

Produced by:

Dr. Brenda Mullally

Ruth Barry

bmullally@wit.ie

rbarry@wit.ie

Department Computing Maths and Physics

Waterford Institute of Technology

www.wit.ie

moodle.wit.ie

MSc Enterprise Software Systems

Business Intelligence

Business Intelligence



Organisational
Memory



Information
Integration



Information
Insights



Information
Presentation

BI Capabilities

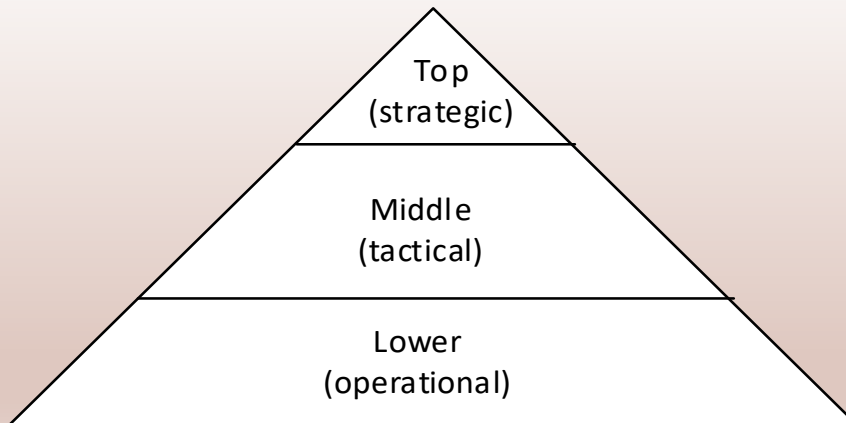
- ▶ **Organisational Memory:** The ability to store information and knowledge.
- ▶ **Information Integration:** The ability to link structured and unstructured data from a variety of sources.
- ▶ **Insight Creation:** The ability to develop new insights and use them in the short-term or long-term to make better decisions.
- ▶ **Presentation:** The ability to use appropriate reporting and balanced scorecards tools, and thereby make BI more valuable to users.

Organisational Memory

- ▶ Key to current data skills required for business intelligence careers is a knowledge of data warehousing.
- ▶ You will gain conceptual background about business architectures, and management practices.
- ▶ You will be able to reflect on business architecture selection, data integration goals and constraints.

