Authoring and deploying business policies dynamically for compliance monitoring

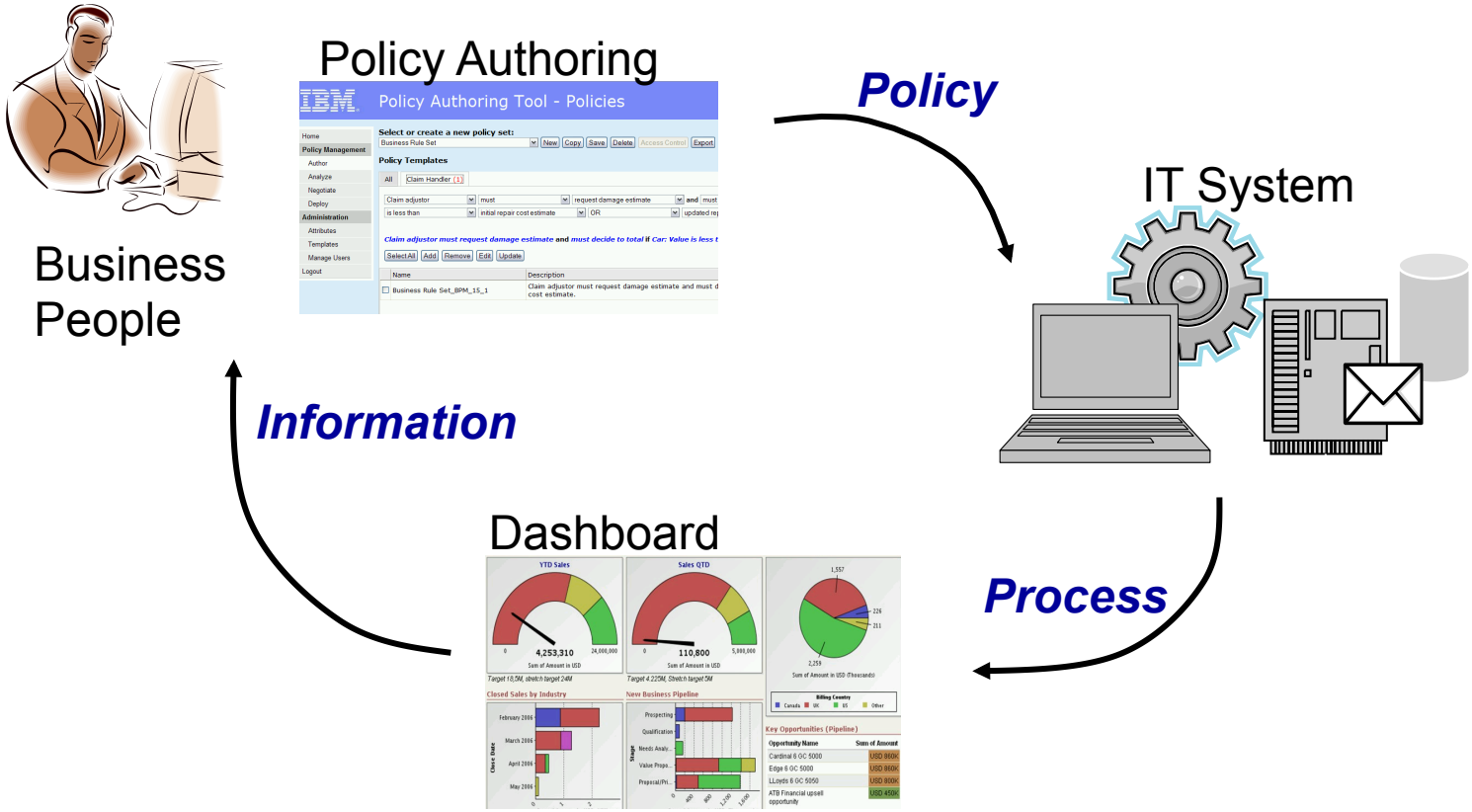
Yurdaer Doganata, **Keith Grueneberg, John Karat, Nirmal Mukhi**

IBM T. J. Watson Research Center
Hawthorne, NY 10532 USA

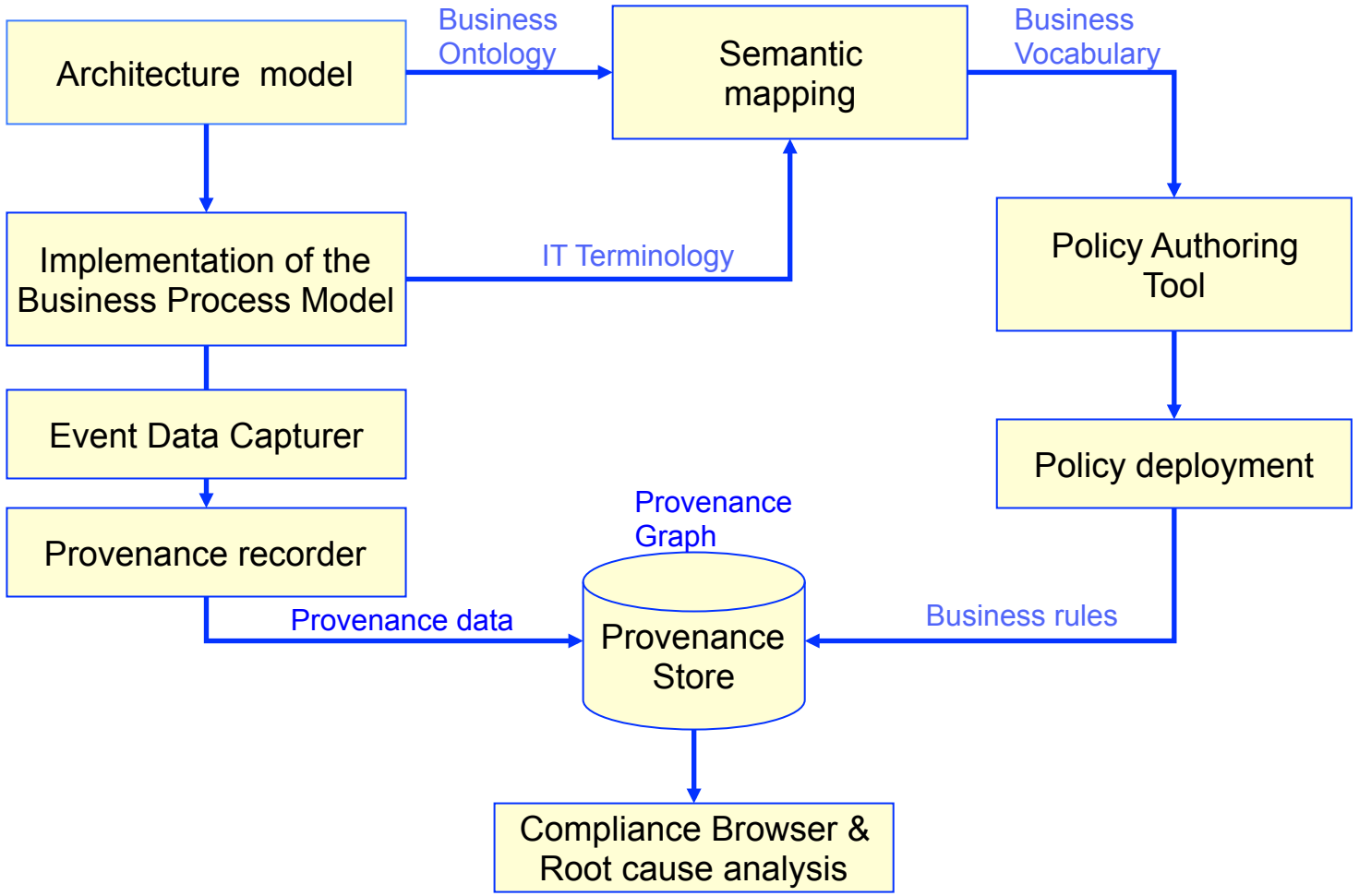
June 7, 2011

© 2011 IBM Corporation

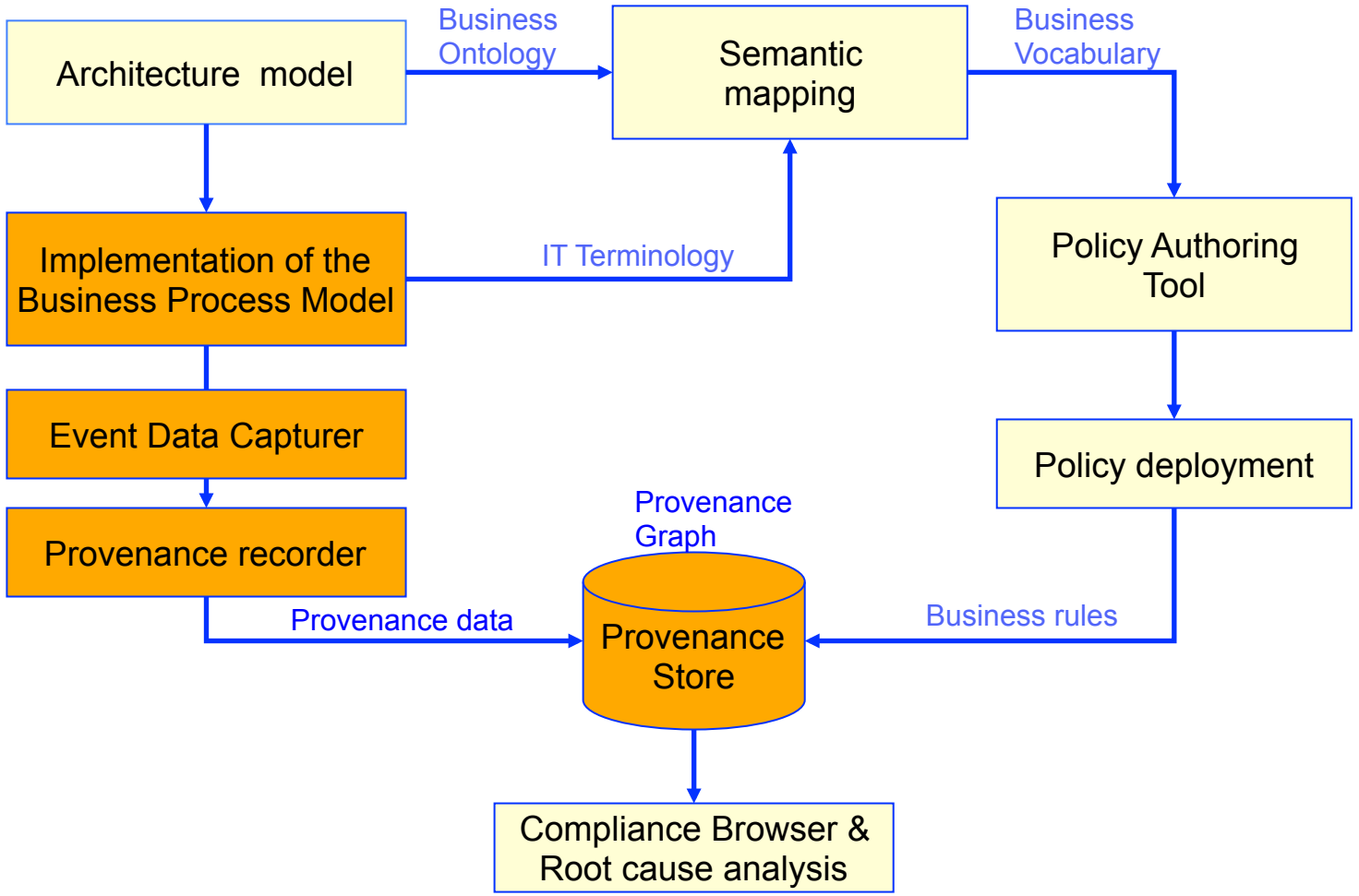
Automate policy authoring, deployment and compliance monitoring



