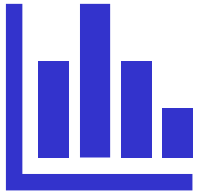
Carlos J. Costa

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

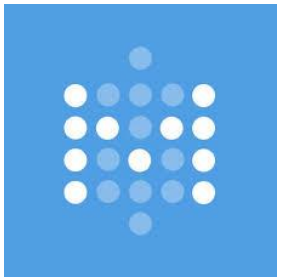
Dashboards/scorecards

Ad hoc query/search/report creation

Drill down

Forecasts, scenarios, models

Business intelligence vendors



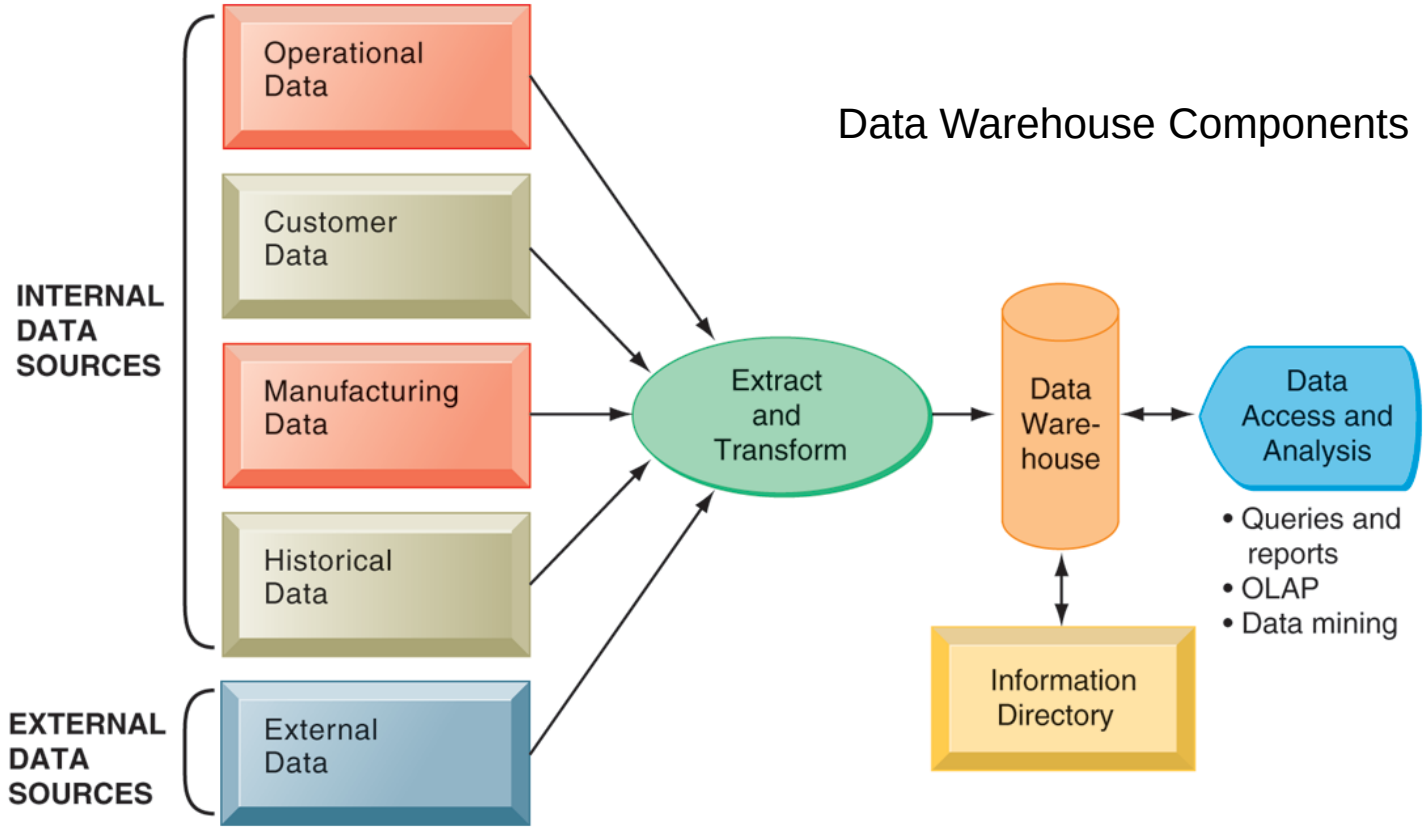
Qlik

tableau

pentaho

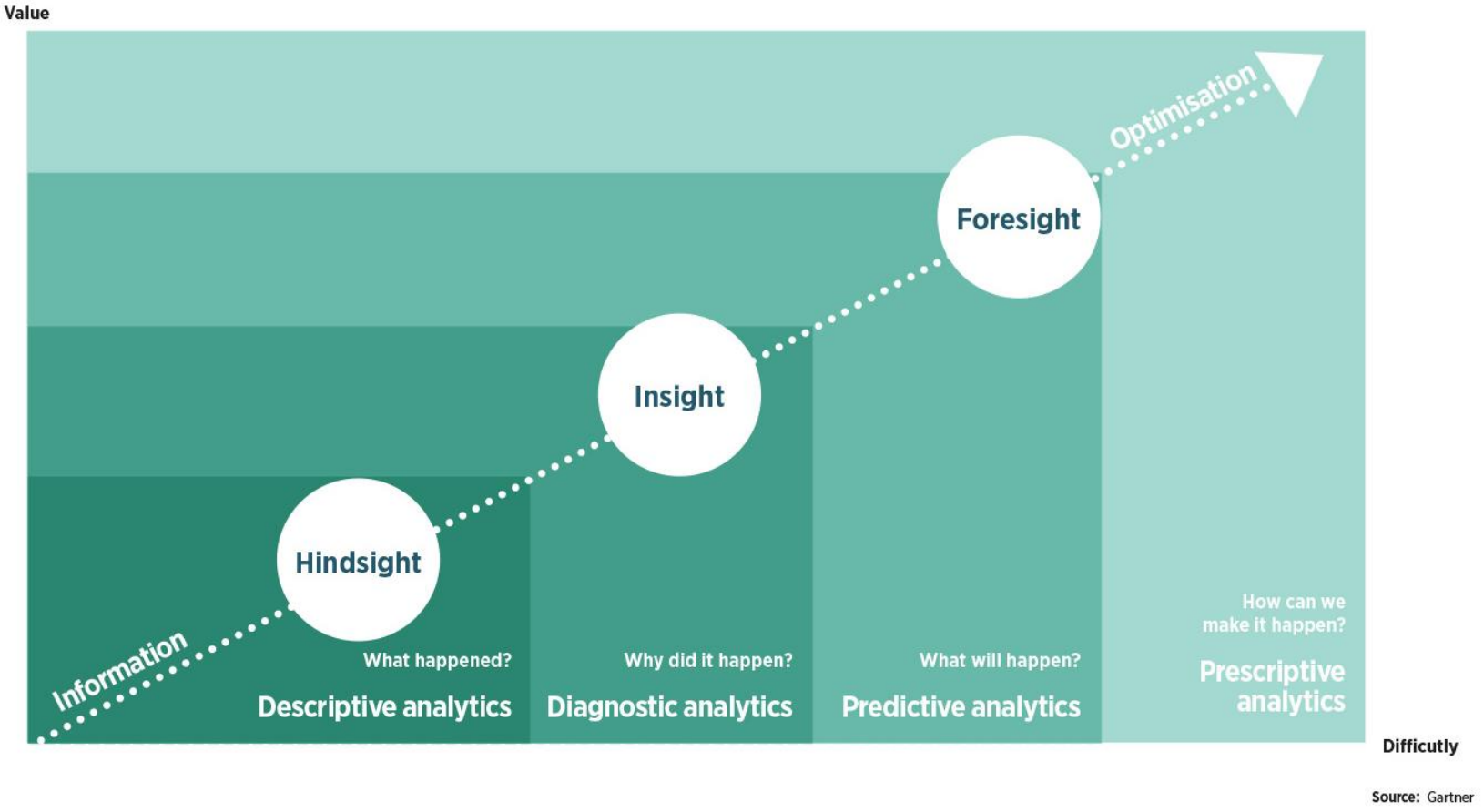
spagobi

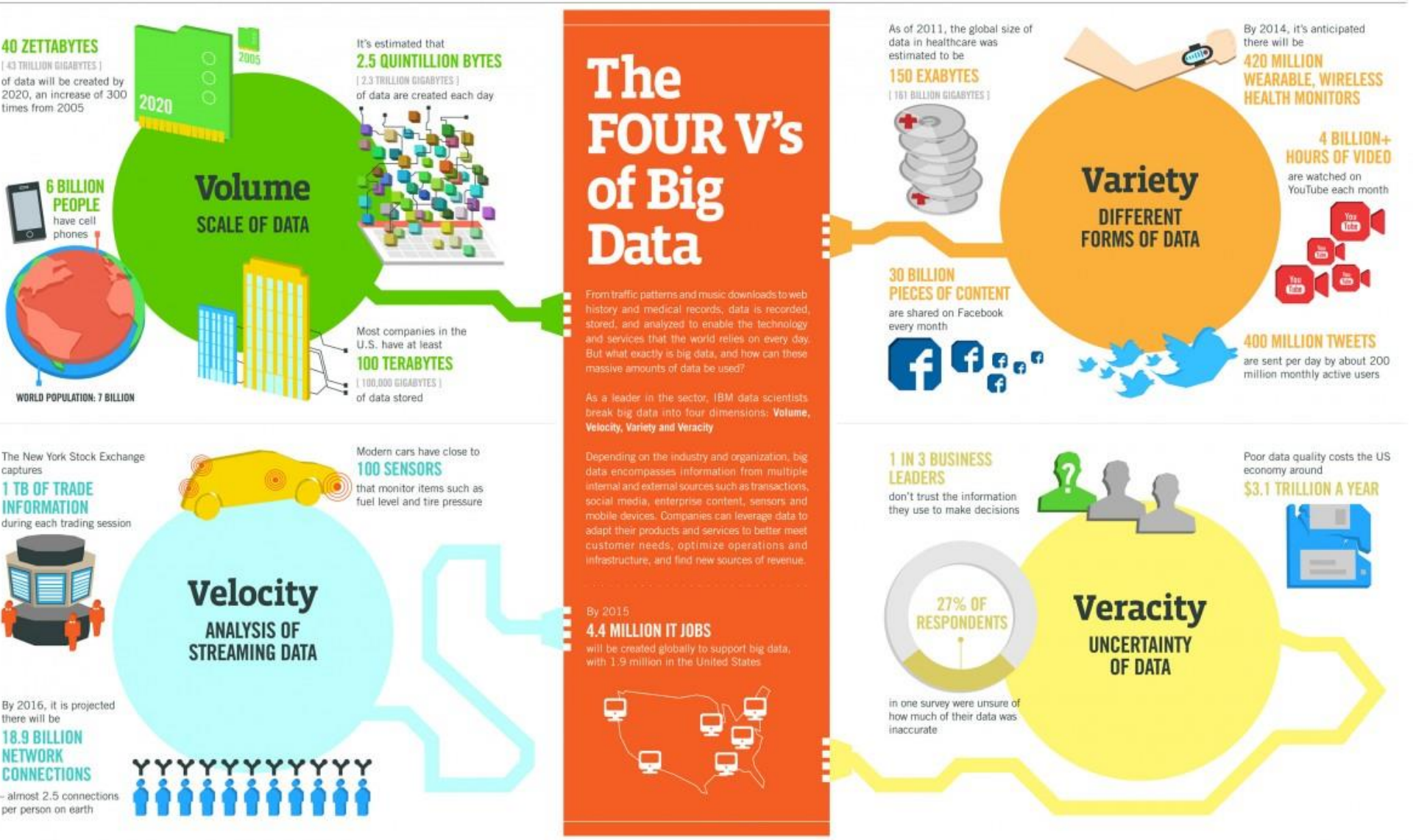
Data Warehouse



Laudon & Laudon (2012)