Data Warehousing - history

Decision making hierarchy



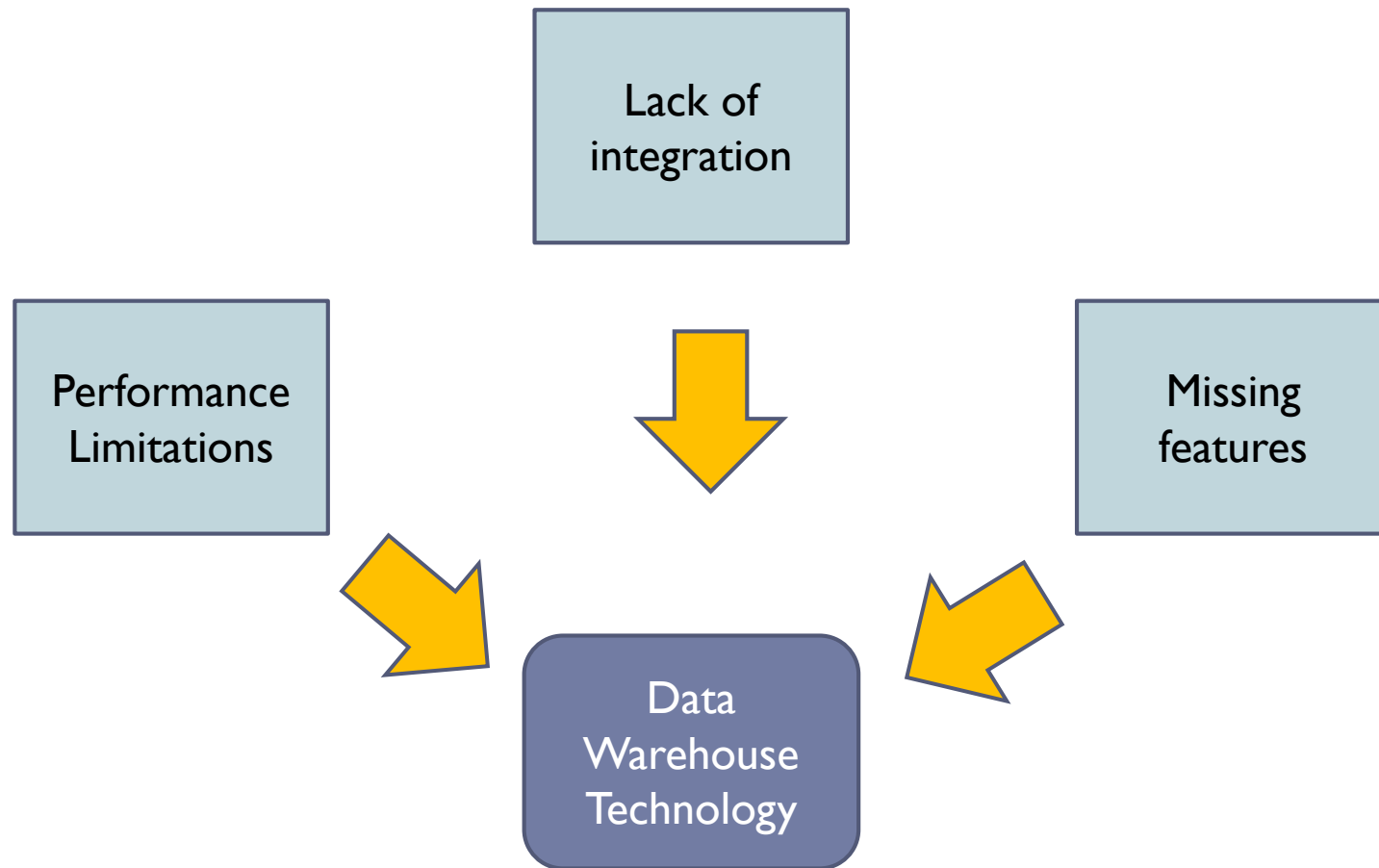
Typical decisions

Identify new markets,
choose store locations

Choose suppliers, forecast
sales

Resolve order delays,
schedule employees

Data Warehousing - History



Data Warehousing

- ▶ What is a data warehouse?
 - ▶ A central repository populated from operational databases and external data sources.
 - ▶ Many transformations take place to clean, standardize and integrate data.
 - ▶ Summarised data stored for optimizing reporting.
 - ▶ It is a prerequisite to Enterprise BI since it helps the organization to obtain value from its data sources by preparing and storing the enterprise data into a repository designed to support decision making