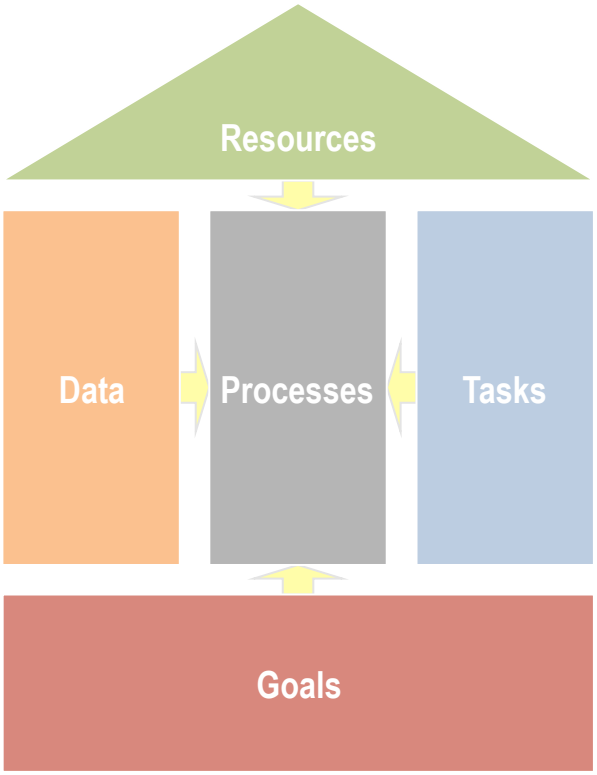
Architecture



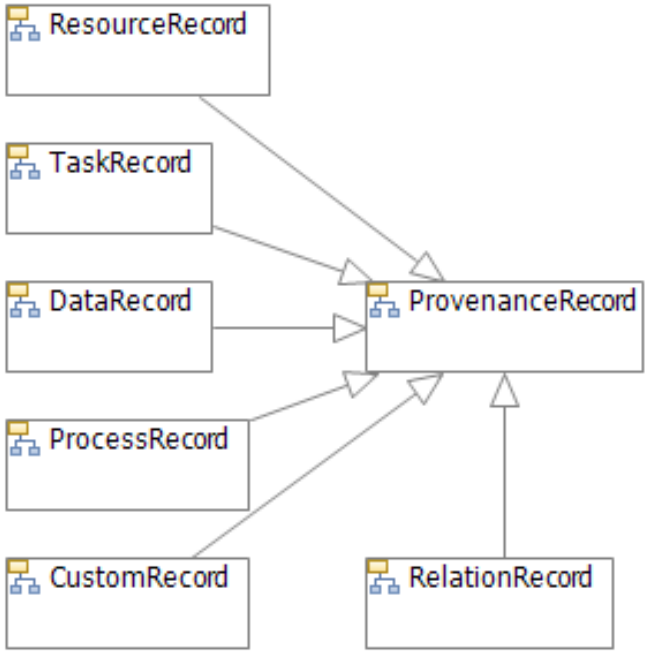
Architecture



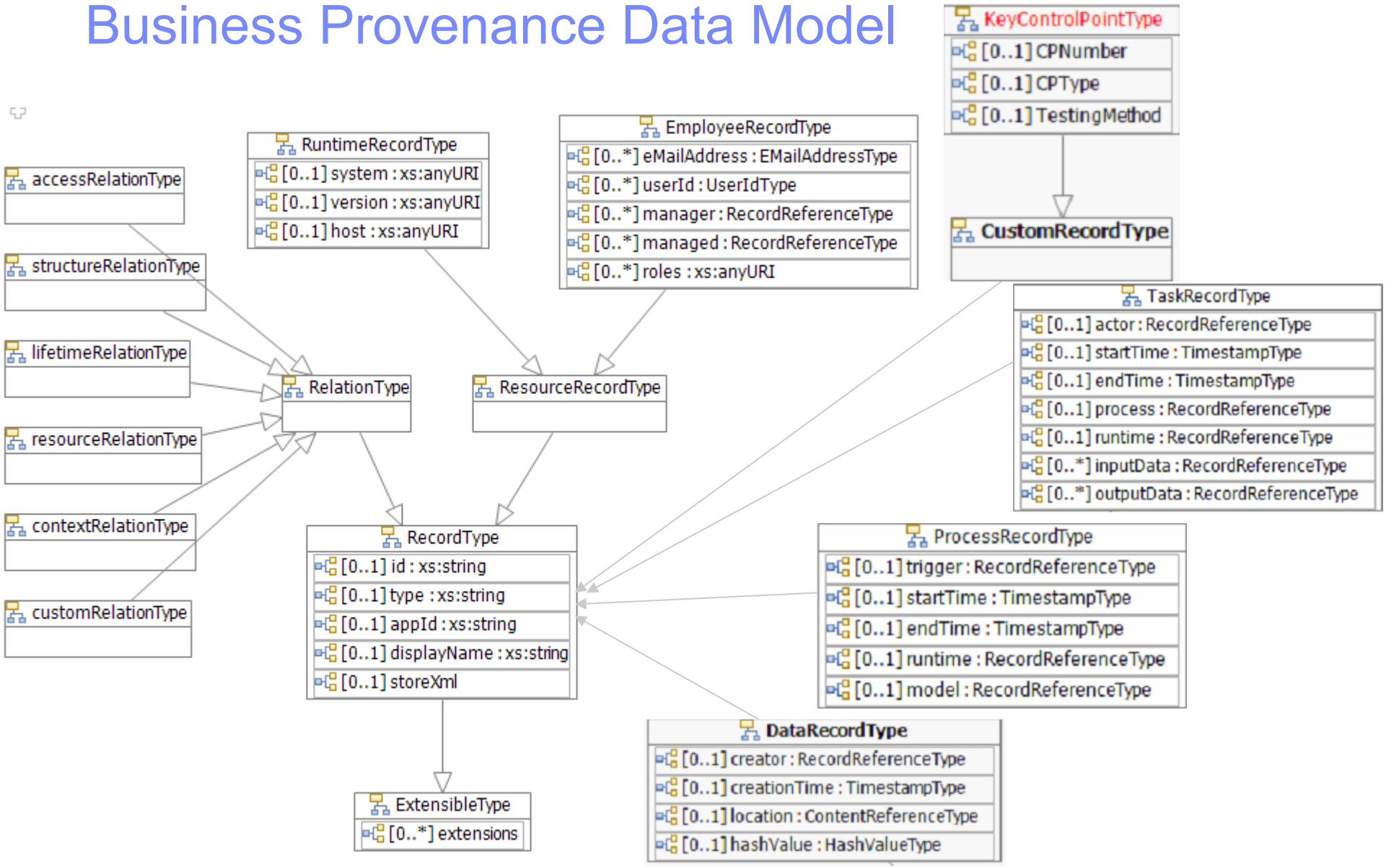
The dimensions of business provenance



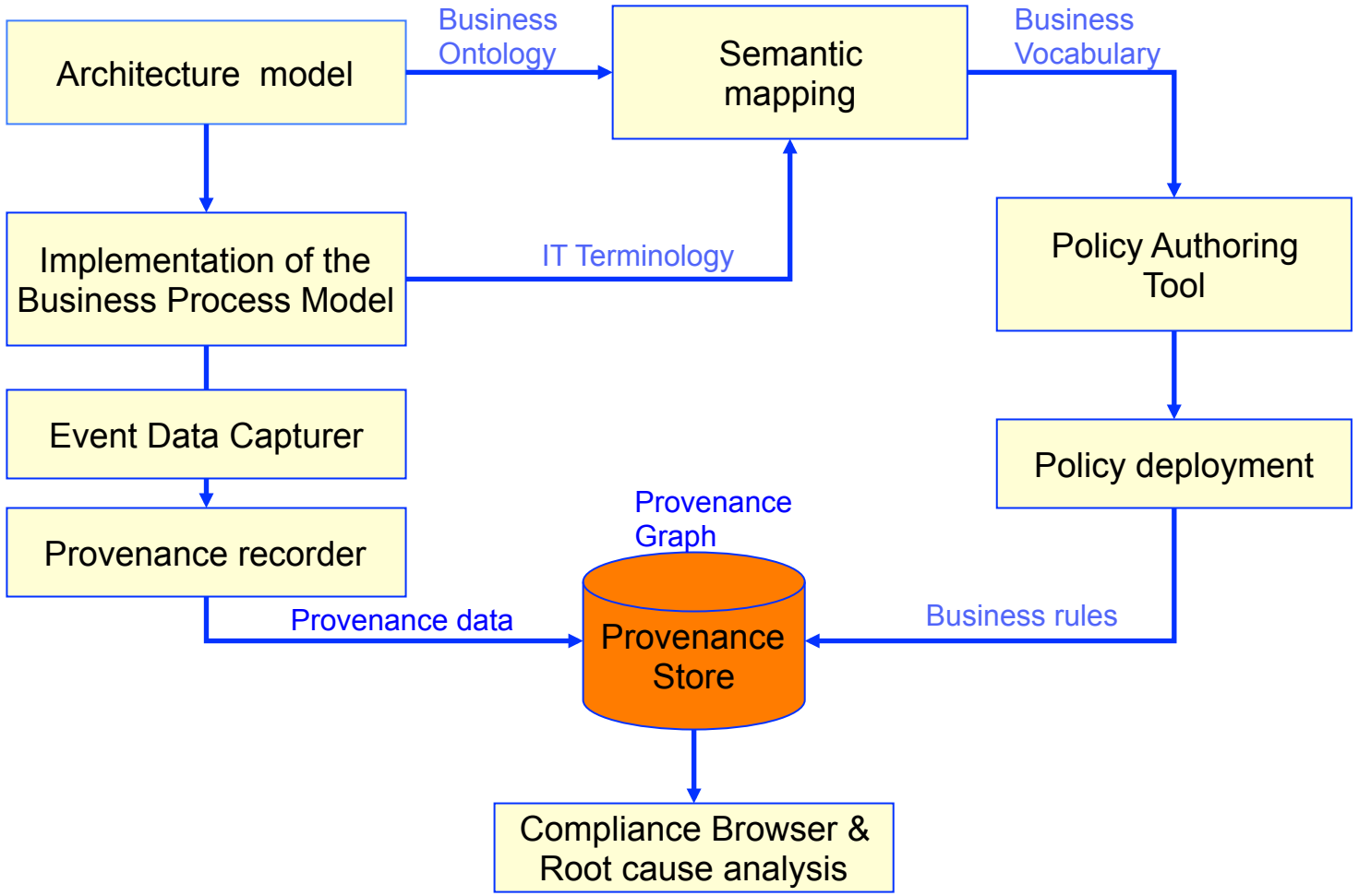
- Who
  - resource as actor
- Did What,
  - task execution,
  - data manipulation
- When
  - process instance
- and Why?
  - goal drives process



Business Provenance Data Model



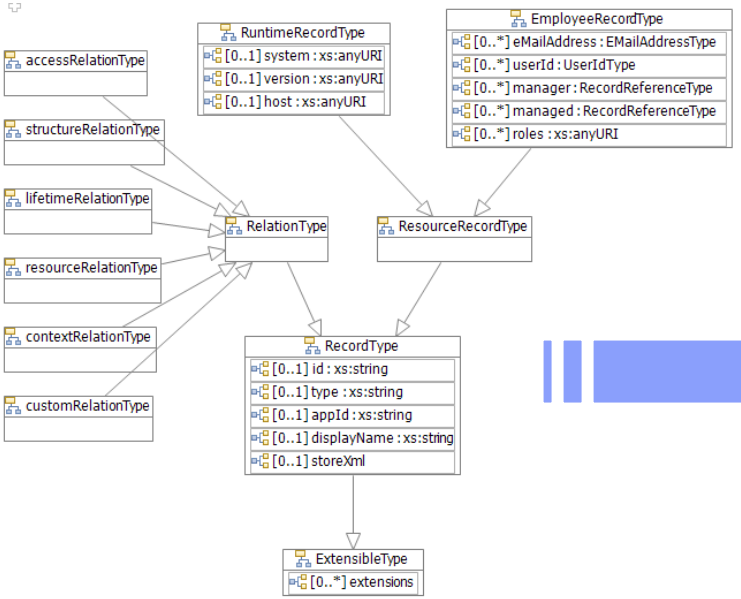
Architecture



Rule authoring is a challenge

- Writing and deploying rules with IT Level data requires data management and programming skills
- Business people need tools to author rules in the language that they understand

IT Level Data



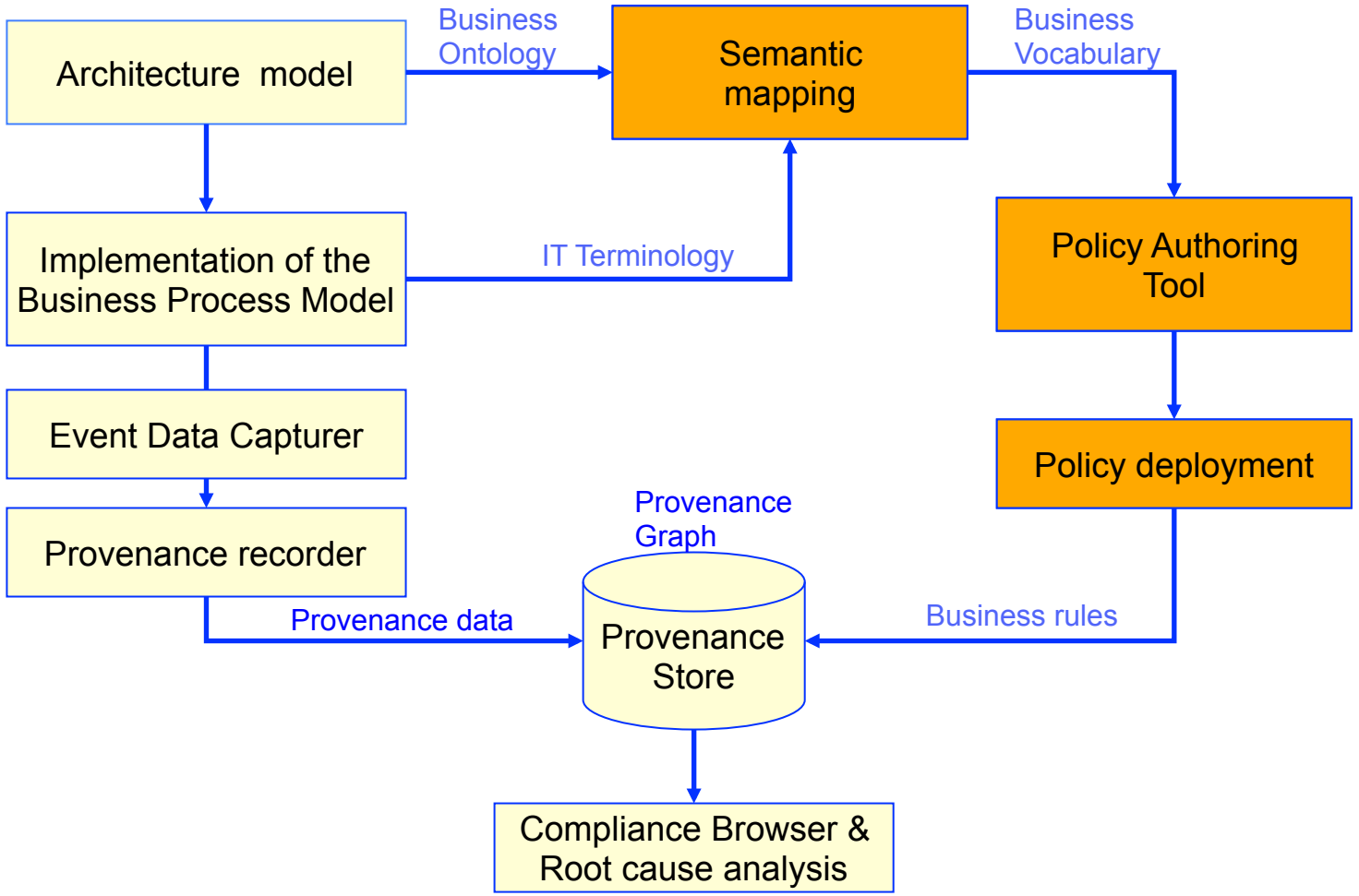
Rule

Example Rule:

```
<trigger>name()='processItem' && $item.name contains
        'Challenge' </trigger>

<action><ae:createItem>
        <ae:condition>
            <ae:select-none name='$item.name'
                    elementType='item'
