

DATA MANAGEMENT ASSOCIATION



SAN FRANCISCO BAY AREA CHAPTER

2011: The Year of Data Virtualization

Lessons & Best Practices from 2010 to Accelerate Your Success



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Agenda

- ✧ Data Virtualization – What Is It?
- ✧ 2011: The Tipping Point
- ✧ Business Needs and Analyst Views
 - Industry Views
 - Customer Needs
- ✧ Navigating the Opportunity to Leverage DV/IaaS
 - Lessons, Challenges, Best Practices
 - Data Virtualization and EA / Information Mgmt
- ✧ Customer Case Studies
- ✧ Demo of Data Virtualization
- ✧ Questions and Answers

Today's Enterprise Data Integration Challenges

Exponential Data Growth

Data Silos

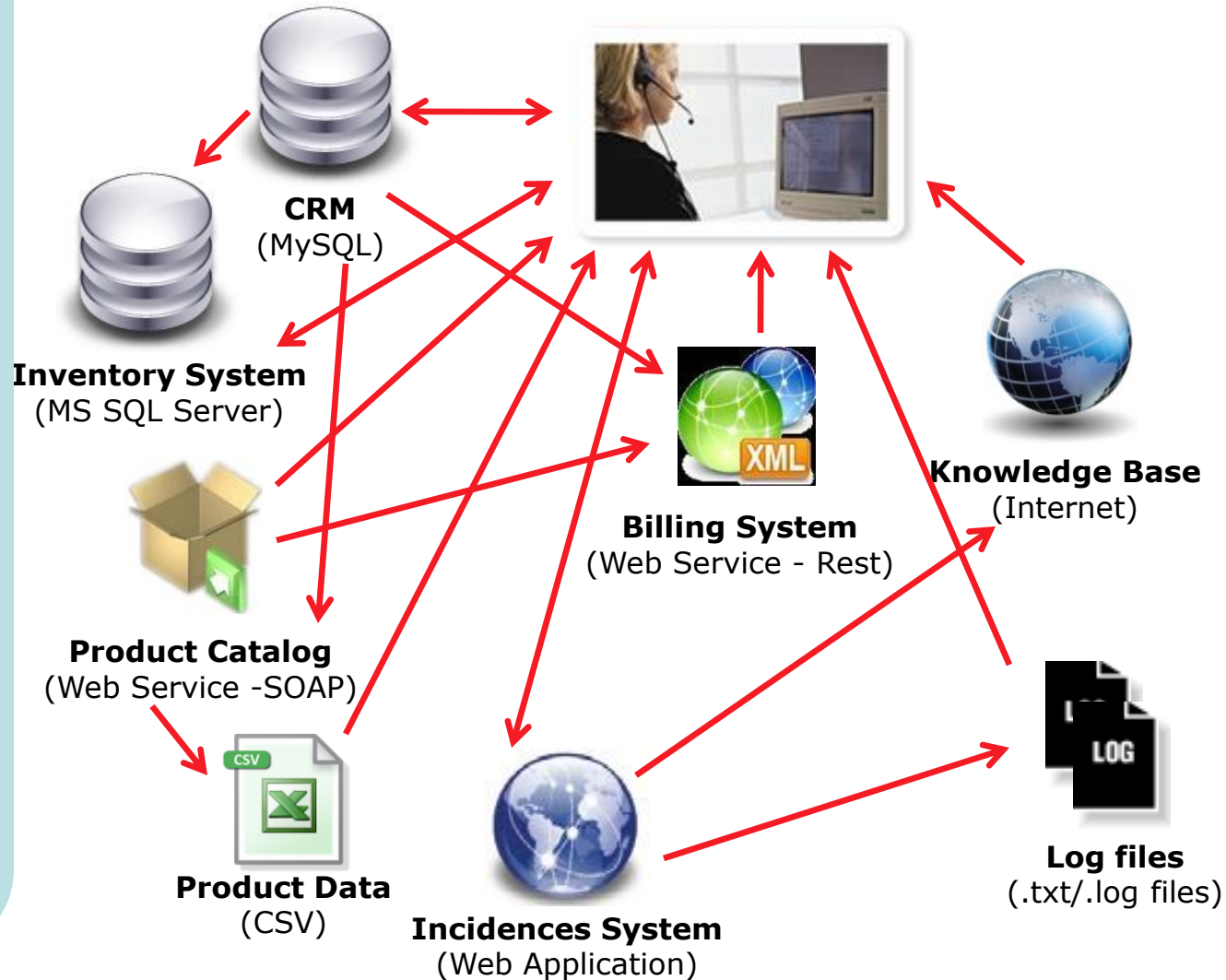
IT System Complexity

Inherent Latency

Move to Cloud

Rigidity

High Costs



Trends Driving Need for New Approach

- Big Data, Cloud, Real-time, Unstructured, Agile ...

FORRESTER®

February, 2010 - Forrester Wave: Information-as-a-Service

... IaaS offers a virtualized data services layer that **integrates heterogeneous data and content to service any application in real time or batch.**

The
Economist

February, 2010 - The Data Deluge:

Businesses, governments and society are only starting to tap its vast potential will produce ten times as many data streams as their predecessors, and **those in 2011 will produce 30 times as many.**

IDC
Analyze the Future

December, 2010 - IDC Predictions 2011:

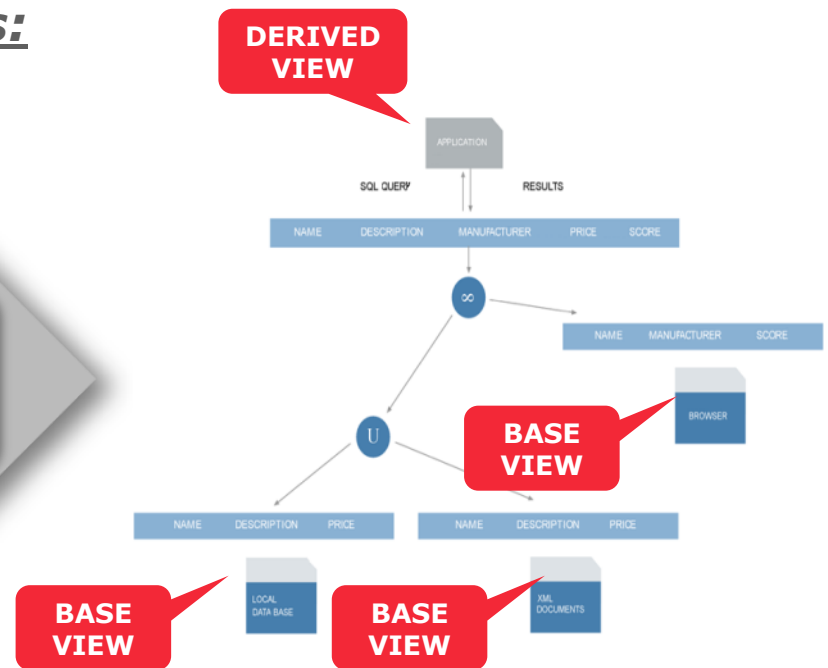
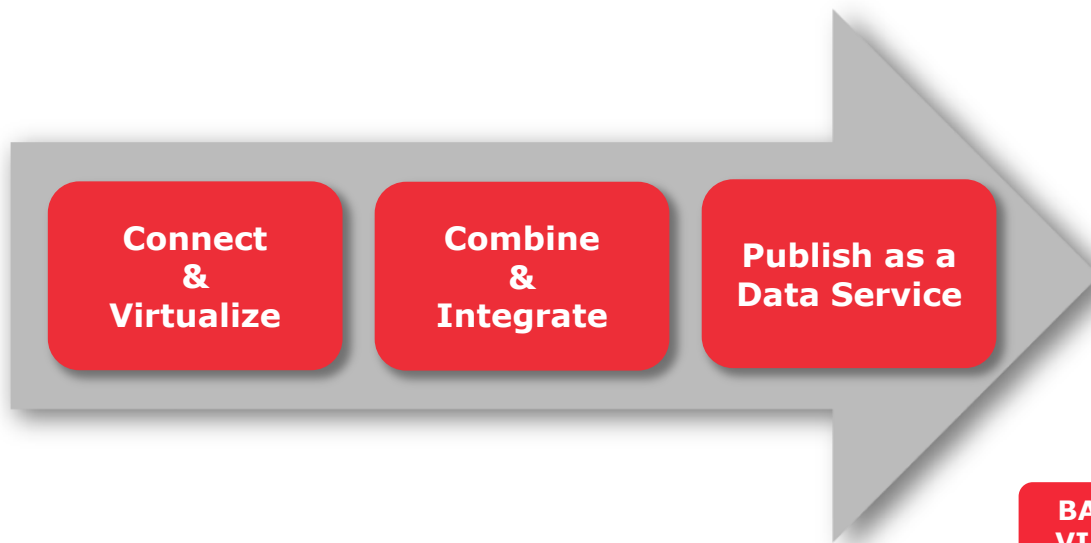
The expanding universe – **reaching 1.8 trillion gigabytes** – will drive demand for cloud - friendly information infrastructure and **real-time analytics** for “**big data**”



What is Data Virtualization?

