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Integrating Complex Financial Workflows by Using Semantics in Oracle Database

Seamus Hayes, PolarLake
Xavier Lopez, Oracle

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Topics

- Introduction
- Using Semantics to Achieve Quality Data
- Semantics in Data Management
- The Oracle Semantics Platform
- Case studies
- Summary

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PolarLake Background

Founded in 2003

Offices in Dublin, London, New York

XML integration heritage – patents in XML processing

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Product History

- Since 2002: Data Streaming
- Patents in Streaming Data and XML Virtualisation Data Models.
- Complex Event Processing.
- ESB.

- Launched 2006
- Entire Data Supply Chain
- Customer driven Semantics introduced in 2009.

- Launched 2009 4.0 - Semantics
- Optimised supply chain
- Navigate/Search/Query of Data throughout Supply Chain
- Packaged PolarLake RDD solution.

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PolarLake Clients

Data Management and Distribution for Financial Services

6 of the top 10 Investment Banks

2 of the top 5 Prime Brokers

2 of the top 10 Asset Managers

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Financial Services Industry Context

Risk Getting Center Stage
Tough regulatory requirements introduced by Dodd Frank
Enterprise-wide “Horizontal” view of risk is mandated
Risk as a pre-trade input, calculated near real-time, will become the new normal

Renewed Emphasis on Data Quality
Reference Data –about instruments and entities - is key
Unstructured data becoming crucial (OTC derivatives)

Data Volumes Growing Exponentially
Millions of market data messages/sec

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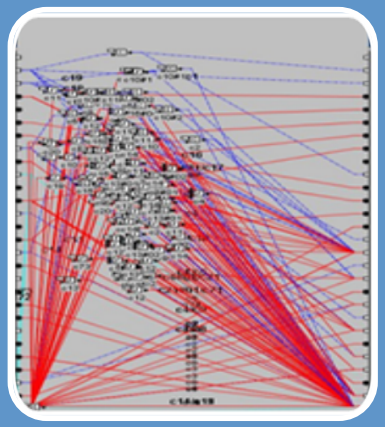
Pricing & Reference Data Management and Distribution



The need for PolarLake?

- Frustration with complexity brittle ETL mappings
- Inflexibility of fixed data models
- Long feedback loops
- Large semantic gap

The PolarLake Benefits

- **Control & Confidence** in delivery – end to end transparency of data and trade supply chain
- **Time to Market** – up to 95% rule generation, 75% less time, 80% less resources than traditional approaches
- **Manage ongoing complexity** – purpose built to support ongoing change.

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PolarLake – Reference Data Management

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Comprehensive and Open
Reference Data Framework

Purpose-built Reference Data Applications

Experienced domain specific
and integration specialists

The Benefits

Reduced project risk

Quicker implementations

Less Total Cost of Ownership

6 of the top 10 Investment Banks
2 of the top 5 Prime Brokers
2 of the top 10 Asset managers

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Efficient Data Supply Chain is central to Good Risk Management

Feed On-Boarding & Search Service

Central Sourcing of Vendor Price and Reference Data

Price Processing

Pricing Exception Management and Price Arbitration

Security Master

Building up Consolidated, Validated or "Cleansed Records"

Reference Data Distribution

Getting the Right Data to the Right Place at the Right Time in the Right Format

Cost Optimization

Optimizing and Controlling Pricing and Reference Data Spend Across the Firm

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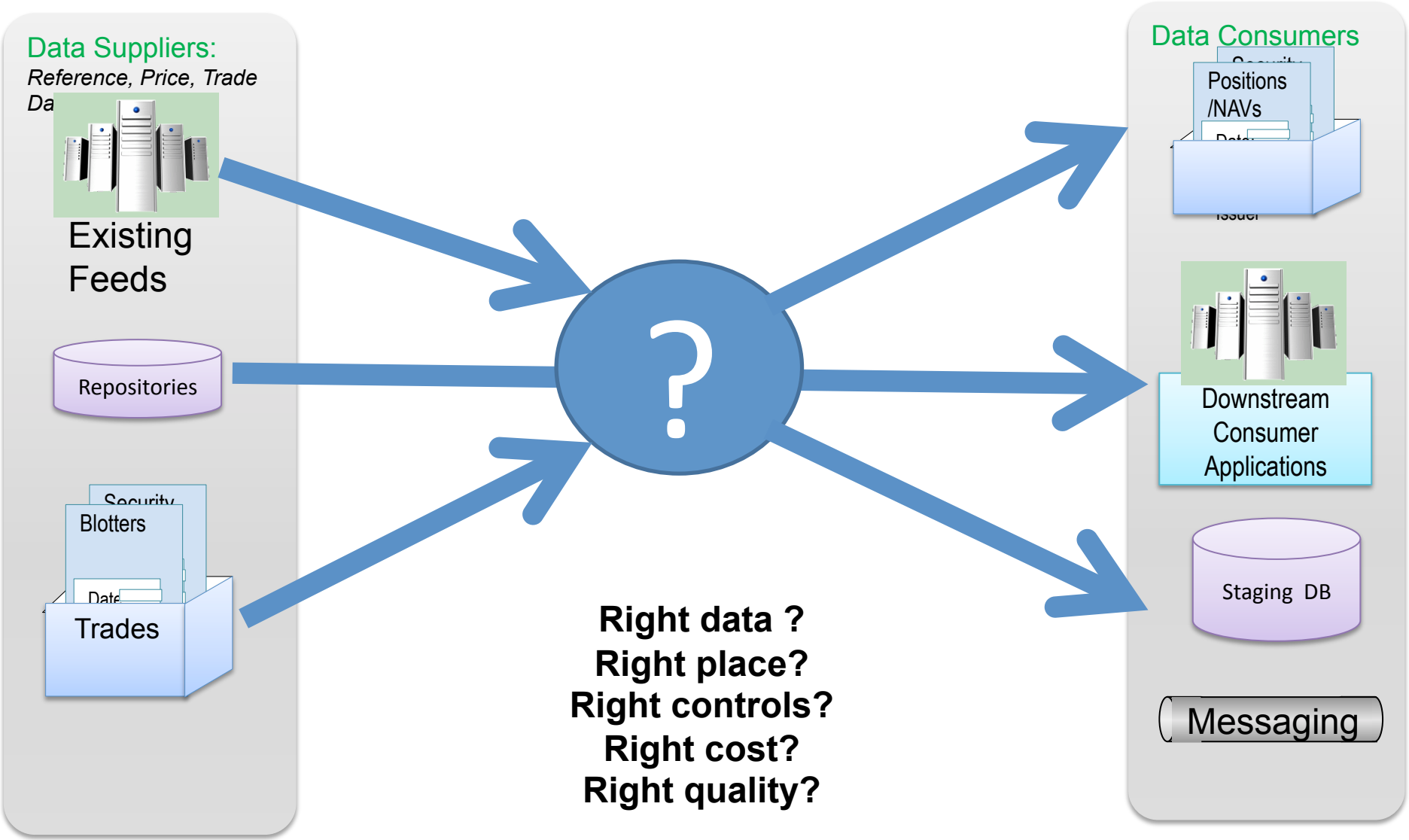
The Problem: Data Supply Chain