                    elementSubType='financialKeyControl'/>
         </ae:condition>
         <ae:template inputElement='item' copyAll='true'
           <prov:item name='$item.name'
                    subType="financialKeyControl"  />
         </ae:template>
</ae:createItem></action>
```

Architecture



Using templates to simplify rule creation

- BUSINESS RULE in NATURAL LANGUAGE
  - If the car value is less than the initial damage estimation, then the car should be totaled by the claim handler
- TEMPLATE
  - If {DATA} {OPERATION} {DATA}, then {RESOURCE} {OBLIGATION} {TASK}
- INSTANTIATIONS
  - If {car.value} {less than} {initial damage estimation}, then {claim handler} {should} {total the car}
  - If {car.value} {more than} {initial damage estimation}, then {claim handler} {should} {not total the car}

Semantic Mapping:
Linking business vocabulary to IT terminology

Business Vocabulary

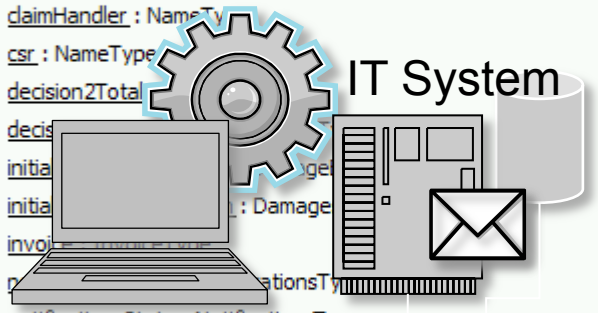
Repair cost must not be more than the "car value"

?