Data Virtualization combines disparate data sources into a single “virtual” layer that provides integrated data services to consuming applications in real-time (right-time)

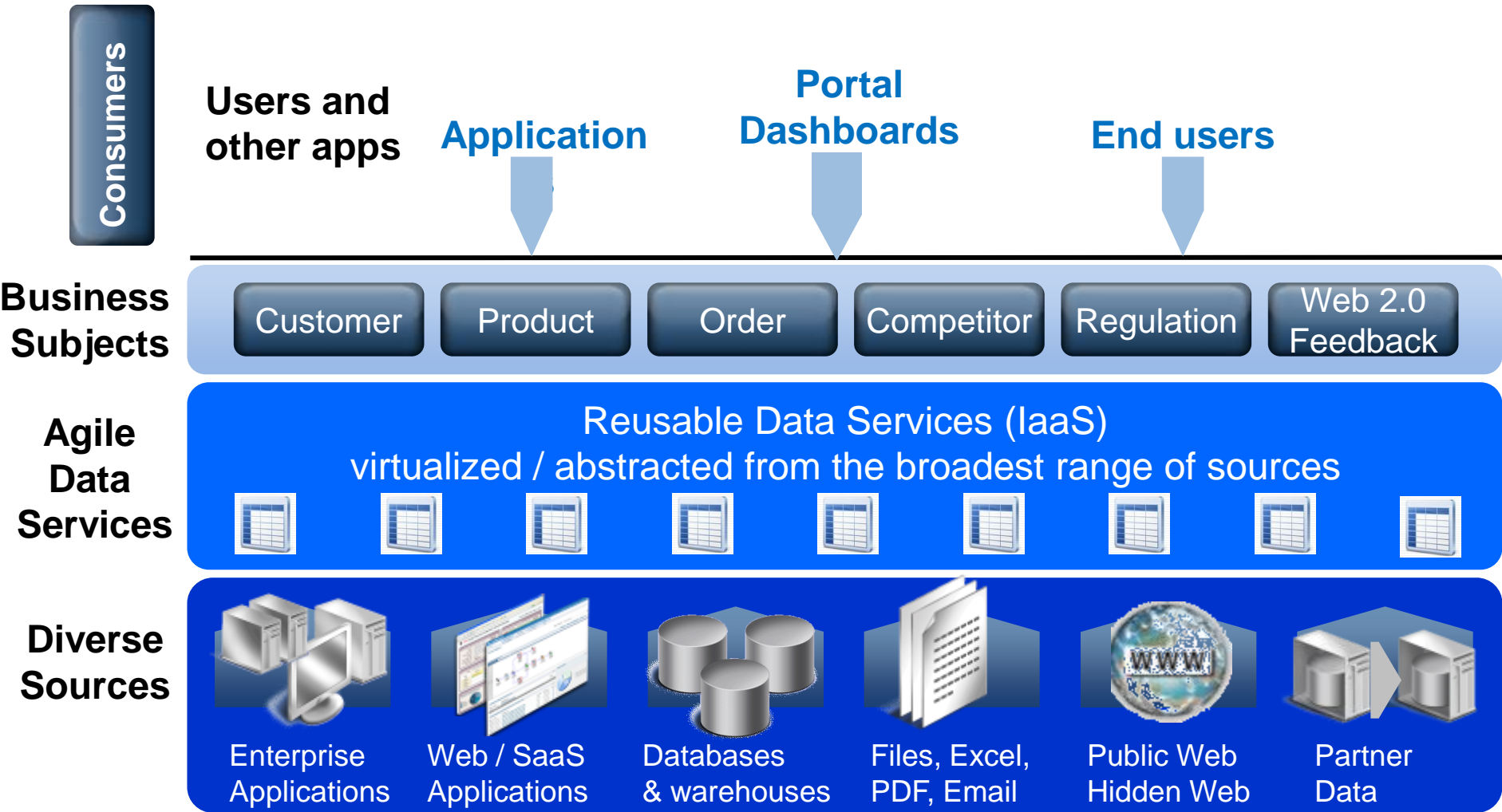
Data Integration in 3 Simple Steps:



Data Virtualization Provides “Virtual” Data Layer

- ✧ **Abstraction** - free yourself from the underlying complexities of data sources and data types
- ✧ **Decoupling** - Decoupling data from the business logic
- ✧ **Logical Representation** - User or Enterprise Defined Data Models
- ✧ **Real-Time or Right-Time Access to Data**
- Data On Demand, Cached or Scheduled Batch
- ✧ **Lighter, Agile Integration** – Federated views of disparate data that is easy to transform, combine, change at will.
- ✧ **Reduce Replication Costs** – HW, SW, and Governance costs of unnecessary data replication
- ✧ **Integrates with Existing Tools** – Leverages them in hybrid modes

Analyst View: How To Architect Agile Data Services?

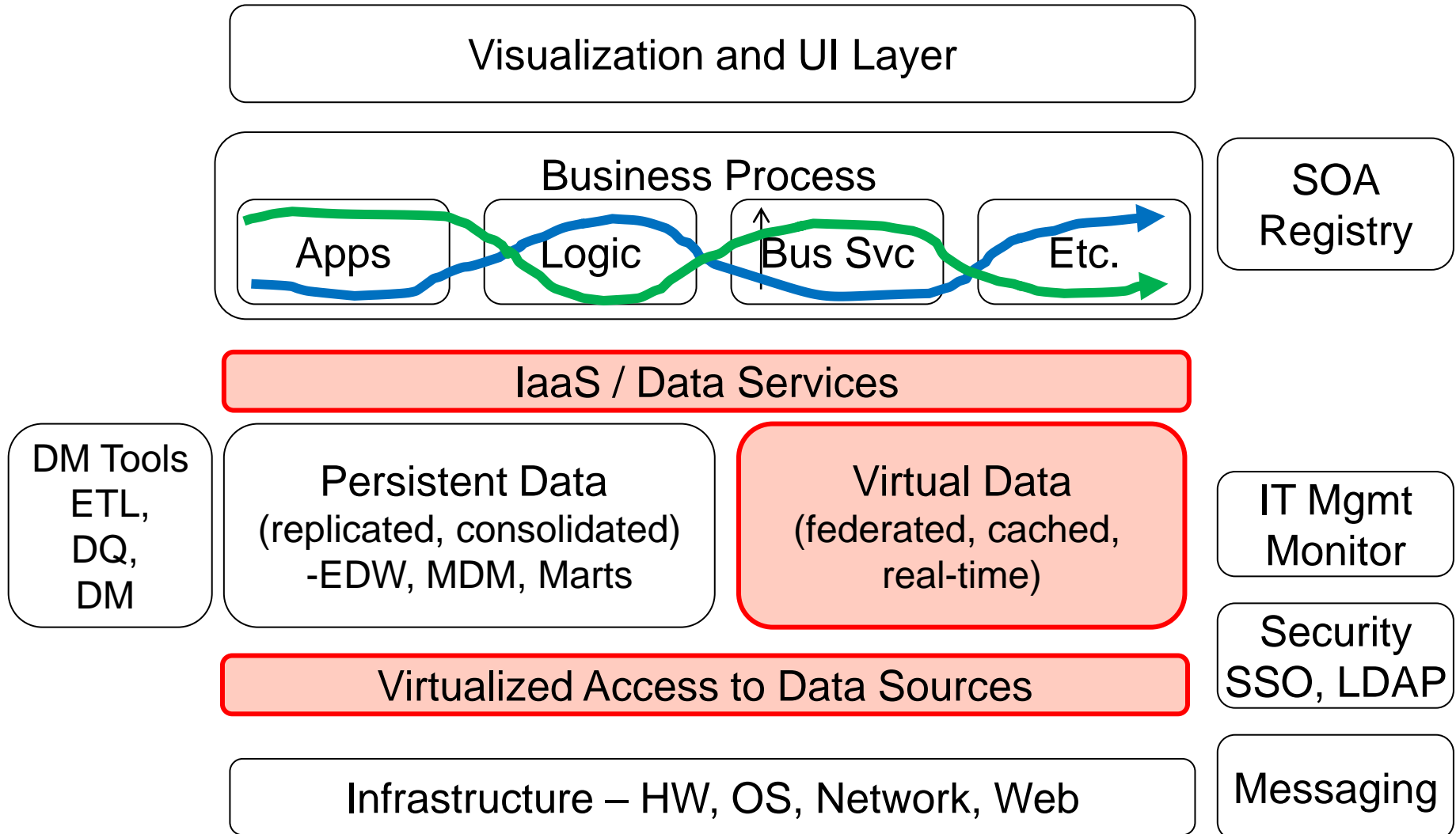


Data Services liberate information from stovepipes

Data Virtualization is used to deliver IaaS

- ✧ IaaS / Data Services is **more than Web-service** enabled data sources
- ✧ Value Added **Data Integration and Management Functions** – Virtualization, Federation, Logical Model, Transformation, Cleansing, Matching, Caching, Query Optimization, multiple delivery modes etc.
- ✧ Access to **Heterogeneous Data Sources** – Structured to Unstructured
- ✧ Publish to **Heterogeneous Consumers** – based on standard interfaces; Registered and discoverable data services; Works with ESB / BPM
- ✧ Improves **data quality and governance** – separates data management logic from application and process logic
- ✧ **Promotes reuse** of data and lowers cost of integration