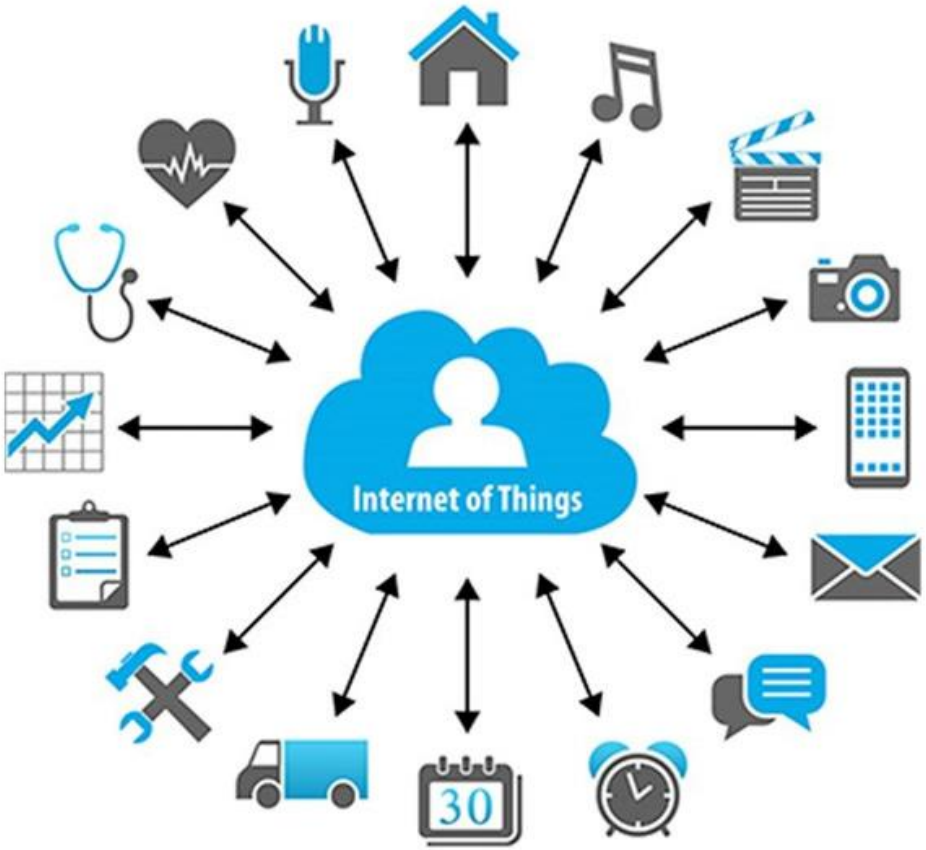
Predictive Analytics



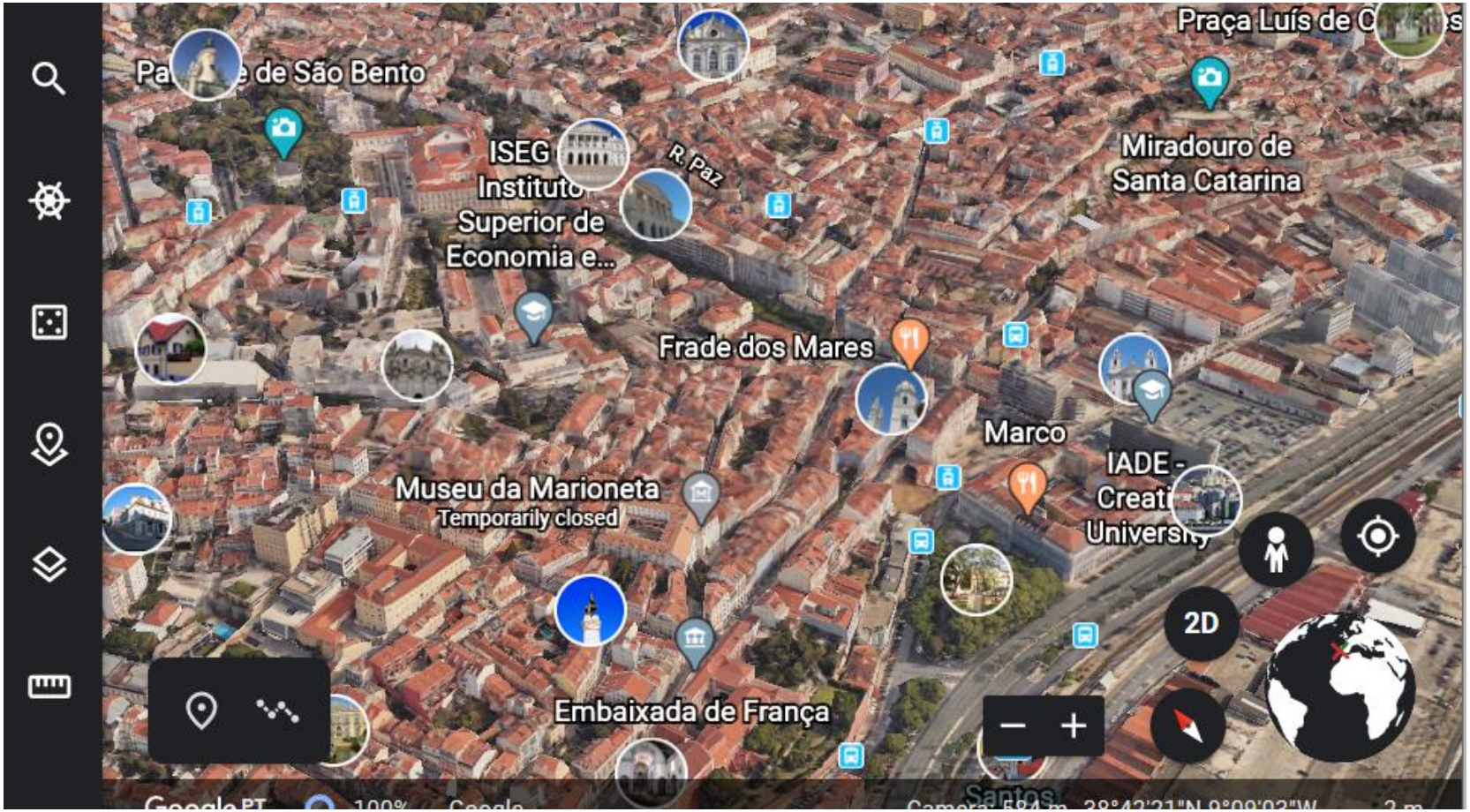


Source: https://www.ibmbigdatahub.com/infographic/four-vs-big-data

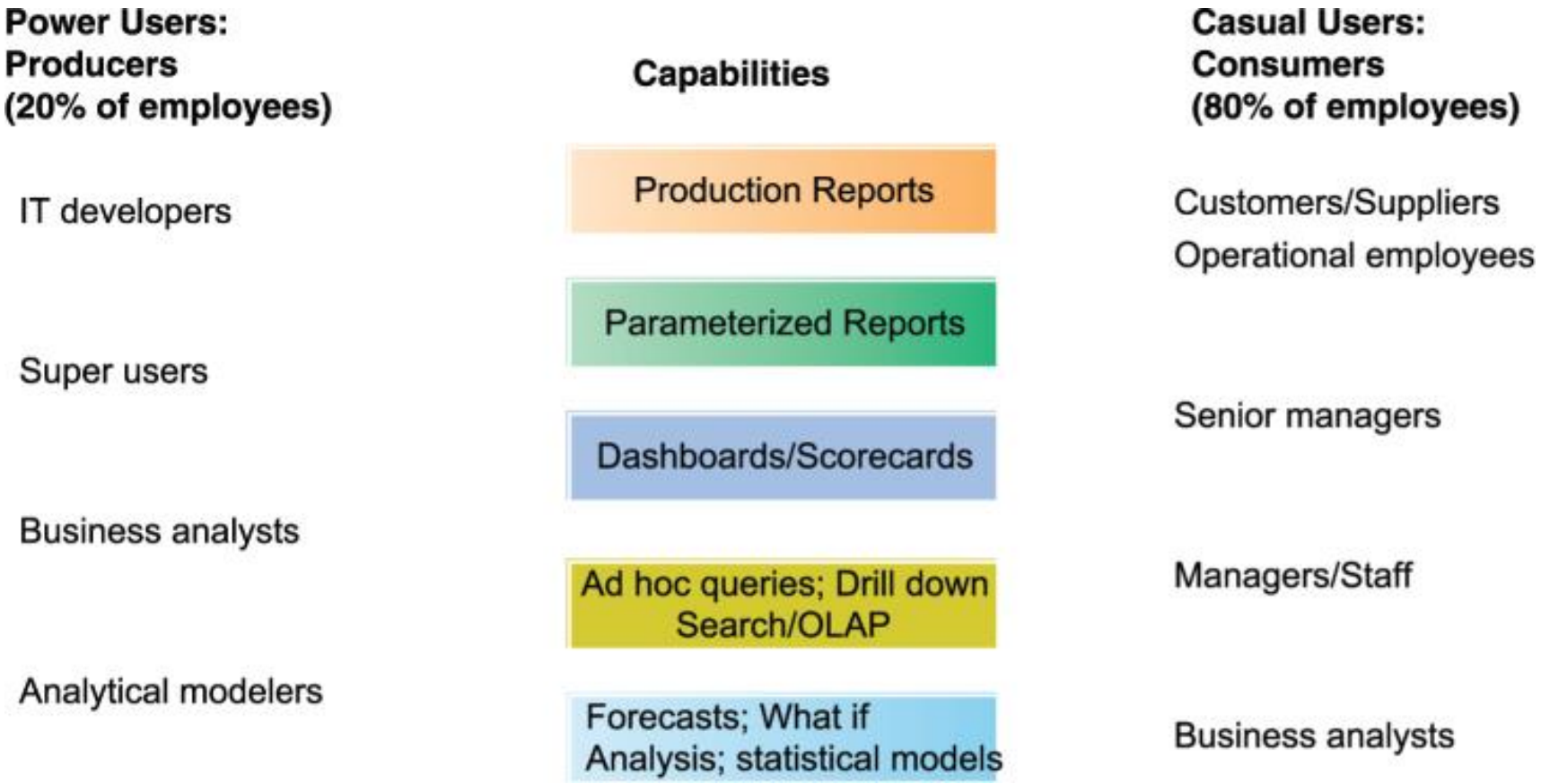
Internet of Things (IoT)



