**AIR CEDE-To-OED Files (POC)**

The proof of concept demonstrates effective transformation of exposure data between AIR Worldwide CEDE format and Nasdaq OED format exposure files. Transformation process uses open source code language and technology: JSON and PYTHON

1. **Scope of POC done**

Work Completed: Transformation of AIR CEDE to OED Files with focus on below

* + Primary Attributes
  + Values & Insurance Terms
  + Address Fields
  + Secondary Risk Attributes added to scope

Work to be done: Reverse Transformation of OED to AIR

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| --- | --- | --- |
| **AIR-To-OED Transformation v1.0.0** | | |
| **Transformation Info** | **Source** | **Target** |
| What to Transform | AIR Exposure | OED Exposure |
| Which Format | CEDE database | OED Location and Account CSV Files |
| Exposure Version | 7.0.0 (Release Date 2019-05-27 13:51:57.000) | v1.0.3 |
| AIRReference\_CEDE Version | 7.0.0 (Release Date 2019-05-29 11:31:34.000) | N/A (the process needs AIRReference\_CEDE DB to transform peril codes in Exposure CEDE) |

1. **Out of Scope Items**

No Reinsurance

No Lines of Business other than Property CAT

1. **Project Familiarization, Requirements and Technical Documents**

POC requirements and technical documents were understood via meetings between leads from Xceedance, Nasdaq and AIR. All transformation specifications were drawn out based on acceptance criteria and functional requirement of both exposure formats. All specifications and existing work were reviewed. Agreed on technical solution to build the tool.

Technical studies included understanding OED specifications on Location and Account files, Databases tables schema from both AIR and OED; Cons/Occ mappings; Peril coding systems and existing work done by Nasdaq and AIR on field to field mappings.

Met with people in the industry to gain insights into industry needs with respect to this broad interoperability objective and this transformation initiative and incorporated their feedback.

For list of technical documents referenced see [Appendix C1](#_Appendix_C1:)

For people who shared expert views, see the list of people in [Appendix C2](#_Appendix_C2:)

For final transformation specifications refer to subsequent sections.

1. **Field mappings and development of associated logic**

Building upon existing work, added/modified few entries. All risk and account information were mapped from CEDE to OED Files. All indirect rule-based mappings with value mapping and conditional logic were developed to transform peril codes and financial terms. Data types and defaults have been reconciled.

For final mappings and transformation rules refer documentation folder in gtihub repository at

<https://github.com/shivamspj/AIR-CEDE-to-OED-file/tree/master/documentations>

1. **Coding**

Post finalization of requirements and mappings, Xceedance developer started coding work using agreed technology (JSON and Python). Incremental approach to coding was adopted. Location files were generated first followed by Account files. Code review was done simultaneously by Nasdaq and Xceedance. Codes were organized to make it modular and flexible.

Code comments provided for clarity and assistance in further development

All JSON mapping files and transformation source codes are available at below github repository folders <https://github.com/shivamspj/AIR-CEDE-to-OED-file/tree/master/augmentations>

<https://github.com/shivamspj/AIR-CEDE-to-OED-file/tree/master/src>

* 1. **Error Handling**

Error handling is implemented for each method/instance being called. A logger with traceback logs the process in the output folder at each step.

* 1. **Coding Limitations**

1. The process transforms one CEDE at a time – no Multiple CEDEs.
2. Entire CEDE gets transformed to one set of OED Location file and OED Account File. Exposure filtering within CEDE or transformed OED not implemented
3. **Transformation Limitations/Assumptions**

There were transformation limitations due to unavailability of some risk and account fields in either of the format CEDE or OED. Limitations were also from discrepancies in supported financial conditions and corresponding supported coverage levels. For list of limitations refer to [Appendix F1](#_Appendix_G1:)

