From Data Warehousing to Performance Management: The Microsoft Business Intelligence Stack

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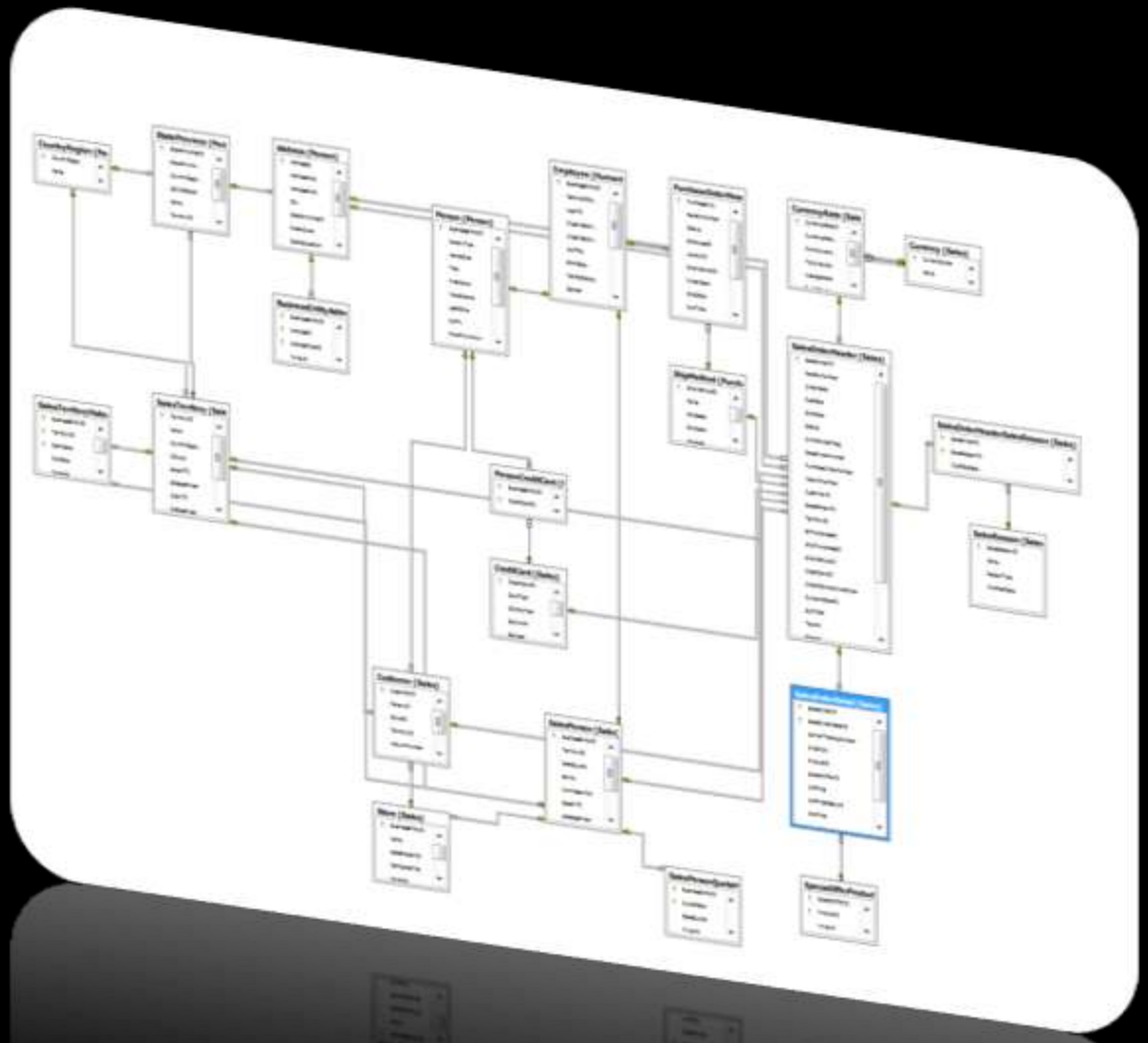
Agenda

- Common Information Problems
  - Why operational db may fail in analytical scenarios
- Data Warehouse and Data Mart
  - A brief methodological introduction
- Reporting and analysis
  - Tools and processes
- Business Intelligence & Performance Management
- How to integrate with custom applications

"Common" operational database

- Optimized for CUD operations
- Highly normalized
- Not “user-friendly”



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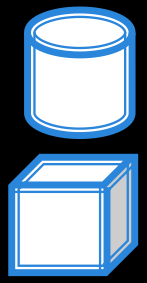
Common Information Problems

- Organizations have large volumes of related data stored in a variety of data systems, often in different formats
- Data systems may not…
  - Be optimized for analytical queries
  - Contain all the data required by design or by time
  - Manage historical context
  - Be available or accessible
- Employees may not have sufficient skills, tools, or permissions to query data systems
- Systems may not have universal definitions
- Analytical queries & reporting can impact operational system peformance

A word on the data warehouse

- A de-normalized data structure optimized for distribution / read
  - Collects & Stores integrated set of historical data from multiple operating systems
  - Serves as the single integrated source of data for processing information.
- Two approaches to build a DW:
  - Top-down approach (Bill Inmon)
  - Bottom's up approach (Ralph Kimball)
- Consists of Facts & Dimensions (tables)

