US Army Corps of Engineers
Army Geospatial Center

The Carbon Project

Innovative Geosocial Solutions

GeoSynchronization

Synchronization of Geo-Databases through Interoperability

Contact:

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www.TheCarbonProject.com

Agenda

- Background and **overview** (5 minutes)
- CarbonCloud Sync **design** overview (10 minutes)
- Enterprise **deployment** possibilities (5 minutes)
- CarbonCloud Sync in **action** (5 minutes)
- Questions? (5 minutes)

Background

Geospatial interoperability tools:

- CarbonTools PRO – software developers
- CarbonArc PRO – OGC for ArcGIS, including WFS-T
- Gaia – free viewer/platform
- Gaia Extenders – allow advanced functionality in Gaia

Canadian Geospatial Data Infrastructure (CGDI):

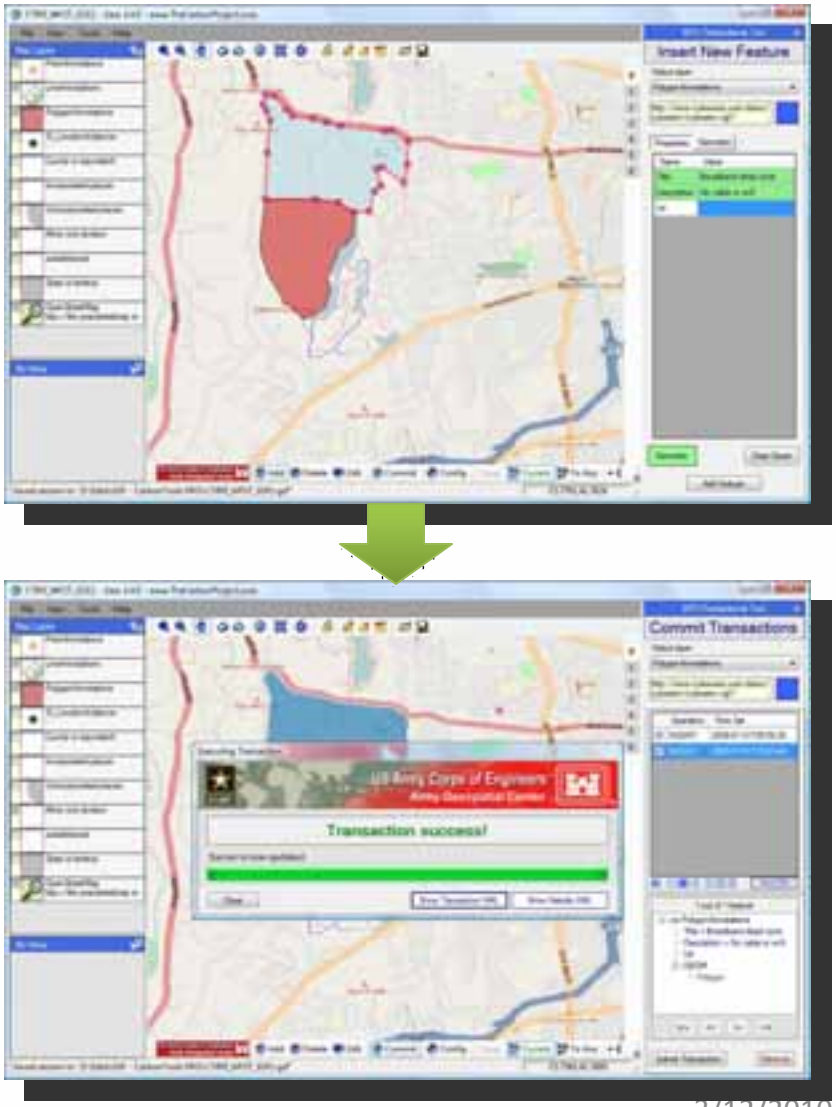
- GeoConnections hosted interoperability pilot in 2007
- OGC spec draft – Nov. 2008 (Peter V. & Glenn S.)

Army Geospatial Center (AGC):

- Enhanced Gaia support for ArcGIS Server OGC interfaces
- Developed WFS-Transactional extender for Gaia
- Develop a geo-synchronization solution

Gaia WFS-T Extender

- Support ArcGIS Server
- Vendor neutrality
- Schema neutrality
- Editing rules templates
- Offline editing on map
- Geometry editing tools
- Bulk transactions



Geo-Synchronization

Separate Entities Updating Geospatial Databases

U.S.ARMY

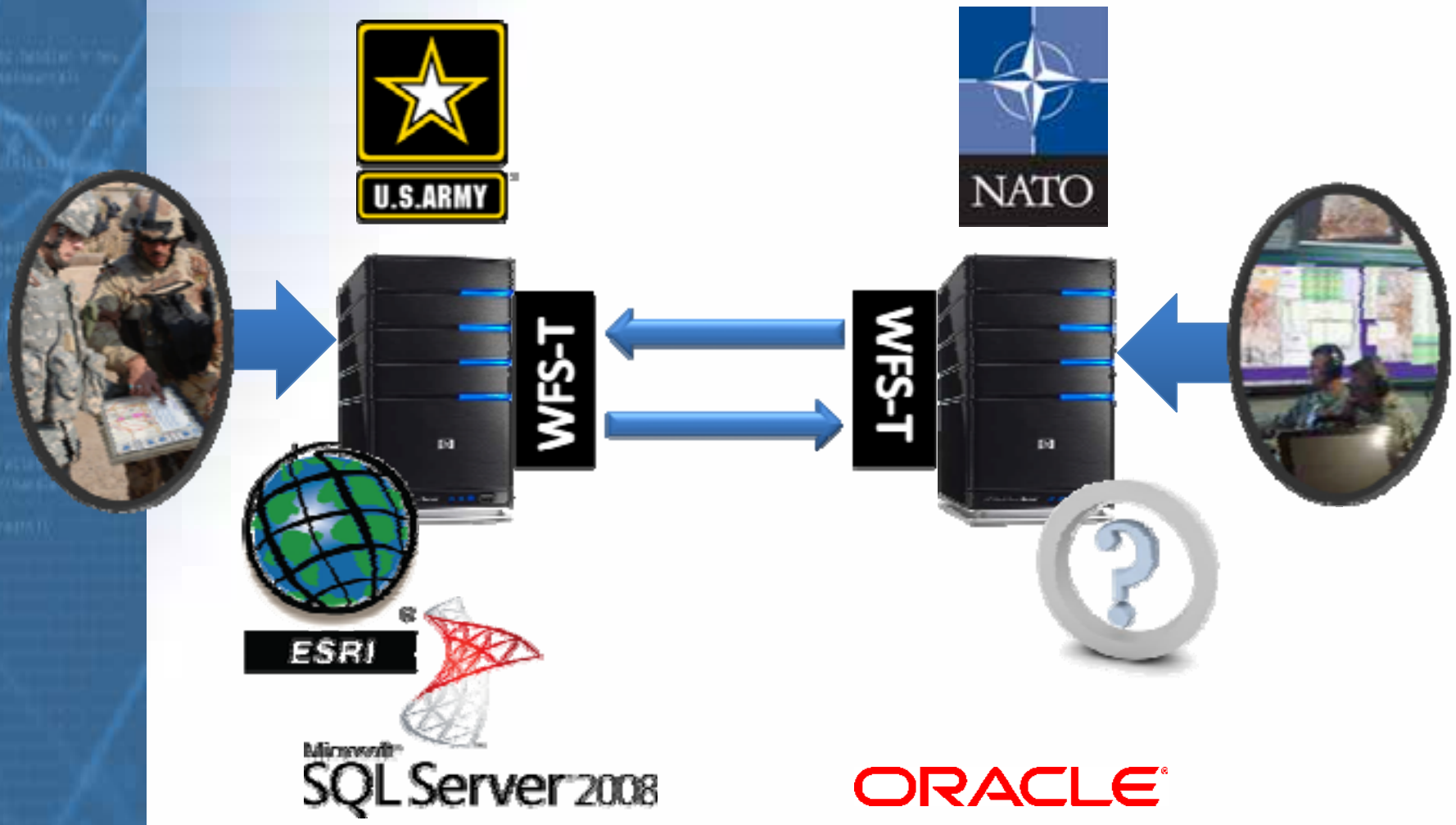
ESRI

Microsoft SQL Server 2008

NATO

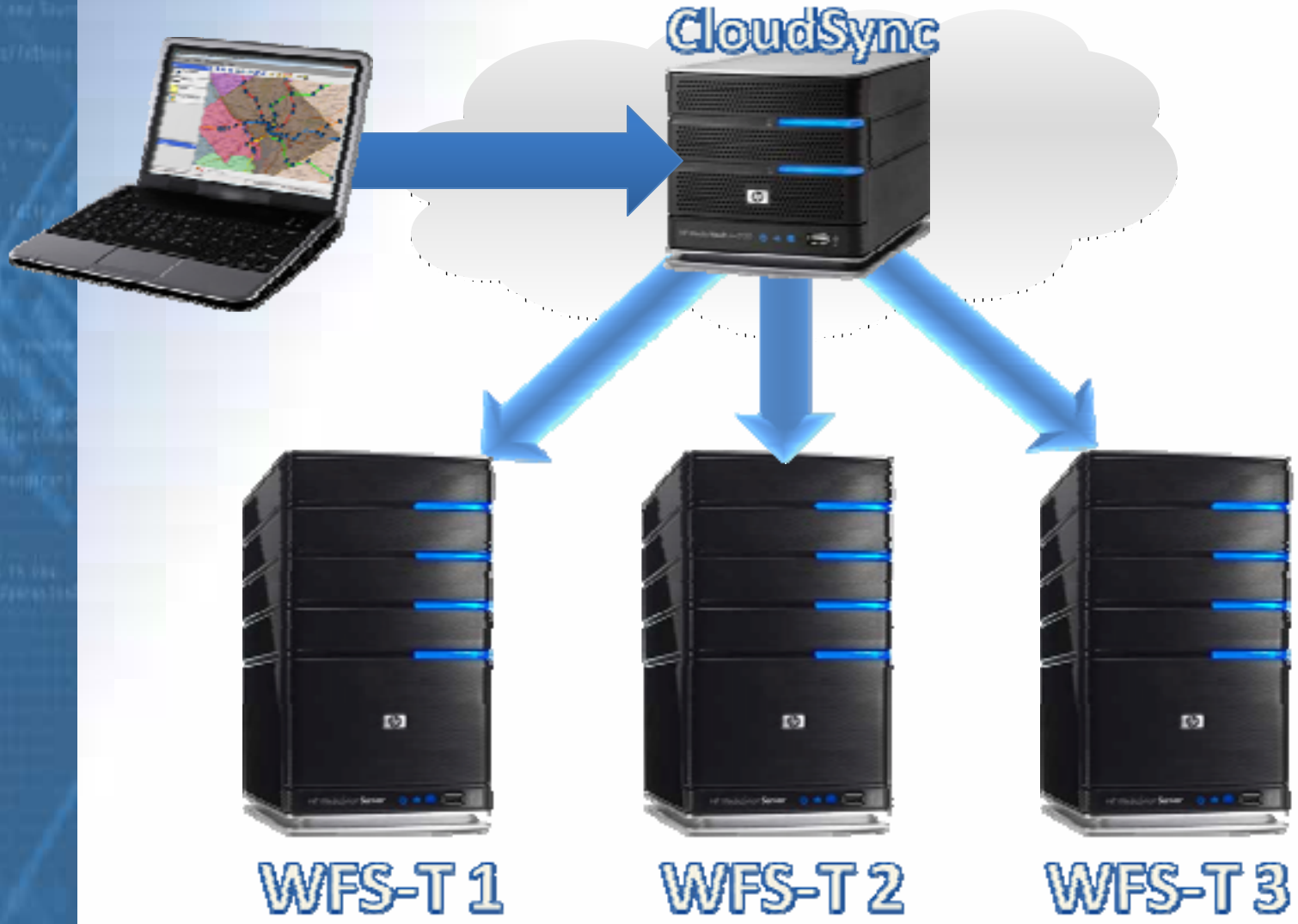
ORACLE

Separate Entities Updating Geospatial Databases



Geo-Synchronization CarbonCloud Sync Design

Geo-Synchronization



Requirements

- **Vendor neutral** : Can sync WFS-T from various vendors based on unspecified databases
- **Schema neutral** : We know little about the schemas used, how they correlate etc.
- **Roles/reviews** : All changes may be reviewed before getting propagated to synced servers
- **Standards** : All operations and transactions should follow standards (ATOM RSS & OGC)
- **Development** : Enhance the Gaia WFS-T tool (i.e. enable the tool to connect to the sync service)