Characteristics of DW (Inmon, 2005)

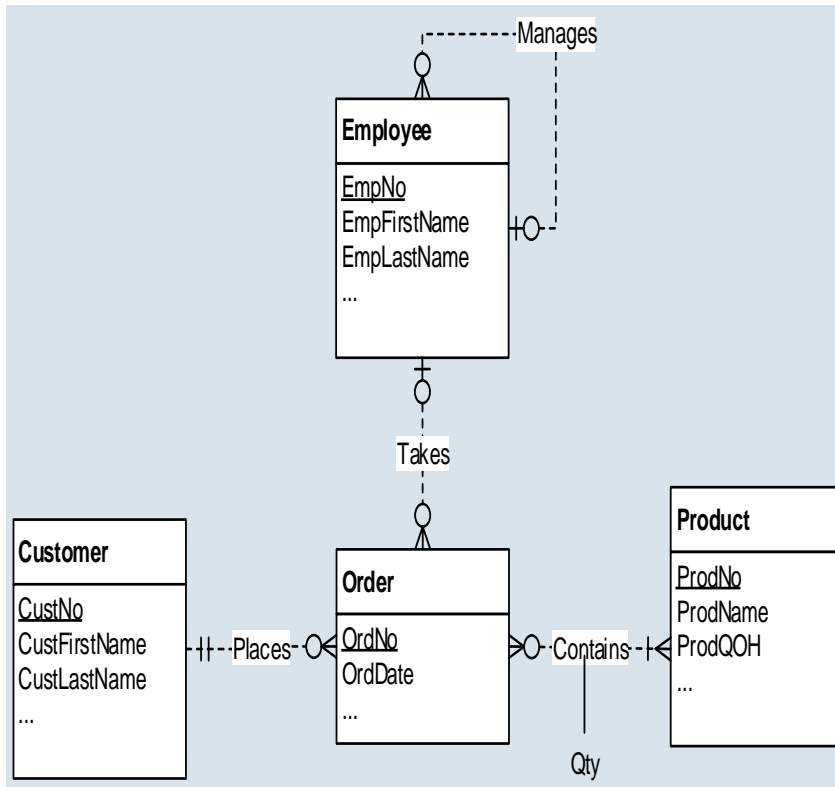
- ▶ **Essential part of infrastructure for Business Intelligence**
 - ▶ Subject oriented
 - ▶ Integrated
 - ▶ Nonvolatile
 - ▶ Time-variant (time series)

Data Comparison

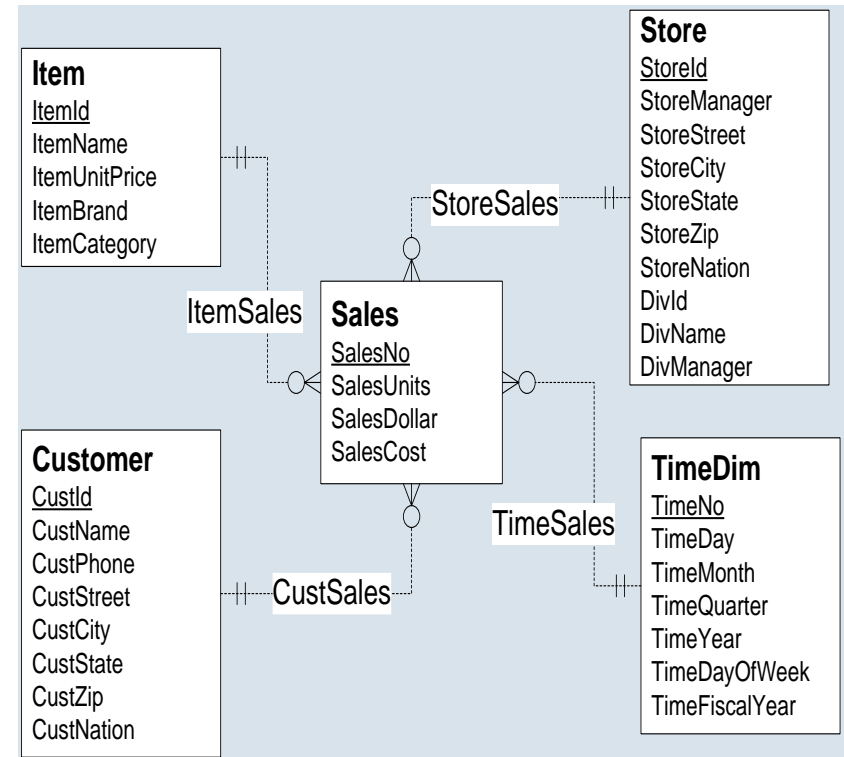
Characteristic	Operational Database	Data Warehouse
Currency	Current	Historical
Details level	Individual	Individual and summary
Orientation	Process	Subject
Records per request	Few	Thousands
Normalization level	Mostly normalized	Normalization relaxed
Update level	Highly volatile	Mostly refreshed (non volatile)
Data model	Relational	Relational (star schemas) and multidimensional (data cubes)