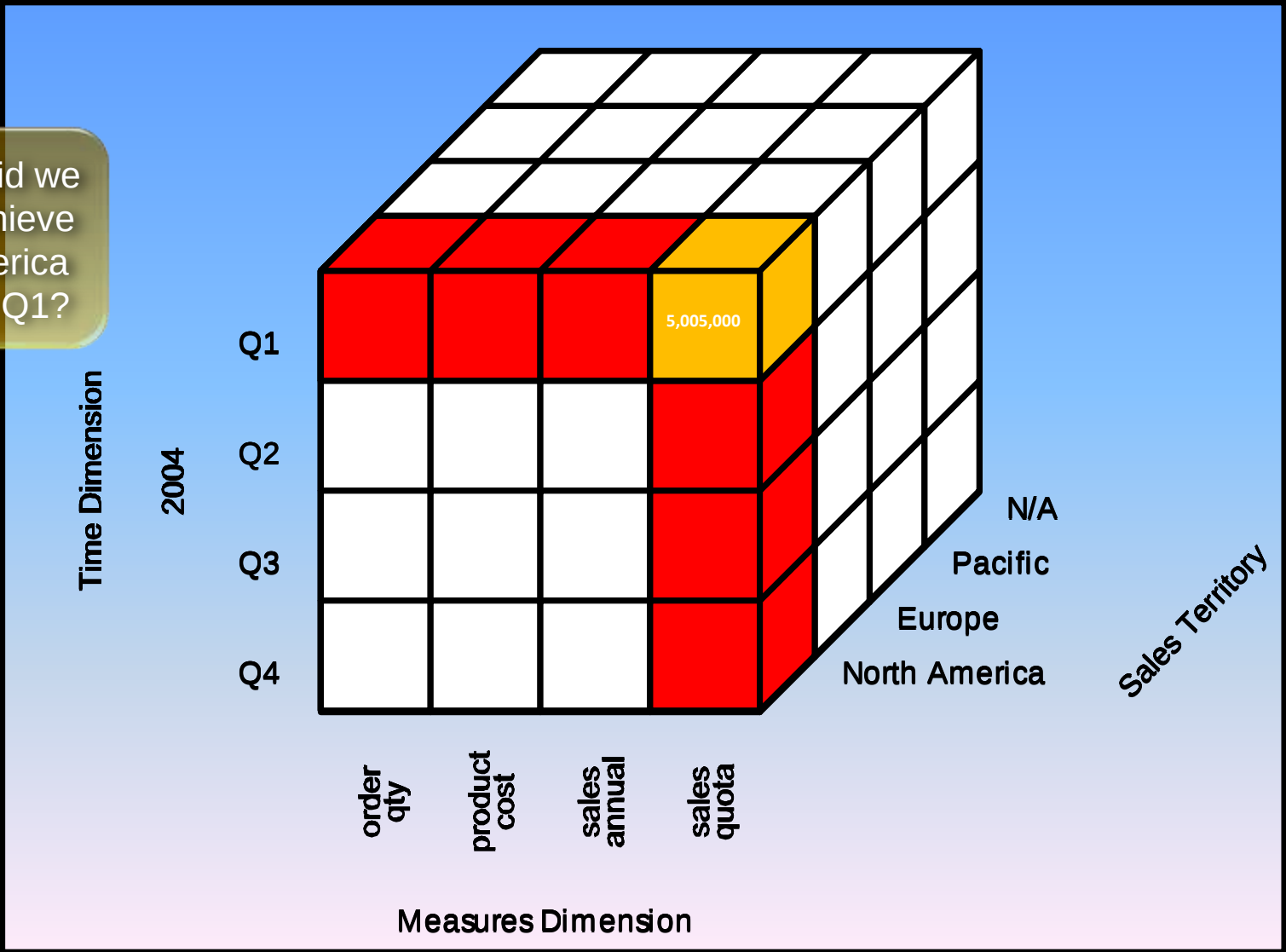
Important Concepts



- OLTP (Online Transactional Processing)
- OLAP (Online Analytical Processing)
  - Aggregates and organizes data from business data sources
  - Structures are optimized for drill down analysis
  - Performs calculations difficult to perform using relational queries
  - Supports advanced business intelligence, such as Key Performance Indicators
  - Includes a calculation engine for fast, flexible transformation of base data

Important Concepts

What sales did we expect to achieve in North America for CY 2004 Q1?



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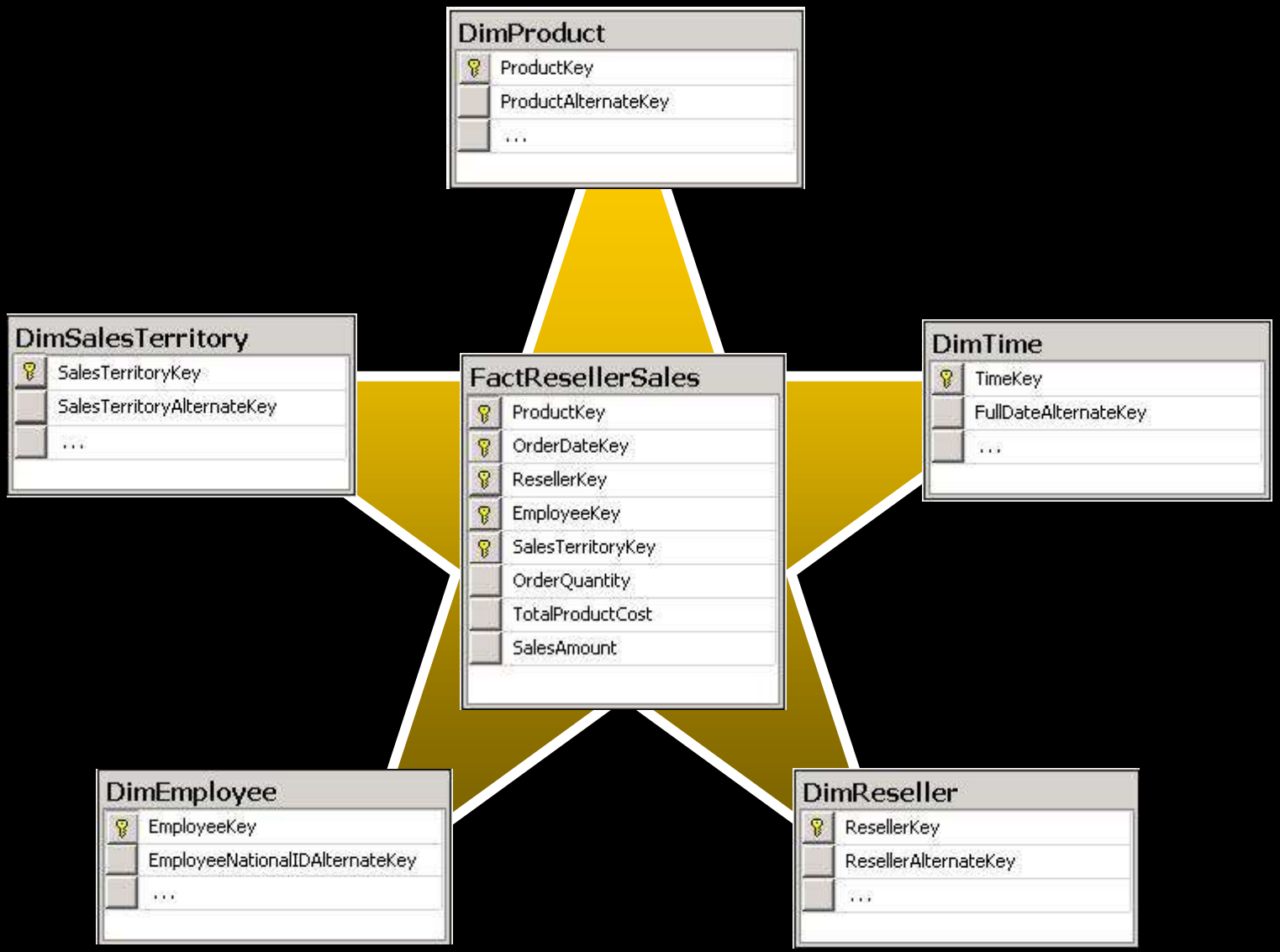