Complexity Bottleneck: Traditional ESB/EAI/ETL and Warehousing

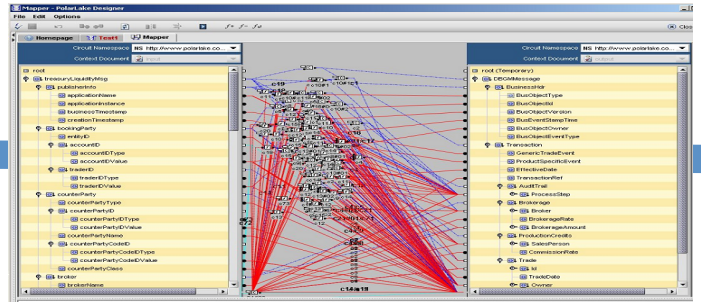
Data Suppliers:
Reference, Price, Trade Da

Existing Feeds

Repositories

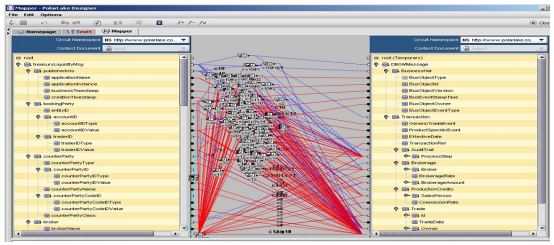
Blotters

Trades



Push

EAI/ETL Rule Black Hole!
Neither trustworthy nor manageable!
How do you scale across product/cases?



Pull

Warehouse Rigidity
Difficult to maintain.

Data Consumers

Positions /NAVs

Downstream Consumer Applications

Staging DB

Messaging

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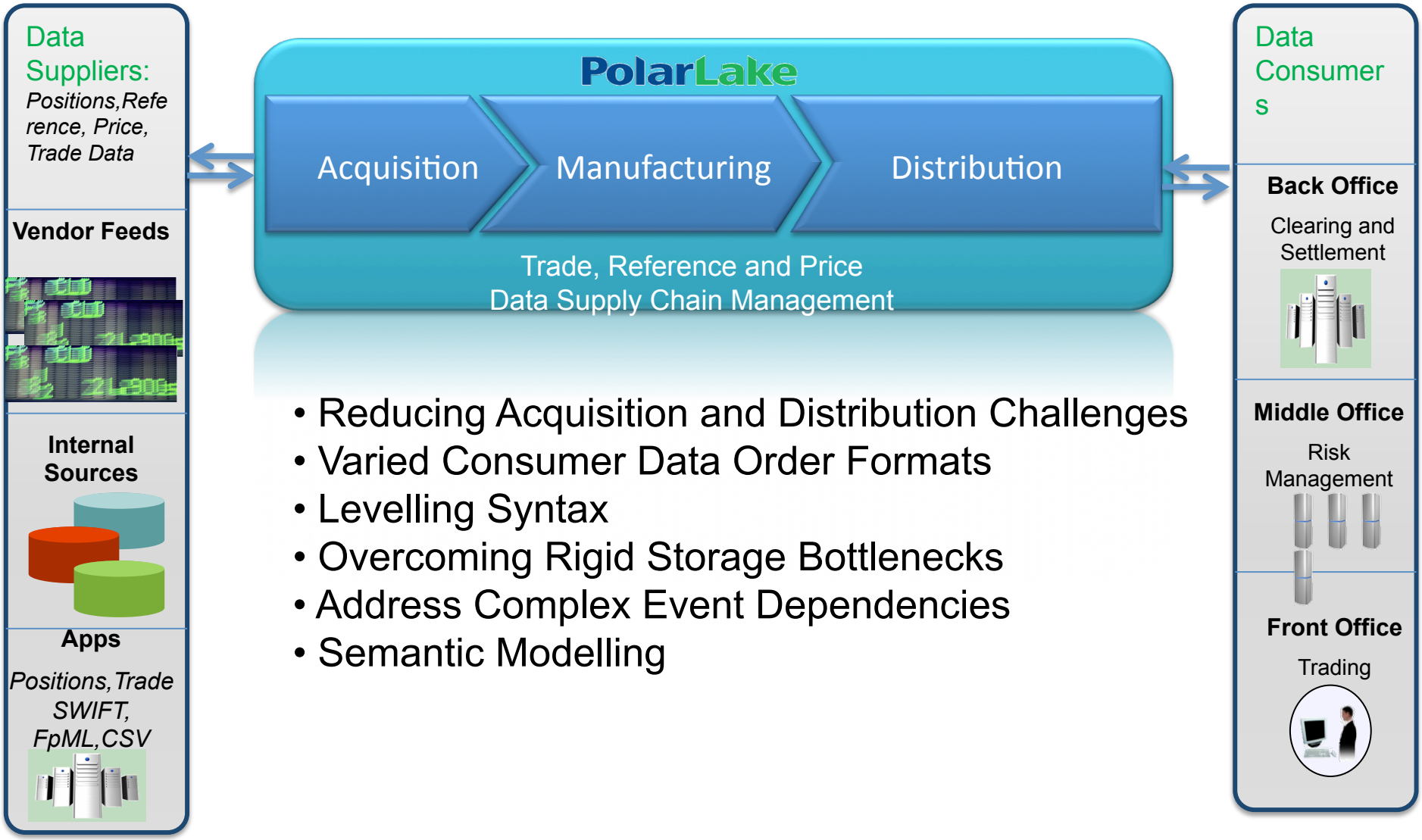
Trade, Price and Reference Data Supply Chain Management