Schema Comparison

Operational Database



Data Warehouse



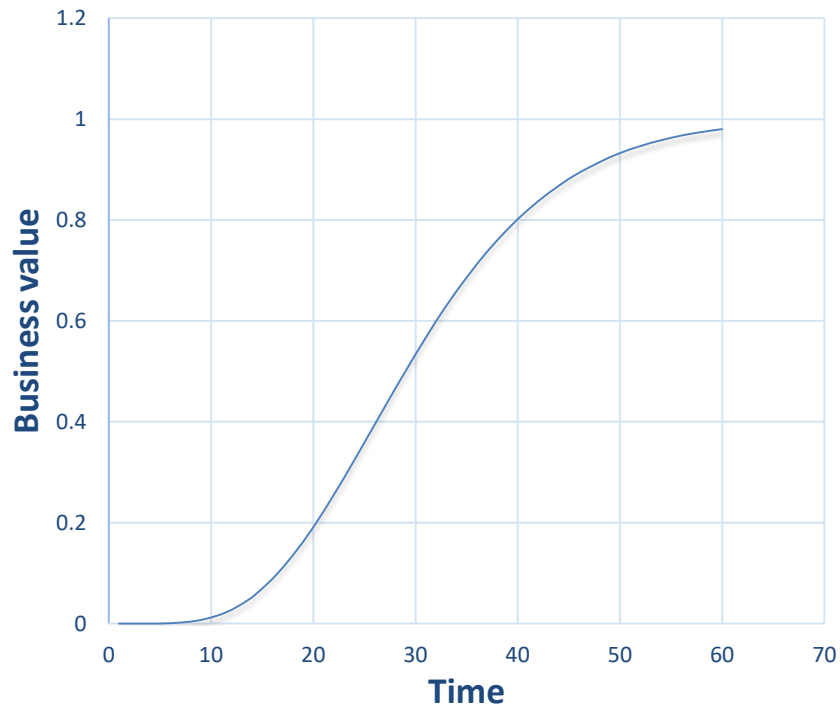
Data Warehouses Challenges

- ▶ Significant coordination across organisational units
- ▶ Uncertain data quality in data sources
- ▶ Difficult to scale data warehouse

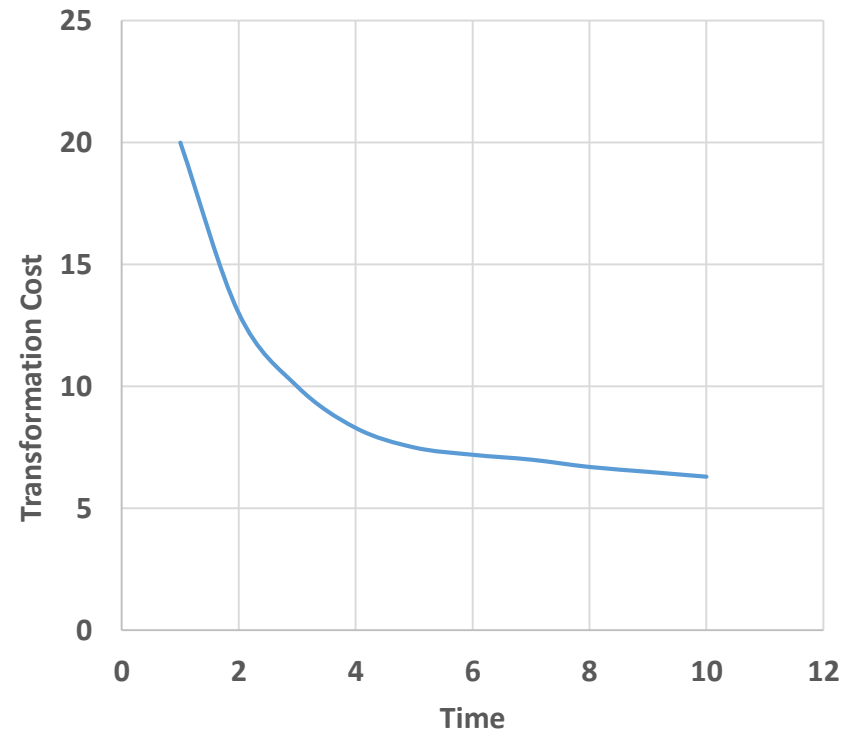
- ▶ Intangible benefits
 - ▶ Data quality

