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BUSINESS INTELLIGENCE

What Is Business Intelligence?

Business Intelligence

Goal is to deliver accurate real-time information to decision makers

Main analytic functionalities of BI systems

Production reports

Parameterized reports

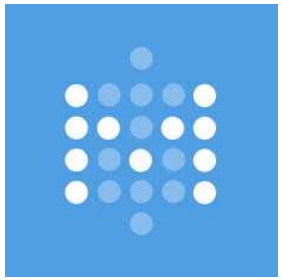
Dashboards/scorecards

Ad hoc query/search/report creation

Drill down

Forecasts, scenarios, models

Business intelligence vendors



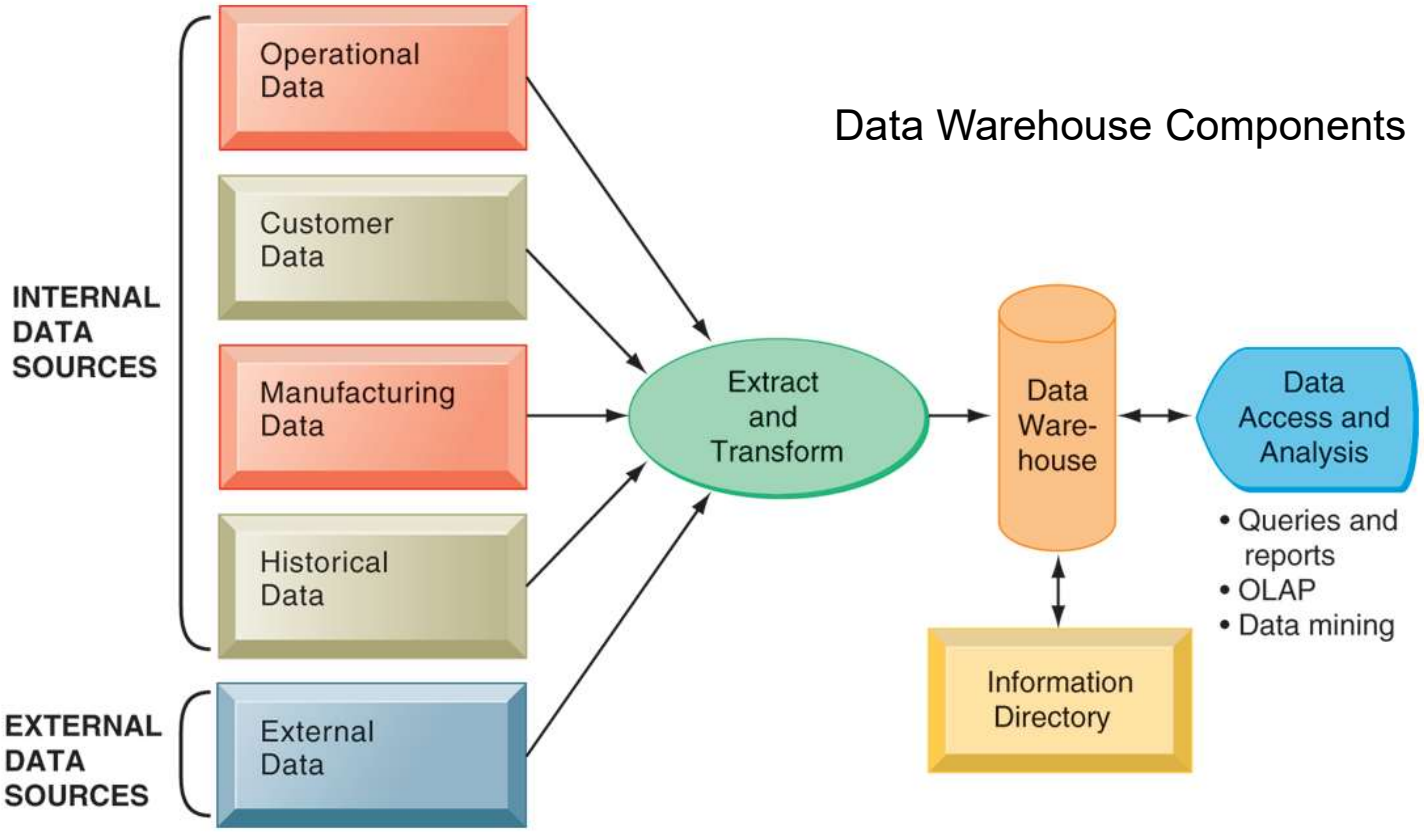
Qlik

tableau

pentaho

spagobi

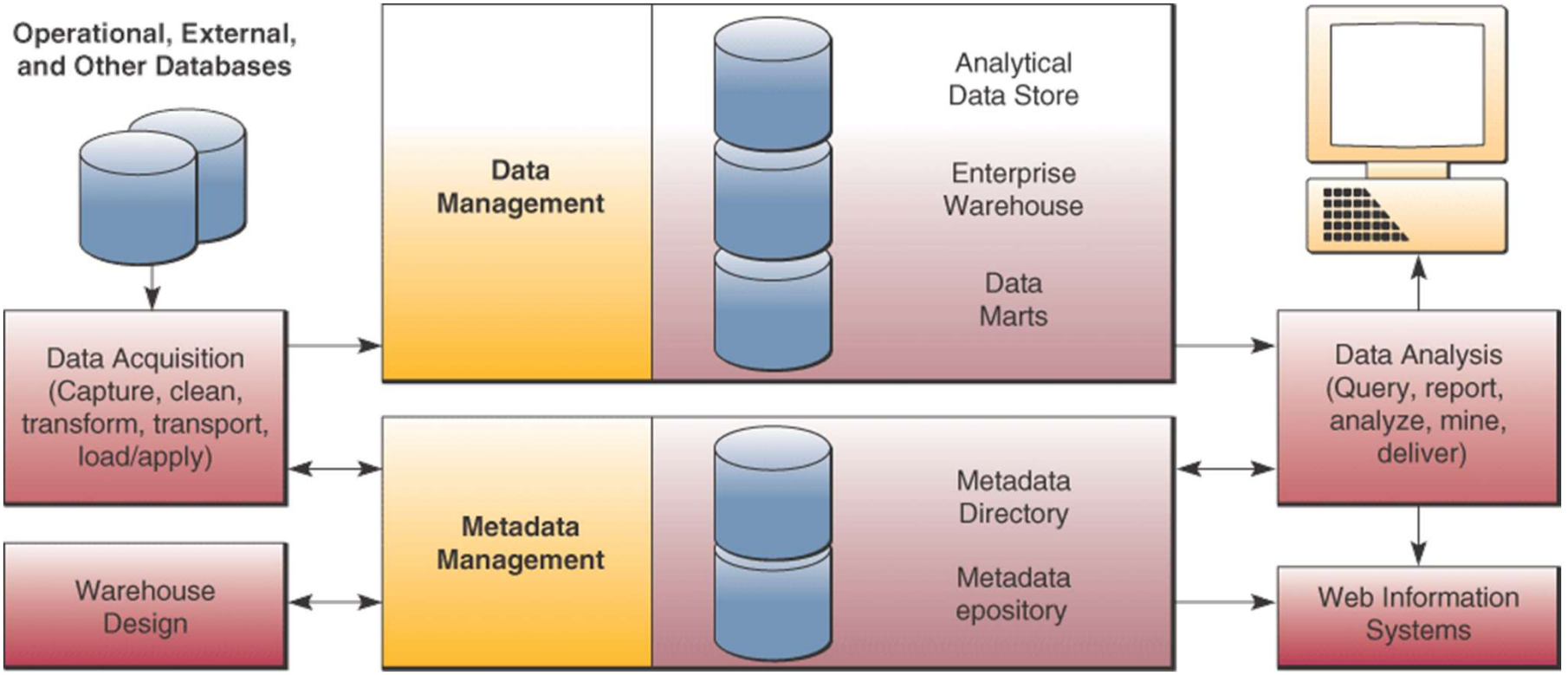
Data Warehouse



Laudon & Laudon (2012)