- Reducing Acquisition and Distribution Challenges
- Varied Consumer Data Order Formats
- Levelling Syntax
- Overcoming Rigid Storage Bottlenecks
- Address Complex Event Dependencies
- Semantic Modelling

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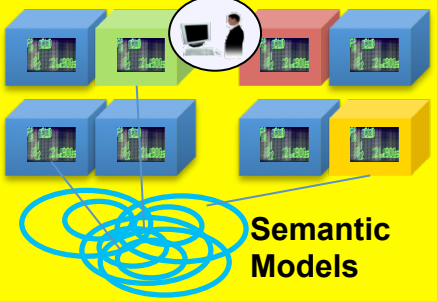
Complete Supply Chain for Reference Data

Integrated End to End Business Operation Monitoring

Rapid New Product Onboarding

11 x Faster Loading Into Soft Repository

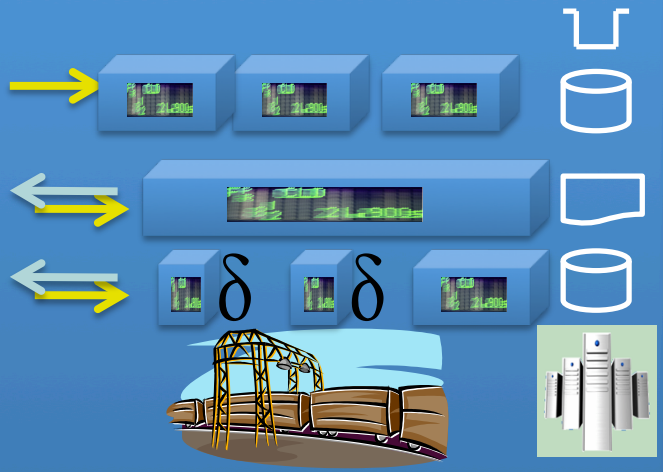
Analyst Sandbox: Semantic Enabled



Validation, Exceptions, Data Lineage, Identification Resolution, Routing, Transformation, Classification, Normalisation, Arbitration, Workflow, Decision Tables, Sequencing, Assembly, Monitoring

Multiple Formats, Protocols and Interaction Models Entitlements and Quota.

Subscriptions, Request/Reply, Deltas, In Memory Cache Distribution



Acquisition ***Manufacturing*** ***Distribution***

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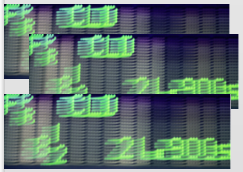
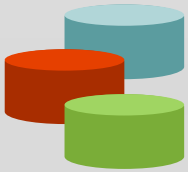
Data Supply Chain – Stakeholders and Requirements

Data Suppliers:
Reference, Price, Trade Data

Vendor Feeds



Internal Sources



Apps

Trade SWIFT, FpML,CSV

Business/Data Analyst

Business Management

Supporting **constant change**
new data, formats and requirements

Confidence through Transparent Operations

Execution of **Data Supply Chain Policies**

Metadata Aware

Diverse Connectivity Patterns

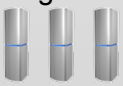
Data Consumers

Back Office

Clearing and Settlement

Middle Office

Risk Management



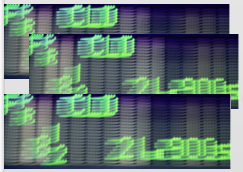
Front Office

Trading

PolarLake Data Management and Distribution

Data Suppliers:
Reference, Price, Trade Data

Vendor Feeds



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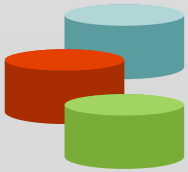

Apps

Trade SWIFT, FpML,CSV

Business/Data Analyst

Rule Management Configuration
Scenario Analysis

Business Management

Audit, Compliance, Exceptions, Reports and Analytics

Trade, Positions, Price and Reference Data Supply Chain Management

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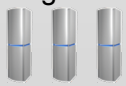
Data Consumers

Back Office

Clearing and Settlement

Middle Office

Risk Management



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PolarLake Data Management and Distribution

Data Suppliers:
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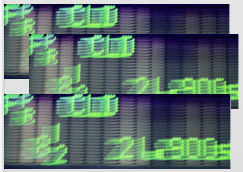

