SMARTREG

Fair Lending & CRA Compliance Management

HEXANIKA™

Succeed with Data

Fair Lending – Industry Context

Regulatory mandate

- Regulators expect lenders to submit accurate HMDA data to assess firms on fair lending and determine potential discriminatory treatment
- The *Interagency Fair Lending Examination Procedures* (*IFLEP*) provide guidance on "risk factors" that may provide evidence of discriminatory treatment
  - ***Underwriting***
  - ***Pricing and Other Terms and Conditions***
  - ***Redlining/Marketing***
  - ***Illegal Steering***
- These risk factors address disparities, or differences, in credit outcomes that differ along the lines of prohibited basis characteristics
- The identification of statistically significant risk factors may result in comparative file reviews or other analyses to determine if discrimination occurred

How should firms respond

- A robust fair lending compliance management system should **evaluate lending patterns using the same methodologies employed by regulators**, focusing on the identification of risk factors for applicable prohibited basis groups
- The identification of risk factors should compel an institution to evaluate its policies and procedures and conduct audits to determine whether discriminatory treatment is evident
- Appropriate **feedback loop and analytics** should be embedded in the operational process

Fair Lending with HEXANIKA

1

Source system lending data

Industry data, census data

2

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SMARTREG

Functionalities:

1. SaaS, on-premise or cloud deployment
2. Seamless ingestion, including scanned documents, preparation of source data, data validation for completeness
3. Comprehensive representation of risk factors with drill-downs
4. Geo-coding and benchmarking with industry datasets

SMARTJOIN SIMPLIFYING DATA — **End To End Data Management, Analytics & Reporting Platform**

- **Ingest, profile, cleanse data sets**
- **Prepare data and map to data model**
- **Reporting & analytics; 100% audit trail**

Benefits:

1. Data validity and completeness
2. AI driven analytics and risk assessment
3. 100% audit trail
4. End-to-end automation
5. Ability to generate customized reports with the same data
6. Significant cost & time savings

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Overview

	Source Data	Prepare Regulatory Reports	Compliance: Assess Fair Lending Risks	Provide Audit Trail
Fair Lending Process				
Problem Statement/ Challenge	❑ Multiple Sources ❑ Scanned & Other Documents ❑ Data Accuracy and Completeness	❑ Data Consolidation ❑ HMDA / CRA Reports ❑ Regulatory Changes	❑ Internal Controls ❑ Intelligent Risk Insights ❑ Benchmarking	❑ Limited Scrutiny ❑ High Cost
HEXANIKA Methodology	**1. Source Data**	**2. Manage** / **3. Report**	**4. Assess Risk**	**5. Scrutiny / E2E Traceability**
	✓ Sourcing Automation ✓ API with Loan Origination Systems ✓ Data Standardization ✓ Document Processing ✓ Data Completeness Validation ✓ Bad Quality Data Identification	✓ Automated and Configurable Data Preparation for Report Mapping ✓ Automated Fair lending and CRA Reports Mapping ✓ Ongoing Update of Pre-Built Reports for Regulatory Changes ✓ Consolidation of Entities ✓ Additional Customized Reporting	✓ IFLEP Risk Factors Analytics ✓ AI (NLP and Machine Learning) Driven Risk Assessment ✓ Geo-coding and Mapping ✓ Benchmarking ✓ Statistical and Trend Analysis	✓ 100% Data Traceability
Product	**SMARTJOIN**		**SMARTREG**	
Features	Easy	Self Service / Configurable	Flexible	Efficient