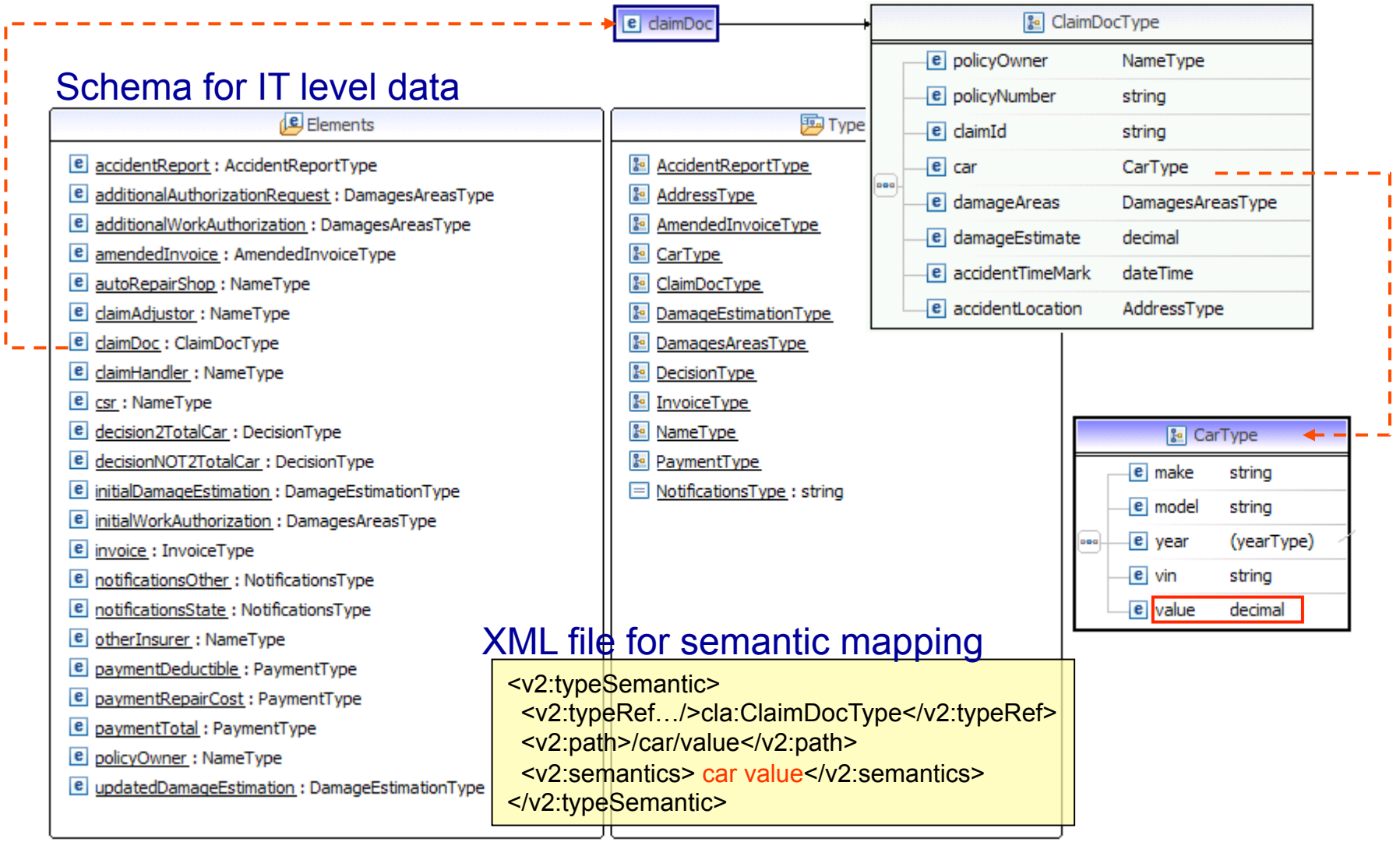
IT Terminology

Elements

- accidentReport : AccidentReportType
- additionalAuthorizationRequest : DamagesAreasType
- additionalWorkAuthorization : DamagesAreasType
- amendedInvoice : AmendedInvoiceType
- autoRepairShop : NameType
- claimAdjustor : NameType
- claimDoc : ClaimDocType
- claimHandler : Name
- csr : NameType
- decision2Total
- deci
- initia
- initia : Damage
- invo
- notificationsState : NotificationsType
- otherInsurer : NameType
- paymentDeductible : PaymentType
- paymentRepairCost : PaymentType
- paymentTotal : PaymentType
- policyOwner : NameType
- updatedDamageEstimation : DamageEstimationType



Semantic Mapping for "car value"



Policy Authoring Tool

Policy Management Environment

- Home
- **Policy Management**
  - Author
  - Analyze
  - Negotiate
  - Deploy
- **Administration**
  - Attributes
  - Templates
  - Manage Users
- Logout

Welcome to the Policy Management Environment!

To get started authoring policies, select the Author link on the left Navigator.

Policy Authoring Tool - Edit Attributes

- Home
- **Policy Management**
  - Author
  - Analyze
  - Negotiate
  - Deploy
- **Administration**
  - Attributes
  - Templates
  - Manage Users
- Logout

Select an attribute to edit values or click "New" to add an attribute: New Import Delete All

Data

- ⊞ Claim document (Data.Claimdocument)
- ⊞ Police report (Data.Policereport)
- ⊞ Invoice (Data.Invoice)
- ⊞ Amended Invoice (Data.AmendedInvoice)
- ⊞ Initial authorization to repair (Data.Initialauthorizationtorepair)
- ⊞ Additional authorization to repair (Data.Additionalauthorizationtorepair)
- ⊞ Initial damage estimation (Data.Initialdamageestimation)
- ⊞ Updated damage estimation (Data.Updateddamageestimation)
- ⊞ Decision To Total (Data.DecisionToTotal)

Resource

- ⊞ Claim Resource (Resource.ClaimResource)

Task

- ⊞ Claim Task (Task.ClaimTask)

Policy Authoring Tool - Edit Attributes

- Home
- **Policy Management**
  - Author
  - Analyze
  - Negotiate
  - Deploy
- **Administration**
  - Attributes
  - Templates
  - Manage Users
- Logout

Select an attribute to edit values or click "New" to add an attribute: New | Import | Delete All

Data

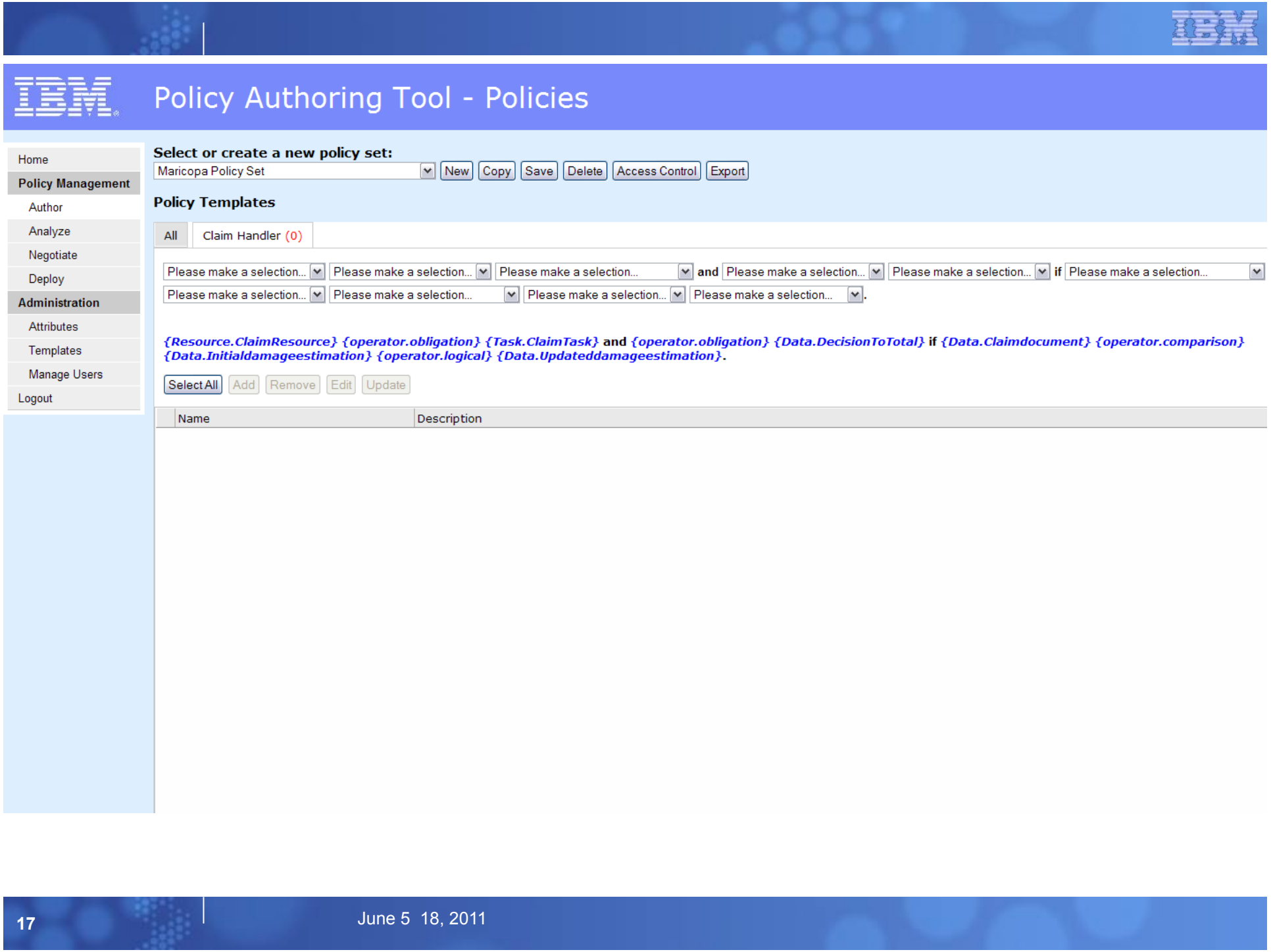
⊟ Claim document (Data.Claimdocument)