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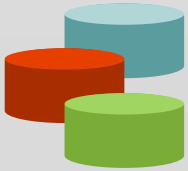

Apps

Trade SWIFT, FpML,CSV

Business/Data Analyst

Rule Management Configuration
Scenario Analysis

Business Management

Audit, Compliance, Exceptions, Reports and Analytics

Rule Layering, Data Cost, Entitlements, Quotas, Reconciliation, Throttling, Refresh, Sequencing, Transformation, Schedules, Subscriptions

- User, group and policy metadata
- WS, MDDL, DB, XSD, OWL/RDF, Files etc

- *Canonical,*
- *Historical or Supply Chain Support*

- *Customisation via configuration not coding.*

Consumer/Supplier – Connectivity Subsystem

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Data Consumers

Back Office

Clearing and Settlement

Middle Office

Risk Management

Front Office

Trading

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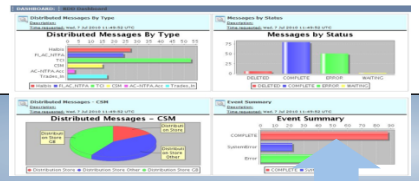
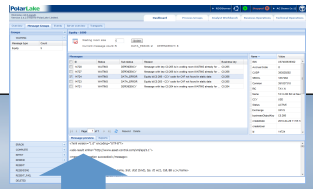
Configuration Roles and Responsibilities

Operate
Monitor and Interact

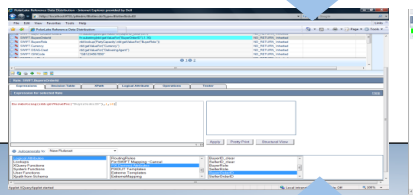


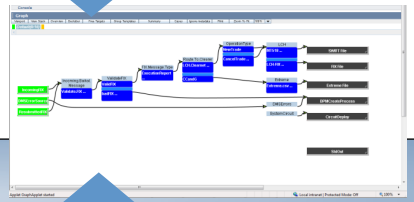


App Workflow

Technical Oper

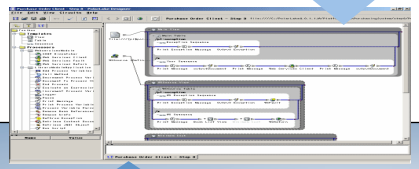
Policy Management
Rule Layering &
Semantic Policies

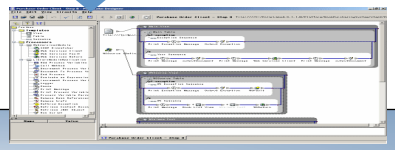




Policy Setup

Technical
Connectivity and
Abstraction





Technical Setup

Virtual XML - Data Pipelining

Connectivity

Meta Data

Runtime Data

Roles

Multiple Formats, Protocols and Interaction Models

PolarLake XML, Semantic and Configuration Stores

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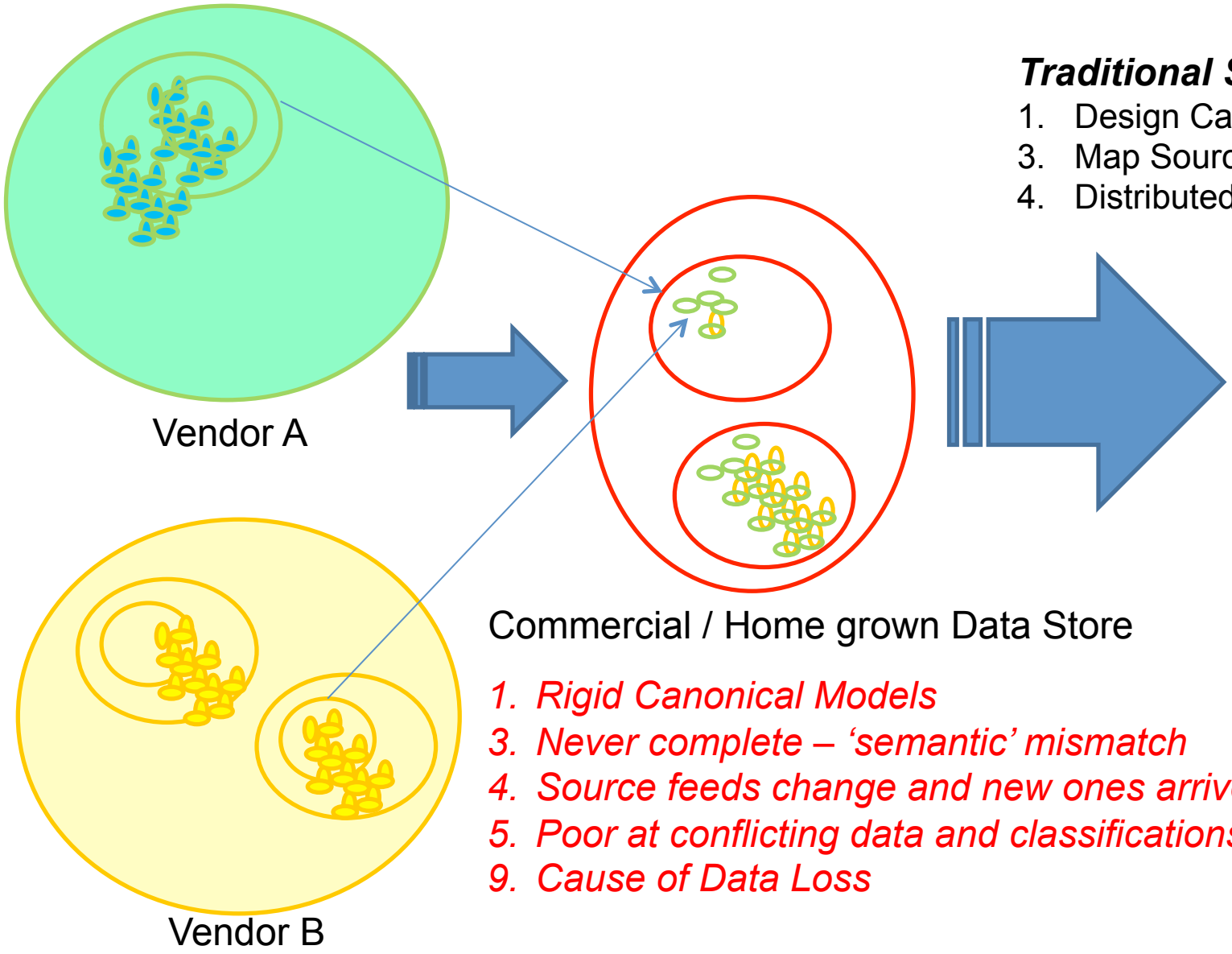
Data Management – The traditional way