Solution Mapping, Capabilities & Benefits

No	Steps	Industry Requirements & Challenges	Product Functionality Capability	Benefits
1.	Source Data	Sourcing data from multiple disparate sources. Some data can be unstructured making it difficult to prepare for consumption. Additionally, data might be in the form of various document types, such as docx, normal pdf, scanned pdf and handwritten documents.	Sourcing Automation - Upload data from internal or external sources in any format. Sourcing can be customized on as needed basis. API with Loan Origination Systems – API connections to main loan servicing systems, including FIS, Ellie Mae, for fast and automated data upload. Data Standardization - Convert unstructured data to structured data (delimited format or XML/JSON). Document Processing - Process various document types, such as docx, normal pdf, scanned pdf and handwritten documents using NLP & Text Analytics.	q Data upload is fast and easy. q Information from documents is easily uploaded to the tool. q Data preparation for efficient sampling and analytics.
	Source Data	Data used for HMDA reporting might be incomplete or of bad quality, leading to potential violations and fines.	Data Completeness Validation – Data is profiled to get a number of data points, such as Min/Max/Avg values, Std deviation, NULL values, unique values, etc. This validates data consistency, completeness and accuracy and flags outliers/omissions. Bad Quality Data Identification - Apply data quality rules to validate and filter bad quality data.	❑ Data used for reporting is complete and accurate.
2.	Manage	Sourced data require customization to prepare it for report mapping.	Automated and Configurable Data Preparation for Report Mapping – The tool applies a variety of custom data preparation and control rules on ingested data sets to prepare it for report mapping, such as combining data sets, filtering data sets using defined criteria, aggregating datasets, reconciling/matching data sets, etc. The rules are configurable, not hard-coded, displayable & explainable.	❑ Data preparation for efficient report mapping.

Solution Mapping, Capabilities & Benefits

No	Steps	Industry Requirements & Challenges	Product Functionality Capability	Benefits
3.	Report	Pre-built Fair Lending and CRA reports, which are automatically updated for regulatory changes.	Automated Fair lending and CRA Reports Mapping - Data is automatically mapped to pre-built HMDA LAR and CRA reports. Edits can be made prior to submission. Ongoing Update of Pre-Built Reports for Regulatory Changes – Changes are monitored by our subject matter experts, and reports are updated as needed.	q Easy Fair Lending and CRA report preparation q Reports are always up-to-date with regulatory changes.
	Report	Existence of multiple legal entities within one organization calls for consolidated view of the overall enterprise portfolio.	Consolidation of Entities – The tool allows to consolidate reports, analytics and carry out risk assessment for multiple legal entities.	❑ Insightful and convenient assessment of enterprise consolidated reports and risks.
	Report	Ability to generate customized reports with the same data or additional data.	Additional Customized Reporting - The data sourced for HMDA LAR & CRA reporting can be used to generate customized reports for other mortgage analytics.*	❑ Other mortgage analytics can be generated with already uploaded data.
4.	Assess Risk	Risk assessment analytics for risk factors outlined by Interagency Fair Lending Examination Procedures (IFLEP).	IFLEP Risk Factors Analytics – The tool provides dashboard operated pre-built risk assessment analytics and drill-downs for IFLEP risk factors: 1. Underwriting 2. Steering 3. Pricing 4.Redlining 5. Marketing. Ability to integrate with third party visualization tools.	❑ Efficient and simple preparation of IFLEP risk factors assessments.
	Assess Risk	Subjective reasons applied in underwriting decisions are usually documented as commentary notes and are difficult to incorporate in analytics for risk assessment.	AI (NLP and Machine Learning) Driven Risk Assessment - Integrated AI (NLP and Machine Learning) algorythms analyze information within commentary boxes and present in a report for risk assessment.	❑ Insightful analytics of data stored within commentary notes.

* - custom-built functionality

Solution Mapping, Capabilities & Benefits

No	Steps	Industry Requirements & Challenges	Product Functionality Capability	Benefits
4.	Assess Risk	Physical addresses of retail offices and any loan production offices must be geo-coded. All offices must be mapped to maps of states, counties, and census tracts.	Geo-coding and Mapping – API integration with FFIEC.gov (gold standard, used by regulators) and Census Bureau Files for geo-coding and mapping.	q Geo-coding and mapping at the standard followed by regulators.
	Assess Risk	Client comparisons must be performed with focus on specific markets.	Benchmarking - Pre-built analyics for benchmarking and scenario analysis vs. integrated industry data.	❑ Efficient and simple performance of benchmarking and scenario analysis.
	Assess Risk	Statistical and trend analysis of loan portfolio.	Statistical and Trend Analysis - Perform statistical analysis, trending analysis, or machine learning using integrated Python libraries.*	q Insightful statistical and trend analysis.
5.	E2E Traceability	Need for data traceability in order to reconcile reports with source data.	100% Data Traceability - Back-tracking using clickable icons to see how the data flow from the source files to the report and all transformations in between. Drill down from aggregate level to transaction level.	❑ Comprehensive data lineage and ability to reconcile with source systems. ❑ Comprehensive representation of risk factors with drill-downs.