Star Schema

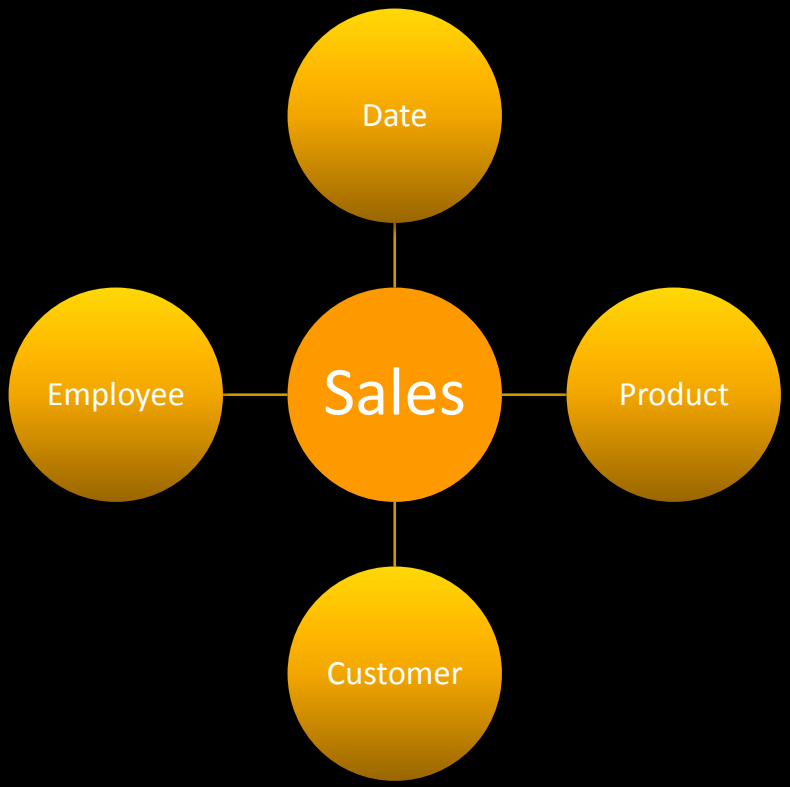
Kimball model

Dimensional tables

- Surrogate keys
- De-normalized attributes
- SCD Type I & II

Fact table

- Sales
- Measures and aggregates



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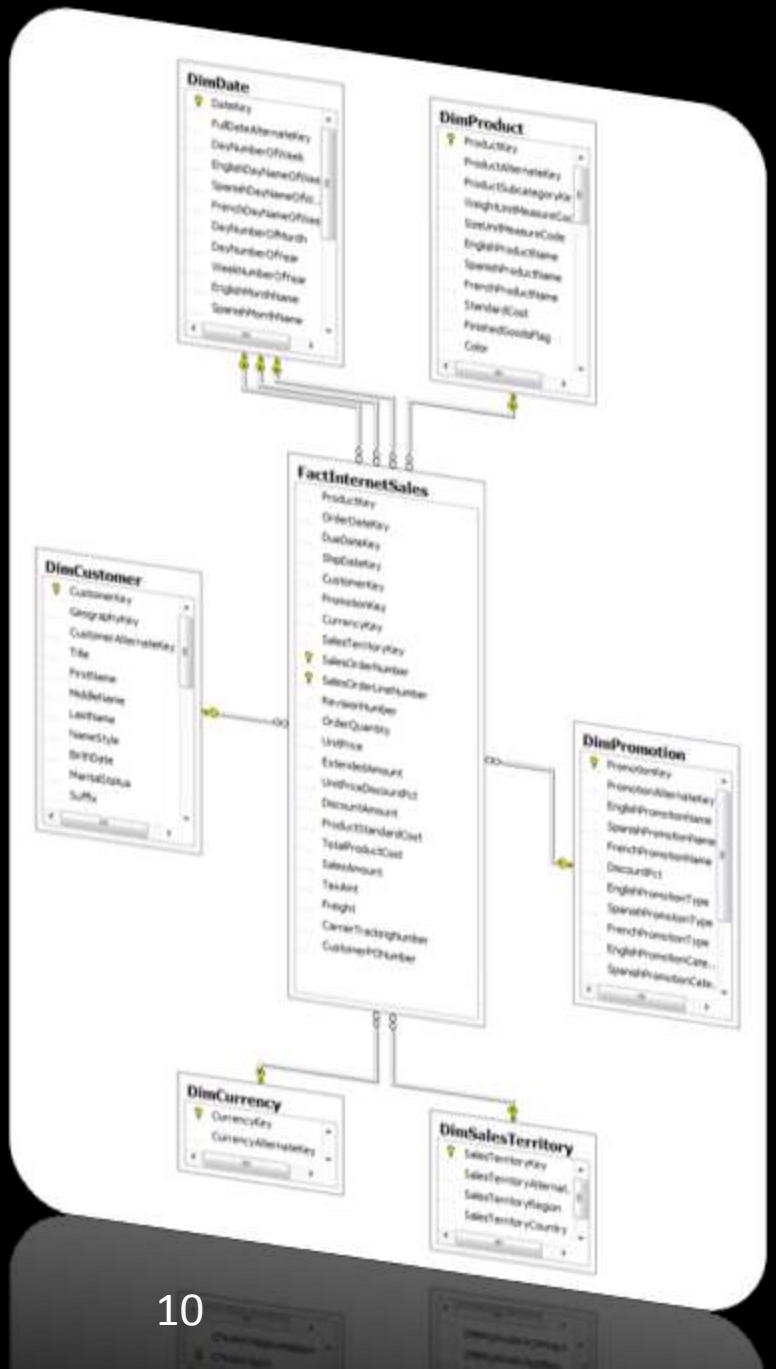
Data Mart

Star / Snowflake Schema

- Relational model
- De-normalized

Entities

- Dimensions: qualitative attributes
- Facts: quantitiative attributes (measure)