Data Warehouse

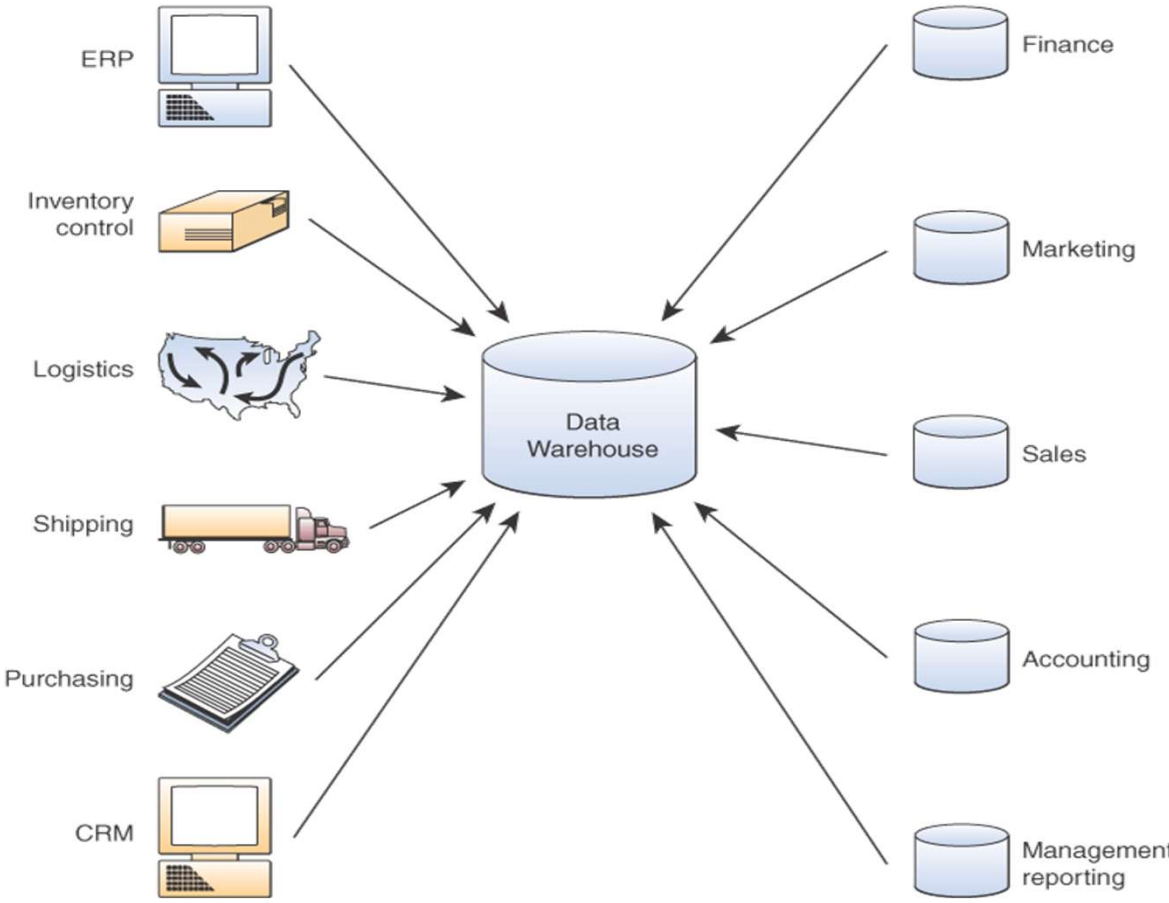
Data Warehouse Components



Laudon & Laudon (2012)