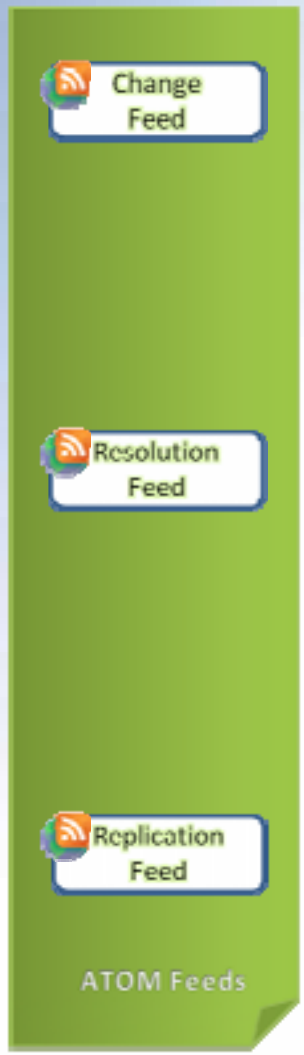
Roles

A **Publisher** is a person (or system) that creates, deletes or inserts features. The Publisher **submits** the operations to the CloudSync service and monitors the review results.

A **Reviewer** is an authority figure that has the final word on the changes. The Reviewer monitors any changes within his/hers jurisdiction and **approves** or **rejects** them.

A **Follower** is a person (or system) who is interested in any sync-transactions made to a specific service (e.g. DBA, IT, COI etc.) Changes are reported via an RSS **feed**.

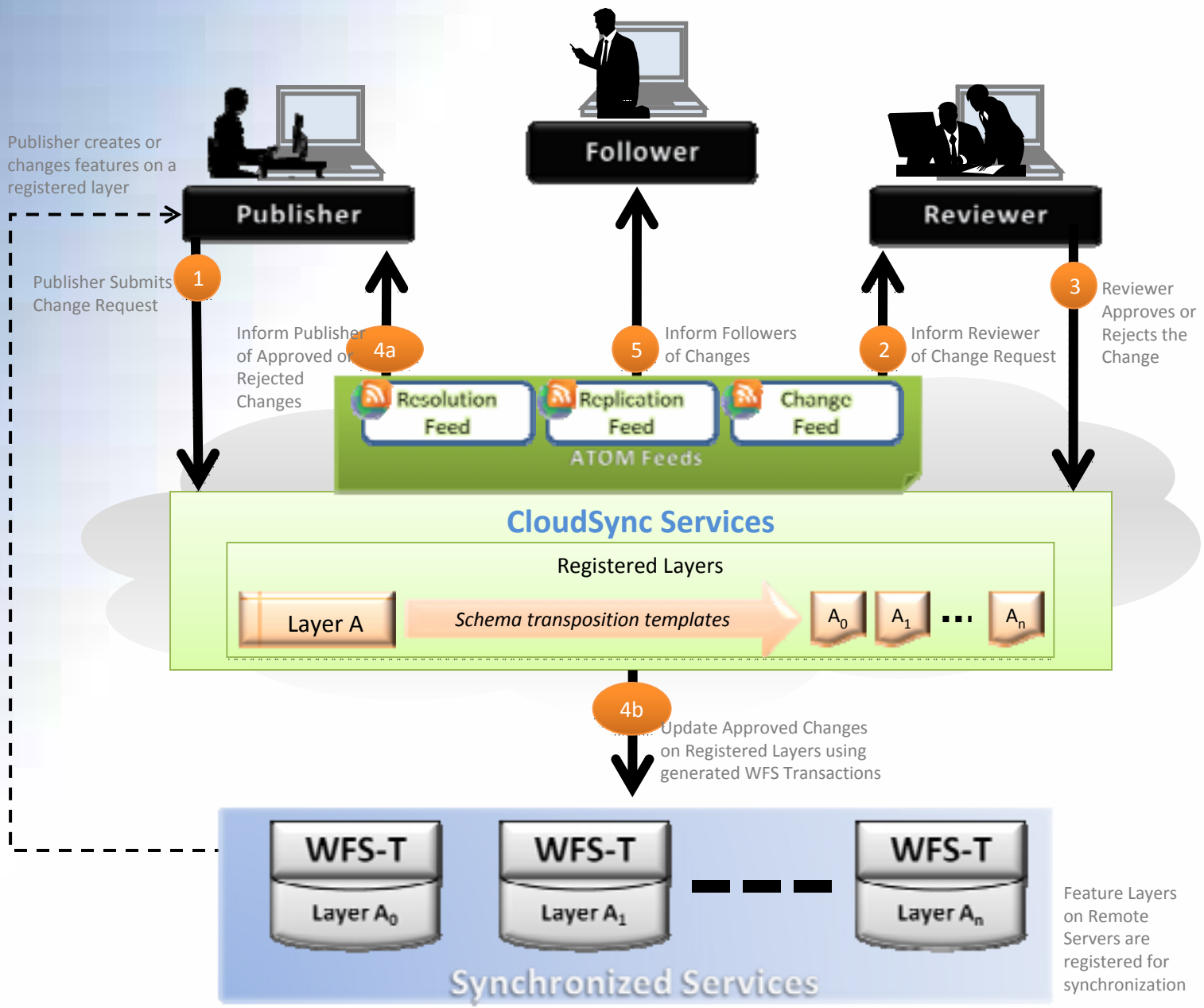
RSS Feeds



The **Change Feed reports to the Reviewer** about **change requests** from Publishers.

The **Resolution Feed updates the Publisher** about the **results of changes review**.

The **Replication Feed** reports of successful **transactions to a synced** service.

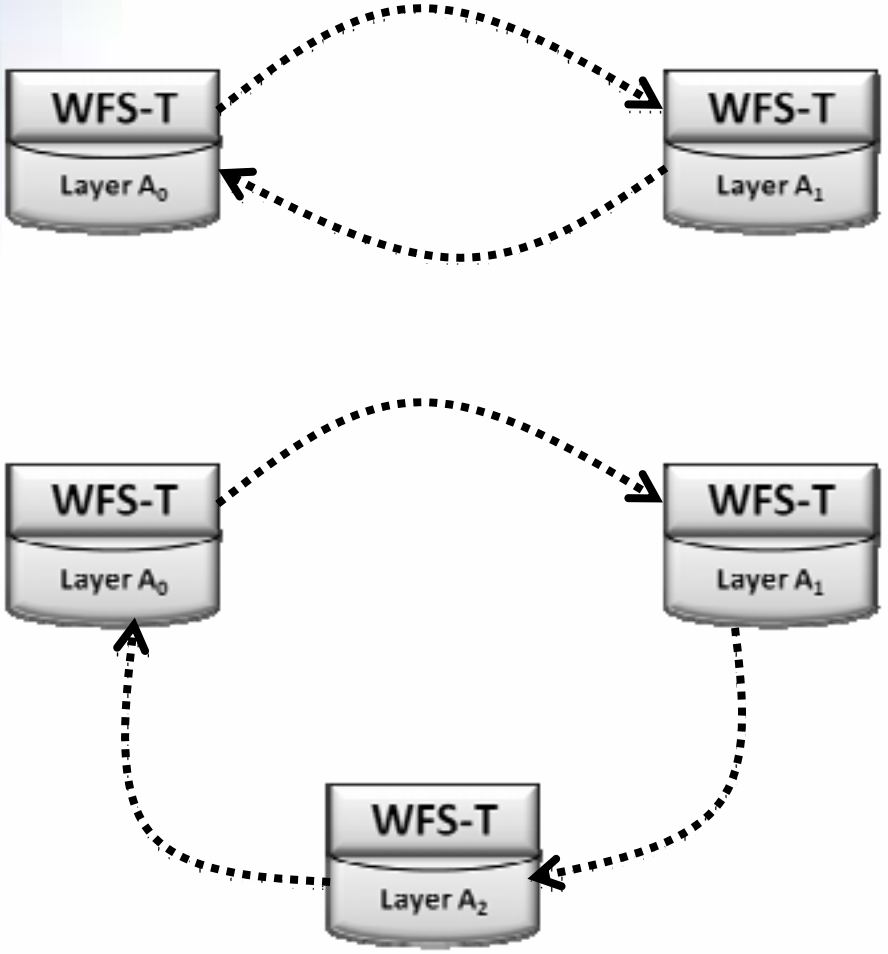

Publisher creates or changes features on a registered layer
Publisher
Follower
Reviewer
Publisher Submits Change Request
1
Inform Publisher of Approved or Rejected Changes
4a
5
Inform Followers of Changes
2
Inform Reviewer of Change Request
3
Reviewer Approves or Rejects the Change
Resolution Feed
Replication Feed
Change Feed
ATOM Feeds
CloudSync Services
Registered Layers
Layer A
Schema transposition templates
A0
A1
An
4b
Update Approved Changes on Registered Layers using generated WFS Transactions
WFS-T
Layer A0
WFS-T
Layer A1
WFS-T
Layer An
Synchronized Services
Feature Layers on Remote Servers are registered for synchronization