Data Virtualization Role in EA

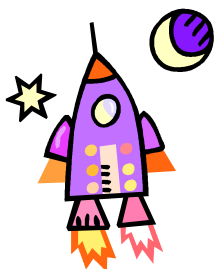


Data Virtualization: Tipping point

Market place and situation today

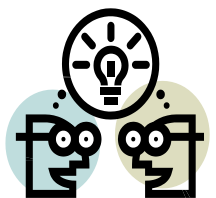
What lies beneath

Data Virtualization - Tipping Point



Need is skyrocketing

Agile Business for survival, Big Data, Growing Volumes, Real-time Data Access, Move to Cloud & Web



Technology is ready

Best-of-breed DV platforms Integrated Data Services, Support for Hybrid Models; Traditional integration reaching its limits



New generation of people

Digital Natives & Immigrants, Daily Virtualization (Skype), Mavens (like Denodo), Wisdom of Crowds (customers)



Data Virtualization: The market buzz (analyst)



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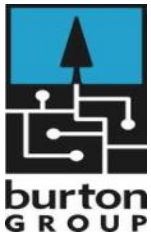
Forrester Wave: Information-as-a-Service

... IaaS offers a virtualized data services layer that integrates **heterogeneous mashups of data and content to service any application in real time** or batch.



Virtual Circle: 10 IT Companies to Watch in 2011

... particularly attracted to the Denodo Platform because of its surprisingly **comprehensive distributed data integration architecture**. It also has a well thought-out approach to mapping.



Near-real-time data integration (NRTDI) is an important new part of integration portfolios, and **pure-play vendors are leading the way** with capable, simple technology that is ready for tactical integration.



Data Virtualization extends (beyond EII and Data Federation use cases) ... to providing a solution for **linking data marts** and warehouses into an extended analytic environment, **enterprise data sharing** (perhaps including such things as **mash-ups**), providing infrastructure support for **real-time capabilities**, and for integrating internal resources with those that may be outsourced or hosted in **SaaS applications or in cloud environments**.

Data Virtualization: The market buzz (customers)

A light gray world map is centered in the background of the slide, showing the outlines of continents and countries.

**Customer requests for
Data Virtualization projects
multiplied by 4x in only 12 months**

Data Virtualization: The market buzz (customers)

Shipping & Logistics

- Guaranteeing timely and error free delivery of services
- Secure and accurate flow of data for operations and services

Travel

- Enhanced customer interfaces
- Self-service capabilities for online booking efficiencies
- Call centre process improvements

Information Services

- Data aggregation on mapping POI and real-time integration to social media information for location and social contextual mapping
- Aggregation of content for b2b publishing and lead-based revenue
- Data Services for database marketing to link personally identifiable information (batch) with attributes and intent (real-time)



Data Virtualization: The market buzz (customers)

Banking & Financial Services

- Improved reporting mechanisms via unified data layer
- Enhanced tracing processes and increased debt-collection ratios
- Next generation strategic finance architecture to gain more agility, flexibility and faster response to business requests

Telco

- Better customer service operations helping reduce customer churn and improve the perceived customer experience
- Integration of various backend systems and legacy ERP systems with online processes/systems to help improve efficiency in points of sales
- B2B Integration of ancillary service offerings with Virtual Mobile Operators

Data Virtualization: The market buzz (customers)

Pharmaceuticals & Life Sciences

- Daily sales real-time reporting across global distributors
- Physician MDM – virtual single views of physicians for CRM and clinical trials consolidating regulatory and certification data
- Virtual knowledge base for distributed research data

Retail & Food Service

- Shared data services infrastructure to serve enterprise needs and provide self-service data to franchise operators and partners
- Virtual Real-Time Inventory: Integrates internal warehouse, 3rd party warehouses, common carrier data with real-time views of in-store inventory to provide accurate hour-by-hour projected inventory
- Competitive price comparison and intelligence reports
- Brand and reputation monitoring for high-end retail

Data Virtualization: The market buzz (customers)

Government

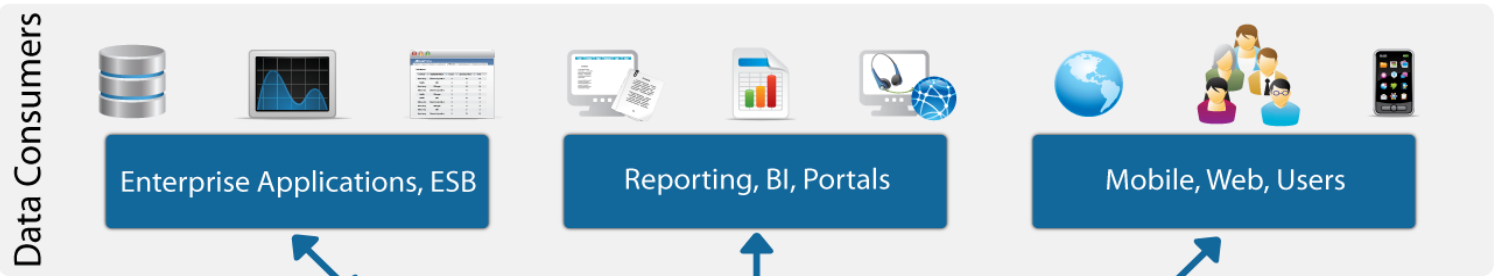
- Unified views of citizens profiles
- IT modernization for the publication of data to companies, citizens and other government bodies

Health & Insurance

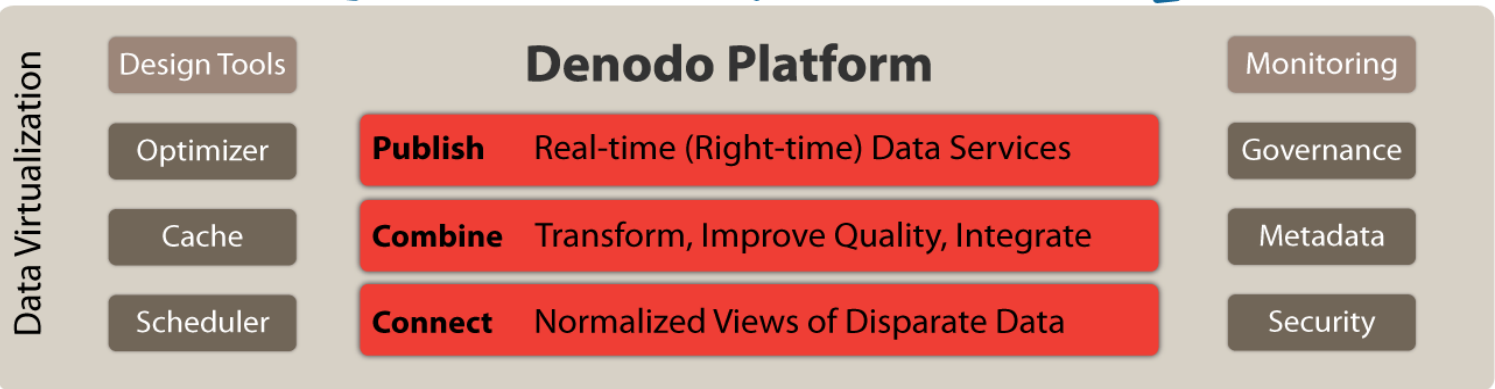
- Internal billing systems for fully automated client invoicing
- Customer self-service provisioning
- Reduction in call handling times and increase of first call resolution rates
- Unified access to customer information
- Enhanced reporting capabilities via automated access to dispersed data
- Clinical safety and quality monitoring for leading indicators of risk against internal and external benchmarks
- Unified healthcare eligibility and enrollment mashup applications