Location Analytics and Geographic Information Systems

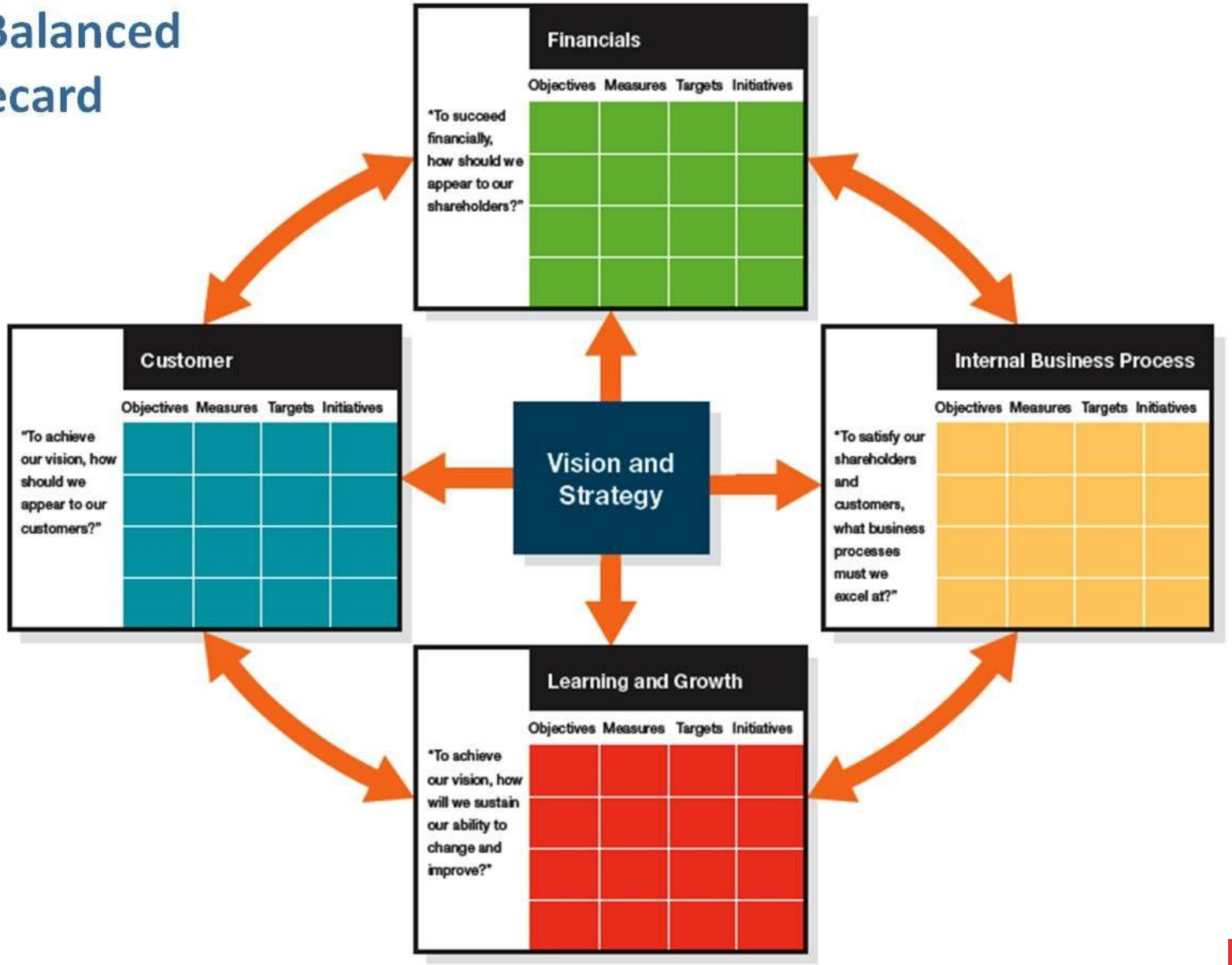


BI Users



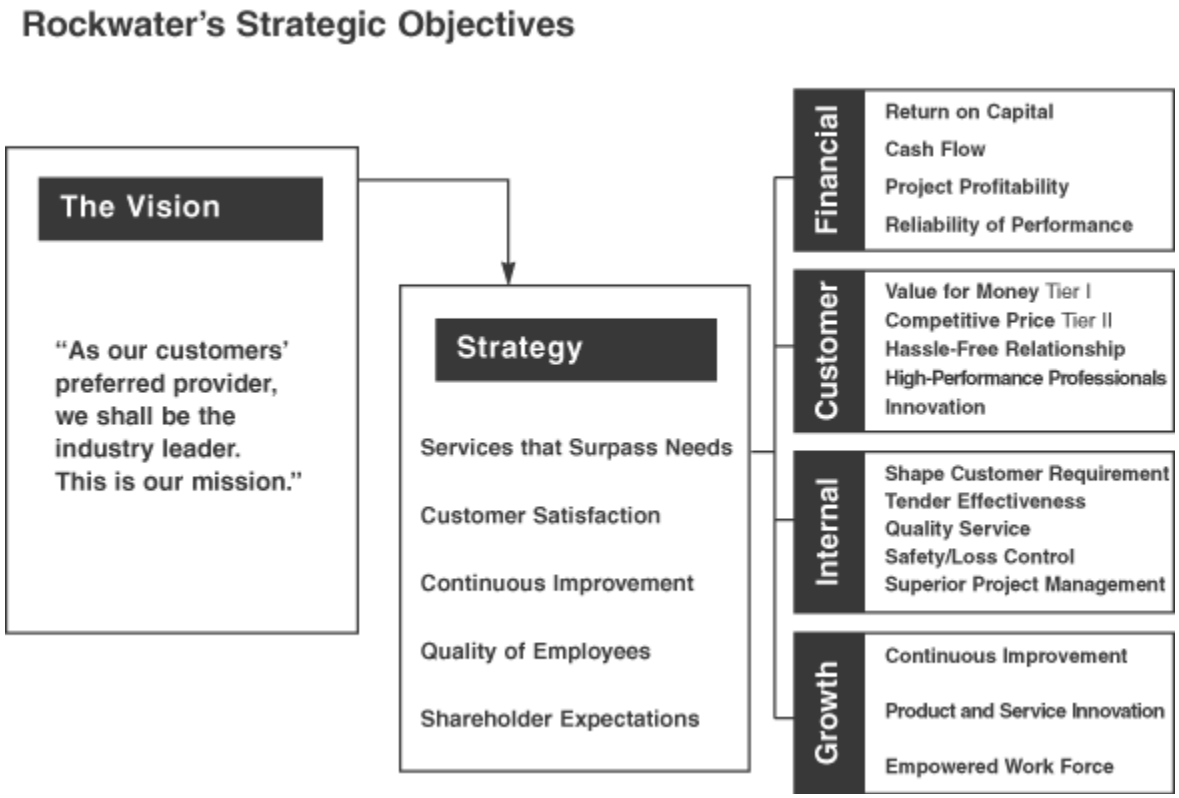
Laudon & Laudon (2012)

The Balanced Scorecard



Decision Support for Senior Management

The Balanced Scorecard Framework



Kaplan & Norton (1993)

Decision Support for Senior Management

Decision Support 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)

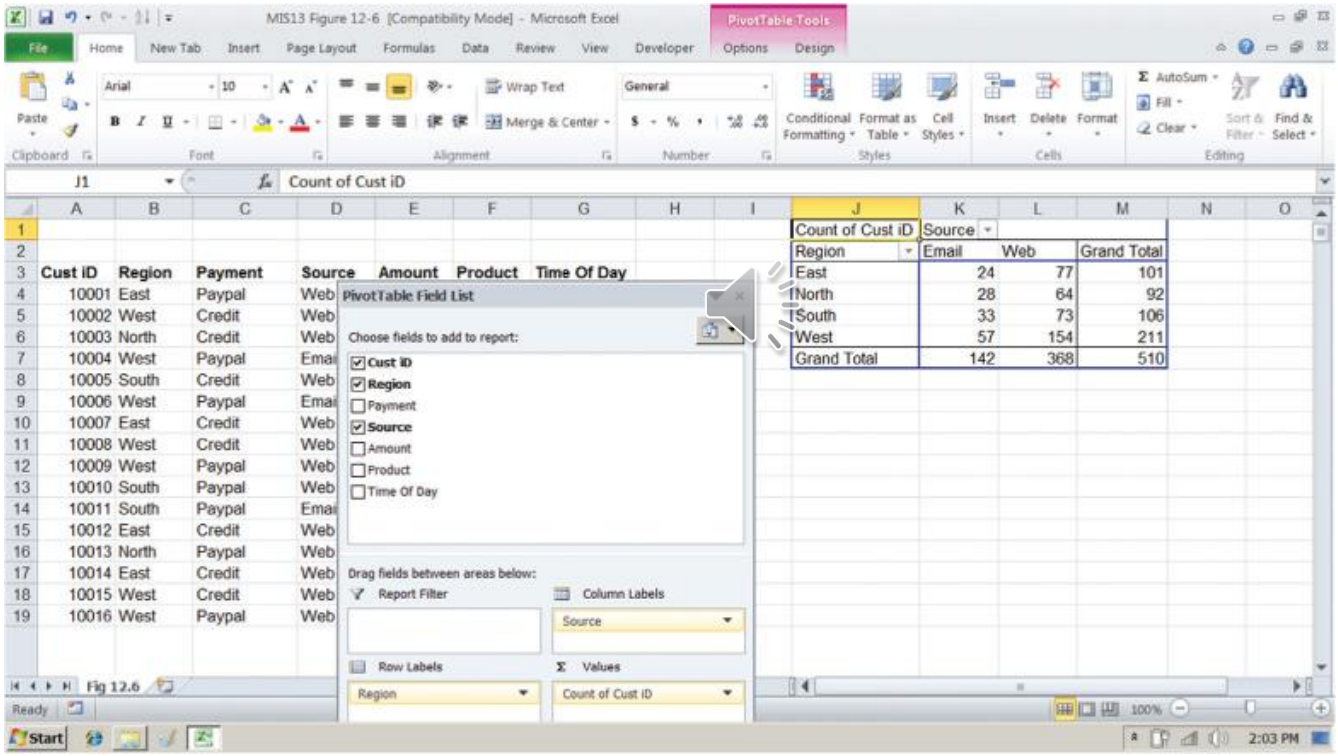
Sensitivity Analysis

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



Laudon & Laudon (2012)