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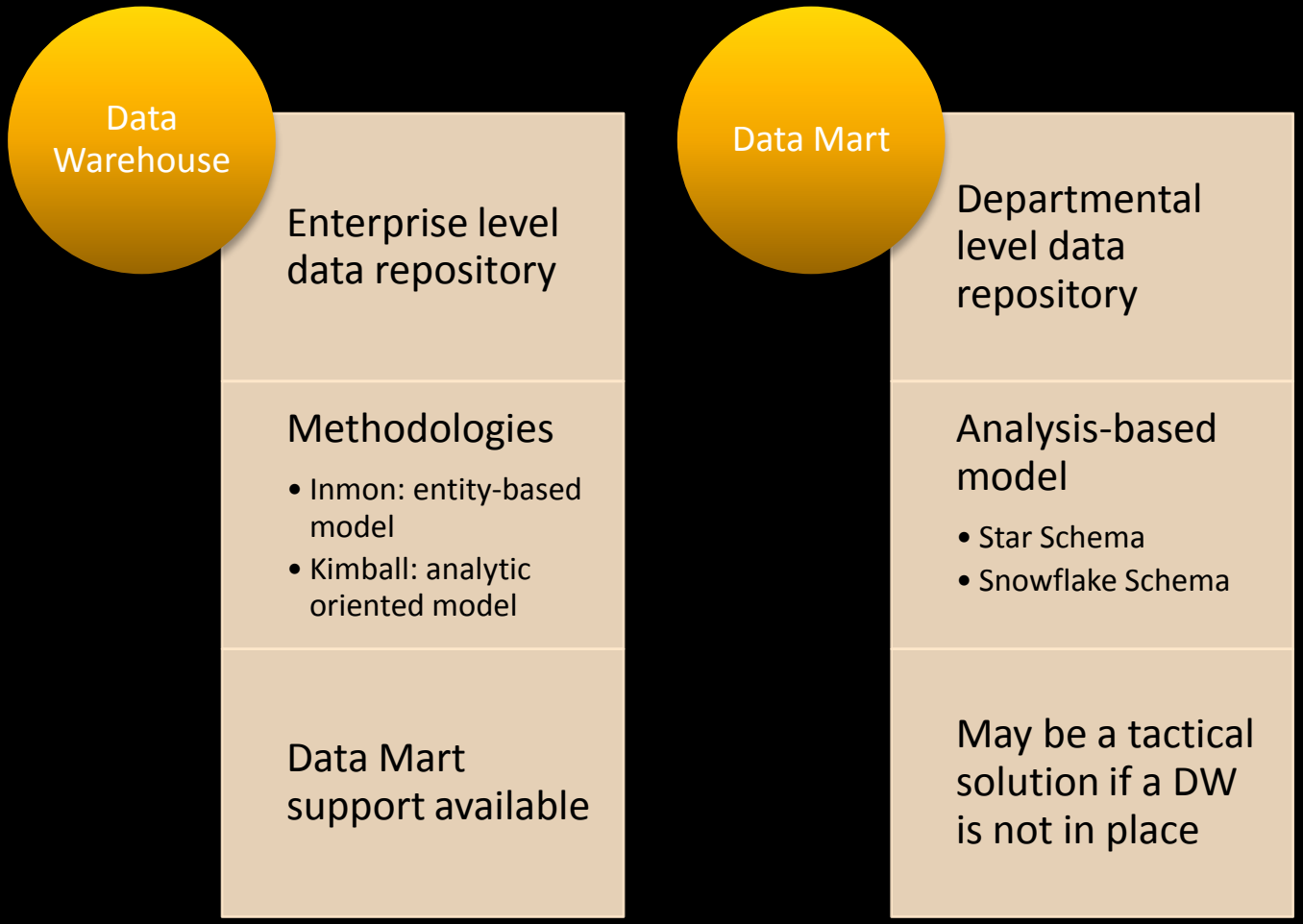
Data Mart and/or Data Warehouse?