1. **Testing, Validation and Code Review**

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| --- | --- | --- | --- |
| **Sl. No** | **Test Name** | **Test Description** | **Status** |
| 1 | Mapping Review | Review Field to field mapping, Value Mapping, Transform Logic by Xceedance/Nasdaq/AIR. Refer Mapping documents at Github  <https://github.com/shivamspj/AIR-CEDE-to-OED-file/tree/master/documentations> | Done. |
| 2 | Code Output Validation with Equivalent Manually created Output Files | Sample test CEDE: 2 contracts with 3 locations of varying address definition, each with all coverage values, varying primary risk characteristics, with location level financial terms defined in both row-wise and column-wise format across 4 different peril sets, with 7 sublimit terms and 2 layers terms.  Convert this sample CEDE and match output against manual output files. All data elements under each column for each row should match. Also ensure the output files confirm to following criteria:  A) All CEDE location records should be represented in OED Files (#records in tLocTerm = #records in OED Location File)  B) 100% of the risk value should be represented in OED Files  C) All mapped occupancies should be represented in OED Files  D) All mapped Constructions should be represented in OED Files  E) All Secondary Modifiers should be represented in OED Files  F) All Financial Conditions should be represented in OED Files  G) All Account/Policy reporting fields represented in OED Files  Validate items B to G by matching each cell Manually created Location and Account Files with transformation tool output.  Refer test excel sheets at <https://github.com/shivamspj/AIR-CEDE-to-OED-file/tree/master/testing> | Done |
| 3 | Independent Code Output Review | Apart from comparing output files with manually created files, check the output files independently (by Nasdaq/AIR and Xceedance) to verify for each field’s datatype and each record’s uniqueness requirement: PortNumber-AccNumber-PolNumber-PolPerils-CondNumber (Account file) And PortNumber-AccNumber-LocNumber-LocPerils-CondNumber (Location file) | Done |
| 4 | OED Exposure Compatibility Test with loss platforms | Test that output OED files import and run successfully in OASIS/ ModEx | Done.  ModEx run successful (tested 2 accounts, 3 locations each, one condition per account) |
| 5 | Code Review | Phase I coding was done to generate files. Coding was later reorganized to make it modular and compliant to coding standards. Broad level Code review is done, detailed code review is ongoing. | On Going |

1. **Recommendations for Future Work**

* We should provide more flexibility to User to transform specific units of exposure or groups of exposure, currently entire CEDE gets transformed
* More Testing with more test CEDEs is recommended to cover all aspects of transformation including performance testing

# **Appendix C1:**

Links to Technical Documents referred to are given below:

<https://github.com/Simplitium/OED>

<http://www.air-worldwide.com/Documentation/Database/CEDE/7.0/webframe.html#topic9.html>

<https://unicede.air-worldwide.com/>

<http://www.air-worldwide.com/Documentation/Validation/6.0/index.htm#Getting_Started/What_s_New_in_Touchstone_6.0_Validation_Reference.htm>

# **Appendix C2:**

**Met People from Industry:**

Dan Spence, Aon Underwriting Managers

Jacob Glasby, Axis Capital

Ben Hayes , OASIS

Mark Pinkerton, Oasis LMF

Graham Pickard , Sequel

Jakir Patel, SCOR

Sumanth Channapatna, SCOR

Matt Jones, Nasdaq

Ben Dryland, Ebix

Guy Williams, Ebix

James Havard, Ascot

Shane Latchman, AIR Worldwide

**People worked closely on the Project:**

Smith, Thomas, AIR Worldwide

Pigott, David , AIR Worldwide

Jonas Nordin, Nasdaq

Aiste Kalinauskaite, Nasdaq

**Project Point in Contact:**

Claire Souch , RMSG

Stuart Fraser, Disaster Risk Consultant

# **Appendix F1:**

Limitations of current CEDE>OED Files transformation:

1. Few of the OED location fields having no equivalent fields in CEDE have been left blank in OED location file. They are: *Correlation group, project completion date, optional Geoschemes 3/4/5, GeoCode quality, Tax, Brokerage, Net Premium*.
2. Some OED fields in Account File have been left blank as there is no equivalent information available in CEDE. They are: *Port Notes, Port Name, AccGroup, PolStatus, ExpiringPolNumber, PolTax, PolBrokerage, PolNetPremium, LayrNumber, HoursClause*.

All *5 Policy User Defined fields* have also been left blank in OED as there are no layer level user defined fields in CEDE.