* - custom-built functionality

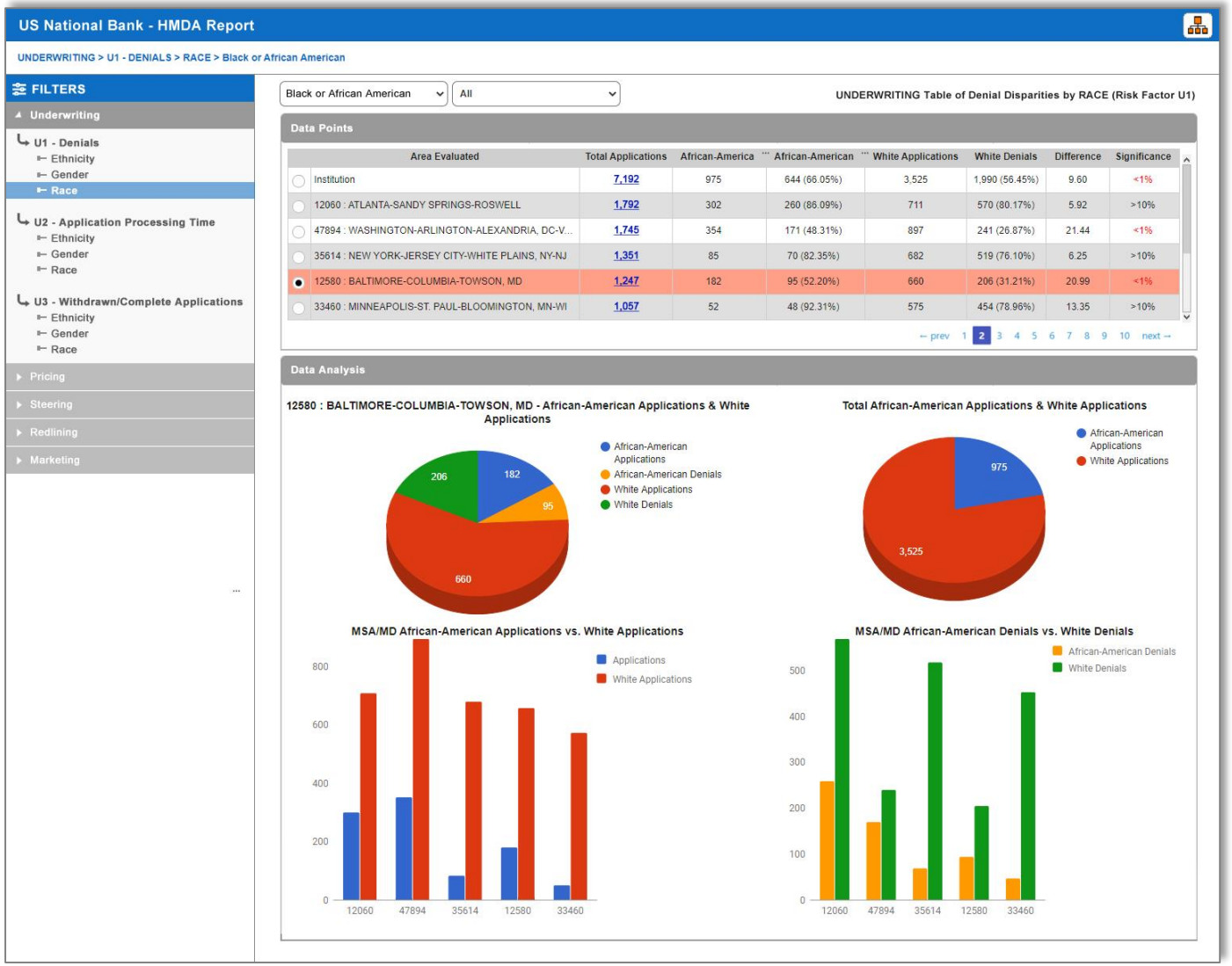
HEXANIKA Fair Lending & CRA Solution

Regulatory Submission

- ✓ HMDA LAR 2020 / 21 with FFIEC Edit Checks
- ✓ CRA Report

Risk Reports

- ✓ Underwriting
- ✓ Pricing
- ✓ Redlining
- ✓ Steering
- ✓ Marketing



Features

Data Model Driven

- ❑ Ingest once, map to HEXANIKA data model, consume multiple times

Adaptive Data Management

- ❑ HEXANIKA™ SMARTJOIN, based on a powerful and user-friendly rules engine, allows for creation and ongoing maintenance of data transformation rules
- ❑ Regular and timely updates to Regulatory Reporting rules

Interactive Analytics

- ❑ Multiple Filters to customize the approach to analyzing fair lending risks
- ❑ Plot lending activity with demographic overlays.