Data Virtualization Architecture

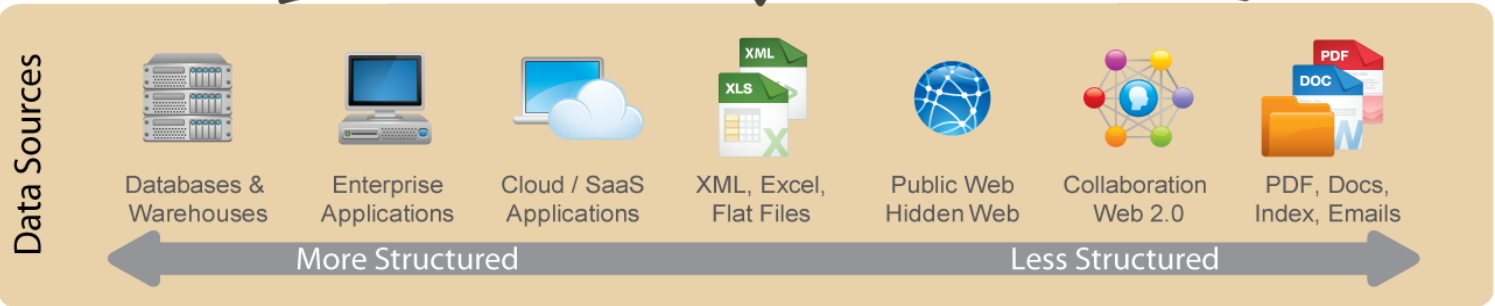
Business Solutions
Access Information-as-a-Service



Denodo Platform
Right Information at the Right Time



Disparate Data
Any Source
Any Format



Best in Class Data Virtualization – Holistic, Virtual, Flexible

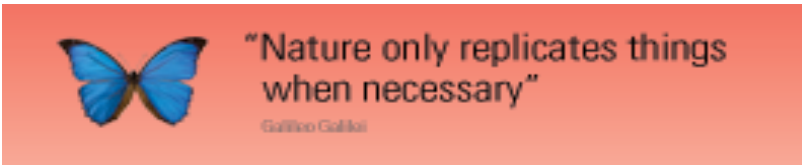
■ Realize Value from All Data

Universal data access across internal, external, web, structured or unstructured



■ Virtualization minimizes Replication

Flexible integration options with fine control
– Virtual real-time, cached or scheduled batch



■ Data Services Abstraction, Reuse

- Abstracted data delivered as reusable data services
- Managed access control, service levels



■ Enterprise Class - Powerful yet Agile

- Performance and scalability
- Data Governance, Security and management
- Easily integrated into existing IT infrastructure



Data Virtualization Use Cases

■ Technical and IT Solutions

- Data Access & Normalization of Disparate Data
- Federate Real-time Data with High Performance
- Extend the Data Warehouse & Marts
- Extend Master Data Management
- Fresh Sources for ETL – “Web ETL”
- Data Services Delivery – Information-as-a-Service
- Web Automation to complement BPM

■ Business Solutions

- Agile Business Intelligence & Reporting
- Customer 360 Views for Customer Portal & Call Centers
- Web, SaaS / Cloud, Social Media Integration

Top 4 Customer Use Case Patterns

Agile Business Intelligence

- Real-time Reporting
- Performance Dashboards
- Virtual Data Marts / EDW
- EDW Prototyping
- Competitive and Social BI

Customer Focus

- Customer 360 Virtual View
- Data Services for Call Center
- Customer Self-Serve Portals
- Customer Analytics
- Social CRM Integration

Web / Cloud / SaaS Integration

- Web Data Extraction
- Web Automation (2-way)
- Cloud /SaaS with no API
- Data Aggregation
- External Watch / Monitoring

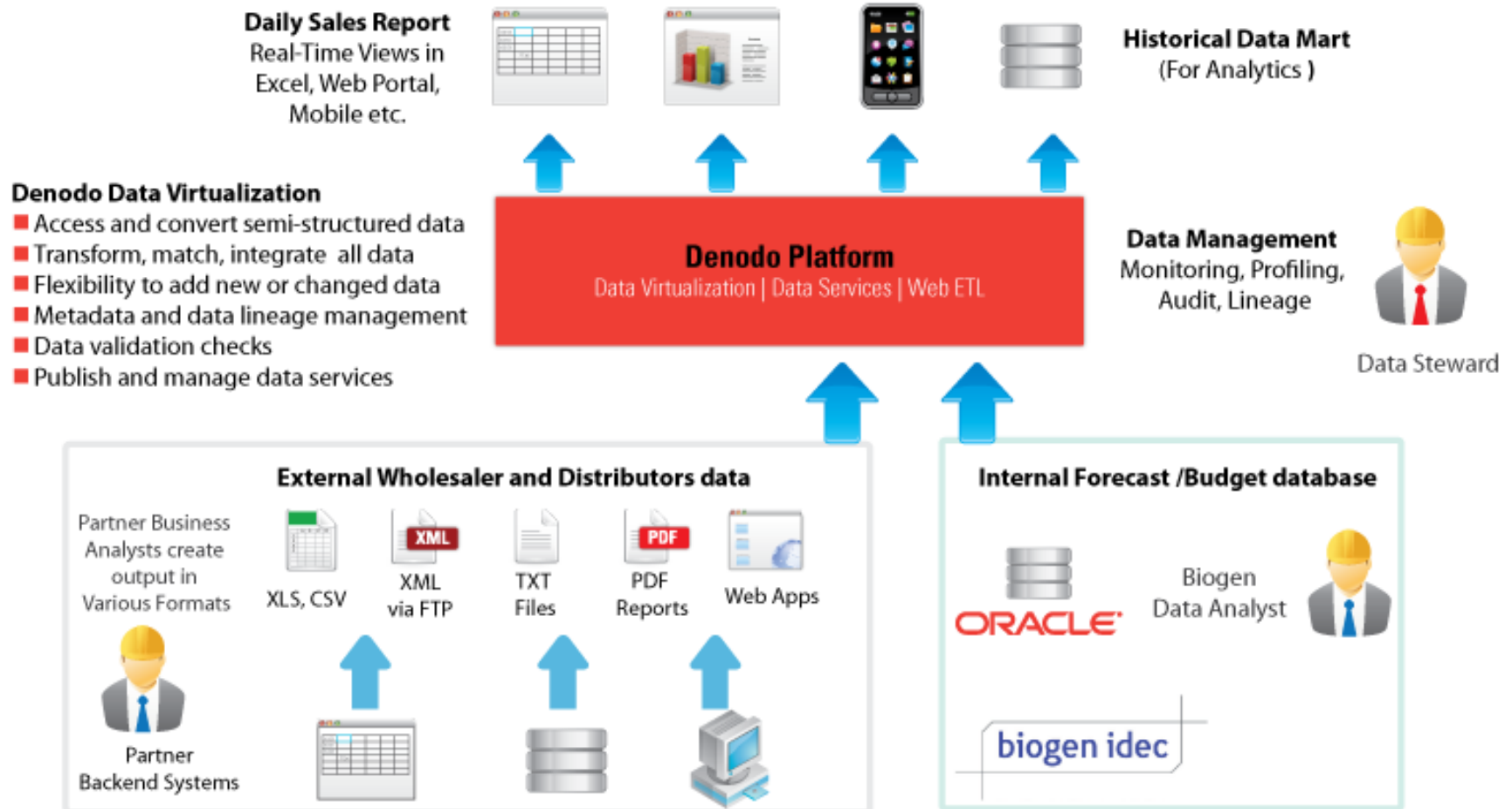
Data Services

- Agile Data Services (IaaS)
- "Virtual" Data Layer
- Logical Abstraction – for Migration or Modernization
- Mashups and Info Feeds

Agile Data Services <-> Agile Business Intelligence

- Strategic Business Intelligence
 - Access Big Data - Distributed, Hadoop, Unstructured, Cloud / Web
 - Virtual Data Marts that extend / hybridize Data Warehousing
 - Single 360 View of Customer, Product, Risk, etc.
- Operational Business Intelligence
 - Real-time Data Services for operational business decisions
 - Pervasive Business Intelligence
- Performance Management and Dashboards
 - Rapid assembly of BI indicators to see Relationships
 - Dashboard of Dashboards
- Competitive & Market Intelligence
- Situational Awareness – Compliance, Reputation