1. Offshore risk information could not be fully transformed due to unavailability of equivalent fields in OED. The fields in CEDE are: *AIR Structure ID, Block, Company Size, Deck Count, Deck Height, Federal/State Waters, Gas Production Rate, Leg Count, Manned/Unmanned, MMS Complex ID, MMS Structure Number, Oil Production Rate, PBN Definition, Protraction/Area, Replacement Value Physical Damage, Slot Count, Slot Drill Count, Topside Cost, Trans Frame Type, Well Count, Year Built*
2. Builder’s risk *Project Phase Code* information could not be transformed due to unavailability of equivalent field in OED.
3. 15 Secondary Risk features in CEDE could not be transformed due to unavailability of equivalent fields in OED. The features are: *FloorOfInterest, WaterHeater, SealOfApproval, ISValue, RoofHailImpactResistance, WallType, GlassPercent, TransitionInSRC, ColdFormedTube, ColumnBasement, LargeMissile, AdjacentBuildingHeight, DefensibleSpace, FirewiseCommunityParticipation, Welding Detail*.
4. OED has about 20 features that CEDE does not have so they have been left blank in OED location file. The features are: *CrippleWalls, SprinklerType, PercentSprinklered, RoofEquipment, GroundEquipment, Roof Frame, Fatigue, BuildingType, ValuablesStorage, ContentsWindVuln, ContentsQuakeVuln, BIPreparedness, BIRedundancy, MechanicalEquipmentSide, FloodDebrisResilience, RoofMaintenance, Packaging, Protection, SalvageProtection, Flashing*
5. *Location level Min/Max deductible fields, BI Waiting Period* have been left blank as they are not available in CEDE
6. Japan Policy terms EE/EF for Extra Expense/Debris Removal could not be transformed due to unavailability of equivalent OED fields
7. Japan Step Functions not transformed due to unavailability of relevant tables in sample CEDE
8. Offshore specific sublimit and layer terms (C100/CAI/CSL100/CSLAI) could not be transformed due to unavailability of equivalent fields in OED
9. Layer level terms in CEDE are defined at combined coverage level, so individual coverage level fields have been left blank in OED
10. Sublimit Min/Max deductible are defined at combined coverage level in CEDE, so individual coverage level Min/Max deductibles have been left blank in OED condition fields.
11. *Condition Priority* field set to ‘1’in OED as CEDE supports only one sublimit per location-peril..
12. Account Level Financial Terms have been left blank in OED as there are no equivalent financial terms in CEDE
13. Country Name is CEDE could not be transformed due to unavailability of a field in OED.
14. No validation done for information contained in the CEDE.
15. Couple of flexibles Geoscheme fieldnames have been hardcoded e.g. XSUBA, XSUBA2 (no country wise variation) – it is not user driven now. To exactly translate area codes from CEDE area code definition need to be known across modeled countries in both OED and CEDE e.g. PostalCode should store which information for which country.
16. For transferring Geomatch level, only ‘GeoMatchLevelCode’ field has been utilized, ‘EnhancedGeoMatchLevelCode’ has not been utilized
17. Area Code and Area Name has been taken as is from CEDE, did not use OED AreaCode values table, as OED table was seen to be the same as Area Code and Area Names of AIR.
18. No equivalent mapping was available in AIR for OED Constructions: “Automobile Personal and Automobile Dealers”
19. Similarly, no equivalent mapping was available in AIR for around 39 OED Occupancy codes as below:

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| --- |
| Commercial, Hospital |
| Commercial, Nursing Home |
| Commercial, Amusement park |
| Commercial, Cinema, concert hall, theatre |
| Commercial, Stadium, arena |
| Commercial, Temporary exhibition facility or circus |
| Commercial, Hotel - Small & Medium |
| Commercial, Hotel - Large |
| Commercial, Casino |
| Commercial, Floating Casino |
| Government, Museum |
| Government, Convention centre |
| Government, Exhibition hall |
| Government, Library |
| Government, Prison / jail |
| Industrial Facilities Model, IFM: Solar panel plant |
| Industrial Facilities Model, IFM: Wind plant |
| Barge, support vessel, seismic vessel |
| Buoy (single point mooring - SPM, catenary anchor leg mooring - CALM) |
| Crane barge or pipelay vessel |
| Drill ship |
| Floating liquefied natural gas (LNG), gas to liquid (GTL) vessel |
| Floating, production, storage and off-loading vessel (FPSO) |
| Floating, storage and off-loading vessel (FSO) |
| Offshore complex (bridge linked fixed steel structures) |
| Offshore concrete gravity based structure |
| Offshore fixed steel structure |
| Other floating production systems |
| Self elevating jack-up with independent legs |
| Self elevating jack-up with mat base |
| Semi submersible drilling rig |
| Semi submersible production platform |
| Spar or tension leg platform |
| Subsea equipment: deep (> 200m and <= 1500m) |
| Subsea equipment: shallow (< 200 m) |
| Subsea equipment: ultra deep ( > 1500m) |
| Offshore pipeline: deep (> 200m and <= 1500m) |
| Offshore pipeline: shallow (<= 200m) |
| Offshore pipeline: ultra deep ( > 1500m) |