Group Decision-Support Systems (GDSS)

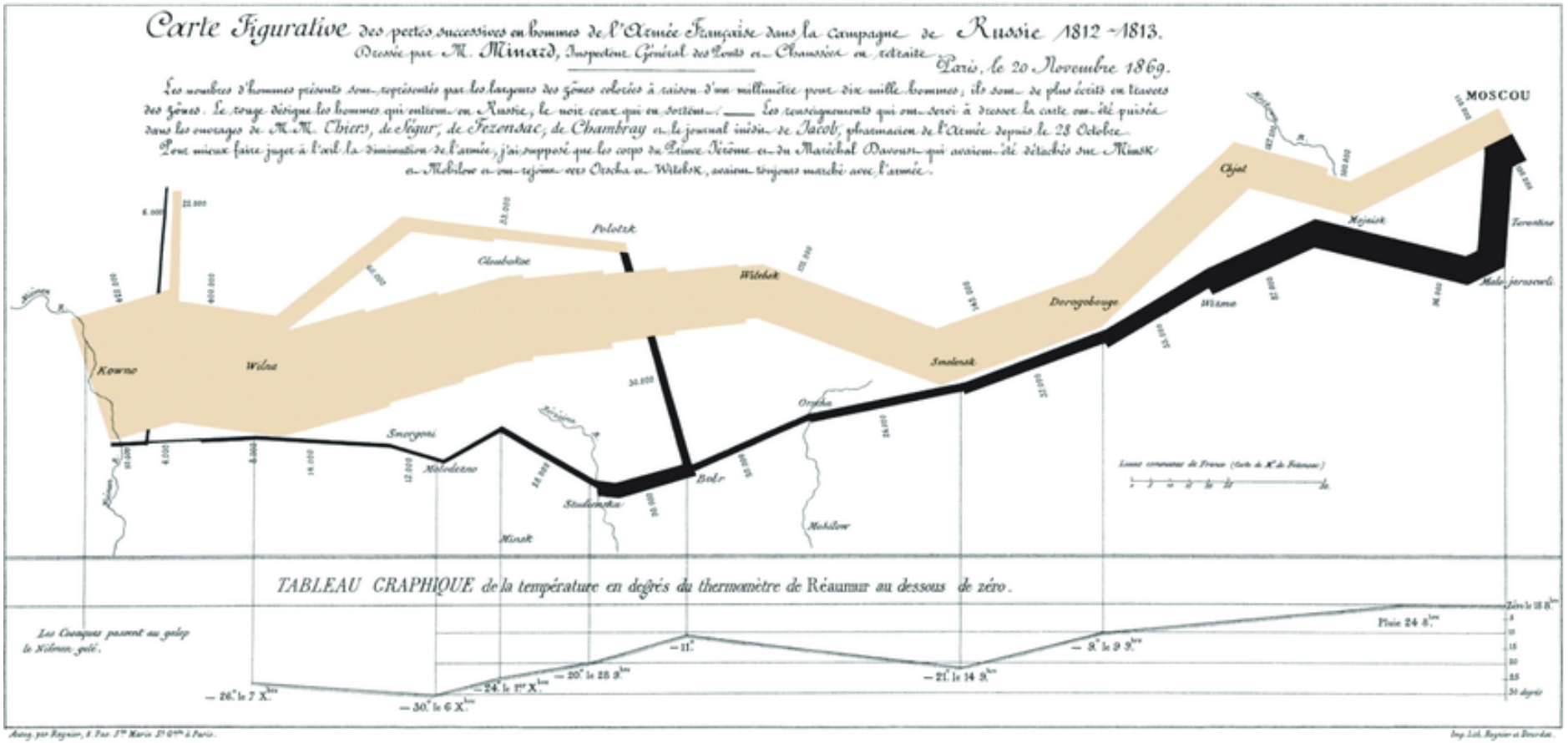
- Voting
- Brainstorming
- Other techniques

Lisbon School of Economics & Management
Universidade de Lisboa

Carlos J. Costa

DATA VISUALIZATION

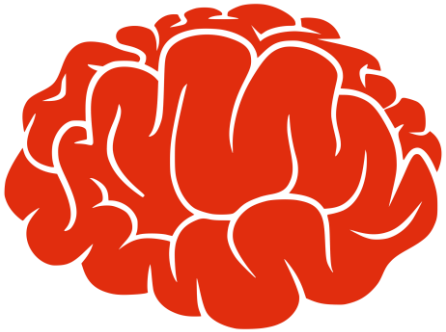
Data visualization



Problems with data visualization

Problems with data visualization

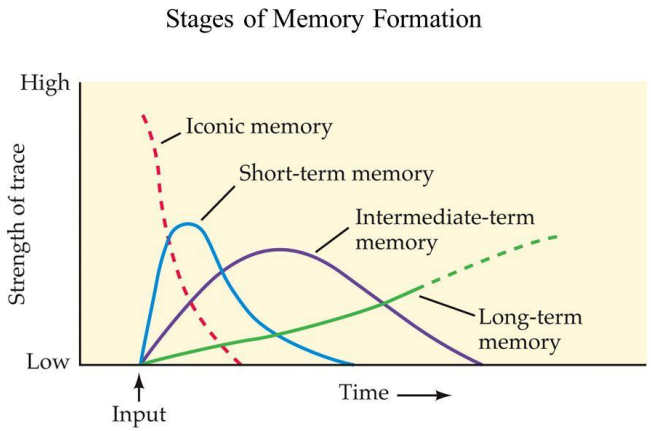
Memory



Iconic memory

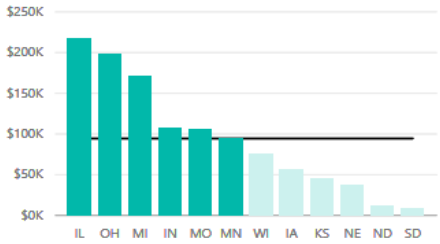
Short Term memory

Long Term memory



Gestalt's principles

Proximity and Similarity



Continuity

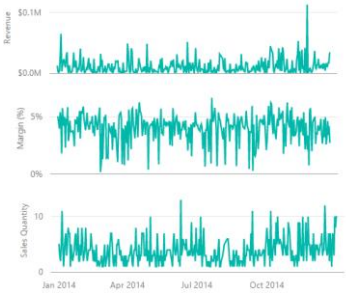
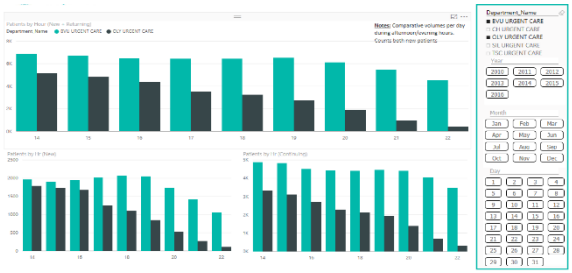
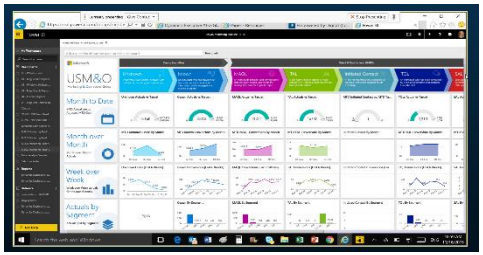