CloudSync Deployment

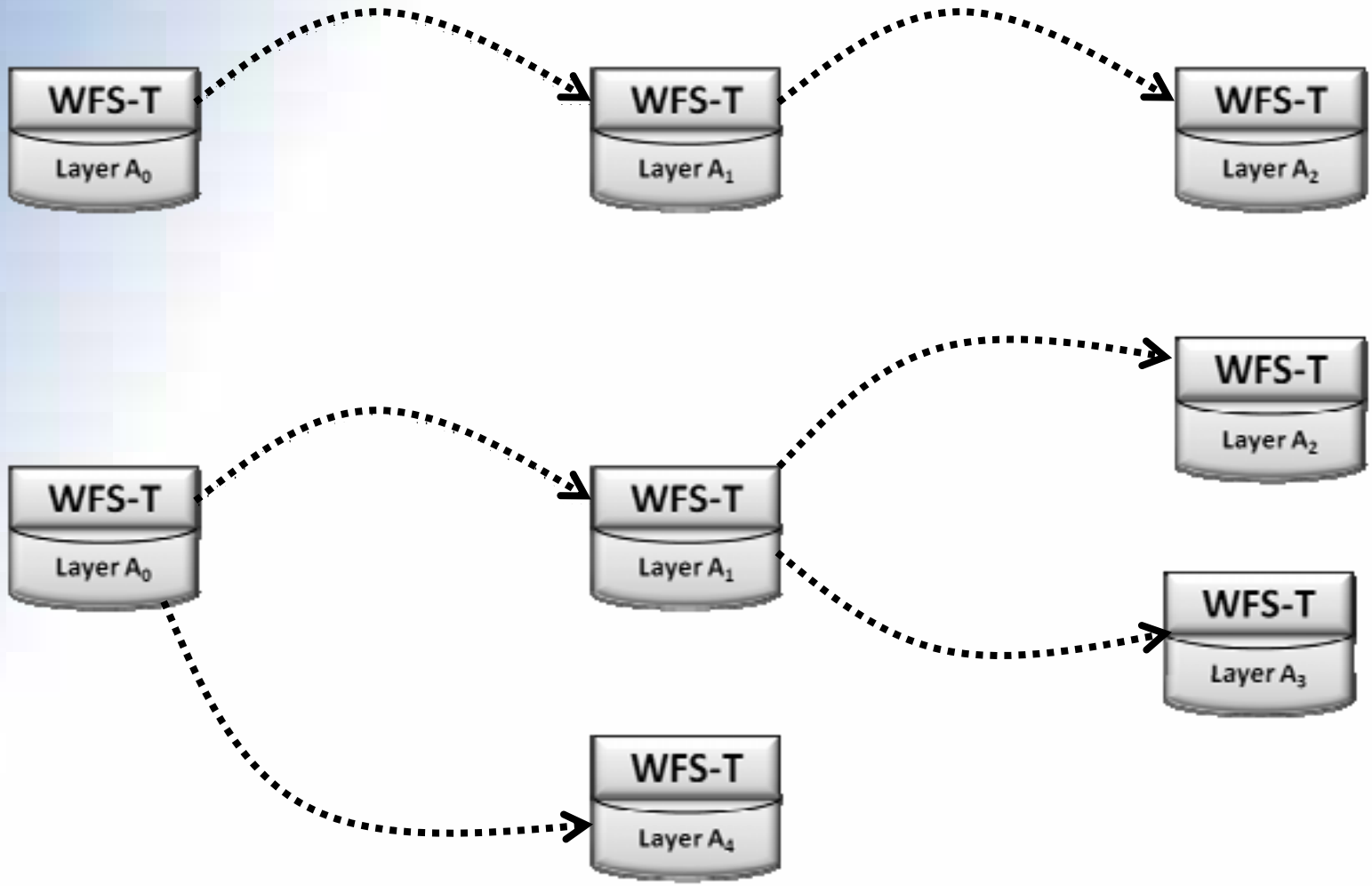
Deployment

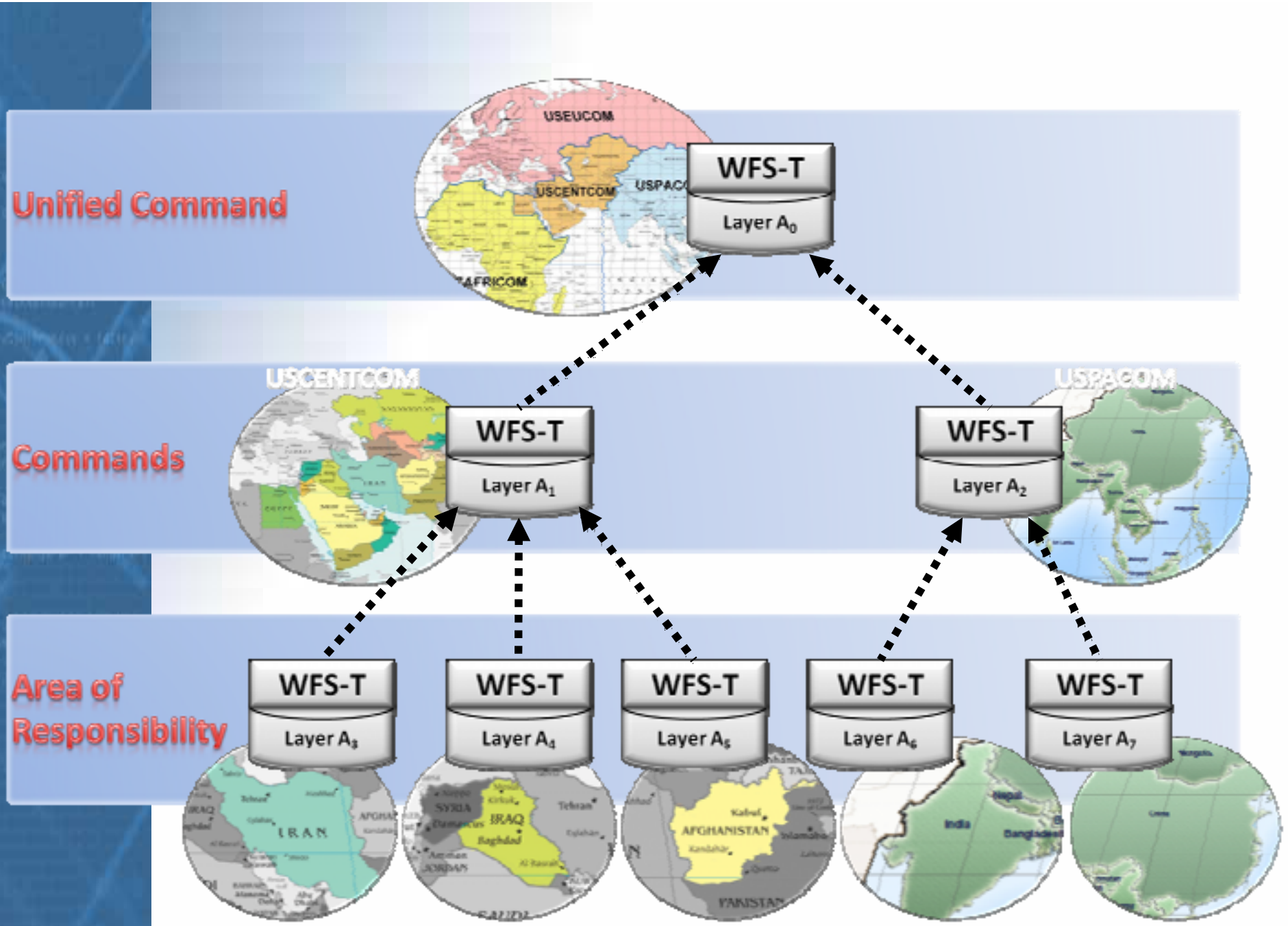
- Service can be server or Cloud hosted
- Management system (Web hosted front-end) allows:
  - Registering users and roles
  - Registering services and layers
  - Assigning sync with other services layers
- Organized in a way where a layer is synced to other layers
- Allows linear or tree-type updates hierarchy
- Allows circular updates (A follows B, B follows A)