Data Virtualization: Agile BI , EDW Extension



Data Virtualization: Agile BI

Agile BI Benefits

- Faster results, less effort, real-time data
- Seamless integration with data marts and BI tools
- Virtual dashboard of dashboards
- Relate disparate data easily with agility
- Easily relate internal and external data



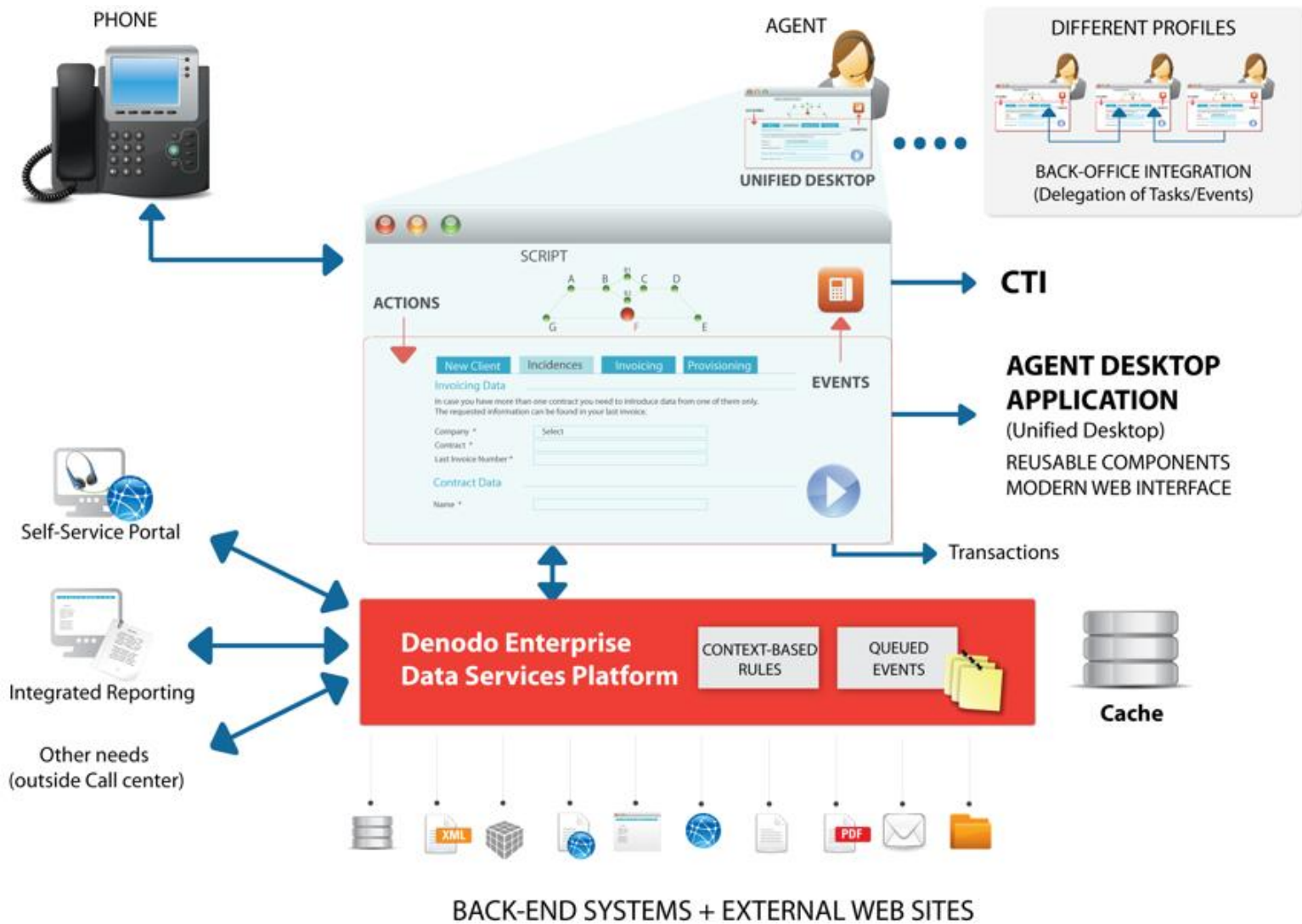
biogen idec

BioGen Idec executives now have access to new partner and public data sources that they could not leverage before : **60% faster** with change requests met in just a few days with IT using **40% less analyst time** to support.

Additional Projects at Biogen using DV

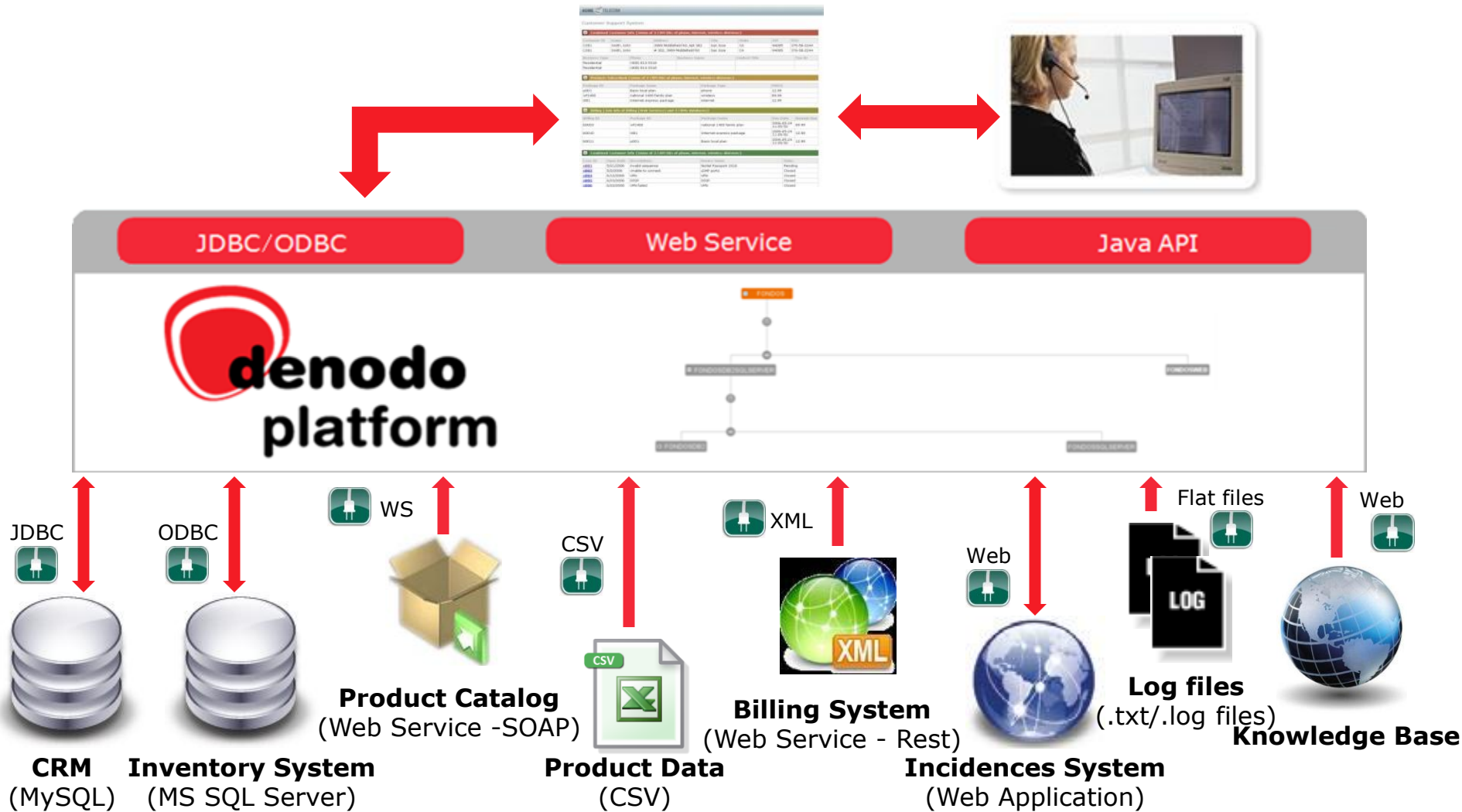
- **HR Reporting:** Combines central HR data with multiple SaaS HR applications such as Benefits, Payroll, and Recruiting
- **Virtual Real-Time Inventory:** Integrates internal warehouse, 3rd party warehouses, and common carrier data
- **Regulatory Compliance:** Consolidates internal reports, validates, compares with government data
- **Registry MDM Extension :** Virtualizes and enriches single views of physicians for CRM and clinical trials
- **EDW Extension:** Federates multiple data marts with other internal and external data