Traditional Stages:

1. Design Canonical Model
3. Map Sources to Model
4. Distributed from Model

1. Rigid Canonical Models
3. Never complete – 'semantic' mismatch
4. Source feeds change and new ones arrive
5. Poor at conflicting data and classifications
9. Cause of Data Loss

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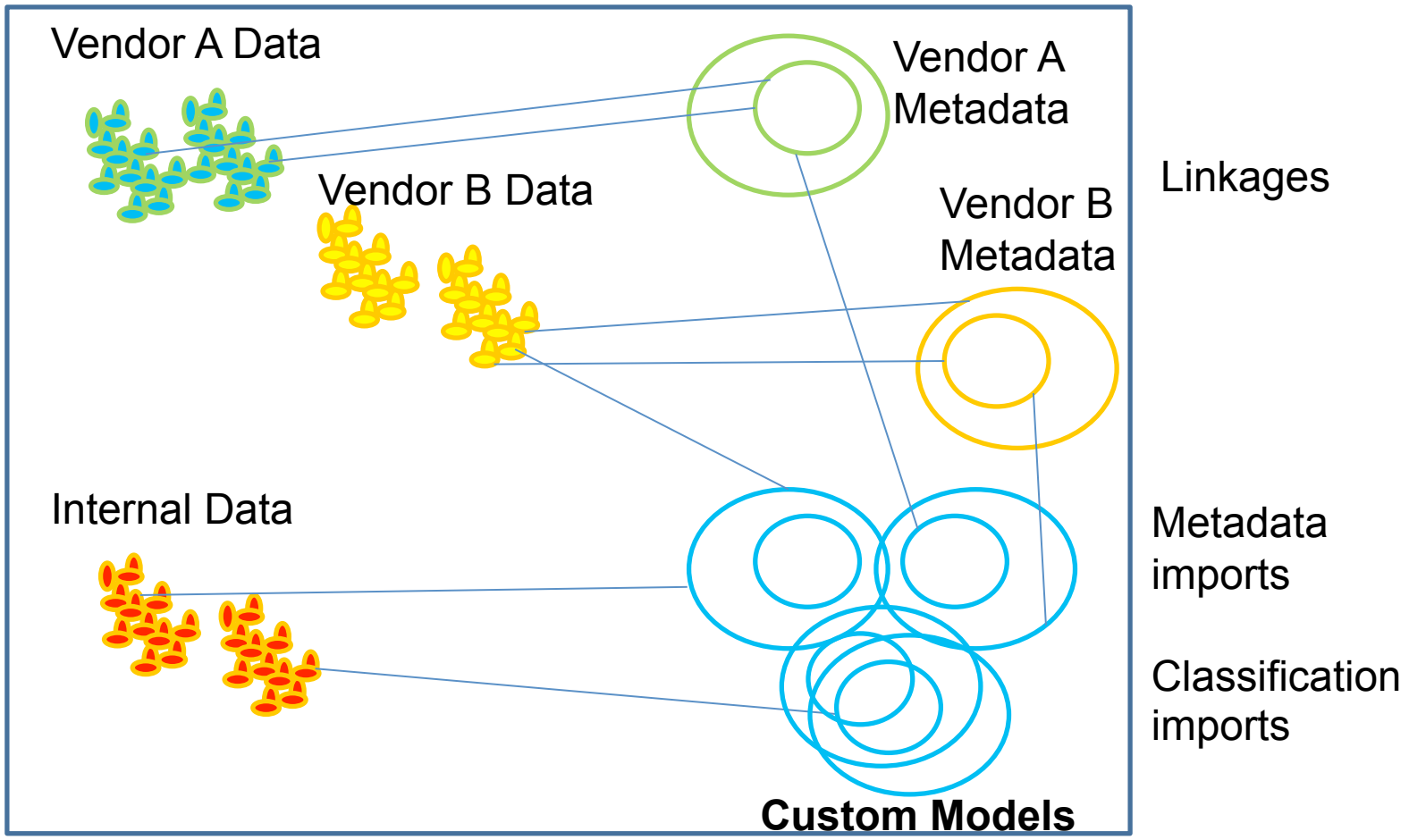
PolarLake Semantic Repository and Data Store