- ❑ Simplified benchmarking and scenario analysis vs Industry data
- ❑ Drill-downs and lineage
- ❑ Generate ad-hoc scheduled reports

Automation

- ❑ Automate the data-pipeline workflow from sourcing to reporting

Refer Appendix for Sample Reports on Risk Factors

Fair Lending & CRA Solution Overview

Illustrative Screenshots – Underwriting Report Risk Factor U1

Prohibited Group vs Control Group comparison for Ethnicity, Gender, Race

Additional filters by Loan Type, Loan Purpose Type, Property Type

UNDERWRITING | REDLINING | PRICING ▶ U1 - DENIALS ▾ 777777 -- US National Bank

ETHNICITY | GENDER | RACE ▶ Female ▾

UNDERWRITING > U1 - DENIALS > GENDER > Female

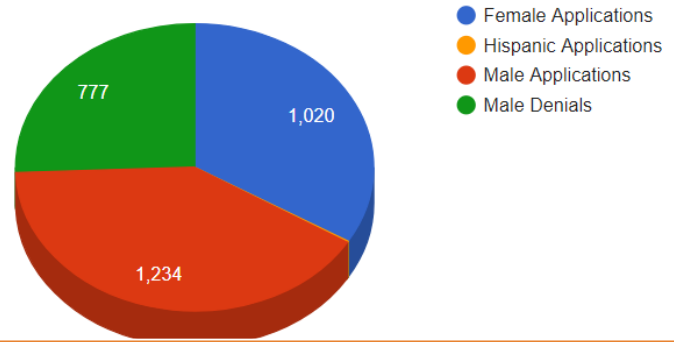
UNDERWRITING Table of Denial Disparities by GENDER (Risk Factor U1)