Data Warehouse

Business Value Learning Curve

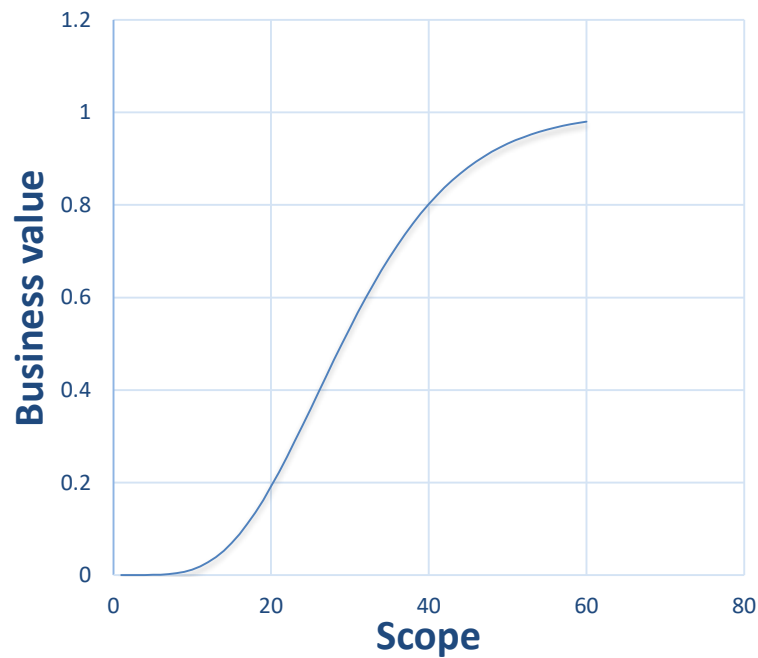


Data Transformation Learning Curve

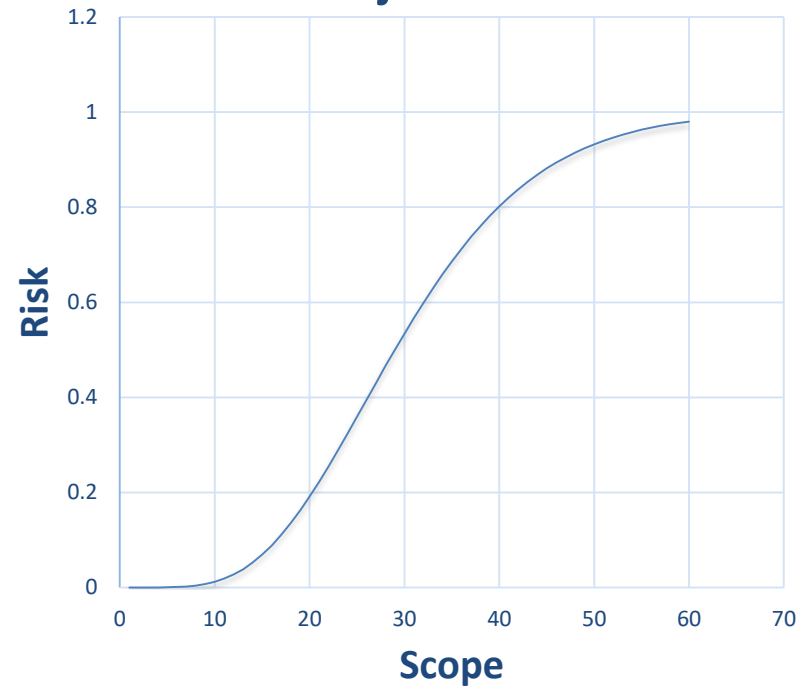


Data Warehouse

Potential Value



Project Risk



Architecture

- ▶ Organisational issues rather than technology
- ▶ Data warehouse scope
- ▶ Integration level

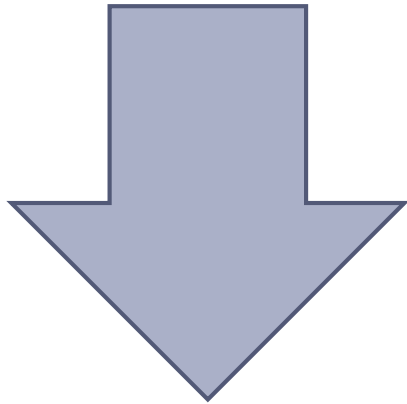
DW definitions

- ▶ **Data Mart:** A departmental data warehouse that stores only relevant data
- ▶ **Dependent data mart:** a subset that is created directly from a data warehouse
- ▶ **Independent data mart:** a small data warehouse designed for a strategic business unit or a department
- ▶ **Operational data stores (ODS):** a type of database often used as an interim area for a data warehouse
- ▶ **Enterprise data warehouse (EDW):** a data warehouse for the enterprise
- ▶ **Metadata:** data about data. In a data warehouse, metadata describes the contents of a data warehouse and the manner of its acquisition and use.

