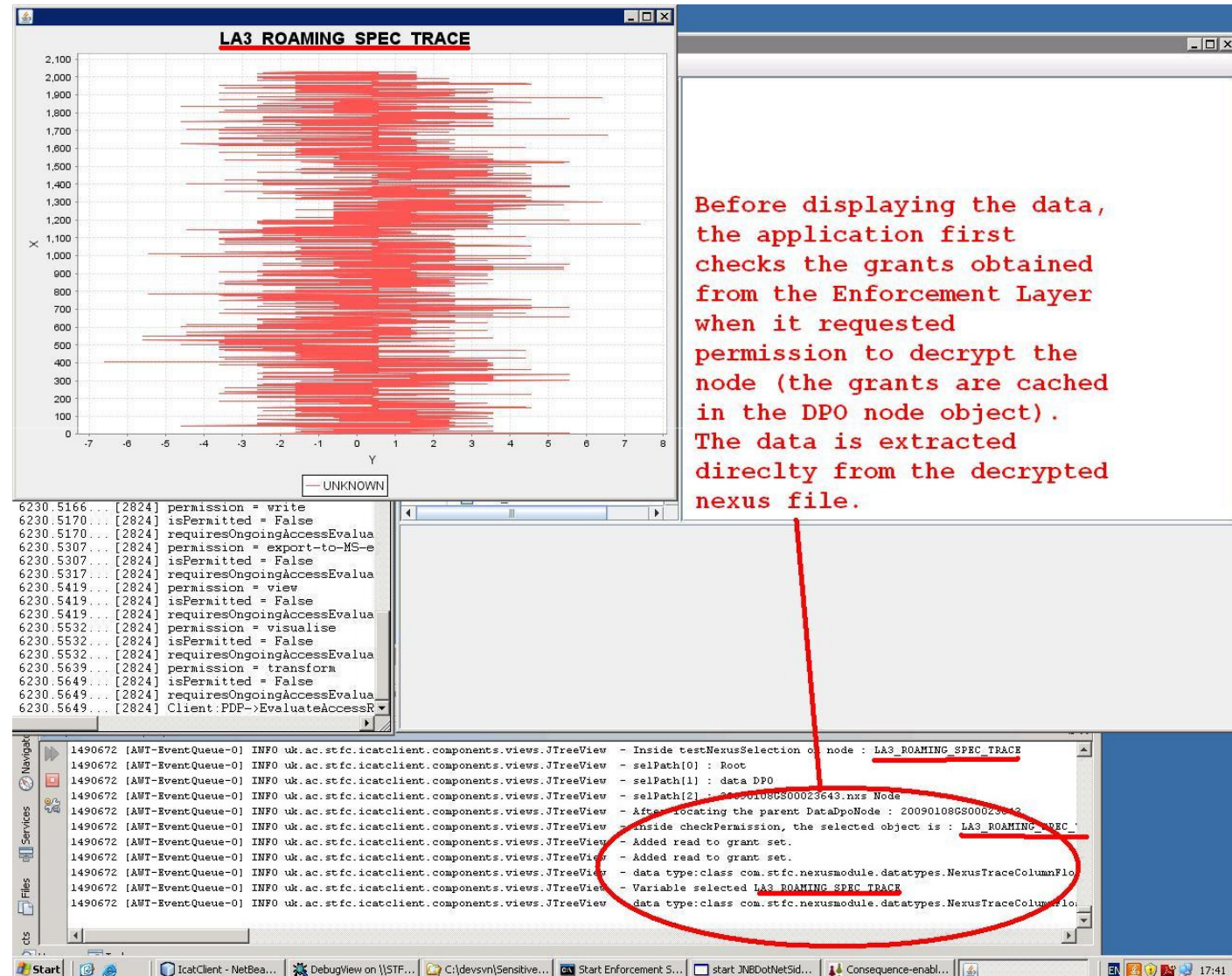
```
stantinate # End
: GetLicensePermiss
: GetLicensePermiss
: getpermissions 2
stantinate # Start
stantinate # End
.on = read
.ted = True
:OngoingAccessEvalua
.on = write
.ted = False
:OngoingAccessEvalua
.on = export-to-MS-e
.ted = False
:OngoingAccessEvalua
.on = view
.ted = False
:OngoingAccessEvalua
.on = visualise
.ted = False
:OngoingAccessEvalua
.on = transform
.ted = False
:OngoingAccessEvalua
'DP->EvaluateAccessR
: getpermissions 2
stantinate # Start
stantinate # End
.on = read
.ted = True
:OngoingAccessEvalua
.on = write
.ted = False
:OngoingAccessEvalua
.on = export-to-MS-e
.ted = False
:OngoingAccessEvalua
.on = view
.ted = False
:OngoingAccessEvalua
.on = visualise
.ted = False
:OngoingAccessEvalua
```