Loan Type ▾ Loan Type 1 ▾

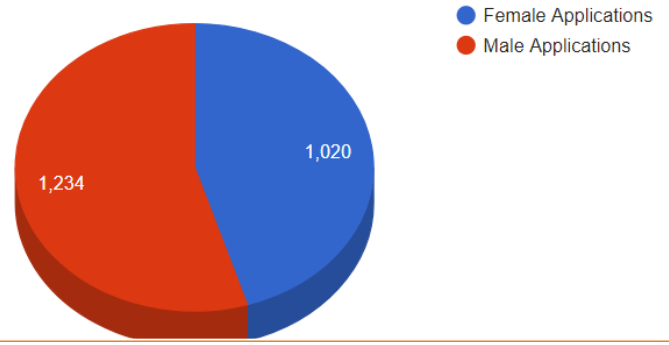
Area Evaluated	Total Applications	Female Applications	Hispanic Applications	Male Applications	Male Denials	Difference	Significance
Institution	3,649	1,020	5 (0.49%)	1,234	777 (62.97%)	-62.48	NA
12060 : ATLANTA-SANDY SPRINGS-ROSWELL	694	224	183 (81.70%)	267	224 (83.90%)	-2.20	NA
47894 : WASHINGTON-ARLINGTON-ALEXANDRIA, DC-...	978	287	125 (43.55%)	317	121 (38.17%)	5.38	>10%
35614 : NEW YORK-JERSEY CITY-WHITE PLAINS, NY-NJ	839	216	167 (77.31%)	285	220 (77.19%)	0.12	>10%
12580 : BALTIMORE-COLUMBIA-TOWSON, MD	654	184	89 (48.37%)	185	74 (40.00%)	8.37	>10%
33460 : MINNEAPOLIS-ST. PAUL-BLOOMINGTON, MN-WI	484	109	89 (81.65%)	180	138 (76.67%)	4.98	>10%

Top 5 MSA/MD

Institution : - Female Applications & Male Applications



Total Female Applications & Male Applications



Fisher Exact methodology for statistical significance

Fair Lending & CRA Solution Overview

Illustrative Screenshots – Redlining Report Risk Factor R1

UNDERWRITING | REDLINING | PRICING ▶ R1 - HMDA APPLICATIONS / OF ▾ 777777 -- US National Bank

ORIGINATIONS APPLICATIONS ▶ All Minorities (50.01 to 100%) ▾

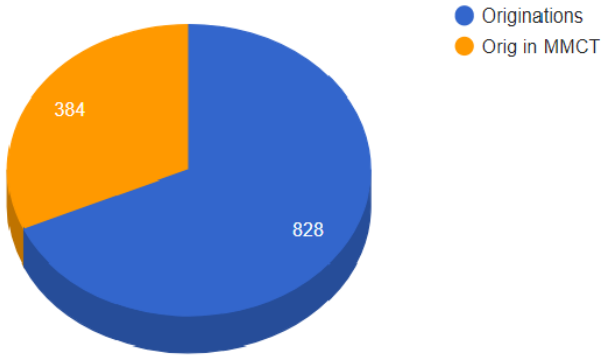
REDLINING > R1 - HMDA APPLICATIONS / ORIGINATIONS > ORIGINATIONS > All Minorities (50.01 to 100%)

Analysis for Minority Tract

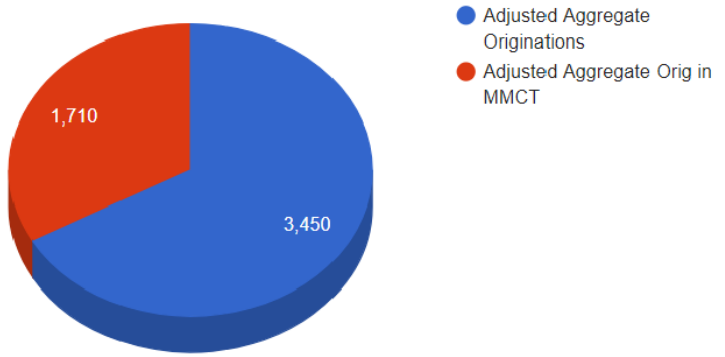
REDLINING Table of Applications / Originations by ORIGINATIONS (Risk Factor R1)

Area Evaluated	Originations	Orig in MMCT	%	Adjusted Aggregate Originations	Adjusted Aggregate Orig in MMCT	%	Difference	Significance
☑ 47894 : WASHINGTON-ARLINGTON-ALEXANDRI...	828	384	46.38 %	3,450	1,710	49.57 %	3.19	>10%
☐ 12580 : BALTIMORE-COLUMBIA-TOWSON, MD	537	133	24.77 %	1,600	345	21.56 %	-3.20	NA
☐ 12060 : ATLANTA-SANDY SPRINGS-ROSWELL	213	56	26.29 %	700	182	26.00 %	-0.29	NA
☐ 35614 : NEW YORK-JERSEY CITY-WHITE PLAIN...	203	43	21.18 %	725	139	19.17 %	-2.01	NA
☐ 33460 : MINNEAPOLIS-ST. PAUL-BLOOMINGTON...	137	11	8.03 %	430	35	8.14 %	0.11	>10%