Architecture choices

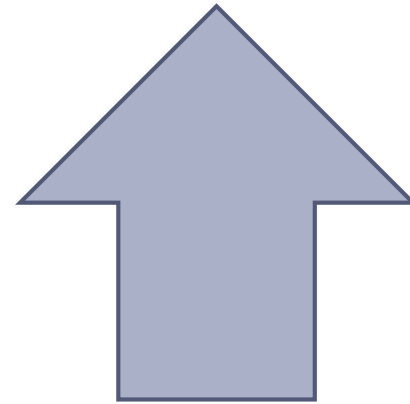
▶ Top Down

- ▶ Enterprise data warehouse
- ▶ High integration
- ▶ Centralised
- ▶ Large scope

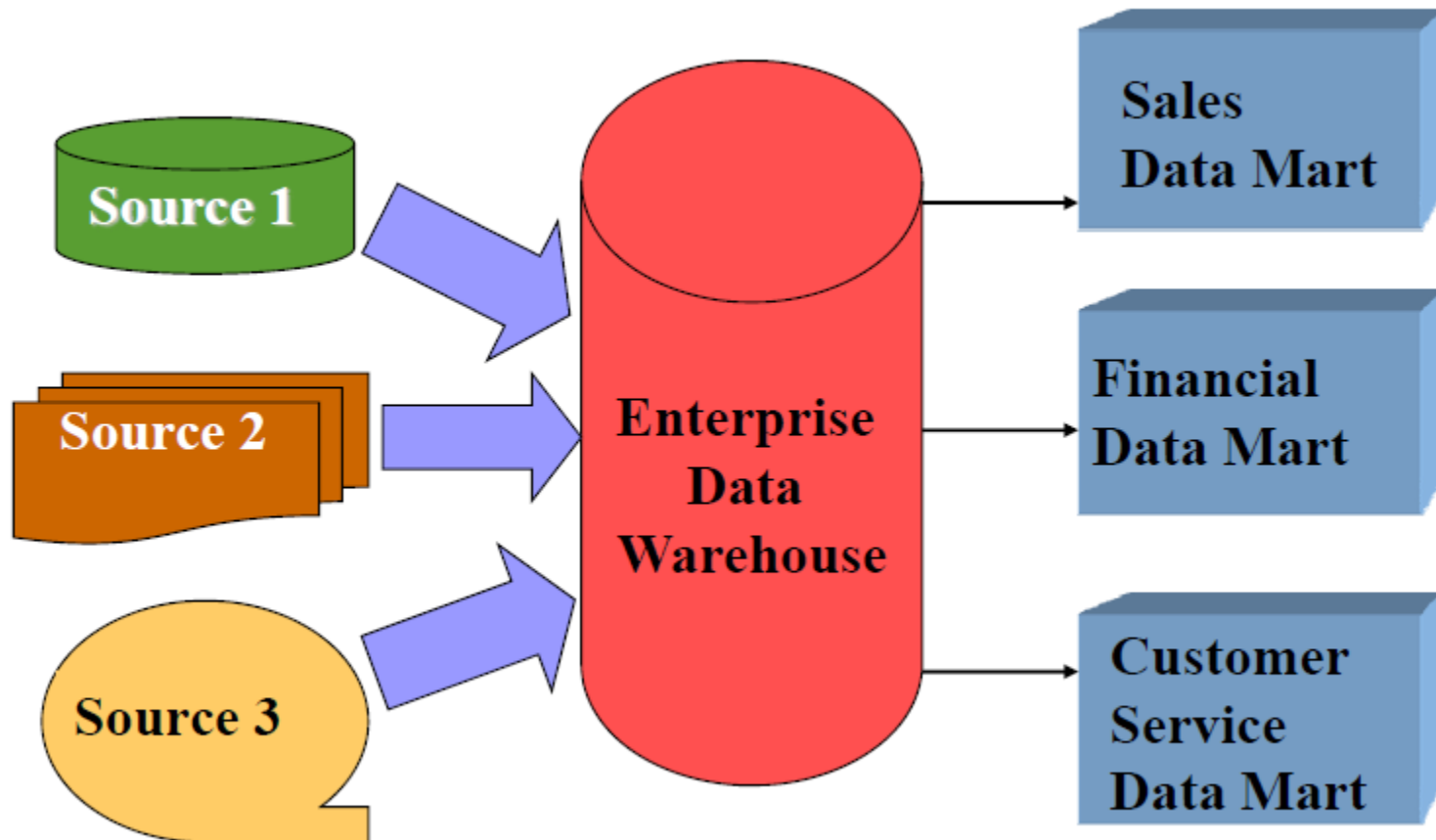


▶ Bottom Up

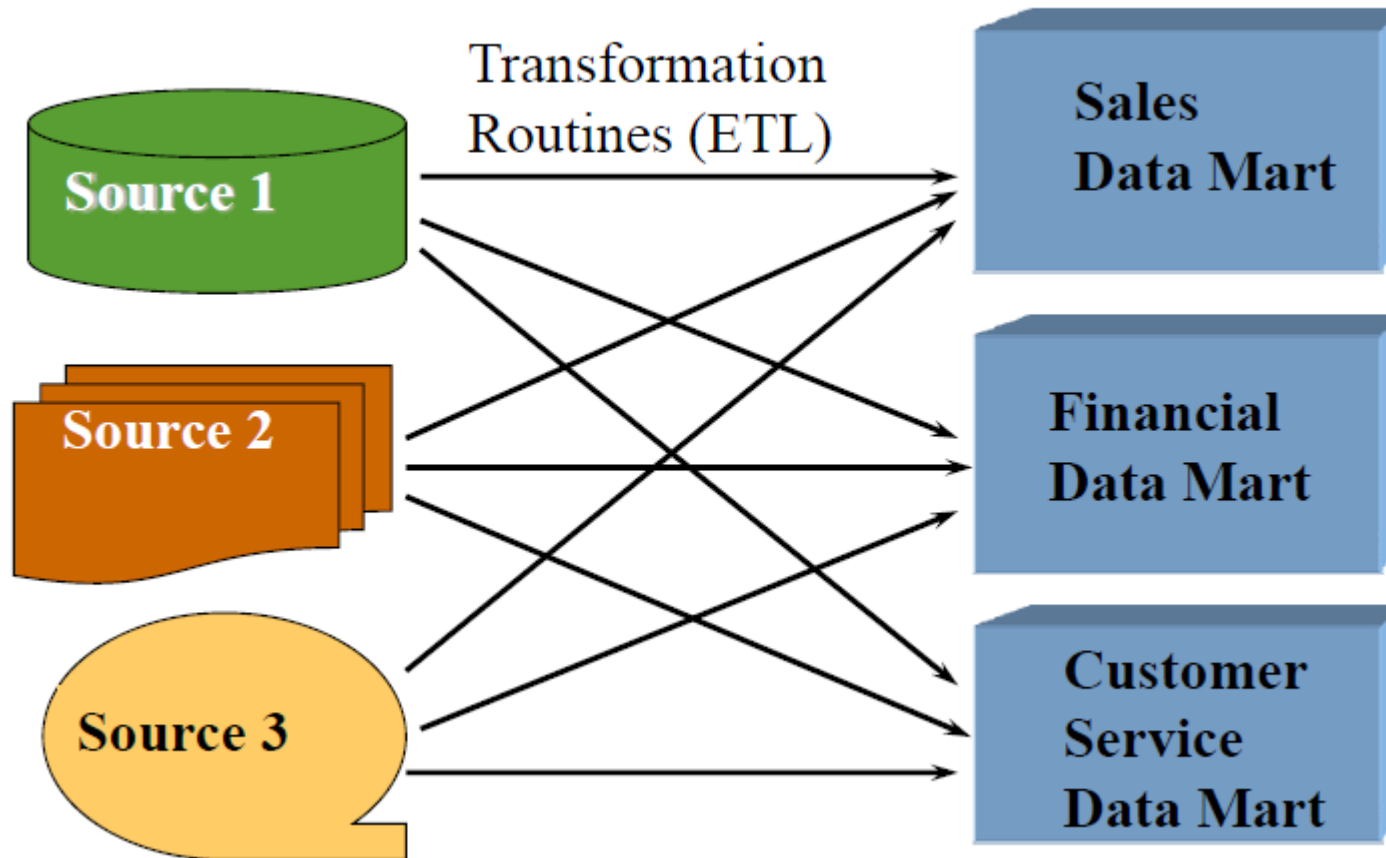
- ▶ Independent data marts
- ▶ Low integration
- ▶ Decentralised
- ▶ Small scope