Usage control: Visualising data



The default display shows a visualisation of a data trace rather than the actual numerical data.

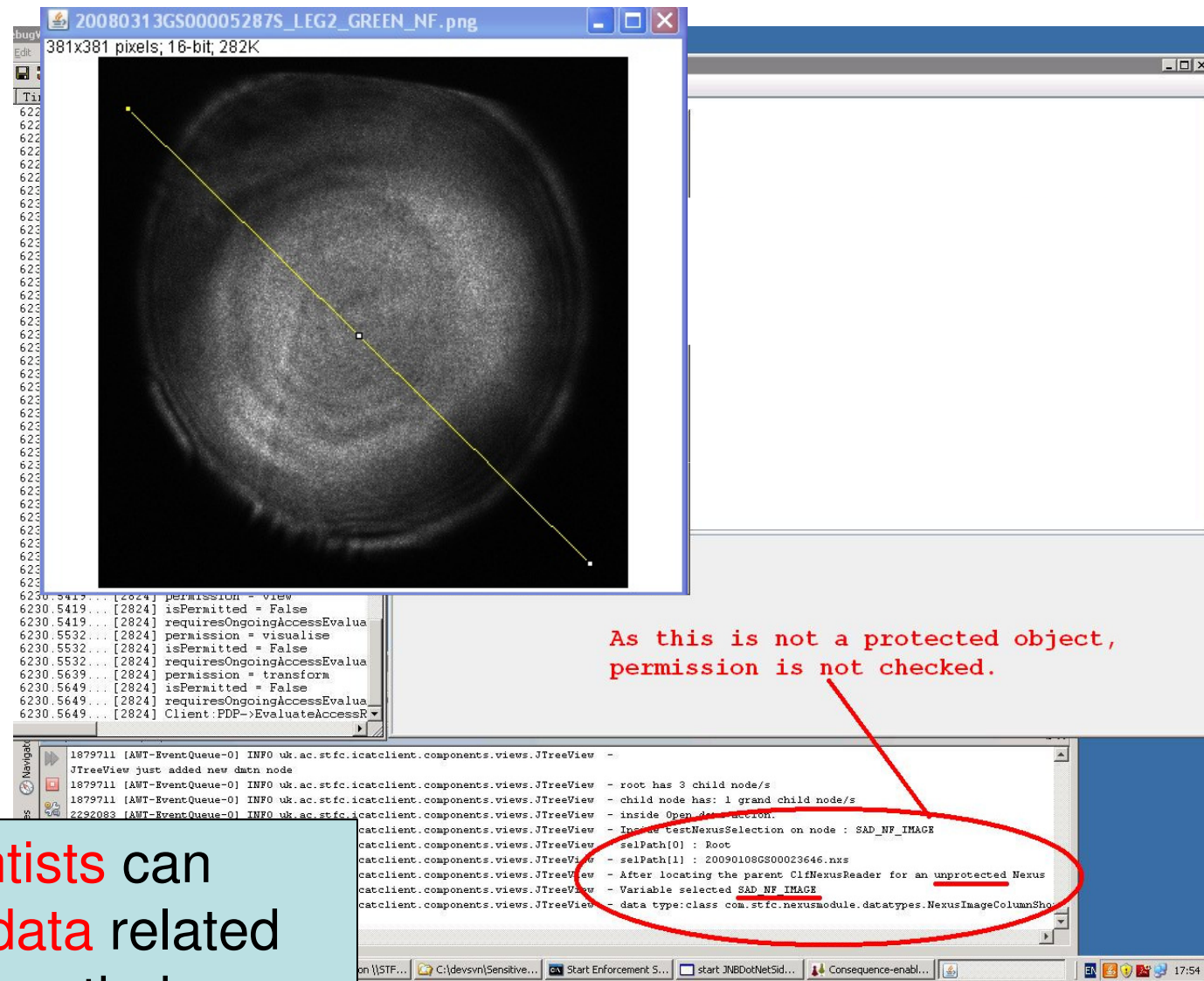
Usage control is applied to the requested action.