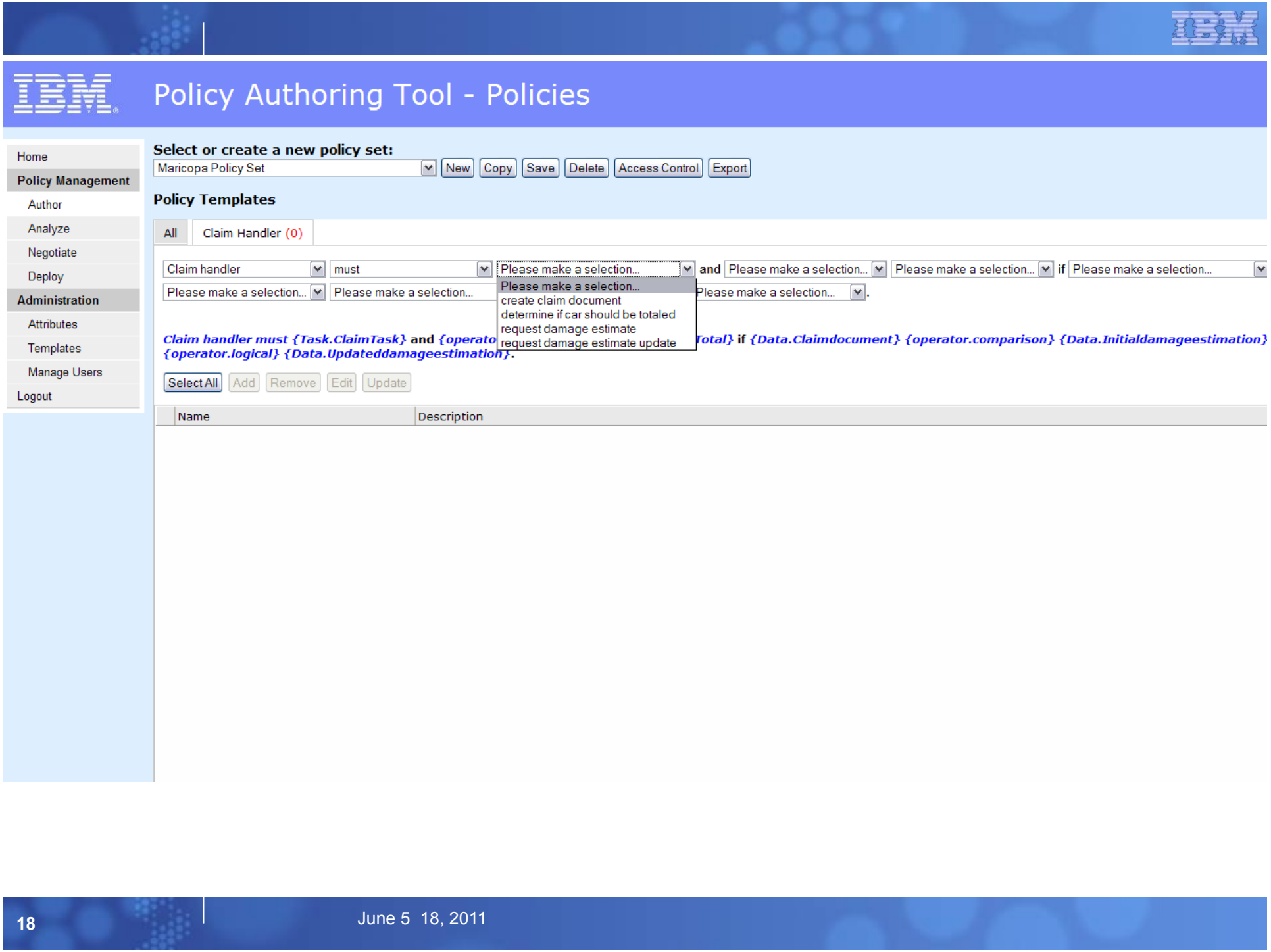
Claim document (Data.Claimdocument)
☐ Car: Make
☐ Car: Model
☐ Car: Value
☐ Car: Vehicle Identification Number
☐ Car: Year
☐ Claim ID
☐ Policy number
☐ Policy owner

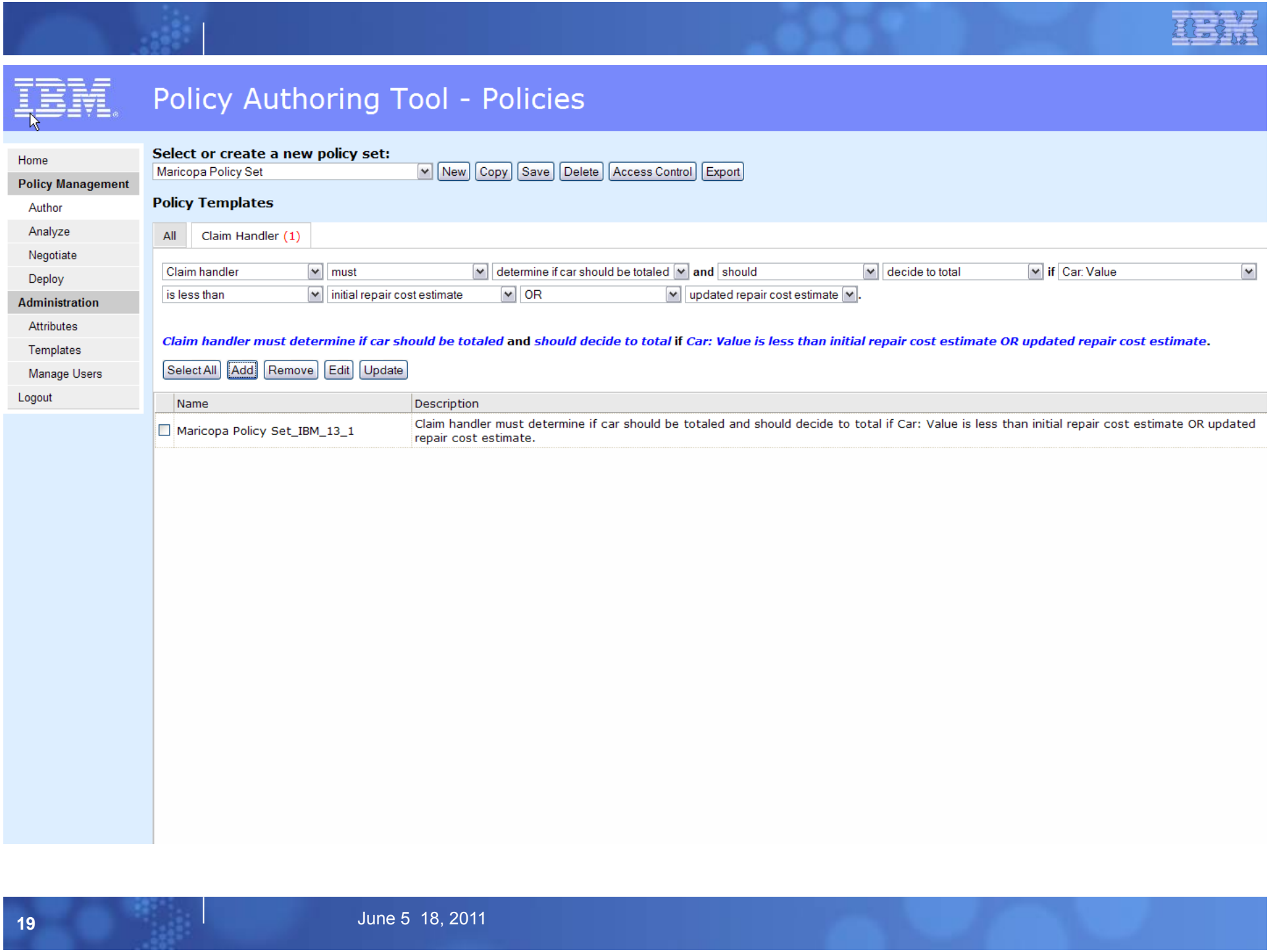
Add | Delete Selected | Delete All

⊟ Police report (Data.Policereport)

Police report (Data.Policereport)
☐ Accident Location: City
☐ Accident Location: State
☐ Accident Location: Street
☐ Accident Location: Zip Code
☐ Time of the accident

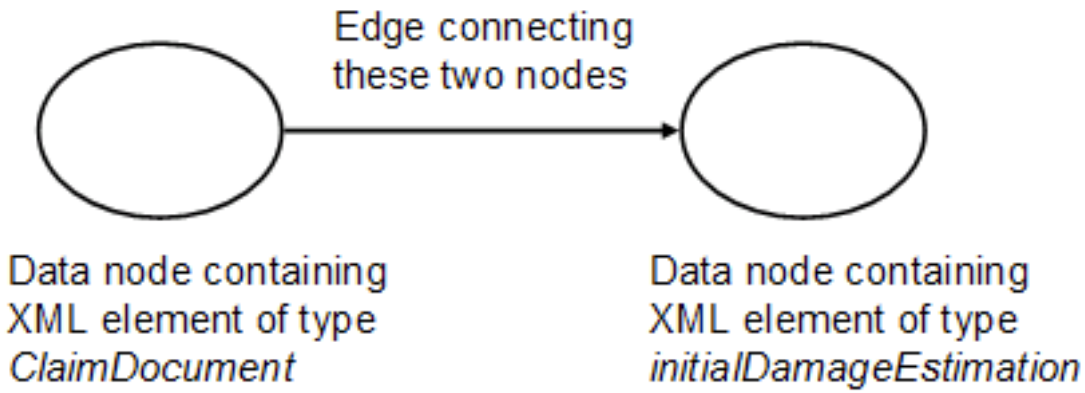

Policy Authoring Tool - Policies
Home
Policy Management
Author
Analyze
Negotiate
Deploy
Administration
Attributes
Templates
Manage Users
Logout
Select or create a new policy set:
Maricopa Policy Set
New
Copy
Save
Delete
Access Control
Export
Policy Templates
All
Claim Handler (0)
Please make a selection...
and
if
{Resource.ClaimResource} {operator.obligation} {Task.ClaimTask} and {operator.obligation} {Data.DecisionToTotal} if {Data.Claimdocument} {operator.comparison} {Data.Initialdamageestimation} {operator.logical} {Data.Updateddamageestimation}.
Select All
Add
Remove
Edit
Update
Name
Description