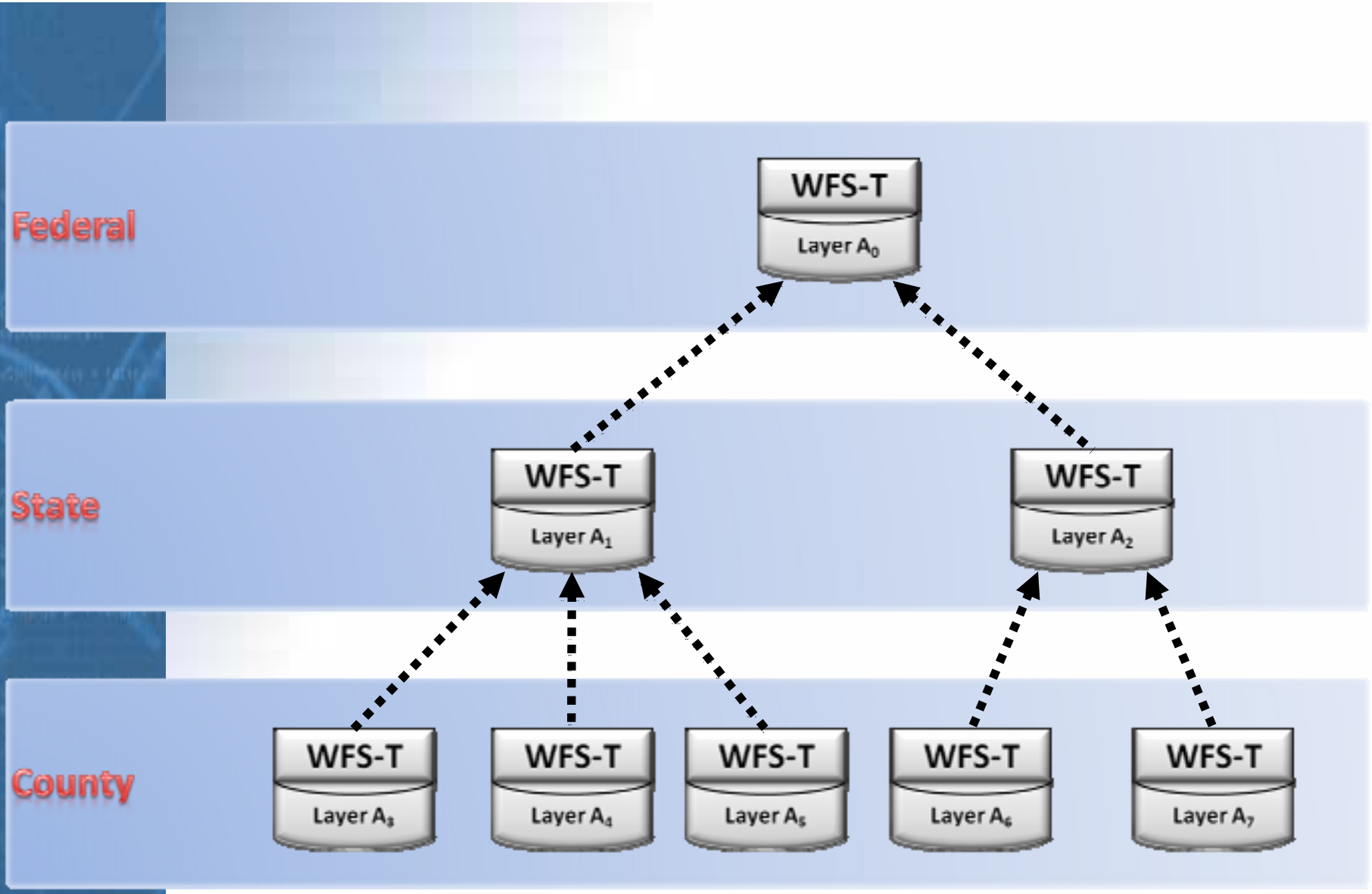
Circular Deployment



One-Directional Deployment

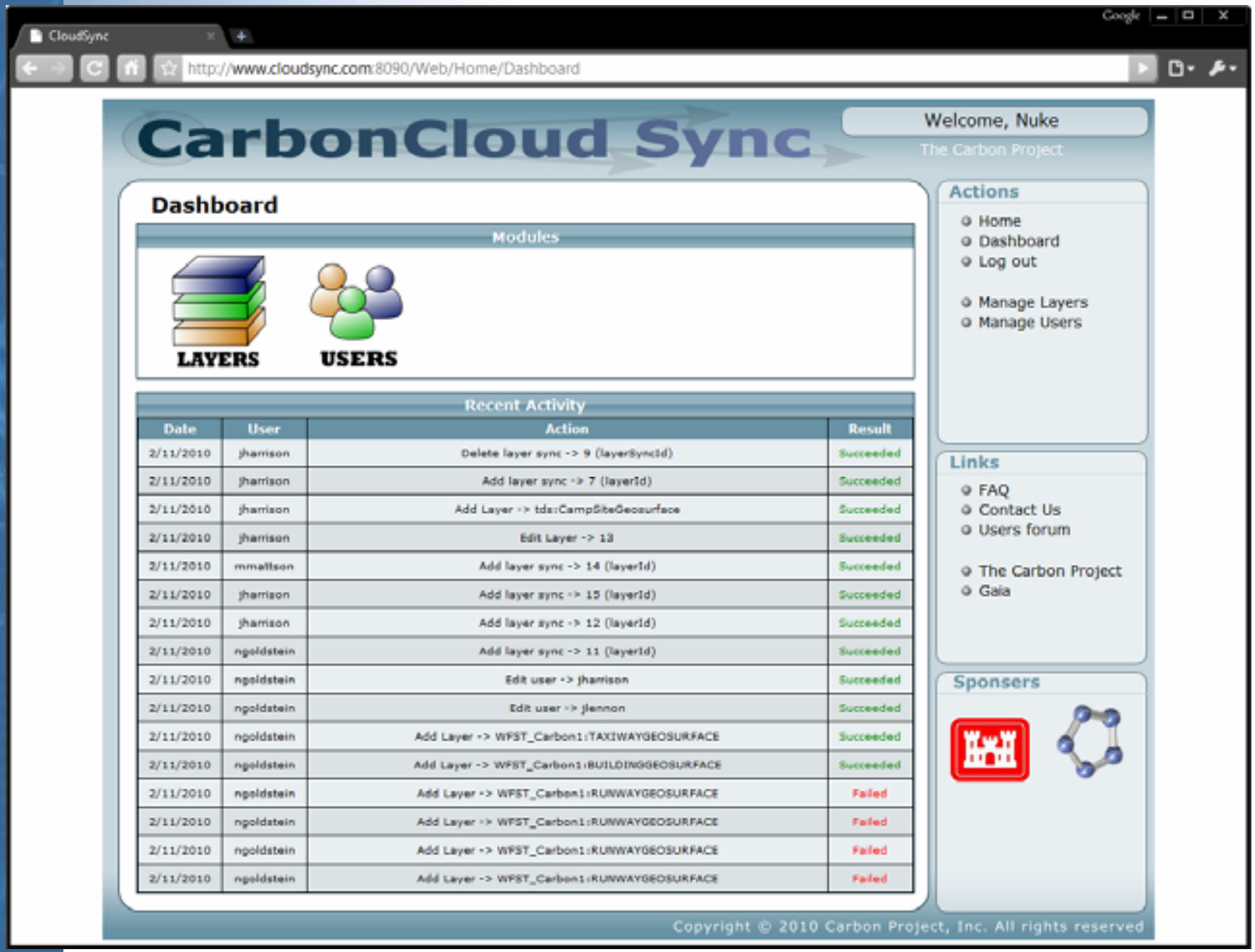






County-State-Federal synchronization

Carbon CloudSync in Action


CloudSync
http://www.cloudsync.com:8090/Web/Home/Dashboard
CarbonCloud Sync
Welcome, Nuke
The Carbon Project
Dashboard
Modules
LAYERS
USERS
Recent Activity
Date | User | Action | Result
2/11/2010 | jharrison | Delete layer sync -> 9 (layerSyncId) | Succeeded
2/11/2010 | jharrison | Add layer sync -> 7 (layerId) | Succeeded
2/11/2010 | jharrison | Add Layer -> tds:CampSiteGeosurface | Succeeded
2/11/2010 | jharrison | Edit Layer -> 13 | Succeeded
2/11/2010 | mmattson | Add layer sync -> 14 (layerId) | Succeeded
2/11/2010 | jharrison | Add layer sync -> 15 (layerId) | Succeeded
2/11/2010 | jharrison | Add layer sync -> 12 (layerId) | Succeeded
2/11/2010 | ngoldstein | Add layer sync -> 11 (layerId) | Succeeded
2/11/2010 | ngoldstein | Edit user -> jharrison | Succeeded
2/11/2010 | ngoldstein | Edit user -> jlennon | Succeeded
2/11/2010 | ngoldstein | Add Layer -> WFST_Carbon1:TAXIWAYGEOSURFACE | Succeeded
2/11/2010 | ngoldstein | Add Layer -> WFST_Carbon1:BUILDINGGEOSURFACE | Succeeded
2/11/2010 | ngoldstein | Add Layer -> WFST_Carbon1:RUNWAYGEOSURFACE | Failed
2/11/2010 | ngoldstein | Add Layer -> WFST_Carbon1:RUNWAYGEOSURFACE | Failed
2/11/2010 | ngoldstein | Add Layer -> WFST_Carbon1:RUNWAYGEOSURFACE | Failed
2/11/2010 | ngoldstein | Add Layer -> WFST_Carbon1:RUNWAYGEOSURFACE | Failed
Actions
Home
Dashboard
Log out
Manage Layers
Manage Users
Links
FAQ
Contact Us
Users forum
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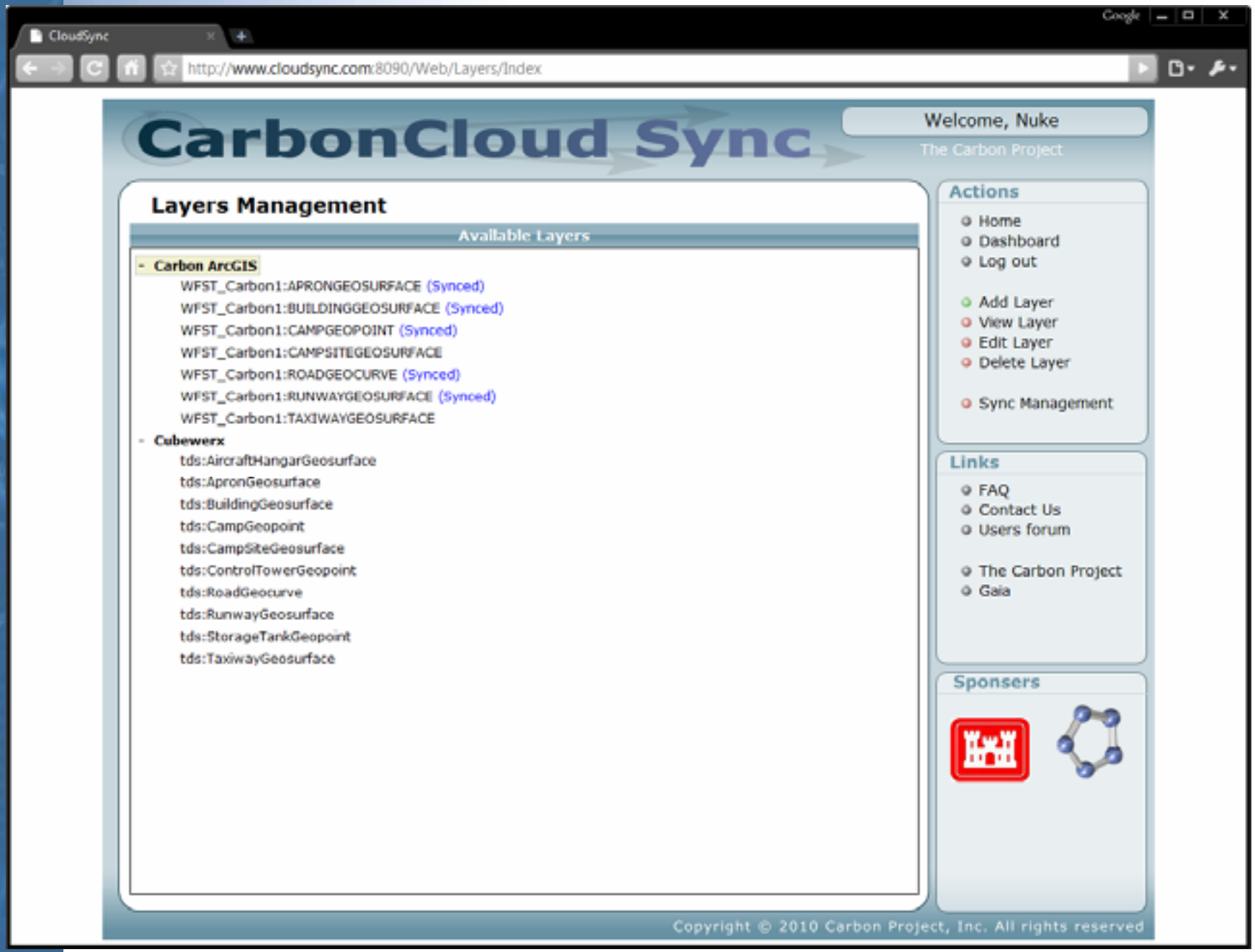
CloudSync
http://www.cloudsync.com:8090/Web/Layers/Index
CarbonCloud Sync
Welcome, Nuke
The Carbon Project
Layers Management
Available Layers
- Carbon ArcGIS
WFST_Carbon1:APRONGEOSURFACE (Synced)
WFST_Carbon1:BUILDINGGEOSURFACE (Synced)
WFST_Carbon1:CAMPGEOPOINT (Synced)
WFST_Carbon1:CAMPSITEGEOSURFACE
WFST_Carbon1:ROADGEOCURVE (Synced)
WFST_Carbon1:RUNWAYGEOSURFACE (Synced)
WFST_Carbon1:TAXIWAYGEOSURFACE
- Cubewerx
tds:AircraftHangarGeosurface
tds:ApronGeosurface
tds:BuildingGeosurface
tds:CampGeopoint
tds:CampSiteGeosurface
tds:ControlTowerGeopoint
tds:RoadGeocurve
tds:RunwayGeosurface
tds:StorageTankGeopoint
tds:TaxiwayGeosurface
Actions
Home
Dashboard
Log out
Add Layer
View Layer
Edit Layer
Delete Layer
Sync Management
Links
FAQ
Contact Us
Users forum
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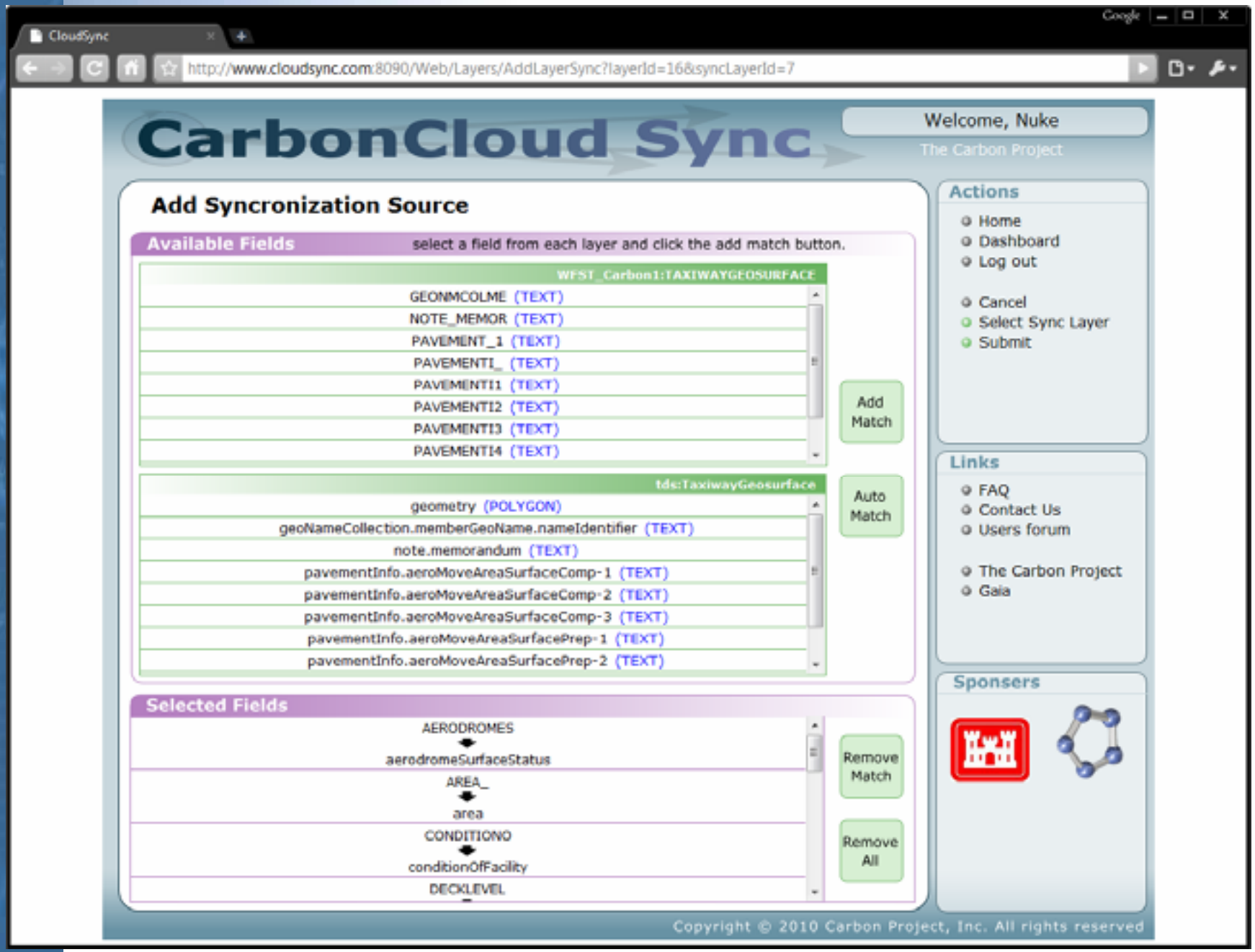
CloudSync
http://www.cloudsync.com:8090/Web/Layers/AddLayerSync?layerId=16&syncLayerId=7
CarbonCloud Sync
Welcome, Nuke
The Carbon Project
Add Syncronization Source
Available Fields
select a field from each layer and click the add match button.
WFST_Carbon1:TAXIWAYGEOSURFACE
GEONMCOLME (TEXT)
NOTE_MEMOR (TEXT)
PAVEMENT_1 (TEXT)
PAVEMENTI_ (TEXT)
PAVEMENTI1 (TEXT)
PAVEMENTI2 (TEXT)
PAVEMENTI3 (TEXT)
PAVEMENTI4 (TEXT)
Add Match
tds:TaxiwayGeosurface
geometry (POLYGON)
geoNameCollection.memberGeoName.nameIdentifier (TEXT)
note.memorandum (TEXT)
pavementInfo.aeroMoveAreaSurfaceComp-1 (TEXT)
pavementInfo.aeroMoveAreaSurfaceComp-2 (TEXT)
pavementInfo.aeroMoveAreaSurfaceComp-3 (TEXT)
pavementInfo.aeroMoveAreaSurfacePrep-1 (TEXT)
pavementInfo.aeroMoveAreaSurfacePrep-2 (TEXT)
Auto Match
Selected Fields
AERODROMES
aerodromeSurfaceStatus
AREA_
area
CONDITIONO
conditionOfFacility
DECKLEVEL
Remove Match
Remove All
Actions
Home
Dashboard
Log out
Cancel
Select Sync Layer
Submit
Links
FAQ
Contact Us
Users forum
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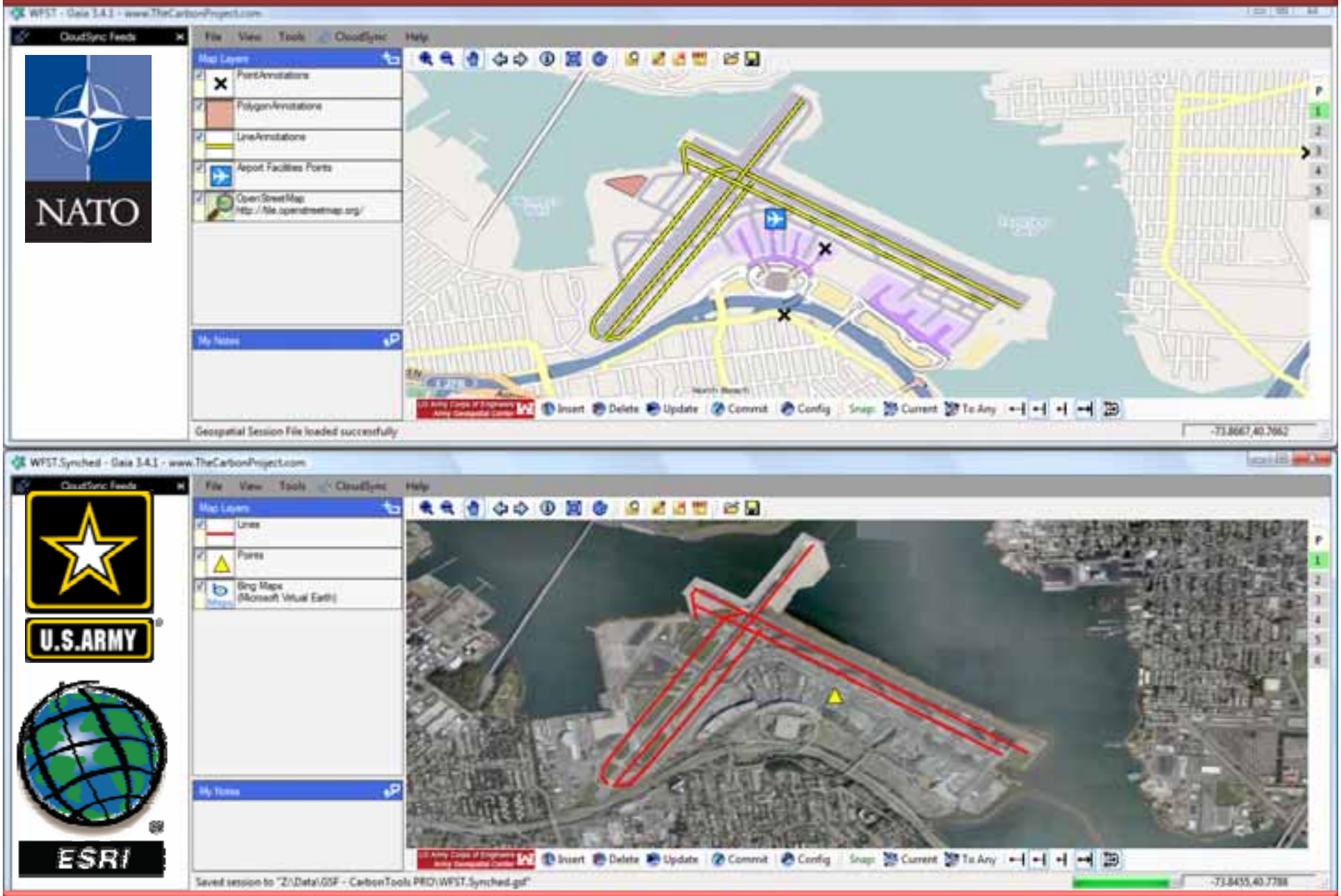
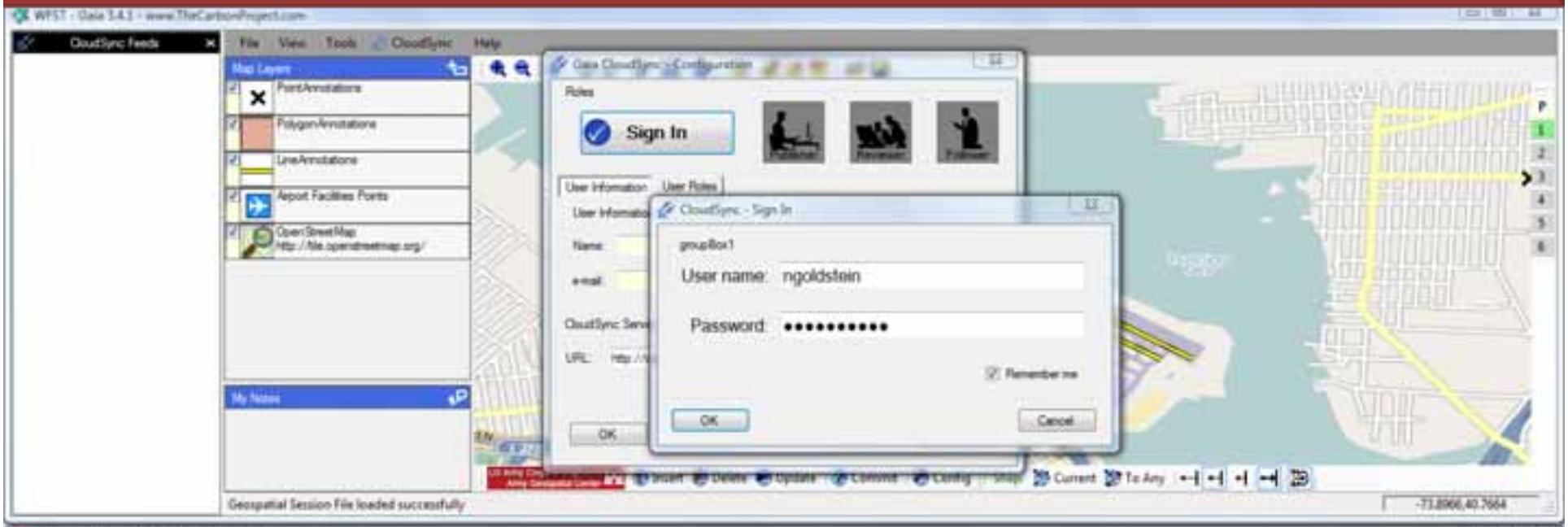
(TOP) Gaia session shows features from an Oracle based CubeWerx WFS-T