Figure-Ground

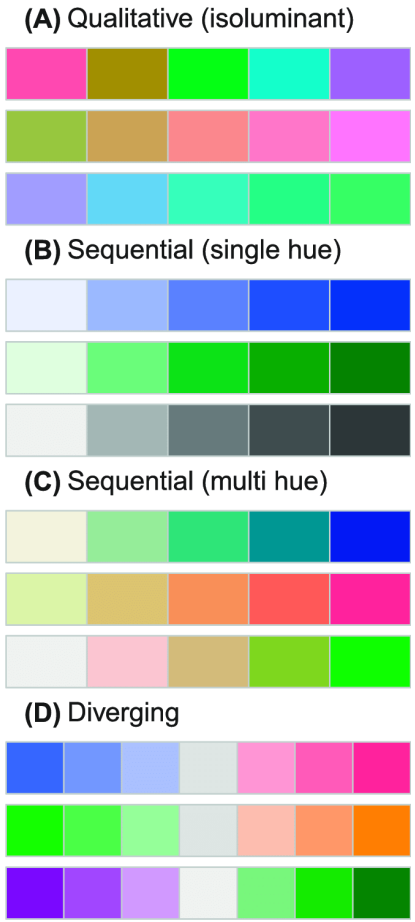
Closure and Simmetry



Simetry and continuity

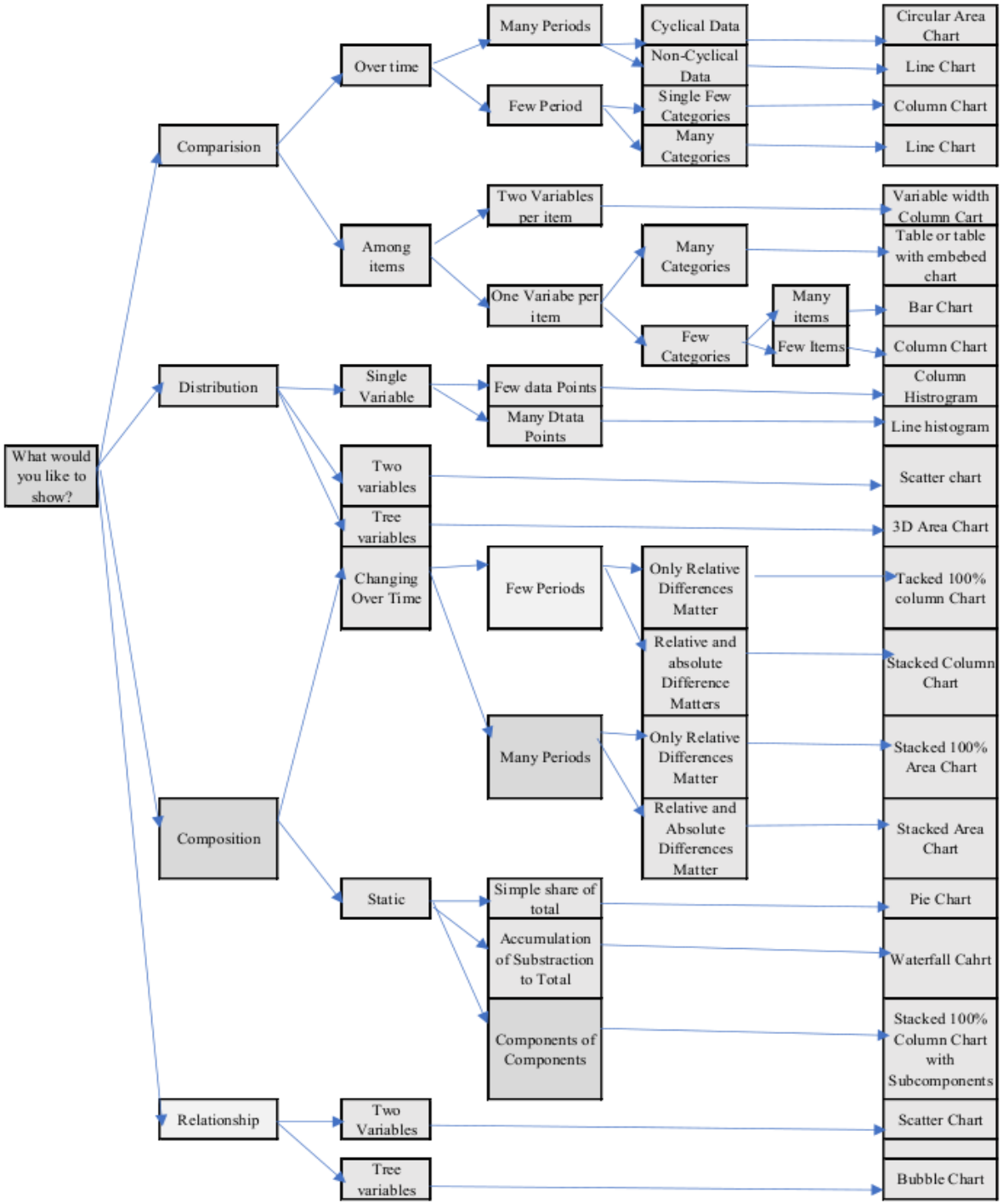


Colour


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

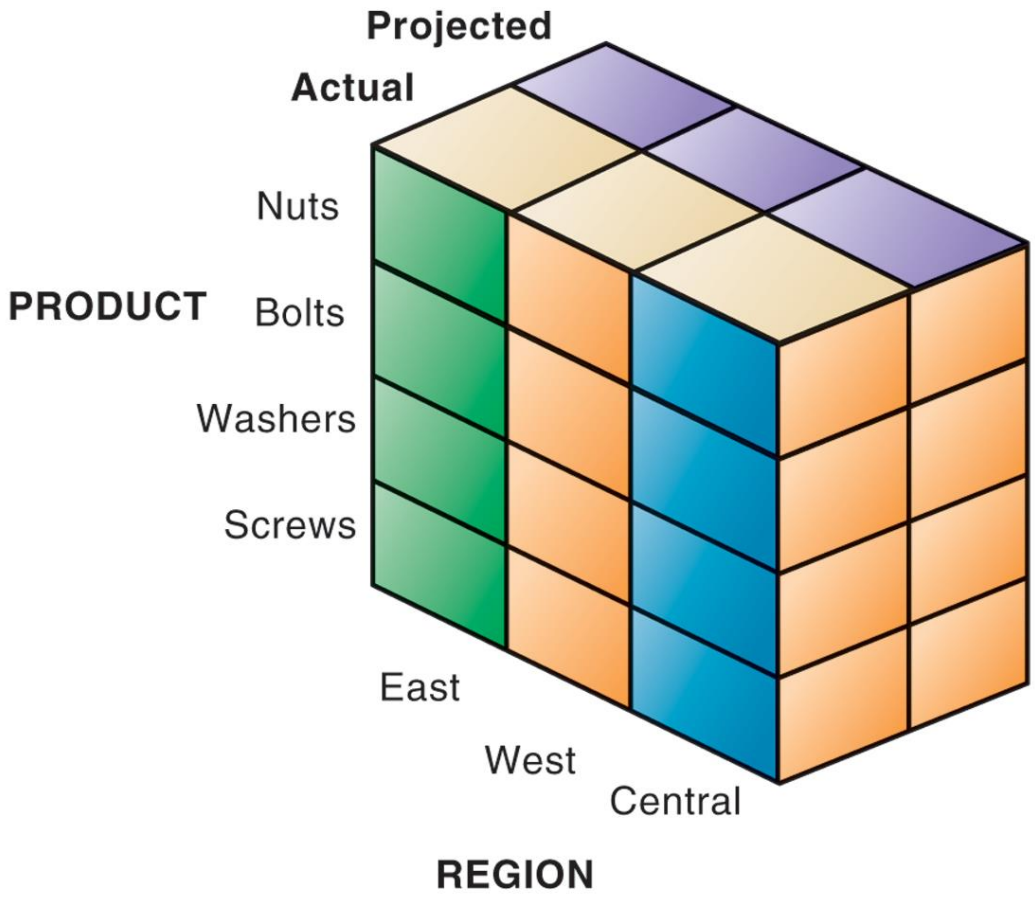
Character Fonts

Good Dashboard