Data Virtualization: Customer Interaction



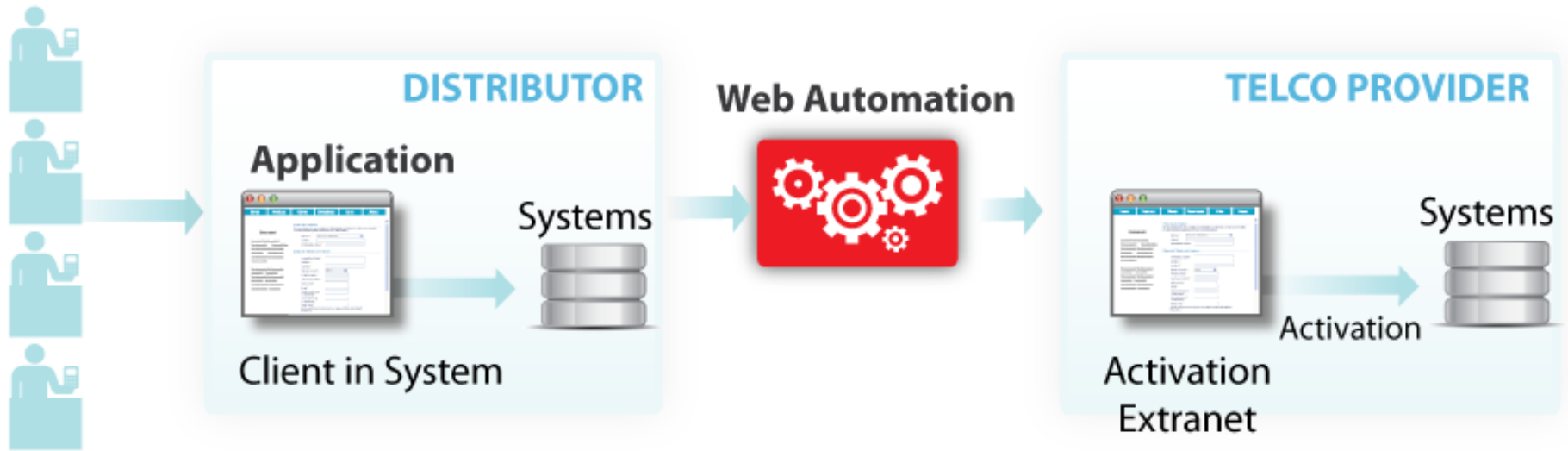
Single View of Customer - Virtual Integration

Homogeneous access to all customer's data



Data Virtualization: Web Automation

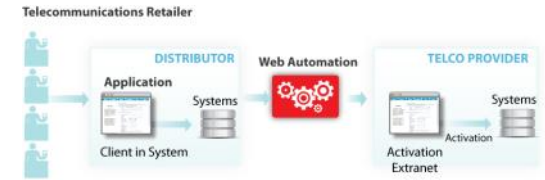
Telecommunications Retailer



Data Virtualization: Web Automation

Web Automation Benefits

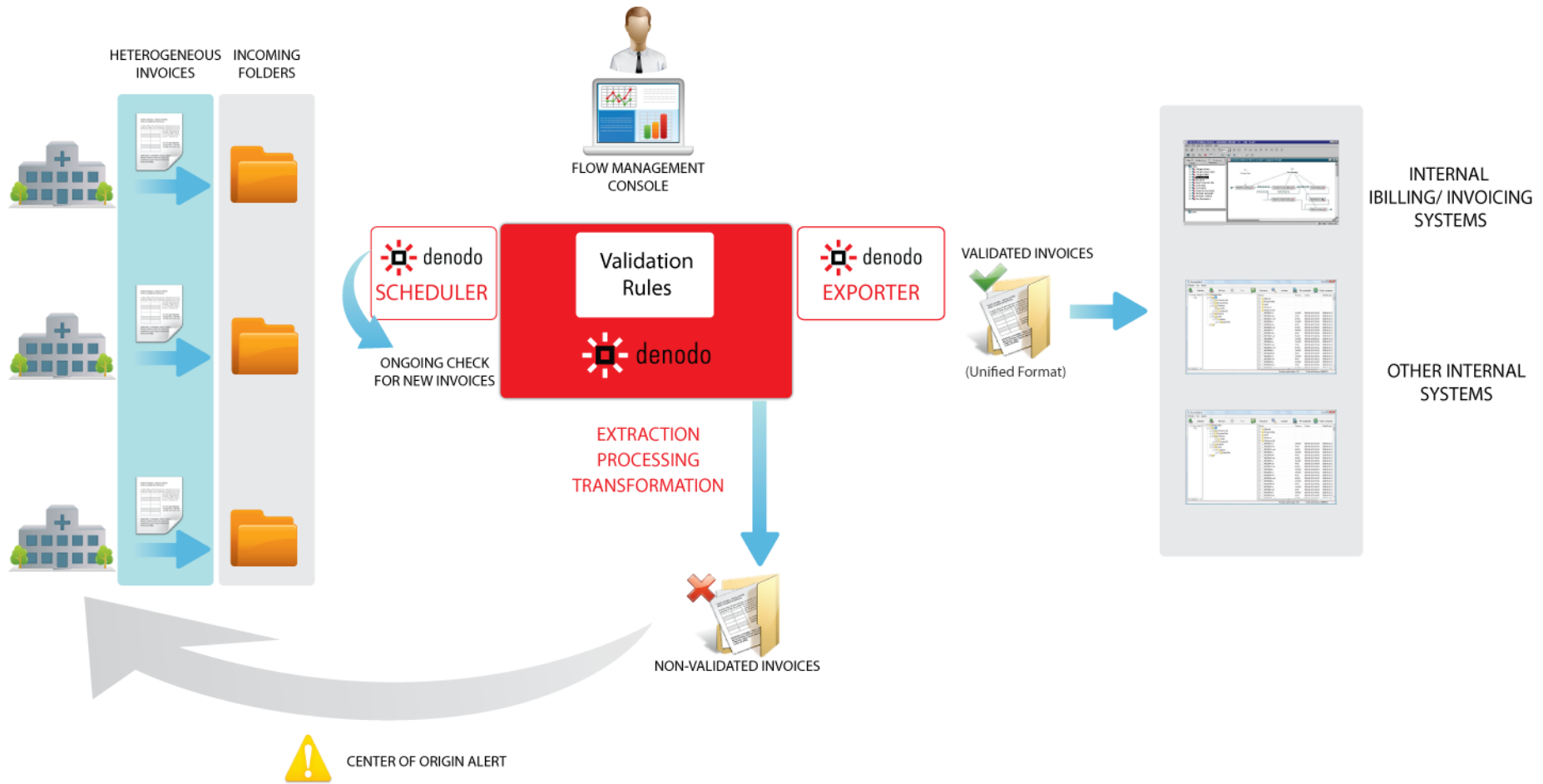
- Automating the use of web data for enterprise applications
- Use the Web as a business process execution platform
- Seamlessly orchestrate enterprise data and applications to work with remote applications, cloud / SaaS and micro-web applications in a flexible way
- Social media integration with CRM, Business Intelligence