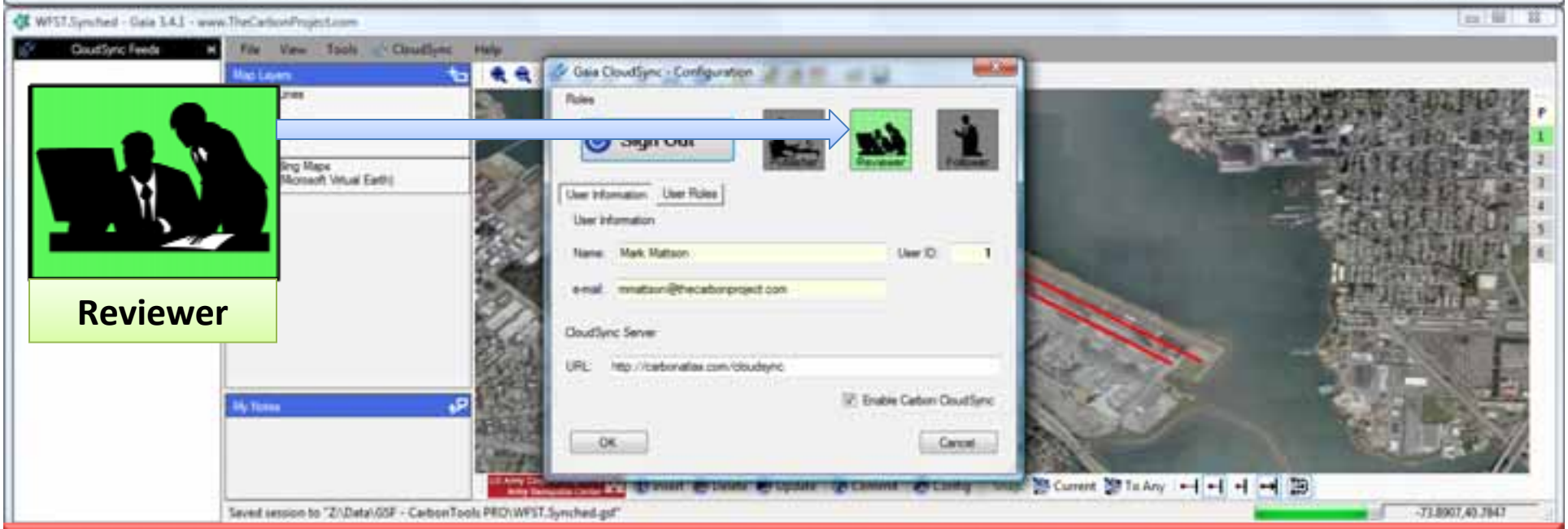
(BOTTOM) Gaia session shows features from a SQL Server based ArcGIS 9.3 WFS-T

(TOP) Gaia user logs in to CloudSync server as ‘ngoldstein’