Data Warehouse

Applications



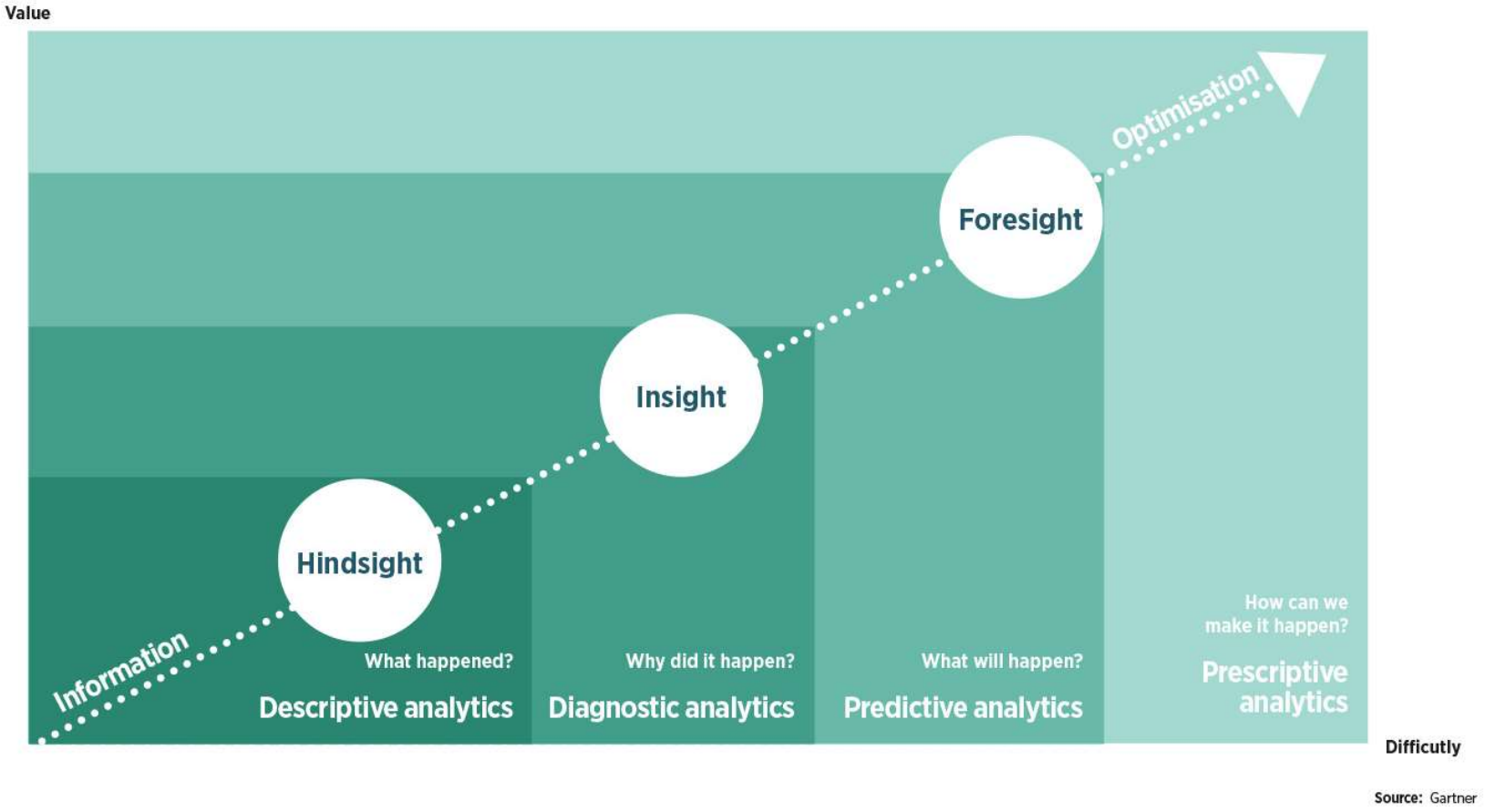
Data Marts

O'Brien & Marakas, 2011

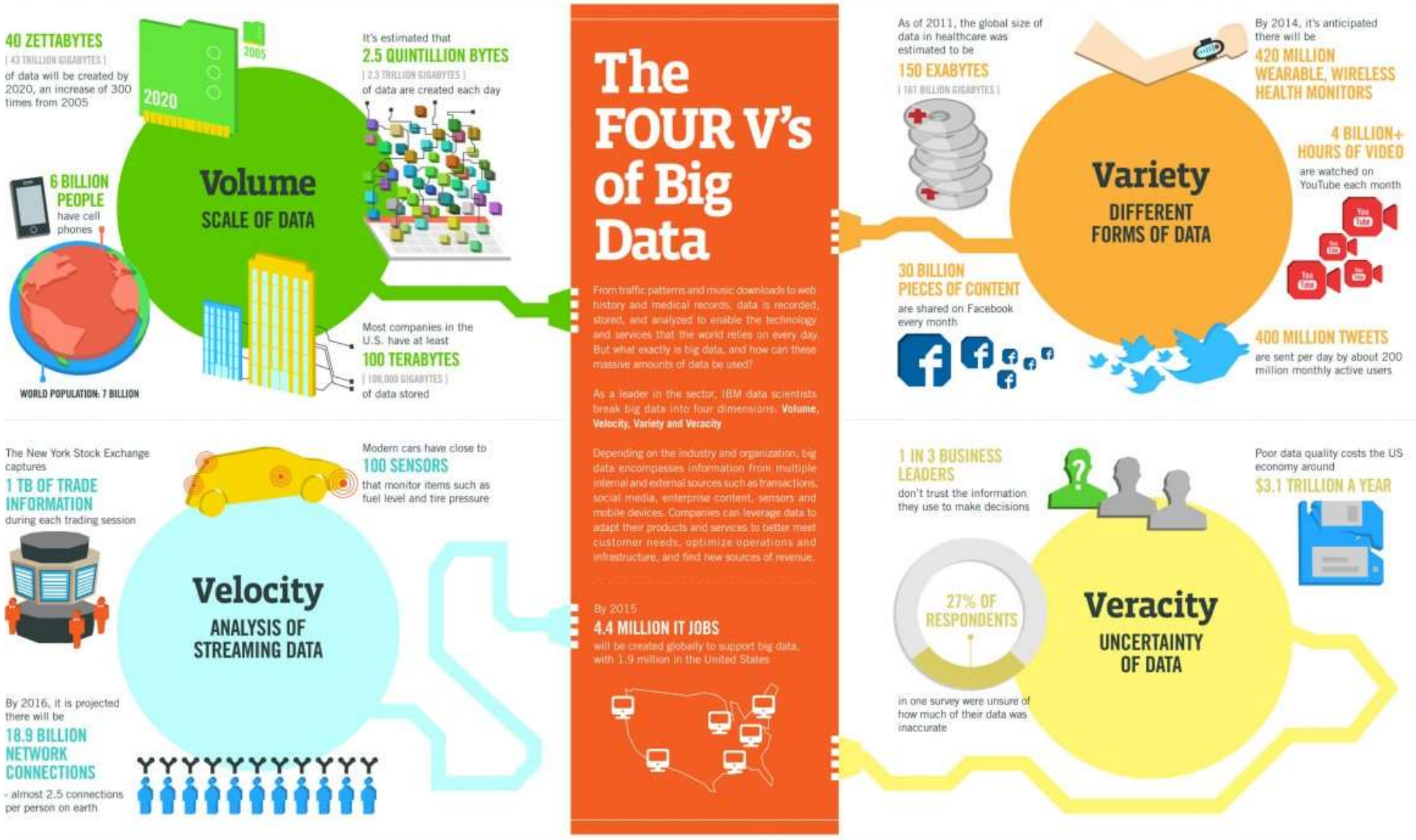
Predefined Production Reports

BUSINESS FUNCTIONAL AREA	PRODUCTION REPORTS
Sales	Forecast sales; sales team performance; cross-selling; sales cycle times
Service/call center	Customer satisfaction; service cost; resolution rates; churn rates
Marketing	Campaign effectiveness; loyalty and attrition; market basket analysis
Procurement and support	Direct and indirect spending; off-contract purchases; supplier performance
Supply chain	Backlog; fulfillment status; order cycle time; bill of materials analysis
Financials	General ledger; accounts receivable and payable; cash flow; profitability
Human resources	Employee productivity; compensation; workforce demographics; retention

Predictive Analytics



Source: Gartner

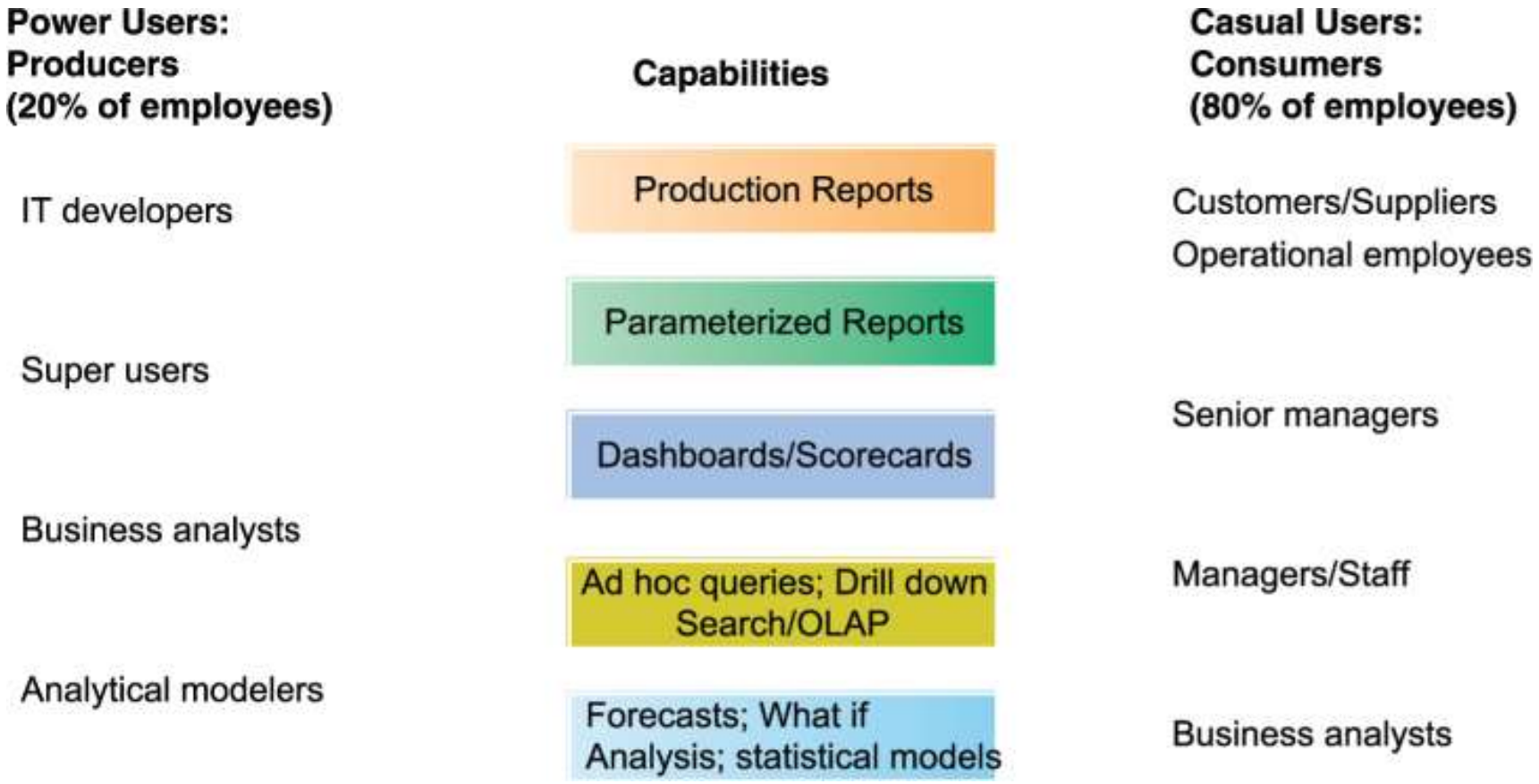


Source: https://www.ibmbigdatahub.com/infographic/four-vs-big-data

Internet of Things (IoT)

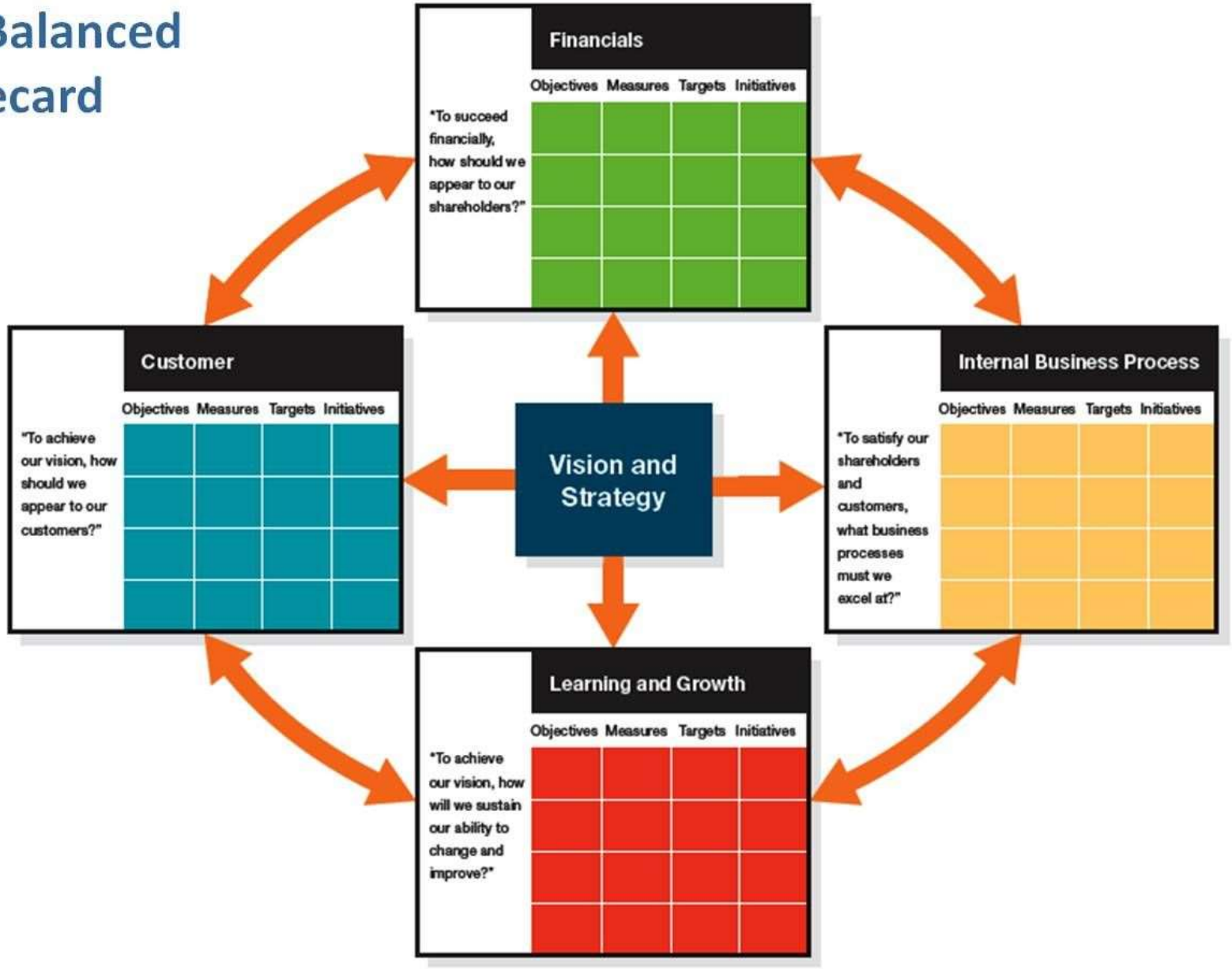
Location Analytics and Geographic Information Systems