47894 : WASHINGTON-ARLINGTON-ALEXANDRIA, DC-VA-MD-WV - Originations & Orig in MMCT



Originations & Adjusted Aggregate Originations



Fair Lending & CRA Solution Overview

Illustrative Screenshots – Pricing Report Risk Factor P6

UNDERWRITING | REDLINING | PRICING ▶ P6 - RATE SPREADS ▾ 777777 -- US National Bank

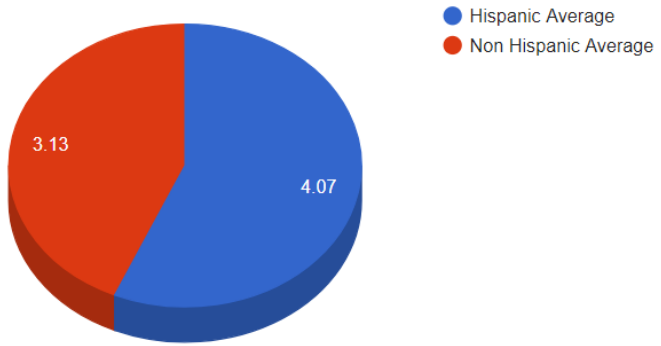
ETHNICITY GENDER RACE ▶ Hispanic or Latino ▾

PRICING > P6 - RATE SPREADS > ETHNICITY > Hispanic or Latino

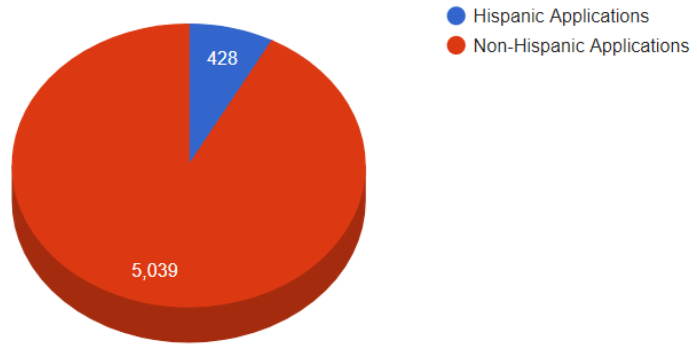
PRICING Table of Rate Spreads by ETHNICITY (Risk Factor P6)

Area Evaluated	Total Applications	Hispanic Applications	Hispanic Average	Non-Hispanic Applications	Non Hispanic Average	Difference	Significance
☑ Institution	7,192	428	4.07	5,039	3.13	0.94	<1%
☐ 12060 : ATLANTA-SANDY SPRINGS-ROSWELL	1,792	37	4.16	1,256	3.21	0.95	>10%
☐ 47894 : WASHINGTON-ARLINGTON-ALEXANDRIA...	1,745	222	4.18	1,247	3.12	1.06	<1%
☐ 35614 : NEW YORK-JERSEY CITY-WHITE PLAINS,...	1,351	81	4.07	853	3.08	0.99	<1%
☐ 12580 : BALTIMORE-COLUMBIA-TOWSON, MD	1,247	63	3.83	940	3.07	0.76	>10%
☐ 33460 : MINNEAPOLIS-ST. PAUL-BLOOMINGTON, ...	1,057	25	3.60	743	3.15	0.45	>10%