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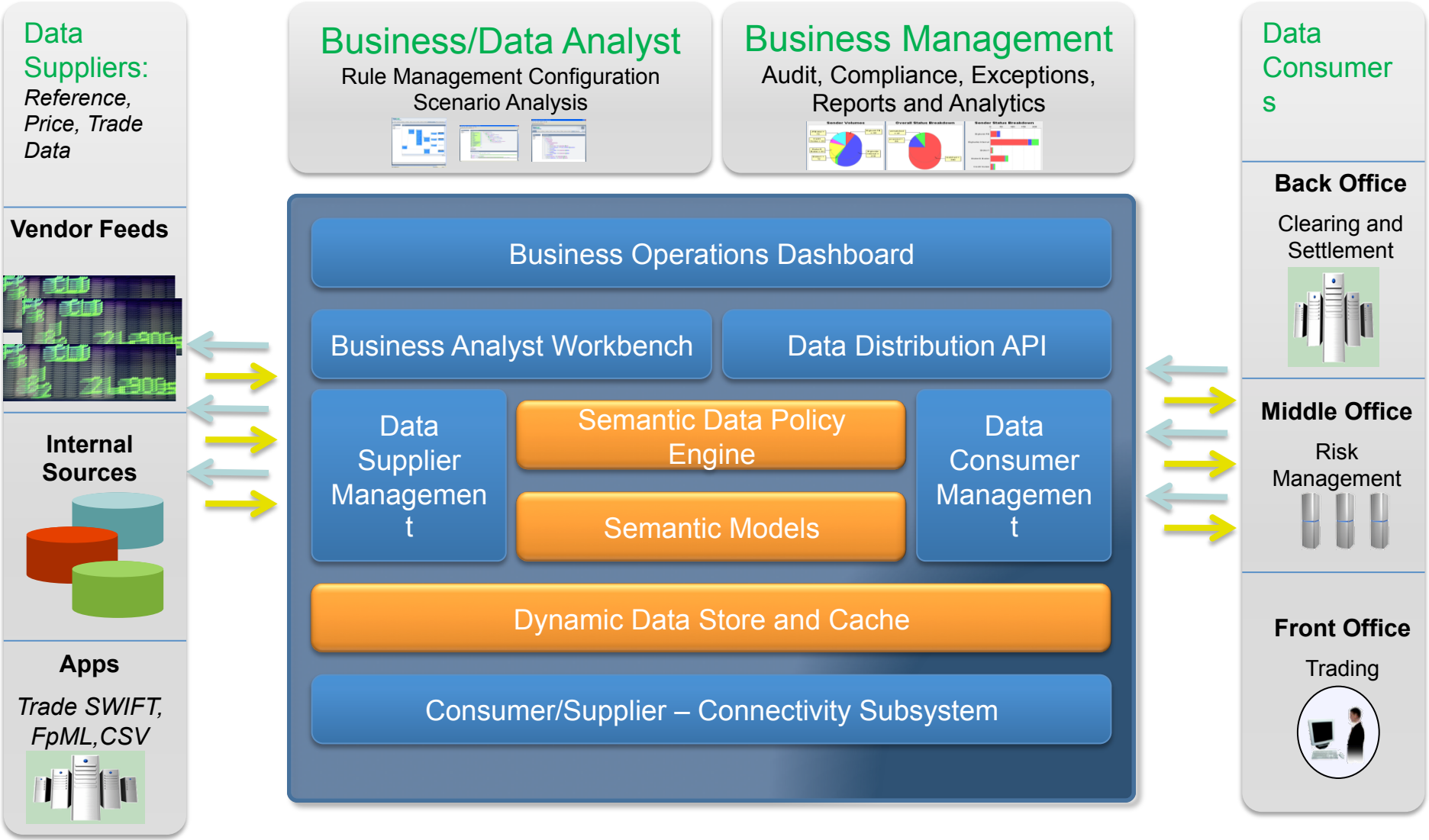
Benefits: Soft Models, Semantics and Policy Engine



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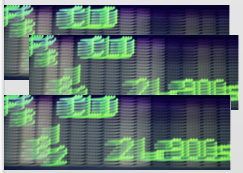
Benefits: Soft Models, Semantics and Policy Engine

Data Suppliers:
Reference, Price, Trade Data

Vendor Feeds



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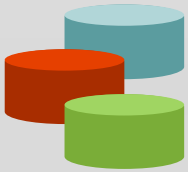

Apps

Trade SWIFT, FpML,CSV

*Capture **conflicting** vendors/apps **classifications** via semantics*

*Navigate different **vendors identifiers** semantically*

*Configure aided by an **integrated semantic data dictionary***

*Semantically **capture business policies** that drive layers of transformation, routing, entitlement etc*