BI Users



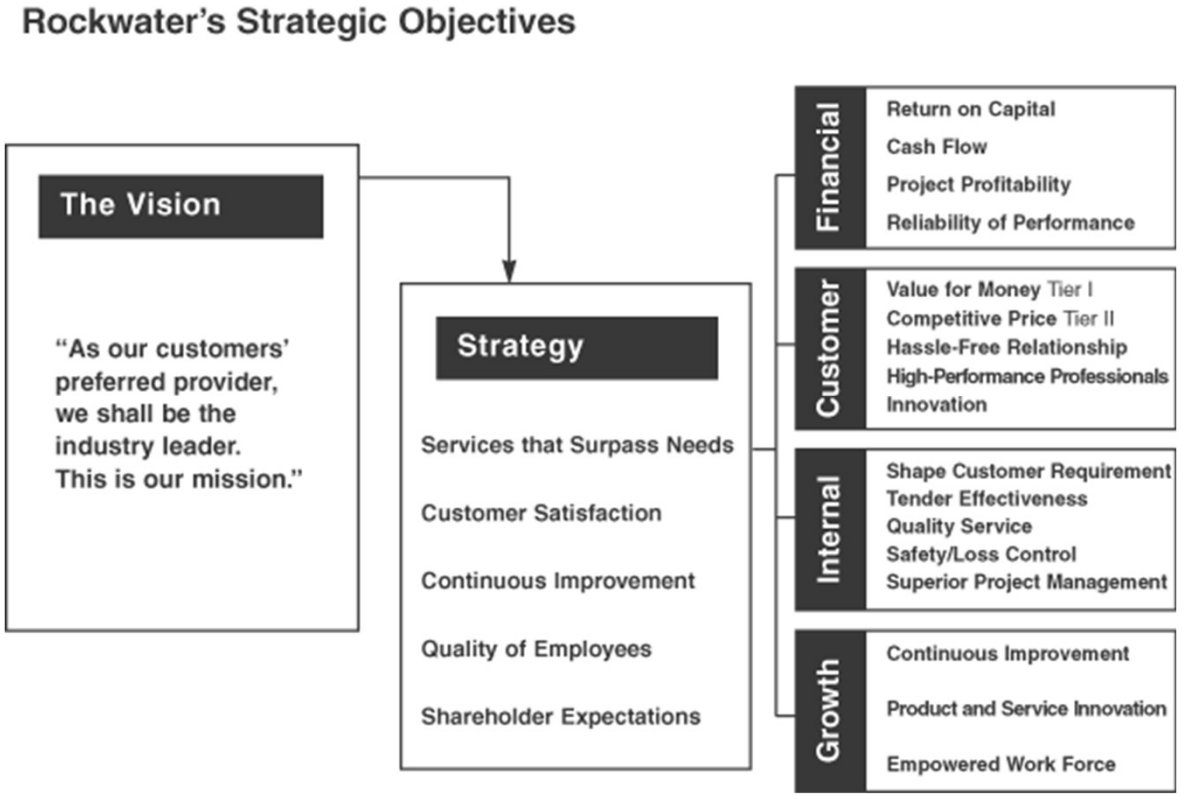
Laudon & Laudon (2012)

The Balanced Scorecard



Decision Support for Senior Management

The Balanced Scorecard Framework



Kaplan & Norton (1993)

Decision Support for Senior Management

Decision Support for Senior Management

Business performance management (BPM)

- Translates firm's strategies (e.g., differentiation, low-cost producer, scope of operation) into operational targets
- KPIs developed to measure progress toward targets

Data for ESS

- Internal data from enterprise applications
- External data such as financial market databases
- Drill-down capabilities

Decision Support Systems

Allows support for semi structured decisions

Use mathematical or analytical models

Allow a variety of analysis:

"What-if" analysis
Sensitivity analysis
Backward sensitivity analysis
Multidimensional analysis / OLAP (ex: pivot tables)

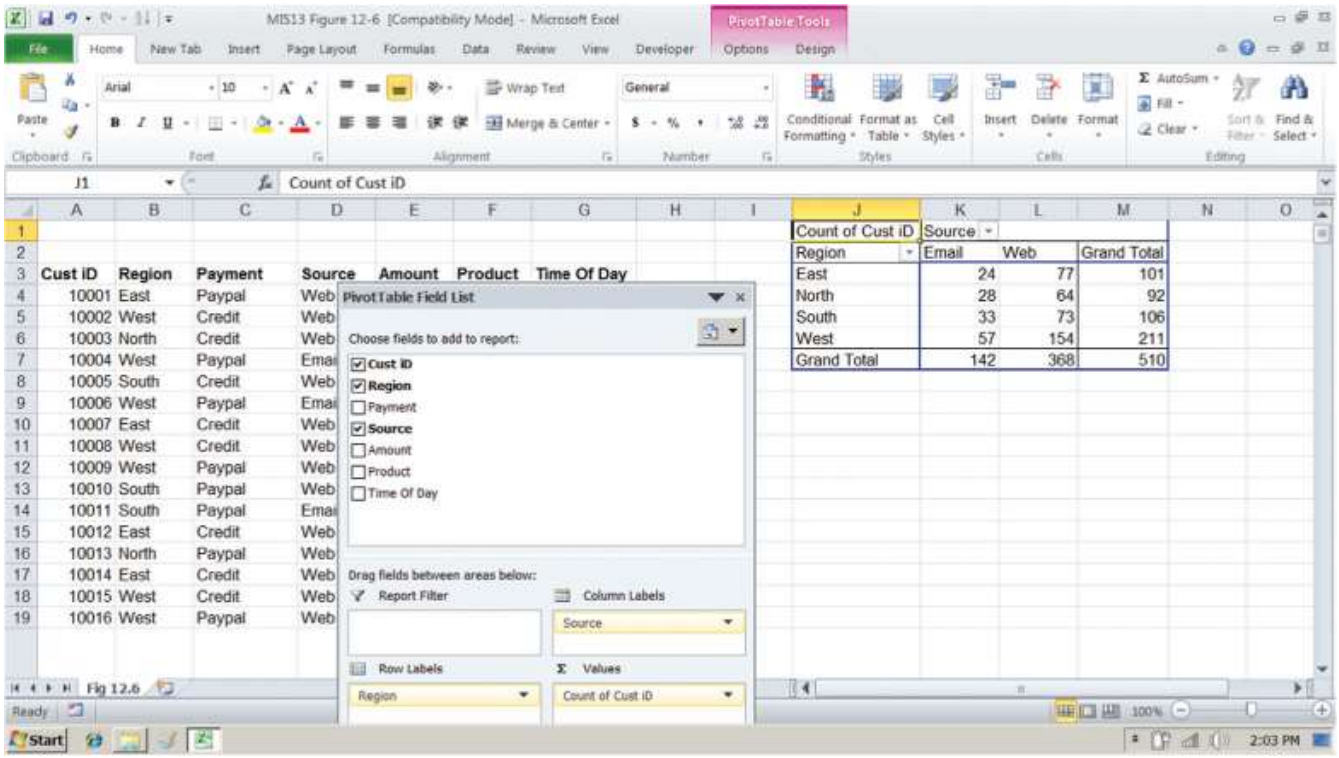
Sensitivity Analysis

Total fixed costs	19000					
Variable cost per unit	3					
Average sales price	17					
Contribution margin	14					
Break-even point	1357					
			Variable Cost per Unit			
Sales	1357	2	3	4	5	6
Price	14	1583	1727	1900	2111	2375
	15	1462	1583	1727	1900	2111
	16	1357	1462	1583	1727	1900
	17	1267	1357	1462	1583	1727
	18	1188	1267	1357	1462	1583

Laudon & Laudon (2012)

A Pivot Table

Examining Customer Regional Distribution and Advertising



Count of Cust ID	Source		
Region	Email	Web	Grand Total
East	24	77	101
North	28	64	92
South	33	73	106
West	57	154	211
Grand Total	142	368	510

Cust ID	Region	Payment	Source	Amount	Product	Time Of Day
10001	East	Paypal	Web			
10002	West	Credit	Web			
10003	North	Credit	Web			
10004	West	Paypal	Emai			
10005	South	Credit	Web			
10006	West	Paypal	Emai			
10007	East	Credit	Web			
10008	West	Credit	Web			
10009	West	Paypal	Web			
10010	South	Paypal	Web			
10011	South	Paypal	Emai			
10012	East	Credit	Web			
10013	North	Paypal	Web			
10014	East	Credit	Web			
10015	West	Credit	Web			
10016	West	Paypal	Web			

Laudon & Laudon (2012)

Group Decision-Support Systems (GDSS)