Policies apply within files



Parts of the Nexus file are protected by different policies.



Beamline scientists can access **image data** related to or produced on their experimental station.

CONSEQUENCE

OWS\system32\cmd.exe

is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
read-81 DEBUG com.consequence.stfc.wp6.gpsTokenProvider.BTgpsSingleton
ingleton.getLocation : ready to extract gps output
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
read-81 DEBUG com.consequence.stfc.wp6.gpsTokenProvider.BTgpsSingleton
ingleton.getLocation : ready to extract gps output
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
read-81 DEBUG com.consequence.stfc.wp6.gpsTokenProvider.BTgpsSingleton
ingleton.getLocation : ready to extract gps output
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
read-81 DEBUG com.consequence.stfc.wp6.gpsTokenProvider.BTgpsSingleton
ingleton.getLocation : ready to extract gps output
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
read-81 DEBUG com.consequence.stfc.wp6.gpsTokenProvider.BTgpsSingleton
ingleton.getLocation : ready to extract gps output
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
read-81 DEBUG com.consequence.stfc.wp6.gpsTokenProvider.BTgpsSingleton
ingleton.getLocation : ready to extract gps output
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77
is: 145330.000,5129.9179,N,00010.7635,W,1,04,5.1,16.2,M,47.0,M,-,0000*77

Consequence WP6 GpsLocation

Application

Bluetooth GPS: BT-GPS-38AD...

Connection URL: btsp://000DB...

DISCOVER BT GP...

reading GPS[Bt-GPS-38AD29]: no sat
reading GPS[Bt-GPS-38AD29]: no sat
reading GPS[Bt-GPS-38AD29]: no sat
reading GPS[Bt-GPS-38AD29]: no sat
reading GPS[Bt-GPS-38AD29]: no sat
{lng=-0.10789199999999999, lat=51
persistLocation : Error sending location
host[stfc-con-cli.consequence-project
United Kingdom : {lng=-0.1075820000
United Kingdom : {lng=-0.107673, lat=
United Kingdom : {lng=-0.107711, la
145316.000,5129.9175,N,00010.78

Emulator for testing

stfc-con-cli.consequence-project.eu - Remote Desktop

The screenshot shows a Java application window titled "Consequence WP6 GpsLocationTokenProvider...". The window has a light blue title bar and a white content area. At the top, the word "Application" is displayed in a bold, black font. Below this, there are two main sections. The first section is labeled "Bluetooth GPS:" and contains a text input field with the value "GPS-Emulator". The second section is labeled "Connection URL:" and contains a text input field with the value "btsp://000DB538AD29:1;authenticate=false;encrypt=false;master=". Below these input fields, there are three buttons: "DISCOVER BT GPS", "CONNECT", and "DISCONNECT". The "DISCONNECT" button is highlighted with a blue background. At the bottom of the window, there is a text area displaying the following log output: "Current country location : Iran", "persistLocation : Error sending location to socket server : sendLocation : IOException connect", "host[stfc-con-cli.consequence-project.eu:4444] Connection refused: connect", "Current country location : Iran", "Current country location : Iran", "Current country location : Iran", "Current country location : Iran", "Current country location : Iran".

Consequence WP6 GpsLocationTokenProvider...