Business/Data Analyst

Business Management

Data Supplier Management

Semantic Data Policy Engine

Semantic Models

Data Consumer Management

Dynamic Data Store and Cache

Data Consumers

*Ease of **onboarding** new **suppliers:** No need to model to store.*

***Multiple layered** semantic **models** supporting local requirements*

Leverage semantic** relationships and **linkages** in **polices

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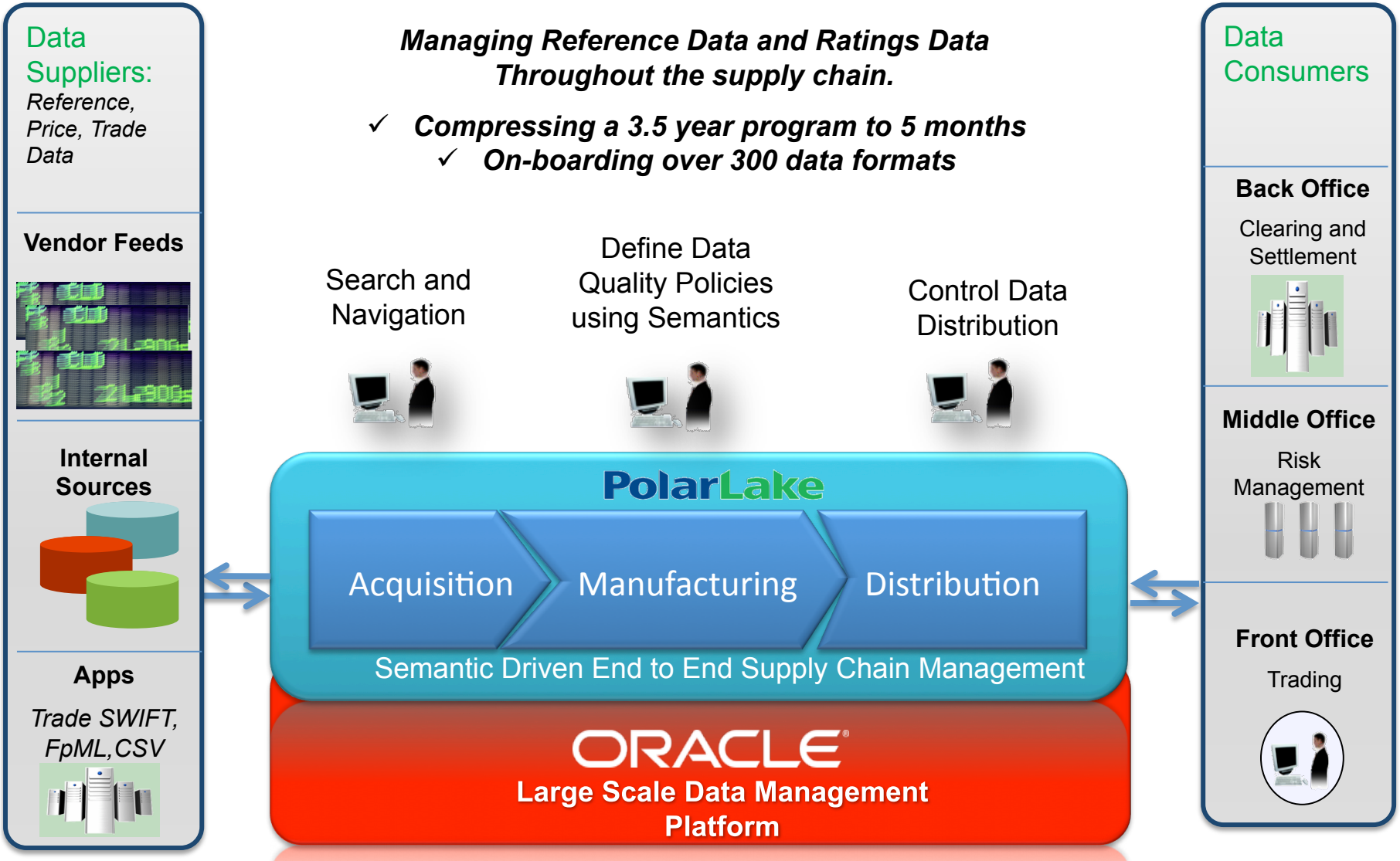
Case Study 1: Managing Ratings Data for a large Buy Side firm.



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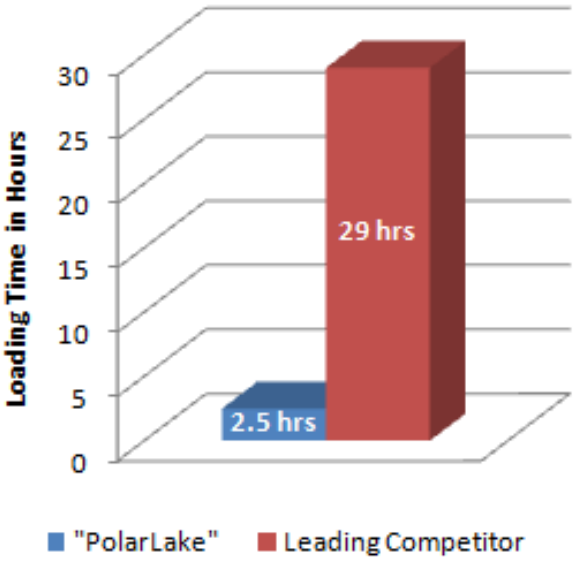
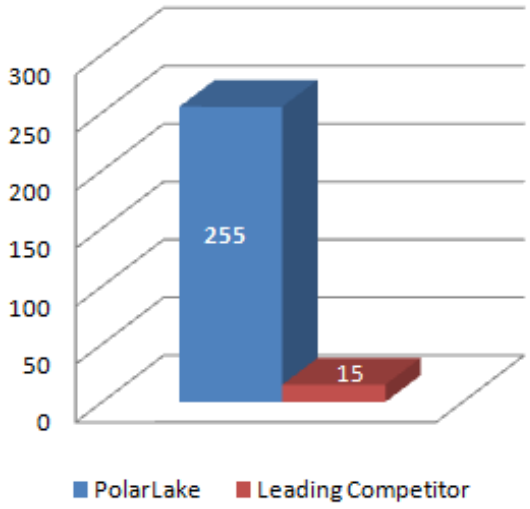
Case Study 2: Disruptive Technology with Massive Performance Improvements