Policy Authoring Tool - Policies
Home
Policy Management
Author
Analyze
Negotiate
Deploy
Administration
Attributes
Templates
Manage Users
Logout
Select or create a new policy set:
Maricopa Policy Set
New
Copy
Save
Delete
Access Control
Export
Policy Templates
All
Claim Handler (0)
Claim handler
must
Please make a selection...
and
Please make a selection...
Please make a selection...
if
Please make a selection...
Please make a selection...
Please make a selection...
Please make a selection...
create claim document
determine if car should be totaled
request damage estimate
request damage estimate update
Please make a selection...
.
Claim handler must {Task.ClaimTask} and {operato Total} if {Data.Claimdocument} {operator.comparison} {Data.Initialdamageestimation} {operator.logical} {Data.Updateddamageestimation}.
Select All
Add
Remove
Edit
Update
Name
Description

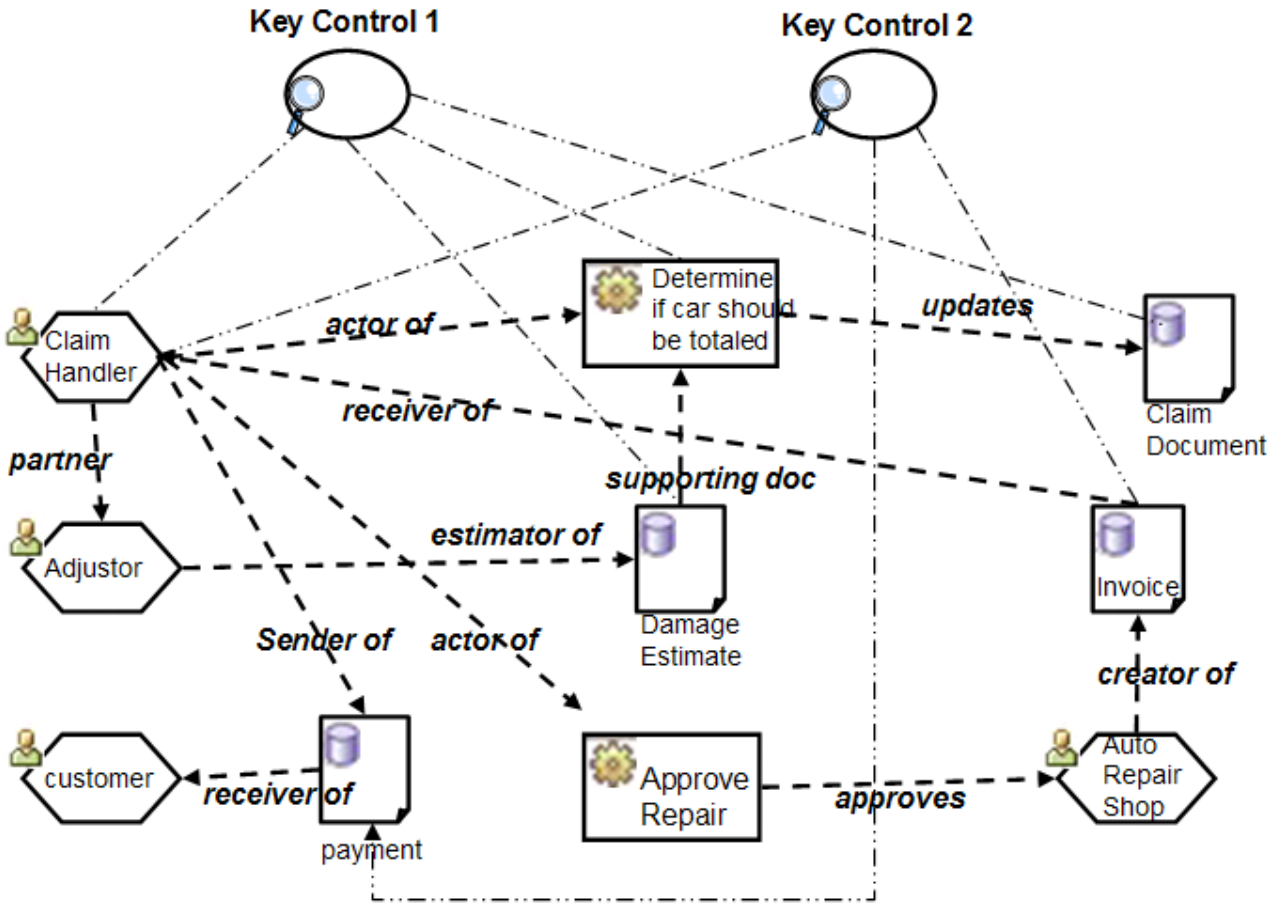

Policy Authoring Tool - Policies
Home
Policy Management
Author
Analyze
Negotiate
Deploy
Administration
Attributes
Templates
Manage Users
Logout
Select or create a new policy set:
Maricopa Policy Set
New
Copy
Save
Delete
Access Control
Export
Policy Templates
All
Claim Handler (1)
Claim handler
must
determine if car should be totaled
and
should
decide to total
if
Car: Value
is less than
initial repair cost estimate
OR
updated repair cost estimate
.
Claim handler must determine if car should be totaled and should decide to total if Car: Value is less than initial repair cost estimate OR updated repair cost estimate.
Select All
Add
Remove
Edit
Update
Name
Description
Maricopa Policy Set_IBM_13_1
Claim handler must determine if car should be totaled and should decide to total if Car: Value is less than initial repair cost estimate OR updated repair cost estimate.

Rule Mapping and deployment

"Each claim must have an initial damage estimation"

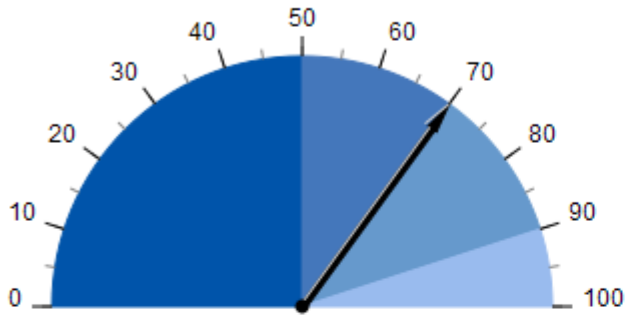


Deploying the rules in Provenance Graph



Dashboard before the rule is deployed

Maricopa Compliance Monitoring - Auto Insurance Scenario



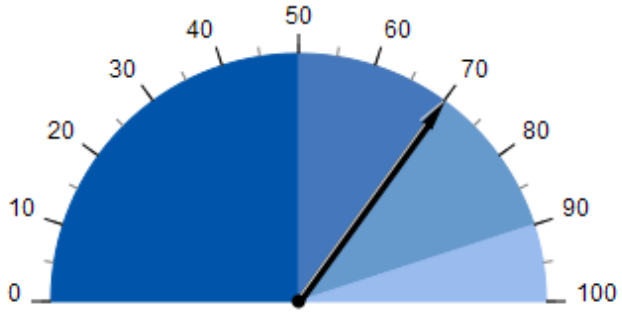
KCP1 : Each claim must have an initial damage estimate

Compliance Status by Case | Cases by Compliance Status

Claim Processes

Process	KCP1
ClaimProcess 10001	Compliant
ClaimProcess 10002	Compliant
ClaimProcess 10000	Defect
ClaimProcess 10005	Defect
ClaimProcess 10006	Compliant
ClaimProcess 10003	Compliant
ClaimProcess 10004	Compliant
ClaimProcess 10009	Compliant
ClaimProcess 10007	Compliant
ClaimProcess 10008	Defect

Maricopa Compliance Monitoring - Auto Insurance Scenario



KCP1 : Each claim must have an initial damage estimate

Compliance Status by Case | Cases by Compliance Status

Claim Processes

Process	KCP1
ClaimProcess 10001	Compliant
ClaimProcess 10002	Compliant
ClaimProcess 10000	Defect
ClaimProcess 10005	Defect
ClaimProcess 10006	Compliant
ClaimProcess 10003	Compliant
ClaimProcess 10004	Compliant
ClaimProcess 10009	Compliant
ClaimProcess 10007	Compliant
ClaimProcess 10008	Defect

Maricopa Compliance Monitoring - Auto Insurance Scenario

Details | Filter | Context

ClaimProcess 10000

Property	Value
class	process
recordTime	2009-12-17T15:57:13.800-05:00
id	urn:uuid:f849aed4-578d-4517-b527-36e1543a9db4
appId	10000