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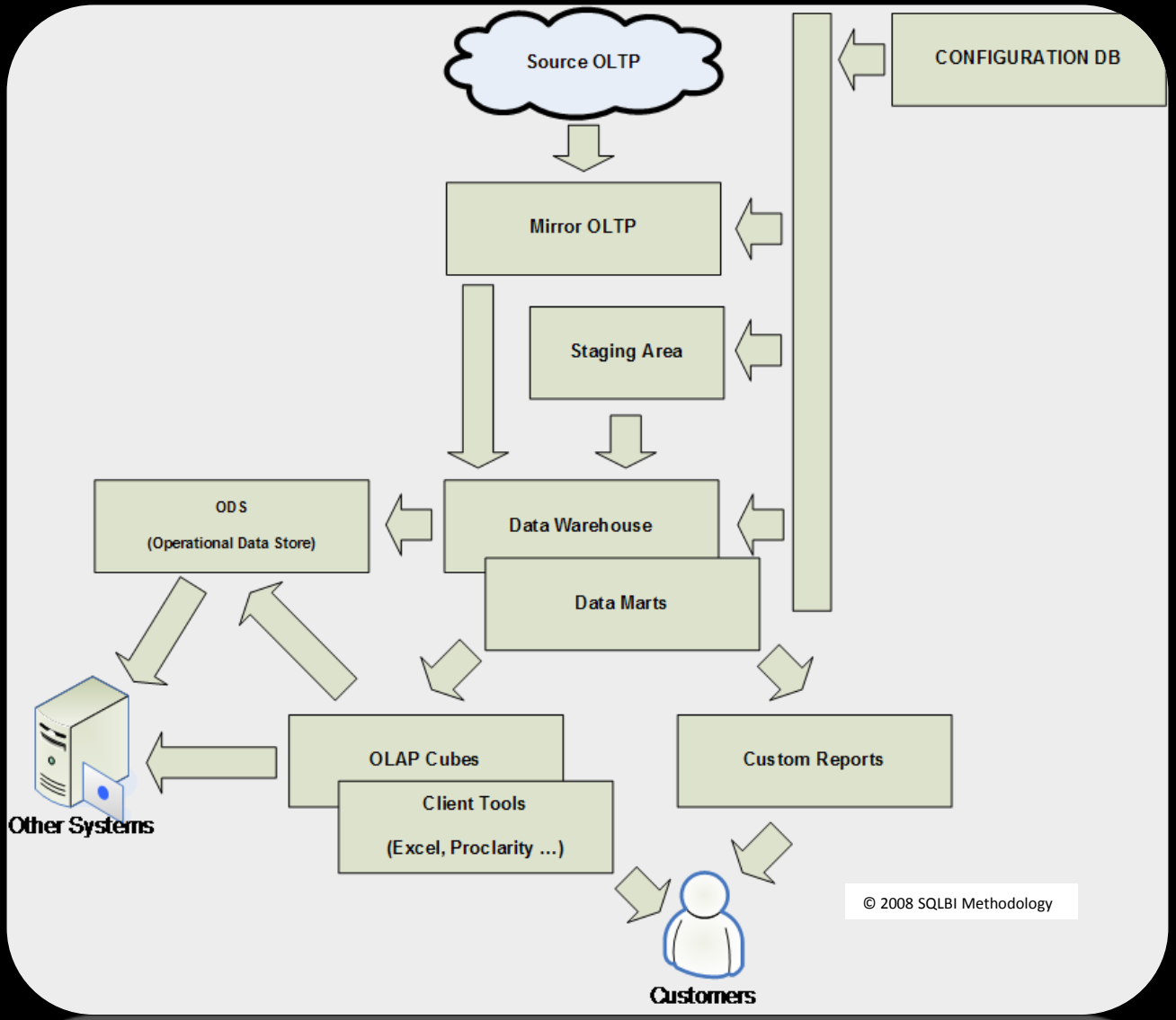
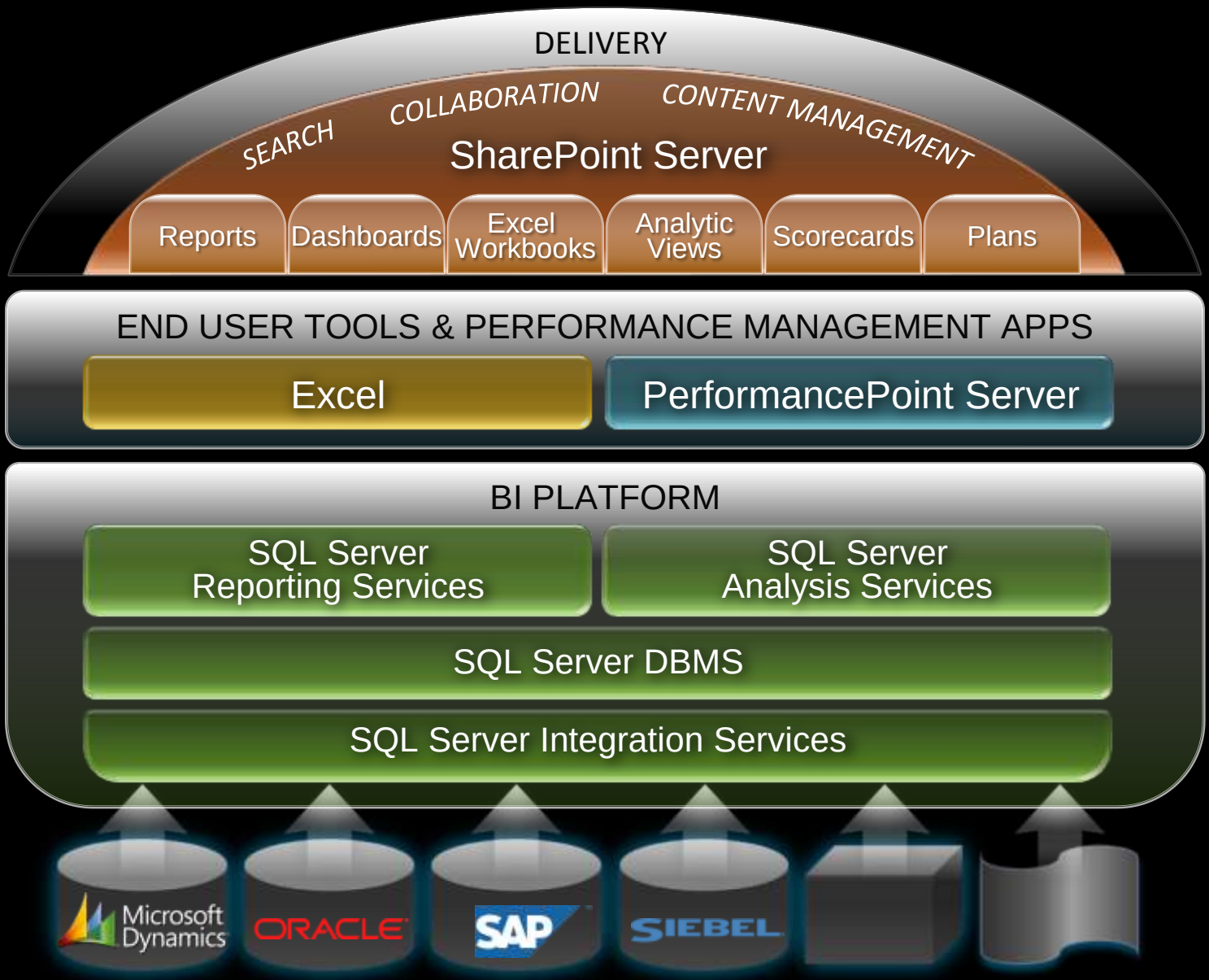
A more detailed scenario