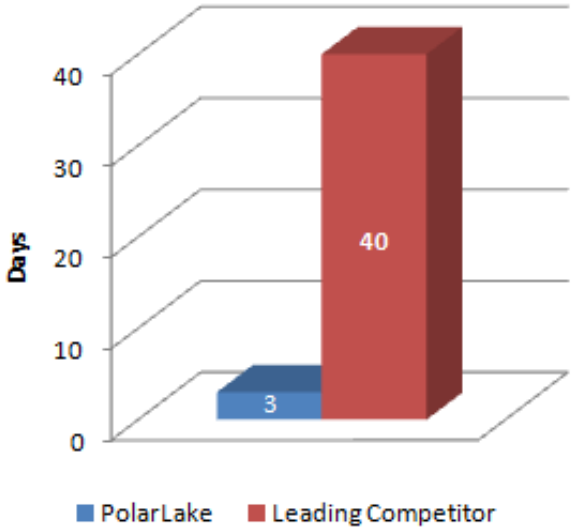
11X Faster Load Time



17X More Securities Queried Per Second



20X Faster Feed On-boarding



Bloomberg, S&P, Fitch, Moodys Loaded, Linked and Searchable in 3 weeks

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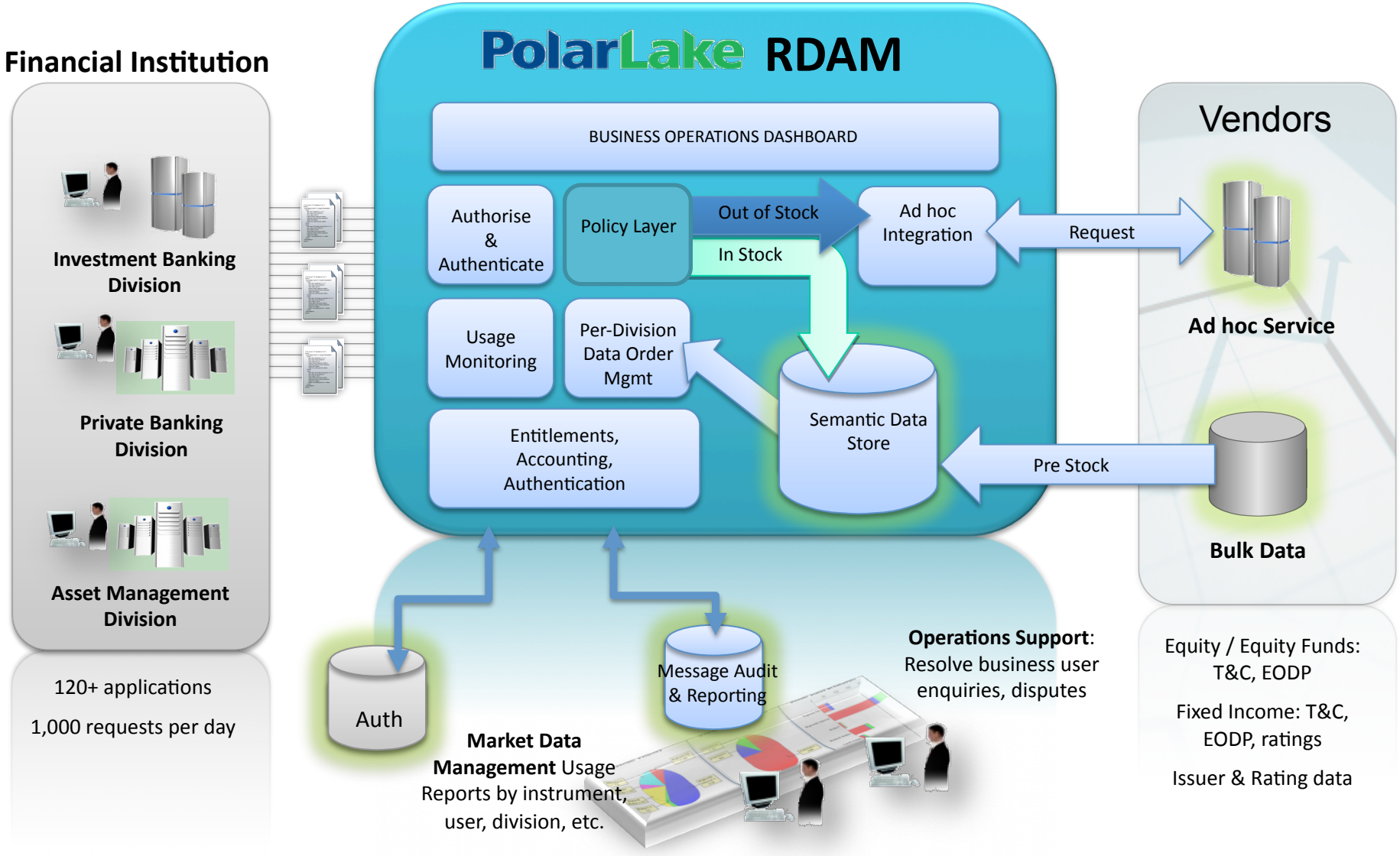
Case Study 3: Semantic Policy Based Data Management



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Storage Queries

```
SELECT rddsem.file, rddxml.doc, rddxml.src  FROM

        TABLE(SEM_MATCH(
                '(?filetype :contains :Issue)
                (?filetype :providedBy :SourceA)
                (?file rdf:type ?filetype)',
        SEM_Models('rdd'),
        SDO_RDF_Rulebases('RDFS'),
        SEM_ALIASES(SEM_ALIAS('','http://www.polarlake.com/rdd#')),
        null)) rddsem
```

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Environment and Volume

- Technology Platform
  - J2SE and J2EE
  - PolarLake Messaging Integrator (XML OS)
  - Primary port Linux
- Data volume
  - up to 8 million documents changing daily round the clock.
  - 600/sec loaded – multiple loads in parallel
  - Documents vary in size from 2K to 1M

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Summary

Using semantics we have developed an efficient supply chain that is robust and scalable

Supply quality data – the raw material of risk management

Diverse case studies prove the success of our semantic approach

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Thank you

http://www.polarlake.com/
http://www.oracle.com/technetwork/database/options/semantic-tech/