The Phone House

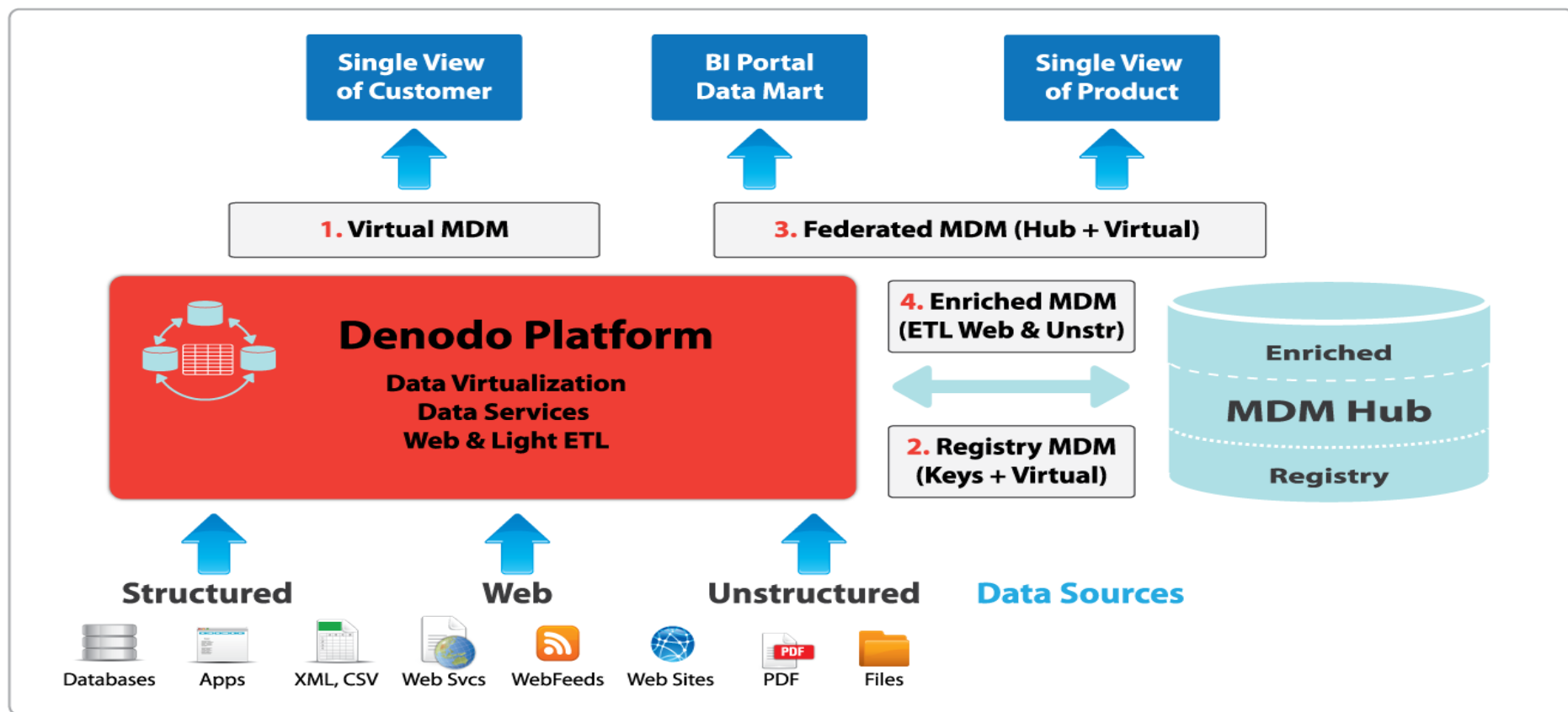
The Phone Warehouse has **reduced client's waiting time by 75%** thanks to Denodo's Manual Process Automation solution.

Data Virtualization: Data Orchestration for Business Process Support



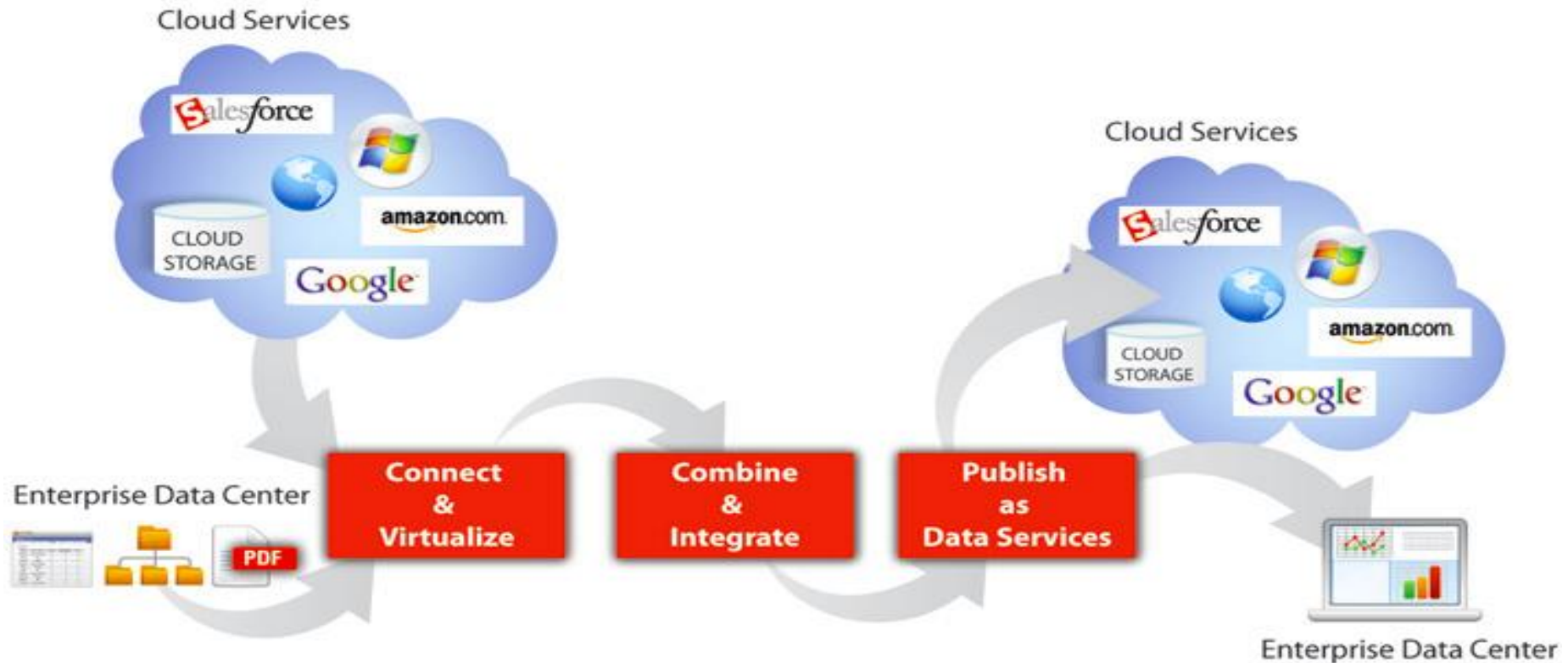
Data Virtualization: Use for Pragmatic MDM

- Prototype your MDM using Virtual MDM
- DV is a perfect complement to Registry MDM
- Extend Federated MDM
- Enrich MDM with Unstructured, External and Web Data



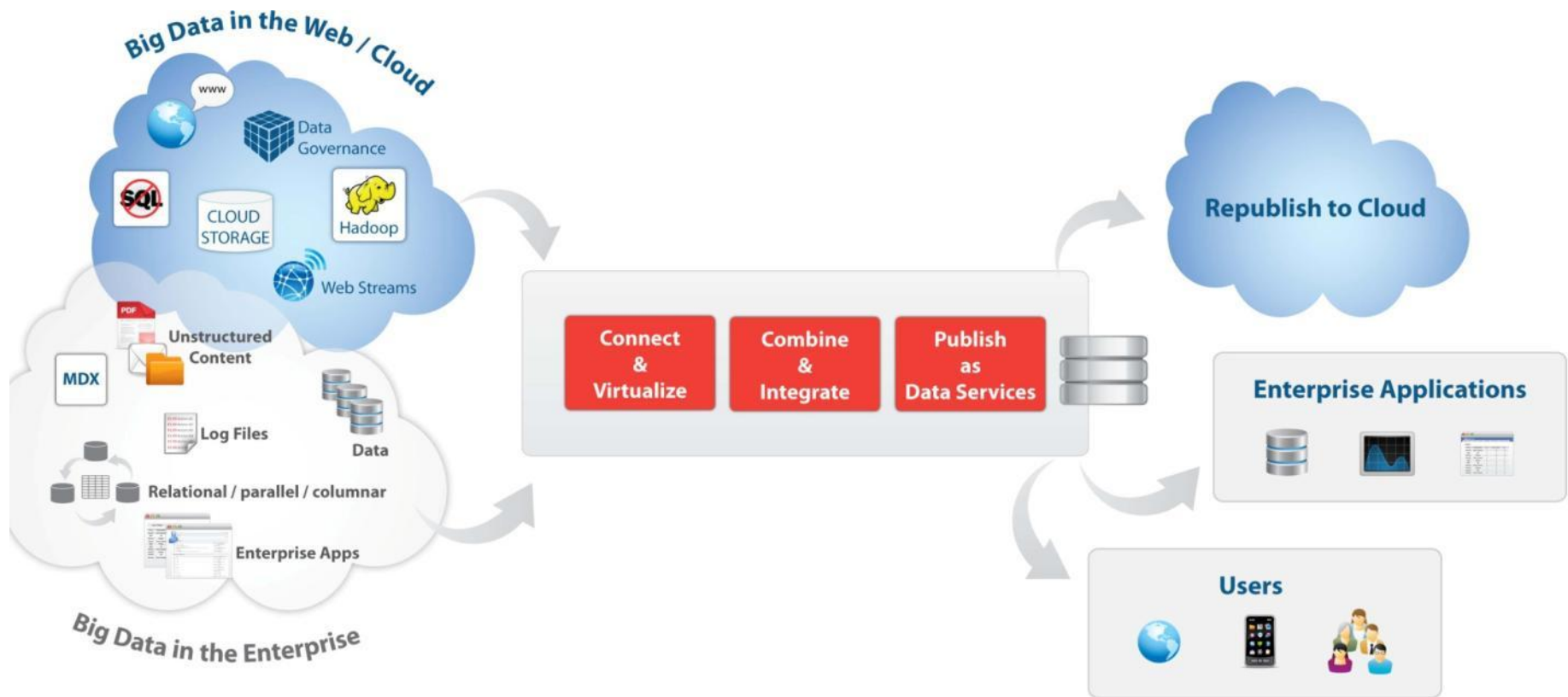
Data Virtualization: Cloud, Web, SaaS Integration