Institution : - Hispanic Average & Non Hispanic Average



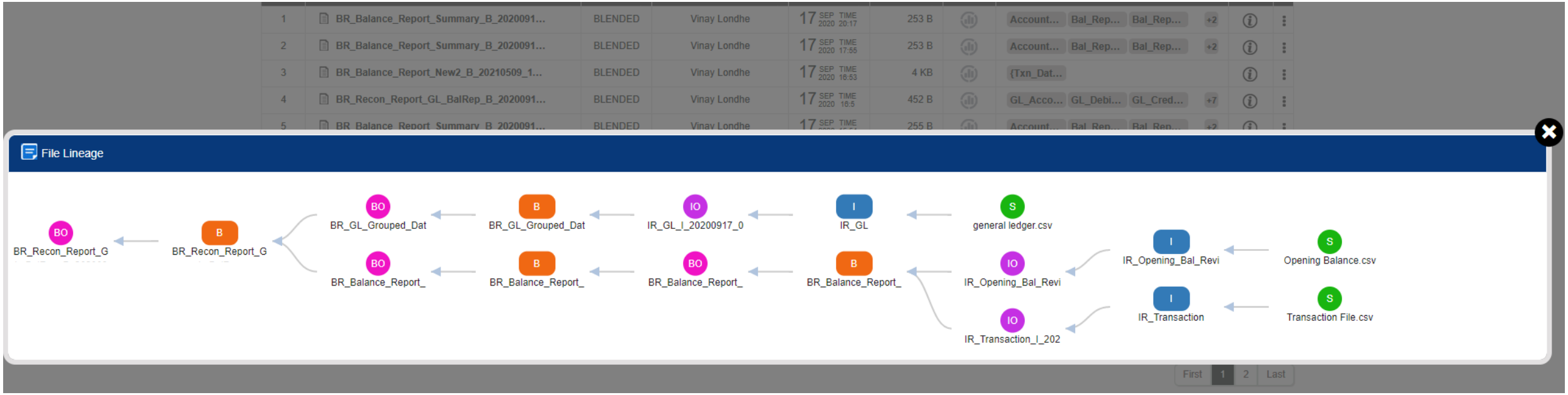
Total Hispanic Applications & Non-Hispanic Applications



Back

Fair Lending & CRA Solution - File Lineage

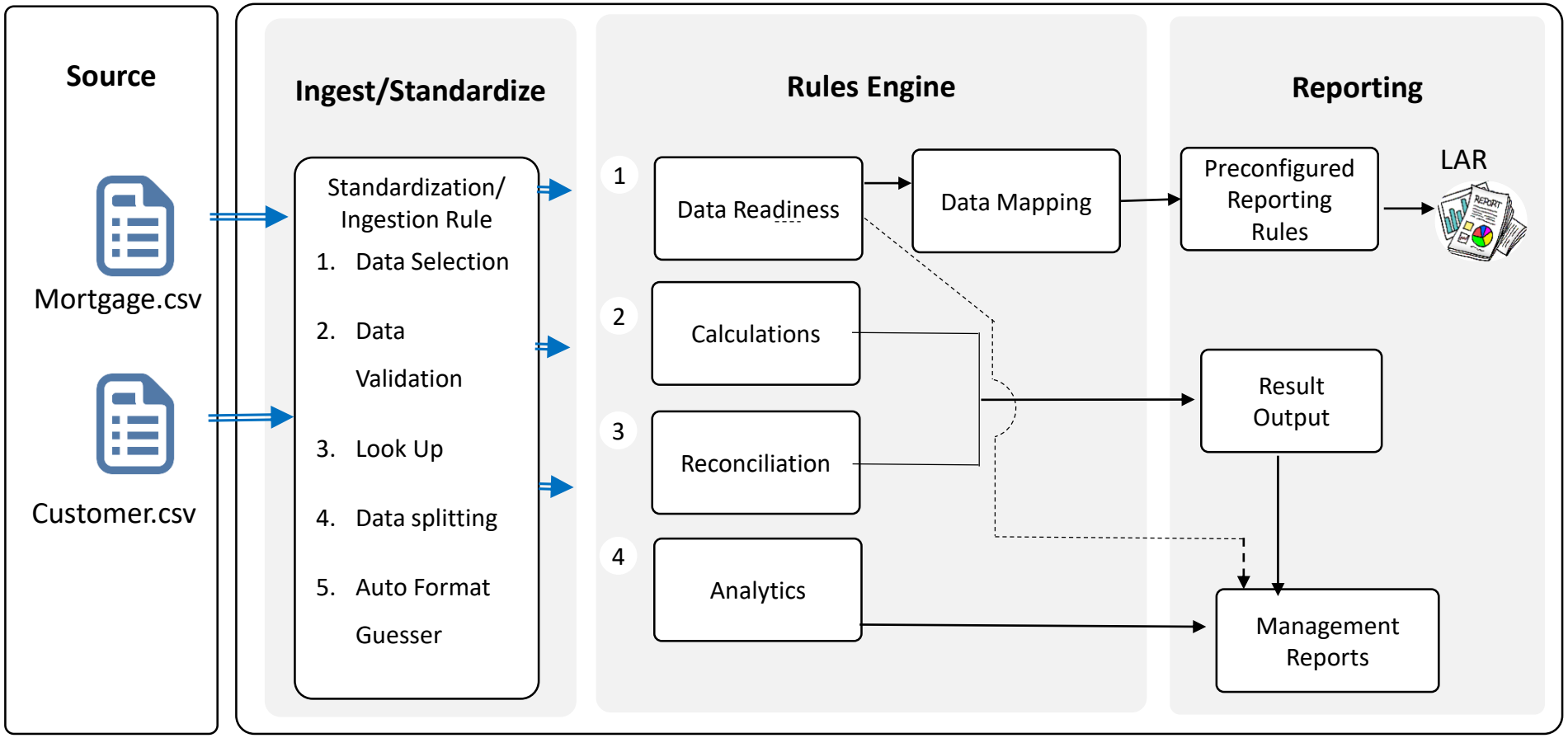
- File lineage helps auditing, quick visualization
- Back-tracking is possible using clickable icons to see how the data qualified