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

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

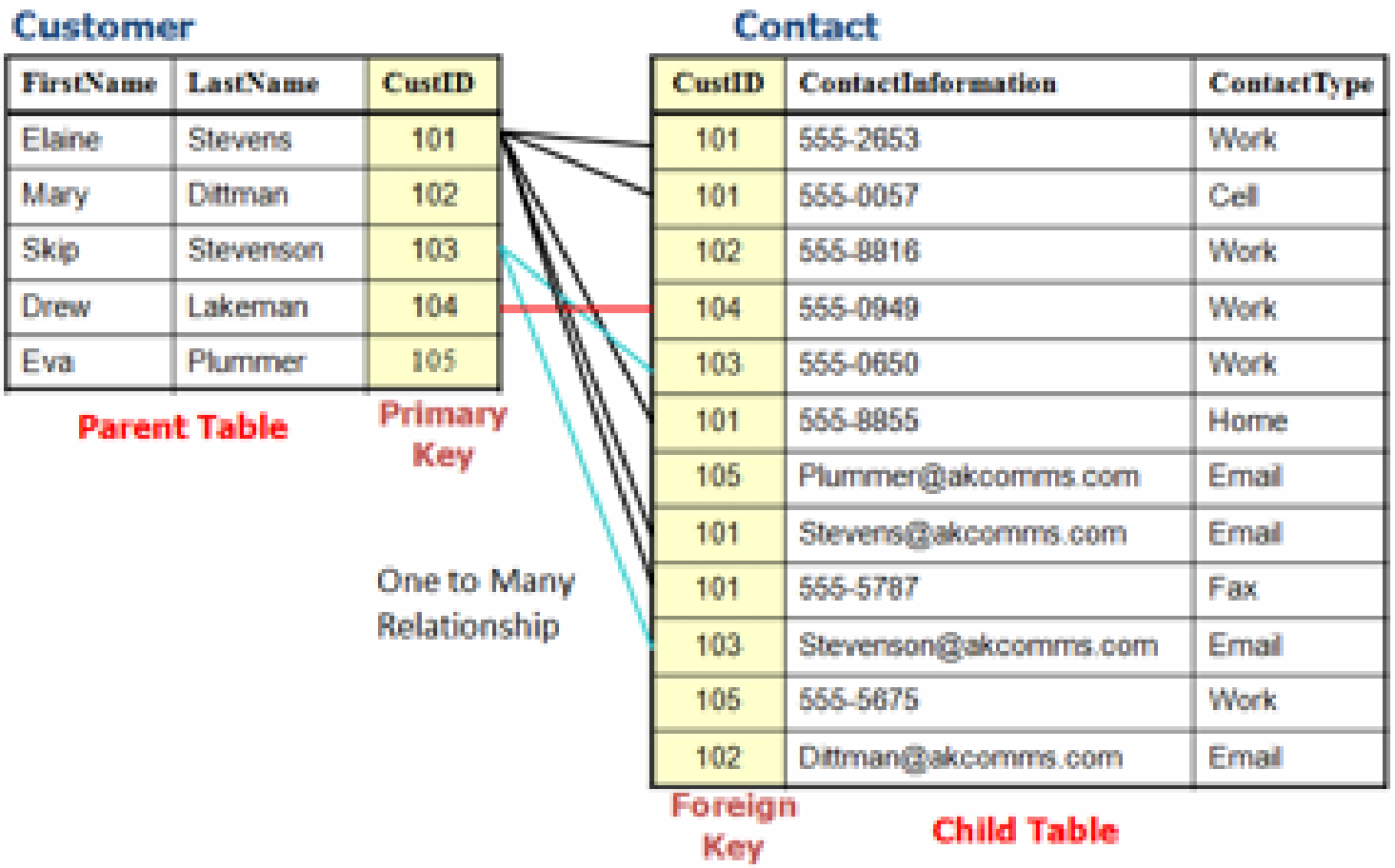
O'Brien & Marakas (2009).

Dimensional Schema

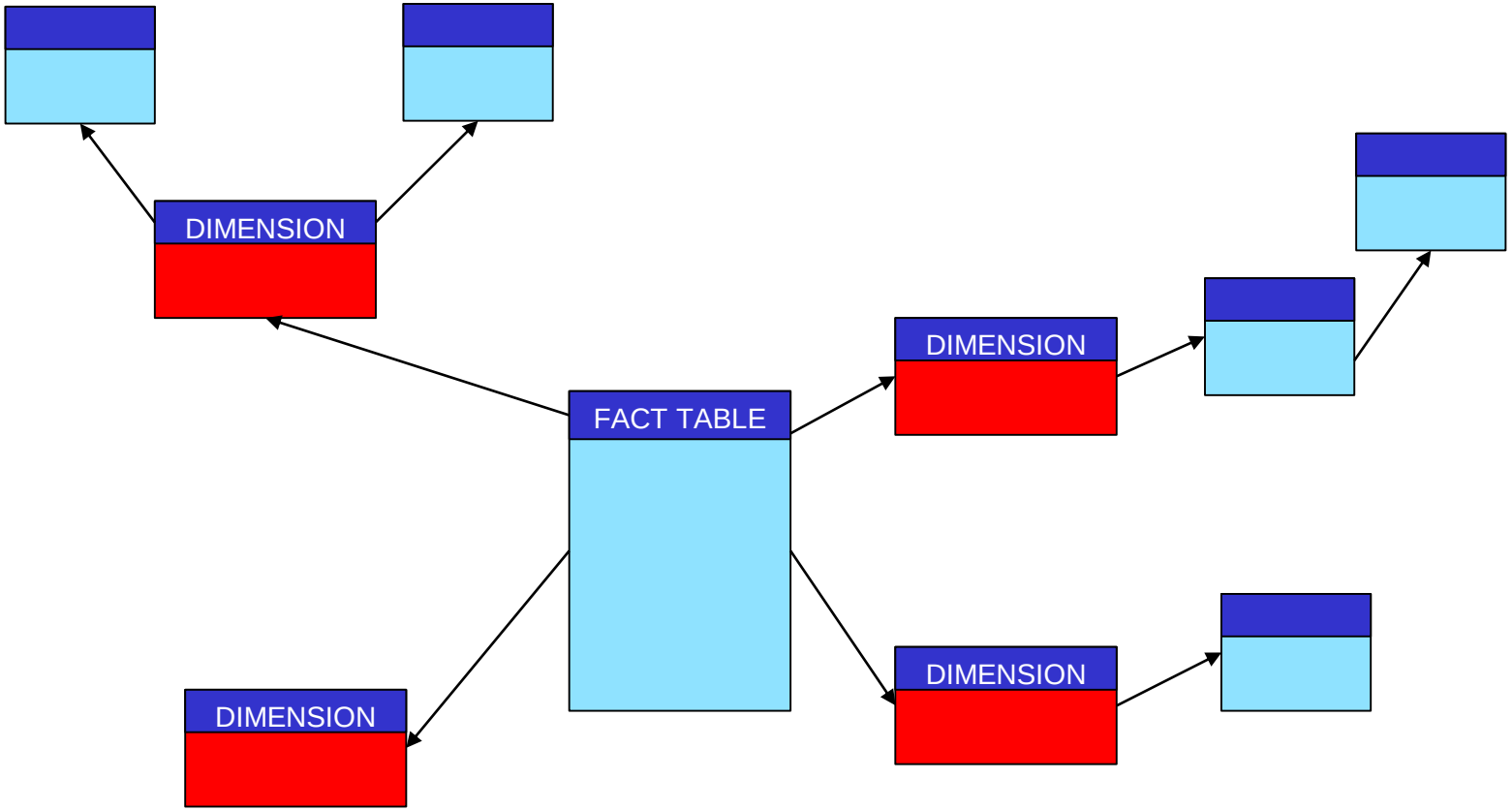
- Primary keys
- Foreign keys
- Fact tables
- Dimension Tables
- Star schemas
- Snowflake schemas