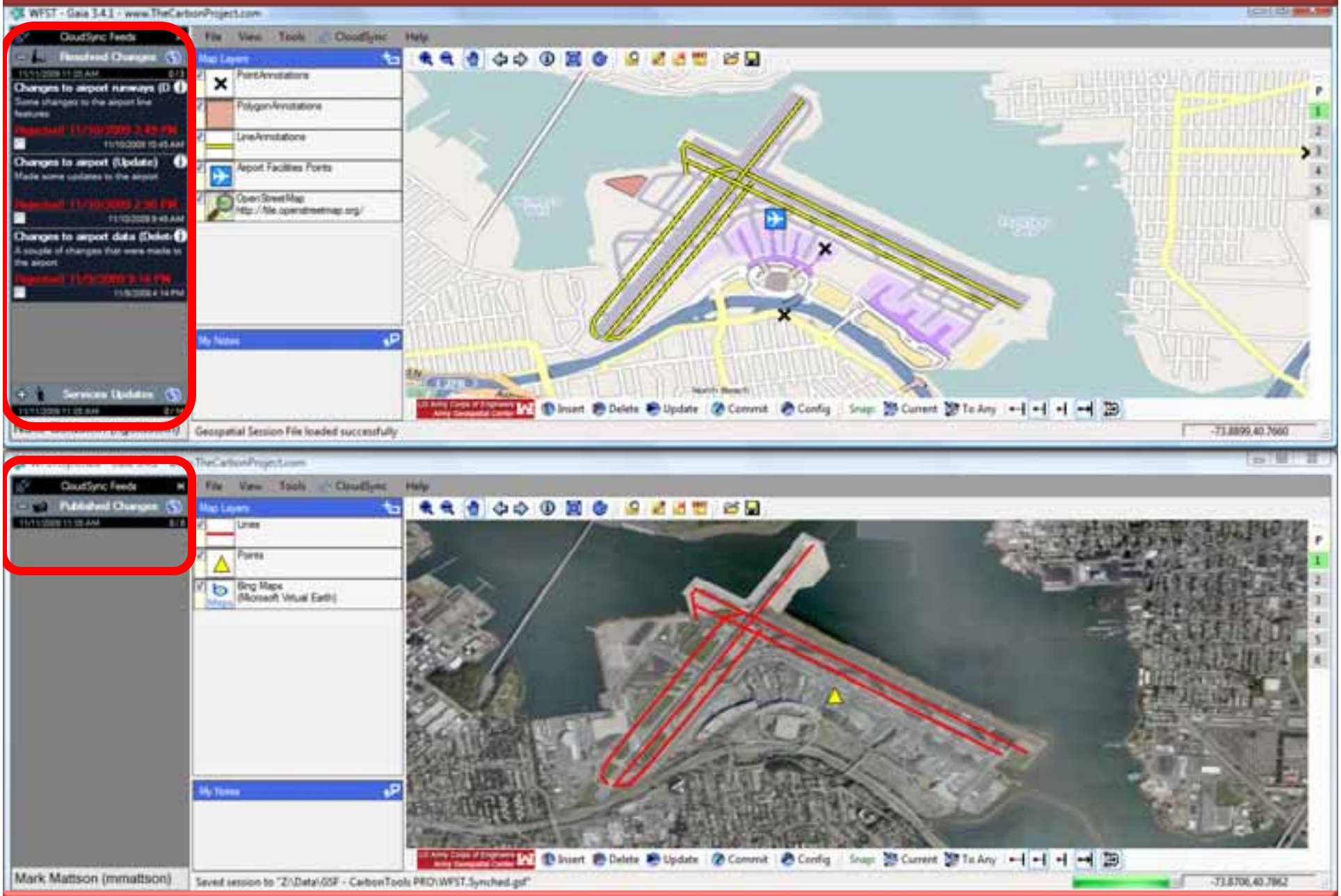
(BOTTOM) Gaia user logs in to CloudSync server as ‘mmattson’

(TOP) User roles are defined as ‘Publisher’ and ‘Follower’



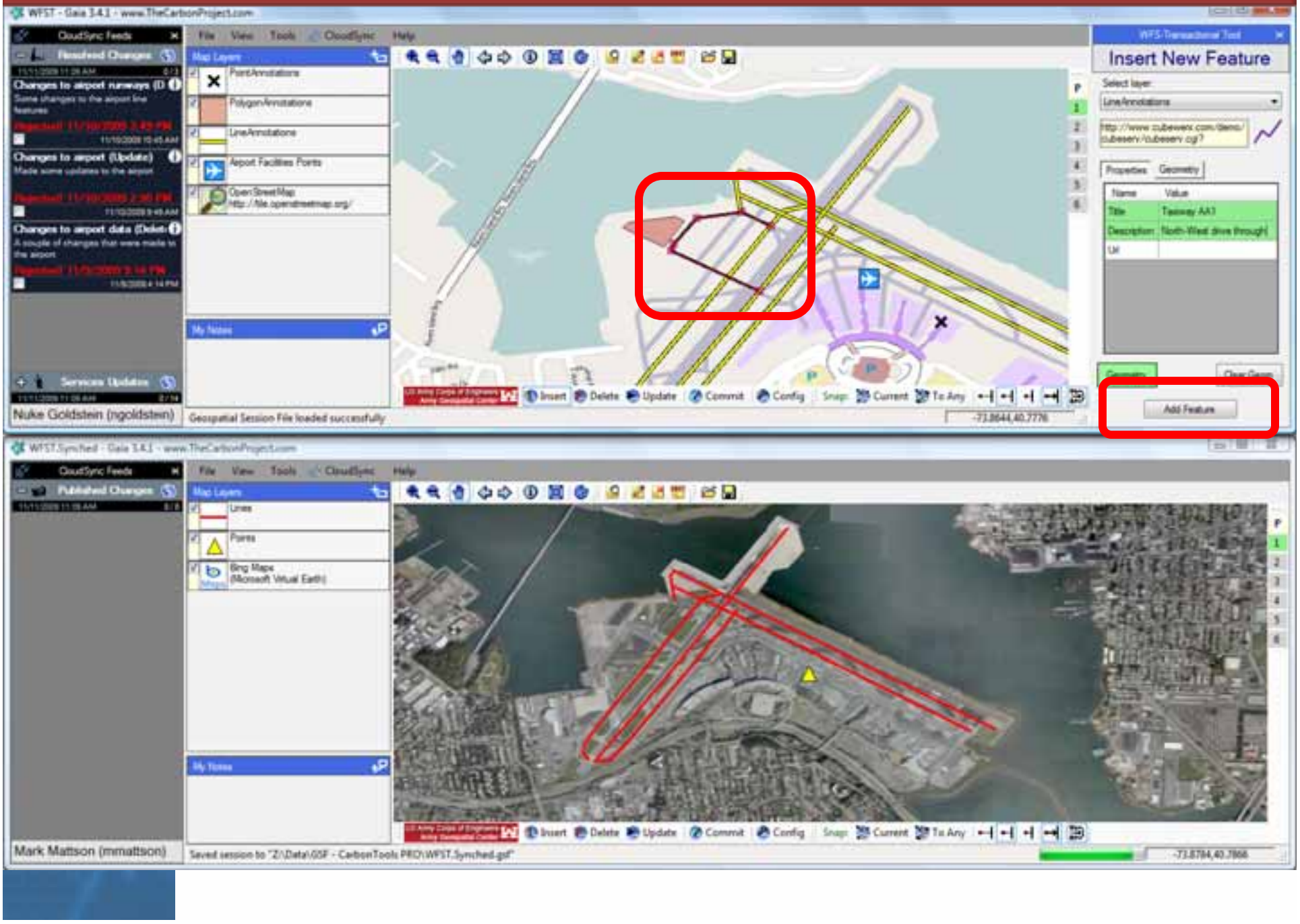
(BOTTOM) User role is defined as ‘Reviewer’

(TOP) Appropriate ‘Resolution’ and ‘Replication’ feeds (filtered for user) are displayed