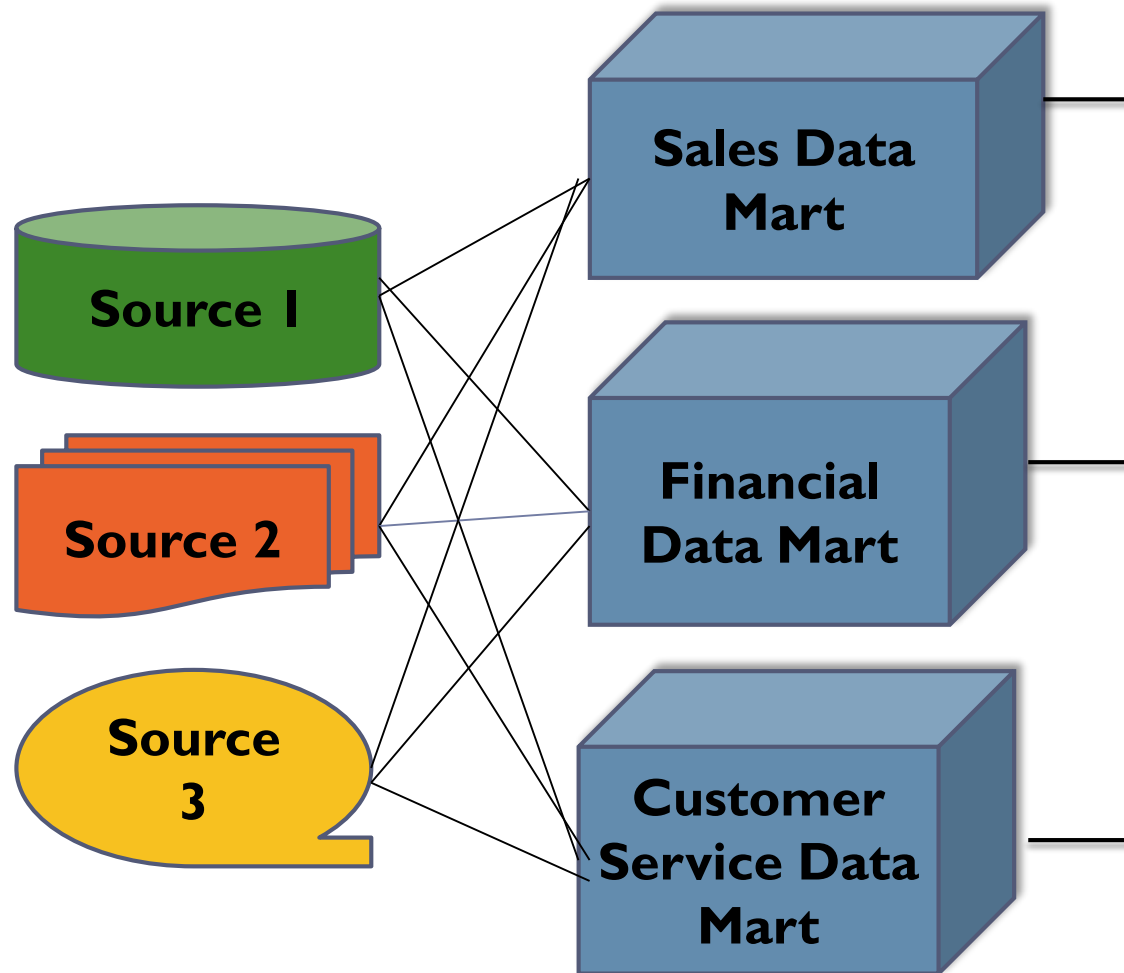
Top down Architecture



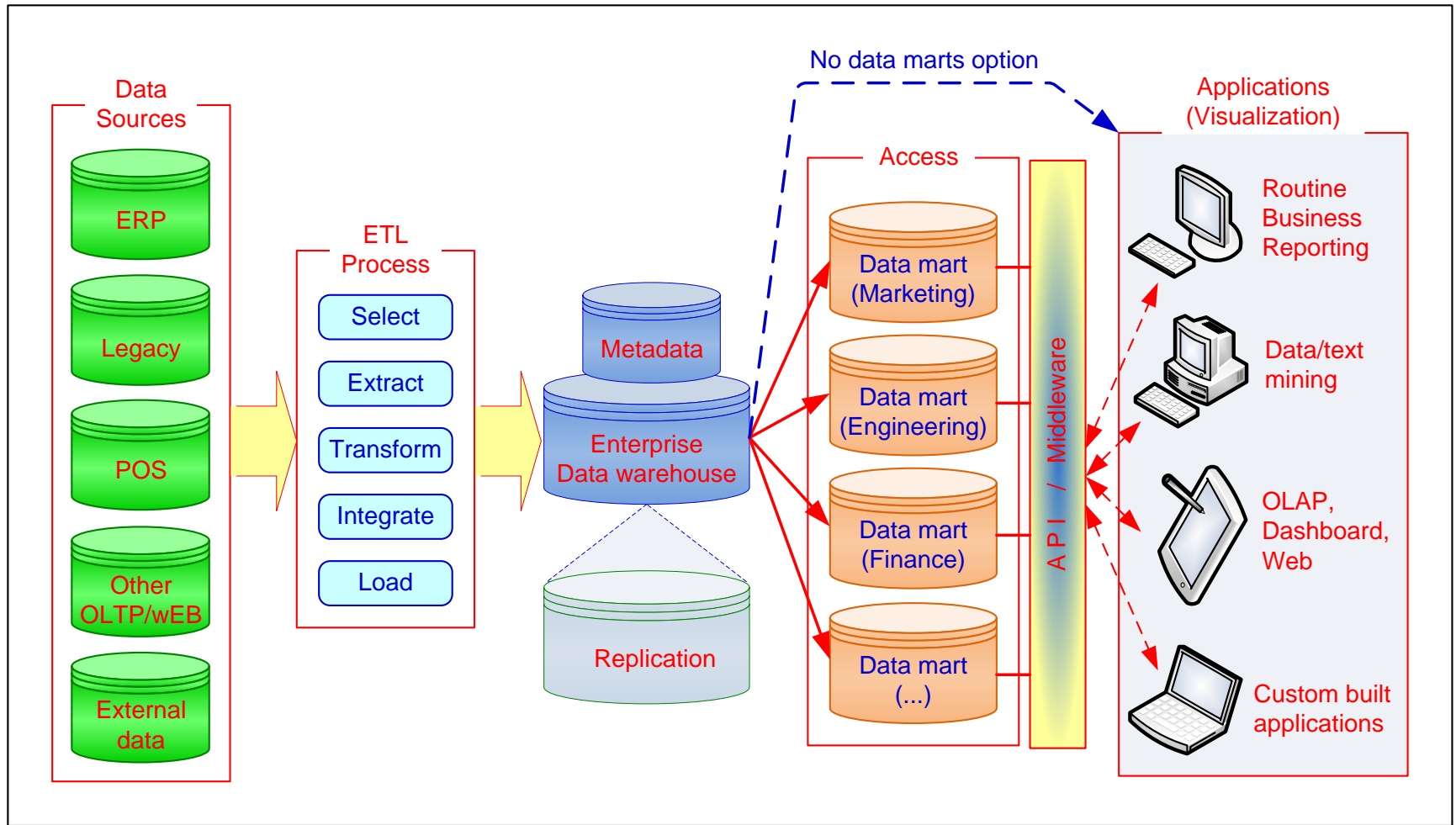
Bottom Up Architecture: Independent Data Marts



Data Mart Bus



Data Warehouse Architecture



Architecture selection

- ▶ Learning effects
 - ▶ Project risk
 - ▶ Intangible business value
- ▶ Strategic view of information technology
 - ▶ Level of sponsorship
 - ▶ Information independence
 - ▶ Task routineness