- Integration of Enterprise and External Apps
- Abstraction Layer to Facilitate to App Migration and Consolidation
- Not all SaaS have APIs – Use Web Automation to Complete Access
- Republish Data Services to Private or Public Cloud



Data Virtualization: Use to Leverage Big Data

- Access Hadoop / HIVE, Cloud Storage, Data Feeds
- Don't Forget the Web! Also Enterprise Big Data ... Logs, files, etc.
- Performance Optimization – push intelligence to edges
- Caching and Reuse Strategies



Lessons & Best Practices from 2010...

Industry Highlights

- **Data Services: A Pragmatic approach to Unify and Extend Your Existing Information Infrastructure** - Noel Yuhanna, Principal Analyst, Forrester
- **Agile BI and Agile Data Services: A Perfect Fit** - James Kobielus, Sr. Analyst, Forrester
- **The Briefing Room** - Senior Analyst Robin Bloor with Eric Kavanaugh, Host of DM Radio
- **Why Agile Reporting and Operational BI are a Perfect Fit for Data Virtualization** - Ron Powell, Cofounder and Editorial Director of Beye Network
- **What is Data Virtualization** - Philip Howard, IT Director & Bloor Research



Lessons & Practices from 2010...

DM Radio Series

- **Data as a Service in Warehousing, Intelligence, and Performance** – DM Radio
- **The Extended Enterprise: Federated Data Models** – DM Radio
- **Agility is Everything: How Application Architectures are Changing** – DM Radio
- **Inside and Out – Integrated and Federated Data Management** – DM Radio
- **Why Agile Reporting and Operational BI are a Perfect Fit for Data Virtualization** - Ron Powell, Cofounder and Editorial Director Beye Network

Data Virtualization: Navigating the opportunity

Key insights from analysts and customers

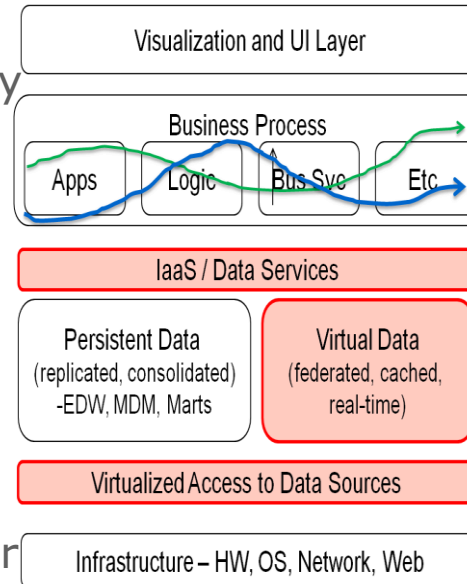
- **Initial adoption of Data Virtualization** starts with **read-only use cases**
 - single version of the truth, real-time BI, and federated views across LOB
- ... but **read-write use cases** are growing rapidly to 20-40% of deployments for SOA / WOA data services
- **Primary drivers** for adoption are increasing **business agility** and automation with **quicker ROI**.
- **Hybrid models prevail** – requirement for best-of-breed data virtualization platforms that leverage existing middleware and applications
- Starting to consider data virtualization as **enabler for cloud integration** with on-premise data
- **Abstraction layer for application modernization** and data consolidation
- **Data governance** features for quality, advanced transformation, model governance / exchange is growing in best-of-breed virtualization platforms
- Evolving from project use to **agile data services infrastructure** to support reuse for many applications.
- Increasing interest in enterprise use cases for **integrating semistructured and unstructured data**

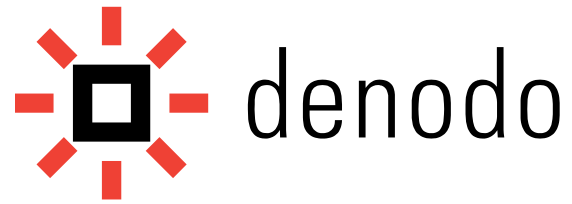
How Data Virtualization Address DM Challenges

- **Performance on Mixed Workloads** - Large Data Sets, Query Performance, Concurrency, Latency Differences ...
- **Security / Access Rights** - Source Level, Model / View Level, Data Services Access, Integration with LDAP/SSO ...
- **Availability , Scalability** – Clusters, Redundancy ...
- **Data Quality & Reliability (accuracy)** – In-flight DQ, Integration of Rules & DQ tools, Add Reliability Metadata
- **Metadata Inconsistencies** – Model Governance, Data Lineage, Top-down & Bottom-up models, Fuzzy Joins ...
- **Changeability** – Data Discovery, Change Impact, View Propagation, Resolution of Data Disputes, Versioning
- **Read & Write** – 2PC Transactions, XA manager

How Data Virtualization Fits in EA

- **Business Capability Driven EA –**
- Right information to right people at right time with agility
- **Virtualized (Abstracted) Access to Data Sources**
- **Virtual (Real-time) and Persistent Data Stores**
Data Virtualization coexists and extends EDW, MDM,
- **SOA Services – Data, Application, Messaging**
Organize SOA components of Data Services, Application or Logic Services, Transaction / Message Services and Business Services ; Shared SOA Registry and Tools
- **Common EA Infrastructure**
Leverage common EA services like Security, Single-Sign On, Management, Monitoring, Private & Public Cloud
- **Visualization and UI Layer**
Delivering Information-as-a-Service / Virtual Data Services transparently to a variety of applications, devices, users





Data Virtualization Demo

- Analytics / Information Use
- Transactional Application Use

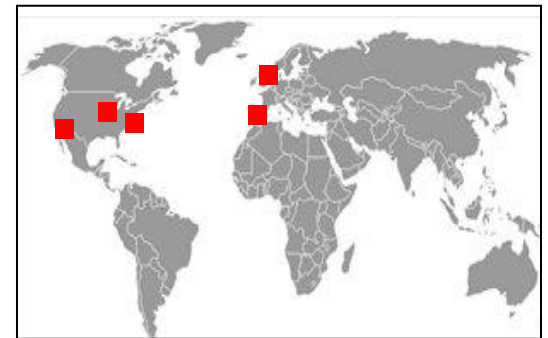
Denodo Overview

Company

- Privately held; \$3.2 Billion Private Equity Backing; Profitable Growth
- HQ in Palo Alto (CA), Madrid (Spain), London (UK) & Regional Offices

Operations

- 100+ Customers – Telco, Finance
Energy, Health, Retail, Gov & Defense
- Direct and channel sales in US & EMEA

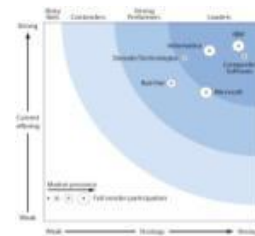


Products & Services – Denodo Platform 4.6

- Data Virtualization is our only focus – unified with Data Services, Web Automation, Unstructured, Data Orchestration and Governance)
- Enterprise class - flexible, high performance, well-integrated
- Access any data source; Advanced integration, transformation; Publish and manage Data Services (IaaS) in wide array of formats.
- Services & Partners – most experienced in industry on DV / IaaS

Denodo – Awards & Recognition

- **Forrester - “Leader” in Information-as-a-Service**
- **Gartner - “Cool Vendor” in Data Integration”**
- **Bloor – “Top 10 IT Companies to Watch”**
- **Burton – “Pretty Impressive! Best of Breed DV”**
- **InfoWorld - “Best Mashup Server”**



Summary - Data Virtualization



Better Quality Information

- Integrate **Disparate Data Silos**
- Include **Web / Cloud**, Big Data, Unstructured
- **Real-time** (Right-time) Data Services



Lower Cost & Agility

- Lower Integration Costs by **80%**
- **Flexibility** to Change



Fast Time to Solution

- Projects in 4-6 Weeks
- **ROI in <6 months**
- Adds New IT and Business Capabilities

Questions?



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