What is a Primary

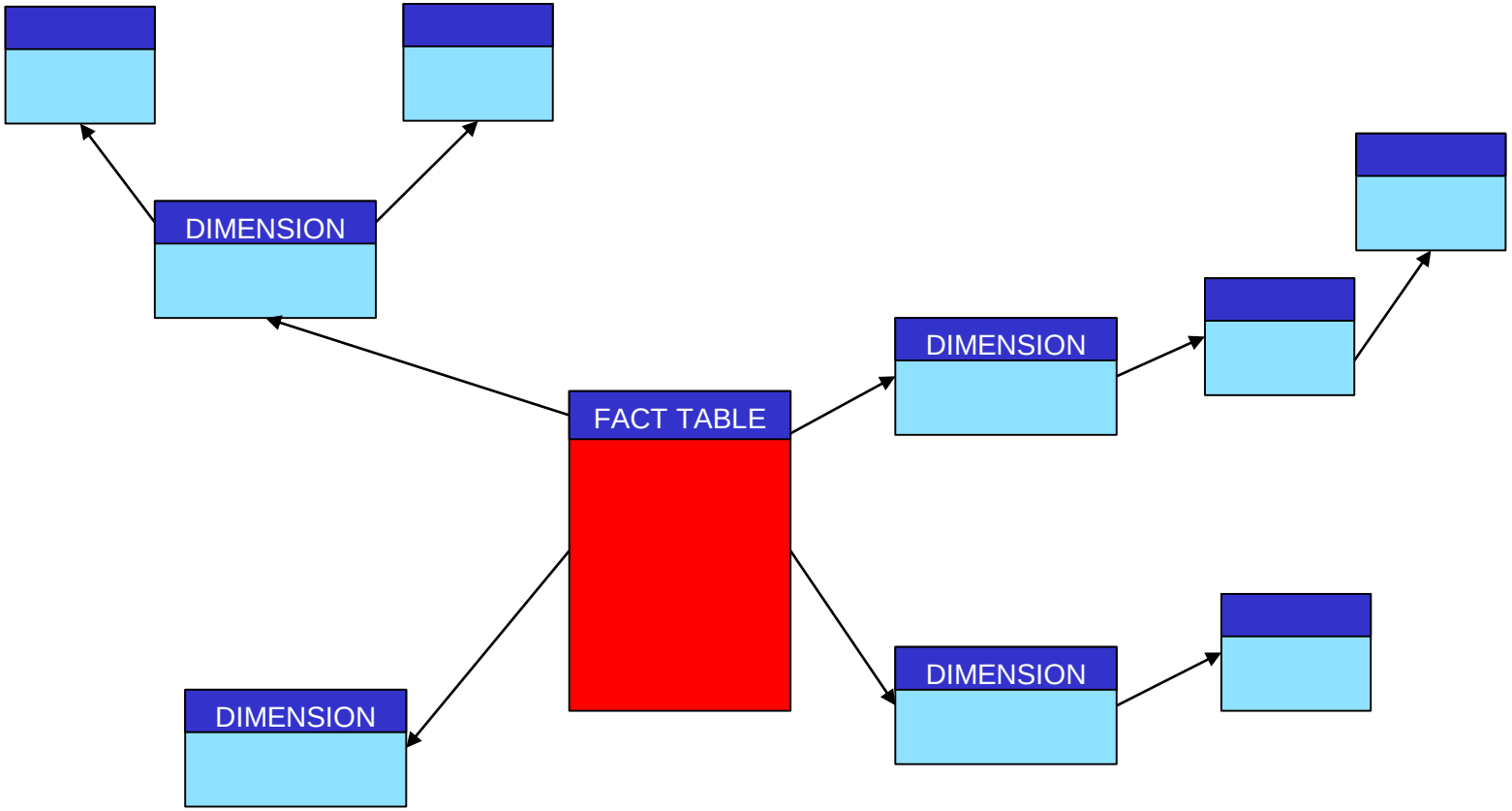
Foreign Key


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
555-0949
Work
103
555-0650
Work
101
555-8855
Home
105
Plummer@akcomms.com
Email
101
Stevens@akcomms.com
Email
101
555-5787
Fax
103
Stevenson@akcomms.com
Email
105
555-5675
Work
102
Dittman@akcomms.com
Email
Foreign Key
Child Table

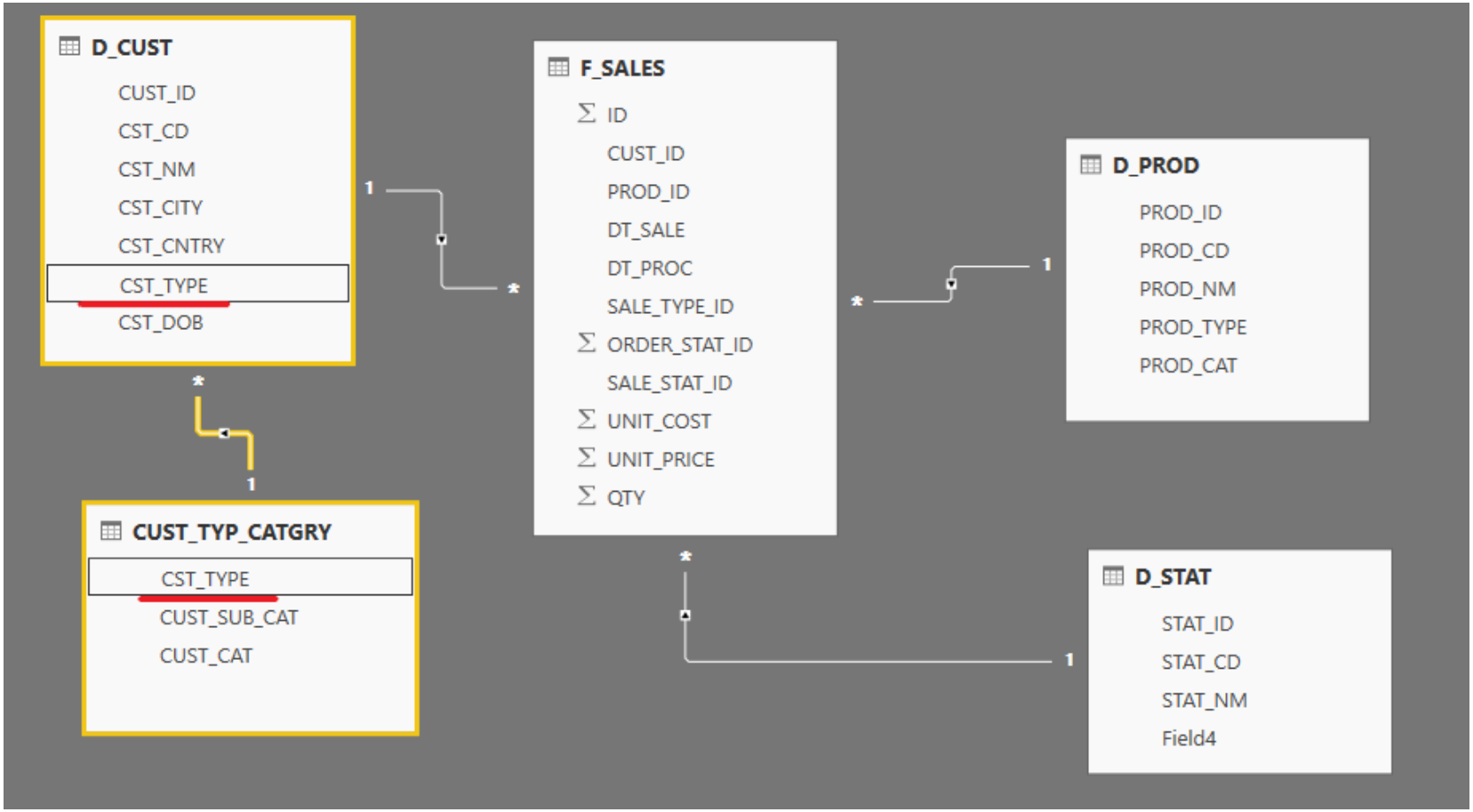
Dimension tables



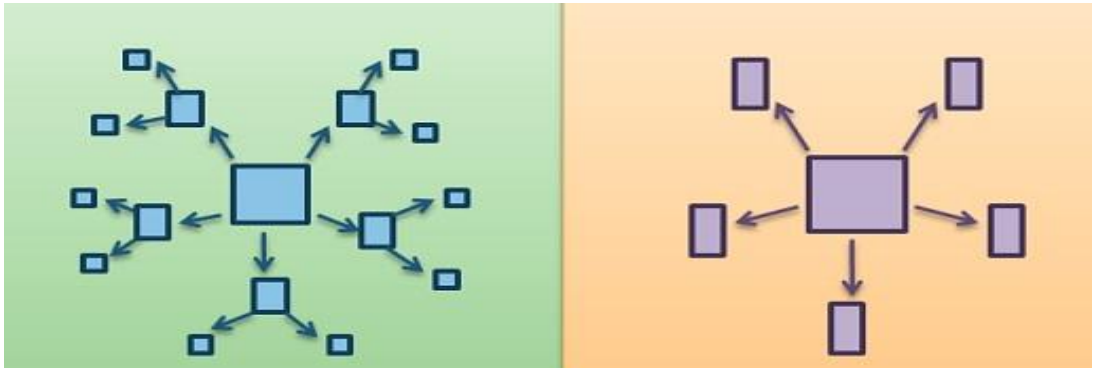
Fact Table



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