Application

Bluetooth GPS : GPS-Emulator

Connection URL : btsp://000DB538AD29:1;authenticate=false;encrypt=false;master=

DISCOVER BT GPS CONNECT DISCONNECT

Current country location : Iran
 persistLocation : Error sending location to socket server : sendLocation : IOException connect
 host[stfc-con-cli.consequence-project.eu:4444] Connection refused: connect
 Current country location : Iran
 Current country location : Iran
 Current country location : Iran
 Current country location : Iran
 Current country location : Iran

Obligations



**Obligation to
notify PI sends
e-mail on
downloads**

The screenshot displays a Windows desktop environment. On the left, a Notepad window titled 'wp6Obligation.log - Notepad' contains a log of system events. The log entries are as follows:

- 2011/01/11 12:23:24 : ****[DSAID : stfc-demo-1]**** Johnny Tucker (id : abc123) authenticated by icat (current location : United Kingdom) downloaded : experimental_data,image (ID : 12,20) from Project: The meaning of life (ID : 1).
- 2011/01/11 12:24:51 : ****[DSAID : stfc-demo-1]**** Johnny Tucker (id : abc123) authenticated by icat who is currently in United Kingdom has downloaded : experimental_data,image (ID : 12,20) from Project: The meaning of life (ID : 1).
- 2011/01/11 12:25:53 : ****[DSAID : stfc-demo-1]**** Johnny Tucker (id : abc123) authenticated by icat and who is currently in United Kingdom has downloaded : experimental_data,image (ID : 12,20) from Project: The meaning of life (ID : 1).
- 2011/01/11 12:30:29 : ****[DSAID : stfc-demo-y3]**** Johnny Tucker (id : abc123) authenticated by icat and who is currently in United Kingdom has downloaded : experimental_data,image (ID : 12,20) from Project: The meaning of life (ID : 1).
- 2011/01/11 12:31:05 : ****[DSAID : stfc-demo-y3]**** who is currently in United Kingdom has read/ed : exper meaning of life (ID : 1).
- 2011/01/11 12:32:24 : ****[DSAID : stfc-demo-y3]**** who is currently in United Kingdom has read : experime of life (ID : 1).
- 2011/01/11 12:56:21 : ****[DSAID : stfc-demo-y3]**** Security Token Service and who is currently in United
- 2011/01/11 12:57:37 : ****[DSAID : stfc-demo-y3]**** Security Token Service and who is currently in United
- 2011/01/11 13:05:23 : ****[DSAID : stfc-demo-y3]**** Security Token Service and who is currently in United
- 2011/01/11 13:08:15 : ****[DSAID : stfc-demo-y3]**** Security Token Service and who is currently in United 12,20) from Project: The meaning of life (ID : 1).
- 2011/01/11 13:10:05 : ****[DSAID : stfc-demo-y3]**** Security Token service and who is currently in United
- 2011/01/11 13:18:13 : ****[DSAID : stfc-demo-y3]**** Security Token service and who is currently in United ed : experimental_data,image (ID : 12,20) from Proj

On the right, a Microsoft Office Outlook window displays an email titled 'Re: Data Access Notification from the Consequence Enforcement Framework - Message (Plain Text)'. The email header shows it is from 'ObligationHandler@stfc.consequence.eu' to 'Principal Investigator'. The body of the email reads:

Dear colleague,

****This is an automatic email generated by the Consequence Framework in line with Data Sharing demo-y3).****

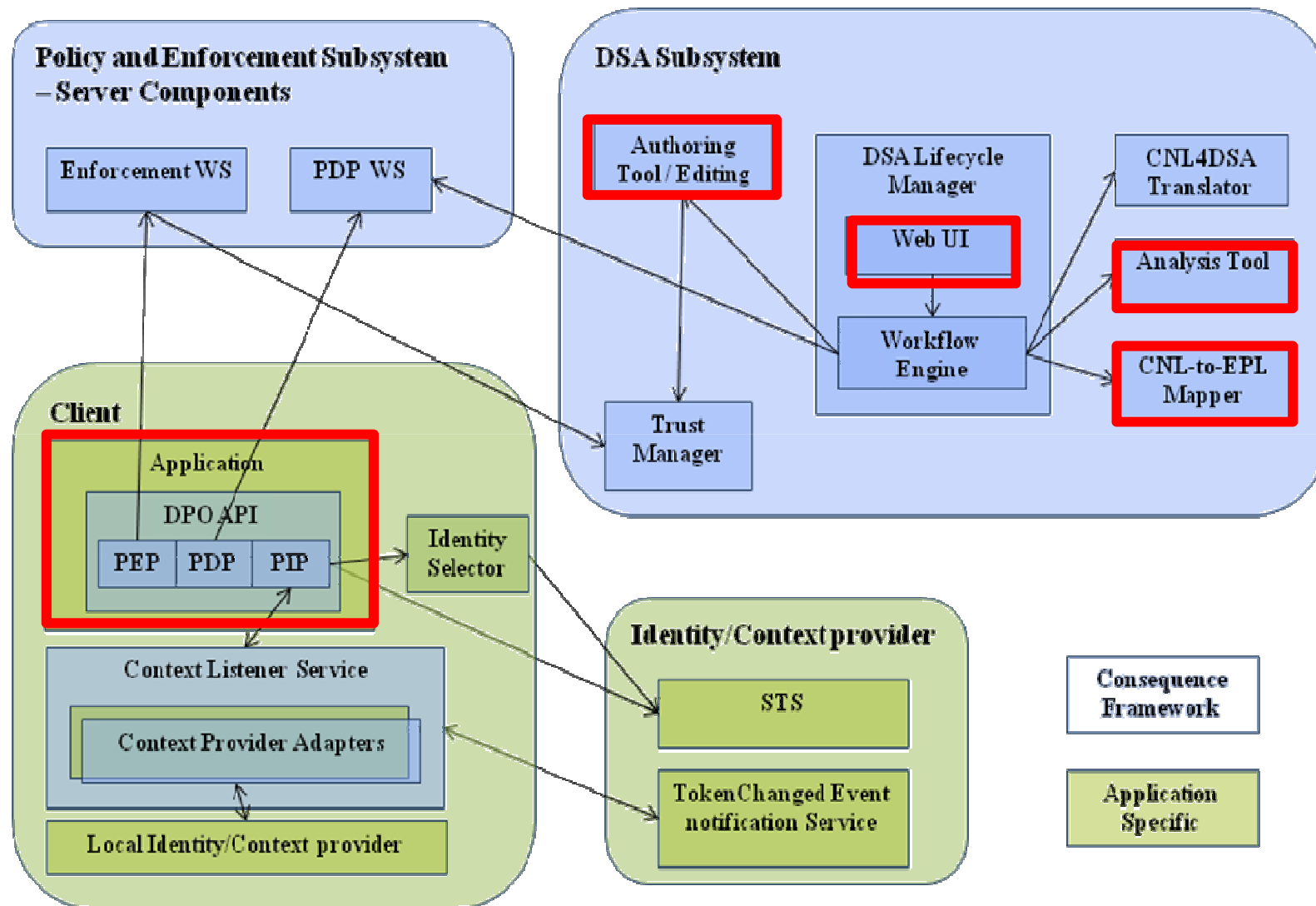
Stephen Versari (id : suv17) authenticated by icat Credential Authority has downloaded the follo data produced by your project (HIV Intigrase Protein Structure, ID : 1) :

investigation_metadata (ID : 1).

****Please do not reply to this message as emails to this address are unmonitored. If you have icatHelp@consequence-project.eu. ****

**Obligation logs
data reads**

Consequence User Interfaces



Main Advances



- Integrating usage control and digital rights management technologies
- Integrating separate advances in the expressiveness of policy languages into a single, usable demonstration
- Semantic driven DSA authoring for managers – not techies
- Generic language technology with UI – ontology, authoring tool, CNL/EPL mapper, metadata manager
- Integration of software engineering formal analysis methods – video later
- Integration of mainstream commercial applications – video later
- For research innovations – see next talk by Dr Emil Lupu

Questions ?