- Voting
- Brainstorming
- Other techniques

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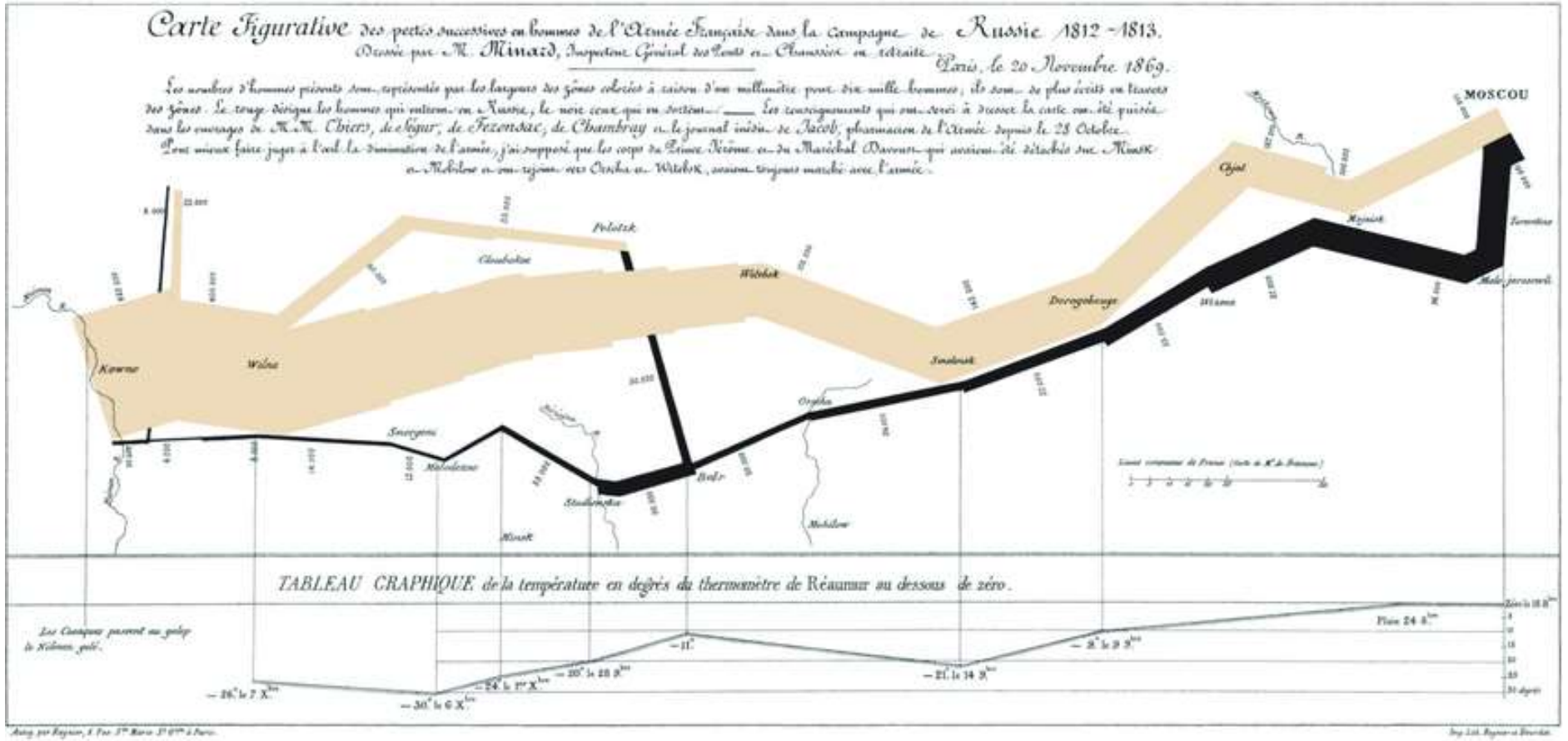
DATA VISUALIZATION

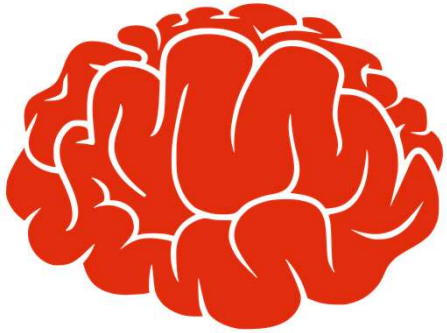
Data visualization



Problems with data visualization

Problems with data visualization

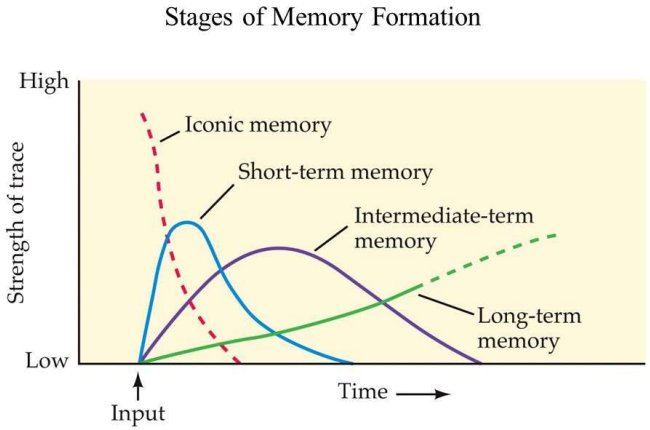
Memory



Iconic memory

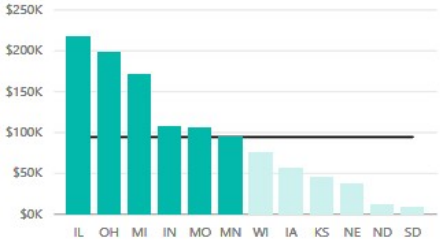
Short Term memory

Long Term memory



Gestalt's principles

Proximity and Similarity



Continuity

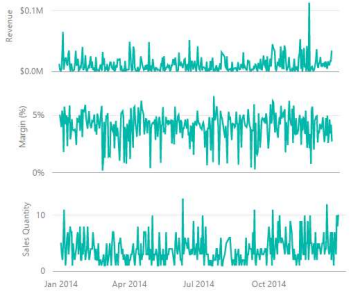
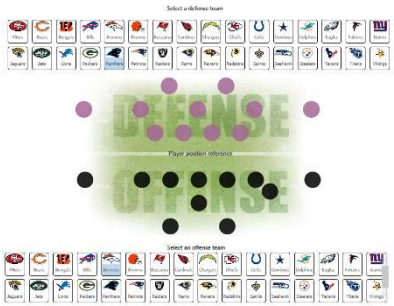
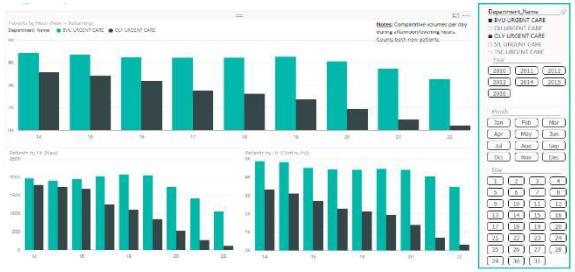