Maturity Model Stages

Stage	Scope	Architecture	Management Usage
Prenatal	System	Management reporting	Control costs
Infant	Individual business analysts	Operational reports and spreadsheets (known as spreadmarts)	Management insight
Child	Departments	Data marts	Support business analysis
Teenager	Divisions	Data warehouses	Track business processes
Adult	Enterprise	Enterprise data warehouse	Drive organization
Sage	Inter-enterprise	BI services	Drive market and industry



Maturity Model Insights

- ▶ Stages provide a framework to view an organization's progress
- ▶ Guidance for investment decisions
- ▶ Difficulty moving between stages
 - ▶ Infant to child stages because of investment level
 - ▶ Teenager to adult because of strategic importance of data warehouse



Traditional Applications

Industry	Key Applications
Airline	Yield management, route assessment
Telecommunications	Customer retention, network design
Insurance	Risk assessment, product design, fraud detection
Retail	Target marketing, supply-chain management

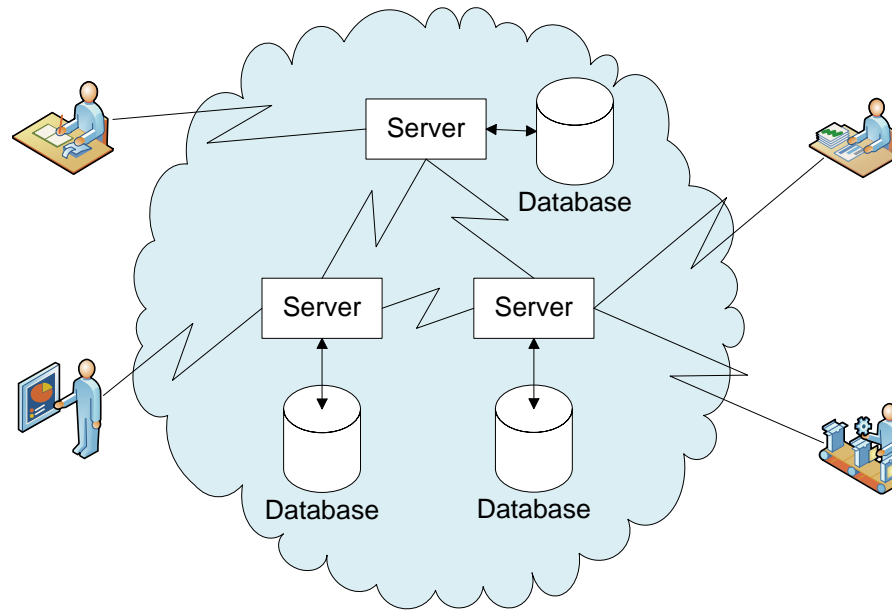
Data Mining

- ▶ Discover significant, implicit patterns
 - ▶ Target promotions
 - ▶ Change mix and collocation of items
- ▶ Requires large volumes of transaction data including sensor data and social media interactions
- ▶ Important tools for business intelligence

Market Shares and Trends

- ▶ Major vendors: Teradata, Oracle, IBM, Microsoft, SAP
- ▶ Large projected market growth
- ▶ Trends
 - ▶ Real time load and analysis
 - ▶ Increased storage and analysis of social interactions
 - ▶ Increased usage of cloud services and appliances

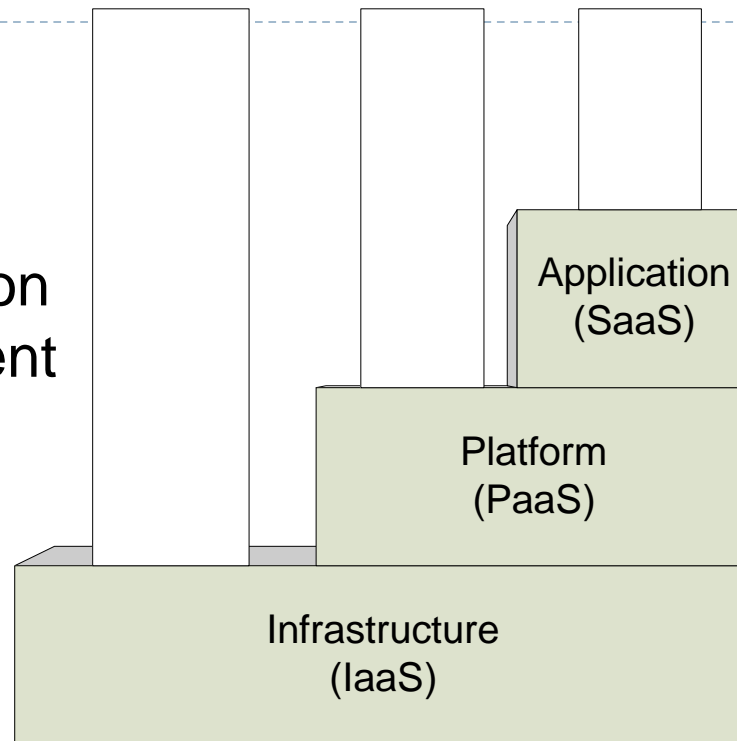
Cloud Influence



- Reduces local expertise to procure technology and manage a data warehouse
- Economies of scale
- Improved scalability
- Higher variable costs but lower fixed costs

Cloud Service Models

User
Organization
Development



Cloud Vendor
Infrastructure