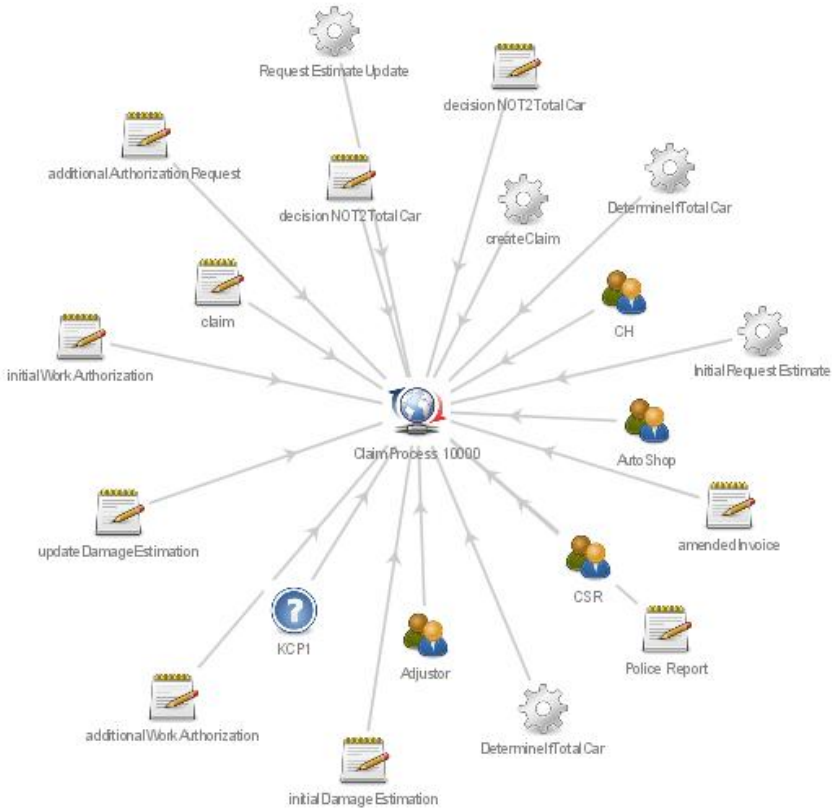
Related Artifacts

Reference	Artifact
partOf	claim
partOf	createClaim
partOf	CSR
partOf	CH
partOf	Police Report
partOf	Adjustor
partOf	AutoShop
partOf	InitialRequestEstimate
partOf	initialDamageEstimation
partOf	DetermineIfTotalCar
partOf	decisionNOT2TotalCar

Table | Provenance Graph | XML

Zoom 25% 100% 175% 250%

Details 0 3



Maricopa Compliance Monitoring - Auto Insurance Scenario

Details | Filter | Context

KCP1

Property	Value
class	custom
recordTime	2009-12-17T15:56:44.534-05:00
id	10921b66-1297-4e93-814c-0e3e31f4aa4b
appId	KCP1-10000
displayName	KCP1
timestamp	Wed, 16 Dec 2009 06:31:13 PM, EST
status	Defect
reason	Initial damage estimatation was not performed for this claim
description	Each claim must have an initial damage estimate
claimId	10000

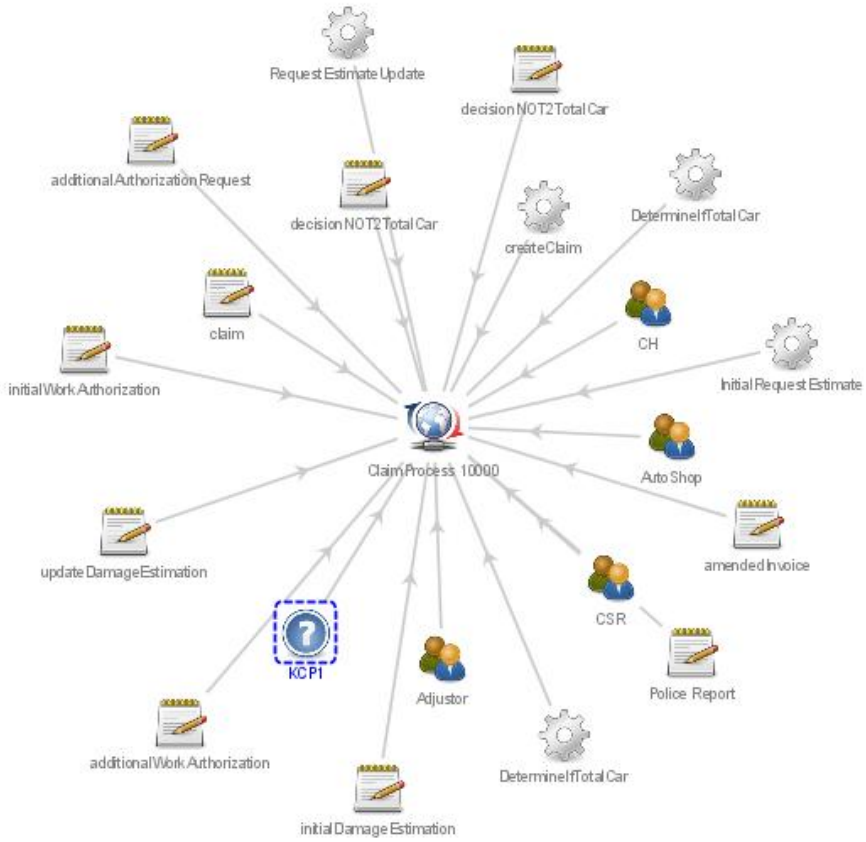
Related Artifacts

Reference	Artifact
partOf	ClaimProcess 10000

Table | Provenance Graph | XML

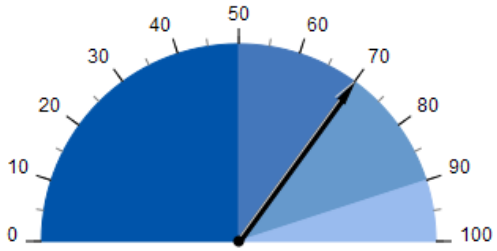
Zoom 25% 100% 175% 250%

Details 0

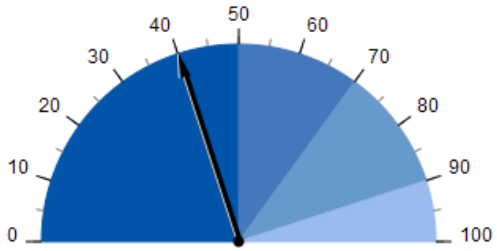


Dashboard after the rule is deployed

Maricopa Compliance Monitoring - Auto Insurance Scenario



KCP1 : Each claim must have an initial damage estimate



KCP2 : Claim handler must determine if car should be totaled and should decide to total if Car: Value is less than initial repair cost estimate OR updated repair cost estimate.

Compliance Status by Case | Cases by Compliance Status

Claim Processes

Process	KCP1	KCP2
ClaimProcess 10001	Compliant	Compliant
ClaimProcess 10002	Defect	Warning
ClaimProcess 10000	Defect	Defect
ClaimProcess 10005	Compliant	Compliant
ClaimProcess 10006	Defect	Warning
ClaimProcess 10003	Compliant	Compliant
ClaimProcess 10004	Compliant	Warning
ClaimProcess 10009	Compliant	Compliant
ClaimProcess 10007	Compliant	Warning
ClaimProcess 10008	Compliant	Warning

Maricopa Compliance Monitoring - Auto Insurance Scenario

Details | Filter | Context

ClaimProcess 10000

Property	Value
class	process
recordTime	2009-12-17T16:43:12.034-05:00
id	urn:uuid:2536b81f-ceaf-44cd-aec4-4e80db2b4743
appId	10000

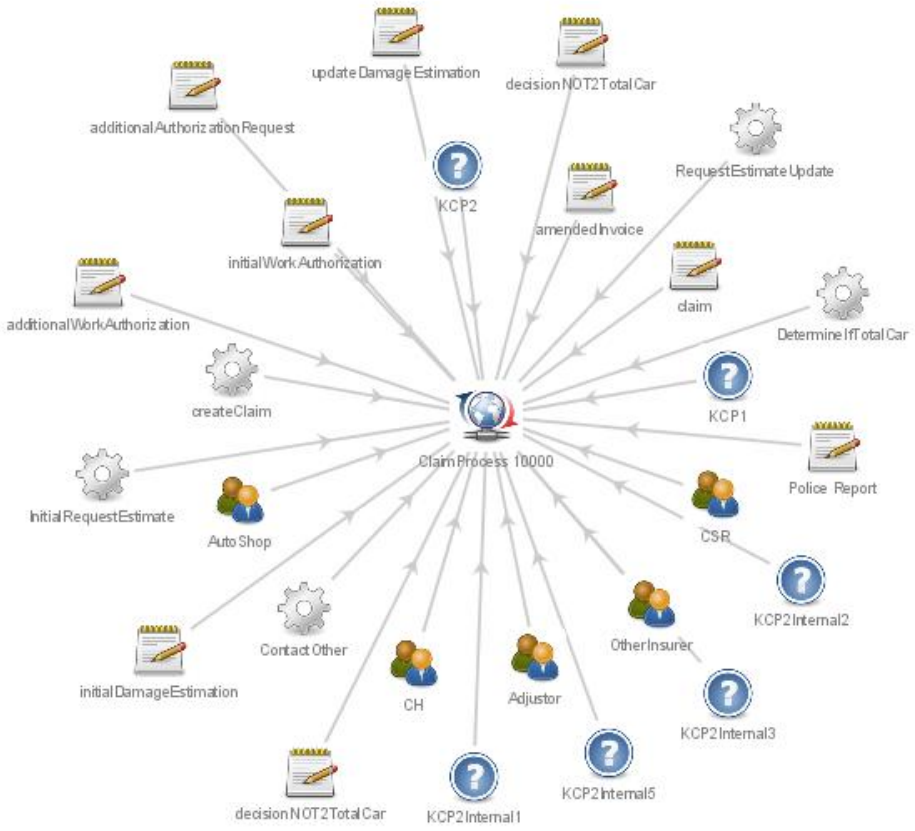
Related Artifacts

Reference	Artifact
partOf	decisionNOT2TotalCar
partOf	initialWorkAuthorization
partOf	additionalAuthorizationRequest
partOf	RequestEstimateUpdate
partOf	updateDamageEstimation
partOf	claim
partOf	createClaim
partOf	CSR
partOf	CH
partOf	Police Report
partOf	OtherInsurer