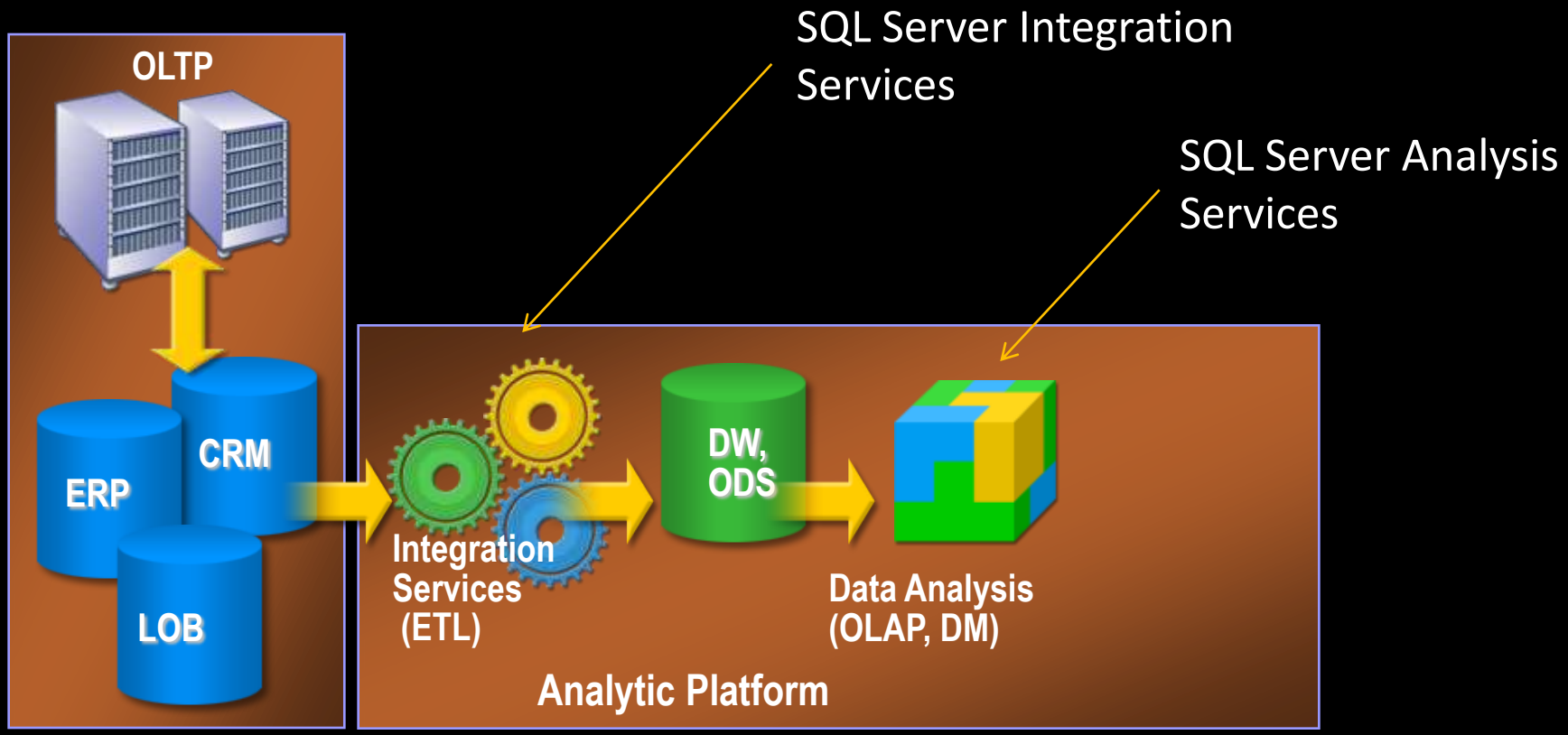
- Data source independence
  - Can survive OLTP system changes
  - Heterogeneous data source
- Single version of the truth
  - Data Warehouse data centralization
  - Data Mart as specific model for analysis
  - Data Mart is user oriented, not Data Warehouse
- Some tools can be used also by OLTP solutions
  - Reporting Services
  - OLTP queries



Integrated End-to-End BI Offering



The flow till now..



MDX

- Multi-dimensional Expressions
- In the cube
  - Calculations, KPIs, Actions and Role filters
  - Extending with CLR assemblies
- Reporting Services
- Excel
- OWC
- ProClarity
- PerformancePoint

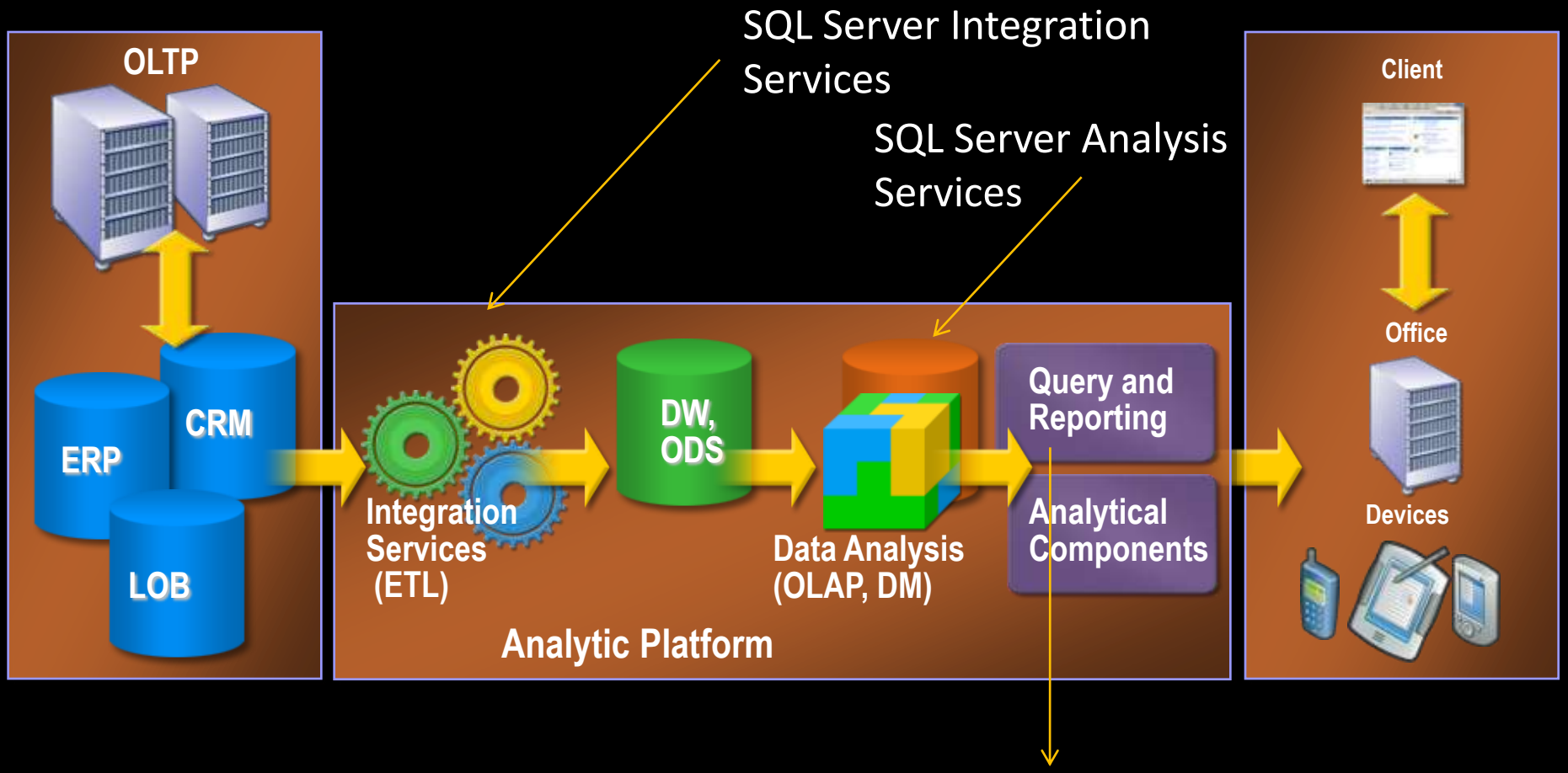
Reporting Services Technologies

- RS against cubes
- Report Builder against cubes
- Relational DW vs. cube for RS/RB
  - GROUPING SETS in T-SQL 2008
- Charting in RS 2008
- Developer Hooks:
  - Programmatic RDL
  - Report Server Web Service, RS URL Access and RS Extensions
  - Custom Assemblies

Excel 2007

- PivotTables and Charts
- Embedding in other Office apps
- CUBE… formulas in the spreadsheet
- Viewing the MDX
- Excel, KPIs, and Scorecards
- Excel Services
- Developer Hooks
  - A VSTO add-in
  - OOXML, Excel Web Services, OfficeWriter
  - And what about VBA?