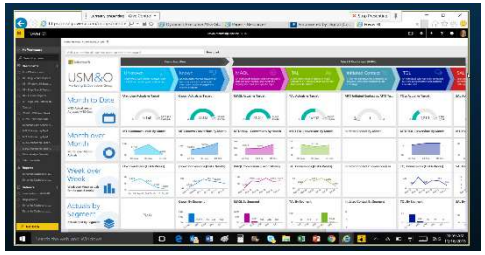
Figure-Ground



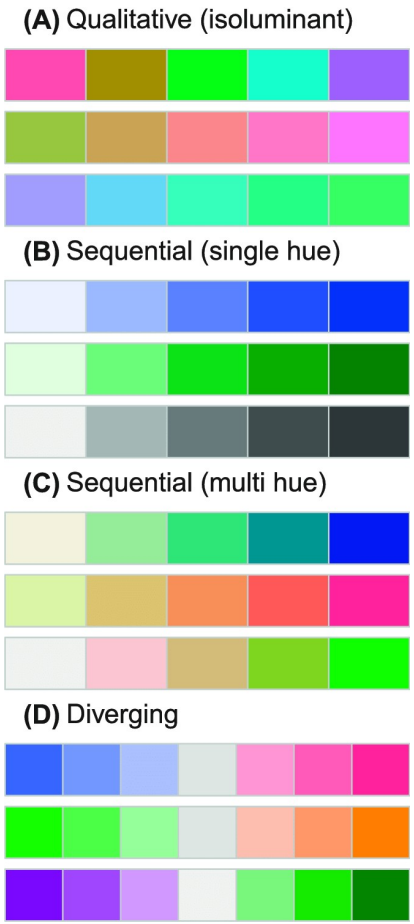
Closure and Simmetry



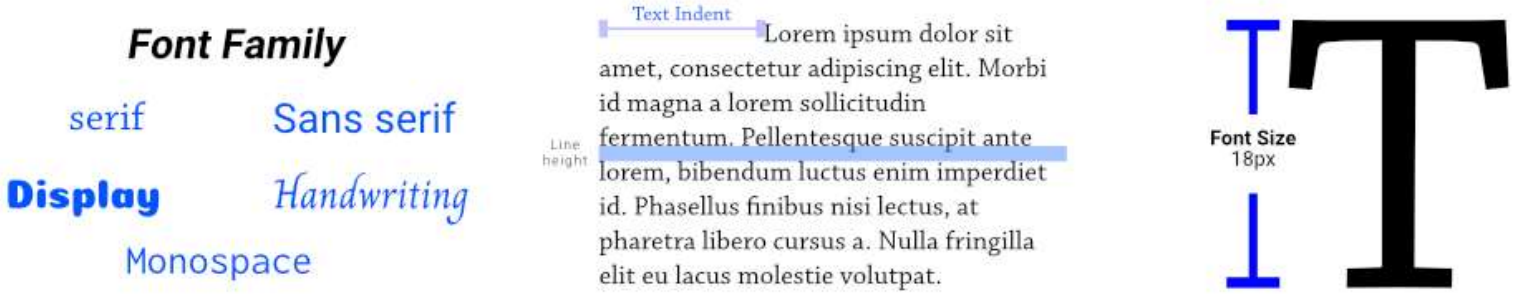
Simetry and continuity



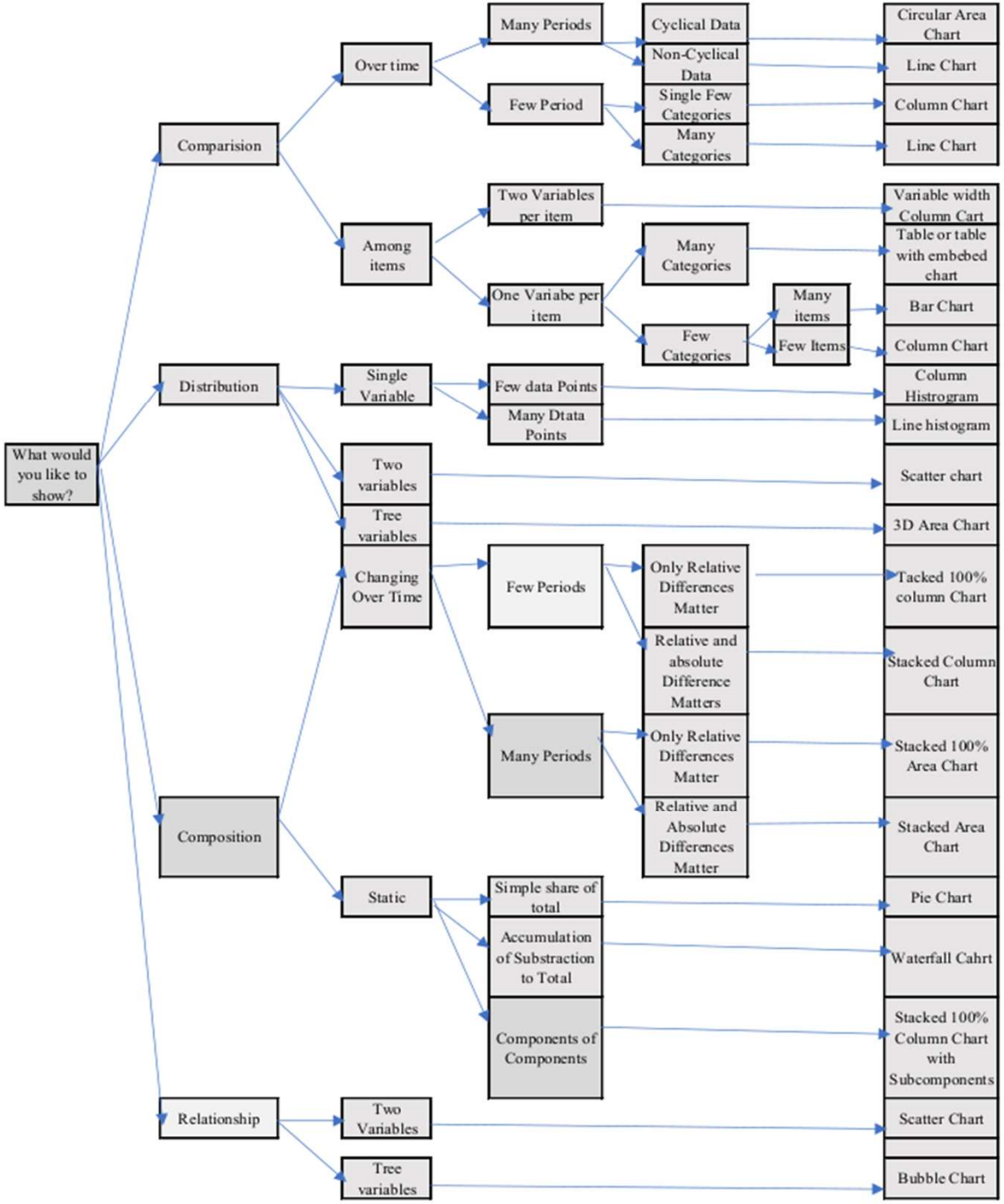
Colour


(A) Qualitative (isoluminant)
(B) Sequential (single hue)
(C) Sequential (multi hue)
(D) Diverging

Character Fonts



Good Dashboard


What would you like to show?
Comparision
Over time
Many Periods
Cyclical Data
Non-Cyclical Data
Few Period
Single Few Categories
Many Categories
Among items
Two Variables per item
One Variabe per item
Many Categories
Few Categories
Many items
Few Items
Distribution
Single Variable
Few data Points
Many Dtata Points
Two variables
Tree variables
Changing Over Time
Few Periods
Only Relative Differences Matter
Relative and absolute Difference Matters
Many Periods
Only Relative Differences Matter
Relative and Absolute Differences Matter
Composition
Static
Simple share of total
Accumulation of Substraction to Total
Components of Components
Relationship
Two Variables
Tree variables
Circular Area Chart
Line Chart
Column Chart
Line Chart
Variable width Column Cart
Table or table with embebed chart
Bar Chart
Column Chart
Column Histrogram
Line histogram
Scatter chart
3D Area Chart
Tacked 100% column Chart
Stacked Column Chart
Stacked 100% Area Chart
Stacked Area Chart
Pie Chart
Waterfall Cahrt
Stacked 100% Column Chart with Subcomponents
Scatter Chart
Bubble Chart

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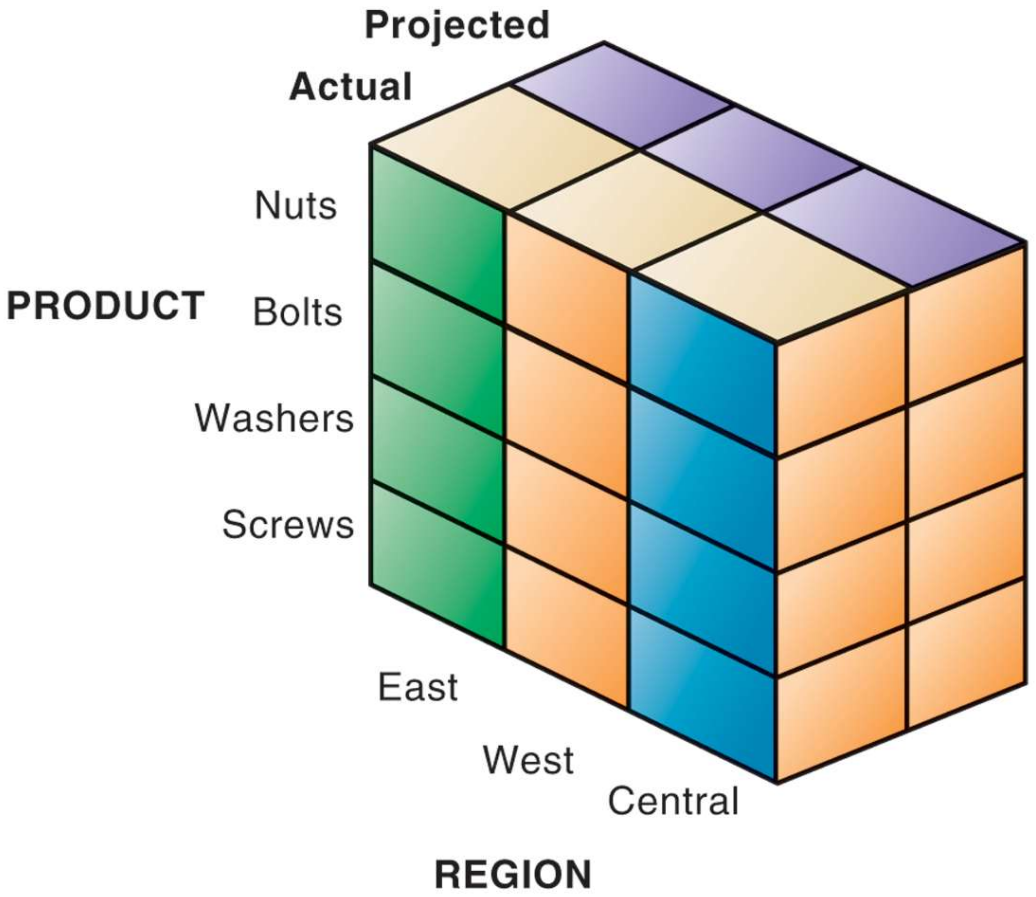
MULTIDIMENSIONAL STRUCTURE

OLAP


Projected
Actual
Nuts
PRODUCT
Bolts
Washers
Screws
East
West
Central
REGION

Multidimensional Data Model

- a variation of the relational model that uses multidimensional structures to organize data and express the relationships between data