Table | Provenance Graph | XML

Zoom 25% 100% 175% 250%

Details 0 3



Maricopa Compliance Monitoring - Auto Insurance Scenario

Details | Filter | Context

KCP2

Property	Value
class	custom
recordTime	2009-12-17T16:42:53.628-05:00
id	urn:uuid:d2971a8f-8e42-4d81-ac1e-0e86c18b6df2
description	Claim handler must determine if car should be totaled and should decide to total if Car: Value is less than initial repa cost estimate OR updated repair cost estimate.
displayName	KCP2
appId	KCP2-10000
status	Defect

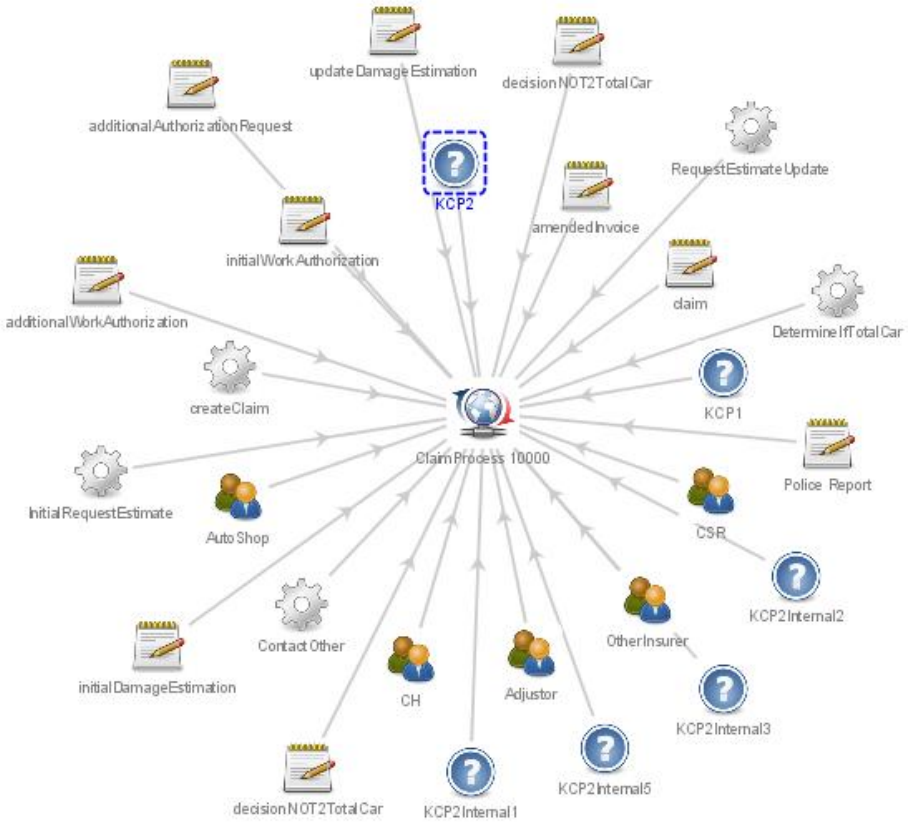
Related Artifacts

Reference	Artifact
refersTo	claim
refersTo	KCP2Internal1
refersTo	KCP2Internal5
partOf	ClaimProcess 10000

Table | Provenance Graph | XML

Zoom 25% 100% 175% 250%

Details 0 3



Details | Filter | Context

KCP2Internal3

Property	Value
class	custom
recordTime	2009-12-17T16:42:31.065-05:00
id	urn:uuid:3efad211-5c88-4906-b31d-ce70ff549d44
description	The car's value is more than the updated repair cost
displayName	KCP2Internal3
appId	KCP2Internal3-10000
value	False
reason	Updated repair cost is 17033 which is more than 15045, the value of the car
claimId	10000

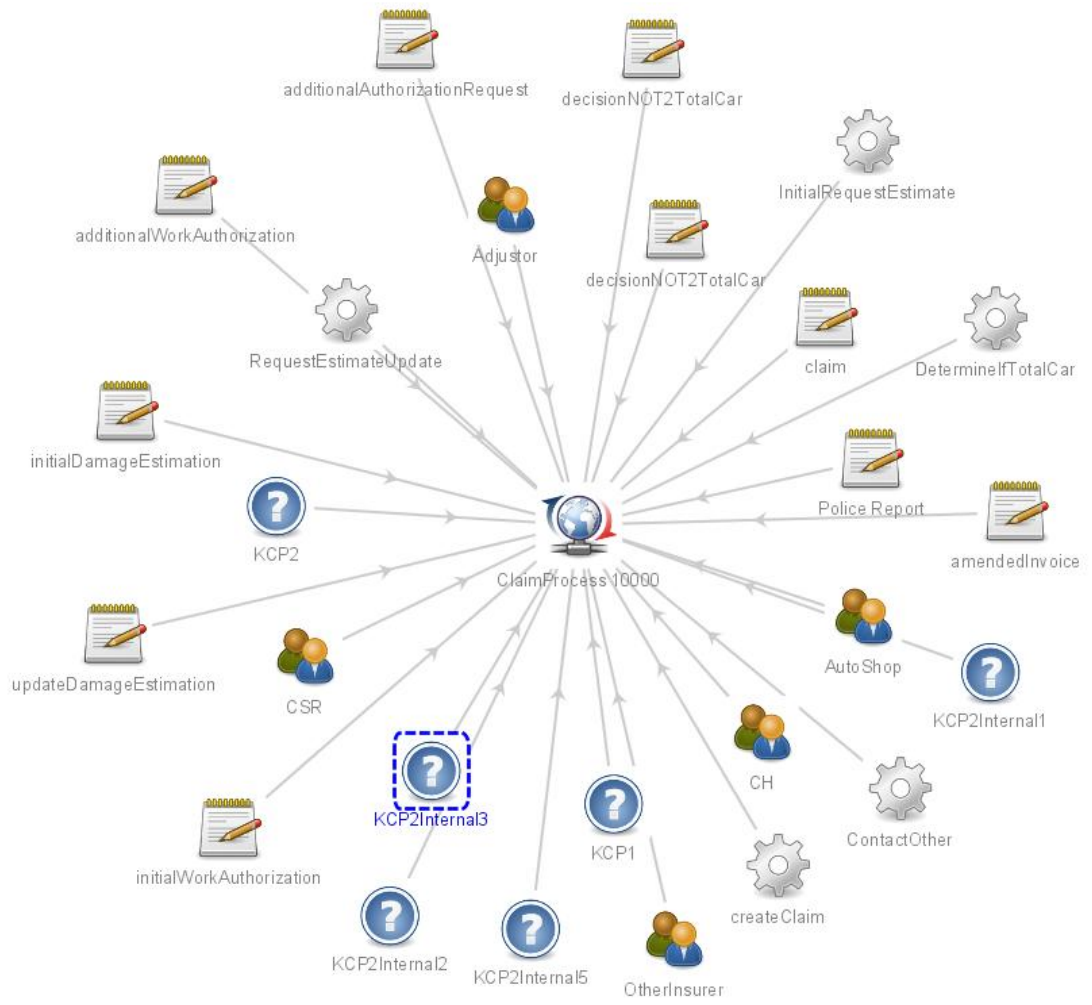
Related Artifacts

Reference	Artifact
refersTo	claim
refersTo	updateDamageEstimation
refersTo	KCP2Internal5
partOf	ClaimProcess 10000

Table | Provenance Graph | XML

Zoom 25% 100% 175% 250%

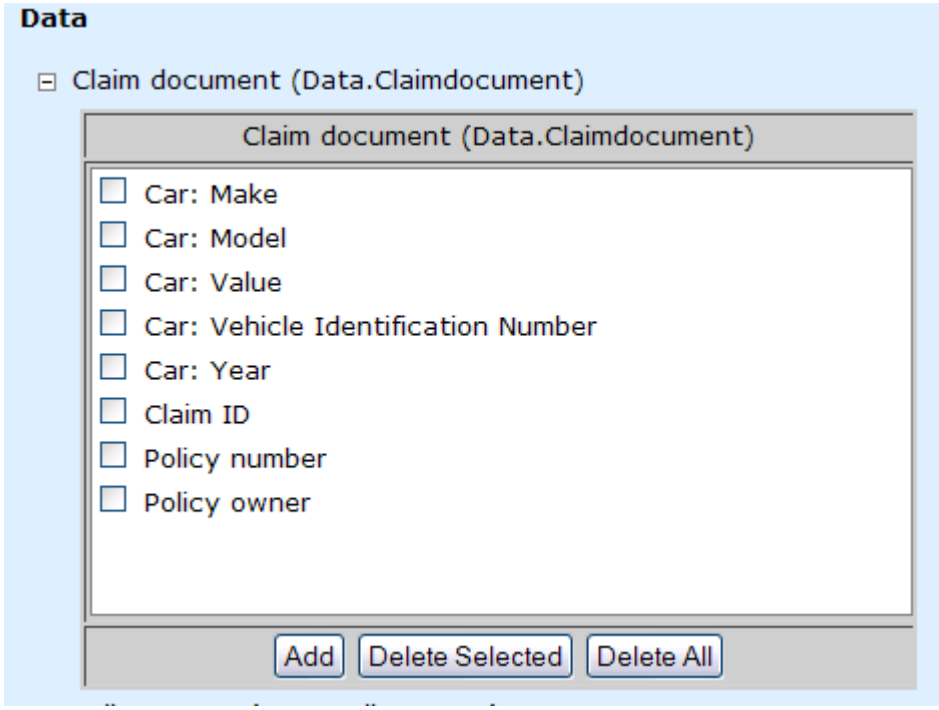
Details 0



Conclusions

- Demonstrated the integration of policy authoring tool to business provenance management system
- Semantic mapping of the IT level data to business language is essential but not automated
- Using templates in policy authoring help to avoid natural language processing
- Mapping the rules from authoring tool to provenance graph require automation

Questions?


Data
Claim document (Data.Claimdocument)
Claim document (Data.Claimdocument)
Car: Make
Car: Model
Car: Value
Car: Vehicle Identification Number
Car: Year
Claim ID
Policy number
Policy owner
Add
Delete Selected
Delete All