The flow – How does it look now?



BI Versus Performance Management

- One view: They're the same
- Another view
  - BI merely provides the technology for discerning information from data
  - Performance Management applies BI technology to help monitor and improve organizational success
- Consensus
  - Performance Management competency is the next logical step for BI professionals
  - PerformancePoint represents Microsoft's acknowledgement of this industry evolution

KPIs And Scorecards Defined

	2004	
	Actual	Target
Support Calls Per Month		
Platinum Customers	5.57	6
Gold Customers	5.54	5.5
Iron Customers	5.36	5
Lead Customers	5.57	2

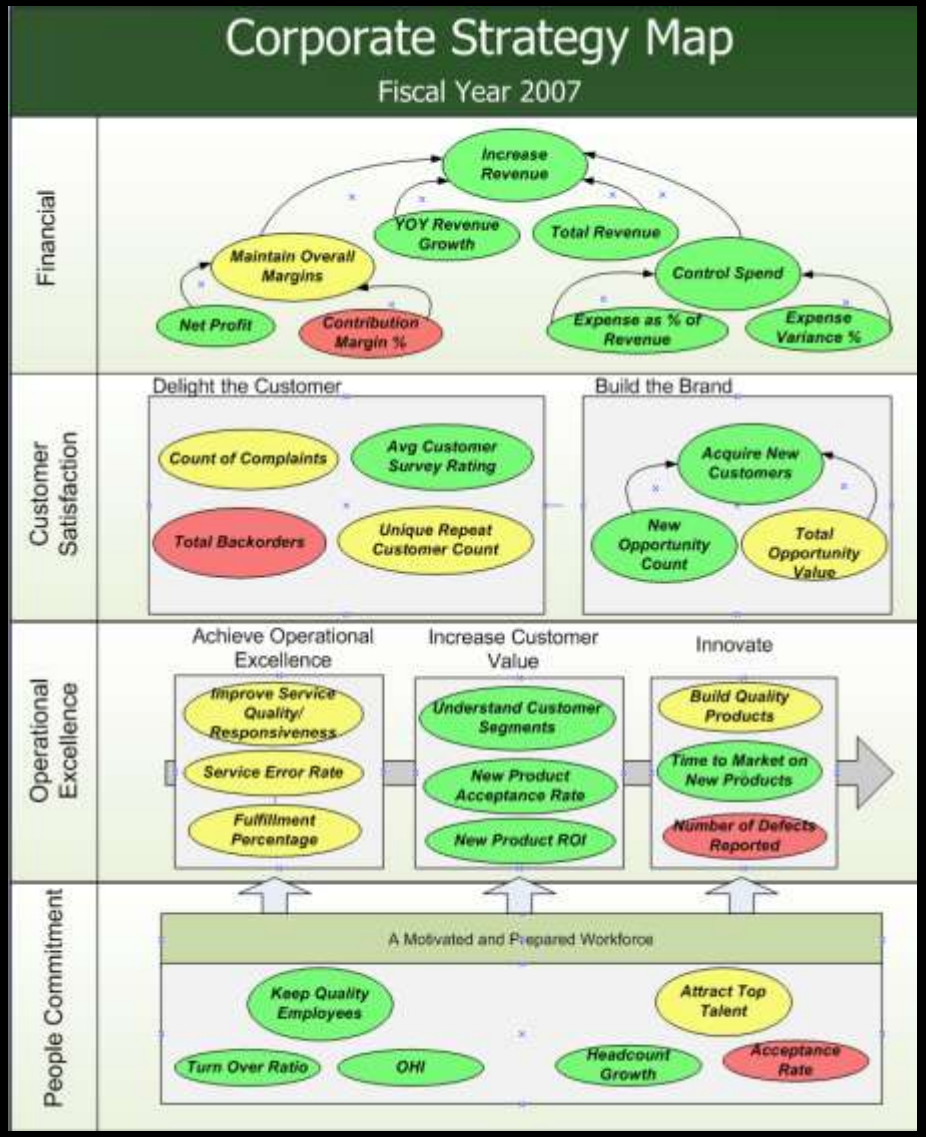
- A KPI really is a measure, but…
  - Has a target
  - Can have a trend
  - In other words, it's a measure paired with a "judgement"
  - KPIs can have parents and children
- A collection of KPIs makes up a scorecard
  - Scorecards make it easy to eyeball the health of an organization or endeavor before drilling down to investigate
  - A logical starting point for analysis
  - A great reality check

Balanced Scorecards

- Sometimes written as “BSC”
- The tool of a management movement akin to TQM and ISO 9000
- Usually include 4 high-level perspectives
  - Financial, customer, internal process (operational), learning and growth (HR)
- Each perspective breaks down into several subsidiary scorecards/KPIs
- Corporate scorecards cascade into business unit/departmental scorecards
- Strategy Map shows interrelationships between different KPIs and/or perspectives

BSC, Strategy Map Examples

Financial Performance		
Increase Revenue		
Maintain Overall Margins		
Net Profit	18.00%	15.00%
Contribution Margin	64.44%	66.00%
YOY Revenue Growth	22.00%	15.00%
New Product Revenue	$2,463,887	$2,000,000
Control Spend		
Expense as % of Revenue	12.00%	10.00%
Expense Variance %	3.00%	1.00%
Customer Satisfaction		
Count of Complaints	127	200
Total Backorders	5,000	1,000
Avg Customer Survey Rating	7	3
Unique Repeat Customer Count	785	1,000
Acquire New Customers	3,547	3,000
New Opportunity Count	446	300
Total Opportunity Value	$1,443,989	$2,000,000
Operational Excellence		
Improve Service Quality/Responsiveness		
Service Error Rate	3.00%	6.00%
Fulfillment Percentage	55.00%	60.00%
Understand Customer Segments		
New Product Acceptance Rate	33.00%	25.00%
New Product ROI	12.00%	10.00%
Build Quality Products		
Time to Market on New Products	33 weeks	23 weeks
Number of Defects Reported	978	2,000
People Commitment		
Keep Quality Employees		
Turn Over Ratio	3.00%	2.00%
OHI	66.00%	50.00%
Attract Top Talent		
Acceptance Rate	55.00%	80.00%
Headcount Growth	19.00%	20.00%