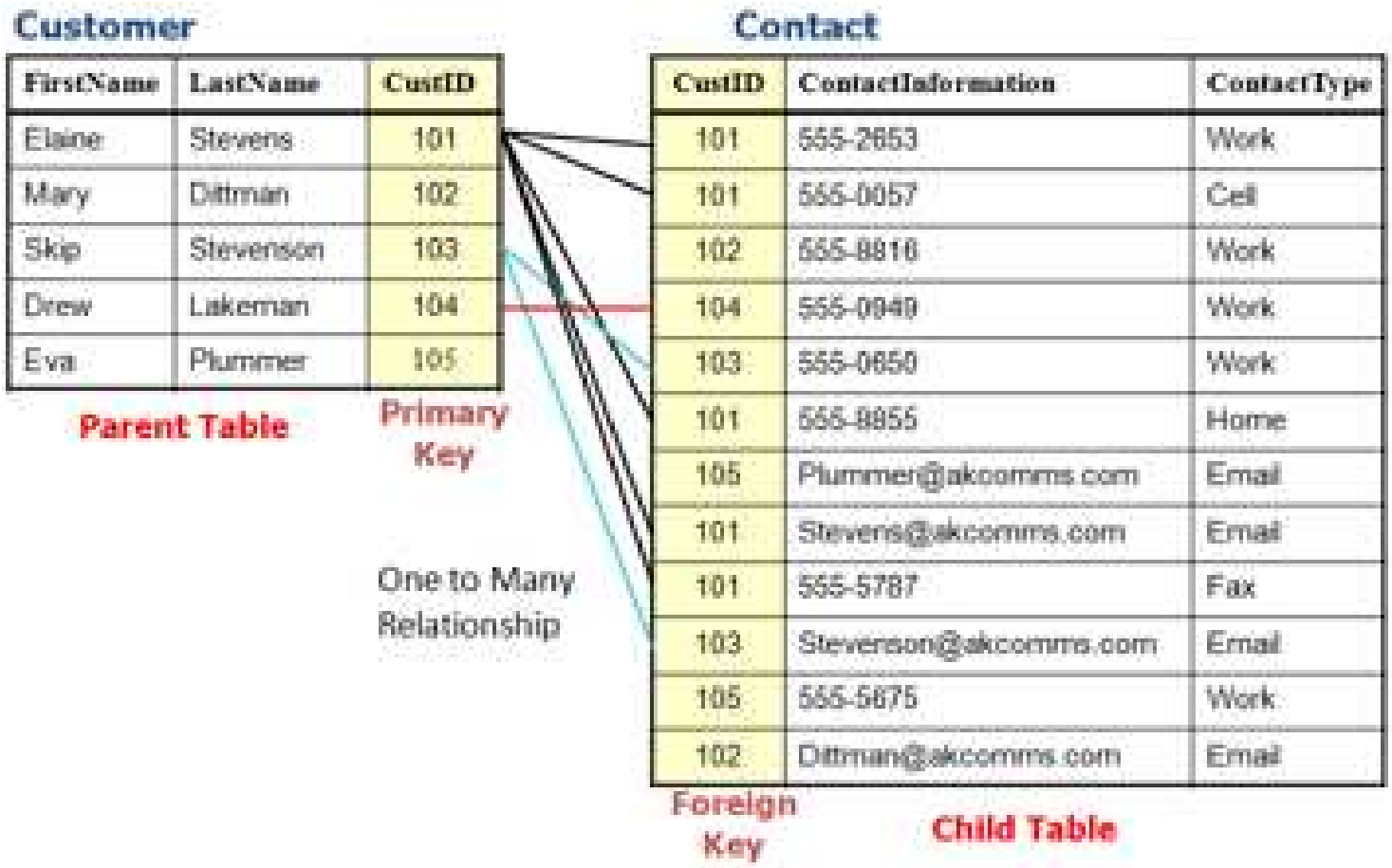
O'Brien & Marakas (2009).

Dimensional Schema

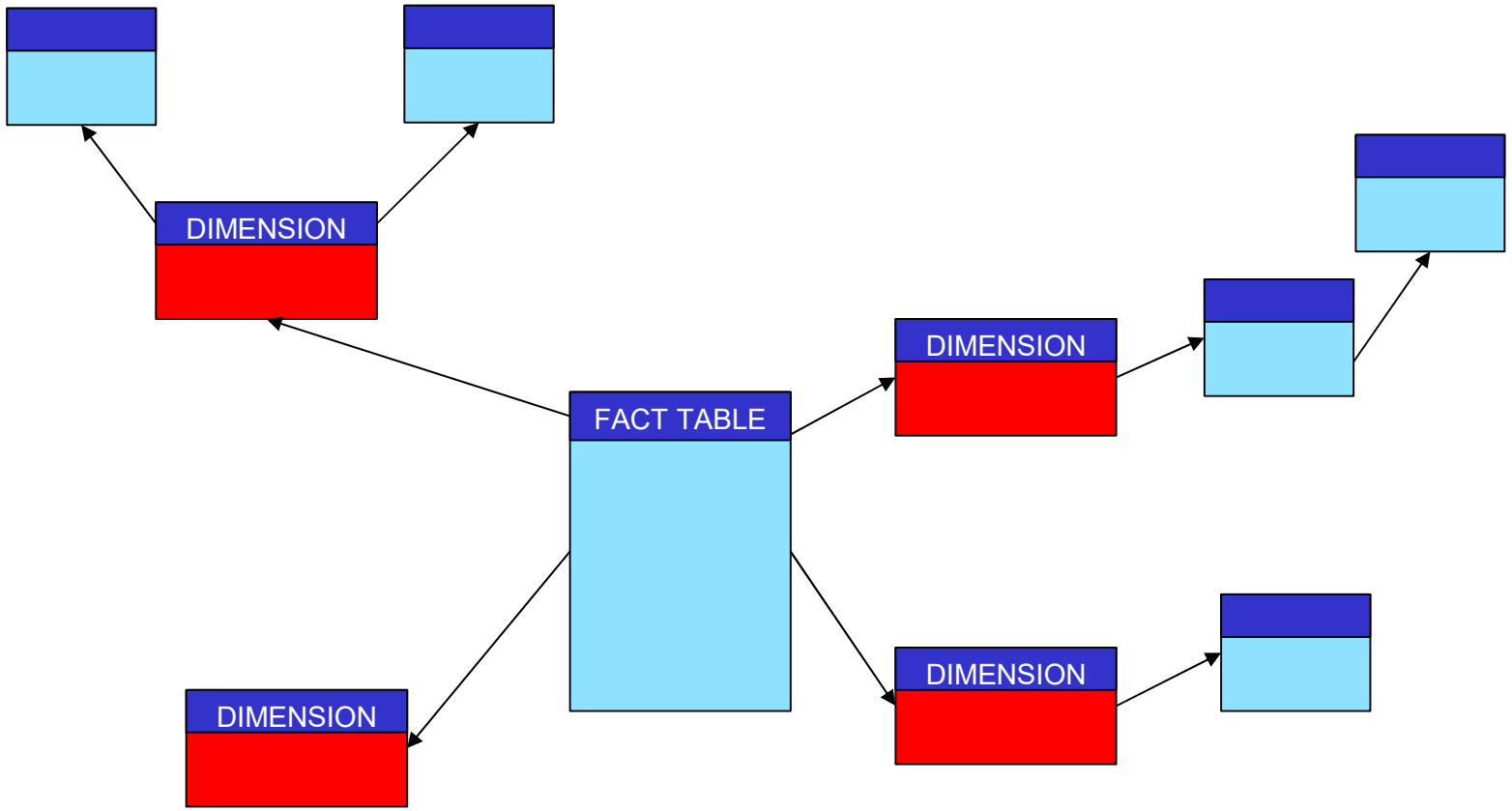
- Primary keys
- Foreign keys
- Fact tables
- Dimension Tables
- Star schemas
- Snowflake schemas