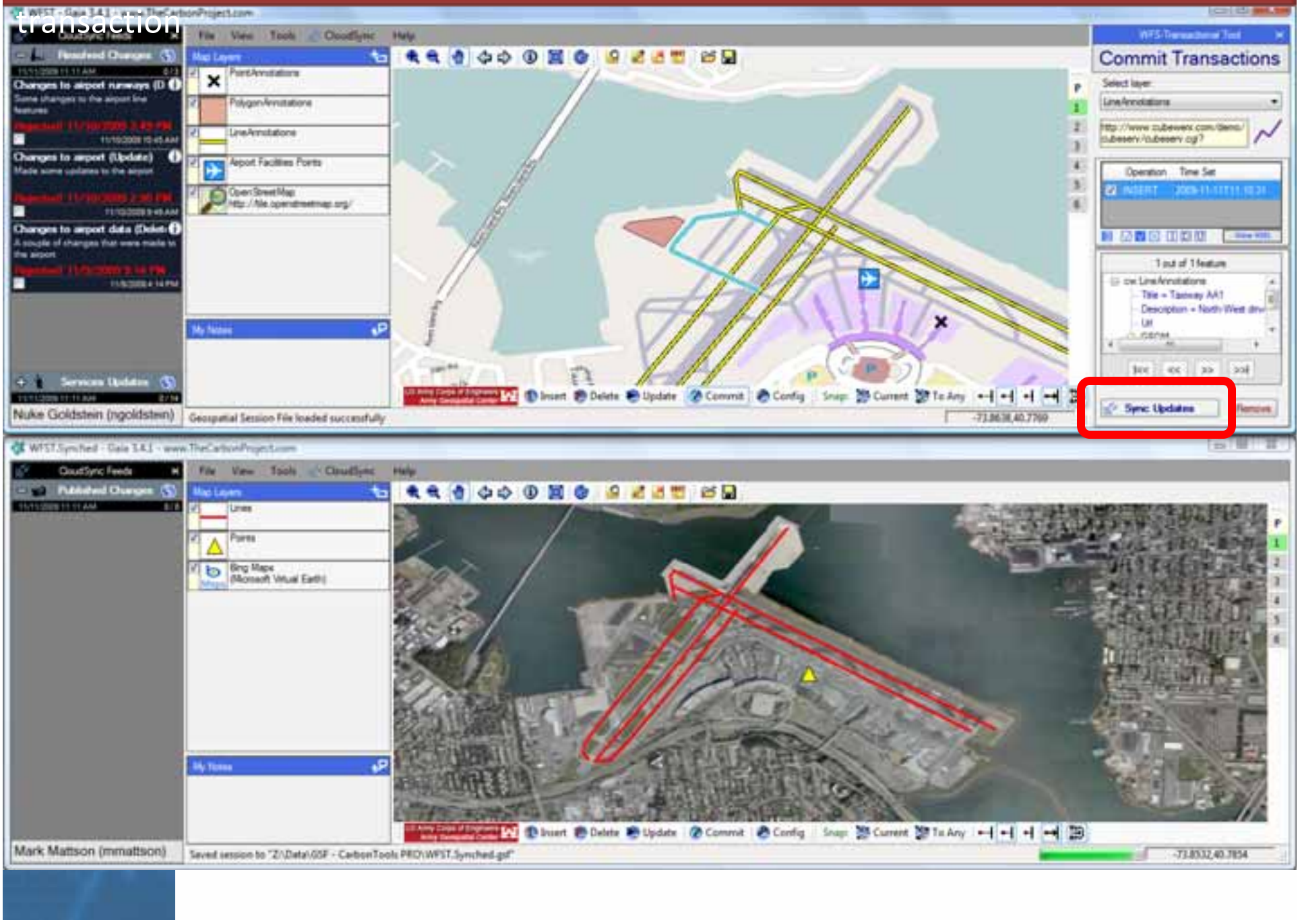


(BOTTOM) Appropriate ‘Change’ feed (filtered for user) is displayed

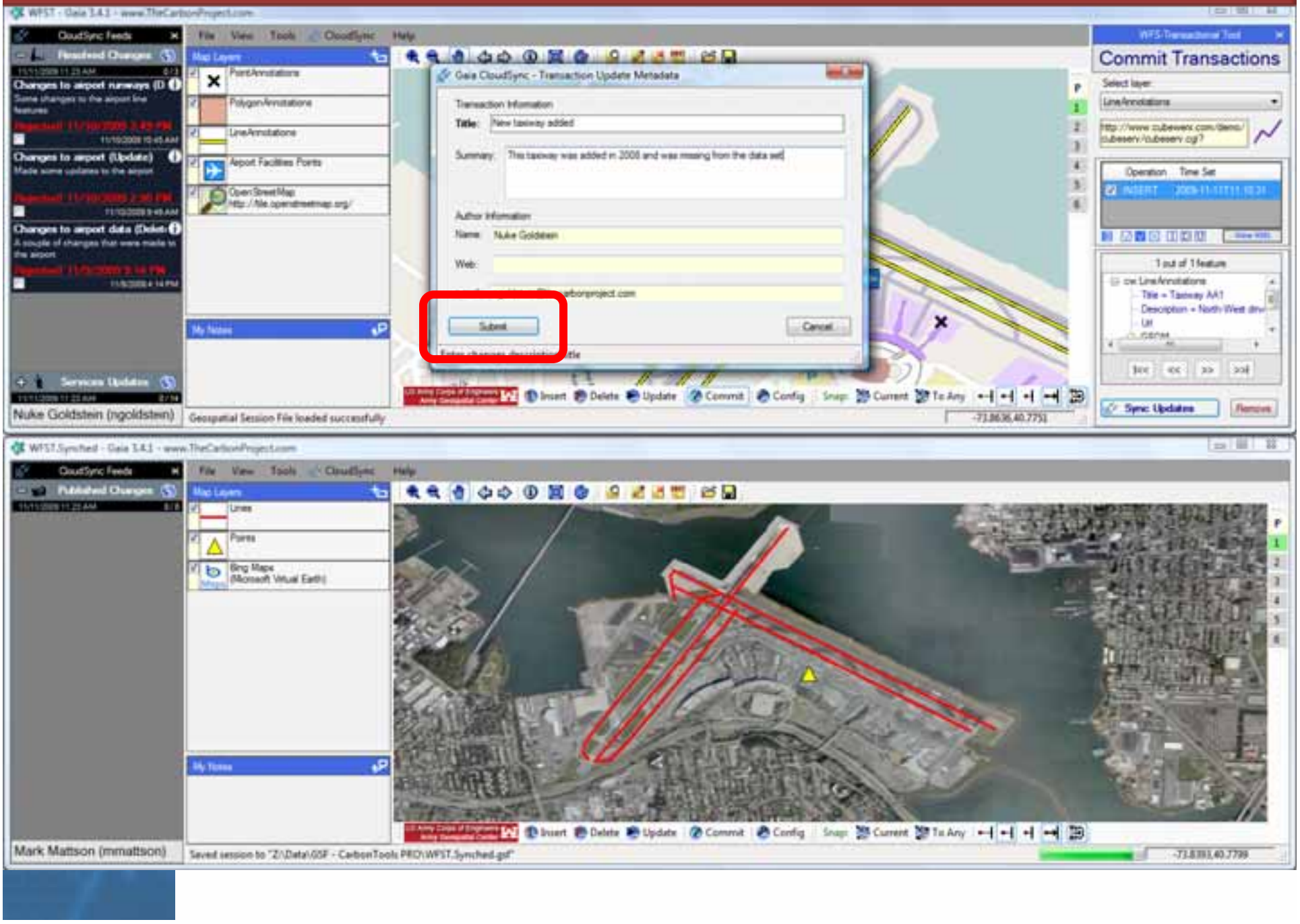
(TOP) User makes changes to layers using Gaia WFS-T Extender



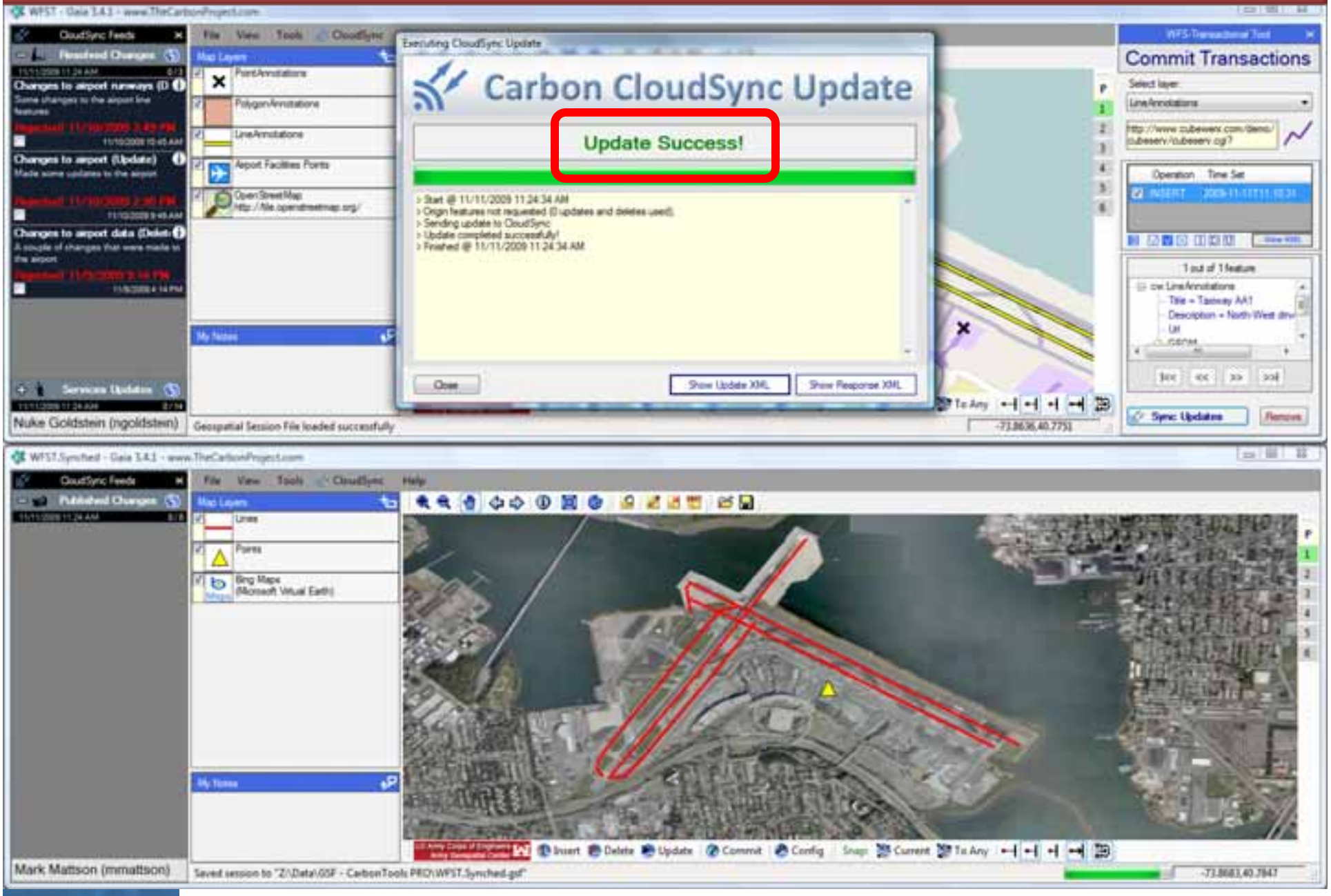
(TOP) CloudSync Extender replaces direct commit to WFS-T with CloudSync transaction