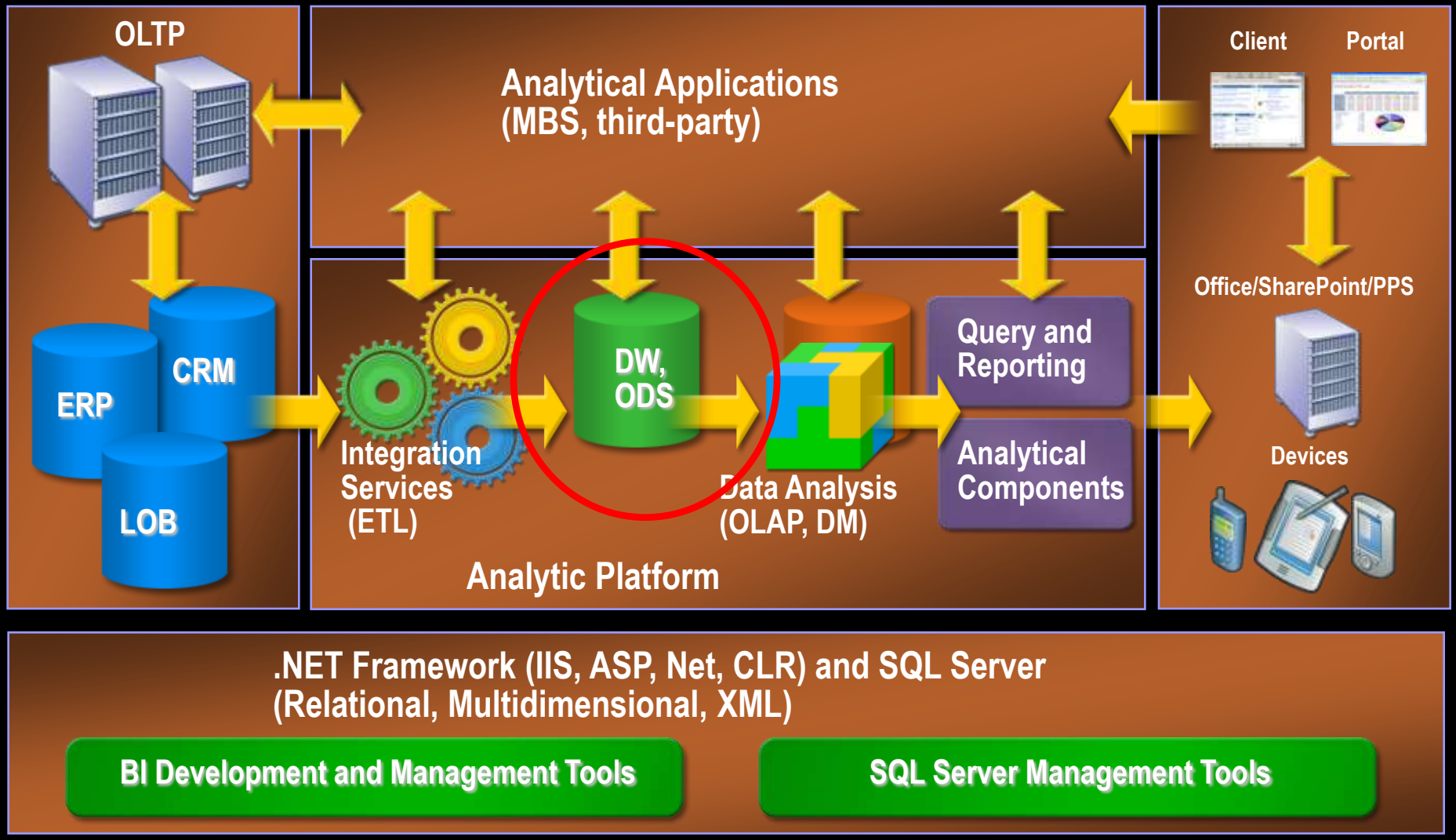
Introducing PerformancePoint

- Dashboard Designer
  - Scorecards
  - Native reports
    - Analytic grids and charts
  - External reports
    - RS, Excel Services, ProClarity
  - Filters
- The PPS Dashboard Web Part
- Developer Hooks
  - Monitoring Server SDK

SharePoint

- RS/RB Integration
- KPI Lists
- Excel Services
- PPS dashboards
- Developer Hooks
  - PPS Dashboard Web Part
  - Custom Web Parts
  - APIs

The comeplete flow – Finally !



What about Data Mining?

- Why mine your Data?
  - Discover meaningful patterns and relationships in data
  - These patterns and trends can be collected together and stored as a mining model
  - Mining models can then be applied to specific business scenarios
- What do you need?
  - Clean Data (Training & Testing)
  - Data Mining Algorithms
  - SSAS engine, Office Excel Data Mining Add-in (Optional)

Languages, APIs, And SDKs

- MDX + DMX
- ADO MD.NET
  - AdomdClient and AdomdServer
- XMLA
- AMO
- RDL
- Report Server Web Service, RS URL Access, and RS Extensions
- PerformancePoint Monitoring SDK

Custom Applications

- Using ADO MD.NET, AMO, and XMLA in your own applications
- Front-ending RS and ProClarity
- Integrating with AdomdServer and server-side assemblies
- Drill down techniques
- Using Data Mining Model Viewer controls
- Visualization with WPF and Silverlight

Summary

- Microsoft SQL Server and his services are the basement for a complete analytical solution, from data consolidation to performance management
- Together with other Microsoft technologies can be used by IT Professionals to build powerful and flexible reporting and analysis solutions for the end users
- Several class libraries and protocols helps solution developers to integrate these components in line of business applications in a easy and natural way
  - .NET Framework languages and technologies are the glue that connect these building blocks together

Your learning path

- DBMS, TSQL
- Data warehousing
- SSIS, SSAS, SSRS, MDX, XMLA, AMO, ADOMD.NET
- Excel as BI client
- SharePoint (Reports, Dashboards, Excel Services)
- Performance Point Server
- Data Mining, DMX, Data Mining Add-ins for Excel