Illustrative Example

This is a visual example of how Fair Lending and CRA solution works using representative data:

a) Sourcing – ability to source raw data from csv/txt format
b) Rules engine – Ability to apply standardization and business rules
c) Regulatory Reporting – Ability to map processed data to HMDA LAR output
d) Management Reporting – view pre-defined risk reports
e) Data lineage



Comparative Analysis

Company Name	HEXANIKA	ASURITY TECHNOLOGIES	MARQUIS	Wolters Kluwer	RATA ASSOCIATES
SaaS Based	☑	☑	☑	☑	☑
HMDA	☑	☑	☑	☑	☑
CRA	☑	☑	☑	☑	☑
Fair Lending	☑	☑	☑	☑	☑
Underwriting	☑	☑	☑	☑	☑
Steering/Reverse Redlining	☑	☑	☑	☑	☑
Marketing	☑	☑	☑	☑	☑
Redlining	☑	☑	☑	☑	☑
Geo-coding	☑	☑	☑	☑	☑
Statistical Analysis	☑	☑	☑	☑	☑

Comparative Analysis

Company Name	HEXANIKA	ASURITY TECHNOLOGIES	MARQUIS	Wolters Kluwer	MTA ASSOCIATES
Seamless Integration	☑	☑	☑	☑	☑
Dynamic Data Importing	☑	☑	☑	☑	☑
BISG Proxy Data Complaint	Feb 2021	☑	☑	☑	☑
Matched Pair Analysis	Feb 2021	☑	☑	☑	☒
Disparity Analysis	Feb 2021	☒	☑	☑	☒
Interface with Loan Origination Systems	☑	☒	☒	☒	☒
100% Data Lineage	☑	☒	☒	☒	☒

HEXANIKA™

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marketing@hexanika.com

Thank You

Awards and Recognitions

TiE 50 2016 TOP START-UP

Winner NIKKEI REG/SUM REGTECH SUMMIT

MEDICI TOP 21 2018 AMERICAS WINNERS REGTECH EDITION

MUMBAI FINTECH FESTIVAL 2018 Jury Special Award

REGTECH 100

RT TOP 50

Money 20/20

Sakāl Media Group
Top 5 Start-up

FIN/SUM FINTECH SUMMIT

sibos