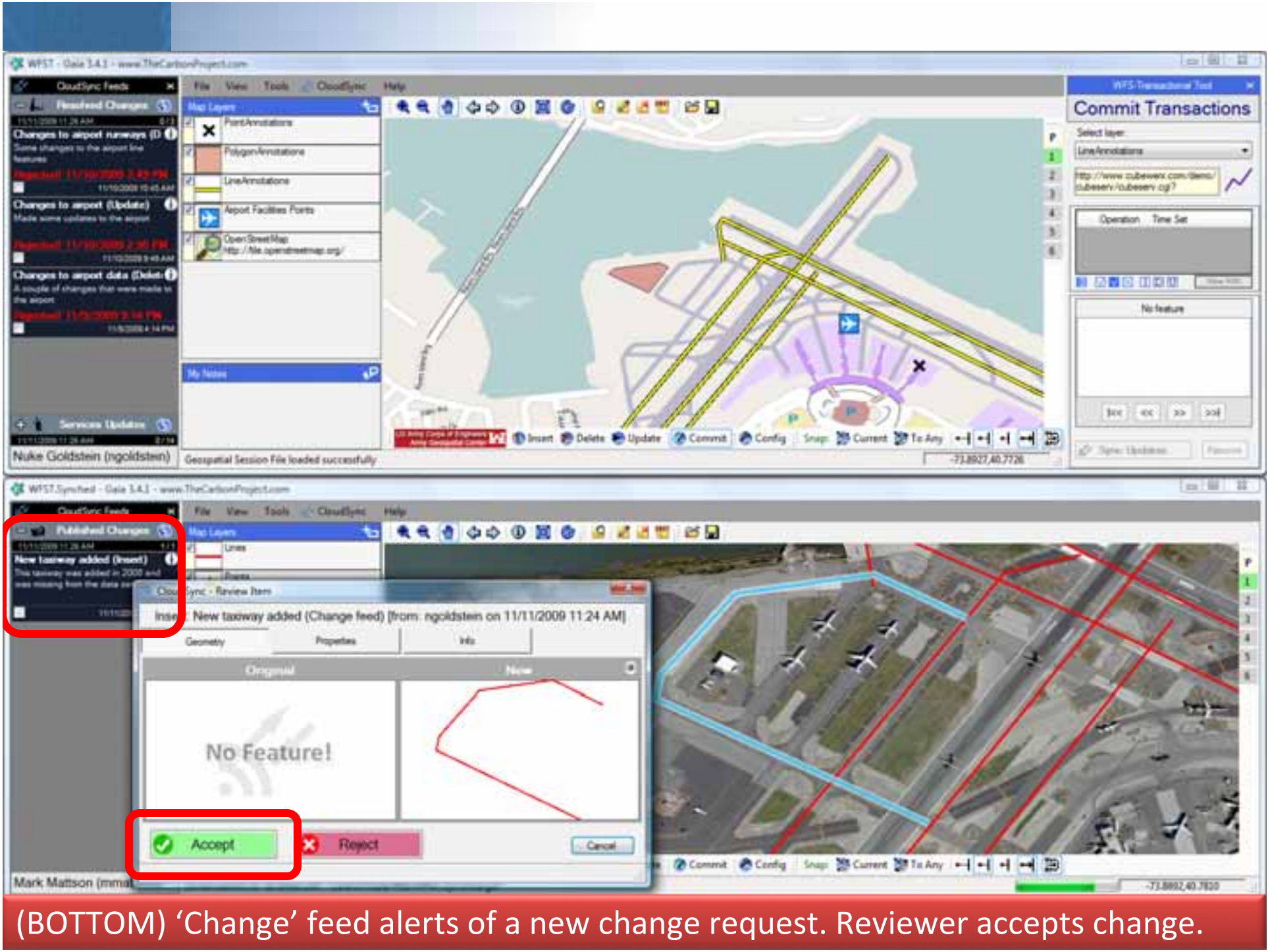


(TOP) User is prompt to add the entries title and summary text



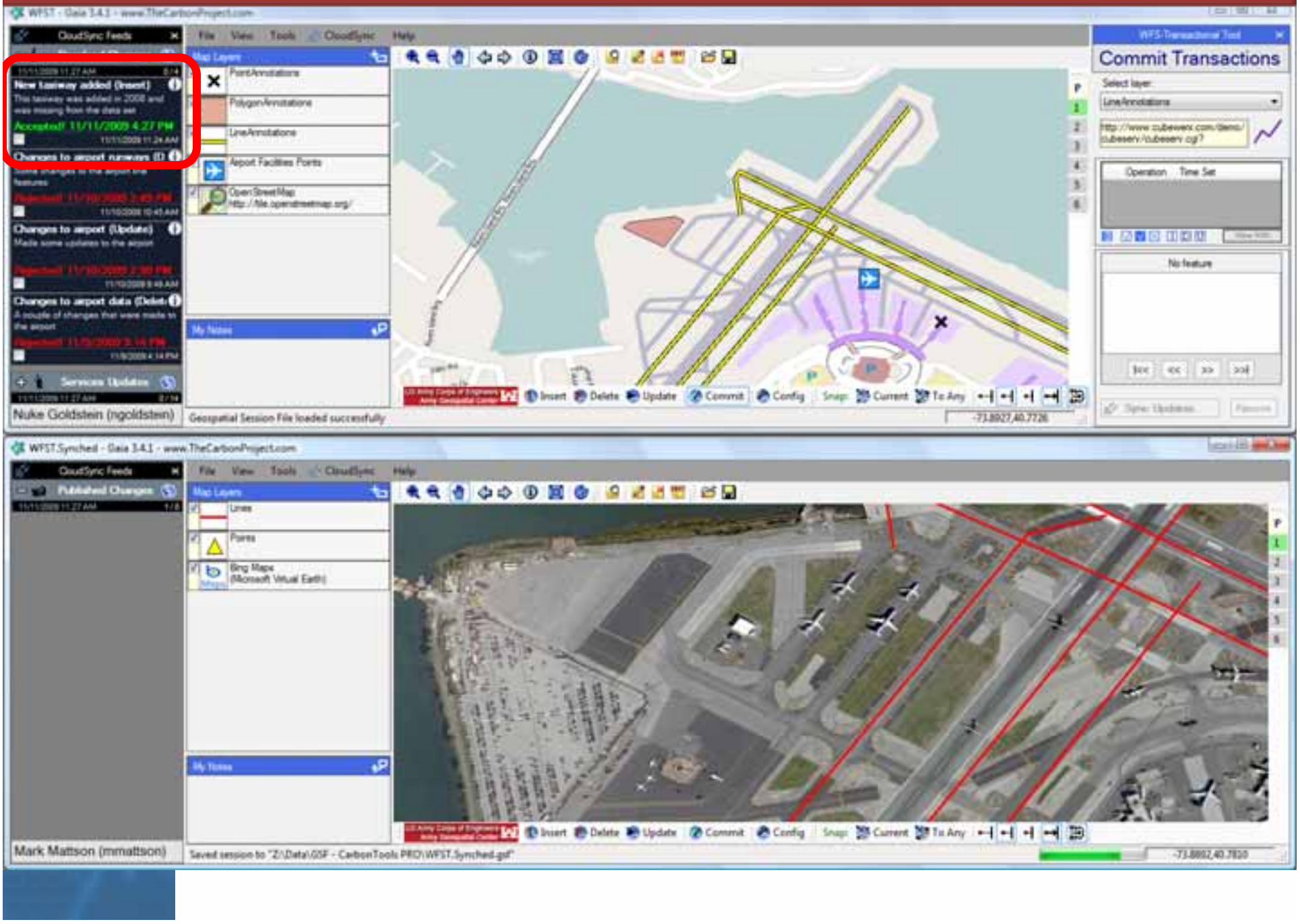
(TOP) Transaction is made to the CloudSync service



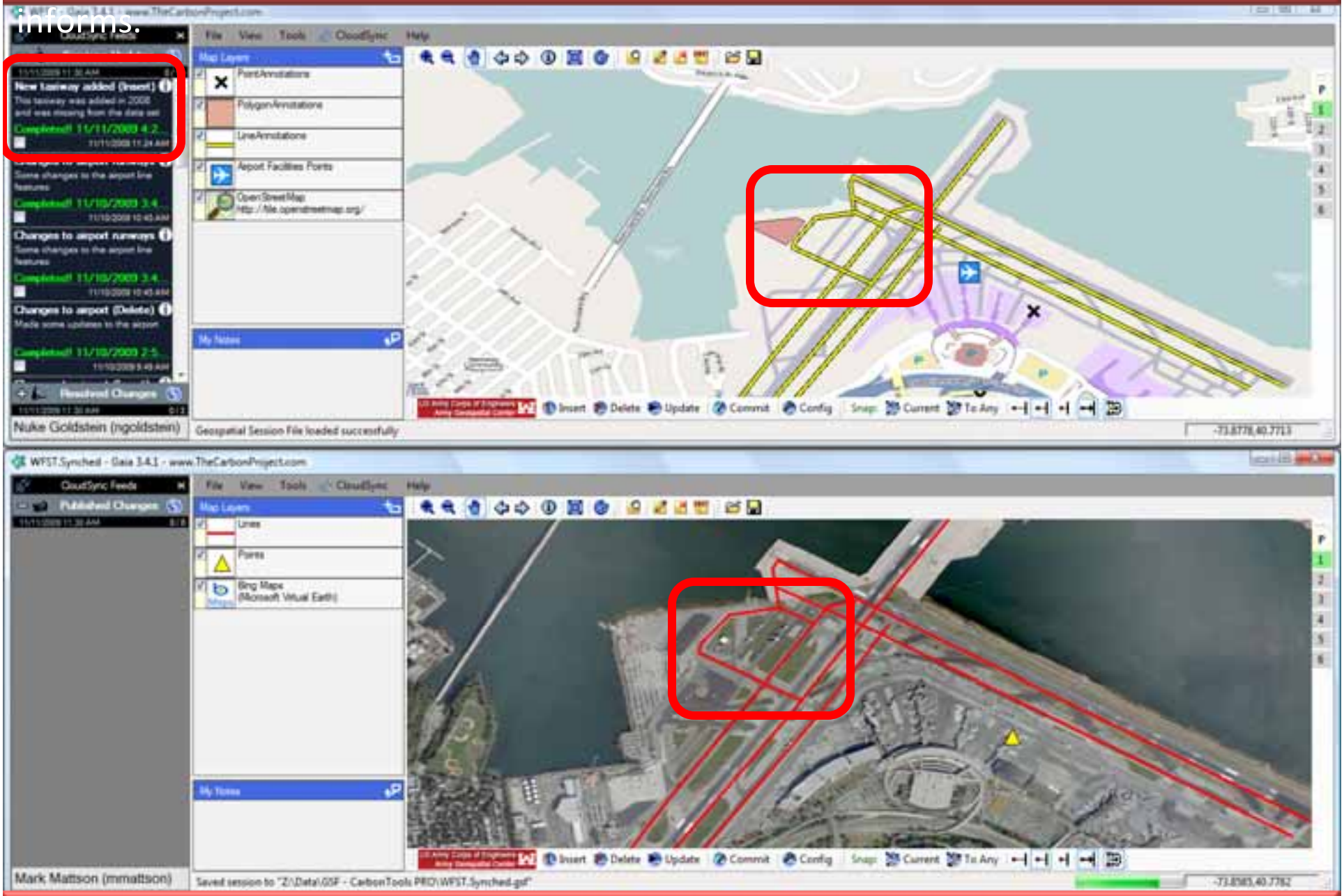


(BOTTOM) ‘Change’ feed alerts of a new change request. Reviewer accepts change.

(TOP) ‘Resolution’ feed informs the Publisher that the change was approved.



(TOP) Oracle/CubeWerx WFS-T is updated with new feature. ‘Replication’ feed informs.



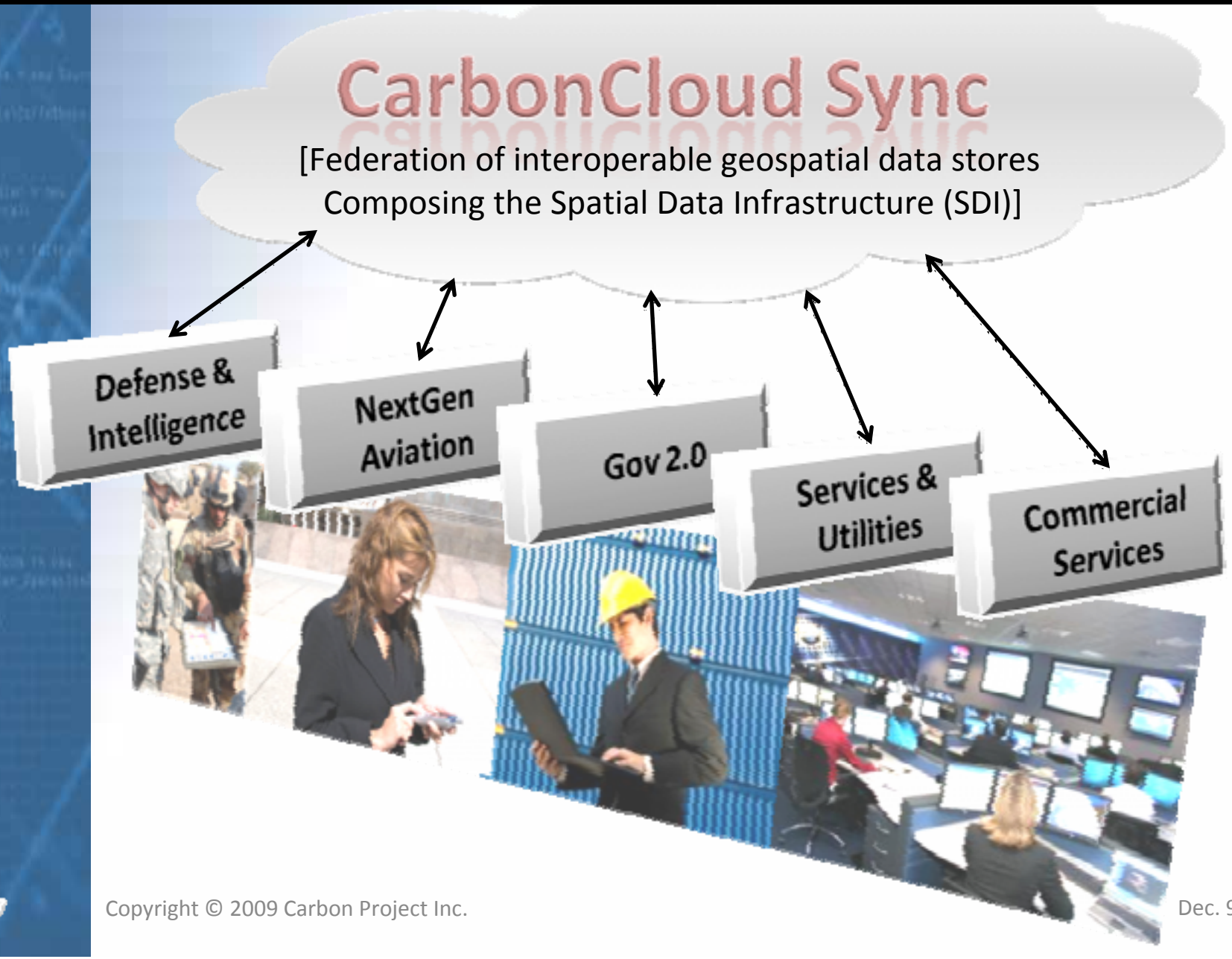
(BOTTOM) SQL Server/ArcGIS WFS-T is updated with new feature

Summary

Key Takeaways

- ☆ Smart **Synchronizing** of:
  different vendors, schemas, spatial structures
- ☆ **Flexible** design and approach for configuring:
  user roles, data layers, federated services
- ☆ **Standards-based** architecture:
  cost effective quick integration to deployed platforms, highly extensible
- ☆ Support both **base plant** and **crowd-sourced** data production at the same time – **with validation**

The ability to seamlessly share information and affect ubiquitous geospatial services will open the SDI to a vast range of uses for government and commercial services.



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