What is a Primary

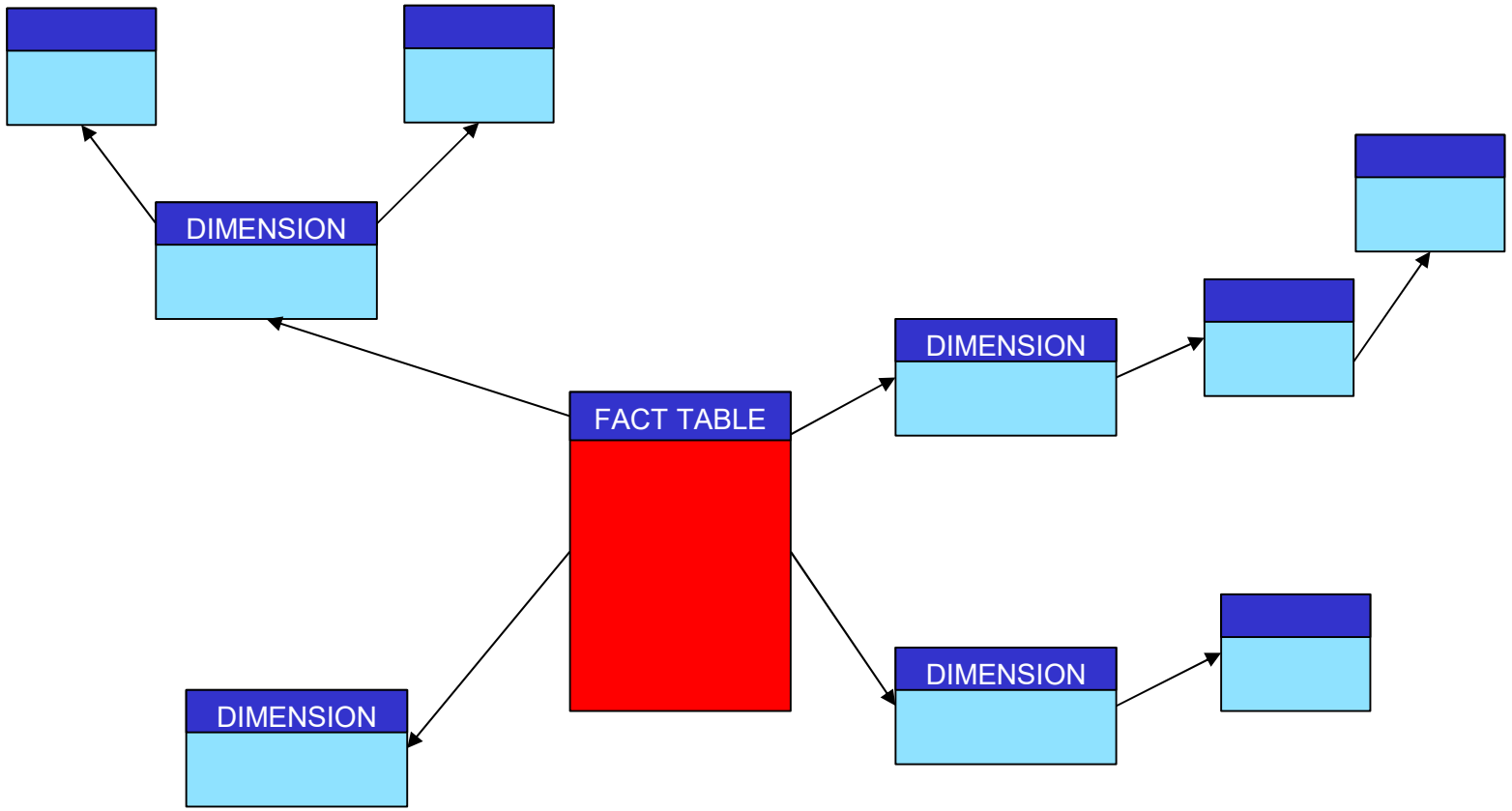
Foreign Key


Customer
FirstName
LastName
CustID
Elaine
Stevens
101
Mary
Dittman
102
Skip
Stevenson
103
Drew
Lakeman
104
Eva
Plummer
105
Parent Table
Primary Key
One to Many Relationship
Contact
CustID
ContactInformation
ContactType
101
555-2653
Work
101
555-0057
Cell
102
555-8816
Work
104
555-0049
Work
103
555-0650
Work
101
555-8855
Home
105
Plummer@akcomms.com
Email
101
Stevens@akcomms.com
Email
101
555-5787
Fax
103
Steverson@akcomms.com
Email
105
555-5675
Work
102
Dittman@akcomms.com
Email
Foreign Key
Child Table

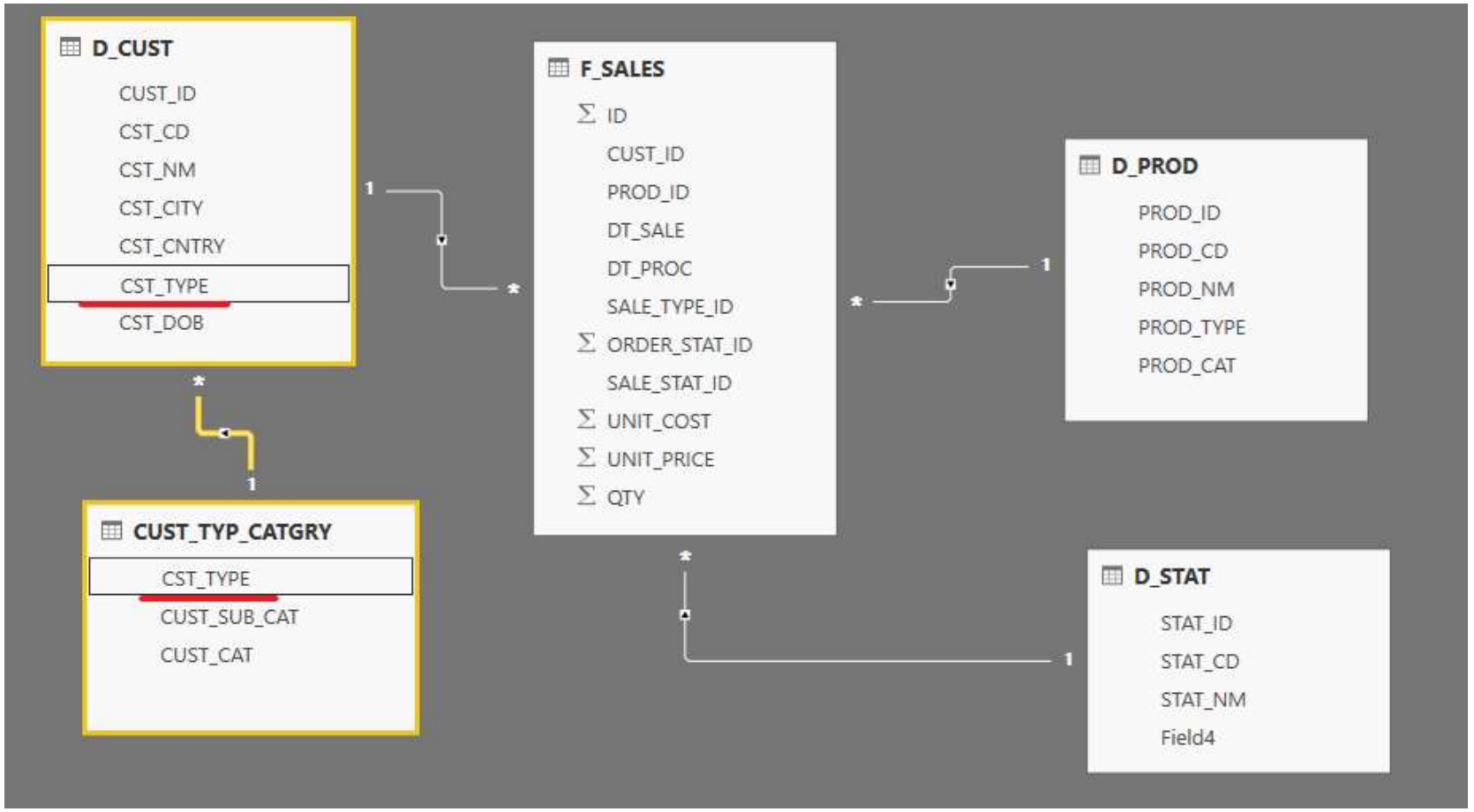
Dimension tables



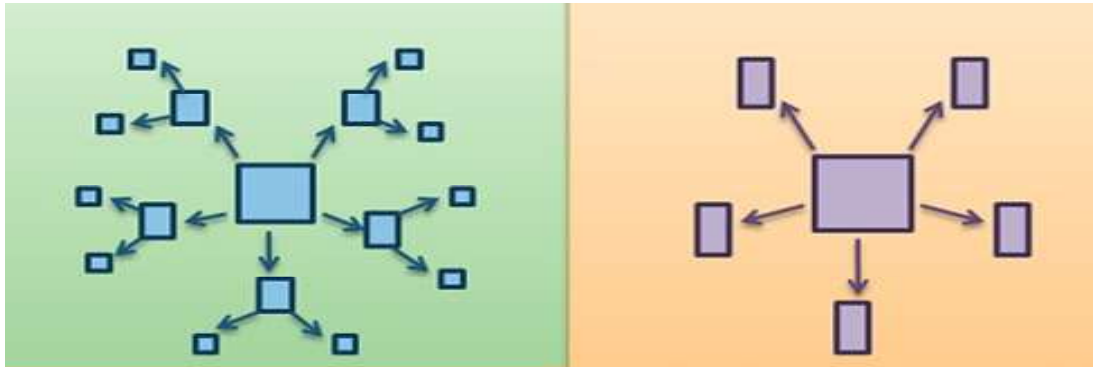
Fact Table



Snowflake schemas



Star schemas



	Snowflake Schema	Star Schema
Ease of maintenance / change	No redundancy and hence more easy to maintain and change	Has redundant data and hence less easy to maintain/change
Ease of Use	More complex queries and hence less easy to understand	Less complex queries and easy to understand
Query Performance	More foreign keys-and hence more query execution time	Less no. of foreign keys and hence lesser query execution time
Type of Datawarehouse	Good to use for datawarehouse core to simplify complex relationships (many:many)	Good for datamarts with simple relationships (1:1 or 1:many)
Joins	Higher number of Joins	Fewer Joins
Dimension table	It may have more than one dimension table for each dimension	Contains only single dimension table for each dimension
When to use	When dimension table is relatively big in size, snowflaking is better as it reduces space.	When dimension table contains less number of rows, we can go for Star schema.
Normalization/ De-Normalization	Dimension Tables are in Normalized form but Fact Table is still in De-Normalized form	Both Dimension and Fact Tables are in De-Normalized form
Data model	Bottom up approach	Top down approach